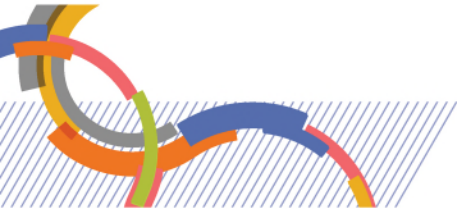


Tech Talk: GTFS and GTFS Flex

Paul Sorensen and
Raphael Barcham

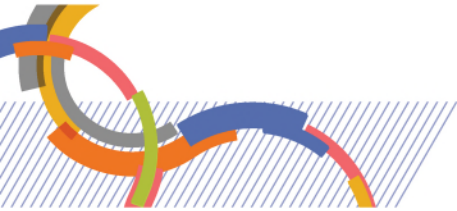
Cambridge Systematics

December 15, 2020



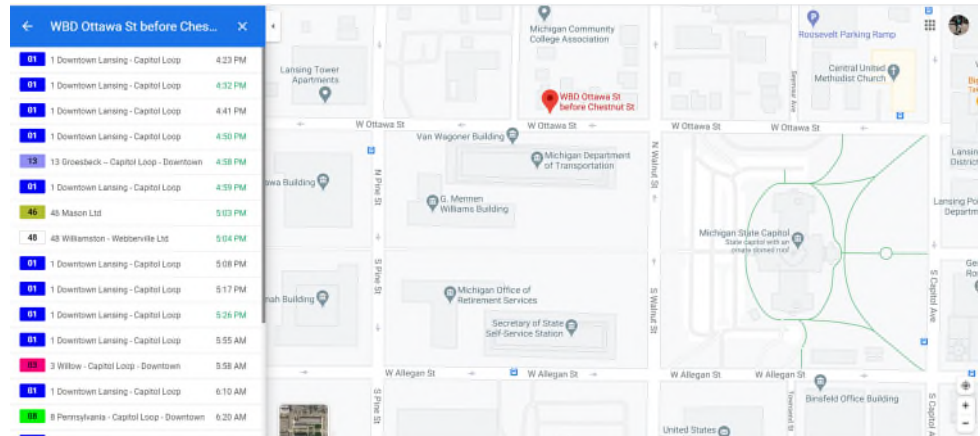
Agenda

- 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



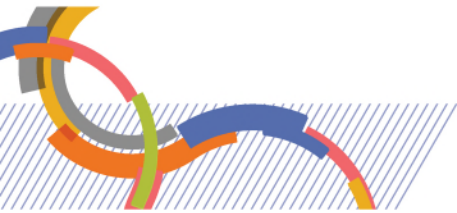
Introduction to GTFS

- “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?

TransitFeeds is now [OpenMobilityData](#)!

[Home](#) / [Feeds](#) / [North America](#) / [US](#) / [MI](#) / [Lansing](#) / [Capital Area Transportation Authority](#) / [CATA GTFS](#)

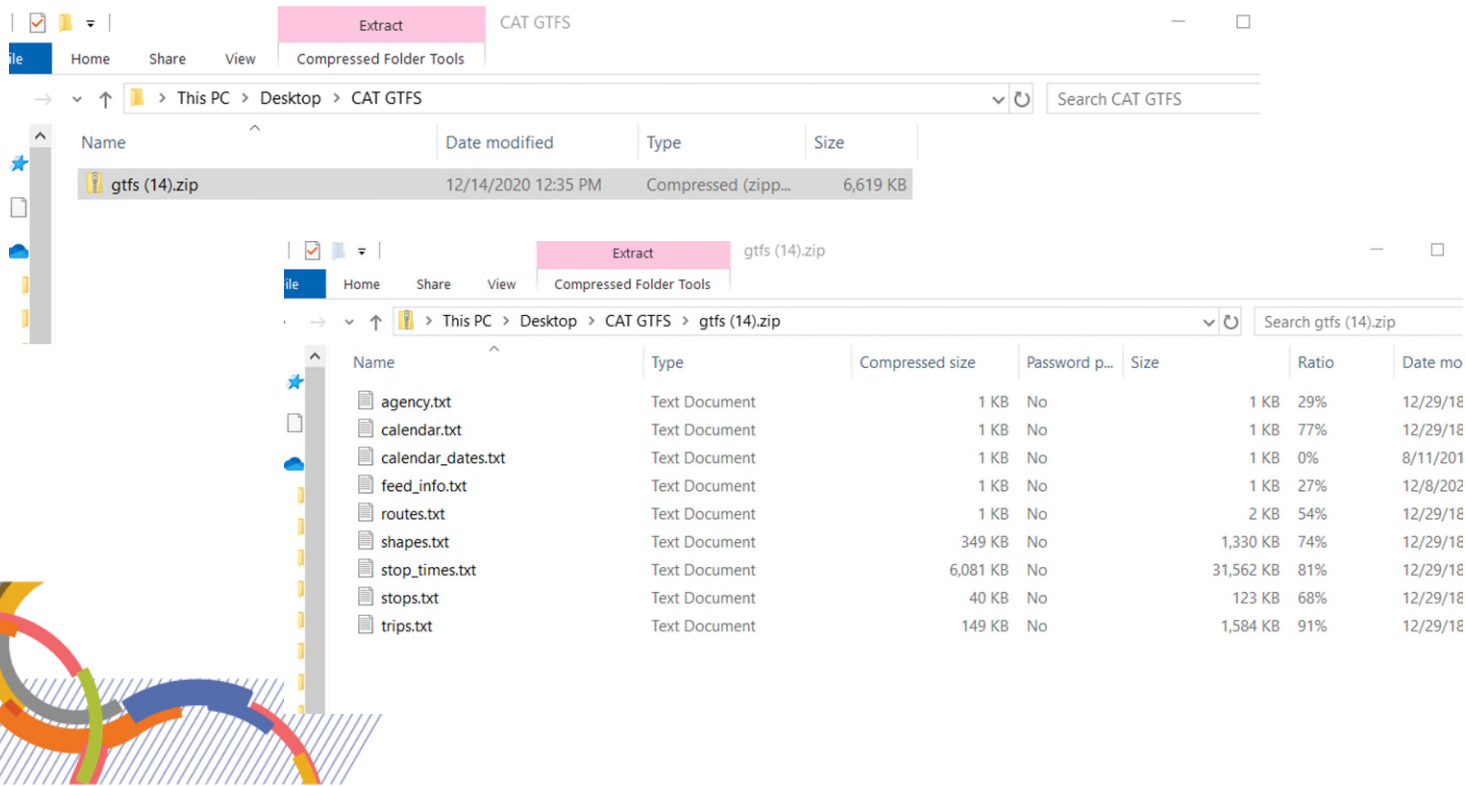
CATA GTFS

About This GTFS Feed

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

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

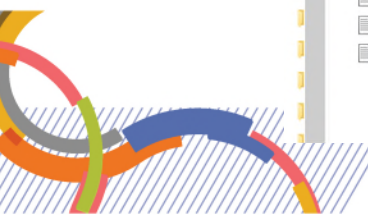
.zip file with text files



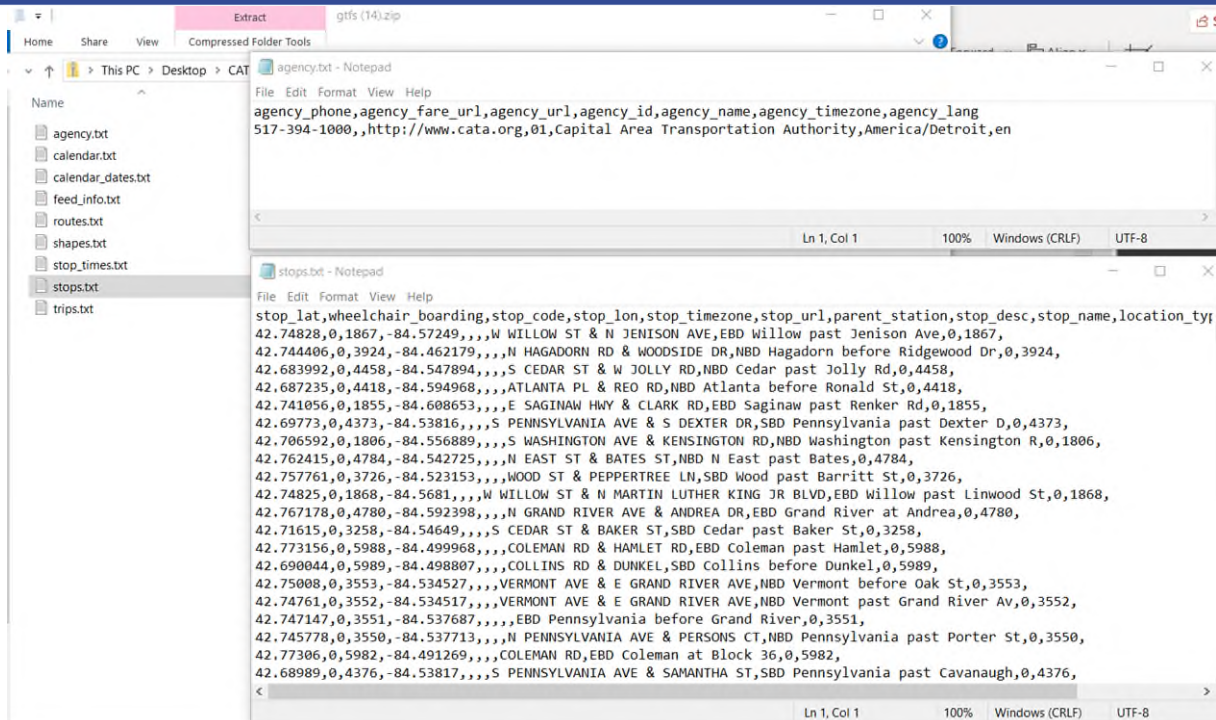
The image shows a Windows File Explorer window titled "CAT GTFS" with the "Extract" tab selected. The address bar shows the path "This PC > Desktop > CAT GTFS". The file list contains one item: "gtfs (14).zip" (Compressed (zip...), 6,619 KB, modified 12/14/2020 12:35 PM).

A second File Explorer window is open over the first, titled "gtfs (14).zip", also with the "Extract" tab selected. The address bar shows the path "This PC > Desktop > CAT GTFS > gtfs (14).zip". The file list shows the contents of the zip file:

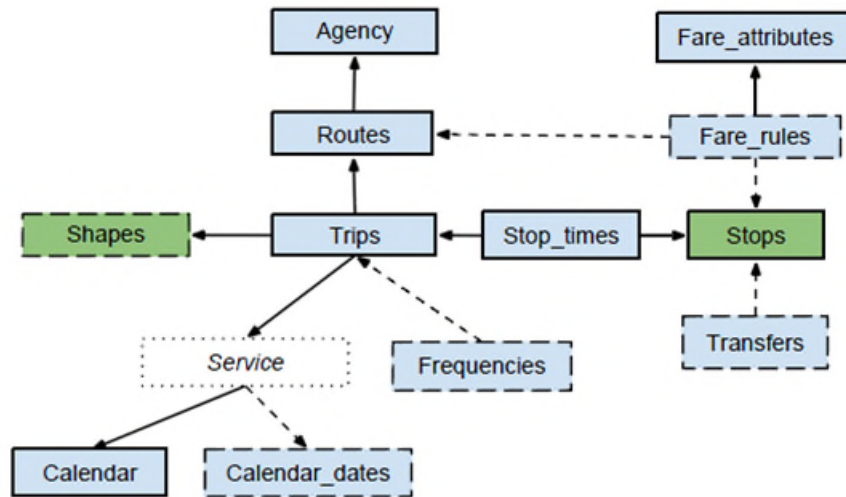
Name	Type	Compressed size	Password p...	Size	Ratio	Date mo
agency.txt	Text Document	1 KB	No	1 KB	29%	12/29/18
calendar.txt	Text Document	1 KB	No	1 KB	77%	12/29/18
calendar_dates.txt	Text Document	1 KB	No	1 KB	0%	8/11/201
feed_info.txt	Text Document	1 KB	No	1 KB	27%	12/8/202
routes.txt	Text Document	1 KB	No	2 KB	54%	12/29/18
shapes.txt	Text Document	349 KB	No	1,330 KB	74%	12/29/18
stop_times.txt	Text Document	6,081 KB	No	31,562 KB	81%	12/29/18
stops.txt	Text Document	40 KB	No	123 KB	68%	12/29/18
trips.txt	Text Document	149 KB	No	1,584 KB	91%	12/29/18



The data is simple



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.



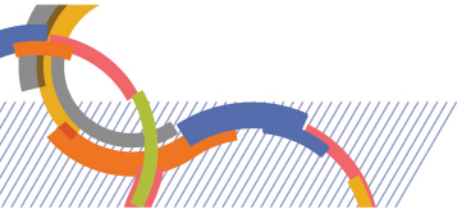
Continuous Stops
(Flag Stops)



Deviated Route
(Flex Route)










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



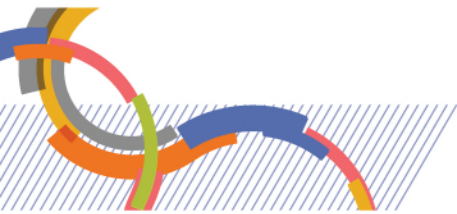
The Technical Solution: GTFS Flex

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

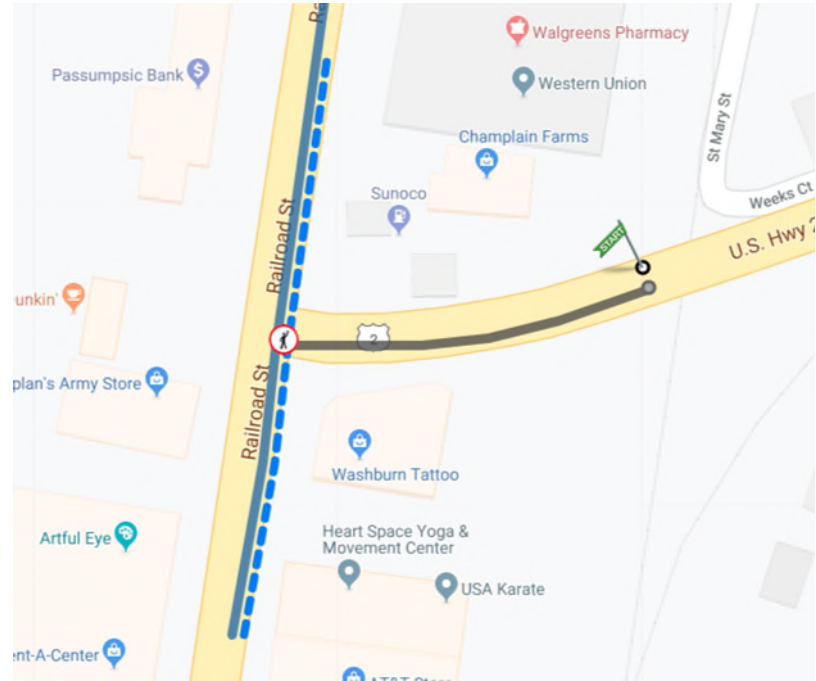
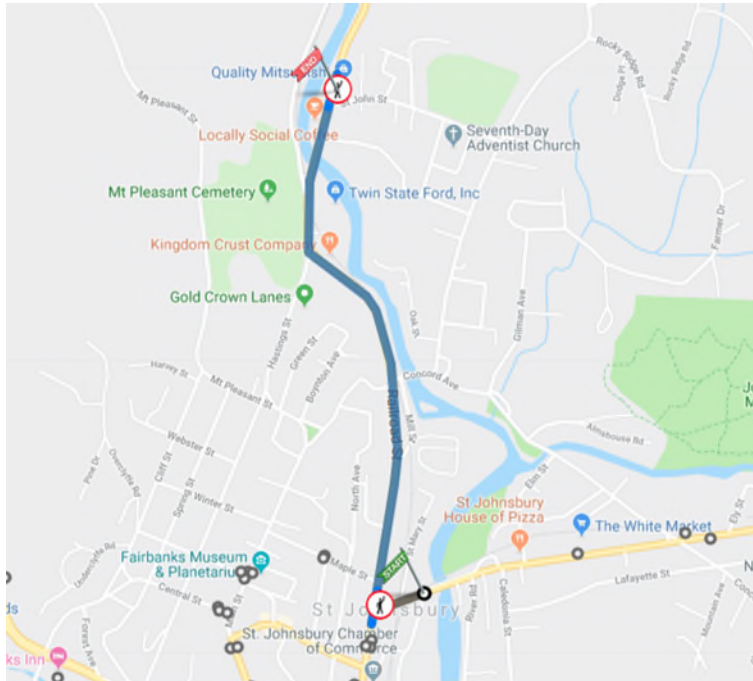
GTFS file / field additions	Continuous Stops	Deviated Route	Call-N-Ride
New geography descriptions in areas.txt			
Extensions to stop_times.txt			
start/stop_service_area_id			
start/stop_service_area_radius			
continuous_pickup and continuous_dropoff			

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

From

Service note:

4:53pm

Mountain Terrace

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

To

Flag Stop

5:19pm

Stony Hill Road

Upon boarding, please let your driver know you
would like a Deviation or a Request Only drop off.



Call-n-Ride to Call-n-Ride

Departs
at Aug 28th 9:00am / 23 min / \$2.00

TransitOrange
Montgomery-Crawford Dial-A-Bus

Depart: Aug 28th 9:00am From: Clinton Street

Arrive: Aug 28th 9:15am To: Montgomery Valero Station

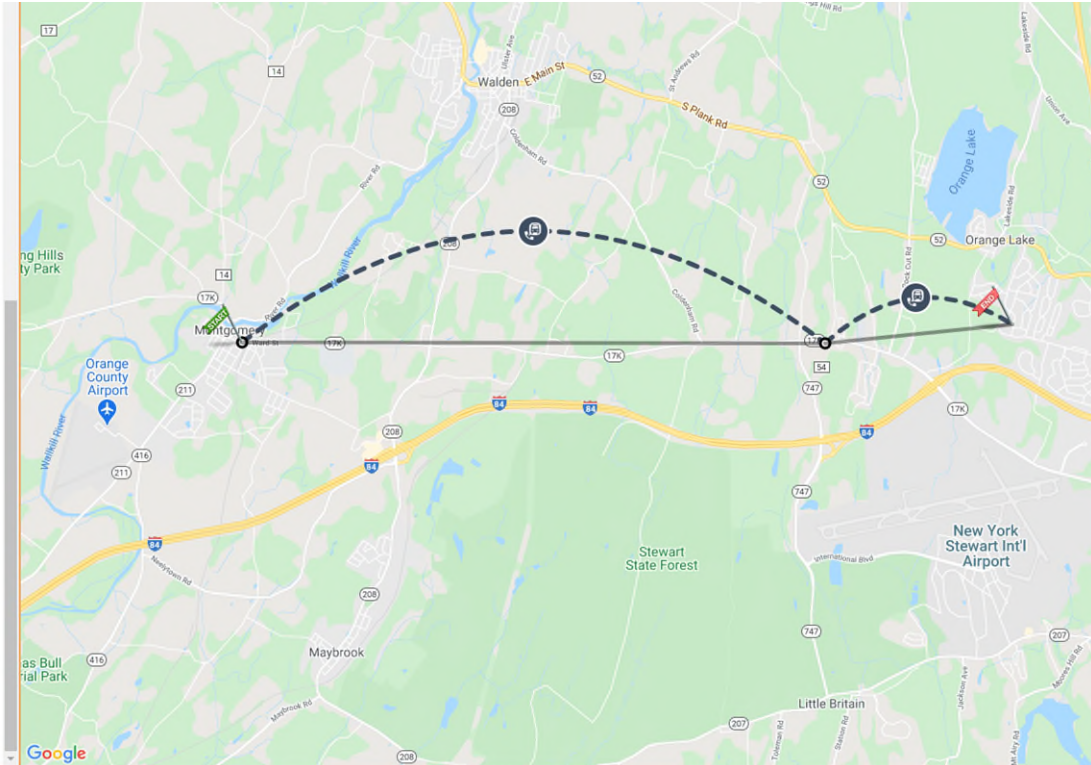
Service Details

TransitOrange
Newburgh Dial-A-Bus

Depart: Aug 28th 9:15am From: Montgomery Valero Station

Arrive: Aug 28th 9:22am To: Monarch Drive

Service Details



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

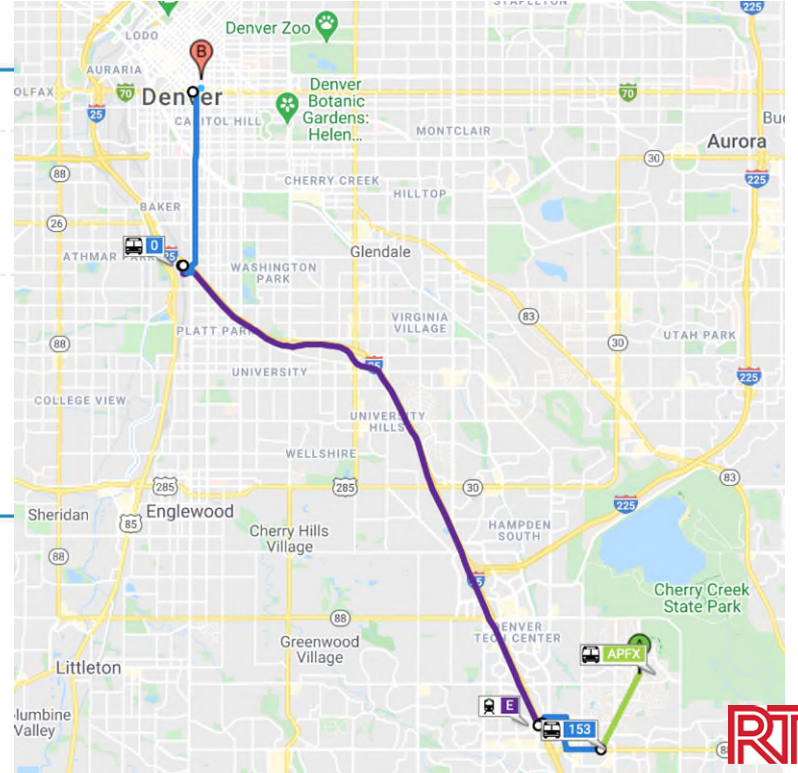
Duration: 8/25/20 10:58 AM to 8/25/20 12:13 PM

Transfers: 3

Distance: 16.44 miles

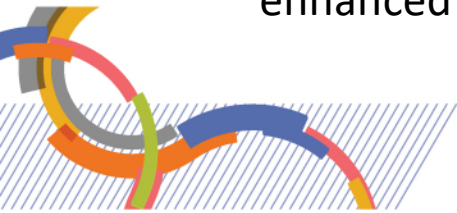
Walk time: 12 minutes

Walk distance: 0.57 miles



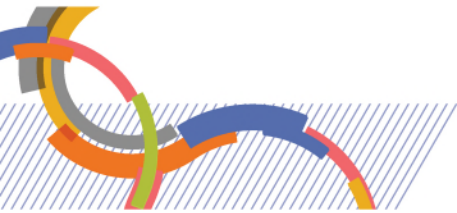
Key Challenge: Producing GTFS Flex

- 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:

psorensen@camsys.com
rbarcham@camsys.com

