

# DATA CENTER INFRASTRUCTURE DESIGN

*Performance is in the details*

Your unique data center needs require a cohesive team of Registered Communications Distribution Designers (RCDD), Project Management Professionals (PMP), System Engineers, Computer Aided Drafters (CAD), and Certified BICSI Installers and Technicians. Our certified team of professionals ensures that every MorganFranklin project meets or exceeds all industry standards — and yours.

Our systematic data center design methodology focuses on five essential factors to meet your specific needs:

- space allocation
- power distribution
- HVAC
- grounding
- infrastructure distribution

## SPACE ALLOCATION

An optimal data center design that maximizes available space must first consider the room's layout, cabinet depth requirements, fire sprinkler clearance, and other factors. For example, aisle way widths must comply with the Americans with Disabilities Act (ADA) and safe egress in emergencies should be provided.

Maximization of available space is key to the efficient use of the data center, but good cabinet orientation can have a positive impact on equipment cooling. Because of this critical consideration, 'hot and cold' aisles are planned for maximum cold flow through the front of the equipment.

## POWER CONSUMPTION AND DISTRIBUTION

Space allocation is the foundation of the data center space. With this segment complete, power consumption and distribution can be addressed by assessing your requirements and crafting a robust solution. Calculation of the expected load (using an industry average Kilowatt per cabinet figure), is performed as well as an assessment of any existing building busses and feeders. Our goal is to assure adequate power supply for present and future needs, and to mitigate points of failure by creating redundant power sources and paths.

Additional consideration is given to load balancing across the power system. Phase diversity is a part of this approach and is also used to provide cabinet power from three sources – allowing dual power supply equipment to continue operation, unabated, in the event of phase loss.

Power management is part of the ongoing health and security of the power system. To that end, IP-based monitoring and control systems are merged with databases and reporting to give full visibility and control of the system. You can expect a diverse and resilient power system as a result of these design efforts.

*Subtle details such as how the data center lighting may be affected by cabinet position are often overlooked by some integrators. Our design team achieves a higher level of performance by focusing on just such details.*



## HVAC

Proper HVAC design is, in part, a function of the power system being implemented. Previously calculated loading from the power design stage is factored as well as 'hot and cold aisle' design principles from the space allocation stage. Consideration is also given to ceiling height, thermal insulation, under-floor obstructions, and expected equipment growth.

## BONDING AND GROUNDING DESIGN

A critical design element of the data center is a comprehensive bonding and grounding system. All active equipment, cabinets and ancillary equipment are part of the bonding and grounding design. The ground reference point for the data center is the Telecommunications Main Grounding Bar (TMGB). The Telecommunications Bonding Backbone (TBB) cable extends the reference point to the Telecommunications Ground Bar (TGB) within the data center space. This design serves as the framework for an ANSI/EIA/TIA-607 compliant design.

With this EIA/TIA-mandated design, all data center components and personnel can be safely and reliably protected from transients, spurious emissions, and incidental contact with live conductors.

## INFRASTRUCTURE DISTRIBUTION

Infrastructure distribution is the final detail of the data center design, which, based on the client's needs, can be complex and multifaceted. We evaluate customer requirements to develop a baseline design and then work closely with the client to refine and mold the infrastructure design. We first determine the necessary media types within the data center and any required classifications. We then determine the topology of the media and establish the amount of media per cabinet. Below is one example of this process:

*A recent client required a large concentration of fiber in every cabinet which terminated into a patch field row. Multiple classifications required rigidity at the user interface, but also required flexibility when implementing moves, adds and changes. We recommended the use of 24 port keyed LC cassette technology with 48 strand ribbonized fiber for the backbone fiber. This allowed us to put multiple classifications in a single cable and terminate them into the cassettes. The keyed LC cassette connectors kept the classifications separate from each other. This solution created a 72 fiber port concentration in a single rack unit (RU) of space, and each cassette was capable of being swapped out for a different keyed cassette. This dynamic environment allowed the client to add/swap classifications without installing more infrastructure.*

Once infrastructure requirements are gathered and documented, we design pathways within the data center. All pathways meet or exceed existing industry standards and fire codes for proper fill ratios, loading, and fire stopping systems. Our extensive experience with pathway design includes wire basket tray, enclosed tray, cable ladder, plastic multi-tier cable tray, and Protected Distribution Systems (PDS) for classified cabling.

*Growth, and the trend toward higher processing in smaller form factors, contributes greatly to the total heat load of the data center. Conventional methods of cooling such as forced air and row coolers may not suffice. Cases such as these may require state-of-the-art inline or glycol (water) cooling to control processor operating temperatures.*