



Cargo-Oriented Development (COD) Concept and Opportunity

Job creation and environmental benefits through the coordination of freight transportation, land use, and economic development



**PREPARED BY
THE CENTER FOR NEIGHBORHOOD TECHNOLOGY**

SEPTEMBER 2013

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Synergistic Investments

Class I railroads are investing more than \$20 billion annually in facilities and equipment. This creates a tremendous opportunity for mutually beneficial partnerships among the rail industry, logistics firms, and state and local governments. The benefits of this investment can be captured in substantially more efficient operations, environmental improvement, and job retention and creation through promotion of *Cargo-Oriented Development (COD)*. COD may be defined as the development of places that are both multi-modal nodes of freight transportation and centers of employment in logistics and manufacturing businesses. The return on coordinated COD investments comes in the form of reciprocal benefits:

Railroads and truckers achieve large efficiencies in operations leading to cost reductions and gains in the number of dedicated customers

Shippers significantly reduce their transportation costs

Jurisdictions that host and facilitate CODs grow their employment and tax bases while improving their natural environment

The synergies of concentrating industrial businesses at freight transportation nodes have been recognized for more than a decade in professional literature that discusses “freight villages,” “logistics platforms,” and “freight zones.”¹ Over the last ten years, newly constructed logistics/industrial parks adjacent to intermodal terminals have demonstrated this beneficial relationship by generating thousands of jobs.² Research also demonstrates that preserving and modernizing freight facilities in established communities can be crucial to the retention of thousands of industrial jobs, as well as the creation of new jobs.³

THE CN RAILROAD'S GATEWAY TERMINAL IN CHICAGO'S SOUTH SUBURBS IS ADJACENT TO INDUSTRIAL PARKS THAT HAVE BEEN IN PLACE FOR DECADES AND ARE UNDERGOING REDEVELOPMENT.



Freight Transportation System Improvements

When the COD principle of coordinating land use and freight transportation is applied, multiple benefits for the efficiency of the freight transportation system follow.

Additional industrial companies are located with excellent access to freight rail. Manufacturers, processors of raw materials, and commodity transload operations take locations along rail spurs, so that rail car load service becomes practical for shippers and railroads. Warehouses, distribution and fulfillment centers, and light manufacturers cluster around intermodal terminals. Industrial parks adjacent to the Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) terminals in the southwest Chicago suburbs, The CSX railroad's Rickenbacker facility in Ohio, and industrial parks linked to intermodal terminals in Alliance, Texas, the Kansas City Smart Port, and California's Inland Empire demonstrate this relationship.



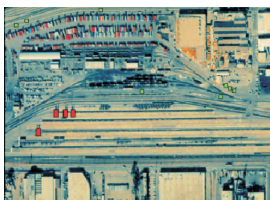
Somewhat more subtly, intermodal terminals such as the Norfolk Southern (NS) facilities on the south side of Chicago and BNSF terminals on the west side are surrounded by residential neighborhoods but located beside expressway ramps in the center of major urban areas. These terminals conduct a thriving business serving customers in Chicago's industrial corridors because drays to these businesses are more efficient from city rather than exurban locations.

The location of shippers near intermodal terminals that use state-of-the-art technologies to minimize transfer costs can change the economies of freight movement. For example, a shipment of less than 600 miles is more practical by truck if the points of origin and destination are each dozens of miles from a modern intermodal freight terminal. But if origin and destination points are only a few miles from intermodal terminals that use the most efficient emerging transfer technologies, train miles become a larger part of the entire

trip and intermodal may become the most cost-effective option.⁴ So COD opens wider segments of the freight market to movement by the most efficient mode .

As COD allows more shippers to use carload service and shortens the length of intermodal drays, congestion caused by intraregional as well as intercity truck traffic will decline. In types of movements that UPS and Federal Express sometimes achieve today, less-than-truck-load consignments may pass through rail-served distribution centers to light vehicles for final delivery, reducing heavy truck movements through city streets.

To the extent that a region realizes COD benefits in its freight transportation system, opportunities are also created for its broader economy and communities.



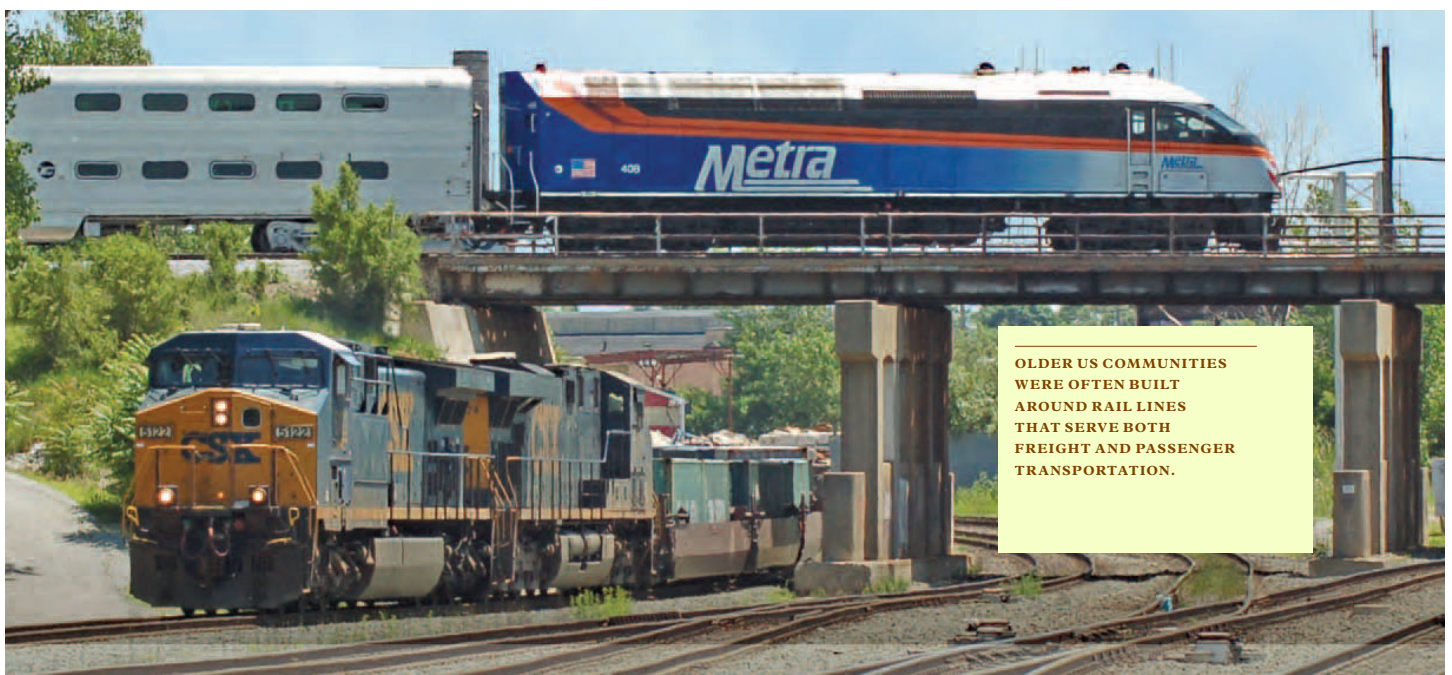
Industrial and Community Development

Cargo-Oriented Development (COD) can be integrated with Transit-Oriented Development (TOD) strategies in older industrial communities. Residential neighborhoods, main streets, and industrial districts of these communities grew up around rail, and today the same infrastructure commonly serves freight and public transit functions. Frequently, these mature communities are suffering economically from plant closings and reductions of industrial employment. COD can mitigate or reverse these losses with employment centers linked to transit. Logistics and manufacturing businesses in established community CODs can draw experienced workers from nearby areas, while workers gain access to good jobs close to home, and their communities experience economic revitalization.

Conversely, when railroad towns lose their freight facilities to greenfield intermodal terminals, there is a tremendous impact on the economic activity of the community. For example, in 2003 Reebie Associates carried out a study for the City of Chicago in which it projected the economic outcomes of retaining intermodal freight terminals in the city compared with relocating them to the suburbs and

converting the city land to other uses. Reebie found that over 18 years, retaining and upgrading the terminals would lead to net gains of over 8,000 jobs and over \$1 billion in gross regional product (GRP), while strategies to replace the terminals would result in losses of 6,000 to 15,000 jobs and over \$1 billion in GRP. While reuse of the land would eventually replace these deficits, the foreseeable benefits were 25 percent to 75 percent lower than keeping and improving the freight terminals. The terminals' main value did not lie in their direct operations, but in the companies that relied on these facilities and would follow them to the suburbs if necessary.⁵

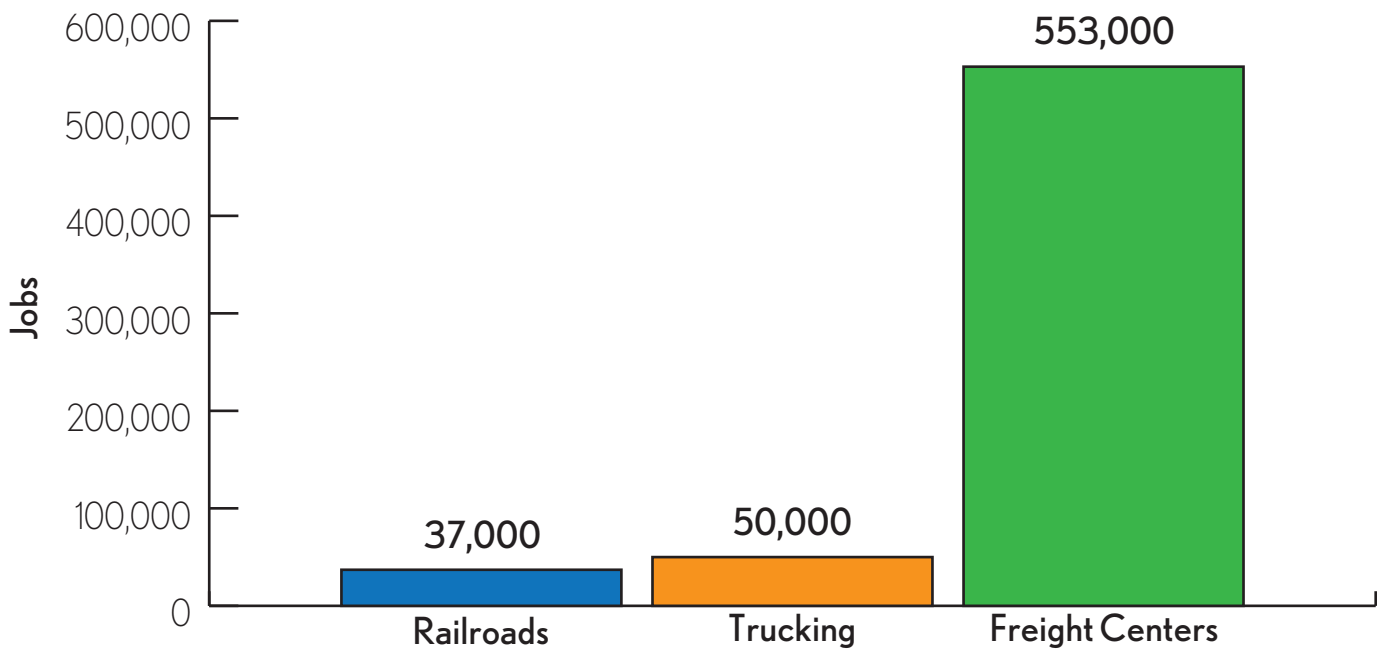
Similar relationships were demonstrated in a 2004 study by the Chicago civic organization Metropolis 2020, now known as Metropolis Strategies. They reported that the Chicago area hosted 87,000 jobs in railroad and trucking companies and 553,000 jobs in logistics-industrial parks adjacent to the region's 21 intermodal freight terminals.⁶ In 2011 a study of the Chicago area's freight cluster by the Chicago Metropolitan Agency for Planning (CMAP) found that approximately 73,000 jobs in truck, rail, and



water freight transportation were the driving force of a logistics cluster that encompassed dozens of industries, including warehousing and storage, express delivery services, and freight arrangement services that employed 204,000 workers.⁷ CMAP also noted that “over a quarter of region’s jobs [more than 1 million] are in industries directly tied to freight and expansions or contractions in freight

industries substantially impact these areas.”⁸ These studies demonstrate a similar pattern – the pyramidal relationship between freight transportation services, per se, and the much broader layers of logistics businesses, subsequently manufacturers, wholesalers, and retail firm supply arms that want to locate in COD areas.

Job Creation in Freight Zones



David Chandler, Albert Benedict, and Stephanie Dock. *Quality of Jobs Linked to Freight Transportation*. 87th Annual Meeting of the Transportation Research Board. January 13-17, 2008

CHICAGO FREIGHT FACILITIES ARE MAJOR JOB ANCHORS

Sustainable Redevelopment and Complete COD

In addition to its critical economic value, COD inherently yields environmental benefits. In 2005, congestion resulting from port landside access was estimated to cost up to \$200 billion annually, including 2.3 billion gallons of wasted fuel,⁹ which represents significant and unnecessary air pollution. Moreover, with the expected increase in freight volume and the increased use of mega cargo ships, these numbers will only spiral upward. In the reduction of congestion and air pollution, the overall energy efficiency with which freight can move over land is critical. In figures that are often quoted, energy consumption per ton-mile of freight is approximately ten times higher for a heavy truck than long-distance rail.¹⁰ However, when the energy requirements of origin/destination drayage as well as modal transfer and cargo storage are taken into account, the energy efficiency advantage of intermodal rail over truck declines to a multiple of 2.75 to 5.5.¹¹ So while a shift in freight volumes from truck to rail is an important environmental goal, efficiency of intermodal operations is critical in deriving full value from this change.¹²

With COD:

Cargo moves as far as possible via the most environmentally efficient mode of transportation

Truck trips are eliminated or substantially shortened

Fuel use, air pollution, traffic congestion, and public infrastructure costs decline proportionately with reductions in truck mileage

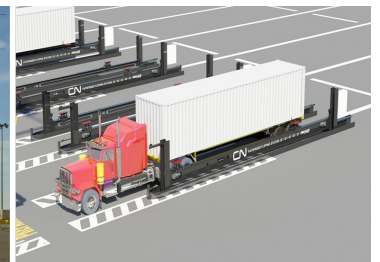
When CODs are built in established communities, which are usually city neighborhoods or inner-ring suburbs, regional environmental benefits multiply:

Sprawl is contained

Brownfields are reclaimed while exurban open space is preserved

Terminals and distribution centers in the middle of urban areas minimize the length of their regular truck movements to customers

Workers can make shorter commutes, frequently by public transit, biking, or walking



AMERICAN MANUFACTURERS SUCH AS MIJACK COMPANY AND NATIONAL RAILWAY EQUIPMENT COMPANY ARE PRODUCING RAILROAD AND CARGO HANDLING EQUIPMENT THAT DRAMATICALLY REDUCES ENERGY USE AND POLLUTION.



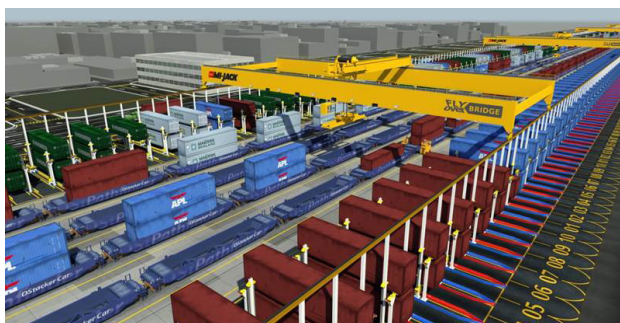
GROUND BREAKING FOR BROWNFIELD CLEANUP AT COD SITE (DIXMOOR, IL)

However, without careful planning and public standards, neighborhoods adjacent to CODs can suffer from negative environmental impacts such as noise, air pollution, and traffic congestion.¹³ Fortunately, the combination of sustainable transportation planning, industrial design, and new freight technology can dramatically mitigate the unwanted side effects of freight movements. Requirements for environmentally beneficial systems and equipment, including new technology that reduces the time and energy involved in transferring containers between modes, as well as noise levels and truck congestion internal to the intermodal yard and on surrounding streets, provide an effective set of remedies for impacted neighborhoods.

One very promising new terminal management program, the Automated Transfer Management System (ATMS), offers a 67% to 80% reduction in energy consumption within

freight terminals largely from greatly reduced need for cargo handling.¹⁴ These innovative freight systems and equipment lines also reduce the space required for freight operations, and thus increase the value of land and COD opportunities in many urban industrial districts that otherwise would be overlooked or abandoned by the freight industry.¹⁵

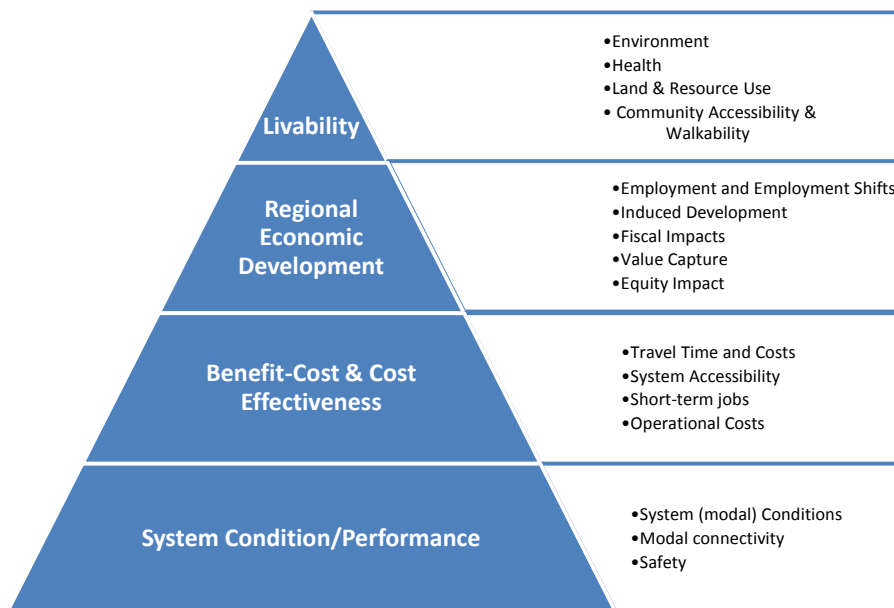
Because the potential of COD to generate broad economic, social, and environmental benefits varies greatly depending on choices about development locations and the use of technologies that reduce pollution, a distinction should be drawn between COD that simply places freight infrastructure and industrial businesses on adjoining sites and “Complete COD” that incorporates more efficient location choices, site designs, and technologies to realize the triple bottom line benefits that are available through this form of development.



**HIGH PERFORMANCE COD—
TRANSPORT AND LOCATION
EFFICIENCY FEATURES**

**Economic Impact Analysis—
Moving Up the Ladder from
System to Community Benefits**

- Most of the excitement is around the top two rungs of this ladder
- Most of the benefits analysis is internally focused on the bottom two rungs
- Needs to be a more balanced approach to attract the full range of interested public and private investors



COD Analysis and Implementation

CNT has developed an analytical tool, the **COD Optimizer™** that enables effective planning and evaluation by government, freight carriers and related businesses. Additionally, CNT has tools for related analysis including: employment access and transit connectivity indices within the Housing + Transportation (H+T®) Affordability Index (htaindex.org).

CNT's Optimizer is a set of algorithms that processes data on a geographic information system (GIS) platform for use at four stages of COD analysis, planning, implementation, and evaluation:

SUMMARY OF OPTIMIZER VARIABLES

CATEGORY	TOD	COD
Land Use and Development Scale	Size and contiguity of vacant or underutilized properties; land fragmentation; average block size; land use diversity; housing density	Size and contiguity of vacant or underutilized properties; land fragmentation; industrial land use
Transportation Assets	Transit availability and ridership	Transit availability; proximity to expressway exits, freight rail, intermodal terminals, trans-load facilities and truck routes
Business Characteristics	Data on employment and sales for nearby commercial businesses	Data on employment and sales for nearby businesses; proximity to industrial and logistics businesses
Demographics	Aggregate household income; H+T costs; foreclosures	Educational attainment of workforce; employment sectors

- Randy Evans, Senior Vice President, CSX Transportation; July, 16, 2003; *TEA-21 Reauthorization and Railroad Infrastructure*, presentation to the Transportation Research Board Summer Meeting \Konstantinos G. Zografos, Athens University & Amelia C. Regan, University of California, *Current Challenges for Intermodal Freight Transport and Logistics in Europe and the US*, particularly, pp 7-8, paper presented to the Transportation Research Board, Annual Meeting January 2004 \Anderson, S., J. Allen, M. Browne, *Urban Logistics, How It Can Meet Policy Makers Sustainability Objectives*, STELLA Thematic Network Seminar, Quebec City, May 26-7, 2003, pp. 18 \Weisbrod R.E., E. Swiger, G. Muller, F.M. Rugg, M.K. Murphy, *Global Freight Villages: A Solution to the Urban Freight Dilemma*, Proceedings of the 81st Meeting of the Transportation Research Board, 11-17 January, 2002.
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- Chicago Metropolitan Agency for Planning (CMAP), Full report, pages 60 - 73.

ABOUT THE CENTER FOR NEIGHBORHOOD TECHNOLOGY

The Center for Neighborhood Technology (CNT) is an award-winning innovations laboratory for urban sustainability. Since 1978, CNT has shown urban communities in Chicago and across the country how to develop more sustainably. CNT promotes the better and more efficient use of the undervalued resources and inherent advantages of the built and natural systems that comprise the urban environment.

As a creative think-and-do tank, CNT researches, promotes, and implements innovative solutions to improve the economy and the environment; make good use of existing resources and community assets; restore the health of natural systems and increase the wealth and well-being of people—now and in the future. CNT's unique approach combines cutting edge research and analysis, public policy advocacy, the creation of web-based information tools for transparency and accountability, and the advancement of economic development social ventures to address those problems in innovative ways.

CNT works in four areas: transportation and community development, water, energy, and climate. CNT has two affiliates, CNT Energy and Alternative Transportation of Chicagoland.

CNT is a recipient of the 2009 MacArthur Award for Creative and Effective Institutions.

More information about CNT is available at www.cnt.org

