|  |
| --- |
| January 2022 |

|  |  |
| --- | --- |
|  | Florida ITS Architecture Support and Maintenance ProjectDistrict 4/6 RITSA Conversion Report (ARC-IT 9.0) Version 1.0 |

|  |
| --- |
|   |
|  |

Document Version Control

|  |  |  |
| --- | --- | --- |
| Author / Action | Submittal Date | Version No. |
| Arobindu Das / Draft Document | November 12, 2021 | 1.0 |
| Cliff Heise / QA/QC Review Draft Document | November 16, 2021 | 1.0 |
| Cliff Heise / Final Document | January 28, 2022 | 1.0 |
| Cliff Heise / Minor Formatting, Typo Revisions | February 1, 2022 | 1.0 |
|  |  |  |
|  |  |  |

Table of Contents

[1.0 Introduction 4](#_Toc88180886)

[2.0 Conversion Process 4](#_Toc88180887)

[3.0 Architecture Conversion Results 5](#_Toc88180888)

[3.1 Architecture Inventory Elements 5](#_Toc88180889)

[3.2 Architecture Services 7](#_Toc88180890)

[3.3 Architecture Functional Requirements 10](#_Toc88180891)

[3.4 Architecture Information Flows 10](#_Toc88180892)

[3.5 Architecture User Defined Information Flows 10](#_Toc88180893)

[3.6 Standards 11](#_Toc88180894)

[3.7 Projects 12](#_Toc88180895)

List of Tables

[Table 1 Conversion Analysis of Inventory Elements 5](#_Toc88180896)

[Table 2 Conversion Analysis of Services 7](#_Toc88180897)

[Table 3 Information Flow Conversion Change Examples 10](#_Toc88180898)

[Table 4 User Defined Information Flow Change Example 11](#_Toc88180899)

[Table 5 Project Conversion Disposition 12](#_Toc88180900)

# Introduction

This Architecture Conversion Report records the District 4/6 Regional Intelligent Transportation System (ITS) Architecture (RITSA) conversion from its reference in the Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT) Version 8.3 to ARC-IT Version 9.0. This report addresses the results of the conversion process.

# Conversion Process

The architecture conversion process uses the Regional Architecture Development for Intelligent Transportation (RAD-IT) software Version 9.0 to convert the architecture to be compatible with ARC-IT Version 9.0. The process includes the following steps to accomplish the conversion.

* Architecture conversion: Conversion features in RAD-IT Version 9.0 convert the architecture database schema to be compatible with RAD-IT Version 9.0 and aligned to reference ARC-IT Version 9.0 content.
* Conversion analysis: Conversion information is produced by RAD-IT for the architecture conversion noting the changes made. The conversion information notes the schema and content changes, such as service splits or consolidations, element divisions, and information flow adjustments. Analysis is required for each converted item to assess the appropriateness of each change for the architecture. For example, the addition of the new CVO05 Commercial Vehicle Parking service involves the division of the Parking Management System element into two new elements, namely the Parking Area Equipment and Parking Management Center elements. These new elements along with the new CVO05 service are applicable to all eight Florida ITS Architectures requiring analysis and update of the architectures to accommodate the new ARC-IT content.

A substantial change that ARC-IT Version 9.0 imposes on the Florida ITS Architectures during conversion is the reorganization of the standards associated with each information flow in each of the architectures and their associated projects. The reorganization introduces solutions which associate sets of standards that are required to address an interface or information flow implementation. The conversion process does not provide the solutions information automatically. The standards solutions were populated with default selections and the selections were analyzed for their applicability for the architecture and each project. In the RAD-IT software, the Standards tab in the user interface is now the Communications tab.

* Architecture content update: The intent of the conversion process was to maintain the alignment of the converted Architecture content to the greatest extent possible with the pre-conversion Architecture content. As noted above, element physical object mapping changes, service package changes, information flow additions and adjustments, and the evolution of the standards mappings in ARC-IT Version 9.0 required changes to be made to the Architecture content. Unless it was necessary, no additional changes beyond those required to align the pre-conversion and converted architecture content were made. During the course of the Annual Architecture Maintenance Update, ARC-IT Version 9.0 features that could be considered as additional information to the Architecture will be assessed.
* Architecture website posting: The converted architecture will be posted to the Florida ITS Architecture website.

# Architecture Conversion Results

The District 4/6 RITSA was converted to be compatible with ARC-IT Version 9.0. The following sections highlight the changes made to the architecture as a result of the conversion process.

## Architecture Inventory Elements

Table 1 provides conversion results for architecture inventory elements impacted by the conversion process. The table information shows the element impacted, the results of the element conversion, the analysis disposition which may indicate a revision to the conversion results depending on the architecture content, and the notes of the conversion implementation.

Table 1 Conversion Analysis of Inventory Elements

| **Element in Source Architecture** | **Element in Converted Architecture** | **Conversion Disposition** | **Conversion Notes** |
| --- | --- | --- | --- |
| City of Miami Beach Parking Management System. Mapped to: * Parking Management System
 | City of Miami Beach Parking Management System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object.  | No service package changes required. |
| Miami Intermodal Center. Mapped to: * Parking Management System
* Alternative Mode Transportation Center
 | Miami Intermodal Center. Mapped to: * Parking Management Center
* Alternative Mode Transportation Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object.  | No service package changes required. |
| Miami Parking Authority Parking Management.Mapped to: * Parking Management System
 | Miami Parking Authority Parking Management. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object.  | No service package changes required. |
| Private/Public Parking Facility Operators.Mapped to: * Parking Management System
 | Private/Public Parking Facility Operators. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a new ‘Parking Area Equipment’ element with appropriate flows in the PM01: Parking Space Management (All Parking Facilities) and the PM03: Parking Electronic Payment (All Parking Facilities) service packages. | Added ‘Private/Public Parking Facility Operators Parking Equipment’ element and information flows in the PM01: Parking Space Management (All Parking Facilities) and the PM03: Parking Electronic Payment (All Parking Facilities) service packages. |
| FDOT CVO Parking Management System.Mapped to: * Parking Management System
 | FDOT CVO Parking Management System. Mapped to: * Parking Management Center
* Parking Area Equipment
 | Remove the mapping to the ‘Parking Area Equipment’ Physical Object. Add a new ‘Parking Area Equipment’ element with appropriate flows in the CVO05: Commercial Vehicle Parking (FDOT D4 CV Parking) and CVO05: Commercial Vehicle Parking (FDOT D6 CV Parking) service packages which will replace the existing PM04: Regional Parking Management (FDOT D4 CV Parking) and PM04: Regional Parking Management (FDOT D6 CV Parking) service packages. | Added ‘FDOT CVO Parking Area Equipment’ element and information flows in the CVO05: Commercial Vehicle Parking (FDOT D4 CV Parking) and CVO05: Commercial Vehicle Parking (FDOT D6 CV Parking) service packages which will replace the existing PM04: Regional Parking Management (FDOT D4 CV Parking) and PM04: Regional Parking Management (FDOT D6 CV Parking) service packages. |

## Architecture Services

Table 2 provides conversion results for architecture services impacted by the conversion process. The table information shows the service impacted, the results of the service conversion, the analysis disposition, and the notes of the conversion implementation.

Table 2 Conversion Analysis of Services

| **Service in Source Architecture** | **Service in Converted Architecture** | **Conversion Disposition** | **Conversion Notes** |
| --- | --- | --- | --- |
| PM01: Parking Space Management (All Parking Facilities) | PM01: Parking Space Management (All Parking Facilities) | Add Parking Area Equipment element. | Added ‘Private/Public Parking Facility Operators Parking Equipment’ element and information flows in PM01: Parking Space Management (All Parking Facilities) |
| PM03: Parking Electronic Payment (All Parking Facilities) | PM03: Parking Electronic Payment (All Parking Facilities) | Add Parking Area Equipment element. | Added ‘Private/Public Parking Facility Operators Parking Equipment’ element and information flows in PM03: Parking Electronic Payment (All Parking Facilities) |
| PM04: Regional Parking Management (FDOT D4 CV Parking) | PM04: Regional Parking Management (FDOT D4 CV Parking) | Replace PM04: Regional Parking Management (FDOT D4 CV Parking) with CVO05: Commercial Vehicle Parking (FDOT D4 CV Parking). Add a ‘Parking Area Equipment’ element and an interface with appropriate flows to the ‘FDOT CVO Parking Management System’ in CVO05.  | Added ‘CVO05: Commercial Vehicle Parking (FDOT D4 CV Parking)’ service package. Removed the ‘PM04: Regional Parking Management (FDOT D4 CV Parking)’ service package. Added ‘FDOT CVO Parking Area Equipment’ element and information flows. |
| PM04: Regional Parking Management (FDOT D6 CV Parking) | PM04: Regional Parking Management (FDOT D6 CV Parking) | Replace PM04: Regional Parking Management (FDOT D6 CV Parking) with CVO05: Commercial Vehicle Parking (FDOT D6 CV Parking). Add a ‘Parking Area Equipment’ element and an interface with appropriate flows to the ‘FDOT CVO Parking Management System’ in CVO05.  | Added ‘CVO05: Commercial Vehicle Parking (FDOT D6 CV Parking)’ service package. Removed the ‘PM04: Regional Parking Management (FDOT D6 CV Parking)’ service package. Added ‘FDOT CVO Parking Area Equipment’ element and information flows. |
| TM12: Dynamic Roadway Warning (FDOT District 4 Connected Vehicle Wrong-Way Driving) | TM12: Dynamic Roadway Warning (FDOT District 4 Connected Vehicle Wrong-Way Driving)  | Replace TM12: Dynamic Roadway Warning (FDOT District 4 Connected Vehicle Wrong-Way Driving) with TM25: Wrong Way Vehicle Detection and Warning service package. | Added TM25: Wrong Way Vehicle Detection and Warning (FDOT District 4 Connected Vehicle Wrong-Way Driving). Removed TM12: Dynamic Roadway Warning (FDOT District 4 Connected Vehicle Wrong-Way Driving). |
| TM12: Dynamic Roadway Warning (FDOT District 4 Wrong-Way Vehicle Detection) | TM12: Dynamic Roadway Warning (FDOT District 4 Wrong-Way Vehicle Detection)  | Replace TM12: Dynamic Roadway Warning (FDOT District 4 Wrong-Way Vehicle Detection) with TM25: Wrong Way Vehicle Detection and Warning service package. | Added TM25: Wrong Way Vehicle Detection and Warning (FDOT District 4 Wrong-Way Vehicle Detection). Removed TM12: Dynamic Roadway Warning (FDOT District 4 Wrong-Way Vehicle Detection). |
| TM12: Dynamic Roadway Warning (FDOT District 6 Connected Vehicle Wrong-Way Driving) | TM12: Dynamic Roadway Warning (FDOT District 6 Connected Vehicle Wrong-Way Driving)  | Replace TM12: Dynamic Roadway Warning (FDOT District 6 Connected Vehicle Wrong-Way Driving) with TM25: Wrong Way Vehicle Detection and Warning service package. | Added TM25: Wrong Way Vehicle Detection and Warning (FDOT District 6 Connected Vehicle Wrong-Way Driving). Removed TM12: Dynamic Roadway Warning (FDOT District 6 Connected Vehicle Wrong-Way Driving). |
| TM12: Dynamic Roadway Warning (FDOT District 6 Wrong-Way Vehicle Detection) | TM12: Dynamic Roadway Warning (FDOT District 6 Wrong-Way Vehicle Detection)  | Replace TM12: Dynamic Roadway Warning (FDOT District 6 Wrong-Way Vehicle Detection) with TM25: Wrong Way Vehicle Detection and Warning service package. | Added TM25: Wrong Way Vehicle Detection and Warning (FDOT District 6 Wrong-Way Vehicle Detection). Removed TM12: Dynamic Roadway Warning (FDOT District 6 Wrong-Way Vehicle Detection). |

## Architecture Functional Requirements

The functional requirements were reviewed in the converted architecture for any changes resulting from conversion. No requirements in the RITSA were affected by the conversion.

## Architecture Information Flows

During the conversion process, 10,216 new information flows were added to the interface tab in the RAD-IT software but were not added to the architecture. This makes these new flows available for future tailoring based on stakeholder needs or requests but did not change the architecture content represented by the pre-conversion architecture.

The conversion process included the renaming of 527 information flows corresponding to ARC-IT Version 9.0 changes. The modified information flow names were reviewed in the converted architecture and no issues were found that would impact the architecture content and meaning. Table 3 provides examples of the information flow changes resulting from conversion.

Table 3 Information Flow Conversion Change Examples

| **Source Element** | **Destination Element** | **Old Flow Name** | **New Flow Name** |
| --- | --- | --- | --- |
| BCT Transit Systems | Broward 211 Trip Planner | transit incidents for media | transit incident information |
| FDOT District 4 Road Ranger Service Patrol Vehicles | FDOT District 4 FMS | incident status | incident scene status |
| SFRTA Commuter Rail System | Palm Tran Transit Systems | multimodal service data | alternate mode service data |
| Miami Intermodal Center | Miami-Dade Transit Control Center | multimodal service data | alternate mode service data |

## Architecture User Defined Information Flows

The conversion process can generate information flow alternatives for user defined flows in the original architecture. Where these information flow alternatives were available, they were reviewed against the user defined flows in the architecture for potential replacement. This is a manual process requiring comparison of the user defined information flows with alternatives. In many cases, the user defined flows exist between inventory elements that are not functionally supported by the physical object pairs and selected services. In those cases, the user defined flows were retained. Where information flow alternatives provided an exact replacement, the user defined flows were replaced with the ARC-IT information flows. An example of a user defined information flow that was revised during conversion is provided in Table 4.

Table 4 User Defined Information Flow Change Example

| **Source Element** | **Destination Element** | **User Defined Flow** | **ARC-IT Flow** |
| --- | --- | --- | --- |
| Broward County TMC | Private Traffic Signal Prediction Service | intersection status\_ud | intersection status |

## Standards

ARC-IT Version 9.0 reorganized the standards associated with each information flow. The reorganization introduces solutions which associate sets of standards for consideration to address an interface or information flow implementation. During the conversion process, standards solutions are not automatically converted. The auto-selection function was used to populate the standards solutions associated with the architecture interface content. The standards solutions selections were reviewed for consistency with the pre-conversion architecture. While additional standards information is now available in the converted architecture, the information was found to be appropriate for each interface to support system design considerations and decisions. The following is an example of the type of standards information now available in the architecture.

**Source Element:** FDOT District 6 SunGuide Transportation Management Center

**Destination Element**: County Fire EMS/Rescue Dispatch

**Information Flow**: emergency traffic control information

**Standards Solution**: TMDD - NTCIP Messaging

**Solution Description**: This solution is used within the U.S. It combines standards associated with US: TMDD with those for C-C: NTCIP Messaging. The US: TMDD standards include upper-layer standards required to implement center-to-center communications with traffic management systems. The C-C: NTCIP Messaging standards include lower-layer standards that support partially secure communications between two centers as commonly used in the US.

**Solution Readiness**: Moderate-Low

**Solution Issues**: Data not fully defined (medium)

* Some of the data elements for this information flow are not fully defined.
* Center-to-center information for signal preemption and priority are not defined.

## Projects

Each project in the architecture was analyzed for impacts from the conversion process. Results of the project analysis and disposition are provided in Table 5.

Table 5 Project Conversion Disposition

| **Project** | **Conversion Disposition** |
| --- | --- |
| Broward County Traffic Signal Data Dissemination | Replaced 'intersection status\_ud' user defined information flow with ARC-IT 'intersection status' information flow. |