Priority Area Five: Regional GTFS Publishing Standards

Vision: General Transit Feed Specification (GTFS) & GTFS-Real-Time (GTFS-RT) feeds are coordinated across the region, regardless of differences in Computer Aided Dispatch (CAD) / Automated Vehicle Locator (AVL) systems. Tools ingesting a GTFS feed are easily able to pull and display data from across the region. Stop names and IDs are consistent across all feeds.

Objective: Identify recommended steps that transit agencies can take to enable coordination among GTFS and GTFS-RT feeds to provide passengers with a consistent display of real-time information through various transit trip planning interfaces.

Initial Findings & Opportunities

Summary of Current Conditions

Agencies use a range of tools to generate GTFS files as shown in Table 1. Many agencies rely on scheduling and planning software to produce the initial GTFS feed, which gets fed into their CAD/AVL system to generate a GTFS-RT feed. Table 2 presents a summary of how GTFS files are generated by the transit agencies operating fixed routes within the region.

Table 1. Summary of Technology Used in GTFS Publication by Transit Agency with Fixed Routes

Transit Agency	Scheduling System	CAD/AVL Systems	GTFS Feeds Link[1]
GoCary	TripSpark	TripSpark	GoCary GTFS-RT
GoRaleigh	Optibus	Clever Devices	GTFS and GTFS-RT Feeds
GoDurham	Optibus	Avail with Swiftly	Real-Time API
GoTriangle	TripSpark – FX/Blockbuster	TripSpark	GTFS-RT Feed Trip Spark
Chapel Hill Transit	Optibus	GMV / Syncromatics	GTFS-RT Feed
Town of Apex	Done by GoCary as operator of service.	Done by GoCary as operator of service.	
NCSU Wolfline	Hastus	Passio	GTFS Feed GTFS-RT Feed
UNC-Chapel Hill	Does not have	Does not have	
Orange County	Does not have	Does not have	GTFS Feed

Table 2. Summary of GTFS File Generation by Regional Transit Agencies with Fixed Route

Transit Agency	GTFS	GTFS-RT	GTFS Generation Process
GoCary	X	X	TripSpark schedule platform is used to generate the GTFS and the exported through scheduling software, with minor refinement to the TripSpark CAD/AVL which produces the GTFS
GoRaleigh	X	X	GTFS feeds are generated in Remix; then sent to the operator to update Optibus scheduling software; then sent to Clever Devices (the CAD/AVL provider) who translates

[1] [1] All feeds available on GoTriangle Developer Resources page at: https://gotriangle.org/developer-resources.

Table 2. Summary of GTFS File Generation by Regional Transit Agencies with Fixed Route

Transit Agency	GTFS	GTFS-RT	GTFS Generation Process
			them for use in their software and performs a QA/QC. Clever then sends the usable database files (including the GTFS) back to GoRaleigh who uploads the GTFS to a permalink on their website. Clever Devices generates the GTFS-RT feeds, which are hosted on the same website.
GoDurham	X	X	The GTFS static is generated in the scheduling software Optibus, which is then sent to Trillium, who publishes the final static files. The static GTFS are imported into the CAD/AVL system Avail, but Avail is unable to produce a GTFS-RT so GoDurham has brought in Swiftly to generate and manage a GTFS-RT feed.
GoTriangle	X	X	Schedule changes are made in Tripspark FX/Blockbuster that get translated into a GTFS that feeds directly into the TripSpark CAD/AVL system, which produces the GTFS- RT.
Chapel Hill Transit	X	X	The GTFS is generated in Optibus and then fed into the CAD/AVL system (GMV) that generates the GTFS-RT files. This is used in GMV (AVL system) to add GTFS-RT, updates, alerts feeds.
Town of Apex	X	X	Done by GoCary as operator of service.
NCSU Wolfline	X	X	Passio is used to generate and update the static GTFS. Passio has built in configurations that allow NCSU to update the GTFS at any time. The GTFS is then given to the operating contractor who uses it for the runcut. All GTFS and GTFS-RT feeds are maintained in Passio and accessible via an API.
UNC-Chapel Hill	X		Manually creates the GTFS stops and schedules since there are only two routes. Changes are manually done in GTFS in house
Orange County	X		The GTFS is generated in Remix, using the planning platform and then uploaded and hosted by National Rural Transit Assistance Program (RTAP). Orange County does not have fixed route scheduling or CAD/AVL software.

Cycle or Frequency of GTFS Updates

GTFS updates generally coincide with service changes. Most agencies update files 2–3 times per year, typically aligning with operator bid selections or semester schedules as presented in Table 3 below. GoRaleigh performs updates in January, May, and September, while GoTriangle historically does this in January/February and August but is considering a third update. NCSU Wolfline, Wake Forest, having a simpler system, updates their GTFS feeds manually before each semester. UNC-Chapel Hill follows a similar twice-annual schedule, with updates tied to service changes.

Table 3 - Summary of Agency Bid Processes that Align with GTFS Updates

Transit Agency	Number of Bids Annually	Bid Cycle
GoCary	2+	Based on bid selections
GoRaleigh	3	January, May, and September
GoDurham	2+	Dependent on service changes
GoTriangle	2	August and Jan./Feb.
Chapel Hill Transit	3	Typically January, May, and August
Town of Apex	2+	Done by operator GoCary
NCSU Wolfline	3	Spring, summer, and fall semesters
UNC-Chapel Hill	2	Spring and fall semester
Orange County	Unknown	Unknown

Changes to Static GTFS Files for New Stops or Routes

Agencies vary in how they manage updates for new stops or routes. Passio allows for real-time updates by NCSU Wolfline, while GoCary handles updates on an as-needed basis but links them to service activation. GoRaleigh incorporates new routes and stops in its planning software and reflects them in GTFS during the next database update and will also add or move stops outside of the database update where needed, though this may result in delays. GoTriangle uses TripSpark FX to translate schedule or route changes into GTFS. UNC Chapel Hill makes manual changes to their simpler GTFS feeds.

In general, the process for adding a new route and including it in the GTFS data is coordinated with the operator bid selection cycle. This allows for transit operators to bid on a route and have it assigned to specific operators before it is introduced to the general public through a GTFS feed.

Maintenance of GTFS Feeds

GTFS maintenance processes vary widely:

- **NCSU Wolfline**: Maintains GTFS in Passio, accessible via an Application Programming Interface (API).
- **GoRaleigh**: Receives GTFS files from Clever Devices, uploads them to a public permalink, and distributes them to other stakeholders.
- **GoDurham**: Changes occur in Optibus during the service change process and the updated GTFS files are exported.
- **GoCary**: New feed generated when a service changes that impacts the feed is conducted
- **UNC Chapel Hill**: Maintains GTFS in-house with manual updates for their simpler routes and adds temporary feeds for events like sports games.
- **Chapel Hill Transit**: Uses Optibus and GMV for feed updates.
- **GoTriangle**: Works on standardizing GTFS maintenance processes as part of CAD/AVL implementation.
- **Orange County**: Seeks external support to enhance GTFS updating efficiency.

Noted Challenges

The overall vision with respect to GTFS publishing standards is the coordination of GTFS & GTFS-RT feeds across the region, regardless of differences in CAD/AVL systems, which will allow tools that ingesting GTFS feeds to easily pull and display data from across the region, where stop names and IDs are consistent across all feeds. Through conversations and feedback provided by the agencies, several challenges were identified in being able to meet this vision. These challenges, which must be overcome are as follows:

- CAD/AVL Vendor Issues - The agencies noted that while most of their concerns with CAD/AVL systems generally have been resolved through working with the vendor technical contacts, there can sometimes be long periods of wait times to resolve known issues with the systems.
- Lack of CAD/AVL or Scheduling Technology – Some systems lack the software to easily generate a GTFS and are unable to generate a GTFS-RT
- GTFS Updates – Systems update their GTFS in conjunction with service changes all at different times. Often systems are not aware that others have made changes to shared stops or coordinated routes.
- Inconsistent Stop Identification – There is a lack of consistency in naming bus stops and using the same Stop ID's for shared stops in the region.
- Documentation – Systems lack a documented process for the process and timeline of updating GTFSs.
- Integration – Systems with separate technologies for generating GTFS and GTFS-RT must export data between the two systems, as they are not seamlessly integrated. Changes made in one system need to be manually carried through to the next.
- GTFS Production Guidelines – The Transit App and Google Transit have different guidelines for producing static GTFS data in regards to transfers. Google does not support transfer types (a mandatory field) 4 and 5. Transfer types 4 and 5 are used to link consecutive trips performed by a vehicle together. Google recommends instead using block transfers. Transit App allows for a type 4 and 5 transfer and discourages use of block transfers.

Opportunities for Innovation / Collaboration

During the fixed-route agency interview, it was noted that a prior bus stop naming convention file was developed in the region when GTFS was first being deployed by transit agencies. This file is dated 2010 and was reviewed as recently as 2021 in the region. This file may be able to serve as a starting point for creating a standard operating procedure (SOP) around how shared stops are addressed in the naming convention file and what updates may be needed to enhance coordination between the agencies. Updates can be made in this file to note that GTFS-RT is a regional standard for transit information so that all agency feeds can be consumed by third-party information service providers (such as Google Maps, Transit App, etc) and also be posted on respective agency websites for review.

The updates to the file could also identify the anticipated cycles that each fixed-route agency follows when making updates to bus stops and routes in the region. Information on the cycles was previously gathered from surveys distributed to the agencies and it could be included in the updated file.

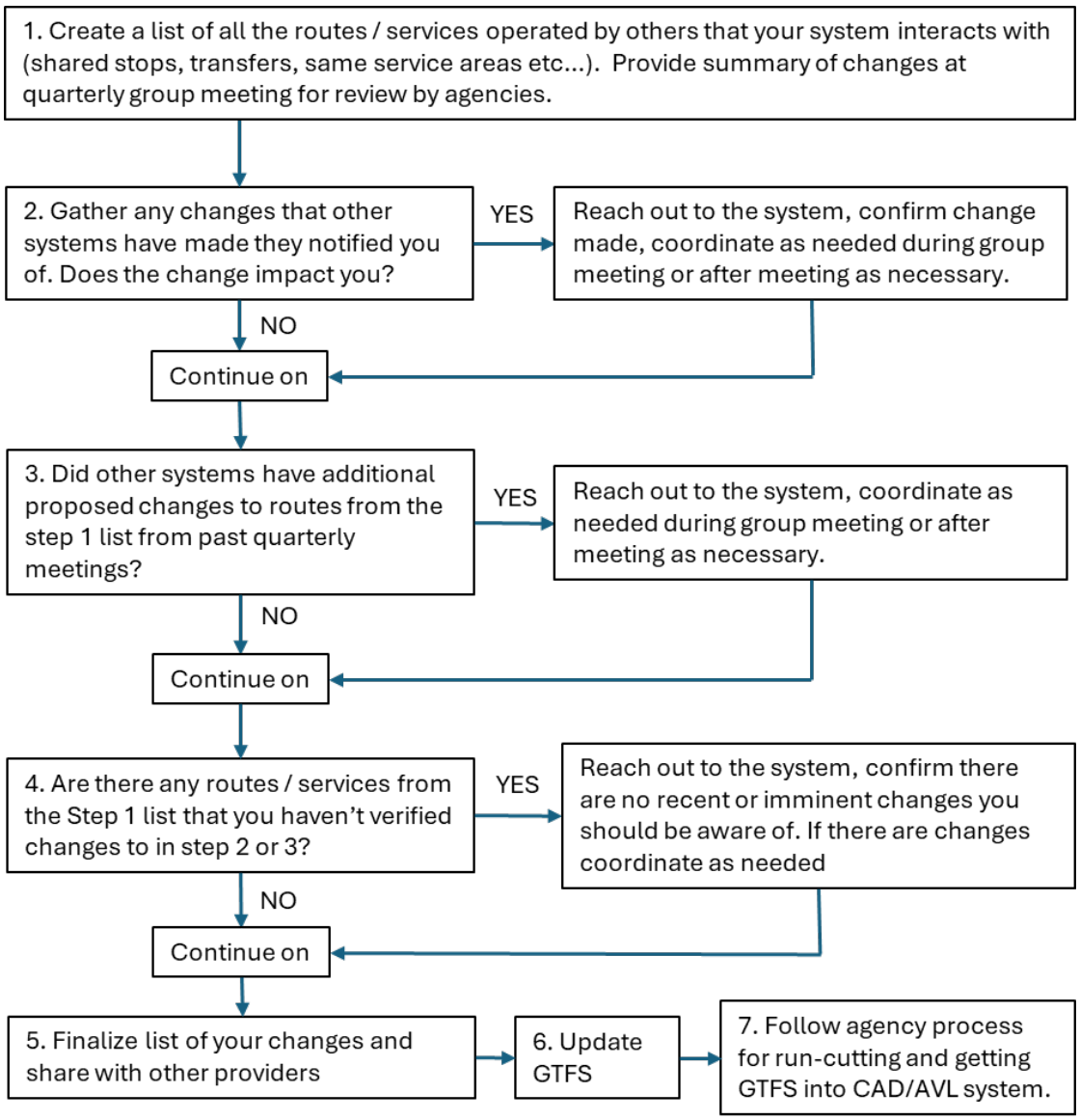
Other information could be included in an updated version of the naming convention with respect to GTFS / GTFS-RT feeds that are generated. This may include how each agency creates its GTFS feed, whether it be through use of a specific software or if it is created by a contracted service operator.

This may provide guidance to other transit agencies that have questions about feed generation and updates.

Further discussion with the project management team about the naming convention will be needed to determine if any changes to the naming of directional headings is needed to improve coordination at shared stop locations.

Another opportunity for regional collaboration exists with respect to the planning for the updates made by transit agencies to their GTFS feeds. Figure 1 below presents a potential workflow for how transit agencies can identify impacts to transit service in areas of shared stops where changes to transit service will impact other agencies. The process is recommended to happen on a quarterly basis throughout the year at points where the transit agencies can meet to discuss service changes that may impact other transit agencies, and thus, update their GTFS feeds in the most efficient manner.

Figure 1. Potential Workflow for Regional Coordination to Support GTFS Updates by Agencies



Case Study: Vermont Agency of Transportation (VTrans)

Since 2014, Trillium has been responsible for producing and maintaining GTFS (General Transit Feed Specification) datasets for all nine public transit providers across the state of Vermont. In 2016, the Vermont Agency of Transportation (VTrans) received a Federal Transit Administration (FTA) Mobility on Demand (MOD) Sandbox grant to develop the VTrans Flexible Trip Planner—an innovative multimodal trip planning application that integrates both fixed-route and demand-responsive transit services.

A core objective of the MOD project was to enable flexible, multimodal trip planning capabilities. To achieve this, the project required the development and implementation of GTFS-Flex, an extension of GTFS designed to model demand-responsive transportation services. Several key innovations contributed to the project's success:

- GTFS-Flex feeds were developed for all public transit providers in Vermont.
- Enhancements to GTFS standards were proposed by the project team and subsequently adopted by MobilityData IO, the global steward of GTFS.
- The OpenTripPlanner (OTP) open-source platform was used as the foundation for the trip planner. Custom code was developed to enable OTP to ingest and utilize both GTFS and GTFS-Flex datasets. The code is publicly available on GitHub.

Trillium was responsible for coordinating with each transit agency to gather the necessary GTFS-flex data needed, documenting how the GTFS-flex was created. Vermont's GTFS static and GTFS-Flex feeds are published and publicly accessible at https://vermont-gtfs.org/. Trillium manages these feeds using its proprietary GTFS Manager platform. These datasets power the Go! Vermont Flexible Trip Planner, providing comprehensive statewide transit coverage.

All demand-responsive transit providers in Vermont utilize the RouteMatch cloud-based ITS platform for CAD/AVL (Computer-Aided Dispatch / Automatic Vehicle Location), a system jointly procured by VTrans and the Vermont Public Transit Association (VPTA) in 2015. Fixed-route scheduling and CAD/AVL platforms vary by agency, depending on individual operational requirements.

Lessons learned from the project are as follows:

- Building a partnership with technology vendors who have a vested (financial) interest in the project is crucial.
- Handling large data sets requires strong data management practices, transit agencies can often lack the capability/knowledge or financial resources to properly invest in data management.
- Flexible services need to have clear definitions of service rules in order to generate a GTFS-Flex.
- High-quality service data is needed, often posted information is not clear on where buses stop, routing and schedules. This info is needed in order to generate a GTFS.

Case Study: Oregon Department of Transportation (ODOT)

Trillium, in partnership with the Oregon Department of Transportation (ODOT), developed the first web-based GTFS editor. At the time, ODOT was working on a statewide trip planner just as Google released the beta version of Google Transit. They quickly recognized that it was more advantageous to focus on creating data that Google's Trip planner could use then to invest in creating a proprietary tool. So to support this effort, ODOT collaborated with Trillium to develop and refine a web-based GTFS Manager tool, making it easier for systems to turn schedule data into a GTFS. This tool is now offered by Trillium, it is not an open source tool.

In 2020, ODOT expanded this collaboration by having Trillium generate GTFS-Flex data for demand-responsive transit systems. Since then, Trillium has been responsible for publishing both GTFS and GTFS-Flex data for 47 of Oregon's 58 transit providers. The remaining 11 agencies manage and publish their own GTFS data. Trillium works closely with each participating agency to collect, organize, and publish accurate GTFS data. This GTFS data supports a range of planning and analysis efforts by ODOT, including TNExT—an open-source, web-based platform developed by ODOT to analyze transit networks statewide. ODOT continues to innovate by developing new tools for creating, utilizing, publicizing, and improving GTFS data. Many of these tools are available on their GitHub repository: https://github.com/ODOT-PTS

Lessons learned from this project are as follows:

- Trip_ID's and stops in APIs that publish GTFS-RT need to align with those in Static-GTFS or else there will be issues with integrating trip planning and real-time in third party aps.
- Interoperable open source tools will provide more value over proprietary ones in the long run as they provide standardization.
- Open source tools created should be published to allow for use (and improvement) by others.
- GTFS feeds need to be updated and maintained. If agencies (particularly those without CAD systems) change their schedules or service rules but don't update Trillium, the changes do not flow through to the GTFS and inaccurate data is published to third-party trip planners.
- Conduct a small pilot when implementing new technology in order to test it out before rolling out systemwide.
- Standards and best practices need to be followed when generating GTFS.

Recommendations for Regional GTFS Publishing Standards

The following are recommendations for the region with respect to Regional GTFS Publishing Standards.

Recommendation #1: Develop Standard Operating Procedure (SOP) to define how regional partners code shared stops in GTFS

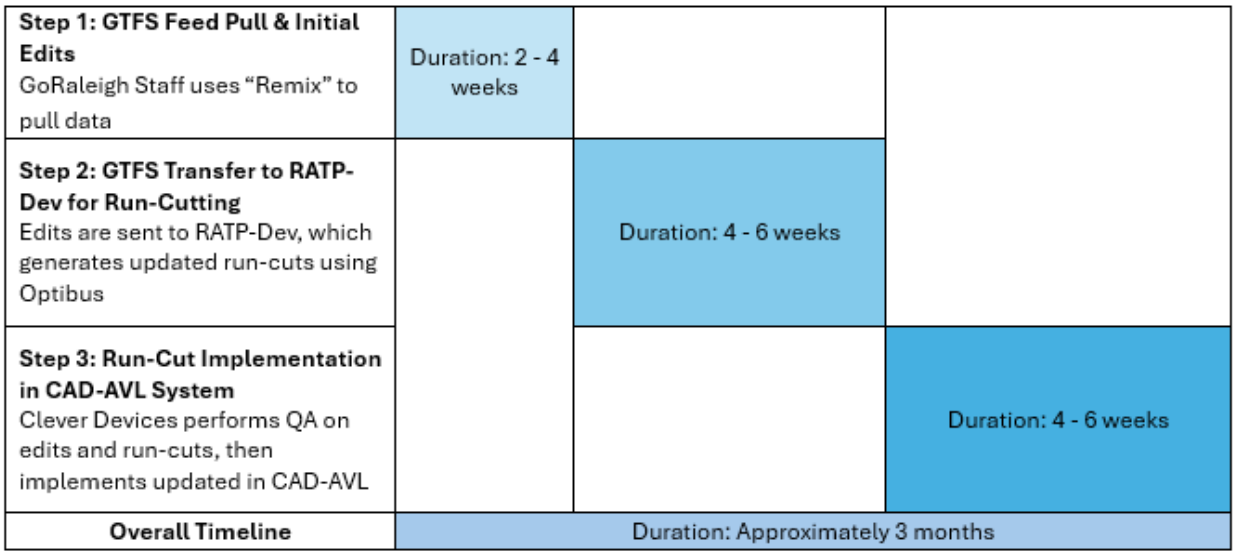
The region created a file in 2010 to coordinate bus stop naming. This file may be able to serve as a starting point for creating a standard operating procedure (SOP) around how shared stops are addressed in the naming convention file and what updates may be needed to enhance coordination between the agencies. This document can outline consistency not only in the naming of stops but the directional headings provided to each route. The region should use cardinal directions (north, south, east, and west bound) and not in-bound or out-bound terminology from a central location. Cardinal directions are universal and would clear up any confusion, particularly among routes whose termini are both central locations.

Recommendation #2: Develop workflows to understand how GTFS edits can be made in a more timely manner than current timeframes allow

Workflows should be developed by each agency that outline the process for updating a GTFS. It should include timeframes, deadlines, roles and responsibilities, standards used, process for notifying other systems of changes, and the flow of information. Figure 2 outlines an example process diagram based on GoRaleigh's description of their GTFS update process that could be included in workflow documentation for editing a GTFS.

Other information could be included in an updated version of the naming convention with respect to GTFS / GTFS-RT feeds that are generated. This may include how each agency creates its GTFS feed, whether it be through use of a specific software or if it is created by a contracted service operator. This may provide guidance to other transit agencies that have questions about feed generation and updates.

Figure 22. GoRaleigh GTFS Update Process Diagram



Recommendation #3: Schedule Quarterly Regional Coordination Meetings to Review Transit Service Changes Impacting Other Agencies

Regional coordination among transit agencies in the region at quarterly working group meetings can help to identify where future transit service changes by each agency may have an impact on other transit agencies, especially at shared stop locations and areas of overlapping transit service.

A potential workflow for regional coordination to support GTFS updates by agencies is presented in Figure 1 as an opportunity for regional collaboration on this effort. The processes for how agencies perform run-cutting and work with their CAD / AVL vendors may differ, but the intent of the process is to improve coordination and understanding of what may need to updated with an agency's GTFS feed.

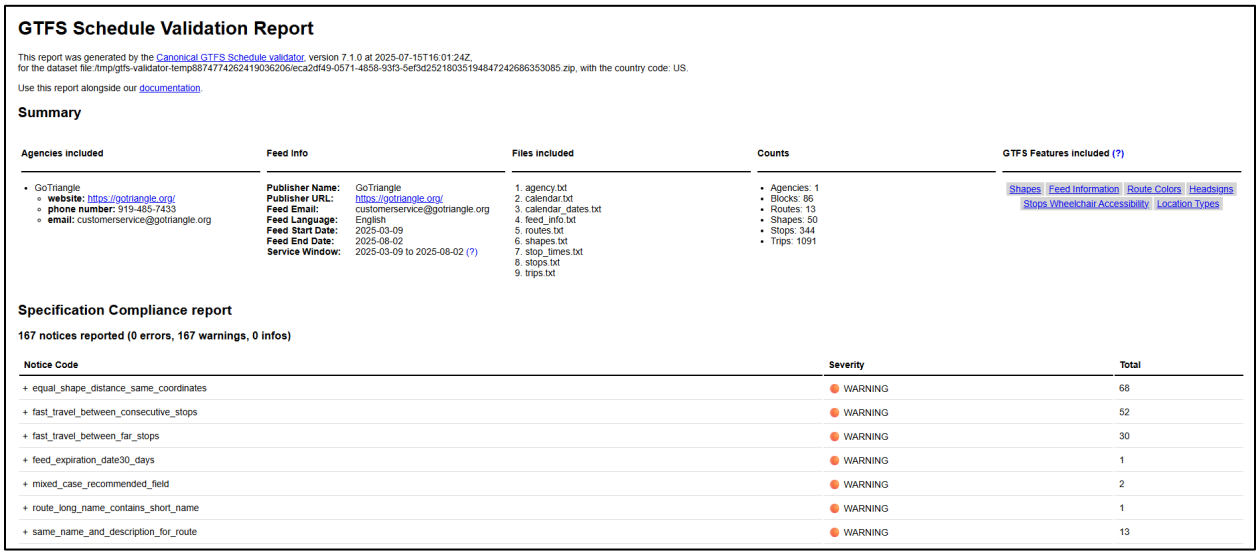
Scheduling the quarterly meetings to review transit service changes will need to be led by a regional agency that can champion the effort and host a location for the agencies to meet and review future transit service changes and the updates that will need to be made to GTFS feeds.

Recommendation #4: Implement Best Practices for Creating GTFSs

GTFS.org is a centralized platform where GTFS rules, requirements, and best practices for generating and publishing are documented. Agencies should implement the best practices outlined on GTFS.org: https://gtfs.org/documentation/schedule/schedule-best-practices/. Best practices are organized into four categories: general practices, publishing, file and field, and use case. Best practices pertain to the overall structure of the GTFS, and several data examples are provided by GTFS.org. Publishing best practices is the manner in which the GTFS is hosted and made available to the public. Best practice by file is recommendations by GTFS file, outlining it by each field within a file. A use case best practice is a specific type of service or use that has best practices across multiple files and fields.

Once best practices are implemented, the GTFS should be run through a validator that checks the dataset against GTFS requirements and best practices. MobilityData offers a free web-based validator (https://gtfs-validator.mobilitydata.org/) where either a ZIP file of GTFS data can be uploaded or a URL provided. The validator will process the data and issue a report outlining issues found based on the severity level. Errors are critical and must be resolved in order to publish a usable GTFS. Warnings are notices that best practices are not being followed. Lastly, the info section highlights items that would affect the quality of the feed. Once run, agencies should go back and fix the errors and re-run the validator to ensure issues are fixed prior to posting the GTFS or pulling it into other software for use. Figure 3 is an example of a GTFS validation report from MobilityData for GoTriangle.

Figure 33. GTFS Validation report from MobilityData for GoTriangle



GTFS Schedule Validation Report

This report was generated by the Canonical GTFS Schedule validator, version 7.1.0 at 2025-07-15T16:01:24Z,
for the dataset file:/tmp/gtfs-validator-temp8874774262419036206/eca2df49-0571-4856-93f3-5ef3d2521803519484724268635308 5.zip, with the country code: US.

Use this report alongside our documentation.

Summary

Agencies included	Feed Info	Files included	Counts	GTFS Features included (?)
• GoTriangle ◦ **website:** https://gotriangle.org/ ◦ **phone number:** 919-485-7433 ◦ **email:** customerservice@gotriangle.org	**Publisher Name:** GoTriangle **Publisher URL:** https://gotriangle.org/ **Feed Email:** customerservice@gotriangle.org **Feed Language:** English **Feed Start Date:** 2025-03-09 **Feed End Date:** 2025-08-02 **Service Window:** 2025-03-09 to 2025-08-02 (?)	1. agency.txt 2. calendar.txt 3. calendar_dates.txt 4. feed_info.txt 5. routes.txt 6. shapes.txt 7. stop_times.txt 8. stops.txt 9. trips.txt	• Agencies: 1 • Blocks: 86 • Routes: 13 • Shapes: 50 • Stops: 344 • Trips: 1091	Shapes Feed Information Route Colors Headsigns Stops Wheelchair Accessibility Location Types

Specification Compliance report

167 notices reported (0 errors, 167 warnings, 0 infos)

Notice Code	Severity	Total
+ equal_shape_distance_same_coordinates	WARNING	68
+ fast_travel_between_consecutive_stops	WARNING	52
+ fast_travel_between_far_stops	WARNING	30
+ feed_expiration_date30_days	WARNING	1
+ mixed_case_recommended_field	WARNING	2
+ route_long_name_contains_short_name	WARNING	1
+ same_name_and_description_for_route	WARNING	13

Transit agencies in the region may want to consider procuring an annual membership for MobilityData.[2] The benefits to the agencies would include access to events where updates on GTFS and its use can be communicated to a larger group of transit agencies around the country. Transit

[2] Membership page available at: https://mobilitydata.org/members/.

agencies in the region would each pay $2,500 on an annual basis to join the group and benefit from lessons learned by other agencies in GTFS implementation.

An alternative option for troubleshooting issues with GTFS feeds and publishing those feeds for the public exists with the Google Transit Data Sharing Portal. This portal was previously known as the Google Partner Transit Dashboard and provides transit agencies a resource to work collaboratively with other transit agencies on issues with their GTFS feeds.

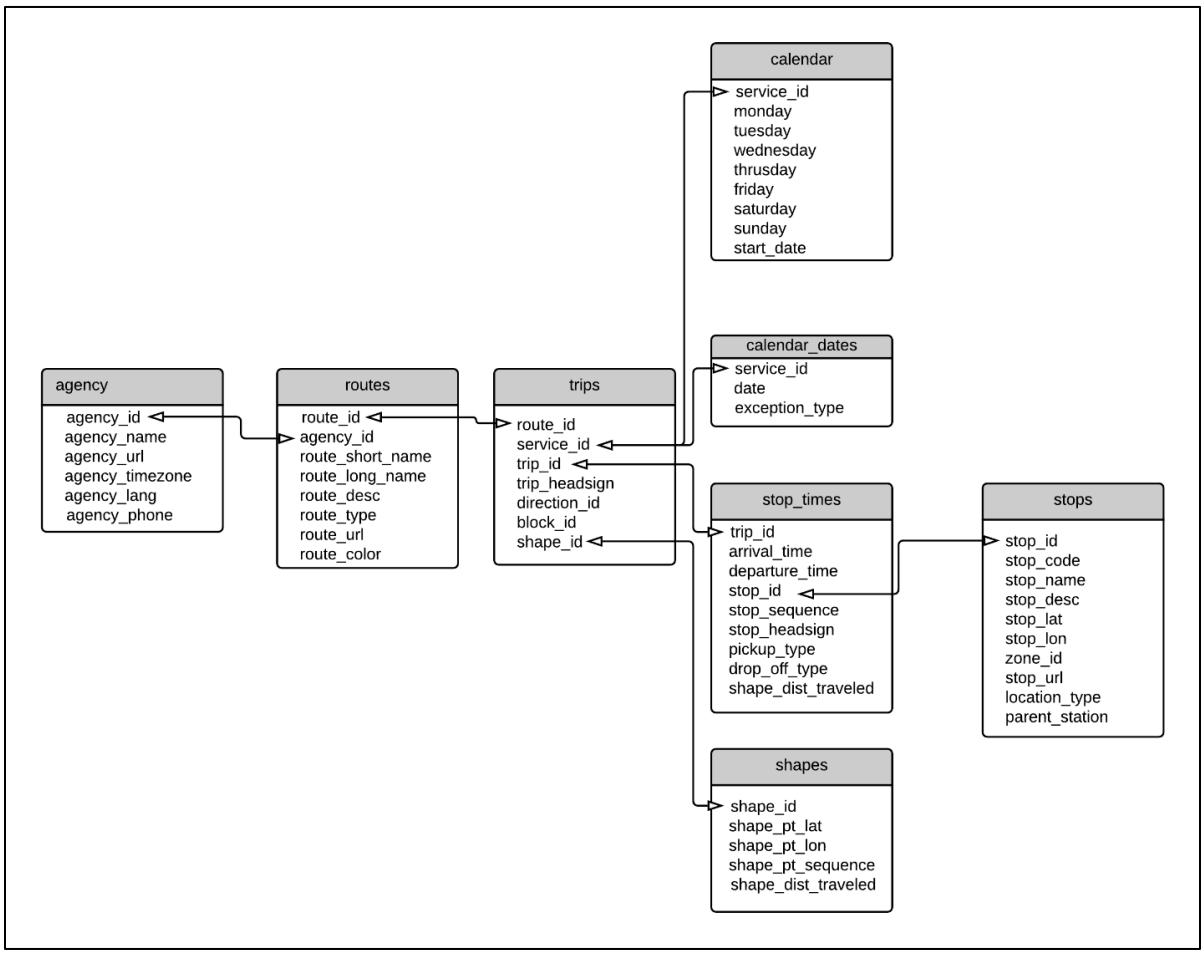
Recommendation #5: Obtain technology to generate a GTFS that saves past versions and allows the agency to streamline their process when service changes are made.

GTFS feeds are a series of .txt files contained within a .ZIP file. At its most basic, it is comprised of 7 files with information about stops, routes, trips, the agency, and when things operate. An 8th file, a shape.txt file, is not required but recommended because it shows the path the vehicle takes, often snapped to an underlying road network. Fields within the files link them together as shown in Figure 4.

While a GTFS can be created in Excel, a tool with drag and drop, an easy-to-use interface, and archive versioning can help streamline the process, quickly identify and remedy errors, and quicken the overall process. There are several web-based GTFS builders and software packages that can generate them, additionally almost all scheduling platforms can generate a GTFS. Commonly used Software-as-a-Service (SaaS) platforms for GTFS creation are:

- Remix Planning – Through the planning modules systems can build schedules, edit route patterns, trips, and timing, define stops, and create calendars. Each time a new GTFS is needed an old project can easily be copied and edited. Once complete a GTFS can be generated. The tool was designed for transit planning but later improved to generate GTFS
- Trillium GTFS Managed Services – This is a managed service provided by Trillium that can replace the software currently used by GoTriangle to build and maintain GTFS feeds. Trillium will discontinue the software used by GoTriangle after Dec. 31st. For agencies that want to continue with the Trillium product, they will then need to transition towards a SaaS version of the software where Trillium staff can create the GTFS feed as requested.
- Optibus Planning – This software is a more robust version of the Trillium software currently used by GoTriangle. It would provide staff with the capability of developing GTFS feeds based on key transit inputs that are a part of the GTFS feed.
- AddTransit – A purpose-built tool for creating GTFS. AddTransit offers a suite of software tools that can streamline operations for transit agencies, improve passenger communication, and increase the visibility for various transportation services. AddTransit focuses on GTFS (General Transit Feed Specification) creation and management, real-time status updates, vehicle tracking, and online ticketing systems for transit agencies.

Figure 44. GTFS File and Field Format and Connections.



Source: Pereira, Andrade, and Vieira[3]

Recommendation #6: Obtain planning/scheduling technology separate from the CAD/AVL system.

Systems should be creating a single GTFS for each bid that feeds into the CAD/AVL system, real-time passenger information, and other software used by agencies for service monitoring. The planning software should be map based, allowing users to visualize routing and stops. The schedule developed in the planning component should automatically be brought into scheduling software to create a runcut. If the agency desires the GTFS to include the block ID field then it must be generated from the scheduling software. A robust scheduling software is needed in order to handle robust union contract rules and optimize the process. For transit agencies that contract out operations and the contractor supplies the scheduling software it is recommended the agency purchase it's own software. When the contractor supplies the software, the agency risks losing access and historical data if the contractor exits the contract or is not chosen in the procurement process.

[3] Pereira, Rafael H. M., Pedro R. Andrade, and João Pedro Bazzo Vieira. 2022. "Exploring the Time Geography of Public Transport Networks with the Gtfs2gps Package." *Journal of Geographical Systems*, December. https://doi.org/10.1007/s10109-022-00400-x.

With the standardization of GTFS, transferring information from a planning/scheduling software to a CAD/AVL is much smoother process. Separate systems are recommended for resiliency. It is not uncommon for technology systems to be bought out or to go under, having separate systems lessens the impact if this happens. When systems invest in an enterprise software that includes all functions, the agencies become dependent on the vendor and locked into a contract. If issues occur it becomes more difficult to exit the contract and the agency ahs become fully dependent on the vendor. Lastly agencies should procure the right software for the right job. While CAD/AVL systems depend on data from planning/scheduling technologies each serves a very different purpose.

Roadmap and Resiliency Plan for Future Years

A roadmap with phased steps is presented in Figure 5 below. Budgetary considerations are provided in Figure 6.

Figure 55. Roadmap of Implementation Steps for GTFS in the Region

Step 1. Develop workflows to understand how GTFS edits can be made in a more timely manner than current timeframes allow Create graphics and outline processes for the entire process from concept to implementation of a change in the GTFS		**Step 2. Develop Standard Operating Procedure (SOP) to define how regional partners code shared stops in GTFS** Reinvigorate the document created for coordinating in naming jointly used bus stops within the GTFS data.		**Step 3. Quarterly Regional Coordination Meetings on Transit Service Changes** Agencies can meet quarterly to review how future transit service at shared stop locations and other locations may impact updates that will need to be made to GTFS feeds.
0-1 years		**1-2 years**		**Years 1-2**
Step 4. Implement Best Practices for Creating GTFSs Utilize the GTFS.org best practices and run GTFS in the Mobility Data Validator to confirm best practices are implemented		**Step 5. Obtain technology to generate a GTFS** Systems which currently use Excel procure a SaaS technology to build and manage static GTFS		**Step 6. Obtain planning / scheduling technology separate from CAD/AVL** Systems that provide transit agencies with the tools to perform scheduling and planning; provides for resiliency in the event that contracted service operator changes over time.
Years 1-2		**Years 1-2**		**Years 1-2**

Figure 66. Budgetary Planning-Level Recommendations for Transit Agency Consideration

	Per Vehicle Estimate for Transit Agencies	Notes on Cost Estimates for Agency Considerations
Software for creating GTFS-Static	**$180-$700 annually per vehicle**	Costs are based on existing contracts held by Rio Metro Regional Transit District, Northwest Arkansas Regional Planning Commission and posted prices by AddTransit