

SECTION 274240 AIRPORT OPERATIONAL DATABASE

PART 1 GENERAL

1.1 SUMMARY

- A. Contractor is to provide all Labor, Materials, Contractor's Equipment and Plant to fully execute the requirements to deliver, configure, install and commission the Works as shown on the Drawings and described in this section. Further requirements are that the provisions of this section are to be complementary to, and are to be correlated with, the requirements of the Contract.
- B. The Contractor shall carry out the Detailed Design in the following stages and submit for Engineer review:
 - 1. 90% Further Design
 - 2. 100% Final Design incorporating all comments
- C. Scope of Works
 - 1. The Contractor shall provide all Enabling and Preparatory Works for the installation of System Equipment as described in this Section, including but not limited to:
 - a. Creating holes and openings in walls, ceilings and furniture to mount and install equipment and any related components, such as power adapters;
 - b. Installing mounting gear, such as structures, frames, arrays and pendants;
 - c. Assessing the necessity of building design modifications to facilitate proper installation of system components, such as location and visibility.
 - d. The provision of power and data outlets, related cabling, grounding and bonding.
 - 2. Coordination of the works as described in this clause with the Supplier.
 - 3. This document may contain requirements which are also, or only, applicable to other buildings in the project scope areas. These requirements are included for information purposes only, to provide the context of the airport-wide solution of the system at hand, but it does not extend the scope of this Section to buildings other than the Passenger Terminal Building, VVIP Terminal, and Energy Center.
- D. The AODB consists of the following functional components:
 - 1. Database
 - 2. Database Management System (DBMS)
 - 3. Reference data
 - 4. Business rules
 - 5. Reports
 - 6. Employer software

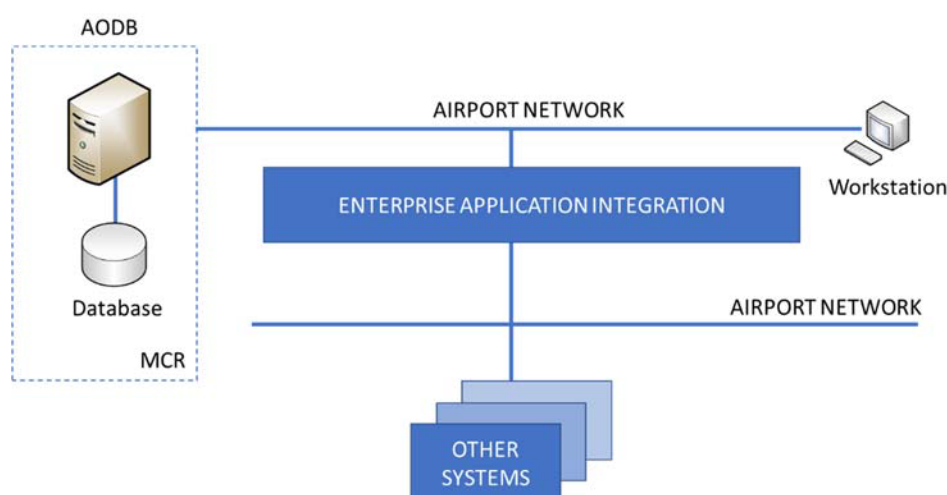


Figure 1: AODB System Overview

E. System Description AODB:

1. The exchange of information between different parties is critical to the efficient operation of a modern airport. To support this exchange of information and to avoid duplicate and potentially inconsistent data in multiple systems, an Airport Operational Database (AODB) will be used. The AODB is a central repository which contains, amongst others, seasonal and operational flight schedules, actual flight data and industry reference data. The AODB is closely related to Enterprise Application Integration (EAI), which it uses to exchange information with other systems.
2. Given the fact that the AODB is the central source of key airport information, special attention shall be paid to data integrity. Apart from using standard tools that most Database Management Systems (DBMSs) provide to improve data integrity, specific business rules shall be defined and implemented in the DBMS to enforce data integrity. This includes rules for handling data ownership, conflicting data, and redundant (reference) data.
3. The AODB will be used 24 hours per day, 7 days a week and is the primary source of information for many parties and systems. Therefore, it shall be extremely robust and reliable.

F. Related and Reference Sections: The Contractor shall refer to the following sections in conjunction with this Section:

1. Section 23 09 00 Building Management System
2. Section 27 05 00 Common Work Results for Communications
3. Section 27 22 00 Data Communication Hardware
4. Section 27 42 10 Dynamic Display System
5. Section 27 42 20 Baggage Reconciliation System
6. Section 27 42 30 Common Use Passenger Processing System
7. Section 27 42 31 Common Use Self Service System
8. Section 27 42 35 Self Service Boarding Pass Control
9. Section 27 42 41 Enterprise Application Integration
10. Section 27 42 50 Resource Management System
11. Section 27 51 16 Public Announcement & Mass Notification System
12. Section 34 77 16 Baggage Handling System

1.2 DEFINITIONS

A. Abbreviations Description

1. ACI Airports Council International

2.	ACRIS	Airport Community Recommended Information Services
3.	AIDX	Aviation Information Data Exchange
4.	AODB	Airport Operational Database
5.	ATA	Air Transport Association of America
6.	BHS	Baggage Handling System
7.	BRS	Baggage Reconciliation System
8.	CAN	Campus Area Network
9.	CSV	Comma-separated values
10.	CUPPS	Common Use Passenger Processing System
11.	CUSS	Common Use Self Service System
12.	DAS	Distributed Antenna System
13.	DBMS	Database Management System
14.	DDS	Dynamic Display System
15.	EAI	Enterprise Application Integration
16.	ECS	Emergency Call System
17.	GDA	GNU Data Access
18.	IATA	International Air Transport Association
19.	ICAO	International Civil Aviation Organization
20.	JDBC	Java Database Connectivity
21.	JSON	JavaScript Object Notation
22.	MCS	Master Clock System
23.	MDS	Message Distribution System
24.	MMDS	Multi Media Distribution System
25.	ODBC	Open Database Connectivity
26.	PAMNS	Public Announcement & Mass Notification System
27.	PMRS	Private Mobile Radio System
28.	PTB	Passenger Terminal Building
29.	RMS	Resource Management System
30.	SACS	Security Access Control system
31.	SAN	Storage Area Network
32.	SOA	Service Oriented Architecture
33.	SQL	Structured Query Language
34.	SSBPC	Self Service Boarding Pass Control
35.	TS	Telephone System
36.	VSS	Video Surveillance System
37.	XML	Extensible Mark-up Language

B. Definitions

1. Airport Community Recommended Information Services (ACRIS). ACI initiative for the consistent adoption of Service Oriented Architecture (SOA) principles that enable airports, airlines, partners and suppliers to exchange and process data in a standardized and service-oriented way.
2. Aviation Information Data Exchange (AIDX). IATA/ATA/ACI standard for exchanging flight data between airlines, airports, vendors and systems (see).
3. Business rule. Rule that defines or constrains airport processes and that is enforced by the DBMS to guarantee data integrity.
4. Campus Area Network (CAN). Common-use infrastructure used for communication between components of the SACS.
5. Code sharing. Arrangement where two or more airlines share the same flight, each using its own airline designator and flight number.
6. Data integrity. Refers to maintaining and assuring the accuracy and consistency of data.
7. Data model. Description of data elements and their relations.
8. Data ownership. Refers to the concept where entities, such as organizations, departments or individuals, have control over a set of data elements.
9. Data, Redundant. Two or more pieces of data that have the same content or meaning but are identified differently, e.g. two different country codes for the same country.
10. Data, Structured. Data which is structured according to a data model.
11. Database. Collection of tables, queries, views and reports that provide the information

needed by other systems and users.

12. Database Management System (DBMS). Software application for managing and accessing the database.
13. Enterprise Application Integration (EAI). Standard infrastructure for exchanging data between systems.
14. Non-airline flight. Flight that is not related an airline, e.g. flights by military or private aircrafts.
15. Reference data. Industry standard terms, names and codes.
16. Relational model. Data model which is based on tables with fields and relations between fields.
17. Report. Formatted, human-readable presentation of data in a database.
18. Reporting system. Functional component of a DBMS for defining and creating reports.
19. Schema. Description of the structure, content and semantics of a data stream, e.g. an XML schema.
20. Service, Quantity-based. Service which is charged according to quantities taken or used.
21. Service, Subscription-based. Service which is charged according to a fixed fee per time interval, e.g. per month, independent of actual usage of the service.
22. Service, Time-based. Service which is charged according to usage duration.
23. Storage Area Network (SAN). Common-use infrastructure for providing access to central data storage.
24. Structured Query Language (SQL). Programming language for managing data in a relational DBMS.
25. Self Service Boarding Pass Control. The SSBPC is to ensure that only travelers with a valid Boarding Pass are able to pass from check-in through to the secure airside areas. Data to be integrated is the data that is present on the boarding pass.

1.3 APPLICABLE LAWS, CODES, RULES, REGULATIONS AND STANDARDS

- A. Following paragraphs define the standards for this Section further to those described in Section 27 05 00 "Common Work Result for Communications".
- B. The AODB shall comply with the following Codes, Standards, Guidelines and Best Practices. For dated references, the edition cited applies. For undated references, the latest edition of the referenced document applies, including any amendments.
 1. IATA Recommend Practices
 2. ACI Recommend Practices
 3. ICAO regulations
- C. The AODB shall use AIDX as the primary format for exchanging flight information.
- D. The AODB shall provide at least the services as defined by ACRIS.
- E. ISO9075 ISO/IEC 9075: Information technology -- Database languages -- SQL

1.4 PERFORMANCE REQUIREMENTS

- A. Following paragraphs define the performance requirements for this Section further to those described in Section 27 05 00 "Common Work Result for Communications".
- B. System Availability
 1. The AODB to be used 24 hours per day, 7 days per week, throughout the year.
 2. The AODB shall be fully redundant
 3. The AODB availability shall be at least 99.99% within a 30-day period. This corresponds to

- a maximum downtime of 260 seconds within a 30-day period.
 - 4. In case of failures, the AODB shall be fully restored and operational within 30 minutes after failure notification.
 - 5. No more than 5 percent of the total number of end-user devices (which includes workstations and printers) to be simultaneously out of service, with a maximum of 5, at the same time at the same area.
 - 6. During the estimated technical lifetime of the AODB, the following MTBF and MTTR requirements to be met for the enlisted individual components and/or systems, taking into account the total system availability as specified above and a minimum time between failures of an individual component of 30 days:
 - a. Workstation
 - b. MTBF > 1 year
 - c. MTTR < 2 hours
 - C. System Capacity
 - 1. Initially the AODB shall allow for at least:
 - a. 100 arriving flights and 100 departing flights per hour
 - b. 1,000 arriving flights and 1,000 departing flights per day
 - c. 150 Pax per flight with 3 bags per passenger on average
 - d. Two years of flight schedules.
 - e. Two years of historical flight data.
 - 2. Batch or bulk operations, such as, but not limited to, importing or creating flight schedules, shall have no impact on the responsiveness of the AODB.
 - D. System Response Times
 - 1. The AODB shall:
 - a. Respond within 0.5 second to data requests.
 - b. Complete any data entries or modifications within 0.5 seconds.
 - E. System Scalability
 - 1. The AODB shall be scalable with respect to the amount of stored data and number of transactions per second, without restarting the AODB.
 - F. Degraded modes
 - 1. In case of discrepancies, the system shall stay robust and all exceptions to be detected, handled, logged according to documented and approved recovery procedures.
 - 2. Incorrect data within a message to be handled without interruption of the interface.
- 1.5 SUBMITTALS
- A. General
 - 1. Following paragraphs define the submittal requirements for this Section further to those described in Section 27 05 00 “Common Work Result for Communications”.
 - 2. Agreed data model shall be implemented and clearly documented.
 - B. Initial Submittals
 - 1. Manufacturer’s data sheets.
 - 2. Detailed calculations for Storage Area Network (SAN) storage capacity. The Contractor to provide a calculation for the Airport operational database system Database and storage of audit files. The storage calculation to be based on specified the system capacity.
 - C. Database Fields
 - 1. Database fields shall be developed by the Contractor in conjunction with the Employer.

Proposed structure and content of database fields shall be submitted for coordination and review by the Engineer and other Contractors during the first phase of development.

D. Business Rules Report:

1. Submit complete lists of all business rules implemented in the AODB. The business rules report to be submitted thirty (30) days prior to any formal testing. The Contractor to enter the approved Business Rules in the system.
2. The Contractor to deliver a report on how the AODB is to be configured for the airport operation. This report to be based on the capabilities of the chosen solution, the contract requirements for data collected/stored and the operating practices of the Employer.
3. Contractor to submit a schedule of the interviews required and questionnaire templates.

E. Business Processes:

1. Submit complete lists of all business processes implemented in the AODB. The business rules report to be submitted thirty (30) days prior to any formal testing. The Contractor to enter the approved Business Rules in the system.

F. Detailed screen layouts.

1. Provide screenshots as example for each Airport operational database input screen and all warning / error screens associated with the operational data entry processes.

1.6 QUALITY ASSURANCE

- A. The Quality Assurance as described in Section 27 05 00 “Common Work Result for Communications” to apply to this Section.

1.7 DELIVERY, STORAGE AND HANDLING

- A. The Contractor to comply with the Delivery, Storage and Handling requirements as described in Section 27 05 00 “Common Work Result for Communications”.

1.8 PROJECT CONDITIONS

- A. The Project Conditions as described in Section 27 05 00 “Common Work Result for Communications” to apply to this Section.

1.9 WARRANTY

- A. The Warranty Conditions as described in Section 27 05 00 “Common Work Result for Communications” to apply to this Section.

1.10 INTELLECTUAL PROPERTY

- A. The Intellectual Property requirements as described in Section 27 05 00 “Common Work Result for Communications” to apply to this Section.
- B. The intellectual property of the data model, business rules, pre-defined reports and screen layouts will be with the Employer.

- C. The Contractor to describe the rights assigned to the Employer for the Resource Airport operational database application software, and integration furnished under this section.

PART 2 PART PRODUCTS

2.1 MANUFACTURERS

- A. The Manufacturers requirements as described in Section 27 05 00 “Common Work Result for Communications” to apply to this Section.

2.2 GENERAL REQUIREMENTS

- A. The AODB to comply with the generic requirements as specified in Section 27 05 00 “Common Work Result for Communications”.
- B. The AODB shall allow for tracking the usage of quantity-based, time-based and subscription-based services and resources.
- C. The AODB shall exclusively use storage hardware as specified in section 27 2210 00 “Data Centre”.
- D. Operational Efficiency and Data Integrity
 1. To ensure smooth operation of the airport, with good communication and coordination between the many companies and teams, it is essential that data is of high quality, consistent between systems and distributed in a timely manner. The architecture of the system shall support these requirements. It shall also feature mechanisms to detect problems and controls to monitor the state of the system and the data.
 2. Reference Tables
 - a. A key element of data consistency is to use the same terms, names and coding schemes when sharing data. Within the airport environment this is complicated by the multiple standards which shall be supported, many resources may have two or more codes, depending on how the information is exchanged. The structure and operation of the airport systems shall identify the owners of each piece of reference data and enforce this by allowing only defined owners to make changes and additions. This requires that such reference data is distributed in real-time to all systems using it.
 - b. The AODB and EAI system shall keep references files up-to-date by different means: e.g. external file import or on-line updates from trusted services.
 - c. The AODB shall log per update event the end-user details, including date and time when the update took place. This to allow backtracking in case of forensic investigations. To minimize the risk that the same reference data in different systems is not matching, due to human errors when entering/updating the data, reference data will be updated only once at a central repository entry point and distributed via the EAI to other relevant systems. Reference data which is not used in other systems will be stored in the respective system itself.
 - d. The central place where all reference data used by several systems is the AODB system.
 - e. The reference data includes the codes for airports and airline operators serving the airport and shall also include any other standard codes and those used by the airport, such as Country Codes, Time-Zones and Customs groups.
 - f. The reference data includes the aircraft resources. This covers the types of aircraft, as well as all details required for each individual airframe. This data is important both for safety, choosing suitable parking stands, but also used for planning and is used when collecting data for invoicing and statistics.
 - g. The reference data includes the airport resources. These tables describe the resources

available within the airport, which are used for planning and for information. The primary resources are stands and gates, but anything that is tracked or allocated to a flight may be included here. Where there are additional properties required for planning, or to be displayed as information, these will be included here. Such properties could be the maximum aircraft group possible on a stand, the length or capacity of an arrival baggage carousel, or type of services available on a stand.

- h. The reference data does not have a flat structure, but should also include a hierarchy to show relations between items. A Passenger Boarding Bridge should always be linked in the AODB to one or more stands (the so-called MARS (Multi Aircraft Ramp Stand)). The stands will have links to the boarding gates.
- i. Ownership of a resource is generally not shown, although an aircraft has a relation to an operator (carrier or airline). However, dedicated use of a resource is not defined as such a relationship. The dedicated use of a gate by a particular airline shall be defined by the rules implemented in the RMS as described in section 27 42 50 'Resource Management System'.

E. Security & Privacy

1. Access to the AODB and its data shall be limited to authorized users and systems.
2. It shall be possible to assign access rights to users and systems for database elements such as tables, records, fields, queries and reports.
3. Access rights shall include the right to create, read, modify or delete database elements, or a combination of these rights.
4. The database and reporting tools shall support database security functions. Database security shall include the following items as a minimum:
 - a. Encryption capability for defined data fields within database objects such as tables or views using an appropriate commercial strong encryption package.
 - b. Prevention of unauthorized database access.
 - c. Prevention of unauthorized access to schema objects.
 - d. Control of system resource usage.
 - e. Assignment of valid username/password combinations.
 - f. Assignment and control of resource limits for a user including hardware, database and application resources.
 - g. Control of user access rights including database, table, record and field level authority.
 - h. Control of which system functions a user can perform.
 - i. The system shall assign a specific user authorization for each user.
5. The system shall provide the following access levels as a minimum:
 - a. Read-only: This access level allows only read capabilities for authorized database fields or interfaces.
 - b. System Administrator: This access level allows unlimited read and write capabilities.
 - c. Data Owner: This access level allows only read and write capability for authorized data base fields or interfaces, including reference tables
 - d. All system security parameters shall be configurable by the System Administrator.

F. Environment

1. It shall be possible to include the AODB into an ACRIS platform or architecture.

2.3 FUNCTIONAL REQUIREMENTS

- A. The AODB shall run on virtualized hardware as made available in the Data Centre (see Section 27 22 00).
- B. The AODB shall include a reporting system which allows authorized users to:
 1. Define and store pre-defined report formats.
 2. Generate, view and print pre-defined and ad-hoc reports.
 3. Save reports to files using standard formats, readable by open-source software.

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