

FORGE

AHEAD



Acknowledgments

FORGE AHEAD

COLUMBUS BECOMES A WORLD-CLASS CITY WITH
A WORLD-CLASS TRANSPORTATION SYSTEM

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Forge Ahead

Forge Ahead is a community-driven transportation campaign that serves as a visioning document and resource book. It is a contribution to the conversation of **ideas to improve our city's transportation system.**

Columbus has resisted Ohio's relative population decline. It's the only major city in the state that is growing—and at an impressive rate no less. It wasn't always the case. After humble beginnings, the city went into a decline with post-World War II suburbanization. Aggressive annexation policies in the latter half of the century skewed the loss of urbanism. The city lost a Union Station and a streetcar system only to replace them with highways and urban renewal projects, all of which sliced through the urban fabric.

Then things turned around again. A great city reasserted itself. Growth drew in outsiders who have arrived in ever larger numbers, bringing money (sometimes), skills (often) and a willingness to work harder than the natives.

Columbus' prosperity is built upon its ability to attract the rich, the clever and the hard-working from all over Ohio, the United States and the world. Anything that undermines our city's growth threatens its future, and anything that jeopardizes Columbus endangers Ohio.

This report narrates the state of the transit in Columbus and provides best practices of transportation investments around the world by each mode.

DOWNTOWN'S EROSION



AGGRESSIVE ANNEXATION POLICIES IN THE LATTER HALF OF THE 20TH CENTURY SKEWED THE LOSS OF URBANISM.



Images: 2010 Downtown Columbus Strategic Plan, MKSK

Executive Summary

COLUMBUS BECOMES A WORLD-CLASS CITY WITH A WORLD-CLASS TRANSPORTATION SYSTEM

Cities such as Columbus depend on effective and reliable operation of infrastructure systems to deliver energy, mobility, water, sanitation, shelter, information, emergency response and other critical services.¹ Across the globe and at home in Columbus, governments, businesses, and communities are beginning to see the impacts of climate change. These events are playing out as population growth continues and urbanization accelerates.

For Columbus, there is a tide coming that is robust population growth and job creation. The latest estimates from the US Census Bureau show the 15 cities with biggest population increases were in the South and West — with two exceptions: New York City and Columbus. The good news is investments are in the pipeline for a variety of infrastructure systems. The bad news is that Columbus leaves a lot to be desired when it comes to multi-modal transportation investments.

The very presence of a convenient and accessible multi-modal transportation system will help attract and retain a skilled and creative workforce. The growth of the region cannot be accommodated by expansion of the highway system alone. As the costs of automobile ownership and fuel continue to grow, there is a need to provide alternative means of transportation to sustain the social and economic well-being of the Columbus Region. Investment in new and expanded pedestrian, bicycle, and transit services can ease growing congestion while providing an equitable transportation system. As for nascent transportation technologies, Columbus is right to take a leadership role in their development. Why? Because that's what world-class cities do.



Let's Forge Ahead!



To support the economic vitality of the Columbus Region, especially by enabling global competitiveness, cost-reduction and efficiency.



To increase the safety of the transportation system for motorized and non-motorized users.



To increase the accessibility and mobility of people and for freight.



To protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements through state and local investments as well as economic development goals.



To enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

THE GROWTH OF THE REGION CANNOT BE ACCOMMODATED BY THE EXPANSION OF THE HIGHWAY SYSTEM ALONE.

Objective of the campaign

TO ENCOURAGE INVESTMENT IN A MULTI-MODAL, WORLD-CLASS TRANSPORTATION SYSTEM.

Goal of the campaign

TO PROPOSE A VISION OF A WORLD-CLASS TRANSPORTATION SYSTEM FOR THE CITY OF COLUMBUS THAT INCLUDES BEST PRACTICES IN OTHER URBAN AREAS THAT CAN BE TAILORED TO THE COLUMBUS REGION.

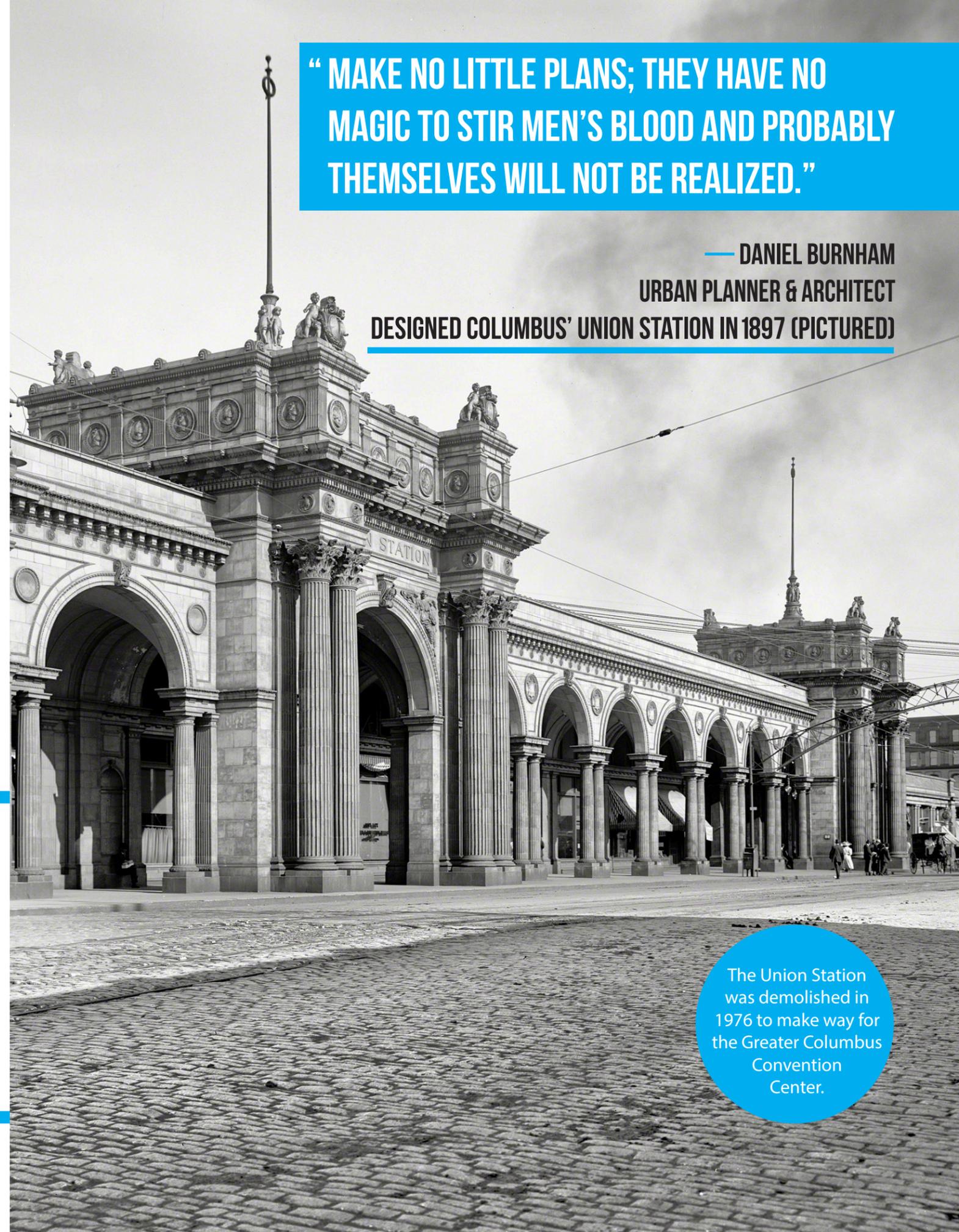
Timeline



“ MAKE NO LITTLE PLANS; THEY HAVE NO MAGIC TO STIR MEN’S BLOOD AND PROBABLY THEMSELVES WILL NOT BE REALIZED.”

— DANIEL BURNHAM
URBAN PLANNER & ARCHITECT

DESIGNED COLUMBUS’ UNION STATION IN 1897 (PICTURED)



The Union Station was demolished in 1976 to make way for the Greater Columbus Convention Center.

THE STATE OF TRANSIT IN COLUMBUS

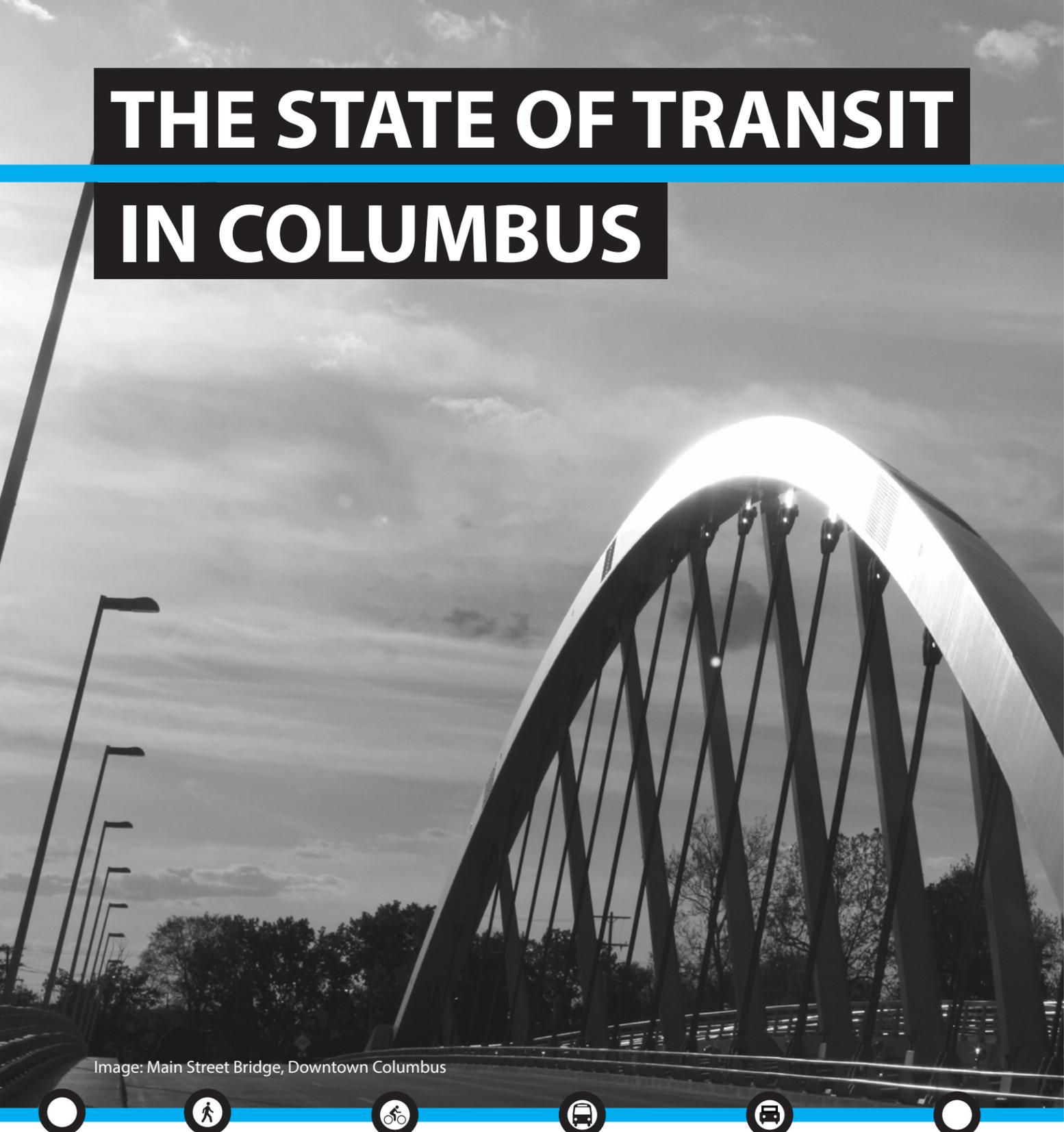


Image: Main Street Bridge, Downtown Columbus

COLUMBUS IS ONE OF THE LARGEST CITIES IN THE U.S. WITHOUT ANY RAIL-BASED TRANSIT.

The Future of the Columbus Region

LAND CONSUMPTION AND LAND USE

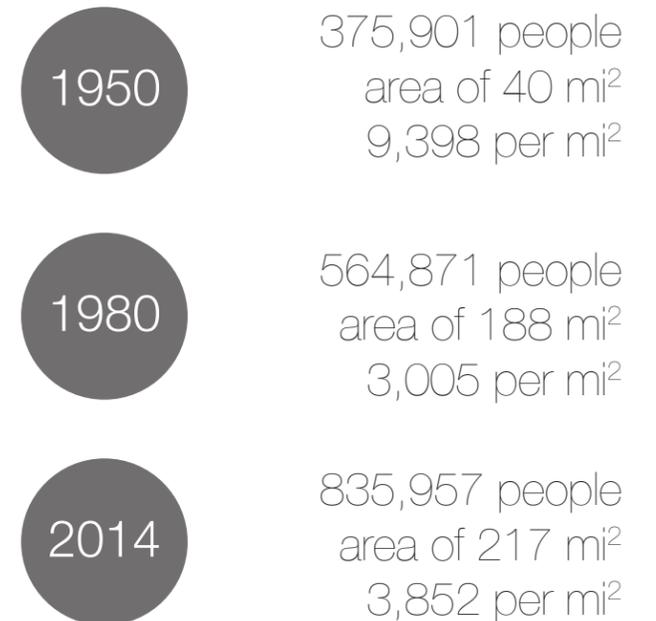
A significant aspect of the Columbus Region's growth has been an imbalance between population increases and land consumption. In 1950, Columbus had a population of 375,901 and an overall density of about 9,400 people per square mile. By 1980, the population was 564,871, and the average density had fallen to about 3,000 people per square mile.

The past 30 years have seen a modest increase in density, but it remains a fraction of the 1950 peak. The imbalance between population increase and land consumption is even more dramatic in other communities the region, particularly Columbus' outlying suburbs. This pattern has been supported and encouraged by the largely autonomous land use decisions, development policies, and regulations of several local governments within the region.

ACCOMMODATING FUTURE GROWTH

By 2050, an estimated 500,000 more people will live in the region.² Over the past 40 years, the Columbus Region's population grew by 707,000 people. It added 235,900 between 2000 and 2010 alone. Simply put, the Columbus Region will absorb a population equal to the entire city of Fresno, CA over the next 40 years. Absorbing this population will take careful planning and could create untenable demands on public infrastructure and tax revenues if not managed wisely.

CITY OF COLUMBUS POPULATION DENSITY

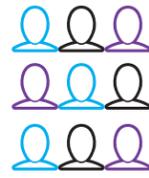


BY 2050, THE COLUMBUS REGION WILL ABSORB A POPULATION EQUAL TO THE ENTIRE CITY OF FRESNO, CA (500,000 PEOPLE). AT THE SAME TIME, THE REGION WILL ADD NO LESS THAN 300,000 JOBS.



12,421

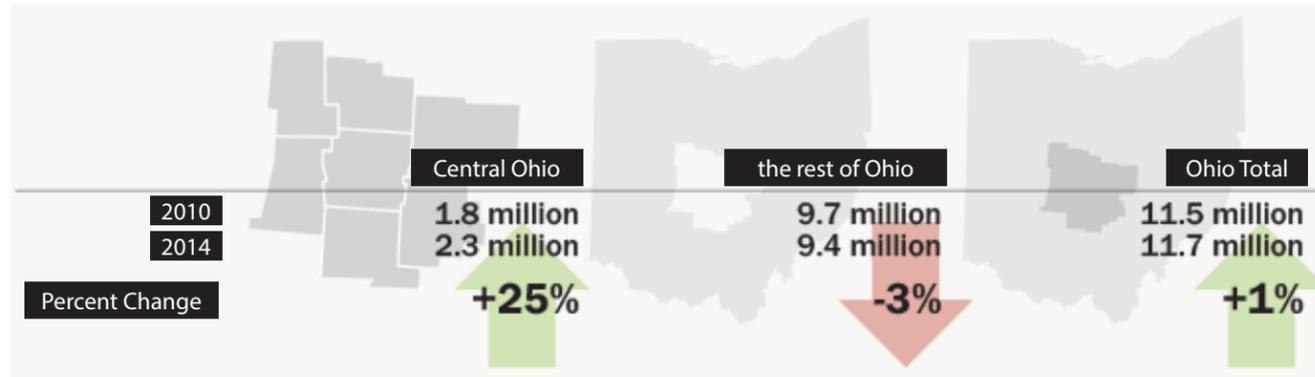
The number of people that moved within Columbus city limits in 2014.³



17,559

The number of people that moved to Franklin County in 2014.⁴

POPULATION GROWTH



Source: US Census Bureau, American Community Survey 2012

DEVELOPMENT SHIFT BEGINNING

Communities throughout the region are already focusing more attention on their older core areas. This is true of both landlocked communities and those with capacity for further territorial expansion. While a focus on the older parts of the region is driven in part by a desire to revitalize declining areas, it is also a direct response to changing demographics and market forces. Studies show that people have a growing interest in neighborhoods that are characterized by a strong urban fabric—mixed-use properties, higher population densities, entertainment options, and access to public transportation.

smaller residences and fewer maintenance responsibilities. Columbus’ efforts to attract new residential development to the region’s core have begun to pay off. From 2000 to 2010, the population of downtown Columbus grew by 40 percent.

FROM 2000 - 2010, THE POPULATION OF DOWNTOWN COLUMBUS GREW BY 40 PERCENT.



In a study conducted by the Columbus Chamber of Commerce, young residents consistently pointed to words such as “downtown” and “public transportation” when describing their ideal city.⁵ Columbus’ Short North District, for example, is noted for its walkable streets, high-quality built environment, cultural and entertainment options, and proximity to downtown. Many older residents share with their younger counterparts this desire for a more urban lifestyle with

400,000

The number of cars on the road every day in the Columbus Region during the peak hour of the morning commute.

PLAN NOW FOR FUTURE SUCCESS

Columbus is one of the largest cities in the country that does not have a fixed-guideway mass transit system (e.g., streetcar, light rail, or commuter rail). The area relies entirely on fixed-route bus service for public transportation. Currently, the Columbus Region is “auto-centric,” with nearly 83 percent of commuters driving alone to work each day.⁶

However, that will not be true in the future. An aging population, lifestyle preferences of younger generations, increased environmental awareness, increased competition for labor and business, rising costs of driving alone, and questionable funding from the federal government are all forcing the region to confront the deficiencies in the current transportation system. Now is the time to prepare for additional travel options.

Additional options should include multiple modes of transportation. Bus routes and light rail have been investigated seven times since 1980, with the most recent study completed in 2005. Unfortunately, up until now, public support has been insufficient to encourage regional leadership to pursue light rail construction. Experience, wisdom, and lessons learned should be used to motivate Columbus to establish a world-class transportation system.

WITH OVER 12 BILLION VEHICLE MILES TRAVELED EVERY YEAR IN COLUMBUS, BUILDING MORE OF WHAT WE HAVE SEEN IN THE PAST WILL ONLY ADD TO CURRENT TRAFFIC CONGESTION.

12 BILLION VEHICLE MILES

With over 12 billion vehicle miles traveled every year in the Columbus Region, developing more of what we have seen in the past will only add to the current traffic congestion throughout our region.⁷

Vehicle Miles Traveled (VMT) is calculated by applying assumptions about the distances people drive each year to projected population growth. These assumptions are calibrated to per-capita driving rates and modeling data from the Columbus Region. This data, as well as national data sets, illustrate that per-capita VMT of both new and existing population vary based on the form of new growth.

For example, when a majority of new growth occurs as compact or urban infill, over time most people – including those living in existing neighborhoods – will be able to drive less because more jobs, daily destinations, and services will be closer. Likewise, if a majority of new growth occurs as sprawl and traditional suburban growth, many people will be likely to drive more, as workplaces and other destinations will grow farther apart. If we do not change course, the annual VMT in 2050 will rise to 15.9 billion miles in 2050.⁸

Variations in passenger VMT lead to substantial differences in the amount of gas (or equivalent) used. These differences will vary depending on how efficient cars become. Assuming the current vehicle fuel economy stays the same no matter the direction of future development, there would be substantial differences in fuel consumption due to land use-related VMT variations. How much different? By 2050, urban sprawl at current rates would require 740 million gallons of fuel annually.⁹ A shift toward urban infill in the Columbus Region would require 227 million gallons less than continued urban sprawl.¹⁰

\$23 billion

The amount of savings the Columbus Region can realize in cumulative fuel costs to 2050 if development shifted from urban sprawl to infill, transit-oriented development.¹¹

MILLENNIALS REALLY ARE BUYING FEWER CARS PER CAPITA¹²

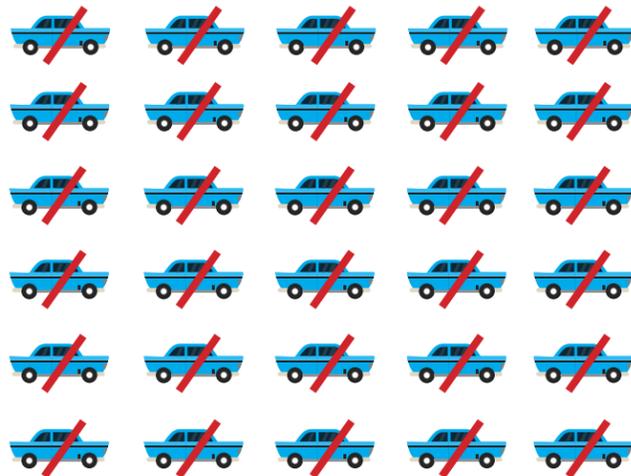
| Generation | Gen Y | Gen X | Baby Boomers |
|---------------------------------|-------------|-------------|--------------|
| Birth Year | 1977 - 1994 | 1965 - 1976 | 1946 - 1964 |
| Age in 2013 | 19 - 36 | 37 - 48 | 49 - 67 |
| Birth Years in Cohort | 17 | 11 | 18 |
| Persons, 2013 | 77,970,996 | 49,211,709 | 75,900,696 |
| Cars Bought 2015 | 3,700,000 | 3,300,000 | 5,100,000 |
| Market Share | 27% | 24% | 38% |
| Cars Purchased per 1,000 People | 47.5 | 67.1 | 67.2 |



The percentage of U.S. 18-years-olds with a driver's license in 2010. In 1983, 80 percent of 18-years-olds held a driver's license.¹³

WHAT IF COLUMBUS COULD REDUCE CAR OWNERSHIP BY 15,000 CARS?¹⁴

= 500 cars



According to AAA, Americans spend on average \$8,876 for each household car. Most of that money leaves the local economy in the form of gasoline, insurance, purchase price over time, and finance charges.

What if 15,000 people decided to get rid of a car? That's exactly what happened in Washington, D.C. From 2005 to 2009, the District's population increased by 15,862 people while car registrations went down by nearly 15,000 vehicles.¹⁵ Such a shift in Columbus would equate to a total simplified amount of \$133,140,000 that could stay in the local economy.

\$133,140,000 The amount that could stay in the local economy if car ownership is reduced by 15,000 cars.

Columbus vs. the competition

Indianapolis

| | |
|----------------------|---------------------------|
| Population (2014) | 848,788 |
| Population density | 2,349 per mi ² |
| GRP (2013) | \$126.5 Billion |
| Light Rail/Streetcar | Planning + Analysis |
| Amtrak | YES |

Columbus

| | |
|----------------------|---------------------------------|
| Population (2014) | 835,957 |
| Population density | 3,852 per mi² |
| GRP (2013) | \$114.3 Billion |
| Light Rail/Streetcar | NO |
| Amtrak | NO |



Columbus has the highest population density compared to other competing cities.

Charlotte

| | |
|----------------------|---------------------------|
| Population (2014) | 809,958 |
| Population density | 2,721 per mi ² |
| GRP (2013) | \$139.0 Billion |
| Light Rail/Streetcar | YES |
| Amtrak | YES |

Austin

| | |
|----------------------|---------------------------|
| Population (2014) | 912,791 |
| Population density | 3,064 per mi ² |
| GRP (2013) | \$103.9 Billion |
| Light Rail/Streetcar | YES |
| Amtrak | YES |

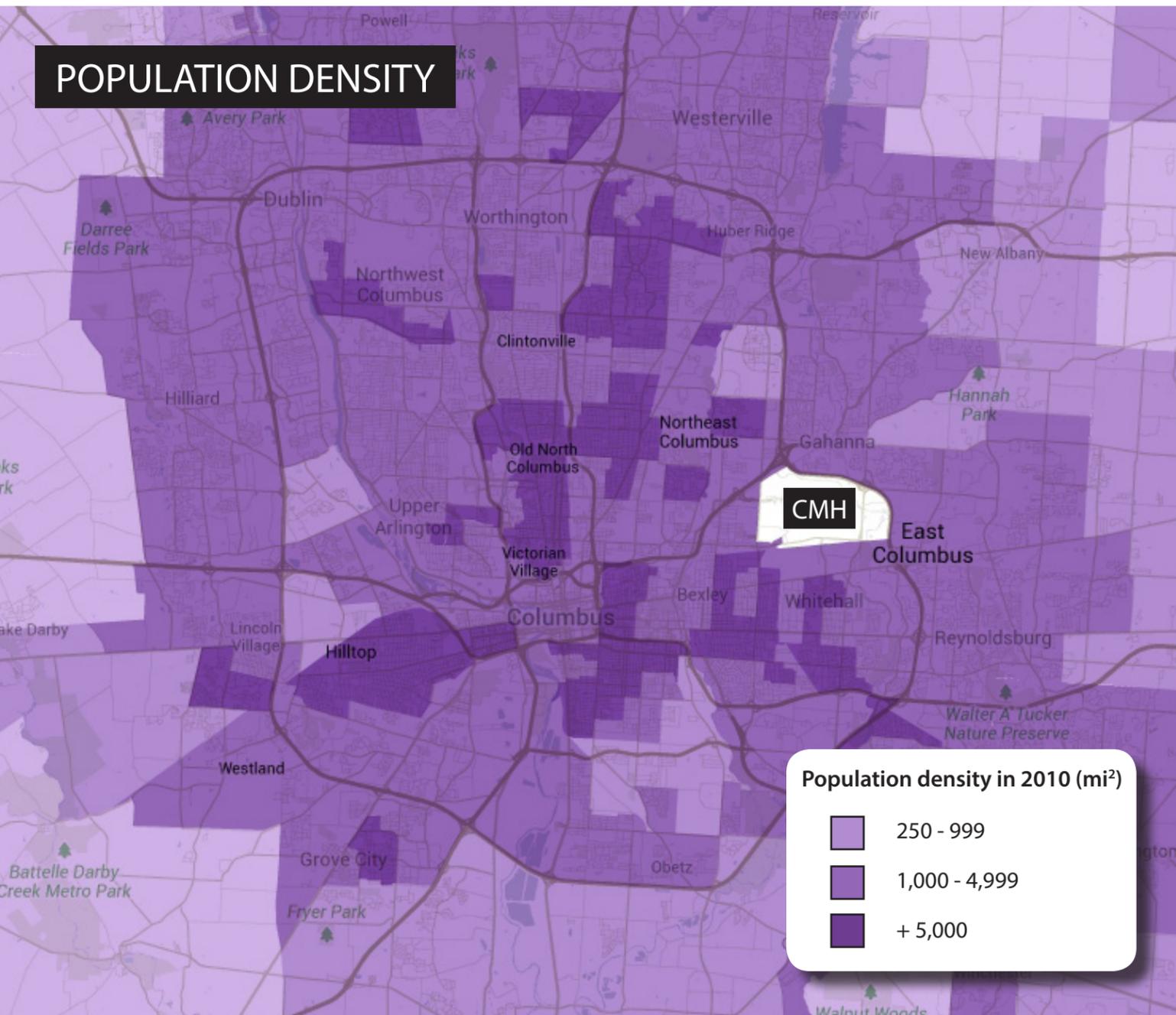
Columbus is also one of the largest cities in America without any rail-based transit.

Urban Sprawl vs. Transit-Oriented Urban Infill

OPTIMAL URBAN DEVELOPMENT

How should Columbus develop? This is an important and timely question. The answer should be based on an all inclusive analysis of the costs and benefits of various development patterns, which can optimize urban expansion, densities, housing variety, and transportation investments.

URBAN SPRAWL COSTS THE U.S. ECONOMY MORE THAN \$1 TRILLION ANNUALLY.



URBAN SPRAWL ► POLARIS PARKWAY

Urban sprawl in Columbus increases per capita land consumption and it increases the distances between activities, which increases per capita infrastructure requirements and the distances service providers, people, and businesses must travel to reach destinations. These primary impacts have various economic costs including environmental degradation; increased costs of providing utilities and government services; reduced accessibility and economic opportunity for non-motorists; and increased transport costs including vehicle expenses, travel time, congestion delays, accidents, and pollution emissions. In total, urban sprawl costs the U.S. economy more than \$1 trillion annually, or more than \$3,000 per capita.¹⁶

TRANSIT-ORIENTED URBAN INFILL ► SHORT NORTH

Extensive research indicates that transit-oriented urban infill tends to increase economic growth by improving accessibility, reducing infrastructure and transportation costs, and reducing the cost to provide utility services.

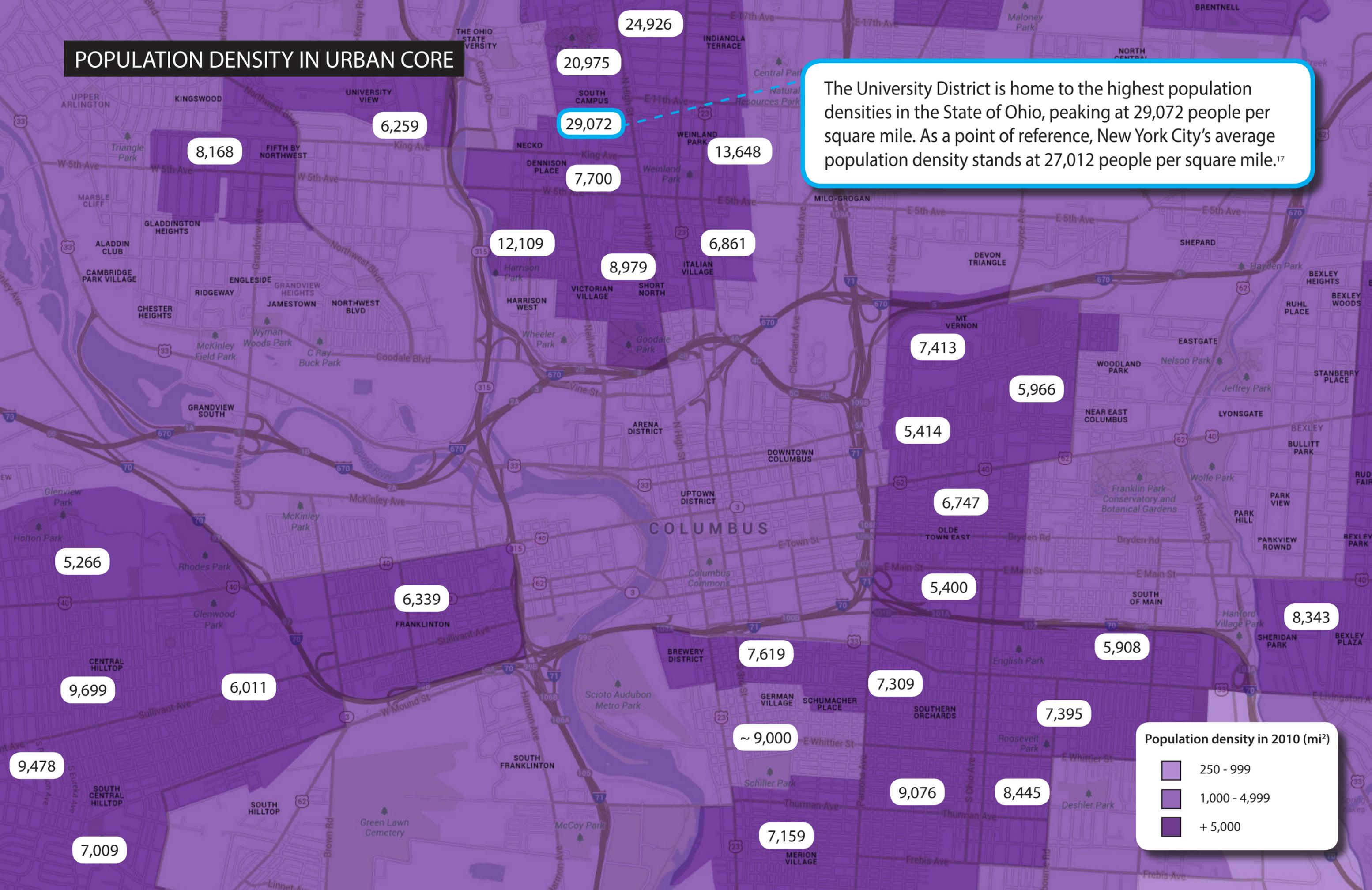
Contrary to a common criticism, transit-oriented urban infill development does not require that everybody live in high-rise apartments. Infill development allows most households that have young children or pets, or enjoy a lawn, the option of choosing single-family or attached housing. The ring of Downtown Columbus neighborhoods are prime examples of denser land use.

| | Urban Sprawl | Transit-Oriented Urban Infill |
|---|--|---|
| Density | Lower-density, dispersed activities. | Higher-density, clustered activities. |
| Land Use | Single use, segregated. | Mixed-use. |
| Growth Pattern | Urban periphery (greenfield and farmland) development. | Infill (brownfield) development. |
| Scale | Large scale. Larger blocks and wide roads. Less detailed, since people experience the landscape from a distance. | Human scale. Smaller blocks and roads. Attention to detail, since people experience the landscape up close. |
| Services (shops, schools, parks) | Regional, consolidated, larger. Requires automobile access. | Local, distributed, smaller. Multi-modal access. |
| Transportation | Automobile-oriented. Poorly suited for walking, cycling and transit. | Multi-modal. Supports walking, cycling, and public transit. |
| Connectivity | Hierarchical road network with many unconnected roads and walkways. | Highly connected roads, sidewalks and paths, allowing direct travel. |
| Street Design | Streets designed to maximize automobile traffic volume and speed. | Reflects complete streets principles that accommodate diverse modes and activities. |
| Planning Process | Unplanned, with little coordination between jurisdictions and stakeholders. | Planned and coordinated between jurisdictions and stakeholders. |
| Public Space | Emphasis on private yards and shopping malls. | Emphasis on shopping streets and neighborhood parks. |

Source: Todd Litman, Victoria Transport Policy Institute

POPULATION DENSITY IN URBAN CORE

The University District is home to the highest population densities in the State of Ohio, peaking at 29,072 people per square mile. As a point of reference, New York City's average population density stands at 27,012 people per square mile.¹⁷



Population density in 2010 (mi²)

- 250 - 999
- 1,000 - 4,999
- + 5,000

24,926

20,975

29,072

13,648

7,700

8,168

6,259

12,109

8,979

6,861

7,413

5,966

5,414

6,747

5,266

6,339

5,400

8,343

7,619

5,908

9,699

6,011

7,309

7,395

~ 9,000

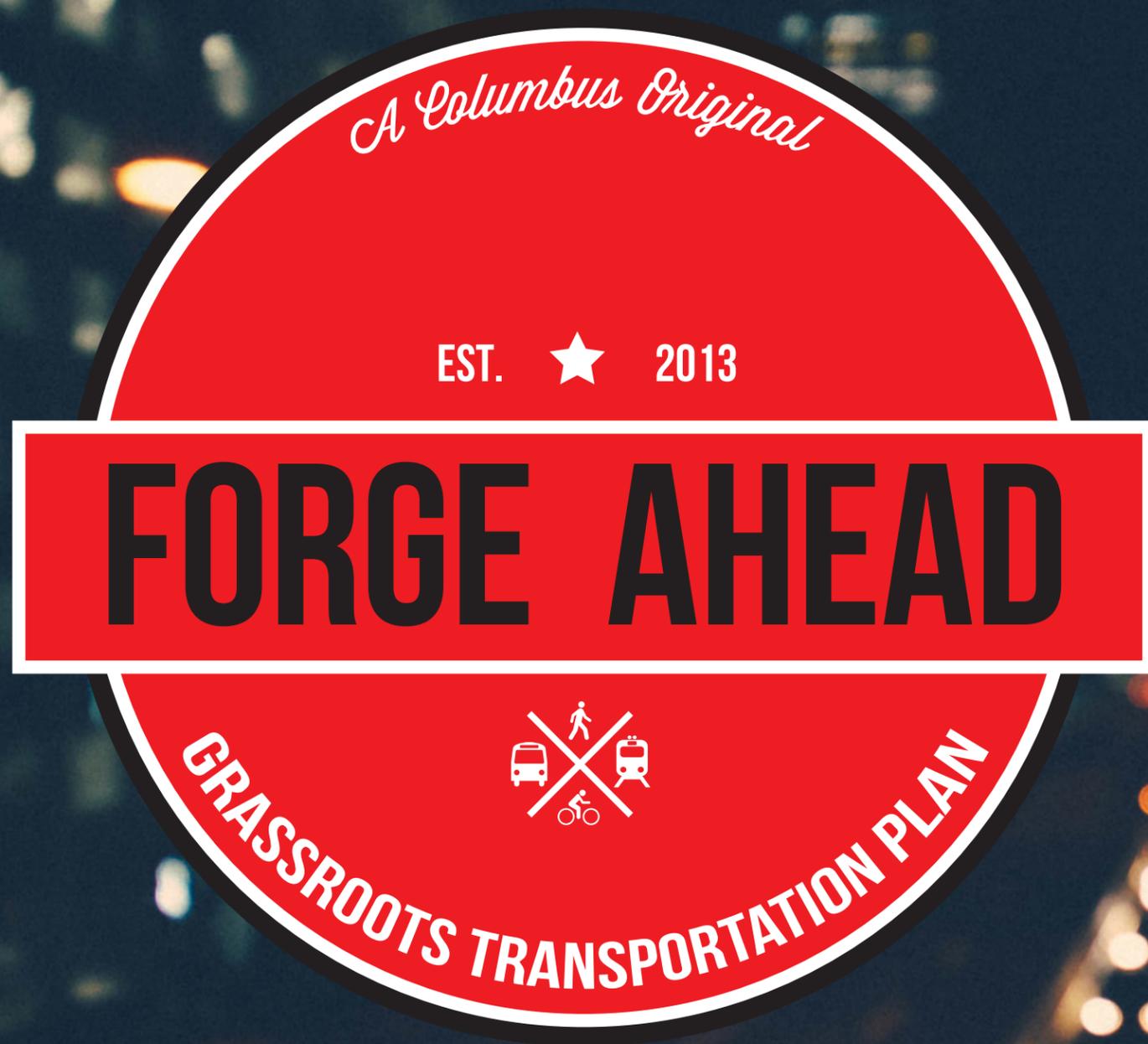
9,478

9,076

8,445

7,009

7,159



WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

FORGE AHEAD

COMPLETE STREETS

World-Class Cities

Global Cities

Alpha Cities

*How would you describe one?*¹⁸

- Transportation related
- Non-transportation related

A GREAT
SUBWAY
SYSTEM.

A GREAT
PUBLIC
LIBRARY.

A BALANCED
QUALITY OF LIFE,
OPPORTUNITY TO
WORK AND LIVE,
AND COST.

SUPERIOR
INFRASTRUCTURE. YOU
CANNOT ATTRACT FOLKS
TO POTHOLED STREETS
AND 8-LANE
HIGHWAYS.

A LANGUAGE
INSTITUTE.

A CLEAN AND
EFFICIENT HIGH-SPEED
TRAIN TO THE
AIRPORT.

A MAJOR LEAGUE
SPORTS
FRANCHISE.

WORLD-CLASS
MUSEUMS.

TRANSPORTATION
OPTIONS.

A GREAT
UNIVERSITY.

MORE TAXICABS
THAN PEOPLE
WANTING TO
USE THEM.

DESIRABILITY AS
AN IMMIGRATION
DESTINATION.

A GREAT
TRAIN STATION.

NEWSPAPERS.
BIG CITIES HAVE ISSUES.
GREAT CITIES EXPLORE
THEM TOO.

A VIABLE
HOUSING MARKET.

A FUNCTIONAL
MASS TRANSIT
SYSTEM.

WORLD-CLASS CITIES

- OPEN UP THE COLUMBUS MARKET TO THE WORLD
- MODERNIZE STREET INFRASTRUCTURE
- EXPAND OPPORTUNITY FOR RESIDENTS AND BUSINESSES

COLUMBUS CAN LEARN FROM CHICAGO

From roadways and railways to seaports and airports, cities need world-class transportation systems that can help residents and businesses thrive. Chicago has built its position as the most internationally significant non-coastal city in the U.S. because 19th-century leaders made it a hub for national canal and railroad networks.¹⁹ It is now an intersection for six of the seven biggest railroads in the U.S. Its airports move 86 million passengers annually.²⁰ Cities can't make much happen without investments. Columbus will never be a world-class city without investments in a world-class transportation system.

WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

COMPLETE STREETS

ECONOMIC GROWTH

- ATTRACT EMPLOYMENT TALENT THROUGH WELL-CONNECTED NEIGHBORHOODS
- ACCESSIBILITY TO ALL JOBS AND ECONOMIC SECTORS
- IMPROVE ENERGY EFFICIENCY AND DECREASE PER CAPITA RESOURCE CONSUMPTION

INVESTMENTS IN PUBLIC TRANSPORTATION

A survey of voters in four major U.S. cities, including Boston, Chicago, Nashville and Pittsburgh, showed that investments in a multi-modal transportation system are key to economic growth and job creation. A large majority of those surveyed say that it is important to invest in public transportation to ensure communities continue to grow and thrive – Boston (91% agree), Chicago (89% agree), Nashville (85% agree) and Pittsburgh (89% agree).²¹ Many also believe a world-class transportation system helps improve the economy and create jobs – Boston (90% agree), Chicago (88% agree), Nashville (85% agree) and Pittsburgh (85% agree).²²

When asked about specific mass transit options such as Bus Rapid Transit (BRT) – a high-performance public transportation system that delivers the reliability, accessibility and speed of rail systems, along with the flexibility of bus systems, at a fraction of the construction cost – a majority of voters support bringing BRT to each of the four cities surveyed – Boston (52% support), Chicago (59% support), Nashville (77% support) and Pittsburgh (66% support).²³ The surveys, funded by the Rockefeller Foundation and conducted by Global Strategy Group, examined voters' perceptions and attitudes towards mass transit and their support for BRT.

The findings illustrate a growing awareness among urban residents that in order to achieve a strong, robust economy and improve access to employment opportunities, there must be greater investment in a multi-modal system.

IN ORDER TO ACHIEVE A STRONG, ROBUST ECONOMY AND IMPROVE ACCESS TO EMPLOYMENT OPPORTUNITIES, THERE MUST BE GREATER INVESTMENT IN PUBLIC TRANSPORTATION.

ECONOMICALLY SUCCESSFUL CITIES FAVOR SPACE-EFFICIENT TRANSPORTATION MODES²⁴

Cities are places where many people and activities locate close together. Doing so maximizes accessibility so it's cheaper to reach goods, services and activities. Space is always constrained in cities, even in Columbus. As a result, cities benefit economically and become more livable by favoring space-efficient transportation modes such as walking, bicycling, car-sharing, and transit.



NEW YORK CITY: SAFER STREETS FOR ECONOMIC GROWTH

Using tax data, the impact of street re-design and transportation enhancements on retail businesses can be analyzed and studied.

The New York City Department of Transportation (NYCDOT) compared sites where a variety of multi-modal improvements had been implemented by the NYCDOT to spots nearby and with the borough as a whole. Overall, the numbers revealed broad economic benefits for the streets that had been changed. According to the tax data, revenue was up 20 percent over the baseline in the second year after protected bike lanes were implemented in the area.²⁵

In another test case, the NYCDOT's main improvements here were changing traffic patterns and improving transit connectivity, along with better pedestrian signals, crosswalks and street trees. Retail sales were up 50 percent by the end of the study period.²⁶

PUBLIC TRANSIT IMPROVEMENTS COULD CAUSE MORE CLUSTERED AND HIGHER-DENSITY EMPLOYMENT AND ENABLE URBAN GROWTH

Using data on U.S. metropolitan areas, urban planners Daniel G. Chatman and Robert B. Noland connected the dots from transit service to central city employment density, urbanized area employment density and population.

Chatman and Noland conducted a number of statistical models that took into account all variables and factors, as well as economic productivity measures like average wage, for more than 300 metropolitan areas across the United States. The results concluded that transit expansion leads to economic growth. Every time a metro area added about 4 seats to trains and buses per 1,000 residents, the central city ended up with 320 more employees per square mile — an increase of 19 percent.²⁷ Adding 85 rail miles delivered a 7 percent increase. A 10 percent expansion in transit service (by adding

either rail and bus seats or rail miles) produced a wage increase between \$53 and \$194 per worker per year in the Downtown business district.²⁸ The gross metropolitan product rose between 1 and 2 percent, too.²⁹

On average, across all the metro areas in the study, expanding transit service produced an economic benefit of roughly \$45 million a year — with that figure ranging between \$1.5 million and \$1.8 billion based on the size of the city.³⁰ Big cities stand the most to gain because they have more people sharing the transit infrastructure. They also tend to have more of the costly congestion.

THE HIDDEN ECONOMIC VALUE OF TRANSIT COULD BE WORTH ANYWHERE FROM \$1.5 MILLION TO \$1.8 BILLION A YEAR, DEPENDING ON THE SIZE OF THE CITY.



Image: Condo.ca

ONTARIO, CANADA: GREEN BONDS HELP FUND BADLY NEEDED TRANSIT PROJECTS

Green bonds are similar to municipal bonds in that they're debt instruments. What makes green bonds different is that the issuer, whether it's a government body or a private-sector corporation, guarantees the funds raised through the offering are dedicated to a specific transportation project or initiative that's positive for the environment.

Private-sector corporations have issued slightly more than \$5 billion of "climate bonds," primarily in rail transportation and the renewable energy sector, which are tied to projects aimed at mitigating the negative impacts of climate change.³¹ Columbus' leaders could tap into green bonds to help finance badly needed transit projects.

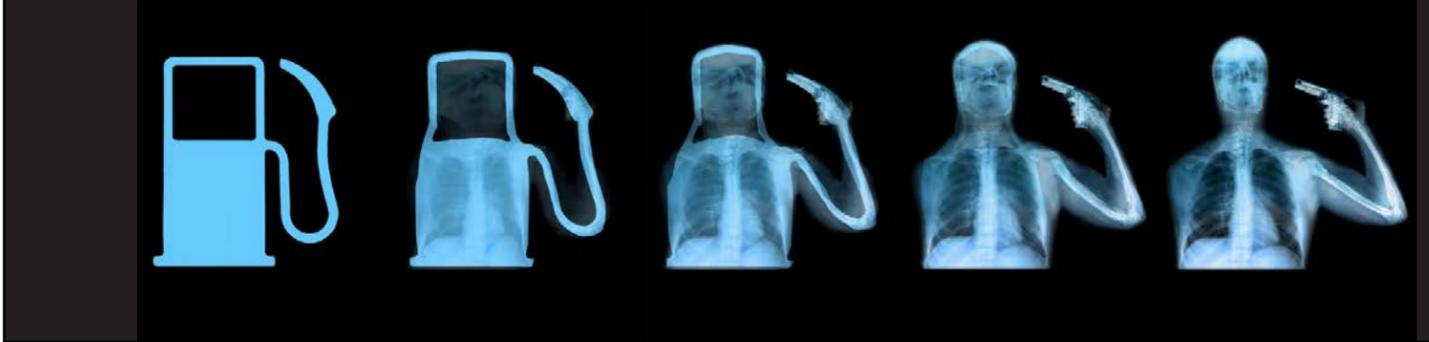


Image: Ahmed Mater

U.S. ECONOMY RANKS 13TH IN ENERGY EFFICIENCY

You cannot have economic growth without energy. That can be problematic if a majority of our energy is generated from nonrenewable resources. A recent report by the American Council for an Energy-Efficient Economy shows that the United States performs very poorly in making the most of its resources. The US scored poorly for number of reasons, including relatively low use of and investment in public transit, a high number of miles traveled in inefficient vehicles as well as high energy usage in both commercial and residential sectors.³²

EXPEDITE TRANSIT PLANNING AND CONSTRUCTION

At their best, planning processes and environmental reviews both protect and involve the public in the projects that will affect the Columbus Region and beyond. However, this can be a long and drawn out process. In order to expedite the transit planning and construction process, we could exempt transit projects that take cars off the road from excessive environmental review—since they are, by nature, beneficial to the environment. Federal policy will be slow to change, but we can start that conversation.

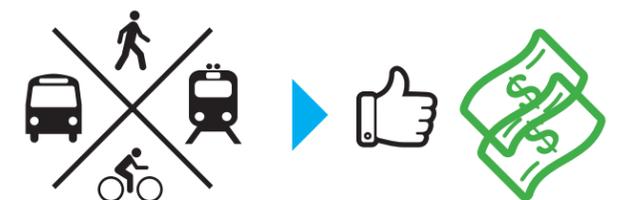
EVERY \$1 INVESTED IN PUBLIC TRANSPORTATION GENERATES APPROXIMATELY \$4 IN ECONOMIC RETURNS.

Source: American Public Transportation Association

YOU CANNOT HAVE ECONOMIC GROWTH WITHOUT ENERGY. THAT CAN BE PROBLEMATIC IF A MAJORITY OF YOUR ENERGY IS GENERATED FROM NONRENEWABLE RESOURCES.

WASHINGTON, DC: AFTER STREETCAR LINES OPEN, \$18 BILLION IN NEW DEVELOPMENT EXPECTED

A tram/streetcar offers an urban rail service for shorter distances. They also spur economic development. Planners in Washington, DC are citing Portland as the model for an expected surge of development and investment—\$18 billion worth within 10 years after completing eight planned streetcar lines.³³ That includes investments in every type of use, ranging from office to retail to residential. The total streetcar network amounts to 37 miles, which equates to just over \$486 million per streetcar mile in development and investment.



Columbus to Chicago



COLUMBUS TO CHICAGO: HIGH-SPEED RAIL

A rail advocacy group in Fort Wayne, IN, the Northeast Indiana Passenger Rail Association (NIPRA), unveiled a study looking at the feasibility of running a 110-mph passenger rail line between Columbus and Chicago.

The study, which calls for upgrading existing freight lines, estimates that the entire project would cost about \$1.285 billion, and eligible federal funding would cover 80 percent of the cost. It puts the economic benefits at over \$6 billion including new jobs, development around stations, and increased tax revenue. Potential timetables show a trip from Columbus to Chicago taking 4 hours on a local train and 3 hours, 45 minutes on an express train.

The project has received preliminary notification that it has been chosen as one of two regional projects that will be awarded funds to advance regional passenger rail planning by the Federal Railroad Administration (FRA) to cover all costs.

As new regional passenger rail corridors are being planned, failure to make Columbus a transit and passenger rail hub now condemns the city to not being one in the future.

THE COLUMBUS TO CHICAGO RAIL PROJECT WOULD COST ABOUT \$1.285 BILLION AND GENERATE OVER \$6 BILLION IN ECONOMIC BENEFITS.

The study calls for upgrading existing freight lines. In Ohio, the rail lines include:

The Panhandle

Port Columbus International Airport (CMH) to Downtown Columbus

Norfolk Southern

Downtown Columbus

CSX

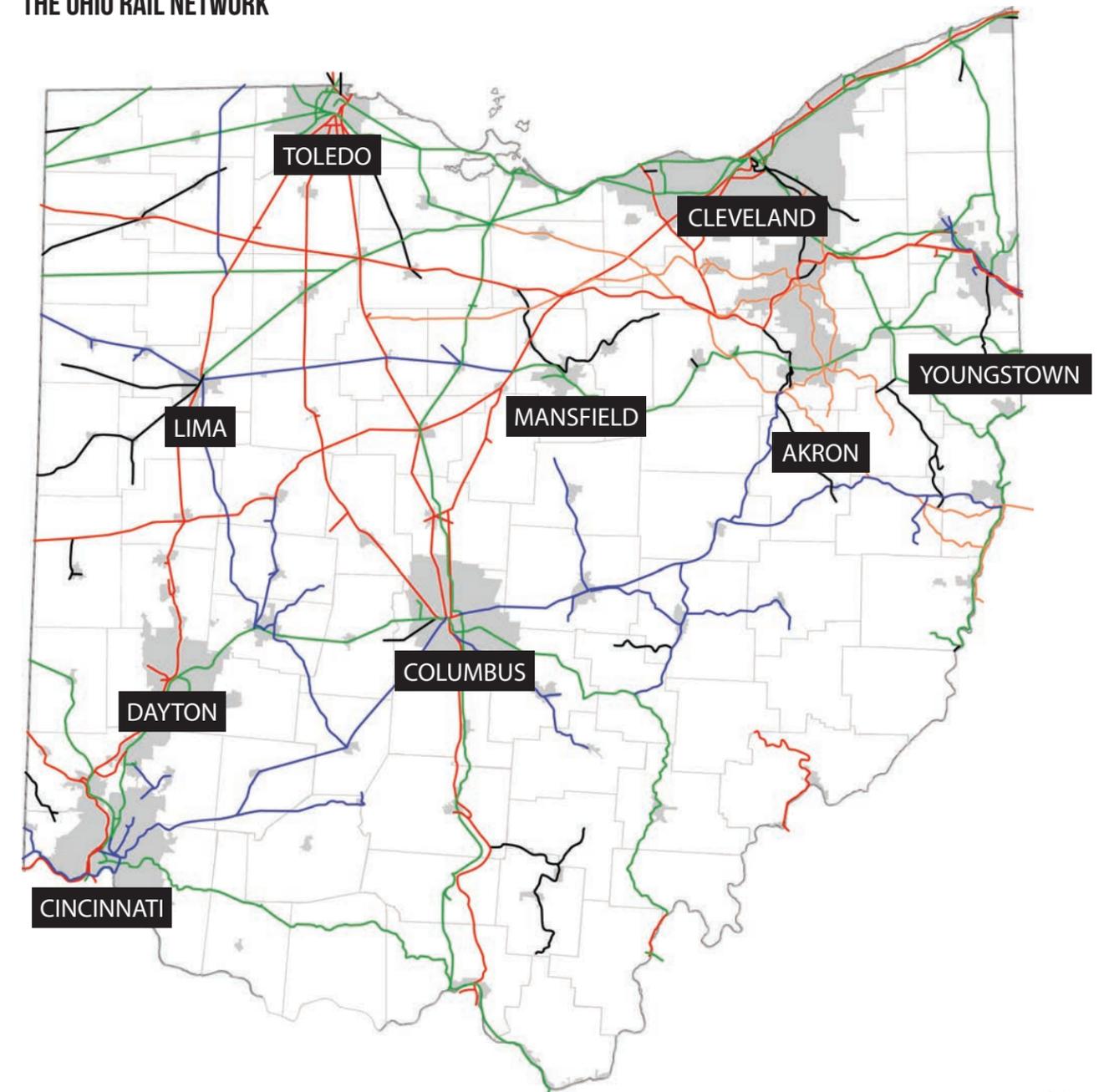
Downtown Columbus to Dunkirk, OH (Hardin County)

CFE

Dunkirk, OH to Indiana border



THE OHIO RAIL NETWORK



Source: Ohio Rail Development Commission



THE BIG PICTURE

OPPORTUNITY, AFFORDABILITY AND ACCESSIBILITY

Columbus continues to lead the state in both population growth and job creation, attracting the best and brightest from around the world. The driving force behind this exciting demographic shift is the convergence of opportunity, affordability, and accessibility that our city offers. Young professionals use these quality of life yardsticks to determine where to call home. Transportation is essential for making our city accessible, attractive, and affordable.

As stated before, an estimated 500,000-600,000 more people will live in the Columbus Region by 2050. The transportation system required to accommodate this projected growth is complex, and the vision will need to be comprehensive. This level of growth cannot be accommodated by the expansion of the highway system alone. Our lack of investment in a multi-modal transportation system undermines accessibility, which shortcomings will negatively impact opportunity and affordability.

For the sake of economic growth, global competitiveness, and talent attraction, Columbus and its regional partners must work in concert to make investments in a multi-modal, world-class transportation system. Keep in mind we are constantly competing with coastal cities and Chicago to recruit young talent that carry skill sets in technology, entrepreneurship, and civic innovation. We have affordability and opportunity in our favor. Now it all hinges on accessibility. Fortune favors the bold.



Accessibility improves transportation infrastructure, and the overall network, in order to provide more mobility options.



WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

COMPLETE STREETS

WALK IT

-  BOLSTER PUBLIC HEALTH AND SAFETY
-  REDUCE CONGESTION
-  IMPROVE WAYFINDING AND EASE OF WALKABILITY FOR RESIDENTS AND VISITORS



Image: Kyril Bromley

EAST HAMPTON, NY: LIGHTED CROSSWALKS ON BUSY STREETS

Streets with heavy automobile traffic would be safer for pedestrians if LED lights were incorporated into the crosswalk. Lights make crosswalks more visible to pedestrians and catch the attention from motorists, particularly at night. If designed to high standards, the lighted crosswalk can serve as public art or as a placemaking tool. Can someone say rainbow LED lights in the Short North?

BALTIMORE: STREET ART FOR TRAFFIC CALMING

There are other ways to improve pedestrian safety in addition to lighted crosswalks. Communities such as Baltimore have done it a more simple way. Research has shown that public art on the street or in the form of murals and sculptures—basically anything that creates visual interest and surprise—slows down vehicular traffic.

Why is slower traffic a good thing? Research has shown that when the United States implemented a nationwide 55-mile-per-hour speed limit in 1974, driving fatality rates plummeted.³⁴ Conversely, when it was lifted in 1987, deaths increased—even with advancements in technology and safety.³⁵ Art can be part of the solution. Over the past decade, communities across the nation have taken to beautifying their roads and intersections with hand-painted murals, slowing motorists as they go. Murals and crosswalks (like those on this page) come at minimal cost—just buy some street-grade paint, get whatever permits your city requires, and figure out how to reroute traffic for a few hours. As people drive through the neighborhood, these art installations catch the eye, create interest, and lighten the right foot on the gas pedal.

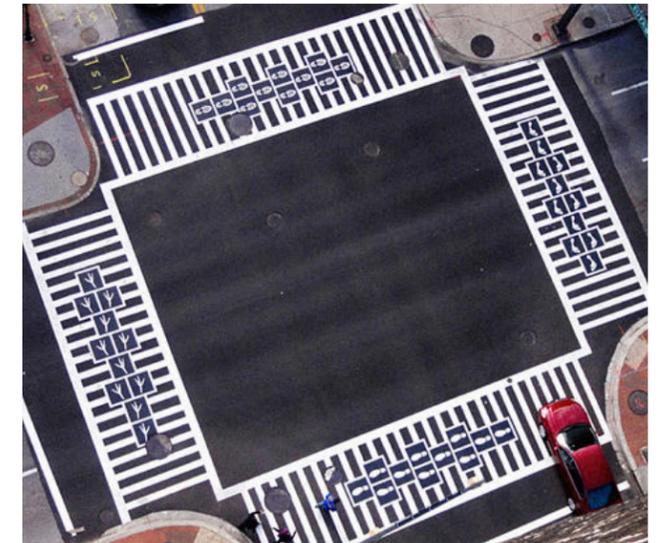


Image: Graham Coreil-Allen

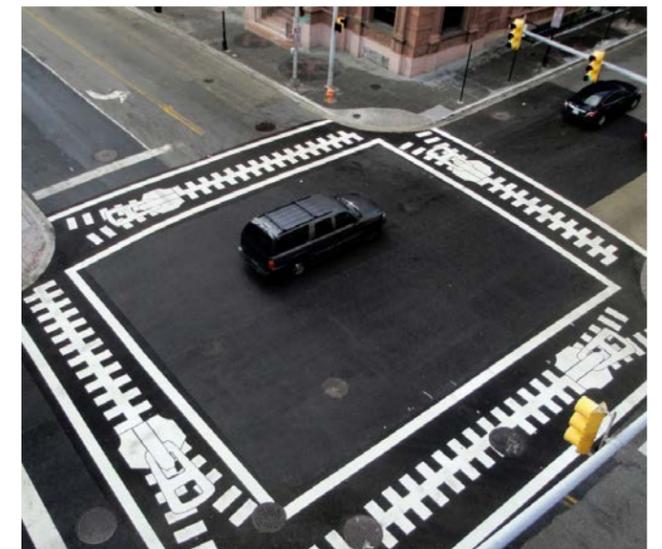


Image: Paul Bertholet

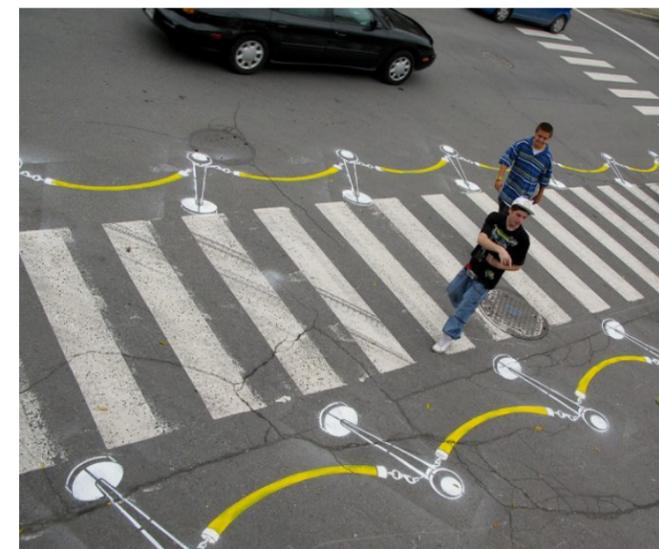


Image: Graham Coreil-Allen



Image: Graham Coreil-Allen

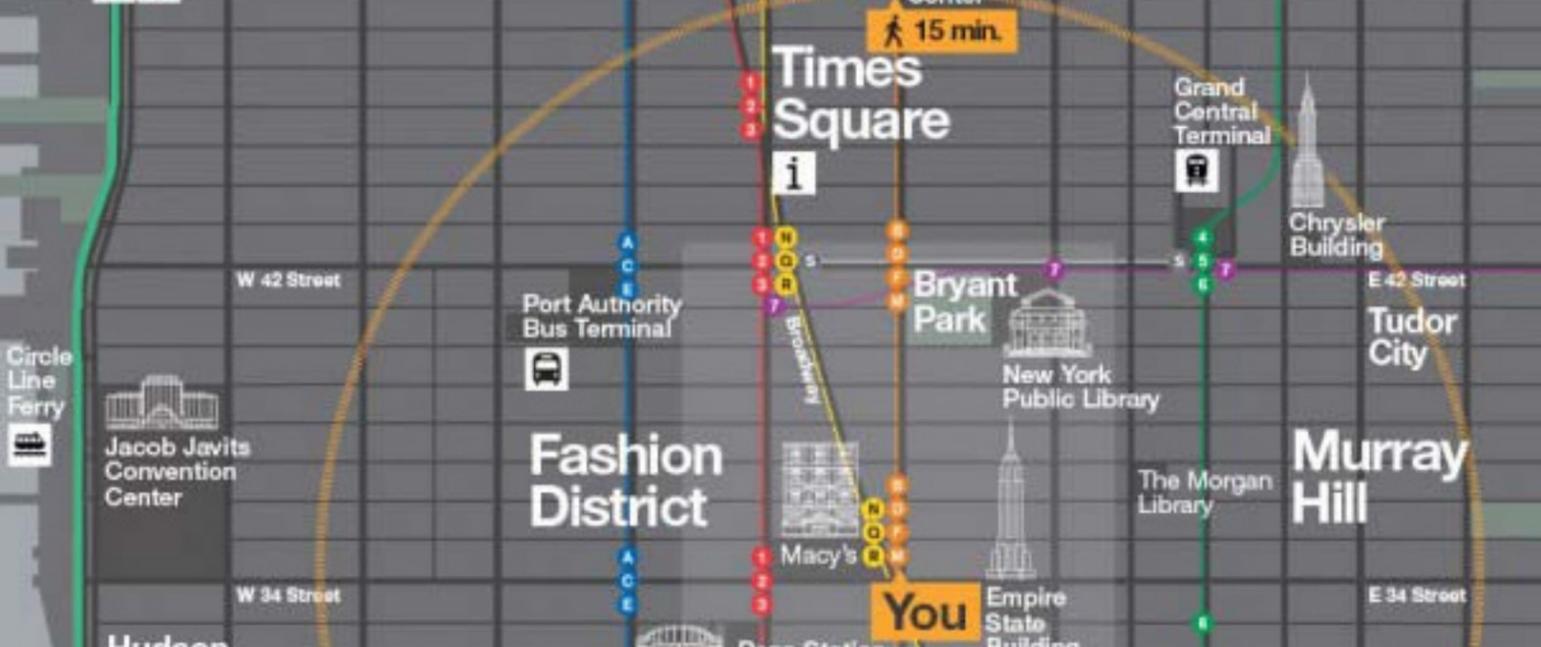


Image: City ID



Image: Control Group, MTA

NEW YORK CITY: PEDESTRIAN MAPS ARE A FEAT OF DESIGN, DATA AND DILIGENCE

The NYCDOT wants to increase walking with its creation of new municipal signage that displays pedestrian information in a much clearer, hierarchical way. Pedestrian maps have become a priority for several reasons, but above all they actually encourage people to walk. That's great from a public health standpoint. More than that, they facilitate accessibility with information on how to get around, which lends a welcoming feel to visitors. The goal of Columbus should be to adopt a pedestrian wayfinding system inspired by New York City's WalkNYC program.

SAN FRANCISCO: PEDESTRIAN SAFETY PROGRAMS

The most dangerous streets for pedestrians in San Francisco will be getting extra attention over the next five years as the city focuses on safety improvements. Those improvements are outlined in WalkFirst, a new initiative to implement a Pedestrian Safety Capital Improvement Program. WalkFirst is designed to address corridors and intersections that represent six percent of the city's street miles but account for 60 percent of severe and fatal injuries.³⁶ Columbus can combine New York City's pedestrian wayfinding program with San Francisco's pedestrian safety program to reduce serious and fatal pedestrian injuries by 25 percent by 2020 and 50 percent by 2025.

NEW YORK CITY: TOUCHSCREEN TRANSIT MAPS FOR TOURISTS AND NEW RESIDENTS

Eighteen 47-inch touchscreen kiosks have been installed at New York City's Grand Central Station. They will display departures, arrivals, delays and outages, as well as nearby points of interest.³⁷

The "MTA On-the-Go kiosks" also display safety and security reminders, as well as advertisements to generate revenue.

We can take this idea and apply it to Columbus. Touchscreen kiosks can be installed at the Greater Columbus Convention Center, in front of Downtown hotels and at cultural attractions like the CMA for tourists to better learn the COTA system. These touchscreen kiosks can also benefit seasoned riders and commuters going somewhere other than their normal route.

LONDON: 'SMART' CROSSWALKS THAT ADJUST CROSSING TIMES

London is also looking to improve the pedestrian experience with a system called SCOOT, which is an acronym for Pedestrian Split Cycle Offset Optimization Technique. SCOOT uses cameras to figure out how many people are waiting to cross the street and adjusts the traffic signal accordingly.³⁸ In other words, if there is a large crowd waiting to cross, the signal to walk will last longer, giving the crowd more time to cross the street.

"This really is a fantastic example of how London is leading the way by using 21st century technology to help make it easier for people to get around our great city," said London's mayor, Boris Johnson, in a statement. "Innovation like this is key to keeping London moving efficiently and making our roads safer for everyone to use." London will be the first city to use this kind of technology in its pedestrian crossings though SCOOT is already used in traffic lights to help control traffic congestion, in London and other cities around the world, including Toronto, Beijing and Santiago.³⁹

WALKFIRST SEEKS TO ADDRESS CORRIDORS AND INTERSECTIONS THAT REPRESENT 6% OF STREETS BUT ACCOUNT FOR 60% OF FATAL AND SERIOUS INJURIES.



Image: Pentagram



THE BIG PICTURE

EVERY TRIP BEGINS AND ENDS AS A PEDESTRIAN

We all leave our home as a pedestrian. Our next steps guide us to either to keep walking, jump on a bicycle, catch a bus, or travel to your destination via car. That's why the pedestrian experience is so important to get right. If a neighborhood is not safe or conducive for walking, then chances are it's not going to fare well for people who bicycle and it may even undermine effective and efficient transit service.

Researchers at St. Michael's Hospital in Toronto looked at what influences walkability on a neighborhood level. They concluded that there four factors that makes a neighborhood walkable:

-  STREET CONNECTIVITY
-  POPULATION DENSITY
-  RESIDENTIAL DENSITY
-  NEARBY WALKABLE DESTINATIONS

Researchers found that population density, residential density, and nearby walkable destinations have the strongest correlation to foster walkable neighborhoods.⁴⁰ Street connectivity had a lower impact, however, the argument can be made that streets in a grid

pattern are more favorable than curvilinear streets most typically found in the suburbs. One factor that ought to be added to the mix is the adoption of traffic calming measures such as the public art crosswalks mentioned in this section.

An exciting case study in suburban retrofitting for walkability is the Bridge Street District in Dublin, Ohio. City officials and urban planners are incorporating the four factors of walkability as well as a big roundabout (which will be examined in the *Drive It* section).

There are many societal benefits to more walking in our urban areas. According to the American Public Health Association, the U.S. would save more than \$100 billion annually in healthcare costs.⁴¹ Walking touches on education, too. Consider the impacts of Safe Routes to School or that college towns such as Columbus boast higher-than-average pedestrian counts.⁴² What about businesses and homeowners? Research shows every point over 70 on the WalkScore results in increased rent of 90 cents per square foot for commercial property and a home value appreciation of \$20 per square foot.⁴³ Columbus can talk the talk, but are we ready to walk the walk?

WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

COMPLETE STREETS



BIKE IT

- BOLSTER PUBLIC HEALTH
- WIDESPREAD SAVINGS ON TRANSPORTATION COSTS
- IMPROVE PUBLIC PERCEPTION AS A VALID MODE OF TRANSPORTATION

Nearly one out of five Millennials (19%) bikes at least once a week, compared with 16% of Gen Xers and 12% of Baby Boomers.⁴⁴

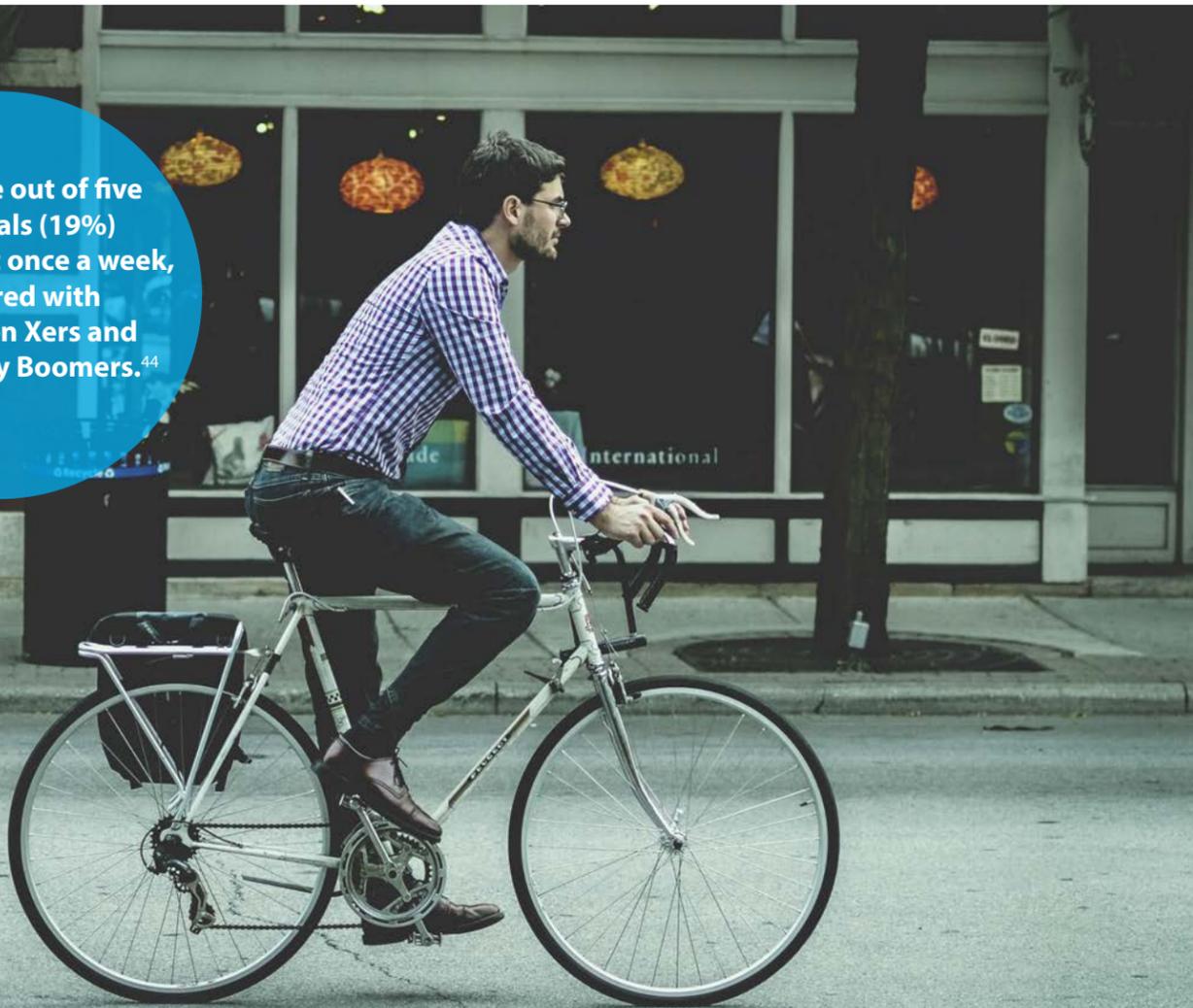


Image: Pro-Teq, Youtube



CAMBRIDGE, UK: GLOW-IN-THE-DARK BIKE LANES AND BIKE TRAILS

Glow-in-the-dark bike lanes and bike trails are one way to increase cyclist safety. Created by Pro-Teq, Starpath is a sprayable coating of light-absorbing particles that harvests ultra-violet rays from the sun during the day and dramatically lights up like a starry sky after dusk. The veneer is non-reflective, anti-slip and waterproof. It can be applied to cement, wood, tarmac or other solid surfaces.⁴⁵

SAN FRANCISCO: BICYCLING BOOM FOLLOWS UPGRADES TO BICYCLE INFRASTRUCTURE

Build it and they will come. San Francisco witnessed a sharp increase in the number of people who bicycle following a surge in infrastructure improvements.⁴⁶ These include such improvements as the installation of bike corrals to protected bike lanes and more. Frankly, bike sharrows are more of a public awareness campaign than a motivator to bicycle. If we really want people to bicycle more, it is going to take more than paint. Focus on the safety aspect.

NEW YORK CITY: BIKE LANES MAINTAIN CAR SPEEDS WHILE INCREASING BICYCLE SAFETY

A recent study by the NYCDOT on protected bike lanes showed that traffic speeds were maintained while bicyclist safety increased.⁴⁷ One of the biggest barriers to implementing bike lanes in certain municipalities is their perception of slowing down car traffic. However, according to a recent study by the NYCDOT reported on by Eric Jaffe at CityLab, these urban interventions did not reduce car speeds and even decreased travel time on some streets. Street design can accommodate multiple modes if we are smart about it. That means a cohesive bike lane network on the appropriate streets for traffic management and maximum bicycle safety.

SAN FRANCISCO WITNESSED A SHARP INCREASE IN THE NUMBER OF PEOPLE WHO BICYCLE FOLLOWING A SURGE IN BIKE UPGRADES.

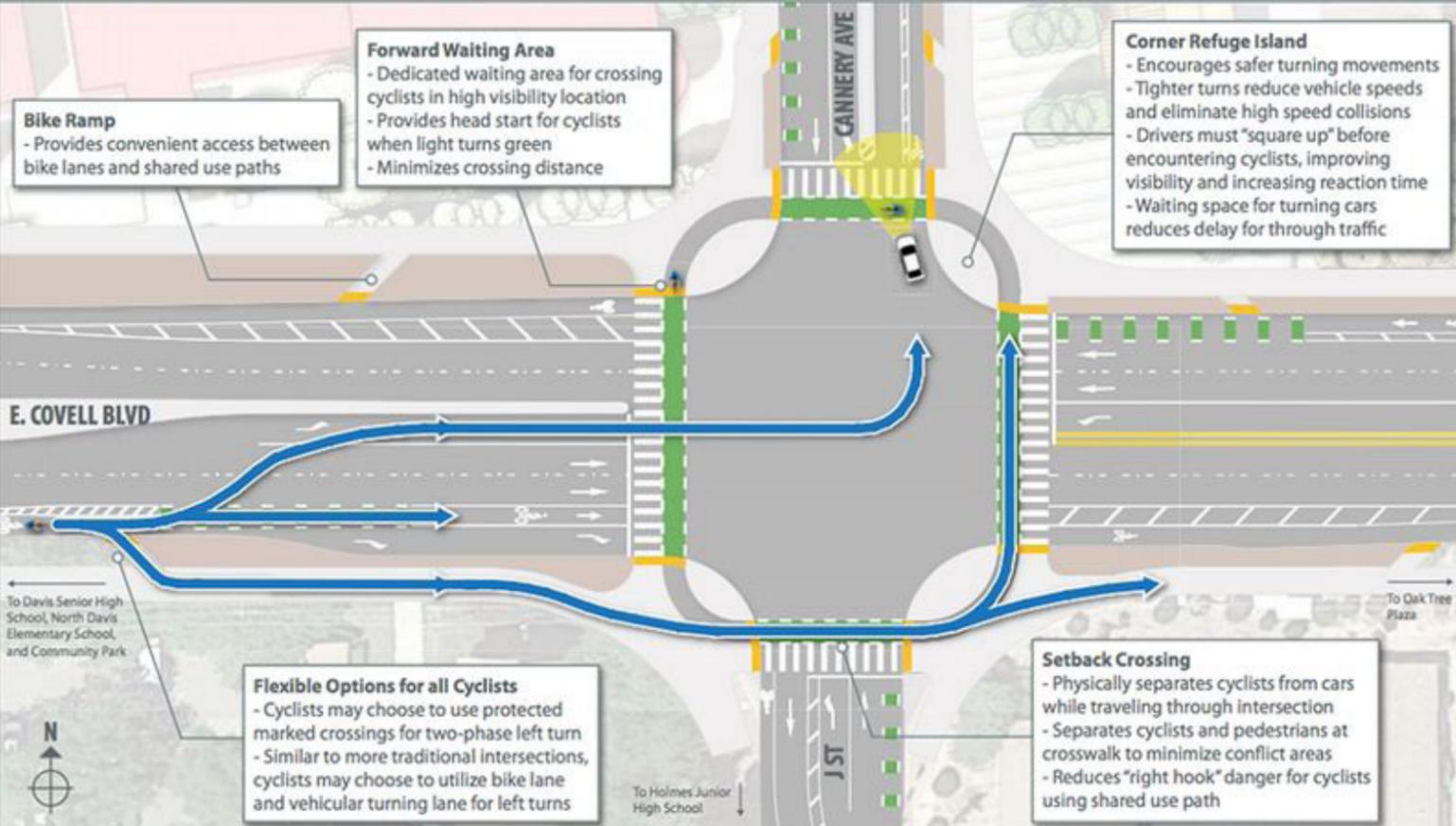


Image: Davis Enterprise

DAVIS, CA: PROTECTED INTERSECTION FOR BICYCLES

For years, Dutch cities have been building protected intersections because they are designed to reduce the risk of people who bicycle getting hit by turning vehicles. They also make pedestrians and people who bicycle more visible to motorists.⁴⁸

The City of Davis, California, made history this year as the first U.S. city to build a protected intersection for bicycles.⁴⁹ The city is a college town much like Columbus, but with a population of 66,205 instead of 835,957. Columbus has many more resources and opportunities to build protected intersections for people who bicycle. A great place to start would be in and around the University District since that neighborhood has high rates of people who bicycle, two bike share systems (CoGo and Zagster) and has the highest population densities in the city, not to mention the entire State of Ohio.

LOS ANGELES: A BICYCLE-FRIENDLY BUSINESS DISTRICT

People who bicycle mean business. The City of Los Angeles is working on establishing its first Bicycle Friendly Business District (BFBD) in Northeast Los Angeles. The new pilot will include several prominent business corridors in Northeast Los Angeles. According to the LA DOT Bike Blog, the program aims to provide business and retail corridors with adequate bicycle facilities including bicycle parking and repair stations, bike lanes, creating maps of the bicycling network, installing signage, and facilitating bicycle wayfinding.⁵⁰

FOR EVERY DOLLAR SPENT TO BUILD NEW PROTECTED BIKE LANES, CITIES COULD SAVE AS MUCH AS \$24 IN HEALTH AND CONGESTION COSTS.

PORTLAND, OR: THE 'BIKESCRAPER' COULD BE PILOTED IN COLUMBUS

The bikescraper is an interesting and bold concept that swaps out vehicle parking for bicycle parking in dense, urban developments. In this case, the Hassalo on Eighth project is designed to have 1,200 bicycle parking spaces.⁵¹ It's ambitious and makes a statement. It's also a risk for a developer and will require a zoning variance to waive minimum parking requirements. That said, the bikescraper can start a dialogue in Columbus about doing away with minimum parking requirements in place of maximum parking requirements and introducing minimum bike parking requirements, which Portland has in its city code.⁵²



Image: GBD Architects, We Build Green Cities

NEW ZEALAND: BIGGER INVESTMENTS RETURN BIGGER PAYOFF WHEN IT COMES TO BIKE INFRASTRUCTURE

Investing in a network of protected bike lanes could mean long-term cost savings for cities in the Columbus Region. But too little investment in subpar infrastructure could actually decrease enthusiasm for cycling. Consider this, for every dollar spent to build new protected bike lanes, cities could save as much as \$24 thanks to lower health care costs and less pollution and congestion.⁵³

INVESTING IN A NETWORK OF PROTECTED BIKE LANES COULD MEAN LONG-TERM COST SAVINGS FOR CITIES IN THE COLUMBUS REGION.

CAMBRIDGE, UK: PEOPLE LIVING NEAR BIKE LANES GET 45 MINUTES MORE EXERCISE EVERY WEEK

Researchers at the University of Cambridge have found that people who live near bike lanes are more likely to exercise 45 minutes more per week than those who do not live in close proximity to a bike lane.⁵⁴ The study has been published in the American Journal of Public Health and makes the case for the public health benefits of widespread bicycle infrastructure. In other words, more investments in bicycle infrastructure can leverage existing efforts by Columbus Public Health and local nonprofits to curb diabetes, heart disease, and other chronic health conditions affecting the Columbus Region.



Image: reddit user Astromike23

CHICAGO: ELEVATED BIKEWAY AND PARK

The 606 is a 2.7-mile long elevated bikeway and park in Chicago that allows bicyclists and pedestrians to travel free of vehicles.⁵⁵ Inspired by the High Line in New York City, The 606 was largely funded through the U.S. Department of Transportation's Congestion Mitigation and Air Quality (CMAQ) improvement program.⁵⁶ The Mid-Ohio Regional Planning Commission (MORPC) taps CMAQ dollars to fund various projects in the Columbus Region. Perhaps the time is ripe to explore a similar project now that the precedent has been set.



Image: Foster + Partners

LONDON: BUILD A SKYCYCLE SYSTEM IN COLUMBUS OVER RAIL LINES

SkyCycle would give people who bicycle a new options for commuters in London. The project is a 135-mile network of bikeways above existing commuter rail lines.⁵⁷ The three-story high routes would be accessed via ramps at more than 200 points and carry an estimated 12,000 cyclists per hour.⁵⁸ The Columbus Region can build a similar system above the many rail lines in the urban area.



Image: www.dac.dk

COPENHAGEN: THE CYKELSLANGEN AS INSPIRATION TO CONNECT PATHS IN COLUMBUS

The Copenhagen Cykelslangen, or Cycle Snake, is a bicycling bridge over a waterfront that acts as a connector to solve connectivity issues for persons who bicycle. The concept can be introduced in Columbus as a way to overcome natural and artificial barriers, such as rivers and highways, in the downtown area.⁵⁹



Image: gobike



Image: gobike

COPENHAGEN: A BIKESHARE DESIGNED FOR TRANSPORTATION AND ECONOMIC GROWTH

GoBike debuted in Copenhagen with a new model for bike shares. Each one of their bicycles have a tablet computer incorporated in to the bicycle design. These tablets direct riders to the best local restaurants, entertainment, and shopping and give the latest times for nearby transit.⁶⁰ It's a tech addition worth considering for both the CoGo Bike Share and Zagster Bike Share.

PORTLAND, OR: ONE MILE OF URBAN HIGHWAY IS EQUAL TO THE COST OF PORTLAND'S BIKE SYSTEM

Portland, Oregon is well-known for its bicycling infrastructure. One reason bicycling has taken off there is because it's a bargain for both taxpayers and riders. Columbus could easily emulate Portland's system if it's willing to prioritize bicycle investments. The aggregate costs over the years has totaled about \$60 million.⁶¹ Roughly the same amount it costs to build one mile of urban highway.

ONE MILE OF URBAN HIGHWAY = \$60 million = PORTLAND'S ENTIRE BIKE SYSTEM



HOW SHOULD COLUMBUS INVEST \$60 MILLION?



Image: CDOT via Streetsblog Chicago

CHICAGO: PROTECTED BIKE LANES

Protected bike lanes allow dedicated safe space for bikers without the dangers of sharing the road with vehicles. The fact that Columbus uses bike sharrows is an inconvenience for both bicyclists and motorists. The bicyclists slow down traffic and create more potential for serious injury by vehicles. Protected bike lanes allow a designated space, allowing traffic to flow normally and bikers at all expertise levels a safe, designated traveling space.

SO FAR, PRELIMINARY RESEARCH CONFIRMS THAT PROTECTED BIKE LANES CAN INCREASE THE NUMBER OF RIDERS.

COLUMBUS CAN LEARN FROM OTHER U.S. CITIES WITH PROTECTED BIKE LANES

Few U.S. cities have experience with protected bike lanes largely because of the limited design guidance provided in the past.⁶² Fortunately, more and more communities are giving consideration to building protected bike lanes. With that interest comes research and studies. So far, preliminary research confirms that protected bike lanes can increase the number of riders.⁶³

The National Institute for Transportation and Communities released a new study recently that evaluated protected bike lanes in Austin, Chicago, Portland, San Francisco and Washington, DC. The big takeaway from the study is that protected bike lanes cannot rapidly boost citywide ridership without a citywide network in place. Columbus can learn from other U.S. cities with protected bike lanes with the goal to build a interconnected protected bike lane network to maximize ridership.

MINNEAPOLIS: PROTECTED BIKE LANES DON'T CAUSE CONGESTION IF YOU PUT THEM ON THE RIGHT STREETS

A common concern when considering the introduction of a protected bike lane is whether or not doing so will create more congestion. The issue was addressed earlier in this section but let's take a closer look. To do so, we turn to Minneapolis and its data on the matter.

The City of Minneapolis funded the construction of 45 miles of bike lanes in 2010 and 2011.⁶⁴ Data was gathered from the 10 road segments that gained a bike lane to test a protected bike lane's effect on congestion. The data revealed that protected bike lanes do not exacerbate congestion if placed on the right streets. For example, streets that are already near capacity would witness severe congestion. However, streets that are well under capacity would only see a slight uptick in congestion.⁶⁵ And frankly it may not even be noticeable.

PROTECTED BIKE LANES DON'T CAUSE A LOT MORE CONGESTION IF PLACED ON THE RIGHT STREETS.

COLUMBUS: A LEADER IN BICYCLING INFRASTRUCTURE? IT'S IN OUR OWN HANDS.

Imagine if we combined protected bike lanes and bike trails with a blue glow-on-in-the-dark finish that fed into protected intersections. Imagine if we took our special improvement districts (SIDs) to the next level and designated them as bicycle-friendly business districts. What if we dared to give the High Line and 606 a run for their money? What if we develop the technology to wed the CoGo and Zagster bike shares seamlessly and incorporate a tablet computer to connect riders to the best our city has to offer? Let's get to work.

Image: Paul Krueger





THE BIG PICTURE

CREATE A BIKE CULTURE IN COLUMBUS

A bike culture in Columbus means that our community recognizes and respects bicycling as a valid transportation option.⁶⁶ That includes as a form of recreation but more so as a form of transportation. We can take pride in our progress under the leadership of Mayor Michael B. Coleman but our efforts must continue.

BOLSTER PUBLIC HEALTH & SAFETY

The number-one reason Portland is the country's iconic city for bicycling is because it's an extremely safe place to ride. In fact, the city avoided any bike-related fatalities in 1999, 2000, 2002, 2006, 2008, 2010 and 2013.⁶⁷

One study in Denmark found a 30 percent drop in mortality rates among adults who commute to work by bicycle.⁶⁸ The City of Copenhagen estimates that \$100 million is saved annually through healthcare savings.⁶⁹ That figure doesn't even take into account broader societal benefits such as increased productivity at the workplace, additional savings from less wear and tear on the roadways and more cars off the road.

In Copenhagen, the cost of building protected bike lanes is about \$2 million per mile per side, which is fully paid for in five years: the city's economic impact study estimates that every mile ridden by bike yields a net gain for society of 21

cents, compared to a net loss of 12 cents per mile driven by car.⁷⁰ These figures include both cost savings in the public sector and the increase of economic activity for the private sector.

INVEST IN BICYCLING TODAY AND BECOME A LEADER TOMORROW

As the Columbus Region continues to grow and densify, transportation issues will continually arise. Cities have engineered different solutions tailored to specific challenges. For example, the Cycle Snake addresses a connectivity problem, while the SkyCycle is a drastic overhaul for a transportation system under stress from growth and a limited public right-of-way. Columbus happens to have both challenges on the horizon. But really these are opportunities to get it right.

The bike culture will play a vital role. It will be part public engagement and part physical investment. More people are willing to bike if a network of protected bike lanes and amenities are incorporated into Columbus' design and development plans. The bicycle is our friend, not our enemy. It's an opportunity, not a challenge. More bicycle ridership can help us be a little more in shape, pollute a little bit less and help us fit a lot more future growth without compromising our love affair with cars.



WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

COMPLETE STREETS

TRANSIT

- ACCOMMODATE FUTURE POPULATION & JOB GROWTH
- ACCESS TO JOBS, EDUCATION AND SERVICES
- ENHANCE ECONOMIC GROWTH

\$100 trillion 

The amount that could be saved between now and 2050 if the world expands public transportation, walking, and bicycling in cities.⁷¹

68%  +   

The percentage of U.S. residents who want more federal spending on public transportation systems, according to a poll for the American Public Transportation Association (APTA).



Image: GlobeSherpa

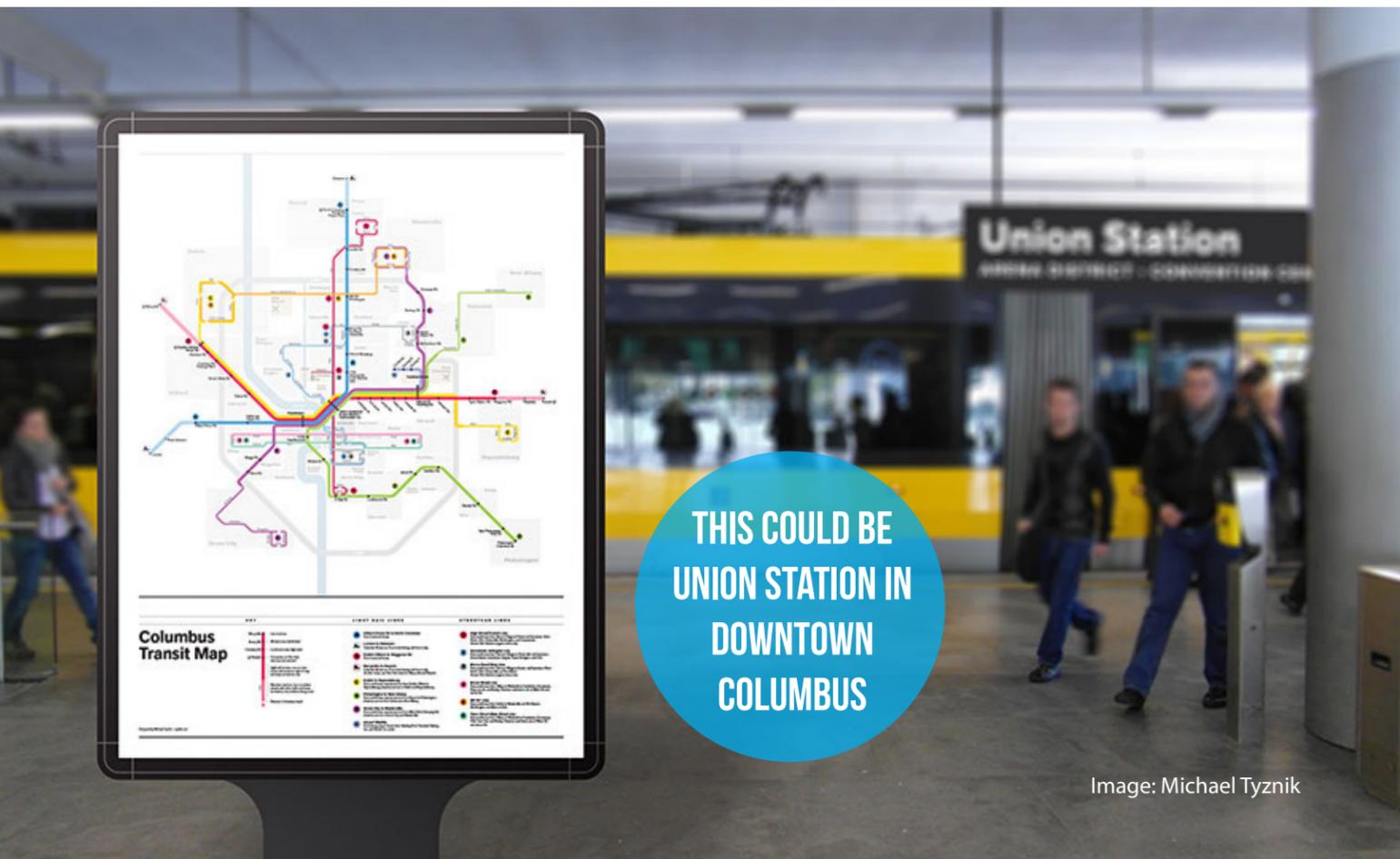
HONG KONG: UNIVERSAL FARE CARD

Imagine using a smartphone to navigate between COTA, the CoGo Bike Share, and the Zagster Bike Share without needing to stop to buy a new fare card or membership. The Columbus Region joins the rest of the country as behind the curve on universal fare cards. Cities in Japan and the Netherlands, as well as Hong Kong, provide passes that allow users to switch modes from rail, bus, taxi, and more.⁷²

ONE PAYMENT TO RULE THEM ALL

The real value of a unified payment system can be felt across the board. It will save time and stress for riders, standardize payment methods for each mode of public transportation, and generate useful data for agencies like COTA and MORPC.

CITY TRAVEL HASN'T HAD THE INTERNET-AGE MAKEOVER THAT LONGER-FORM TRAVEL HAS ENJOYED WITH THE LIKES OF KAYAK AND ORBITZ.



THIS COULD BE UNION STATION IN DOWNTOWN COLUMBUS

Image: Michael Tzunik



Image: CTA



Image: Garrett/County Lemonade

BOGOTÁ, COLUMBIA: EXCLUSIVE BUS LANES

Enrique Peñalosa, a former mayor of Bogotá, Colombia, argues that, “an advanced city is not one where even the poor use cars, but rather one where even the rich use public transport.” Mr. Peñalosa advocates for exclusive bus lanes because they represent democracy in action by allocating public road space to poor as well as affluent residents. Bus lanes also provide an efficient use of public space.

Although a single bus lane may seem to provide only modest direct benefits, an integrated bus lane network implemented with other pro-transit policies can be the fastest and most cost-effective way of creating more multi-modal cities.⁷³

SAN FRANCISCO: RED PAINT KEEPS DRIVERS OUT OF EXCLUSIVE BUS LANES

San Francisco’s transit authority, SFMTA, uses red paint to keep drivers out of bus lanes. One recent case study focused on the effectiveness of the policy. Data showed that travel times on bus lines with red lanes improved by five percent and on-time performance increased by 20 percent.⁷⁴

PORTLAND, OR: HIGH FREQUENCY TRANSIT SERVICE

The frequency of service can make or break a transit system. For example, Portland’s local transit authority reduced bus frequency on ten bus routes around the city in 2009.⁷⁵ Ridership dropped. During the period of the service cut, as good connections enabled by the high frequency service became more difficult and frustrating, the overall use of the system diminished. Weekday bus ridership declined 3.6 percent between Fall of 2012 and Fall of 2013.⁷⁶ COTA must avoid a similar outcome.

SALT LAKE CITY: LIGHT RAIL SYSTEM REDUCES VEHICLE TRAFFIC ON PARALLEL ROADWAYS

A recent study by researchers at the University of Utah explores the impact of Salt Lake City’s TRAX light rail system on vehicle traffic on parallel roadways.⁷⁷ The findings of the study revealed significant declines in average daily traffic counts, despite an influx of new development in the area.

How much of a reduction in daily traffic counts? About 50 percent.⁷⁸ Without the rail line, the corridor in focus could expect 44,000 vehicles a day but the reality is about 22,300 daily counts.⁷⁹ The study goes a step further with estimates of impacts to traffic congestion, fuel consumption, and costs of building more parking structures (like a parking garage). One corridor of light rail saves almost 500,000 gallons of gasoline, prevents nearly 10 million pounds of carbon emissions and avoided \$23.6 million to build more structured parking.⁸⁰

ONE CORRIDOR OF LIGHT RAIL SAVES IN ONE YEAR:

500,000 gallons of gasoline

10 million pounds of carbon dioxide emissions

\$23.6 million to build more structured parking



Image: Diogo Moreira, Governo do Estado de São Paulo

SÃO PAULO: THE MONORAIL GETS A SECOND LIFE

The Brazilian metropolis of São Paulo has given new purpose to the monorail. Unlike tourism monorail systems you see at Disney World, the line in São Paulo is designed to move 48,000 passengers each hour each way between two major suburbs.⁸¹ The monorail is a practical solution for a city or region that has to solve transportation issues in a pinch and with a limited budget. A subway would have been too expensive and the traffic congestion in São Paulo would have made bus rapid transit service ineffective. The long-term plan is to build a new monorail-based transit system, including a proposed line to the airport. Columbus can take a page from São Paulo.



Image: Jaime Lerner, Associated Architects

CURITIBA, BRAZIL: DEVELOP A BUS RAPID TRANSIT NETWORK WITH OUR SISTER CITY

The City of Curitiba, Brazil is an international model for sustainable, cost-effective public transportation. Columbus is fortunate to call the Brazilian city of Curitiba a sister city. The City of Columbus should work with policymakers, urban planners, and transportation engineers in Curitiba to help our region develop a cost-effective bus rapid transit system. The CMAX down Cleveland Avenue is a great step in the right direction but it is not the textbook definition of bus rapid transit (BRT). It's more like BRT-light.



Image: Wikimedia Commons user burts

DRESDEN, GERMANY: DEVELOP A STREETCAR/ TRAM NETWORK WITH OUR SISTER CITY

Light rail transit serves to move people long distances across the city, such as commuters from the suburbs to the city center. In contrast, trams or streetcars serve to move people within the urban core. Columbus can continue to encourage development in the urban core by building a tram system. This can also complement other efforts such as BRT and light rail. Dresden has a terrific tram system and happens to be another sister city.



Image: Brasco International

CONSTRUCT MORE BUS STOP SHELTERS AROUND COLUMBUS

A bus shelter preserves dignity, protects riders from elements, and gives a safe space for the disabled or elderly. Unfortunately there are many bus stops that lack a bus shelter. COTA can change that. First, identify which bus stops have an absence of a shelter. Next, prioritize which stops need shelters based on ridership, bus frequency, and ample right-of-way.

LOS ANGELES: RESIDENTS LIVING NEAR LIGHT RAIL LINE REDUCE CAR USE BY 40%

Los Angeles residents living within a half-mile of the Expo light rail line tripled their ridership and reduced their daily driving by 40 percent, a University of Southern California study finds.⁸²

The study looked at the behavior of riders and how urban design influenced ridership. Light rail stations with more bus lanes and fewer lanes of traffic were most successful at reducing the number of miles driven and increasing ridership.⁸³ Streets with too many lanes of traffic discourage riders from getting to stations. The study also found that more people are likely to use rail if bus service complements it to finish the last mile.



Image: Markus Tollhopf

MUNICH: BUILD NICER TRANSIT SHELTERS AND STATIONS TO ATTRACT MORE RIDERS

Push the envelop when it comes to design and aesthetics. Evidence suggests that transit shelters and stations with sleeker designs, like this one in Munich, boost ridership. A recent study out of the University of Naples compared ridership on two similar lines, only one of which had colorful, recently-redesigned stations.⁸⁴ The researchers found that riders were willing to put up with more, including higher costs and longer wait times, at the nicer stations. The researchers concluded that a station's architectural quality should be an important design consideration and should even be weighted against other service metrics, including frequency and accessibility, when determining transit improvements.⁸⁵

EVIDENCE SUGGESTS THAT TRANSIT SHELTERS AND STATIONS WITH SLEEKER DESIGNS BOOST RIDERSHIP.

SPACE REQUIRED TO TRANSPORT 60 PEOPLE



CAR

BUS

BICYCLE

Image: Ecolocalizer.com

WASHINGTON (STATE): AN OHIO COMMUTE TRIP REDUCTION LAW

The State of Washington's Legislature first passed a Commute Trip Reduction (CTR) law in 1991 with goals to improve air quality, reduce traffic congestion, and reduce the consumption of fossil fuels through employer-based programs that encourage the use of alternatives to driving alone. Alternatives include riding the bus or train, carpooling, vanpooling, bicycling, walking, working a compressed work week or teleworking. If such a law were passed in Ohio, Columbus and its suburban neighborhoods can implement ordinances to define how such a law would apply to workplaces in their area. Local jurisdictions are required to provide training and technical assistance for employers.⁸⁶

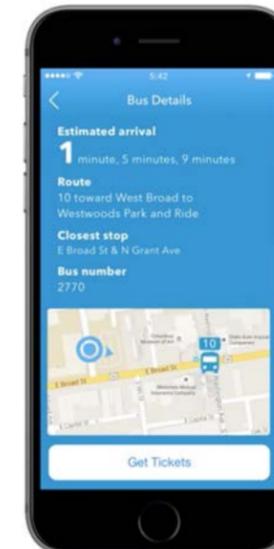
COMMUTE TRIP REDUCTION LAWS REQUIRES MAJOR EMPLOYERS TO DEVELOP AND IMPLEMENT AN EMPLOYEE COMMUTE PROGRAM TO REDUCE THE NUMBER AND LENGTH OF COMMUTES DONE BY A PERSON ALONE IN A CAR TO THE WORKPLACE.

omnibus

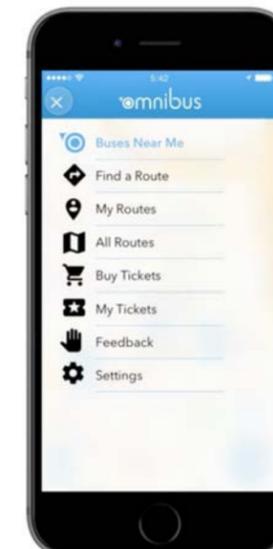
Forward. For you. For all.



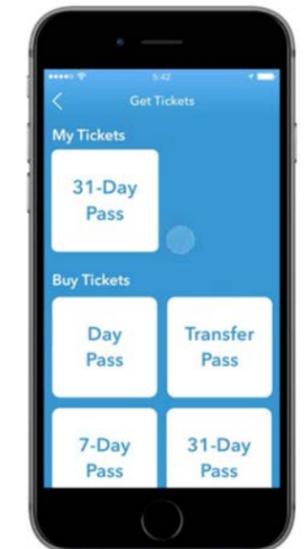
Omnibus provides quick access to the features users want.



Quickly find a bus using actual locations.



Create and save routes and tickets.



Purchase and use digital tickets.

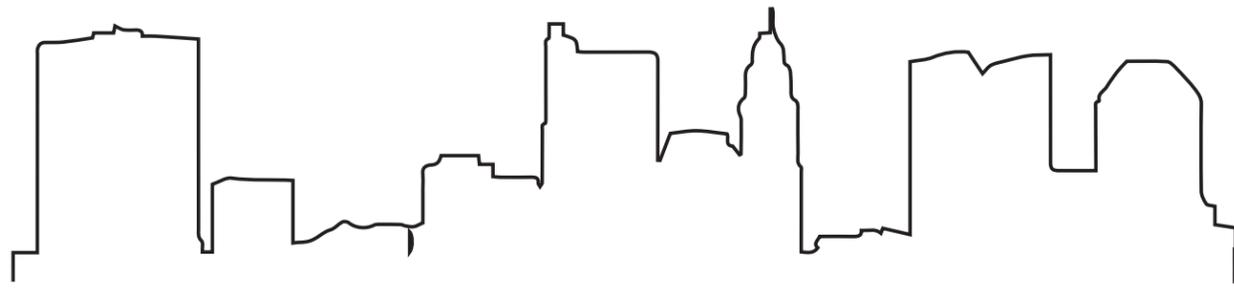


...and on your watch.

Quickly find a bus and use your tickets.

COLUMBUS: SUPPORT THE OMNIBUS MOBILE APP

Omnibus is a mobile app that was created by a brilliant team of tech-savvy minds at this year's GiveBackHack hackathon event. Omnibus eliminates transportation uncertainty by showing users where their bus is in real-time. The platform is similar to Uber's mobile app where you can track your driver turning a trip. The Central Ohio Transit Authority (COTA) has a real-time tracking initiative in existence. Omnibus can complement that system and provide more flexibility since it's software, which can be easily updated instead of buying new hardware.



THE BIG PICTURE

CREATE A REGIONALLY SUPPORTED TRANSIT VISION

The Columbus Region has an advantage over other communities because of the amount of work that it has already done to improve transit, which includes the following:

- TRANSIT SYSTEM REALIGNMENT
- COTA NEXTGEN INITIATIVE
- INCREASED SERVICE HOURS OF OPERATION
- THE CLEVELAND AVENUE CMAX

CONGESTION IS A REGIONAL PROBLEM

If we fail to make the right investments for growth, we risk our ability to mitigate congestion on our transportation network and strain on our infrastructure. As the central city in the region, Columbus can show leadership on transportation policy, but ultimately the region as a whole will have to collaborate and cooperate to make investments with a regional scope. Regionalism will make us stronger and more competitive to lure talent and outside investment.

Transit, density, and congestion are interconnected.⁸⁷ The largest metropolitan areas in the United States have varying levels of congestion based on their population, which suggests that varying levels of transit and density have different outcomes for congestion.⁸⁸

Philadelphia, Chicago, Boston, and San Francisco are the largest metropolitan areas where over 25 percent of the population uses transit to go to work and the central city density is over 10,000 per square mile within city limits.⁸⁹ A high-density central city combined with not-so-dense suburbs, like Boston or San Francisco, can lead to higher levels of congestion.⁹⁰ Boston and San Francisco have the 10th and 11th highest populations in the country, respectively. They also have the 8th and 3rd highest levels of congestion. On the other hand, Philadelphia and Chicago have the 5th and 3rd highest populations, respectively, and the 13th and 12th highest levels of congestion.

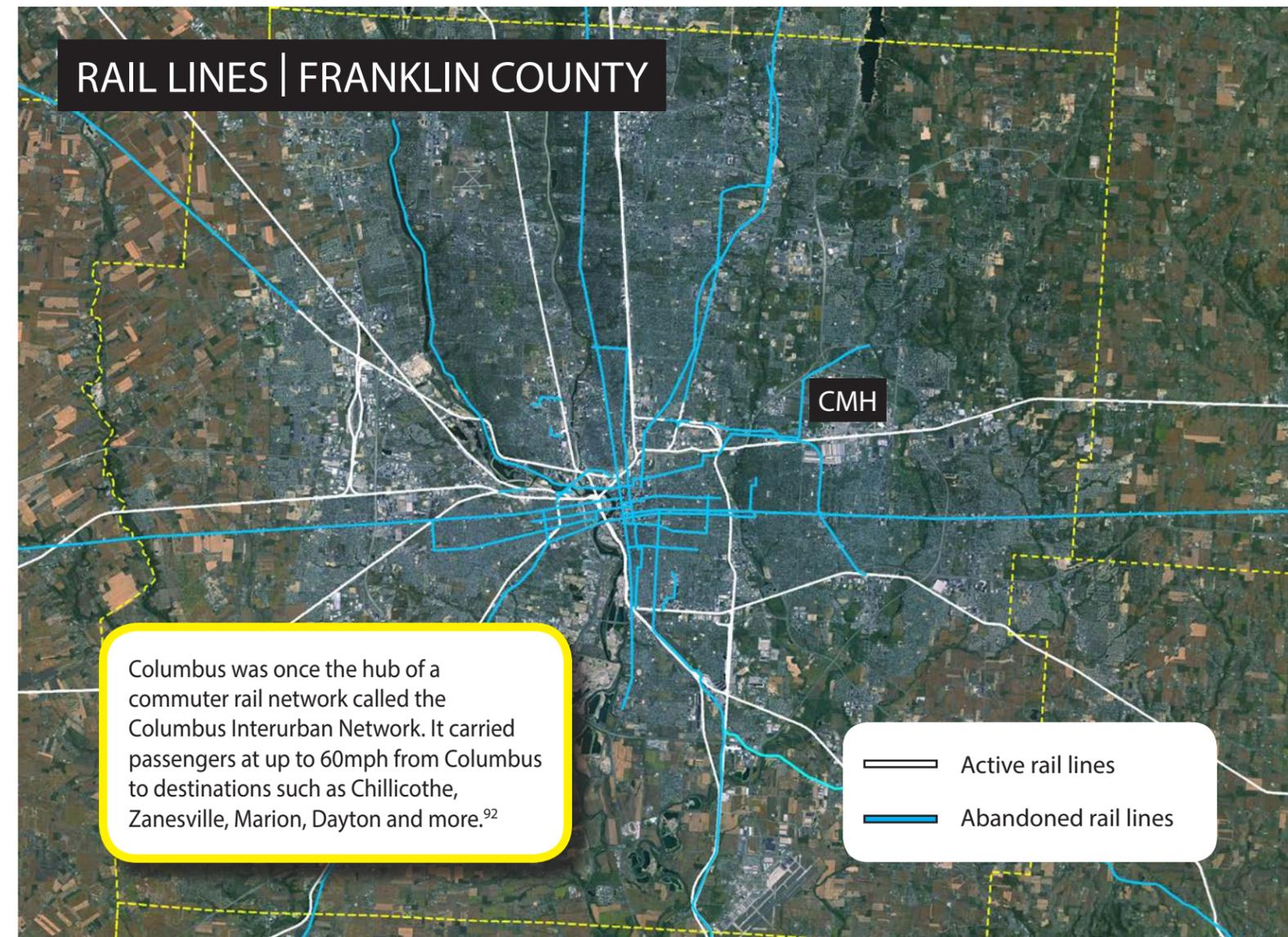
As the Columbus Region continues to grow, it will become more dense overall. But if the region has mediocre transit and streets designed only for cars, then congestion will only worsen.⁹¹ Columbus has the power now to prepare for the transportation system of the future by altering our development patterns to accommodate transit. Urban planners who pay attention to bus stop locations and urban design standards visibly

elevate transit as a travel option. For instance, the Short North Kroger incorporated a covered bench for bus riders into its High Street façade. Therefore, COTA's service can be amplified if urban design and development complement transit. It only highlights the importance of an entire Columbus Region that is transit-oriented in both scope and scale.

IF THE COLUMBUS REGION HAS MEDIOCRE TRANSIT AND STREETS DESIGNED ONLY FOR CARS, THEN CONGESTION WILL ONLY WORSEN.

LONG-TERM GOALS FOR TRANSIT IN COLUMBUS

- Continue to find efficiencies in fixed route bus service.
- Improve connections between transit and other modes of transportation.
- Improve transit operations and experience through investment in technology and facilities.
- Support efforts to introduce fixed guideway transit service (BRT, tram/streetcar, light rail, and commuter rail).
- Make the 0.25% renewable levy on sales tax to support COTA a permanent levy.



RAIL LINES | URBAN CORE

Site of the former Columbus Union Station, which served railroad passengers until the late 1970s. The Greater Columbus Convention Center replaced our train station. The last remaining arch stands across from Nationwide Arena as memory of what once was and what could be.

The blue lines on the map are abandoned rail lines while the white lines are active ones that transport freight. Many of the abandoned rail lines located on the street grid are footprints of Columbus' extensive streetcar system.

— Active rail lines
— Abandoned rail lines



WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

COMPLETE STREETS

DRIVE IT

- INCREASE PUBLIC SAFETY AND IMPROVE AIR QUALITY
- MITIGATE CONGESTION AND LOOK FOR NEW EFFICIENCIES
- INTEGRATE CUTTING-EDGE TECHNOLOGY TO BECOME NATIONAL LEADER

“NOT TV OR ILLEGAL DRUGS BUT THE AUTOMOBILE HAS BEEN THE CHIEF DESTROYER OF AMERICAN COMMUNITIES.”

— JANE JACOBS
DARK AGE AHEAD

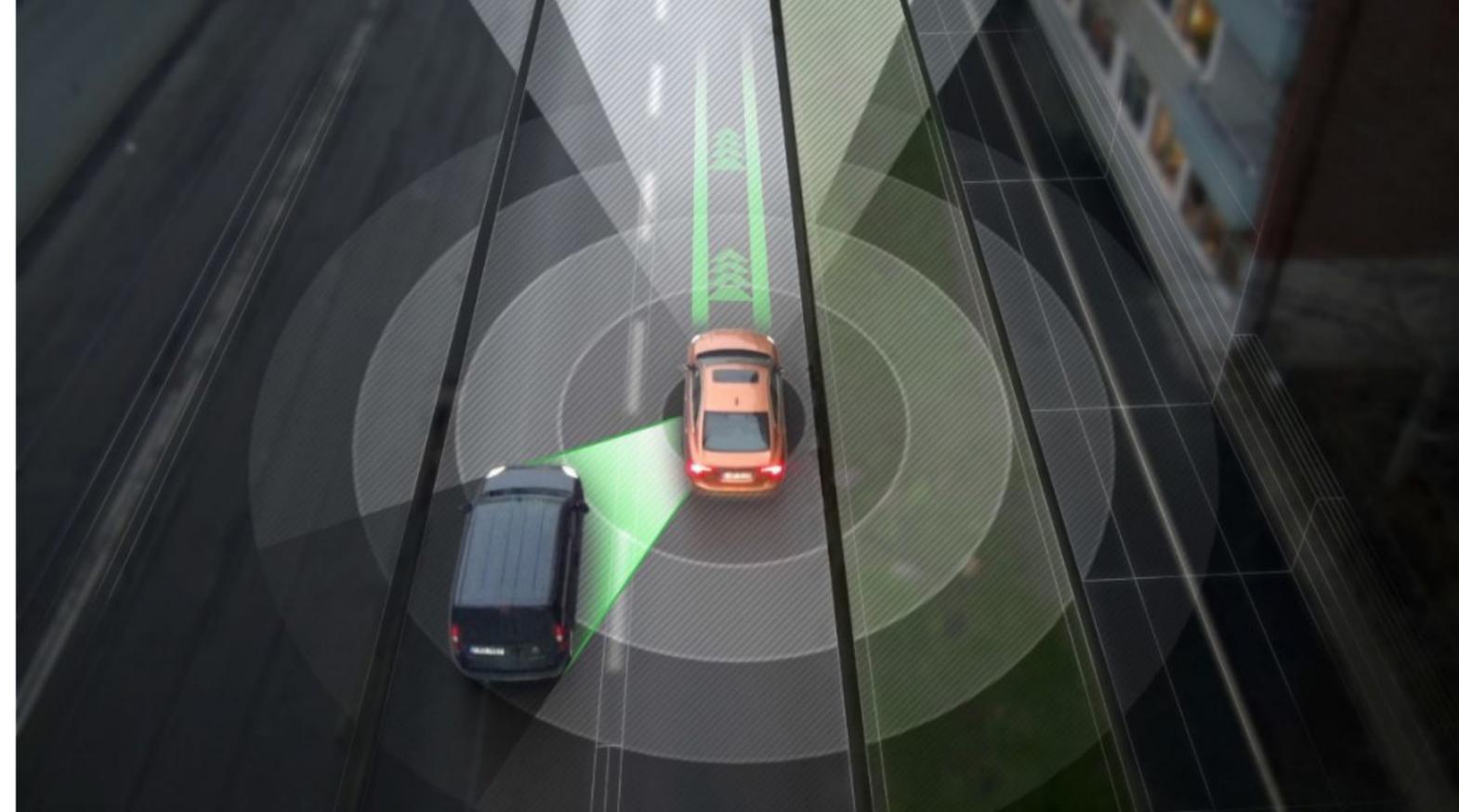
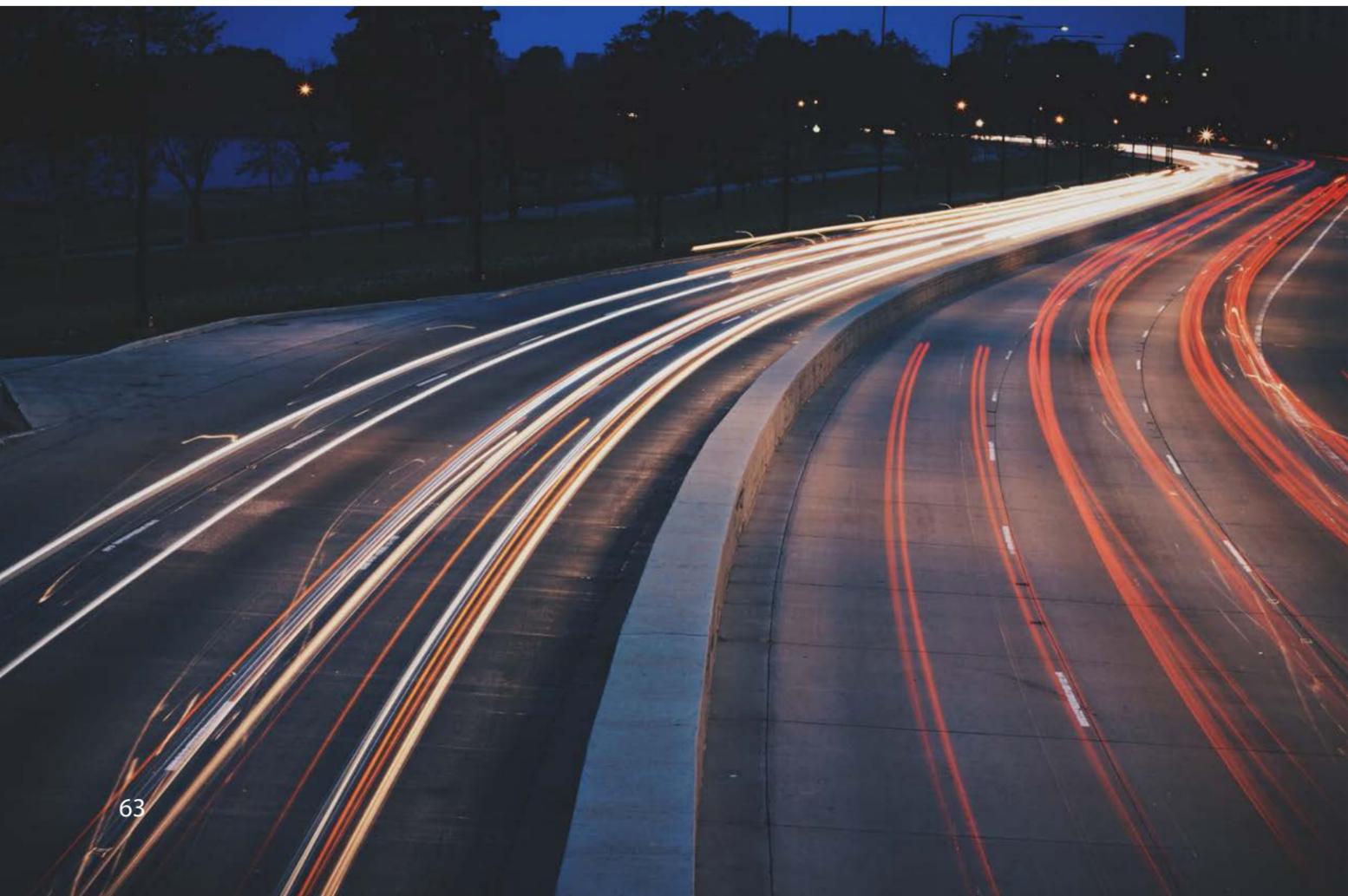


Image: Motor Authority



THE DRIVERLESS CAR COULD TRANSFORM CITIES AND COLUMBUS CAN LEAD THE WAY

Over the past few decades, technology has changed the way we interact, access knowledge, and do business. These technologies are only now beginning to find applications in the urban space. We live in the age of the sharing economy, where accessibility is valued more than ownership. Companies like Uber, car2go, and Airbnb are just a few examples of the sharing economy that have taken root in Columbus.

Uber recently announced that it has moved a step closer to realizing its goal of driverless cars.⁹³ Get excited, but not too excited. Driverless cars are not expected to begin entering the market until 2020, but a new study by IHS Automotive predicts once they arrive, they will quickly go mainstream.⁹⁴ The study calculates 54 million driverless cars on the road by 2035, with worldwide sales reaching 11.8 million.⁹⁵

TORONTO: 10-FOOT VEHICLE TRAVEL LANES FOR SAFETY

Narrower Lanes, Safer Streets is a recent report by senior transportation planner and adjunct lecturer Dewan Masud Karim. Mr. Karim looked at vehicle travel lanes in Toronto and Tokyo, specifically at crash data associated at randomly chosen intersections. His findings point out that collision rates increase quickly as lane widths exceed about 10.5 feet. The common width for urban arterial roadways is 12 feet.⁹⁶ The data points to speed as the main culprit. Narrower lanes reduce vehicle speed, which has a big impact on fatalities in urban places.

The good news is that narrower lane widths are supported in national policies outlined by the American Association of State Highway and Transportation Officials (AASHTO), particularly for urban areas.⁹⁷ The bad news is the official standards in many states prohibit them. To make our major urban roadways safer, let's scale back the width to 10.5 feet and use the excess for bike lanes or streetscaping.



Image: City of Dublin



Image: Edwin E. Moise

DUBLIN, OH: ROUNDABOUTS CUT DOWN ON CONGESTION AND BOLSTER SAFETY

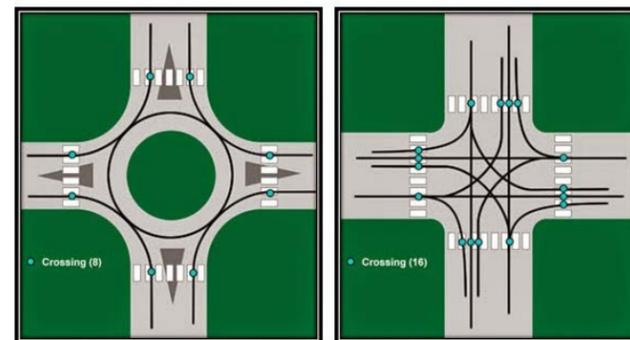
The roundabout is favored by traffic engineers because it cuts congestion and reduces collisions and deaths.⁹⁸ Americans are finally catching on. Roundabouts first made their U.S. debut in the early 1990s and have since jumped to about 5,000 today.⁹⁹

Roundabouts are not the same as traffic circles. Vehicles have the right of way based on when their light turns green in a traffic circle. Roundabouts typically do not have traffic lights; instead, they have a smaller diameter, promoting low circulating speeds. Approaching vehicles yield to those already in the roundabout.

Compared to a four-way intersection, roundabouts are significantly safer. For example, crashes that result in serious injuries or death fall by about 82 percent versus a two-way stop, and by 78 percent compared with an intersection with traffic lights, according to the Federal Highway Administration.¹⁰⁰ At a four-way intersection there are 32 possible conflict points between vehicles and only eight at roundabouts.¹⁰¹ Pedestrians face a total of 16 conflicts at a four-way intersection whereas at a roundabout they only have eight.¹⁰²

There is also a philosophical element to roundabouts. According to *The Economist*, “the roundabout represents not just a clever solution to a common inconvenience, allowing vehicles to swirl rather than stop at empty crossroads, but also the triumph of cooperation over confrontation. Vehicles and the people in them do not need to go head-to-head: if everyone bends a little, everybody can get along.”¹⁰³

PEDESTRIAN SAFETY IN ROUNDABOUTS



8 conflict points

16 conflict points

Image: USDOT, FHWA

THE ROUNDABOUT IS FAVORED BY TRAFFIC ENGINEERS BECAUSE IT CUTS CONGESTION AND REDUCES COLLISIONS AND DEATHS.

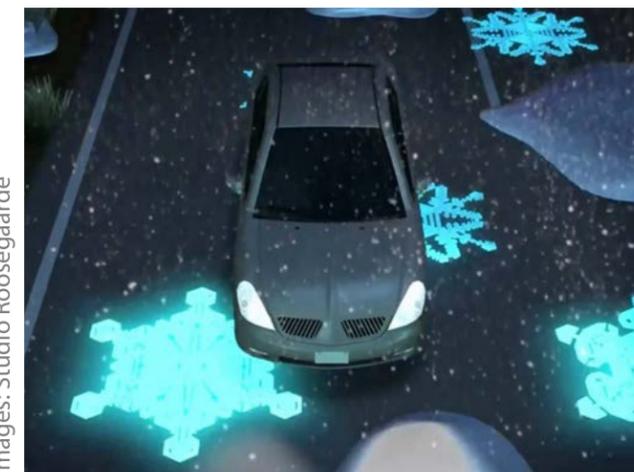


Image: Chattanooga Times Free Press

SHANGHAI: HIGHWAY PLANTERS FOR STORMWATER MANAGEMENT AND BETTER AIR QUALITY

Shanghai highways and overpasses are flanked by planters to counter air and noise pollution as well as capture some stormwater. Not to mention, they add a green aesthetic to the mix. Columbus can incorporate highway planters

throughout the Downtown 70-71-670-315 Highway Innerbelt and on highway overpasses inside Interstate 270. The greening of Columbus can take on many forms. Highway planters such as the ones pictured above are worth exploring.



Images: Studio Roosegaarde

THE NETHERLANDS: SMART HIGHWAYS TO PROVIDE SAFER DRIVING CONDITIONS

Glow-in-the-dark roads mean safer driving. The Columbus Region can work with the Ohio Department of Transportation and the Federal Highway Administration to pilot a stretch of smart highways such as the ones found in the Netherlands. Roadway lines can be painted over with a photo-luminescent powder, making lanes glow brightly in the dark.¹⁰⁴ Unlike the typical glow-in-the-dark paint, the powder is super-charged, meaning that even the limited sun available during wintertime is enough to make it glow for up to 10 hours at night.¹⁰⁵

Roadway lines are not the only application. The same treatment can be tweaked to be temperature sensitive. One pilot program uses glow-in-the-dark paint that only becomes visible when temperatures dip below freezing, giving motorists a warning of possible ice and other hazardous conditions.¹⁰⁶



Image: SFMTA, vs. Goliath



Image: Jonathan Quilter | Columbus Dispatch

SAN FRANCISCO: THE SFPARK PILOT PROGRAM INTRODUCES DEMAND-BASED PARKING

San Francisco launched a \$20 million federally-funded parking pilot called SFPark, which promises to revolutionize the way cities manage and price metered curb parking.¹⁰⁷

The demand-based parking model includes 7,000 of the city's 28,800 metered spaces and 12,250 garage spaces.¹⁰⁸ Drivers will be able to use a smartphone app or computer with the aid of street sensors to get real-time data on the availability and cost of parking spaces in 15 commercial districts.¹⁰⁹

Findings from the SFPark pilot has resulted in cheaper parking prices overall, more readily available parking, many fewer parking citations, and much less time wasted by motorists circling around looking for open parking spots.¹¹⁰ Average on-street meter rates dropped by four percent per hour while average garage rates dropped by 12 percent.¹¹¹ Other key findings include an 16 percent increase in parking availability and a 43 percent drop in time spent circling around for a parking spot.¹¹² That translates to a 30 percent reduction in parking-related greenhouse gas emissions overall.¹¹³

THE SFPARK PILOT PROGRAM RESULTED IN CHEAPER PARKING PRICES, MORE READILY AVAILABLE PARKING, FEWER PARKING CITATIONS AND MUCH LESS TIME WASTED BY DRIVERS CIRCLING AROUND FOR A PARKING SPACE.

The SFPark pilot can serve as inspiration for a similar parking pilot in Columbus, with emphasis on two Columbus neighborhoods where parking is a premium and, at times, a point of contention: the Short North and the University District.

The scope of the pilot calls for an end to free parking on Sundays. It's certainly a nice perk for motorists but giving a free pass to car that contributes to air pollution sends the wrong message. A possible trade off could be to allocate a portion of meter revenue to be reinvested into the street where the meter is located or used to democratize transportation and target underserved neighborhoods. That could take the form of sidewalk repairs, bicycle infrastructure, street trees, street cleaning, and so on.

NORWAY: A PUSH FOR ZERO-EMISSION ELECTRIC CARS COULD IMPROVE AIR QUALITY AND MORE

The Tesla Model S and Nissan's Leaf are best-sellers in Norway because the country offers incentives and policies for electric cars that include free parking much like car2go.¹¹⁴ Norway is pushing for more electric cars for a few reasons, including decreasing carbon emissions and cutting dependency of gasoline.¹¹⁵ At the peak hour of the morning rush hour in the Columbus Region, there are 400,000 cars on the road emitting carbon emissions and other pollutants into our air. A push for more zero-emission electric cars could improve air quality.

The World Health Organization estimates that air pollution costs the U.S. economy about \$1.6 trillion a year.¹¹⁶ With a population of 319 million, that translates to about \$5,000 per person. The subsidies and perks for program in Norway included an exemption from sales tax, toll roads, parking meter fees as well as a lower cost for auto insurance and free electricity at thousands of charging stations.¹¹⁷ Research suggests these subsidies could be worth about \$7,800.¹¹⁸ Perhaps a similar pilot can be brokered with state and federal agencies to provide up to \$5,000 in subsidies and incentives for electric vehicles. The pilot program can be implemented for a certain time frame or until a quota of electric vehicles are sold in the Columbus Region.

ENGLAND: ROADS THAT RECHARGE YOUR ELECTRIC CAR AS YOU DRIVE

Electric cars are more environmentally friendly and can be a lot cheaper to power compared to gasoline. But there's one major drawback: it takes time to charge them.

A pilot program in England is hoping to address the charging time concerns with the introduction of roads that can charge electric vehicles as they drive along them.¹¹⁹ If researchers and engineers get it right, there can be real-world application on roadways.

According to Highways England, the pilot program works with the help of wireless technology and special equipment. Electric cables buried under the surface of the roadway will generate electromagnetic fields, which will be picked up by a coil inside the car and converted into electricity.¹²⁰ The power transfer could potentially work for all types of vehicles because the technology won't require building any infrastructure above ground that could increase risks of collision or electric shock.¹²¹



THE BIG PICTURE

INVESTMENTS IN CUTTING-EDGE DRIVING TECHNOLOGY CAN PAY OFF HANDSOMELY

One of the biggest impacts from driverless cars will be increased public safety. Congestion and air quality will improve as driverless technology maximizes efficiencies in traffic flow and fuel consumption. According to a study by IHS Automotive, driverless cars in the marketplace will rise from 230,000 in 2025 to about 11.8 million in 2035.¹²² This creates an opportunity for the Columbus Region to take a lead in the burgeoning industry. That may take the form of a partnership between The Ohio State University, the Battelle Memorial Institute, federal agencies, local governments, technology firms, and others. Imagine if these local partners teamed up with the likes of Uber or Google. It could be a game-changer for Columbus. Not to mention, a boon to local tech and engineering jobs.

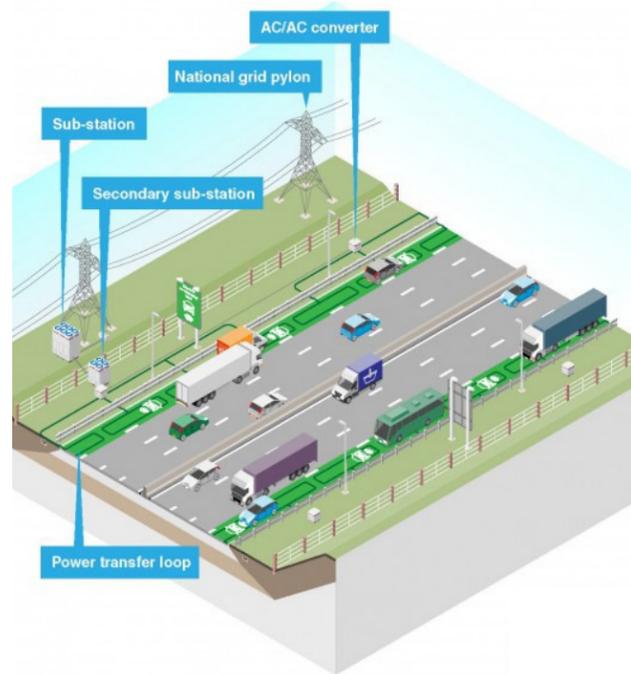


Image: Highways England

SAFETY NEEDS TO FRAME THE CONVERSATION

The cost of automobile accidents and injuries is extremely high when it comes to property damages, healthcare resources, and the loss of human life. The slightest improvements in safety now can have a meaningful impact in the coming years and decades. But we can do better. We must raise our safety and health standards when it comes to driving technology and associated infrastructure. If our efforts are successful, Columbus can become a national model.

DRIVERLESS CAR TECHNOLOGY CREATES AN OPPORTUNITY FOR COLUMBUS TO TAKE A LEAD IN THE BURGEONING INDUSTRY. DOING SO COULD BE A GAME-CHANGER. NOT TO MENTION, A BOON TO LOCAL TECH AND ENGINEERING JOBS.

WORLD-CLASS CITIES

ECONOMIC GROWTH

WALK IT

BIKE IT

TRANSIT

DRIVE IT

COMPLETE STREETS



COMPLETE STREETS

- DEFINE NEIGHBORHOODS AND FOSTER PLACEMAKING
- INCREASE CONNECTIVITY WITHIN AND ACROSS MODES
- INCORPORATE NEW TECHNOLOGIES AND URBAN DESIGN STANDARDS
- INCREASE PUBLIC SAFETY
- MANAGE STORMWATER RUNOFF AND IMPROVE AIR QUALITY
- INTEGRATE GREEN INFRASTRUCTURE INTO URBAN FABRIC

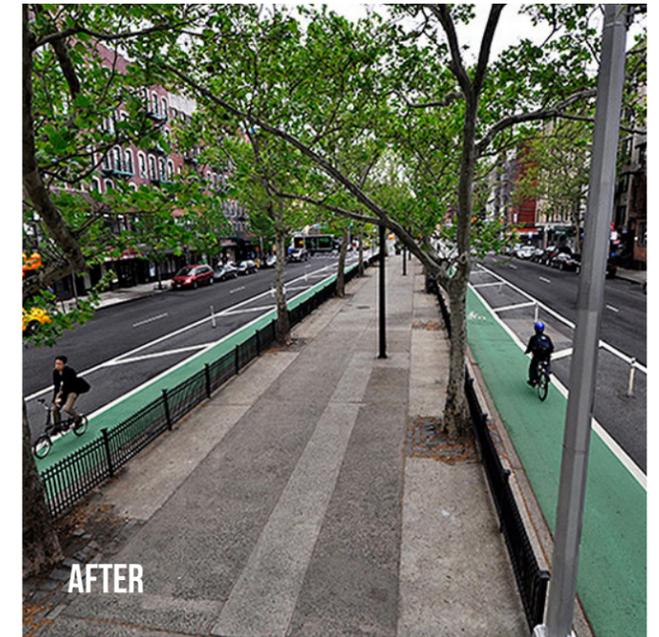
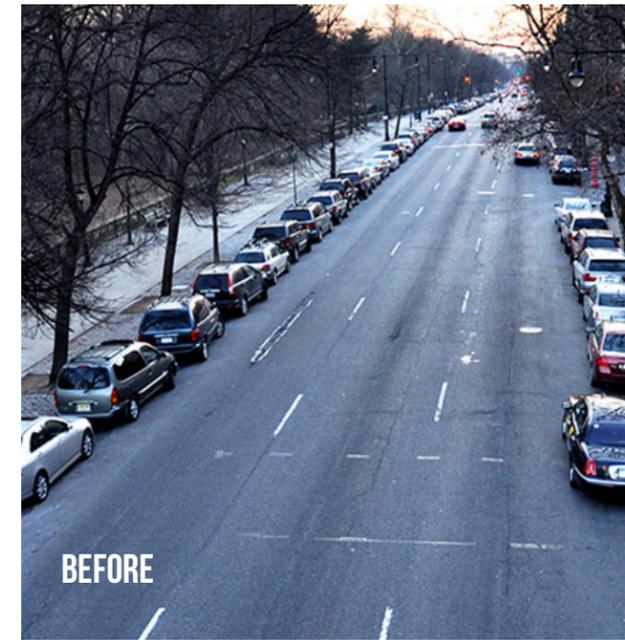


Image: Toole Design Group

NORMAL, IL: ECONOMIC BENEFITS OF COMPLETE STREETS

Streets for the people, by the people, and of the people. It's not just poetry. It's the idea behind complete streets. The local economy benefits when the public space of streets is designed for people who walk, bicycle, ride transit, or drive a car. A great case study is the community of Normal, Illinois, where city officials invested \$47 million on a complete streets project.¹²³ The scope of the work included the sidewalk widenings and repairs as well as the construction of a multi-modal transportation center. Imagine that, Columbus! Today, more than 40 percent of all trips in Uptown Normal are by foot or bicycle.¹²⁴ Since these improvements, it experienced a 46 percent boost in retail sales and attracted more than \$160 million in private investment.¹²⁵

NEW YORK CITY: EXAMPLES ON HOW TO DESIGN AND IMPLEMENT COMPLETE STREETS



Images: New York DOT



Image: University City District

PHILADELPHIA: STREET PLANTERS FOR PLACEMAKING AND FOR ADDED SAFETY

Planting trees and shrubs near the street provide a good buffer between pedestrians and motorists. While many areas in Columbus already have small plots of grass by their roads, it is important that the landscape is artistic and unique because doing so creates interesting places that result in surprise. In other words, the goal is placemaking. Successful placemaking creates a dynamic urban space that encourages people to visit.

The Woodland Avenue Pedestrian Plaza is the first finished project from the City of Philadelphia's Pedestrian Plaza Program. The pedestrian plaza seeks to further placemaking efforts by converting excessive asphalt and concrete into pocket parks.¹²⁶ The planters at the Woodland Avenue Pedestrian Plaza also form a buffer from street traffic for added safety. Another added benefit lies with stormwater management. The planters capture rain that would otherwise add strain to stormwater infrastructure pipes beneath the city.¹²⁷

FREE WI-FI IN THE ARENA DISTRICT, PUBLIC PARKS AND ON THE HIGH STREET CORRIDOR

Free and fast access to data is everything in today's economy. The introduction of free wi-fi in areas where people walk and socialize will enhance the pedestrian experience. The city can encourage walking and street life by partnering with Internet providers to provide the service. Good places to start would be the High Street corridor, the Arena District, Goodale Park and Columbus Commons.

BOSTON: SOLAR-POWERED BENCHES THAT CHARGE SMARTPHONES¹²⁸



Image: SOOFA



Image: City of Los Angeles

LOS ANGELES: CONTINUE TO CONVERT COLUMBUS STREETLIGHTS TO LED LIGHTING

City planners across the U.S. are dropping the streetlights of yesteryear for brighter, more energy-efficient lights.¹²⁹ Cities en masse, Columbus included, are switching to brighter, whiter LED streetlights.

Los Angeles is at the forefront of an often overlooked issue of cities: light pollution. Recently the city concluded a five-year program to replace 155,000 street lights with energy efficient LED fixtures.¹³⁰ The result? \$10 million dollars a year in cost-savings and 40,500 tons of emissions displaced.¹³¹ LEDs have proven to be more cost-effective and durable than traditional high-pressure streetlights. Columbus has started to convert to LED streetlights. It's a good policy that should continue until the job is done.

LED LIGHTS HAVE PROVEN TO BE MORE DURABLE AND COST-EFFECTIVE THAN TRADITIONAL STREETLIGHTS.

LYON, FRANCE: BRING AN ANNUAL LIGHT FESTIVAL TO COLUMBUS

Light festivals cover part of a neighborhood with brilliant displays of light during dark autumn nights. The best light festivals are ones that transform historical buildings, bridges and tunnels into lively works of art.¹³² It's a great way to raise the art profile of the city and create a new attraction. The reason for the success of light festivals is rooted in placemaking. Create an element of surprise and people will come.



Image: Ville de Lyon - Muriel Chaulet



Image: Kevin Lee/Bloomberg



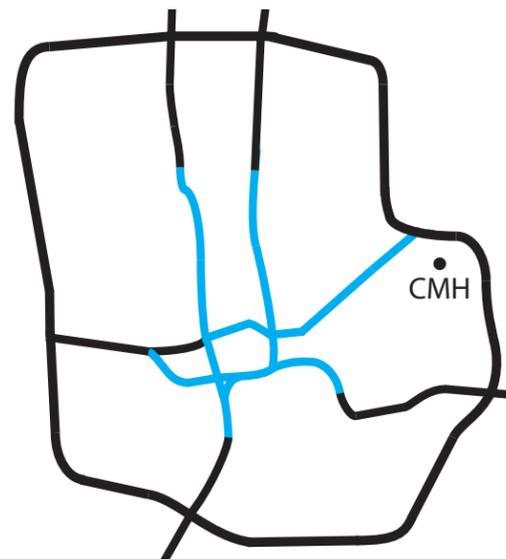
Image: Rosales + Partners

MASSACHUSETTS: NEW IDEAS FOR UNDERUTILIZED OVERPASSES AND ELEVATED ROADWAYS

MassDOT has sought ideas from the community on how to create inviting spaces in other underused spots underneath highway overpasses, elevated roads and bridges.¹³³ The most well-conceived ideas are those that increase connectivity among neighborhoods, promote the arts, support the environment, or establish a retail use.¹³⁴ Other cities have activated underutilized spaces in a similar manner. Those have taken the form of parks, basketball courts, volleyball courts, and auditoriums or theater spaces.¹³⁵

One unique idea could build on what already exists. Consider the creation of a network of striking cyan linear lights integrated into the underside of underpass bridges of selected highway segments. The clean, minimalist lighting creates an exciting gateway into the urban core of Columbus. It also gives new face to the understated architecture of highway overpasses. Port Columbus International Airport has the first piece of this system already in place. Shanghai (pictured above) has built a similar concept and can serve as further inspiration.

HIGHWAYS OF COLUMBUS



- highway segments with uniform blue lighting overpasses
- highway segments without uniform blue lighting overpasses

PORT COLUMBUS INTERNATIONAL AIRPORT HAS THE FIRST PIECE OF THIS SYSTEM IN PLACE.



Image: Wikipedia user George100

FINLAND: DATA-POWERED STREET FURNITURE

The Internet of things has allowed for the debut of data-powered street furniture. For example, Finland is making garbage collection a smarter process. The Finnish system records when collections are made to allow operators to predict when the bins will be full.¹³⁶ Now garbage management systems are making collections less frequently, which allows for cost-savings and a smaller carbon footprint.

The University of Washington has found an interesting way of making garbage bins more energy efficient with a high-tech solution.¹³⁷ The university introduced solar-powered garbage compactors and recycling bins to the street space. The bins are energy independent and off the power grid. It is designed to send out text alerts when the garbage bin needs to be emptied. This has led to a reduction in the number of collections by four or five per week, and decrease fuel costs. The City of Columbus has a similar pilot in progress for solar-powered garbage compactors and recycling bins. A widespread roll out of this pilot could lead to further cost-savings and carbon emission reduction.



Image: Ashley Bingham

VIENNA: THE SOLAR TREE FOR PLACEMAKING AND SOLAR-POWERED STREET LIGHTING

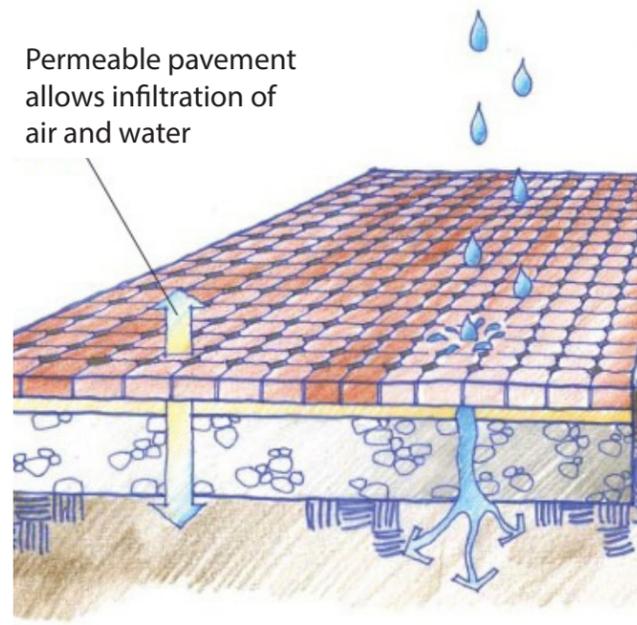
The Solar Tree is a creation by Welsh designer Ross Lovegrove. It serves as a public art installation, a tool for placemaking and as street lighting. The tree-inspired form comes equipped with several LEDs that light up automatically after dusk.¹³⁸ Although the Solar Tree can absorb enough power to glow for three days, it can also feed energy back once connected to the grid.¹³⁹

BY USING BUILT-IN SENSORS, TRASH AND RECYCLING BINS CAN DETECT HOW FULL THEY ARE AND CALL FOR COLLECTION ONLY WHEN IT IS NEEDED, SAVING ON GAS AND RESOURCES.



INCREASE SUPPORT FOR OPEN STREETS COLUMBUS

Open Streets Columbus is part of a growing movement that temporarily closes streets to motorists to allow people to use them for healthy and fun physical activities like walking, jogging, biking, and dancing. The initiative essentially returns streets to their historic origin as a place for people.



Permeable pavement allows infiltration of air and water

Image: SF Streets Blog

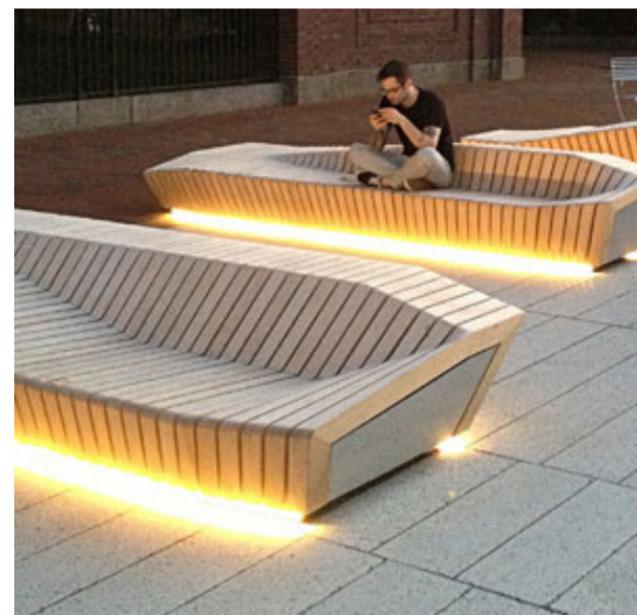


Image: Stoss Landscape Urbanism

BERKELEY, CA: PERMEABLE PAVEMENT FOR STORMWATER MANAGEMENT

The City of Berkeley has piloted a permeable pavement for roads to aide stormwater management.¹⁴⁰ Permeable pavement absorbs water and slows down the flow of water, which in return lessens the strain on the stormwater management system. Traditional asphalt sends all stormwater runoff to the nearest storm drain and only exacerbates the problem.

BOSTON: REDESIGNING THE FORM AND FUNCTION OF THE PUBLIC BENCH IN COLUMBUS

A more ergonomic redesign of the public bench could lead to healthier, more inclusive public spaces in Columbus.¹⁴¹

BUILD MORE PARKLETS IN COLUMBUS AND MAKE THEM PERMANENT PEOPLE SPACES

A parklet is a parking space that is converted into *people space*. It is a mini park where people can sit and enjoy this extension of the sidewalk. A parklet also helps people reimagine the potential of streets and parking spaces. San Francisco piloted the first parklet years ago and now the city now has over 40 parking spaces converted into permanent parklets. They've become public art destinations.

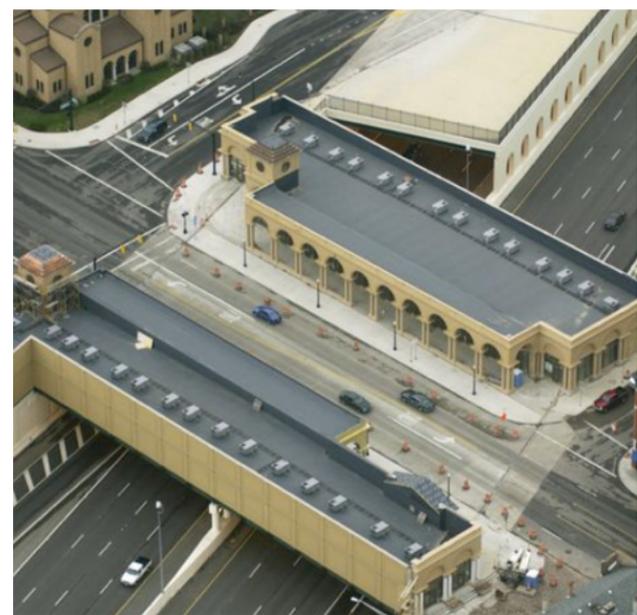


Image: Columbus Dispatch, Meleca Architecture



Image: Colorado Department of Transportation

COLUMBUS: PROMOTE HIGHWAY CAPS DOWNTOWN TO RESTITCH THE URBAN FABRIC

Highway building in the latter half of the 20th century cut off entire neighborhoods. Only now have we begun to undue the damage. One clever solution is the High Street highway cap over I-670. The street on the cap is flanked by retail, which restitches the urban fabric between the Short North and Downtown Columbus. More caps should be built over Downtown highways and populated with cafés, restaurants, and pubs.

DENVER: BURY ELEVATED HIGHWAYS AND COVER THEM WITH A PARK LID

The Colorado Department of Transportation (CDOT) has proposed a project that would sink two miles of I-70 up to 40 feet underground and put a four-acre lid on top of the highway where it passes by a local elementary school.¹⁴² The project calls to tear down an old elevated portion of I-70. Columbus and ODOT can look at this project for inspiration to put a park lid over a portion of the I-70/71 Downtown Split.

Let's rethink the street.

For too long we have designed and built streets for the ease of automobiles. The reality is streets can do more than serve the automobile. They can safely move people who walk, bicycle, and take transit. Most of this action takes place in a public right-of-way, which is land owned by the public. That means streets from the ground up are public spaces and ought to be treated as such. *Forge Ahead* is centered on the democratization of ideas, design, and urban space—people space. Let's rethink the street. Visit streetmix.net and start designing streets in Columbus that can serve people of all ages, abilities and backgrounds. Streets for the people, of the people and by the people.

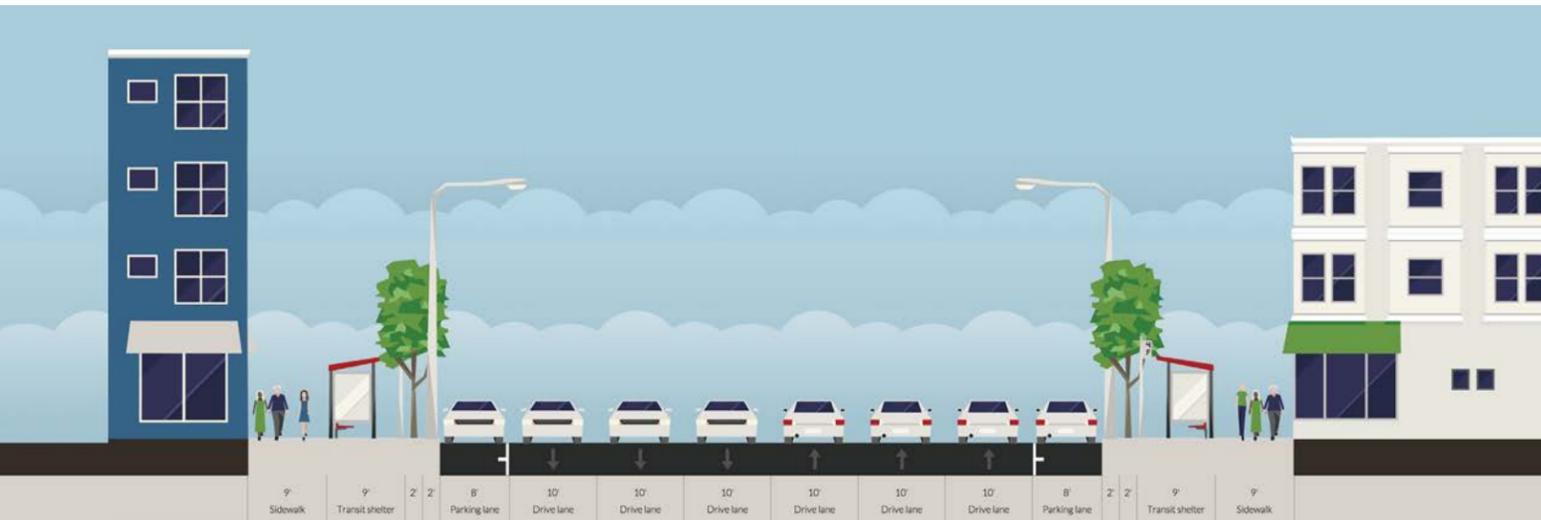
Image: Webner House



GAY STREET: TWO-WAY CONVERSION OF STREETS IMPROVES LIVABILITY OF A NEIGHBORHOOD

One-way streets create wide rivers of fast moving vehicles that making walking and bicycling uncomfortable. The city should convert Summit and Fourth street back into two way streets to help encourage walking and street life in Italian Village, Weinland Park, and the University District.

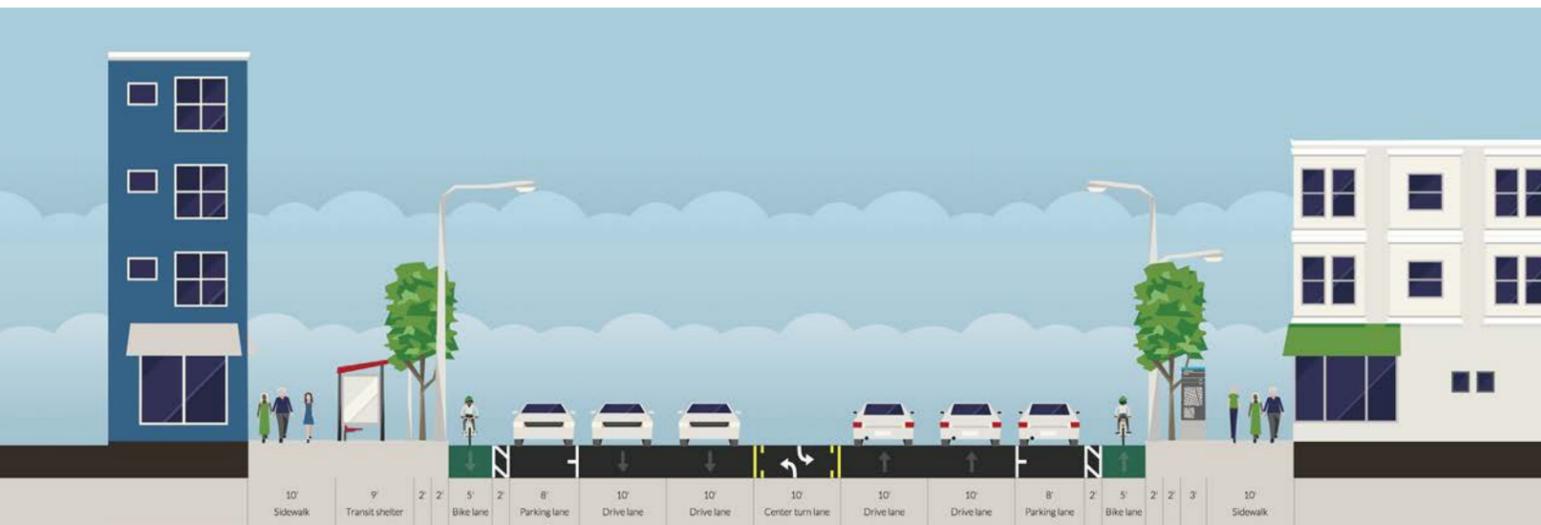
BROAD STREET EXISTING



BROAD STREET PROTECTED BIKE LANES + BUS LANES



BROAD STREET PROTECTED BIKE LANES



BROAD STREET PROTECTED BIKE LANES + LIGHT RAIL



Let's talk money.

Let's forge ahead.

| TRANSPORTATION MODE | INFRASTRUCTURE | TYPICAL LENGTH | CAPITAL COST PER MILE |
|---|--|----------------|-----------------------|
|  <p>Expanded Bus Service Fixed-route bus service is a rubber-tired transit service that operates in mixed traffic.</p> | Existing street right-of-way (ROW) | 8 - 20 miles | Less than \$50,000 |
|  <p>Bus Rapid Transit BRT carries a higher capacity of riders and operates in an exclusive bus lane, allowing faster travel times.</p> | Exclusive street ROW | 8 - 20 miles | \$7 - 20 million |
|  <p>Tram/Streetcar A tram/streetcar offers an urban rail service for shorter distances. They also spur economic development.</p> | Existing street ROW and/or Exclusive ROW | 2 - 5 miles | \$25 - 45 million |
|  <p>Light Rail Light rail provides an urban rail service that is designed to serve high volume corridors at moderate speeds.</p> | Existing street ROW and/or Exclusive ROW | 10 - 20 miles | \$40 - 80 million |
|  <p>Heavy Rail/Subway Heavy rail/subways are designed to serve dense urban areas at high speeds.</p> | Exclusive ROW | 10 - 15 miles | \$120 - 400 million |

Image: Gary S. Brown

| TRANSPORTATION MODE | INFRASTRUCTURE | TYPICAL LENGTH | CAPITAL COST PER MILE |
|---|--|----------------|--|
|  <p>Commuter Rail Commuter rail service operates along longer, high-volume corridors at high speeds.</p> | Exclusive ROW | 20 - 80 miles | \$10 - 30 million |
|  <p>Highway A controlled-access highway provides an unhindered flow of traffic, with no traffic signals, intersections or property access.</p> | Existing ROW | Varies | \$2 - 20 million per lane per mile |
|  <p>Protected Bike Lane Protected bike lanes are the next generation of bicycle infrastructure being built across the U.S. The number have quadrupled over the past five years.</p> | Existing street ROW and/or Exclusive ROW | 1 mile | \$200,000 |
|  <p>Sidewalk Sidewalks are the foundation of a good transportation system.</p> | Existing ROW | square foot | \$6 to \$10 per square foot* *Cost varies on scope and scale of project |

Image: Wikipedia user MBTafan2011

Sources: Nelson\Nygaard Consulting Associations, COTA

Sources: Nelson\Nygaard Consulting Associations, COTA



THE BIG PICTURE

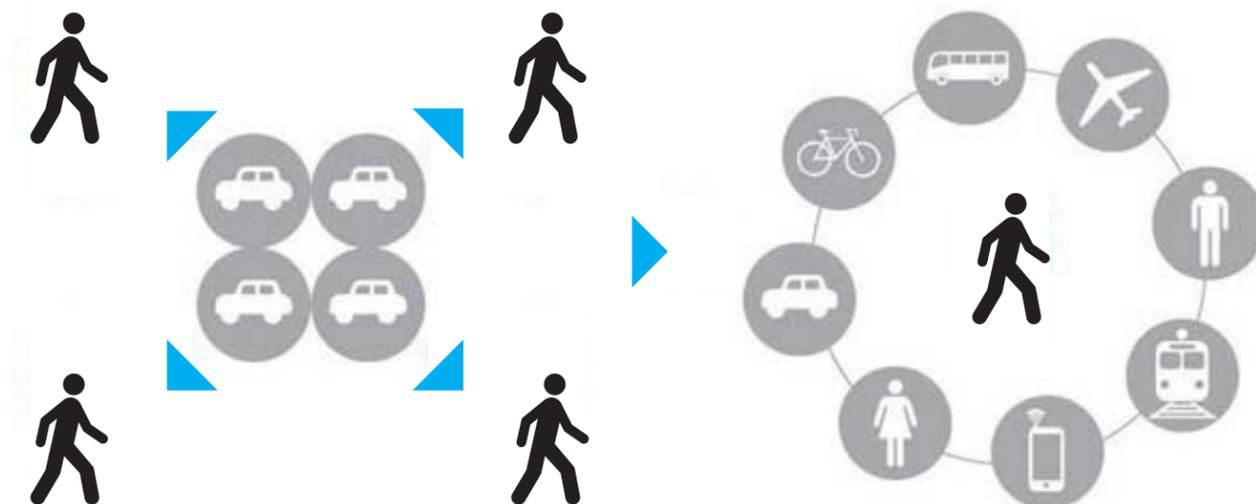
CONNECT COLUMBUS IS OUR PLAN FOR COMPLETE STREETS

The City of Columbus and its institutional partners are currently building a Complete Streets plan called Connect Columbus. This is a tremendous undertaking that needs citizen engagement and support. Make your voice heard. For inspiration, check out New York City's Department of Transportation 2013 Street Design Manual.¹⁴² You will not regret it.

A citywide design competition to develop applications and design solutions for improving life in Columbus' streets and public spaces. The top three entries can be put on display with cash prizes. Our city is fortunate to have several world-class urban design firms. Let's tap their expertise, resources and talented workforce.

FOUR DESIGN PRINCIPLES FROM NEW YORK CITY'S DEPARTMENT OF TRANSPORTATION

- Make the street easy to use by minimizing the complexity of driving, walking and bicycling, thus reducing serious injury and risk of collision.
- Create safety in numbers, which makes vulnerable street users such as people who walk and bicycle more visible.
- Make the invisible visible by putting users where they can see each other.
- Choose quality over quantity so that street design serves the first three design principles.



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