

DATA CENTER UPDATE

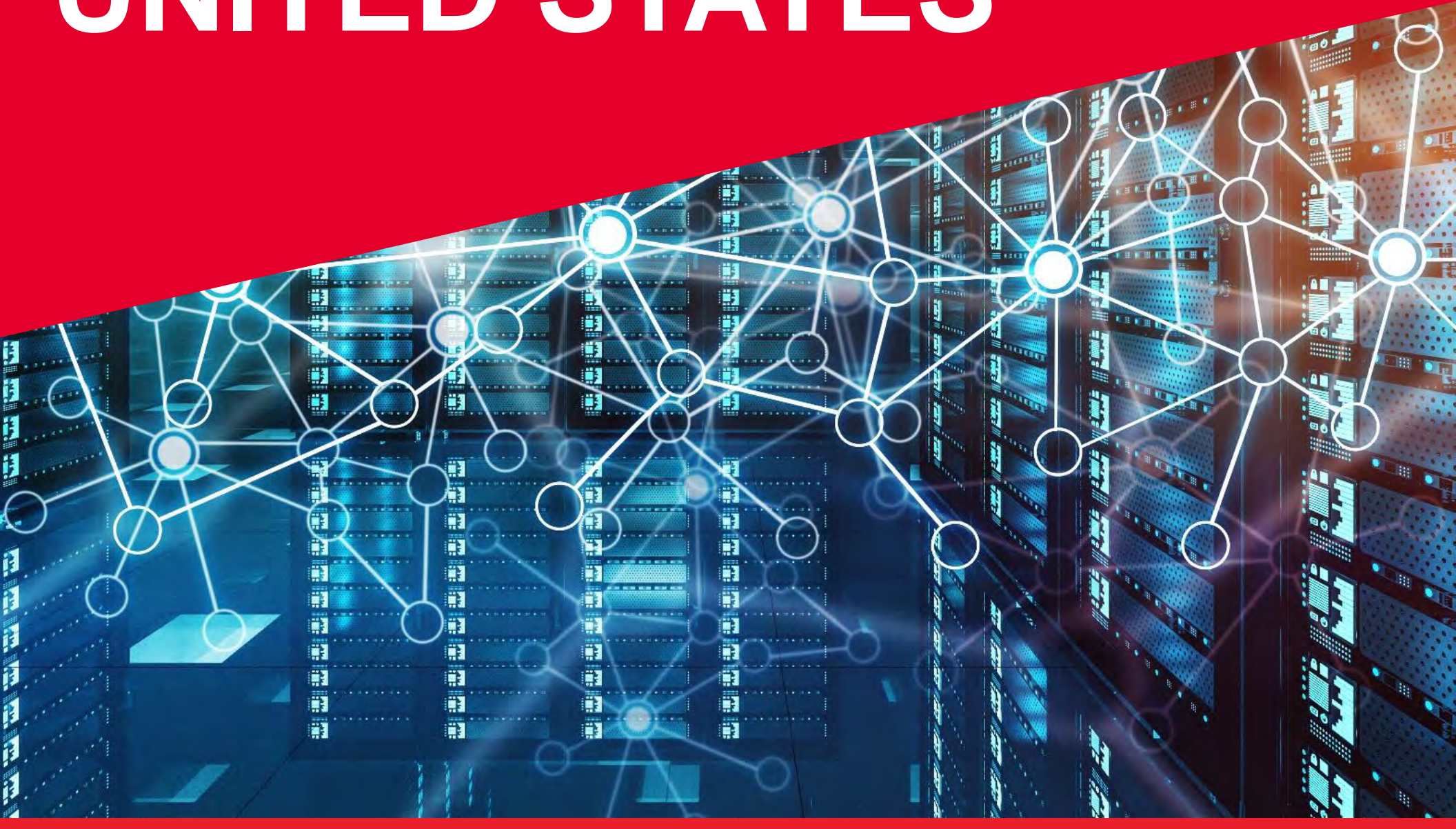
AMERICAS:

United States and Canada



DATA CENTER UPDATE

UNITED STATES



Key Indicators



Under Construction
210 MW



Vacancy
5%



Absorption (Second Half)
12 MW

GLOBAL DATA CENTER ADVISORY GROUP

Cushman & Wakefield's [Data Center Advisory Group](#) is a global team of elite professionals delivering specialized real estate solutions for mission critical users, owners, and environments. With scalability, reliability, and security as a driving force, our highly knowledgeable and responsive professionals guide clients to make effective financial decisions. Our expertise ranges includes colocation facilities, control centers, greenfields, powered shell, and trading floors. We lend additional value through our understanding of global dynamics and their impact on local markets.

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Market Overview

Atlanta has encountered the fate of many similarly hot markets, with absorption at just 12 megawatts in the second half of 2021, due to the lack of available large-scale capacity. Vacancy has continued to tighten to just five percent, with several new phases in process by DataBank, Digital Realty, H5, and Switch, with work on the colossal Meta campus progressing rapidly. Additional large projects remain in planning, including several potential builds by Microsoft across the metropolitan area. The investment market stayed red hot in recent months, with larger buyouts of QTS and DataSite having local components and individual deals by serial acquirers Landmark Dividend and Strategic Capital. Atlanta is home to several enterprise facilities thanks to local corporate and regional headquarters, suggesting further possibilities for sale-leaseback transactions. Expect further absorption locally as phased construction completes through the end of 2023, along with greater connectivity options and investment deals.

Ecosystem Developments

- **Peachtree Corners** has elected to migrate city applications to OVHcloud, integrating systems from the local autonomous vehicle testing center and membership of the Curiosity Lab Innovation Center. OVHcloud will allow for scalability and improved analytics.
- **Microsoft** and AT&T have partnered to launch a local Azure Edge zone, providing Azure services close to the user combined with 5G connectivity. AT&T cited initial clients from the entertainment and drone industries, with Microsoft planning considerable local development across several data center campuses.
- **Bandwidth IG** has added connectivity to Digital Realty locations in Atlanta and Silicon Valley, with 56 Marietta as the newly-added local option. Bandwidth IG offers a variety of dark fiber solutions across these two major markets.
- **Linode** launched NVMe block storage first locally, with Atlanta the first of eleven markets to receive this new option. The new service will allow for increased performance and improved efficiency.
- **Zayo** completed a new Atlanta to Dallas fiber route in autumn, with the 822-mile system touted as the most direct route between the two key markets. The new route is part of eight major routes completing across the country through the end of 2022.
- **Meta** has secured power from three new solar projects across the state of Georgia, with 287 megawatts of power for the local Social Circle campus. The power will be provided via a partnership between Walton Electric Membership Corporation and Silicon Ranch, with another 125 megawatts coming soon for the social media giant.

Growing Market Strength

Atlanta had a fantastic finish in our [Global Data Center Market Comparison](#), tying Chicago for fourth place globally and revealing the continued local growth. The highly well-connected downtown area combined with all major cloud services available, robust construction pipeline, and consistently tight vacancy led to an impressive placement in comparison to other key markets. The continued low cost of land and available incentives ensure further interest in coming years, particularly as other cities become more expensive and power-constrained.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
DataBank	ATL3	22,000	4.5	Under Construction / Q2 2022
Digital Realty	250 Williams	41,661	2	Under Construction / Q3 2022
Switch	Atlanta 1 (new phase bldg 1)	500,000 (est)	50	Under Construction / Q4 2022
	Atlanta 3 Sector 1	450,000	15	Under Construction / Q1 2023
	Atlanta 1 (new phase bldg 2)	400,000 (est)	35	Under Construction / Q4 2023
Meta	Social Circle	1,500,000	100 (est)	Under Construction / Q4 2023
H5	Atlanta	20,000	3	Under Construction
QTS	Metro Atlanta	1,150,000	100 (est)	In Planning / 2024
CyrusOne	Douglasville	440,000	50	In Planning
Stack Infrastructure	Lithia Springs	130,000	12	In Planning
Microsoft	Palmetto	250,000	25 (est)	In Planning
	Douglasville	980,000	100 (est)	In Planning
	East Point	250,000	25 (est)	In Planning

Recent Site Sales

PROPERTY	SIZE (Acres)	SALE DATE	SALE PRICE	BUYER	SELLER
4165 Ben Hill Rd, Atlanta	8	Nov-21	\$1,000,755	Microsoft	McDonald Development

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
1650 Union Hill Rd, Alpharetta	167,705	Feb-22	\$80,000,000	Strategic Capital	Legacy Investing
2480 Rock House Rd, Lithia Springs	75,000	Dec-21	\$101,000,000	Landmark Dividend	IPI Data Center Partners
1130 Powers Ferry PI SE, Marietta	73,000	Oct-21	\$49,740,000	American Tower	DataSite
5295 Brook Hollow Pkwy, Norcross	86,842	Aug-21	\$6,550,000	CleanSpark	MDRE Equities
Three Assets (Atlanta, Suwanee)	1,827,417	Aug-21	\$900,000,000 (est)	Blackstone	QTS

Key Indicators

**Under Construction**
194 MW**Vacancy**
7%**Absorption (Second Half)**
65 MW

MORE INFORMATION

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Market Overview

Consistent construction completions led to more capacity for hyperscalers and others to take in the second half of 2021, leading to a record 65 megawatts absorbed across Chicago, tightening overall market vacancy to just seven percent, returning to an all-time low. While nearly 200 megawatts are under construction among hyperscalers and colocation operators alike, the bigger story is the nearly 600 megawatts under planning, including by new market entrants Prime Data Centers and CloudHQ. Prime is proposing their largest build to date in Elk Grove Village and are in process of acquiring a site directly from the city to launch construction. CloudHQ closed on the former United Airlines campus in Arlington Heights at the end of the year and are planning a 252-megawatt campus over three phases. As the entire Chicago colocation market is currently sized at just under 500 megawatts, these upcoming developments will cause Chicago to become a one-gigawatt market, at full completion.

As widely reported in the data center and business press, several data center REITs have been taken private or are in process in recent months, with many having local assets. Blackstone completed their \$10 billion acquisition of QTS at mid-year, with 2800 South Ashland included in the deal. American Tower completed their own \$10 billion acquisition of CoreSite late in the year, with two downtown assets included, and KKR and GI Partners remain in contract for their \$15 billion acquisition of CyrusOne, with buildings in Lombard and Aurora as part of the deal. Impressive performance for Chicago over the second half, with more coming throughout 2022.

Ecosystem Developments

- **Commonwealth Edison** has acquired the former CME Group building at 333 S La Salle St in downtown Chicago, with plans to convert the building to a new substation. The renovated property could potentially provide power for future data center expansion throughout downtown, albeit not before launch in 2026.
- **Amazon Web Services (AWS)** has partnered with Verizon to bring Wavelength Zones to Chicago alongside Houston and Phoenix, with providing compute services alongside telecommunications networks. The two companies will be combining forces in further cities globally. AWS also partnered with Boingo Wireless to set up a new private network at O'Hare Airport as part of the overall airport modernization project.
- **Microsoft** announced a second peering location for Azure ExpressRoute locally, joining new international deployments in Seoul and Pune. ExpressRoute allows for connectivity to all Azure and 365 applications.
- **ColoHouse** has acquired Steadfast Networks, taking over management of both locations in Chicago at 725 S Wells and 350 E Cermak. The deal includes an additional data center in New Jersey, with ColoHouse itself having been acquired by 1547 Realty and Valterra Partners earlier in 2021.
- **Deft** now offers Managed Object Storage services locally and in Northern Virginia, providing a variety of configurable storage options outside the public cloud. The company suggests that the service will assist in controlling costs and providing high levels of performance.

DATA CENTER UPDATE

CHICAGO

WINTER 2021



Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
NTT	CH1	42,000	12	Under Construction / Q2 2022
Stream Data Centers	Chicago II	226,724	4	Under Construction / Q2 2022
Aligned	Northlake	220,000	48	Under Construction / Q2 2022
Facebook	DeKalb	907,000	100 (est)	Under Construction / Q4 2022
Microsoft	Elk Grove Village	400,000	30	Under Construction
	Hoffman Estates	400,000	50	In Planning
EdgeConneX	Elk Grove Village	167,000	22	In Planning / Q4 2023
1547/CIM Group	Chicago	52,000	5	In Planning
Bridge Digital Infrastructure	Itasca	300,000	30 (est)	In Planning
Prime Data Centers	Elk Grove Village	750,000	150	In Planning
CloudHQ	Arlington Heights	1,700,000	252	In Planning
Skybox	Elk Grove Village	189,000	30	In Planning
Iron Mountain	Des Plaines	330,000	36	In Planning

Recent Site Sales

PROPERTY	SIZE (Acres)	SALE DATE	SALE PRICE	BUYER	SELLER
1200 E Algonquin Rd, Arlington Heights	49.7	Dec-21	\$54,142,000	CloudHQ	United Airlines
1600 Oakton St, Elk Grove Village	17.5	Dec-21 (in contract)	\$21,338,824	Prime Data Centers	City of Elk Grove Village
2101 Lunt Ave, Elk Grove Village	1.3	Sep-21	\$2,782,500	EdgeConneX	PJC Real Estate LLC (Patrick Carroll)
1700 Nicholas Blvd, Elk Grove Village	2.22	Jul-21	\$4,292,500	EdgeConneX	TD Investment LLC (Terrell Weiner)

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
Two Assets (Chicago)	347,407	Dec-21	\$250,000,000 (estimated)	American Tower	CoreSite
Two Assets (Lombard, Aurora)	488,838	Nov-21 (in contract)	\$300,000,000 (estimated)	KKR, GI Partners	CyrusOne
1221 E Business Center Dr, Mount Prospect	44,000	Sep-21	\$2,000,000	Americaneagle.com	T2 Capital Management
2800 S Ashland Ave, Chicago	474,979	Aug-21	\$350,000,000 (estimated)	Blackstone	QTS

DATA CENTER UPDATE COLUMBUS

WINTER 2021



Key Indicators



Under Construction
80 MW



Vacancy
3%



Absorption (Second Half)
1 MW

Market Overview

Columbus has continued to shine as a hyperscale destination, with Google recently closing on additional expansion land and formally confirming a full Cloud region coming online later in 2022. The new region joins a new facility soon to go live for Facebook and continued strong investment from Amazon across their local portfolio. As further companies require on-ramps to all these services, the colocation market has tightened dramatically of late, with vacancy hitting a record low three percent. As with many suddenly interesting markets, further development is certainly required, as Columbus draws far more attention than a 40-megawatt colocation market normally would. Investment continued throughout the second half of 2021, with Canadian cloud firm ThinkOn purchasing a small building in New Albany and Landmark Infrastructure acquiring an Expedient-leased data center in Upper Arlington as part of a national portfolio at the end of the year. A very strong end to 2021 for Columbus, with high expectations of further expansion to meet demand throughout 2022.

Ecosystem Developments

Zayo has announced three new long haul routes linking Columbus to other regional cities including Cleveland, Ashburn, and Pittsburgh, providing further network capacity for operators locally. The fiber provider has invested heavily in recent years throughout the greater Midwest, bringing more robust connectivity to secondary data center markets.

Recent Site Sales

PROPERTY	SIZE (ACRES)	SALE DATE	SALE PRICE	BUYER	SELLER
105 Whiley Rd, Lancaster	185.6	Aug-21	\$3,914,300	Google	Robert Ruble

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
5000 Arlington Center Blvd, Upper Arlington	20,000	Dec-21	\$7,087,300	Landmark Infrastructure	Five 9s Digital
7000 Souder Rd, New Albany	34,000	Jul-21	\$3,192,000	ThinkOn	PCM

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Facebook	New Albany	530,000	50 (est)	Under Construction / Q1 2022
Google	New Albany	275,000	30 (est)	Under Construction / Q2 2022
Cologix	COL4	250,000	40	In Planning

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Key Indicators



Under Construction
27 MW



Vacancy
10%



Absorption (2nd Half)
72 MW

MORE INFORMATION

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Market Overview

The Dallas multi-tenant data center market recorded its largest absorption year and quarter (Q4) ever in 2021, as long-anticipated hyperscale demand finally converted to transactions in the market. Once widely considered to be 'over-supplied,' Dallas enters 2022 with very limited quality, turn-key supply, and a low vacancy rate of approximately 10%. In addition to hyperscale activity, the Dallas market saw robust enterprise absorption from a wide-range of industry verticals, including financial services, insurance, and technology companies. Dallas enters 2022 with a strong pipeline of enterprise and hyperscale activity, with many providers expected to solve for the anticipated demand with expansions and new builds. Following in the footsteps of Facebook, Google and Compass, data center providers and hyperscalers alike are actively searching for land south of Dallas, with several new developments in the area expected to be announced in 2022.

On the investment side, Menlo Equities purchased two (2) powered shell facilities from Digital Realty, as part of a larger portfolio transaction: 14901 FAA Blvd in Fort Worth, which is fully leased to Cyxtera; and 900 Dorothy Ave in Richardson, TX. A joint venture between Legacy Investing and Invesco Real Estate also continued to expand its data center portfolio with the acquisition of Flexential's Plano data center; as a part of the transaction, Flexential will continue to lease back the full facility, which is located at 3500 E Plano Pky.

Ecosystem Developments

- **Databank** announced the expansion of its Plano data center, DFW3, in late December. The expansion will add two (2) data halls (Data Hall 4 & Data Hall 5) totaling 22,000 square feet and 3 MW of additional capacity. Expected delivery for the new data halls is set for Q2 2022.
- Construction is actively underway at **Compass Data Centers'** 250 MW+ campus in Red Oak, TX. The provider landed a large hyperscale requirement in the 2nd half of 2021, with the hyperscaler expected to consume the majority of capacity on the to-be-completed campus.
- **Amazon** acquired a 9-acre site south of Dallas in Desoto, TX, which is widely-speculated to be slated for data center development. The Dallas data center market saw a significant uptick in demand from Amazon's AWS and its hyperscale peer group, in a trend that looks to accelerate into 2022.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Databank	Plano (DFW3)	22,000	3	Under Construction / Q2 2022
QTS	Irving (DC3)	36,000	6	Under Construction / Q2 2022
Flexential	Plano	100,000	9	Under Construction / Q2 2022
Facebook/Meta	Fort Worth	277,513	20 (est)	Under Construction / Q3 2022
Digital Realty	Richardson	38,108	10	Under Construction / Q4 2022

Key Indicators



Under Construction
599 MW



Vacancy
1%



Absorption (Second Half)
290 MW

MORE INFORMATION

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Market Overview

Northern Virginia enjoyed another record half to end 2021, with 290 megawatts absorbed thanks to an extremely strong fourth quarter as new expansion space filled and pre-leases occurred en masse, as hyperscalers seized the opportunity to take down large capacity. The take-downs stimulated a fresh round of site acquisitions and construction starts, with nine sites trading in December and January alone and a new-record of nearly 600 megawatts now underway followed by two gigawatts in planning thereafter. The new capacity cannot arrive soon enough, with vacancy now at an all-time low of just one percent, the tightest of any market globally. National acquisitions of CoreSite, QTS, and CyrusOne all involved local assets, with each of these companies expected to develop further buildings locally with this new capital. Power accessibility for the largest deployments is a slight concern, mainly due to the rapid increase in 100 MW and larger projects in current planning, leading to a rush to acquire land and begin the process.

With sites for development increasingly scarce, Prince William County is now reviewing a new plan that could allow 2,100 acres of currently agricultural land to be rezoned for data center usage. Rumors have already circulated throughout the data center press indicating those parties interested in acquiring sites, albeit with some concern over potential effects on the Manassas National Battlefield and surrounding parkland. If enacted the plan would assist for the continued development of the largest hyperscale campuses; the boundaries of Data Center Alley continue to expand, with increasing interest also in Gainesville and Warrenton as markets for development thanks to the larger sites generally available. An extremely positive second half for the world's largest data center market, soon to surpass two gigawatts in size and with continued positives expected throughout 2022.

Ecosystem Developments

- **Cyxtera** and Nutanix have created a lab in Sterling for the testing of cloud deployments by the US government, offering a variety of scenarios for government cloud-based applications. The lab will allow for agencies to provide initial assessments across hybrid cloud scenarios.
- The **Pentagon** revealed details around their move to the cloud in the autumn, stating that over one thousand separate systems have been shifted already. Key drives in the move have been scalability and keeping up with the latest in technology, with defense agencies focused on low latency applications.
- **Equinix** opened a Co-Innovation Facility at DC15 at the beginning of the year, partnering with companies such as Bloom Energy, ZutaCore, Virtual Power Systems, and Natron to boost sustainability in the data center environment. The companies will work together to drive efficiency and test a variety of emerging technologies.
- **Amazon Web Services (AWS)** revealed their continued move to solar power locally, with 1.43 GW of solar power to be deployed for Virginia data centers through 2023. The power purchase will cost the company \$2.1 billion across the 15 projects.
- **Digital Fortress** has completed a new fiber network linking their Richmond campus to Ashburn and Virginia Beach. The new system was constructed in partnership with Metro Fiber Networks.
- **Harbor Link** launched a new fiber network early in the year, with 60 miles of fiber coming by early 2023 linking Baltimore to Northern Virginia. The fiber will run alongside I-95 and I-97, with 300 access points throughout.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Digital Realty	Ashburn	371,658	16	Under Construction / Q1 2022
	Western Lands	7,460,000	1,000	Planned
Cologix	Ashburn	350,000	32	Under Construction / Q1 2022
CyrusOne	Sterling X	225,000	20 (est)	Under Construction / Q2 2022
TA Realty-Mitsubishi Estate	Leesburg	1,500,000	50	Under Construction / Q2 2022
Stack Infrastructure	Manassas	700,000	36	Under Construction / Q4 2022
	NVAL2	1,000,000	216	Under Construction / Q3 2023
Equinix	DC21 Phase 2	68,250	6.83	Under Construction / Q4 2022
Corscale	Gainesville Crossing	230,000	72	Under Construction / Q4 2022
DataBank	IAD3	200,000	4	Under Construction / Q1 2023
Skybox	NOVA	210,500	30	Under Construction / Q2 2023
COPT	Parkstone A	227,000	25 (est)	Under Construction / Q2 2023
	Parkstone B	193,000	25 (est)	Under Construction / Q2 2024
Microsoft	Western Ashburn	250,000	30 (est)	Under Construction
EdgeCore	Sterling	180,000	36	Under Construction
Amazon	Chantilly	1,750,000	200 (est)	Planned
	Manassas	1,100,000	150 (est)	Planned
Evoque	Ashburn	100,000 (est)	10	Planned
Aligned	Ashburn	513,000	120	Planned
AREP/Harrison Street	ABX-1	265,000	25 (est)	Planned
	AOL site	1,760,000	300	Planned
BlackChamber Group	Gainesville	1,000,000	210	Planned
	Sterling	530,000	100 (est)	Planned
Yondr/JK Land	Bristow	2,500,000 (est)	500	Planned
Prologis	NOVA1	500,000	50 (est)	Planned
CloudHQ	Dulles Berry	4,050,000	400 (est)	Planned

Ecosystem Developments

- **Microsoft** has signed a renewable energy agreement with AES, with the energy company providing a mix of wind and solar power totaling 576 MW to power local data centers. The cloud giant is aiming for carbon neutrality by 2030 and remains an active acquirer of local sites.
- **Hetzner** opened their first US data center location late in the year, with the German cloud services provider choosing Ashburn as their initial market entry point. Hetzner also offers cloud and colocation services from two locations in Germany and a third in Finland.
- **CoreSite** announced that their VA3 data center is now powered by entirely renewable energy thanks to a provision from Dominion Energy. As noted elsewhere in this report, the former REIT was recently acquired by American Tower for \$10 billion.
- **Telstra** launched an expansion at Equinix DC21, emphasizing the low latency available to both Europe and Asia from the data center. Telstra utilizes Equinix in several locations globally.
- **Dark Fiber & Infrastructure** has completed a new 65-mile fiber route linking Ashburn to Linthicum Heights, providing further capacity into oft-overlooked Baltimore suburbs. The route will provide further low-latency connectivity for the greater region and is among multiple local fiber routes for the company.
- **Zayo** added another long-haul network locally, linking Ashburn to growing market Columbus. The fiber giant has continued to blanket the Midwest and East Coast with eight new networks in recent months.

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
9651 Hornbaker Rd, Manassas	243,000	Jan-22	\$222,500,000	CloudHQ	COPT
24244 Quail Ridge Ln, Aldie	204,014	Dec-21	\$145,973,319	Amazon	IPI Data Center Partners
Two Assets (Reston)	578,166	Dec-21	\$500,000,000 (est)	American Tower	CoreSite
Four Assets (Sterling, Oak Grove)	643,500	Nov-21 (in contract)	\$1,300,000,000 (est)	KKR, GI Partners	CyrusOne
22001 Loudoun County Pkwy, Ashburn	1,232,635	Oct-21	\$330,000,000	Landmark Dividend	AGC Equity Partners
Three Assets (Ashburn, Manassas)	414,292	Sep-21	\$204,520,000 (est)	Menlo Equities	Digital Realty, Prudential Real Estate
Four Assets (Ashburn, Sterling, Manassas)	1,141,553	Aug-21	\$500,000,000 (est)	Blackstone	QTS

Recent Site Sales

PROPERTY	SIZE (Acres)	SALE DATE	SALE PRICE	PRICE/ACRE	BUYER	SELLER
21660 Ridgetop Cir, Sterling	12	Jan-22	\$26,439,000	\$2.2M	Amazon	St John Properties
43813 Beaver Meadow Rd, Sterling	10	Dec-21	\$14,500,000	\$1.4M	Digital Realty	Sunrise Landscape & Design
22285 Lockridge Rd, Ashburn	82	Dec-21	\$145,000,000	\$1.77M	Stack Infrastructure	Sentinel Data Centers
7150 Catharpin Rd, Gainesville	23	Dec-21	\$16,400,000	\$722K	CTP-II LLC	Gainesville 66 LC (Joseph Contrucci)
9630 Innovation Dr, Manassas	92	Dec-21	\$87,356,395	\$950K	Stack Infrastructure	Amazon
44900 Prentice Dr, Sterling	43	Dec-21	\$136,000,000	\$3.14M	American Real Estate Partners, Harrison Street Investment Management	Yahoo
43787 Beaver Meadow Rd, Sterling	6	Dec-21	\$8,400,000	\$1.4M	Digital Realty	Beaver Meadow LLC (Stephen Borcharding)
46000 Manekin Plz, Sterling	12	Dec-21	\$21,051,600	\$1.75M	Amazon	Stewart Investment Partners
45865 Maries Rd, Sterling	10	Dec-21	\$12,000,000	\$1.2M	EdgeCore	Williams family
8613 Linton Hall Rd, Bristow	200	Oct-21	\$48,550,000	\$243K	JK Moving, Yondr	Edith Rameika
Blackwell Rd, Warrenton	42	Sep-21	\$39,700,000	\$952K	Amazon	Weissberg Investment Corp
Pacific Blvd, Sterling	17	Aug-21	\$32,500,000	\$1.9M	Amazon	John Darvish Construction
6651 Wellington Rd, Bristow	11	Jun-21	\$11,255,382	\$1.01M	Microsoft	JK Moving

Key Indicators



Under Construction
10 MW



Vacancy
10%



Absorption (Second Half)
12 MW

MORE INFORMATION

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Market Overview

The second half of 2021 continued the sizable deal flow seen earlier in the year, with the national acquisitions of CyrusOne, CoreSite, and QTS all involving local assets changing hands. An array of older suburban assets were on the move, including the acquisition by BNY Mellon of a previously leased facility in Somerset and DataBank purchasing a data center in Orangeburg for redevelopment. The deals show a continued desire by investors and operators alike to have exposure to the greater metropolitan area, with vacancy continuing to tighten to a current ten percent. Absorption in both New Jersey and New York City has been steady, albeit at a much slower pace than other rapidly growing primary markets. An array of further network options continues to allow for stronger points-of-presence in New York City, and leased operations have changed hands inside key carrier hotels and suburban assets as shown elsewhere in this report. Development remains tepid with Digital Realty and CoreSite adding further phases to existing campuses, though DataBank is planning their new build and EIP is back in action for planning in Connecticut. Some solid news for the greater New York/New Jersey market, with some continued optimism for future.

Ecosystem Developments

- **UPIX Networks** has now connected to the NJFX data center, providing access to their 25,000-mile fiber network that spans ten countries. UPIX offers extensive connectivity to regional undersea cables in addition to many prime facilities.
- **NASDAQ** has announced a move to Amazon Web Services (AWS), though without moving out of their longtime home inside Equinix at Carteret. AWS will be launching in the same building, providing additional options for NASDAQ clients besides serving the exchange itself.
- **Cordiant Digital Infrastructure** acquired DataGryd at the turn of the year, paying \$74 million to assume ownership of DataGryd operations at 60 Hudson Street. DataGryd has access to 15 megawatts of power in the building along with the excellent connectivity available at the key carrier hotel.
- **ColoHouse** has completed the acquisition of Steadfast Holdings, gaining access to two data centers in Chicago and one locally in Edison in the Iron Mountain facility. ColoHouse is now backed by 1547 and Valterra Partners and has embarked on a series of acquisitions.
- **H5** recently assumed operations of seven vXchnge data centers in leased space across the country, with the local data center in Secaucus included in the deal. This is the second recent expansion for H5 locally after assuming management of 325 Hudson.
- **Zenlayer** completed a new cloud networking link joining New York to Sao Paulo, connecting the global business hub to the biggest data center market in Brazil. Zenlayer launched a series of links at mid-year to boost connectivity in key cities.
- **Epsilon Global Communications** has changed ownership, with the once London- and now Singapore-based connectivity provider now controlled by a partnership between KT Group and Daishin Private Equity, who collectively paid \$145 million. Epsilon operates a data centre locally at 60 Hudson.
- **Tata Consultancy Services** and Google Cloud are partnering to establish TCS Google Garages in three global cities, with New York joining Tokyo and Amsterdam acting as locations for co-innovation and research. Cloud solutions, artificial intelligence (AI), and much else will be on offer for companies to evaluate.

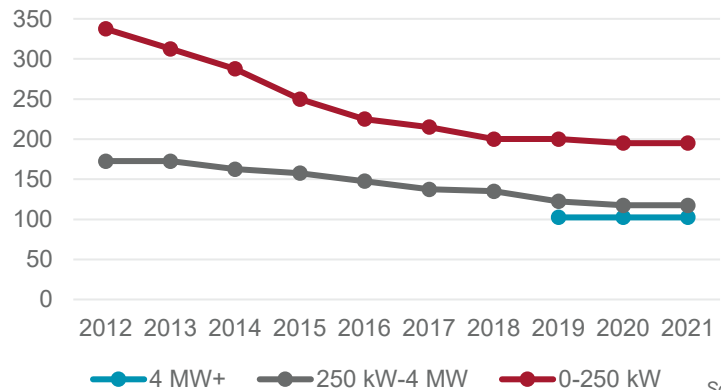
DATA CENTER UPDATE

NYC-NJ

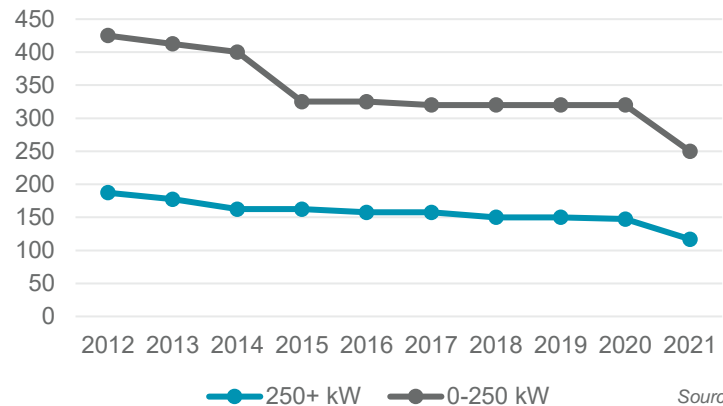
WINTER 2021

CUSHMAN & WAKEFIELD

NEW JERSEY PRICING



NEW YORK PRICING



Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Digital Realty	Totowa	150,000	4.8	Under Construction / Q1 2022
	Piscataway	10,000	1.2	Under Construction / Q1 2022
CoreSite	NY2 Phase 4A	35,000	4	Under Construction / Q1 2022
DataBank	Orangeburg	200,000	30	In Planning
EIP	New Britain	465,000	20	In Planning

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
Two Assets (Hawthorne)	218,078	Dec-21	\$46,900,000	Landmark Dividend	Robert Martin Co, HIG Realty Partners
2 Emerson Ln, Secaucus	236,250	Dec-21	\$200,000,000 (est)	American Tower	CoreSite
800 Cottontail Ln, Somerset	212,522	Nov-21 (in contract)	\$300,000,000 (est)	KKR, GI Partners	CyrusOne
636 Pierce St, Somerset	180,000	Sep-21	\$81,490,000	BNY Mellon	Digital Realty, Prudential Real Estate
2000 Corporate Dr, Orangeburg	225,000	Sep-21	\$23,000,000	DataBank	Skae Power Solutions
Two Assets (Piscataway, Hightstown)	913,930	Aug-21	\$200,000,000 (est)	Blackstone	QTS

Key Indicators



Under Construction

162 MW



Vacancy

7%



Absorption (Second Half)

50 MW

MORE INFORMATION

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GLOBAL DATA CENTER ADVISORY GROUP

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Market Overview

Phoenix enjoyed a phenomenal second half of 2021, with another record of 50 megawatts absorbed to bring the tally to 89 megawatts for the entire year. Mainly driven by hyperscale interest, this take-up has compressed total market vacancy to just seven percent, with continued prospective deployments circling the market. This interest has spurred further construction starts, both hyperscale and otherwise. Meta (formerly Facebook) purchased just over 360 acres in Mesa at mid-year, breaking ground shortly thereafter on a near one-million-square-foot campus for what will be their largest deployment locally. NTT, Iron Mountain, and Vantage all have builds completing later in the year, with Stack and phoenixNAP planning large expansions soon.

The investment market remained healthy throughout the second half of 2021, with small sales of a vacant building in Goodyear and a partial leaseback to Blue Cross Blue Shield in Phoenix completing, continuing the possibility of the Phoenix metropolitan area as an attractive data center play for lower-level acquisitions. Recent mergers have also included Phoenix; the pending \$15 billion purchase of CyrusOne by KKR and GI Partners includes the 1.2-million-square-foot campus on Ellis Street in Chandler, spread across buildings constructed in several phases by the REIT. Scheduled to close shortly, the merger should provide CyrusOne with further funding for expansion in Phoenix and elsewhere. In sum an excellent and expansive half for Phoenix, with further growth expected throughout 2022.

Ecosystem Developments

- **DE-CIX** has added an internet exchange in Phoenix, the westernmost location in the United States for the global exchange operator. The exchange offers five millisecond latency to other large western markets such as Los Angeles and is located at phoenixNAP.
- **Zayo** recently added 300 route miles of fiber throughout greater Phoenix, with 100 miles across Goodyear, Avondale, and El Mirage aimed at data center use, and another 200 miles across Pinal County for educational usage. The expansion adds new connectivity to hundreds of new buildings across the Phoenix metropolitan area. Zayo has also launched its Shielded Internet Access product, with Phoenix as an initial market alongside Denver, Dallas, Indianapolis, Seattle, and Toronto.
- **Windstream Wholesale** has connected its Intelligent Converged Optical Network (ICON) to the EdgeConneX data center in Tempe. The network serves 30 local clients, including carriers, content providers, and enterprises.
- **Arcadian Infracore** launched two new fiber routes connecting Phoenix to Denver and Salt Lake City, purposefully routing these networks through the Navajo reservation to provide connectivity to the local community. The networks will be funded by TIAA who will act as the investment manager moving forward.

Regional Competition

The Phoenix data center market often draws comparisons to other markets across the southwestern United States, particularly for those enterprises looking for a single regional deployment. In our recently released Global Market Comparison report, Phoenix finished seventh overall globally, thanks to the already sizable market, good fiber, available cloud services, and consistently tight vacancy. This was ahead of traditional primary market Dallas (which finished ninth) and newer data center markets Denver (26th), Las Vegas (28th), or Salt Lake City (32nd). As referenced elsewhere in this report, new fiber continues to be rolled out across the greater market, and construction both current and planned will continue apace for some time. Overall power and construction costs are less than markets in California, with low latency to both the Bay Area and Los Angeles. Phoenix will likely continue to grow for some time.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Expedient	Phoenix	45,000	2.4	Completed / Q4 2021
NTT	Mesa	126,000	36	Under Construction / Q1 2022
Comarch	Mesa	32,000	3 (est)	Under Construction / Q2 2022
Vantage	Goodyear	250,000 (est)	16	Under Construction / Q2 2022
Iron Mountain	AZP-2 Phase 5	70,000 (est)	7	Under Construction / Q4 2022
Meta	Mesa	950,000	100 (est)	Under Construction
Stack Infrastructure	Avondale	1,000,000	150	In Planning
PhoenixNAP	Phoenix	500,000	50	In Planning

Recent Site Sales

PROPERTY	SIZE (Acres)	SALE DATE	SALE PRICE	BUYER	SELLER
E Elliot Rd, Mesa	360.4	Jul-21	\$123,184,182	Meta	DMB Associates

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
2335 S Ellis St, Chandler	1,248,429	Nov-21 (in contract)	\$500,000,000 (est)	KKR, GI Partners	CyrusOne
2475 W Townley Ave, Phoenix	50,960	Oct-21	\$11,000,000	Five 9s Digital	Blue Cross Blue Shield
16422 W Commerce Dr, Goodyear	20,000	Sep-21	\$5,900,000	DCX Goodyear 1 LLC (Peter Martori)	National Oilwell Varco

DATA CENTER UPDATE PORTLAND

WINTER 2021



Key Indicators



Under Construction
30 MW



Vacancy
8%



Absorption (Second Half)
55 MW

Market Overview

Several construction completions throughout 2021 were more than matched by excellent absorption across Portland, with the second half of the year as the best-performing half in Portland history with 55 megawatts taken up. The new construction has allowed vacancy to remain steady at eight percent, with Digital Realty planning to complete a pre-leased 30-megawatt phase by the end of the first quarter. Data center press reports indicate a major new build by QTS is in planning on behalf of Meta (formerly Facebook), with the campus reported as requiring 250 megawatts of power at full buildout. The prospective campus would be powered entirely by renewable energy via Portland General Electric, emphasizing the hydroelectric power on offer throughout Portland and rural Oregon alike for large deployments. QTS itself was taken private by Blackstone in August, with the local campus in Hillsboro included in the \$10 billion transaction, expected to lead to further development across the portfolio. Further large-scale construction remains very much in demand, with rumors of further cloud service interest along with potential relocations from pricier markets to the south. The expectation continues for further strong quarters upcoming for Portland, as the Hillsboro cluster continues to grow toward 200 megawatts and beyond.

Ecosystem Developments

- **Telia Carrier** has added a new point-of-presence (PoP) at the Flexential Hillsboro 2 data center, adding more connectivity to a variety of local networks. The addition allows for full connectivity to the Telia backbone along the west coast and across Asia.
- **EdgeConneX** is now offering Amazon Web Services Direct Connect 100 Gbps on-ramps in Hillsboro, becoming the second location locally providing the service. EdgeConneX has two local data centers and a third currently in planning.
- In other **Amazon Web Services** news, the company launched a fresh group of Local Zones in October, with a new location in Portland joining Las Vegas and New York City. The cloud giant has rolled out fourteen Local Zones nationally in thirteen locations over the past two years.
- **H5** has reached a nationwide agreement to assume operations at seven vXchnge data centers, with the downtown location in the Pearl District included in the deal. The local facility includes just over one megawatt of power available for colocation purposes.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Digital Realty	Hillsboro	823,056	30	Under Construction / Q1 2022
EdgeConneX	POR 03	40,000 (est)	13	In Planning
QTS	Hillsboro	250,000 (est)	250	In Planning

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Key Indicators



Under Construction
254 MW



Vacancy
3%



Absorption (Second Half)
24 MW

Market Overview

In the face of little available capacity, the 24 megawatts absorbed in the second half of the year was a strong performance locally, with vacancy tightening even further to just three percent, among the most constrained markets globally and following concerns over available power in the key neighborhoods in Santa Clara. More development is coming to ease this pressure, with Prime Data Centers securing two further sites at the end of the year. The company now has four sites on Martin Avenue and Comstock Street, with one building under construction and three coming soon. A partnership between Oppidan and Harrison Street secured a further four parcels in two transactions on Comstock Street at the end of the year as well, with plans afoot for a 50-megawatt build in place. The Amazon and China Mobile sites continue to progress, with Digital Realty and CoreSite adding further buildings in Santa Clara soon. A dearth of buildable land has continued to cause price rises, with two recent site sales nearing seven million dollars an acre, a rapid increase from previous years. Expect further pricing increases throughout 2022 for the choicest remaining sites, with creative amalgamations likely required for future hyperscale-sized builds.

The investment market stayed strong throughout the second half of the year, with the corporate buyouts of both QTS and CoreSite involving local assets, with considerable value attached to the CoreSite campus off Central Expressway and the landmark “Gold Building” carrier hotel in downtown San Jose. Both former REITs are likely to pursue expansion in several markets with the fresh influx of capital. Digital Realty elected to exit several older assets, liquidating their national joint venture with Prudential Real Estate involving local buildings in Sunnyvale, San Jose, and Santa Clara, snapped up by Menlo Equities. Digital followed this with the exit of the long-held 150 South 1st Street in downtown San Jose, with local rumors suggesting an upcoming redevelopment by new owner Hines. Investor interest remains high, albeit with fewer available potential assets for sale after recent trades.

Continued healthy demand will lead to further pricing pressure on remaining capacity, with anecdotal reports suggesting slight upticks in asking rents for small-scale deployments in Santa Clara. New capacity thus cannot arrive soon enough, with those operators that can secure land and power to be amply rewarded by ravenous client requirements. Another strong period with more expected throughout 2022.

Ecosystem Developments

- **VPLS** took over operations at the former Wave data center at 3080 Raymond Street in Santa Clara, with the renamed SV3 offering three megawatts of capacity for colocation. The building offers access to 20 fiber networks and on-ramps to eight cloud services.
- **Bandwidth IG** has added connectivity to Digital Realty locations in Atlanta and Santa Clara, with the upcoming 641 Walsh as the newly-added local option. Bandwidth IG offers a variety of dark fiber solutions across these two major markets.

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Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Prime Data Centers	1111 Comstock	80,000	9	Under Construction / Q4 2022
	2175 Martin	80,000	9	In Planning / 2023
	2225 Martin	207,000	32	In Planning
	1231 Comstock	119,000	9	In Planning
Digital Realty	Santa Clara	430,000	48	Under Construction
1547, CIM Group	San Francisco	187,000	24	Under Construction
China Mobile	San Jose	217,000	26	Under Construction
Amazon	Santa Clara	515,742	99	Under Construction
CoreSite	SV9	250,000	48	Under Construction
CyrusOne	Santa Clara	144,000	36	In Planning
EdgeCore	Santa Clara	350,000	36	In Planning
T5	Newark	180,000	32.1	In Planning
Cologix	SV1	134,000	11	In Planning
Harrison Street/Oppidan	Santa Clara	200,000	50	In Planning
Stack Infrastructure	SVY03	560,000	48	In Planning

Recent Site Sales

PROPERTY	SIZE (Acres)	SALE DATE	SALE PRICE	BUYER	SELLER
795 Comstock St, Santa Clara	3.6	Dec-21	\$17,726,000	Harrison Street Real Estate, Oppidan	Rochelle Maize
715 Comstock St, Santa Clara	3.7	Dec-21	\$22,950,000	Harrison Street Real Estate, Oppidan	Granite Construction
2225 Martin Ave, Santa Clara	4.1	Dec-21	\$28,250,000	CIM Group, Prime Data Centers	PJMB Commercial
1231 Comstock St, Santa Clara	1.4	Dec-21	\$9,500,000	Prime Data Centers	Lasecke Living Trust
26203 Production Ave, Hayward	11.4	Jul-21	\$46,000,000	Stack Infrastructure	Alex Brown Realty

Recent Property Sales¹

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
150 S 1 st St, San Jose	179,800	Dec-21	\$59,600,000	Hines	Digital Realty
Eight Assets (San Jose, Milpitas, Santa Clara)	1,186,226	Dec-21	\$900,000,000 (est)	American Tower	CoreSite
Four Assets (Sunnyvale, San Jose, Santa Clara)	326,305	Sep-21	\$108,800,000	Menlo Equities	Digital Realty, Prudential Real Estate
Two Assets (Santa Clara)	138,662	Aug-21	\$140,000,000 (est)	Blackstone	QTS

DATA CENTER UPDATE

CANADA



DATA CENTER UPDATE

MONTREAL

WINTER 2021



Key Indicators



In Planning
51 MW



Vacancy
14%



Absorption (Second Half)
8 MW

MORE INFORMATION

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GLOBAL DATA CENTER ADVISORY GROUP

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Market Overview

Montreal made continued progress in the second half of 2021, with eight megawatts of absorption to equal first half activity. Despite the slower take-up than many larger markets, the total is the highest in several years and has tightened vacancy to 14%, though much improved from recent years. Rumored hyperscale interest in the area continues, as many have carbon-neutral pledges to fulfil before 2030 and the low-cost hydroelectric power locally will assist in achieving this goal. Vantage remains in planning on two sites locally, with QScale suggesting that a campus in Montreal may be coming soon after an initial build in Quebec City. The investment market enjoyed a sizable sale late in summer, with BentalGreenOak closing on a downtown office and data center building for C\$74 million. Longtime owner IBM has elected to stay on in a sale-and-leaseback scenario, with the building changing hands at a currently typical 4.7 cap. The deal follows an earlier transaction of a similar building in the Toronto area. In sum a reasonably solid half for Montreal, with continued optimism for future needs of hyperscalers and those interested in pursuing a sustainable power strategy.

Ecosystem Developments

- **Cologix** announced a new partnership with PCCW at their MTL7 data center, with the PCCW Console Connect service now available to provide interconnection options. Console Connect is now available in 650 data centers across 50 countries.
- **Leaseweb** acquired iWeb late in summertime, gaining management over three local data centers and a robust cloud hosting business. INAP had owned the iWeb brand since 2013, and Canada now becomes the third-largest market worldwide for Leaseweb.
- **FullHost** announced a partial move to Amazon Web Services (AWS), with clients now able to host from the AWS region in Montreal. The company offers a variety of low-cost hosting solutions for customers, having previously offered these from data center locations in Toronto and Vancouver.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Vantage	YUL-02	300,000 (est)	26	In Planning
	Montreal II	200,000 (est)	25	In Planning

Recent Property Sales

PROPERTY	SIZE (SQ FT)	SALE DATE	SALE PRICE	BUYER	SELLER
275 Ave Viger E (Montreal)	218,486	Aug-21	C\$74,000,000	BentalGreenOak	IBM

DATA CENTER UPDATE TORONTO

WINTER 2021



Key Indicators



Under Construction
44 MW



Vacancy
6%



Absorption (Second Half)
16 MW

MORE INFORMATION

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Market Overview

Toronto enjoyed an uptick in absorption throughout the second half of 2021, with the fourth quarter the strongest locally since the first quarter of 2020, tightening overall vacancy further to just six percent. Further phases from Digital Realty, Stack Infrastructure, Equinix, and Compass are under construction to provide greater capacity for prospective tenants, with Compass securing a North York site late in summer to add to their local portfolio. Land remains expensive throughout Toronto, with voracious competition from industrial users due to the concurrent expansion needs of that asset class. Prospective developers are having difficulty locating quality sites, leading to further delays in bringing potential capacity to market. Expect further interest in Toronto throughout 2022, with ample rewards for those able to work around site selection issues.

Ecosystem Developments

- **Google** completed their new Cloud region in Toronto in autumn, listing clients such as Deloitte and Accenture as initial signings. The region is Google's second in-country, after a primary launch in Montreal in 2018.
- **Zayo** has launched its Shielded Internet Access product, with Toronto as an initial market alongside Denver, Dallas, Indianapolis, Seattle, and Phoenix. The offering will allow for clients to bundle their internet, security, and direct access to the cloud. The fiber provider also announced another 140 kilometers of new routes coming in the Greater Toronto Area by the end of 2022.
- **Hut 8** acquired operations of the TeraGo data center portfolio across Canada, with two locations in Toronto included alongside two locations in Vancouver and one in Kelowna. The five locations offer 4.1 MW of capacity and 400 total customers.
- **Amazon Web Services (AWS)** announced 32 new metro areas to receive Local Zones deployments through 2024, with Toronto among those chosen. AWS has yet to bring a full region online locally, choosing instead to focus on regions in Montreal and Calgary with another Local Zone coming soon in Vancouver.

Construction Update

OPERATOR	LOCATION	SIZE (SQ FT)	POWER (MW)	STAGE / EST. DELIVERY
Digital Realty	Toronto (2 locations)	427,050	4.8	Under Construction / Q2 2022
Stack Infrastructure	Toronto	100,000 (est)	8	Under Construction / Q2 2022
Equinix	TR2 Phase 4	10,800	1.08	Under Construction / Q3 2022
Compass Datacenters	Etobicoke	214,000	30	Under Construction
Cologix	TOR4	50,000	10	In Planning

Recent Site Sales

PROPERTY	SIZE (ACRES)	SALE DATE	SALE PRICE	BUYER	SELLER
15 Fenmar Dr, North York	8.7	Aug-21	C\$38,500,000	Compass Data Centers	H&R Property Management