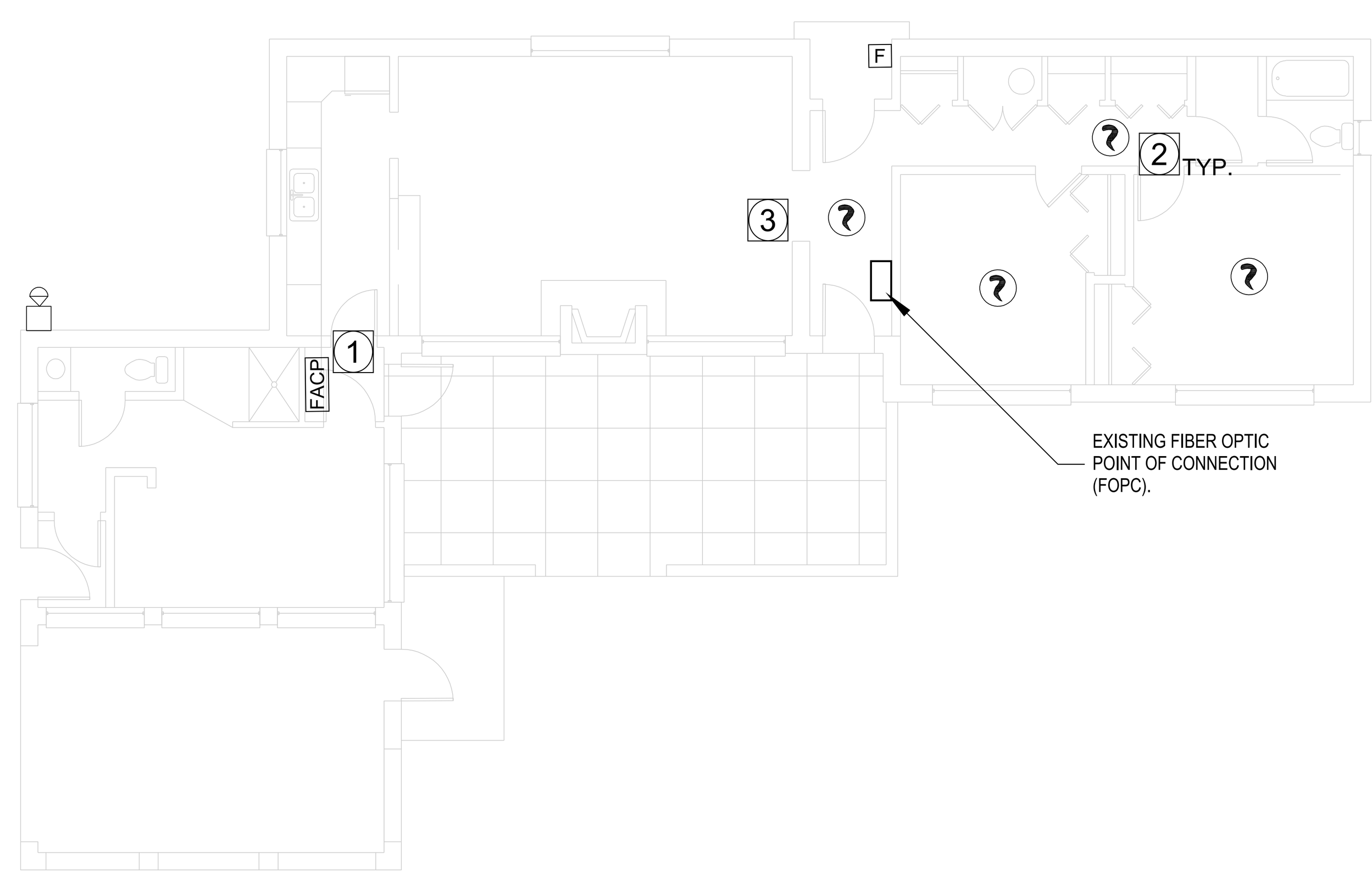
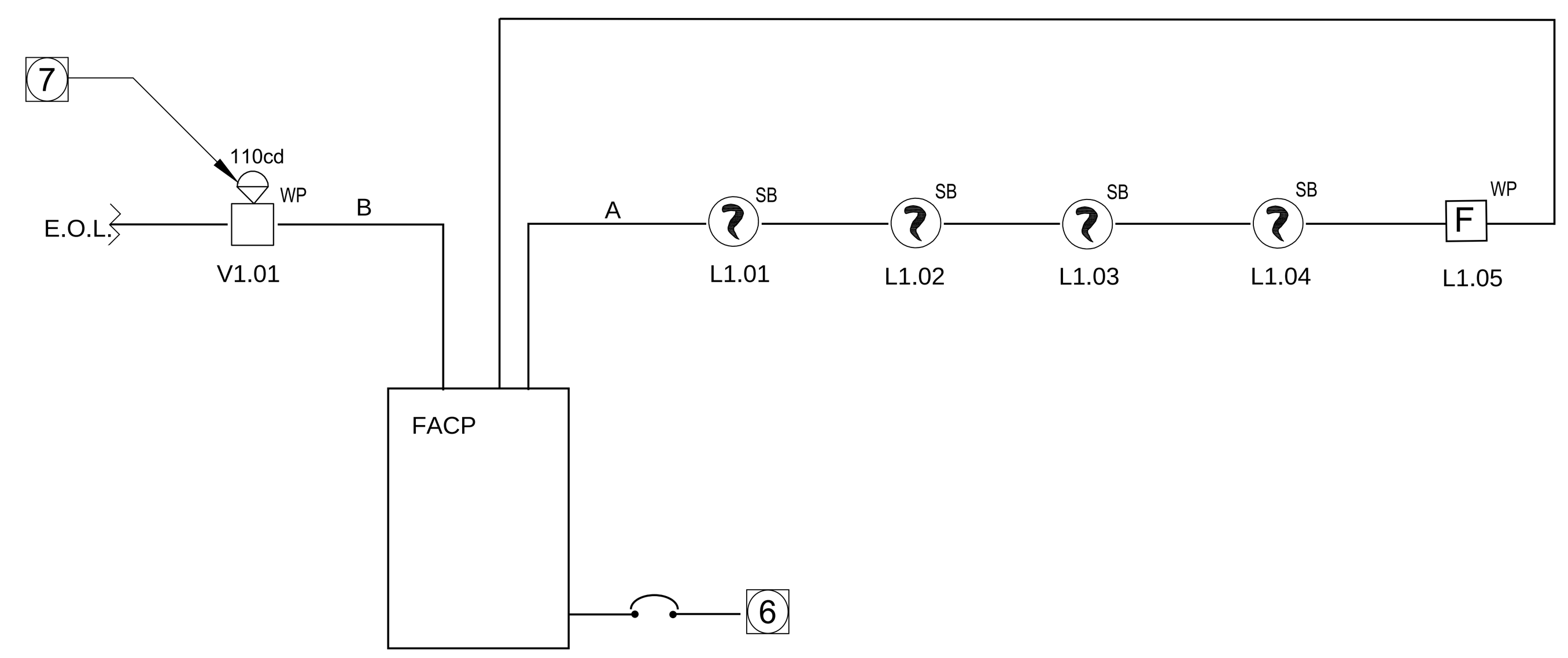


DEMOLITION PLAN



RISER DIAGRAM

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

Project Name	Kitt Peak Fire Alarm Renovation	
Date	8/18/2022	
Circuit Number	NAC CKT #1	
Area Covered	Residence 1	
Nominal System Voltage	20.4	
Minimum Device Voltage	16	
Total Circuit Current	0.162	

		Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	25	14	3.07
Wire Gauge for balance of circuit		14	3.07

Device Number	Device Current (Enter current in amps. .150 = 150 ma)	Distance from previous device	Voltage At Device	Voltage Drop from source	Percent Drop
Device 1	0.162	25	20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
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END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
Totals	0.162	25	End of Line Voltage	20.38	

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS			CIRCUIT IS WITHIN LIMITS		
Totals		Voltage	Totals		Voltage	Totals		Voltage
Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
0.162	25	**0.02**	0.162	25	**0.025**	0.162	25	**0.012**
End of Line Voltage		**20.38**	End of Line Voltage		**20.38**	End of Line Voltage		**20.39**
Percent Drop		0.12%	Percent Drop		0.12%	Percent Drop		0.06%

End of Line and Load Centering Methods use only the wire guage for the first device to source

Standard Wire Resistance in Ohms per 1000 feet.

18=7.77 16=4.89 14=3.07 12=1.98 10=1.24

18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors

Notes:
Wire resistance is doubled in the calculations for two wires (Positive and Negative)
The voltage calculated to the last device in any method must not be lower then
the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).

Device Manufacturer: System Sensor

Horn Strobes Model #	Candela	Current @Rated Voltage
PR2L - 30cd	30	0.158
PR2L - 75cd	75	0.121
PR2L - 95cd	95	0.142
PR2l - 110cd	110	0.162

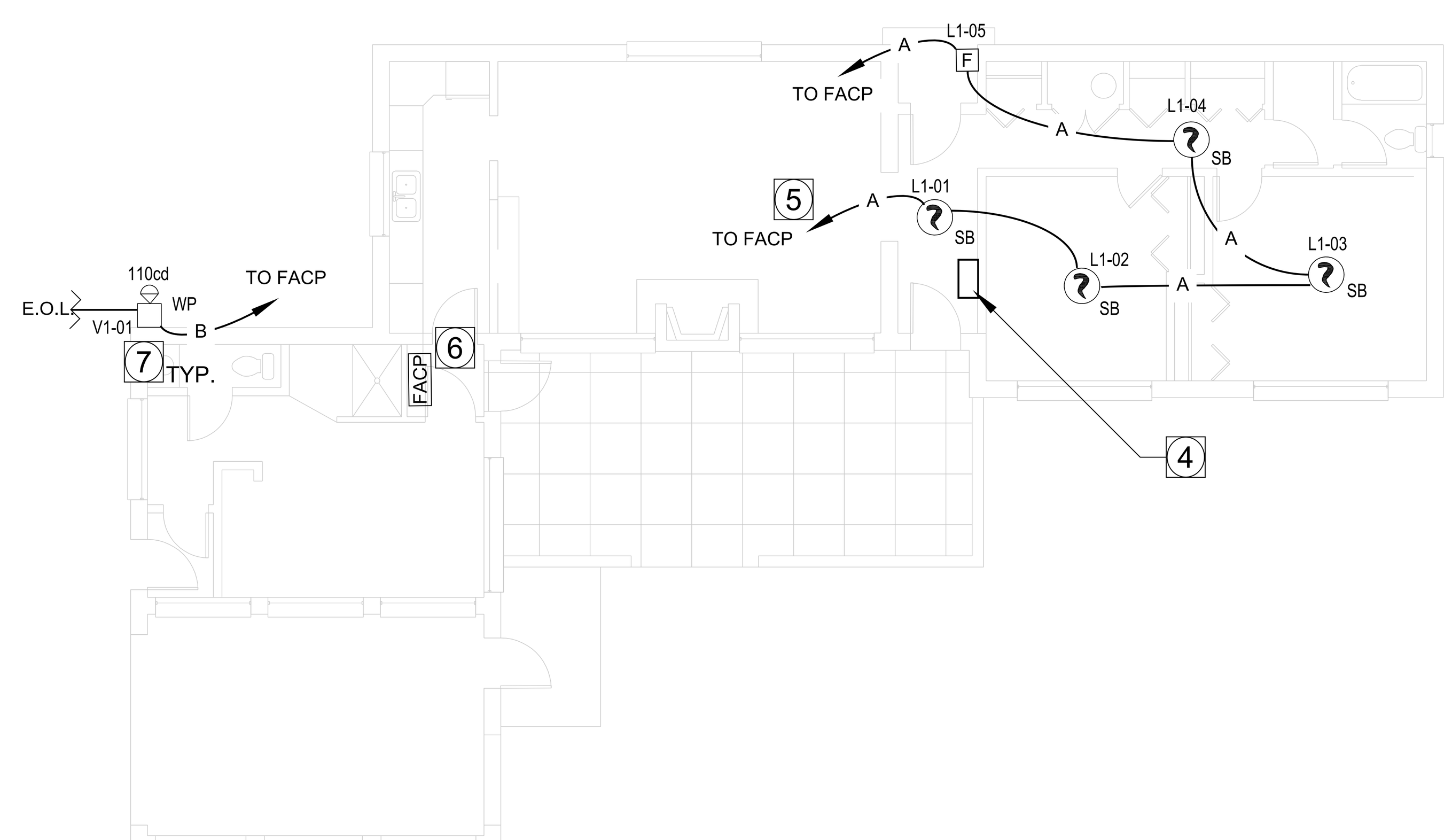
Device Manufacturer: System Sensor

Strobe Only Model #	Candela	Current @Rated Voltage
SRL - 15cd	15	0.043
SRL - 30cd	30	0.063
SRL - 75cd	75	0.107
SRL - 95cd	95	0.121

Residence 1 Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		1	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		1	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		1	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		1	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		4	0.000200	0.000800	0.000200	0.000800
B200S - LF	Sounder Base - Low Frequency		4	0.000500	0.002000	0.000500	0.002000
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		1	0.000300	0.000300	0.003000	0.003000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		1			0.162000	0.162000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.003100**	**Total Periph Alarm**	**0.167800**
				Total Standby Amps	**0.227100**	**Total Alarm Amps**	**0.523800**

Battery Set # 1		Standby Current		Alarm Current
Current Draws				
Panel Equipment		0.224		0.356
Peripherals		0.003		0.168
		0.227	**<--Grand Totals -->**	**0.524**
Additional Battery Capacity Required	**20%**	0.045		0.105
Standby Time =	**24** Hrs	6.540	Standby Ah	
Alarm Time =	**15** Mins.	0.157	Alarm Ah	
		6.698	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**	**8.102**	**Total Ah**	



NEW FIRE ALARM PLAN

FIRE ALARM WIRE AND CABLE SCHEDULE

Cable Symbol	Stranded or Solid Wire AWG	# of Conductors	Twisted?	Application	Connect AIR Wire #
A	16	2	Y	Signal Line Circuit (SLC)	W161P-2633
B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

UB=Underground direct burial rated cable.

Not all cables may apply to this project

SPECIFIC PLAN NOTES

1. CONTRACTOR SHALL DEMO EXISTING FIRE ALARM CONTROL PANEL, ALL EXISTING DEVICES AND CABLES. MAINTAIN EXISTING FIRE ALARM SYSTEM PATHWAYS AND BACKBOXES FOR REUSE.
2. CONTRACTOR SHALL USE CARE WHEN REMOVING EXISTING EQUIPMENT AND RETURN TO OWNER FOR FIRST RIGHT OF REFUSAL.
3. DISPOSE OF ALL CABLE AND DEVICES NOT RETAINED BY OWNER IN A SAFE AND APPROPRIATE MANNER.
4. FIBER OPTIC POINT OF CONNECTION (FOPC). CONTRACTOR SHALL PROVIDE AND INSTALL 2-STRAND SINGLE MODE PATCH FIBER BETWEEN FACP AND FOPC. PATCH CABLE SHALL HAVE LC CONNECTORS ON BOTH ENDS.
5. CONTRACTOR SHALL ROUTE ALL NEW CABLING THROUGH EXISTING CONDUIT AND PATHWAYS. WHERE REQUIRED CONTRACTOR SHALL PROVIDE NEW PATHWAYS FOR CONNECTION TO NEW DEVICES, IN LOCATIONS WHERE EXISTING PATHWAYS DO NOT EXIST OR IF EXISTING PATHWAYS ARE DAMAGED AND CANNOT BE REUSED.
6. CONTRACTOR SHALL CONNECT NEW FACP TO EXISTING ELECTRICAL CIRCUIT.
7. HORN STROBE dB LEVEL SHALL BE 89dB (HIGH) UNLESS OTHERWISE NOTED.

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2. NOTIFICATION APPLIANCES IN ROOMS CONTAINING (2) OR MORE AUDIBLE OR VISUAL DEVICES SHALL BE SYNCHRONIZED PER 2019 NFPA 72. THIS SHALL INCLUDE AUDIBLE AND VISUALDEVICES LOATED IN ADJOINING /ADJACENT SPACES.
3. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON THE CONSTRUCTION DOCUEMTNS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER /ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL ARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE RESPONSIBIOLITY OF THE CONTRACTOR.
4. DETECTORS SHALL NOT BE LOCATED IN DIRECT AIR-FLOW, LOCATE DEVICES NOT CLOSER THAN 3 FEET FROM ANY SUPPLY DIFFUSER.
5. AUDIBLE ALARM NOTIFICATION APPLIANCES SHALL PROVIDE A SOUND PRESSURE LEVEL OF 15dBA ABOVE THE AVERAGE AMBIENT SOUND LEVEL OR 5dBA ABOVE THE MAXIMUM SOUND LEVEL HAVING DURATION OF AT LEAST 60 SECONDS, WHICH EVER IS GREATER.
6. THE FIRE ALARM EVACUATION SIGNAL SHALL BE CLEARLY HEARD AND COMPLY WITH 2019 NFPA 72 SECTION 18.4.4.1.
7. ALL PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRE STOP SYSTEM EQUAL TO OR GREATER THAN THE FIRE RATING OF THE STRUCTURE/ SURFACE BEING PENETRATED.
8. ALL FIRE ALARM WIRING SHALL BE RUN IN EXISTING FA CONDUITS WHERE POSSIBLE. WHERE NEW CONDUIT OR PATHWAYS MUST BE RUN CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SLEEVES, LOCATIONS AND SIZES OF CONDUITS AND SHALL ENSURE COMPLIANCE WITH LOCAL CODES AND STANDARDS.
9. IF SHIELDED WIRE IS USED, THE FOLLOWING SHALL BE OBSERVED:
   A. METALLIC CONTINUITY OF THE SHIELD MUST BE MAINTAINED AND INSULATED THROUGHOUT THE ENTIRE LENGTH OF THE CABLE.
   B. THE ENTIRE LENGTH OF THE CABLE MUST HAVE A RESISTANCE GREATER THAN 1MEGAOHM TO EARTH.

RESIDENCE 1

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

1

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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
TUCSON, ARIZONA

PLANNET CONSULTING
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Issue	Date & Issue Description	By	Check
	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

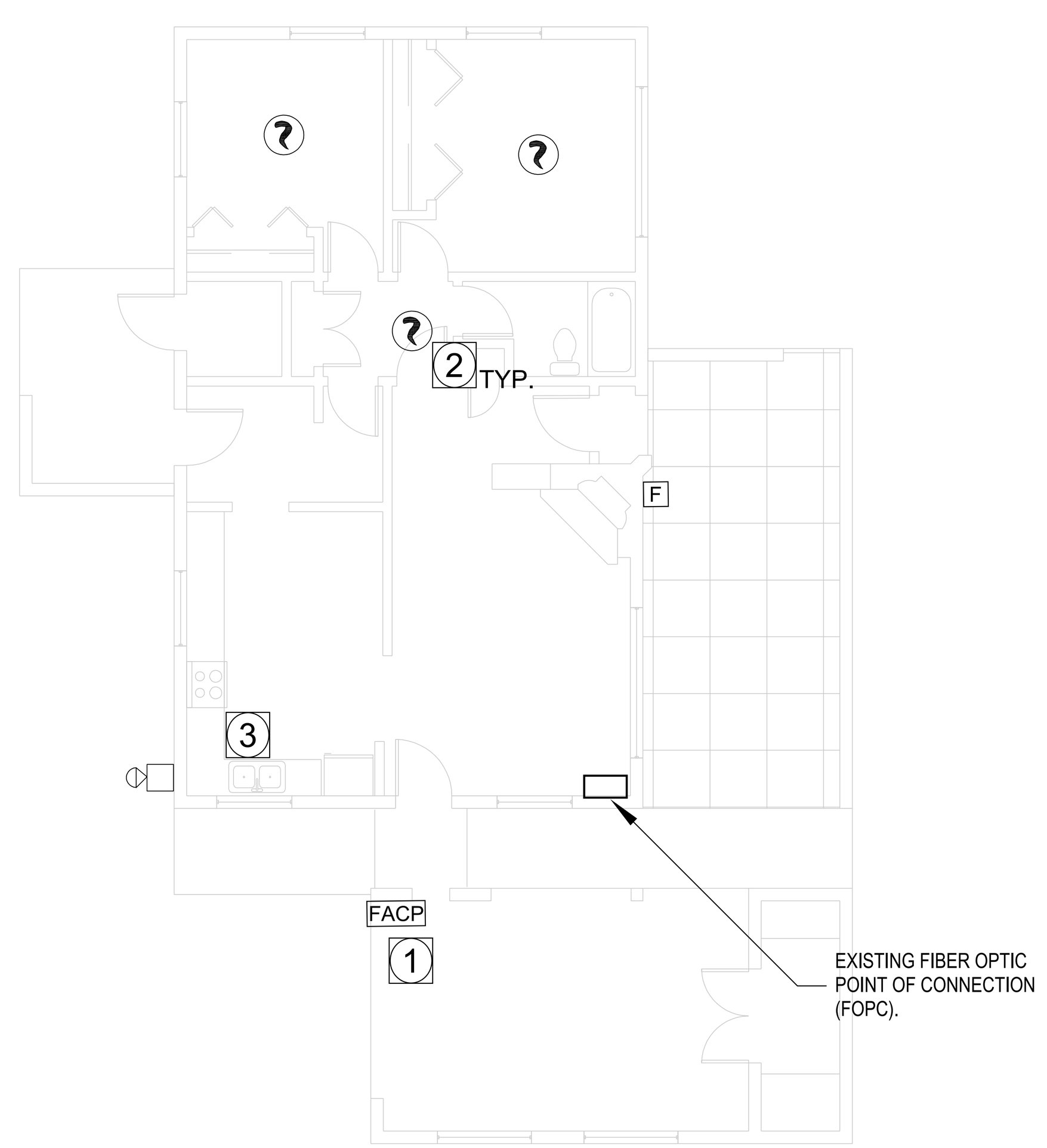
Project Number

CAD File Name

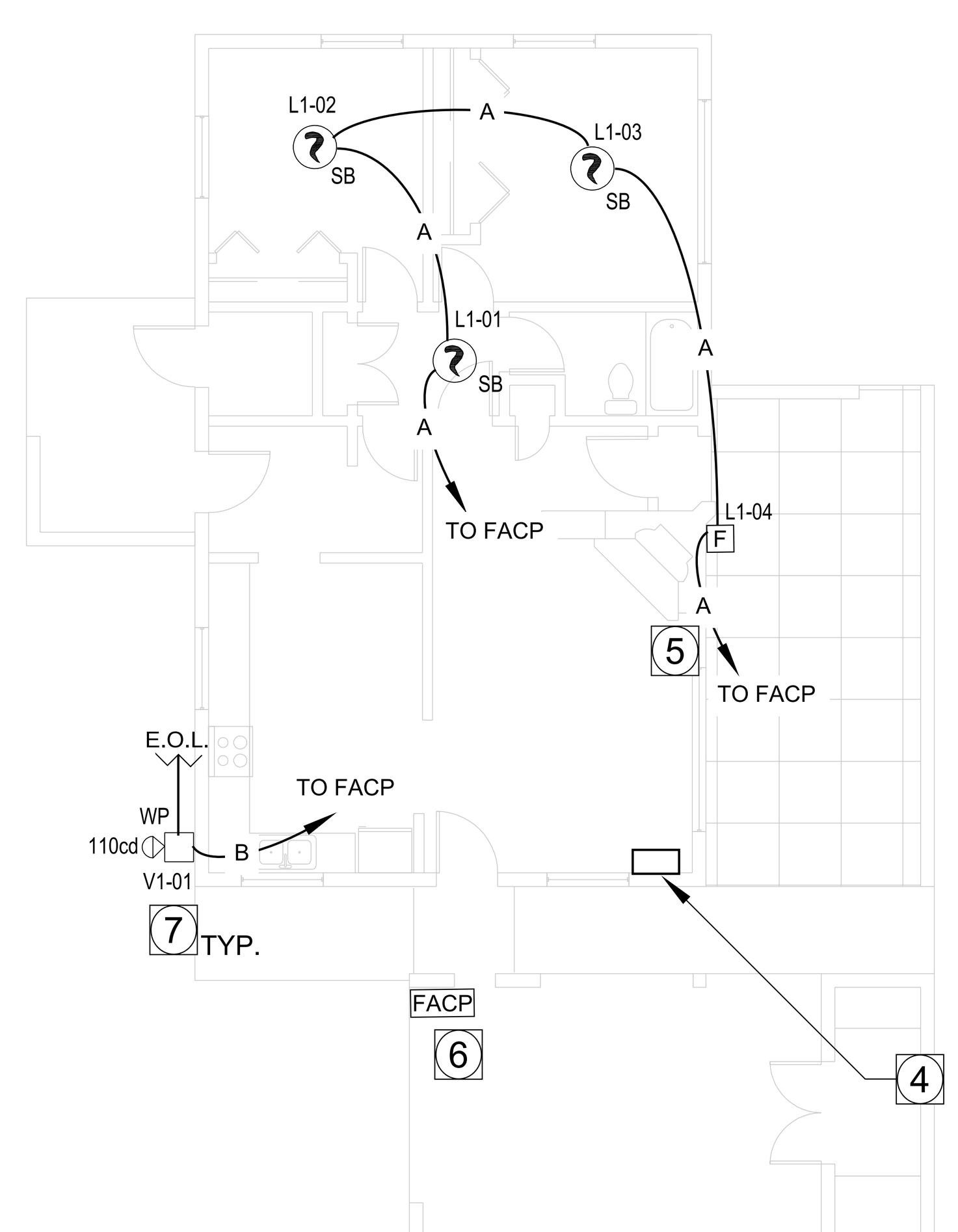
Description: LOW VOLTAGE FLOOR PLAN - RESIDENCE 1

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

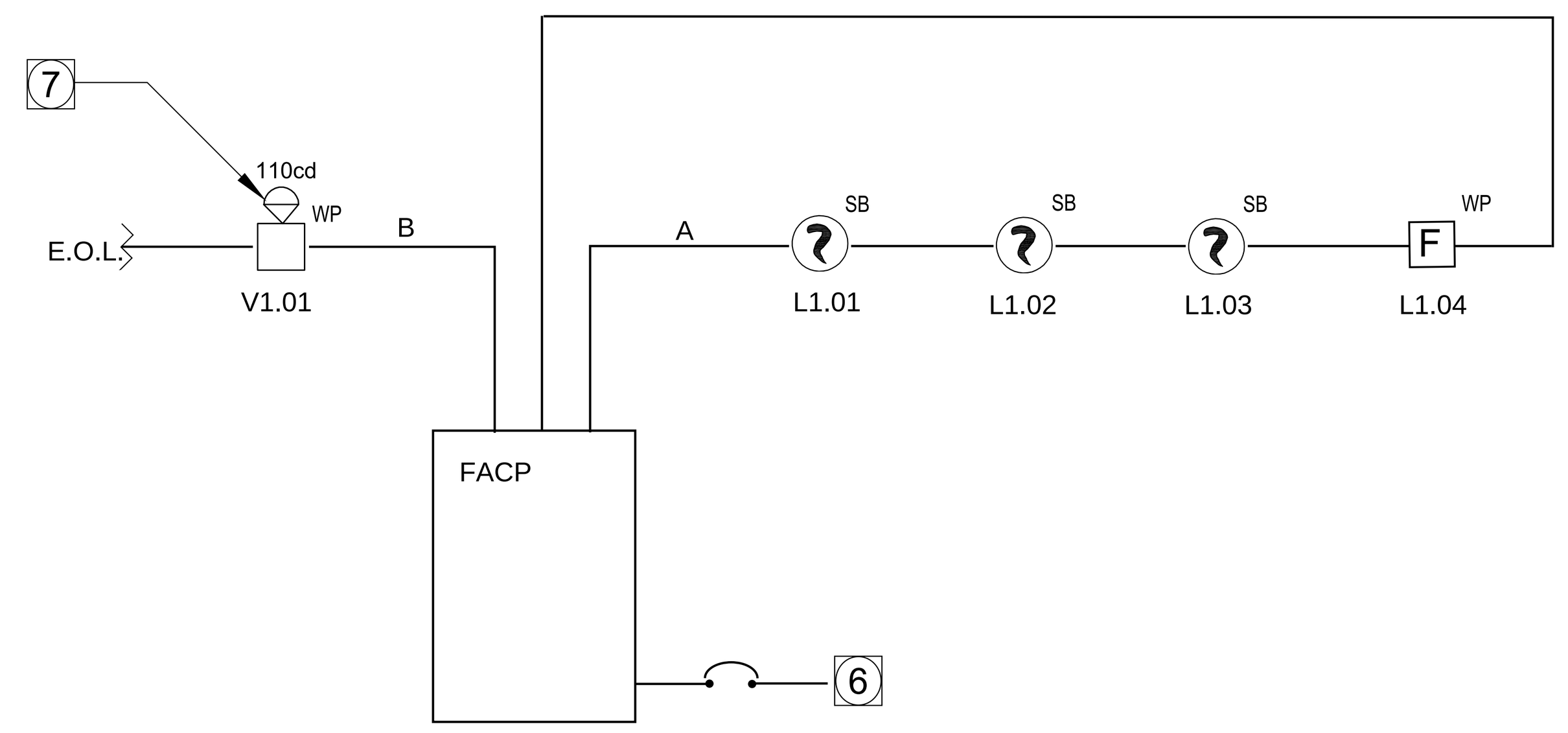
LV1.06



DEMOLITION PLAN



NEW FIRE ALARM PLAN



RISER DIAGRAM

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

Project Name	Kitt Peak Fire Alarm Renovation				
Date	8/18/2022				
Circuit Number	NAC CKT #1				
Area Covered	Residence 2				
Nominal System Voltage		20.4			
Minimum Device Voltage		16			
Total Circuit Current	0.162		Wire	Ohm's	
			Gauge	Per 1000	
Distance from source to 1st device		25	14	3.07	
Wire Gauge for balance of circuit			14	3.07	
Enter current in amps. .150 = 150 ma		Distance from previous device	Voltage		
Device Number	Device Current	Distance from previous device	At Device	Drop from source	Percent Drop
Device 1	0.162	25	20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
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END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
END			20.38	0.025	0.12%
Totals	0.162	25	End of Line Voltage		**20.38**

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Totals		Voltage	Totals		Voltage	Totals		Voltage
Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
0.162	25	**0.02**	0.162	25	**0.025**	0.162	25	**0.012**
End of Line Voltage		**20.38**	End of Line Voltage		**20.38**	End of Line Voltage		**20.39**
Percent Drop		0.12%	Percent Drop		0.12%	Percent Drop		0.06%

End of Line and Load Centering Methods use only the wire guage for the first device to source

Standard Wire Resistance in Ohms per 1000 feet.

18=7.77 16=4.89 14=3.07 12=1.98 10=1.24

18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors

Notes:
Wire resistance is doubled in the calculations for two wires (Positive and Negative)
The voltage calculated to the last device in any method must not be lower then
the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).

Device Manufacturer	System Sensor	
Horn Strobes		Current @Rated Voltage
Model #	Candela	
PR2L - 30cd	30	0.158
PR2L - 75cd	75	0.121
PR2L - 95cd	95	0.142
PR2l - 110cd	110	0.162

Device Manufacturer	System Sensor	
Strobe Only		Current @Rated Voltage
Model #	Candela	
SRL - 15cd	15	0.043
SRL - 30cd	30	0.063
SRL - 75cd	75	0.107
SRL - 95cd	95	0.121

Residence 2 Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		1	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		1	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		1	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		1	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		3	0.000200	0.000600	0.000200	0.000600
B200S - LF	Sounder Base - Low Frequency		3	0.000500	0.001500	0.000500	0.001500
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		1	0.000300	0.000300	0.003000	0.003000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		1			0.162000	0.162000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.002400**	**Total Periph Alarm**	**0.167100**
				Total Standby Amps	**0.226400**	**Total Alarm Amps**	**0.523100**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.002		0.167
			0.226	**<--Grand Totals -->**	**0.523**
Additional Battery Capacity Required	**20%**		0.045		0.105
Standby Time =	**24**	Hrs	6.520	Standby Ah	
Alarm Time =	**15**	Mins.	0.157	Alarm Ah	
			6.677	Estimated Total Ah	
Battery Supplied	12V10A 10AH		**8.078**	**Total Ah**	

FIRE ALARM WIRE AND CABLE SCHEDULE

Cable Symbol	Stranded or Solid Wire AWG	# of Conductors	Twisted?	Application	Connect AIR Wire #
A	16	2	Y	Signal Line Circuit (SLC)	W161P-2633
B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

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Not all cables may apply to this project

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5. CONTRACTOR SHALL ROUTE ALL NEW CABLING THROUGH EXISTING CONDUIT AND PATHWAYS. WHERE REQUIRED CONTRACTOR SHALL PROVIDE NEW PATHWAYS FOR CONNECTION TO NEW DEVICES, IN LOCATIONS WHERE EXISTING PATHWAYS DO NOT EXIST OR IF EXISTING PATHWAYS ARE DAMAGED AND CANNOT BE REUSED.
6. CONTRACTOR SHALL CONNECT NEW FACP TO EXISTING ELECTRICAL CIRCUIT.
7. HORN STROBE dB LEVEL SHALL BE 89dB (HIGH) UNLESS OTHERWISE NOTED.

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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
TUCSON, ARIZONA

PLANNET CONSULTING
180 N. Riverview Dr. Suite 240 Anaheim, CA 92808
Phone: 714.982.5800 Fax: 714.982.5801
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Issue	Date & Issue Description	By	Check
	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

Project Number

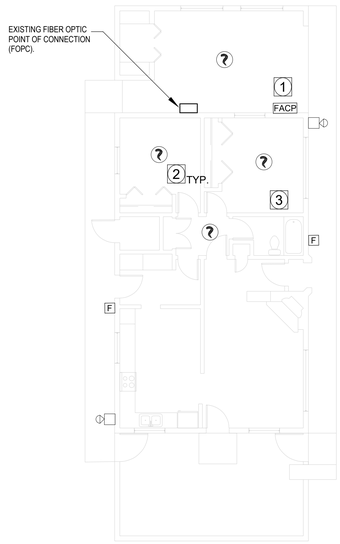
CAD File Name

Description: LOW VOLTAGE FLOOR PLAN - RESIDENCE 2

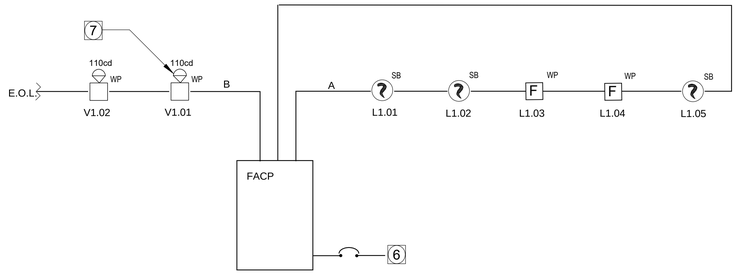
Scale: 1/8"=1'-0"

LV1.07

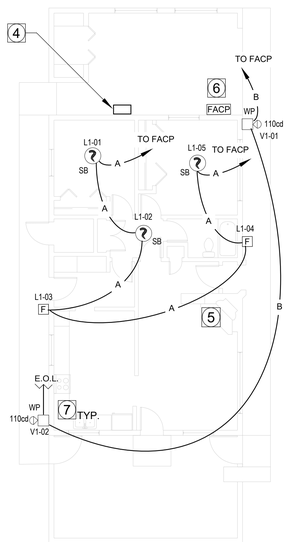
RESIDENCE 2 — SCALE: 1/8"=1'-0" — 1



DEMOLITION PLAN



RISER DIAGRAM



NEW FIRE ALARM PLAN

FIRE ALARM WIRE AND CABLE SCHEDULE

Cable Symbol	Stranded or Solid Wire AWG	# of Conductors	Twisted?	Application	Connect AIR Wire #
A	16	2	Y	Signal Line Circuit (SLC)	W161P-2633
B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

UB=Underground direct burial rated cable.

Not all cables may apply to this project

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).
Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

					Point to Point Method			**End of Line Method**			**Load Centering Method**		
Project Name	Kitt Peak Fire Alarm Renovation				**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Date	8/18/2022												
Circuit Number	NAC CKT #1				Totals		Voltage	Totals		Voltage	Totals		Voltage
Area Covered	Residence 3				Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
Nominal System Voltage		20.4			0.324	80	**0.09**	0.324	80	**0.159**	0.324	80	**0.080**
Minimum Device Voltage		16			End of Line Voltage		**20.31**	End of Line Voltage		**20.24**	End of Line Voltage		**20.32**
Total Circuit Current	0.324		Wire	Ohm's			Percent Drop	0.45%		Percent Drop	0.78%		Percent Drop	0.39%
			Gauge	Per 1000	End of Line and Load Centering Methods use only the wire guage for the first device to source								
Distance from source to 1st device	12	14	3.07		Standard Wire Resistance in Ohms per 1000 feet.								
Wire Gauge for balance of circuit		14	3.07				18=7.77	16=4.89	14=3.07	12=1.98	10=1.24		

Enter current in amps. 150 = 150 ma		Distance from	Voltage			18-14 Awg = Solid Conductors			12-10 Awg = Stranded Conductors				
Device Number	Device Current	previous device	At Device	Drop from source	Percent Drop	Notes:							
Device 1	0.162	12	20.38	0.024	0.12%	Wire resistance is doubled in the calculations for two wires (Positive and Negative)							
Device 2	0.162	68	20.31	0.092	0.45%	The voltage calculated to the last device in any method must not be lower then							
END			20.31	0.092	0.45%	the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).							
END			20.31	0.092	0.45%	Device Manufacturer	System Sensor			Device Manufacturer	System Sensor		
END			20.31	0.092	0.45%				Current				Current
END			20.31	0.092	0.45%	Horn Strobes			@Rated	Strobe Only			@Rated
END			20.31	0.092	0.45%	Model #	Candela		Voltage	Model #	Candela		Voltage
END			20.31	0.092	0.45%	PR2L - 30cd	30		0.158	SRL - 15cd	15		0.043
END			20.31	0.092	0.45%	PR2L - 75cd	75		0.121	SRL - 30cd	30		0.063
END			20.31	0.092	0.45%	PR2L - 95cd	95		0.142	SRL - 75cd	75		0.107
END			20.31	0.092	0.45%	PR2I - 110cd	110		0.162	SRL - 95cd	95		0.121
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
END			20.31	0.092	0.45%								
Totals	0.324	80	End of Line Voltage		**20.31**								

Residence 3 Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		1	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		1	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		1	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		1	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		3	0.000200	0.000600	0.000200	0.000600
B200S - LF	Sounder Base - Low Frequency		3	0.000500	0.001500	0.000500	0.001500
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		2	0.000300	0.000600	0.003000	0.006000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		2			0.162000	0.324000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.002700**	**Total Periph Alarm**	**0.332100**
				Total Standby Amps	**0.226700**	**Total Alarm Amps**	**0.688100**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.003		0.332
			0.227	**<--Grand Totals -->**	**0.688**
Additional Battery Capacity Required	**20%**		0.045		0.138
Standby Time =	**24**	Hrs	6.529	Standby Ah	
Alarm Time =	**15**	Mins.	0.206	Alarm Ah	
			6.735	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**		**8.215**	**Total Ah**	

SPECIFIC PLAN NOTES

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2. CONTRACTOR SHALL USE CARE WHEN REMOVING EXISTING EQUIPMENT AND RETURN TO OWNER FOR FIRST RIGHT OF REFUSAL.
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5. CONTRACTOR SHALL ROUTE ALL NEW CABLING THROUGH EXISTING CONDUIT AND PATHWAYS. WHERE REQUIRED CONTRACTOR SHALL PROVIDE NEW PATHWAYS FOR CONNECTION TO NEW DEVICES, IN LOCATIONS WHERE EXISTING PATHWAYS DO NOT EXIST OR IF EXISTING PATHWAYS ARE DAMAGED AND CANNOT BE REUSED.
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7. HORN STROBE dB LEVEL SHALL BE 89dB (HIGH) UNLESS OTHERWISE NOTED.

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3. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON THE CONSTRUCTION DOCUEMTNS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER /ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL ARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
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6. THE FIRE ALARM EVACUATION SIGNAL SHALL BE CLEARLY HEARD AND COMPLY WITH 2019 NFPA 72 SECTION 18.4.4.1.
7. ALL PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRE STOP SYSTEM EQUAL TO OR GREATER THAN THE FIRE RATING OF THE STRUCTURE/ SURFACE BEING PENETRATED.
8. ALL FIRE ALARM WIRING SHALL BE RUN IN EXISTING FA CONDUITS WHERE POSSIBLE. WHERE NEW CONDUIT OR PATHWAYS MUST BE RUN CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SLEEVES, LOCATIONS AND SIZES OF CONDUITS AND SHALL ENSURE COMPLIANCE WITH LOCAL CODES AND STANDARDS.
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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
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Issue	Date & Issue Description	By	Check
	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

Project Number

CAD File Name

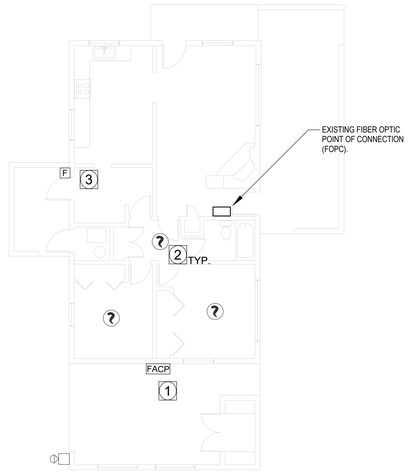
Description: LOW VOLTAGE FLOOR PLAN - RESIDENCE 3

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

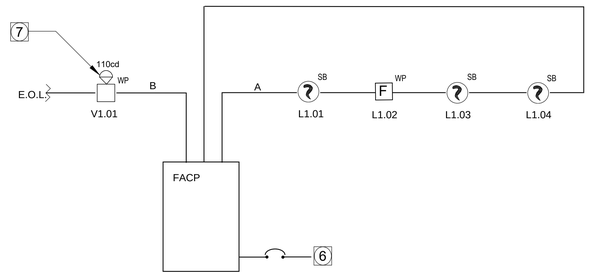
LV1.08

RESIDENCE 3

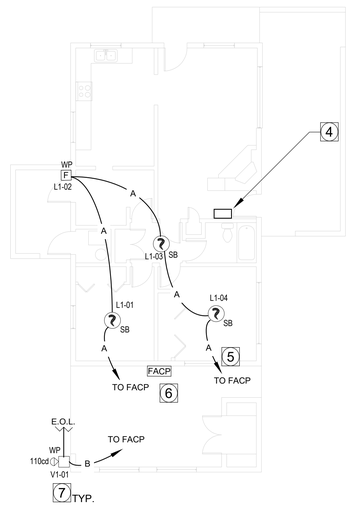
SCALE: 1/8"=1'-0"



DEMOLITION PLAN



RISER DIAGRAM



NEW FIRE ALARM PLAN

FIRE ALARM WIRE AND CABLE SCHEDULE

Cable Symbol	Stranded or Solid Wire AWG	# of Conductors	Twisted?	Application	Connect AIR Wire #
A	16	2	Y	Signal Line Circuit (SLC)	W161P-2633
B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

UB=Underground direct burial rated cable.

Not all cables may apply to this project

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).
Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

					Point to Point Method			**End of Line Method**			**Load Centering Method**		
Project Name	Kitt Peak Fire Alarm Renovation				**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Date	8/18/2022												
Circuit Number	NAC CKT #1				Totals		Voltage	Totals		Voltage	Totals		Voltage
Area Covered	Residence 4				Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
Nominal System Voltage		20.4			0.162	25	**0.02**	0.162	25	**0.025**	0.162	25	**0.012**
Minimum Device Voltage		16			End of Line Voltage		**20.38**	End of Line Voltage		**20.38**	End of Line Voltage		**20.39**
Total Circuit Current	0.162		Wire	Ohm's	Percent Drop		0.12%	Percent Drop		0.12%	Percent Drop		0.06%
			Gauge	Per 1000	End of Line and Load Centering Methods use only the wire guage for the first device to source								
Distance from source to 1st device	25	14		3.07	Standard Wire Resistance in Ohms per 1000 feet.								
Wire Gauge for balance of circuit		14		3.07	18=7.77 16=4.89 14=3.07 12=1.98 10=1.24								

Enter current in amps. .150 = 150 ma		Distance from previous device	Voltage			Notes:
Device Number	Device Current		At Device	Drop from source	Percent Drop	Wire resistance is doubled in the calculations for two wires (Positive and Negative)
Device 1	0.162	25	20.38	0.025	0.12%	The voltage calculated to the last device in any method must not be lower then
END			20.38	0.025	0.12%	the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
END			20.38	0.025	0.12%	
Totals	0.162	25	End of Line Voltage		**20.38**	

Device Manufacturer	System Sensor			Device Manufacturer	System Sensor	
		Current				Current
Horn Strobes		@Rated		Strobe Only		@Rated
Model #	Candela	Voltage		Model #	Candela	Voltage
PR2L - 30cd	30	0.158		SRL - 15cd	15	0.043
PR2L - 75cd	75	0.121		SRL - 30cd	30	0.063
PR2L - 95cd	95	0.142		SRL - 75cd	75	0.107
PR2l - 110cd	110	0.162		SRL - 95cd	95	0.121

Residence 4 Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		**1**	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		**1**	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		**1**	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		**1**	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		**3**	0.000200	0.000600	0.000200	0.000600
B200S - LF	Sounder Base - Low Frequency		**3**	0.000500	0.001500	0.000500	0.001500
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		**1**	0.000300	0.000300	0.003000	0.003000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		**1**			0.162000	0.162000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.002400**	**Total Periph Alarm**	**0.167100**
				Total Standby Amps	**0.226400**	**Total Alarm Amps**	**0.523100**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.002		0.167
			0.226	**<--Grand Totals -->**	**0.523**
Additional Battery Capacity Required	**20%**		0.045		0.105
Standby Time =	**24**	Hrs	6.520	Standby Ah	
Alarm Time =	**15**	Mins.	0.157	Alarm Ah	
			6.677	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**		**8.078**	**Total Ah**	

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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
TUCSON, ARIZONA

PLANNET CONSULTING
180 N. Riverview Dr. Suite 240 Anaheim, CA 92808
Phone: 714.982.5800 Fax: 714.982.5801
plannet.com

Issue Date & Issue Description	By	Check
04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

Project Number

CAD File Name

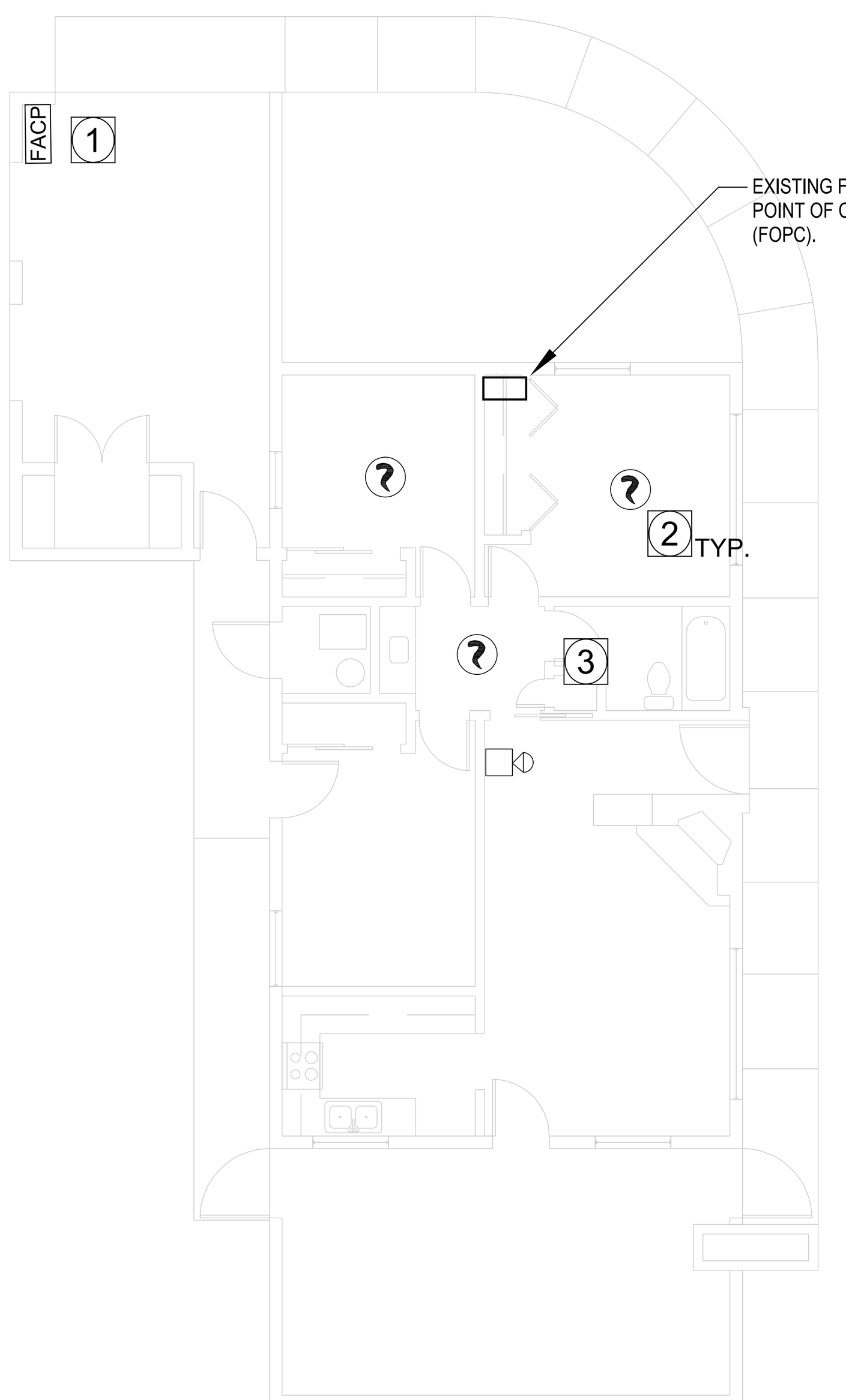
Description: LOW VOLTAGE FLOOR PLAN - RESIDENCE 4

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

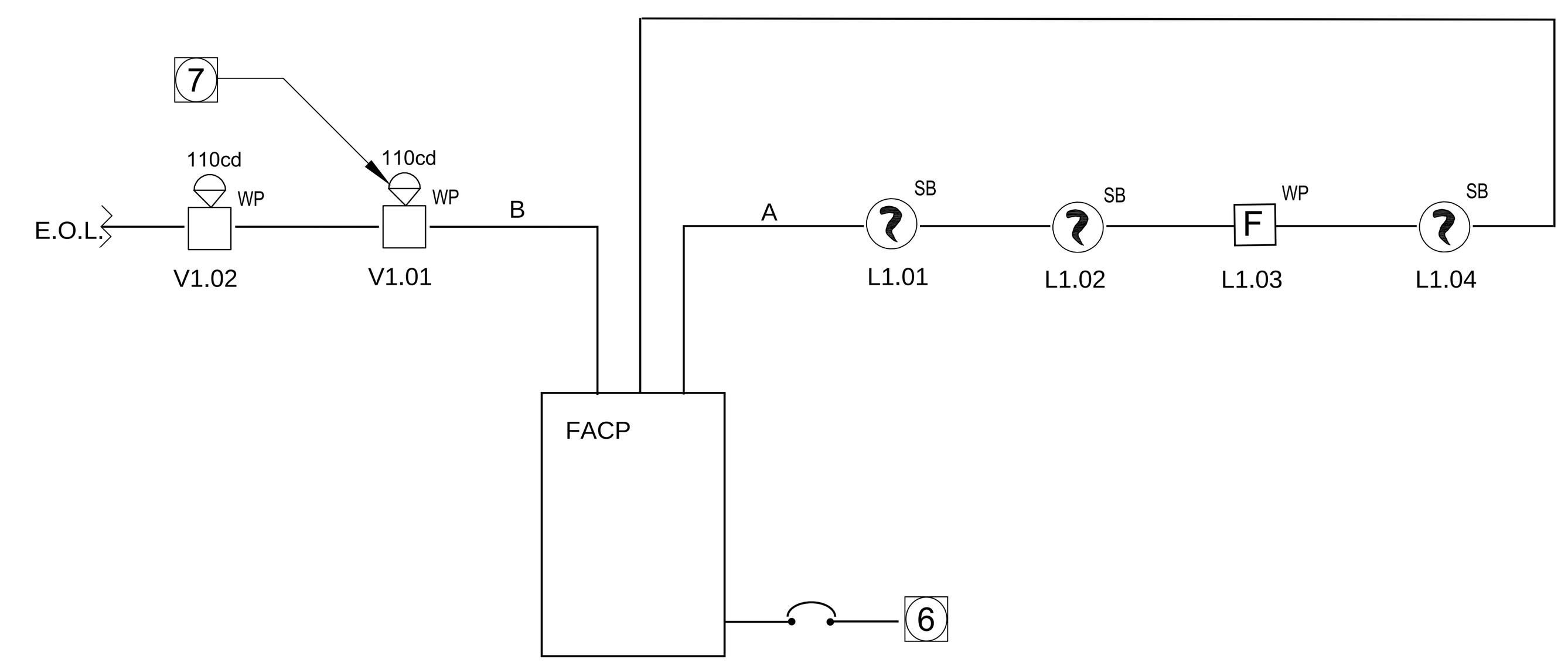
LV1.09

RESIDENCE 4

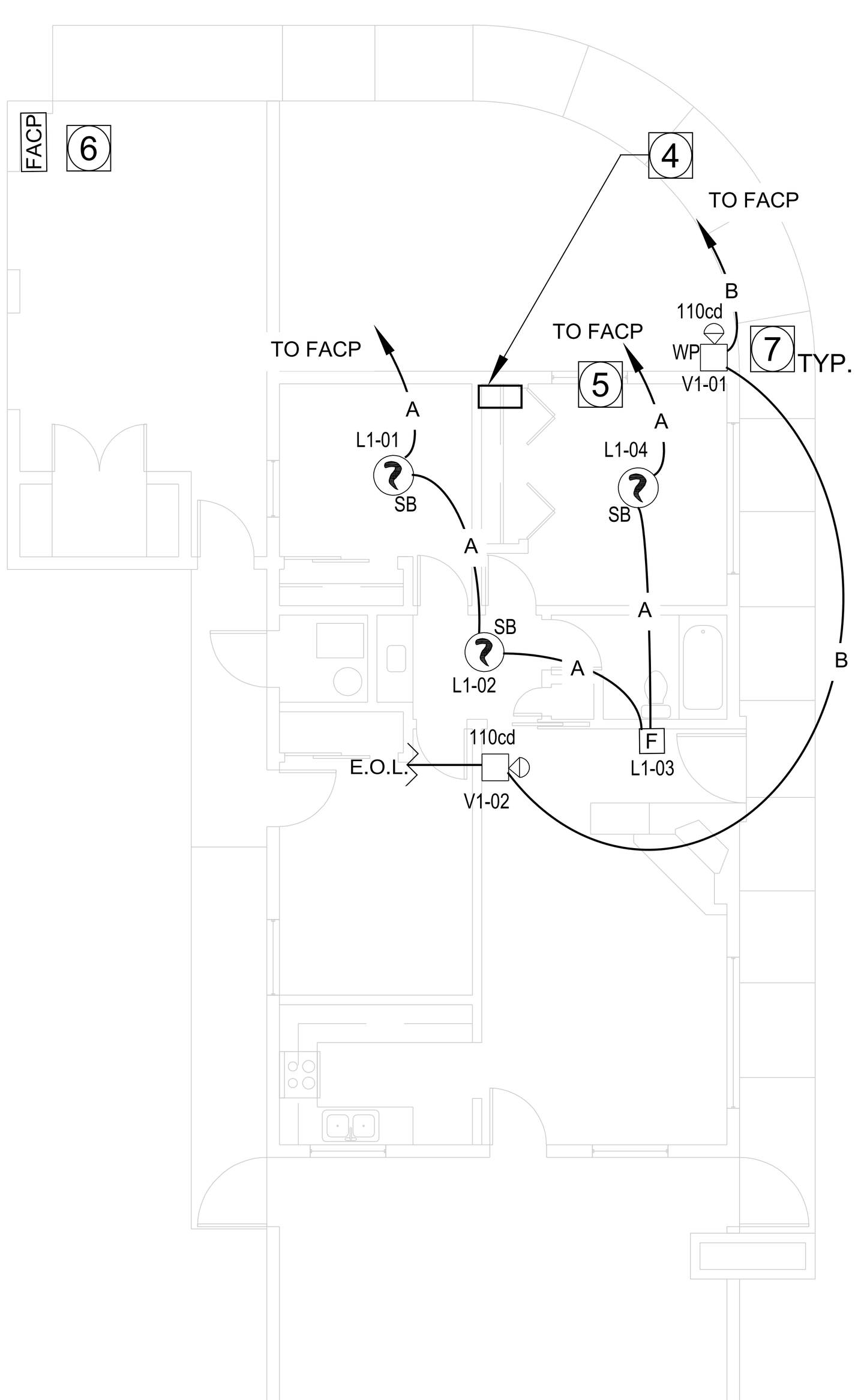
SCALE: 1/8"=1'-0"



DEMOLITION PLAN



RISER DIAGRAM



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C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

UB=Underground direct burial rated cable.

Not all cables may apply to this project

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).

Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

Project Name	Kitt Peak Fire Alarm Renovation		
Date	8/18/2022		
Circuit Number	NAC CKT #1		
Area Covered	Residence 5		
Nominal System Voltage	20.4		
Minimum Device Voltage	16		
Total Circuit Current	0.324	Wire Gauge	Ohm's Per 1000
Distance from source to 1st device	40	14	3.07
Wire Gauge for balance of circuit		14	3.07

Point to Point Method			End of Line Method			Load Centering Method		
CIRCUIT IS WITHIN LIMITS			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Totals		Voltage	Totals		Voltage	Totals		Voltage
Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
0.324	68	**0.11**	0.324	68	**0.135**	0.324	68	**0.068**
End of Line Voltage		**20.29**	End of Line Voltage		**20.26**	End of Line Voltage		**20.33**
Percent Drop		0.53%	Percent Drop		0.66%	Percent Drop		0.33%

End of Line and Load Centering Methods use only the wire guage for the first device to source

Standard Wire Resistance in Ohms per 1000 feet.

18=7.77 16=4.89 14=3.07 12=1.98 10=1.24

18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors

Notes:
Wire resistance is doubled in the calculations for two wires (Positive and Negative)
The voltage calculated to the last device in any method must not be lower then
the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).

Device Number	Device Current	Distance from previous device	At Device	Voltage Drop from source	Percent Drop
Enter current in amps. .150 = 150 ma					
Device 1	0.162	40	20.32	0.080	0.39%
Device 2	0.162	28	20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
END			20.29	0.107	0.53%
Totals	0.324	68	End of Line Voltage		**20.29**

Device Manufacturer	System Sensor	
Horn Strobes		Current @Rated Voltage
Model #	Candela	
PR2L - 30cd	30	0.158
PR2L - 75cd	75	0.121
PR2L - 95cd	95	0.142
PR2l - 110cd	110	0.162

Device Manufacturer	System Sensor	
Strobe Only		Current @Rated Voltage
Model #	Candela	
SRL - 15cd	15	0.043
SRL - 30cd	30	0.063
SRL - 75cd	75	0.107
SRL - 95cd	95	0.121

Residence 5 Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		1	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		1	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		1	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		1	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		3	0.000200	0.000600	0.000200	0.000600
B200S - LF	Sounder Base - Low Frequency		3	0.000500	0.001500	0.000500	0.001500
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		1	0.000300	0.000300	0.003000	0.003000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		2			0.162000	0.324000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.002400**	**Total Periph Alarm**	**0.329100**
				Total Standby Amps	**0.226400**	**Total Alarm Amps**	**0.685100**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.002		0.329
			0.226	**<--Grand Totals -->**	**0.685**
Additional Battery Capacity Required	**20%**		0.045		0.137
Standby Time =	**24**	Hrs	6.520	Standby Ah	
Alarm Time =	**15**	Mins.	0.206	Alarm Ah	
			6.726	Estimated Total Ah	
Battery Supplied	12V10A 10AH		**8.202**	**Total Ah**	

SPECIFIC PLAN NOTES

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2. CONTRACTOR SHALL USE CARE WHEN REMOVING EXISTING EQUIPMENT AND RETURN TO OWNER FOR FIRST RIGHT OF REFUSAL.
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3. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON THE CONSTRUCTION DOCUEMTNS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER /ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL ARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE RESPONSIBIOLITY OF THE CONTRACTOR.
4. DETECTORS SHALL NOT BE LOCATED IN DIRECT AIR-FLOW, LOCATE DEVICES NOT CLOSER THAN 3 FEET FROM ANY SUPPLY DIFFUSER.
5. AUDIBLE ALARM NOTIFICATION APPLIANCES SHALL PROVIDE A SOUND PRESSURE LEVEL OF 15dBA ABOVE THE AVERAGE AMBIENT SOUND LEVEL OR 5dBA ABOVE THE MAXIMUM SOUND LEVEL HAVING DURATION OF AT LEAST 60 SECONDS, WHICH EVER IS GREATER.
6. THE FIRE ALARM EVACUATION SIGNAL SHALL BE CLEARLY HEARD AND COMPLY WITH 2019 NFPA 72 SECTION 18.4.4.1.
7. ALL PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRE STOP SYSTEM EQUAL TO OR GREATER THAN THE FIRE RATING OF THE STRUCTURE/ SURFACE BEING PENETRATED.
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   B. THE ENTIRE LENGTH OF THE CABLE MUST HAVE A RESISTANCE GREATER THAN 1MEGAOHM TO EARTH.

RESIDENCE 5

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

1
— —

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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
TUCSON, ARIZONA

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Issue	Date & Issue Description	By	Check
	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

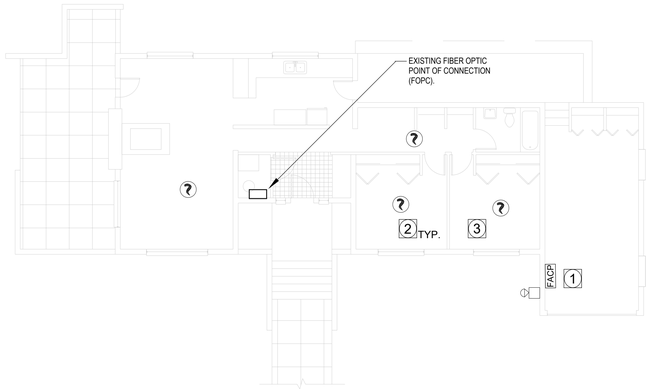
Project Number

CAD File Name

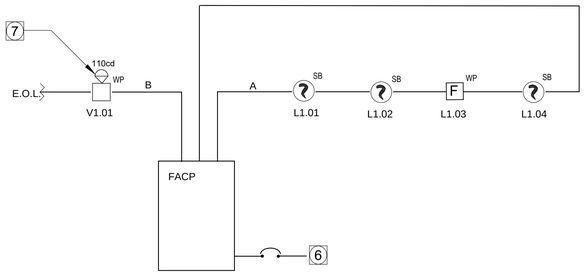
Description: LOW VOLTAGE FLOOR PLAN - RESIDENCE 5

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

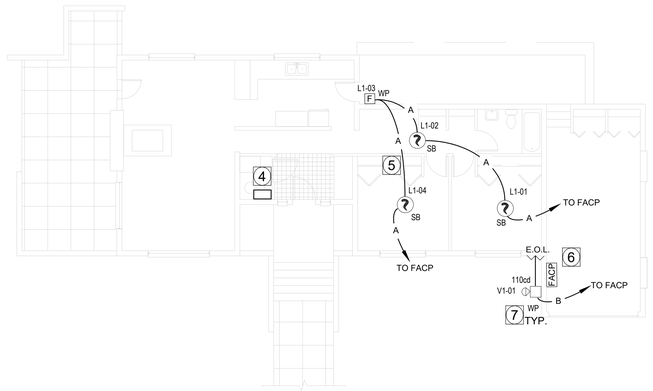
LV1.10



DEMOLITION PLAN



RISER DIAGRAM



NEW FIRE ALARM PLAN

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).
Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

					Point to Point Method			**End of Line Method**			**Load Centering Method**		
Project Name	Kitt Peak Fire Alarm Renovation				**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Date	8/18/2022												
Circuit Number	NAC CKT #1				Totals		Voltage	Totals		Voltage	Totals		Voltage
Area Covered	Residence 6				Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
Nominal System Voltage		20.4			0.162	10	**0.01**	0.162	10	**0.010**	0.162	10	**0.005**
Minimum Device Voltage		16			End of Line Voltage		**20.39**	End of Line Voltage		**20.39**	End of Line Voltage		**20.40**
Total Circuit Current	0.162		Wire	Ohm's	Percent Drop		0.05%	Percent Drop		0.05%	Percent Drop		0.02%
			Gauge	Per 1000	End of Line and Load Centering Methods use only the wire guage for the first device to source								
Distance from source to 1st device	10	14	3.07		Standard Wire Resistance in Ohms per 1000 feet.								
Wire Gauge for balance of circuit		14	3.07				18=7.77	16=4.89	14=3.07	12=1.98	10=1.24		
Enter current in amps. .150 = 150 ma	Distance from previous device	Voltage			18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors								

Device Number	Device Current	Distance from previous device	At Device	Drop from source	Percent Drop	Notes:
						Wire resistance is doubled in the calculations for two wires (Positive and Negative)
Device 1	0.162	10	20.39	0.010	0.05%	The voltage calculated to the last device in any method must not be lower then
END			20.39	0.010	0.05%	the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
END			20.39	0.010	0.05%	
Totals	0.162	10	End of Line Voltage		**20.39**	

Device Manufacturer	System Sensor			Device Manufacturer	System Sensor	
			Current			Current
Horn Strobes			@Rated	Strobe Only		@Rated
Model #	Candela		Voltage	Model #	Candela	Voltage
PR2L - 30cd	30		0.158	SRL - 15cd	15	0.043
PR2L - 75cd	75		0.121	SRL - 30cd	30	0.063
PR2L - 95cd	95		0.142	SRL - 75cd	75	0.107
PR2I - 110cd	110		0.162	SRL - 95cd	95	0.121

Residence 6 Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		**1**	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		**1**	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		**1**	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		**1**	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		**3**	0.000200	0.000600	0.000200	0.000600
B200S - LF	Sounder Base - Low Frequency		**3**	0.000500	0.001500	0.000500	0.001500
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		**1**	0.000300	0.000300	0.003000	0.003000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		**1**			0.162000	0.162000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.002400**	**Total Periph Alarm**	**0.167100**
				Total Standby Amps	**0.226400**	**Total Alarm Amps**	**0.523100**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.002		0.167
			0.226	**<--Grand Totals -->**	**0.523**
Additional Battery Capacity Required	**20%**		0.045		0.105
Standby Time =	**24**	Hrs	6.520	Standby Ah	
Alarm Time =	**15**	Mins.	0.157	Alarm Ah	
			6.677	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**		**8.078**	**Total Ah**	

FIRE ALARM WIRE AND CABLE SCHEDULE

Cable Symbol	Stranded or Solid Wire AWG	# of Conductors	Twisted?	Application	Connect AIR Wire #
A	16	2	Y	Signal Line Circuit (SLC)	W161P-2633
B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
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N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

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Not all cables may apply to this project

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RESIDENCE 6

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

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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
TUCSON, ARIZONA

PLANNET CONSULTING
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plannet.com

Issue Date & Issue Description	By	Check
04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

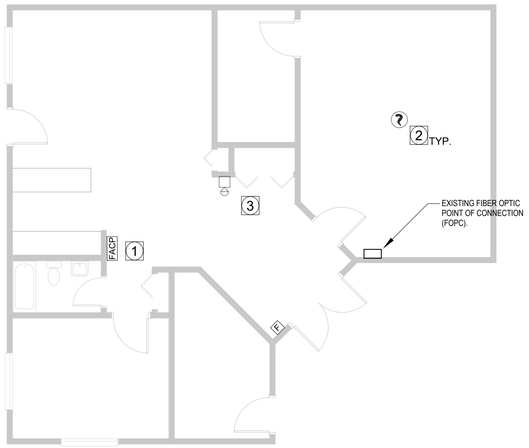
Project Number

CAD File Name

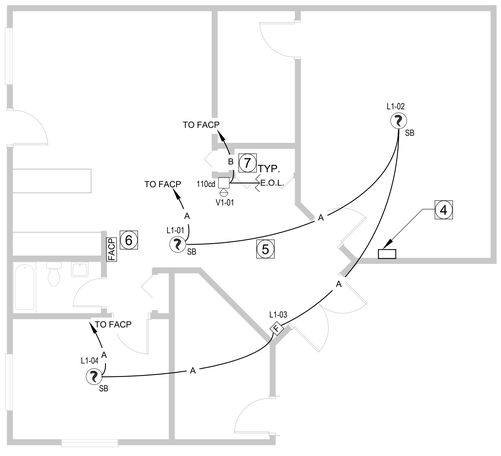
Description: LOW VOLTAGE FLOOR PLAN - RESIDENCE 6

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

LV1.11



DEMOLITION PLAN



NEW FIRE ALARM PLAN

FIRE ALARM WIRE AND CABLE SCHEDULE

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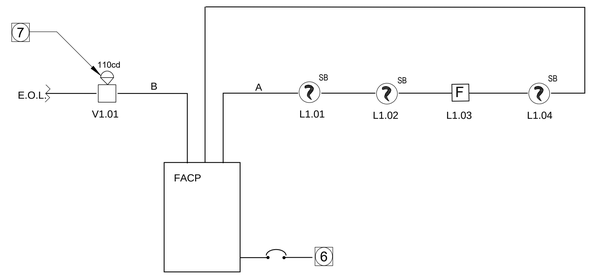
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

UB=Underground direct burial rated cable.

Not all cables may apply to this project



RISER DIAGRAM

KITT PEAK NATIONAL OBSERVATORY

NAC Voltage Drop Calculator
for Audio / Visual devices

This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).
Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

					Point to Point Method			**End of Line Method**			**Load Centering Method**		
Project Name	Kitt Peak Fire Alarm Renovation				**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Date	8/18/2022												
Circuit Number	NAC CKT #1				Totals		Voltage	Totals		Voltage	Totals		Voltage
Area Covered	Calypso				Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
Nominal System Voltage		20.4			0.162	18	**0.02**	0.162	18	**0.018**	0.162	18	**0.009**
Minimum Device Voltage		16			End of Line Voltage		**20.38**	End of Line Voltage		**20.38**	End of Line Voltage		**20.39**
Total Circuit Current	0.162		Wire	Ohm's	Percent Drop		0.09%	Percent Drop		0.09%	Percent Drop		0.04%
			Gauge	Per 1000	End of Line and Load Centering Methods use only the wire guage for the first device to source								
Distance from source to 1st device	18	14		3.07	Standard Wire Resistance in Ohms per 1000 feet.								
Wire Gauge for balance of circuit		14		3.07			18=7.77	16=4.89	14=3.07	12=1.98	10=1.24		
Enter current in amps.	Distance					18-14 Awg = Solid Conductors			12-10 Awg = Stranded Conductors				
150 = 150 ma	from	Voltage			Notes:								
Device Number	Device Current	previous device	At Device	Drop from source	Percent Drop								
Device 1	0.162	18	20.38	0.018	0.09%	Wire resistance is doubled in the calculations for two wires (Positive and Negative)							
END			20.38	0.018	0.09%	The voltage calculated to the last device in any method must not be lower then							
END			20.38	0.018	0.09%	the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).							
END			20.38	0.018	0.09%	Device Manufacturer	System Sensor				Device Manufacturer	System Sensor	
END			20.38	0.018	0.09%				Current				Current
END			20.38	0.018	0.09%	Horn Strobes			@Rated		Strobe Only		@Rated
END			20.38	0.018	0.09%	Model #	Candela		Voltage		Model #	Candela	Voltage
END			20.38	0.018	0.09%	PR2L - 30cd	30		0.158		SRL - 15cd	15	0.043
END			20.38	0.018	0.09%	PR2L - 75cd	75		0.121		SRL - 30cd	30	0.063
END			20.38	0.018	0.09%	PR2L - 95cd	95		0.142		SRL - 75cd	75	0.107
END			20.38	0.018	0.09%	PR2I - 110cd	110		0.162		SRL - 95cd	95	0.121
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
END			20.38	0.018	0.09%								
Totals	0.162	18	End of Line Voltage		**20.38**								

Calypso Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		1	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		1	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		1	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		1	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		3	0.000200	0.000600	0.000200	0.000600
B200S - LF	Sounder Base - Low Frequency		3	0.000500	0.001500	0.000500	0.001500
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		1	0.000300	0.000300	0.003000	0.003000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		1			0.162000	0.162000
PC2RL	Horn Strobe - Clg Mtd - 75cd					0.121000	
SRL	Strobe Light - Wall Mtd - 110cd					0.148000	
SCRL	Strobe Light - Clg Mtd - 75cd					0.107000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.002400**	**Total Periph Alarm**	**0.167100**
				Total Standby Amps	**0.226400**	**Total Alarm Amps**	**0.523100**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.002		0.167
			0.226	**<--Grand Totals -->**	**0.523**
Additional Battery Capacity Required	**20%**		0.045		0.105
Standby Time =	**24**	Hrs	6.520	Standby Ah	
Alarm Time =	**15**	Mins.	0.157	Alarm Ah	
			6.677	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**		**8.078**	**Total Ah**	

SPECIFIC PLAN NOTES

1. CONTRACTOR SHALL DEMO EXISTING FIRE ALARM CONTROL PANEL, ALL EXISTING DEVICES AND CABLES. MAINTAIN EXISTING FIRE ALARM SYSTEM PATHWAYS AND BACKBOXES FOR REUSE.
2. CONTRACTOR SHALL USE CARE WHEN REMOVING EXISTING EQUIPMENT AND RETURN TO OWNER FOR FIRST RIGHT OF REFUSAL.
3. DISPOSE OF ALL CABLE AND DEVICES NOT RETAINED BY OWNER IN A SAFE AND APPROPRIATE MANNER.
4. FIBER OPTIC POINT OF CONNECTION (FOPC). CONTRACTOR SHALL PROVIDE AND INSTALL 2-STRAND SINGLE MODE PATCH FIBER BETWEEN FACP AND FOPC. PATCH CABLE SHALL HAVE LC CONNECTORS ON BOTH ENDS.
5. CONTRACTOR SHALL ROUTE ALL NEW CABLING THROUGH EXISTING CONDUIT AND PATHWAYS. WHERE REQUIRED CONTRACTOR SHALL PROVIDE NEW PATHWAYS FOR CONNECTION TO NEW DEVICES, IN LOCATIONS WHERE EXISTING PATHWAYS DO NOT EXIST OR IF EXISTING PATHWAYS ARE DAMAGED AND CANNOT BE REUSED.
6. CONTRACTOR SHALL CONNECT NEW FACP TO EXISTING ELECTRICAL CIRCUIT.
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3. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON THE CONSTRUCTION DOCUEMTNS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER /ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL ARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE RESPONSIBIOLITY OF THE CONTRACTOR.
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6. THE FIRE ALARM EVACUATION SIGNAL SHALL BE CLEARLY HEARD AND COMPLY WITH 2019 NFPA 72 SECTION 18.4.4.1.
7. ALL PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRE STOP SYSTEM EQUAL TO OR GREATER THAN THE FIRE RATING OF THE STRUCTURE/ SURFACE BEING PENETRATED.
8. ALL FIRE ALARM WIRING SHALL BE RUN IN EXISTING FA CONDUITS WHERE POSSIBLE. WHERE NEW CONDUIT OR PATHWAYS MUST BE RUN CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SLEEVES, LOCATIONS AND SIZES OF CONDUITS AND SHALL ENSURE COMPLIANCE WITH LOCAL CODES AND STANDARDS.
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   B. THE ENTIRE LENGTH OF THE CABLE MUST HAVE A RESISTANCE GREATER THAN 1MEGAOHM TO EARTH.

CALYPSO

SCALE: 3/16"=1'-0" | 1

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KITT PEAK NATIONAL OBSERVATORY

FIRE ALARM RENOVATION
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Issue	Date & Issue Description	By	Check
	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

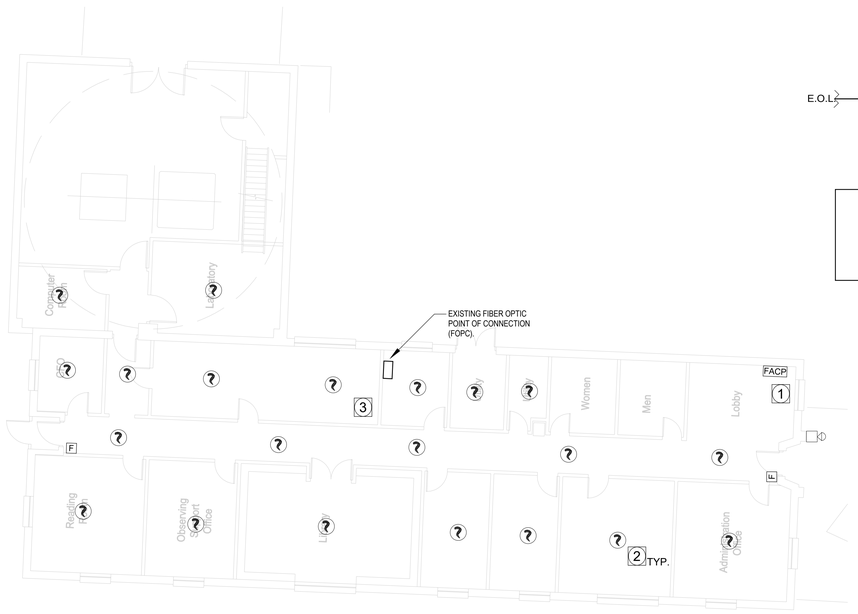
Project Number

CAD File Name

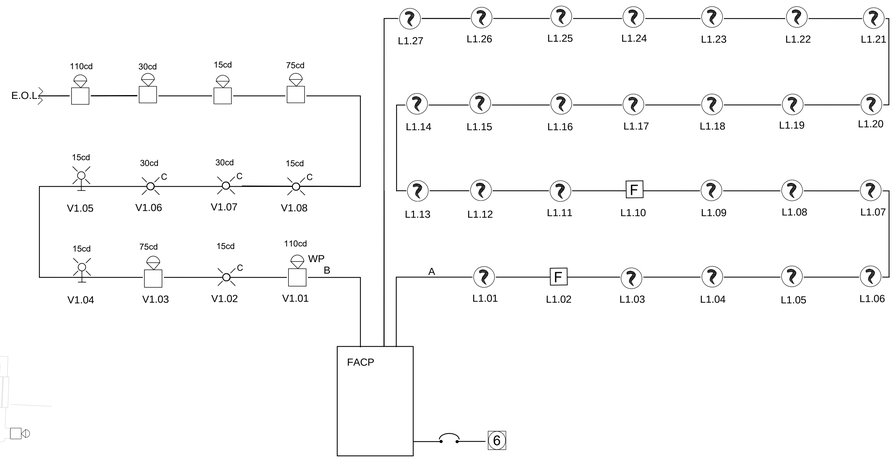
Description: LOW VOLTAGE FLOOR PLAN - CALYPSO

Scale: 3/16"=1'-0"

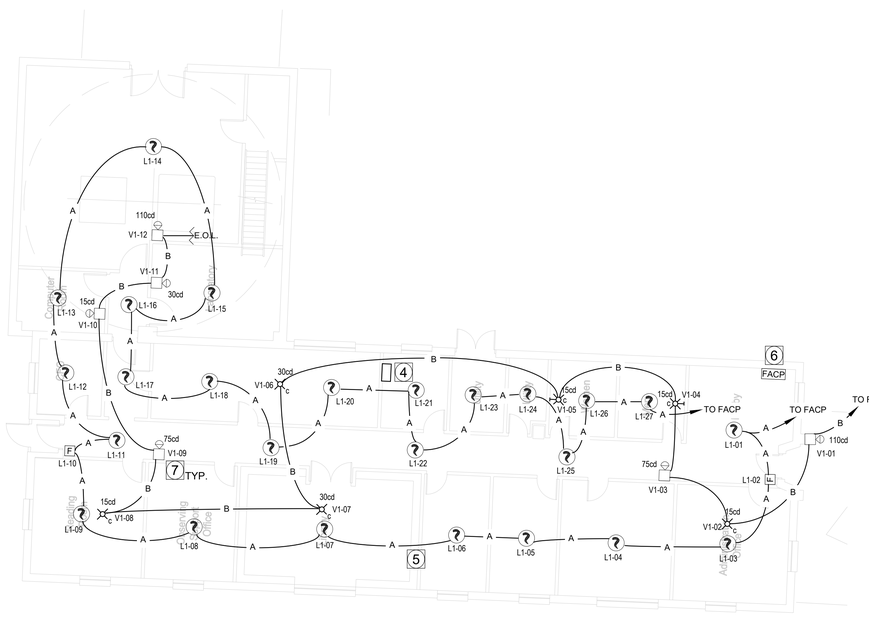
LV1.12



DEMOLITION PLAN



RISER DIAGRAM



NEW FIRE ALARM PLAN

FIRE ALARM WIRE AND CABLE SCHEDULE

Cable Symbol	Stranded or Solid Wire AWG	# of Conductors	Twisted?	Application	Connect AIR Wire #
A	16	2	Y	Signal Line Circuit (SLC)	W161P-2633
B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

UB=Underground direct burial rated cable.

Not all cables may apply to this project

KITT PEAK NATIONAL OBSERVATORY

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for Audio / Visual devices

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Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

					Point to Point Method			**End of Line Method**			**Load Centering Method**		
Project Name	Kitt Peak Fire Alarm Renovation				**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Date	8/18/2022												
Circuit Number	NAC CKT #1				Totals		Voltage	Totals		Voltage	Totals		Voltage
Area Covered	Administration Bldg				Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
Nominal System Voltage		20.4			0.992	269	**0.93**	0.992	269	**1.638**	0.992	269	**0.819**
Minimum Device Voltage		16			End of Line Voltage		**19.47**	End of Line Voltage		**18.76**	End of Line Voltage		**19.58**
Total Circuit Current	0.992		Wire	Ohm's	Percent Drop		4.56%	Percent Drop		8.03%	Percent Drop		4.02%
			Gauge	Per 1000	End of Line and Load Centering Methods use only the wire guage for the first device to source								
Distance from source to 1st device	17		14	3.07	Standard Wire Resistance in Ohms per 1000 feet.								
Wire Gauge for balance of circuit			14	3.07			18=7.77	16=4.89	14=3.07	12=1.98	10=1.24		
Enter current in amps. .150 = 150 ma	Distance from previous device		Voltage		Notes: 18-14 Awg = Solid Conductors 12-10 Awg = Stranded Conductors								

Device Number	Device Current	Distance from previous device	At Device	Drop from source	Percent Drop
Device 1	0.162	17	20.30	0.104	0.51%
Device 2	0.043	24	20.17	0.226	1.11%
Device 3	0.121	21	20.07	0.327	1.60%
Device 4	0.043	23	19.98	0.421	2.07%
Device 5	0.043	20	19.90	0.498	2.44%
Device 6	0.063	41	19.76	0.644	3.16%
Device 7	0.063	26	19.67	0.726	3.56%
Device 8	0.043	32	19.58	0.816	4.00%
Device 9	0.121	15	19.55	0.853	4.18%
Device 10	0.054	26	19.50	0.900	4.41%
Device 11	0.074	14	19.48	0.920	4.51%
Device 12	0.162	10	19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
END			19.47	0.930	4.56%
Totals	0.992	269	End of Line Voltage		**19.47**

The voltage calculated to the last device in any method must not be lower then the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).

Device Manufacturer	System Sensor		
		Current	
Horn Strobes		@Rated	
Model #	Candela	Voltage	
PR2L - 15cd	30	0.054	
PR2L - 30cd	30	0.074	
PR2L - 75cd	75	0.121	
PR2L - 95cd	95	0.142	
PR2I - 110cd	110	0.162	

Device Manufacturer	System Sensor	
		Current
Strobe Only		@Rated
Model #	Candela	Voltage
SRL - 15cd	15	0.043
SRL - 30cd	30	0.063
SRL - 75cd	75	0.107
SRL - 95cd	95	0.121

Administration Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		**1**	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		**1**	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		**1**	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		**1**	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		**25**	0.000200	0.005000	0.000200	0.005000
B200S - LF	Sounder Base - Low Frequency			0.000500		0.000500	
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		**2**	0.000300	0.000600	0.003000	0.006000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd		**2**			0.162000	0.324000
P2RL	Horn Strobe - Wall Mtd - 75cd		**2**			0.121000	0.242000
P2RL	Horn Strobe - Wall Mtd - 30cd		**1**			0.074000	0.074000
P2RL	Horn Strobe - Wall Mtd - 15cd		**1**			0.054000	0.054000
SRL	Strobe Light - Wall Mtd - 15cd		**2**			0.043000	0.086000
SCRL	Strobe Light - Clg Mtd -15cd		**2**			0.043000	0.086000
SCRL	Strobe Light - Clg Mtd -30cd		**2**			0.063000	0.126000
XXXX-XXXX	Description						
				Total Periph Stby	**0.005600**	**Total Periph Alarm**	**1.003000**
				Total Standby Amps	**0.229600**	**Total Alarm Amps**	**1.359000**

Battery Set # 1

			Standby Current		Alarm Current
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.006		1.003
			0.230	**<--Grand Totals -->**	**1.359**
Additional Battery Capacity Required	**20%**		0.046		0.272
Standby Time =	**24**	Hrs	6.612	Standby Ah	
Alarm Time =	**15**	Mins.	0.408	Alarm Ah	
			7.020	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**		**8.826**	**Total Ah**	

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ADMIN BUILDING

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

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KITT PEAK NATIONAL OBSERVATORY
FIRE ALARM RENOVATION
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Issue	Date & Issue Description	By	Check
1	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

Project Number

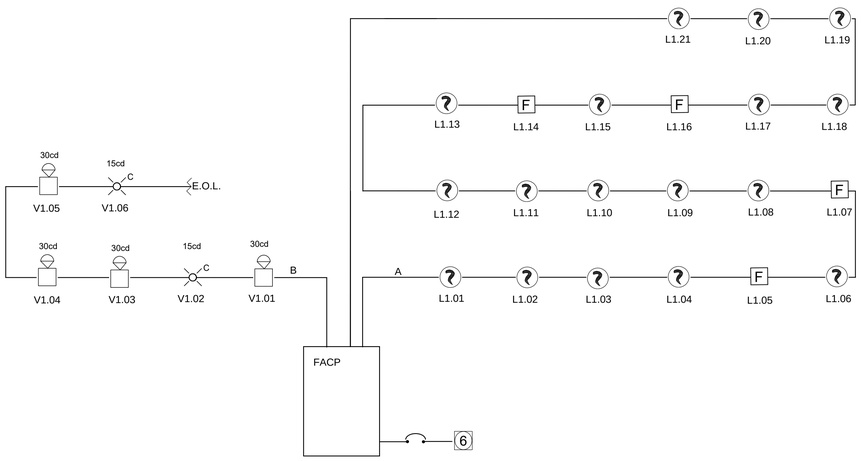
CAD File Name

Description: LOW VOLTAGE FLOOR PLAN - ADMIN BUILDING

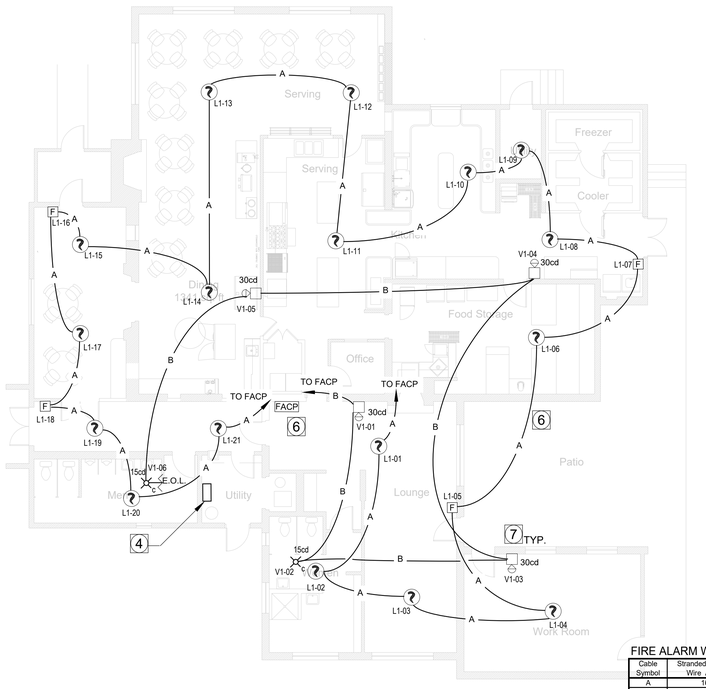
Scale: 1/8"=1'-0"

LV1.13

DEMOLITION PLAN



RISER DIAGRAM



NEW FIRE ALARM PLAN

FIRE ALARM WIRE AND CABLE SCHEDULE

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B	14	2	N	Horn/Strobe Circuit (NAC)	W141P-2611
C	14	2	N	Strobe Circuit (NAC)	W141P-2611
D	16	2	Y	Speaker Circuit (NAC)	W161P-2633
E	16	2	Y	Network Data Riser	W161P-2633
F	16	2	Y	Network Audio Riser	W161P-2633
N	16	2	N	Control Module Output	W161P-2601
P	14	2	N	24VDC Power	W141P-2611

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This calculator provided voltage drop calculations in three formats (Point to Point, End of Line, and Load Centering).
Make sure that you know what method is accepted by, and the results do not exceed the limits set by the respective jurisdiction

					Point to Point Method			**End of Line Method**			**Load Centering Method**		
Project Name	Kitt Peak Fire Alarm Renovation				**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**			**CIRCUIT IS WITHIN LIMITS**		
Date	8/18/2022												
Circuit Number	NAC CKT #1				Totals		Voltage	Totals		Voltage	Totals		Voltage
Area Covered	Dining Hall				Current	Distance	Drop	Current	Distance	Drop	Current	Distance	Drop
Nominal System Voltage		20.4			0.382	287	**0.34**	0.382	287	**0.673**	0.382	287	**0.337**
Minimum Device Voltage		16			End of Line Voltage		**20.06**	End of Line Voltage		**19.73**	End of Line Voltage		**20.06**
Total Circuit Current	0.382		Wire	Ohm's	Percent Drop		1.66%	Percent Drop		3.30%	Percent Drop		1.65%
			Gauge	Per 1000	End of Line and Load Centering Methods use only the wire guage for the first device to source								
Distance from source to 1st device	24		14	3.07	Standard Wire Resistance in Ohms per 1000 feet.								
Wire Gauge for balance of circuit			14	3.07			18=7.77	16=4.89	14=3.07	12=1.98	10=1.24		
Enter current in amps.	Distance				18-14 Awg = Solid Conductors			12-10 Awg = Stranded Conductors					
.150 = 150 ma	from		Voltage		Notes:								

Device	Device	previous	At	Drop from	Percent	
Number	Current	device	Device	source	Drop	
Device 1	0.074	24	20.34	0.056	0.28%	
Device 2	0.043	40	20.27	0.132	0.65%	
Device 3	0.074	42	20.20	0.200	0.98%	
Device 4	0.074	74	20.11	0.287	1.41%	
Device 5	0.074	52	20.08	0.324	1.59%	
Device 6	0.043	55	20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
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END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
END			20.06	0.339	1.66%	
Totals	0.382	287	End of Line Voltage		**20.06**	

Notes:
Wire resistance is doubled in the calculations for two wires (Positive and Negative)
The voltage calculated to the last device in any method must not be lower then
the manufactures listed minimum operating voltage (IE: rated operating voltage 20-32 VDC).

Device Manufacturer	System Sensor		
			Current
Horn Strobes			@Rated
Model #	Candela		Voltage
PR2L - 15cd	30		0.054
PR2L - 30cd	30		0.074
PR2L - 75cd	75		0.121
PR2L - 95cd	95		0.142
PR2I - 110cd	110		0.162

Device Manufacturer	System Sensor	
		Current
Strobe Only		@Rated
Model #	Candela	Voltage
SRL - 15cd	15	0.043
SRL - 30cd	30	0.063
SRL - 75cd	75	0.107
SRL - 95cd	95	0.121

Dining Hall Fire Alarm Battery Calculations

Module	Description	Existing Qty	New Qty	Standby Current	Total Standby	Alarm Current	Total Alarm
Panel Equipment							
S3 Series	Fire Alarm Control Panel		**1**	0.111000	0.111000	0.243000	0.243000
LCD-SLP	Remote Fire Alarm Annunciator			0.030000		0.065000	
DACT-E3	Digital Alarm Communications Transmitter		**1**	0.018000	0.018000	0.018000	0.018000
FSL-E3	SM Fiber Optic Channel Card		**1**	0.079000	0.079000	0.079000	0.079000
RPT-E3-UTP	Network Repeater Card		**1**	0.016000	0.016000	0.016000	0.016000
				Total Panel Stby	**0.224000**	**Total Panel Alarm**	**0.356000**
Peripheral Devices							
ASD-PL3	Photoelectric Smoke Detector		**17**	0.000200	0.003400	0.000200	0.003400
B200S - LF	Sounder Base - Low Frequency			0.000500		0.000500	
DNR-DNRW	Duct Mounted Smoke Detector			0.000200		0.000200	
MCS-COF	Heat Detector			0.200000		0.200000	
MS-7A	Double Action Pull Station		**4**	0.000300	0.001200	0.003000	0.012000
AMM-2RIF	Addressible Dual Monitor Relay Module			0.001300		0.024000	
AOM-2RF	Addressible Relay Module			0.000300		0.000300	
Miscellaneous Peripheral Devices							
P2RL	Horn Strobe - Wall Mtd - 110cd					0.162000	
P2RL	Horn Strobe - Wall Mtd - 75cd					0.121000	
P2RL	Horn Strobe - Wall Mtd - 30cd		**4**			0.074000	0.296000
P2RL	Horn Strobe - Wall Mtd - 15cd					0.054000	
SRL	Strobe Light - Wall Mtd - 15cd					0.043000	
SCRL	Strobe Light - Clg Mtd -15cd		**2**			0.043000	0.086000
SCRL	Strobe Light - Clg Mtd -30cd					0.063000	
XXXX-XXXX	Description						
				Total Periph Stby	**0.004600**	**Total Periph Alarm**	**0.397400**
				Total Standby Amps	**0.228600**	**Total Alarm Amps**	**0.753400**

Battery Set # 1			**Standby Current**		**Alarm Current**
Current Draws					
Panel Equipment			0.224		0.356
Peripherals			0.005		0.397
			0.229	**<--Grand Totals -->**	**0.753**
Additional Battery Capacity Required	**20%**		0.046		0.151
Standby Time =	**24**	Hrs	6.584	Standby Ah	
Alarm Time =	**15**	Mins.	0.226	Alarm Ah	
			6.810	Estimated Total Ah	
Battery Supplied	**12V10A 10AH**		**8.329**	**Total Ah**	

DINING HALL

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

SPECIFIC PLAN NOTES

1. CONTRACTOR SHALL DEMO EXISTING FIRE ALARM CONTROL PANEL, ALL EXISTING DEVICES AND CABLES. MAINTAIN EXISTING FIRE ALARM SYSTEM PATHWAYS AND BACKBOXES FOR REUSE.
2. CONTRACTOR SHALL USE CARE WHEN REMOVING EXISTING EQUIPMENT AND RETURN TO OWNER FOR FIRST RIGHT OF REFUSAL.
3. DISPOSE OF ALL CABLE AND DEVICES NOT RETAINED BY OWNER IN A SAFE AND APPROPRIATE MANNER.
4. FIBER OPTIC POINT OF CONNECTION (FOPC). CONTRACTOR SHALL PROVIDE AND INSTALL 2-STRAND SINGLE MODE PATCH FIBER BETWEEN FACP AND FOPC. PATCH CABLE SHALL HAVE LC CONNECTORS ON BOTH ENDS.
5. CONTRACTOR SHALL ROUTE ALL NEW CABLING THROUGH EXISTING CONDUIT AND PATHWAYS. WHERE REQUIRED CONTRACTOR SHALL PROVIDE NEW PATHWAYS FOR CONNECTION TO NEW DEVICES, IN LOCATIONS WHERE EXISTING PATHWAYS DO NOT EXIST OR IF EXISTING PATHWAYS ARE DAMAGED AND CANNOT BE REUSED.
6. CONTRACTOR SHALL CONNECT NEW FACP TO EXISTING ELECTRICAL CIRCUIT.
7. HORN STROBE dB LEVEL SHALL BE 89dB (HIGH) UNLESS OTHERWISE NOTED.

GENERAL NOTES

1. DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE OF WORK AND TO INDICATE GENERAL ARRANGEMENT. THEY ARE NOT INTENDED TO SHOW EVERY DETAIL INCLUDING OFFSETS, FITTINGS OR EVERY STRUCTURAL DIFFICULTY THAT MAY BE ENCOUNTERED DURING WORK. EXCEPT WHERE OTHERWISE INDICATED, LOCATIONS ARE APPROXIMATE ONLY. EXACT LOCATIONS NECESSARY TO ADHERE TO CODE REQUIREMENTS AND SECURE PROPER CONDITIONS AND RESULTS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND MUST BE DETERMINED AT THE PROJECT SITE.
2. NOTIFICATION APPLIANCES IN ROOMS CONTAINING (2) OR MORE AUDIBLE OR VISUAL DEVICES SHALL BE SYNCHRONIZED PER 2019 NFPA 72. THIS SHALL INCLUDE AUDIBLE AND VISUALDEVICES LOATED IN ADJOINING /ADJACENT SPACES.
3. DO NOT DEVIATE FROM CONDUIT RUNS AS SHOWN ON THE CONSTRUCTION DOCUEMTNS WITHOUT PRIOR APPROVAL FROM SYSTEM SUPPLIER /ENGINEER. FACTORS SUCH AS EXCESSIVE VOLTAGE DROP, ADDITIONAL ARTS, ENGINEERING, ETC. THAT ARE A RESULT OF CONDUIT RUN DEVIATIONS SHALL BE THE RESPONSIBIOLITY OF THE CONTRACTOR.
4. DETECTORS SHALL NOT BE LOCATED IN DIRECT AIR-FLOW, LOCATE DEVICES NOT CLOSER THAN 3 FEET FROM ANY SUPPLY DIFFUSER.
5. AUDIBLE ALARM NOTIFICATION APPLIANCES SHALL PROVIDE A SOUND PRESSURE LEVEL OF 15dBA ABOVE THE AVERAGE AMBIENT SOUND LEVEL OR 5dBA ABOVE THE MAXIMUM SOUND LEVEL HAVING DURATION OF AT LEAST 60 SECONDS, WHICH EVER IS GREATER.
6. THE FIRE ALARM EVACUATION SIGNAL SHALL BE CLEARLY HEARD AND COMPLY WITH 2019 NFPA 72 SECTION 18.4.4.1.
7. ALL PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS SHALL BE PROTECTED FROM THE SPREAD OF FIRE WITH AN APPROVED FIRE STOP SYSTEM EQUAL TO OR GREATER THAN THE FIRE RATING OF THE STRUCTURE/ SURFACE BEING PENETRATED.
8. ALL FIRE ALARM WIRING SHALL BE RUN IN EXISTING FA CONDUITS WHERE POSSIBLE. WHERE NEW CONDUIT OR PATHWAYS MUST BE RUN CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SLEEVES, LOCATIONS AND SIZES OF CONDUITS AND SHALL ENSURE COMPLIANCE WITH LOCAL CODES AND STANDARDS.
9. IF SHIELDED WIRE IS USED, THE FOLLOWING SHALL BE OBSERVED:
   A. METALLIC CONTINUITY OF THE SHIELD MUST BE MAINTAINED AND INSULATED THROUGHOUT THE ENTIRE LENGTH OF THE CABLE.
   B. THE ENTIRE LENGTH OF THE CABLE MUST HAVE A RESISTANCE GREATER THAN 1MEGAOHM TO EARTH.

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KITT PEAK NATIONAL OBSERVATORY
FIRE ALARM RENOVATION
TUCSON, ARIZONA

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Issue Date & Issue Description	By	Check
04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

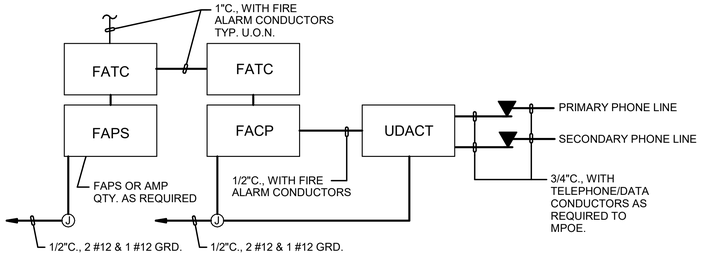
Project Number

CAD File Name

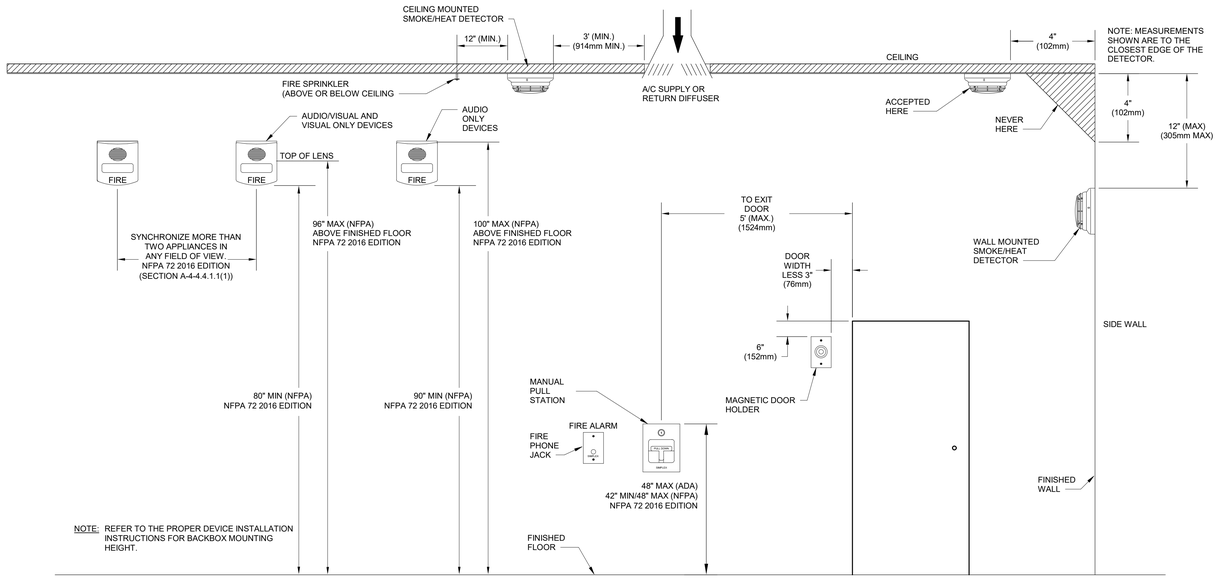
Description: LOW VOLTAGE FLOOR PLAN - DINING HALL

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

LV1.14



FIRE ALARM SYSTEM SCHEMATIC | 1" = 1'-0" | 2



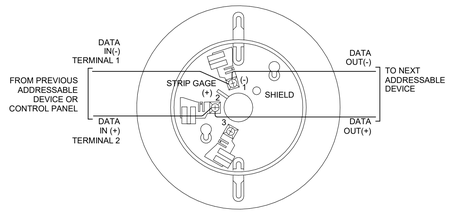
DEVICE MOUNTING DETAIL | 1" = 1'-0" | 1

SEQUENCE OF OPERATION(S)

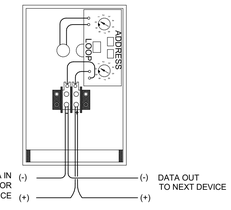
SYSTEM OUTPUTS

SYSTEM INPUTS

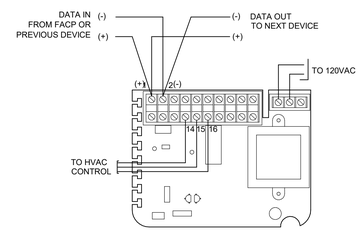
		CONTROL UNIT ANNUNCIATION												NOTIFICATION									REQUIRED FIRE SAFETY CONTROL												SUPPLEMENTARY		
		ACTUATE PANEL COMMON ALARM SIGNAL INDICATOR	ACTUATE PANEL AUDIBLE ALARM SIGNAL	ACTUATE PANEL COMMON SUPERVISORY SIGNAL INDICATOR	ACTUATE PANEL AUDIBLE SUPERVISORY SIGNAL	ACTUATE PANEL COMMON TROUBLE SIGNAL INDICATOR	ACTUATE PANEL AUDIBLE COMMON TROUBLE SIGNAL	DISPLAY CHANGE OF STATUS	NOT USED	NOT USED	ACTUATE NOTIFICATION APPLIANCES:	NOT USED	TRANSMIT FIRE ALARM SIGNAL TO SUPERVISING STATION	TRANSMIT SUPERVISORY SIGNAL TO SUPERVISING STATION	TRANSMIT TROUBLE SIGNAL TO SUPERVISING STATION	ACTIVATE ELEVATOR RECALL TO PRIMARY (EGRESS) FLOOR	ACTIVATE ELEVATOR RECALL TO ALTERNATE FLOOR	ACTIVATE ELEVATOR SHUNT TRIP	CLOSE SMOKE/FIRE DAMPERS IN RATED WALLS	RELEASE MAGNETIC DOOR HOLDERS, BY FLOOR INVOLVED	RELEASE ACCESS CONTROL DOORS, BY FLOOR INVOLVED	NOT USED	ACTIVATE FAN SHUTDOWN	NOT USED	NOT USED	NOT USED	NOT USED							
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB							
1	MANUAL PULL STATION	●	●					●			●		●																							1
2	SMOKE DETECTOR	●	●					●			●		●							●																2
3	HEAT DETECTOR	●	●					●			●		●																							3
4	DUCT SMOKE DETECTOR			●	●			●						●						●					●											4
5	SMOKE DETECTOR - ELEVATOR LOBBY - (EGRESS) FLOOR																																			5
6	SMOKE DETECTOR - ELEVATOR LOBBY - ALL OTHER FLOORS																																			6
7	SMOKE DETECTOR - ELEVATOR MACHINE ROOM																																			7
8	SMOKE DETECTOR - ELEVATOR HOISTWAY																																			8
9	HEAT DETECTOR - ELEVATOR MACHINE ROOM																																			9
10	HEAT DETECTOR - ELEVATOR HOISTWAY																																			10
11	ELEVATOR SHUNT AC POWER FAILURE																																			11
12	SPRINKLER WATERFLOW SWITCH	●	●					●			●		●																							12
13	SPRINKLER CONTROL VALVE TAMPER SWITCH			●	●			●						●																						13
14	FIRE ALARM AC POWER FAILURE					●	●	●							●																						14
15	OPEN CIRCUIT					●	●	●							●																						15
16	GROUND FAULT					●	●	●							●																						16
17	NOTIFICATION APPLIANCE CIRCUIT SHORT					●	●	●							●																						17
18	NOT USED																																			18
	NOT ALL OPERATIONS MAY APPLY TO THIS PROJECT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB							



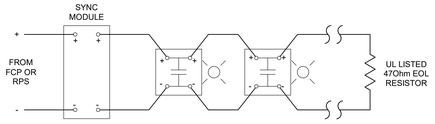
STANDARD DETECTOR BASE



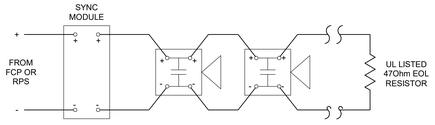
MANUAL PULL STATION



A/C UNIT SHUT-DOWN



VISUAL APPLIANCE



AUDIBLE APPLIANCE

TYPICAL DEVICE WIRING DIAGRAMS | 1" = 1'-0" | 3

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Issue	Date & Issue Description	By	Check
	04.13.2022 COORDINATION		

Seal/Signature

Project Name: KITT PEAK NATIONAL OBSERVATORY

Project Number

CAD File Name

Description: FIRE ALARM DETAILS AND SEQUENCE OF OPERATION

Scale

LV6.01