

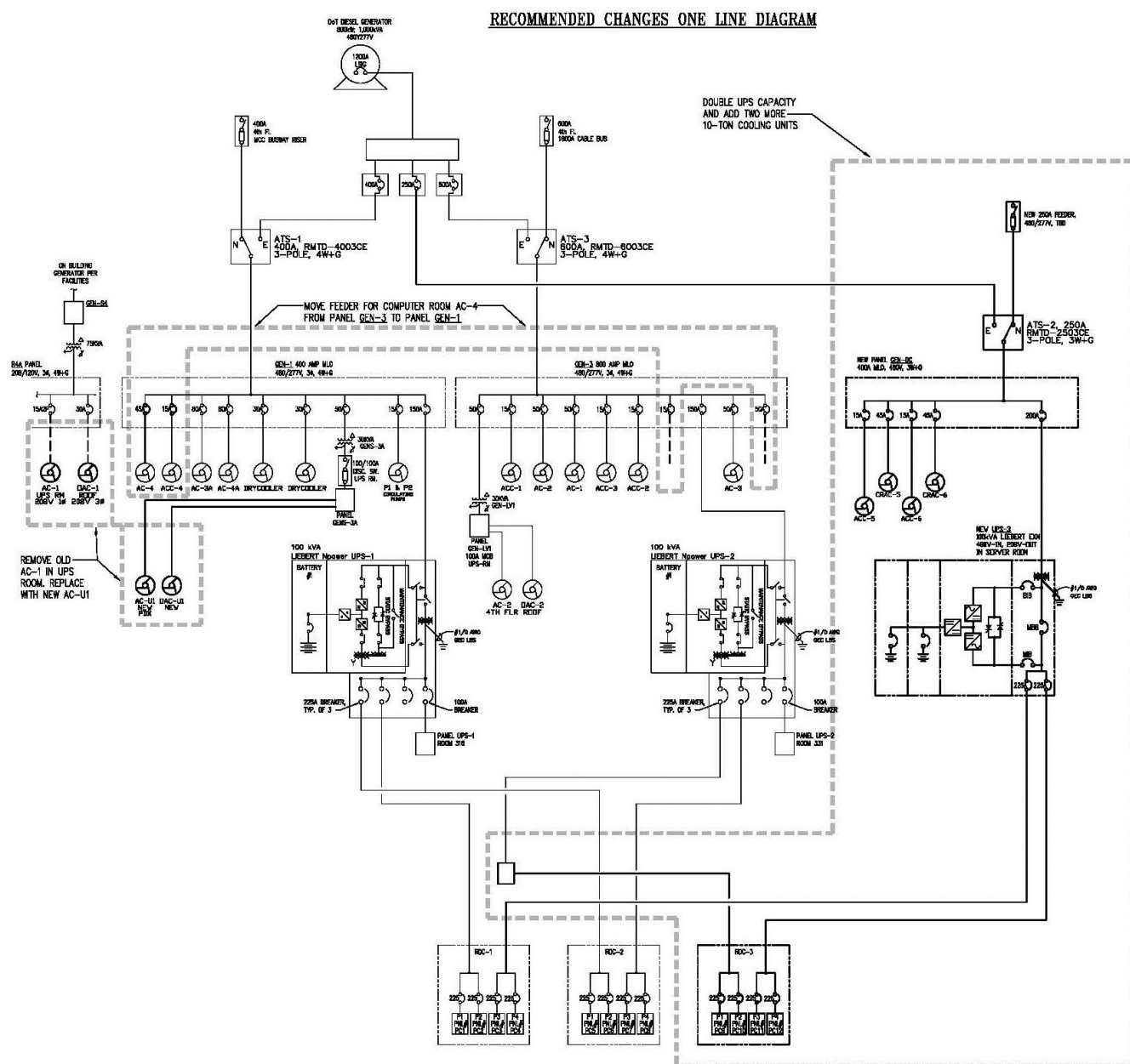
TechSite Combined Recommendation for Data Center East

4 January 2019

(From Site Assessment Report, Dated 10/5/18)

There are several modifications which will improve operations at the East Data Center. DoT personnel have indicated that their objectives for this facility are 1) additional power capacity to support an impending IT upgrade, and, 2) higher infrastructure reliability. To that end, we have assembled a combined recommendation which we believe will best meet those objectives.

The conceptual recommended one line diagram below shows recommended changes needed to increase data center critical load capacity.



The increase in power to IT equipment requires an increase in cooling capacity. Two more 10-Ton computer room air conditioners (CRAC) are needed along with the new UPS. The new CRACs are fed from a new electrical distribution panel. One of the existing CRAC units is moved electrically from panel Gen-3 to panel Gen-1. This move distributes the CRAC feeds so that not all cooling is lost if one of the ATSs or panels fails.

In order to increase the UPS critical load capacity from 80kW to 160kW dual bus, a third UPS is proposed. Currently UPS-1 backs up UPS-2 via dual-corded IT equipment. Adding a third UPS doubles the dual-corded load capacity by having UPS-3 back up UPS-1 and UPS-2. UPS-1 would back up UPS-2 and UPS-3, and UPS-2 backs up UPS-1 and UPS-3. A third remote distribution cabinet (RDC-3) is added to enable this doubling of available UPS power.

The older UPS room cooling unit is replaced and fed from panel GEN-1, while the backup cooling unit for the UPS room is fed from panel GEN-3. This reduces the chance of losing the UPS room cooling if one ATS fails.

The One Line schematic above conceptually illustrates the expansion of the critical power bus to the East Data Center facility. The easiest way to retrofit an additional power bus in a working data center is to install the majority of the components prior to disconnecting any existing critical loads. This reduces the amount of time required to tie-in the new system. It will also usually allow some amount of commissioning prior to putting the equipment in service. The budget for the entire dual bus modification (both IT power and air conditioning) is below:

Combined Recommendations to increase facility critical load to 160kW:

- ✓ Install new 250 amp ATS
 - ✓ Install new ATS-2, and Distribution Panel GEN-DC
 - ✓ Install two new 10-Ton CRAC units from GEN-DC and relocate power for one 10-Ton Server Room CRAC unit
 - ✓ Install new UPS Room HVAC unit
 - ✓ Install new 100 kW UPS in Server Room (UPS-3)
 - ✓ Install one new dual-feed remote distribution cabinet (RDC-3)
 - ✓ Rework power to existing and new RDCs so that existing and new UPS power is distributed evenly
 - ✓ Can be installed with minimal impact on data center operations
- Total Estimated Budget \$898,600

Proposed Detailed Engineering Cost: \$ 28,150
Arc Flash Hazard and Breaker Coordination Analysis \$ 20,000

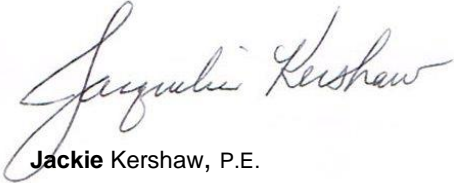
Clarifications:

1. The Detailed Engineering price factors in a 15% credit to the overall design scope estimate based on having previously performed a Site Assessment and Conceptual Design.
 - a. The 15% credit assumes the final design follows the scope discussed above. Deviation from stated scope may increase design time required and the cost.
2. The Detailed Engineering pricing includes only the detailed design and bid documentation. Engineering Construction Administration (performed during the construction process) will be priced separately after completion of this work.
3. The Arc Flash Hazard, Short Circuit and Breaker Coordination work priced above would cover the data center systems only (vs. the entire building's electrical infrastructure).



Thanks for considering this service offering. If the scope is acceptable, let me know and we will create the documentation and full proposal you need for internal review of these services.

Sincerely,



Jackie Kershaw, P.E.

Vice President

TechSite

