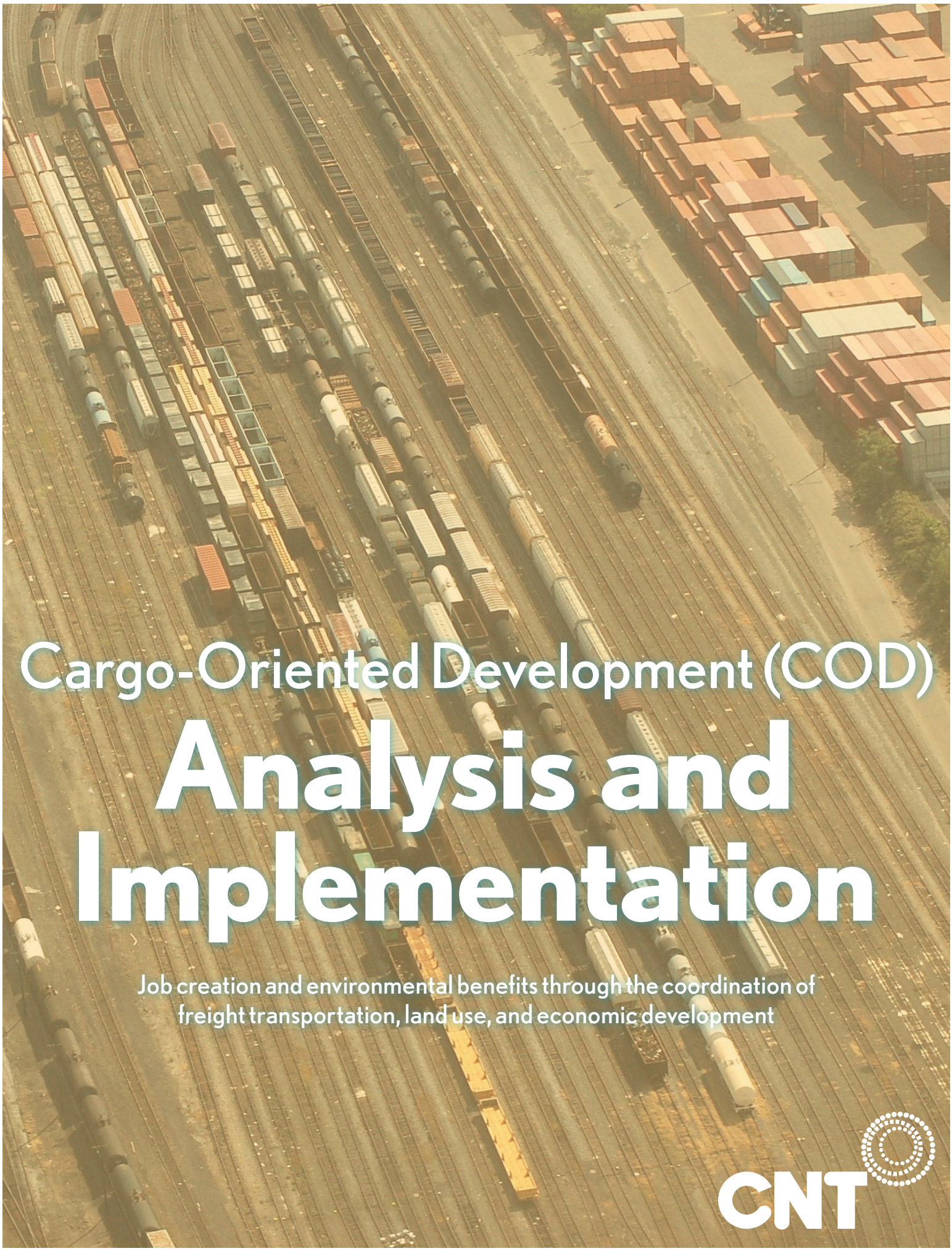

Cargo-Oriented Development (COD)

Analysis and Implementation

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

CNT

PREPARED BY
THE CENTER FOR NEIGHBORHOOD TECHNOLOGY

SEPTEMBER 2013

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Concept and Opportunity

Railroads are investing more than $20 billion a year in new facilities and equipment in anticipation of continued growth in freight demand. This situation creates a tremendous opportunity for productive partnerships among the rail industry, logistics firms, and state and local governments to capture the benefits of that investment in substantially more efficient operations, environmental improvement, and job retention/creation through ***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. When high quality transit service is nearby, employers have access to a broader workforce and the site has potential for supportive retail, office and housing, known as transit-oriented development (TOD). The return on this coordinated investment comes in the form of reciprocal benefits:

- Railroads and truckers achieve large efficiencies in operations leading to cost reductions and gain dedicated customers
- Shippers significantly reduce their transportation costs
- Jurisdictions that facilitate CODs grow their employment and tax bases while improving the quality of their environment

Today, the benefits of COD can be greatly enhanced by new technologies—such as advances in IT and operational

equipment, especially new generation lift technology—that reduce energy use, time in transit and handling, and traffic congestion. These innovative systems and equipment lines also reduce the space required for freight operations, increasing the value of land and COD opportunities in existing industrial districts that otherwise would be overlooked or abandoned by the freight industry. COD that considers location within existing communities, provides convenient access for workers, protects the surrounding neighborhood through its industrial design, and comprehensively adopts new technologies to optimize economic, social, and environmental benefits can be thought of as ***Complete COD.***

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.

Emerging Practice in Complete COD

The significant increase in railroad capital investment over the last decade[1] is largely in anticipation of a predicted rise in freight volumes, which USDOT projects will grow by 62 percent in tonnage and 134 percent in value over the next three decades.[2] The congestion of US highways and mounting fuel prices, coupled with the increasing efficiency and reliability of the US rail industry, are directing much of this growth into intermodal channels. USDOT predicts that only half of the anticipated increase in freight volume will move by truck alone.[3]

Many of these major new developments are occurring in exurban locations where land can be assembled readily, but many of the larger potential benefits of complete COD in established communities are lost.[4] As a related concern, the pace at which energy-efficient freight handling equipment and systems are being adopted may not be achieving its potential.

Yet in a growing number of cases around the country, highlighted by the examples on the following pages, civic and economic development organizations and local governments are collaborating with private freight companies to realize the potential of COD for sustainable development. These collaborations will improve economies and the quality of life in regions and in established communities.

INTERMODAL FREIGHT IS GROWING RAPIDLY AND REPLACING MANY LONGER TRUCK MOVEMENTS.

PORT OF BALTIMORE AND MOUNT CLARE YARD

BALTIMORE, MD

The Port of Baltimore is upgrading its infrastructure to receive new super-sized "post-Panamax" ships that will be moving through the expanded Panama Canal in 2015. Consequently, containerized cargo volume at the Port of Baltimore is projected to rise by 10 to 25 percent, an expectation which led the CSX railroad to seek a new rail-to-truck intermodal facility to replace an obsolete one located at the port. CSX identified several sites for this yard in suburban Baltimore County, but those municipalities declined the investment due to zoning and community concerns over congestion and pollution. However, City of Baltimore Mayor Stephanie Rawlings-Blake saw the strategic importance of the yard for the economy of the city and region, and urged CSX to redirect its site search to potential locations within the city limits. The final choice was Mount Clare Yard, an active CSX rail yard in the southwestern part of the city. The yard was a legacy facility primarily used to store coal that was smaller than the suburban locations CSX initially planned.

Public and private investments have made Mount Clare Yard a viable intermodal site and positioned Baltimore to capture projected freight increases. CSX will purchase high-efficiency electrical cranes that will allow a capacity of 90,000 container lifts per year on an infill footprint, while substantially reducing the impact of emissions and air pollution on the surrounding community. CSX also will move the entrance to the new facility to minimize residential disruptions, and the Maryland Department of Transportation is improving intermodal connectors to keep trucks off of residential streets. These improvements minimized the externalities to the surrounding community and secured City and State support for the repurposed facility. Besides preserving the value of Baltimore's investment in its port, this development is expected to stimulate a new logistics and industrial district adjoining the rail terminal.[5]

KC SMARTPORT

KANSAS CITY, MO & KS

Encompassing a 90-mile radius around Kansas City that includes 18 counties across state lines, KC SmartPort creates a unified brand for the numerous freight assets in the region, which span multiple modes and public and private owners, so as to attract developers, investors, and end users to "shovel-ready" development sites in their area. The organization manages online data services, facilitates the designation of Foreign Trade Zone (FTZ) subzones, and coordinates a workforce development partnership with community colleges (among other services) to facilitate COD. Class I railroads and private businesses fund KC SmartPort, even though they compete in daily operations. All partners believe in the importance of the initiative for the economic development of their region, and collaborate successfully to implement common strategies. Since its launch, KC SmartPort has attracted several distribution and logistics companies to the Kansas City region, creating thousands of new jobs despite a challenging economic environment. In 2012 the region attracted 11 new companies to occupy 1.4 million sq. ft. of space, created 500 new jobs, and added $18 million in new payroll.[6]

PORT OF BALTIMORE
Photo Credit: RyanCrierie via Flickr/CC

THE CENTER FOR NEIGHBORHOOD TECHNOLOGY (CNT) AND THE CHICAGO SOUTH SUBURBAN GREEN TIME ZONE

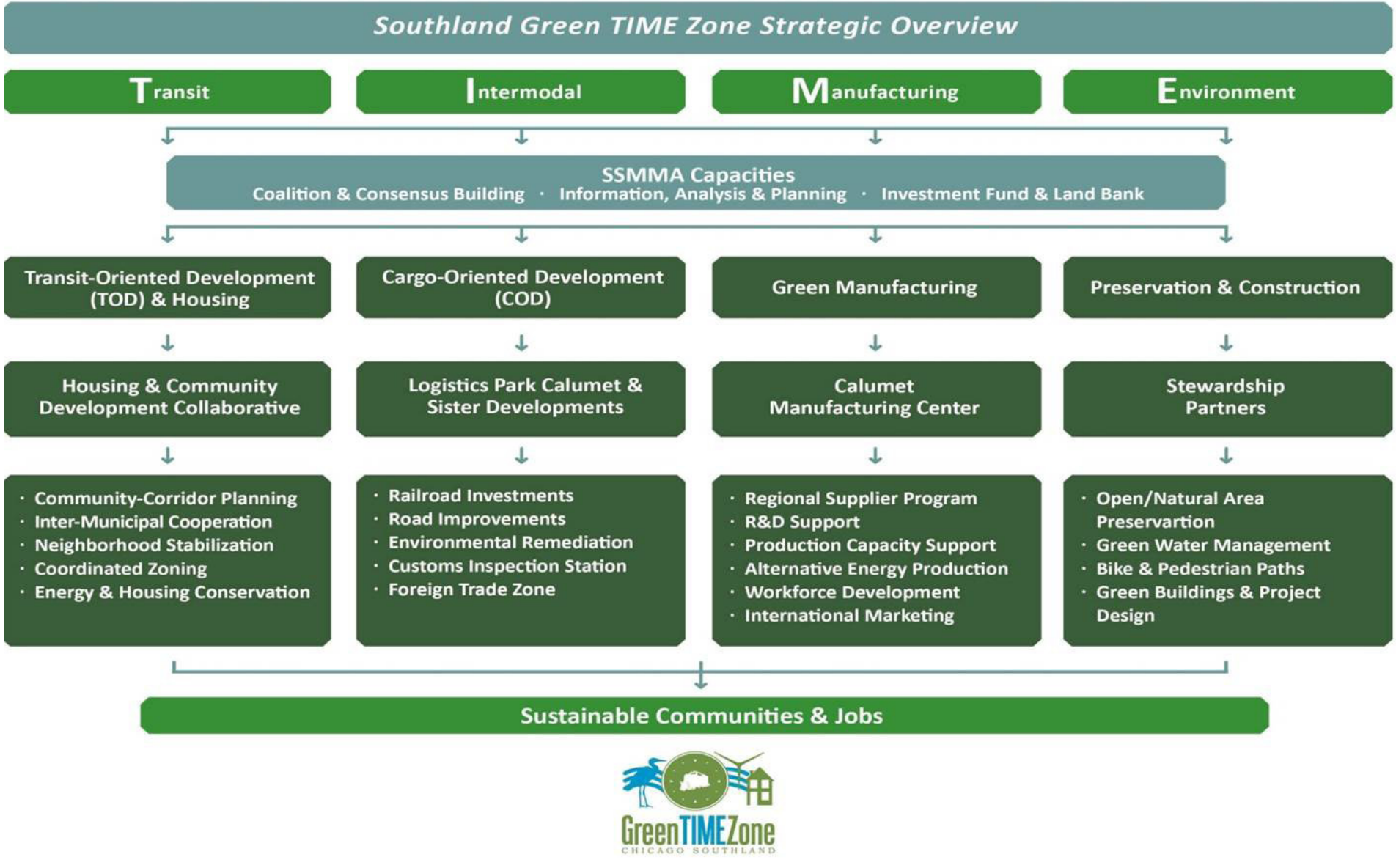
CHICAGO, IL

Since 2005, the Center for Neighborhood Technology (CNT), in partnership with the local governments and community organizations of Chicago's 42 south suburbs, has carried out a pilot program to implement a strategy of linked COD and TOD.[7] Initially, CNT conducted a GIS-based analysis of the south suburbs that identified over 3,000 acres of vacant industrial land in large blocks with high COD potential, and analyzed 33 active and 9 planned transit stations in the same towns to identify a range of viable TOD opportunities.[8] To model the potential redevelopment, CNT partnered with Blue Island and Harvey, IL, two economically distressed southern suburbs with strong COD and TOD potential. CNT conducted a bottom-up planning process with the municipal governments and residents of these towns and created economic development plans to capitalize on their TOD and COD assets.[9]

Encouraged by some initial successes resulting from these plans, CNT entered into a partnership with the South Suburban Mayors and Managers Association (SSMMA), the council of governments organization for Chicago's south suburban region, to pursue linked COD and TOD as the primary redevelopment strategy for the area. The overarching campaign is named the Southland Green TIME Zone (in which TIME stands for Transit, Intermodal, Manufacturing, Environment). To date this strategy has led to public and philanthropic investments of over $20 million in information management systems, brownfields remediation, and infrastructure improvements that have prepared sites for new businesses and homes, as well as the preservation of workforce housing and worker training for new manufacturing and logistics jobs. Federal agencies, including the Environmental Protection Agency (EPA), the Department of Transportation (DOT), the Department of Housing and Urban Development (HUD), the Economic Development Administration (EDA), the Department of Labor (DOL) and the inter-agency Sustainable Communities Challenge Grant program, are contributing to this initiative. Early private sector investments of over $25 million have more than matched public funding, and will soon dwarf public dollars as new businesses are built on upgraded sites.[10] To accelerate this leverage of private investments, the program created a structured fund and lenders consortium, and an act of the Illinois General Assembly permits the next $21 million of state income tax revenue from new industrial jobs in the Green TIME Zone to reimburse COD investments.[11]

CNT shares its COD experience in presentations at national transportation and urban planning conferences, and provides technical assistance regarding COD to HUD and USEPA grant recipients.[12] CNT also works as a COD consultant in multiple regions around the country, identifying appropriate technologies for greater efficiency gains, solving redevelopment problems or creating long-term plans for sustainable redevelopment.[13]

COD COMMUNITY VISION DEVELOPMENT

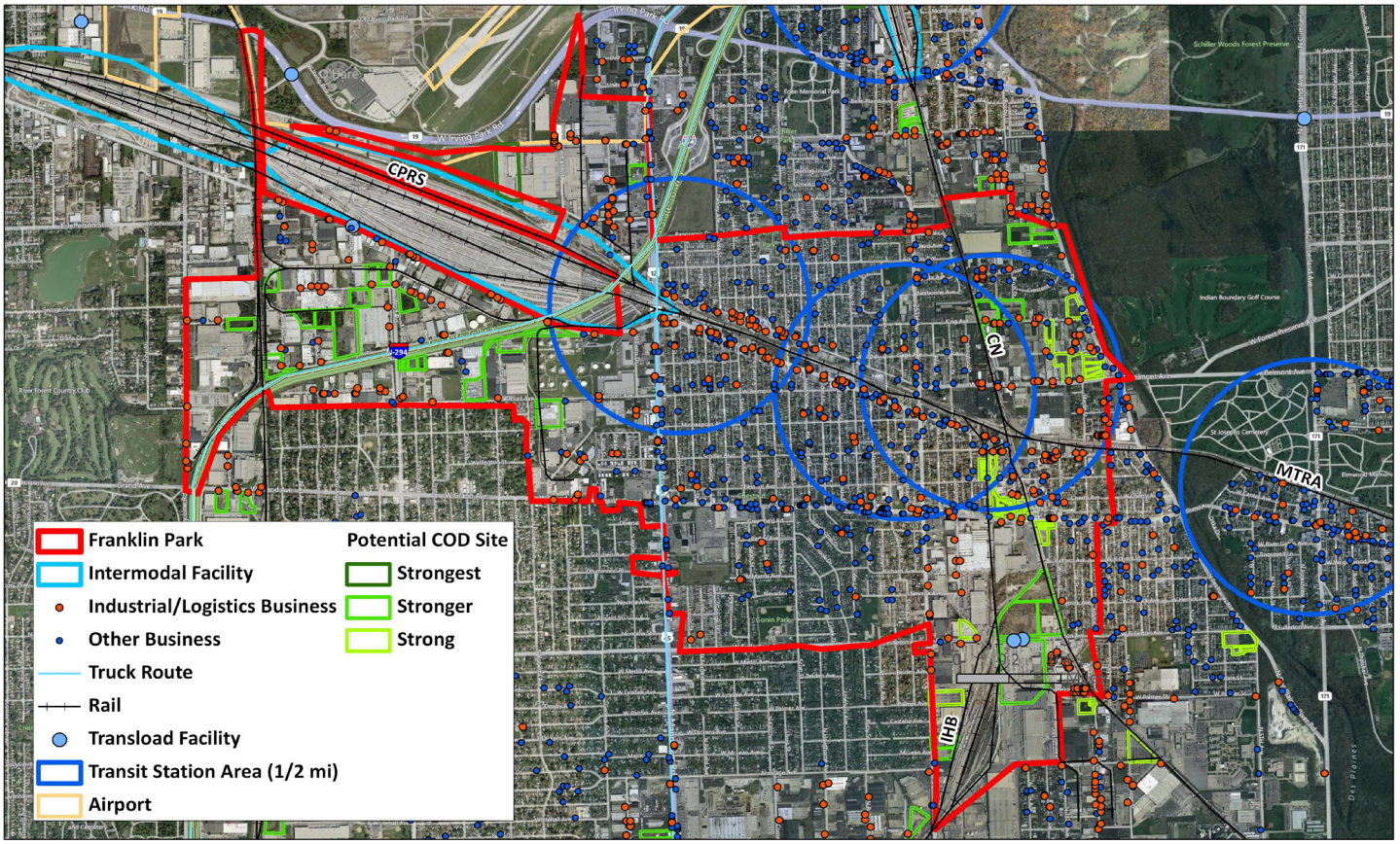

Southland Green TIME Zone Strategic Overview
Transit
Intermodal
Manufacturing
Environment
SSMMA Capacities
Coalition & Consensus Building · Information, Analysis & Planning · Investment Fund & Land Bank
Transit-Oriented Development (TOD) & Housing
Cargo-Oriented Development (COD)
Green Manufacturing
Preservation & Construction
Housing & Community Development Collaborative
Logistics Park Calumet & Sister Developments
Calumet Manufacturing Center
Stewardship Partners
· Community-Corridor Planning
· Inter-Municipal Cooperation
· Neighborhood Stabilization
· Coordinated Zoning
· Energy & Housing Conservation
· Railroad Investments
· Road Improvements
· Environmental Remediation
· Customs Inspection Station
· Foreign Trade Zone
· Regional Supplier Program
· R&D Support
· Production Capacity Support
· Alternative Energy Production
· Workforce Development
· International Marketing
· Open/Natural Area Preservartion
· Green Water Management
· Bike & Pedestrian Paths
· Green Buildings & Project Design
Sustainable Communities & Jobs
GreenTIMEZone
CHICAGO SOUTHLAND

COD Analysis and Planning

The Range of COD Analysis

Recent federal law requires that state freight plans and asset management plans, at a minimum, address the preservation of the National Highway System. The US Department of Transportation is encouraging states to include all freight modes in these plans. COD analysis can make a significant contribution to these inclusive plans.

Complete COD analysis considers the issues that are typically factored into professional transportation planning, such as freight flow; condition and capacity of infrastructure (especially at nodes of intermodal transfer), and the patterns of freight's first mile collection and last mile distribution. These freight transportation patterns are considered alongside patterns of land use, economic development, and demography, from perspectives that are broader than estimating trip generation. These include the interests and plans of private freight carriers and shippers seeking to minimize freight transportation costs through increased efficiencies while controlling occupancy costs and providing convenient access to customers, suppliers, and workers. Complete COD plans include the needs of communities to maximize land values while limiting public infrastructure costs and to foster job creation while minimizing pollution, noise, and traffic congestion.



MAPPING FOR INTEGRATED COD-TOD PLANNING (FRANKLIN PARK, IL)

At an individual project level, decision makers may be concerned with identifying the optimal location for an industrial park or business or the investment of scarce public funds that will produce the greatest job creation or environmental improvement. Appropriate zoning is often a challenge to redevelopment, due to the way communities grew up around railheads and yards, but the growing application by local governments of form-based codes provides a way of regulating transitions from the hard industrial activities of freight movement and interchange to related activities of light manufacturing, offices, and sales that are more compatible with residential uses.

Project plans must recognize that pollution generated by freight movements has been scientifically linked to negative health outcomes, including death. This fact, as well as noise and other side effects that degrade the quality of life, make the adoption of systems and equipment that dramatically reduce these hazards a key public benefit that should be required in any public-private partnership or public subsidy. Among these systems are industrial designs that control stormwater with green infrastructure, ensure energy efficiency in buildings, and buffer negative side effects of freight movements from neighboring communities. Linked technologies include numerous information technology innovations that have been developed in the American Association of Railroads (AAR) testing facility in Pueblo, Colorado; the USEPA Tier III and Tier IV locomotive standards; and new lift equipment and terminal management software that greatly reduces intermodal yard space requirements and truck movements (from reduced cargo handling) and related noise and energy use. **Complete COD planning makes optimal use of these energy-conserving systems and technologies.**

HIGH PERFORMANCE COD—TRANSPORT AND LOCATION EFFICIENCY FEATURES

CNT's Optimizer Tool for COD Analysis

Through years of development experience and study of COD as a national phenomenon, CNT has developed an analytical tool, the **COD Optimizer™**, which can contribute to sound COD decision making for state policies or individual projects and for officials, freight carriers and related businesses. 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:

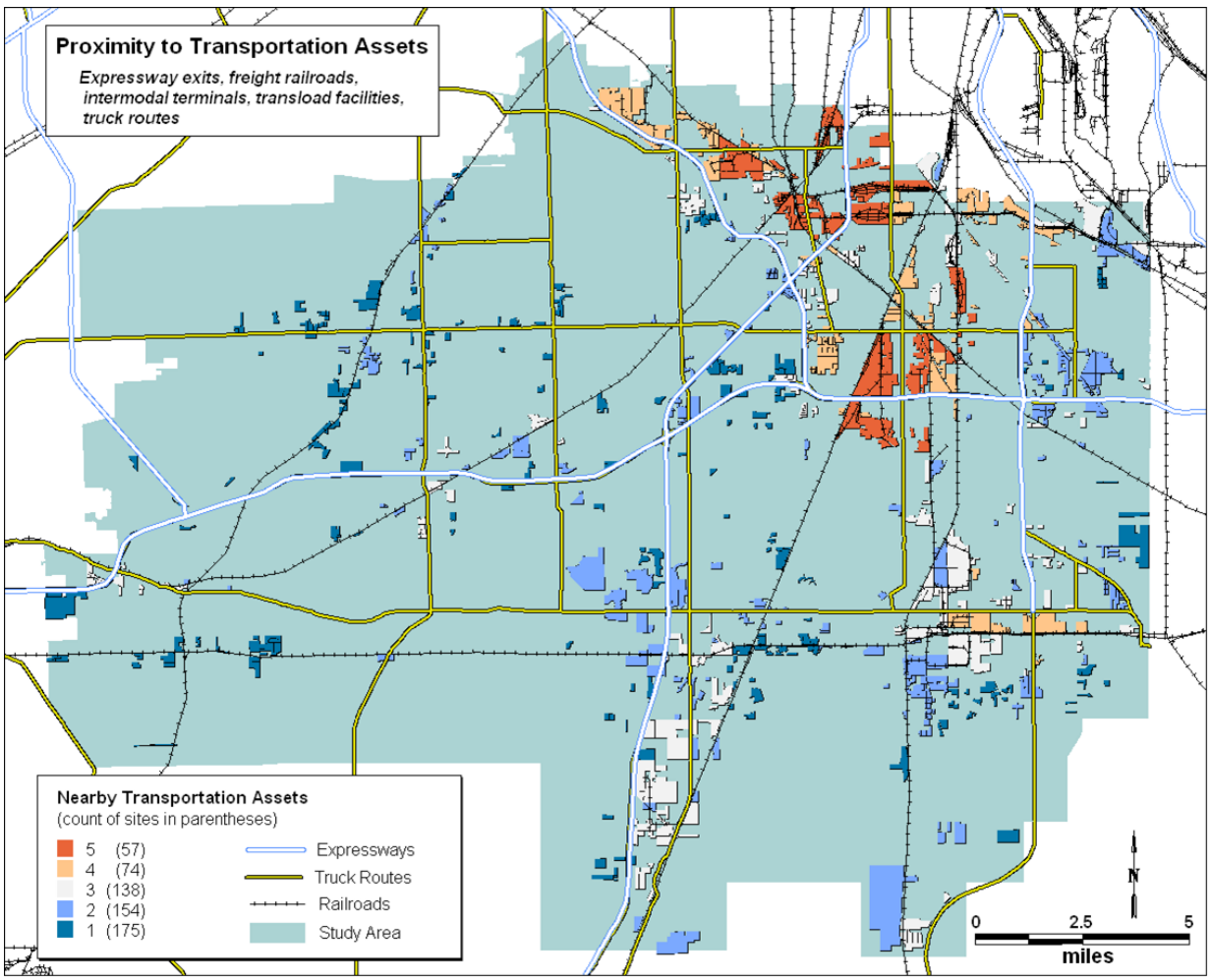
SUMMARY OF OPTIMIZER VARIABLES

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 under-utilized 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

1. IDENTIFICATION OF OPTIONS

The Optimizer scans data for a given area to identify places or situations that meet certain threshold criteria, such as criteria for potential development sites or segments of infrastructure that need to be upgraded. The potential sites or infrastructure projects identified in this way define a set of options. The threshold criteria and metrics for selecting these options are tailored to the issue under consideration and factor in knowledge of rail or port investment plans and goals.

For example, to consider the optimal leverage points for public and private investment to impact a freight transportation system, the Optimizer might identify all transportation route segments and/or nodes in the study area that: meet or fail to meet standards for capacity and good repair, carry a certain throughput relative to its capacity, and provide access to specified numbers of industrial companies and jobs. To identify possible locations for a logistics-industrial park, the Optimizer might identify all sites in a study area that meet such threshold criteria as: proximity and access to rail and other freight facilities or infrastructure, available rail service, contiguous acreage of industrially zoned vacant or under-utilized land, proximity to industrial businesses and industrial worker populations.



COD OPTIMIZER, SAMPLE MAP OF FINDINGS

2. COMPARISON OF OPTIONS

The Optimizer employs a chi-squared minimization analysis to compare and rank alternatives. The criteria considered at this stage will include the degree to which threshold requirements are met and factors that may be too cumbersome or time consuming to apply to a broad universe of options. For example, transportation system decisions at this stage might include estimates of trip generation, infrastructure investments, and environmental considerations such as levels of energy use and air pollution. Assessments of development sites might consider such factors as the degree to which land ownership is consolidated, the prices of comparable properties and the costs of site preparation, the degree to which certain business clusters exist in the area, a gravity model estimate of the available workforce, and the degree to which the site is accessible to workers by transit. In this comparative phase of analysis, alternative investment decisions may also be considered. For example, the impacts of investments in sustainable site design, operating systems or technologies may be estimated for the alternatives under consideration.

Through a chi-squared minimization statistical analysis, factors as disparate as financial cost, jobs created, and air pollutants generated are translated to a common factor (standard deviation from a mean) so that they can be included in an integrated, quantitative analysis. Such an analysis can cut through what may seem to be a daunting array of different data sets and inform public and private investors of the relative benefits and constraints of COD options.

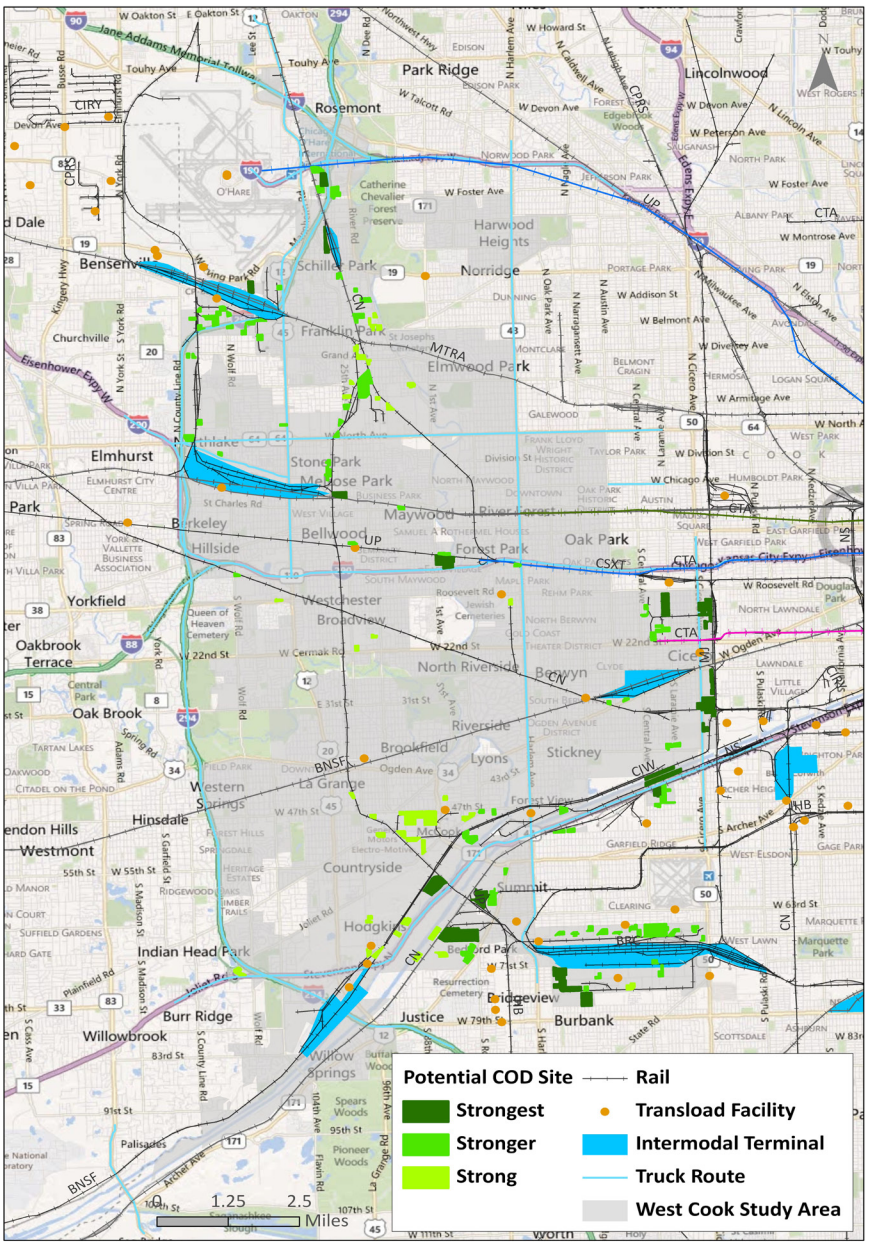
	Land Acreage			Transportation Assets		Businesses		Workforce	
Name, Location	Total	Indust-rial	Develop-able	Nearest Asset	Total Assets (out of 5)	On Site	Nearby	% Industrial & Transp. Workers	% Unemployed
Alsip 2	334	298	176	Freight rail	5	28	826	26	6.3
Chicago Heights 1	406	150	305	Freight rail	3	4	495	31	8.4
Alsip 1	554	456	112	Freight rail	4	86	992	25	3.9
Chicago Heights 2	295	78	249	Freight rail	2	8	494	29	8.2
Markham 1	187	108	109	Truck route	4	12	506	24	8.0
Sauk Village 1	180	144	36	Truck route	4	2	204	28	7.4
Burnham 1	211	45	202	Freight rail	3	3	325	27	7.1
Crete 2	238	0	238	Freight rail	2	0	35	24	3.7
University Park 1	447	204	243	Freight rail	3	6	89	21	5.7
University Park 2	413	413	23	Truck route	3	0	93	21	5.3
Crete 1	610	0	0	Intermodal terminal	2	1	83	23	3.8
Chicago Heights 4	219	36	184	Freight rail	3	8	348	26	6.3
Chicago Heights 3	233	202	45	Freight rail	4	16	436	30	8.5
Harvey 2	121	57	70	Freight rail	5	10	572	24	7.6
Matteson 1	349	244	104	Truck route	2	0	71	23	4.4
Homewood 1	197	21	178	Freight rail	5	8	555	21	5.4
Chicago Heights 6	106	89	43	Truck route	3	18	463	28	7.7
Harvey 1	535	33	5	Freight rail	5	14	743	22	6.6
South Holland 2	87	61	28	Freight rail	5	38	544	24	7.1
Monee 1	219	0	219	Truck route	2	1	59	22	4.1
South Chicago Heights 1	149	76	76	Freight rail	2	59	469	29	7.6
Richton Park 2	71	71	71	Freight rail	2	4	85	22	4.7
University Park 3	256	110	151	Truck route	3	6	89	21	6.1
Dolton 1	185	124	63	Freight rail	4	4	302	26	8.6
Dixmoor 1	94	88	70	Freight rail	5	0	440	24	7.6

COD OPTIMIZER, SAMPLE DATA TABLE

3. ACTION PLAN DEVELOPMENT

An Optimizer analysis provides a profile of the strengths and weaknesses of each COD option under consideration and a guide for acting on each alternative. In an Optimizer analysis, the alternatives may be ranked on any or all of the factors under consideration. By using this transparency and ranking the alternatives with different combinations of factors, the reasons why an alternative ranks high or low in the integrated analysis are made clear. Accordingly, for each alternative the strengths on which action should capitalize and the deficiencies that need correction are clarified. This information should guide not only choice among alternatives, but a plan for implementation that may be shared with co-investors.

MAP OF COD REGIONAL OPPORTUNITIES (WEST COOK COUNTY, IL)



4. PERFORMANCE MEASUREMENT AND EVALUATION

While COD Optimizer analyses are tailored to the requirements of each application, there is a standard set of performance metrics used in all Optimizer analyses. In the creation and evaluation of COD plans consistently used metrics include:

- Proximity to rail infrastructure and service for a shipper business, e.g., truck route distance to an intermodal terminal gate or distance from an active rail line that would justify spur development for car load service
- Proximity to highway infrastructure for a shipper business, e.g., truck route distance to an expressway ramp
- Proximity to populations with an appropriate level of education for entry level logistics or manufacturing employment (a HS diploma or AA degree, but not a BA or advanced degree)
- Proximity to complementary logistics and industrial businesses, creating the potential for clustering
- Proximity to good transit service (no set standard, but an oft-cited example is within a half-mile of transit service that is at least every 30 minutes, and lesser headway at peak periods)
- Availability of re-developable lands for freight facilities within two miles of an intermodal freight facility or one mile of an active rail line – making a rail spur practical
- Appropriate zoning for the freight network and the types of uses anticipated, including the use of form-based codes that could allow an appropriate mix of uses involved in freight

OLDER US COMMUNITIES WERE OFTEN BUILT AROUND RAIL LINES THAT SERVE BOTH FREIGHT AND PASSENGER TRANSPORTATION.

A number of the metrics used in COD Optimizer planning may also serve as performance measures for the evaluation of implemented projects as data becomes available:

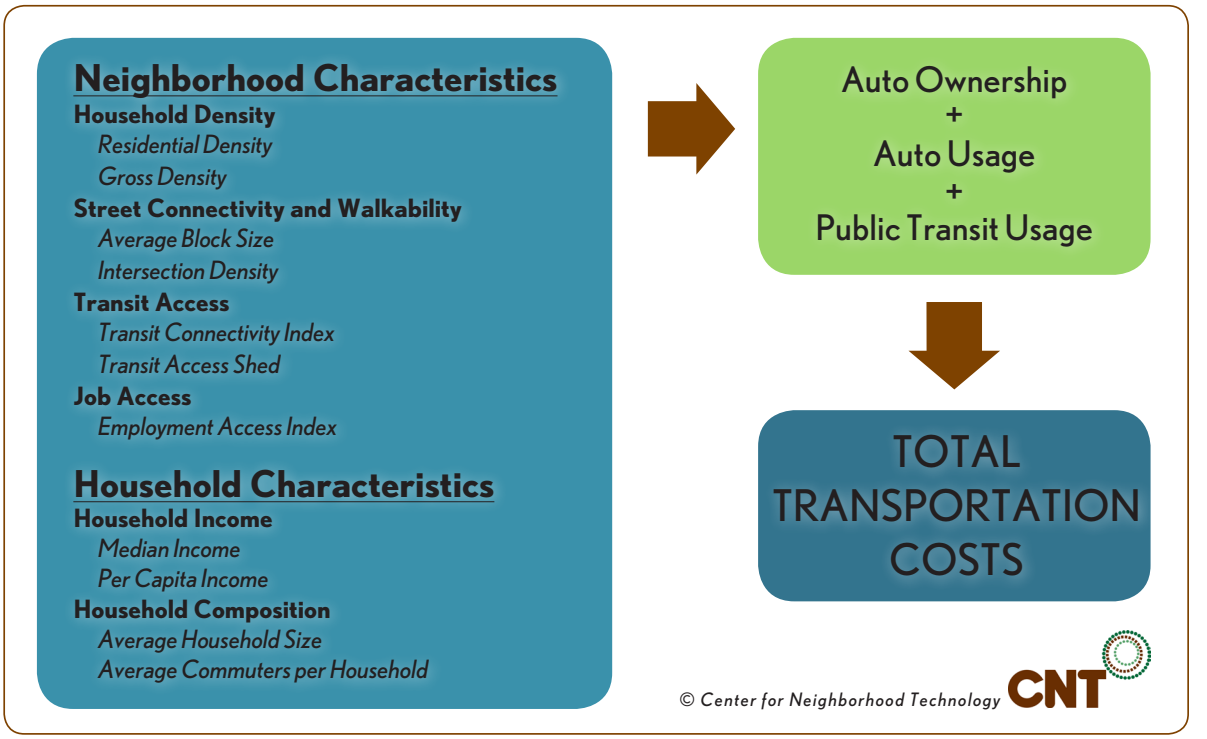
- Reductions in truck VMT in relation to the volume of cargo moved and subsequent generation of air pollution
- Reduction in time requirements for first/last mile delivery of freight
- Increased reliability of freight delivery
- Efficiency in terminal operations: reduced energy use, noise levels, space required per container, and time in yard
- Acres of brownfields remediated
- Acres of vacant land restored to productive use
- Increased jobs in the COD area at AMI and above, and total jobs
- Increased workers in the COD area with accredited certifications of competence for logistics or manufacturing occupations
- Reduced unemployment in the COD area

Increased H+T Index rating of neighborhoods near the COD area as a result of increased jobs nearby and accessible by transit
Increased tax base in the COD area
Increased transit use by residents in the COD area

In CNT's experience, COD and TOD opportunities are frequently linked in established communities and a local labor force with transit access to the site is an asset for a COD.

CNT's Housing + Transportation (H+T®) Affordability Index incorporates transit and job accessibility indices and is a strong indicator of TOD potential.[14] Accordingly, CNT has made the H+T Index rating of communities near a site a metric in the planning and evaluation functions of the COD Optimizer. As CNT studies the prospects of North American regions for COD, each region's potential for TOD that can contribute to Complete COD is an important consideration.

FACTORS IN CNT'S HOUSING + TRANSPORTATION AFFORDABILITY INDEX™



1. Projected estimate of railroad industry capital investment of $25.5B in 2013 (Testimony of Association of American Railroads President and CEO Edward R. Hamberger before the Senate Commerce Committee on June 19, 2013: link to article)
2. "Freight Facts and Figures 2012", Federal Highway Administration (FHWA), 2012
3. Ibid FHWA
4. C.W. Steel, et al, *Freight Facility Location Selection: A Guide for Public Officials, pages 13-16,* National Cooperative Freight Research Program (NCHRP), Report 13, 2011
5. Ibid
6. Kyle Smith, CNT, "Introduction to Cargo-Oriented Development", pages 19-20, an "Issue Brief" commissioned by the US Department of Housing and Urban Development (HUD) as a topic introduction for Sustainable Community Challenge Grant recipients
7. D. Chandler, et al, CNT, "Smart Growth in Older Communities", 2011, a case study of CNT's experience coordinating linked TOD and COD in Chicago's south suburbs, Presented in panel discussions at: 2011 Fall Meeting of the Transportation Research Forum, 2012 Annual Meeting of the Transportation Research Board, 2012 Fall meeting of the Association of Metropolitan Planning Organizations, and in an American Planning Association webinar, June 2012.
8. D. Chandler, et al, CNT, "COD Opportunity Sites in South Chicago Suburbs", 2008, an analysis of potential COD sites, Presented in a panel discussion at: 2008 Annual TransPort Chicago Conference "Making Smart Choices", an analysis of potential TOD sites in Chicago's south suburbs, Presented in a panel discussion at: 2009 Annual TransPort Chicago Conference
9. D. Chandler, et al, CNT, Blue Island Plan; D. Chandler et al, CNT, Harvey Plan
10. D. Chandler, et al, CNT, "Smart Growth in Older Communities", 2011and the Green TIME Zone Strategy.
11. CNT, *Brownfields Redevelopment and Intermodal Promotion Act,* (BRIMPA) an Act of the Illinois General Assembly: BRIMPA Factsheet; BRIMPA Act
12. Between 2010 and 2013 CNT staff made 25 presentations regarding COD at professional conferences. "CNT Roster of COD Presentations", 2012-2013
13. CNT: COD Consulting Reports: Knoxville, TN; Erie, PA
14. The H+T Affordability Index is a product of CNT, fully described at www.htaindex.cnt.org

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**

CNT