Last-Mile Logistics: Commercial Real Estate's Growth Engine

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Last-mile logistics has become integral in every aspect of our economy and a critical component in the functionality of commercial real estate. It's become a differentiating factor and disruptive force with the rise of Amazon in the mid-1990s,[1] and now COVID-19 has further highlighted how it is systemic to all aspects of our economy, including real estate. Amazon revealed and COVID-19 amplified how the supply chain is integral to our real estate DNA and subsequently influences commercial real estate metrics across all property types – not only retail and industrial. The impact of last-mile logistics on the economy and CRE performance can be seen in the recent cyberattack that shut down the Colonial Pipeline and the global computer chip shortage that resulted in a 50 percent decline in new car and truck inventory in May. Commercial real estate professionals play a key role in the new era of last-mile logistics, but a deep understanding of the drivers of change and where they are headed are essential in capitalizing on new opportunities. The adage, "It's the economy stupid," could be refreshed to, "It's logistics and supply chain."

World War II is the quintessential historical example underscoring the significance of supply chain. Troops and supplies had to move great distances across varied geography at a speed unevenly matched with the infrastructure of the time because there were no interstate highways or container ports like there are today. Railroads became the "essential mile" in the supply chain for the war effort — the precursor to today's last mile. Fast forward three quarters of a century, and logistics and supply chain are more global in nature with greater demands on capacity and speed with inadequate infrastructure to reach the all-important last mile. Redundancy and the ability to process disruption are two key elements required to support the fast-moving, high-volume requirements of modern-day logistics in the "shop-online-and-deliver-to-me" era we find ourselves in.

As referenced in the CCIM Institute course, "Last-Mile Logistics: The Final and Most Expensive Link in the Supply Chain,"[2] last-mile logistics is defined as the final step of the process where a package arrives to the end user/customer in a journey from the factory through distribution channels. However, that last mile is dependent on multiple components of infrastructure, including ports, inland waterways, rail, highways, bridges, energy, aviation, and even levees and storm-water management. All must work in synchronization for the last mile of delivery to function at peak efficiency and capacity. Failing to look at the interconnectivity of last-mile logistics is a systemic risk unveiled first by the tariffs enacted under President Donald Trump in 2019 and amplified by COVID-19. Any link in the chain connecting to the last mile can undermine the entire effectiveness of what is really the essential mile. In 2021 alone, the country experienced firsthand how a winter storm in Texas knocked out an entire power grid, leaving the local population in dire straits; how a cyberattack on the Colonial Pipeline supply shut down half the East Coast's gasoline supply; and how a computer chip shortage paralyzed automobile manufacturing and even home building due to appliance shortfalls. This report takes a deep dive into all the factors impacting last-mile logistics and maps their relevance to commercial real estate.

At the writing of this paper, two burgeoning infrastructure items were making headlines. The first was the release of the American Society of Civil Engineers (ASCE) quadrennial Infrastructure Report Card (IRC), which highlighted trillions of dollars in deferred maintenance within the nation's 17 infrastructure categories,[3] and the second was President Joe Biden's proposed infrastructure bill. According to the administration's fact sheet for the proposed legislation, spending to modernize bridges and roads "in most critical need of repair" would amount to $115 billion.[4] That amount stands in stark contrast to the roughly $2 trillion total budget of the Biden infrastructure bill, as well as findings from the ASCE 2021 IRC that estimate that $1.2 trillion is needed to repair and update America's surface transportation like roads and bridges.

The White House's fact sheet acknowledges at least 173,000 miles of major U.S. highways and other heavily trafficked roads are in a state of disrepair, and an estimated 45,000 bridges need rebuilding. However, Biden's proposed infrastructure spending bill would address a fraction of the current need – a mere 20,000 miles of roadways and only 10,000 bridges. The plan intends to target roads and bridges in the nation's most populated states and MSAs, such as New York and California. Yet the ASCE report notes the need is greatest in the states of Iowa (the state with the most bridges in need of repair), Missouri, and Louisiana. This proposed legislation will go through many iterations before facing a potential vote in late summer or early fall 2021. For now, it is important for commercial real estate professionals to focus on the needs documented in the ASCE IRC report and to recognize that the politics around this legislation are likely to dictate the amount directly allocated to critical physical infrastructure analyzed by the ASCE. In the end, modern e-commerce and last-mile industrial assets will follow locations where logistics infrastructure is up to date, being modernized, and not in disrepair.

Finding Speed and Reliability in Last-Mile Logistics

An appreciation for the interconnectivity of supply chain links is integral to understanding the overall impact of last-mile logistics on commercial real estate. Before the Amazon van or FedEx truck arrives at your home or office, a lot has transpired to reach that last mile. Materials and components are moved to factories to manufacture the merchandise. Finished goods are then sent through seaports and cargo-centric airports, and containerized goods are moved inland by rail via one of the country's Class I railroads to distribution warehouses. Upon arrival, merchandise is sorted and delivered via courier, express, or parcel delivery services. Think of this process as a relay race. Each supply chain athlete needs to run their segment at peak performance and then hand off the package to the next segment without dropping it. As Walmart defined it in 2017, last-mile logistics is an on-time and in-full (OTIF) process, and commercial real estate is the track upon which this relay race plays out.

The speed and reliability of the materials, merchandise, and packages depend on the supply-chain pathways and type of last-mile customer. Some pathways are more efficient than others. The ports of Los Angeles and Long Beach are the busiest container ports in the U.S., but they have historically experienced labor disruptions,

chassis shortages, and empty container backlogs. Both ports are also located across the continent from the majority of the U.S. population (70 percent resides east of the Mississippi River). Southeast and Gulf Coast ports are making headway by becoming Post-Panamax ready — dredged to 50-foot depth and outfitted with automation technology like robotic gantry cranes and on-dock intermodal rail terminals to move containers faster from ship to inland distribution centers. Additionally, these ports are better aligned with the Class I network to move more by rail, reducing today's dependence on trucking with the added benefits of easing truck congestion and wear and tear on the vital road and bridge infrastructure that has been identified as being in disrepair or need of upgrade. There is also a reduction in shipping costs as goods move more efficiently by rail than truck. The rail lines in the Southeast and Gulf Coast regions can also accommodate double stacking of containers on rail cars, unlike the Northeast with bridge and tunnel height limitations. What does all this mean for commercial real estate? Logistics infrastructure that can facilitate more efficiency is driving the where and why for site selection.

These efficient pathways are redefining site-selection activity for auto assembly plants, manufacturing, and the location of e-commerce fulfillment centers by Amazon, FedEx, Home Depot, Walmart, grocers, and other retailers from apparel to home improvement categories. These pathways are also bifurcating last-mile logistics into business-to-business (B2B) and business-to-consumer (B2C) models. As detailed in CCIM Institute's last-mile logistics course, the B2B and B2C models have different priorities and needs, and utilize different last-mile logistics strategies. OTIF drives B2B, whereas retail-to-industrial conversion (RIC) is key for B2C.[5] For example, Walmart developed a leading B2C model where 90 percent of Americans live within 10 miles of a physical Walmart store. As a result, Walmart is utilizing more of a buy-online, pickup-in-store (BOPIS) model, whereas Amazon's direct B2C model involves e-commerce warehouses to deliver products directly to the consumer.

As was the case in WWII, rail remains the backbone of last-mile logistics connecting our seaports to inland assembly plants and population centers. Only seven Class I railroads service North America. Two — Union Pacific and Burlington Northern Santa Fe — travel west-to-east connecting the West Coast ports to pivotal inland distribution hubs in Chicago and Memphis, Tenn. The others move mostly north-to-south, linking Canada and the Gulf and East Coast ports — CSX, Norfolk Southern, Kansas City Southern (KSU), Canadian National (CN), and Canadian Pacific (CP). Canadian National is the only Canada-to-Gulf Coast railroad bisecting the U.S. running from Port Rupert and Vancouver in Western Canada south through Minnesota and Illinois and terminating at the port of Mobile, Ala.

Noteworthy highlights of this rail infrastructure include:

- It runs primarily through the Central U.S. and along the East Coast, which is in proximity to 70 percent of the U.S. population.
- Kansas City Southern is the only railroad that connects the U.S. to all the primary ports and industrial regions in Mexico that manufacture many of the components used in U.S. assembly plants.
- There are three primary T-intersections of this rail infrastructure that are pivotal to last-mile logistics, located in Kansas City, Mo.; Memphis, Tenn.; and Chicago. As a result, major intermodal hubs have developed around these cities.
- These intersections are driving interest in the acquisition of Kansas City Southern from two Canadian rail lines. Combining one of the two Canadian railroads with Kansas City Southern would result in the only true North American railroad linking all of Canada to all of Mexico. This pending merger would be transformative for logistics and supply chain in North America as it would create an integrated and streamlined north-to-south Class 1 rail system.

The Golden Triangle: Logistics Pathways Influence CRE Opportunities

Not all last-mile logistics pathways or models are created equal. Industrial and e-commerce investment is clustering around a region I have long defined as the “Golden Triangle.” The term describes a geographic region that extends from the pinnacle at the Great Lakes southwest to Texas and the Gulf Coast to form one side or leg of the triangle, and then southeast through Tennessee, Alabama, Georgia, the Carolinas, and Florida to form the other side of the triangle. This region is golden in large part because it encompasses five of the seven Class I railroads, more ports than any other regions of the U.S., and 70 percent of the American population. In other words, the Golden Triangle is the epicenter of logistics infrastructure and where the dominant e-commerce, package delivery, and retail companies are locating their “shop-online-and-deliver-to-me” warehouses.

In fact, the Golden Triangle now surpasses the West Coast market in virtually every industrial CRE metric, including new construction, transaction activity, and pricing. One other metric further brings into focus the impact that the Golden Triangle continues to have on CRE activity — the ratio of shipping containers handled by West Coast ports in comparison to East and Gulf Coast ports. This ratio has shifted over the past two decades – especially in the past decade with the opening of the expanded locks in the Panama Canal in 2015 – from 65:35 in favor of West Coast ports in 2000 to 50:50 currently. The rise of Amazon, an increase in online e-commerce, and advances in last-mile technologies pushed e-commerce sales from less than 10 percent of total retail sales to 14 to 16 percent over the last five to six years, according to the St. Louis Federal Reserve’s Federal Reserve Economic Data system.[6] So, it is no surprise that the Golden Triangle is increasingly on the radar of institutional investors. This heightened investor activity is on full display with the 2021 merger activity involving KSU. After KSU accepted an offer earlier this year to merge with CP, CN entered the bidding war, and KSU reversed course and accepted CN’s higher bid on May 13.[7]

A Picture (or Story Map) Is Worth a Thousand Words

Story mapping is an effective tool to visualize last-mile logistics, especially when that picture combines big data and custom layering of a variety of cogent factors for commercial real estate practitioners. The following five pictures created via Site To Do Business, CCIM Institute's real estate data analytics platform that includes CRE mapping powerhouse Esri, offer interactive layering of last-mile logistics — from location of ports and Class I rail lines to the location of Walmart stores and FedEx fulfillment warehouses.

The following five images convey:

1. The location of the country's Class I railroad infrastructure, which highlights the strategic importance of Kansas City Southern railroad and the recent merger battle for it among the Canadian railroads.

Class I Railroad Infrastructure

2. An overlay of the Golden Triangle, which includes more than half the U.S. GDP within its boundaries. Additionally, 90 percent of these households live within a five-hour truck drive of the rail lines and the primary intermodal facilities and inland rail ports that run along them.

The Golden Triangle

15 of 20 Amazon HQ2 Finalists were within the Golden Triangle

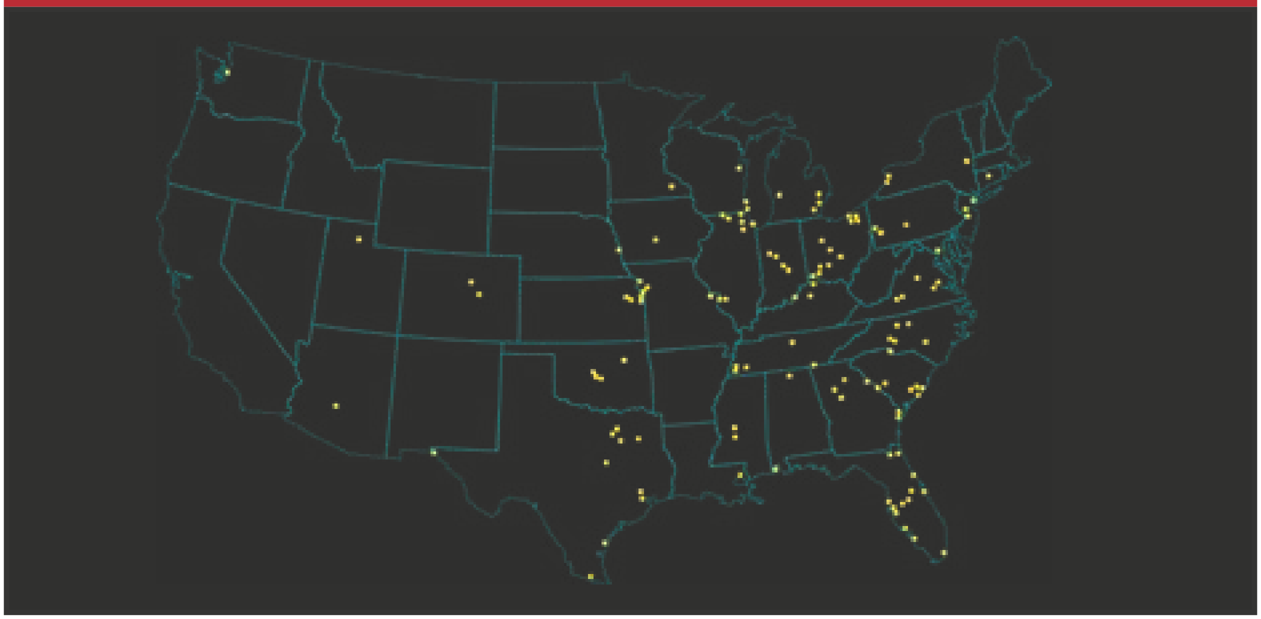
Accounts for **more than half** of GDP

90% of households reached

BEA Regions Map Produced by United States Regional Economic Analysis Project http://united-states.reaproject.org

3. The investment in new e-commerce warehouses by Monmouth REIT (MREIC), the top performing industrial REIT in 2020.[8]

Portfolio Footprint – Monmouth MREIC eCommerce Warehouse Investments



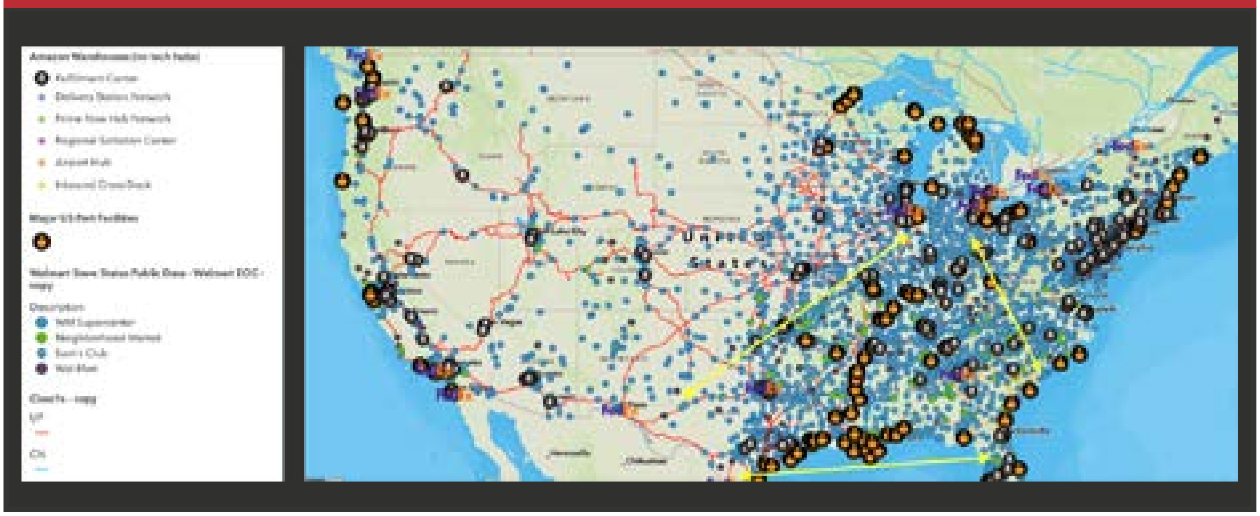
4. The location of Walmart employment, including both retail and logistics. Walmart now ranks as the top private employer in 21 states.

Walmart Nation – Walmart Is the Largest Private Employer in 21 States

Source: 24/7 Wal St. Walmart, Governing | Visualcapitalist.com

5. A Site To Do Business Story Map analysis layering in the nation's ports, rail lines, FedEx fulfillment warehouses, and Walmart stores.

Site To Do Business Story Map



In particular, the Site To Do Business story map layers all the components of last-mile logistics into a single interactive view of how and where the U.S. is connected. Essentially, like the children's song, the port-bone is connected to the rail-bone which is connected to the e-commerce and last-mile bones. This story map enables brokers, investors, and clients to visualize the data and better understand the contrasting logistics models of the two leaders in the space – Amazon's "shop-online-and-deliver-to-me" model and Walmart's BOPIS approach. In this instance, layering port and rail infrastructure with Amazon, FedEx, and Walmart assets enables commercial real estate professionals and logistics investors to understand where and why last-mile warehouses are being located in the Golden Triangle. Access the interactive story map online.

Leveraging Story Maps to Visualize Market Opportunities

The old saying about a picture being worth a thousand words holds true now more than ever in an era of infographics and social media. Photos, images, and videos help to grab and hold attention to make even complex information easier to digest. As such, story maps are becoming an increasingly important part of the toolkit for commercial real estate professionals.

Story maps combine text, images, and other multimedia together into one concise visual package. Oftentimes, data is layered on top of a base map that offers a broad view of the world or a particular country, or a micro view of a city, submarket, or specific neighborhood. This technique of layering data is being used broadly across commercial real estate by owners, appraisers, brokers, and managers. Story maps also have a variety of applications ranging from location and market analysis to virtual tours, a view of portfolio holdings, or even a broker's resume of transactions.

"As big data and analytics continues to play a bigger role in real estate decision-making, a story map is a powerful tool to help visualize the data emerging from analysis and forecasting models."

– Mark Cypert, CCIM, CCIM Institute instructor and partner with Middleton Partners

"Story mapping is a process that is very helpful to better understand the dynamics of particular locations, especially when it comes to supply chain management and all the changes that have occurred over the past decade due to the exponential increase in e-commerce and the need to shorten delivery time frames," says Mark Cypert, CCIM, a CCIM Institute instructor and partner with Middleton Partners, a Dallas-based private equity investment firm. Cypert uses story mapping in underwriting investment opportunities.

Specific to logistics, story mapping illustrates the connectivity between the real estate and the end users of that real estate. For last-mile analysis, in particular, story mapping can show where the rooftops are located in proximity to distribution networks, with an ability to take a deeper dive into the location of different population groups and demographics, such as income, age, education, and other factors. Where are those target rooftops in relation to key infrastructure, including distribution facilities, roads, railways, airports, and inland ports? What are the best last-mile locations that can combine speed of delivery with proximity to the end customer?

As big data and analytics continue to play a bigger role in real estate decision-making, a story map is a powerful tool to help visualize the data emerging from analysis and forecasting models. "Site mapping is a great way for diagnosing where there are gaps and opportunities to be filled, or where there is an overabundance of supply that ultimately helps investors, space users, and developers make better decisions," says Cypert.

Voracious Appetite for Logistics Assets

Not only have investors been engaged in activity for vital logistics infrastructure assets like the Kansas City Southern railroad, but they have also been pursuing industrial CRE assets across the U.S., especially among institutional capital sources that have moved modern industrial e-commerce assets to the top of the list for investment. This was a trend pre-COVID, but it has since accelerated. For example, a goal for many institutional investors in 2021 is to grow allocations to industrial property from an average of less than 15 percent of their total portfolios in aggregate to more than 20 percent by the end of 2022, creating an aggressive bidding environment for both individual assets and portfolios that come to market. This highly competitive environment is generating low cap rates (e.g., 4 to 5 percent) in other regions and MSAs that have traditionally been reserved solely for the Los Angeles-Long Beach and Inland Empire markets in southern California. This cap rate trend can even be found in secondary MSAs that are in proximity to vital logistics infrastructure, such as ports, intermodal rail, and burgeoning inland ports in Florida (Winter Haven), South Carolina (Greer and Dillon), Georgia (Appalachian Regional Port in northwest Georgia), New York, Pennsylvania, Arkansas (Little Rock), and Alabama (Montgomery). Plus, there is no longer a risk premium associated with being an e-commerce warehouse in a secondary market such as Salt Lake City; Greensboro and Charleston, S.C.; Savannah, Ga.; Columbus, Ohio; or Central Florida.

Look no further than the recent hostile takeover attempt of MREIC – a 50-plus-year-old industrial REIT with approximately 120 modern warehouses leased to credit tenants such as FedEx, Home Depot, and Amazon – for a powerful illustration of this point. An initial offer of $16.75 per share for Monmouth in December culminated in an announced merger on May 4 in an all-stock price that equated to approximately $19.50 per share and a cap rate in the range of 4.5-5 percent, depending on treatment of transaction costs. It’s important to note that 95 percent of the Monmouth portfolio consists of modern warehouses located in secondary MSAs with none in

West Coast markets like Los Angeles-Long Beach. In other words, it's not about a location relative to primary MSAs that matters in logistics any longer; it's about a location in proximity to logistics infrastructure and where 70 percent of the U.S. population lives. The following is an excerpt from Merrill Ross, head of REIT research with Compass Point Research & Trading, on the company's analysis of Equity Commonwealth's acquisition of MREIC that highlights the underlying shift by investors to logistics and industrial CRE — be it individual assets, portfolios, or REIT mergers:

> "Chair Samuel Zell and CEO David Helfand took control of EQC in 2014 and liquidated over 150 diversified properties and stockpiled cash as they evaluated a broad range of real estate sectors and businesses. They pursued contrarian opportunities as well as differentiated ways to engage with a more favored sector that would allow them to establish a low basis in sought-after assets. Because Mr. Zell believed that 'the current environment is mispricing risk and therefore what otherwise [might] be opportunistic scenarios are priced as though the opportunity was understood in advance,' EQC management turned its focus on sectors with strong fundamental tailwinds and businesses with high-quality cash flows from creditworthy tenants. Given the tailwinds of e-commerce that accelerated during the pandemic, the industrial business and particularly MNR's portfolio were found to be an ideal fit. In our assessment, an all-stock transaction will preserve nearly $2.5 billion of cash on EQC's balance sheet and create an industrial REIT powerhouse with an enormous amount of dry powder that can take advantage of the demand for quality last-mile distribution facilities for the next three to five years."

Demand for warehouses catering to the growth in e-commerce continues to drive commercial property price appreciation (CPPI), as well, even during the pandemic, according to Green Street data. Green Street's 1Q2021 CPPI Index shows that, from 2Q2020 through 1Q2021, industrial CRE gained the most in a 12-month price appreciation at 10-plus percent, followed by manufactured home parks at 9 percent. Malls, strip retail, lodging, office, health care, and even self-storage property types all had negative returns.[9] Interestingly, though, the Green Street CPPI trends by property type during the first year of the pandemic are not directionally different than what was evident pre-COVID, in 2018 and 2019. Industrial warehouses and manufactured home parks also led in price appreciation in the three to five years pre-pandemic at 13 percent and 16 percent in 2019, respectively, while malls, lodging, and strip retail lagged and moved directionally lower. Office turned in an anemic annual CPPI rate of just 3 percent in 2019.

While the Green Street CPPI is based on estimates of price appreciation derived from U.S. REITs covered by the firm, Real Capital Analytics (RCA) analyzes a broader group of properties beyond the REIT sector and at the MSA level. RCA also uses a hedonic model whereby variables related to asset quality are analyzed to explain variations in prices. This type of modeling is especially important today as independent variables tied to building design, site location near last-mile logistics infrastructure, and tenant quality are especially germane in explaining the wide range in warehouse prices. The legacy 1980 and 1990 vintage warehouses with 18- to 24-foot clear ceiling heights on sites with land-to-building ratios of 5:1 or less sell at half the price per square foot – up to $100 per sf – compared to modern e-commerce warehouses that offer:

- Clear ceiling height of at least 32 foot.
- 9:1 or 10:1 land-to-building ratios.
- Proximity to last-mile logistics infrastructure in the Golden Triangle.
- NNN leases with investment grade e-commerce tenants, such as Amazon, FedEx, and Home Depot.

GREEN STREET CPPI 2020 (1Q2020-1Q2021)

	INDEX VALUE	CHANGE IN COMMERCIAL PROPERTY VALUES		
		PAST MONTH	FROM PRE-COVID	PAST 12 MONTHS
All Property	125.8	0%	-7%	-7%
Core Sector	126.8	0%	-6%	-6%
Apartment	147.1	0%	-5%	-5%
Industrial	180.4	0%	8%	10%
Mall	77.0	0%	-20%	-25%
Office	106.9	0%	-9%	-9%
Strip Retail	97.5	0%	-13%	-13%
Health Care	137.0	0%	-4%	-4%
Lodging	94.7	0%	-13%	-13%
Manufactured Home Park	260.8	0%	8%	9%
Net Lease	91.8	0%	-8%	-8%
Self-Storage	185.3	0%	0%	-1%
Student Housing	145.8	0%	-6%	-6%

Commercial Property Price Index - March 4, 2021

GREEN STREET CPPI CY 2019

	INDEX VALUE	CHANGE IN COMMERCIAL PROPERTY VALUES		
		PAST MONTH	PAST 3 MONTHS	PAST 12 MONTHS
All Property	135.4	0%	1%	3%
Core Sector	135.1	0%	2%	4%
Apartment	152.2	0%	3%	6%
Industrial	164.7	0%	4%	13%
Mall	106.9	0%	0%	-11%
Office	116.8	0%	0%	3%
Strip Retail	111.7	0%	0%	1%
Health Care	142.7	0%	1%	2%
Lodging	108.9	0%	0%	0%
Manufactured Home Park	233.3	0%	3%	16%
Net Lease	99.3	0%	0%	1%
Self-Storage	186.6	0%	0%	4%
Student Housing	154.9	0%	0%	3%

Commercial Property Price Index - March 4, 2021

Consider the following 20-year analysis of warehouse prices and cap rates by RCA.

This analysis of warehouse transactions reveals several noteworthy points on investment in industrial CRE. Cap rates have compressed more than 50 percent from 9 to 9.3 percent in 2001 to 2002 to 5.75 percent or less by the end of 2020. Furthermore, cap rate compression has not run its course for industrial CRE because:

- Warehouse demand will continue to exceed supply for the next two to three years despite more than 250 msf of new construction per year.
- Institutional investment capital is underweighted in industrial CRE, with non-bank sources (life companies, CMBS, sovereign funds, etc.) looking to increase their investment in warehouse as previously noted.

RCA 20-YEAR ANALYSIS OF WAREHOUSE SALES

	U.S. INDUSTRIAL HEDONIC CAP RATE	U.S. INDUSTRIAL CAP RATE	U.S. INDUSTRIAL CPPI	U.S. INDUSTRIAL HEDONIC PRICE ($/SF)	KEY EVENT
6/30/2001	9.4%	9.0%	69.76	$67.48	Pre-rise of Amazon
3/31/2002	9.5%	9.3%	68.50	$63.84	
3/31/2003	9.0%	8.8%	69.71	$64.14	Amazon's reach not understood until 2007-2017
3/31/2004	8.5%	7.9%	72.06	$65.73	
3/31/2005	8.0%	7.9%	81.92	$71.07	
3/31/2006	7.3%	7.0%	93.44	$77.91	
3/31/2007	6.9%	6.8%	103.62	$84.39	
3/31/2008	7.1%	7.4%	102.83	$84.25	
3/31/2009	7.9%	7.9%	86.40	$73.18	The Great Recession
3/31/2010	8.4%	8.2%	74.12	$66.31	
3/31/2011	8.1%	8.0%	71.21	$68.33	
3/31/2012	7.7%	7.6%	73.44	$69.75	
3/31/2013	7.6%	7.6%	76.04	$73.54	
3/31/2014	7.2%	7.1%	84.09	$79.43	
3/31/2015	6.9%	6.9%	94.68	$85.01	
3/31/2016	6.7%	6.8%	100.21	$88.69	
3/31/2017	6.5%	6.8%	108.39	$93.39	Amazon acquires Whole Foods
3/31/2018	6.3%	6.3%	118.29	$101.87	Record retail bankruptcies and store closings
3/31/2019	6.2%	6.3%	129.60	$108.44	
3/31/2020	6.0%	6.1%	142.13	$117.84	COVID-19 and a record rise in e-commerce to >14% of total retail sales
6/30/2020	6.0%	6.0%	144.99	$117.62	
9/30/2020	5.9%	5.9%	148.65	$120.45	
12/31/2020	5.9%	5.8%	151.67	122.11	

- The hunt for yield continues away from lodging, office, and retail property types.
- Long-term growth prospects are present despite an uptick in new construction.

The competition for new warehouses with all the desirable modern last-mile attributes detailed above is pricing assets in 1H2021 at cap rates in the low 5 percent range and even in the 4 percent range for core MSAs. The resulting price per square foot for warehouses has doubled in 20 years from the mid-$60 per sf range to low $120 per sf range in 2021. The $120 per sf range indicated by RCA in 1Q2021 is on the low side. Industrial REITs are now paying north of $150 per sf. For the right asset with all the last-mile attributes, prices can exceed $175 per sf and are approaching $200 per sf. The following factors are driving the increase:

1. Warehouses cost more to build. Steel and other key material prices like concrete are up 25 percent to 100 percent since the onset of the pandemic. For example, the last building acquired by Monmouth in 4Q2020, an e-commerce warehouse in south metro Atlanta leased to Home Depot, would cost as much as $1 million more today due to steel costs alone.
2. Today's e-commerce warehouse requires twice the land area as a decade ago because tenants are anticipating expansion at renewal of base lease terms and are requiring more truck pad parking area. In the Home Depot warehouse example, the land to building ratio was 10:1 for the 650,000-sf warehouse – or double what was typical three to five years ago.
3. Capital sources want more industrial warehouse assets in their portfolio and are willing to pay aggressively to rebalance the property mix. Because these warehouse assets represent less than 5 percent of total operating expenses for e-commerce and package delivery companies like Amazon, Walmart, FedEx, UPS, and the like, and they now operate 24/7 versus 12/6 a decade ago, higher costs for more land and construction materials are not dissuading development of even more warehouse buildings.

CRE professionals also need to view last-mile logistics from both an opportunity and a risk perspective. The risks are three-fold:

- One risk is simply building or buying a large e-commerce warehouse in a location that doesn't work, such as one too far from vital logistics infrastructure to be accretive for last-mile logistics. Such mistakes can be costly given that modern warehouse facilities cost double what they did three to five years ago.
- Another risk is associated with evolving digital economy models. Site selection for last-mile logistics is a new discipline with multiple models, such as B2B versus B2C, and CRE professionals and their clients need to understand that change is an inherent risk. What works today may evolve into something new tomorrow.
- The final risk is the added unknown of legislative or political change. One example is the recent attempts to unionize e-commerce workers in both California and Alabama, which could significantly impact operating costs in those states and, ultimately, location decisions for e-commerce firms.

The Ripple Effects of Last-Mile Evolution

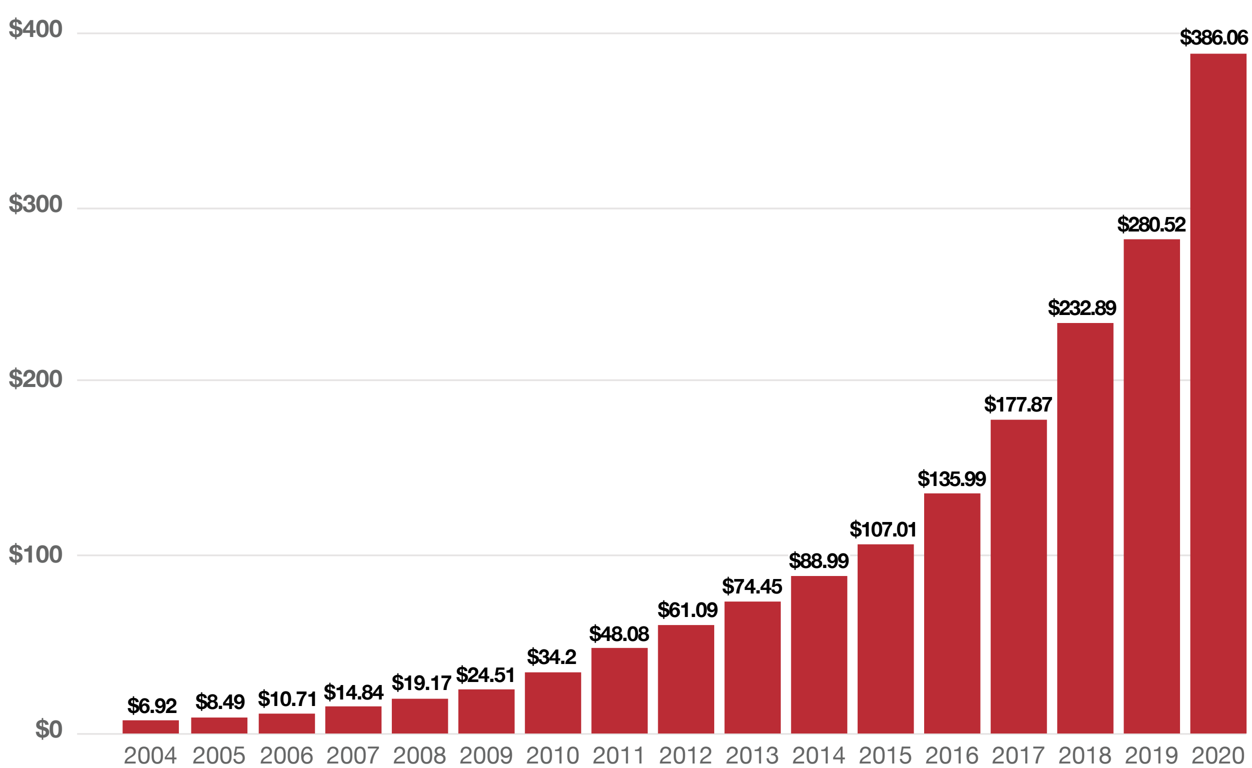
The expansion of e-commerce activity to include everything from toilet paper to cars during COVID-19 has advanced last-mile logistics from the first inning of a baseball game to the third or fourth. We are still a long way from the seventh-inning stretch and nowhere near the end of the logistics ballgame. While it is generally recognized that the pandemic moved e-commerce forward exponentially, we have yet to appreciate the degree of change that has occurred and that which still lies ahead. For example, Amazon became the "everything retailer," with net sales that have surged four-fold from $100 billion in 2015 to $400 billion in 2020.[10]

However, Amazon has not only disrupted the way we consume but is also re-envisioning commercial real estate assets. The company is converting many former big-box retail stores into last-mile staging centers, a process now termed RICs. Amazon first prototyped this RIC approach with former Toys "R" Us stores and is now expanding to former Kmart stores. This trend is discussed extensively in the CCIM Institute last-mile logistics course.

The term "logistics" conjures images of e-commerce, warehouses, and delivery. However, it is important for CRE professionals to understand the many

ANNUAL NET REVENUE OF AMAZON FROM 2004 TO 2020

(in billion U.S. dollars)



different layers and nuances of logistics. The topic of logistics no longer fits neatly into just the box of the industrial sector. Logistics are the arteries that direct materials and merchandise flow to the vital elements of our economy. This evolution of logistics and last-mile delivery is creating ripple effects that are being felt broadly across property types. Logistics now influences the where and why of site selection for all property types.

Gone are the days when housing needed to be located in proximity to essentials, such as a grocery store or shopping center. Thanks to the evolution of a "shop-online-and-deliver-to-me"[11] economy, people can live farther from dense areas and physical retail stores. Going a step further, the combination of remote-work technology, housing affordability, and last-mile logistics has the potential to disrupt demand and location strategies for office, as well. The pandemic proved that the workforce can live where it's more affordable, and employers are able to cast a bigger net and draw a skilled workforce from anywhere. The growth of Zoom Towns in the U.S. further supports this disruption.

While some companies will go back to dense, high-rise office building environments in large urban cities, others will not. Large office space users, such as technology and financial services, are being challenged to rethink their needs. As a result, office investors may be forced to reprice their office assets based on the post-COVID rethinking of office work. Suburban and secondary markets may become the next-gen office of choice for office building investing, emphasizing smaller, more horizontal office building designs — such as repurposed malls and single-story 1980s vintage office parks.

Last-mile logistics has surged to the forefront in the restaurant sector, too. With the pandemic fueling a bigger shift to online ordering, restaurant chains embraced digital apps and delivery, forcing them to reevaluate site-selection criteria that focuses more heavily on easy access, ingress and egress, and parking to accommodate delivery drivers and curbside pickup.

Even hotels could be impacted by the shift in last-mile logistics. Will the hotel of tomorrow even need to have banquet and meeting facilities? Why invest in on-site food service for catering or room service requests when Uber Eats or Grubhub can offer more choices along with fast, convenient service to guests? Last-mile logistics can also enable alternative hospitality models. Why not host meetings and events in non-traditional venues, such as a city park, versus the traditional convention center or hotel?

The obvious target for logistics disruption is the retail sector, which is often measured by retailer bankruptcies and store closings. Synergies are driving change within the retail sector, such as leveraging that last-mile network for more cost-efficient BOPIS and reverse logistics — the return of goods through the supply chain. Retailers are adopting an "if you can't beat 'em, join 'em" mentality, offering in-store package pickup or return locations for the likes of Amazon, FedEx, and UPS. Ultimately, last-mile logistics is creating a ripple effect beyond industrial to include all property types. What that means for commercial real estate professionals is they need to keep their finger on the pulse of changing site selection criteria, logistics infrastructure, and essential last-mile backbones needed to support supply chain and business models for occupiers, as well as the risk analysis for development and investment opportunities.

Footnotes

1 History of Amazon 1994 through February 2021 by Interesting Engineering

2 CCIM Institute Ward Center for Real Estate Studies: Last-Mile Logistics: The Final and Most Expensive Link in the Supply Chain

3 ASCE 2021 Infrastructure Report Card (IRC)

4 *Newsweek*'s Analysis of Biden's Proposed Infrastructure Plan

5 CCIM Institute Ward Center for Real Estate Studies: Last-Mile Logistics: The Final and Most Expensive Link in the Supply Chain

6 E-commerce Sales 4Q2020 16% and February 2021 14.4% According to St. Louis Fed FRED System

7 Kansas City Southern Reverses Course and Accepts CN Bid Over CP

8 MREIC Investor Presentation: April 2021

9 Green Street 1Q2021 CPPI

10 Amazon Net Sales Chart 2004-2020 by Statista

11 Logistics Infrastructure: Transformational Opportunities

What are your thoughts?

This report is intended to start a dialogue. Share it with clients and colleagues, and send your thoughts to report@ccim.com.

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