National Park Service
U.S. Department of the Interior

Washington Support Office – Park Facility Management Division
Washington, D.C.

# General Transit Feed Specification (GTFS) Phase II Report


**Figure 1. Zion Canyon National Park Visitor Center bus stop.**
Source: U.S. DOT Volpe Center, 2024.

December 2025

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This report provides an overview of the National Park Service (NPS) General Transit Feed Specification (GTFS) Phase II Project. To better connect visitors to parks and improve trip planning capabilities, the NPS is interested in improving and seamlessly sharing transit information on third-party applications, such as Google Maps and Apple Maps, and NPS digital products, such as the NPS app and website. With parks turning to transit service to help manage congestion and expand visitor access, creating and sharing GTFS feeds is a cost-effective way to enhance operational efficiency by reducing staff time devoted to sharing transit information with visitors and directing traffic. This project aligns with the 2025 NPS National Transportation Strategy objective of improving and expanding trip planning tools.

GTFS is the standardized and widely accepted method for transmitting transit information to third-party navigation applications. GTFS feeds can either be “static,” displaying a pre-determined, fixed schedule, or “realtime,” displaying live updates of transit vehicle positions and expected arrival times. Establishing GTFS feeds can help visitors make more informed travel decisions and further integrate NPS systems into the larger transit network. This project aimed to build upon the Phase I work by creating static GTFS feeds for high boarding transit systems, compiling GTFS realtime feeds, and providing recommendations for continuing and improving GTFS feed creation and maintenance.

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## Contents

## Figures



## Tables

## Executive Summary

This report provides an overview of the National Park Service (NPS) General Transit Feed Specification (GTFS) Phase II Project. To better connect visitors to parks and improve trip planning capabilities, the NPS is interested in improving and seamlessly sharing transit information on third-party applications, such as Google Maps and Apple Maps, and NPS digital products, such as the NPS app and website. With parks turning to transit service to help manage congestion and expand visitor access, creating and sharing GTFS feeds is a cost-effective way to enhance operational efficiency by reducing staff time devoted to sharing transit information with visitors and directing traffic. This project aligns with the 2025 NPS National Transportation Strategy objective of improving and expanding trip planning tools.

GTFS is the standardized and widely accepted method for transmitting transit information to third-party navigation applications. GTFS feeds can either be "static," displaying a pre-determined, fixed schedule, or "realtime," displaying live updates of transit vehicle positions and expected arrival times. Establishing GTFS feeds can help visitors make more informed travel decisions and further integrate NPS systems into the larger transit network. This project aimed to build upon the Phase I work by creating static GTFS feeds for high boarding transit systems, compiling GTFS realtime feeds, and providing recommendations for continuing and improving GTFS feed creation and maintenance.

### *Summary of GTFS Phase II Project*

For the GTFS Phase II project, the project team (NPS and U.S. Department of Transportation Volpe Center) prioritized creating static GTFS feeds for high boarding transit systems (greater than 50,000 annual boardings), excluding systems with an interpretive tour primary purpose. This will maximize the digital infrastructure investment and ensure that the information will reach the greatest number of visitors. During this effort, the project team also worked with the park staff to maintain the static GTFS feeds created or compiled as part of Phase I. All feeds are currently available at NPS' GTFS repository.

The project team consulted three parks (Acadia National Park, Bryce Canyon National Park, and Devils Postpile National Monument) that already produce GTFS realtime (GTFS-rt) feeds. The team worked with the park staff, partners, contractors, and concessionaires to obtain a copy of those GTFS-rt feeds and hosted it on the NPS Developer Resources page, alongside the static feeds. During this phase of work, the project team also conducted research to understand the steps NPS would take to produce GTFS-rt feeds, including procuring Computer Aided Dispatch / Automatic Vehicle Locator (CAD/AVL) vehicle tracking systems and generating GTFS-rt for ferry systems using the Maritime Safety and Security Information System (MSISS) / Transview (TV32) database. The project team also explored park system conditions where it is most appropriate and relevant to develop a GTFS-rt for the park transit system, such as cell service, system headways, and connections to gateway communities.

During this effort, the project team explored additional ways to share and standardize transit information using the GTFS feeds, beyond third-party navigation applications and the NPS Developer Resources page. The project team worked with the Information Resources Division and the Digital Experience Program Office to design the future display of static GTFS information on NPS.gov and the NPS app and standardize the transit information provided within the "Plan Your Visit" section of park websites. The project team also investigated implementing realtime transit information screens at transit stops to share information about arrival and departure times and manage rider expectations. These screens, and the realtime arrival information they provide, are now standard for transit agencies and leverage existing GTFS information to generate information for the display. During this phase of work, the project team conducted a market analysis of commercial transit information screens and an initial feasibility assessment for relevant park systems.

## *Recommendations*

**Recommendation 1: Continue Static Feed Maintenance**

To keep the transit information up to date and available, static GTFS feeds should be maintained regularly to reflect any changes to transit routes, schedules, and stops. After further exploring coordination with the National Transit Inventory and transit system funding processes, the project team determined that the GTFS data collection and maintenance will need to exist as a separate process. The project team recommends that they maintain all static feeds for the next few years to advance process efficiencies, including standardized bi-annual outreach to all parks with active GTFS feeds, shifting GTFS maintenance to operating partners when possible, integrating the park transportation website updates concurrently, and coordination with third-party navigation applications.

The Washington Area Support Office (WASO) should continue to explore options for streamlining GTFS feed maintenance, including reduced frequency of schedule updates and who should maintain the feeds in the long-term. The project team also recommends that NPS continue to explore developing an automated GTFS creation tool to make GTFS data collection and feed maintenance. Finally, the project team recommends that all feeds continue to be stored at or linked from NPS's GTFS repository or the NPS API. Having the feeds available in one central location makes it easier for NPS developers and third-party applications to consume the data and ensure that this open data is kept up to date.

**Recommendation 2: Implement GTFS-rt for Additional Transit Systems**

The project team recommends implementing GTFS-rt feeds for three to five additional transit systems including CAD/AVL procurement, prioritizing implementation at Grand Canyon National Park and Zion National Park. The transit vehicles for these park systems are owned by NPS (which will make procuring CAD/AVL more feasible), connect to a gateway community, and have high boardings. These conditions will ensure maximum return-on-investment for implementing GTFS-rt at these locations.

The project team also recommends continuing to explore GTFS-rt creation for ferry systems via the MSISS/TV32 database and adding transit information screens at two to three parks that align with CAD/AVL procurement.

**Recommendation 3: Integrate GTFS into NPS Digital Products**

The project team recommends continuing to integrate GTFS information into NPS digital products, such as the NPS app and NPS.gov, to consistently display accurate transit information. During this effort, the project team worked with the Information Resources Division and the Digital Experience Program Office to plan display of transit routes and schedules on NPS.gov and the NPS app using GTFS data. Visitors will then be able to use the NPS app to navigate the transit system when there is limited cell service because the park maps can be downloaded for offline use.

**Recommendation 4: Explore Applicability of Transit ITS Data Exchange**

The project team recommends completing an initial assessment of the value of the Transit ITS Data Exchange Specification (TIDES) in the NPS context. TIDES is managed by MobilityData, and it is an additional transit data standard that builds on GTFS data to allow easy analysis and facilitate the interoperability of transit provider data, like passenger counts, on-time performance, and typical ridership patterns.

# Introduction

This report provides an overview of the National Parks Service (NPS) General Transit Feed Specification (GTFS) Phase II Project. The report details lessons learned from the project and outlines recommendations for future GTFS-related implementation for park transit systems. The intended audience for this report includes Washington Area Support Office (WASO) staff and other NPS staff interested in funding and implementing static and GTFS Realtime at parks.

## *Project Purpose*

At the time of this report, 92 transit systems—consisting of ferries, buses, and other vehicles— operated in NPS units across the country, providing approximately 30.5 million trips each year. To better connect visitors to parks and improve trip planning capabilities, NPS is interested in improving and better sharing transit information on third-party applications, such as Google Maps and Apple Maps, and NPS digital products, such as the NPS app and website. With parks turning to transit service to help manage congestion and improve safety, creating and sharing GTFS feeds is a cost-effective way to enhance operational efficiency by reducing staff time devoted to sharing transit information with visitors and directing traffic. This project also aligns with the 2025 NPS National Transportation Strategy objective of improving and expanding trip planning tools.

GTFS is the standardized and widely accepted method for transmitting transit information to third-party applications. This project aimed to build static GTFS for all relevant park transit systems, pilot GTFS Realtime (GTFS-rt) at a few parks, and provide recommendations for improving GTFS feed creation and maintenance. While static GTFS is the proven, reputable transit data standard, there are fewer examples of GTFS-rt in a rural or public lands context. GTFS-rt can greatly improve the transit experience for visitors, especially for systems with frequent updates to service or deviations from scheduled arrival times. However, NPS transit systems often operate in areas with poor connectivity, which could limit the value of providing GTFS-rt. This phase of work explored the feasibility and value of GTFS-rt in an NPS context.

**Throughout project Phases I and II, the NPS and U.S. Department of Transportation (U.S. DOT) Volpe Center project team, created or collected static GTFS feeds for approximately 20 transit systems** including Acadia National Park, Bandelier National Monument, Boston Harbor Islands National Recreation Area, Bryce Canyon National Park, Cape Lookout National Seashore, Denali National Park, Devils Postpile National Monument, Fort Matanzas National Monument, Dry Tortugas National Park, Fort Sumter and Fort Moultrie National Historical Park, Glacier National Park, Grand Canyon National Park, Gulf Islands National Seashore, Harpers Ferry National Historical Park, the National Mall, Sequoia & Kings Canyon National Park, Statute of Liberty National Monument, Yosemite National Park, and Zion National Park. Additionally, during project Phase II, **the project team collected and formatted GTFS-rt for three transit systems**: Acadia National Park, Bryce Canyon National Park, and Devils Postpile National Monument. All active GTFS feeds are currently available at NPS' GTFS repository.

## *Visitor Experience Cycle*

Visitors can use GTFS transit information throughout the Visitor Experience Cycle, pictured in Figure 2, by consulting third-party navigation applications and NPS digital products. During the Travel Planning phase, visitors can learn about existing shuttle options, which will impact how visitors choose to travel to and within the park. During the other phases of the Visitor Experience Cycle, visitors can use third-party applications to check shuttle schedules and locations. With the implementation of GTFS-rt, visitors would also eventually be able to track the location of the transit vehicles and see an updated time of arrival.

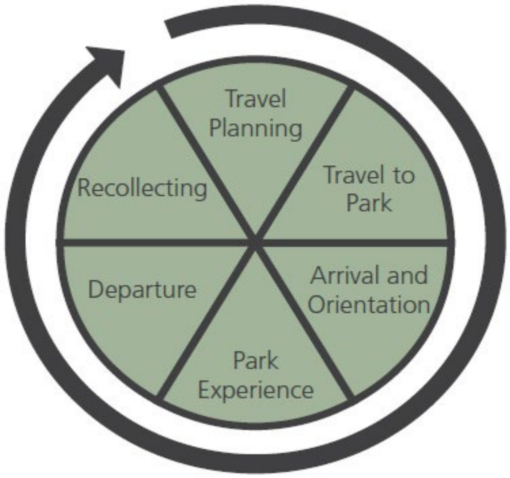


**Figure 2. Visitor Experience Cycle.**
Source: NPS, 2014.

## *Previous Work*

In 2017, NPS, with U.S. DOT Volpe Center assistance, piloted GTFS at five park units. This effort produced static GTFS feeds for those five parks and a report summarizing the project results. Ultimately, the NPS did not maintain these feeds, but the memo included relevant research and recommendations. The key areas for further research identified in the 2017 report included collaboration with third party navigation applications, standardization, centralization of an official NPS repository, and integrating GTFS into park transit operations and outreach.

The 2023 GTFS Phase I project built on the recommendations from the 2017 report. The GTFS Phase I project aimed to understand GTFS best practices and technological advances since 2017, build static GTFS for 10 park transit systems, and provide recommendations for continuing and improving GTFS feed creation and maintenance. The project team concluded that NPS should create static GTFS feeds for high-ridership transportation-focused transit systems, further integrate the GTFS feeds and standardized transit information into the NPS digital products, and pilot GTFS-rt at a few park systems. The Phase I report summarizes the full project activities, outcomes, and recommendations.

As parks seek to improve the visitor experience and increase operational efficiency, static and realtime GTFS continue to present a well-established and highly valuable opportunity to integrate NPS systems into the larger transit data network.

# General Transit Feed Specification (GTFS)

## *Definitions*

**Static GTFS**

GTFS is a standardized data format for transit schedules that allows easy integration with third-party navigation applications, such as Google Maps and Apple Maps. Prior to the creation of GTFS, no data standard existed for communicating public transit information across platforms. GTFS feeds consist of a series of text files that communicate transit information, including agency data, routes, and schedules. GTFS feeds can either be “static,” displaying a pre-determined, fixed schedule, or “realtime,” displaying live updates of bus positions and expected arrival times. GTFS feeds can range in complexity from shuttles having one route with a few stops to large systems with several routes.

**GTFS Realtime**

GTFS-rt, is an extension of the static GTFS format. Like static GTFS, it is designed to provide interoperable, standardized access to travel data. However, GTFS-rt also incorporates dynamic data and live updates, including current bus positions, route deviations, vehicle capacity and congestion, and service alerts. This can greatly improve the transit experience for visitors, especially for systems with frequent updates to service or deviations from scheduled arrival times. GTFS-rt has many potential benefits in the NPS context, including lowering the barrier to entry for new riders, improving the perception and operational efficiency of the transit agency, and increasing ridership.

Most transit systems use Computer Aided Dispatch / Automatic Vehicle Location (CAD/AVL) systems to track and transmit realtime transit information. AVL systems transmit realtime data about a transit vehicle’s location to servers and internal applications, and CAD systems provide an interface for dispatchers to manage transit vehicle fleets. Figure 3 provides an overview of the components of a GTFS-rt system, including CAD/AVL.

There are several steps in the operation of an AVL system that generate realtime transit information. The first step is *location determination*—the process of identifying a vehicle’s location. This is most often determined from global positioning system (GPS) signals, which are transmitted from AVL equipment on a transit vehicle to satellites. AVL systems will typically include a GPS modem onboard each transit vehicle and a GPS antenna. The GPS modem and onboard computer then transmits the vehicle’s location coordinates (and potentially other details such as speed and passenger load) at a specified frequency. The interval between location updates is typically referred to as the *polling rate*, where more frequent updates are best for ensuring rider satisfaction, especially if the vehicle is moving faster. Another factor to consider is *latency*—the time it takes location data to be transmitted from the vehicle to a passenger interface (such as third-party navigation apps), as lower latencies generally improve passenger satisfaction and trust in the system. There are some potential downsides to the use of GPS, such as the tendency of signals to bounce off large objects near the vehicle (such as canyon walls or other vertical topographic features) and the quality of vehicle location information can vary over time due to changes in satellite orbits. Some AVL systems are therefore also designed to report vehicle location based on cellular or Wi-Fi signals.

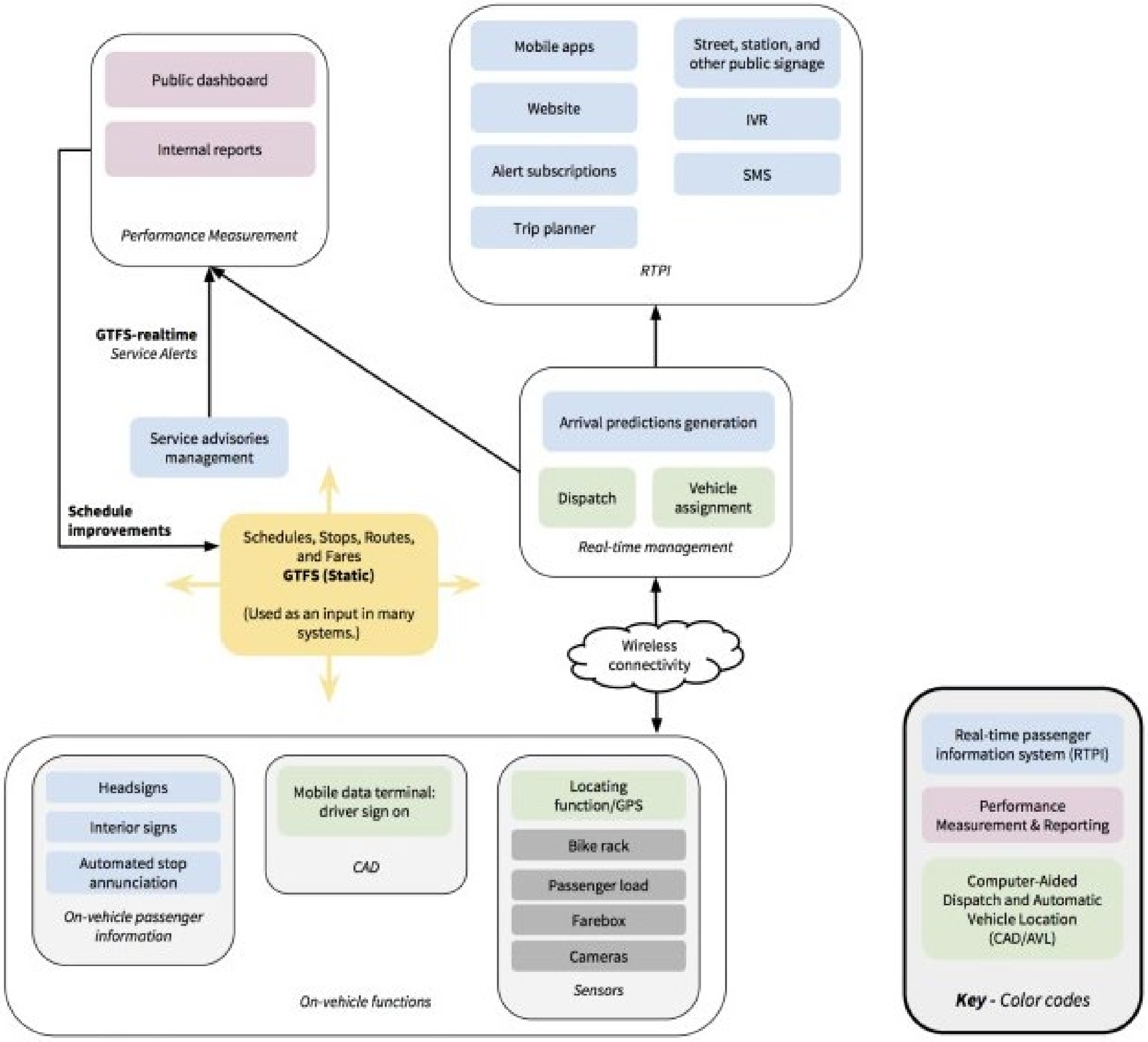


**Figure 3. Realtime transit system architecture.**
Source: Oregon Department of Transportation, 2018.

The second step in the realtime process is *communication of vehicle position data to the server*. This is generally accomplished via transmission to cellular networks, something that most GPS vehicle trackers can do. It can sometimes be challenging to communicate location data to servers in areas with limited cellular coverage (although it should be noted that the transmission of realtime location information is generally not very data intensive). There are however some solutions, such as "dead reckoning," which can infer a vehicle's location based on factors such as last known speed and location. According to Passio (a major transit technology provider), dead reckoning is the "process of calculating current position of some moving object by using a previously determined position, or fix, and then incorporating estimates of speed, heading direction, and course over elapsed time."

The third step of the realtime process is *assignment*, or the process of assigning a vehicle to a particular route. This is most frequently handled by the vehicle operator or dispatcher and requires them to enter information (like trip numbers) into an interface. There are generally two options for systems that require the vehicle operator to enter the necessary information: specialized CAD interface panels mounted inside the vehicle (which are generally the most reliable option) or consumer grade electronics such as tablet computers (which are generally cheaper). Some realtime systems have other options for assigning vehicles, such as inferring a vehicle's route based on its behavior or location.

## *Use Cases*

Figure 4 illustrates how transit information is distributed via GTFS through multiple channels to reach visitors. First, the park decides to create a GTFS feed for their transit system. The GTFS is then uploaded to [NPS.gov](NPS.gov), which displays the transit schedule information. The GTFS is then ingested by third-party navigation apps, and it will eventually be ingested and integrated into the NPS digital products. Variable messaging signs and other digital signage can also ingest the feeds and display the transit information. Visitors then consult these endpoints to receive important transit information throughout the Visitor Experience Cycle.

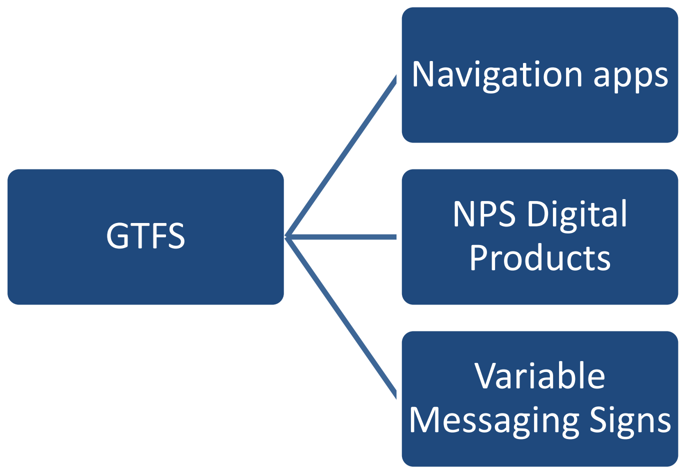


**Figure 4. GTFS process diagram.**

Source: U.S. DOT Volpe Center, 2023.

## *Third-Party Navigation Applications*

In this report, third-party navigation applications are defined as non-NPS sources of traveler information that can ingest GTFS and display transit information. The most common third-party applications are Google Maps and Apple Maps. Visitors receive transit information from third-party navigation apps throughout the Visitor Experience Cycle, illustrated in Figure 1.

Third-party navigation applications assist users in planning their trips from one location to another, by providing step-by-step information on how to use various multimodal transportation options to reach a given destination. NPS visitors use these third-party navigation applications to plan their park visits, especially at urban parks or parks served by municipal transit systems. According to the 2023 Socioeconomic Research of National Park Service Visitors Report, 58% of surveyed visitors used GPS/Navigation on a personal electronic device while visiting the NPS unit. The survey also found that visitors thought GPS/Navigation was the most important activity for which to use their personal electronic devices during their NPS visit. Therefore, accurately providing transit information to visitors via third-party navigation applications is one of the most important ways to provide traveler information.

Third-party navigation applications have different types of legal agreements and terms of services in place for partnerships and data sharing. NPS GTFS feeds released as open data under a clear public domain license allow data consumption by third-party navigation applications.

## Project Summary and Outcomes

This section summarizes the activities conducted during the Phase II GTFS project including descriptions of the nine static GTFS feeds created, three GTFS-rt feeds compiled, research on CAD/AVL and Automatic Passenger Counters (APC) systems, tracking of third-party navigation applications' GTFS feed ingestion, integration with NPS digital products, transit information screens research, and case studies on Zion and Bryce Canyon National Parks.

### *Static GTFS*

For Phase II static GTFS creation, the project team prioritized high ridership transit systems, excluding systems with an interpretive tour primary purpose and systems that already have static GTFS feeds. The project team proposed excluding guided interpretive tours, because these types of transit systems are not necessarily part of a visitor's travel to or within the park. Visitors who are interested in using these systems are more likely to consult NPS.gov and other information sources to plan their engagement with the interpretive tours. For this project, the project team considered systems with boardings above 50,000 as high ridership systems. Focusing on the higher ridership systems ensures that this investment in traveler information is cost-effective and will reach the greatest number of visitors. Of the 18 transit systems identified for Phase II static GTFS implementation detailed in Table 1, the project team created or compiled 10 static GTFS feeds.

**Table 1. Static GTFS feeds identified for creation in Phase II, sorted by 2022 passenger boardings.**

| Park Code | System Name | Vehicle Type | 2022 Passenger Boardings | Vehicle Ownership | Agreement Type | Purpose |
|---|---|---|---|---|---|---|
| **STLI** | Statue of Liberty Ferries | Ferry/Boat | 6,993,087 | Non-NPS | Concession Contract | Critical Access |
| **ALCA/ GOGA** | Alcatraz Cruises Ferry | Ferry/Boat | 1,327,939 | Non-NPS | Concession Contract | Critical Access |
| **SEKI** | Giant Forest Shuttle | Shuttle/ Bus/ Van/ Tram | 733,477 | Non-NPS | Cooperative Agreement | Critical Access |
| **DINO*** | Tram Transit | Shuttle/ Bus/ Van/ Tram | 350,668 | Non-NPS | Service Contract | Critical Access |
| **DENA** | Bus Tours and Shuttle Service | Shuttle/ Bus/ Van/ Tram | 340,258 | Non-NPS | Concession Contract | Critical Access |
| **FOSU** | FOSU Ferry Service | Ferry/Boat | 284,380 | Non-NPS | Concession Contract | Critical Access |
| **GRTE*** | Jenny Lake Shuttle Boat | Ferry/Boat | 238,920 | Non-NPS | Concession Contract | Mobility to or within Park |
| **MACA*** | Green River Ferry | Ferry/Boat | 189,310 | NPS | NPS Owned and Operated | Transportation Feature |
| **GLAC** | Visitor Transportation System | Shuttle/ Bus/ Van/ Tram | 165,631 | NPS | NPS Owned and Operated | Mobility to or within Park |
| **CUVA*** | Cuyahoga Valley Scenic Railroad | Train/Trolley | 100,481 | Non-NPS | Cooperative Agreement | Mobility to or within Park |
| **CALO** | CALO Ferry Service | Ferry/Boat | 97,484 | Non-NPS | Concession Contract | Critical Access |

| Park Code | System Name | Vehicle Type | 2022 Passenger Boardings | Vehicle Ownership | Agreement Type | Purpose |
|---|---|---|---|---|---|---|
| CHIS* | Island Packers | Ferry/Boat | 80,223 | Non-NPS | Concession Contract | Critical Access |
| MUWO* | Muir Woods Shuttle | Shuttle/ Bus/ Van/ Tram | 75,310 | Non-NPS | Cooperative Agreement | Mobility to Or Within Park |
| FOMA | FOMA Ferry Service | Ferry/Boat | 71,464 | NPS | NPS Owned and Operated | Critical Access |
| DRTO | DRTO Ferry Service | Ferry/Boat | 59,782 | Non-NPS | Concession Contract | Critical Access |
| DEPO | Reds Meadow Shuttle Bus | Shuttle/ Bus/ Van/ Tram | 54,013 | Non-NPS | Cooperative Agreement | Critical Access |
| CACO* | Coastguard Beach Shuttle | Shuttle/ Bus/ Van/ Tram | 53,988 | NPS | NPS owned and operated | Critical Access |
| PINN* | Pinnacle National Park Shuttle | Shuttle/ Bus/ Van/ Tram | 52,475 | NPS | NPS Owned and Operated | Mobility to or within Park |
| Total | | | 11,268,890 | | | |

Source: National Transit Inventory, 2022.
*GTFS feeds were not created nor compiled for the starred parks.

The project team engaged with the park staff for the starred transit systems in Table 1 and determined that creating static GTFS was not appropriate in the park context for this phase of work for a variety of reasons, including short routes, irregular or limited service, and future service uncertainty. Engaging with the park staff was an important exercise to better understand the variety of reasons why static GTFS might not be appropriate in unique park contexts. These insights will inform the NPS GTFS and digital infrastructure strategy moving forward.

During the GTFS Phase II project, the project team also worked with the park staff and the NPS Information Resources team to maintain the static GTFS feeds created or compiled as part of Phase I. Since many park transit systems are seasonal, the project team reached out to the parks to compile the seasonal transit schedules and update the GTFS feeds. Parks often finalized their transit schedule only a day or two before the new seasonal service would begin, which proved to be a challenge in maintaining these static GTFS feeds. The park transit system GTFS feeds maintained as part of the Phase II work included Acadia National Park, Bandelier National Monument, Boston Harbor Islands National Recreation Area, Bryce Canyon National Park, Grand Canyon National Park, Gulf Islands National Seashore, Harpers Ferry National Historical Park, the National Mall, Yosemite National Park, and Zion National Park.

## *GTFS Realtime*

In addition to static feed creation, the GTFS Phase II project aimed to explore the applicability of GTFS-rt in an NPS context. GTFS-rt builds on the static GTFS standard, and it transmits live information about transit services, including vehicle locations, schedule updates, and service alerts. GTFS-rt must be linked to a static feed and cannot operate as a standalone feed. During this phase of the project, but the team consulted three parks (Acadia National Park, Bryce Canyon National Park, and Devils Postpile National Monument) that already produce GTFS-rt feeds. The team worked with the park staff, partners, contractors, and concessionaires to obtain a copy of those GTFS-rt feeds and hosted it on the NPS Developer Resources page, alongside the static feeds.

During this phase of work, the project team also conducted research to understand the steps needed to produce a realtime feed. In addition to parks not operating like standard transit agencies from a contracting perspective, the NPS context also creates unique challenges for GTFS-rt feed creation, discussed below.

**Cell Coverage**

Given the remote and rural nature of many parks, cell coverage is a major barrier to the adoption of GTFS-rt. Limited connectivity impacts the feasibility of GTFS-rt feeds, as feeds should be updated at least every 30 seconds. Many parks have cell “dead zones” that would require longer downtimes for the system. While some advanced feed creation software can infer vehicle position based on its last known speed, direction, and historical travel data, this is not fully developed and is not a direct replacement for live tracking. Even if cell coverage issues can be addressed for feed creation, feed consumption remains a challenge. If riders are unable to connect to the internet and receive live vehicle locations while in the park, the value of the feed is greatly diminished. Parks will need to assess their current cell coverage and how that intersects with typical travel patterns to determine the feasibility and value of a GTFS-rt feed over just a static feed.

**System Context**

Traveler behavior and system context will impact the value of GTFS-rt for a given system. For systems with frequent and reliable service (for example, sub-10-minute headways), visitors are unlikely to derive much value from knowing precise arrival times during standard operations. Conversely, for parks with infrequent headways or where service to a particular destination may be limited, visitors will value realtime information. There was also a consensus among park staff that visitors moving within the park were generally more content to be off their phones, enjoy the park, and worry less about the exact location of the vehicle. However, visitors arriving or departing the park were more likely to be stressed or confused about the transportation system and could benefit from additional information. Given this dynamic, parks could consider pursuing GTFS-rt for certain routes, like ones linking the park to the gateway community. Similarly, parks could consider installing transit arrival boards at only certain stops where they are likely to be most valuable (like a visitor center or hotels in the gateway community).

**System Technology**

The CAD/AVL market can be classified into three main categories based on the level of GTFS support offered by providers. These distinctions should be considered when parks procure new vehicles or equipment, as the initial system configuration will be a major factor in creating GTFS-rt feeds.

1. Fleet management and bus tracking systems designed primarily for internal use, offering realtime tracking for dispatchers and drivers but lacking direct GTFS integration. While these systems could be adapted for GTFS-rt, providers typically do not support this use case, and it would require additional technology to create and host the feed.
2. Transit-focused providers that fully integrate with third-party software, supporting GTFS-rt with seamless realtime data export, validation tools, and dedicated support for public-facing transit information. These companies may also offer standalone GTFS-rt feed creation support but typically prefer that customers use certain hardware to ensure compatibility.
3. Providers with proprietary passenger-facing tracking applications that require users to install the company's software. Understanding the capabilities of park hardware and the level of support offered by the vendor is an important first step in determining the viability of GTFS-rt in an NPS context.

APCs also support GTFS-rt integration, allowing transit operators to communicate congestion levels to riders. Most CAD/AVL hardware providers also have APC equipment that can be added to the initial system purchase, if desired.

While standalone APC equipment can also be purchased and installed independent of a CAD/AVL system, purchasing both together is more convenient and helps ensure compatibility between the systems.

**Existing Park System Tracking Technologies**

As part of Phase II, the project team inventoried the existing vehicle location equipment on park buses. The project team compiled this information with the agreement type, ridership, and routes in gateway communities, detailed in Table 2 on the following page. This information informed the recommendations for future GTFS-rt and equipment procurement.

To determine the "Cell Connectivity" for each transit system in Table 2, the project team analyzed the Federal Communications Commission (FCC) 2021 Mobile LTE Coverage Map. Using this data, the project team calculated the average number of cell providers (0, 1, 2, 3, or 4) available across the transit routes. For buses, the project team calculated the average based on the bus route line. For ferry systems, the project team calculated based on a 500-foot buffer around the ferry terminals. The four cell service providers represented in this data set are AT&T Mobility, T-Mobile, UScellular, and Verizon.

Transit systems with greater than two cell providers on average across the route/stops received a "High" classification. Transit systems with less than two and greater than one cell provider on average received a "Medium," and transit systems with less than one cell provider on average across the route/stops received a "Low" classification.

The FCC dataset is five years outdated, and there have been significant cell service improvements in many of these transit system areas. Therefore, this analysis should represent only a starting place for future GTFS-rt implementation decisions. Conversations with park staff will be necessary to determine an accurate understanding of current cell connectivity in the area, amongst other GTFS-rt implementation factors.

**Table 2. Existing park system CAD/AVL technologies.**

| Park | Usefulness | Existing Technology | Cell Connectivity | Operating Model | Vehicle Ownership | Partner(s) | 2023 Ridership | Connects to Gateway |
|---|---|---|---|---|---|---|---|---|
| ACAD | High | Realtime location tracking; Partner creates GTFS-rt feed | High | Cooperative | Non-NPS | Downeast Transportation Inc., Avail | 451,032 | Yes |
| BAND | High | Partner has tracking | High | Cooperative | Non-NPS | Atomic City Transit | DNO | Yes |
| BOHA | High | MSSIS tracking | High | Cooperative | Non-NPS | Boston Harbor City Cruises | 4,264 | Gateway Ferry |
| BRCA | Medium | Realtime location tracking; Partner creates GTFS-rt feed | High | Service | Non-NPS | Red Canyon, TransLoc | 666,911 | Yes |
| CALO | Medium | MSSIS tracking | High | Concession | Non-NPS | Island Express Ferry Service | 100,600 | Yes |
| DENA | Low | None | Medium | Concession | Non-NPS | Doyon/ARAMARK | 382,728 | No |
| DEPO | High | Realtime location tracking; Partner creates GTFS-rt feed | High | Cooperative | Non-NPS | Eastern Sierra Transit, Swiftly | 29,896 | Yes |
| DRTO | Low | MSSIS tracking | Medium | Concession | Non-NPS | Yankee Freedom III, LLC | 57,423 | Yes |
| FOMA | Low | None | High | NPS Operated | NPS | N/A | 42,756 | No |
| FOSU | Medium | MSSIS tracking | High | Concession | Non-NPS | Fort Sumter Tours? | 290,531 | Yes |
| GLAC | Low | None | Low | NPS Operated | NPS | N/A | 221,517 | No |
| GRCA | High | None, procuring new buses | Medium | Service | NPS | Paul Revere | 4,745,966 | Yes |
| GUIS | Medium | MSSIS tracking | High | Concession | Mixed | Pan Isles (MS), HMS Ferries (FL) | 58,556 | Yes |
| HAFE | High | None, procuring new buses | High | Service | NPS | Eastern Panhandle Transit Authority | 419,343 | No |
| SEKI | High | None | Medium | Cooperative | Non-NPS | City of Visalia | 296,680 | No |
| STLI | High | MSSIS tracking | High | Concession | Non-NPS | Statue Cruises | 8,780,307 | Yes |
| YOSE | Medium | CAD/AVL system maintained by partner; issues with adoption | High | Mixed | NPS | Yosemite Hospitality, Avail | 1,595,104 | No |
| ZION | Medium | None (CAD system) | Medium | Service | NPS | RATP Dev | 5,730,436 | Yes |

**Creating GTFS-rt with MSSIS/TV32**

During this phase of the project, the project team explored the ability to generate GTFS-rt feeds for NPS ferry systems using an existing ferry location data source. The [Maritime Safety and Security Information System (MSSIS)] is a freely shared, unclassified, near realtime data collection and global distribution network of vessel locations maintained by the U.S. DOT. This data is shared through Transview (TV32), a Windows application developed by the U.S. DOT that allows users to view and interact with this data. The project team explored using MSSIS/TV32 to generate GTFS-rt for NPS ferry systems.

Coordinating with the TV32 developer team, the project team created a TV32 account, filtered the vessels shown on the application to just those operating at parks, and configured the application to output a text file every minute listing the realtime location latitude and longitude coordinates and vessel ID of the currently operating vessel of interest.

Standard GTFS-rt feeds use the [protocol buffer file format] and include the GTFS trip ID, the vessel's location, and the timestamp. Some parks have multiple ferries operating at the same time, making it more difficult to assign the correct GTFS trip ID to each vessel in MSISS/TV32. The project team prototyped the GTFS-rt generation process using the Dry Tortugas National Park ferry system, because only one ferry runs at a time. The project team created a Python script to read the output text file from TV32, identify the GTFS trip of the vessel, and write the protocol buffer file. Figure 5 below shows an overview of the process.

In the next phase of the project, the project team will work to formally establish this process on NPS infrastructure. The team will then coordinate with the third-party navigation applications to ensure that the GTFS-rt and protocol buffer files are properly formatted and contain the correct information.

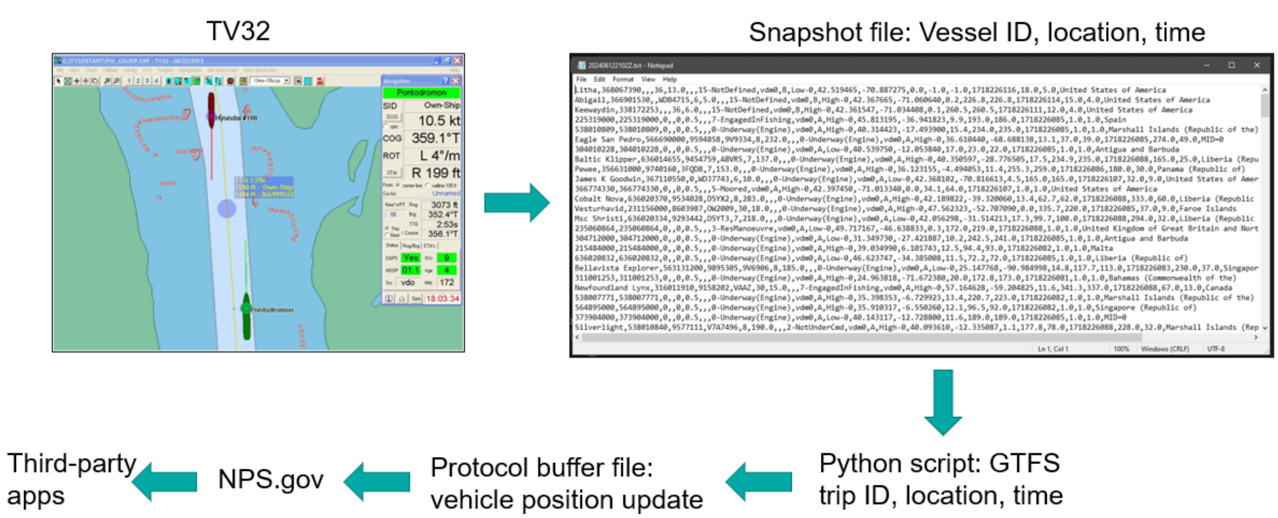


**Figure 5. Proposed process to create GTFS-rt ferry feed.**

Source: U.S. DOT Volpe Center, 2025.

## *NPS Digital Products*

The project team recommends integrating the GTFS information into NPS digital products, such as the NPS app and NPS.gov, to consistently display accurate transit information. This will help reduce discrepancies between the park transportation websites and GTFS feeds, as well as standardize transit information presentation across parks. During this effort, the project team worked with the Information Resources Division and the Digital Experience Program Office to plan display of transit routes and schedules on NPS.gov and in the NPS app using GTFS data. Using the GTFS information, the project team is also working with the Information Resources Division to help standardize the transit information provided on the “Plan Your Visit” section of park websites using the GTFS fields.

## *Transit Information Screens*

The project team explored implementing realtime transit information screens to keep travelers informed and help manage rider expectations about departure times. These screens, and the realtime arrival information they provide, are now standard for transit agencies across the nation and leverage existing GTFS to generate the display information.

During this effort the project team conducted a market analysis of commercially available transit information screens and an initial assessment of possible options for park use. The project team explored transit information screen options provided by commercial vendors, as well as the feasibility of lower-cost implementations by individually sourcing and installing screens/hardware and programing the software to operate the screens. Information screen options currently on the market and utilized by transit agencies generally fall into three types: Liquid Crysal Displays (LCD), Light emitting diodes (LED), and Electronic Ink (E Ink), illustrated in Figure 6.


**Figure 6. From left: examples of LCD, LED, and E ink transit screens in use.**
Source: Flickr (CC BY-NC-SA 2.0)

**LCD:** Liquid-crystal displays (LCDs) are common, appearing in devices including laptop and TV monitors. They are familiar to park visitors, who likely own one themselves. LCDs come in a variety of sizes and offer crisp, high-quality images. They can also be programmed to show a wide range of both static and moving graphics and images. Many parks already have LCDs at visitors’ centers or service waysides. Large LCDs have deployment limitations in an NPS setting, however. LCD screens require a significant, reliable power source and internet connectivity. They have limited outdoor performance and durability because they operate in a limited temperature range and require protection from dust and other natural elements. Additionally, their weight requires significant mounting. Therefore, LCDs might be more applicable in an indoor location.

- <u>Commercial full-service vendor option:</u> Based on reviews of commercially available options pitched specifically to the transit industry, launch costs for screens, associated hardware and software, and installation ranges from $11,000 to $30,000 per screen. Reoccurring costs for supplier support, web hosting of the software to enable the live updates, and other regular updates range from $2,000 to $10,000 per year for a system.

- Low-cost pilot option: Directly purchasing a usable LCD display would cost approximately $3,000-$10,000 depending on display specifications. While this does eliminate reoccurring costs for support, it also requires additional work to weatherize, power, and maintain the display. Most industrial (i.e. weatherproofed, outdoor rated, etc.) displays are not sold directly to consumers. An initial estimate of costs to independently build a suitable display ranges from $3,000-$10,000 depending on screen size and power specifications.

**LED:** Light emitting diodes (LEDs) are another widely used technology for transit information screens. In LEDs, individual diodes light up to form an image, like individual pixels on a screen. Like LCDs, they come in various sizes and formats, and can display variable images, information, and moving graphics. For example, many large-scale screens in stadiums and arenas are LED screens. LEDs have variable image quality, however, with higher quality screens having more diodes in a denser configuration; Higher quality LED screens are more expensive. LEDs are more energy efficient compared to LCD screens but also have similar deployment limitations related to power needs, connectivity, mounting, and exposure to the elements.

- Commercial full-service vendor option: Market research suggests that launch costs are roughly $25,000 - $30,000 per screen, including associated hardware and software and installation. Reoccurring costs for are between $5,000 and $10,000 per year for any system.
- Low-cost pilot option: An initial cost estimate for independently constructing a suitable LED display —factoring in necessary enhancements for durability, power supply, and installation—might range from $2,000 to $10,000, varying based on display size and required power specifications.

**E Ink**: Electronic-ink (E Ink), also sometimes known as e-paper, is a newer technology for display screens. This technology is most commonly found in consumer electronic e-readers. These screens are usually smaller formats (13-inch or 24-inch screens) than LED or LCDs (typically about 40-inch screens but ranging up to 95-inch screens) and have more limited graphic variability to allow for moving or scrolling elements. E Ink works by 'refreshing' its display every few seconds. While not as graphically flexible, the screen quality for E Ink is high and these displays are extremely durable. They can operate in a wide range of weather conditions and have fewer complex components, compared to LCD and LED screens. E Ink screens can operate on wired, solar, or battery power and require minimal power to operate for an extended period. E Ink screens are also light-weight and can be mounted or installed in a wider variety of locations and settings by staff without special installation skills. They can receive updated information through wired or wireless connectivity. Transit agencies are increasingly installing these screens at bus or rail stops.

- Commercial full-service vendor option: Based on market research, launch costs are between $5,000 to $10,000 per screen with reoccurring costs of roughly $2,000 for a system.
- Low-cost pilot option: At the time of this report, there were minimal options for direct-to-consumer E Ink displays. Most E Ink displays sold directly to consumers were too small to be viable as transit display boards, and most suppliers of larger boards either required bulk purchases or ongoing subscription support. Future developments in E Ink technology may enable direct purchasing in the future, but it was not deemed a viable option by the project team in the current market. The largest direct to consumer E ink displays, approximately 13 inches, retail for $250-$500, which is too small to effectively display transit information for riders.

## *Case Studies*

The project team visited Zion and Bryce Canyon National Parks to better understand potential opportunities and challenges to implementing GTFS realtime in different park contexts.

**Zion National Park**

In 2023, the Zion National Park shuttle system had the second highest boardings of all National Park transit systems with approximately 5,730,000 annual boardings. The park implemented the shuttle system in 2000 to reduce traffic and parking challenges, protect vegetation, and restore tranquility to Zion Canyon. The cost of riding the bus is included in the park entrance fee, and visitors are not required to reserve a shuttle ticket. The Springdale route connects visitors in the gateway community of Springdale, UT to the Visitor Center. The Zion Cayon route transports visitors from the Visitor Center several miles up Zion Canyon. During the shuttle season (March-November), visitors are required to use the Zion Canyon shuttle on Zion Canon Scenic Drive. Shuttles arrive about every 10-15 minutes on the Springdale route and about every 5-10 minutes on the Zion Canyon route.


**Figure 7. Zion National Park shuttle system.**

Source: U.S. DOT Volpe Center, 2024.

The shuttle service schedule is well-documented on the park website. To better share traveler information with visitors who use third-party navigation applications, the project team created a static GTFS feed for the route during Phase I. The project team believes that sharing this information via third-party navigation applications is especially valuable for visitors planning their trips and deciding how they will travel to the park. By sharing transit options on third-party navigation applications, visitors can make better informed decisions about taking transit.

The project team also identified that this transit system could be appropriate for future GTFS-rt implementation. Zion National Park recently purchased new battery electric buses, which are equipped with telematics system.

These new buses could be outfitted with additional GPS-tracking technology, which would enable GTFS-rt creation. The GTFS-rt could pair nicely with new realtime transit signage at the bus shelters. Park staff and the project team acknowledged that GTFS-rt and realtime transit signage would be especially beneficial for visitors at bus stops in Springdale. Anecdotally, visitors experience higher levels of anxiety related to bus reliability and frequency when traveling to the park for the first time. Adding realtime transit signage at Springdale locations could help improve the visitor experience and encourage visitors to choose transit when traveling to the park. The Zion Canyon route runs frequently and there is limited cell service in the canyon, so GTFS-rt does not make sense for this route at this time.

**Bryce Canyon National Park**

In 2023, the Bryce Canyon National Park shuttle system experienced approximately 670,000 annual boardings. The cost of riding the bus is included in the park entrance fee, and visitors are not required to ride the bus. The park created this shuttle service to mitigate congestion on the park roads and parking lots. Popular parking lots often reach capacity, and park staff temporarily close these lots until parking becomes available. The shuttle route is a loop, connecting visitors in the gateway community of Bryce Canyon City, UT to the Visitor Center and several popular destinations in the park. Shuttles arrive approximately every 15 minutes.


**Figure 8. Bryce Canyon National Park shuttle system.**

Source: U.S. DOT Volpe Center, 2024.

The shuttle service schedule is documented on the park website. To better share traveler information with visitors who use third-party navigation applications, the project team created a static GTFS feed for the route during Phase

I. By sharing transit options on third-party navigation applications, visitors can make better informed decisions about taking transit to and within the park.

The project team also identified that this transit system could be appropriate for GTFS-rt implementation. Realtime information about the Bryce Canyon shuttle was already being shared via the Bryce Canyon Shuttle Tracker website. The project team worked with Red Canyon Transit to share this realtime information in the standardized GTFS-rt format on the NPS GTFS repository.

The project team also identified that the GTFS-rt could pair nicely with new realtime transit signage at some of the bus shelters. Similar to Zion National Park, park staff and the project team acknowledged that realtime transit signage would be especially beneficial for visitors at bus stops in Bryce Canyon City and the visitor center to reduce anxiety related to bus reliability and frequency when traveling to the park for the first time. Adding realtime transit signage at Bryce Canyon City locations and the Visitor Center could help improve the visitor experience and encourage visitors to choose transit when traveling to the park.

## Recommendations

This section describes recommendations for the maintenance of static GTFS feeds moving forward, future GTFS-rt development, further integration of GTFS information into the NPS digital products, and other ways to better share transit information using GTFS.

### *Recommendation 1: Continue Static Feed Maintenance*

Transit service changes between years and seasons, especially for parks that run seasonal transit. As such, it is important to maintain the static GTFS feeds to ensure visitors receive the most accurate information. For visitors, inaccurate information can be worse than no information. To keep the transit service information up to date and available, static GTFS feeds should be maintained regularly to reflect any changes to transit routes, schedules, stops, and frequencies.

The GTFS Phase I Report outlines the data fields that are needed to create and maintain static GTFS, as well as several options for feed maintenance processes. After further exploring coordination with the NPS National Transit Inventory and transit system funding processes, the project team determined that the GTFS data collection and maintenance will need to exist as a separate process. The project team recommends the following suggestions for maintaining static GTFS feeds.

1. The project team will maintain all static feeds for the next few years. This will allow the project team to help move the GTFS maintenance process to a more streamlined, steady state. The project team will work to advance process efficiencies, including standardized bi-annual outreach to all parks with active GTFS feeds, shifting GTFS maintenance to operating partners when possible, and integrating the park transportation website updates concurrently.
2. While the project team maintains the static GTFS feeds for the next few years, WASO will explore options for streamlining long-term maintenance of the GTFS feeds.
3. The project team also recommends that NPS continue to explore developing an automated GTFS creation tool to make GTFS data collection and feed maintenance more efficient. Parks would submit their transit schedule information in a structured format through an NPS form or application, and that would trigger an automatic update of the GTFS feed and the transit schedules on the NPS.gov website.
4. The project team recommends that all feeds continue to be stored at or linked from NPS' GTFS repository. Having the feeds available in one central location makes it easier for NPS developers and third-party applications to consume the data and ensure that this open data is kept up to date. NPS could also start integrating the GTFS feeds into the NPS API to further facilitate feed consumption.
5. The project team recommends sharing NPS GTFS feeds with Google Maps by providing the HTTPS link shared on the NPS Developer Resources page. The project team can set how often Google should fetch the data from the NPS website (every one minute, each day etc.). Moving forward this will simplify the process of sharing and maintaining GTFS feeds with Google Transit Partners and ensure that Google Maps displays the most up-to-date version of the transit schedule information.

### *Recommendation 2: Implement Realtime GTFS for Additional Systems*

In addition to maintaining the existing static GTFS feeds, the project team recommends further implementing GTFS-rt for park transit systems. The project team recommends implementing GTFS-rt feeds for three to five additional transit systems including CAD/AVL procurement, continuing to explore creating GTFS-rt through the MSSIS database, and adding transit boards at two to three parks.

**Recommendation: Implement GTFS-rt for Three to Five Transit Systems**

During this Phase II, the project team consulted three parks (Acadia National Park, Bryce Canyon National Park, and Devils Postpile National Monument) that already produce GTFS-rt feeds. The team worked with the park staff and contractors to obtain a copy of those GTFS-rt feeds and hosted it on the NPS Developer Resources page. The project team believes that these are the only park transit systems currently operating where the contractor or partner agency currently maintains a GTFS-rt. NPS should continue to maintain these GTFS-rt links and coordinate with the park partners to ensure the feeds are up to date. The project team also believes that Atomic City Transit maintains a GTFS-rt for Bandelier National Monument's shuttle service, but the shuttle service did not operate in 2024 due to driver shortages.

Based on the project team's transit system technologies' inventory analysis, the project team recommends implementing GTFS-rt for the park systems outlined in Table 3, in the next phase of work. The project team maintains static GTFS for each of these shuttle bus systems, and the vehicles are owned by NPS, which will enable easier CAD/AVL system procurement. After researching GTFS-rt and CAD/AVL systems, the project team believes that the most efficient way to implement GTFS-rt would be procure CAD/AVL systems that include a GTFS-rt component. If the NPS or the project team wanted to create GTFS-rt from the raw GPS location data, it would require permanent web-hosting space and maintenance. Therefore, the project team recommends procuring standardized CAD/AVL systems that include GTFS-rt capabilities for all park transit systems outlined in Table 3.

Of the systems detailed in Table 3, the project team recommends prioritizing implementing GTFS-rt at Grand Canyon and Zion National Parks because their transit systems connect gateway communities to the parks. As discussed previously, the project team believes that sharing realtime transit information via third-party navigation applications is especially valuable for routes that connect parks to gateway communities, to ease visitor anxiety related to bus reliability and frequency when traveling to the park for the first time. Encouraging transit use at these locations can also reduce cars from the park entrance road, reducing congestion. Grand Canyon and Zion experience the highest boardings of all NPS transit systems; implementing GTFS-rt at these locations will ensure that the information will reach the greatest number of visitors, and that NPS receives the maximum return on investment.

**Table 3. Recommended park transit systems for GTFS-rt development.**

| Park Code | Transit System Name | Operating Model | Vehicle Ownership | Partner | Connects to a Gateway Community |
|---|---|---|---|---|---|
| **BAND** | Bandelier National Monument | Cooperative Agreement | Non-NPS | Atomic City Transit | Yes, White Rock |
| **GRCA*** | South Rim Shuttle | Service Contract | NPS | Paul Revere | Yes, Tusayan |
| **HAFE** | HAFE Shuttle Transport | Service Contract | NPS | Eastern Panhandle Transit Authority | No |
| **YOSE** | Yosemite Valley Shuttle | Service Contract | NPS | Yosemite Hospitality, LLC | No |
| **ZION*** | Zion Shuttle | Service Contract | NPS | RATP Dev | Yes, Springdale |

Source: NPS and U.S. DOT Volpe Center, 2024.

*Prioritized for Phase III GTFS-rt development.

**Recommendation: Consider Piloting GTFS-rt for all Ferries in 2026**

The project team recommends continuing to develop GTFS-rt for all NPS ferry vessels using MSSIS/TV32, as described in the Project Summary and Outcomes sections. This will include formally establishing the GTFS-rt generation process on NPS infrastructure and coordinating with the third-party navigation applications to ensure that the GTFS-rt and protocol buffer files are properly formatted and contain the correct information.

**Recommendation: Implement Realtime Transit Information Screens at Two to Three Parks**

The project team recommends implementing realtime transit information screens to keep travelers informed and manage rider expectations for departure times. The project team recommends that NPS explore, test, and pilot these screens at two to three parks to better assess the value of this investment and identify products that would best work for NPS's unique operating circumstances, context, and needs.

As discussed previously, the project team recommends starting by implementing transit information screens at key transportation nodes and routes that connect parks to gateway communities, since discussion with park staff revealed that visitors arriving or departing the park were more likely to be stressed or confused about the transportation system and could benefit from additional, realtime transit information. Additionally, placing transit information screens in gateway communities can help increase the visibility of the system and share information with visitors who may not have planned to utilize the system prior to arriving at the park. Information screens located in gateway communities also allow parks to communicate about important non-transit information that might impact visitors, such as congestion or road closures, before they enter the park.

As part of this pilot transit screen deployment, NPS should explore whether it makes more sense in the NPS context to contract a commercial, full-service vendor or implement lower-cost options by individually sourcing screens and hardware and programing the software to operate screens.

The commercial, full-service vendors usually provide a quality product as well as installation, troubleshooting, and maintenance, which would reduce the burden on park staff. However, all commercial, full-service vendors reviewed as part of this effort require ongoing, reoccurring costs in a subscription model. This covers the costs for web hosting of the background systems that enable the realtime information, maintenance, service updates, and other services. Many vendors also operate on economies of scale, requiring a larger purchase order and contract. This is a possible option, but it will take time to establish a statement of work and execute a contract.

NPS may also be able to deploy low-cost pilot implementations by purchasing individual system components, programming the software, and installing the screens. This might be a more cost-effective option, but the park should consider whether it has the technical capabilities to successfully design, procure, program, install, and/or maintain a transit information screen system. During the next phase of work, the project team recommends conducting a low-cost pilot installation of a transit information screen system assembled using individual components to assess technical requirements, observe NPS specific installation challenges, and generate best practices for other parks interested in pursuing this option.

Regardless of whether the NPS pursues a commercial, full-service vendor or low-cost pilot option, the project team recommends further exploring the feasibility of installing E Ink transit information screens, due to their cost effectiveness and durability. The project team recommends investigating E Ink transit display screens for most target outdoor locations (i.e., shuttle stops). In certain cases, such as at transit hubs or large visitor centers, LCD or

LED options may be more appropriate, particularly when the park has existing displays that could be dedicated to transit information.

## *Recommendation 3: Integrate GTFS into NPS Digital Products*

The project team recommends continuing to integrate GTFS information into NPS digital products, such as the NPS app and NPS.gov, to consistently display accurate transit information. During this effort, the project team worked with the Information Resources Division and the Digital Experience Program Office to plan display of transit routes and schedules on NPS.gov and the NPS app using GTFS data. Visitors will be able to use the NPS app to navigate the transit system when there is limited cell service because the park maps can be downloaded for offline use. Using the GTFS information, the project team is helping to standardize the transit information provided on the "Plan Your Visit" section of park websites using the GTFS fields.

## *Recommendation 4: Explore Applicability of Transit ITS Data Exchange Specification (TIDES)*

The project team recommends doing an initial assessment of the value of the Transit ITS Data Exchange Specification (TIDES) in the NPS context. TIDES is an additional transit data standard that builds on GTFS data to allow easy analysis and facilitate the interoperability of transit provider data. While GTFS is primarily oriented towards passengers, TIDES mostly benefits operators and service providers by unlocking new insights into their service patterns. TIDES provides a standardized format for data like passenger counts, on-time performance, and typical ridership patterns. While many NPS systems are relatively simple as compared to more complex urban transit networks, some parks may benefit from the improved analysis capabilities facilitated by TIDES. Perhaps, TIDES would be helpful for parks that are planning major fleet recapitalizations or already have APCs, such as Acadia, Grand Canyon, Yosemite, and Zion National Parks. In these case, the park would likely need to include this request in procurement documents.

## Conclusion

This report provided an overview of the 2024-2025 GTFS Phase II Project and outlined recommendations for future GTFS implementation for park transit systems. By investing in static and GTFS-rt creation, the NPS can continue to improve traveler information and the visitor experience.


**Figure 9. Bryce Canyon National Park shuttle parking and bus stop.**

Source: U.S. DOT Volpe Center, 2024.