

Tech Talk: GTFS and GTFS Flex

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Cambridge Systematics

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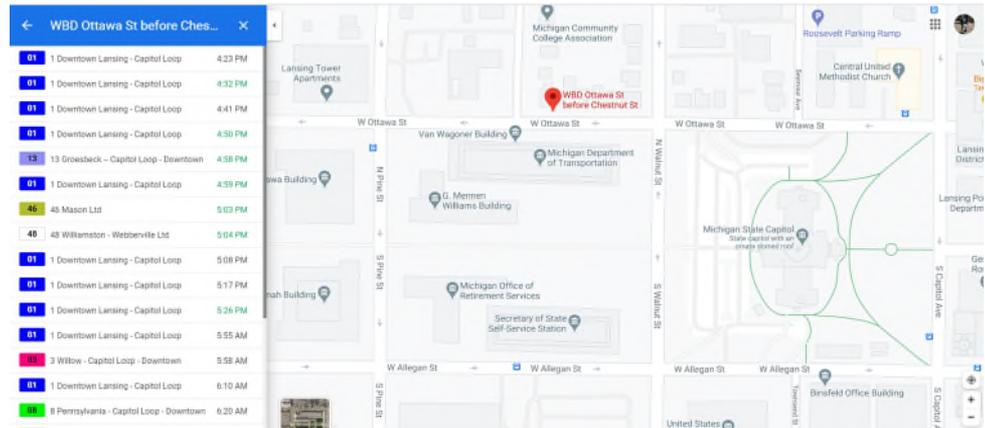
Agenda

- Introduction to GTFS
- Family of GTFS standards
- Structure of GTFS data
- GTFS resources
- Motivations for GTFS Flex
- Structure of GTFS Flex data
- Early GTFS Flex experience
- Producing GTFS Flex data
- GTFS Flex V2



Introduction to GTFS

- “General Transit Feed Specification”
- Introduced 2006 as standard for open transit service data
- Makes it easy for transit agencies to share service information...
 - Between systems...
 - With 3rd party apps...
 - With anyone!



Family of GTFS Standards

- GTFS
 - Basic schedule information in .txt/.csv format
 - plus-
 - New ways to describe transit service in greater detail
 - GTFS-vehicles, GTFS-fares, GTFS-flex...
- GTFS-RT
 - Real-time arrivals and alerts
 - .pb format – not human-readable



So what does it look like?

 Feeds API Updates [Sign in with GitHub](#)

TransitFeeds is now [OpenMobilityData!](#)

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CATA GTFS

[Download Latest](#) **6.5 MB** [Routes](#) **34** [Stops](#) **1,308**

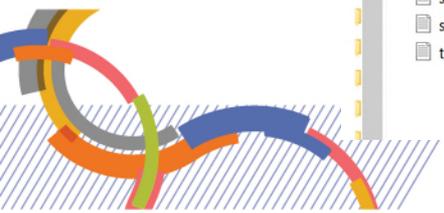
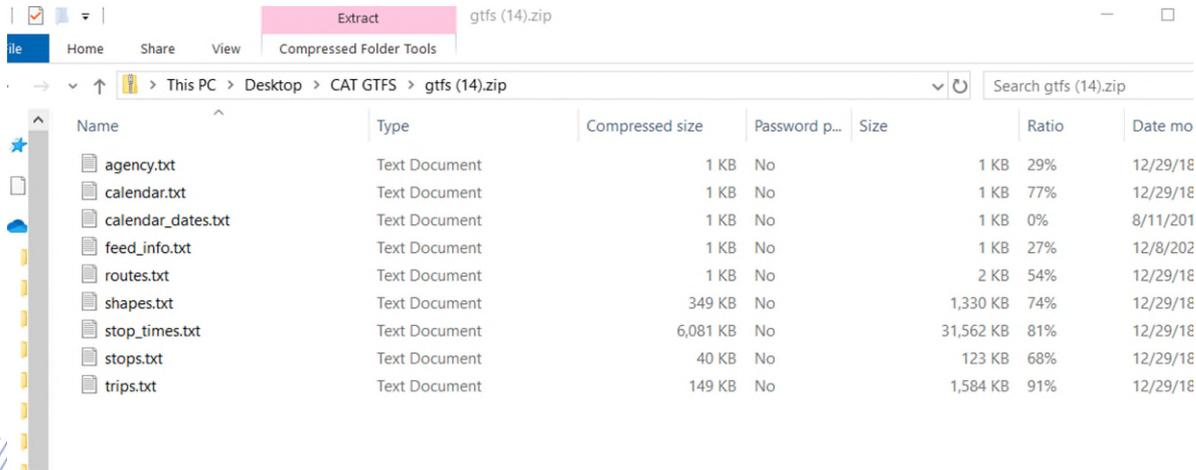
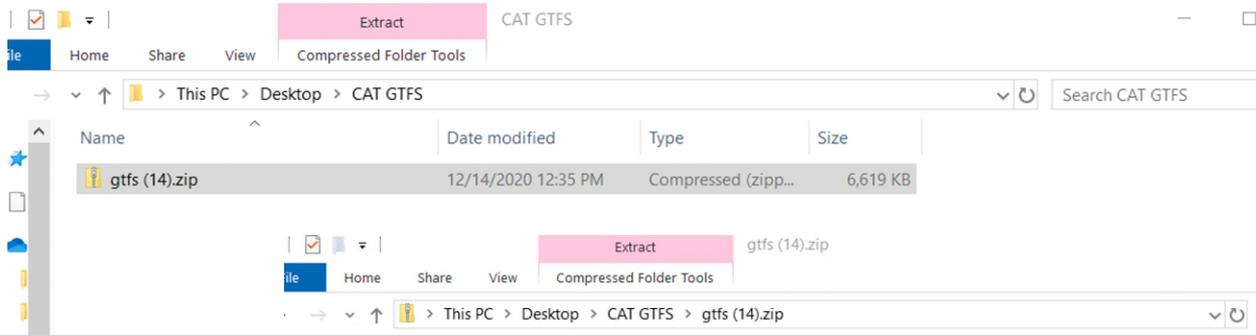
Date	Version	Size	Routes	Status
8 December 2020	20-07 (Sep28-Jan10)_20201208	6.5 MB	34	View Download
22 September 2020	20-06 (Jul06-Dec20)_20200915	6.5 MB	34	View Download
27 August 2020	20-05 (Jul06-Sept27)_20200826	2.4 MB	34	View Download
30 June 2020	20-05 (Jul06-Aug30)_20200624	6.2 MB	34	View Download
21 May 2020	20-04_20200520	5.4 MB	34	View Download

About This GTFS Feed

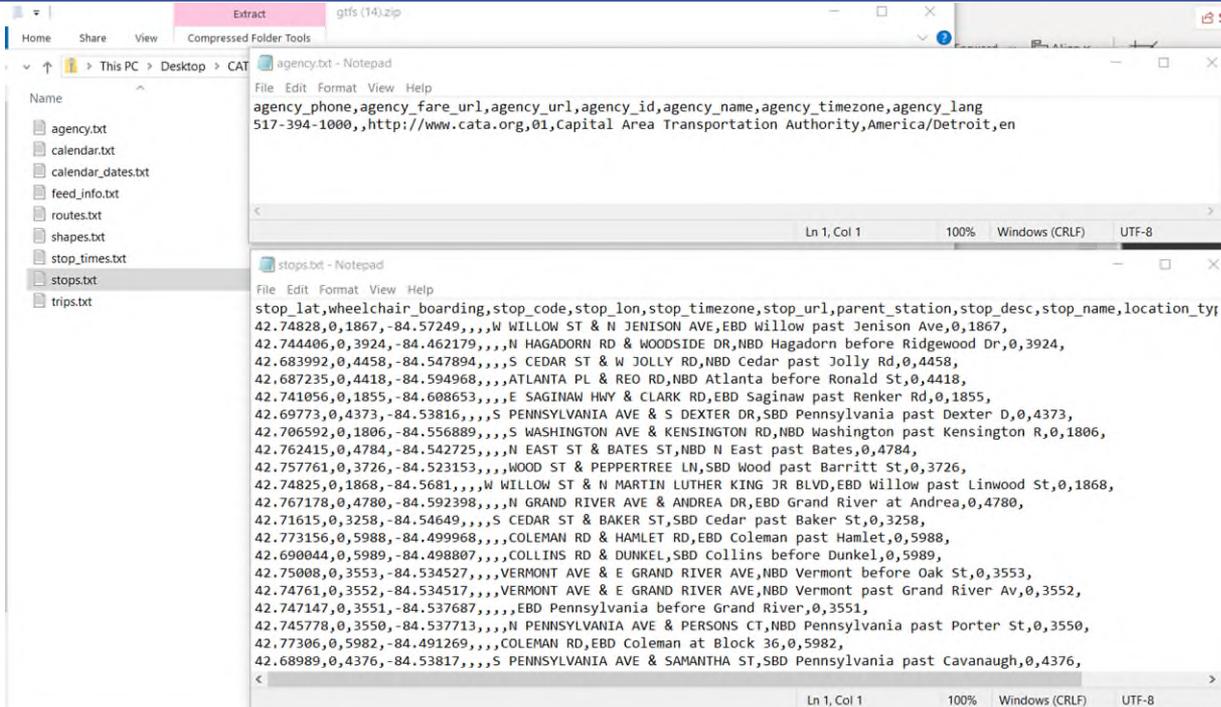
[Feed Info](#) / [Terms of Use](#)



.zip file with text files



The data is simple



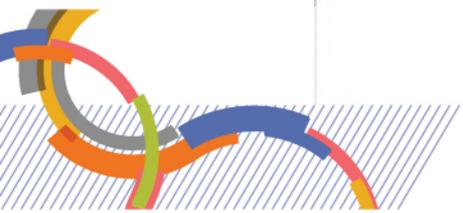
The image shows a Windows file explorer window titled "Extract gifs (14).zip" with a "Compressed Folder Tools" ribbon. The left pane shows a folder named "CAT" containing several text files: agency.txt, calendar.txt, calendar_dates.txt, feed_info.txt, routes.txt, shapes.txt, stop_times.txt, stops.txt, and trips.txt. Two Notepad windows are open, displaying the contents of "agency.txt" and "stops.txt".

agency.txt - Notepad

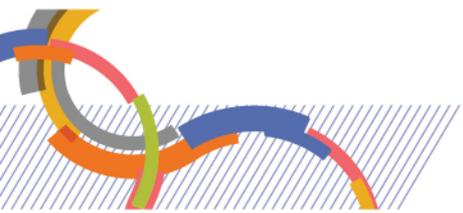
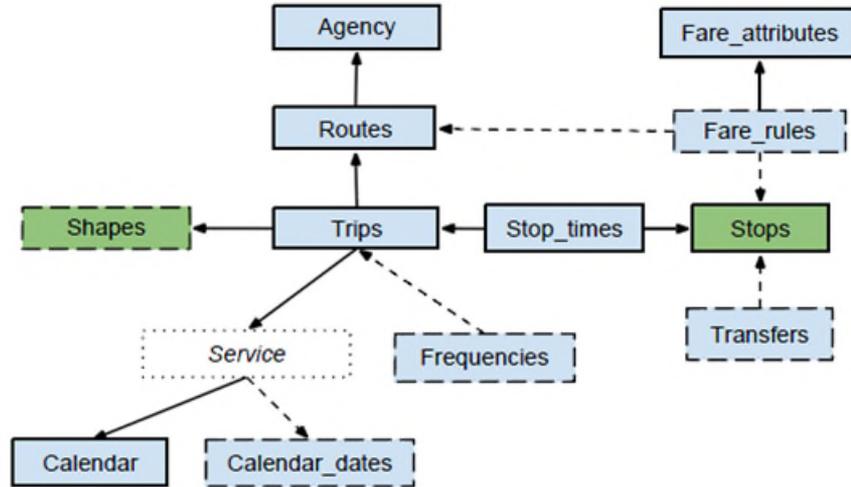
```
agency_phone,agency_fare_url,agency_url,agency_id,agency_name,agency_timezone,agency_lang  
517-394-1000,http://www.cata.org,01,Capital Area Transportation Authority,America/Detroit,en
```

stops.txt - Notepad

```
stop_lat,wheelchair_boarding,stop_code,stop_lon,stop_timezone,stop_url,parent_station,stop_desc,stop_name,location_ty  
42.74828,0,1867,-84.57249,,W WILLOW ST & N JENISON AVE,EBD Willow past Jenison Ave,0,1867,  
42.744406,0,3924,-84.462179,,N HAGADORN RD & WOODSIDE DR,NBD Hagadorn before Ridgewood Dr,0,3924,  
42.683992,0,4458,-84.547894,,S CEDAR ST & W JOLLY RD,NBD Cedar past Jolly Rd,0,4458,  
42.687235,0,4418,-84.594968,,ATLANTA PL & REO RD,NBD Atlanta before Ronald St,0,4418,  
42.741056,0,1855,-84.608653,,E SAGINAW HWY & CLARK RD,EBD Saginaw past Renker Rd,0,1855,  
42.69773,0,4373,-84.53816,,S PENNSYLVANIA AVE & S DEXTER DR,SBD Pennsylvania past Dexter D,0,4373,  
42.706592,0,1806,-84.556889,,S WASHINGTON AVE & KENSINGTON RD,NBD Washington past Kensington R,0,1806,  
42.762415,0,4784,-84.542725,,N EAST ST & BATES ST,NBD N East past Bates,0,4784,  
42.757761,0,3726,-84.523153,,WOOD ST & PEPPERTREE LN,SBD Wood past Barritt St,0,3726,  
42.74825,0,1868,-84.5681,,W WILLOW ST & N MARTIN LUTHER KING JR BLVD,EBD Willow past Linwood St,0,1868,  
42.767178,0,4780,-84.592398,,N GRAND RIVER AVE & ANDREA DR,EBD Grand River at Andrea,0,4780,  
42.71615,0,3258,-84.54649,,S CEDAR ST & BAKER ST,SBD Cedar past Baker St,0,3258,  
42.773156,0,5988,-84.499968,,COLEMAN RD & HAMLET RD,EBD Coleman past Hamlet,0,5988,  
42.690044,0,5989,-84.498807,,COLLINS RD & DUNKEL,SBD collins before Dunkel,0,5989,  
42.75008,0,3553,-84.534527,,VERMONT AVE & E GRAND RIVER AVE,NBD Vermont before Oak St,0,3553,  
42.74761,0,3552,-84.534517,,VERMONT AVE & E GRAND RIVER AVE,NBD Vermont past Grand River Av,0,3552,  
42.747147,0,3551,-84.537687,,EBD Pennsylvania before Grand River,0,3551,  
42.745778,0,3550,-84.537713,,N PENNSYLVANIA AVE & PERSONS CT,NBD Pennsylvania past Porter St,0,3550,  
42.77306,0,5982,-84.491269,,COLEMAN RD,EBD Coleman at Block 36,0,5982,  
42.68989,0,4376,-84.53817,,S PENNSYLVANIA AVE & SAMANTHA ST,SBD Pennsylvania past Cavanaugh,0,4376,
```



Structure of GTFS Data



GTFS Resources

- MobilityData GTFS Reference:
 - <https://gtfs.org/getting-started/>
 - <https://gtfs.org/reference/static>
- Google
 - <https://developers.google.com/transit/gtfs/reference/>
- Transitfeeds repository
 - <https://transitfeeds.com/>
- National RTAP GTFS Builder
 - <https://www.nationalrtap.org/Web-Apps/GTFS-Builder>



The Challenge

Flexible (or demand responsive) transit services, prevalent in lower-density rural and exurban areas, cannot be represented in the traditional GTFS data standard, and as a result are not discoverable in most trip planning tools.



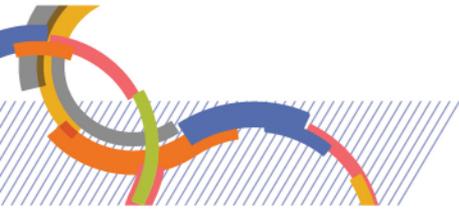
Continuous Stops
(Flag Stops)



Deviated Route
(Flex Route)



Call-n-Ride
(Dial-a-Ride)



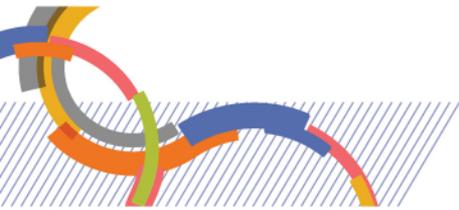
The Technical Solution: GTFS Flex

To represent demand-responsive services, GTFS Flex extends GTFS:

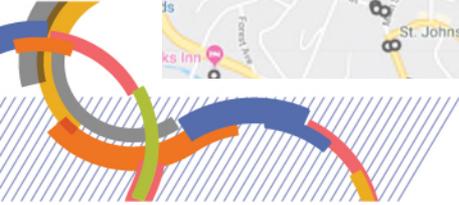
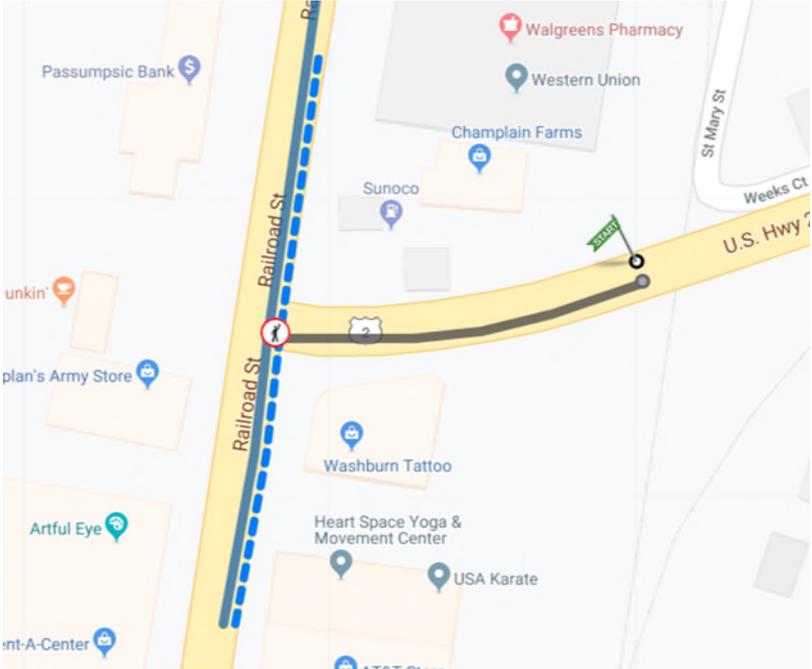
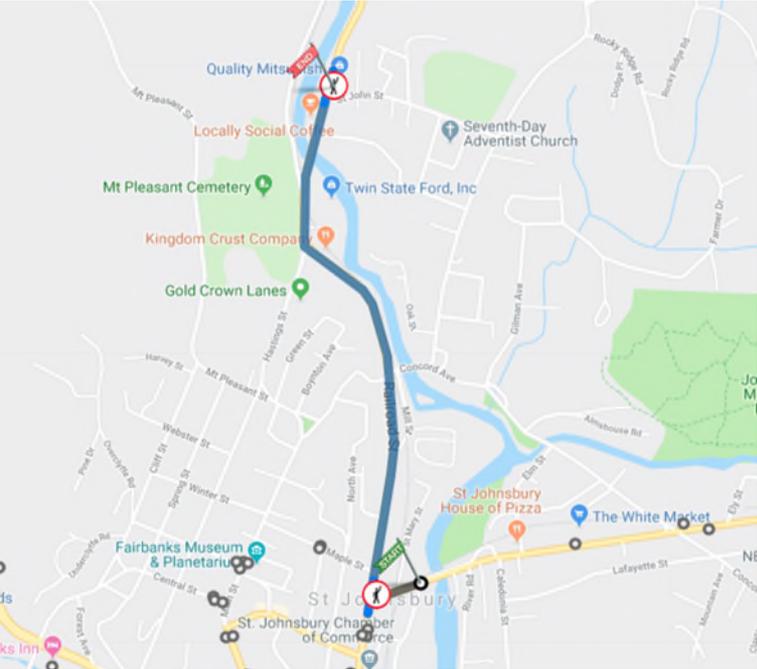
GTFS file / field additions	Continuous Stops	Deviated Route	Call-N-Ride
New geography descriptions in areas.txt			
Extensions to stop_times.txt			
start/stop_service_area_id			
start/stop_service_area_radius			
continuous_pickup and continuous_dropoff			

Early GTFS Flex Development

- Vermont Agency of Transportation (VTrans)
 - FTA MOD Sandbox Project (with Trillium and CS)
 - Refined emerging GTFS Flex spec for different services in Vermont
 - Enhanced OpenTripPlanner to read and route with GTFS Flex data
 - Enhanced OpenTripPlanner UI to symbolize DRT routes
- Transit Orange (New York): ridetransitorange.com
- RTD (Denver): project nearing completion



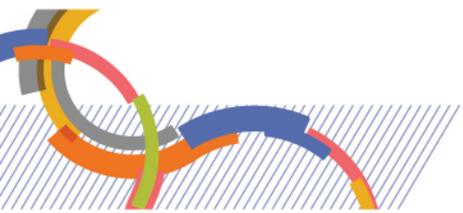
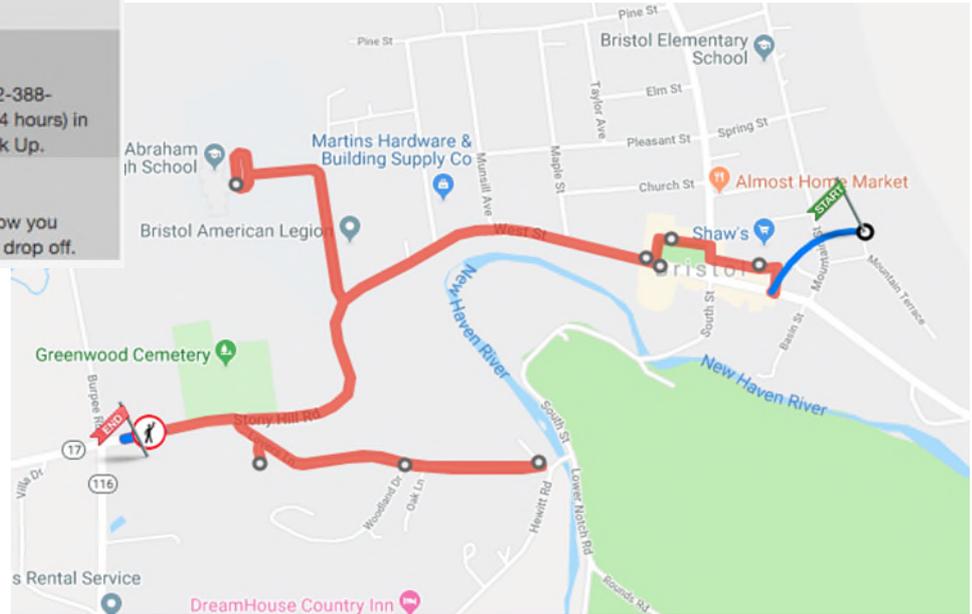
Continuous Stops



Deviated Route

Addison County Transit Resources  **TTSB/B**

Depart 4:53pm	From Mountain Terrace	Service note: Deviations subject to availability. Call 802-388- ACTR(2287) at least one business day (24 hours) in advance, or on Fridays for a Monday Pick Up.
Arrive 5:19pm	To Stony Hill Road	Flag Stop Upon boarding, please let your driver know you would like a Deviation or a Request Only drop off.



Call-n-Ride to Fixed Route

TRIP 1

This itinerary exceeds your maximum walking distance.

APFX > 153 > > > E > > 0 > >

10:58 AM bus departure

Trip length: 1 hour 15 minutes

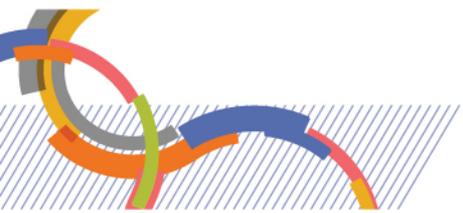
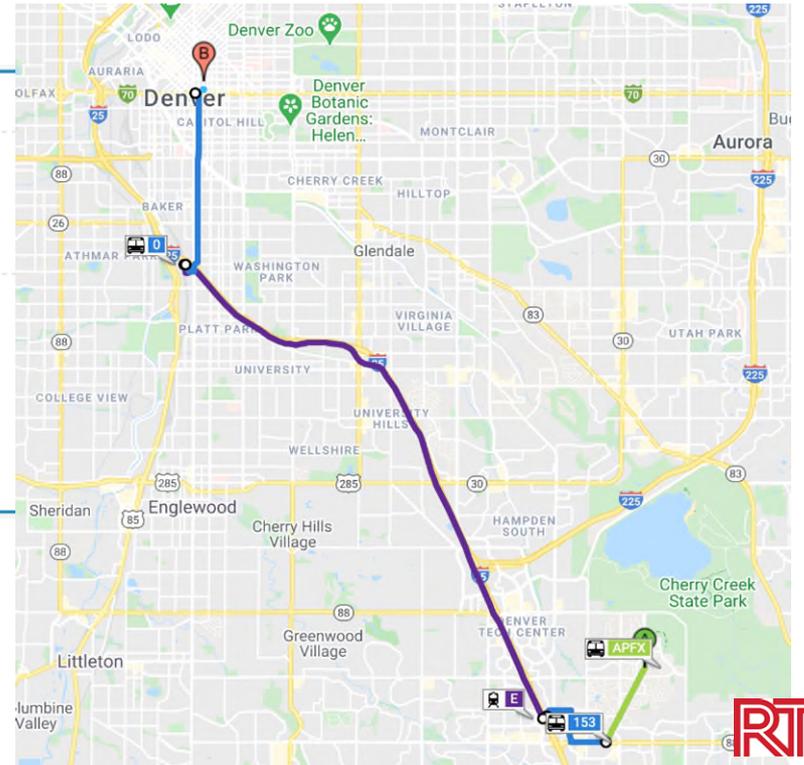
Duration: 8/25/20 10:58 AM to 8/25/20 12:13 PM

Transfers: 3

Distance: 16.44 miles

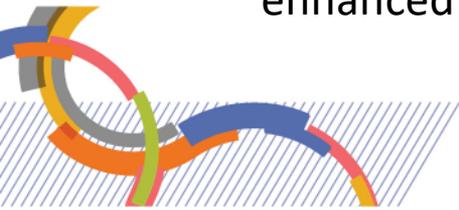
Walk time: 12 minutes

Walk distance: 0.57 miles



Key Challenge: Producing GTFS Flex

- GTFS Flex could be helpful in many contexts
- Producing GTFS Flex data poses near-term challenges
 - Many agencies that offer flexible services are small and lack the technical capabilities to produce their own GTFS Flex data
 - Near term: possible role for state DOTs, regional planning organizations, or large regional transit providers to help organize or fund GTFS Flex production for small agencies
 - Longer term: transportation scheduling systems for flexible services can be enhanced to produce GTFS Flex for those same services



GTFS Flex V2 Coming Soon

- Version 2 of Flex standard nearing completion
- Areas of emphasis:
 - Describing services more clearly, with less ambiguity
 - Inclusion of more detailed booking rules



Thanks!

Questions?

Feel free to reach out to us
for additional discussion:

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rbarcham@camsys.com

