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How it Works

What does the TransitCenter Equity Dashboard Do?

The TransitCenter Equity Dashboard tracks how well public transit systems in seven US regions serve their riders, and how changes to transit service affect riders over time. The dashboard measures access to opportunity on transit, transit service intensity and transit affordability for people of color, people living in poverty, essential workers, and other people who rely on transit to meet their daily needs. The dashboard also includes metrics of transit reliability and how travel times to key destinations on transit compare to travel times by car. The dashboard shows these data with a series of charts, interactive maps, and downloadable data sets. Data begin in February 2020 and are included for Boston, Chicago, Los Angeles, New York City, Philadelphia, San Francisco-Oakland, and Washington D.C.

Who made the dashboard?

The TransitCenter Equity Pulse was funded by TransitCenter and was completed in May 2021 by [Sustainable Systems Research, LLC](#), SF2 Enterprises Inc, [University of Vermont](#), and [Klumpentown Consulting](#). The project team includes [Jeff Allen](#), Steven Farber, Alex Karner, [Willem Klumpenhower](#), Lisa Li, Rick Liu, Mitchell Robinson, [Diego Da Silva](#), [Dana Rowangould](#) and Amer Shalaby. The work was performed in collaboration with Mary Buchanan and Steven Higashide at TransitCenter. Community partners in the seven US regions provided feedback and guidance on the dashboard.

How do I cite this dashboard?

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How is the information shown on the Dashboard calculated?

Below we provide a brief description of the methods used to create the dashboard. A more detailed methodology is available upon request. Please contact dashboard@transitcenter.org for more information.

Accessibility represents the ease with which people can reach the places they want and need to go. Accessibility is a function of transportation and land use (where essential destinations are located). Access to opportunities measures, which represent the ease of reaching a specific type of destination, are a commonly used measure of accessibility. The dashboard evaluates access to opportunity on public transit with several measures, including number of jobs, low-wage jobs, or amount of park space accessible in a set amount of time. The dashboard also shows access to opportunity in terms of the travel times to nearby grocery stores, hospitals, urgent care facilities, pharmacies, and colleges or universities.

Measures of public transit accessibility can capture many characteristics of transit systems that affect people's ability to reach their destinations, including the location of stops and routes, what kinds of destinations can be reached on those routes, the speed or directness of routes, the frequency of service, fares, and time spent walking to and from a transit stop or transferring between routes. We estimate transit and car accessibility by calculating transit and car travel times to the locations of destinations across each region. For some measures, we also estimate accessibility using a fare

constraint to represent lower-cost transit travel.

Transit travel times between all Census block groups in each region are estimated using the [OpenTripPlanner](#) (OTP) tool. OTP uses a detailed pedestrian network from [OpenStreetMap](#) (OSM). Transit schedules are represented by [General Transit Feed Specification](#) (GTFS) data for transit operators in each region. These GTFS data are obtained from [TransitLand](#) and [OpenMobilityData](#). Transit travel times are capped at 90 minutes and include all parts of a door-to-door trip, including time walking to and from a transit stop, time spent waiting for a transit vehicle, time spent traveling in vehicle(s), and time spent transferring between transit vehicles. Areas where no destination can be reached within 90 minutes are displayed on maps in the "least access" quantile. Car travel times are estimated using ArcGIS Network Analyst (ArcGIS Pro 2.7) and the ESRI Streetmap Premium network based on [HERE](#) data to represent typical road traffic conditions.

Transit fares are estimated using a simplified heuristic. We created a fare calculator that uses OTP to generate detailed transit itineraries for the shortest trip between all Census tracts in each region. The fare calculator estimates the cost of each itinerary based on a database of manually calibrated rules representing fare information from each transit operator's website. These fare rules include the cost of transfers within and between agencies. In a small number of cases these rules are simplified. We assume that transit travelers pay for a one-way ride with an intermediate purchase choice that is less expensive than cash, such as a ticket or card where available. We assume cash fares where no intermediate choice is available. We do not include discounted fares like student or senior fares or options that require a large up-front purchase like monthly or weekly passes. The fare constraints used in each region are determined based on the cost of living and base transit fares. They are set at \$4 for a one-way trip in Chicago, Los Angeles, and Philadelphia and \$5 in Boston, the District of Columbia, New York City, and San Francisco-Oakland. The fastest transit time between each pair of tracts in the region and its accompanying fare is then estimated for two different transit networks: one that includes only low-cost modes (local bus plus comparable-cost modes) and the other including all modes (all available public transit options). When determining the travel time between two locations, we select the shortest of the two travel times that meets the fare constraint (if applicable). A full list of transit agencies and premium modes (which are excluded from the low-cost travel network) is included [below](#).

We consider five categories of destinations. Destinations and data sources include:

- Jobs and low-wage jobs (\$1250/month or less): [US Census LEHD](#)
- Grocery stores and supermarkets: [SNAP retailers](#)
- Healthcare facilities: [hospitals](#), [urgent care facilities](#), and [pharmacies](#)
- Parks and other green space (including cemeteries, school yards, etc.): [OpenStreetMap](#) queried with the [Overpass API](#).
- Higher education: [colleges and universities](#) and [supplemental colleges](#)

We combine travel times (fare-constrained transit, unconstrained transit, and car) and the location of these destinations to estimate how many destinations can be reached in a certain amount of time, e.g. jobs reachable within 30 minutes. These types of accessibility measures are estimated for destination types that are widely available, including jobs, low-wage jobs, and parks and greenspace. The dashboard's data download also includes a similar gravity-based accessibility measure that uses a continuous decay function to weight opportunities based on how quickly they can be reached.

We also estimate travel times reach a certain number of opportunities, e.g. travel time in minutes to one hospital or to three hospitals. The travel time to one hospital reflects the minimum possible time to reach a hospital. The travel time to three hospitals measures travel time to the third-closest hospital, capturing people's need for options, where the closest hospital may not match someone's needs in terms of the cost or type of care provided. These types of measures are used for healthcare facilities, grocery stores and supermarkets, and higher education.

Transit service intensity represents how often an area is served by transit. Using transit schedules from GTFS feeds we estimate the total number of unique transit trips that visit stops within 200 meters of a block group, and estimate the average number of unique trips per hour over a 24-hour period.

Transit reliability measures evaluate the on-time performance of transit vehicles in a particular transit system, calculated as the fraction of all vehicles in that system that are between 1 minute early and 5 minutes late. The dashboard shows on-time performance for a select number of transit operators that provide direct reports about the status of delay of every vehicle (e.g., minutes early or late for the next stop) in their real-time GTFS feeds. Where a transit operator does not provide on-time performance we do not report reliability. Available GTFS-realtime and NextBus

Jobs	Cumulative Jobs	CE01_P	30 min	c30	45 minutes	c45	60 minutes	c60	autoY autoN fareY fareN
Groceries	Travel Time Minutes	snap_M	Closest	t1	3rd Closest	t3	-	-	autoY autoN - fareN
Hospitals	Travel Time Minutes	hospitals_M	Closest	t1	3rd Closest	t3	-	-	autoY autoN - fareN
Urgent Care	Travel Time Minutes	urgentcare_M	Closest	t1	3rd Closest	t3	-	-	autoY autoN - fareN
Pharmacies	Travel Time Minutes	pharmacies_M	Closest	t1	3rd Closest	t3	-	-	autoY autoN - fareN
Parks	Cumulative Acres	parks_P	15 minutes	c15	30 minutes	c30	-	-	autoY autoN fareY fareN
Post-Secondary Institutions	Travel Time Minutes	schools_M	Closest	t1	3rd Closest	t3	-	-	autoY autoN - fareN
Transit Service Intensity	Average Hourly Trips	los_trips	Options are WKD for weekday service, SAT for Saturday service.						

Note: An additional gravity-based accessibility score is included for access to jobs, both low-income and all. A gravity-based accessibility measure that uses a continuous decay function to weight opportunities based on how quickly they can be reached. These scores are represented with the parameter `nexp`. These scores are not included in the summary data as they are not used in the story page.

Transit Agencies and Routes Used

New York

Agency	Premium Routes
Connecticut Transit Shore Line East	All Rail; Bus Routes: SLET
JFK Airtrain	Bus Routes: 2877, 2878, 2879
Monroe County Transit Authority	None
MTA: MNR Hudson Rail Link	None
Nassau Inter-county Express	None
NJ Transit	All Rail; Bus Routes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
NYC Ferry	All Ferry
Port Authority Trans-Hudson Corporation (PATH)	None
Southeast Area Transit District	None
NYCDOT (Staten Island Ferry)	All Ferry
Westchester County Department of Transportation (Bee-Line Bus)	Bus: 18013
MTA: Long Island Rail Road	Rail Routes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
MTA: Metro-North	Rail Routes: 1, 2, 3, 4, 5, 6, 10, 11, 12, 13, 14

Railroad

MTA	Bus Routes: BM1, BM2, BM3, BM4, BM5, BXM1, BXM10, BXM11, BXM18, BXM2, BXM3, BXM4, BXM6, BXM7, BXM8, BXM9, QM1, QM10, QM11, QM12, QM15, QM16, QM17, QM18, QM2, QM20, QM21, QM24, QM25, QM3, QM31, QM32, QM34, QM35, QM36, QM4, QM40, QM42, QM44, QM5, QM6, QM7, QM8, X27, X28, X37, X38, X63, X64, X68
Academy	Bus Routes: SIM1, SIM10, SIM11, SIM15, SIM1C, SIM2, SIM22, SIM23, SIM24, SIM25, SIM26, SIM3, SIM30, SIM31, SIM32, SIM33, SIM33C, SIM34, SIM35, SIM3C, SIM4, SIM4C, SIM4X, SIM5, SIM6, SIM7, SIM8, SIM8X, SIM9

Washington D.C.

Agency	Premium Routes
Arlington Transit	None
Calvert County Public Transportation	None
Charles County VanGo	None
DASH Bus	None
DC Circulator	None
DC Streetcar	None
Fairfax Connector	Bus Routes: 393, 394, 395, 396, 599, 698, 699
Fairfax CUE	None
Maryland Transit Administration	Rail: MARC
Montgomery County MD Ride On	Bus Routes: 6461
OMNIRIDE	Bus Routes: 3335, 3336, 3337, 3338, 3339, 3340, 3341, 3346, 3348, 3349, 3350, 3351, 3354, 3355, 3356, 3357, 3358, 3360, 3361, 3365
Prince George's County TheBus	None
Regional Transportation Agency of Central Maryland	None
TransIT Services of Frederick County	None
Virginia Railway Express	All Rail
WMATA	Bus Routes: 11Y, 17B, 17G, 17H, 17K, 17L, 17M, 18G, 18H, 18P, 29W, 5A, B30
Prince George's County TheBus	None
Regional Transportation Agency of Central Maryland	None
TransIT Services of Frederick County	None
Virginia Railway Express	All Rail
WMATA	All Subway; Bus Routes: 11Y, 17B, 17G, 17H, 17K, 17L, 17M, 18G, 18H, 18P, 29W, 5A, B30

Los Angeles

Agency	Premium Routes
Anaheim Resort Transportation	None
Airport Valet Express	None
Avalon Transit	None
Beaumont Transit	Bus Routes: 3420, 15730, 16684
Big Blue Bus	Bus Routes: 3265
Corona Cruiser	None

Culver City Bus	None
Duarte Transit	None
El Monte Transit	None
Foothill Transit	Bus Routes: 490-155, 493-155, 495-155, 498-155, 499-155, 699-155, 707-155
Glendale Beeline	None
Gold Coast Transit	None
Kern Transit	Bus Routes: 1161, 1162, 1164, 1166, 1167, 1168, 1173, 1175, 1367, 1368
LA Go Bus	None
LADOT	Bus Routes: 626, 627, 628, 629, 630, 631, 633, 634, 635, 636, 637, 638, 640
Lawndale Beat	None
Long Beach Transit	None
Metro - Los Angeles	Bus Routes: 442-13135, 460-13135, 487-13135, 489-13135, 501-13135, 550-13135, 577-13135, 910-13135
Metrolink Trains	All Rail
Mountain Transit	All Cable Tram; Bus Routes: 240, 241, 242, 243
Norwalk Transit System	None
OmniTrans	None
Orange County Transportation Authority	Bus Routes: 206, 211, 213, 701, 721, 794, 53x, 57x, 64x
Palo Verde Valley Transit Agency	Bus Routes: 358, 6467
Palos Verdes Peninsula Transit Authority	None
Pasadena Transit	None
Riverside Transit Agency	Bus Routes: 200, 204, 205, 206, 208, 210, 217
Simi Valley Transit	None
Spirit Bus	None
SunLine Transit Agency	Bus Routes: 1294
Thousand Oaks Transit	Bus Routes: 5234
Torrance Transit System	None
Ventura County Transportation Commission	None
Victor Valley Transit Authority	Bus Routes: 7106

Philadelphia

Agency	Premium Routes
Cecil Transit	None
NJ Transit Rail	All Rail
SEPTA	None
Port Authority Transit Corporation	All Rail

San Francisco-Oakland

Agency	Premium Routes
AC TRANSIT	Bus Routes: F, G, J, L, LA, NL, NX, NX1, NX2, O
Altamont Corridor Express	All Rail
Angel Island Tiburon Ferry	All Ferry
Blue & Gold Fleet	All Ferry

Caltrain	All Rail
Capitol Corridor Joint Powers Authority	All Rail
City of Palo Alto Shuttle	None
Commute.org Shuttles	None
County Connection	None
Dumbarton Express Consortium	Bus Routes: DB, DB1
Emeryville Transportation Management Association (Emery Go-Round)	None
Fairfield and Suisun Transit	Bus Routes: 11144, 11128
Golden Gate Ferry	All Ferry
Golden Gate Transit	None
Livermore Amador Valley Transit Authority	None
Marin County Transit District	None
Mission Bay TMA	None
Rio Vista Delta Breeze	Bus Routes: 29, 31
SamTrans	Bus Routes: FCX-184
San Benito County Express	None
San Francisco Bay Ferry	All Ferry
San Francisco Municipal Transportation Agency	Cable Tram Routes: California Street Cable Car, Powell-Hyde Cable Car, Powell-Mason Cable Car
San Joaquin Regional Transit District (RTD)	Bus Routes: 150, 152, 163
Santa Cruz Metro	Bus Routes: 17-130
SolTrans	Bus Routes: 13571, 11098
Sonoma County Airport Express	Bus Routes: 12331
Sonoma Marin Area Rail Transit	None
Stanford Marguerite Shuttle	None
Tideline Water Taxi	None
Tri Delta Transit	None
Union City Transit	None
VTA	Tram Routes: All; Bus Routes: 101, 102, 103, 104, 121, 168
WestCat (Western Contra Costa)	Bus Routes: 2676
Bay Area Rapid Transit	All Rail

Chicago

Agency	Premium Routes
Chicago Transit Authority	None
Metra	All Rail
Northern Indiana Commuter Transportation District	All Rail
PACE	Bus Routes: 755-317, 850-317, 851-317, 855-317

Boston

Agency	Premium Routes
128 Business Council	None
Boston Harbor Islands National and State Park	All Ferry
Brockton Area Transit Authority	None
Cape Ann Transportation	Bus Routes: 2846

Coach Company	Bus Routes: 12119, 12138, 12143
Lowell Regional Transit Authority	None
Martha's Vineyard Transit Authority (including Vineyard Fast Ferry)	Bus Routes: 2799, 2803, 2805, 2807
Massport / Logan Express	Bus Routes: 11704, 11705, 11706, 11707
MBTA	Bus Routes: 170, 325, 326, 351, 352, 354, 426, 428, 434, 450, 501, 502, 503, 504, 505, 553, 554, 556, 558, 741, 742, 743
Merrimack Valley Regional Transit Authority	Bus Routes: 10735, 10736, 70738
Middle West Regional Transit Authority	None
Middlesex 3 TMA	None
Montachusett Regional Transit Authority	Bus Routes: 3510, 4729
Patriot Party Boats	None
Peter Pan Bonanza Division and Peter Pan Bus Lines	None
Pioneer Valley Transit Authority (including Plymouth and Brockton Street Railway Co.)	None
Rhode Island Public Transit Authority	None
Seastreak	None
Southeast Area Transit District	None
Southeastern Regional Transit Authority	None
The Greater Attleboro Taunton Regional Transit Authority	None
Worcester Regional Transit Authority	None
Yankee Line	Bus Routes: All

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