TRACS

Transportation Resilience, Accessibility and Climate Sustainability

METROPOLITAN TRANSPORTATION COMMISSION

World Institute on Disability

Community Research Overview, Findings, and Recommendations

World Institute on Disability

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Transportation Resilience, Accessibility and Climate Sustainability (TRACS)

A partnership between the World Institute on Disability (WID) and Metropolitan Transportation Commission (MTC), supported by the California Department of Transportation (Caltrans)

TRACS is an intensive research and policy analysis initiative to explore how people with disabilities and seniors in the San Francisco Bay Area navigate regional transportation systems. Among other topics, it will address these groups' use of transportation, their positive feedback, frustrations, concerns, and recommendations. TRACS aims to improve the transportation system overall to support independence and well-being, with special focus on ensuring climate resilience and effective emergency management for seniors and people with disabilities. TRACS includes data analysis; research on regional transportation options, operators, policies and planning; engaging the disability community through focus groups, interviews, and surveys; developing policy

recommendations; and public education initiatives through workshops and publications.

Community Research Overview, Findings and Recommendations: Table of Contents

Table of Contents

Overview

The San Francisco Bay Area ("Bay Area") is a geographically, economically and demographically diverse region comprising the 9 counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma Counties. According to the US Census Bureau's American Communities Survey (ACS), the Bay Area has over 7.6 million residents as of 2017; approximately 9.8% of the population has a disability and 14.8% are seniors (age 65 and above), while the combined disability and senior populations represent 20% of the region's residents. [Note: some agencies and organizations consider seniors to be age 60 and above, which would result in a larger senior population than 14.8%; the ACS's methodology for defining and calculating disability is somewhat conservative as well, so the disabled population is likely higher than 9.8%.] These groups represent a significant constituency that will grow in the coming years given the area's aging population and correlation between age and disability. The combined constituencies of seniors and people with disabilities also have unique experiences and needs related to the region's economy, services and infrastructure.

Transportation is one of the largest concerns to people with disabilities and seniors in the Bay Area. People with disabilities – including but not limited to individuals with mobility, sensory, psychological, learning, intellectual and/or developmental disabilities – have distinct needs around transportation ranging from physical accessibility (e.g. functioning ramps, elevators, and wheelchair-accessible private vehicles) to ease-of-navigation to information being available in

accessible and/or alternative media (e.g. brochures in braille, screen-reader-accessible websites and apps, etc.). People with disabilities and seniors also utilize transportation options that are not necessarily available to younger individuals without disabilities, including paratransit, volunteer driving services, and assorted fare discounts on public transit.

Through mid-late 2019 and early 2020, a team from the World Institute on Disability (WID) and Metropolitan Transportation Commission (MTC) – collectively, the "TRACS staff" – conducted a series of interviews, workshops, and focus groups, as well as distributed an online survey, to engage stakeholders from across the Bay Area. The stakeholders included people with disabilities, seniors, allies and support networks (e.g. fellow advocates, friends, family and care attendants), plus transportation-focused professionals (e.g. transit agency staff and contractors) and advocates. TRACS staff also reviewed literature and reports related to the intersection of transportation, transit systems, seniors and people with disabilities. While the research is mostly qualitative, some research provided quantitative insights – such as assorted information in literature reviews and some data gleaned from the TRACS online survey. This work builds off preliminary research to understand the nature of the Bay Area's population of people with disabilities and seniors, its transportation networks, and the intersections thereof[1].

In general, our findings show that there is a large population of seniors and people with disabilities that strive to have vibrant, independent lives. These

[1] Bay Area Transportations Systems Overview and Analysis, WID 2020

communities thus need access to the types of transportation that make vibrant, independent living possible. Ideal transit should be affordable, accessible, reliable, timely, relatively simple (e.g. with zero or few transfers for a single trip), flexible, and feature multiple transportation options to accommodate a range of individuals and situations. While transit systems should meet the legal baseline for accessibility, operators should ultimately strive to meet "universal design" principles that go beyond the Americans with Disabilities Act (ADA) and other statutes. Finally, transportation networks should provide reliable, resilient and efficient mobility in the case of disasters – such as for evacuating ahead of wildfires or traveling after an earthquake – and be able to bring vital goods and services to individuals who "shelter in-place." This is increasingly important in an age of drastic climate change and its related threats to the frequency and severity of wildfires, potential for flash-flooding events, and so on.

Unfortunately, seniors and people with disabilities do not always have access to the reliable and affordable transportation that makes vibrant, independent living possible. Interviewees, attendees at focus groups and workshops, and survey respondents did not hold back criticisms of the Bay Area's transportation system. Assorted barriers and shortcomings include, but are not limited to: lower rates of personal vehicle ownership, difficulty navigating complex public transit systems, lengthy travel times on fixed-route transit, physical accessibility barriers on pedestrian pathways (e.g. uneven sidewalks), inaccessible bus stops and transit stations, unreliable elevators to light- and heavy-rail stations, cost concerns, dangers to personal safety, and scheduling constraints for paratransit. Although participants understand the importance of paratransit, that service received

outsize criticism compared to fixed-route systems, especially regarding the need for advanced scheduling and paratransit's wide pick-up time "windows." Individuals living in more rural areas, especially the Bay Area's most isolated segments (e.g. coastal Sonoma County), have very limited public transit options with related consequences to independent living; secondary troubles (e.g. safety concerns at bus stops) add even more barriers.

Interviewees, event participants and survey respondents also showed appreciation for many aspects of the Bay Area's transportation system. Some paratransit users consider its services indispensable, despite any qualms about scheduling, and have learned to navigate around day-ahead reservations and half-hour (or longer) pick-up windows; paratransit users in regions with more comprehensive service (e.g. San Francisco, which provides door-to-door assistance) recognized those benefits as well. Research highlighted the importance of affordable transportation, especially for people with disabilities given the group's disproportionately low income and asset levels: low-cost services like fixed-route buses and paratransit, combined with senior and/or disability discounts, provide some of the only feasible transportation options for lower-income seniors and people with disabilities. Accessibility was another positive theme: because many people with disabilities cannot use non-modified vehicles (e.g. most cars, trucks, taxis and ride-share vehicles), accessible public transit (e.g. buses with ramps and wheelchair seating areas) is sometimes the only viable option for leaving one's home – and people with accessibility needs recognize that value.

Transportation-related stakeholders – including transit agency staff, contracted paratransit service providers, regulators and travel trainers – showed a personal commitment to supporting high-quality, accessible and reliable transportation for seniors and people with disabilities. These stakeholders were upfront about the difficulties of managing and improving the Bay Area's transportation network (and segments thereof). Funding and overall financial management was a frequent focus area, creating outsize stresses for some entities – such as agencies with smaller sizes (e.g. for budgets, numbers of vehicles and ridership), smaller revenue streams, and larger geographic footprints. Interviewees and participants recognized the validity of many federal and state guidelines, such as farebox recovery minimums and the ADA's paratransit regulations; however, those guidelines can be difficult to meet and/or make it difficult to change policies for the better (e.g. how farebox recovery minimums prevent agencies from providing public transit free-of-cost). Transportation stakeholders have heard a plethora of appreciation, complaints and recommendations from seniors and people with disabilities: for the most part, stakeholders want to improve the system and encourage disability and senior advocates to understand the nature of the Bay Area's transportation entities – and where to direct feedback to make the largest impact. They also encourage policymakers to pursue comprehensive strategies to improve transportation while utilizing the specific capacities of the Bay Area's myriad transportation and related entities; so dynamic systems using Universal Access and other equity principles may be better than attempts to shoehorn dozens of entities into a "one-size-fits-all" accessibility framework.

Policy research and a literature review illuminated several strategies to support vibrant, equitable and independent living through the transportation system. Strategies include: improving physical accessibility of transit stops and paths-of-travel; expanding “travel training” programs, in both individual and group settings; listing accessibility features in trip-planning websites and applications; starting public awareness campaigns about the benefits of using transit; training staff on appropriate ways to interact with passengers with disabilities, their mobility equipment, service animals, etc.; and tracking any financial benefits of those improvements (e.g. reduced expenses through passengers using buses instead of more costly paratransit). Community engagement – following the advocacy mantra of “Nothing About Us, Without Us” – should be built into all major decision-making processes, with new commissions and community advisory boards as needed. Finally, it should be a system-wide goal to improve transportation service for seniors and people with disabilities, using universal access and independent living frameworks, from regional planning through retrofitting specific bus stops.

Review: People with Disabilities and Seniors in the Bay Area

In early 2020, TRACS staff produced a document outlining the current experience of seniors and people with disabilities in the Bay Area, as well as an overview of the Bay Area’s many transportation systems. The document, titled “Bay Area Transportation Systems for People with Disabilities – Overview and Analysis,” laid out the demographic profile of these population groups; outlined the “disability

experience" of these Bay Area residents and the importance of independent living frameworks; provided a history of the disability rights movement in the Bay Area and beyond; explained the assorted transportation services in the Bay Area, including qualities relevant to seniors and people with disabilities; and analyzed the quantitative profiles (e.g. budgets, ridership, and performance measures) of the Bay Area's transportation service providers and service types.

The report's population overview utilized census-tract level data from the American Communities Survey and listed seniors as being 65 years or older (as opposed to the 60-and-over definition used by some entities). The data showed a regional profile of 9.8% people with disabilities, 14.8% seniors, and 20.0% combined; numbers varied widely by county, as shown in the following table.

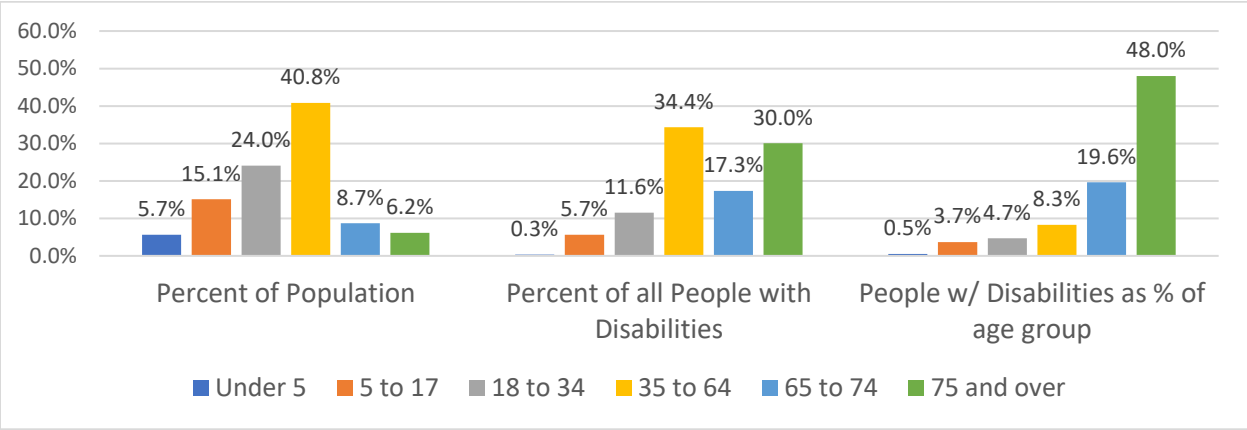
Table 1: Population of People with Disabilities in the Bay Area

County	**Total Population***	**Percent Disabled**	**Percent Seniors**	**Percent combined**
Alameda	1,619,367	9.6%	13.6%	18.9%
Contra Costa	1,141,780	11.7%	15.2%	22.1%
Marin	256,005	9.2%	21.9%	25.8%
Napa	139,286	13.1%	17.9%	24.7%
San Francisco	880,097	9.8%	15.2%	19.9%
San Mateo	767,094	8.2%	15.7%	19.1%

Santa Clara	1,928,741	8.2%	13.0%	17.0%
Solano	432,898	13.0%	15.2%	22.9%
Sonoma	500,585	11.9%	18.7%	25.4%
Total	**7,665,853**	**9.8%**	**14.8%**	**20.0%**

* Total Civilian Noninstitutionalized Population

Figure 1: Civilian Noninstitutionalized Population Characteristics



The Bay Area has 1.581 non-water census tracts across its 9 counties; the demographic makeups of these census tracts varied widely, with clear differences between types of geographies (e.g. urban/suburban/rural), between counties and even in different parts of the same city. The following tables and maps show the number of Census tracts delineated by the percentage of populations that are age 65 or older and/or have disabilities, as well as the density in persons per square mile.

Figure 2: Count of Census Tracts by Percentage of Population

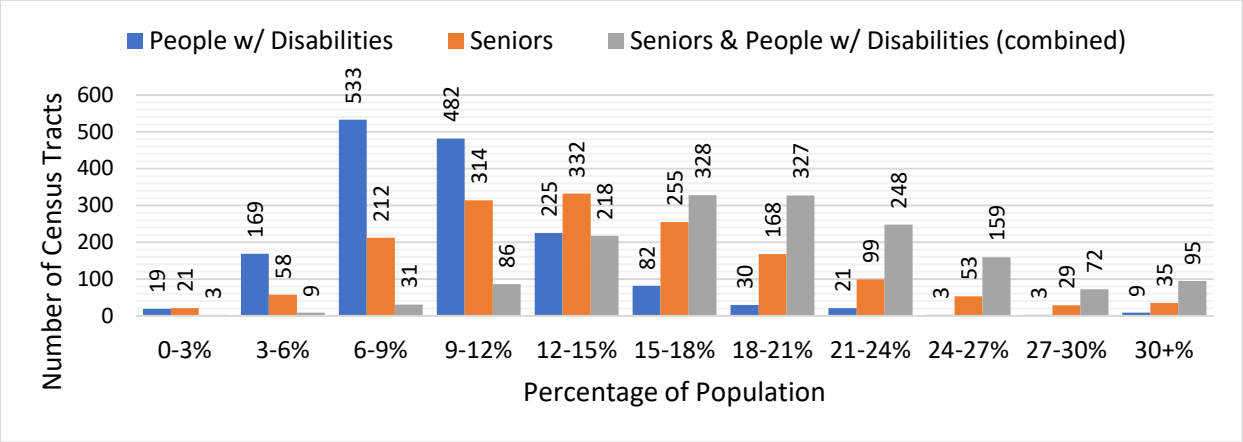


Figure 3: Count of Census Tracts by Population Density

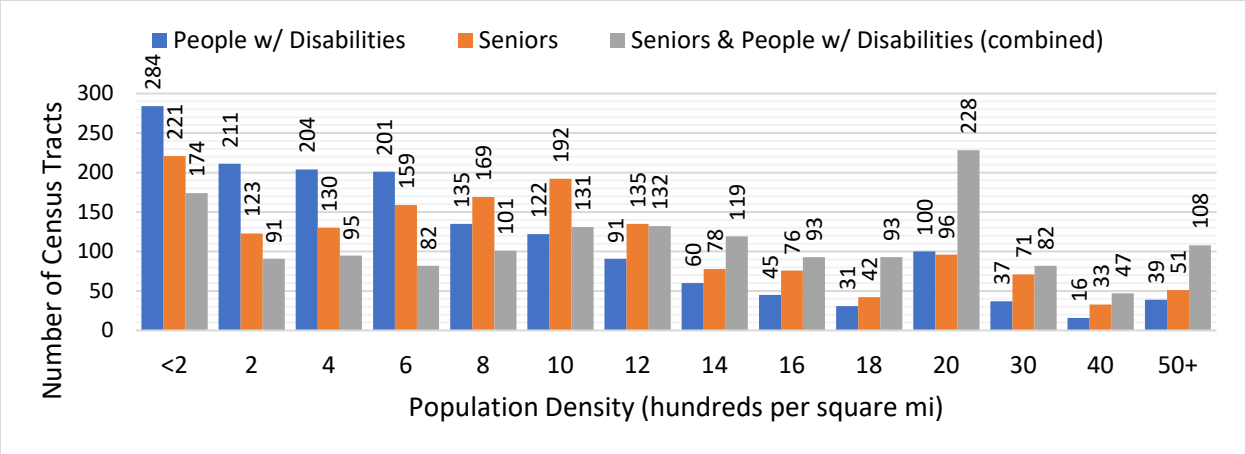


Fig 4.1: People w/ Disabilities as % of Population

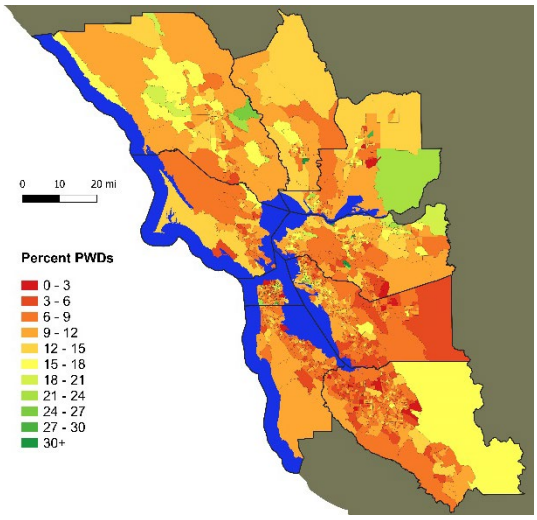


Figure 4.2: Seniors as % of Population

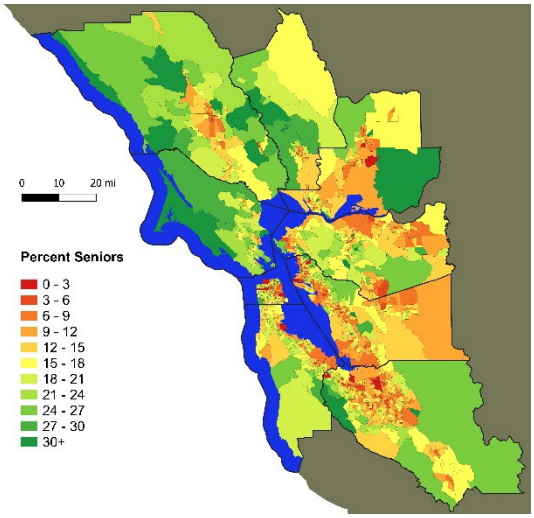


Fig. 4.3: Combined as % of Population

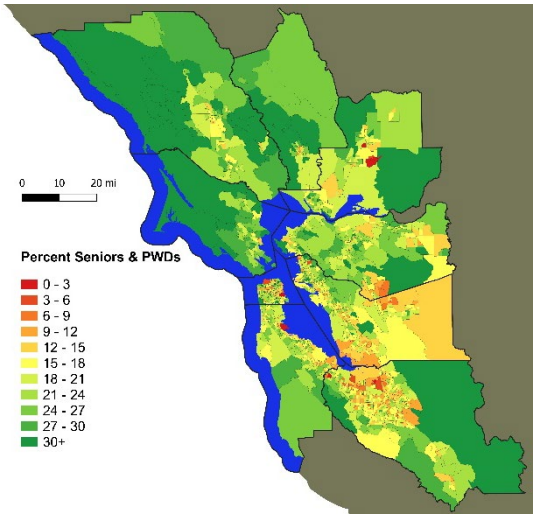


Figure 5.1: People w/ Disabilities per mi^2

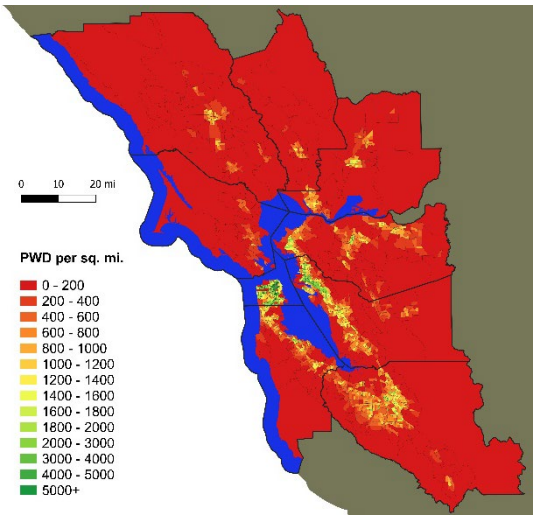


Figure 5.2: Seniors per mi^2

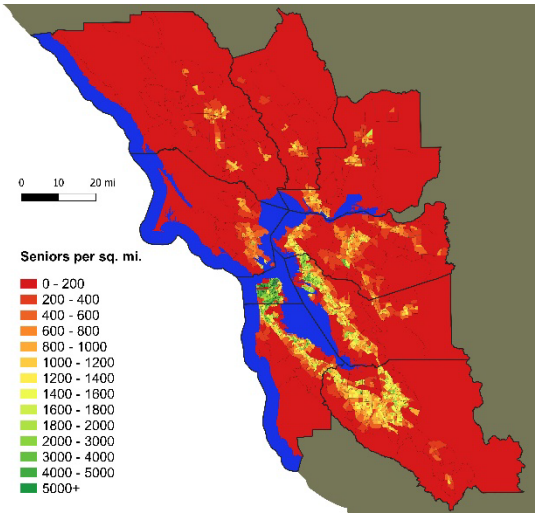
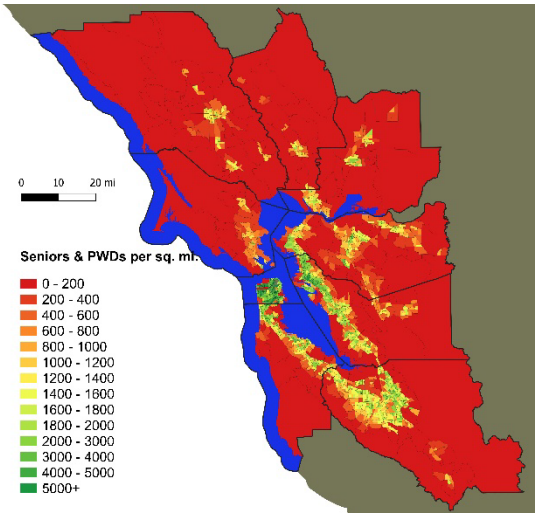


Figure 5.3: Combined - per mi^2



Review: Transportation Networks of the Bay Area

The Bay Area features a complex network of transportation systems including, but not limited to: pedestrian pathways; bicycle boulevards; surface streets; major highways and freeways; multiple bridges; taxi operators and TNC companies; 19 fixed-route bus operators; several shuttles; the Bay Area Rapid Transit (BART) heavy rail system; Caltrain commuter rail; the Altamont Corridor Express (ACE) commuter rail; the Sonoma-Marin Area Rail Transit (SMART) commuter rail; segments of Amtrak, including the “Capitol Corridor” segment between San Jose and Sacramento; several ferry lines; light rail systems; paratransit systems; demand-response and flexible-fixed-route systems; and several operations unique to San Francisco, including trolleys, trolley buses, and the world-famous cable car.

Transit agencies support vital segments of the Bay Area’s transportation network. As of 2020, there are 25 agencies covering fixed-route transit, flexible-route transit, and paratransit; Amtrak, which provides interstate train and bus travel, as

well as the Capitol Corridor commuter train from San Jose to Sacramento, also operates in the Bay Area. The 25 agencies are:

- AC Transit
- ACE
- BART
- Caltrain
- County Connection (formerly CCCTA)
- City of Dixon Readi-Ride
- FAST
- Golden gate Transit
- LAVTA
- Marin Transit
- Petaluma Transit
- Pleasanton Paratransit
- Rio Vista Delta Breeze
- SamTrans
- Santa Rosa CityBus
- SFMTA
- SolTrans
- Sonoma County Transit
- TriDelta
- Union City Transit
- Vacaville
- Vine
- VTA
- WestCAT
- San Francisco Bay Ferry

These agencies have a wide range of service footprints, budgets, ridership levels, and so on. For example: the difference between the smallest population served (7,700 by Rio Vista Delta Breeze) and largest (4.125 million by ACE) is more than 500-fold; the agency with the largest vehicle fleet (SFMTA with 1152) has almost 300 times the vehicles of the smallest agency (Rio Vista Delta Breeze with 4); SFMTA's annual ridership (233.1 million) is over 25,000 times that of the ridership of the smallest agency, Pleasanton Paratransit (9000); and the budget of BART ($637.4 million) is nearly 1500 times that of Rio Vista Delta Breeze ($431,000). Agencies also have a range of performance factors such as farebox recovery percentages (farebox revenues compared to overall expenses) and cost effectiveness (expenses per passenger).

There are 13 service types provided by Bay Area transportation agencies; 6 of these are only listed by one agency apiece, while 5 are used by between 2-4 agencies, and two are used by nearly all agencies (18 agencies use fixed-route buses and 19 utilize paratransit). The transportation types are:

- Fixed-route bus (18 operators)
- Flexible fixed-route bus (2 operators)
- Paratransit (19 operators)
- Heavy Rail (4 operators: ACE, BART, Caltrain & SMART). Amtrak also operates heavy rail.
- BART Oakland Airport Connector

- “Demand Response”, which sometimes includes Paratransit that is not reported separately (4 operators: City of Dixon Readi-Ride, FAST, Marin Transit & Vine)
- Ferry (2 operators: Golden Gate Transit & San Francisco Bay Ferry)
- Trolley Bus (SFMTA only)
- Cable Car (SFMTA only)
- Street Car (SFMTA only)
- Light Rail (2 operators: SFMTA & VTA)
- Shuttle (VTA only)
- Non-Traditional Transit, listed as including Catch a Ride, Volunteer Driver, and directly operated Yellow Bus (Marin Transit only)

Each transportation type has a different service profile – for example, heavy rail offers fast transportation along limited routes, while buses are slower and have a wider footprint. Various agencies sometimes provide the same transportation “type” in different ways, whether that means entirely different vehicles and hardware (e.g. the “heavy rail” electric BART and diesel Caltrain systems) or that one agency provides additional services that others do not (e.g. SFMTA paratransit providing door-to-door service instead of the more widely-used curbside pick-up and drop-off). In general, the regional network of fixed route buses has the highest combined overall costs of any service type, followed by heavy rail, light rail, trolley buses and paratransit; flexible fixed-route buses have the least cumulative funding, followed by non-traditional transit and shuttles. Performance concepts show that many types of fixed-route transit are especially

efficient, while paratransit and some similar services (i.e. demand-response and flexible fixed-route buses) are relatively inefficient across many metrics.

Bay Area residents have access to these transportation options as well as navigating the world through pedestrian pathways, personal vehicles (as a driver and/or passenger), bicycles/scooters, taxis, ride-sharing, and other privately-operated services. Each has its own benefits and drawbacks; more detail is available in "Bay Area Transportation Systems for People with Disabilities – Overview and Analysis."

Research Methodology

TRACS pursued several strategies to understand the transportation experiences and needs of the Bay Area's senior and disability communities. The research tasks included:

- A literature review explored barriers and solutions for inclusive transportation services, as well as existing efforts of Bay Area transportation stakeholders.
- Beginning in early-mid 2019, TRACS staff interviewed 12 individuals to gather a range of experiences and insight: interviews were mostly seniors and people with disabilities, alongside relevant experts and two transportation stakeholders (including a paratransit operator).
- TRACS then hosted four "focus groups" of seniors and people with disabilities: these ranged between 6 and 14 participants per event and used multiple host locations.

- Two “workshops” were held at the Ed Roberts Campus in Berkeley, which served as venues for more in-depth engagement and feedback: one workshop was for transportation stakeholders (e.g. operators, travel trainers, etc.) and one was for the senior and disability communities (attendees included individuals, advocates, allies and organizational representatives).
- An online survey with 32 questions, using the fully-accessible survey website SurveyGizmo, was left online for 30 days in January and February 2020. Questions were derived using insights gained from other research (e.g. literature review, interviews, focus groups and workshops) in order to understand the experience of the Bay Area’s senior and disability communities. TRACS staff advertised the survey through emails (to organizations, agencies, listservs, advocates, etc.) and social media (including targeted advertisements) in that timeframe. The survey received 217 full responses, with several dozen other “partial” responses where individuals started the survey but did not enter enough information to support data analysis.
- The Bay Area features a wide array of agencies, organizations and collaboratives whose work is related, in part or in full, to TRACS focus areas. These entities sometimes host presentations, summits, conferences, planning meetings, tabletop exercises, and other events to improve community engagement and the Bay Area’s infrastructure and services. TRACS staff attended many of these events to learn about relevant ongoing activities – including, but not limited to, coordinating events and tabletop

exercises by the Urban Area Security Initiative (UASI), meetings of the newly-formed Bay Climate Adaptation Network (BayCAN), and city-level forums about improving access to shared mobility.

In general, each segment of the research served a different purpose. The literature review uncovered frequent policy concerns and provided some promising solutions, including ways to measure success. The interviews gathered frank testimonials from community members, with a strong focus on the pros and cons of paratransit; transit system operators that were interviewed provided insight on how they create goals, procure services, measure successes, and so forth. Focus groups allowed attendees to explain their experiences, identify shared frustrations and positive outcomes, and brainstorm strategies to better meet the community's needs. Workshops had a "problem-action-solution" format where attendees were encouraged to brainstorm actions (and larger frameworks for action) that could change systems for the better. Outside events provided valuable insight to the Bay Area's actors, their roles and responsibilities, and ongoing and anticipated changes to infrastructure, systems and services. Finally, the survey illuminated common experiences and areas-of-focus while letting respondents share deeper insights in paragraph form.

Literature and Technology Review: Local Plans and Broader Frameworks

TRACS staff reviewed an array of literature including government reports, think-tank research and policy recommendations, and local planning documents. We chose a diverse set of resources to paint the "full picture" of how seniors and

people with disabilities interact with the transportation system – and ways to facilitate independent living with better transportation.

A literature review covered many topics including:

- Bay Area broad transportation and/or development plans (e.g. “Bay Area Plan 2040”).
- Coordinated plans for Bay Area counties and/or specific transit agencies.
- Other relevant local studies and policy frameworks, such as the redevelopment plans for San Pablo Ave across Oakland, Berkeley and El Cerrito.
- Research and reports from national entities and academics on improving transportation for the senior and disability communities.

Staff also attended separate transportation-related events and conferences to glean insight from emerging technologies. The events included a conference on automated vehicles and a 2-day summit on “pod cars,” which are small automated vehicles that operate on designated railways or pathways. These interactive events – and the connections made therein – illuminated the potential benefits and drawbacks of new mobility systems, in general and for the senior and disability communities.

Existing State and Bay Area Frameworks

Numerous entities have already published information, plans and recommendations related to TRACS goals. These resources range from disaster and infrastructure planning at the state level, a coordinated Bay Area

transportation and human services plan, and disaster readiness strategies addressing transportation. Resources include the following documents and insights:

California Transportation Plan 2040 (CTP 2040)

The California Transportation Plan 2040 provides overarching themes, a suite of strategies and specific investments to improve California's transportation system through 2040 and beyond. Its 6 main goals include: improve multimodal mobility and accessibility for all people; preserve the multimodal transportation systems; support a vibrant economy; improve public safety and security; foster livable and healthy communities and promote social equity; and practice environmental stewardship. Goals number 4 (improve public safety and security) and 5 (foster livable and healthy communities and promote social equity) fall under the "social equity" category that is especially applicable to seniors and people with disabilities – the others fall into either "prosperous economy" and "human & environmental health" categories. Goals have between 2 and 4 related policies apiece. They are the following (note: each goals' policies are listed alphabetically, although in the CTP 2040 they are numerical):

1. Improve multimodal mobility and accessibility for all people
    a. Manage and operate an efficient integrated system
    b. Invest strategically to optimize system performance
    c. Provide viable and equitable multimodal choices including active transportation
2. Preserve the multimodal transportation system

a. Apply sustainable preventative maintenance and rehabilitation strategies
b. Evaluate multimodal life cycle costs in project decision making
c. Adapt the transportation system to reduce impacts from climate change

3. Support a vibrant economy
    a. Support transportation choices to enhance economic activity
    b. Enhance freight mobility, reliability, and global competitiveness
    c. Seek sustainable and flexible funding to maintain and improve the system
4. Improve public safety and security
    a. Reduce fatalities, serious injuries, and collisions
    b. Provide for system security, emergency preparedness, response, and recovery
5. Foster livable and healthy communities and promote social equity
    a. Expand engagement in multimodal transportation planning and decision making
    b. Integrate multimodal transportation and land use development
    c. Integrate health and social equity in transportation planning and decision making
6. Practice environmental stewardship
    a. Integrate environmental considerations in all stages of planning and implementation
    b. Conserve and enhance natural, agricultural, and cultural resources

c. Reduce greenhouse gas emissions and other air pollutants
d. Transform to a clean and energy efficient transportation system

The report itself provides useful information about California's transportation network – including information about the state highway system, airports, shipping, rail, under-construction high-speed rail, tribal infrastructure, and other concerns. It also outlines overarching themes and specific activities to meet the plan's goals; the overarching themes include demand management, mode shift, adjusting travel costs, and improving operational efficiency. CTP 2040 has limited information about disability- and senior-specific services, largely leaving accessibility and age-related concerns to local planning and investment. It does mention that "Californians expect a well-connected, integrated transportation that is convenient, reliable, and **accessible to all** users. This includes rural, urban, the disabled, and those of all socioeconomic bands. It needs to accommodate across generational needs." [Emphasis original]

Plan Bay Area 2040

Plan Bay Area releases detailed reports and recommendations once per decade. Its most recent report, "Plan Bay Area 2040," is described thusly:

> "Plan Bay Area 2040 is a state-mandated, integrated long-range transportation and land use plan. As required by Senate Bill 375, all metropolitan regions in California must complete a Sustainable Communities Strategy (SCS) as part of a Regional Transportation Plan. In the Bay Area, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) are jointly responsible for

developing and adopting a SCS that integrates transportation, land use and housing to meet greenhouse gas reduction targets set by the California Air Resources Board (CARB)."

Plan Bay Area 2040 addresses a significant growth in projected housing and employment sectors; identifies likely revenue sources for relevant investments; and provides urban planning strategies to meet housing, economic and equity goals while also reducing greenhouse gas emissions. The document is not a comprehensive, directive guide, though. As the report notes: "Plan Bay Area 2040 neither fund specific transportation projects nor changes local land-use policies. Importantly, individual jurisdictions retain all local land-use authority. But Plan Bay Area 2040 does set a roadmap for future transportation investments and identifies what it would take to accommodate expected growth." Authors note that it is "one piece of the puzzle" alongside other documents and strategies, such as the 2017 Clean Air Plan that addresses broader pollution from vehicles and industry.

Plan Bay Area outlines 7 overarching goals and 13 specific targets, including 4 targets that fall into an "equity" category (other categories are "environment" and "economy"). Overarching goals are the following, with equity goals in parentheses: climate protection; adequate housing ("house the region's population"); healthy and safe communities; open space and agricultural preservation; equitable access ("decrease share of lower-income households' budgets spent on housing and transportation," "increase share of affordable housing," "do not increase share of households at risk of displacement"); economic vitality; and transportation system effectiveness. Given the relationship

between seniors, people with disabilities and the built environment, several topics not labeled “equity” still have equity benefits. For example, any improvement in transportation system effectiveness would especially benefit people who use public transit for some or all of their travel needs, while a robust job market can support employment for economically-disadvantaged people with disabilities.

Main findings and recommendations from Plan Bay Area 2040 include:

- Housing concerns are paramount in the Bay Area. In 2017 – the report’s publication date – there was a notable mismatch between supply and demand for housing, with related consequences for household budgets, equity concerns, growing carbon footprint from unnecessary sprawl, and other “Displacement and Quality of Life Concerns.” The report notes that major “Policy Contributors to the Housing Crisis” fall into two primary buckets of “Regulatory Barriers and Tax Policy Challenges” and “Reduced Support and Insufficient Progress in Building Affordable Housing.” Improved zoning, construction and regional planning can ease this strain.
- Transportation networks are gradually becoming overwhelmed. Plan Bay Area 2040 mentions “record levels of freeway congestion and historic crowding of transit systems” like BART, Caltrain and Muni. Several freeway areas serve as “bottlenecks” with significant congestion, including US 101 from the Silicon Valley across the Golden Gate Bridge, Interstate 80 in Alameda and Contra Costa counties, and the Interstate 580 Altamont Pass segment in southeast Alameda County. Fixed-route rail often runs near intended capacity in rush-hour, and sometimes ridership exceeds trains’

passenger limits. Improving and expanding transit networks will relieve congestion on those systems and their adjacent networks (e.g. freeways parallel to BART lines).

- The Bay Area has used a "self-help" strategy as one of many tools to invest in transportation infrastructure. This includes a combination of local sales taxes, gas taxes and bridge tolls that together "generated some $2.5 billion for Bay Area transportation in 2016 alone."
- The Bay Area's business, academic, government, advocacy, and other stakeholders are all valuable contributors to progress and innovation on employment and urban planning.
- Plan Bay Area 2040 uses growth in total population, total households, and jobs to put forward its recommendations. However, as the COVID-19 crisis has shown, unexpected events can create economic conditions that differ significantly from multi-decade projections. These can have spillover effects for transportation: for example, economic contraction leads to lower tax revenue and lower ridership for transit agencies, impacting budgets and service.
- Forecasts show growth in some job sectors – a trio of construction, health/education, and professional/managerial categories will experience increased job opportunities. Projected contractions exist in transportation/utility, agricultural/natural resources, and manufacturing/wholesale categories. It is important to understand these job trends because there are large differences in accessibility to people with disabilities, considering necessary tasks and the ability for them to be

modified logistically or with technology. For example, professional and managerial jobs can often be done using adaptive technology and software; meanwhile, manufacturing and wholesale employment may be more accessible for people with learning or intellectual disabilities but less accessible for people who have mobility impairments.

- Demographics will change in the coming years. The largest trends will be a decrease in the share of individuals age 25-64 and growth in those 65 years or older; there will also be a smaller proportion of white residents and growth in Hispanic and "Asian/other" groups ("Asian/Other refers to Asian, Pacific Islander and other multiracial/multiethnic categories.")
- The costs to maintain the existing transportation asset conditions through 2040 is projected to be approximately $230 billion; the cost "to achieve ideal asset condition" is $254 billion. Assets include local streets and roads, state highways, local bridges, regional bridges, transit capital, and transit operating costs.
- Transportation agencies have constructed, are constructing, and/or are planning to construct new transportation assets and improve existing services. Plan Bay Area 2040 highlights the expansion of the BART system to Antioch in the Northeast and toward San Jose to the south.
- Plan Bay Area 2040 projects $303 billion in forecasted transportation revenues over the 24-year project timeframe, but notes that "[o]nly a modest share of the $303 billion in transportation funding is flexible," leaving approximately $74 billion in discretionary revenue and flexible funding over 24 years. The $229 billion in "committed revenues" includes

funding for transit operations and maintenance, funding for road operations and maintenance, funding already committed to projects (including "funding commitments made in previous years that will continue to be spent within the timeframe of the plan"), and debt service.

- Financial sources for the $74 billion in discretionary revenue include federal, state, regional, local, and "Anticipated/Unspecified" revenue ("Anticipated revenues reflect new state and federal revenues that are unknown at this time but likely within the plan period").
- Plan Bay Area 2040 identifies nearly 200 Priority Development Areas (PDAs) and over 100 Priority Conservation Areas (PCAs) within the 9-County Bay Area. For our purposes, PDAs are most important as they "can help motivate land use and support the success of focused growth strategy and the locally identified PDAs that already house much of the Bay Area's existing development."
- The key land-use assumptions and recommended policies for PDAs include the following:
    - Assign higher densities than currently allowed by cities to select PDAs
    - Keep current urban growth boundaries in place
    - Preserve and incorporate office space caps in job-rich cities
    - Assume all for-profit housing developments in cities with PDAs make 10 percent of units deed-restricted in perpetuity
    - Reduce the cost of building in PDAs and Transit Priority Areas (TPAs) through eased parking minimums and streamlined environmental clearance

    - Assume subsidies to stimulate housing/commercial development within PDAs
    - Assess commercial development fee based on Vehicle Miles Traveled to improve jobs-housing ratio and to fund affordable housing in PDAs
- Planning defines 3 categories to consolidate the Bay Area's 101 cities and towns. The groups (called "subregions") include the "Big 3" cities of San Jose, San Francisco and Oakland; the "Bayside" cities from Vallejo through Richmond, down to Fremont, up San Mateo County and some urban parts of Marin; and the "inland/coastal/Delta" cities farther from the Bay shoreline. The report notes that "by 2040, the Big 3 Cities and Bayside subregions will contain 72 percent of the Bay Area's total households and 77 percent of the region' total jobs." Inland, coastal and Delta cities will still see 23% household and 24% employment growth between 2010 and 2040.
- Assorted counties will experience different percentage rates of growth, from a low of 1% household growth in Marin and Napa counties to a high of 31% in Santa Clara County. Job growth ranges from 1-4% in the North Bay counties and is highest in Santa Clara (30%), San Francisco (23%) and Alameda (19%) counties.
- Plan Bay Area 2040 "develops a blueprint for short-term and long-term transportation investments to support the plan's focused growth strategy." The 4 main categories of investments include operations and maintenance, modernization, expansion, and debt service and cost contingency. The plan notes that "Investment priorities for the next 24 years reflect a primary commitment to 'Fix It First'," emphasizing operations-and-maintenance

over expanding footprints and capacity. About 2/3 of planned investments are for public transit, "mostly to ensure that transit operators can sustain existing service levels through 2040." The largest single investment will be $8.5 billion for the Bay Area segment of California High-Speed Rail.

- Capital improvements include, but are not limited to: BART extensions, Caltrain and SMART extensions and Caltrain electrification, high-speed rail, improvement of infill stations and major bus terminals, and expansion of ferry service. Local transit system improvements include, but are not limited to: bus rapid transit projects in multiple cities and expansion of light rail projects in San Francisco and Santa Clara counties. Widening, improvement and repair of highways is another main long-term improvement. Some bridge, express lane, and other fees will change.
- Plan Bay Area 2040 "includes a nearly $70 billion 'Equity Roadmap' that makes major improvements toward bus operations ($62 billion); increases in bus service and other improvements ($5 billion); County access initiatives ($1 billion); and lifeline, mobility management and means-based fair programs ($900 million)." The Lifeline Transportation Program "will fund priority projects identified by residence in MTC's Communities of Concern" and also includes $90 million for a future mobility management program. MTC notes that the Lifeline Transportation Program "strategy is especially key to the region's ability to address [2]growth in the Bay Area's population of seniors and persons with disabilities." Counties will contribute $300

[2] https://mtc.ca.gov/our-work/plans-projects/other-plans/coordinated-public-transit-human-services-transportation-plan

million to similar initiatives and $700 million to expanding paratransit services.

- A longer companion "Equity Analysis Report" includes many concerns relevant to seniors and people with disabilities. It lists several groups as "Communities of Concern." This groups include: minority; low-income; limited English proficiency; zero-vehicle household; senior; people with a [3]disability; single-parent family; and cost-burdened renter. The report is largely an analysis and provides limited recommendations, but is a useful resource regardless.
- In the end, Plan Bay Area 2040 has 3 primary goals aside from transportation, noting that well-designed transportation systems will support those goals. The 3 goals are: housing production, preservation and protection; economic development; and resilience (to economic impacts, natural disasters, and climate change consequences).

Plan Bay Area 2040 is straightforward in statements that the Bay Area faces housing, transportation and affordability challenges. These are especially relevant for those seniors and people with disabilities who have limited housing options (both for accessibility and affordability), limited transportation options, and lower average income and assets than the able-bodied population. People with disabilities, as a population group, face large hurdles around transportation, housing and economic equity: although Plan Bay Area 2040 does not solve all

[3] http://2040.planbayarea.org/sites/default/files/2017-07/Equity_Report_PBA%202040%20_7-2017.pdf

equity concerns, it shows that government is cognizant of those concerns and plans to address them in planning and implementation.

MTC 2018 Coordinated Public Transit-Human Services Transportation Plan

As is required by the Fixing America's Surface Transportation (FAST) Act, transportation coordinating entities must create Coordinated Plans to align transportation and human services needs. MTC's 2013 Coordinated Plan was updated in 2018 and will continue to be updated every several years. It addresses a set of topics for seniors, people with disabilities, veterans, and low-income populations; the topics combine transportation modes with support services, such as travel training and mobility management.

Through community-based research, the Coordinated Plan found common themes identified as "biggest gaps" for the target populations. These include:

- "Spatial gaps–areas of our region that are either difficult or impossible to reach by public transportation–continue to be a key need express through the region
- Temporal gaps–points in time that lack service–also constrain the mobility of target populations
- With regional consolidation of facilities and growing rates of disease, healthcare access is a major concern in the region
- Transit and paratransit fares are unaffordable for many people in all parts of the Bay Area
- Funding needs are growing faster than revenues

- Constituents recognize that safety investments for pedestrians and people on bicycles improve mobility for all, and increase access to transit
- While suggestions were made to leverage emerging mobility services providers to assist in solving mobility gaps, people are concerned about the lack of accessibility of both taxis and ride-hailing services
- Stakeholders highlight the importance of transportation information availability and associated referral services to steer people to gap-filling services
- Consistent with the 2013 Plan, transfers on both the fixed-route transit network as well as between ADA Paratransit service providers (when trips across county lines, for example) are barriers"

Strategies for improved mobility include the following two main categories and their subcategories:

- Coordination Strategies
    - Implement County-based mobility management: plans and programs, including "in-person eligibility assessments, travel training, and information and referral services."
    - Improve paratransit: explore cost-sharing and other cost recovery programs, reduce costs including through mobility management strategies, and explore payment solutions with Clipper 2.0
    - Provide mobility solutions to suburban areas: provide diverse services and supports from MTC to counties and other relevant transportation stakeholders

    - Regional means-based transit care program: ensure a “financially viable and administratively feasible” program
    - Shared and future mobility: ensure affordability and accessibility, pursue partnerships
    - Improve mobility for veterans: provide services and multi-stakeholder communication
- Action plan
    - Keep the momentum (6-12 months)
    - Implement the basics (1-2 years)
    - Build out the program (3-4 years)

The document’s full chapters are, in order: introduction and methodology; Bay Area demographic; transportation resources; outreach and stakeholder gap identification; and regional strategies for coordination. Many of the contents therein were covered in the first TRACS report and through our community-based research, so they will not be repeated here.

California Is Not Adequately Prepared to Protect Its Most Vulnerable Residents from Natural Disasters – California State Auditor Report 2019-103

Before explaining this document, it is important to address the connection between natural disasters, climate and environmental change, and the transportation network, as well as important factors for seniors and people with disabilities.

A note on disasters, climate and environmental changes

A main focus of this project is to address disaster readiness and response for people with disabilities and seniors. Transportation is imperative for evacuating – whether before, during or either – the 3 most likely disasters for the Bay Area: increasingly-frequent wildfires, flooding from heavy storms, and earthquakes. Climate change and other environmental factors (including sea level rise, increasing heat waves, higher wildfire danger, and economic impacts) will also affect certain transportation networks. The important impacts of transportation in disasters and climate change, as well as the impact of disasters and climate change on transportation networks, include but are not limited to:

- All 3 types of disasters may damage parts of the transportation networks, which will need to be repaired, rebuilt or replaced. Some damage may be irreparable.
- Climate change impacts – especially sea level rise – may damage parts of the transportation network. Some damage may be irreparable or require creative solutions, e.g. addressing sea level rise on San Francisco's waterfront roads and many underground rail segments.
- Smoke from wildfires may impact individuals' transportation choices: for example, they may avoid buses because of the need to stay outdoors at a bus stop for extended periods of time.
- Immediate evacuations are crucial during wildfires and flood events. Wildfires are most likely to affect rural areas (especially in the North Bay), as well as suburban and urban areas at the urban-wildland interface (e.g. the Oakland hills or San Francisco's Presidio). Flooding may hit any part of

the Bay Area; and flooding events are most likely to happen in El Niño years and sea level rise from climate change.

- Transportation networks are crucial for individuals escaping acute disasters, especially in advance and/or in the midst of wildfires and flooding events. However, public transit may be inoperable before, during and/or after disasters, or be unable to reach and transport individuals without vehicles. This is an especially important concern in the Bay Area's more dispersed suburban and rural areas, including much more remote areas with few escape routes and/or no public transit service (e.g. parts of coastal Sonoma County).
- Transportation networks are crucial for first responders during disasters. This includes evacuations from disasters and reaching injured individuals, as well as returning to hospitals or other evacuation areas.
- California is committed to developing a low-carbon and efficient transportation system in the coming years, as are many Bay Area localities. This will almost certainly lead to electrification of some or all of the transportation system, which will affect bus service and other road transportation (e.g. paratransit). Diesel-based rail (SMART, Caltrain, ACE, Amtrak and BART's diesel-multiple-unit segment near Antioch) may be electrified in coming years and the California high-speed rail system will eventually reach through San Jose to San Francisco. Other innovative technologies are likely to be expanded, e.g. electric pod-cars and electric ride-share systems.

- Recent Public Safety Power Shutoff (PSPS) events will continue for the coming years, due to a combination of poorly-maintained equipment, inadequate tree-trimming, and increasing wildfire danger from climate change with impacts on the operation and reliability of electrified transportation. PSPS events will also affect cell phone and other communication networks that support individuals attain transportation, e.g. to call paratransit, use a ride-sharing app or navigate with a phone-based map.
- Extreme heat events may change transportation patterns – for example, avoiding non-air-condition transportation, limiting time outdoors at transit stops, or motivating people to take transit to cooling shelters (e.g. public libraries).
- A less-discussed consequence of climate change is economic contraction, which may reduce consumer spending and tax revenue. This will limit funding to support transportation infrastructure and services and/or reduce individuals' spending on transportation with related consequences (e.g. lower fare recovery rates).
- An assortment of unexpected emergencies – such as the Covid-19 crisis – can make transportation services unavailable, limit operation of transportation services, and/or limit transportation ridership (among other impacts). Certain emergencies may leave residents wary of riding public transportation: for example, some experts anticipate that people will avoid crowded spaces after the Covid-19 crisis, even if a vaccine is developed and widespread.

The importance of these impacts for people with disabilities include, but are not limited to:

- Immediate evacuation from wildfires and floods will be difficult for seniors and people with disabilities, who have disproportionately low levels of personal vehicle ownership; also, a disproportionately low percentage seniors and people with disabilities have driver's licenses.
- Individuals who use public transit and/or paratransit may not be reached in a timely manner, if at all, in an event that requires evacuation. Paratransit may evacuate those with enough advance warning of oncoming disasters, but may be unavailable in active danger zones or in the face of fast-moving fires and floods.
- Individuals who are bed-bound and/or work with personal attendants may be unable to get into a wheelchair and/or leave their home in a timely manner. Individuals with specific transportation needs (e.g. wheelchair-accessible vehicles) may be unable to attain proper transportation in time; those who are able to transfer to somebody else's (e.g. a neighbor's) inaccessible vehicle may need to leave mobility equipment behind as they evacuate.
- Seniors and people with disabilities often experience social isolation and have limited access to news information (particularly as both groups have disproportionately low access to the Internet, smart phones, and cable television), meaning they may not receive timely information through the news or social networks. They may not know of potential dangers (e.g.

nearby fires or flooding) and public orders to evacuate in advance enough in an appropriate timeframe.

- PSPS events (and other power shut offs, e.g. after an earthquake) will impact both groups' access to transportation, especially systems that use cell phones and/or the Internet. It may be impossible to access ride-sharing apps or get in touch with friends, family and attendants who are primary drivers. Paratransit may likewise be inaccessible. Electricity-powered mobility (e.g. BART and light rail systems) may be out-of-service.
- Some, but not all, seniors and people with disabilities may be especially affected by extreme heat: for example, people with diabetes, circulatory conditions and some spinal cord injuries have difficulty regulating their temperature and may be at disproportionate risk for heatstroke. These individuals may take extra heat-related precautions in their transportation choices (e.g. avoiding all outdoor stops or going to cooling shelters more frequently) or begin taking precautions at lower temperatures than younger and/or able-bodied counterparts.
- In the case that transportation infrastructure is damaged, it is possible that some access features (e.g. transit station elevators) will take longer to repair than the timeframe for otherwise restoring service.
- Economic contraction may constrain funding for transportation services, including those that benefit seniors and people with disabilities. For example, reduced funding for paratransit could significantly impact mobility and independent living, although service providers will still need to meet legal obligations around availability and timeliness even with limited funds.

Transportation assistance, such as travel training and trip planning, may encounter challenges.

- Individuals may adjust their travel habits in the face of economic contraction and limited personal spending. Some may cut back on travel altogether, while some may shift to more affordable options (e.g. taking the bus instead of heavy rail).

Document notes on Disaster readiness

This document, prepared by the California Governor's Office, evaluated 3 counties – Butte, Sonoma and Ventura – to "assess how well prepared each county is to protect vulnerable populations before, during, and after a natural disaster." It focuses on Access and Functional Needs which "come from a variety of circumstances, such as disabilities, limited English proficiency, transportation disadvantages, and older age." And notes that individuals with Access and Functional Needs may require assorted services during disasters. These are listed as:

> "Individuals with mobility disabilities: Assistance with evacuating, such as accessible vehicles. Equipment and emergency shelters, such as wheelchairs and accessible cots.
>
> Individuals with sensory disabilities: Devices to receive evacuation alerts, such as bed shakers for people who are deaf or hard of hearing. Interpreters or documentation in Braille at emergency shelters.
>
> Individuals with transportation disadvantages: Assistance with evacuating, such as emergency public transportation services

Individuals with limited or no English proficiency: translated evacuation alerts. Interpreters in emergency shelters.

Individuals with chronic conditions or injuries: Medical supplies and emergency shelters, such as bandages or oxygen.

Older adults: Assistance with understanding emergency communications, such as for older adults with cognitive impairments. Equipment and emergency shelters, such as walkers and accessible showers."

Sonoma County was highlighted because of the 2017 Sonoma Complex Fires, together some of the deadliest and most destructive fires in state history. They also disproportionately seniors and people with disabilities: of the 24 fatalities listed for Sonoma County, 18 individuals where 65 years of age or older alongside 7 fatalities where "the coroner records noted a potential access or functional need." (There was some overlap, although it was not noted how much). Butte and Ventura counties were likewise chosen because of recent deadly wildfires.

The report uses FEMA guidance on incorporating disability into disaster management plans to assess how well each County ensures the needs of people with access and functional needs are met during a disaster. Unfortunately, it finds that all 3 counties "are not adequately prepared for natural disasters" under 3 categories of assessing populations' needs; maintaining complete, updated plans for alert and warning, evacuation and sheltering; and prearranging key resources to assist people during evacuations and an emergency shelters.

Sonoma County had developed a *recovery and resiliency framework* after the 2017 Sonoma Complex Fires, which includes notes on people with access and

functional needs. Budget constraints are a substantial barrier to meeting all FEMA guidance, with the Gov.'s report noting a shortfall of several hundred thousand dollars to achieve both FEMA's and the county's disaster readiness goals. The entire report addresses multiple aspects of disaster readiness and response, with a few relevant notes around transportation and evacuation:

- Advance notification for oncoming wildfires is paramount. Messages must be sent via landline, cell phone, text message and other venues; include all necessary information including that relevant to seniors and people with disabilities; and include multiple languages. [Note: contact lists and applications used by transportation providers can assist with disaster outreach].
- The document notes that "None of the Three Counties Adequately Planned to Assist Evacuees During Natural Disasters." None of the 3 counties had: developed and updated all-hazard evacuation plan; assessed how many people need assistance in evacuation and developed maps accordingly; and prearranged accessible transportation for evacuees. To be successful, disaster planning must include these 3 factors, especially in areas that risk destructive and fast-moving events such as wildfires.
- The report notes that "best practices recommend that counties include public transit and transportation agencies in their emergency planning efforts." Caltrans guidance includes recommending "that representatives of local transit operators be a part of emergency planning teams and memorialize in writing their agreements with emergency management

agencies." Of course, disability and senior stakeholders should also be a part of these discussions.

- In-Home Supportive Services (IHSS) is referenced as a potential partner agency to assess the circumstances of seniors and people with disabilities who need attendant services, and use that information to assist in emergency planning. The report's authors "believe that County agencies could provide general information to emergency planners about IHSS clients – such as the neighborhoods that have high concentrations of people who need assistance – without violating the state law's restrictions on information sharing."

Other Relevant Literature

Self-Driving Cars: Mapping Access to a Technology Revolution [National Council on Disability]

We are aware that transformative transportation technologies, such as automated vehicles and pod cars, will play an increasing role in the Bay Area's transportation system. It is also important that these systems be universally accessible and meet the needs of seniors and people with disabilities.

In 2015, the National Council on Disability released a report addressing "different levels of automation and their impact on people with diverse disabilities (e.g. physical, sensory, intellectual/developmental, cognitive) as well as veterans with disabilities and the aging population." It notes that transformative technologies, including automated vehicles, are accelerating at a rapid pace; however, the rapid

development combined with entrepreneurial nature of many new technologies has passed over or minimized accessibility and useful features for people with disabilities. The disability community has not been sufficiently consulted by technology developers, in contrast to the “nothing about us, without us” disability rights mantra.

Other findings include:

- Automated vehicles are classified on a scale between Level 0 (no automation) through Level 4 (full self-driving automation). Each has benefits and drawbacks for people with disabilities. Level 4 systems may be especially valuable for “people with disabilities who are currently unable to obtain a driver’s license.”
- The report addresses the state of technology development for automated vehicles – however, the technology has developed rapidly in the past several years and we are significantly closer to deploying Level 3-4 technology at larger scales.
- It is important to track federal regulations around testing, licensing, permitting and operations.
- Technological barriers must be addressed: barriers may include physical accessibility, operations, and universally accessible software/applications (e.g. for blind individuals).
- A list of “Potential Policy and Societal Barriers to the Independent Use of Automated Vehicles by People with Disabilities” addresses:
    - Driver’s licensing – there is not an existing system to grant driver’s licenses to people who cannot drive Level 0 cars but could operate a

vehicle with better or full automation. This must be remedied, with appropriate safeguards under the Americans with Disabilities Act and through the Office of Civil Rights, to support mobility for people with disabilities who may be able to use the higher-level automated vehicles on their own.

- Cost and income disparity barriers – automated vehicles are expensive and likely out of the price range for many people with disabilities. However, AVs are likely to operate in a fee-for-service model, similar to Transportation Network Companies; in this case, stakeholders should address affordability (e.g. through subsidies or taxi-scrip setups).
- Attitudinal barriers – a portion of the public is concerned about the safety of AVs, while some in the public and in government may not believe people with disabilities can operate a visa safely. Misconceptions are often based off previously-deployed technologies and their dangers, as well as "unsupported generalizations about the capabilities of people with disabilities." Rules and regulations should be designed looking at on-the-market and up-and-coming technologies, rather than prior technologies' performance, to enable a faster transformation of the transportation system. People with disabilities must be allowed to utilize AVs without being considered high-risk based on stigma alone.

- Liability – the largest concerns are likely to be around licensing, insurance, and the need to secure mobility equipment. An array of technologies and business models raises many liability concerns.
- Privacy – data-sharing through AV systems must avoid any privacy or HIPAA violations.
- Ethical considerations – automated vehicles will make split-second decisions that can mean the difference between health and injury, or even life and death. For example, a car may avoid an upright pedestrian and hit a mailbox instead in order to minimize the risk of death. Technologies must not discount the lives of people with disabilities, and must ensure that people with disabilities are recognized as individuals and not objects (especially people with mobility equipment).
- Cyber security – this is a paramount concern to protect vehicles from being "hijacked" by hackers. It's especially important for people with disabilities in vehicles with a manual system (e.g. steering wheel and gas pedals), as some passengers with disabilities may be unable to "take over" from the automated vehicle.

- Recommendations include:
  - Any technology program funded, in part or in full, by federal programs must comply with Section 504 and Section 508 of the Rehabilitation Act. RFPs should ask about how applicants will ensure disability access.

- The federal government must provide guidelines for AV licensing at the state level. Any guidelines must address disability concerns.
- "Congress should pass legislation requiring full accessibility for all types of common and public use AVs." Disability stakeholders should be involved in federal and state accessibility efforts. [Note: accessibility was a large concern around transportation network companies in California, requiring state intervention and an ongoing process with the CPUC to facilitate more wheelchair-accessible vehicles].
- The Federal Government can enforce state-level compliance by making highway funds conditional on compliance, similar to "the approach historically taken… with respect to the legal drinking age."

Self-Driving Cars: The Impact on People with Disabilities

Another white paper, "Self-Driving Cars: The Impact on People with Disabilities," released by the Ruderman Family Foundation and Securing America's Future Energy, addresses the social benefits of automated vehicles for people with disabilities. Two noteworthy paragraphs highlight the need to avoid unnecessary regulations that would impede people with disabilities' use of automated vehicles:

> One of the most important policy debates that will impact the ability of the disability community to realize the benefits of autonomous vehicles is whether regulations will require a licensed "driver" in the vehicle. Many who have a "severe" disability, whether it be because of epilepsy,

blindness, intellectual disability, or other physical limitation, would benefit from autonomous vehicles but are not able to obtain a driver's license.

Several states and the federal government have weighed in on this issue. It is highlighted here because of the core importance of this policy issue and how broadly applicable it is to the disability community. If a restrictive policy is put in place on this front, it will prevent a significant portion of the disability community from realizing the benefits of new transportation technologies.

The paper discusses assorted stakeholder views, including barriers and benefits to several disability groups (blind and visually impaired, ambulatory and physical disability, deaf and hard of hearing, and intellectual and developmental disability) and perspectives of technology developers. Its recommendations include:

- Disability Community
    - "The disability community should begin engaging immediately in the debate around autonomous vehicles, establishing a coalition of aligned interests."
- Government
    - "Highly automated vehicles should not require a licensed driver."
    - "Federal, state, and local governments should encourage entities to develop pilot programs for autonomous vehicles with a focus on fostering independence and enhanced mobility for the disability community and aging population."
- Industry

- "Manufacturers of the technology should design SAE level 4 products that offer access as soon as technically feasible, while also gathering input from the disability community during pilot programs." (Note: an earlier section describes "Highly automated vehicles" as "those classified as Society of Automotive Engineers (SAE) level 4 or 5").

- Collaborative
  - "The US Department of Transportation should create a center to facilitate an ongoing dialogue around the design, testing, and deployment of highly automated vehicles."
  - "The US Department of Transportation should conduct further research on the transportation needs of people with disabilities"[4]

Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities

This 2014 document from the federal Transit Cooperative Research Program (TCRP) should be a major influence on any regional and local transportation strategy. It provides overarching concepts and strategies to improve accessibility of fixed-route transit and ridership by people with disabilities. It also gives a framework for evaluating the value of each system change – and ultimately shows that many accessibility improvements are well worth the investment. Anecdotes and examples from across the country provide a variety of options and

[4] National Academies of Sciences, Engineering, and Medicine 2014. *Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities*. Washington, DC: The National Academies Press. https://doi.org/10.17226/22397.

demonstrate both social and fiscal benefits. Research was in-depth, including a literature review, consultation with nationwide stakeholders, a survey of people with disabilities with 1927 responses, a survey of public transit agencies with 163 responses, and 37 case studies of projects and strategies. The report is nearly 200 pages and includes recommended formulas (which are not explained in detail here).

The report notes 2 main reasons to enable and promote the use of fixed-route transit by people with disabilities. The first is equity: people with disabilities have an equal right to fixed-route transit (with both legal and social obligations) and many paratransit users would have improved quality-of-life if they had better access to fixed-route transit. The 2nd reason regards operations and finance: there is a growing demand for paratransit, which is more expensive than fixed-route transit to operate, so much that investments that shift existing or potential paratransit riders toward fixed-route transit are worth the cost in the long term.

The growth in annual paratransit rides has been significant (the report notes a growth from 15 million in 1991 up to 67 million in 2008), which the report attributes to 5 main reasons:

1. A growing awareness of paratransit's existence by people with disabilities, leading to growing enrollment and use, greater awareness through the community, and so on.
2. Fixed-route transit systems are still not fully accessible, contributing to a greater paratransit need than there would be with a fully accessible fixed-route system.

3. Many people with disabilities would be able to navigate their region on fixed-route transit but have limited or no experience doing so. There is limited availability of travel training programs and limited awareness and utilization of existing programs.
4. As the report notes, "[i]mplementing effective ADA paratransit eligibility determination processes has been a challenge in many areas." There is no simple "checklist" for easy determination and eligibility can vary from agency to agency. Navigating eligibility can be a complex task, both for staff and clients, depending on the location, existing knowledge, etc.
5. Because of existing (and often justified) frustrations by people with disabilities, there is a shortage of shared "positive experiences" of fixed-route passengers. Frustrations are wide-ranging, such as difficulty securing mobility equipment, people with disabilities' being perceived as a "disruption" during morning and securement, dealing with broken equipment (e.g. elevators), safety concerns, and so forth. There is a need for more public awareness of accessibility improvements, public outreach and engagement, life quality benefits of using fixed-route transit, and other efforts and benefits.

As the report notes, many people who use paratransit would be able to use a fully accessible fixed-route transit system and would prefer to use fixed-route transit if possible, but encounter a physical barrier (e.g. no accessible sidewalks or an inaccessible bus stop) or are simply not comfortable navigating the system. Survey respondents explained the appeal of accessible buses and trains, plus frustrations with paratransit, as reasons to ride fixed-route. (Note: our survey of

Bay Area residents had similar findings). The benefits of access to fixed-route transit for individuals include greater flexibility, more spontaneity, and often better reliability. Any individual who uses fixed-route transit instead of using paratransit ultimately saves agencies money, so boosting accessibility is a desirable goal for operators.

The report's recommendations begin with understanding people with disabilities' paratransit use and existing services; setting system-wide goals for improved accessibility; gathering data on fixed-route and paratransit for baseline and future assessments; and settings system-wide policies and goals to get organization-wide direction. The next recommendations are:

1. Ensure the entire system is accessible: guarantee that "the strategy also includes efforts to obtain the most usable equipment and programs to monitor the provision of service."
2. Address accessibility to and from fixed-route transit stops, such as repairing broken sidewalks, clearing overgrown bushes, adding curb-cuts, or building sidewalks on rural roads.
3. Provide information on the benefits and use of fixed-route transit to people with disabilities and the broader disability community. Information venues can include marketing, online materials, trip planning services, travel training, and more.
4. Increase ridership through fare incentives, such as reduced or free fares for qualifying people with disabilities (and by extension, seniors).

5. Explore “alternative service designs,” such as flex-route, community bus services, paratransit-to-fixed-route feeder services, and the general public dial-a-ride.
6. Use well-designed eligibility determination for paratransit, including for specific trips. If possible, factor in distance-to-stops, the presence (or lack thereof) of sidewalks, the accessibility of transit stops, etc.
7. Use and integrate multiple efforts for comprehensive and complementary systems.

Most improvements ended up being worthwhile from a budgetary standpoint. This reflects the reality that the budget impact of a regular rider on paratransit vs. one on fixed-route transit can be tens of thousands of dollars annually. One-time capital improvements that shift ridership from paratransit to fixed-route transit (e.g. making a bus stop accessible) can pay off in just a few years, if not a few months. Ongoing programs, like travel training and counseling, are often worthwhile as well. Other community benefits are not quantified, such as life quality improvements and more reliable access to jobs.

Referenced studies (e.g. at the state and county level) use innovative strategies to evaluate the impact of a given improvement. For example, many agencies tracked how many times each bus deployed its wheelchair ramp at every stop in their footprint. It also tracked the number and frequency of paratransit rides, and identified quarter-mile radii for each bus stop. In nearly all cases, whenever a bus stop had accessibility improvements, the number of ramp deployments increased at that stop and the change in number of paratransit rides in a quarter-mile radius was lower than other nearby areas.

The Maryland Transit Administration demonstrates the value of bus stop improvements simply by looking at the average annual ADA paratransit rider cost, which is approximately $38,000 annually. They pursued a set of “simple” improvements averaging $7000 a piece and “enhanced” improvements averaging $58,000 per stop (e.g. with a covered bus stop and information ticker). Given this, transitioning just one individual to a fixed-route rider “would recover the stop improvement costs in 10 weeks for the simple improvements and in 18 months for the enhanced improvements.” Another example comes from Intercity Transit in Olympia, Washington, which improved 24 bus stops in 2010. Overall boarding at those improved stops increased by 14% the next year compared to an increase of 5% system-wide, while lift deployments increased 37% compared to 16% systemwide wide. Assuming each “lifted deployment” trip was avoiding ADA paratransit, the agency saved $17,996 through its improvements. TriMet in Portland, Oregon, spent $500,000 to upgrade 17 bus stops “with repair and construction of incomplete and damage sidewalks, and the addition of 10 bus shelters and concrete pad at the stops.” Lift deployments doubled in just a couple years, and ridership on ADA paratransit by conditionally eligible riders decreased 12% near improved stops (it’s also possible that the agency avoided new paratransit enrollments by people living near those stops). The agency estimated a $60,000 annual savings, meaning the improvements will pay off in under a decade.

In addition to many more recommendations and examples, this document includes a valuable overview of relevant segments of the Americans with Disabilities Act to both paratransit and fixed-route transit. We encourage all Bay

Area transportation organizations to use this document in planning, investments, and operations.

TRACS Survey

TRACS staff assembled a survey in late 2019, using insights gained from community-based research and literature reviews. The survey followed a similar format to a study by the National Academies of Sciences, Engineering and Medicine[5] to gauge the transportation-related experiences and sentiments of people with disabilities nationwide (Ferris, 2014); it also included paragraph-length fields for open-ended feedback and, given the amount and nature of feedback about paratransit through community-level research, a page devoted specifically to paratransit. Fields included "logic" functions that asked follow-up questions depending on a given response: for example, if a person responded that they use paratransit for some trips, they were asked about reasons they enrolled in the service, and which factors influence whether they use paratransit for a given trip (e.g. the proximity of their destination to a nearby bus stop). SurveyGizmo was the online survey host, since it is easy to navigate with text-to-speech software utilized by many blind and low-vision individuals (JAWS and other programs). TRACS staff distributed the survey via email to nearly 200 Bay Area organizations serving seniors and people with disabilities; the survey was regularly shared on social media and Facebook while it was online (33 days in

[5] National Academies of Sciences, Engineering, and Medicine 2014. *Strategy Guide to Enable and Promote the Use of Fixed-Route Transit by People with Disabilities*. Washington, DC: The National Academies Press. https://doi.org/10.17226/22397.

early 2020); and both WID and MTC used targeted, paid social media advertisements to reach seniors and people with disabilities in the Bay Area.

In one month online, the survey received 375 responses. 205 of these were "complete" where respondents did not leave the survey webpage until they reached the last question. TRACS staff reviewed the remaining 173 responses and deleted instances where respondents stopped before reaching a section about transportation habits (i.e. only entered their name, email, disability status, senior status and/or ZIP Code) or when individuals landed on the survey page but did not provide any information. Several responses were also removed based on location: this included respondents who listed a home ZIP Code outside the 9-County Bay Area or, if they did not list a ZIP Code, if the IP address of their computer (as logged by SurveyGizmo) was outside the Bay Area. It is possible that the location-based strategy omitted some respondents who were traveling when they filled out the survey or who use a Virtual Private Network (VPN); however, priority was given to ensuring that responses indeed came from the Bay Area. The resulting data included 217 responses: 202 complete and 15 partial. There was a roughly representative group of respondents from each County, with a slightly lower percentage and the northern section of the Bay Area. There were enough overall respondents to feel comfortable reporting numbers at the Bay Area-wide level, but not at the county level.

Main findings from the survey include:

- There was a relatively even split in respondents between seniors (or filling out on behalf of a senior) and people with disabilities (or filling out on

behalf of someone with a disability). There is also overlap, with around one-third of respondents selecting multiple categories.

- Nearly three-quarters of respondents had some sort of disability. 50.2% of all respondents had a mobility disability, 10.1% were deaf or hard-of-hearing, 10.1% had an intellectual and/or cognitive disability, 8.8% were blind or low-vision, and 7.8% had a psychiatric disability. 18.4% listed "other," where write-in details mostly had specific diagnoses and mobility equipment.
- Of respondents who use mobility equipment, 70.7% is a Walker or cane, 19% use a manual wheelchair, 16.3% use a power wheelchair, 10.2% use a power scooter, 6.1% use a guide dog or service animal, and 5.4% use a white -tipped cane. 10.9% listed "other," with write-in answers including ankle braces, oxygen concentrators, and a wheeled basket.
- Approximately 89% of respondents receive some form of government benefits. Of these, 70.5% are on Medicare, 51.9% receive Social Security Retirement benefits, 21.3% are on Medi-Cal, 14.2% are on SSI, 12% receive IHSS, and 9.8% receive SSDI. Assorted benefits in the "other" category include CalFresh, disability pensions, private retirement, and VA disability. One person noted "I was born off-grid and never registered or documented. I am legally not a person and therefore cannot get any governmental assistance."
- When asked if they own a vehicle, 27.8% noted that nobody in their home owns a vehicle. 51.7% reported they own a "regular car, truck, or van;" 23.4% live in a home where somebody else owns a vehicle, 3.3% own a

vehicle that is designed, or has been modified, for their disability; and 1.9% own a scooter or motorcycle. The low rate of personal vehicle ownership is a regular concern regarding the mobility of people with disabilities.

- Respondents were asked how frequently they use an array of transportation services. The most frequently-used transportation modes were in personal vehicles – either as a driver, as a passenger in a household vehicle, or as a passenger in a friend, family member, or attendant's vehicle. Traveling several blocks by walking or using a wheelchair/scooter was also frequently used method, although a full 33.5% of respondents said they never use this method. Of other transportation modes, buses were used most frequently, followed by heavy rail and light rail. Approximately 18% use taxi or ride-sharing services daily or weekly, while 13% use paratransit daily or weekly; another 32.5% use taxis and ridesharing monthly, while 8.7% use paratransit monthly. Very few individuals use a ferry (none use it daily, only 2% do so weekly and 13.1% monthly) or by using a bicycle or scooter (2.1% daily, 3.6% weekly and 1.6% monthly).
- When asked about how important assorted factors are in choosing which transportation method to use, respondents answered on a scale from one (not important) to 5 (very important). The methods that were most important – with a combination of scores 4 and 5 – were, in order: numbers of transfers to reach a destination; distance from home to a transit stop; frequency of arrivals; distance from a transit stop to the destination; safety; amount of time spent traveling to a destination; appropriate schedules (e.g. early mornings or late nights); respondents' understanding of the

transportation system; pedestrian barriers (e.g. broken sidewalks); accessibility and availability of applications; cost of transportation; the need for advanced scheduling; information on barriers in the pedestrian pathway; and onboard space for equipment. Responses in the "other" category included accessibility of payment options, assistance from a vehicle into a building and elevators, crowding and availability of seats, cancellation of transportation routes, assistance at gas stations, drivers' attitudes, and environmental impacts.

- When asked about travel training, 55.5% said they have not done travel training and are not interested. The remainder, collectively nearly half of all respondents, included people who received travel training in a group setting (6.2%), those who received it in a one-on-one travel training (5.7%), and people who have not done travel training but are interested (a full 32.5%).
- When asked about their experiences with travel training, people referenced assistance from Disability Services and Legal Center, the Lighthouse for the Blind, and the School for the Blind in Berkeley. One respondent learned how to use the transit system on their own as a way to avoid the higher costs of paratransit. People who received travel training had mixed reviews, but it was worthwhile for many respondents. Some respondents were not aware of travel training but are interested, and others elaborated on why they would like to use fixed-route transit more.
- When asked "are you interested in using fixed-route transit more?" 45% of respondents said yes, 19% said no, and 36% were not sure.

- Respondents were asked if they are signed up for paratransit. 3.8% are signed up and use it for all trips; 18.4% use it for some trips; 7.5% used in the past but to not anymore; 20.3% do not use it but are interested in signing up; and 50% do not use it and are not interested in signing up.
- The 22.2% of individuals who use paratransit some or all of the time were asked "why are you enrolled in paratransit?" Of those respondents, the most frequent responses were that pathways to nearby stops are inaccessible or hard to navigate; transit stops are not close enough to regular destinations; other direct transportation is not physically accessible; other direct transportation is too expensive; there are no transit stops close enough to the respondent's home; transit stops near regular destinations are not fully accessible; pathways to and from regular destinations are hard to navigate; and traveling on fixed-route transit takes too much time. Less-frequent responses included that nearby transit stops are not fully accessible, websites that help with transportation are not fully accessible, using fixed-route transit is difficult to understand, and fixed-route transit is too expensive. Explanations in the "other" category include difficulty reaching streets on their own, concerns about safety on fixed-route transit, specifics about the difficulty using transit, and that one respondent found the "whole experience overwhelming."
- Of the 16 respondents who previously used paratransit but no longer do, reasons varied but mostly revolved around difficulty with scheduling, advance notice, and transfers between paratransit providers. One individual noted that the cost was unaffordable after a support program

ended. Another individual moved closer to an accessible transit stop, reinforcing that increasing the availability of accessible fixed-route transit can reduce paratransit demand.

- Respondents who use paratransit occasionally were asked what influences their decision to use paratransit for another method. Respondents could give multiple answers and the most frequent responses were the timing of a trip (76.9%), the location of the destination (69.2%), rain or bad weather (64.1%), personal health at the moment (56.4%), if a friend, family member or care attendant is available to drive (53.8%), and the number of transfers needed on a given trip (53.8%). Less-frequent responses were when taxis or ride-sharing are easier for one trip and it is affordable (25.6%), if taking fixed-route transit to a new destination is difficult to understand (23.1%), and the cost of the trip on fixed-route transit, such as needing to take a train instead of a bus (20.5%). Responses in the "other" category included personal issues with balance, timeliness, and a lack of Sunday service.
- Past and current paratransit riders were asked about what paratransit does well, with write-in paragraph responses. There were a substantial number of responses – showing that people do appreciate the service despite its flaws. One person referenced their chemical sensitivity and noted that paratransit is usually sent-free, in contrast to ridesharing vehicles. Some respondents spoke highly of drivers, including door-to-door assistance available in some areas (one blind paratransit user appreciated getting walked to front doors). Individuals who had discounted fares appreciated the cost, although others found it expensive.

- Past and current paratransit riders were asked about what problems they encountered when using the service, with write-in paragraphs. These answers were lengthier and, at times, more strongly worded than the responses giving praise (though one respondent did use this section to give genuine praise ending with “Thanks, Paratransit! Without it I will be stuck at home”). The biggest criticisms included long wait times for getting picked up, discrepancies in scheduling, issues with customer service, excessive advanced scheduling, barriers and concerns when transferring between agencies, last-minute cancellations, some driver interactions, and problems with payment (namely balancing coupons, credits, cash and online payments). One respondent explained that they have a speech impediment and tried to get the driver’s attention when they needed to change destinations, but driver did not put in the effort to communicate back and led to a long and unnecessary journey.
- Respondents were asked if they had any recommendations for paratransit with write-in paragraph responses. Answers included lower fees, improved scheduling flexibility, upgrading GPS systems, expanding the service footprint to rural areas, training dispatchers to understand clients’ circumstances and needs, providing a same-day system, improving transparency about late arrivals, avoiding cancellations, coordinating between agencies for better transfers, and upgrading vehicles with poor shock absorbers.
- Individuals who have not signed up for paratransit were asked why they have not enrolled, with write-in paragraphs. Some respondents were

unsure of how to sign up, several were told they did not qualify, many have enough access to a personal vehicle and a driver (e.g. friend, family member or attendant) that they do not need paratransit, one respondent started applying but gave up after a lengthy and frustrating process, and a belief that using public transit is more flexible and reliable than paratransit. One respondent noted "I've been getting by without it, but suppose there may be a time that I will need in the future."

- Respondents were given the opportunity to answer the question "do you have any criticisms or bad experiences, in general or with specific services?" We received many responses including the following broader insights:
    - There were numerous criticisms of paratransit, most of which were already addressed above. Criticisms came both from personal experience and "per reports from others," showing that public perception likely affects ridership.
    - Stop announcements on buses and rail can be difficult to understand, which creates extra problems during rush hour especially as, as one respondent noted, "it's hard to see through the window or check maps when the train is crowded."
    - BART elevators were mentioned multiple times, especially regarding cleanliness, reliability, and cracking down on a fare-evaders that impede or slow down the use of elevators for individuals who need them.
    - Service cutbacks and changes made specific trips difficult and some impossible (either at all, or within a needed time frame). BART's new

Sunday set up impedes early-morning travel (including timeliness to jobs with fixed working hours).

- Some respondents had bad experiences with bus drivers (paratransit drivers get less criticism). Drivers occasionally drive past waiting passengers with mobility equipment, which is viewed as a personal attack and also affects independence and mobility. Other drivers are unprofessional or seem visibly frustrated when securing mobility equipment.
- A regular transit rider would like more covered bus stops and transit stations (including covered seating at Caltrain stations). This is a concern for people with disabilities who have a more difficult time with inclement weather (e.g. difficulty holding umbrellas in the rain).
- Safety on fixed-route transit was a frequently cited concern. Several responses addressed crime on BART specifically, while crowded and unclean pedestrian pathways and bus stops were also mentioned..
- One individual criticized the lack of supports and services for undocumented persons.
- Seating on public transit is uncomfortable for some people with disabilities, including with physical disabilities and/or chronic pain.
- A long-time Bay Area resident reflected that Muni used to be more focused on meeting customers' needs, possibly with small detours, and having frequent enough surface that a slightly-late bus was not a big deal. The gradual transition to prioritizing efficiency and

timeliness has, the respondent believes, left customers' needs by the wayside and has done more harm than good.

- Canceled stops resulting from redrawing maps or service cutbacks have impacted individuals' ability to reach regular destinations. This includes stops near facilities that should be higher priority – one respondent mentioned that it is now difficult to reach Sutter Mission Bernal Hospital via fixed-route transit.
- Crowding on transit is a large concern, whether on bus or rail.
- One person with a service animal has had bad experiences with untrained pets being aggressive toward their service animal on light rail systems. Another person also mentioned unruly pets, while light rail drivers sometimes ask for identification for a service animal. The first respondent said "please make light rails NOT pet friendly and enforce such" and the second said "seems hypocritical that they would allow aggressive dogs some days, but then hassle me about my trained dog."
- Ridesharing drivers sometimes reject people with service animals.
- One respondent got lost using a bus and needed a family member to pick them up.
- Respondents noted a lack of coordination between transit agencies.
- Increasing costs of paratransit and demand-response services are putting many people with disabilities in a bind. Referencing Catch a Ride, one respondent said "Marin County is not a good place if you are poor and without a car. It's shameful!"

- Shopping for perishable food items is an under-addressed issue. One statement seems funny at first but has real implications: “staying on [a] paratransit ride for two hours and having ice cream on board” means it’s practically impossible to purchase and enjoy some frozen foods.
- Passengers sometimes refused to move away from designated accessible seating. (One respondent reflected “BART does not have a culture of young passengers yielding seats near the doors to elderly or disabled passengers, particularly during busy times of days”). It’s essentially impossible to get help from staff on some systems (especially BART, with fixed schedules and just one driver on multi-car trains) when those passengers refused to move. Drivers, customer service staff etc. are not always willing to confront non-compliant riders even when staff are nearby. One driver reportedly said “lady, I’m a driver, not a policeman” after a passenger with a disability asked them to intervene when another passenger refused to vacate a designated accessible seat.
- The lack of morning and/or evening bus service affects some people’s mobility and independence. One respondent lives in Contra Costa County and takes a bus to the local BART station for a train to San Francisco. Inadequate morning service makes it so they occasionally miss their desired train; the final bus home leaves the BART station at 6:30-7 PM so the respondent must get on BART quickly when the workday ends.

    - One respondent explained that “the Salesforce transit center in San Francisco is a nightmare for disabled patrons to navigate. It’s a half-mile long end to end, and there isn’t an option for Shuttle service on the AC Transit deck at all.”
    - Local activists were very frustrated with what they viewed as ongoing unaddressed accessibility problems and a lack of community engagement. One activist penned a multi-page response with many words and sentences in all-caps for emphasis. This level of frustration echoes our discussions in workshops, interviews and focus groups – including skepticism of the TRACS effort as a continuation of a procedural status quo without concrete outcomes.
    - One respondent, likely in a rural area, simply stated “I have [no] public transportation where I live.”
- Respondents were asked to share their compliments or good experiences. Answers included:
    - BART provides speed and reliability that many passengers value. Of course, there are caveats: as one person said, “BART works great when the elevators are clean & reliable.”
    - SMART seem to get high marks overall.
    - One respondent liked the pilot project of having staff in BART elevators, while another noted improved cleanliness in the downtown SF BART stations. (Another response was more mixed, saying in part “BART is disgusting. I’m glad it no longer smells like urine.”)

- One respondent who had used multiple services said “it is my sense that SamTrans is the best Bay Area transit provider in terms of overall disability accommodation.”
- Caltrain was described as “comfortable and reliable” – and in general, Caltrain received more positive feedback than negative criticism in the written responses.
- The ferry, despite its higher costs, is an enjoyable experience.
- There were many positive reflections and appreciation of drivers, including noticing improved customer service recently. One respondent said that “In general, my complements go to the drivers and train operators, most of whom maintain a good attitude and professional demeanor in spite of all the craziness they have to put up with when dealing with the public.” Another respondent noted “despite problems posted above I have seen drivers go out of their way to help client in particular difficult situations and I’m grateful for that.”
- When discussing the quality of drivers, one person referenced the “old-timers” and “old-schoolers” with many years of experience as especially responsive and helpful.
- The Palo Alto crosstown shuttle was described as “very quick and convenient” and another effused “I love the small shuttle buses in Marin County! They have roots into the less used areas.” These comments show the value of lower-profile shuttle services.

- Notably, more than one dozen respondents decided to answer this optional question with some form of “no,” “n/a,” or something similar. This occasionally turned into more extended criticisms, including a straightforward “SF Bay Area transit is a wasteland that’s best navigated able bodied.”
- One respondent noted that increased accessible parking spaces at the El Cerrito Plaza BART station “increase the times of day I can travel by BART, don’t have to wait until 10:00 for an empty permit space.”
- Paratransit is viewed as a valuable resource for many people who use it regularly. One respondent noted “Paratransit has been a lifesaver for me and my family. I have one child and the strain of driving me wherever I go is too much. I get to retain more of my independence with paratransit… Financially it helps me and my family cut down on expensive transportation costs…”
- Two responses demonstrate how much these issues are subjective. One builds off improved access since the days of inaccessible buses: “for the most part, the access to transit has improved greatly over the last 30 years in the bay area.” Another compares our systems to other countries’: “The public transportation systems in Italy, England, Slovenia, Croatia put the current public transportation companies to shame.”

- Respondents were invited to make open-ended recommendations. These included:

- One individual recommended improving ground transportation to ferry stations (they specifically mentioned a shuttle from the ferry station to downtown Petaluma).
- Respondents called for increased funding to transportation networks, including support to disability- and senior-focused services.
- As noted in the complements and criticisms, the actions and attitudes of drivers are very important to passengers with disabilities and seniors. Several respondents recommended better training for drivers about securing mobility equipment, as well as sensitivity training and appropriate ways to interact with seniors and passengers with disabilities. Training can also address service animals, what to do when other passengers refused to vacate accessible seating, etc.
- BART passengers want redundant elevators and a better backup transportation, should an elevator be out-of-operation. Backup transportation could be to the next closest station or directly to one's destination.
- Elevators should feature large floor-level buttons for individuals who cannot press conventional elevator buttons on their own. The new elevators that connect Ashby BART to the Ed Roberts Campus have such floor-level buttons.
- Respondents want more reliable service, especially in areas where routes have changed, arrivals are less frequent and/or service has been cut back.

- Passengers want more comfortable seats, especially on BART.
- Passengers would like better training and interaction with non-drivers, including station attendants and police officers. This is doubly important because people with disabilities sometimes encounter problems at fare gates or with broken elevators that mean they need assistance processing tickets and adjusting fares correctly.
- Paratransit riders would like shorter trip times and same-day booking.
- Passengers want better safety, with many comments about BART and Muni.
- People in suburban, rural and unincorporated areas want expanded service and larger service footprints.
- Passengers want more covered bus stops.
- Respondents had comments about bringing back specific transit routes, reflecting that well-intentioned (and even well-designed) service changes have negative impacts for individuals that lose nearby service and stops/stations.
- Several respondents referenced the need for better announcement systems of approaching vehicles and upcoming stops. This includes louder, clearer audio announcements and multiple media. Blocked maps on crowded trains and buses should be addressed where possible.

- A respondent recommended designated bus-only lanes on freeways and bridges, which they argue will increase public transit efficiency and ridership.
- Respondents want better collaboration between agencies, including between paratransit operators (e.g. to allow for overlapping service areas and/or for more reliable timed transfers between shuttles).
- Several respondents want more overnight service. One individual recommended that there be an accessible shuttle available for the region's three major airports overnight, to accommodate people who arrive late at night (whether scheduled or unexpected) and cannot use inaccessible taxis and TNCs.
- Several respondents recommended combining the region's service providers into one entity, as they believe it would improve coordination and efficiency.
- Paratransit users would like more flexible payment options aside from credits and exact cash fares.
- Explore the development of a "transportation disadvantage board" that could evaluate equity concerns and provide recommendations as needed.

- The survey asked if respondents have any recommended resources or organizations to contact. Responses included:
  - Independent living centers
  - The Lighthouse for the Blind
  - Urban Habitat.

- Canine Companions for Independence and Guide Dogs for the Blind. (For evaluating and explaining was about service dogs on transit).
- Senior Centers
- Libraries
- Rotary Clubs
- “Just my brains!”
- YMCA
- “yes”
- Mental Health Association of SF
- Transportation unions
- Hand in Hand
- Bicycle and pedestrian advisory commissions, and other relevant citizen oversight boards.
- California Council of the Blind.
- AARP
- Colleges’ and universities’ disabled students programs.
- Other cities with successful systems and services. New York City, Seattle and Toronto were specifically highlighted.

Finally, we asked about household income and current employment status. The responses – 181 on income and 191 on employment status – were as follows:

Percent and count of responses by income level

Income Level	Percent	Responses
Less than $25,000	24.3%	44
$25,000 to $34,999	12.7%	23
$35,000 to $49,999	8.8%	16
$50,000 to $74,999	13.3%	24
$75,000 to $99,999	10.5%	19
$100,000 to $149,999	12.7%	23
$150,000 or more	6.6%	12
I don’t know	11%	20

Percent and count of responses by current employment status

Employment status	Percent	Responses
Employed full time (40 hours+)	12.0%	23
Employed part time (<40 hours)	12.0%	23
Unemployed and currently looking for work	4.2%	8
Unemployed and not currently looking for work	4.7%	9
Student	1.6%	3
Retired	49.7%	95
Self-employed	2.6%	5
Unable to work	13.1%	25

Themes through Community Discussions

TRACS staff had discussions with community leaders and technology developers at assorted events and in unrecorded conversations. In addition to the findings in our community events and literature review, 2 themes emerged. They are the need for a "whole-environment" strategy and the need to address emerging technologies. It should also be noted that transportation stakeholders will need to reevaluate investments and operations in the wake of Covid-19 (with its impact on both the economy and the public's comfort riding on buses and trains).

A "Whole-Environment" Strategy

The process of improving transportation systems for seniors and people with disabilities involves more than cars, buses and trains: improving mobility means examining and improving everything from housing to sidewalks. Seniors and people with disabilities navigate their environment through numerous means – such as driving a personal vehicle, taking fixed-route transit, or utilizing pedestrian pathways. This means that numerous factors impact personal mobility, including personal financial resources, the location of one's home and destinations (e.g. school or work) relative to fixed-route transit, the upkeep and accessibility of pedestrian pathways, the robustness of social support networks (e.g. friends who can drive someone to their destination), and access to information and technology. Transportation networks likewise do not operate in a silo: for example, recent California legislation is accelerating the development of multi-family dwelling units (i.e. apartment and condo buildings) adjacent to heavy rail stations, including by building housing on property owned by BART, in order to reduce congestion and greenhouse emissions; dynamics between transit and housing go in the other direction as well, as transit agencies sometimes change bus routes to better serve areas with growing housing developments.

Most transportation planning focuses on the layout of roadways (to balance vehicle, bicycle and pedestrian traffic), capital improvements to roadways and transit networks, daily operations, budgeting, staffing needs, and customer service. Our research shows that seniors and people with disabilities also want improvements to other related systems, namely smoother and safer pedestrian pathways, better transit-oriented housing options, stable social services, and

inclusive rights-based disaster readiness and response. In fact, 56% of survey respondents noted that they travel several blocks on pedestrian pathways either daily or weekly; when respondents were asked how important factors are to their transportation choices, 65% ranked "barriers in the pedestrian environment getting to and from stops/stations (e.g. uneven sidewalks or overgrown bushes)" as either 4 or 5 on a scale of 1-5, a percentage that placed 9th out of 14 options, behind such answers as cost of transportation and have enough physical space for mobility equipment in buses/trains/etc.[6] These and similar findings show that advocates and officials can improve personal mobility by adopting a "whole-environment" strategy for universal access, building synergies between transit operators, urban planners, infrastructure managers, social service agencies, housing departments, and other diverse stakeholders.[7]

Recommendations on adopting a whole-environment strategy include:

- Continue developing transit-oriented multifamily dwelling units – and do so in a way that expands the regional stock of accessible, affordable housing. New construction offers better accessibility than older buildings, especially those built before the passage and implementation of the Americans with

[6] On a personal note, one member of the TRACS staff team was riding his wheelchair through a sidewalk in 2012 and made a turn around a grass hill obstructing the view of the other side of the turn. It was late at night without overhead lighting, so the sidewalk was difficult to see – to the point that the staff member did not notice a chopped-down tree stump in the middle of the sidewalk, obstructing the right half, immediately after the grass hill. He ran head-on into the tree stump at his power wheelchair's full speed, fell out of the chair and had a complete spiral fracture in his right femur. We understand the importance of broken and obstructed sidewalks from our community engagement – and even from personal experience.

[7] https://www.ada.gov/2010ADAstandards_index.htm

Disabilities Act in the 1990s (note: ADA guidelines were most recently updated in 2010,[8] with more potential changes in the future). Transit-oriented housing is beneficial for seniors and people with disabilities as it minimizes the time and distance to transit services, while compensating for disproportionately low personal vehicle ownership by providing nearby transportation options. New construction should be built using Universal Design frameworks, such as having automatic door-openers on buildings and putting roll-in showers into a minimum percentage of apartment/condo units. Buildings should also provide affordable housing options that are viable for people with disabilities and seniors on limited income.

- Improve the quality of sidewalks and other pedestrian pathways. Smooth, navigable sidewalks are necessary for many seniors and people with disabilities to get from origin to destination in a way that stays on sidewalks and crosswalks (i.e. avoiding entering a street or bike lane to bypass an obstruction).
- Make every effort to co-locate transit stops and entities frequented by seniors and people with disabilities (e.g. community and senior centers, social service agencies, employment support services, medical facilities, etc.). For example, Oakland's Eastmont Town Center was converted from a shopping mall to now house a mix of stores, social service agencies, clinics, nonprofits, and a library branch; Eastmont Town Center is co-located with the Eastmont Transit Center serving more than 10 AC Transit local, transfer,

[8] https://www.ada.gov/2010ADAstandards_index.htm

all-nighter and school bus routes, as well as a free shuttle from Eastmont's Social Security Administration Office directly to the Oakland Coliseum BART station. The combined Eastmont facility provides a virtual "one-stop-shop" for many senior and disability services alongside shopping and entertainment, and is reachable by bus and/or BART for a large number of Alameda County residents. Co-location – whether large-scale like Eastmont Town Center or smaller-scale for individual entities – can happen by placing a transit stop near an existing priority entity, by rearranging bus routes to better serve those entities, or during the process of identifying entities' new locations (e.g. when constructing a new senior center or moving an employment center's main office).

- Build networks of stakeholders whose work impacts personal mobility, whether directly or indirectly – such as urban planners, social service agencies, housing departments and others. Create working groups and host regular meetings or conference calls to keep stakeholders updated on each other's disability- and senior-related work and coordinate accordingly. Clearly outline the goals of universal accessibility, personal mobility, social equity, and effective disaster readiness and response. Encourage relevant agencies to bring in more staff with disabilities to increase internal diversity and knowledge about the "lived experience" of disabled persons.
- Any investments and operations paid for, in part or in full, by the federal government must be fully accessible to people with disabilities; this is a legal requirement per Section 504 of the Rehabilitation Act. Service providers and advocates can leverage Section 504 to improve the "whole

environment," including but not limited to transportation networks, infrastructure, housing, and disaster preparedness and response. Although Section 504 addresses access for people with disabilities specifically, universal design across the whole environment benefits other groups, including many seniors without disabilities covered by TRACS.

Personal mobility is important because it supports quality-of-life and independent living. Mobility is affected by more than vehicles and pathways: the entire built environment, including operational structures and services, affects where and how people move. Planning and actions should address that reality to create a universally accessible Bay Area.

Address Emerging Technologies

Automated vehicles (AVs), pod cars and other transformative technologies have great potential for seniors and people with disabilities, and efficient mobility in general. Developers often pitch emerging technologies as transformational systems that will reduce the need for conventional personal vehicles, eventually replacing cars and even some frequently used public transit networks, like fixed-route buses. Given that these new systems may become pervasive, they must be built using Universal Design principles that will allow all seniors and people with disabilities to navigate the world using new systems. Luckily, the current early stages of development (ranging from conceptual design to testing phases to low-scale deployment, depending on the technology) provides a perfect opportunity to build out truly accessible transportation systems – and avoid the need for retrofits or building separate "accessible" technologies to make up for shortcomings in the design and deployment phases.

The Bay Area has been a hub of innovation for decades and several Bay Area regions, including San Francisco, the inner East Bay and Silicon Valley, are on the cutting-edge of emerging transportation technologies. However, emerging technology developers may not be well-versed in accessible transportation systems or understand the legal requirements and equity importance of accessibility. Depending on the technology, developers may also believe that that incorporating Universal Design principles is either technologically impossible or financially unrealistic. For example, one type of pod car design includes an elevated guideway, similar to BART's elevated sections south of Oakland but with a tighter footprint, using automated, smaller 4-to-8-passenger cars and more frequent stops [note: the pods can be "platooned" to connect with each other and act similar to a conventional subway train]. When TRACS staff spoke with elevated-guideway pod-car designers, those designers were concerned about the cost of providing enough elevators so that people with disabilities can reach every pod-car station from street level (given the design of pod car systems, stations are often closer together than stations in rail networks); some also prioritized the efficiency of a compact design over a wheelchair-accessible but larger vehicle.

The situation with wheelchair-accessible vehicles and TNCs shows how late responses to accessibility concerns can result in inequitable systems and policy gridlock. TNCs did not offer wheelchair accessible vehicles in their early years, claiming they are communication networks and have no responsibility to guarantee any accessibility of their drivers' vehicles; taxis, on the other hand, either have accessible vehicles or partnerships with accessible transportation providers, but are increasingly squeezed out by ridesharing services and do not

offer the same scheduling flexibility as ridesharing apps. Disability advocates pushed strongly for equal access to TNC services: after several years, California legislation directed the California Public Utilities Commission (CPUC) to start a rulemaking procedure to provide equal access to wheelchair-accessible vehicles. The rulemaking is still ongoing, and the deployment and management of accessible vehicles will be a lengthy process. Early action could have insured equal access to these ridesharing services, but now California is playing catch-up.

Local officials should do everything possible to push for universal accessibility and equitable services for all upcoming technologies. In the case of certain technologies, service providers may push back against access concerns deeming them financially and/or logistically unrealistic (e.g. fully accessible pod cars or elevators at every station, even if they are just a couple blocks apart). However, emerging technologies must still abide by disability rights law and should strive for universal design and full accessibility. Policymakers and advocates should hold these new systems to legal obligations and push them to go beyond what the law requires.