

WHAT IS BRT?

Bus Rapid Transit (BRT) is a rapid mode of transportation with the high quality of rail transit and the flexibility of the bus.



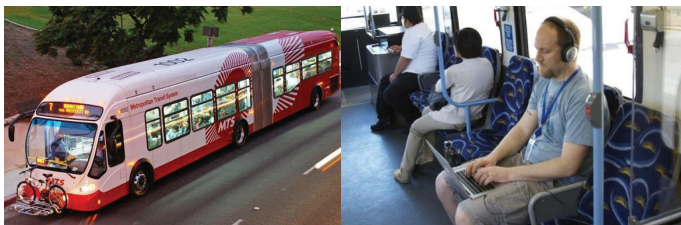
Frequent and Convenient

High frequency is the key to attracting riders. BRT systems typically operate every 10-15 minutes. Fares are paid in advance so there is no lining up at the front of the bus- passengers can exit and enter via any door. Real-time information displays show the actual time the next bus is scheduled to arrive.



Attractive and Permanent

BRT stations are designed to provide an attractive, clean, safe and comfortable place to wait for the next bus. They are designed to be highly visible and relate to their surroundings. Shelters, canopies, seating, information and even artwork contribute to their high quality look and feel. The permanence and quality of BRT infrastructure can provide an opportunity to encourage new development around stations.



Accessible

Accessibility for all is a key attribute of BRT. Buses and stations are designed to be fully accessible for persons with disabilities. The combination of low floor buses, "high platform" stations and precision docking allow all passengers to board and exit buses without the need for a lift, ramp or steps. Where high platforms are not possible, stations are designed so that buses can deploy ramps efficiently and safely. Many BRT buses have special areas for persons in wheelchairs that do not require tie-downs. BRT systems also accommodate bicycles, either inside buses or with a front bike rack.

Fast and Reliable

Because BRT stations are spaced about every 1/4 to 1/2 mile, buses can pick up speed between stops, shortening the time it takes to travel up and down a corridor. Many cities report that BRT speeds bus travel time by at least 25%.

Some BRT systems use special bus-only lanes to enable buses to move through traffic with minimal interference. But not every street and road can accommodate exclusive lanes. Instead, many systems use signal priority and queue jumps to help buses move more quickly through busy intersections, Business Access - Transit ("BAT") lanes along the curb enable cars to access homes, businesses, and other activities. By being able to stay on schedule, the result is greater reliability day in and day out.



Popular

Cities that have replaced slow local bus routes with new BRT service have experienced significant ridership increases. Cleveland, Ohio's Health Line, for example, doubled transit ridership along the Euclid Avenue corridor. In Eugene, Oregon, the first BRT line boosted ridership by 74%. Not every system has experienced such dramatic growth but all new systems in the U.S. have reported increased ridership. In addition, new BRT lines are being implemented every year, and cities such as Indianapolis and Kansas City, buoyed by the success of their initial lines, have embarked on expansions and new lines.



CLEVELAND, OHIO

THE HEALTH LINE

Opened in 2008, the Health Line is the result of nearly two decades of study, design and construction. The Health Line is located along Euclid Avenue, Cleveland's principal thoroughfare, linking downtown with the city's second largest employment and activity center, University Circle. The Cleveland Clinic, University Hospital, Case Western Reserve University and several other major civic and cultural institutions are located in University Circle since its opening ridership along the corridor has increased by 68%.



Bus-Only Lanes

For 4.5 miles, Health Line buses operate in median bus-only lanes. Two exclusive lanes are provided for buses (eastbound and westbound). One lane in each direction is maintained for general traffic. The right-of-way includes a bike lane as well.

The remaining 2.3 miles of the Health Line operate in bus-only or mixed traffic right side lanes in the downtown and University Circle areas.



Service

Length	6.8 miles
Number of Stations	39
Average distance between stations	0.2 miles
Service Frequency:	
Daytime/evening:	10 minutes
Late night:	25 minutes
Saturday/Sunday:	15 minutes

Travel Speed

Although the Health Line's stations are only spaced about 2/10 of a mile apart on average, it replaced a former local route with over 100 stops and an average speed of 10 mph. The Health Line has top travel speeds between 25 and 35 mph. End-to-end travel time was improved by 26%.

A signal priority system also helps buses cross busy streets and seamlessly switch from median to curbside operation at either end.

BRT Buses

A fleet of specially designed 60-foot articulated buses was purchased for the Health Line. Three doors are located on the right side of the bus; two doors are located



on the left side. The buses accommodate bicycles inside with a specially designed bike rack.

Stations

Most stations are located in the median of Euclid Avenue. They share a unified look. They are enclosed and heated. Stations also feature seating, real-time bus arrival information displays, ticket vending machines and blue light emergency call boxes.



Precision Docking

The combination of low bus floors and high station platforms enable "level boarding." This helps minimize time spent at stations and enables a faster and more reliable trip.



EUGENE, OREGON EMERALD EXPRESS

Eugene's transit agency, the Lane Transit District, opened its first BRT Line, called Emerald Express – or EmX for short, in 2007. The total cost was \$96 million. The Federal Transit Administration awarded Eugene a grant that covered nearly 80% of the capital cost. The EmX carries about 10,000 riders per day.



Exclusive Guideway

EmX operates in downtown streets and wider suburban roadways. Some of these have medians, which provide sufficient right-of-way to provide bus-only lanes in both directions. The medians are landscaped. Signals are used to help buses move quickly and safely through intersections.



Service

Length	9 miles
Number of Stations	26
Average distance between stations	0.3 miles
Service Frequency:	
Daytime/evening:	10 minutes
Late night:	30 minutes
Saturday/Sunday:	15-30 minutes

Reversible Lanes

Several miles of the EmX line operate in single reversible lanes. To maintain and control safe operations, a signal system is used along with passing lanes at stations. The use of single reversible lanes allows EmX to fit within the roadway's limited right-of-way.



Buses

Eugene partnered with Cleveland on the development and joint purchase of 60-foot, diesel-electric hybrid, articulated buses designed specifically for BRT operations.

Three doors are located on the right side and two are located on the left side to maximize flexibility of locating stations, either in the center of the roadway with center platform stations, or curbside.



Buses are fully accessible. Bridgeplates are deployed to allow persons with wheelchairs and other mobility devices to efficiently board and exit without the need for a wheelchair lift. Up to three bikes are accommodated inside buses.

EmX has an off-board, pre-paid "Proof of Payment" fare system that enables passengers to enter and exit the bus by any door, reducing the amount of time the bus needs to spend at a station and helping the line maintain its speed and reliability.

Stations

The number of stops along the previous local routes serving the corridor was reduced by 45%. Most EmX stations are located in the median with inbound and outbound bus lanes on either side. Raised platforms allow for level boarding, enabling full accessibility for everyone including persons with disabilities. Stations include large canopies, ticket vending machines, and real-time next bus arrival displays. Artwork is incorporated into various station components.



GRAND RAPIDS, MICHIGAN SILVER LINE

Development of the Silver Line began in 2005 by conducting an Alternatives Analysis, with the selection of a locally preferred alternative in 2007. The line is operated by Interurban Transit Partnership, the transit authority serving the Grand Rapids region that goes by the name "The Rapid."

The Silver Line replaced a local bus with 27 stops along Grand Rapids's north-south Division Avenue with BRT service with 17 stations. Average end-to-end travel time went from 53 minutes to 24 minutes. Total project cost was \$35 million. The Federal Transit Administration awarded Grand Rapids a \$28 million Small Starts grant; the State of Michigan paid for the remaining 20%.



Business Access-Transit (BAT) Lanes

The Silver Line does not operate exclusive bus lanes. Instead, right-side curb lanes are designated as BAT Lanes. Buses are allowed to use them as through lanes, but other traffic can use them to make right turns and to access driveways.



Service

Length	9.6 miles
Number of Stations	17
Average distance between stations	0.6 miles
Service Frequency:	
Daytime/evening:	10-30 minutes
Late night:	30 minutes
Saturday/Sunday:	30 minutes

Stations

Stations are large and prominent. Major factors in the design process included durability of materials and ease of maintenance. The stations feature glass-roofed canopies, seating, ticket vending machines, real-time bus arrival information displays, emergency call boxes, security cameras and lighting.

Raised platforms allow for level boarding, reducing the amount of times buses are stopped at stations. A plastic guide rail on the side of the platforms facilitates precision docking to minimize the gap between platform and bus.



Buses

The Silver Line fleet consists of specially-designed 40-foot buses that allow for fully accessible level boarding and exiting for all passengers. Buses are equipped with exterior bike racks. Pre-paid fares permit passengers to board the buses through both doors, minimizing the amount of time stopped at stations.



INDIANAPOLIS, INDIANA RED LINE



The north-south Red Line opened September 2019. The initial studies of the corridor began in 2012. It is operated by IndyGo, the regional transit agency. The project cost \$96.3 million with \$79 million obtained from the Federal Transit Administration and \$19 million from local sources.

The Red Line operates directly through downtown extending as far north as the Broad Ripple neighborhood, a major shopping, entertainment and residential district. Along the way it serves two colleges and the city's largest medical center. South of downtown, the line serves the resurgent Fountain Square neighborhood and the University of Indianapolis.

Battery Electric Buses

The Red Line is one of the nation's first all-electric BRT lines. Its fleet of 14 60-foot "articulated" buses are electric battery powered. They are charged at the bus garage overnight but some stations have special inductive wireless charging devices embedded in the pavement. IndyGo has had several problematic issues with its buses, which are manufactured in China and is suspending new orders for the time being. Lextran's battery electric buses are made by a different manufacturer and have not been subject to the problems in Indianapolis.



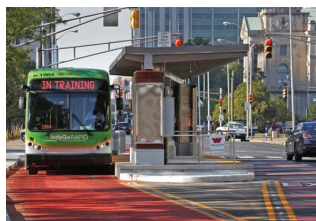
Service

Length	13.1 miles
Number of Stations	28
Average distance between stations	0.47 miles
Service Frequency:	
Daytime/evening:	10 minutes
Late night:	20 minutes
Saturday/Sunday:	15-20 minutes

Expansion

IndyGo is already embarking on expansion of its BRT network to include two additional lines:

- The east-west Blue Line, connecting neighborhoods to the east and west of downtown as well as Indianapolis International Airport.
- The east-west Purple Line, providing crosstown service on one of the city's busiest corridors, 38th Street.



Bus-Only Lanes

Red Line buses operate in their own exclusive lanes in two types:

- Bus only lanes, painted a solid red, general traffic is not allowed in them at any time.
- Combination lanes with red horizontal stripes where motorists can make left turns or U-turns at specific points.

The positioning of the bus only lanes varies by center of the street- using a single reversible lane or by curbside.



Stations

A station design competition resulted in a "kit of parts" using steel, glass and wood components. All stations provide "level boarding" for easy, no step or lift access for everyone, including persons with disabilities, persons with strollers and bicyclists. Bike racks are provided on-board buses. Ticket vending machines are located at each station. A "proof of payment" system enables passengers to enter and exit buses through any door, reducing the amount of time the buses are stopped at the station and providing a faster overall trip.



KANSAS CITY, MISSOURI MAX

Kansas City opened its first BRT line in 2005 along its most prominent corridor, Main Street, connecting downtown with some of the city's largest employment and activity centers, including the Union Station Science Center, the complex Crown Center (offices, hotel, and shopping mall), and Country Club Plaza, Kansas City's "second downtown." At the southern end of the north-south Main Street MAX Line is the University of Missouri-Kansas City. The Main Street Line carries 6,000 riders per day.

MAX is part of the RideKC system under the auspices of the Kansas City Area Transportation Authority. Planning for the MAX Main Line began in 2000, culminating in the award of a Federal Transit Administration Small Starts grant that covered 80% of its \$20.9 million capital cost.

Arterial BRT

MAX is an example of Arterial BRT, or "BRT Lite." It has many of the features of full-scale BRT, but the main difference is that buses do not operate in exclusive, bus-only lanes. Instead, they run in Business Access-Transit Lanes ("BAT Lanes") in the right-side lane. Cars and trucks can also use those lanes but are encouraged to use them only to make right turns onto other streets or access driveways to homes, businesses and other locations. The result of these treatments was a 20% improvement in travel time.

Signal priority is also used at 31 key intersections during peak traffic periods to help buses move quickly through and maintain their schedules.

Service

Length	6 miles
Number of Stations	28
Average distance between stations	0.3 miles
Service Frequency:	
Daytime/evening:	9-15 minutes
Late night:	30 minutes
Saturday/Sunday:	10-30 minutes

Stations

Stations are spaced every 1/4-1/2 mile. They feature an attractive, uniform design, with a spacious shelter that maximizes visibility from within and without, a tall pylon that clearly delineates each station and provides a unique identity for the line and a real-time bus arrival information display.



Buses

Kansas City chose standard, 40-foot buses for MAX. Buses are specially branded for exclusive use on MAX. Because stations are located on sidewalks and lack raised platforms, ramps are used to enable persons with disabilities to board and exit buses without the need for lifts.

Buses cannot accommodate bikes inside but are equipped with exterior bike racks. MAX does not currently use a pre-paid, "proof-of-payment" system. Riders enter via from the front door and deposit cash or swipe fare cards at the fare box.



Expansion

Kansas City's MAX system has expanded since the MAX Main Line opened in 2005. The MAX Troost Line, which serves the busy and transit-oriented Troost Avenue corridor, opened in 2011 and carries over 8,500 daily riders. In 2018, the MAX Prospect opened, serving 7,000 riders a day. The lessons learned from the MAX Main Line led to improvements in station design, the addition of solar lighting, hybrid-electric buses and the use of pervious concrete. Planning is currently underway for a fourth line that would provide east-west service.



LOUISVILLE, KENTUCKY

DIXIE HIGHWAY RAPID



The Rapid is part of the "The New Dixie Highway" project, a \$35 million total overhaul of Louisville's Dixie Highway corridor. Construction began in 2017 and is scheduled to be completed in 2020. The project features: Roadway design improvements, safety improvements, raised medians, new sidewalks and upgraded crosswalks, pullouts and upgraded shoulders for BRT.

Cost

The cost of the BRT portion of The New Dixie Highway project, called Rapid, was \$11.5 million. Operated by the Transit Authority of River City (TARC), Rapid provides BRT service between downtown and the Gene Snyder Freeway. Buses do not have their own lanes and operate in mixed traffic. The line includes:

- Queue jump lanes to help buses move faster through busier intersections and stay on schedule.
- Pullout lanes at stations to avoid interference with traffic.



Service

The Rapid opened in January 2020. The Dixie Highway corridor currently carries about 4,000 transit riders a day. Rapid stations, which are still under construction, are located about ½ mile apart. Each will consist of an attractive shelter designed to provide protection from the elements while maintaining visibility.

Length	14.1 miles
Number of Stations	20
Average distance between stations	0.7 miles
Service Frequency:	
Daytime/evening:	15 minutes
Late night:	30 minutes
Saturday/Sunday:	20-30 minutes

Shoulders, Pullouts and Pedestrian Connections

The New Dixie Highway project includes a series of shoulders and pullouts that allows Rapid buses to stop safely outside the general traffic lanes in this busy corridor. Concrete bus pads have also been added at several station stops.

The project also includes new pedestrian connections between stations and nearby locations such as shopping centers, employment sites, apartment complexes, and schools.

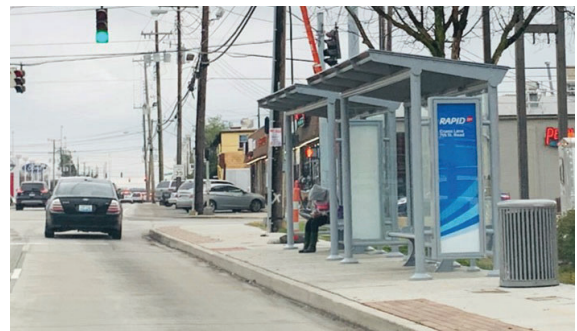
Buses

A new fleet of 40-foot buses was designed for Rapid service. Buses are low floor and equipped with exterior bike racks. Because Rapid stations are widely spaced to allow for faster running times, it is continuing to operate its local Route 18 which is slower than the Rapid but serves all 78 existing stops every 30 minutes.



Stations

Stations are fully accessible for persons with disabilities. The Rapid does not employ level boarding. Stations are designed to allow buses to deploy ramps.



Side panels will provide nighttime lighting. Each station will have a prominent marker equipped with display panels that will convey real time bus arrival information. Stations and buses have been specially branded so that the new type of service offered by TARC stands out from the rest of the system.



MINNEAPOLIS, MINNESOTA

RED LINE

The Red Line is a collaborative effort among several regional entities including the regional planning agency and suburban transit systems. It operates along north-south Cedar Avenue, a heavily traveled residential and commercial thoroughfare between the Mall of America in Minneapolis and downtown Apple Valley in Dakota County. The first stage of the Red Line, which opened in 2013, cost \$112 million. Federal funding comprised 40% of the total cost while state funding covered 23%. The rest was funded locally.



Buses

The Red Line, operated by the Minnesota Valley Transit Authority under contract with the Metropolitan Council, uses a fleet of specially designed and branded 40-foot buses. An extra-wide rear door facilitates boarding and exiting for all riders, including those with disabilities.



Service

Length	11 miles
Number of Stations	20
Average distance between stations	2.2 miles
Service Frequency:	
Daytime/evening:	15 minutes
Late night:	30 minutes
Saturday/Sunday:	30 minutes



Cedar Avenue

The Red Line was developed to improve travel along congested Cedar Avenue, which is traveled by 70,000 vehicles a day, by providing an attractive alternative for commuters and others currently driving up and down the road. The Red Line is an example of "BRT Lite," which includes many of the features associated with Bus Rapid Transit but without exclusive lanes for buses.

Instead, the shoulders of Cedar Avenue were widened to accommodate buses, which are also used by general traffic for right turns and access to businesses and homes. Signal priority is also used to help buses quickly move through busy intersections and maintain on-time service.

Stations

The station design was developed in consultation with adjacent neighborhoods, resulting in a curved-roof structure and use of stone, steel and glass. Given Minnesota's climate, the stations are enclosed and heated. Large expanses of glass maintain visibility within and throughout. Platforms are raised to facilitate level boarding and exiting. A plastic guide rail on the side of the platform is used by drivers for precision docking at stations, minimizing the gaps between buses and platforms.



WHAT IS TOD?

Transit Oriented Development (TOD) is a set of transportation and land use principles in which higher density, mixed use development is focused around a transit stop in a high frequency transit corridor.



- **Orients** mixed use developments and highest densities around a transit corridor.
- **Promotes** public plazas, shopping, and dining along pedestrian connections.
- **Creates** a dense network of pedestrian and bicycle friendly travel corridors.
- **Promotes** walkable types of development based on proximity to transit access.

How does TOD Work?

EXISTING: Multiple bus stops on a congested corridor



SHORT/MEDIUM TERM: Consolidate bus stops, increase transit frequency



LONG TERM: Area around transit stations develop as Live + Work + Entertainment hubs



CLEVELAND, OHIO

Opened in 2008, the Health Line serves Euclid Avenue, Cleveland's principal thoroughfare. It links downtown with the city's second largest activity center, University Circle, home of the Cleveland Clinic, University Hospital, Case Western Reserve University and several other major civic and cultural institutions. Cleveland State University is also located on Euclid Avenue.

Operated by the Greater Cleveland Regional Transit Authority (RTA), the Health Line was the first BRT system in the U.S. funded under the Federal Transit Administration's New Starts program.

The total project cost was \$197 million.

The Health Line and the redesign and reconstruction of Euclid Avenue is considered a success in terms of stimulating economic development and the rebirth of the corridor. RTA estimates that it will have generated



\$5.5 billion in new investment since its opening, including:

- 7.9 million sq. ft. of commercial development
- 5400+ new or renovated residential units
- \$41.3 billion in capital improvements
- \$62 million in annual local tax revenue
- \$1.98 million in annual sales tax revenue for RTA
- 13,000 new jobs

In 2007, the City of Cleveland developed a citywide comprehensive plan, Connecting Cleveland 2020. The plan emphasized development along Euclid Avenue. A portion of the Euclid Avenue Health Line corridor was proposed as a "Health-Tech Corridor" due to the presence of two major medical facilities: Cleveland Clinic and University Hospital. These uses were envisioned to attract additional health-related development.



One of the direct results of the plan was a new zoning overlay to encourage TOD. The overlay requires that projects must be multi-story, front directly on Euclid Avenue, place parking in the rear of the building, and have at least 60% commercial or retail use on the ground floor.



The \$200 million, mixed use Uptown District, in the University Circle segment of the Health Line corridor, occupies 8.2 acres of formerly vacant land. It was conceived by the Cleveland Foundation's Greater University Circle Initiative, a public-private partnership between University Circle's major medical centers, Case Western Reserve University, community groups and the City of Cleveland. The Health Line connects the Uptown District to the major medical and educational institutions in University Circle as well as downtown.



The Midtown area, Euclid Avenue's most economically stressed segment, now experienced significant new investment near Health Line stations, including renovation of existing industrial and commercial buildings into new uses, and new construction focusing on housing and ground floor retail.

The firm BD Euclid Ave LLC developed its One Midtown townhouse project purposely near a Health Line station, and markets its units with its access to the Health Line and the many employment centers and attractions it serves.

The campus of Cleveland State University (CSU) is located on Euclid Avenue just east of downtown. Its 1966 master plan created an inward-facing campus with little connection to Euclid Avenue. With the City of Cleveland's new focus on Euclid Avenue, including a total re-landscaping and development of the Health Line, CSU conducted a Master Plan Update in 2010 that re-oriented the campus outward, re-engaging with the city, and taking advantage of adjacent Health Line stations. To date, CSU has invested over \$300 million on new development facing Euclid Avenue, including new campus housing and ground-floor retail.



LEXINGTON



EUGENE, OREGON

Eugene's transit agency, the Lane Transit District, opened its first BRT line, called Emerald Express – or EmX for short – in 2007. The EmX Franklin Line runs between downtown Eugene and downtown Springfield. The Gateway extension, serving areas north of downtown Springfield, opened in 2011.

The City of Eugene is supporting TOD by establishing a vision in its comprehensive plan, implementing a TOD overlay zone, and designating downtown as an urban renewal district.



The City also established a Vertical Housing Development Zone. It provides a 10-year property tax abatement for new construction that includes ground floor retail with residential above.

To date, most TOD in Eugene has been largely concentrated along the segment near the University of Oregon campus. It includes hotels, housing and retail that caters primarily to the university community. A new medical facility is currently being constructed next to an EmX station.



The University's Matthew Knight Arena (aka the Duck Pond) was also built directly across from an EmX station. The BRT line is heavily used during events at this facility.



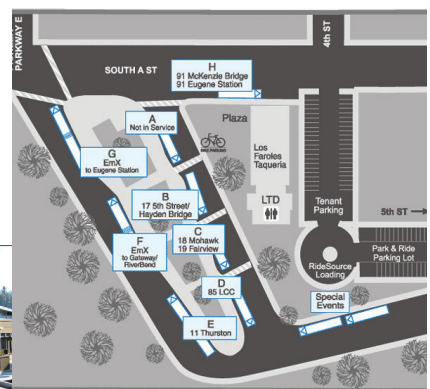
The City of Eugene, working with local community groups, developed a "Specific Area Plan" for the area that surrounds the EmX Walnut Station. The plan calls for a focus on transit, pedestrian and bicycle connections throughout the neighborhood, and identifies the tools needed to create a more walkable, mixed use community.



The Walnut Station Specific Area Plan includes visualizations that show how the Franklin corridor/EmX line can evolve to enhance the streetscape, provide multimodal options and add more density within context of neighborhood preferences.



The Lane Transit District has also engaged in its own TOD initiatives, including adding retail space at its downtown Springfield Transit Center.



HARTFORD, CONNECTICUT

CTFastrak is the name of a 9.4-mile BRT line connecting the cities of Hartford and New Britain. The line opened in 2015.

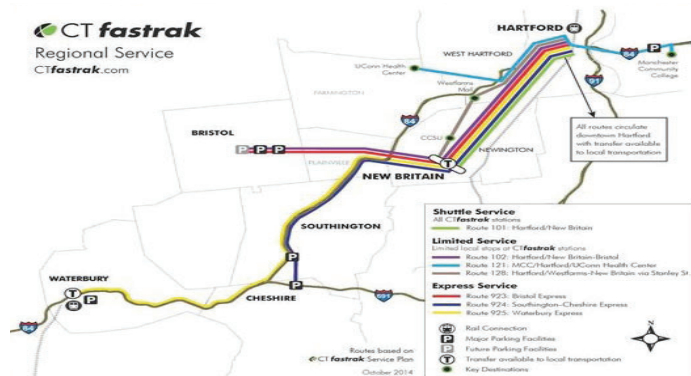
Ten stations serve the two downtowns and various neighborhoods in between. Ridership is about 10,000 on weekdays. Buses run every seven minutes during rush hour. End-to-end travel time is under 30 minutes.



The state Department of Transportation conducted a study of the potential for TOD at each of the stations along the CTfastrak BRT line.



A market analysis was prepared that identifies the type and extent of TOD for each station location.



Recommendations varied from station to station but most include mixed use development including residential.



One of the first station areas subject to more intensive TOD analysis is Parkville, located 1.5 miles from downtown Hartford.

Parkville is the site of former factory buildings that have sat empty for several years. TOD opportunities have focused on adaptive reuse of some of the old industrial buildings into mixed use developments, including housing. Conversion is also currently underway of a former industrial building into a food hall.



Downtown New Britain is another TOD focal point. New Britain is an old industrial city that has lost much of its manufacturing but retains several factory sites available for redevelopment. Columbus Commons, currently under construction, is New Britain's first TOD. Two six-story buildings will contain 160 residential mixed-income units and 20,000 square feet of retail space. It is within walking distance of the BRT line.



LEXINGTON

imagine
NICHOLASVILLE ROAD

INDIANAPOLIS, INDIANA

The north-south Red Line opened September 2019. The initial studies of the corridor began in 2012. It is operated by IndyGo, the regional transit agency.

The Red Line operates directly through downtown. To the north, it extends as far as the Broad Ripple neighborhood, a major shopping, entertainment and residential district. Along the way it serves two colleges and the city's largest medical center. South of downtown, the line serves the resurgent Fountain Square neighborhood and the University of Indianapolis.

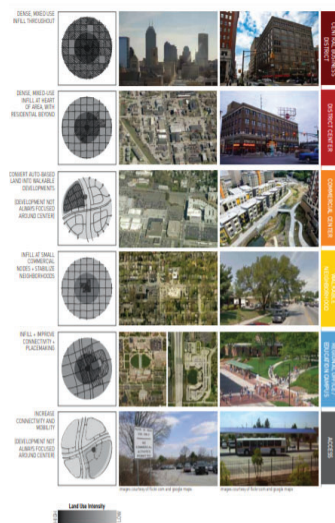
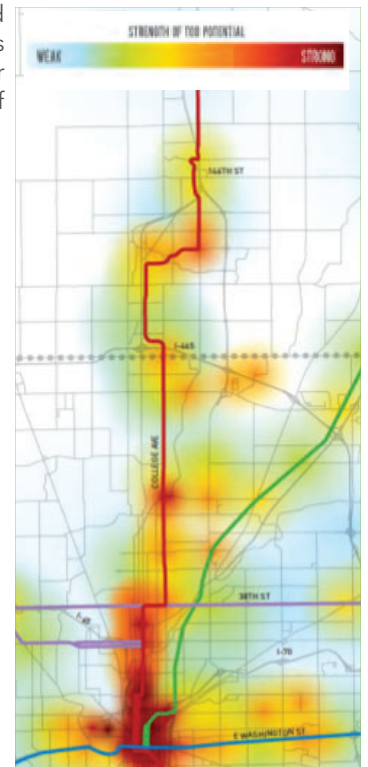
In established neighborhoods served by the Red Line, TOD opportunities are limited. Closer to downtown, however, the City of Indianapolis has been encouraging development of affordable housing near key stations where land is available within a half-mile walking distance of stations. The Indianapolis Neighborhood Housing Partnership and a local lending corporation have established a \$15 million ETOD (Equitable Transit Oriented Development) revolving fund to purchase two parcels in South Indianapolis to develop affordable housing near the Red Line.

The Indianapolis Metropolitan Planning Organization, the region's planning agency, developed a Strategic Plan to identify TOD opportunities and the tools and actions needed to implement plans and projects along the Red Line, as well as the Blue and Purple BRT lines currently in development, working with local neighborhoods and stakeholders.



The Strategic Plan included "heat maps" showing areas with the greatest potential for TOD based on a composite of several factors including:

- Employment density
- Employment density with transit preference
- Population per square mile
- Gross residential density
- Residential vacancy rate
- Sidewalk to street ratio
- Intersections per square mile
- Average block length
- Physical barriers
- Walk score (walkability)
- Retail sales
- Percentage of Baby Boomers and Millennials
- Median household income
- Average rent
- Median home value
- Distance to downtown
- Housing and transportation affordability
- Land assembly
- Major trip generators



A series of different TOD "typologies" was devised based on the existing character of each station area. Each station was then subject to a detailed analysis that identified existing conditions, TOD potential and potential development approaches.



KANSAS CITY, MISSOURI

Kansas City opened its first BRT line, called MAX, in 2005 along its most prominent corridor, Main Street, connecting downtown with some of the city's largest employment and activity centers, including the Union Station Science Center, Crown Center (offices, hotel and shopping mall) and Country Club Plaza, Kansas City's "second downtown." The southern end of the north-south Main Street MAX Line is the University of Missouri-Kansas City (UMKC).

Since the opening of the first BRT line (Main Street), Kansas City has seen some success in leveraging its MAX lines to attract transit oriented development at some of its stations, especially along the MAX Troost line. While some commercial development has resulted, most has involved institutions and community facilities,

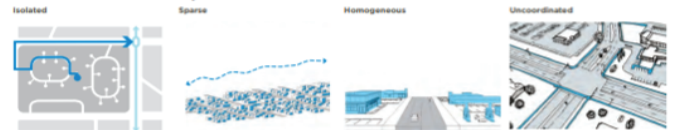


Kansas City's TOD Policy is detailed and comprehensive. It tackles several sensitive issues such as boundaries and transition between higher density TOD stations and lower density, established neighborhoods.

Transit-Oriented Development Is:



Transit-Oriented Development Is Not:



The plan recognizes that transit alone will not generate TOD, and that development policies and land use near station stops is as important as the transit itself. It also determined that current market conditions do not fully support TOD. As a result, the plan's recommendations include:

- Use public funds to catalyze early investments.
- Make 2-3 station areas the priority for development.
- Concentrate commercial development and zoning.
- Move forward on TOD zoning.
- Make sure infrastructure supports TOD.



As its BRT system has grown, the City of Kansas City has embarked on a more comprehensive plan to generate TOD along the MAX lines. To that end, it identified a series of goals that "provide a touchstone that grounds and guides this policy's diverse recommendations, in the context of Kansas City's long term sustainability."

Social & Cultural:

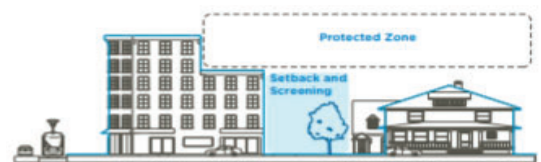
- Accessibility & mobility
- Diversity & integration
- Neighborhood identity
- Affordable housing
- Safety and security
- Public Health

Economic:

- Local prosperity
- Creativity & innovation
- Commercial clustering/business niches
- Productivity
- Housing diversity
- Fiscal sustainability

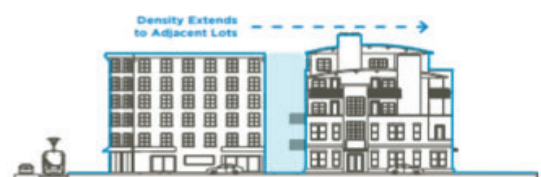
Environmental:

- Resource conservation
- Open space preservation
- Mitigate climate change
- Improve air quality
- Improve water quality
- Biodiversity



Transition from Node to Neighborhood

The portion of a development site in a node near a neighborhood should be set back from the neighborhood and match the heights of existing buildings in the neighborhood in order to preserve neighborhood character.



LEXINGTON

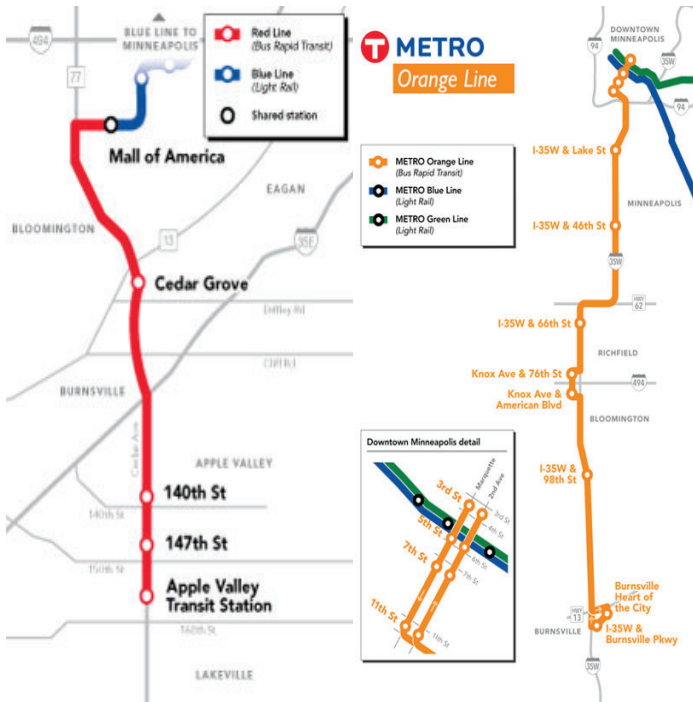
imagine
NICHOLASVILLE ROAD

MINNEAPOLIS, MINNESOTA

Minneapolis's BRT system is relatively new. Its first line, the Red Line, connects the Mall of America with the suburban community of Apple Valley. Its second line, the Orange Line, is currently under construction. TOD has not yet occurred along either line, but steps are being taken to encourage new development at stations.



To prepare for the development of its BRT network, the Metropolitan Council – which oversees transportation planning and funding for the Minneapolis-St. Paul metropolitan area – initiated as TOD Strategic Action Plan. It is designed to create a robust TOD program.



The Metropolitan Council developed a working definition of TOD:

A moderate to higher density district/corridor located within easy walking distance of a major transit stop that typically contains a mix of uses such as housing, jobs, restaurants, shops, services and entertainment. These districts/corridors enable people of all ages, backgrounds and incomes abundant transportation choices and the opportunity to live convenient, affordable and active lives.

To that end, the Council identified four TOD goals.



WHAT ARE COMPLETE STREETS?

COMPLETE STREETS...

enable safe, convenient, comfortable and accessible travel for *all* users of *all* ages and abilities. Complete streets are planned, designed and operated to provide safety for everyone regardless of mode of travel including pedestrians, bicyclists, transit riders and drivers.

WHY COMPLETE STREETS?

- **Create** a vision
- **Balance** all needs
- **Connect** places with efficient transportation
- **Enhance** quality of life
- **Trigger** economic and social benefits
- **Encourage** comprehensive decision making
- **Improve** the aesthetics of the street
- **Integrate** technology



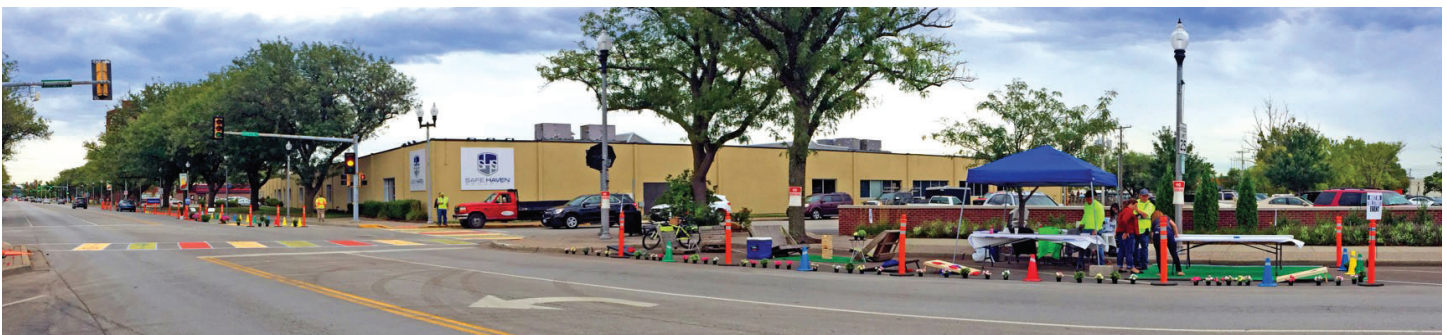
ARMOUR ROAD NORTH KANSAS CITY, MISSOURI



Complete Streets Elements

- Road diet
- Bike lanes
- Narrow lanes
- Sidewalks
- On-street parking
- Raised medians
- Curb extensions
- Access control
- Landscaping
- ITS/Smart technologies
- Freight routes
- Wayfinding
- Placemaking

BEFORE → **AFTER**



ROUTE 115 NORMANDY, MISSOURI



Complete Streets Elements

- Road diet
- Bike lanes
- Narrow lanes
- ITS/Smart technologies
- Pedestrian scale lighting
- Reduced speed limit
- On-street parking
- Raised medians
- Curb extensions
- Access control
- Landscaping
- Sidewalks

BEFORE



AFTER



AFTER



LEXINGTON

NW NAITO PARKWAY PORTLAND, OREGON



Complete Streets Elements

- Road diet
- Bike lanes
- Green paint
- Narrow lanes
- Sidewalks
- On-street parking
- Raised medians
- Curb extensions
- Access control

BEFORE



AFTER



BROADWAY TEMPE, ARIZONA



Complete Streets Elements

- Bike lanes
- Narrow lanes
- Sidewalks
- Raised medians
- Intersection treatments
- Access control
- Landscaping
- ITS/Smart technologies
- Wayfinding
- Placemaking

BEFORE



AFTER



LEXINGTON

imagine
NICHOLASVILLE ROAD

COMPLETE STREETS (CS): TOOLS & ELEMENTS RELEVANT FOR NICHOLASVILLE ROAD

A variety of tools and elements were employed in the complete streets projects that have been showcased. The following treatments may be applicable to the Nicholasville Road corridor. The benefits of each, along with some lessons learned (LL) are highlighted.

Floating Transit Island



Floating transit islands allow for bus stop bump-outs without a costly reconstruction of utilities, facilitating easy bus boarding and alighting to minimize traffic impacts and maximize bus operating speed.

Intersection Treatments & Curb Extensions



Intersection treatments and curb extensions increase visibility of vulnerable road users while also slowing traffic down, providing and creating a safer environment for all users.

Landscaping



Rain gardens and native landscaping add aesthetics to roads and reduce heat island effects, minimize upkeep and also helping provide a buffer between vehicular traffic and pedestrians.

Pedestrian Scale Lighting



Pedestrian scale lighting increases visibility of pedestrians, while reducing collisions with vehicles and enhancing safety. LL: Ensure pedestrian lighting is incorporated at conflict points between cars and walkers. Consider

CPTED (Crime Prevention Through Environmental Design) principals with lighting.

Raised Medians



Raised medians help to prevent vehicles from entering oncoming traffic. This can prevent serious crashes and also keep traffic moving. Raised medians also act as a safe refuge for pedestrians crossing busy streets.

Roadway Improvement

Narrow lanes, reduce speed limits, synchronized signals and access control are among the modifications to the roadway. These modifications can help slow cars by reducing speed limits, improve efficiency of travel with synchronized signals, and enhance safety by controlling access. LL: these elements should be coordinated with emergency services, planning and zoning and the public.

Separated Bike Paths



Separated bicycle paths create a less stressful area for cyclists with a higher level of safety. Green paint and high visibility paint should be used at conflict areas for safety. LL: Ensure that the maintenance entity has vehicles that can access the bike paths for sweeping and other operational maintenance needs.

Sidewalks & Crosswalks

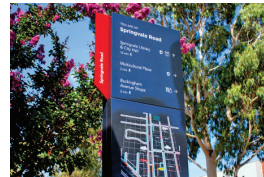


Sidewalks throughout the corridor give the option for users to safely walk instead of driving. Using sidewalks can help increase health and decrease congestion. Looking for gaps in the network and connectivity opportunities to transit and development is key for walkability.

Smart Technology

Technology advances everyday and helps to provide smoother commutes and safer facilities with enhanced lighting and traffic signal synchronization. LL: Look for partnerships with start up companies or business agencies to create /develop apps using city real time data.

Wayfinding & Placemaking



Wayfinding and placemaking help people navigate the public realm and transit systems. Signage helps residents and tourists orient themselves and find destinations. Placemaking enhances the experience of travel through different elements worked into design or programming. LL: Think about wayfinding and placemaking for different user modes. Biking signage and wayfinding should be placed at different intervals and experiences than for cars or pedestrians.