Insights Into On-Demand Transit: A Case Study of Houston METRO's curb2curb Transit Services

Preprint

LaQuinton Armbrister,[1] Stanley E. Young,[1] J. Sam Lott,[2] Bonnie Powell,[1] Alejandro Henao,[1] and Michael Andrade[3]

1 National Renewable Energy Laboratory
2 Automated Mobility Services LLC
3 Metropolitan Transit Authority of Harris County, Texas (METRO)

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LaQuinton Armbrister, M.S[1], Stanley Young, PhD[1], J. Sam Lott, PE[2], Bonnie Powell, M.S.[3], Alejandro Henao, PhD[1], Michael Andrade[4]

[1] Center for Integrated Mobility Sciences, National Renewable Energy Laboratory
[2] Automated Mobility Services LLC.
[3] Resilient Infrastructure and Security Center, National Renewable Energy Laboratory
[4] Metropolitan Transit Authority of Harris County, Texas (METRO)

ABSTRACT
As modern on-demand transit (ODT) deployments increase, the insights gained from studying real-world systems prove more useful. In this study, a shared ODT system called "METRO curb2curb" in the suburbs of Houston, Texas was studied, with a particular focus on the Missouri City zone, which has the highest ridership out of the four total zones in which the system operates. The Missouri City zone spans 18 square miles with an average daily ridership of nearly 400 as of November 2024. In order to gain a passenger perspective, data collection was performed through using the ODT system first-hand, completing 50 rides in March and April of 2023. These rides included a mix of three different types of on-demand travel accommodations – 1.) advance bookings (30 min – 2 hours ahead), 2.) as-soon-as-possible / real-time dispatch bookings, and 3.) no-reservation trips at two designated "anchor points." Wait and travel time were collected for each ride. Anecdotal findings related to ease of locating the driver/vehicle, the process of booking a ride, and popular trip purposes were also documented. This study provides an overview of the METRO curb2curb system, including its history, service provider, service area, ridership, booking options, wait time, and travel time. Intricacies related to different definitions of wait time are included. Finally, relevant considerations for automating the on-demand transit system and discussed.

I. INTRODUCTION

On-demand transit (ODT) continues to alter the way a growing number of people commute and travel. ODT is a form of shared public mobility, distinguished by its flexibility in time and space, that allows passengers to request a trip at a more desirable time and from convenient locations for both pick-up and drop-off than more traditional fixed route transit services. It has often been used as an alternative or supplement to fixed route transit for short trips within the community and for first-mile/last-mile connection to regional transit service. NREL's research of ODT services has found that it is becoming increasingly popular within many larger transit agencies, and serves as a responsive, cost effective mode to provide transit options to residents of communities with low population density (Young et al. 2024). ODT works as a supplement to more traditional fixed-route services in lower density areas since these areas have lower ridership demand, providing direct trips (origin to destination) and facilitating connections to other transit options (Duvall 2023). Low-income and underserved communities typically predominantly benefit from ODT systems.

Metropolitan Transit Authority of Harris County, Texas (Houston METRO) has implemented ODT in a service branded curb2curb. ODT commonly uses smaller, Americans with Disabilities Act (ADA) compliant vans and minivans. For the Houston METRO curb2curb system, their minivans have been modified to include a wheelchair ramp so that a single wheelchair passenger can be loaded with the assistance of the METRO vehicle operator.

This case study of the Houston METRO curb2curb is the first of NREL's case studies to investigate the integration of ODT as part of a major transit system in a larger metropolitan area. Previous case studies have characterized ODT and its performance and sustainability for rural, sub-urban, and ex-urban environments – apart from the integration of those ODT systems into a larger metropolitan transit system. The goals of this case study are to characterize the performance of the Houston curb2curb, to assess how it integrates into a larger metropolitan sized transit system, and to begin to assess the operational implications of Houston METRO's curb2curb microtransit service for possible future conversion to a fully automated/autonomous vehicle (AV) service using battery-electric vehicles, or other suitable AV technology.

II. HISTORY OF METRO'S CURB2CURB SERVICE

Houston METRO's on-demand microtransit service, branded curb2curb, initially began as an evolution from their dial-a-ride service and was originally referenced as a "community connector" service. Its inception began in the community called Acres Homes, a 7 square mile area inside the city limits of Houston that is a classic "transit desert", having very low-density suburban development while also having a significant transit dependent population. This primarily low-income, minority community generates a relatively low transit ridership demand that did not meet the normal criteria that would justify a full-scale fixed-route bus service circulating within Acres Homes. The community connector service allowed for affordable circulation and first/last mile service option to supplement METRO's limited, fixed-route service that penetrated the Acres Homes district. In its initial form, the Acres Homes community connector service required passengers to use the dial-a-ride reservation system and schedule *at least three hours* in advance. This service allowed METRO to provide transit access throughout the community with connections to a single METRO bus transit center in the middle of the Acres Homes area. This community connector service benefits residents through "serv[ing] low-income riders, who are unable to afford Uber/Lyft, or cannot rely on them due to their variable 'surge pricing' " (Weinreich 2020 pg. 21).

As ridership increased and as the long-term application of new community connector services were being planned, Houston METRO also sought to modernize and improve its conventional paratransit service. METRO management recognized that as a foundation for an enlarged community connector service, the basic dial-a-ride services were generally inefficient since most rides needed to be reserved significantly in advance.

METRO began collaborating with RideCo – an on-demand transit software service to formulate a specific objective to transform and modernize their dial-a-ride services to become an on-demand transit service suitable for communities like Acres Homes. The RideCo mobile app-based reservation system released by METRO on September 8, 2020 aimed to reduce the number of manual dial-in-ride requests by allowing customers to book rides within defined zones, and reduce the waiting time from request to arrival and boarding. The time between requesting a ride and ride delivery was reduced to an average of 30 minutes.

Figure 1 shows the relative size and location of the four on-demand service areas in operation by Houston METRO under the label of curb2curb service. These services were highlighted in a national webinar by RideCo – the company providing the mobile app used for real-time ride reservations – on June 7, 2023 (RideCo 2023) and featured in a presentation by METRO staff for the Texas Innovation Alliance on June 14, 2023.

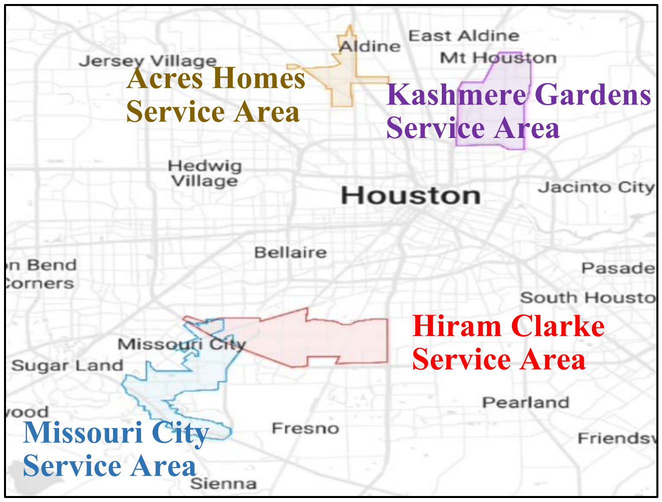


Figure 1: METRO curb2curb Zones in relation to Houston *Source: Houston METRO*

Service area, service hours, average daily ridership (as of June 2023), and year the service began are shown in **Table 1** for each of the four zones. Ridership has increased since the webinar presented on June 7, 2023, and the Missouri City zone had an average daily ridership of 388 between July and November, 2024.

Table 1: Houston METRO curb2curb Zones Characteristics
Source: Houston METRO June 2023 Webinar (RideCo 2023)

Zone	Service Area	Service Hours	Average Daily Ridership	Year Service Began Inclusive of Community Connector
Acres Homes	7 Sq. Miles	5:00 - 19:00	128	2015
Missouri City	18 Sq. Miles	5:00 - 19:00	298	2018
Kashmere Gardens	16 Sq. Miles	20:00 - 24:00	7	2019
Hiram Clarke	22 Sq. Miles	5:00 - 19:00	136	2022

III. CASE STUDY: METRO'S MISSOURI CITY CURB2CURB ON-DEMAND TRANSIT SERVICE

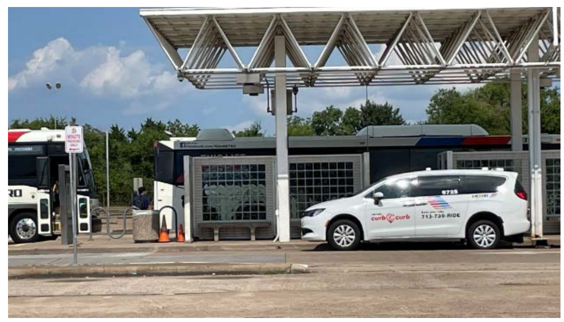
a. Service Area Description

The suburban community of Missouri City is located approximately 15 miles southwest of downtown Houston and has experienced a steady population growth, from 67,358 residents in 2010 (cite 2010 Census) to 74,259 residents in 2020 (cite 2020 census). Missouri City has recently received increasing commercial investment that has altered the city, creating a mixed-use land development with an array of businesses and residential areas. Currently, fixed route transit service within the limits of Missouri City is nonexistent.

There are two park and ride locations within the curb2curb service area where METRO operates express bus services for passengers to reach the Texas Medical Center and other connections within the larger Houston metro area outside of Missouri City. As of the time of this paper, the Missouri City curb2curb service area is the busiest curb2curb operational zone that METRO currently operates, with over twice the number of average daily rides than any of the other areas served by curb2curb (see Table 1).

b. Anchor Point Service:

There are two special service nodes within the Missouri City curb2curb service that are identified as “Anchor Points”. These are located at points where ridership demand is relatively high –the Missouri City park & ride facility, as well as a Walmart store, as shown in **Figure 2**. In addition to the fleet of ADA accessible minivans, Missouri City’s zone has two New England Wheel minibuses which can be accessed at the two anchor points without the need to reserve on the RideCo app. As opposed to being dispatched in response to a passenger ride request on the mobile app, anchor point service with the larger minibus-size vehicles operates on a scheduled departure each hour from the two anchor points. Passengers can simply board the minibus at the anchor points and provide the driver with their destination. Then, the driver adds these passenger trips to the route which takes them to their unique destination’s drop-off point within the curb2curb service area. This operational approach is designed to boost operational efficiency with the limited fleet size during the occasional surges of ridership activity at two of the most popular origins/destinations. The regular on-demand service can also be used to access the anchor points from any origin in accord with the passenger’s personal travel schedule.



Walmart Anchor Point   Missouri City Park & Ride Anchor Point

Figure 2: Anchor Points located in Missouri City *Photo Source: J. Sam Lott*

c. Ridership Growth

Missouri City’s service zone is METRO’s most successful curb2curb microtransit deployment in terms of overall ridership. Ridership has continuously trended upward since inception in 2018. Ad-hoc observations and discussion with riders during data collection activities by the authors revealed that riders mostly utilize the service for commuting to and from work, accessing Houston METRO’s regional transit services, as well as point-to-point trips for leisure around the bustling suburban city. Over the past two years, Missouri City curb2curb Ridership has increased by 124%. METRO data shown in **Figure 3** reveal that in May 2023, a total of 9,055 trips were booked in Missouri City on curb2curb transit vehicles. Figure 3 shows a steadily increasing utilization of the curb2curb with around 4,000 monthly rides in June of 2021 to over 9,000 monthly rides in May of 2023. Residents are now taking advantage of this option as their mode of choice over using personal vehicles, as evidenced through observations, passenger conversations, and travel data collection.

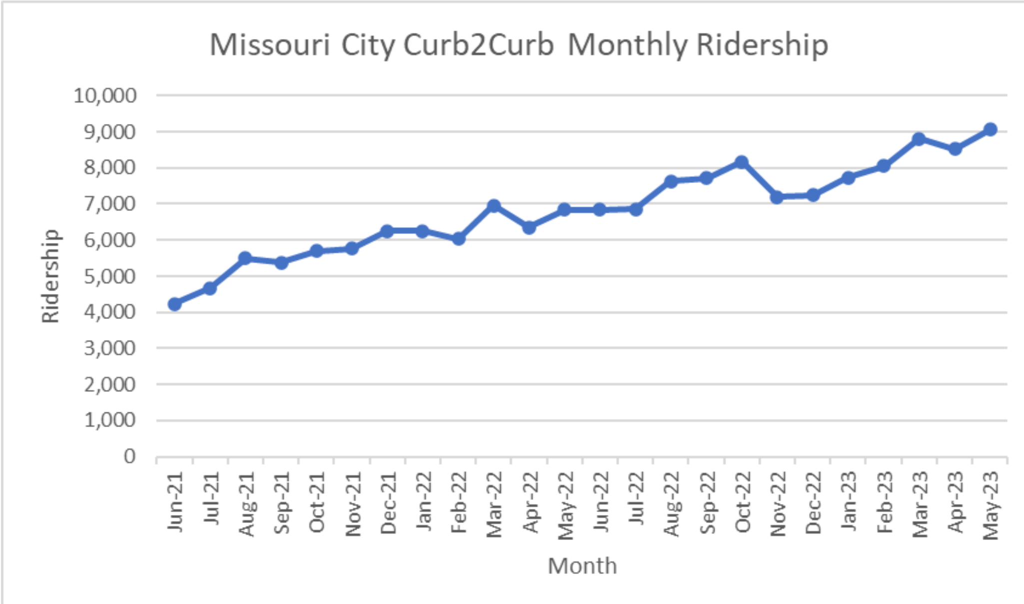


Figure 3: Missouri City curb2curb monthly ridership.
Data Source: Houston METRO Ridership Reports

d. Booking Time, Wait Time and Travel Time

Data on booking time, wait time, and travel time was collected by the first author riding the Missouri City curb2curb service in the Spring of 2023 for 50 trips. During the trips, the researcher observed and recorded ridership, wait-time, challenges, successes, and driver and passenger commentary to gain an understanding the service. For purposes of clarity, this document defines a 'real-time ride request' as the initial time the rider requested immediate service through a smart phone app. In comparison, a ride request for some time in the future is referred to as 'scheduled ride request.' As indicated in the discussion above, the curb2curb system evolved from dial-a-ride and paratransit services, all of which were inherently scheduled ride requests. The ODT service mode was intended to minimize the required schedule time and to maximize service with a small fleet of vehicles. Although curb2curb allows for 'real-time' ride requests, the system works most efficiency when rides requests are scheduled in advance – typically 30 minutes or more.

The researchers noted that there exists no formal or standard industry definition for booking time, wait time, or travel time with respect to on-demand transit services generally. These definitions vary from city to city, between service and software providers, depending on implementation. Wait-time is traditionally the primary data point in determining operational efficiency, and its impact on passenger service. It is also one of the key parameters for mode selection between private rides and transit use. *Wait time* within the curb2curb system is unique to the service and is measured slightly differently between scheduled ride requests and real-time ride requests.

Scheduled Ride Request – A graphical timeline illustrating scheduled ride requests, which is the predominant method of operation for Houston curb2curb, is provided in Figure 4 below.

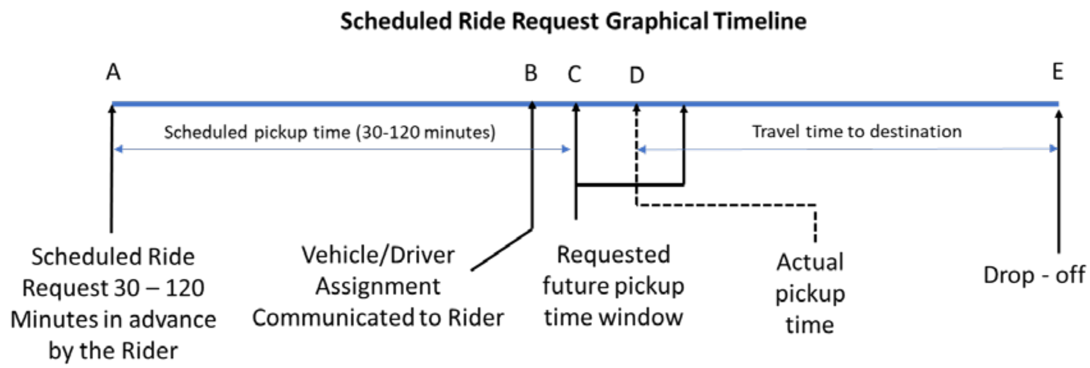


Figure 4: Graphical Timeline and Definition of Wait time for Scheduled Rides

The Figure 4 graphical timeline points designated A, B, C, D and E are described below with respect to the schedule ride request on-demand service mode.

- Point A: Scheduled Ride Request: Rider requests a trip from curb2curb 30 minutes to 120 minutes (typical range) in the future through the smartphone application. The system acknowledges the request. If, for some reason, the system is too busy to accommodate the request, the rider is informed that the requested ride is not available (this occurred one time during data collection), and to try again later. However, most of the time the ride is booked, and the rider anticipates being picked up within a 10-minute window coinciding with the scheduled ride request time (C)
- Point B: Vehicle with Driver Assignment Communicated to Rider: Prior to the requested pickup time (but sometimes at or even after), a message is sent to the rider through the smartphone app informing the driver assignment and vehicle identifier. This usually occurs a minute or two before the requested pickup time
- Point C: Requested Future Pickup Time Window: This is time the rider requested a future trip. Within the RideCo app this time is referred to as the 'Depart After' attribute in the ride request. The expectation of service is that the curb2curb booking will meet the rider within 10 minutes of the requested trip time.
- Point D: Actual Pickup Time: This is when the rider boards the vehicle.
- Point E: Dropoff Time: This is the time when the rider is dropped off at their destination.

The curb2curb systems tracks and reports the parameter referred to as ***Wait Time in Pickup Window***. The Wait Time in Pickup Window is the difference between the vehicle/driver notification delivered to the rider (B), and the actual pickup time (D). During data collection, researchers also tracked the time difference between the requested pickup time (C), and the actual pickup time (D), and refer to this as the ***User Experienced Wait Time***. The User Experienced Wait Time can technically be negative if rider boards the vehicle before the beginning of the requested pickup time. This occurred on more than one occasion during data collection. Note that when this occurred, the User Experienced Wait Time was assigned zero, rather than a negative number.

Real-Time Ride Request – Houston curb2curb service also accommodates real-time ride requests. These are requests for service 'as soon as possible', but for optimal efficiency purposes, curb2curb does not encourage this method of booking. A graphical timeline illustrating real-time ride requests, the non-recommended method of operation for Houston curb2curb, is provided in Figure 5 below.

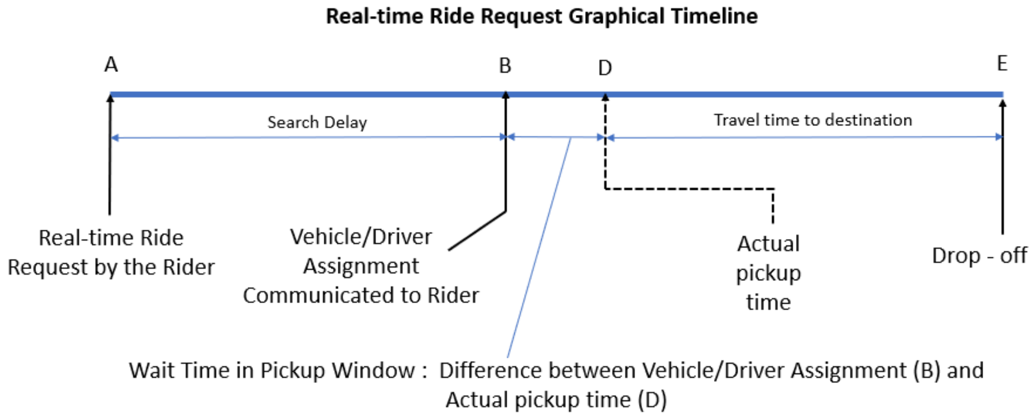


Figure 5: Graphical Timeline for Real-Time Ride Requests

The Figure 5 graphical timeline points, which are labeled for comparison to the graphical timeline points described above for Figure 4, are described below for real-time ride requests.

- Point A: Real-time Rider Request: Rider requests a trip from curb2curb for service as soon as possible through the smartphone application. The system acknowledges the request. If, for some reason, the system is too busy to accommodate the request, the rider is informed that the requested ride is not available (this occurred several times during data collection), and prompts the rider to try again later. The system then begins a search for vehicle/driver to meet the real-time ride request.
- Point B: Vehicle/Driver Assignment Communicated to the Rider: When a vehicle/driver is found to serve the real-time ride request, a message is sent to the rider through the smartphone app informing them of the driver assignment and the vehicle identifier. In the research data collection this occurred 10 to 45 minutes after the request was made.
- Point D: Actual Pickup Time: This is when the rider boards the vehicle.
- Point E: Dropoff Time: This is the time when the rider is dropped off at their destination.
- Wait times for Real-Time Ride Requests: ***Wait Time to Pickup*** is the time elapsed between the time the rider is notified of vehicle/driver assignment and the time of passenger pickup. The ***Search Delay Time*** is the time elapsed between a traveler requesting a real-time ride (A) to vehicle/driver assignment.

The authors' experience with ODT systems prior to Houston curb2curb were with systems that primarily accommodated real-time ride requests, though scheduled requests were accommodated. As such, NREL's expectation for wait time metrics (and consistent with previous studies) was in line with real-time ride requests. NREL defined ***User Experienced Wait Time*** for real-time ride requests as the time from ride request to pickup, which is the sum of Search Delay Time plus Wait Time in Pickup Window. Between July and November 2024, METRO reported an average total wait time (equivalent to the user-experienced wait time) of 15 minutes. For both scheduled trip requests and real-time trip requests, this reflects the time between the requested depart-after time and pickup arrival time.

During data collection on the curb2curb system, the researchers discovered that scheduled rides for 30 minutes or more into the future produced reliable and predictable service, consistent with recommendations by Houston METRO. Not only does prescheduling provide more consistent performance for the user, but it also allows METRO to allocate and dispatch available vehicles efficiently.

It is important to note that in cases of either scheduled or real-time trip requests, when curb2curb resources are constrained (not enough vehicles for the trips requested), the trip is denied. In those instances, customers are instructed to retry booking a vehicle reservation later. This occurred once during data collection with scheduled ride requests, and multiple times with real-time ride requests.

e. Data Collection Methodology

The methodology used to obtain the data described below has been supplemented by additional anecdotal information drawn from discussions with drivers and other passengers. To record this initial data, 50 trips were taken to garner real-world observations and service insights. This field research involved data collection that was primarily conducted during March and April of 2023. The trips were divided into scheduled trip requests (typically 30 minutes or more) and real-time trip requests. At the onset of the data collection exercise, NREL researchers were not aware that the dominant (and recommended) mode of operation was scheduled trip requests for rides 30 or more minutes in the future.

Seven trips were accessed using METRO's designated Anchor Points – the unique type of trip described above which requires no ride-reservation booking on the part of the passenger. When the passenger boards at one of the two designated Anchor Points, the driver initiates a trip record in the RideCo reservation system with the requested passenger trip to the specific destination. These types of trips will be identified in the data as "Anchor Point Trips" that are applied to the fixed schedule service between the two anchor points. The distribution of types of trips is provided in **Table 2**, noting that 34 trips of the 50 total were scheduled trips.

Table 2: Houston METRO curb2curb Research Trip Distribution

Number of Scheduled Trips	Number of Real-Time Booking Trips	Number of Anchor Point Trips	Total Trips
34	9	7	50

f. Passenger Service Time Results

When the ride is scheduled in advance the wait-time reflects the difference between the start of the pickup window provided by the system, and the actual pickup time, designated as the Wait Time in Pickup Window (defined above). The results for the 34 pre-scheduled ride requests are shown in **Figure 6**. The rides were scheduled approximately 30 minutes to 2 hours in advance. For these 34 trips, the average vehicle/driver assignment to beginning of pickup window time was 3.3 minutes, the average wait time in pickup window was 9.4 minutes, and the average travel time (time in vehicle) was 12 minutes. On five occasions, the vehicle arrived several minutes earlier than the scheduled time.

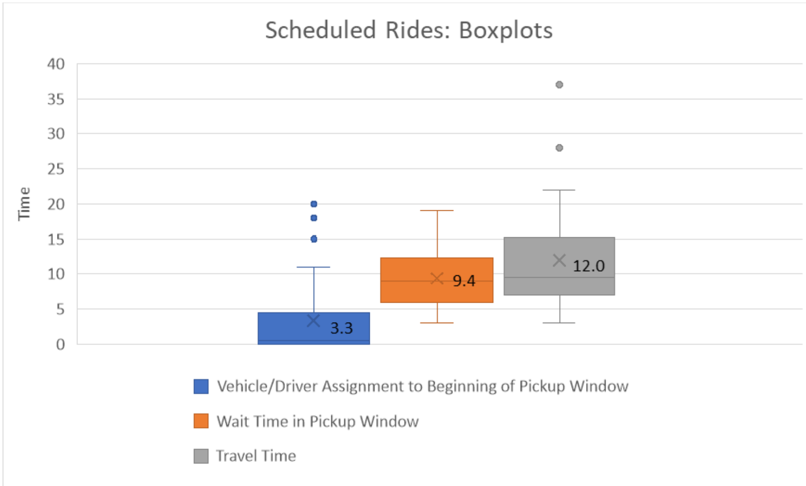


Figure 6: Boxplots showing passenger wait and travel times for scheduled ride on-demand service, using data from 34 trips. Median is shown with an "x" (labeled), the mean with a line, and the upper and lower quartiles with the "whiskers." Outliers are shown with dots.

Figure 7 presents the results of the portion of real-time trip requests when no advance reservation was made, and the app was used to book a trip as soon as possible. For these 9 trips, the average search delay time was 43.6 minutes, the average wait time in pickup window was 8.4 minutes, and the average travel time (time in vehicle) was 13.2 minutes.

Note that these figures do not account for 4 occasions during January 2023 and 5 occasions during the primary data collection time of March and April 2023 when the researcher was unable to book a real-time ride due to there being no vehicles available for service. The initial experiences with this approach to C2C service indicate that using the app for real-time ride requests presents a much greater chance that a "No Vehicle Available—Try Again Later" response form the RideCo app will be given. These experiences led NREL researchers to better understand the prevailing method of use by curb2curb riders of scheduling trips 30 minutes to two hours in advance for better responsiveness and predictability. This "planned trip time" method is a common characteristic of most experienced public transit users and provides riders with a convenient on-demand service at the specific time desired by the user.

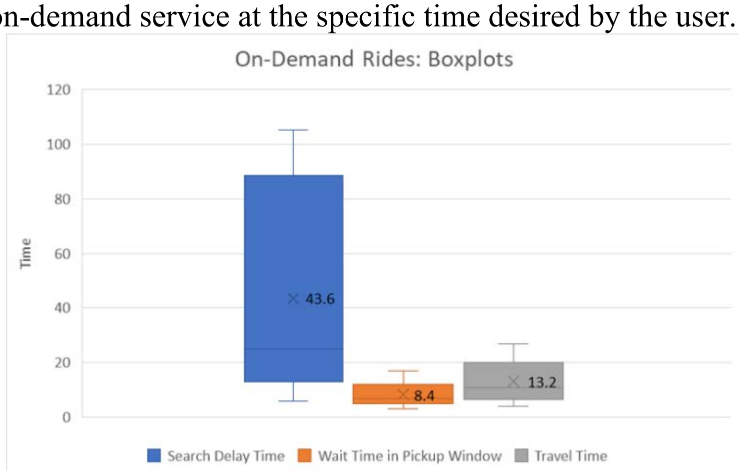


Figure 7: Boxplots showing passenger wait and travel times for real-time on-demand service, using data from 9 trips. Median is shown with an "x" (labeled), the mean with a line, and the upper and lower quartiles with the "whiskers." Outliers are shown with dots.

IV. OBSERVATIONS ON CURB2CURB SERVICES DURING DATA COLLECTION

Two anomalies affecting efficient passenger service (from the passenger's perspective) were occasionally observed throughout the data collection process. Both are related to the periodic difficulties with the curb2curb passenger pickup process and the successful rendezvous with the travel party.

a. Difficulty of a Driver Finding the Passenger Waiting to Board

The first such anomaly observed during the data collection was the occasional difficulty of the driver locating the passenger waiting for pickup. METRO's service is unique where there are no designated pickup points apart from the anchor point service. In shopping centers where there are several businesses, there were occasions when the drivers had difficulty locating the passenger (the NREL researcher). In discussion with METRO after the fact, they commented that this issue was being addressed by directing passengers to a point of interest hub in shopping areas.

When curb2curb vehicle arrives to pick up a passenger, the passenger is alerted via text message, communicating that they have one minute to come to the vehicle and board. If the vehicle arrives prior to the pickup window, drivers are instructed to wait until start of the pickup window and then begin the 1-minute timer. After approximately 30 seconds of waiting, the driver alerts the dispatcher who in turn calls the passengers and requests that they immediately board. During data collection there occurred times when the driver was unable to locate the researcher and left without the passenger boarding. While the curb-to-curb model is often more convenient for passengers, issues with locating the passenger/vehicle (with no dedicated pickup spots) remain problematic at times.

With respect to future AV enabled service, this situation may be amplified, as there would be no driver, and no non-verbal communication (such as arm motions or eye-contact) to assist transit vehicles to locate their rider. This issue touches on curb-side operations for pickup and dropoff where local position technologies such as Bluetooth low-energy and Ultra-wide band are being investigated to address similar issues.

b. Experience with Multiple Simultaneous Ride Requests

The researcher attempted to book several chained rides in advance, attempting to compensate for the longer wait times and uncertainty for real-time ride requests. As an example, consider the hypothetical example of a person who is in a meeting and uncertain exactly what time the meeting will end, yet there is some urgency for them to obtain a curb2curb ride as soon as possible after the meeting concludes. One solution would be to schedule four rides – each 15 minutes apart within the range of possible times that the meeting is expected be concluded. As the meeting time becomes extended, the passenger could use the app to cancel the next scheduled ride that they will be unable to meet. Finally, after canceling several scheduled rides during the meeting, the passenger will ultimately be able to meet the curb2curb vehicle at the next pre-scheduled pickup time remaining in the ride reservation system. The benefit to passengers is that they will have minimize experienced wait-time between the time that the meeting is concluded and their curb2curb vehicle arrives. In some ways this may be considered 'gaming the system', creating an advantage for the rider but creating significant issues for operations.

When the researcher booked several reservations near each other and then canceled the trip or trips they no longer required, a penalty was imposed. The curb2curb booking system has an Automatic Booking Limitation (ABL) function, which limits a user's ability to schedule rides in advance. METRO's stated purpose in imposing the ABL function is to prevent passengers from misusing vital curb2curb capacity resources and thereby unfairly penalizing all other users through the resulting disruption to the scheduled ride dispatching process caused by cancellations. Researchers noted that even Transportation Network Companies also impose their own version of similar penalties for misuse of resources through monetary charges.

V. OBSERVATIONS ON IMPLICATIONS OF VEHICLE AUTOMATION

A full understanding of the C2C user experience is important to analyze with respect to the evolution of the service to a higher level of automation technology. The following two observations are on the possible implications for the eventual automation of the transit vehicle operations as a result of the NREL case study findings.

Strategic Application of Driverless Vehicles – With full automation of ODT, operating a driverless ODT automated system provides increased flexibility to meet demand, maximizing the utility of limited fleet resources. The operational capacity limitations during ridership peaks are currently subject to both vehicle and driver availability. With AVs, fleet management strategies could increase peak demand responsiveness. For example, a strategy can be applied that stages empty vehicles within the network close to expected demand locations and points in time. For manually driven fleets, such a strategy is costly, as a driver is required to be available for each vehicle, whereas with an AV fleet, a vehicle asset can wait in anticipation of demand with minimal resources. Pre-positioning AV fleet vehicles in anticipation of surge demand is a topic of ongoing study by NREL.

Optimizing Transit Vehicle and Passenger Rendezvous – The challenge resulting from the difficulty of vehicle/passenger rendezvous may be amplified by AV service and should be addressed as an integral part of the conversion of curb2curb to an automated vehicle fleet in the future. Passenger and vehicle rendezvous is already a minor issue in the existing system, and Houston METRO is considering solutions as previously described. In an AV ODT service, the supervisory control system will be responsible for many functions, and not limited to vehicle dispatching and routing. Substantial improvements to the user interface will be needed without a driver to successfully and consistently rendezvous rider with vehicle. Potentially establishing precise pickup and drop-off locations within the service network is one approach. One of the authors experienced this issue in automated taxi service offered in the Pheonix, AZ metropolitan area offered by Waymo. Upon hailing the service, the vehicle pulled up to the curb, and then proceeded to drive past the researcher another 100 feet before stopping. There was no mechanism to inform the automated vehicle of the position on the curb of the rider. As the pickup location was at an airport curb, the additional distance to the automated service also entailed transport of luggage the distance on the automated taxi overshoot.

The challenges discussed above should be addressed/considered in the future through the design process as part of the full automation of shared-ride ODT services. It is reasonable to expect that the introduction of these emerging automation technologies will serve to resolve operational issues and real-time challenges associated with METRO’s curb2curb service that are discussed in this report, but may also have unexpected challenges.

VI. CONCLUSION

On-demand transit is an emerging form of transit that is well suited for shared-ride services in low-density areas, allowing efficient public transportation for community circulation as well as first-mile/last-mile service to inter-regional transit services. However, ODT is resource intensive, requiring vehicles and drivers to scale service. Vehicle automation is one avenue considered to maximize the availability of vehicles while minimizing personnel resources (noting that even automated services require oversight, in the future one ‘driver’ may be able to oversee the multiple AVs). As with any emerging technologies and innovative approach, there are challenges and hurdles to be mitigated with continued research and process improvement, as well as evaluation of real-world pilot deployments.

The following general conclusions show that the curb2curb service in Missouri City has been a successful implementation of a microtransit service that combines first-mile/last-mile access to regional transit with internal circulation within the service area. This service area has shown the following indicators of success and sustainability:

1. METRO's reporting of strong ridership growth over the past two years since its inception.
2. Data showing that Missouri City has the highest daily ridership of all METRO curb2curb service areas.
3. NREL's observation of diverse trip-purpose usage that spans home-to-work trips, access to restaurants, retail centers and community college classes, as well as access to METRO's Park and Ride service connecting Missouri City with other major activity centers and urban districts within Central Houston.

These indicators from the Missouri City service area show that Houston METRO's curb2curb service is an example of a successful implementation of microtransit in communities where traditional fixed-route services are not fiscally plausible, efficient, or adequate to meet the needs of the low-density surrounding community. The increase in ridership, most notably in Missouri City, highlights a shared ride microtransit deployment where the service is beneficial to residents.

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