



Sample Data Room Assessment

2017.1014

October 14, 2017

DESIGN

*white space layout,
electrical & mechanical,
UPS, precision cooling,
power distribution
& generation*

BUILD

*turn-key construction,
general contractor services,
jobsite supervision,
equipment installation,
startup & commissioning,
single point of responsibility*

MANAGE

*assessment services,
infrastructure planning,
expansion planning,
remote monitoring,
preventative maintenance,
& service agreements*



EXECUTIVE SUMMARY

The Vision Data Room in Little Rock, AR was surveyed on October 14, 2017. The observations and recommendations contained in this report are based upon that site visit. The site serves as the primary data center for Vision Data. We were hired to give a report of the current status of this facility with an emphasis on making changes so that the room would have redundant air. This report will be based on the current as is status.

The goal of this report is to assess the existing conditions, establish reasonable requirements and make recommendations for changes, upgrades and improvements that should be considered. As mentioned above, a strong emphasis was given to make the data center cooling a 2N environment. This report is color coded (Red, Yellow, Green) to show what we think is the priority of the items to be addressed first etc. It helps to establish a baseline of where things are today and what should be considered in the future to meet planned changes. This report is intended to provide a holistic view of the critical infrastructure in the data center.

If Vision elects to implement any of the proposed items a detailed proposal will be submitted. All pricing shown in this report is for budget estimate only. We feel the budget pricing is helpful to determine the feasibility of implementing a project. A general scope of work was included to give an idea of what the estimate included. This scope of work is subject to change and is only included as a reference point.

The proposed cooling upgrade would have considerable energy savings. The energy to run the proposed cooling system would be at least half the current energy usage of the current cooling system. These savings could be quantified if this would help with upgrade justification.



CURRENT CONDITIONS

This section documents the current conditions in the Data & Comm. Rooms.



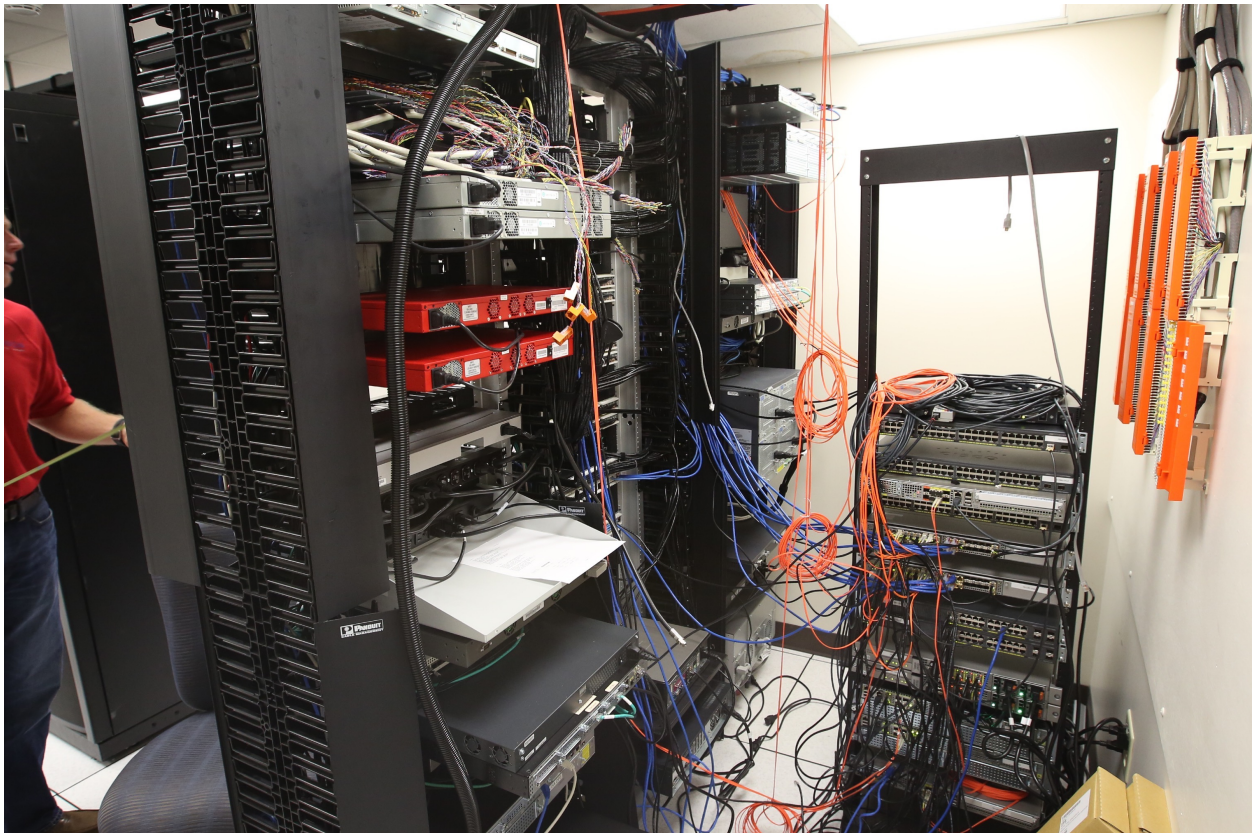
Picture 1. Data Room Front of IT Racks



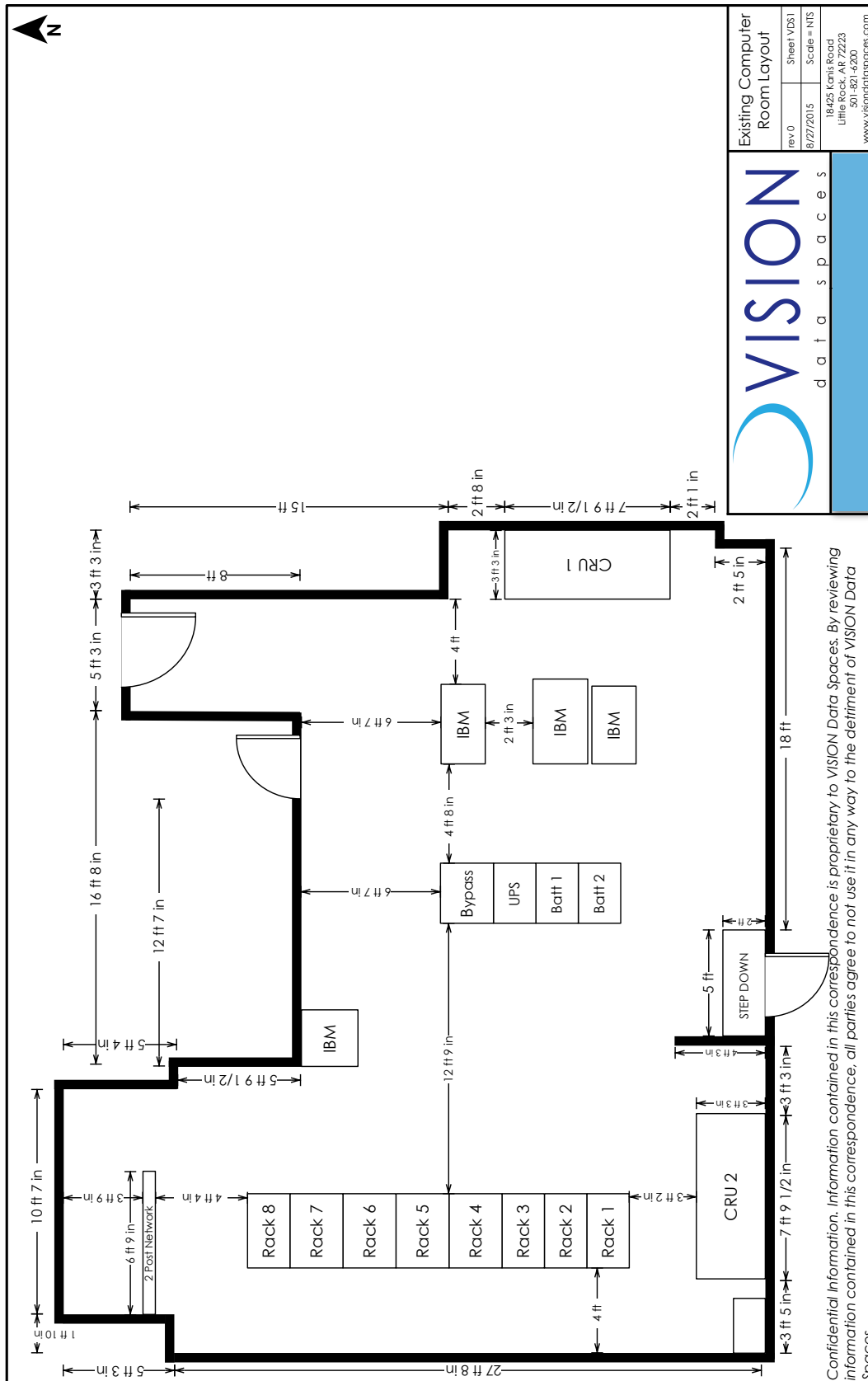
Picture 2. Data Room Front of Comm. Racks



Picture 3. Data Room Back of IT Racks



Picture 4. Data Room Back of Comm Racks



VISION

d a t a s p a c e s

Existing Computer Room Layout

rev 0

8/27/2015

Sheet VDS1

Scale = NTS

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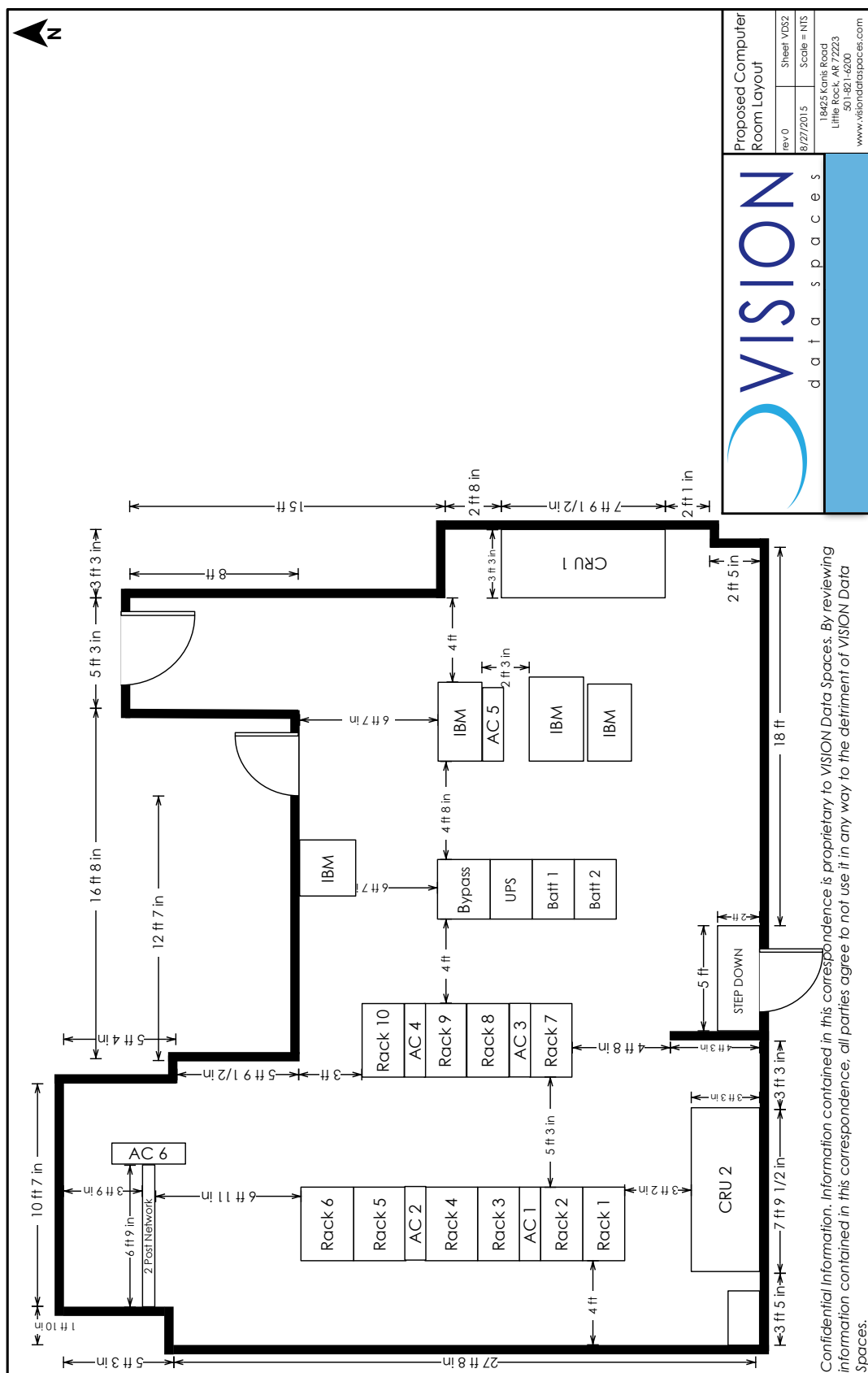
Drawing 1. Current Data Room Layout

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The table below summarizes the current rack conditions. Required airflow and heat rejection requirements were calculated from power usage. Additional load on the UPS was from the stand alone IBM unit.

Table 1. Current Rack Conditions

CURRENT RACK CONDITIONS					
	POWER (WATTS)	AIRFLOW REQUIRED (CFM)	HEAT REJECTION		
			TON	BTU/Hr	
RACK 1	3,600	450	1.02	12,283	
RACK 2	3,400	425	0.97	11,601	
RACK 3	2,500	313	0.71	8,530	
RACK 4	2,400	300	0.68	8,189	
RACK 5	3,200	400	0.91	10,918	
RACK 6	3,600	450	1.02	12,283	
RACK 7	2,800	350	0.80	9,554	
RACK 8	3,200	400	0.91	10,918	
COMM RACK 1	700	88	0.20	2,388	
COMM RACK 2	1,000	125	0.28	3,412	
COMM RACK 3	800	100	0.23	2,730	
IBM STAND ALONE	3,600	450	1.02	12,283	
TOTAL	30,800	3,850	8.76	105,090	



RECOMMENDATIONS

This section contains recommendations based upon the current conditions, anticipated growth, and the critical nature of the operation. The Critical Infrastructure Evaluation Matrix provides an overview of each area, the critical nature of that area, the recommended implementation time frame and the estimated cost associated with recommended changes or upgrades. A detail proposal can be offered if you want to implement any of these projects. Drawing 2 shows the proposed changes in the layout.

Table 2. Critical Matrix

CRITICAL INFRASTRUCTURE EVALUATION MATRIX			
	CRITICALITY	IMPLEMENTATION TIME FRAME	COST ESTIMATE
● COOLING SYSTEM	High	Immediate	\$110,000
● AIRFLOW MANAGEMENT	High	Immediate	(1)
● ENVIRONMENTAL MONITORING	Medium-High	Immediate - 1 Year	\$3,000-5,000
● INFRASTRUCTURE MANAGEMENT, MONITORING & ALARM NOTIFICATION	Medium-High	Immediate - 1 Year	\$5,000-\$7,000
● UPS SYSTEM	Medium	1+ Year	\$5,000
● LABELING	Medium	1+ Years	\$4,000-\$10,000
● RACK & ROOM LAYOUT	Medium-Low	1+ Year	\$0
● CABLE MANAGEMENT	Medium-Low	1+ Years	\$2,000/rack
● POWER DISTRIBUTION	Medium-Low	1+ Year	\$800/PDU
● BACKUP GENERATION	Low	None	\$0
● FIRE SUPPRESSION	Low	None	\$0
● SECURITY & ACCESS CONTROL	Low	None	\$0
● ROOM SIZE & CONSTRUCTION	Low	None	\$0
● SURGE PROTECTION	Low	None	\$0
● GENERAL BUILDING CONDITIONS	Low	None	\$0

(1) Part of Cooling Solution

The proposed rack densities shown in the chart below are based upon the existing rack densities. These are average maximum per rack. The densities are based on air flow and cooling limitations of existing system. This is the maximum density to still have a 2N system due to the limitations of the existing cooling system (which would become the backup).

Table 3. Proposed Rack Densities

PROPOSED MAXIMUM RACK DENSITIES					
	POWER (WATTS)	AIRFLOW REQUIRED (CFM)	HEAT REJECTION REQUIRED		
			TONS	BTU/HR	
RACK 1	4,000	500	1.14	13,648	
RACK 2	4,000	500	1.14	13,648	
RACK 3	4,000	500	1.14	13,648	
RACK 4	4,000	500	1.14	13,648	
RACK 5	4,000	500	1.14	13,648	
RACK 6	4,000	500	1.14	13,648	
RACK 7	4,000	500	1.14	13,648	
RACK 8	4,000	500	1.14	13,648	
RACK 10	4,000	500	1.14	13,648	
COMM RACK 1	1,000	125	0.28	3,412	
COMM RACK 2	1,000	125	0.28	3,412	
COMM RACK 3	1,000	125	0.28	3,412	
IBM STAND ALONE	3,600	450	1.02	12,283	
	42,600	5,325	12.11	145,351	

COOLING SYSTEM(S)

CURRENT CONDITIONS. The existing room is cooled with two 16 Ton Data Aire CRAC (Series DAAD-1632-C) cooling units. These are down flow units on a 8 inch raised floor. The unit is a DX unit, with condensers on the roof, as well as chill water cooling, dual coils. Maximum air flow is 8000 CFM per unit. We observed one unit using the DX coil and the other using the chill water coil. The two units have to both be running to adequately cool the current IT load and space. This is due to an inadequate air delivery system. The floor height is not capable of delivering the capacity of the two 16 Ton units. The cooling capacity of just one of the units is capable of cooling the room if you could get maximum output, which is limited by floor height. In our opinion, it is not practical to raise the floor or try to duct the units to maximize capacity.



Picture 5. Data Aire Typical of two

RECOMMENDATIONS. Install new InRow chilled water cooling units as shown on proposed room layout drawing (2). The existing system will be utilized as the backup system.

IMPLEMENTATION TIME FRAME. Immediate for 2N cooling solution.

SCOPE OF WORK

- Add six (6) InRow chill water cooling units that would supply the primary cooling for the IT equipment. The existing system would be used for backup. Fail over circuits would be installed to start backup system in case of primary failure. Two additional racks would be required with recommended solution.

COST ESTIMATE. \$110,000

AIR FLOW MANAGEMENT



CURRENT CONDITIONS. The existing air flow is not adequate to maximize the capabilities of the two 16 Ton CRAC units. The 8 inch raised floor has insufficient plenum volume to handle the 8000 CFM of air flow the Data Aires are capable of outputting. This is why it takes both unit running to cool the room. Tiles are placed in appropriate locations for best cooling practices. However, tile placement will not change the air delivery system.



Picture 6. Raised Floor Depth

RECOMMENDATIONS. See "Cooling System" on page 9.

CRITICALITY. High. For a 2N redundant cooling system the recommendation in the "Cooling System" section must be implemented.

IMPLEMENTATION TIME FRAME. Immediate for 2N solution.

SCOPE OF WORK

- See "Cooling System" solution on page 9.

COST ESTIMATE. INCLUDED IN "COOLING SYSTEM"

ENVIRONMENTAL MONITORING



CURRENT CONDITIONS. There is currently no environmental monitoring system in the room.

RECOMMENDATIONS. Basic temperature, humidity and dew point sensors should be installed at multiple locations within the room. Basic alarming and notification should be included as part of the environmental monitoring system.

CRITICALITY. Medium-High.

IMPLEMENTATION TIME FRAME. Immediate - 1 Year. Maintaining the appropriate temperatures, humidities and dew points in a server room is essential to ensuring satisfactory equipment operating status and life cycle.

SCOPE OF WORK

- Install an environmental monitoring system that monitors the temperatures and dew points of the Data Room and Comm Room.

COST ESTIMATE. \$3,000-\$5,000

INFRASTRUCTURE MANAGEMENT, MONITORING & ALARM NOTIFICATION



CURRENT CONDITIONS. The current space has no infrastructure management, monitoring or alarm notification. Currently the rack PDUs do not have metering capability.

RECOMMENDATIONS. Install a system to aggregate, manage, monitor and provide alarm notification and reporting. This ability is crucial to managing the data center as it grows. It provides historical information that can be used to predict potential problems in the future and can provide valuable information as additional IT equipment needs to be installed.

CRITICALITY. Medium-High.

IMPLEMENTATION TIME FRAME. Immediate - 1 Year. A system like this is relatively inexpensive to begin with and can be scaled to grow as the infrastructure grows. It requires network connectivity to all of the infrastructure devices that it is monitoring.

SCOPE OF WORK

- Install network management cards in all devices to be monitored.
- Install, configure and monitor a Data Center Infrastructure Management software tool.

COST ESTIMATE. \$5,000-\$7,000

UPS SYSTEM

CURRENT CONDITIONS. Multi-module UPS. APC Symmetra PX80. Input: Three Phase + Neutral + Ground 208/120V AC. Output: Three Phase + Neutral + Ground 208/120V AC. Configured to 40KVA N+1 (5- 10KVA Power Modules, 14 battery strings (56 Batteries)). 43 Minutes of runtime at current load of 30.6kW, 33.3kVA. Maximum capability is 80kVA N+1 with addition of power modules. The current load of UPS is 77% due to an imbalance of phases. Phase 1- 76%, 106Amps; Phase 2 - 44%, 63 Amps; Phase 3 - 70%, 90 Amps; Neutral - 30 Amps. A 2N Power System with "A" & "B" bus system would be something to consider for more backup power redundancy.



Picture 7 Front of Symmetra UPS.

	LOCATION	CAPACITY (W)	% LOAD	OUTPUT (W)
UPS	Data Room Floor Mount	40,000	77%	30,800

RECOMMENDATIONS. Install one additional power module to upgrade the UPS to 50KVA N+1. This would put the UPS at approximately 62% loaded. We recommend an ideal load on the UPS to be 75% or below.

CRITICALITY. Medium.

IMPLEMENTATION TIME FRAME. 1+ Years.

SCOPE OF WORK

- Install a new 10kVA Power Module.

COST ESTIMATE. \$5,000

LABELING



CURRENT CONDITIONS. There is minimal labeling of the Racks, PDU's, Power Cables, Panels, etc.



Picture 8. MGE PMM Panel with no labeling

RECOMMENDATION. Label all devices for quick recognition

CRITICALITY. Medium.

IMPLEMENTATION TIME FRAME. 1+ Years.

SCOPE OF WORK.

- Label all Racks, PDU's, Cables, Panel, etc

COST ESTIMATE. \$Cost varies on degree of detail. Up to \$10,000. This would include verifying cables and feed locations. Tracing all connections.

RACK & ROOM LAYOUT



CURRENT CONDITIONS. The Main Data room has eight Dell and APC 24" wide enclosed racks. The COMM area has three open two post racks.

RECOMMENDATIONS. None unless Cooling System is upgraded. Layout would need to be similar to Proposed layout drawing

CRITICALITY. Medium-Low.

IMPLEMENTATION TIME FRAME. 1+ years

SCOPE OF WORK

- Configure racks as shown on Proposed Layout Drawing 2.

COST ESTIMATE. \$0

CABLE MANAGEMENT SYSTEMS



CURRENT CONDITIONS. Eight 24" Dell and APC racks. Cabling could be cleaned up to allow better air flow.



Picture 9. Back of racks



Picture 10. Wiring at back of rack - Restricts air flow

RECOMMENDATIONS. Wider racks would allow cabling to be less intrusive to air flow.

CRITICALITY. Medium-Low. The existing cable management is functional. If densities increase additional airflow will be required.

IMPLEMENTATION TIME FRAME. 1+ years

SCOPE OF WORK

- Install APC 30" Wide racks

COST ESTIMATE. \$2,000/rack

POWER DISTRIBUTION SYSTEM(S)



CURRENT CONDITIONS. Single phase APC Zero U PDU



Picture 11. Zero U rack PDU

RECOMMENDATIONS. These should be labeled “A” bus and “B” bus. The UPS is currently out of balance. Metered PDUs are recommended.

CRITICALITY. Medium-Low. The existing power distribution method is adequate.

IMPLEMENTATION TIME FRAME. 1+ Years.

SCOPE OF WORK

- Install Metered PDUs

COST ESTIMATE. \$800/PDU.

BACKUP GENERATION



CURRENT CONDITIONS. The current generator is adequately sized for the facility.

RECOMMENDATION. None

CRITICALITY. Low

IMPLEMENTATION TIME FRAME. None.

SCOPE OF WORK.

- None.

COST ESTIMATE. \$0

FIRE SUPPRESSION SYSTEMS



CURRENT CONDITIONS. The Data and Comm rooms currently have an adequate dry agent FM200 fire suppression system.

RECOMMENDATIONS. Maintain maintenance contract on the system

CRITICALITY. Low.

IMPLEMENTATION TIME FRAME. None

SCOPE OF WORK

- None

COST ESTIMATE. \$0

SECURITY & ACCESS CONTROL



CURRENT CONDITIONS. The current space and building has adequate key fob access security. There are cameras in the Data room.

RECOMMENDATIONS. None.

CRITICALITY. NONE

IMPLEMENTATION TIME FRAME. N/A.

SCOPE OF WORK

- None

COST ESTIMATE. \$0

ROOM SIZE & CONSTRUCTION



CURRENT CONDITIONS. The current room size and construction are adequate.

RECOMMENDATIONS. None.

CRITICALITY. Low

IMPLEMENTATION TIME FRAME. N/A

SCOPE OF WORK

- None.

COST ESTIMATE. \$0



SURGE SUPPRESSION SYSTEM

CURRENT CONDITIONS. Did not observe. There was possibly surge protection in switchgear room.

RECOMMENDATIONS. Surge protection is recommended for all Data Rooms.

CRITICALITY. Low

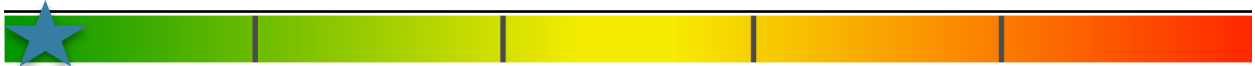
IMPLEMENTATION TIME FRAME. None

SCOPE OF WORK

- None

COST ESTIMATE. \$0.

GENERAL BUILDING CONDITIONS



CURRENT CONDITIONS. General Building conditions were good.

RECOMMENDATIONS. None

CRITICALITY. None

IMPLEMENTATION TIME FRAME. None

SCOPE OF WORK

- None

COST ESTIMATE. \$0