

May 26, 2021

Constructing a Data Center: Understanding the Key Issues

**Richard Reizen**

Construction

Cryptocurrency & Blockchain

With society's increased reliance on working remotely, via a vis through "the cloud" and need for unfettered amounts of storage and processing power, data centers seem to be popping up almost everywhere you turn. In fact, data center construction has been growing exponentially to satisfy these computing needs. From the outside, they may look like a simple warehouse structure with a goal of protecting an expansive array of servers and other computer equipment. Thus, one may conclude that the construction of such a basic structure may be fairly straight-forward. However, despite this relatively simple exterior, the construction of a data center is anything but routine.

Jones Lang LaSalle (JLL), in its ["2020 Year-End Data Center Outlook,"](#) offered the following reasons for the incredible growth of data center construction:

- Insatiable cloud demand across the globe.
- Even with pandemic slowdowns and leasing backlogs, enterprise colocation demand picked-up.
- Robust M&A activity and operator investment.
- Anticipated demand for 5G networks
- Sustainability goals, which impact green data center design, are not slowing down.

For these reasons identified by JLL, and given the rise in construction of cryptocurrency mining facilities, which have many of the same features/issues as with construction of large scale data centers, we believe that data center construction will continue to experience growth and expansion in the coming years. In fact, [according to recent news reports](#), data center construction is expected to grow at a compound annual rate of approximately 5% over the next five years.

Key Construction Considerations

It is important to understand not only preliminary planning issues you may incur, but also common design issues. Having a comprehensive understanding of key construction contract provisions will lend itself to better and more efficient project development and construction. Below, we will briefly examine some of the key components of data center construction, which will likely impact your next data center project.

Location and Site Procurement

Whether you are building a new facility or retrofitting an existing building, location is crucial for several reasons:

- Does the local utility have a sufficient power infrastructure to support the substantial, and ongoing, demands of the project?
- Are there local or state regulations which may impact the project?
- Are there climate issues in the proposed location that should be considered which may impact the heating/cooling of the facility?

- Is the location a safe one from a security standpoint (given the type of data that will be stored there)?

Design Issues

Depending upon where the project is located, the aesthetics of data center design may not be important as the “substance” of the design.

1. Power Demands

We would argue that the most important design issue facing the data center designer and constructor is the issue of meeting power demands. Not only are extreme amounts of energy necessary to support the data systems, but also one must power the required redundancy, meet necessary security requirements (both for the data and the structure itself) and satisfy cooling demands. As discussed above and in further detail below, there has been an increased push for “green” data centers. In that instance, it may also be possible to construct a data center with the ability to share excess electricity.

2. Cooling, Energy Consumption and Sustainable Alternatives

The increased demands, and sheer amount of servers, located in a data center, comes with the need to design powerful and efficient cooling systems. The costs of designing and building those systems can be substantial. While traditional air-handlers and room air conditioners are still most prevalent (liquid cooling options are gaining traction), there are numerous innovations which should be considered:

- Hydrogen fuel cells to store excess electricity.
- Solar panels which utilize energy storage.
- The use of gray water to cool rather than municipal water sources for liquid cooled systems
- Other water sources for cooling.
- The use of rain capture systems.
- Efficiency through analytics and automated systems which increase cooling system and efficiency.

3. Data Room Design

The data room design should consider adaptability, flexibility and options for future expansion. The design should also take into consideration certain electrical and cooling systems which may impact overall layout. Depending on the type of equipment utilized, layout (i.e. electrical, HVAC, etc.) can affect efficiency and latency and must be considered. Finally, racking must be carefully selected.

4. Security

Due to the importance of the ongoing operation of data centers and the information which is stored within, overall security is crucial. Not only must physical security of the site be addressed, but protections must be put in place for the information which is stored at the facility.

First, there is the physical security to the center. Given the cost of the equipment located in large data centers and the damage that would occur by physical destruction or damage of equipment, good security systems are necessary. Typically, data center design incorporates limited access points to the interior of the building (i.e. doorways, windows, etc.). However, in addition to these features, additional security measures may include, fencing or barriers, motion activated lights and cameras, biometric scanners, and possibly even 24 hour in person security depending on the location.

Second, and of equal importance, is the protection of information stored at the facility. Given that companies may be relying on the facility for cloud computing purposes, back-up power and redundant systems are key. In addition, network security is essential. The degree of such protections hinges on the type(s) of information which may be stored at your facility. For example, a data center which houses proprietary data or customer information may require higher levels of network security than one which does not.

Key Contract Provisions

Another key to a successful data center project is proper contract documentation. Having contractual protections put in place prior to commencement of your project will limit future risk and, hopefully, provide for a smooth construction of the facility. Although the following is by no means an all-encompassing list of important provisions to consider, the four categories noted below should be reviewed and assessed.

Force Majeure

Here, a party's contractual obligations may be altered due to an event which is beyond their control. Recent supply chain issues, which have been ever prevalent in many of today's construction projects, may impact sourcing of necessary equipment. There is also the issue of climate impacts and what should and cannot be anticipated. Depending on how this provision is drafted, a force majeure event may include a scenario such as this (or others), and may result in increased costs, delays or even a possible termination event.

Scheduling and Liquidated Damages

Establishing an appropriate schedule which utilizes phasing and sequencing of trades performing construction work may allow for quicker completion times. However, one should also consider the risks associated with late completion of the facility, which can occur for a variety of reasons (i.e. labor issues, equipment delays, trade bottlenecks, etc.). In the event your project is delayed, a liquidated damage provision, may reduce the financial impacts associated with a late completion.

Performance Guarantees

When extensive amounts of equipment are necessary, performance and efficiency become increasingly important. Both can be impacted by a myriad of factors including, but not limited to, operating temperature, layout, or even improper installation/construction. Additionally, equipment may simply not function at the specified levels. In this case, performance guarantees can provide certain financial protections in the event reduced efficiency impacts your bottom line.

Equipment Warranties

In connection with the foregoing discussion of performance guarantees, equipment warranties are equally important. As with any type of advanced equipment component, they tend to malfunction which can impact the operation of your facility. Having a strong warranty in such circumstances can lend itself to reduced replacement costs.

Conclusion

In conclusion, despite the simple exterior features of a large-scale data center, construction and operation of such a facility is anything but mundane. A thorough understanding of the construction process, including contract requirements, is key to keeping your project on track and limiting potential risks for late completion, equipment malfunction/failure or even possible termination by a contractor.

Likewise, one must give particular thought to site selection, layout, energy consumption/sustainability, security and equipment procurement in order to increase the likelihood of a successful energy efficient center. Although these considerations are applicable to all data centers, the importance of each may be impacted by the type of data being stored at the facility.

For more information or to discuss any of these topics, please contact a member of Gould & Ratner's [Construction Practice](#).