

Construction Cost of a 5000-Rack Data Center



Overview

Data Center Construction Cost | 2025 Cost Breakdown | Cortex Data center construction is expensive. These are not standard commercial buildings — they are.

Key Takeaways

Building a 5000-rack data center can cost roughly \$500 million to over \$1 billion, depending on power density, redundancy tier, and location. Cost Estimation Overview

The total construction cost of a 5000-rack data center depends primarily on IT load capacity, tier level, and regional construction costs. A typical large-scale facility of this size may require 50–100 MW of IT power, assuming an average of 10 kW per rack . Using industry benchmarks, the average construction cost per megawatt in the U.S. ranges from \$7 million to \$12 million per MW, with premium markets like Northern Virginia or Silicon Valley reaching \$14–18 million per MW . This translates to a total CapEx of \$350 million to \$1.2 billion for a 5000-rack facility, depending on location and redundancy requirements.

Major Cost Components

- Land and Site Preparation: Costs vary widely by region, from \$50,000 to \$500,000 per acre, plus grading, utilities, permitting, and environmental work . Urban areas are more expensive, while remote sites may require additional infrastructure investment.
- Building Shell and Structural Work: Includes steel, concrete, reinforced flooring, and roofing designed to support heavy racks. Typically \$3–5 million per MW .

- **Electrical Infrastructure:** Substations, generators, UPS, switchgear, and redundant distribution systems are often the largest cost driver, averaging \$3–5 million per MW . Higher uptime tiers (Tier III or IV) increase complexity and cost.
- **Mechanical and Cooling Systems:** Air or liquid cooling systems, chillers, and HVAC typically cost \$2–4 million per MW . Efficient cooling reduces operational costs and improves PUE (Power Usage Effectiveness).
- **Fire Suppression, Security, and Controls:** Includes sprinklers, gas suppression, access control, and monitoring systems, costing \$0.5–1 million per MW .
- **Additional Development Costs:** Architectural and engineering design (5–8% of construction cost), construction management (3–5%), commissioning and testing (1–2%), and utility interconnection (\$1–10 million depending on distance and capacity), .

Regional and Tier Considerations

- **Premium markets** (Northern Virginia, Silicon Valley) can increase total costs by 20–50% due to labor and material premiums .
- **Tier II vs Tier III:** Tier III facilities require concurrent maintainability, adding redundancy and increasing costs, while Tier II may be sufficient for campus-level redundancy strategies .
- **Power Density:** Higher kW per rack increases electrical and cooling infrastructure costs but can reduce footprint and land costs.

Summary

For a 5000-rack data center, assuming 10 kW per rack and a Tier III design, the estimated construction cost is:

- **Low-end** (moderate location, Tier II): ~\$500 million
- **Average U.S. market** (Tier III, 50–100 MW): ~\$700–900 million
- **Premium market** (Tier III/IV, high-density, Northern Virginia/Silicon Valley): \$1–1.2 billion These estimates cover land, building shell, electrical and mechanical systems, fire suppression, security, and commissioning, but exclude IT equipment such as servers, storage, and networking gear . Careful planning, modular design, and efficient cooling strategies can optimize costs and improve long-term operational efficiency.

Article Content

Data Center Rack and Stack Cost Guide for U.S. Companies in 2025

Explore our comprehensive Data Center Rack and Stack Cost Guide, offering insights into pricing for rack installation cable

Contact Us

Continue your research online:

Website: <https://rivomultitrade.co.za>

Technical inquiry: <https://rivomultitrade.co.za/contact.html>

This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

