Introduction

BETTER STREETS, BETTER SERVICE

Making transit work in cities means raising the level of design across the entire street network. Cities can take the lead on transit, creating dedicated lanes and transitways, designing comfortable stops and stations, and coordinating action with transit agencies on intersections and signals.

Transit-first street design also means treating walking as the foundation of the transportation system. Ultimately, the efficiency of transit creates room for public space, biking and walking networks, and green infrastructure—allowing cities to remake their streets as safer, more sustainable public spaces.

TRANSIT CREATES URBAN PLACES

Cities and transit are deeply linked. In vibrant, bustling cities, people are on the move, and transit plays an indispensable role in keeping them moving. Walkable urban places have a critical mass of people and activities that support and rely on transit to connect them to other places. Cities can strengthen this synergy by creating transit streets: places that move people.

With the majority of US residents preferring walkable, bikeable urban environments, the value of better transit accrues not only to existing transit passengers and newly attracted ones, but to people who will decide where to live and start businesses—in which neighborhood, city, or region—based on the availability of transit-served walkable neighborhoods. These location decisions affect the competitiveness of the entire metropolitan area and justify transit-first policies in street design and investment.

A MOBILITY SERVICE FOR THE WHOLE CITY

Making it possible to quickly and reliably go anywhere by transit is a way for cities to significantly improve quality of life. A transit system designed as a mobility service focuses on its value to the rider, providing prompt, seamless, and safe connections to where people want and need to go. A public transit-based mobility system, open to people of all ages and abilities, is fundamentally more equitable than one based primarily on private vehicles.

A crucial complement to the transit network is a suite of flexible, convenient, and affordable mobility choices—walking, bicycling, shared mobility, and on-demand rides—that, together with fixed-route transit, allow residents to avoid the costs of car ownership and make proactive decisions about each trip they take.

GROWTH WITHOUT CONGESTION

Transit streets allow growth in economic activity and developmental density without growth in traffic congestion by serving more people in less space. Transit is most productive for a city and most effective for riders when a large number of people want to travel along one street, but these types of streets are inherently prone to automobile congestion, with unreliable travel times when the most people need to travel.

Streets designed for rapid transit reverse this equation, making transit trips fastest on streets with high travel demand, where frequency is greatest. A public transit-based mobility system benefits everyone in a city, whether or not they choose to ride transit, as people using transit and private vehicles alike can access more destinations in the same amount of time after transit has been improved and density increased.

SAFE MOVEMENT AT A LARGE SCALE

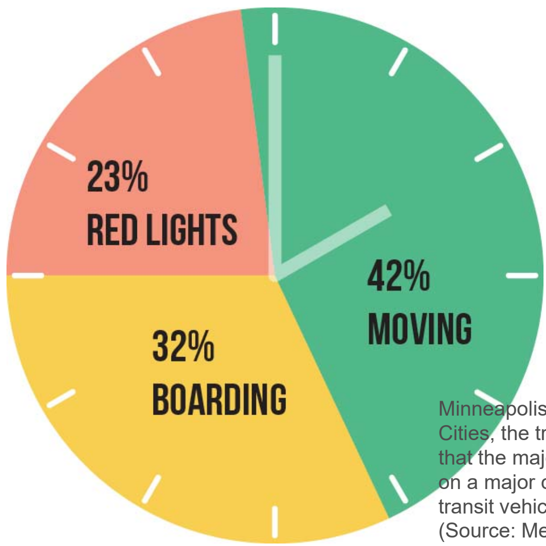
With transit's order-of-magnitude safety advantage over private automobiles, promoting transit is integral to policies that seek sustained improvements in pedestrian, bicyclist, and vehicle occupant safety. Transit mode share and transit-supportive infrastructure are directly correlated to lower traffic fatality rates.

Improving transit does not mean creating speedways, since higher top speeds have little benefit for transit on city streets. Transit streets designed with people in mind are safe places to walk and bike, and transit improvements go hand in hand with better pedestrian access, safer crossings, and more enjoyable public space decisions about each trip they take.

PERMANENT ECONOMIC BENEFITS

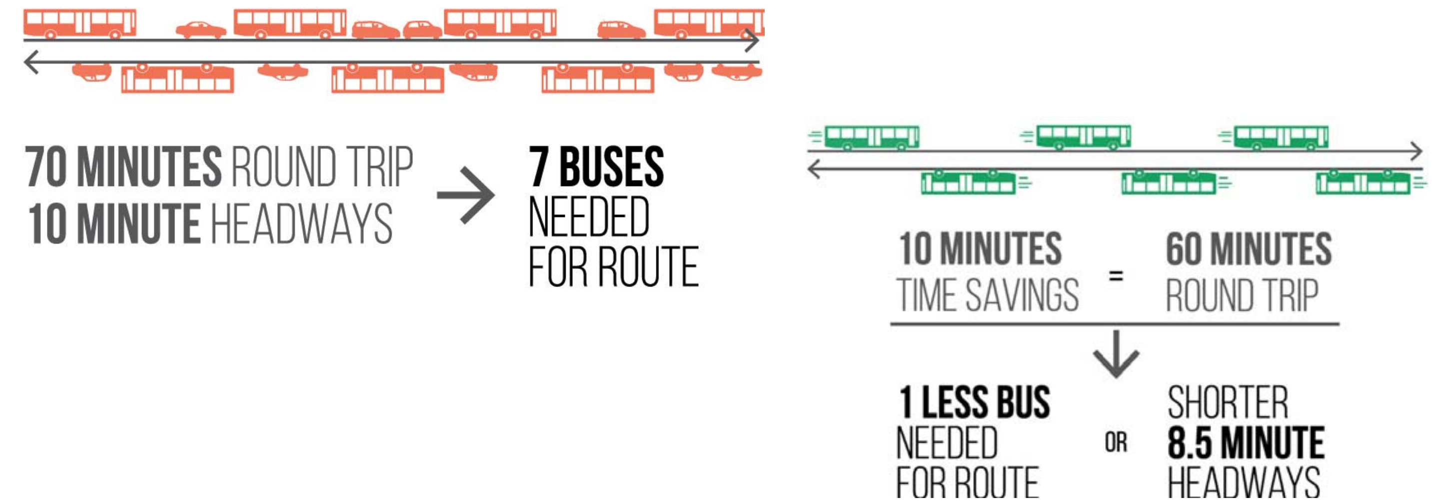
Transit streets save both time and money, making frequent service into a financially sustainable proposition and setting off a virtuous cycle of more riders, more service, and more street space for people. Beyond the well-documented local economic benefits of transit-friendly street design, savings are accrued by transit agencies, which can provide mobility to more people at a lower cost, as well as to passengers who can access more destinations faster. And since transit supports higher-value, more compact development, it is a more fiscally sustainable investment than highway infrastructure. These savings are good for businesses and residents along a transit corridor and far beyond..

Efficiency



Minneapolis, MN: In the Twin Cities, the transit agency estimates that the majority of transit runtimes on a major corridor are when transit vehicles are not moving. (Source: Metro Transit)

New York, NY: After implementing a series of street and service improvements including all-door boarding and dedicated lanes on First and Second Avenues, New York's Metropolitan Transportation Authority and Department of Transportation observed substantial travel time improvements on the M15 Select Bus Service compared with the previous M15 Limited service. (Source: NYC DOT).



Unlocking the enormous potential of transit requires active measures to make trips take less time. To achieve this, the Transit Street Design Guide details street design strategies to improve transit reliability and reduce overall travel times.

Transit service that is reliable and efficient brings value to people and cities, but slow and inconsistent service will discourage passengers and jeopardize local benefits. If a trip takes significantly longer by transit than by other modes, or if actual trip time ranges so widely as to be unpredictable, people may choose not to take transit and cities will miss out on opportunities to reduce congestion and spur development.

For urban transit, getting to a destination faster means removing sources of delay rather than raising top travel speeds. The most significant sources of transit delay are related to both street design and transit operations, calling for coordinated action by transit and street authorities.

TRAFFIC & INTERSECTION DELAY

In mixed traffic, transit is limited by prevailing traffic conditions, and will be delayed by all the factors that delay the cars it shares space with. Time spent waiting for signals or slowing for stop signs, known as intersection delay or traffic control delay, increases as traffic volume nears the capacity of the street, and as cross streets are more frequent or reach their own capacity. Providing transit lanes and using signal strategies can help cut travel times by half, with the greatest benefits made available by using transitways. While these levels of priority stop short of grade-separated facilities, they can be the foundation of every city's transit design toolbox, and are inherently adaptable to a variety of street conditions.

While signal delay is relatively easy to address through active TSP if traffic queues are short, signals with long or variable queues can add up to very long delays for buses and streetcars in mixed-traffic conditions. Time spent slowly approaching red signals or stop signs in heavy traffic can also contribute to overall delay.

DWELL TIME

Dwell time related to passenger boarding and payment is a large component of total travel time on productive routes, especially in downtowns and destination areas. Level or near-level boarding, multi-door boarding and advanced payment options, and better passenger information can cut dwell time in half or more. Stop consolidation also reduces the amount of time spent dwelling at stops.

TIME IN MOTION: ACCELERATION, MERGING, & ROUTE DIVERGENCE

Acceleration, deceleration, and door operation time approaching or leaving a stop can add 15–30 or more seconds per stop. Consolidating from stops to stations and introducing rapid services can dramatically reduce this time expenditure.

For buses in particular, merging into or re-entering the flow of general traffic after a conventional curbside pull-out stop is a perennial source of delay. Reduce this delay by providing in-lane stops and stop-related signal treatments (see Signals & Operations, and Stop Placement & Intersection Configuration), or by enforcing a yield-to-bus law.

Circuitous routes and turns can be time consuming for transit operators and confusing for passengers, often adding significantly to travel time. Keeping transit lines simple and direct serves to minimize this delay, improving transit travel times. While this may increase the time spent walking to a stop, it can benefit overall trip times. Evaluate any changes based on a walking network model and transit travel times.

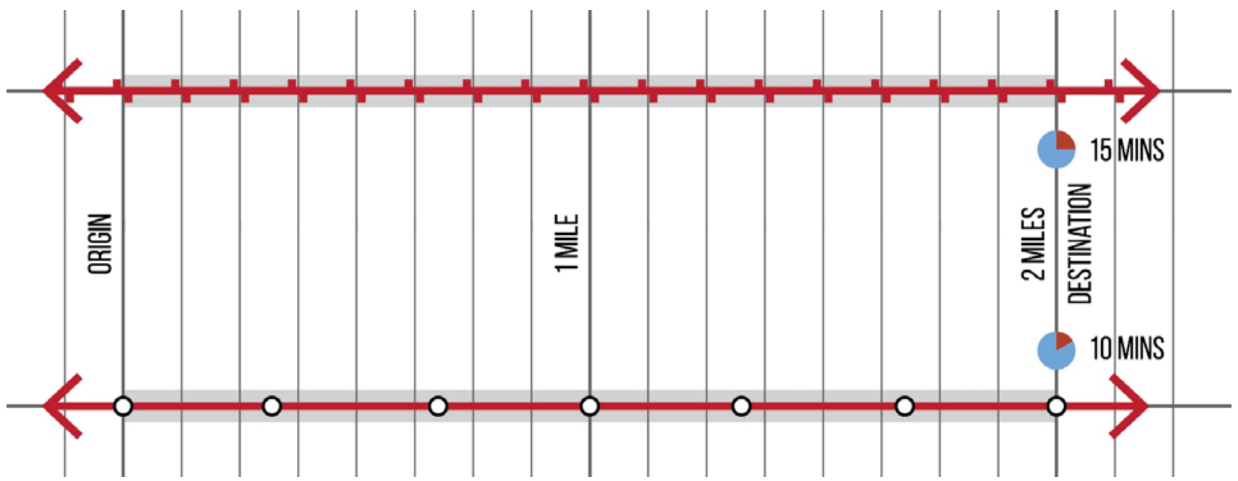
UNLOCKING OPERATIONAL EFFICIENCIES

Addressing the main sources of transit delay has two related benefits. It shortens door-to-door time for a passenger trip, improving the competitiveness of transit. It also reduces the time and cost of each transit vehicle's run, enabling a transit agency to provide more frequent service to each stop with the same number of vehicles and drivers. In this context a small travel time savings is a large cost savings.

Buses in mixed traffic are susceptible to a downward service spiral, in which increased congestion—exacerbated over the long term by designing streets primarily to accommodate private motor vehicles—results in lower ridership and revenue, resulting in service cuts and lower ridership and revenue.

This cycle can be reversed by improving on-street transit travel times. Shorter travel time allows transit operators to run more frequent service, with more runs per hour using the same number of vehicles and drivers. Greater frequency and shorter trip time yields higher ridership, raising revenue and permitting still greater service frequency.

Efficiency



From RTD in Denver
"According to a Portland study, bus stop consolidation improved bus speeds by six percent. The transit industry has standards for stops per mile, depending on population density. Our goal is to consolidate bus stops to meet industry guidelines, which would space bus stops every ¼-mile. Bus stops will still be located near key intersections, major activity generators and areas to accommodate people with disabilities."

From Transitcenter.org
"Too many bus stops means that buses aren't moving as quickly as they should be.
Many bus stops around the country are too close together, slowing down the ride for everyone. Fortunately, transit agencies like SFMTA and Maryland MTA are taking steps to rebalance existing bus stop networks.
Bus stop balancing typically keeps stops that are key transfer points, as well as ones with high ridership. Priority is also granted to bus stops near community and senior centers.
People who can currently reach multiple stops won't see any difference. For riders at stops that have been moved, the maximum added walk time to a new stop should be 1/4 mile at a maximum – approximately five minutes. This (slightly) longer walk means a faster ride, which will enable people to spend more time doing the things they love.
In New York City, buses spend 22% of their time at stops. The MTA has an initial plan to reduce stops on Staten Island Express buses, but needs to take a much broader look at the problem."

Stop spacing is a powerful service-planning tool with relevance to both travel time and coverage goals. Consolidating existing stops is not simple, but converting a route from numerous low-ridership stops to better spaced, higher-capacity stations achieves the benefits of stop consolidation and accessible boarding at the same time.

Switching from stops to high-quality stations can serve to balance walking time and on-vehicle time, with benefits for both travel time and reliability. Prominent, attractive stations with elements like platforms and shelters are easier to construct when investments are concentrated in a smaller number of stops. Stops can become recognizable stations that anchor the transit service in a place.

Stations can be mobility hubs, attracting riders from a larger area with bike share, bike parking, and car share service integration.

APPLICATION & CONTEXT

Local services with eight or more stops per mile are prime beneficiaries of stop consolidation.

Scheduled reconstruction projects are opportunities to include stop consolidation and upgrades, vehicle procurements, and improvements to the pedestrian realm.

New vehicles, especially when procured to meet accessibility standards or to provide rapid service, provide an opportunity to install platforms and consolidate stops.

BENEFITS

Longer station spacing reduces dwell time associated with making more frequent stops; fewer stops allow faster and more consistent travel times, improving service quality for passengers and service cost for agencies. Savings can be used to reduce route cost or increase service frequency.

More prominent stations reinforce the existence, permanence, and legibility of the route and its identity as part of a broader transit system.

Larger stops can accommodate more passengers with better amenities. Higher pedestrian volumes accessing transit stations reinforce safer pedestrian conditions, especially when sidewalks and crossings are upgraded.

More robust station-stop design can allow for faster boarding with level or near-level boarding and off-board fare payment.

Noise and air pollution are reduced when vehicles stop and start fewer times.

Stations allow space used for stops to be restored to other curbside uses, such as vehicle and bike parking, green infrastructure, or parklets also reduces the amount of time spent dwelling at stops.

RECOMMENDATIONS

Set stop spacing based on goals for the route. For general applications, convert to a pattern of stops 800 feet apart for local service, and 1/4–1/2 mile for rapid lines. Distancing stops evenly along the route enables simpler signal progression planning.

When local and rapid services both operate along the same street, more frequent local stops are more acceptable, and rapid stops can be spaced as much as one mile apart. Where local runs alone for long corridors and rapid service is unlikely to be added, consider 1,200–1,400 foot spacing.

Stop spacing for local services of more than 5 per mile can be useful when most passengers are going short distances. These conditions are often met on short routes, in retail and entertainment areas, where substitutes for walking are a primary reason for the service, or where design and street conditions render the delay caused by stops less relevant.

Adjust stop spacing to the street grid and the surrounding transit network, especially reducing the distance to transfers.

Transition from making stops on demand to stopping at every station. Predictable stops and dwell times simplify service and trip planning.

Pair stop consolidation with station investments, including near-level boarding platforms, high-quality shelters and seating, green infrastructure, bike parking, bike share, and real-time passenger information systems (see Stations & Stops and Stop Elements).

Prioritize near-level or level boarding and comfortable waiting areas that do not block pedestrian through movement. Universal design enables more comfortable use for all passengers, including those with disabilities, and speeds boarding and alighting while easing the demand on operators.

Types of Routes

DOWNTOWN LOCAL - Downtown local routes, often frequent, serve an area with a very high demand for short trips and are sometimes operated by a city transportation department or civic group. Unlike conventional loop circulators, downtown locals provide a core transit function for short distances, sometimes parallel to longer local or rapid routes. If planned to complement rather than compete with other structural routes, they can become a permanent feature of the city.

APPLICATION

Downtown locals can be used to connect a high-capacity node (such as a commuter rail terminal) with a broader destination area.

Downtown locals provide extra capacity where dense residential areas are close to major employment or education centers.

Complementary designs: In-lane stops, Transit lanes

SERVICE DETAILS

Stop Frequency: 4 or more per mile.

Service Area: Compact, dense.

LOCAL -Local routes, whether served by bus or rail, are the basic building blocks of urban transit. Local service must balance access—usually considered in terms of stop frequency—with speed. For passengers and operators alike, reliability is often more important than running time. To be effective, local service must be as direct as possible. Deviating from a direct route to serve areas of relatively low ridership will degrade the quality of service.

APPLICATION

Appropriate for all urban contexts, local service serves trips within and between neighborhoods, downtowns, and other hubs.

Provide stop and intersection investments, potentially tied to modest increases in stop distance, to reduce delay on local routes.

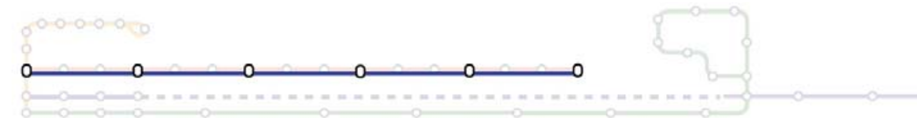
Complementary designs: Enhanced shared lanes, Dedicated transit lanes, Conversion from stops to stations, Multi-door boarding, Transit signal progressions and short cycle lengths

SERVICE DETAILS

Stop Frequency: 3–5 per mile.

Service Frequency: Moderate to high, depending on context.

Service Area: While route length is variable, riders typically use for short- to medium-length trips (less than 3 miles).



RAPID - With less frequent stops and higher capacity vehicles, rapid (or "limited") service can provide a trunkline transit service for longer trips and busy lines, or can run along the same route as a local service. Most bus rapid transit, light rail transit, rapid streetcars, and limited-stop bus lines run on this service pattern.

APPLICATION

On long, direct, or high-demand transit routes, especially on priority corridors such as those connecting downtowns to dense neighborhoods.

Rapid service can make transfers worthwhile to more passengers on routes that intersect many other transit routes.

Complementary designs: Separated transitways, Dedicated transit lanes, Stations or high-amenity stops, Transit signal priority, All-door boarding

SERVICE DETAILS

Stop Frequency: 1 to 3 per mile.

Service Frequency: Moderate to high.

COVERAGE - In low-density areas, or where street networks are poorly connected, basic transit accommodation often results in indirect or infrequent service. In these areas, routes have to be circuitous to serve small pockets of ridership. This is best done by using a coverage route rather that adding a deviation to a local route. Keeping coverage routes as direct as is reasonable can be a prelude to a more productive service as density and demand increases.

APPLICATION

In less densely populated urban edges, coverage service provides a functional connector to regional hubs and destinations, and to the full transit network.

If coverage service is provided to a planned development corridor, include transit-supportive design in initial capital projects.

Complementary designs: Enhanced stops, Complementary mobility services, such as taxi, for-hire vehicles, and car sharing can reduce the need for coverage service in some areas.

SERVICE DETAILS

Stop Frequency: 2 to 8 per mile.

Service Frequency: Low.

Service Area: Low density, feeder to intermodal hubs

EXPRESS - Provide direct point-to-point service with few stops using limited-access highways, sometimes in dedicated or HOV lanes, to reach destinations quickly. Express bus operation is usually more expensive per passenger than limited service, since it often uses one central boarding/alighting point. Many express services run coach buses.

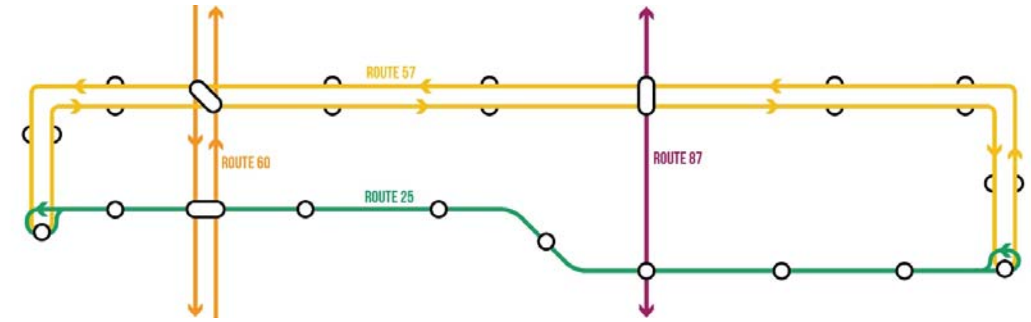
APPLICATION

Connecting neighborhoods with peak-period ridership directly to downtown or other destinations such as airports.

Where freeways or other limited access routes are available.

Primarily serving long-distance commuter routes.

Route Simplification



Direct, simple routes are easy to use, and save time compared with circuitous routes. Transit routes that have evolved in a piecemeal fashion over decades can be simplified to create more frequent and direct service.

Dedicated space and signal strategies pair well with projects that straighten a transit line along a main street, helping these changes add up to meaningful time savings.

APPLICATION

Routes that turn frequently or do not operate in alignment with the existing street grid.

Areas experiencing significant growth or changes in transportation demand including routes that are transitioning from a coverage role to a structural (local or rapid) role in the network.

Systems that have undergone many small, spot-level changes over a long period.

BENEFITS

Reducing the number of turns, especially through complex intersections, eliminates a large source of transit delay.

Transit signal progressions, some forms of active signal priority, and dedicated space treatments are easier to achieve on a single main street.

Reducing route “branching” can allow routes to operate at high frequencies.

CONSIDERATIONS

When transitioning to a grid network that relies on transfers, service needs to be frequent and reliable to facilitate predictable trip times.

Moving or eliminating stops or routes requires local public discussion and an understanding of stakeholder needs. Route realignments in areas with inaccessible or disconnected pedestrian infrastructure are much more challenging to plan in a way that supports existing riders. These changes may be unsuccessful in saving costs, as paratransit trips may increase.

Though access distances can be increased, transit service changes should be designed to avoid entirely cutting off passengers from fixed-route service, with special concern for places where a large percentage or number of passengers are fully reliant on transit.

RECOMMENDATIONS

Long routes should be designed to mitigate the cumulative impacts of delay.

Long routes are a high priority for directness, and should be designed to mitigate the cumulative impacts of delay from turns and other causes.

Turns that serve specific destinations should be close to the beginning or end of a route so that only those passengers using that destination are directly impacted by the increased travel time.

To serve multiple large origins and destinations on separate streets, routes should be chosen to provide reasonable walking distances to both locations without diverting. Choosing to run transit on streets in the center, rather than the edge of districts with multiple destinations, can create a stronger route with more all-day and both-directions ridership.

Routing multiple lines to converge onto a single corridor can increase core frequency and justify higher-quality transit treatments.

Structure routes to serve destinations in a straight line.

Routes that divert from a main street to reach a particular stop reflect a preference for shorter walking distances for passengers who use that stop at the expense of travel time for those already on board. Diverging from the street into parking lots or large developments and campuses can be a major time expense; instead, stop on the street, and work with large landowners to develop frontages or improve internal walking circulation.