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TRANSPORT FINDINGS

Where can you go on the go? An Assessment of Public Restroom Access along Transit in San Diego

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Findings

For people "on the go" like public transit riders, restroom access can be a valued amenity, especially as cities seek to curb greenhouse gas emissions by reducing auto-dependence. However, little research exists on public restroom access along transit lines. This study: 1) visualizes the distribution of available restrooms along trolley lines in San Diego, California; and 2) assesses the basic health-supportive features of available transit-adjacent restrooms. Results show low restroom availability, especially at stations with the highest volumes of riders. Results also reveal limited access and low quality of the restroom facilities that are available.

1. Questions

Restrooms are among the most basic health-supporting resources that all people need 5 to 8 times daily, on average (Hanson, Bichard, and Greed 2007). Public transit riders in U.S. cities including Boston, New York, D.C., and Los Angeles have limited access to restrooms (Herman 2021; Marshall 2015; Ley 2022; Payne 2023), in part because transit agencies struggle with the time and expense it takes to maintain these facilities for riders and operators alike (National Academies of Science, Engineering, and Medicine 2020). However, in the absence of these facilities, transit operators and others must deal with open urination/defecation and the related public health consequences (Amato et al. 2022).

Behind safety and security features, restrooms are one of the most desired amenities at transit stations: the presence of a restroom is associated with higher rider satisfaction, ranking higher than other amenities such as places to sit, places to purchase food/drinks, and cleanliness (Taylor et al. 2009; Iseki and Taylor 2010). As efforts continue to shift travel out of private cars and towards public transit to curb greenhouse gas emissions, investment in basic station amenities, such as restrooms, could reduce the perceived burden of transit use and contribute to a comfortable, safe, and healthy transit travel experience (Fan, Guthrie, and Levinson 2016; National Academies of Science, Engineering, and Medicine 2020; Washington 2014). Little else is known about restroom availability, distribution, and quality in a transit setting.

To address gaps in knowledge around the measurement and visualization of this basic need, we use San Diego, California as a case study. San Diego has experienced repeated public health outbreaks directly connected to inadequate restroom access (Dehaven 2017; Rivas 2023). This study answers the following questions: What are the characteristics of public restrooms along the San Diego

Metropolitan Transit System's (SDMTS) trolley lines? How are restrooms distributed across trolley lines and stations and what does access look like at these restrooms? What health and safety features are or are not available?

2. Methods

The San Diego Association of Governments (SANDAG) maintains an open GIS data warehouse where SDMTS' General Transit Feed Specification (GTFS) data are publicly available (SanGIS 2022). We downloaded these GTFS data (August 2022) and used ArcGIS Pro to identify and map the three SDMTS trolley lines and 63 associated trolley stations. We further validated these locations using SDMTS' online trolley system map (SDMTS, 2022). SDMTS provided data on average weekday ridership at 62 of the 63 trolley stations, due to one station (Qualcomm Stadium) being under construction, for June 12, 2022, through September 3, 2022. We use ridership data as a proxy for potential restroom demand but note that SDMTS does not have documented policy related to ridership and restroom availability.

We developed a spatial database of public restrooms in San Diego County. Every restroom is identified with a unique identification number, name, and geographic coordinates. Data are stored and openly accessible online (Project for Sanitation Justice 2023). All restrooms in this dataset (n=798) were verified to meet a set of inclusion criteria which include that each facility:

- cannot charge a fee for use;
- cannot be in a facility that charges an entry fee (paid museums, concert venues, some campgrounds);
- must be a permanent structure with a toilet and handwashing station (no portable toilets, which can disappear without notice);
- cannot be located inside of a private business;
- cannot be permanently closed or under construction; and
- cannot be located beyond a security screening checkpoint such as those at K-12 schools, airports, and military bases.

Additionally, we categorize restrooms as either "open access" or "subjective access," with the latter having one or more of the following barriers: security guards or attendants; time limits on usage; limits and rules about what personal belongings can be brought into the restroom; or the user must get a free key/token from an adjacent business to gain entry to the restroom.

We layer these restroom locations with trolley station locations in GIS. We use Euclidean distance buffers around each of the SDMTS trolley stations to identify restrooms within a quarter-mile radius of a trolley station; this is the same distance-based buffer SDMTS uses to identify restrooms at or adjacent to

Figure 1. Schematic of Restroom Assessment Tool

Questions	Responses
Menstrual Product Availability	1. Yes (Monetary Fee) 2. Yes (Free) 3. No 4. Unknown
Baby Changing Stations	1. Yes 2. No 3. Unknown
Gender Neutral Stall(s)	1. Yes 2. No 3. Unknown
ADA-Accessible	1. Yes 2. No 3. Unknown
Shower	1. Yes (Monetary Fee) 2. Yes (Free) 3. No 4. Unknown
Hours of Operation (verification of advertised hours)	1. Same as advertised hours 2. Could not confirm 3. Closed during advertised hours 4. Other a. Open-ended
Restroom Category (facility type)	1. Public Facility a. Library, Recreation Center, Pool, Senior Center, Community Center, or Health Center 2. Outdoor Facility a. Park, Beach, Trail, Campground, or Golf Course 3. Government Building 4. Commercial a. Shopping Centers or Restaurants 5. Transportation a. Bus Stop, Trolley Station, Gas Station, or Rest Stop 6. Other a. Open-ended
Adjacent SDMTS Trolley Station ID(s) (within 400 m (0.25 mile))	Open-ended
Barrier(s) to Entry	Select all that apply: 1. Rules/limits (e.g., time limit, prohibition on bringing belongings inside) 2. Security Guard or attendant present 3. Key or token needed to gain entry 4. None

their stations (SDMTS, 2023). In some cases, a restroom fell into more than one trolley station's buffer. This process identified 32 trolley station-adjacent restrooms.

The research team visited each identified restroom and completed a field assessment. Prior research (e.g., Corradi, Garcia-Garzon, and Barrada 2020) and advocacy (e.g., PHLUSH n.d.) informed development of the assessment tool. Using Esri's Field Maps mobile application (Esri n.d.) we collect assessment data to confirm the location of each facility and collect "top line" information on critical restroom features. Figure 1 displays a schematic representation of the assessment tool.

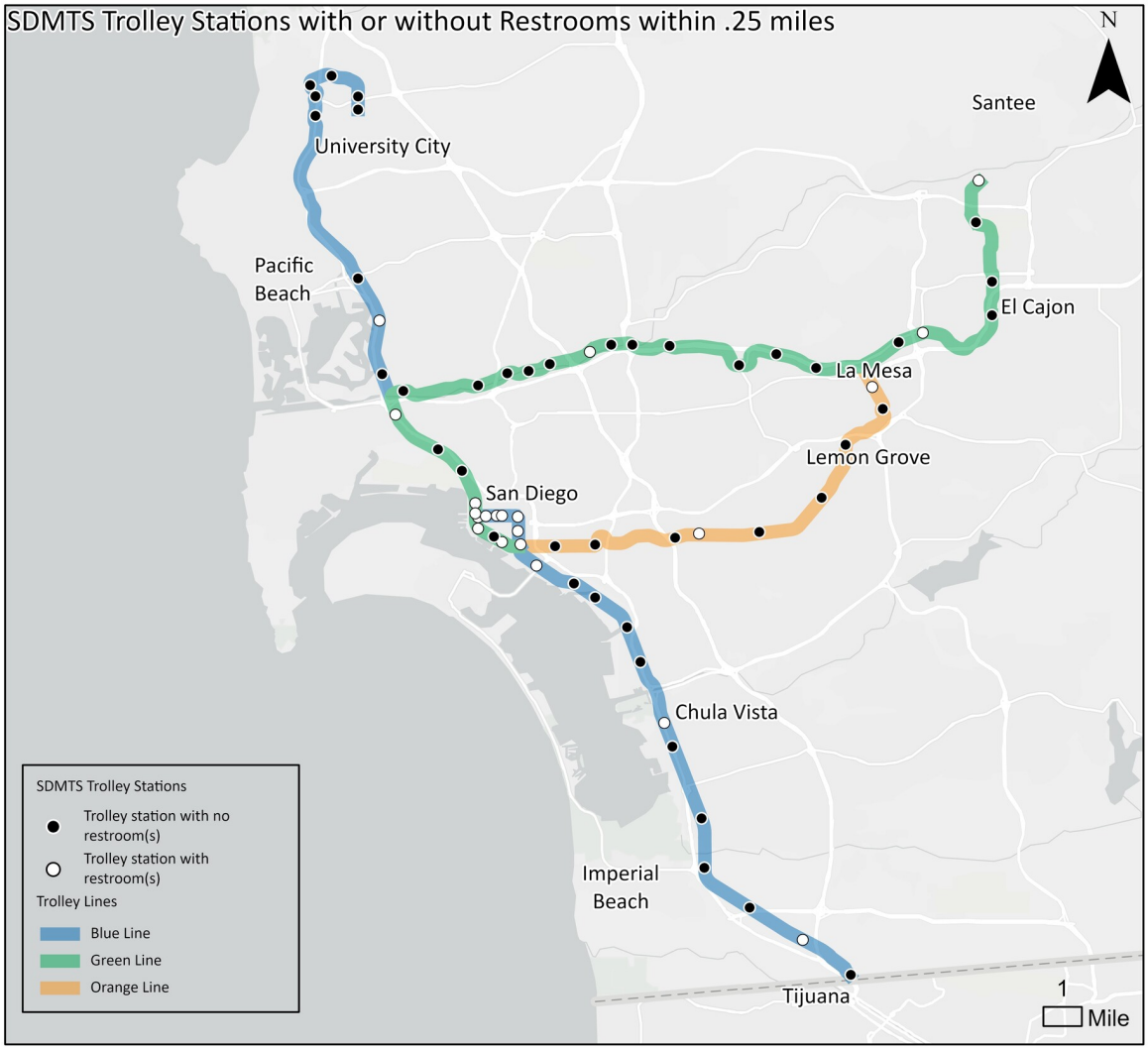

Figure 2. SDMTS Trolley Stations with and without Public Restrooms within 400m (0.25 miles)

3. Findings

Of the 63 SDMTS trolley stations, 21 (33%) have one or more open or subjective access public restrooms (n=32) within a quarter-mile radius (see Figure 2). There is a high density of restrooms near trolley stations in the Downtown and Old Town neighborhoods where stations have three or four restrooms, respectively. Only two stations have an available restroom at or immediately next to the boarding platform.

Across trolley lines, the Blue Line has the most stations (n=32) and the majority of SDMTS-adjacent restrooms (n=13) are along this line (Table 1). Proportionally, the Green Line has the fewest stations with restrooms where only 9 of 27 stations (33%) have a restroom available. Note, some trolley stations serve more than one trolley line.

We calculate quartiles by station ridership and compare the average number of restrooms available at trolley stations in each quartile (Table 2). The average ridership across trolley stations during the study period was 1,691 passengers with a standard deviation of 2,391. In general, higher ridership trolley stations

Table 1. Restroom Availability along SDMTS Trolley Lines

	Stations with Restrooms	Stations without Restrooms
Blue Line	13 (41%)	19 (59%)
Green Line	9 (33%)	18 (66%)
Orange Line	9 (47%)	10 (53%)

Table 2. Trolley Station Ridership and Restroom Availability

	Ridership Range	Average Number of Restrooms Available at Trolley Stations
Quartile 1	0 to <633	0.24
Quartile 2	633 to <935	0.47
Quartile 3	935 to <1,937	0.60
Quartile 4	1,937 to <14,636	1.10

Table 3. Access and Quality Features of Public Restroom Facilities within a Quarter-mile Radius of SDMTS Trolley Stations.

Restroom Access and Critical Features	Restrooms with Feature Present
ADA-accessible	29 (91%)
Barrier(s) to entry (i.e. subjective access)	11 (34%)
Open 24/7**	4 (13%)
Baby changing station present	13 (41%)
Gender-neutral facility available	10 (32%)
Menstrual products available*	5 (16%)
Showers (free)	4 (13%)

* Menstrual products are available at 5 restroom locations – 3 are free and 2 cost money.

** Of 4 restrooms advertised as open 24/7, we confirmed that 3 are indeed available 24/7.

have a greater number of nearby public restrooms. Approximately one in four stations in quartile one has a restroom available while there is on average, one restroom available at each station in quartile four. However, two of the five highest ridership stations do not have a nearby restroom, and stations in three of the four quartiles have less than one restroom available, on average.

We also found limited access and low quality among the public restroom facilities that are available (Table 3). Not all restrooms have an ADA-accessible option, with (2, 9%) lacking an accessible stall. A low percentage of facilities offer 24/7 availability (4, 13%); gender-neutral or "family" restroom options (10, 32%); and baby changing stations (13, 41%). Menstrual products were available (5, 16%) but free of charge at only 3 locations.

To our knowledge, this is the first study to visualize the distribution of public restrooms along transit lines. Results show low restroom availability along SDMTS trolley lines, especially at stations with the highest volumes of riders. Our analyses rely on a quarter-mile Euclidean distance buffer around stations and may overestimate the availability of convenient trolley-adjacent restrooms. Results also reveal limited access and low quality of the restroom facilities that are available. In the wake of COVID-19 and tight budget conditions, it is

unlikely that transit agencies like SDMTS can provide restrooms at all stations. We use ridership data in this analysis to provide one option for thinking through how to prioritize investments at stations and policy related to restroom needs. Future research should examine the role that restroom access might play in incentivizing public transport usage, especially in the context of broader climate action goals.

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