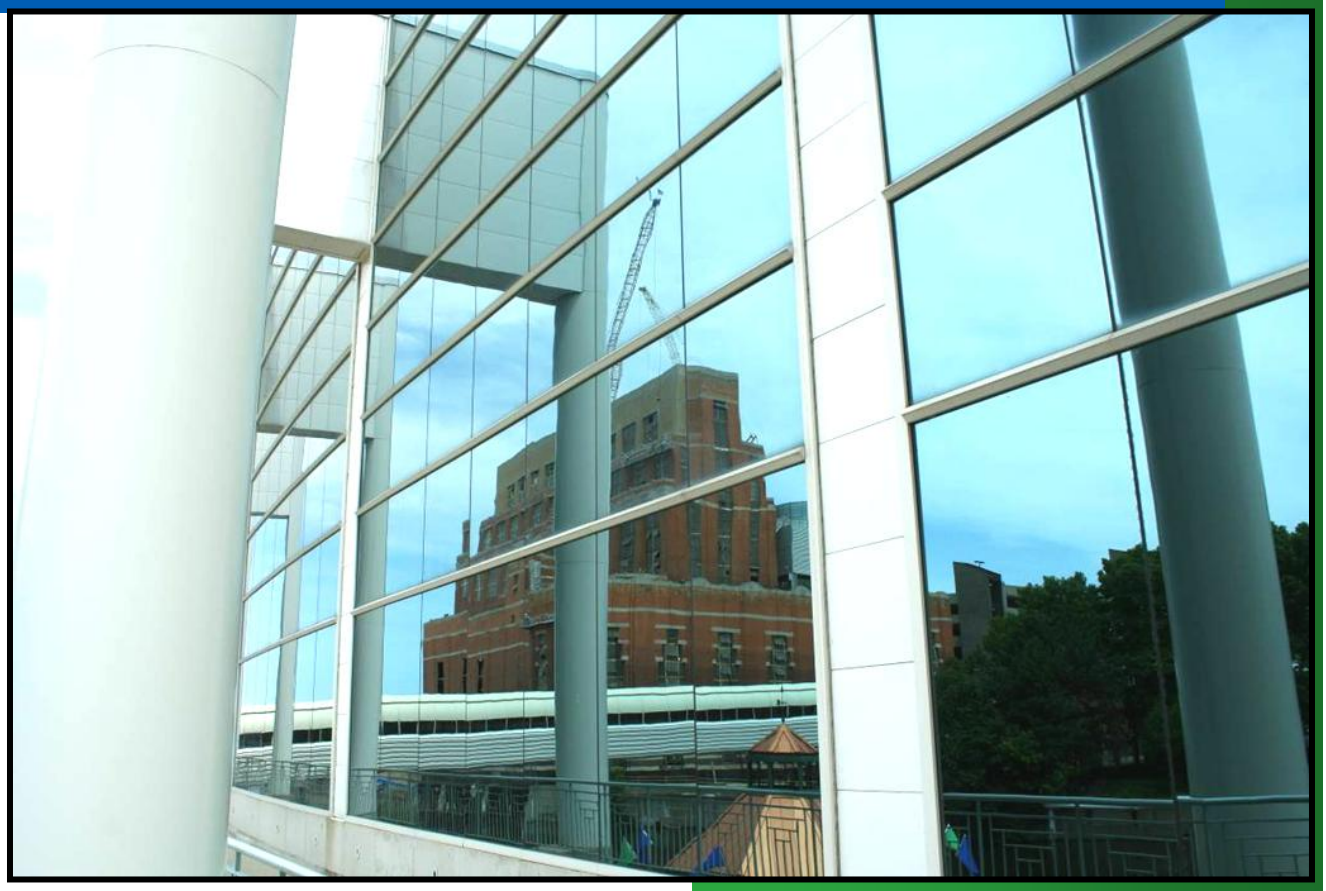
Designing for Transit-Oriented Development in Greater Lansing

2nd Edition



A Handbook for Developers, Policymakers, and Planners in the Tri-County Region

System Planning
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WHY IS CATA TALKING ABOUT DEVELOPMENT?

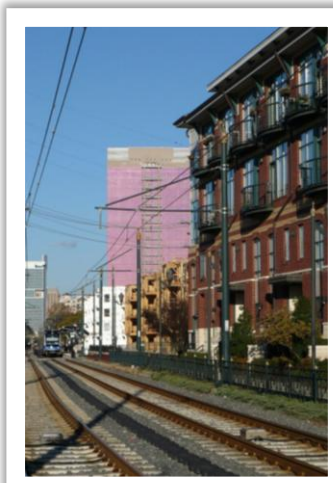
There is an important link between transportation and land use. Transportation infrastructure shapes the form of land use, while land use changes drive the need for transportation infrastructure. This document is intended to further our region's discussion about the link between future development and public transportation, and how that link can be used to improve the quality of life for residents of the Greater Lansing region.

Contained within this document is information about types of land uses, development patterns, and design features that support Transit-Oriented Development. From a municipal planning perspective, this document presents opportunities for revising zoning ordinances and local plans to effectively leverage the existing public transportation system to create better communities. For developers, this document will show your design team how to take advantage of the local transportation system to maximize use of land and encourage density. For state policymakers, this document describes a type of development that can help Michigan move toward retooling its cities for the 21st century and provides a local perspective on implementation.

WHAT IS TRANSIT-ORIENTED DEVELOPMENT?

Transit Oriented Development (TOD) is exactly as its name implies - development centered around and coordinated with public transportation service. The intent of TOD is to establish land uses and structures designed to:

- Increase use of transit;
- Decrease adverse effects of automobile use;
- Strengthen economic development opportunities;
- Create incentives for urban living; and
- Provide attractive alternatives to Single-Occupant Vehicle (SOV) use.



Transit-Oriented Development in Charlotte, North Carolina

TOD varies in scale and can include all types of development, from single infill developments to station-area public-private partnerships encompassing thousands of square feet of retail, office, high-tech industrial and residential uses. Successful TOD implementation will not decrease a person's need for daily trips, but it will expand the mode choices available to him or her. Effective TOD creates an efficient mix of pedestrian, transit, and single-occupant vehicle transportation options.

TOD projects of all scales have been successful throughout the United States. While Boston, MA; Portland, OR; San Francisco, CA; Phoenix, AZ and Washington, DC have flagship projects, a city does not have to be a bustling metropolis to reap the benefits of TOD. Addison, TX; Norfolk, VA; Charlotte, NC and other budding projects including the "Health Line" in Cleveland, OH, show that TOD principles can be applied to many situations with great success.

TOD DEFINITION FROM RECONNECTING AMERICA

"*Transit-oriented development is often defined as higher-density mixed-use development within walking distance – or a half mile – of transit stations. We use a performance-based definition, and believe that projects should also:*

- *Increase 'location efficiency' so people can walk and bike and take transit*
- *Boost transit ridership and minimize traffic*
- *Provide a rich mix of housing, shopping and transportation choices*
- *Generate revenue for the public and private sectors and provide value for both new and existing residents*
- *Create a sense of place*

We believe that TOD is really about creating attractive, walkable, sustainable communities that allow residents to have housing and transportation choices and to live convenient, affordable, pleasant lives -- with places for our kids to play and for our parents to grow old comfortably." (www.reconnectingamerica.org/public/tod)

BENEFITS OF TRANSIT-ORIENTED DEVELOPMENT

TOD projects have direct social, environmental, and financial benefits. In sum, well-executed TOD projects create lasting places that benefit developers and local governments financially while creating interesting and sustainable places with a long lifecycle. A few of these benefits are outlined below.

INCREASED PRIVATE INVESTMENT

In addition to the initial economic impact of constructing advanced public transportation options such as Bus-Rapid Transit (BRT), Modern Streetcar, and Light-Rail Transit (LRT), advanced transit service leads to significant private investment. TOD projects throughout the nation have been successfully utilized as tools for economic development.

Investment associated with BRT system implementation:

- *Cleveland: $3.1 Billion*
- *Boston: $1.25 Billion*
- *Ottawa: $675 Million*
- *Pittsburgh: $302 Million*

EASED PARKING NEEDS

TOD requires less parking for residents, as many choose to not own a car. Parking ratios are cut by as much as 25% in some cities, allowing that space to be used for additional retail, residential, or green space. Developers benefit because they do not need to overbuild parking structures or lots, while municipalities benefit from increased property values and decreased infrastructure expenses. Michigan cities such as Grand Rapids have implemented parking *maximums* to discourage new construction of large-lot developments.

DECREASED TRAFFIC CONGESTION

Studies show that TOD results in a reduction of vehicle miles traveled (VMTs). This leads to less congestion, improved air quality, decreased use of imported fossil fuel, and other benefits associated with driving less. Two studies by consultants at ICF International showed that public transportation eliminated the need for 102.2 billion VMTs and 5.2 billion gallons of fuel in the US in 2007[1]. Development that increases public transportation use will further increase this effect.

IMPROVED SENSE OF COMMUNITY

Sense of community describes the intangible sense of belonging or commitment to a place that is felt by members of a particular community. Two well-known social scientists, Robert Putnam and David Halpern, assert that development patterns and design standards of urban sprawl have led to a decrease in social capital as evidenced by decreased levels of civic engagement and other measures. Additionally, a recent comprehensive study has found that three things have the greatest impact on people's "attachment" to their community: Social offerings, openness and aesthetics.[2] TOD concepts directly impact two of these three areas by providing places that are built for social interaction.

Increased Safety

Transit-oriented development principles, increased transit utilization, and successful local design considerations are part of a holistic approach to transportation safety. Michigan State University utilized transit, traffic calming, and other techniques to decrease auto-related injuries by over 95% between 1997 and 2007.

Increased System Efficiency

As the graphic below demonstrates, public transportation provides an efficient alternative to private automobile usage that can substantially decrease congestion and improve the function of existing transportation infrastructure. The Greater Lansing Region already enjoys improved system efficiency through the use of transit. In 2009, CATA buses carried more than 10% of the daily trips through the Grand River Avenue corridor in East Lansing, while comprising less than 1% of the vehicles. 40-foot buses carry up to 80 passengers, and 60-foot buses can carry up to 115, replacing a significant number of automobiles on the road with a vehicle that takes up less space than four SUVs lined end-to-end. Options such as Bus Rapid Transit, Modern Streetcar, and Light Rail Transit have the potential to carry hundreds of passengers per vehicle at even higher speeds. As these options are explored, the region stands to improve system efficiency.

Single-occupant vehicles are an inefficient use of transportation infrastructure

TOD and Economic Development

In the past, development largely occurred in response to population growth. New people required new housing, new shopping and new jobs. In today's global economy, talented people drive growth and economic prosperity, and these talented people are extremely mobile. They can live wherever they want to and tend to seek cities with a unique character and high quality of life[3]. As a consequence, development today has to be viewed as a catalyst for attracting and retaining talent. As stated in the Greater Lansing Next Plan, public transit is a key component of the placemaking improvements necessary to attract and retain talented workers[4].

This emerging perspective on development is focused on providing the greatest access possible for people, instead of focusing on access for cars. Pedestrian-friendly environments are mixed use, have high-densities compared to their automobile-dependent counterparts and feature human-scale design. The final result is a built environment that improves the efficiency of transit, as destinations for riders are consolidated into fewer areas, the distance between destinations is reduced and transit becomes an attractive alternative to private automobiles.

Furthermore, demand is growing for dense, walkable, mixed-use living environments among Baby Boomers as they reach retirement age and young professionals as they consider buying or leasing a first primary residence. This new demand is powering growth and development in many metropolitan areas, largely because these demographic groups account for half of the United States' population.

In 1993, before a DART Light-Rail Station was planned for downtown Plano, TX, the city adopted a zoning district for downtown that allowed for up to 40 residential units per acre. When a large, mixed-use development (Eastside I) was proposed at a density of 100 units per acre, it was seen as exactly the type of development Plano wanted to encourage. Based on the quality of design and local support, the city council amended the zoning to accommodate this density.

Transit-oriented developments lend themselves to placemaking activities because they are not constrained by large parking requirements and vehicle access needs. Instead, TOD can focus on creating unique places that serve multiple purposes. Additionally, future rapid transit services in the Lansing region can provide new branding opportunities for the region's unique districts and neighborhoods.

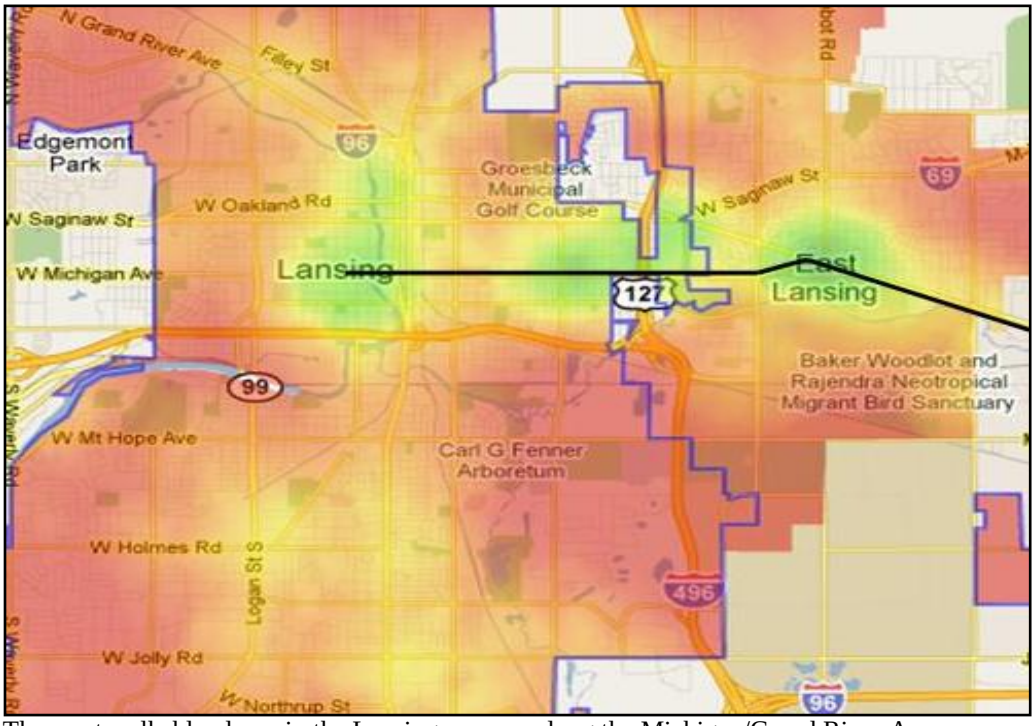
Orenco Station in Portland, OR. Source: http://www.planetizen.com/node/92

TOD AND WALKABILITY

The relationship between walkability and transit is symbiotic. Transit supports walkability and walkability supports transit and transit-oriented development. A recent corridor analysis in Boulder, Colorado found the best places for TOD have high residential and employment density, a market for development and are walkable.[5] The map below shows the most walkable places in Lansing and East Lansing according to walkscore.com. Green areas are most walkable, red are least walkable and the black line is the Michigan/Grand River Avenue Corridor. The information on the map is quite striking; the most walkable places are undoubtedly centered along Michigan and Grand River Avenues.

A recent study by CEOs for Cities using a measure of walkability, called "walkscore" (www.walkscore.com), found that for every 1-point increase in walkscore, home value increased between $700 and $3,000.[6] In other words, an increase in proximity to goods and services means an increase in property value. The table to the right displays the walkscore for Lansing, East Lansing and other select cities. San Francisco is the city with the highest walkscore in the United States.

City	Walk Score
San Francisco, CA	86
Chicago, IL	74
Portland, OR	67
East Lansing, MI	**60**
Champaign, IL	60
Ann Arbor, MI	59
Madison, WI	59
Cleveland, OH	58
Grand Rapids, MI	56
Eugene, OR	56
Detroit, MI	51
Flint, MI	51
Austin, TX	51
Columbus, OH	51
Lansing, MI	**48**
Indianapolis, MI	41



The most walkable places in the Lansing area are along the Michigan/Grand River Avenue Corridor. Source: www.walkscore.com.

SETTING THE STAGE FOR TOD

Public transportation cannot be effective without supportive land use. Proper zoning for TOD will allow the market to build developments that are both profitable to the developer and make efficient use of public resources.

Transit-oriented development fits well into the land-use goals outlined by the "Tri-County Regional Growth: Choices for our Future" land use and transportation plan, and the Tri-County 2035 Transportation Plan. Many local governments have passed resolutions of support for and adopted the recommendations included within the land use and transportation plan, which is available electronically at: www.tricountygrowth.org.

Mixed use, high-density developments that are characteristic of TOD projects are often not allowed in municipal zoning codes. So, to encourage TOD, local municipalities must first allow for it in their zoning code. TOD zoning must be flexible and simple. An example of successful TOD zoning practice can be found in Grand Rapids, MI. With adoption of its new Master Plan and zoning ordinance, Grand Rapids created TOD overlay districts. These overlays permit a gradual shift in the development pattern toward more transit-oriented design, while retaining the character of the district.

The following pages detail critical components of a successful and vibrant transit-oriented development district.

Select Elements of the City of Grand Rapids TOD Zoning Districts

- *Required building lines (build-to lines) and no minimum front or side setbacks.*
- *Incentives are provided in the form of additional permitted stories or square footage for open space, ground floor retail, mixed-income housing and providing a transit station.*
- *Entrances are required to be on the front façade of buildings, parallel to the street.*
- *Three or more stories permitted by-right in all TOD districts.*
- *Many automobile-dependent uses are prohibited (e.g. auto supply and sales).*

Visit http://www.grand-rapids.mi.us/index.pl?page_id=5831 to view the zoning ordinance.

ENCOURAGE HIGHER DENSITY

High density is essential to maximizing the benefits of TOD. A 1997 study using American Housing Survey data found that density had an effect 40 times greater than land use mix on public transportation utilization.[7] Generally, it has been repeatedly found that housing and employment density are the most significant factors in determining demand for public transportation.

Generally, a density of 9 dwelling units per acre is sufficient to call for bus service to be at a 30-minute frequency. Higher densities require higher capacity and frequency, and increased frequency can encourage new ridership. The table below shows general thresholds for residential density and transit service.

TOD Type	Land Use Mix	Min. Housing Density	Regional Connectivity	Frequencies
Urban Downtown	Office Center; Urban Entertainment; Multi-Family; Retail	>60 Units/Acre	High, near or at regional Hub	<10 Minutes
Urban Neighborhood	Residential; Retail; Medium Commercial.	>20 Units/Acre	Medium Access to Town; sub-regional Hub	10 minutes peak; 20 minutes off-peak
Suburban Center	Office Center; Urban Entertainment; Multi-Family; Retail	>50 Units/Acre	High Access to Downtown; Sub-regional hub	10 minutes peak; 20 minutes off-peak
Suburban Neighborhood	Residential; Neighborhood Retail; Local Office	>12 Units/Acre	Medium access to suburban center; Access to downtown	20 minutes peak; 30 minutes off-peak
Neighborhood	Residential; Neighborhood Retail	>9 Units/Acre	Low	30-60 minutes or demand response

Source: Transit Cooperative Research Program Report 128: Effects of TOD on Housing, Parking and Travel.

Examples of Urban Downtown, Urban Neighborhood and Suburban Center TOD (Source: Reconnecting America).

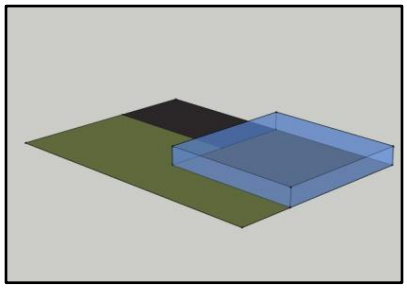
Employment density is equally, if not more important to successful TOD than residential density. Clustered, transit-accessible employment centers typically have much higher transit use than their automobile-centered counterparts. A minimum of 20 employees per acre is needed to support intermediate bus service, and a density of 50 to 75 employees per acre will support more frequent bus service. A minimum of 125 employees per net employment acre around public transportation stations is needed to support high-speed transit options like Bus Rapid Transit, Modern Streetcar, and Light Rail.

In order to increase employment densities, a high floor-to-area ratio (FAR) is necessary. A typical one-story commercial building has a FAR of .35 or lower, with surface parking. In higher density districts, surface parking becomes less feasible with FAR at .5 or above. To achieve transit-supportive development in a station area, vertical mixed-use developments should have a FAR of 1.5 or above. The chart and graphics below provide some basic examples of these thresholds and the advantages of density and vertical development that is conducive to transit usage.

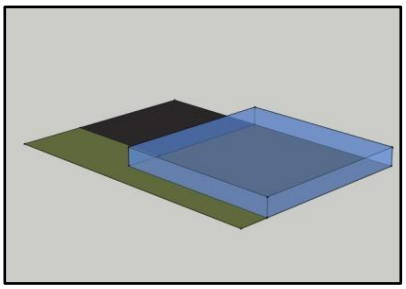
	FAR .35	FAR .5	FAR 1.5
Land Area	43,750 ft^2	43,750 ft^2	43,750 ft^2
Building Area (Footprint)	15,313 ft^2	21,875 ft^2	22,100 ft^2
Stories	1	1	3
Floor Area	15,313 ft^2	21,875 ft^2	66,300 ft^2
Parking Area*	8,320 ft^2	11,680 ft^2	17,520 ft^2
Parking Stories	1	1	2
Spaces**	52	73	219
Open Space	20,117 ft^2	10,195 ft^2	4,130 ft^2

*A square footage requirement for parking and circulation of 160 square feet per space was assumed for this example.

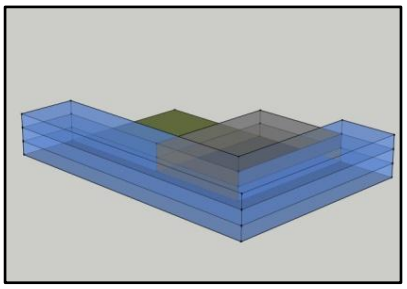
**A parking requirement of 1 space per 300 square feet of floor area was assumed for this example.



FAR .35



FAR .5



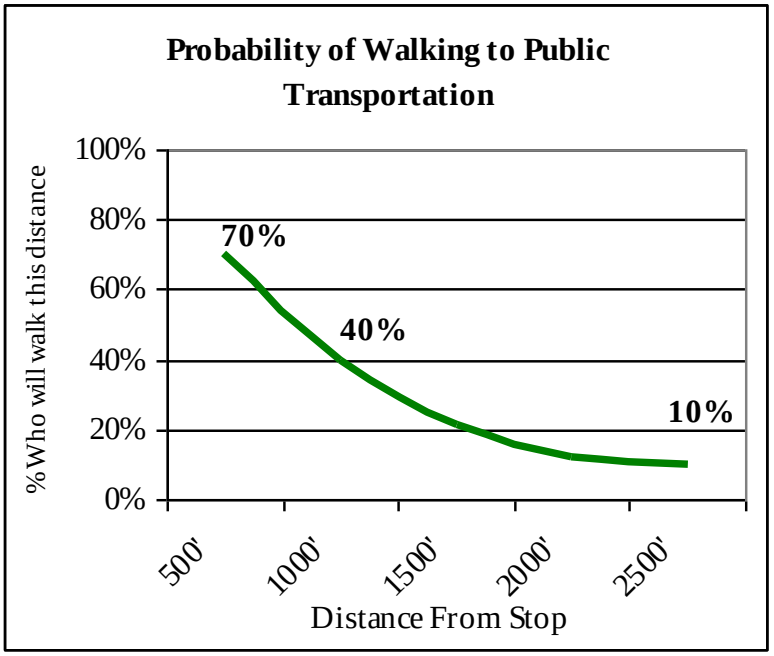
FAR 1.5

LOCATE DEVELOPMENT NEAR EXISTING PUBLIC TRANSPORTATION SERVICE

Proximity to public transportation service has a major effect on its utilization. The National Personal Transportation Survey found that 70% of Americans will walk 500 feet for normal daily trips, 40% are willing to walk 1000 feet and 10% are willing to walk a half mile.[8] The graph below illustrates this relationship.

Most development projects in the Greater Lansing urban area are within .25 miles of CATA service, but as the following chart illustrates, public transportation is more likely to be utilized if the development is built next to, rather than near to the route. However, distance is not the only factor affecting willingness to walk. Improvements to the built environment that create a more pleasant environment can also improve a person's desire to walk. Providing an attractive walking environment with some protection from weather can substantially improve people's willingness to walk in terms of both time and distance.

Guiding development to areas that already have high levels of service – such as the Michigan Avenue/Grand River Avenue Corridor – is a critical component of improving the utilization and benefits of the existing public transportation system.



The Stadium District, Lansing, MI

The Arbaugh Building and CATA Transportation Center, Lansing, MI

Lansing Center, Lansing, MI

Grand River Ave. East Lansing, MI

Emphasize Transit-Friendly Land Uses

The way land is used affects the type of transportation people use to access it. Transit-Oriented Developments are most successful when they have destinations people will frequent throughout the day that are not auto-dependent. The table to the right shows examples of Transit-Friendly and Non Transit-Friendly uses.

Encourage Transit-Friendly Uses

Because all transit riders begin and end their trips as pedestrians, transit-supportive uses are those that encourage pedestrian trips. Supportive uses include multi-dwelling residential units, retail shops, restaurants, and offices.

Discourage Non-Transit Friendly Uses

Uses that discourage transit often consume large areas of land, are not easily accessible to pedestrians, and have extensive surface parking facilities for automobiles. Such non-supportive uses include car dealerships, warehouse storage, and strip malls. These uses should not be permitted in areas where TOD is being encouraged.

Encourage Mixed-Use Development

Mixed-use development places retail, employment, and residential uses within the same area. It eliminates the need for some auto-based trips, and encourages the use of non-motorized modes. Clusters of mixed-use developments can be connected by public transportation, which reduces demand for automobile trips.

Diverse land uses enable provide access to more goods and services in a single trip. For a trip with multiple destinations, it allows for internal walking trips rather than multiple auto trips. Because TOD generally includes a mix of employment, housing, shopping, and entertainment, it can serve to balance the utilization of transportation infrastructure, and create areas with activity at all times of day and night.

Transit-Friendly Land Uses
Multi-Dwelling Residential
Affordable Housing
Retail Shops
Grocery Stores
Restaurants
Offices
Hotels
Health Care Facilities
Medical Clinics
High Schools and Colleges
Daycare Facilities
Cultural Institutions
Athletic/Recreational
Health Clubs
Entertainment Facilities

Non-Transit Friendly Land Uses
Parking Lots
Warehouses
Automotive Services
Car Washes
Warehouse
Distribution
Regional Parks
Storage Facilities
Low-Density Housing
Low-Intensity Industrial
Gas Stations
Strip Malls
Areas with poor walkability

ENSURE THE DEVELOPMENT IS ACCESSIBLE BY TRANSIT

CATA operates 40’ and 60’ buses as part of the region’s fixed-route public transportation system. In addition to being properly located near transit service, new developments should be situated for bus accessibility in a context-sensitive manner.

In addition to obvious height and width restrictions, bus accessibility is significantly affected by three factors: visibility, speed and turns.

When stopped at an intersection, buses should have no less than 85 degrees of visibility on each side. This allows bus drivers enough line-of-sight for reacting to unexpected oncoming traffic, such as a vehicle running a red light.

Buses should also be able to move quickly between bus stops. Driving through unnecessary loops, multiple turns, and waiting for traffic lights increases trip time, decreases predictability, and makes public transportation a less competitive mode choice. When possible, as with large developments, bus-only routes should be considered to improve bus traffic flow.

Generally, civil engineers will estimate the turning radius of a large bus at 45 feet. This is not sufficient for CATA's 40' buses. Field work with Michigan State University has shown that 47 feet is the bare minimum outer turning radius for a CATA bus.

A turning radius diagram is attached in the Appendix and is available in .dwg format by contacting CATA's Planning Department at (517) 394-1100.

Specifications	Large 40’ Bus	Articulated 60’ Bus
Length	40.8'	62.8'
Width	102"	102"
Height - Roof	111"	136"
Floor Height -	14.5"	16"
Weight	**Empty:** 13 Tons; **Full:** 20 Tons	**Empty:** 22 Tons; **Full:** 32 Tons
Approach Angle	9.01°	8.5°
Departure Angle	8.76°	8.76°
Breakover Angle	8.3°	F: 11.29° R: 8.35°
Outer Turn Radius	47 feet	38.6 feet
Recommended Min	47 feet	47 feet
Wheelbase	293"	F: 228.22" R: 302.77"
Passenger Capacity	Up to 80	Up to 115

MAKE PEDESTRIAN AND BICYCLE MODES A HIGH PRIORITY

All public transportation riders start and end their trip as pedestrians. As a result, safe and attractive walking environments generally increase the effectiveness and utilization of public transportation. Pedestrian activity is also associated with increased economic development opportunity.[9]

Bicycles also increase the effective service area of public transportation, as cyclists are willing to travel farther than pedestrians to access public transportation. Although many regular cyclists will ride on the road, inexperienced riders may not consider bicycling if there are no bike lanes or bike paths. Non-motorized investments are part of a holistic and balanced approach to transportation investment.

Pedestrians prefer short distances between destinations. This is accommodated by building entrances facing the sidewalk; minimal building setbacks and overhangs or awnings meant to protect pedestrians from the elements.

COMMIT TO BARRIER-FREE ACCESS

CATA Spec-Tran, a service used by persons with disabilities, provided over 300,000 trips in FY 2010. Because of this great need, all public transportation-related facilities and their connections should be 100% barrier free. This need will only grow in the coming years as the region's population ages. For example, building entrances should be at ground-level, or have sufficient space available for ramps, lifts, or other aids to accessibility.

Pedestrian-friendly area on the north side of Michigan Avenue has room for roadway, metered parking, a green "buffer" zone, and wide sidewalks with attractive design features. - Lansing, MI

The Lansing Center's renovated façade removed the front driveway and replaced it with additional square footage, access to the street, and other treatments to make an attractive, accessible, and safe area for pedestrians - Lansing, MI

GET PARKING OUT OF THE WAY

There are a few simple rules to follow concerning parking practices in transit-oriented developments:

- Minimize surface parking.
- Maximize use of structured parking.
- Other than on-street parking, surface lots should be in the rear of buildings.
- Eliminate any parking in places where pedestrians must walk.

Transit-oriented developments require less parking for the same number of inhabitants, workers, and visitors. Over 90% of station area residents in a 2003 California TOD study reached their transportation station by walking.[10] Right-sizing parking is the best way to efficiently utilize land in a TOD.

Large parking lots force automobiles and pedestrians to share the same space, which can create unnecessary conflicts between modes. Vehicle travel lanes are often poorly defined and visibility can be hampered by obstacles. These conditions lead to unpredictable and potentially dangerous behavior by both drivers and pedestrians. If a large lot is necessary, it should be designed with clearly marked pedestrian paths and located in a manner that does not separate the building from the street.

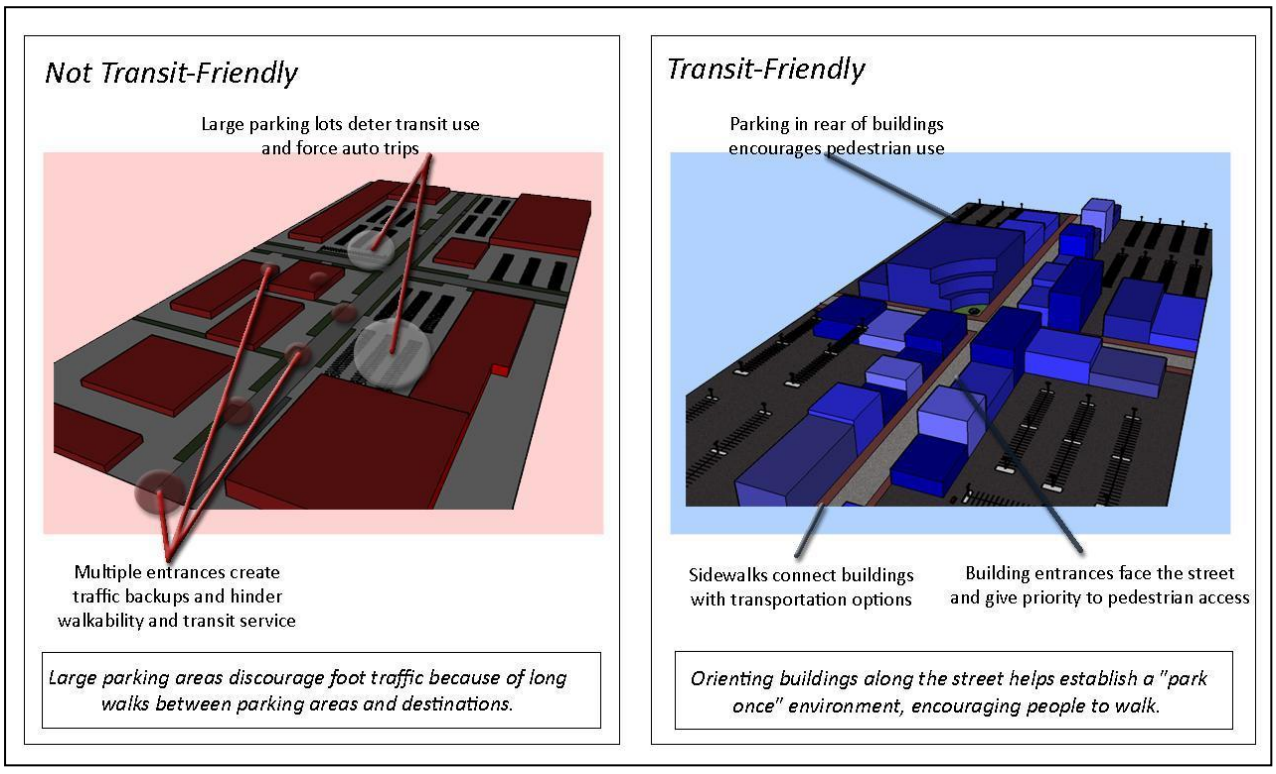
Traditional parking management aims to have no more than 80% of parking spaces filled at the peak hour of demand, thereby making it easy to find a space on the busiest days. Parking ratios should be reconsidered in areas with access to transit to be appropriate for the number of auto trips remaining after increased pedestrian and public transportation usage.

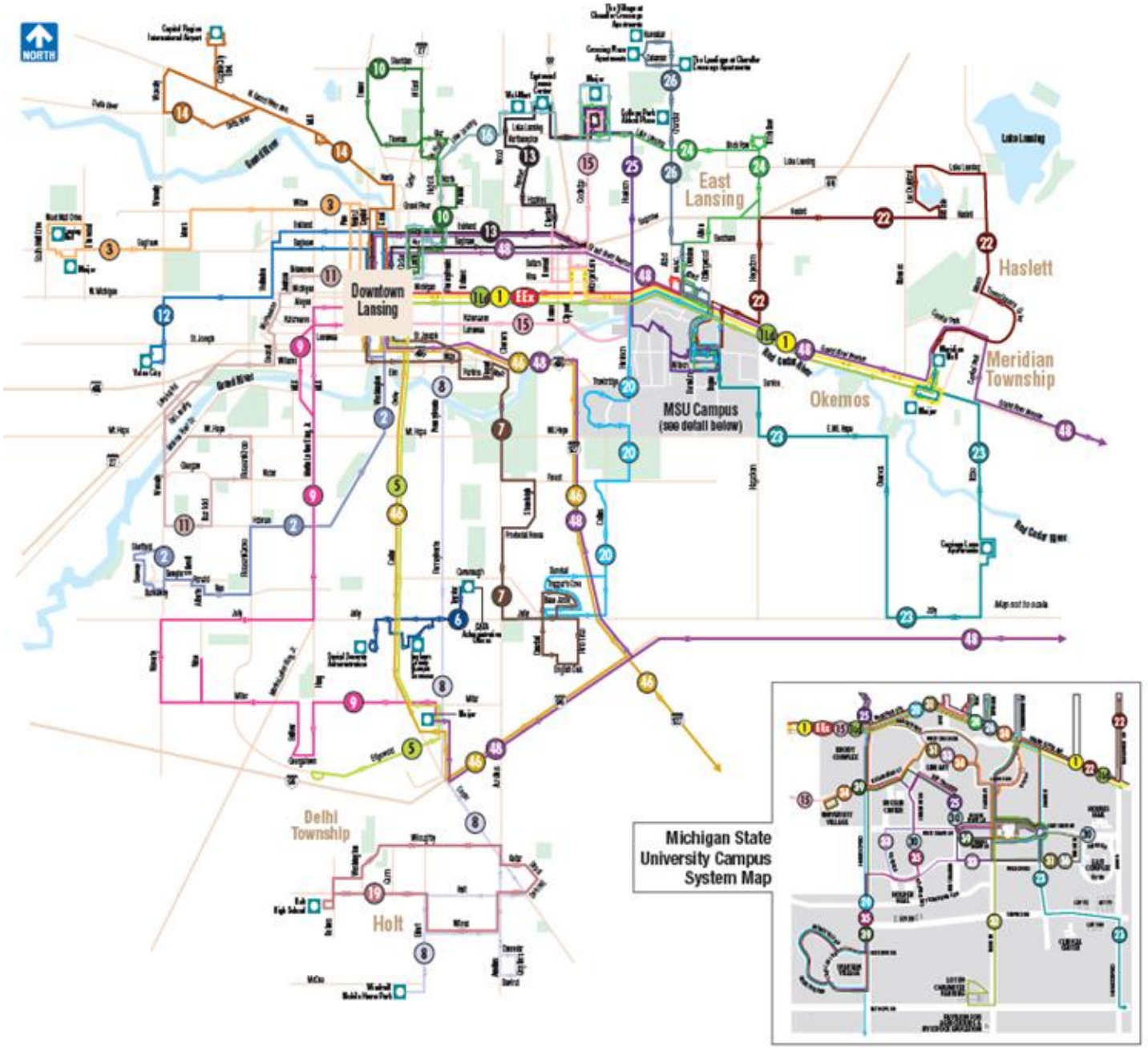
This CATA Shelter on Route 5 demonstrates how parking can "get in the way" of accessing public transportation by separating stops from destinations.

The graphic below contrasts a typical automobile-centric development pattern with Transit-Oriented Development. The development on the left is an example of an abundance of parking placed in a manner that discourages transit usage. Buildings in this example are sprawling, encompassing thousands of square feet with a minimal FAR, which reduces employment and residential density. In addition, extensive use of surface parking in front of buildings presents a significant barrier to pedestrians. The distance between the street, where transit stops will be located, and pedestrian destinations as well as the increased danger of navigating a large parking lot with no pedestrian facilities discourages pedestrian usage and communicates a message that "Pedestrians are not welcome here." There is also a lack of a clear center and an appropriate location for a transit stop that provides access to the entire area. All of these factors discourage effective use of transit.

In contrast, the graphic to the right shows a, high-density area with building heights varying from 1-6 stories. In this example, parking amenities are exaggerated to show that they can be placed behind buildings, allowing access to the street while still providing ample parking. Pedestrian activity is encouraged and focused on the street-level were businesses can take advantage of focused foot-traffic.

The transit-friendly site also has a central location that can be used as a transit station or major hub. Concentrating ridership in a single area such as this provides significant benefit to public transportation in the form of better on-time performance, higher fuel efficiency (less stop-and-





SYSTEM MAP

Greater Lansing Area Map With CATA Routes

Effective: August 30, 2010

QUESTIONS? Call our Customer Information Center at (517) 394-1000.
info@cata.org
Michigan Relay Center Voice TDD: (800) 649-3777.
More information on CATA Services is also available online at: **cata.org.**

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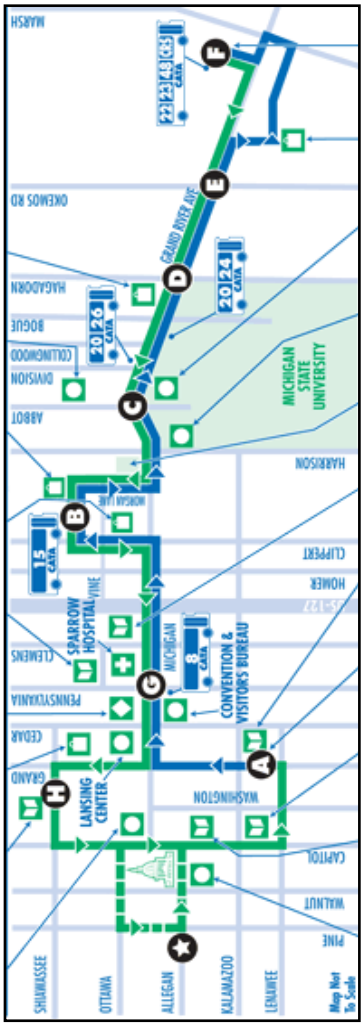
TRANSIT CORRIDORS AND BOARDING CENTERS

Initially, transit-oriented development should be focused around areas of existing transit service. Focusing development around these transit corridors and boarding centers will increase the effectiveness of existing service and enhance the viability of TOD projects.

There are several corridors that already contain fairly robust public transit service in the Lansing Region. These corridors, as identified in CATA's most recent Comprehensive Operational Analysis (COA), represent heavily-utilized routes with high-frequency bus service.



Route 1

MICHIGAN/GRAND RIVER AVENUE CORRIDOR

This corridor stretches eight miles from the Capitol Building in downtown Lansing to the Meridian Mall in Meridian Township and is currently served by several routes including CATA's Route 1. Buses serving Route 1 arrive every 10 to 15 minutes, depending on the time of day and day of the week. Route 1 is most heavily used route in CATA's system, with over 1.7 million trips in FY 2010.

Route 1 carried over 6,000 riders on an average weekday in 2010, and operates at capacity during peak demand. Based on ridership loads and standard average vehicle occupancy, the route is carrying approximately 10 percent of all persons traveling in the corridor. Additionally, ridership on increased by 26% between Fiscal Year 2004 and Fiscal Year 2010, a trend that is expected to continue.

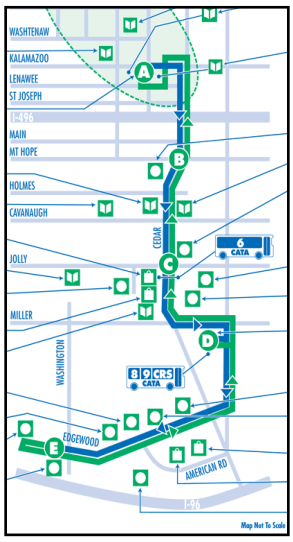
The heavy ridership on Route 1 and other routes that intersect the corridor points not only to a need to improve speed and reliability for transit, but also to provide for safe pedestrian access to, across and through the corridor.

The corridor carries a significant amount of regional traffic, and has been the subject of many transportation and land use studies. Its land-use mix varies along its length, but includes the Capitol building, Thomas M. Cooley Law School Stadium, Lansing's Eastside Neighborhood, Frandor shopping center, Downtown East Lansing, Michigan State University, the Meridian Mall, and many other retail, residential, and employment destinations.

The Michigan/Grand River Avenue Corridor was also identified in a 2005 study performed for CATA as a candidate for improved, higher-speed transit service. As a consequence, CATA has engaged in an Alternatives Analysis of the corridor that determined Bus Rapid Transit was the best transportation mode to serve the corridor's needs. In the future, CATA will be pursuing this improvement along the corridor in cooperation with local governments and other partners. For more information on this project, please visit www.migrtrans.org.

Cedar Street Corridor

CATA's Route 5 serves the Cedar Street Corridor, which runs over five miles from the Downtown Transportation Center to Cooley Stadium at Michigan Avenue to the area near I-96 in Southern Lansing. Route 5 operates seven days a week, with buses arriving every 20 to 40 minutes on weekdays, and every 30 to 60 minutes on weekends.



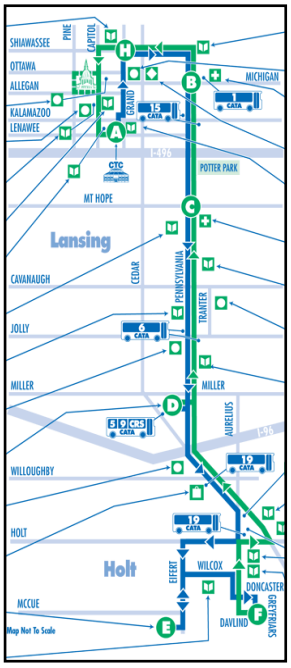
Route 5

Auto traffic in the Cedar Street Corridor averages more than 24,000 vehicles per weekday, while CATA's Route 5 carries more than 2,000 passengers per weekday. The development pattern in this highly-traveled corridor is currently focused toward single-occupant vehicle use, but there are many parking lots and opportunities for infill development that would decrease this reliance. Several big-box retailers have gone out of business, leaving a great opportunity for redevelopment in a less automobile-dependent manner.

The relatively dense clustering of commercial areas within walking distance of established neighborhoods suggests that the Cedar Street corridor has potential for TOD-type development. Further development of commercial nodes will improve the ability of employees, patrons and residents to use public transit.

Pennsylvania Street Corridor

CATA's bus service in the Pennsylvania Street Corridor runs for over five miles from Sparrow Hospital at Michigan Avenue to the intersection with Cedar Street at I-96. Route 8 serves this corridor, and buses arrive every 20 to 40 minutes on weekdays, and 30 to 60 minutes on weekends.



Route 8

CATA Transportation Center

Bus service for much of the region is centered on a central service hub known as the CATA Transportation Center (CTC). With over 5,000 daily boardings and 17 routes transferring here, a rider can travel to the Capital City Airport, Lansing Mall, Meridian Mall, Holt, Mason, Williamston-Webberville, Michigan State University, and many other regional destinations. Greyhound buses also serve this station, connecting Lansing with other cities. The CTC is the point of highest connectivity for transit service in the Lansing area.

The area surrounding the CTC is pedestrian-oriented, and is less than three blocks from Cooley Law School, the Boji Tower, State office complexes, and many retail, office, and urban living options and destinations. In addition to high transit connectivity, its central location utilizes existing public infrastructure, including road capacity, structure-parking, utilities, and data lines.

Other Boarding Centers

Boarding centers are safe and comfortable spaces for passengers to wait while transferring between bus routes. They consist of a sidewalk-level concrete pad, a large bus shelter, and seating.

Located in existing large-lot retailers at the periphery of CATA's urban service area, these boarding centers helped to transform otherwise auto-centric parking lots into transit- and pedestrian-friendly destinations. They serve as transfer points for multiple routes, and improve the appeal of public transit use.

Ridership patterns at these locations demonstrate a need for amenities more substantial than a traditional bus shelter, but are not strong enough to warrant a dedicated transit facility such as the Downtown CTC.

CATA worked with the Lake Lansing Rd Meijer to build a safe, comfortable waiting space for Meijer and CATA customers, including a pedestrian crossing allowing for safe access to Meijer. This boarding center is served by three different bus routes.- East Lansing, MI

EXAMPLES OF TOD

Transit-oriented development has been implemented successfully in the United States and all over the world. With ingenuity, the success of these projects can be used to guide development decisions in the Tri-County region. Below are summaries of a few TOD projects of note.

THE ARBAUGH BUILDING
Lansing, MI

Built as a department store over a century ago, the Arbaugh in downtown Lansing, MI, is one of the first developments in the Lansing area that could be classified as transit-oriented. Through adaptive reuse, the building now contains 20,000 square feet of office/retail space, and has 48 2- and 3-bedroom loft apartments. It is located directly adjacent to the CATA Transportation Center, the regional hub for public transportation service.

The Arbaugh meets many of the requirements for successful TOD. It encourages higher density, is located next to a regional transit hub, contains transit-supportive uses, is highly accessible to pedestrians, and has a parking ratio that incentivizes transit usage.

Additionally, a large proportion of its residents are students at Cooley Law School. Students tend to have lower rates of automobile ownership, and are more willing to use public transportation to satisfy their transportation needs.

THE STADIUM DISTRICT
Lansing, MI

Built across from Lansing's Thomas M. Cooley Law School Stadium, the Stadium District has 50 living units and 35,000 square feet of retail space. It is located in a existing transit corridor along Michigan Avenue.

Stadium District Building
(Source: Lansing EDC)

This significant development is Lansing's first transit-oriented development to be constructed in recent times, and is part of an ambitious redevelopment project surrounding the baseball park.

It is a mixed-use development with pedestrian amenities that include wide sidewalks, tree-planters, and benches. It is very close to public transportation service with easy access to the bus stop on the curb in front of the building. Residential options include a mix of one- and two- bedroom condos and apartments. The development has surface parking, but this parking is located in the rear and does not interfere with the site's pedestrian accessibility. The development has 35 parking spaces for residents and additional lot and on-street parking for retail tenants.

This development illustrates the positive feedback loop associated with transportation infrastructure and land use density. CATA's existing robust service on Route 1 provides an incentive for residents to live an urban lifestyle. As more developments of this character are

built, demand for transit service will increase, likely resulting in even more robust service, and so on. Furthermore, once service levels increase, parking needs may decrease, further incentivizing transit use.

Source: http://www.flickr.com/photos/thomashobbs/98286049/sizes/o/in/photostream/

BUS RAPID TRANSIT TOD
Curitiba, Brazil
Transit Mode: Bus Rapid Transit

When this Brazilian city's transportation needs began to outpace its ability and budget to build, city planners and policymakers concentrated on maximizing benefits from inexpensive infrastructure. It is in this environment that the idea of Bus Rapid Transit (BRT) was born. Curitiba, using a proactive and engaging planning process, directed development toward public transportation growth corridors centered around BRT and now enjoys a very accessible, efficient public transportation system.

Development pressures in this city and the mass-mobility effects of high-capacity and efficient public transportation service allowed Curitiba to develop at a higher density within its core than other similarly-sized cities.

Although planners have access to different planning tools in Brazil, the overriding principle of incorporating transit to catalyze transit-oriented development has proven to increase development potential and alleviate many challenges associated with density.

Source: http://cincinnatitransforum.org/2010/08/at-the-heart-of-the-streetcar-is-transit-oriented-development/

THE BRIDGES
Bridgeland Neighborhood, Calgary, Alberta
Transit Mode: Regional Light Rail

Bridgeland is a suburb of nearby Calgary, Alberta. This development is comprised of 37 acres of Light Rail-proximate brownfield redevelopment on a site previously occupied by a hospital. The redevelopment of this area began in 2004, and includes condominiums, shops, more than 11 acres of greenspace, and a highly pedestrian-accessible public transportation station with service to the city's downtown.

Significant development pressure around public transportation stations prompted the City of Calgary to create six Station Area Plans. These plans guide the character of development and minimize zoning and permitting issues around transit stations in diverse areas of the city.

CONCLUSION

Transit-Oriented Development, as a concept, is relatively simple. It requires developers and cities to create places that are walkable, with appropriate density, preferably with a unique draw or "sense of place" and effectively connect them with public transit systems.

Implementation, on the other hand, can be a significant challenge. All partners in the planning and development process must be brought to the table, which commonly requires new partnerships in order for TOD to realize its full potential. CATA hopes to jumpstart this discussion by working with regional partners to educate the community about existing services and identify future needs to be met in order to help move our region forward to a better future.

CATA is best able to serve areas that are walkable, dense, mixed-use, and located adjacent to existing transit service. Routes are unlikely to change significantly in the near future, so developing and redeveloping around existing infrastructure will allow our region to grow in a financially and environmentally sustainable fashion.

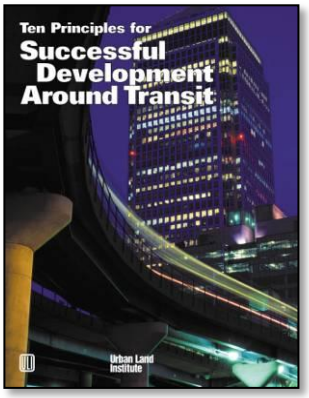
The Lansing region stands to benefit substantially by rethinking development. By utilizing walkability, mixing uses, and other TOD principles, we are not just creating a more efficient transportation system; we are creating more livable, sustainable, and stable communities. Improving the transit-oriented nature of development in our region will not only improve the quality of life for existing residents, but it will help our region attract new residents and retain talented young people that drive economic growth.

CATA is an eager partner in the planning and development process. With significant challenges and successes on the horizon, it is more important now than ever to work collaboratively to provide the best environment for economic development possible.

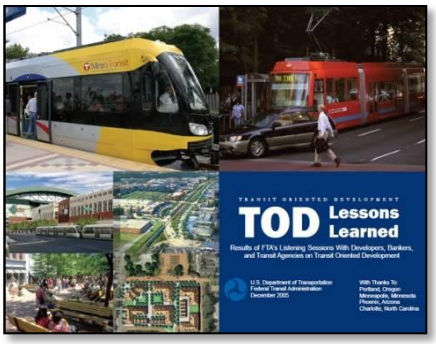
For questions about transit-oriented development, this document or CATA's service in general please contact the System Planning Department at 517-394-1100.

SUGGESTED READING

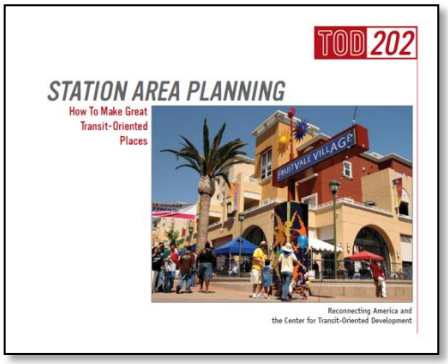
This document draws from a wealth of knowledge and research performed nationwide regarding the effects and best practices of Transit-oriented development. These documents are available through a number of sources. A short summary and a link to each document are contained below.



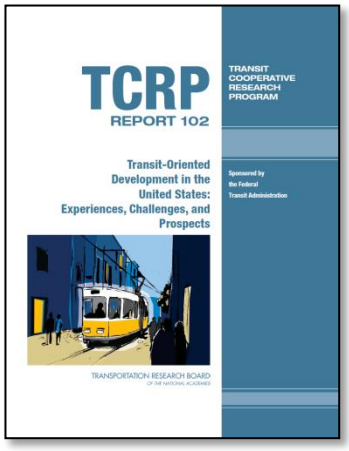
Ten Principles for Successful Development Around Transit: Produced by the Urban Land Institute, this document discusses and provides examples of best practices, including the importance of developing partnerships, establishing market-driven retail, incorporating buses, parking, varying housing options, etc.



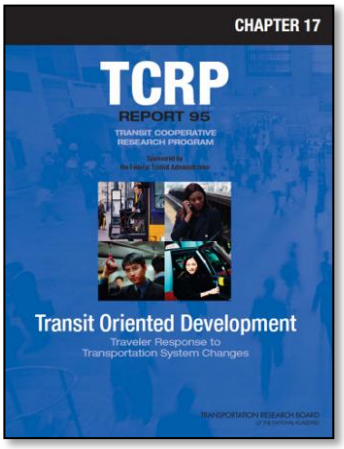
TOD - Lessons Learned: A short summary of the Federal Transit Administration's (FTA) listening sessions regarding TOD



Station Area Planning: "Reconnecting America" published a series of guidebooks on Transit-oriented development. The "TOD 202" manual discusses different types of TODs, planning principles, and other information in a simple, graphic-laden format.



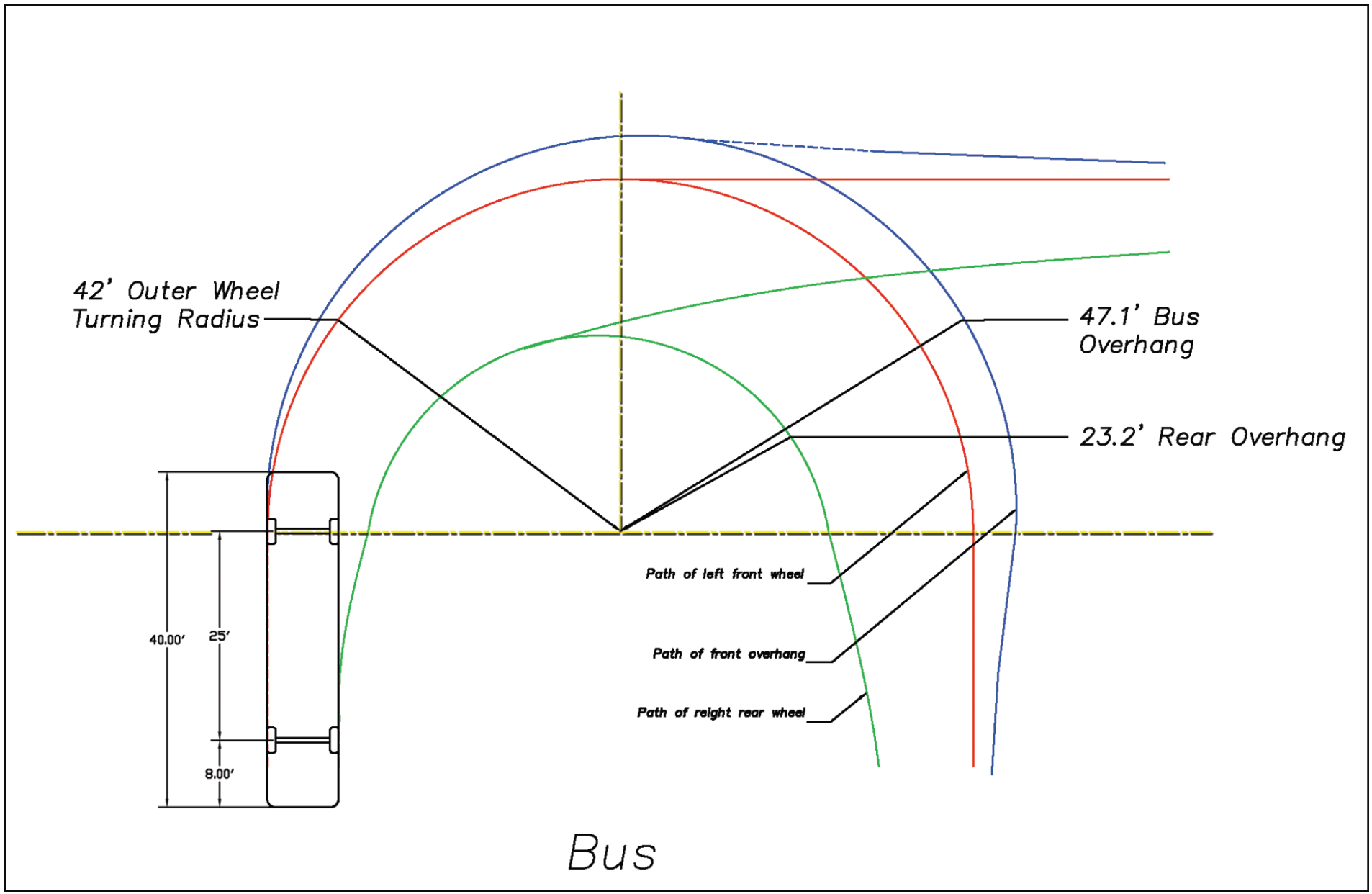
TCRP Report 102: The Transit Cooperative Research Program produced this report that explores several TOD examples, works through their challenges, and brings to light additional information about the future of TOD.



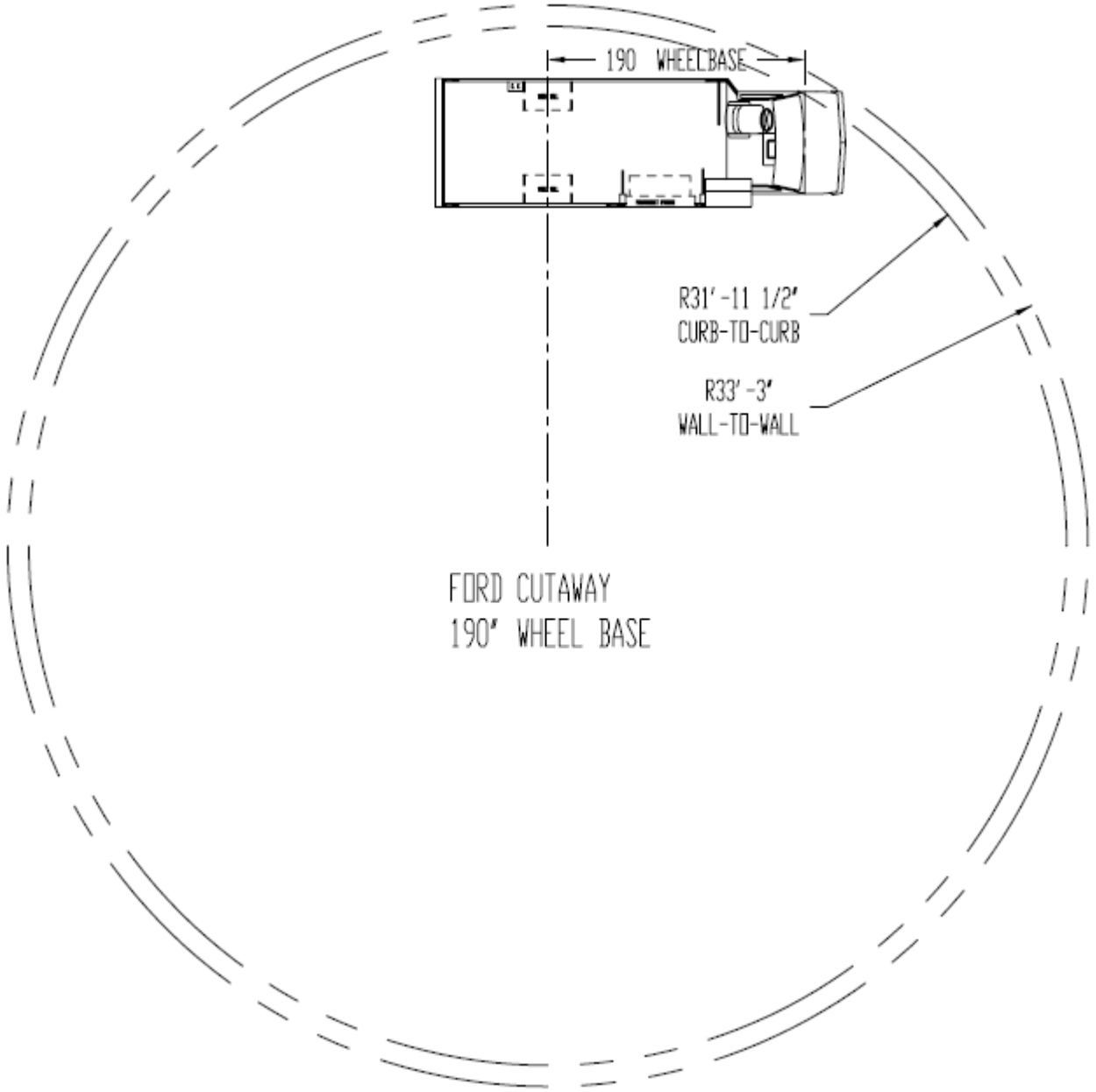
TCRP Report 95: This report discusses the impacts of TOD on trip-making decisions, passengers, transportation modeling, and many other important TOD-related items.

TECHNICAL DRAWINGS

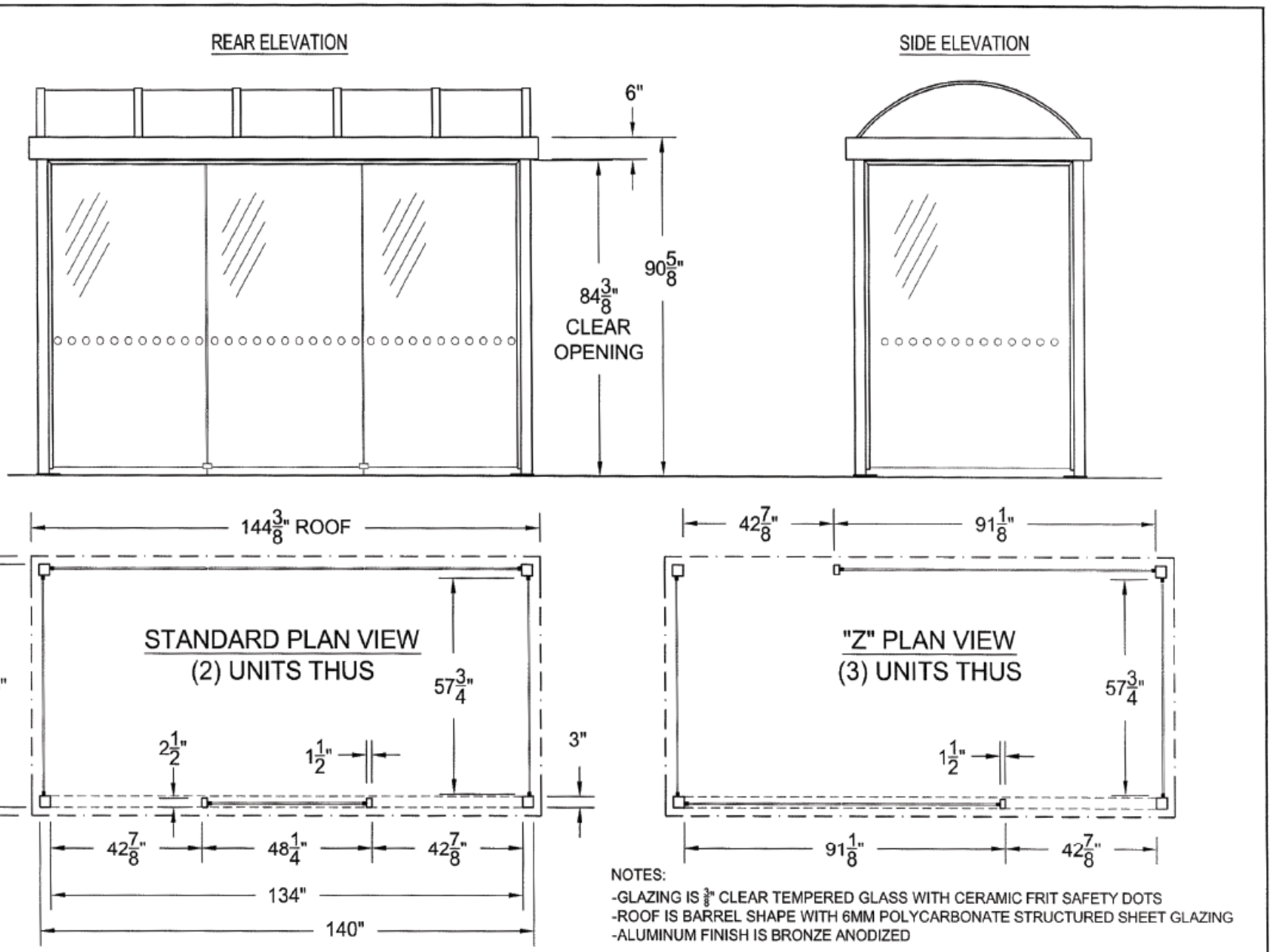
The following pages contain an assortment of technical drawings outlining the design guidelines of stop amenities and the turning radii for CATA's 40' large buses. These turning diagrams are available in original ".dwg" format by contacting Service Planning at (517) 394-1100.



The fixed Route bus with the widest turning radius is the 40' New Flyer Diesel/Electric Hybrid. This layout was produced by Michigan State University through analysis of campus transportation needs, which concluded that our buses require more area to turn than traditional estimates allow for.



CATA has a fleet of small Buses used for demand response services such as Spec-Tran and CATA Rural Service. These buses are lift-equipped Ford cutaway vehicles that may pick up and drop off passengers directly from their doorstep. Developments should be



NOTES:
-GLAZING IS 3/8" CLEAR TEMPERED GLASS WITH CERAMIC FRIT SAFETY DOTS
-ROOF IS BARREL SHAPE WITH 6MM POLYCARBONATE STRUCTURED SHEET GLAZING
-ALUMINUM FINISH IS BRONZE ANODIZED

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APPROVAL SIGNATURE DATE

X _____ ___/___/___

PROJECT NAME
6832 CAPITAL AREA TRANSPORTATION AUTHORITY

DESCRIPTION
5' x 11' WITH BARREL-VAULT ROOF JOB # 7129-7133 - (5) UNITS

PRJT ENG	PRJT MGR	DRWG DATE	REV1		SCALE	PAGE	OF	DRWNG #
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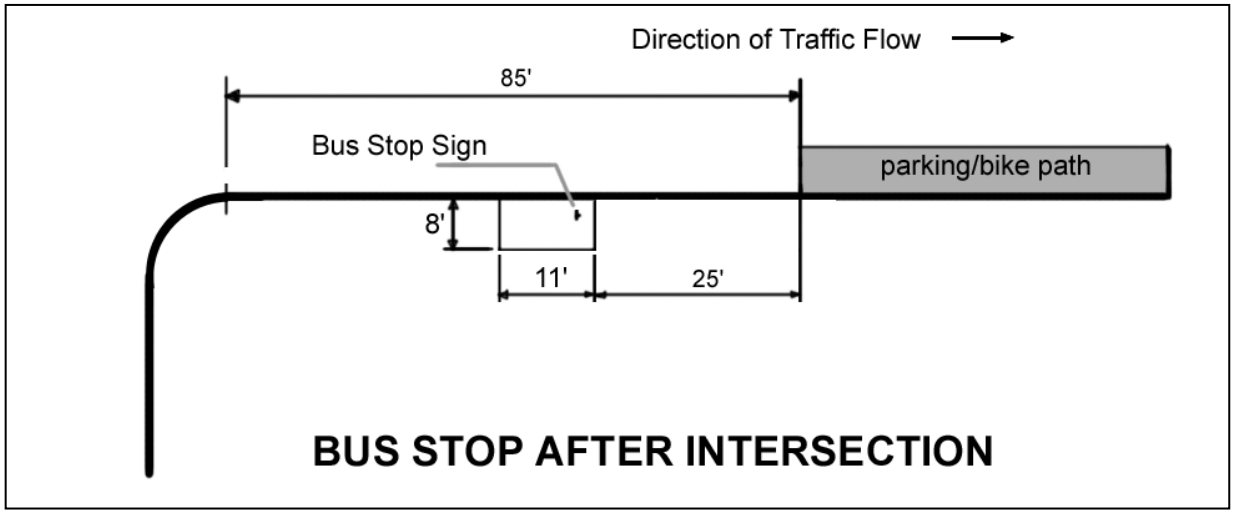
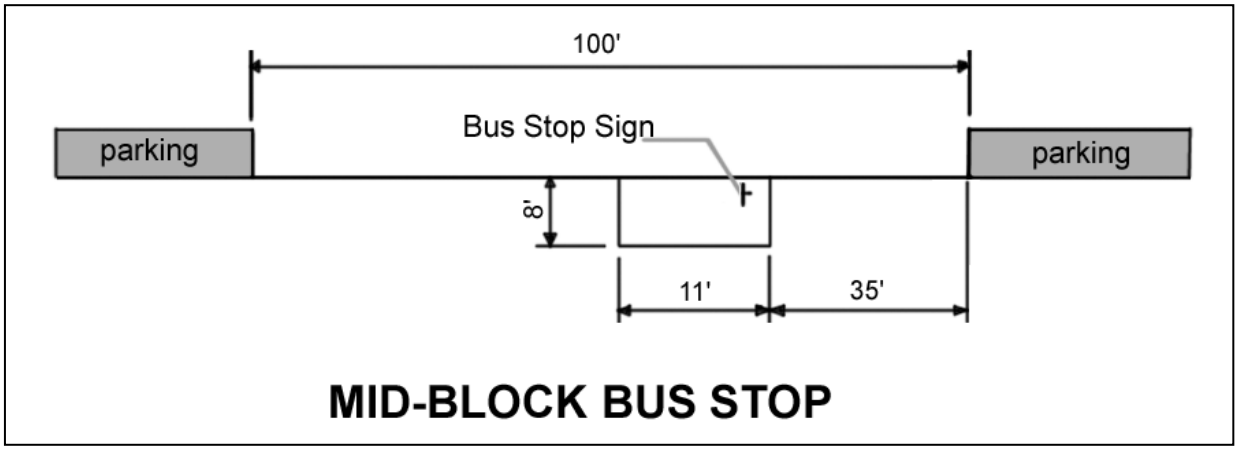
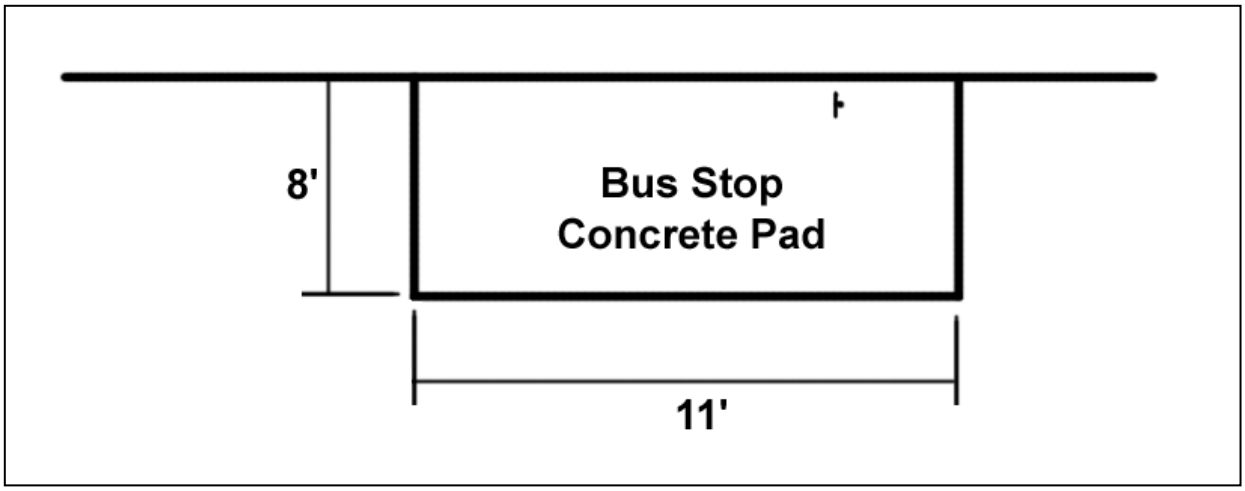
BUS STOP LOCATION DIMENSIONS







Concrete Bus Stop Pads are typically 8’ x 11’. All stop pads should have a paved connection to sidewalks for access by pedestrians and persons with disabilities.

REFERENCES

[1] Bailey, L. Mokhtarian, P.L. & Little, A. (2008). *The Broader Connection between Public Transportation, Energy Conservation and Green House Gas Reduction.* <http://www.apta.com/gap/policyresearch/Documents/land_use.pdf>

[2] Knight Foundation. (2010). *Knight 2010 Soul of the Community: Why People Love Where They Live and Why it Matters*. <http://www.soulofthecommunity.org>

[3] Adelaja, Soji et al., (2009) *Chasing the Past or Investing in our Future*. Land Policy Institute at Michigan State University.

[4] Lansing Economic Area Partnership (2009) *Greater Lansing Next: A Plan for Regional Prosperity*. <http://www.greaterlansingnext.com/>

[5] Center for Transit-Oriented Development (2010). *Transit Corridors and TOD: Connecting the Dots*. 2010, <http://reconnectingamerica.org/public/stories/2514>.

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[8] U.S. DOT. (1986) *Personal Travel in the U.S., Volume II, A Report of Findings from the 1983-84 Nationwide Personal Transportation Study*.

[9] Litman, Todd. (2003) *Economic Value of Walkability*. <http://www.vtpi.org/walkability.pdf>

[10] Transit Cooperative Research Program (2008). TCRP Report 95, Chapter 17 Transit Cooperative Research Program Research Results Digest.