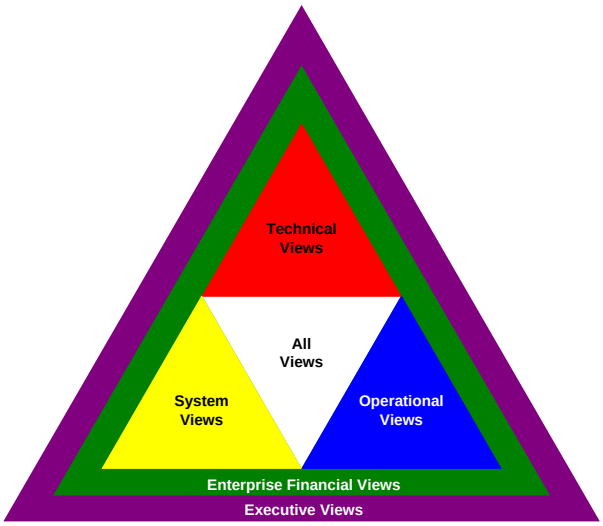
BASELINE

NAS-EA-OV-7-Mid-Term-v4.0-013015

National Airspace System Enterprise Architecture (NAS EA)

Office of NextGen (ANG)



Mid-Term Logical Data Model (OV-7)

Version 4.0

Part of Integrated Mid-Term Release Package 4.0

January 30, 2015

Version History

Version	Date	Description of Change
Draft v1.0	31 May 2011	Original draft version of the Mid-Term OV-7
Integrated Mid-Term Release Package 1.0 Review Draft OV-7 v1.1	27 April 2012	Provided status update to Mid-Term OV-7 development. Incorporated new subject area diagrams, made updates to existing diagrams, refined definitions, and incorporated comments from the previous version.
Integrated Mid-Term Release Package 1.2 Review Draft OV-7 v1.2	28 September 2012	Refined and updated diagrams consistent with the NAS EA OV-5 and the data requirements found in international exchange models (FIXM, AIXM). Additional refinements implemented: ▪ Standardized approach to identifying and portraying enumerated lists (i.e., valid value lists) for coded value class attributes ▪ Standardized approach to documenting Units of Measure for measurement type class attributes ▪ Improvements in class and attribute naming practices ▪ Enhanced use of the Person and Organization shared models to eliminate the need for standalone attributes depicting a role that a Person or Organization plays ▪ Improved definition clarity and sourcing This version of the Mid-Term OV-7 features a reduced set of diagrams from the set published as Draft 1.0
Integrated Mid-Term Release Package 1.3 Final Draft OV-7 v1.3	02 November 2012	Revised document in accordance with adjudicated comments on version 1.2
Integrated Mid-Term Release Package 2.0 Baseline OV-7 v2.0	20 December 2012	Revised document in accordance with adjudicated comments on version 1.3

Version	Date	Description of Change
Integrated Mid-Term Release Package 2.1 Review Draft OV-7 v2.1	30 September 2013	18 New diagrams added for this release: ▪ Approaches ▪ Arrival ▪ Departures ▪ Holding ▪ EnRoute ▪ Lighting ▪ Weather Context ▪ Weather Element Detail ▪ Obscuration Detail ▪ Precipitation Detail ▪ Other Weather Element Detail ▪ Space Weather ▪ Weather Phenomenon Detail ▪ Weather Observation ▪ Weather Observation Source ▪ Weather Forecast ▪ Weather Analysis ▪ Weather Artifact Diagrams revised since last release: ▪ Physical Location Geometry ▪ Airport/Heliport ▪ Surveillance Data ▪ Aircraft Diagrams unchanged since last release: ▪ Flight Procedure ▪ ATM Operations ▪ Flight Data ▪ Apron ▪ Runway ▪ Runway Monitor ▪ Taxiway ▪ NAVAID System ▪ Address ▪ Organization ▪ Person Diagrams removed since last release (diagram refinement in progress): ▪ Airspace ▪ Airspace Operational Agreement

Version	Date	Description of Change
Integrated Mid-Term Release Package 3.0 Baseline OV-7 v3.0	28 February 2014	Revised document in accordance with adjudicated comments on version 2.1
Integrated Mid-Term Release Package 3.1 Review Draft OV-7 v3.1	17 October 2014	Revised document in accordance with adjudicated comments on version 3.0
Integrated Mid-Term Release Package 4.0 Baseline OV-7 v4.0	30 January 2015	Approved by JRC

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1 Product Description

The Mid-Term NAS Logical Data Model (OV-7) describes the logical structure of a domain's system data types and the structural rules that govern the system data. It provides a definition of the data types, their attributes (or characteristics), and their associations. The Mid-Term OV-7 promotes analysis of an enterprise architecture's logical data requirements, without consideration of implementation-specific or product-specific concerns. These concerns are addressed by lower level efforts within NAS development programs. The Mid-Term OV-7 is the building block for the physical data structures (both persistent and exchange) used to support system functions developed by NAS programs.

The enterprise NAS Mid-Term OV-7 is a critical component for facilitating interoperability because it defines the system semantics (meanings) that are the basis for shared understanding. This applies for both system-to-human interactions as well as system-to-system interfaces. Additionally, the increasing need for timely, accurate, and relevant data within and external to the NAS relies on data that conforms to the standards stated within the Mid-Term OV-7.

The Mid-Term OV-7 structure and content enables:

- Consistent and synchronous management of data and information as part of the NAS governance structure, ensuring the interoperability of data derived, acquired, and exchanged between activities and systems managed from an enterprise perspective.
- Insights into methods for increasing shared understanding with national and international FAA partners
- Standardization of terminology that may reveal potentially overlapping or inconsistent data or information that can be impediments to improving the integrity, fidelity, and/or efficiency of NAS operations.
- A means for Program Managers to determine if their proposed data structures are redundant with, or new and beneficial to other proposed NAS capabilities.

The NAS Mid-Term OV-7 is constructed using Unified Modeling Language (UML)[1] Class diagrams and notational conventions for modeling. As such, these diagrams are explicit about the objects of interest (Classes), their properties (Attributes), and the connections between the objects (Associations).

Class: Classes describe real world entities (e.g., people, places, things, events, concepts) and the fundamental information we need to know to support business functions. A class may represent things that are concrete and tangible, or abstract and conceptual, and whose instances may change over time.

Attribute: Attributes are properties or characteristics of the class that describe or portray information about the class's instances. Attributes are the containers for data values and apply to all instances of the class. Please note that sometimes attributes listed within a class box are shown with a leading '-' and sometimes without. This is an artifact of the modeling tool used to create the diagrams and has no meaning.

Association: Associations represent relationships or connections between two classes and may carry a special set of attributes. Association lines depict a relationship or business rule between two classes.

[1] For more on UML, please see http://www.uml.org/

2 Mid-Term Logical Data Model (OV-7)

This section presents the set of UML Class diagrams that comprise the current version of the Mid-Term OV-7. To facilitate ease of development and use, the logical data models are partitioned across seven subject areas. Classes that are native to a particular subject area are filled with the color assigned to that subject area.

Table 1: NAS Mid-Term OV-7 Subject Area Definitions

Subject Area	Definition
Air Transport Infrastructure	Airspace infrastructure and status information needed to safely and efficiently manage airspace and airport airside assets and operations throughout the NAS.
Aircraft Data	Description of the aircraft data used for a flight, e.g., aerodynamic performance capabilities, navigation capabilities, flight management capabilities, air/ground voice and data communication capabilities, aircrew qualifications and authorizations with respect to ATM procedures.
Flight Data	Flight-specific plans, events, and trajectory information including representation of multiple states (e.g., activation, approval, in negotiation, etc.) and versions (e.g., preferences).
NAS Base Infrastructure	Data about the identity, location, description, operational status, and configuration of the infrastructure assets and obstacles in the NAS that provide structure and constraints, including physical facilities and systems.
Operations Data	Data generated as a product of executing core air traffic management functionality. This includes data enabling the provision of traffic flow management services and data supporting the provision of air traffic separation assurance services.
Shared	Classes in the Shared subject area are considered pervasive throughout all subject areas and may not be NAS specific classes. These include Person, Organization, and Physical Location.
Weather Data	Data about current and forecast atmospheric or meteorological conditions in the NAS airspace; including the collection of data from weather sensors, weather processing subsystems that analyze the current observations and produce forecasts, as well as, the dissemination of weather products to and amongst ATC systems.

Additionally, Reference Classes are color coded for ease of recognition.

Reference	Reference classes are modeled to depict the enumerated valid values, and source, for class attributes that have three or more valid values.

There are 33 logical data models, arranged by package (subject area), and information class:

Table 2: OV-7 Subject Areas and Diagram Definitions

Subject Area	Subject Area/Information Class	Definition	Class Diagram	Class Diagram Definition
AIRCRAFT DATA	N/A	N/A	Aircraft	Provides details about aircraft construction characteristics, physical properties, make, model, equipment on board, configuration, system components, registration information, etc.
AIR TRANSPORT INFRASTRUCTURE	Instrument Flight Procedure	Information related to the plan of operations that an aircraft has to follow while in the vicinity of an airport, in order to departure or land.	Flight Procedure	Provides an overview on hierarchy of different types of flight procedures.
			Approaches	A series of predetermined maneuvers by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en route obstacle clearance criteria apply (ICAO).
			Arrival (STAR)	A Standard Terminal Arrival Route is a published procedure followed by aircraft on an IFR flight plan just before reaching a destination airport. A STAR usually covers the phase of a flight that lies between the top of descent from cruise or en-route flight and the final approach to a runway for landing.
			Departures	A preplanned instrument flight rule (IFR) departure procedure published for pilot use, in graphic or textual format, that provides obstruction clearance from the terminal area to the appropriate en route structure.
			Holding	A holding pattern for IFR aircraft is usually a racetrack pattern based on a holding fix used for separation.
	Route	A specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services for safe separation.	EnRoute	A specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services for safe separation.

Subject Area	Subject Area/Information Class	Definition	Class Diagram	Class Diagram Definition
ATM OPERATIONS DATA	N/A	N/A	ATM Operations	Data generated as an outgrowth of core air traffic management functionality. This includes data supporting the provision of traffic management services data supporting the provision of air traffic services, and data supporting the provision of flight planning services.
FLIGHT DATA	N/A	N/A	Flight Data	Flight Plan, events, trajectory information including representation of multiple states (e.g. activation, approval, in negotiation, etc.) and versions (e.g., preferences).
GEOSPATIAL	Physical Location Geometry	Information about an identifiable place of existence. A geographic or spatial identification assigned to a region or feature based on a specific coordinate system, or by other precise information such as a street address, a postal address, a descriptive location, a legal land definition, etc. Location data types primarily consist of Vector data.	Physical Location Geometry	Information about an identifiable place of existence. A geographic or spatial identification assigned to a region or feature based on a specific coordinate system, or by other precise information such as a street address, a postal address, a descriptive location, a legal land definition, etc. Location data types primarily consist of Vector data.
NAS BASE INFRASTRUCTURE	Aerodrome	A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft. (Source ICAO Annex 14) .	Airport/Heliport	Information about characteristics of aerodrome, as well as its associations with obstacle area, construction area, certification, NOTAM, organizational responsibility, survey control, etc.
			Apron	A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, or maintenance. With regard to seaplanes, a ramp is used for access to the apron from the water AC 150/5300-18B.
			Lighting	One or more light sources located on the ground and that provide visual assistance for air and ground navigation.
			Runway	A defined rectangular area prepared for the landing and takeoff run of aircraft along its length in a land airport.
			Runway Monitor	Information about characteristics of runway monitors, various types of monitor zones and monitor areas.
			Taxiway	A defined path established for the taxiing of aircraft from one part of an airport to another AC 150/5300-13.

Subject Area	Subject Area/Information Class	Definition	Class Diagram	Class Diagram Definition
	Navigation Aids	Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight.	NAVAID System	One or more Navaid Component providing navigation services. The Navaid Component share business rules like paired frequencies.
	Surveillance Component	Information about surveillance or radar components.	Surveillance Data	Information about surveillance types and their associations with various types of surveillance data as well as radar systems.
	Surveillance System	Information about the uses of electromagnetic waves to identify the range, altitude, direction, or speed of both moving and fixed objects such as aircraft, ships, motor vehicles, weather formations, and terrain.		
PARTY	Address	Information about the location at which a particular organization or person may be found or reached.	Address	Information about the location at which a particular organization or person may be found or reached.
	Organization	Captures information and shows associations for a specific job instance requiring an established set of duties and competencies, associations for an administrative structure with a mission.	Organization	Captures information and shows associations for a specific job instance requiring an established set of duties and competencies, associations for an administrative structure with a mission.
	Person	Information about a human being.	Person – NAS	Information about a human being.
WEATHER DATA	Weather Context	Information relating general weather states.	Weather Context	Shows a sub-set of the major classes and associations in the Weather Logical Data Model. It is intended to provide an overview for navigating to other class diagrams which reveal additional classes and lower-level details.

Subject Area	Subject Area/Information Class	Definition	Class Diagram	Class Diagram Definition
	Weather Element	Information about the basic conditions of the atmosphere. Wind, visibility, runway visual range, weather, obscurations, sky condition, temperature and dew point, and pressure.	Weather Element Detail	Intended to provide an overview of the Weather Element Detail sub-classes, which are captured more explicitly in the individual Weather Element Detail Diagrams (Precipitation Detail, Obscuration Detail, and Other Weather Element Detail). This diagram shows all of the Weather Element Detail classes in a single view, but reserves displaying the attributes for the individual Weather Element Detail diagrams.
			Obscuration Detail	Displays all of the sub-classes of the Obscuration class, and their attributes.
			Precipitation Detail	Displays all of the sub-classes or types of the Precipitation class, and their attributes.
			Other Weather Element Detail	Displays all of the sub-classes of the Other Weather Element Detail class, and their attributes.
			Space Weather	Displays all of the Weather Element Detail sub-classes or types related to Space Weather, and their attributes
	Weather Phenomena	Information about an observable event that can be explained by the principles of meteorology. Weather phenomena fall into three categories: precipitation, obscurations, and other phenomena.	Weather Phenomenon Detail	Capture the Weather Phenomenon Detail sub-classes and show their attributes.
	Weather Observations	Information about the evaluation of one or more meteorological elements that describe the state of the atmosphere either at the earth's surface or aloft.	Weather Observation	Shows the Weather Observation class and its association to other related classes.
	Weather Observation Data Source	Information about Automated or Non-Automated Weather Source Systems.	Weather Observation Source	Displays the automated and non-automated weather source sub-classes or types and their attributes. It also shows the Weather Observation Source class which captures the details and geometric location about the Weather Source for a particular observation.

Subject Area	Subject Area/Information Class	Definition	Class Diagram	Class Diagram Definition
	Weather Forecasts	Information that predicts the state of the atmosphere for a future time and a given location. A statement of prediction of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc.	Weather Forecast	Shows the Weather Forecast class and its association to other related classes.
	Weather Model	Information that produces meteorological information for future times at given positions and altitudes.	Weather Analysis	Displays all of the classes and associations related to the Weather Analysis class.
	Weather Message	Information relating weather conditions and surface weather observations in a variety of formats (e.g. METAR, PIREP, TAF, etc.).	Weather Artifact	Displays all of the classes and associations related to Weather products or reports. For the purposes of this model, Weather Information Artifact represents the metadata about any type of report, product, or other collection of weather data.

Aircraft

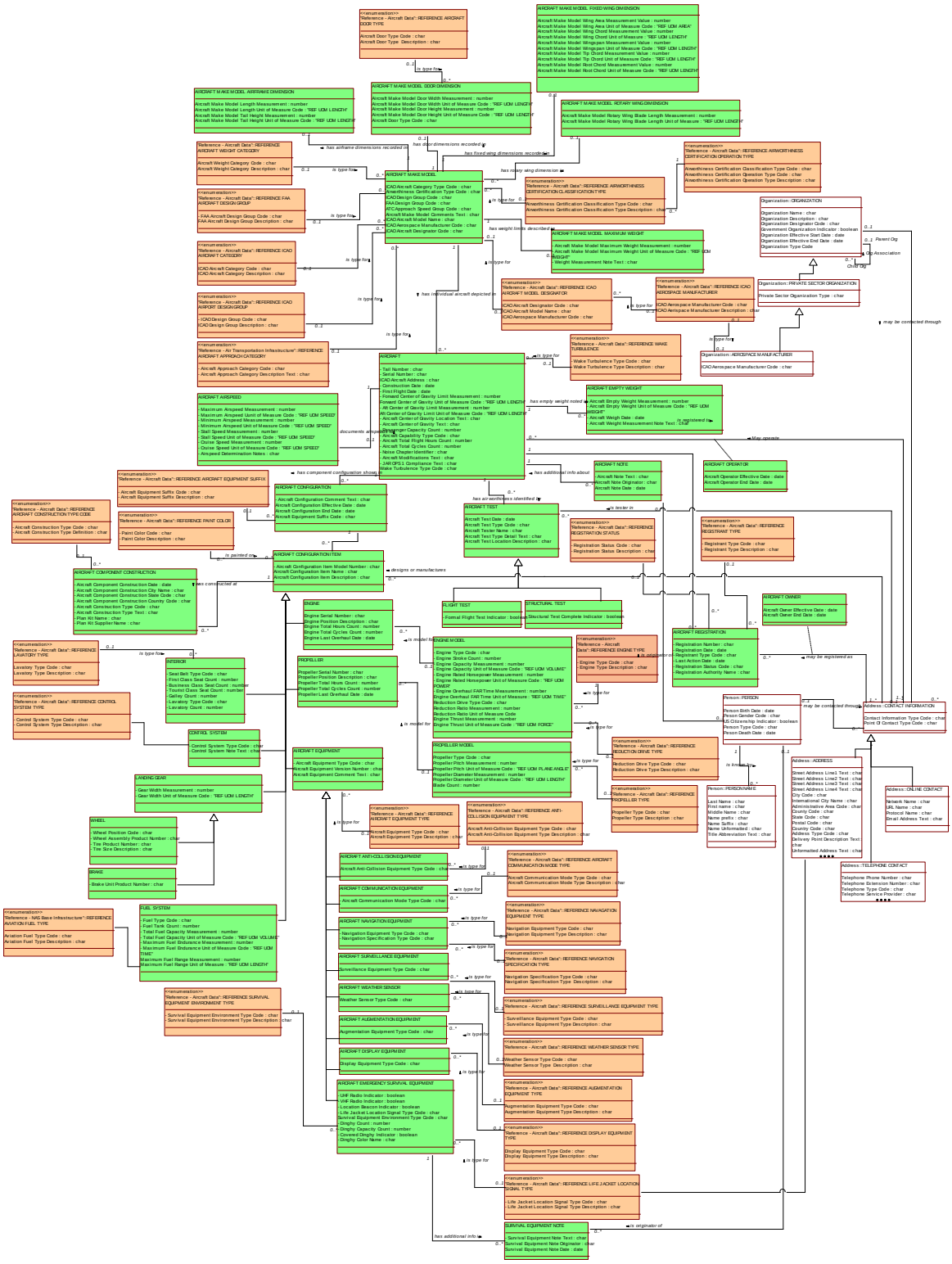

Figure 1 Aircraft Diagram

Flight Procedure

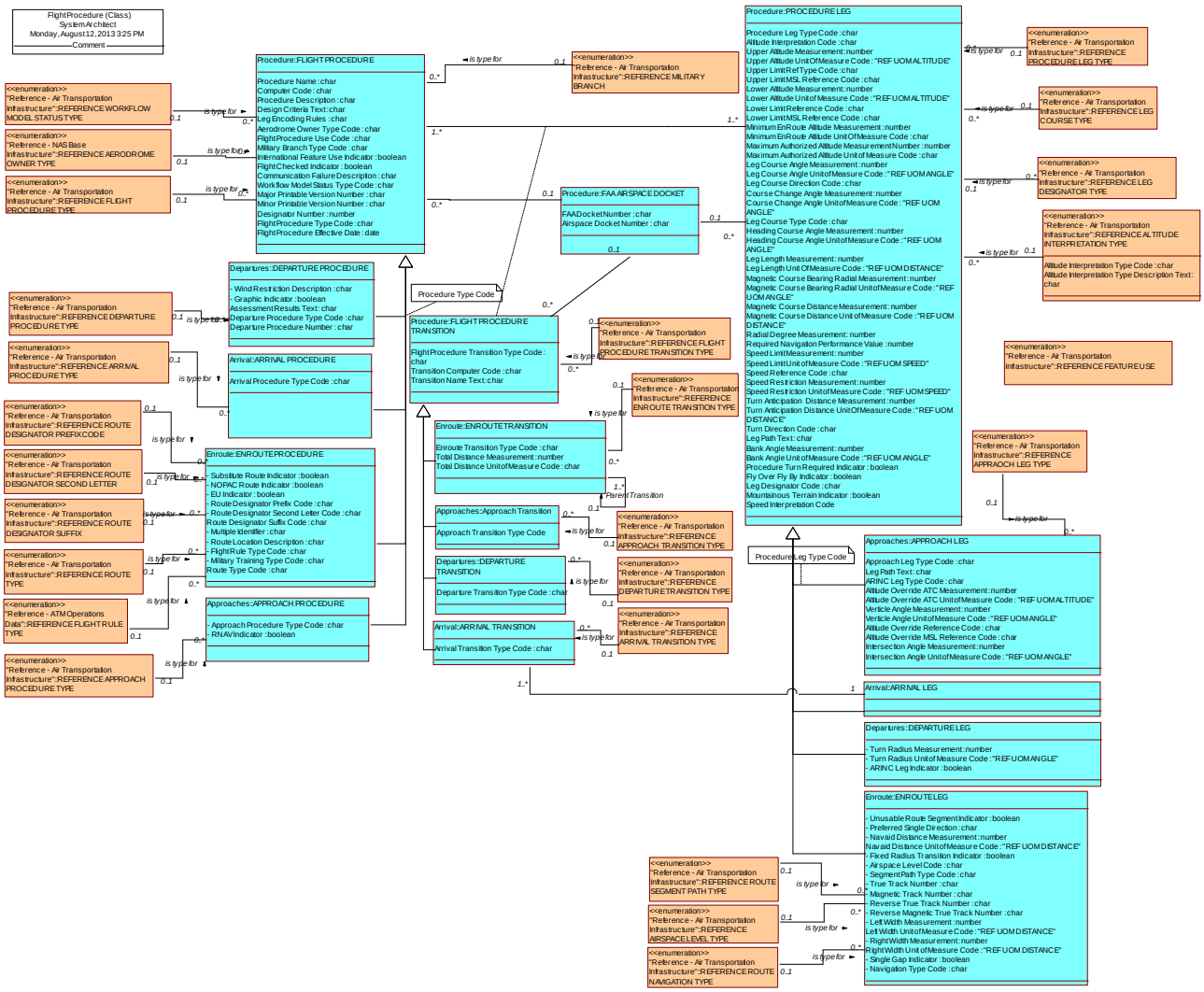

Figure 2 Flight Procedure Diagram

Approaches

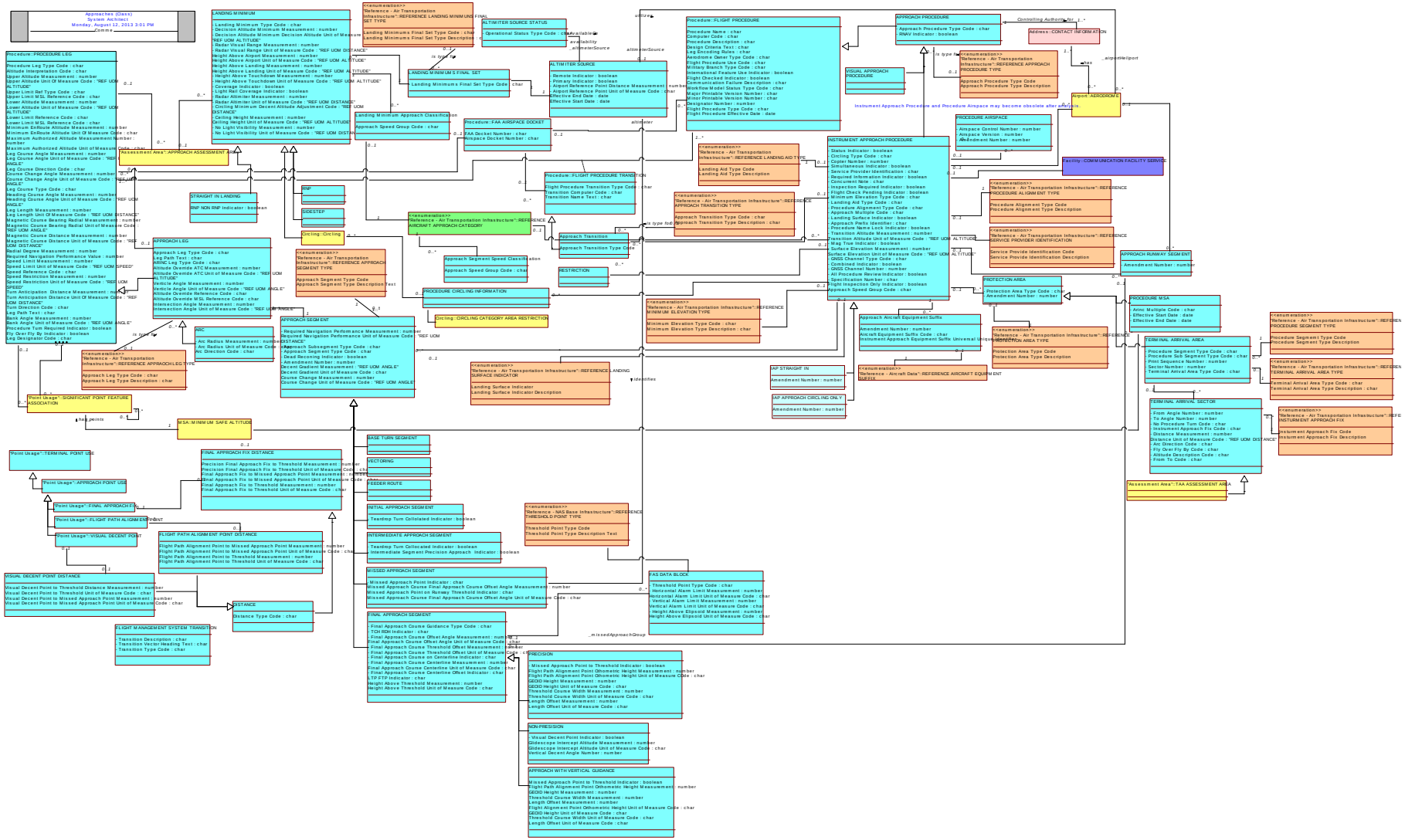

Figure 3 Approaches Diagram

Arrival

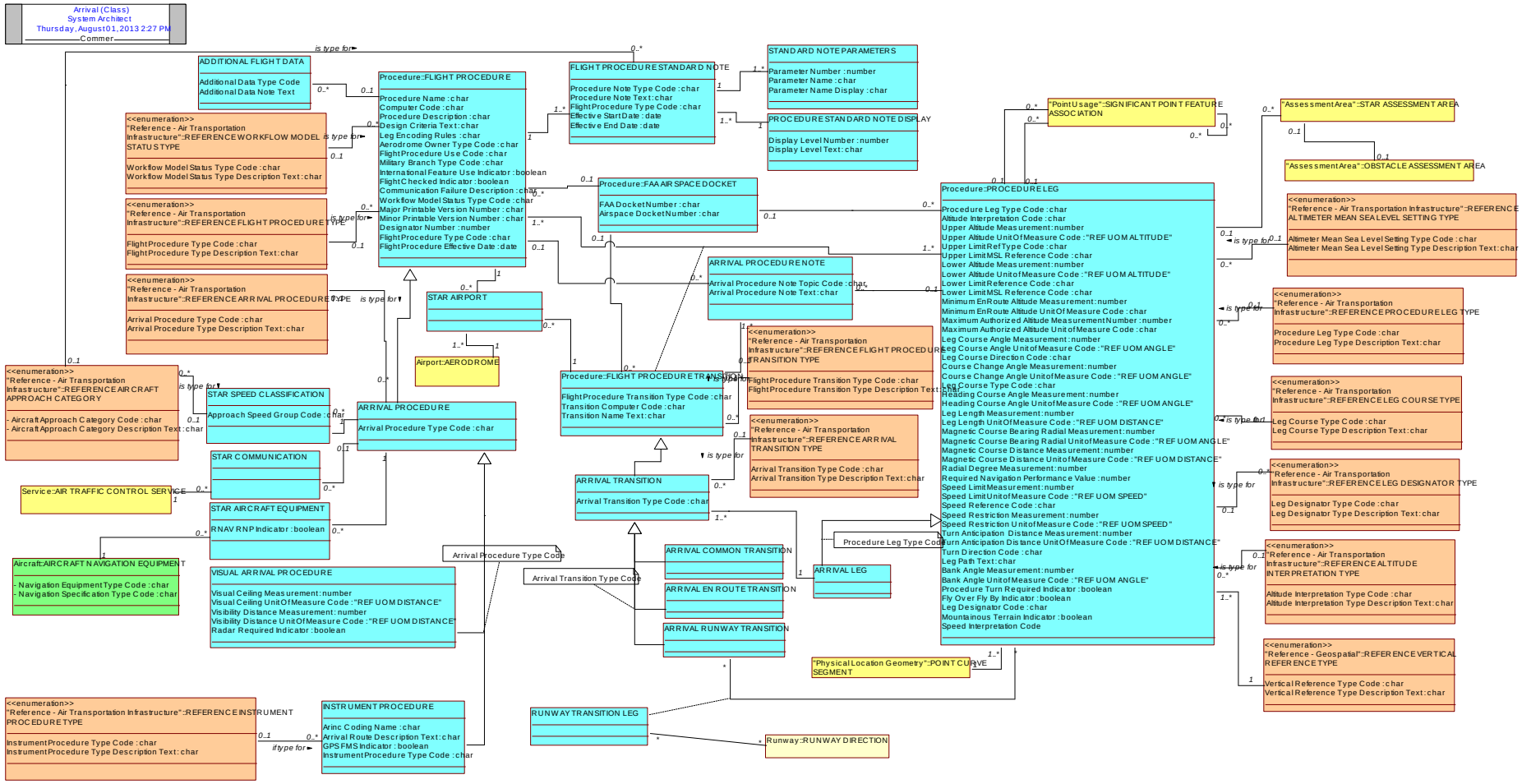

Figure 4 Arrival Diagram

Departures

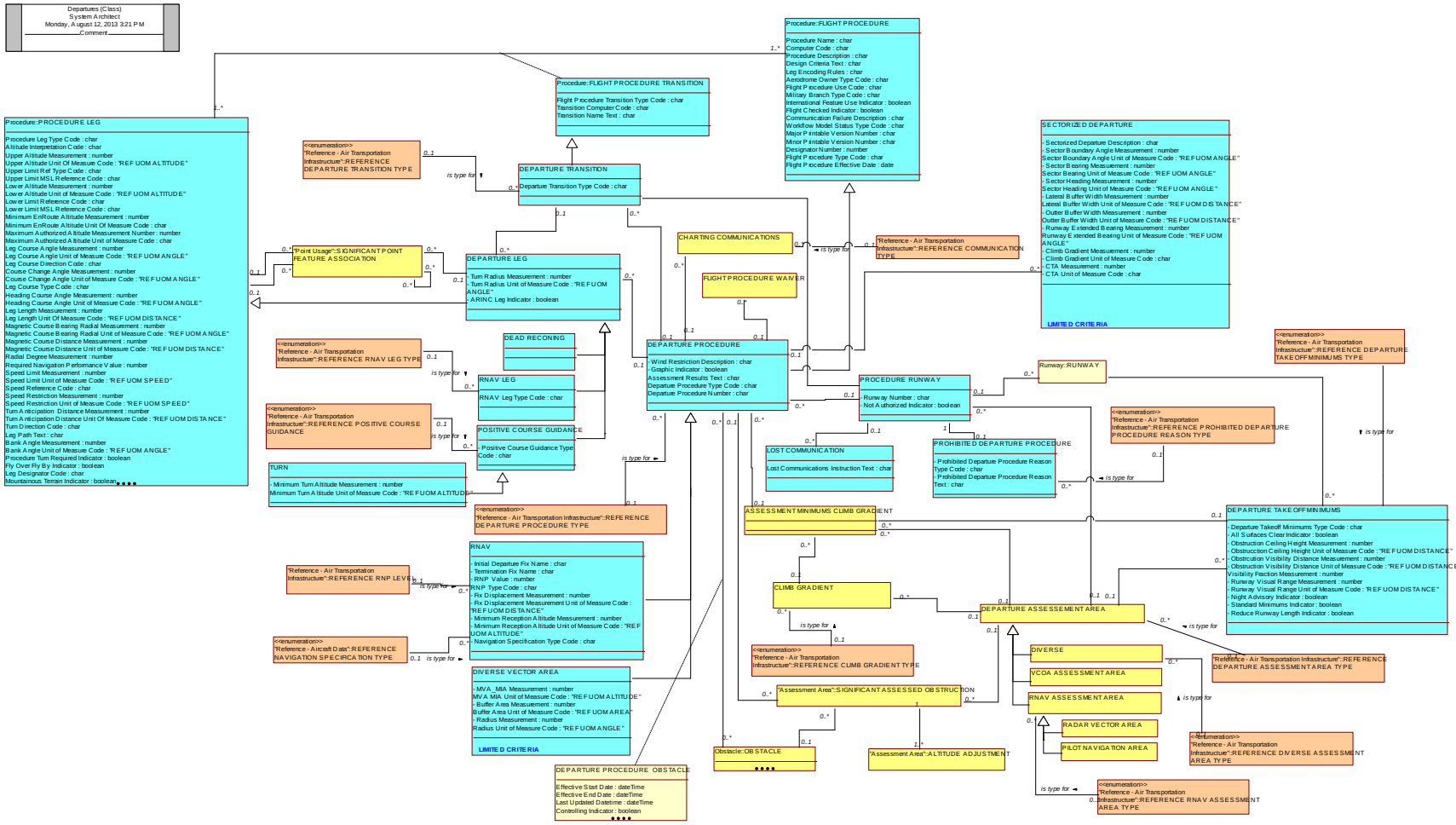

Figure 5 Departures Diagram

Holding

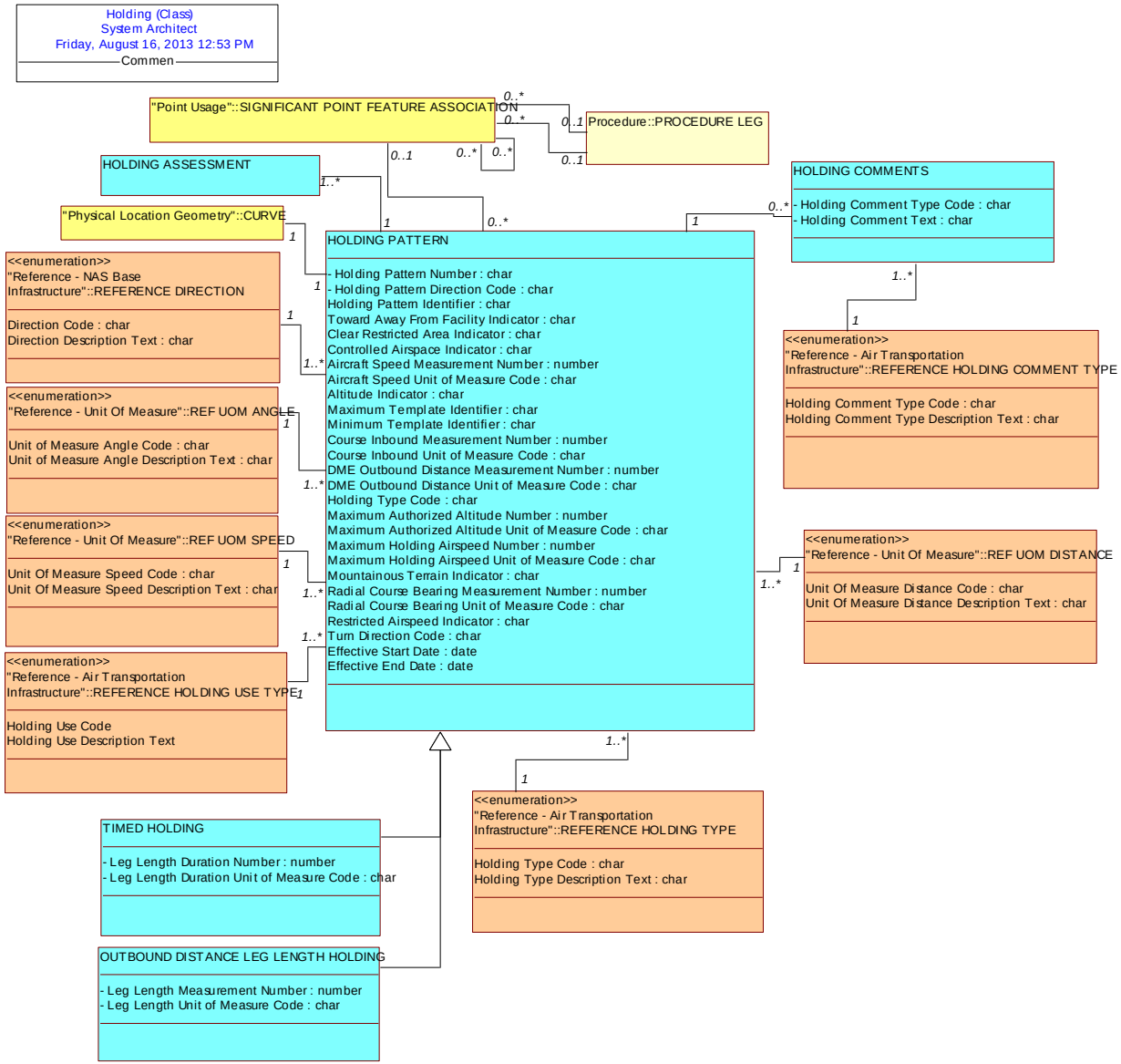

Figure 6 Holding Diagram

EnRoute

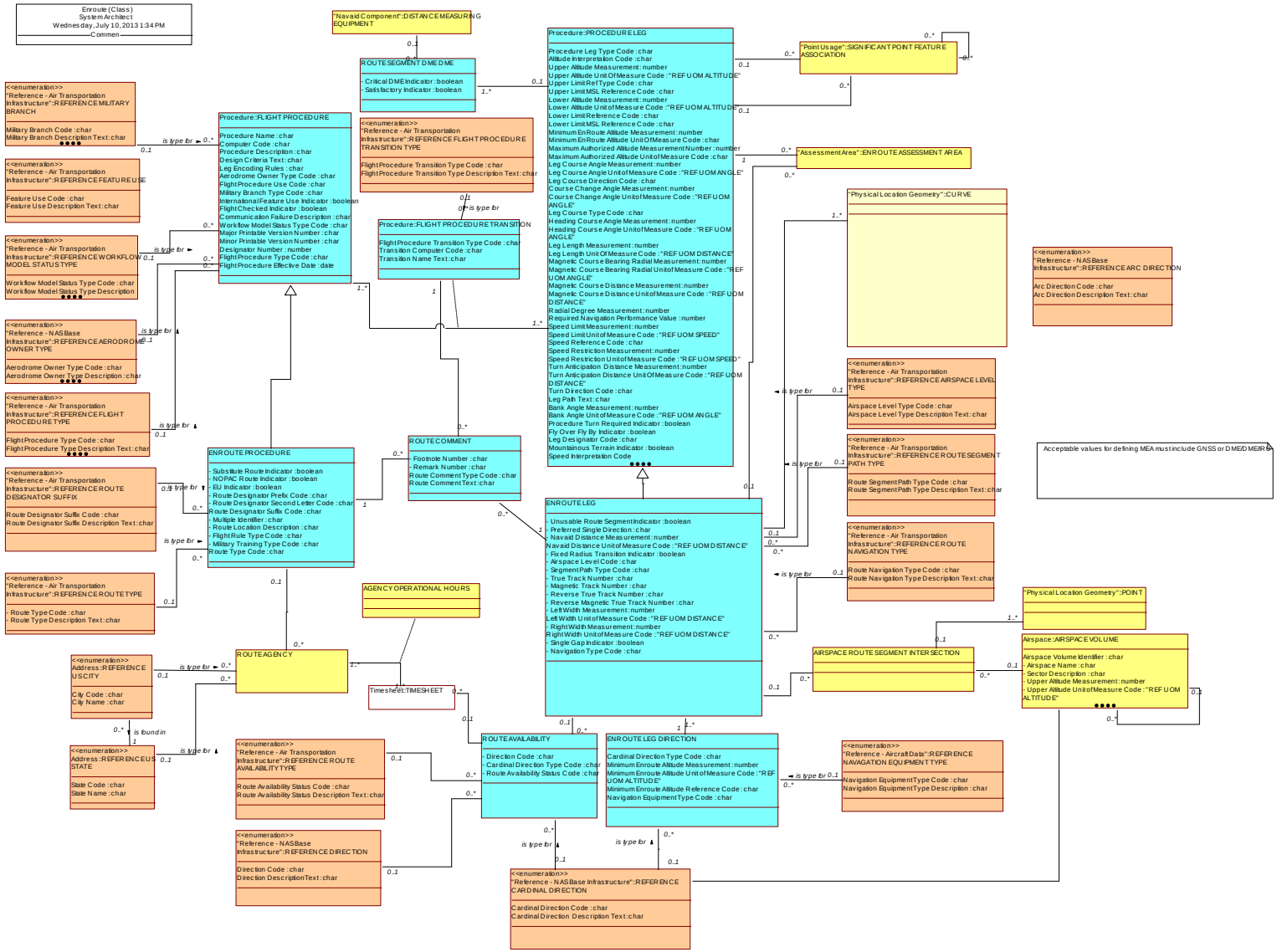

Figure 7 EnRoute Diagram

ATM Operations

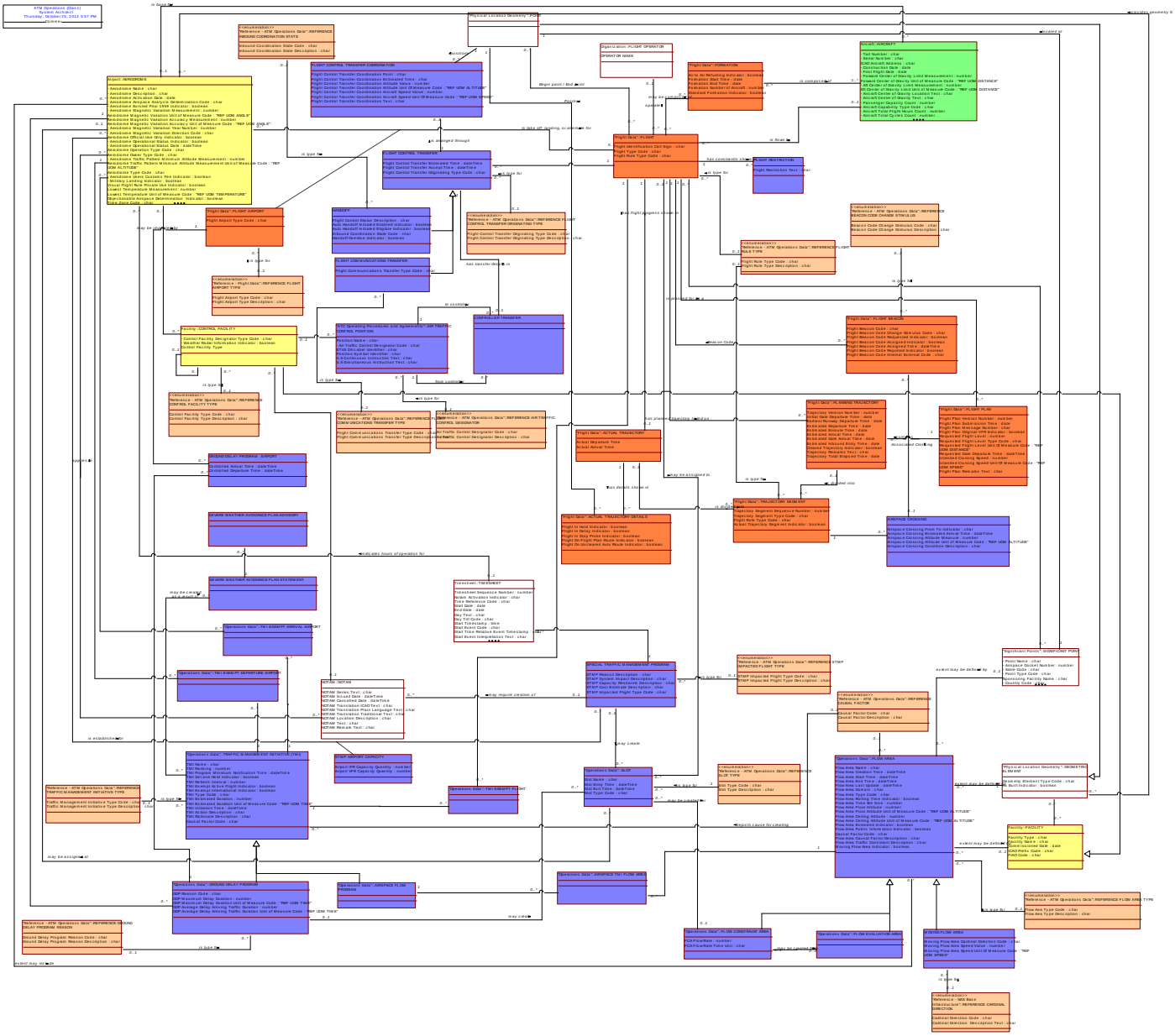

Figure 8 ATM Operations Diagram

Flight Data

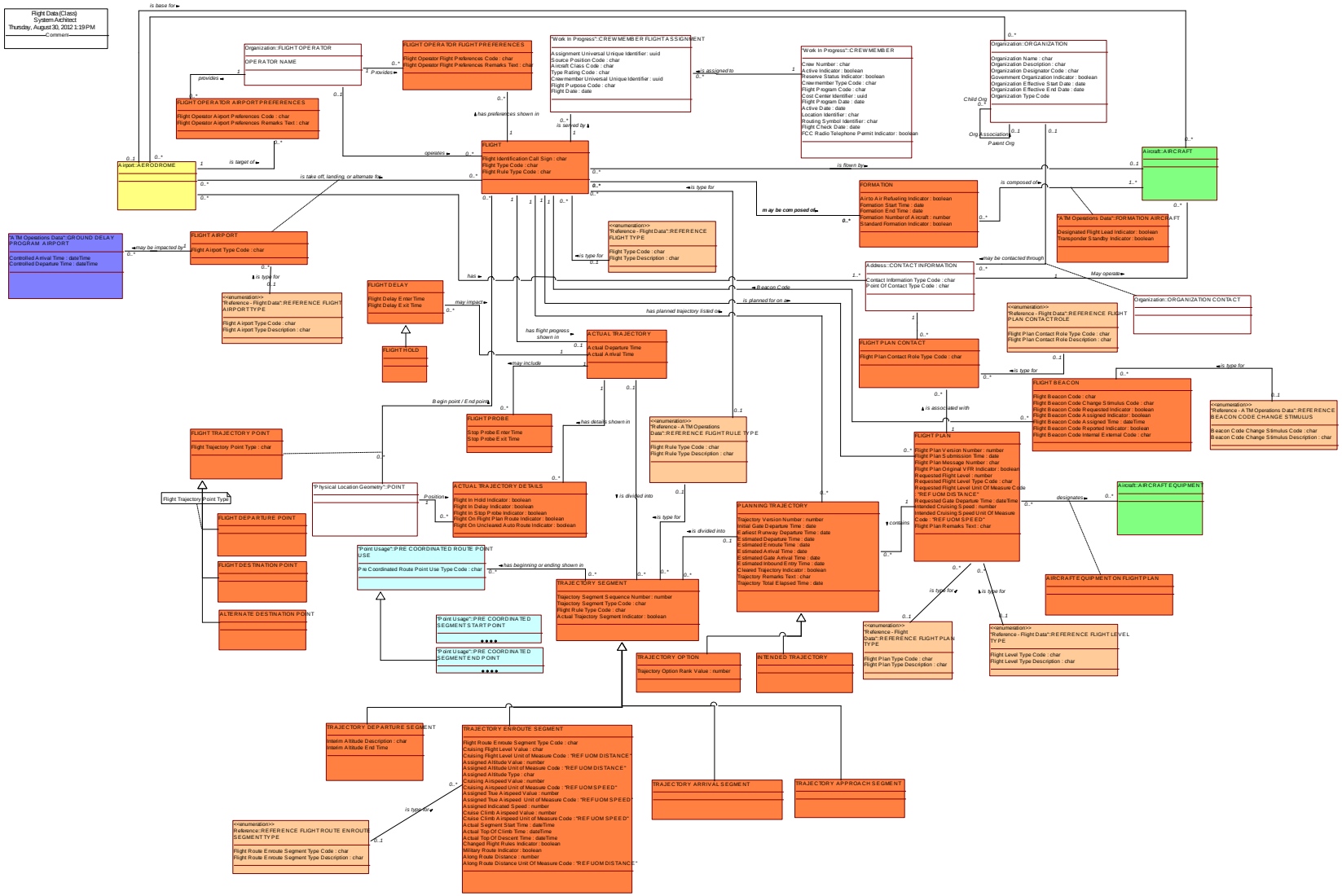

Figure 9 Flight Data Diagram

Physical Location Geometry

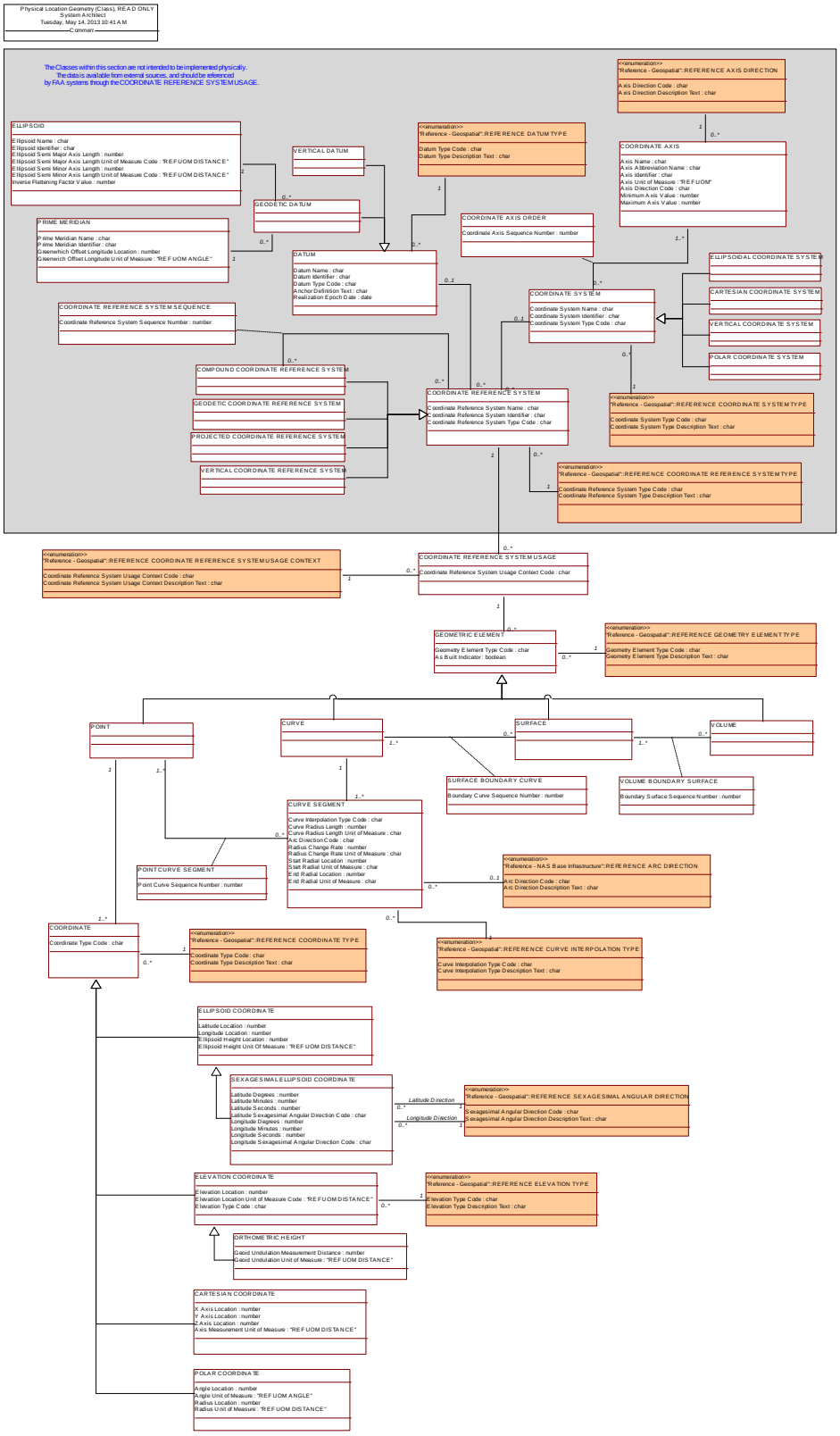

Figure 10 Physical Location Geometry Diagram

Airport/Heliport

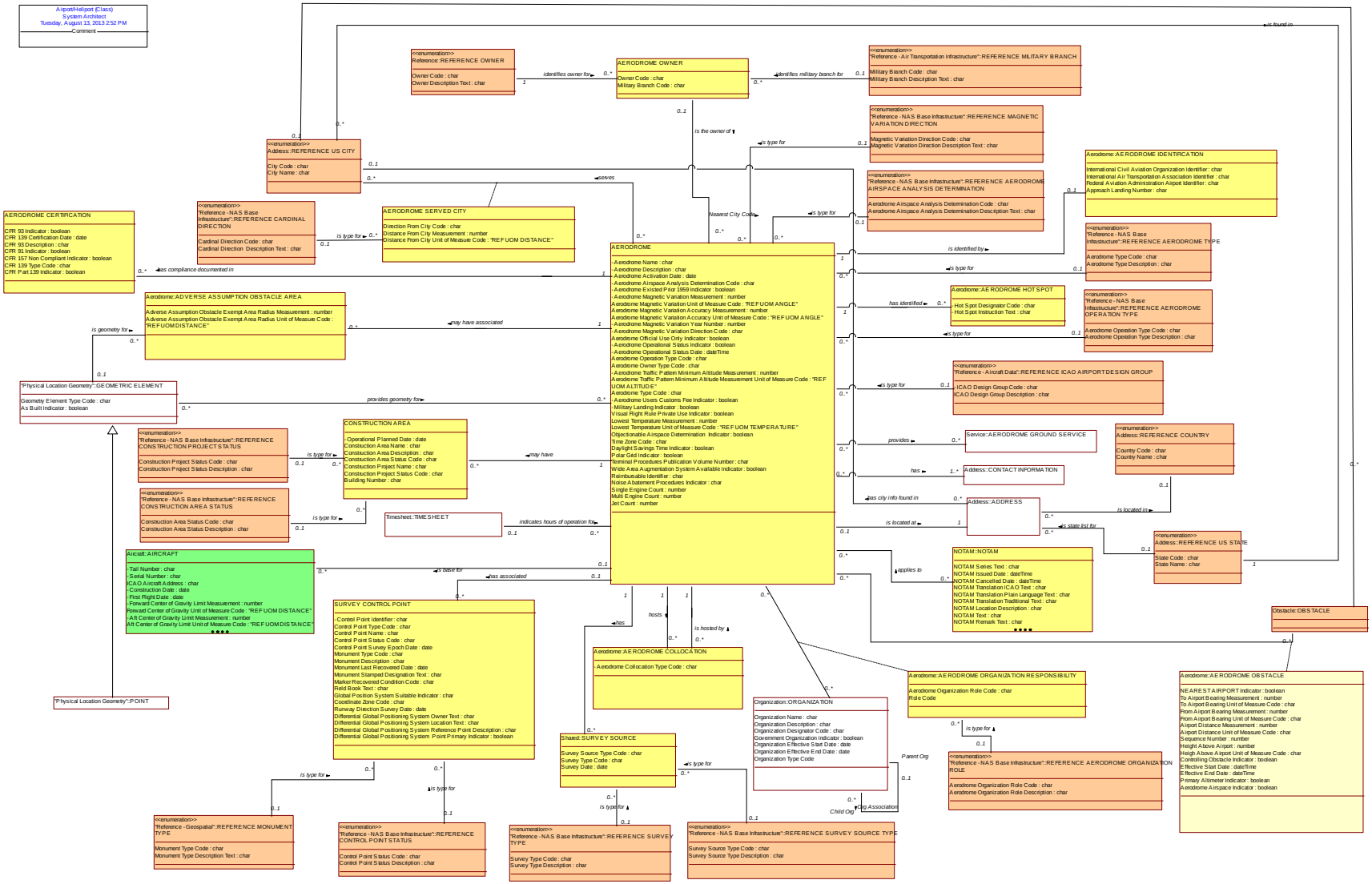

Figure 11 Airport/Heliport Diagram

Apron

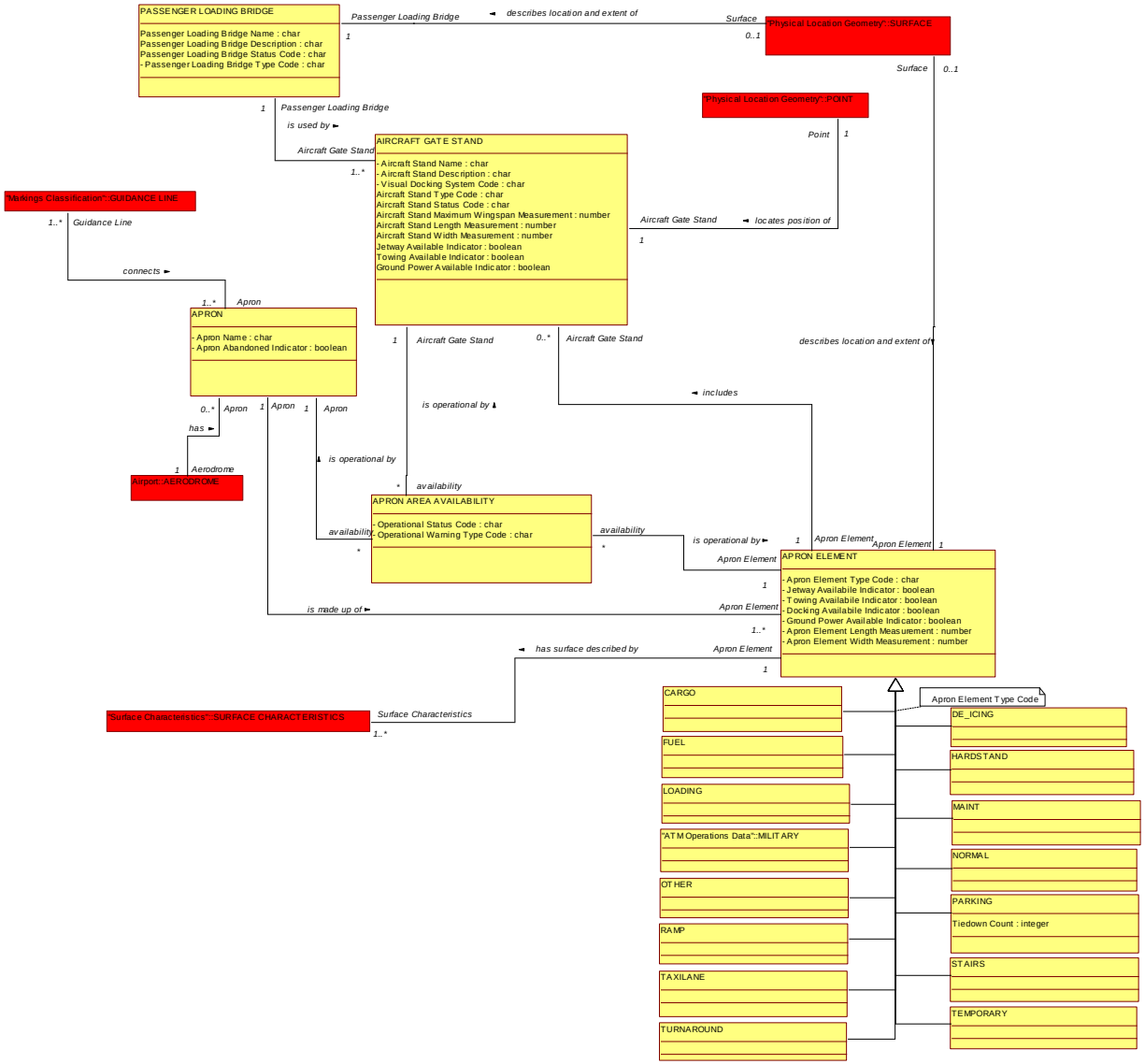

Figure 12 Apron Diagram

Lighting

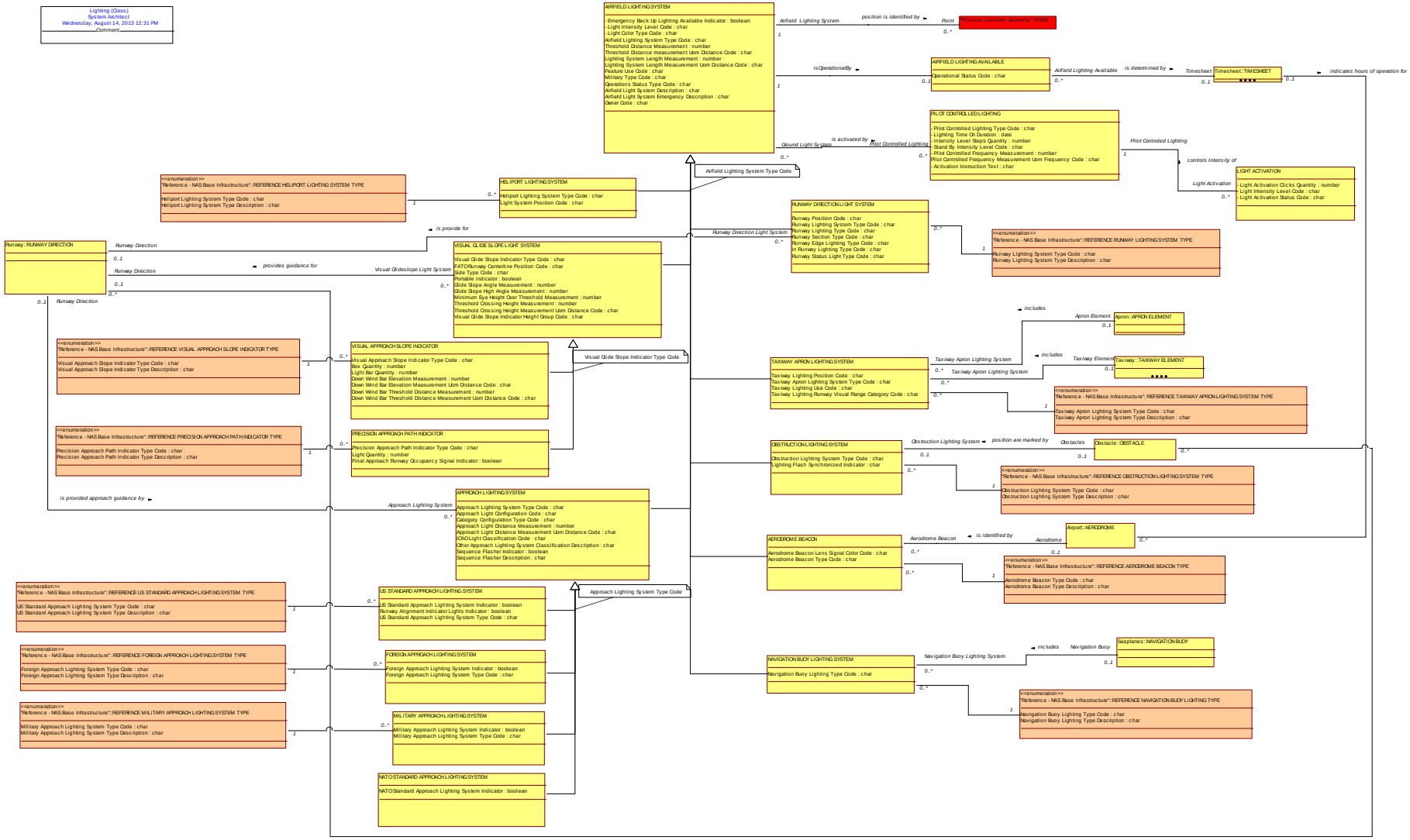

Figure 13 Lighting Diagram

Runway

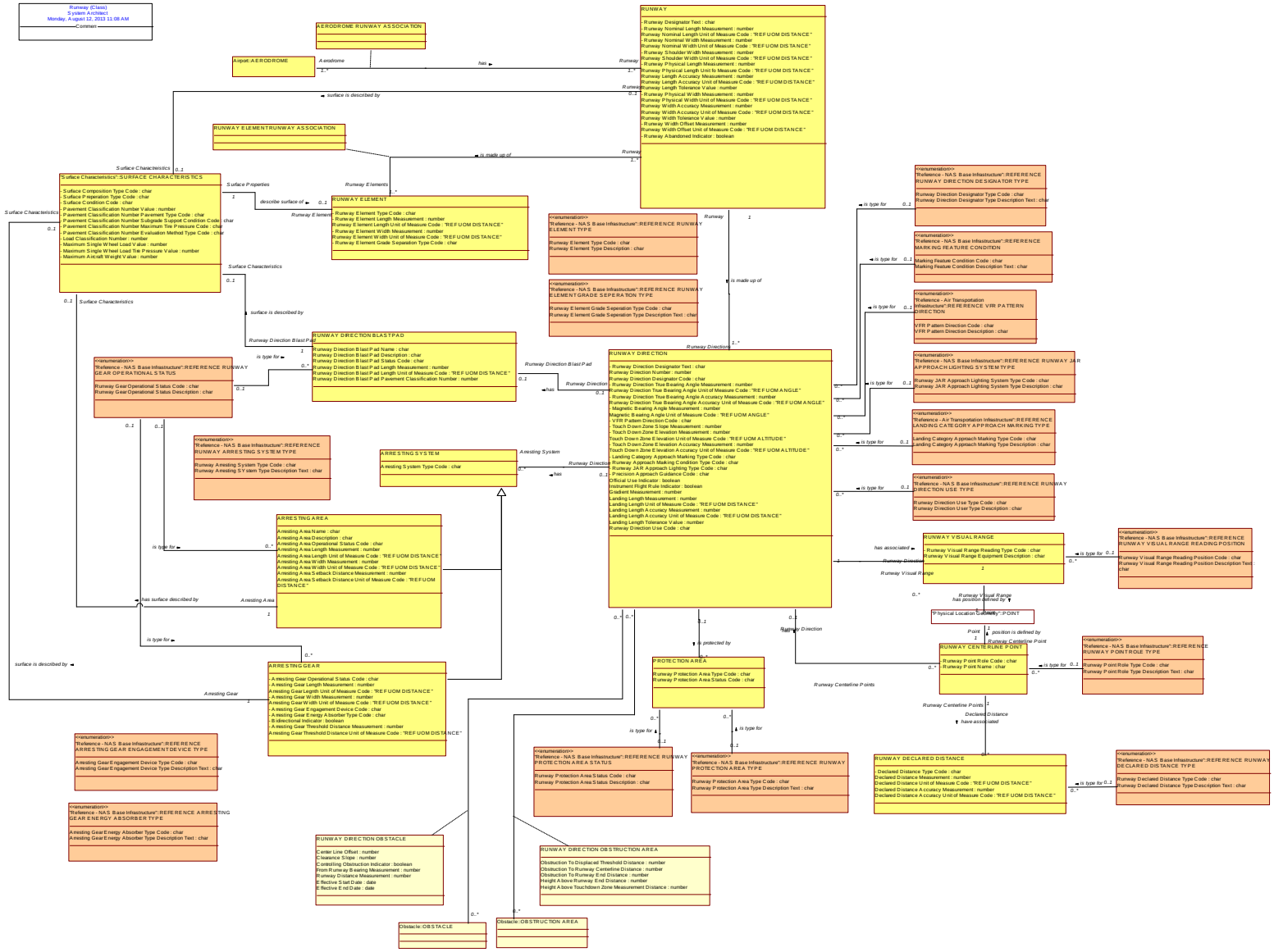

Figure 14 Runway Diagram

Runway Monitor

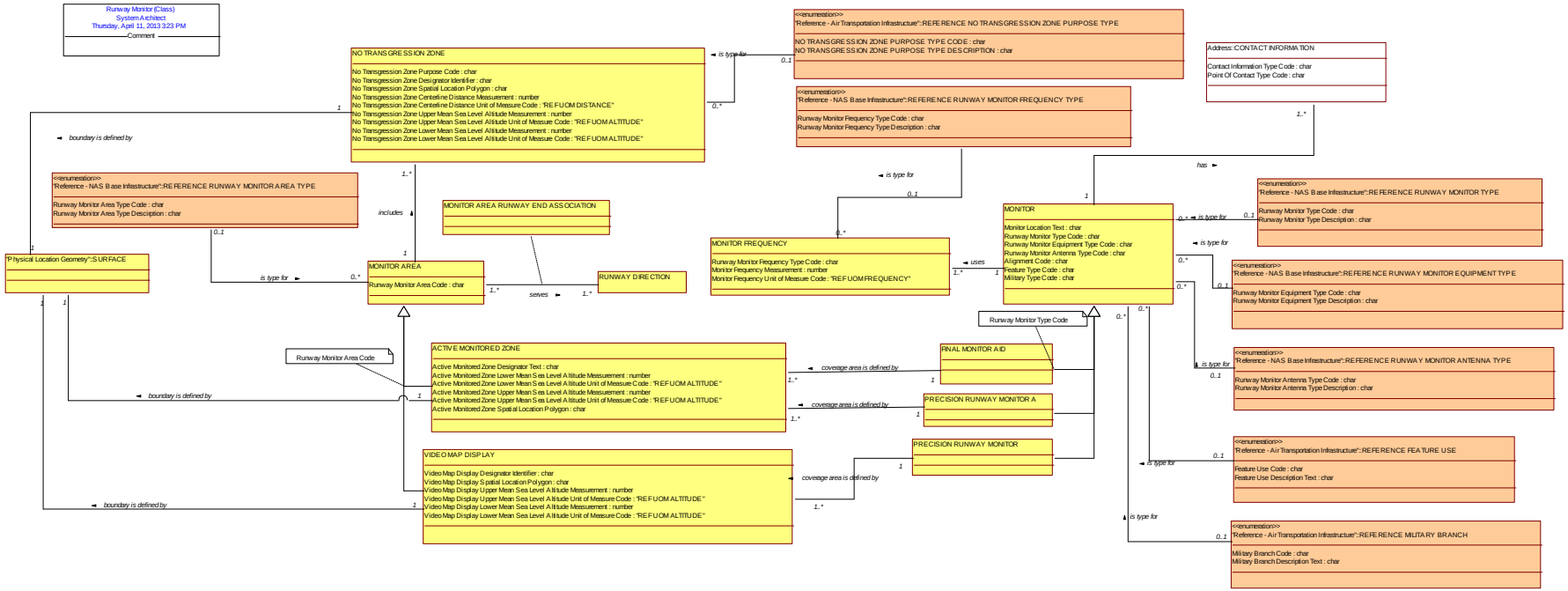

Figure 15 Runway Monitor Diagram

Taxiway

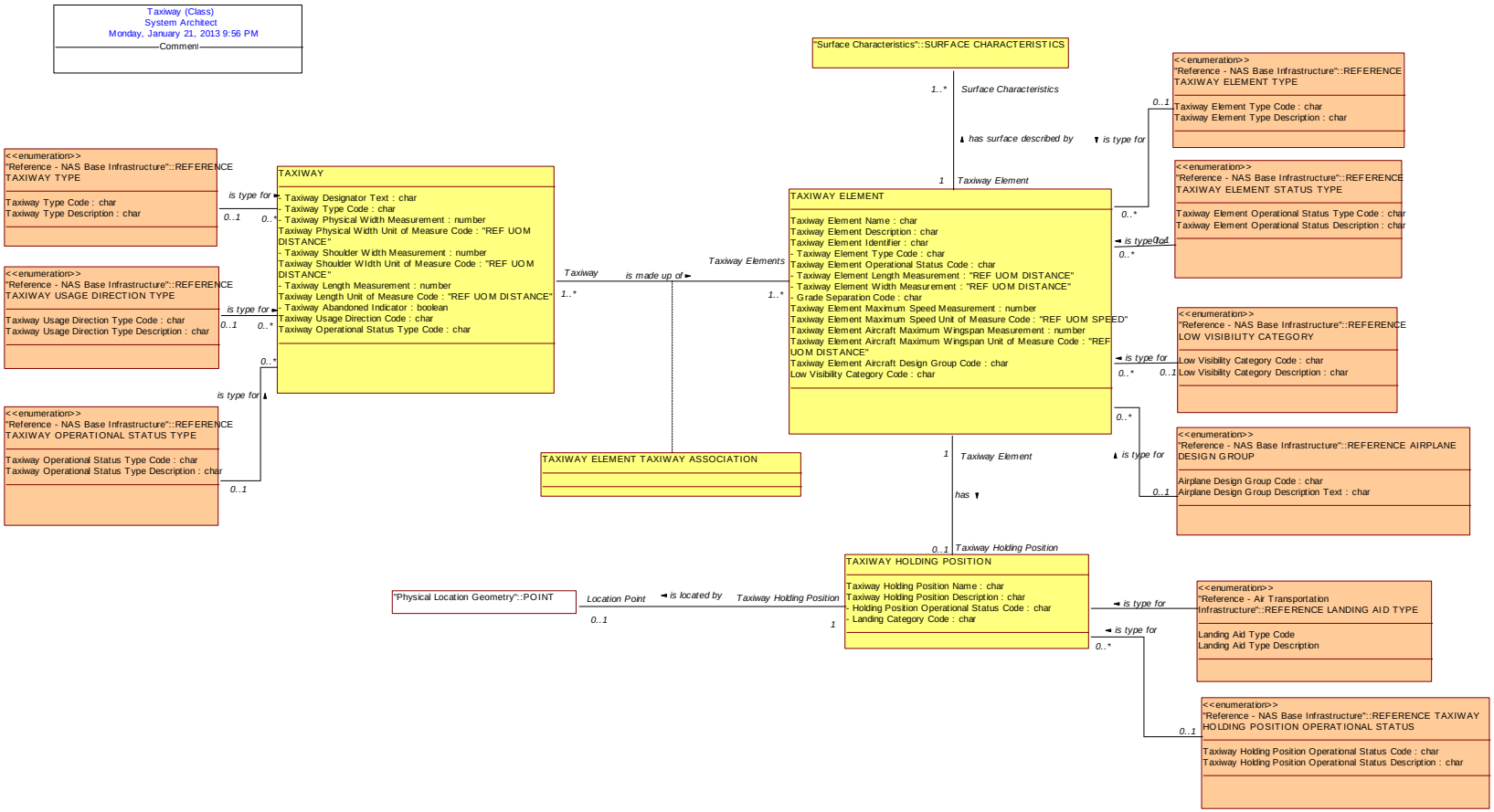

Figure 16 Taxiway Diagram

NAVAID System

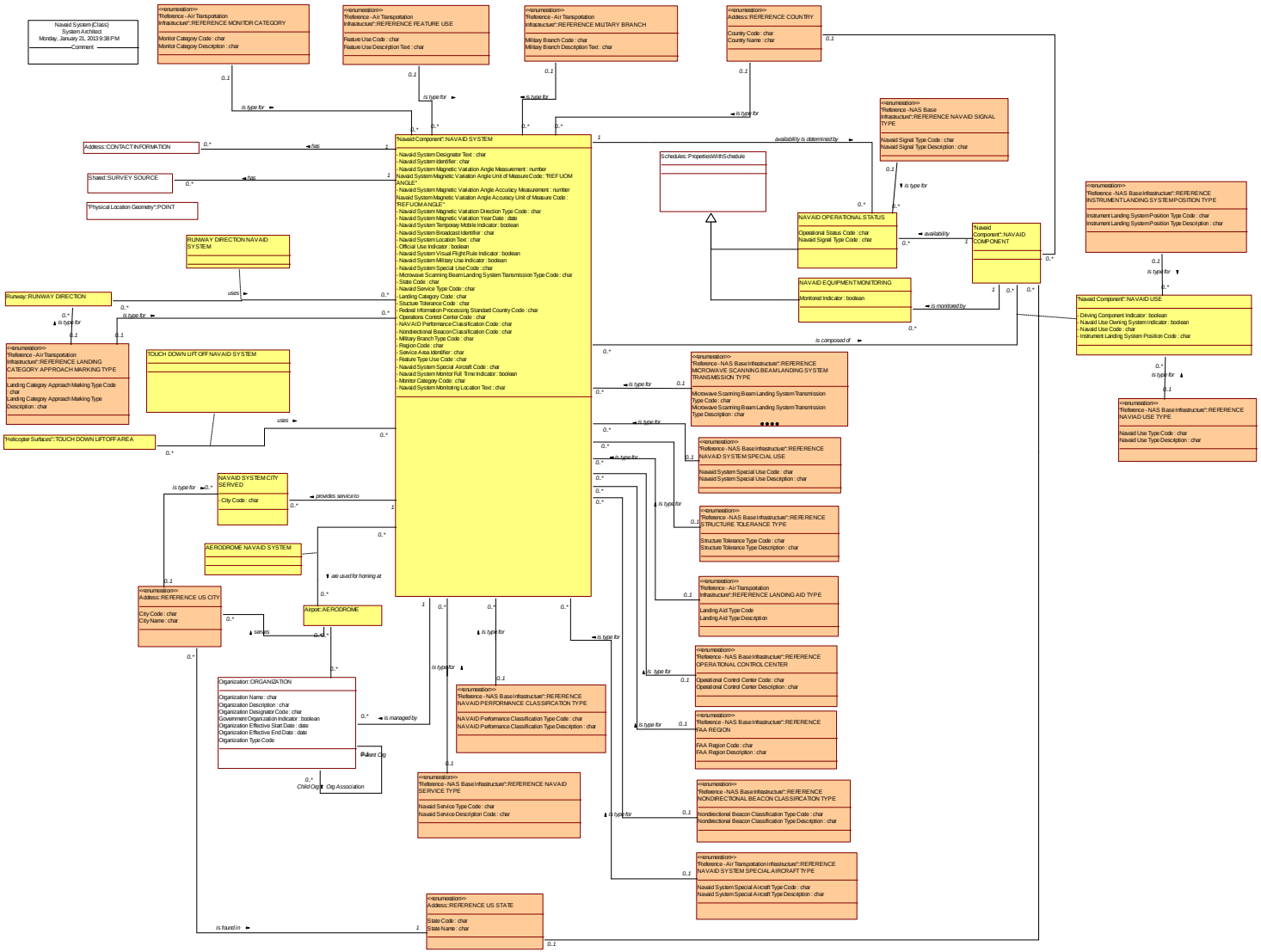

Figure 17 NAVAID System Diagram

Surveillance Data

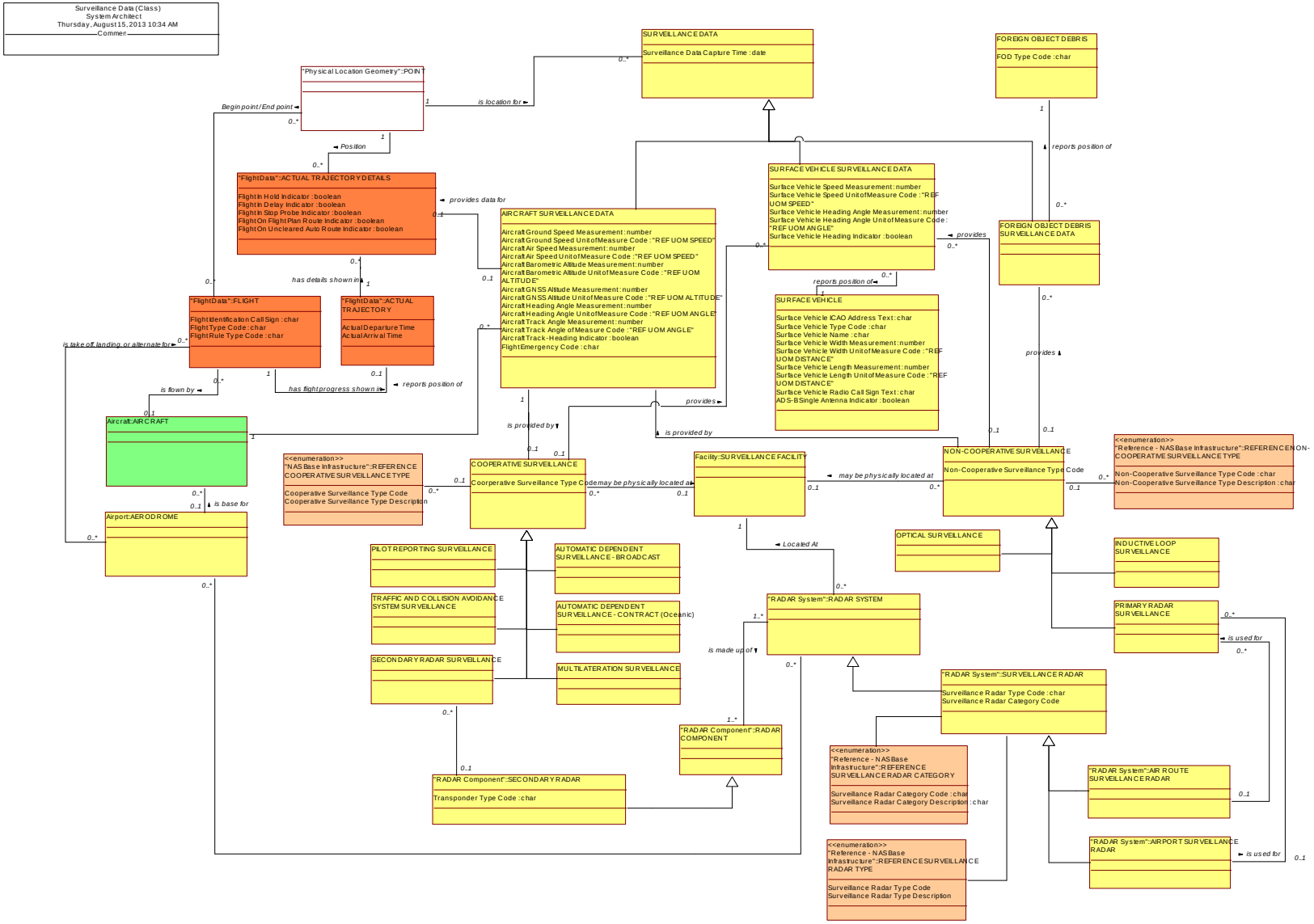

Figure 18 Surveillance Data Diagram

Address

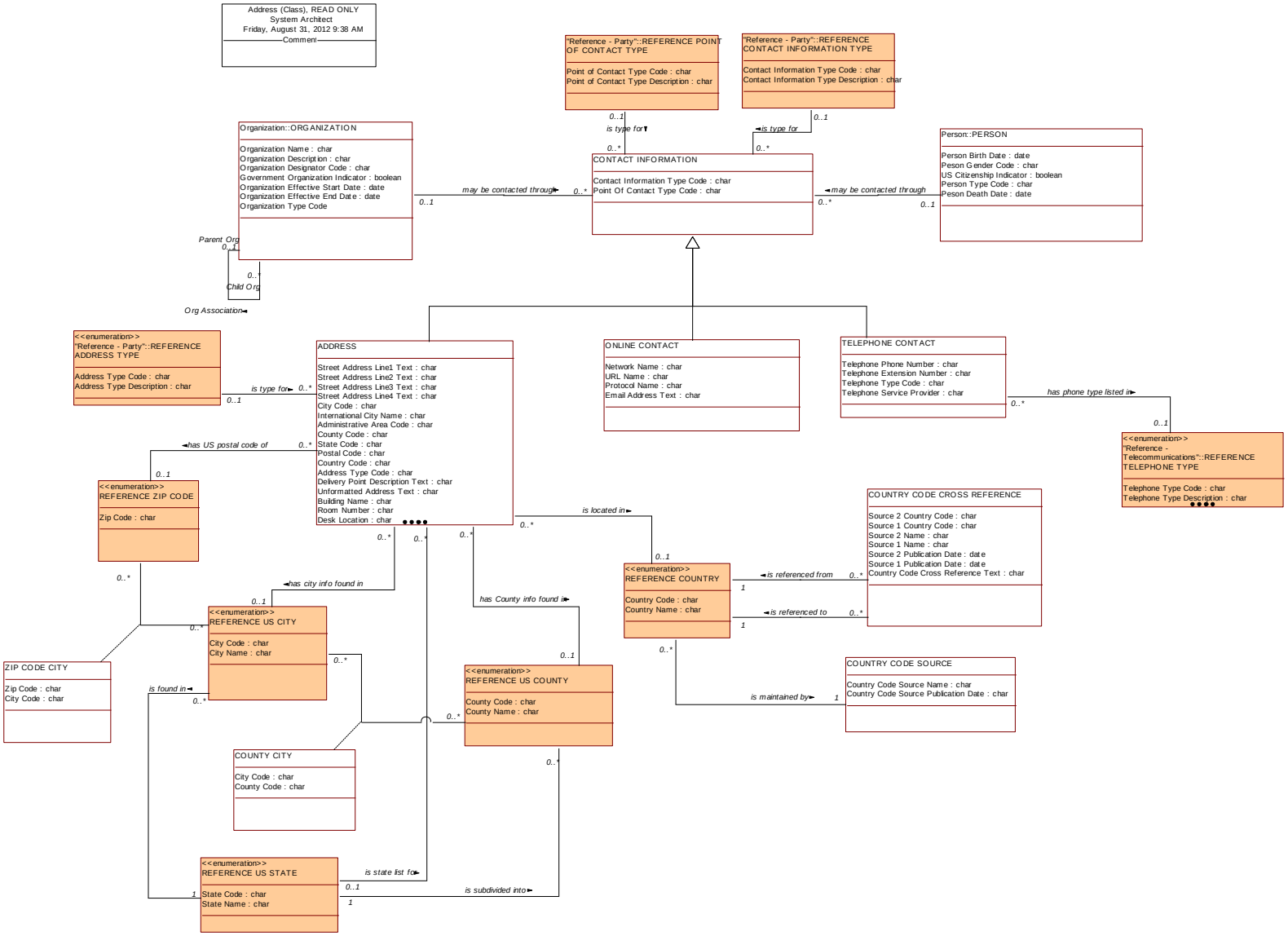

Figure 19 Address Diagram

Organization

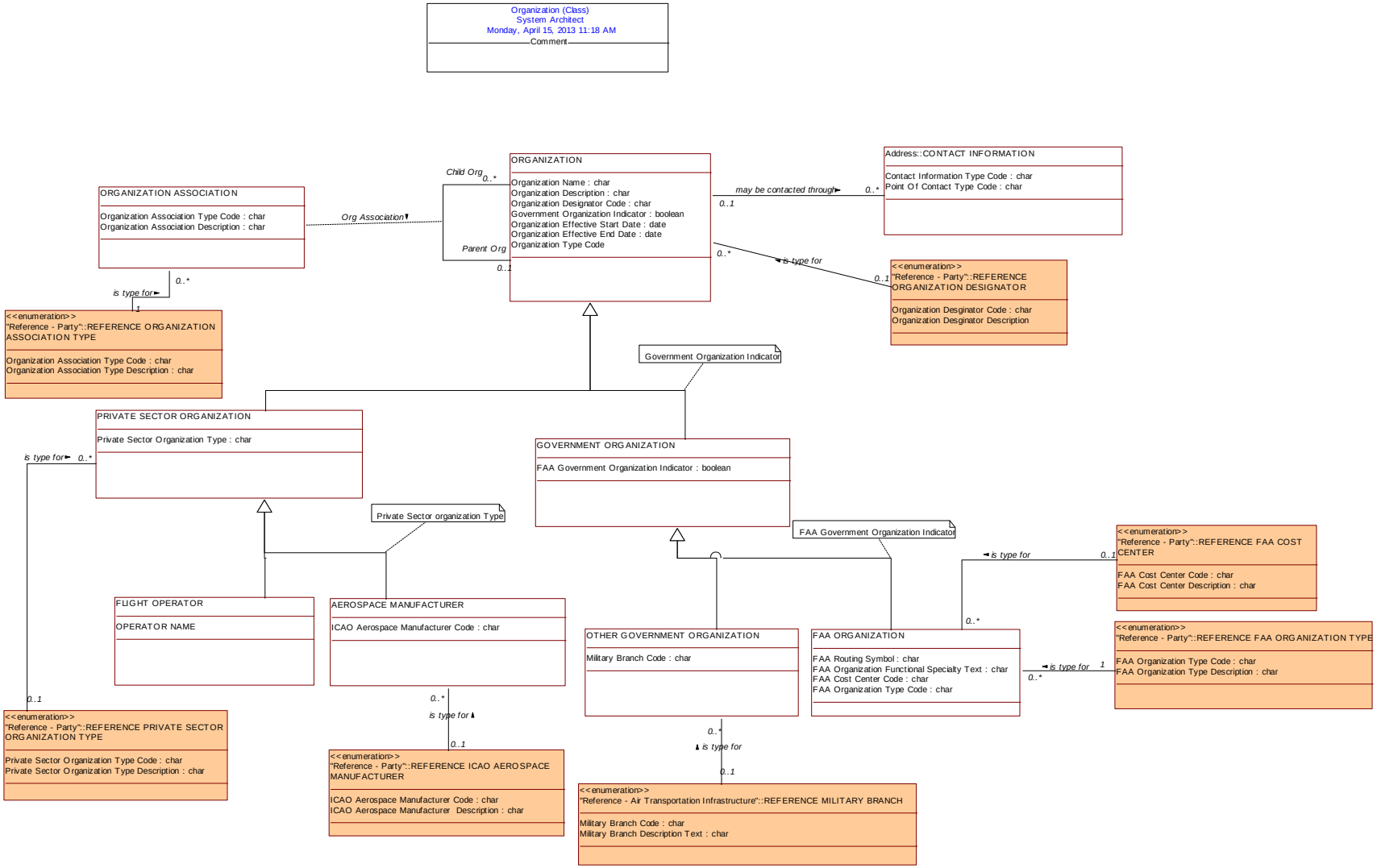

Figure 20 Organization Diagram

Person

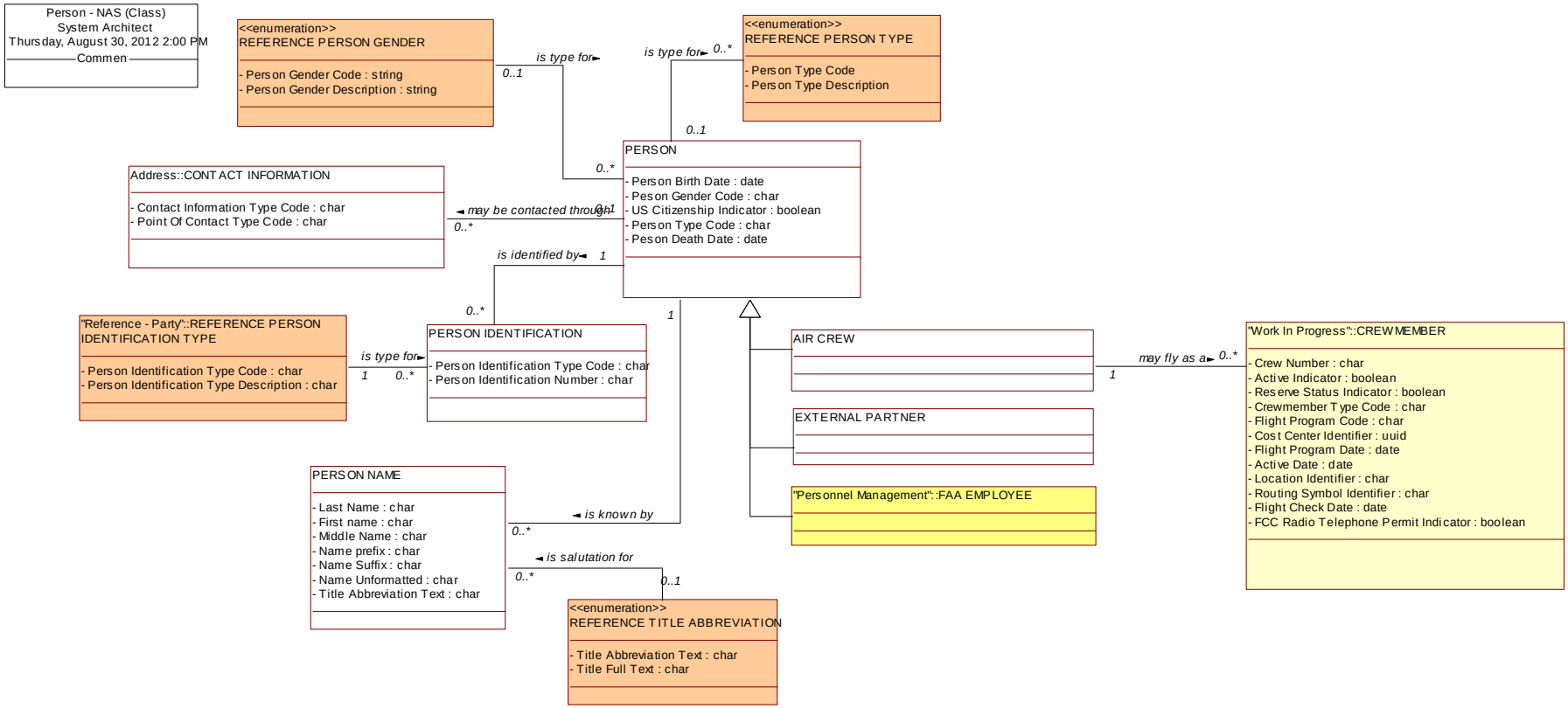

Figure 21 Person Diagram

Weather Context

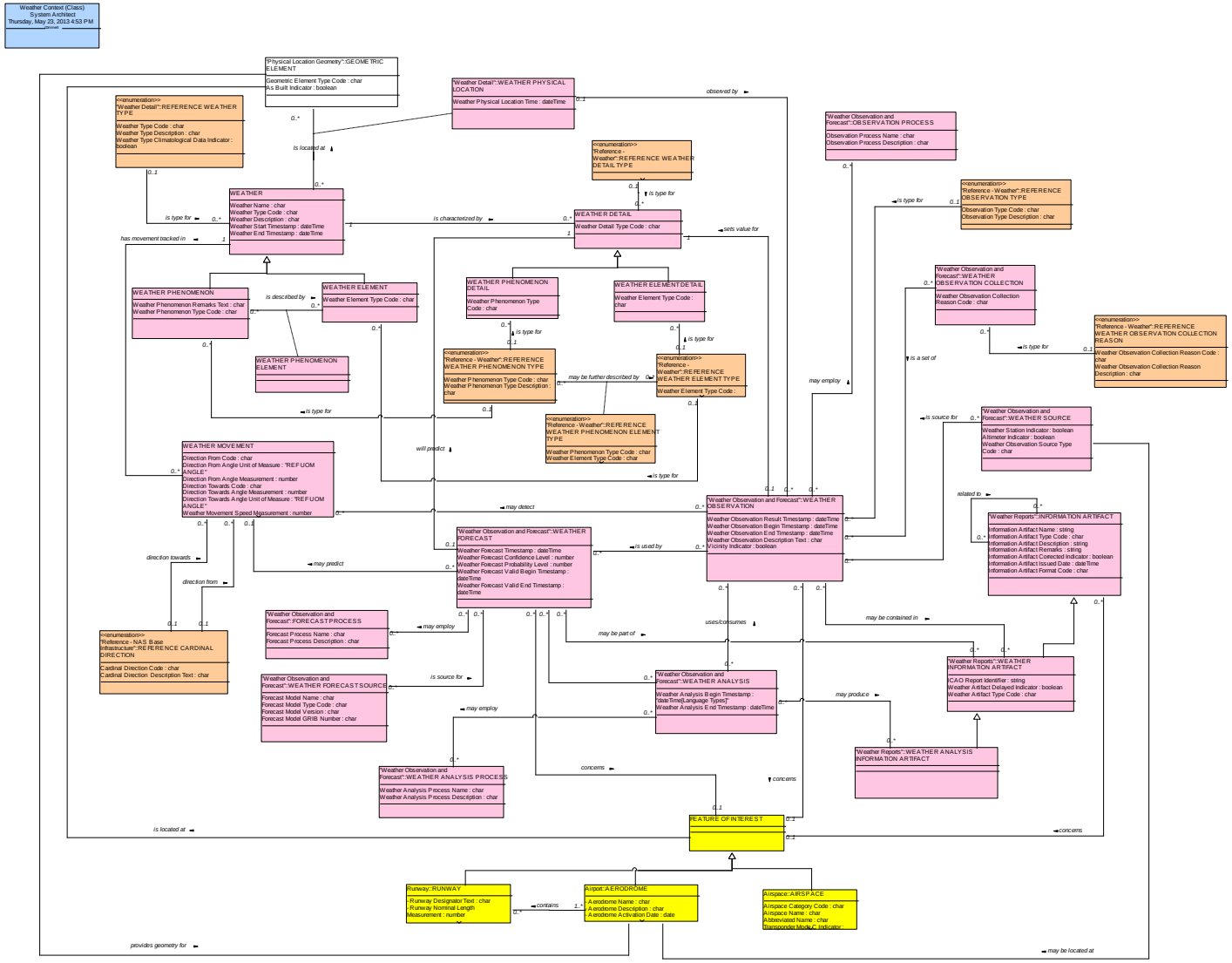

Figure 22 Weather Context Diagram

Weather Element Detail

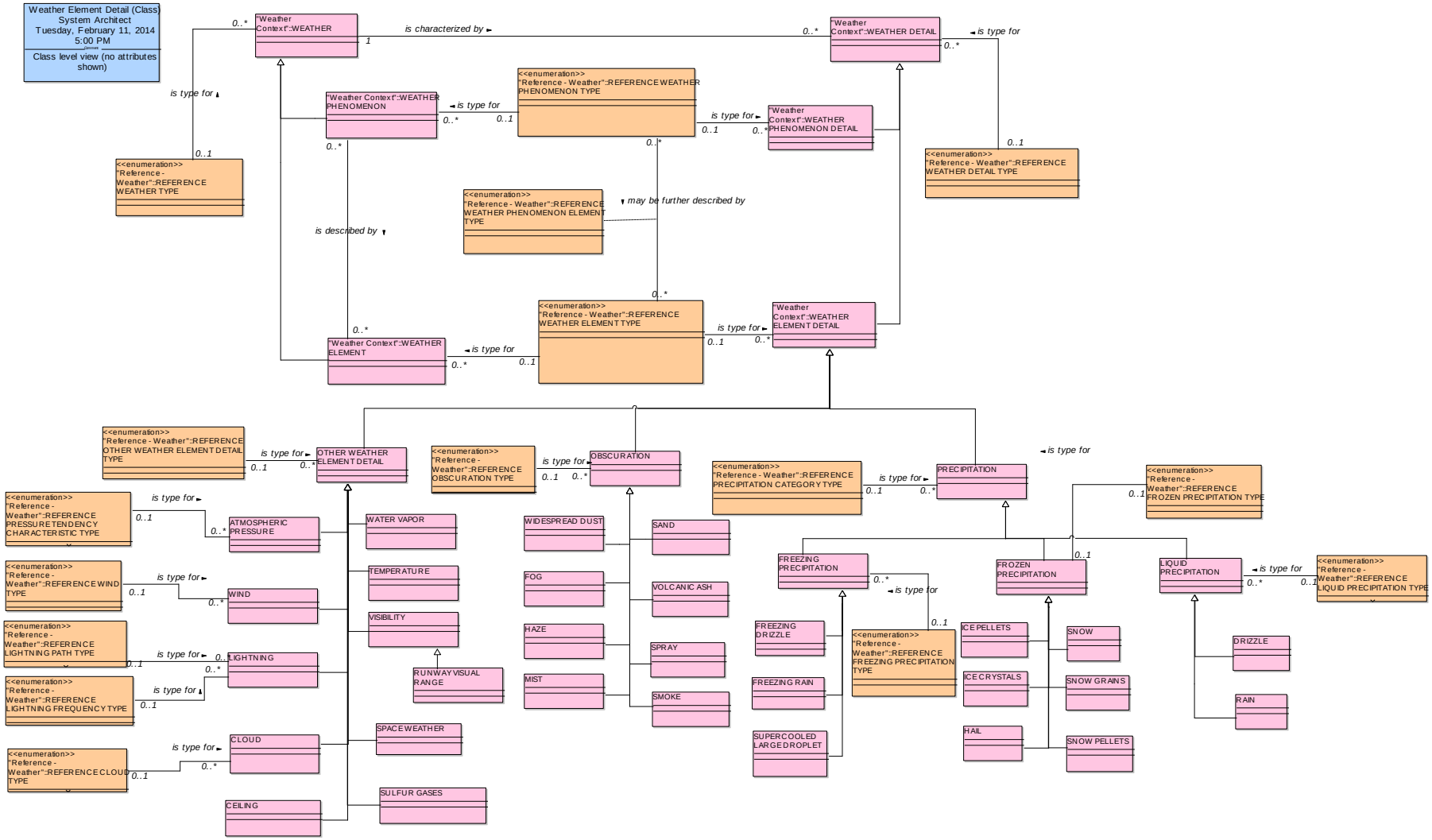

Figure 23 Weather Element Detail Diagram

Obscuration Detail

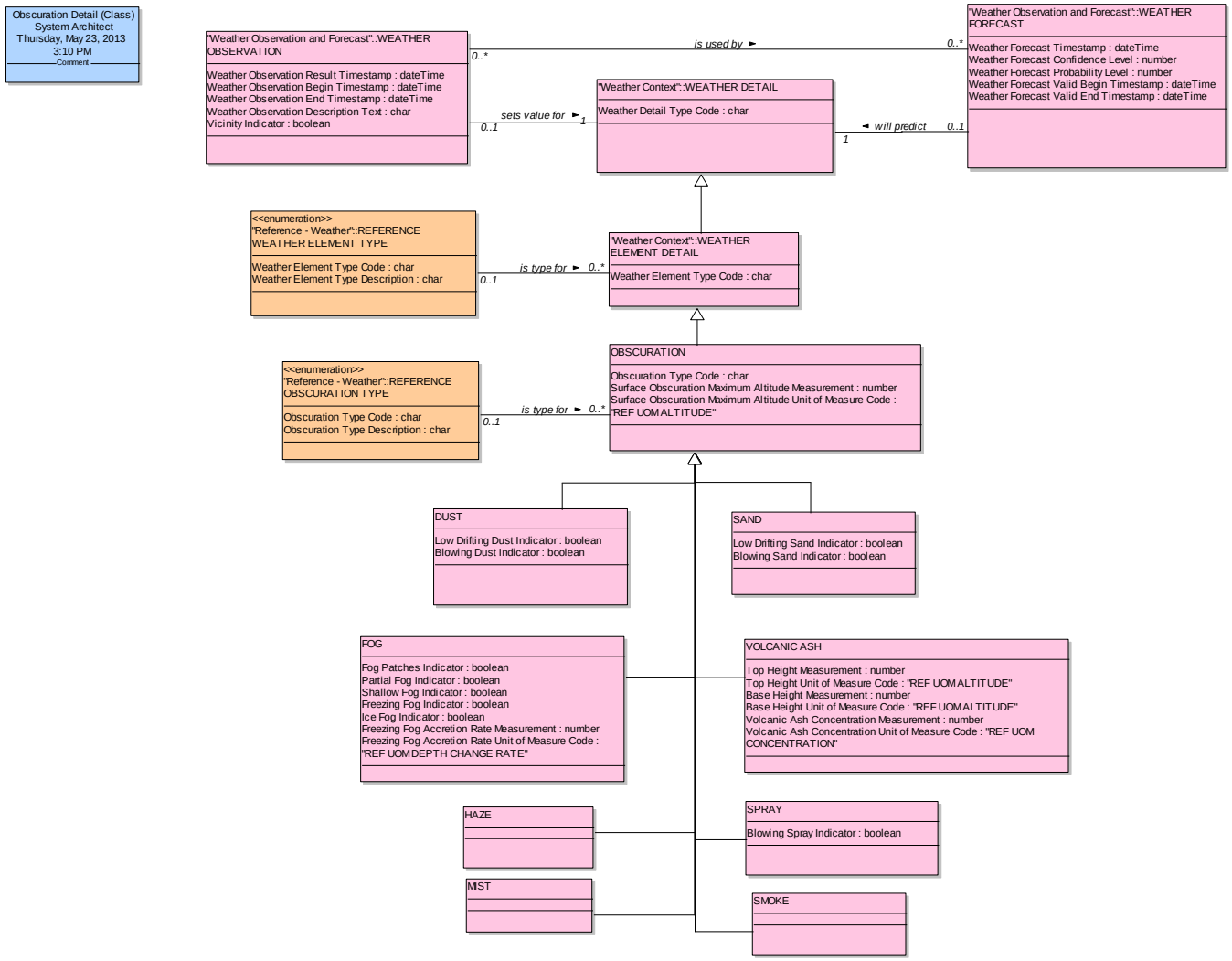

Figure 24 Obscuration Detail Diagram

Precipitation Detail

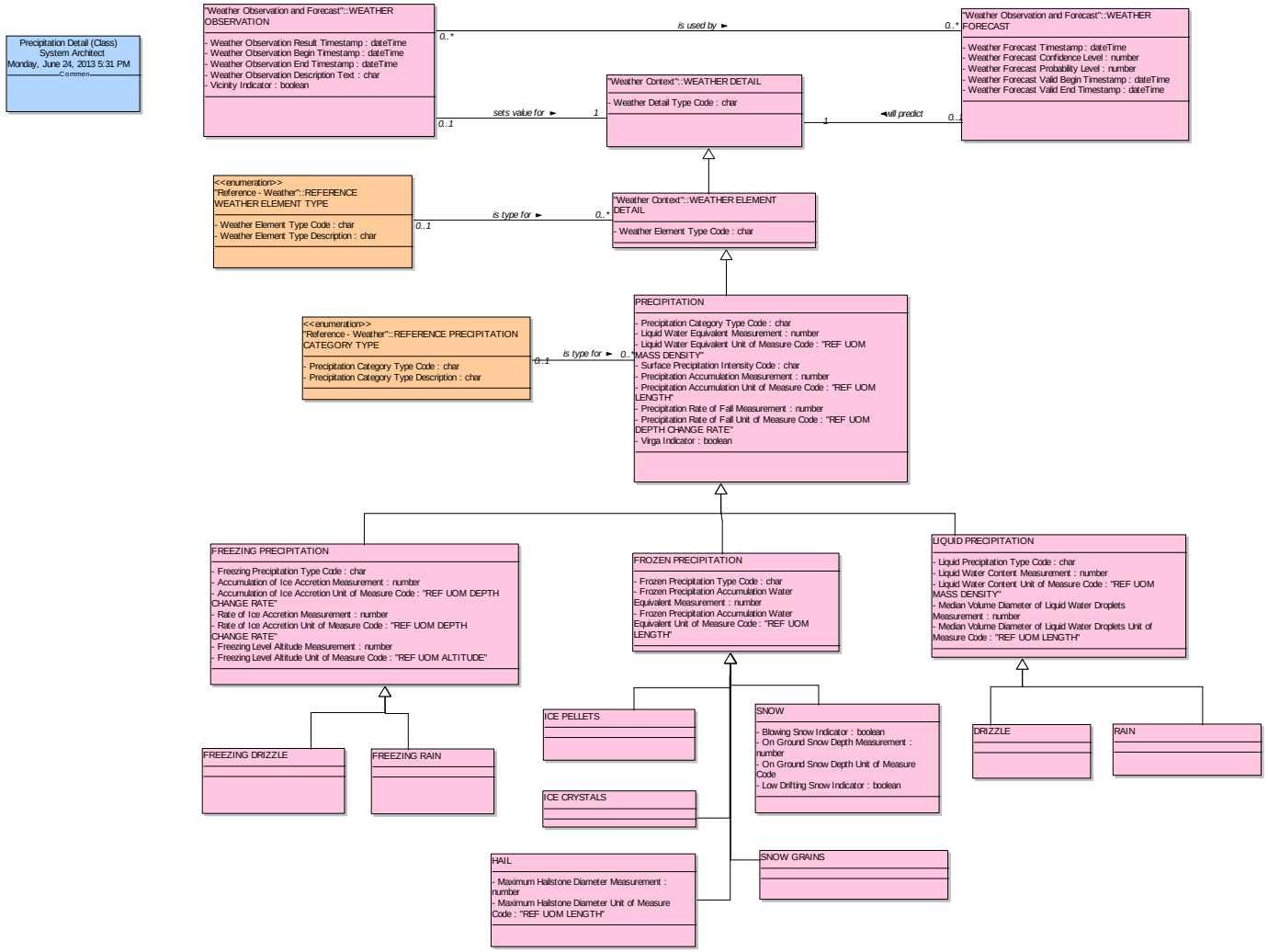

Figure 25 Precipitation Detail

Other Weather Element Detail

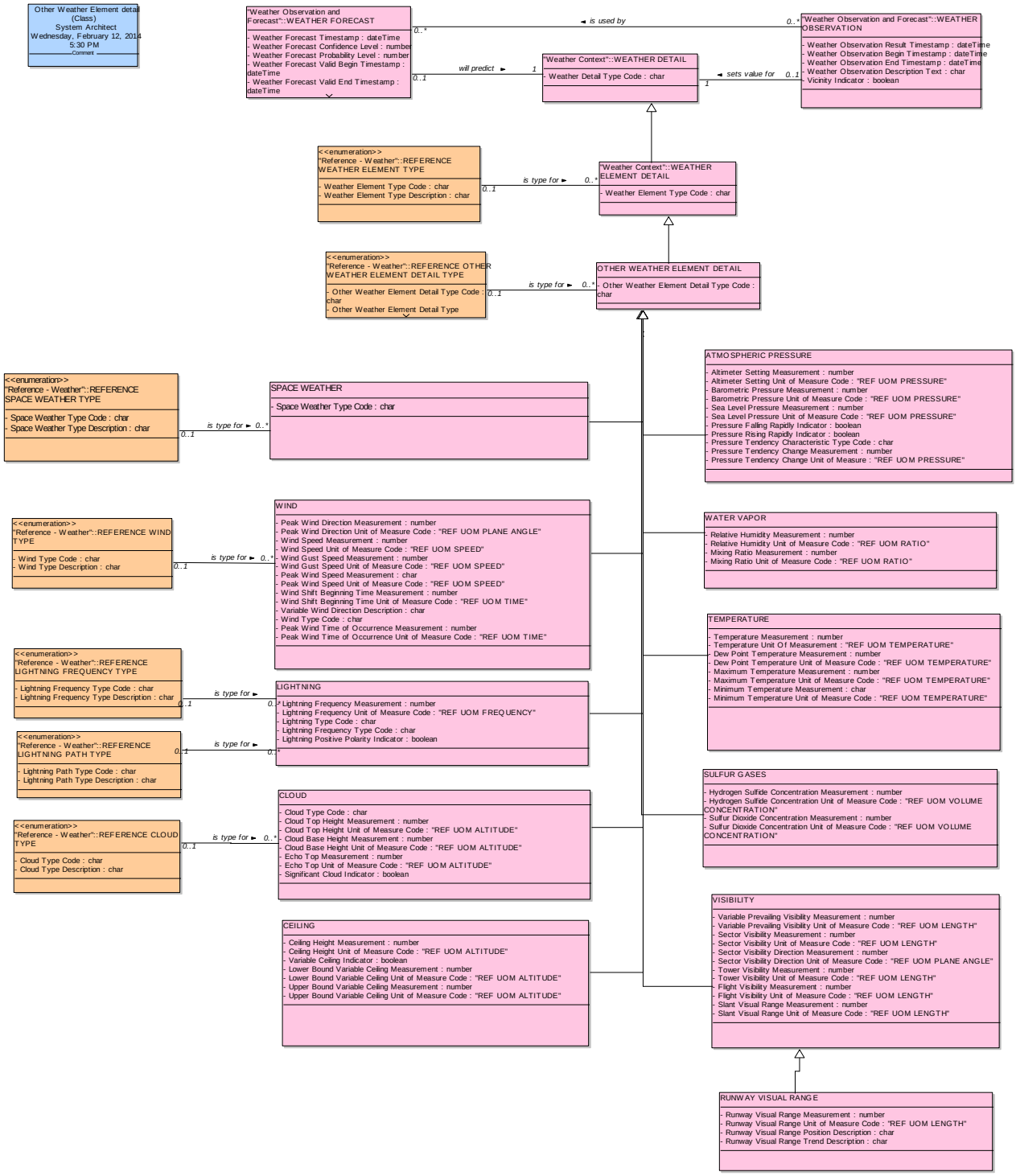

Figure 26 Other Weather Element Detail

Space Weather

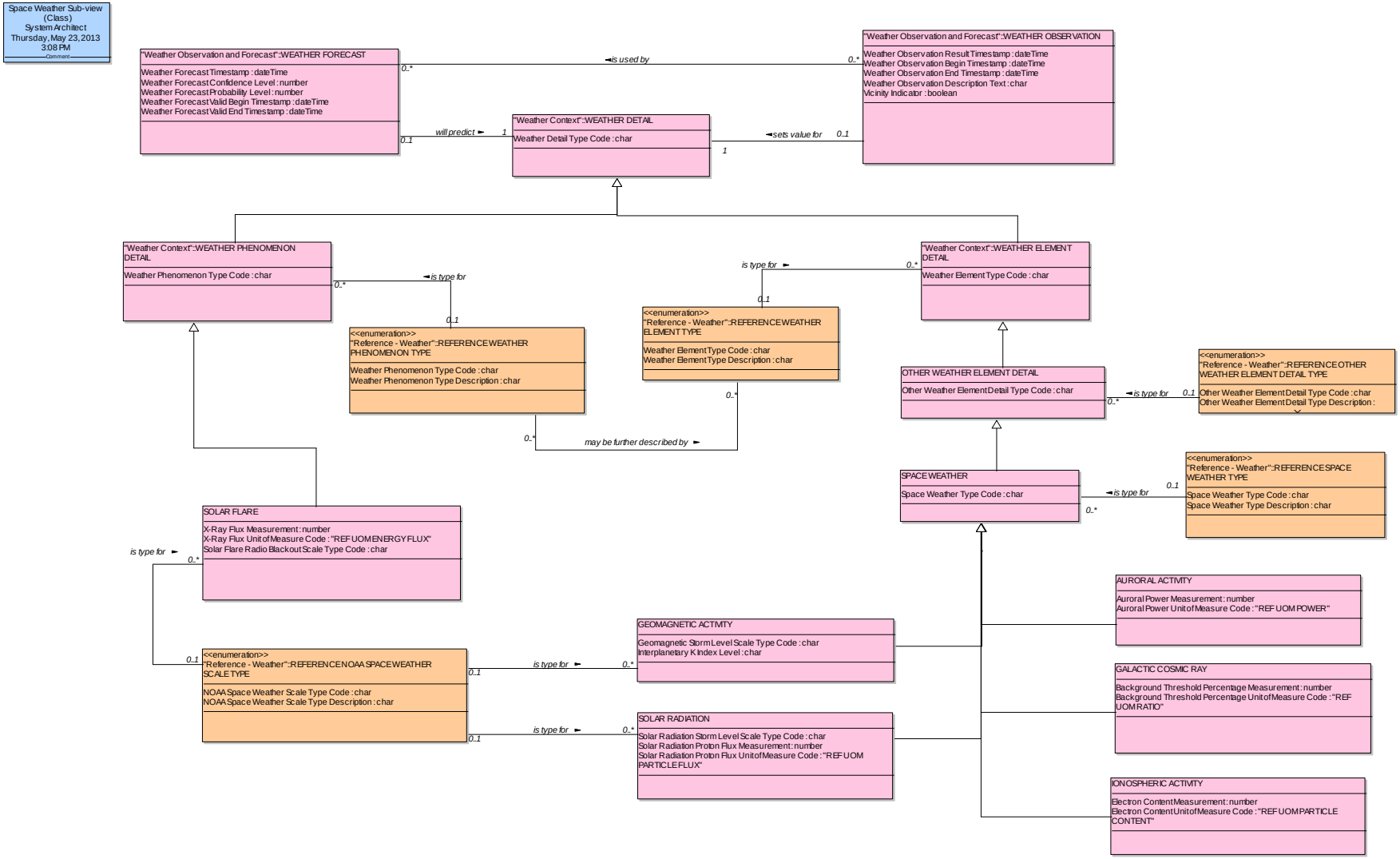

Figure 27 Space Weather Diagram

Weather Phenomenon Detail

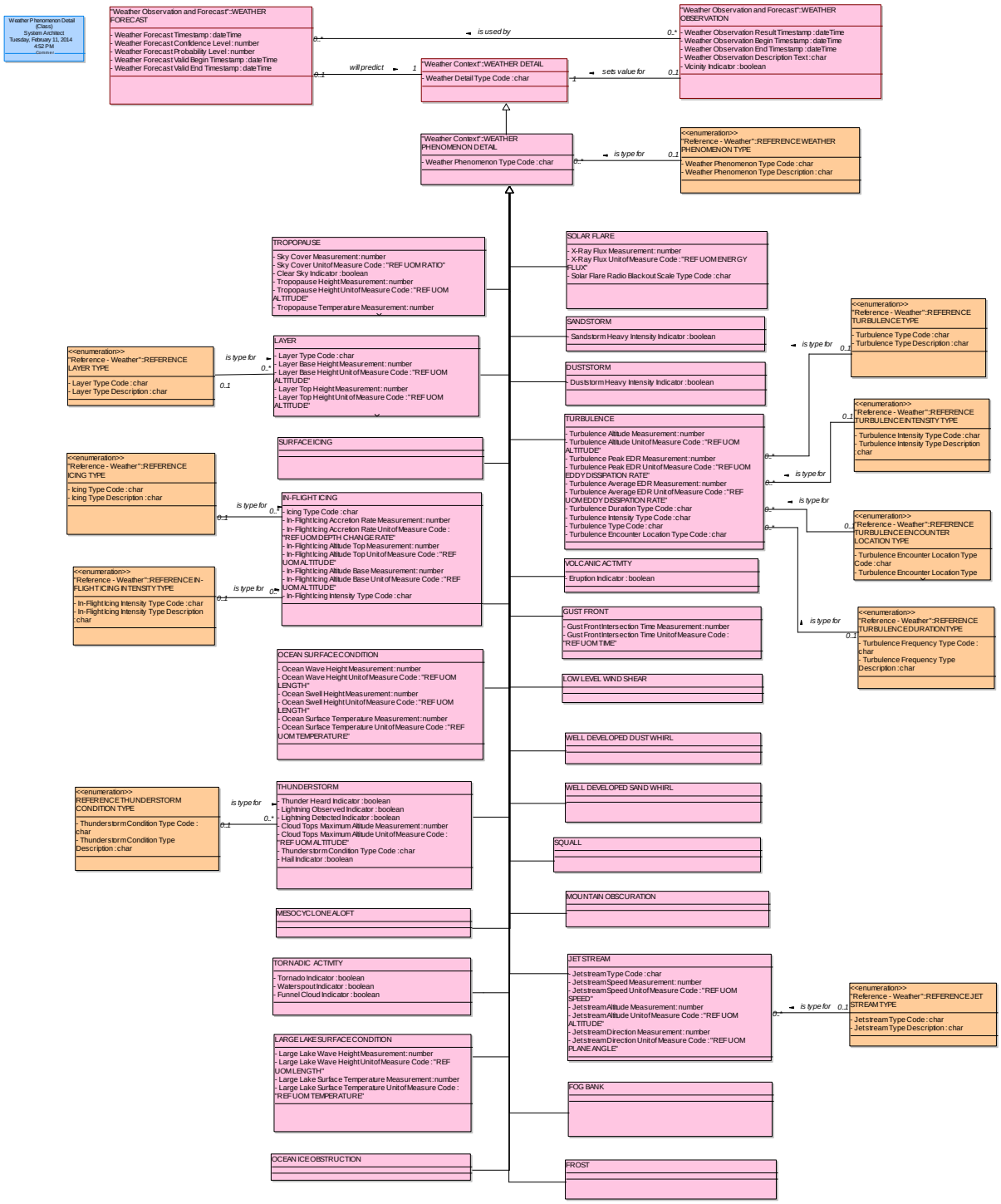

Figure 28 Weather Phenomenon Detail

Weather Observation

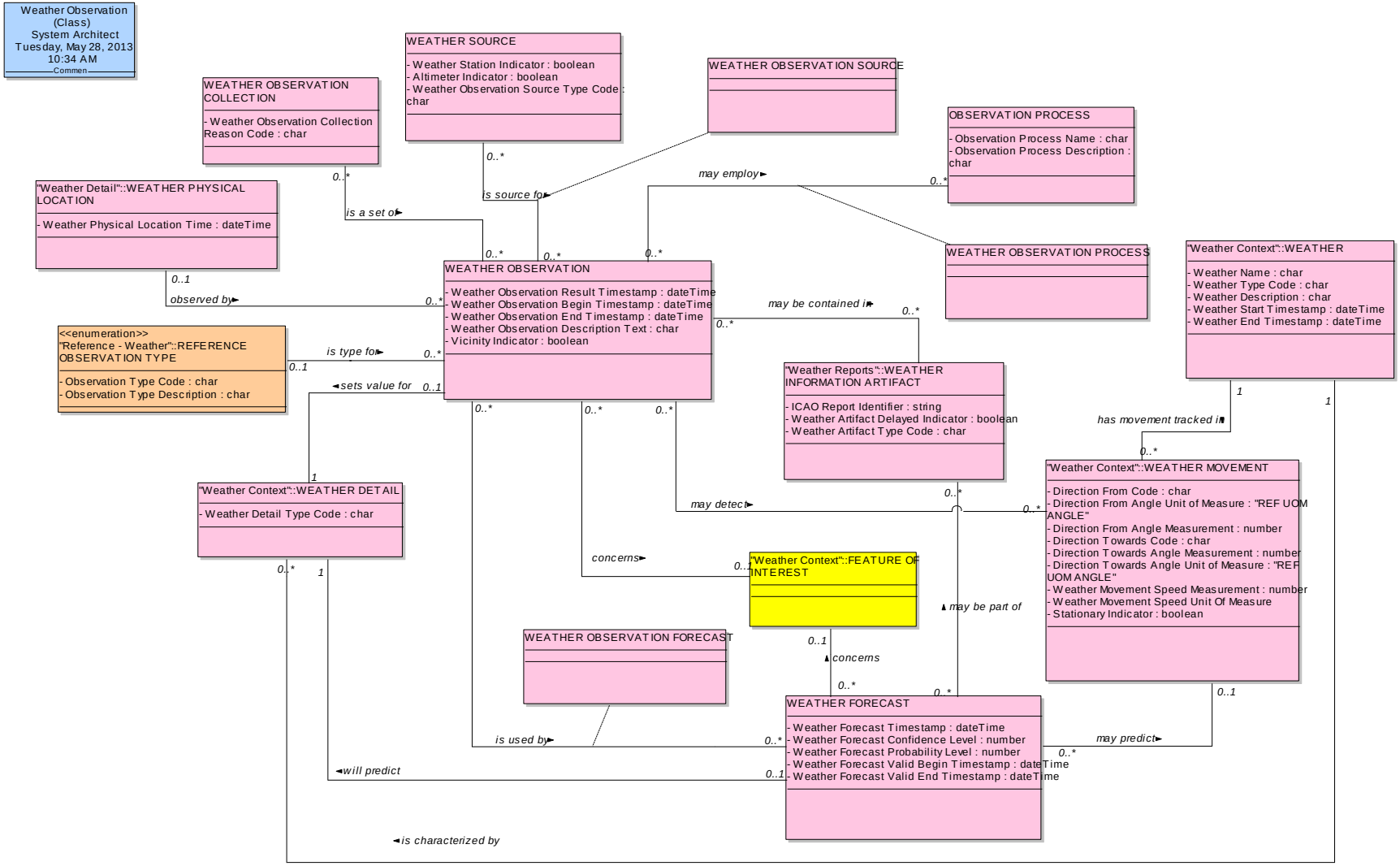

Figure 29 Weather Observation Diagram

Weather Observation Source

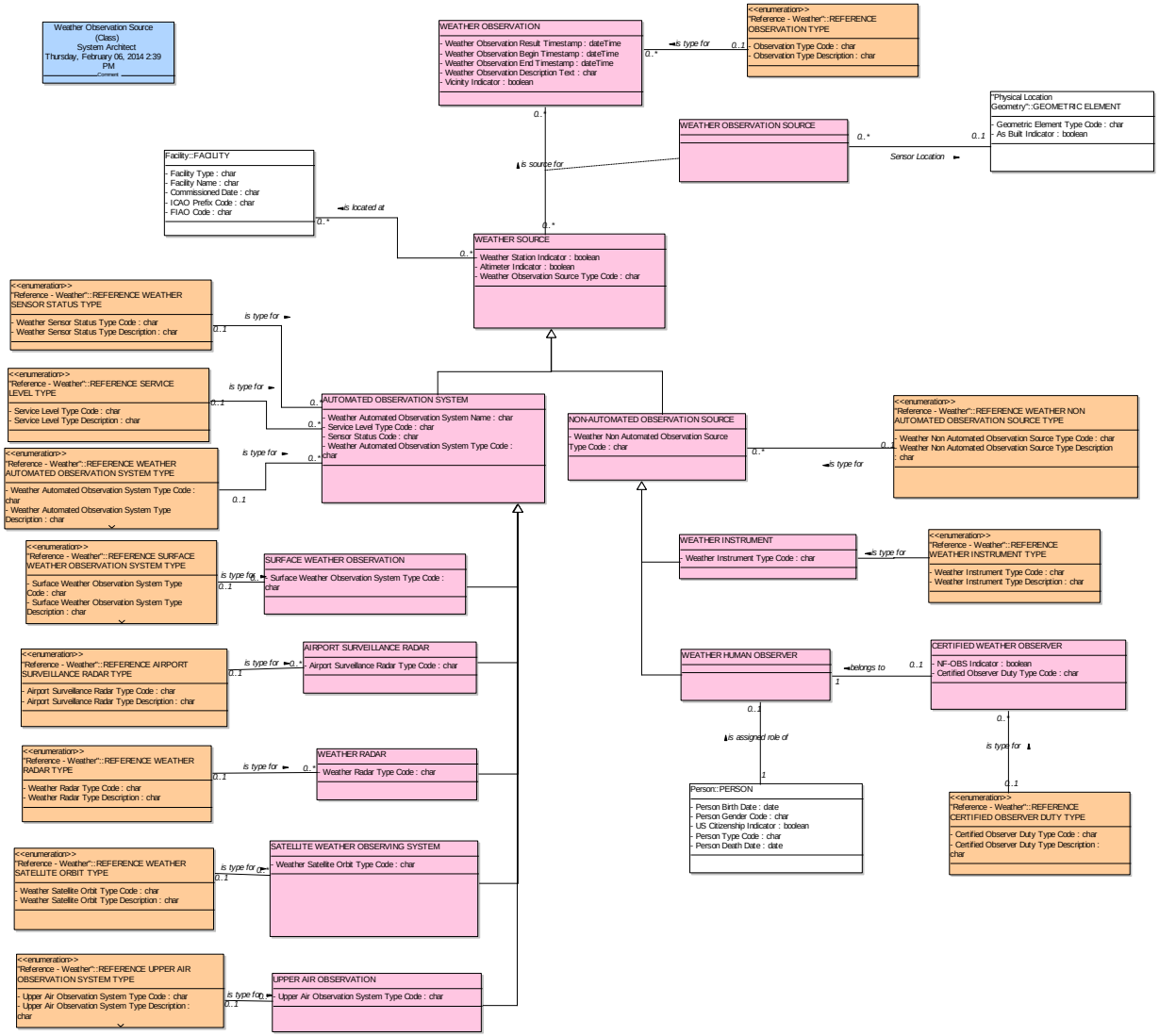

Figure 30 Weather Observation Source Diagram

Weather Forecast

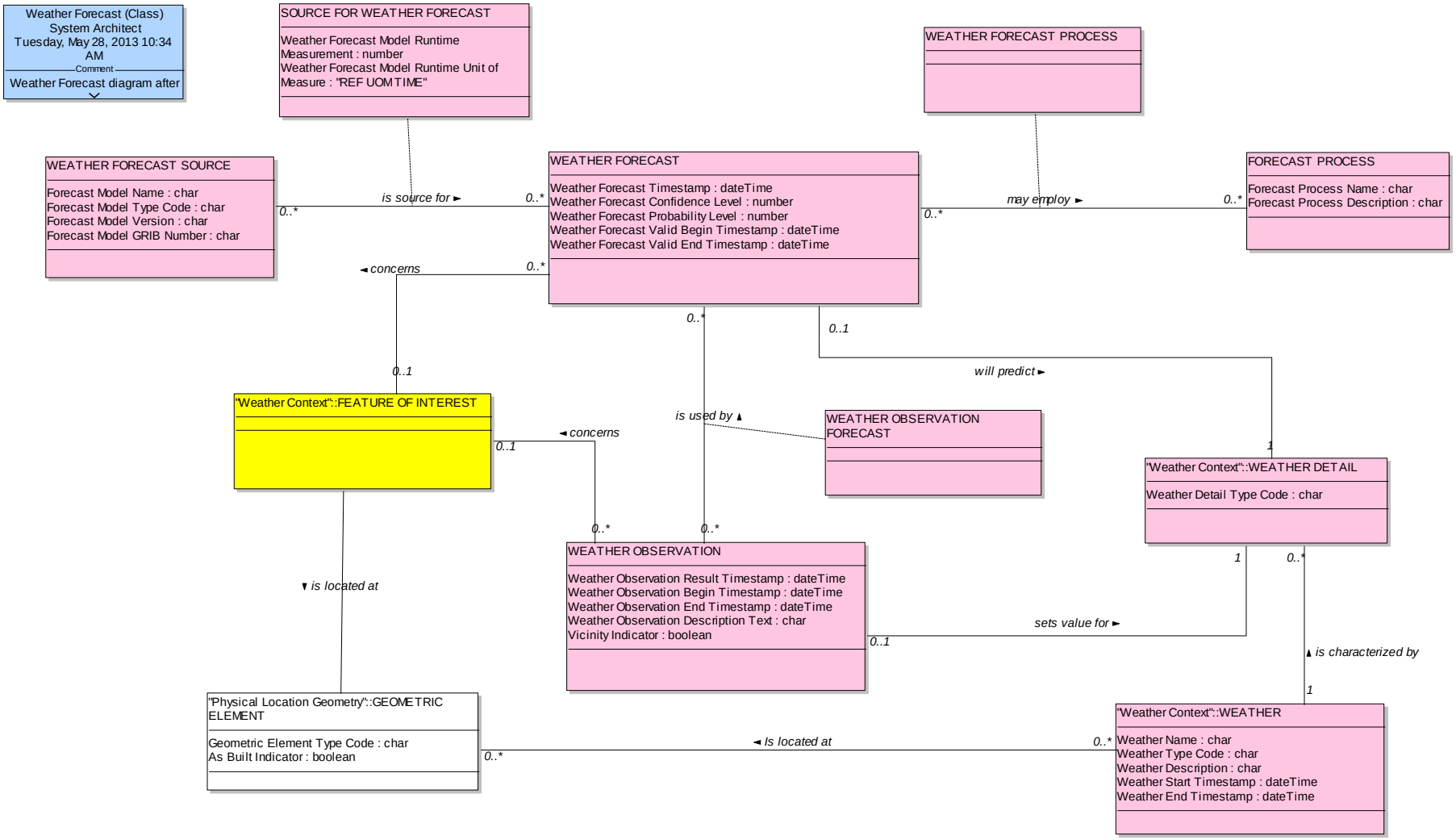

Figure 31 Weather Forecast Diagram

Weather Analysis

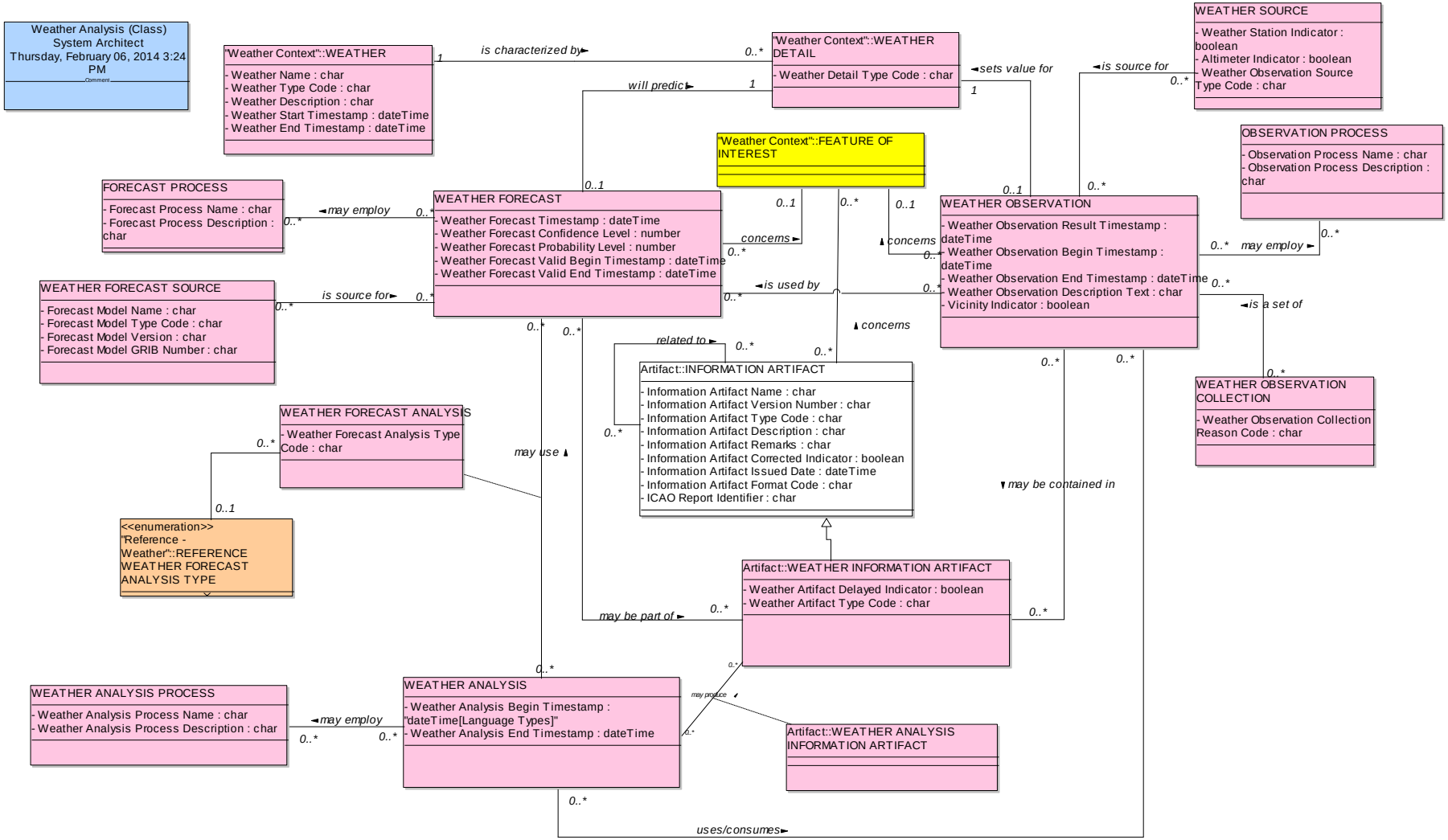

Figure 32 Weather Analysis Diagram

Weather Artifact

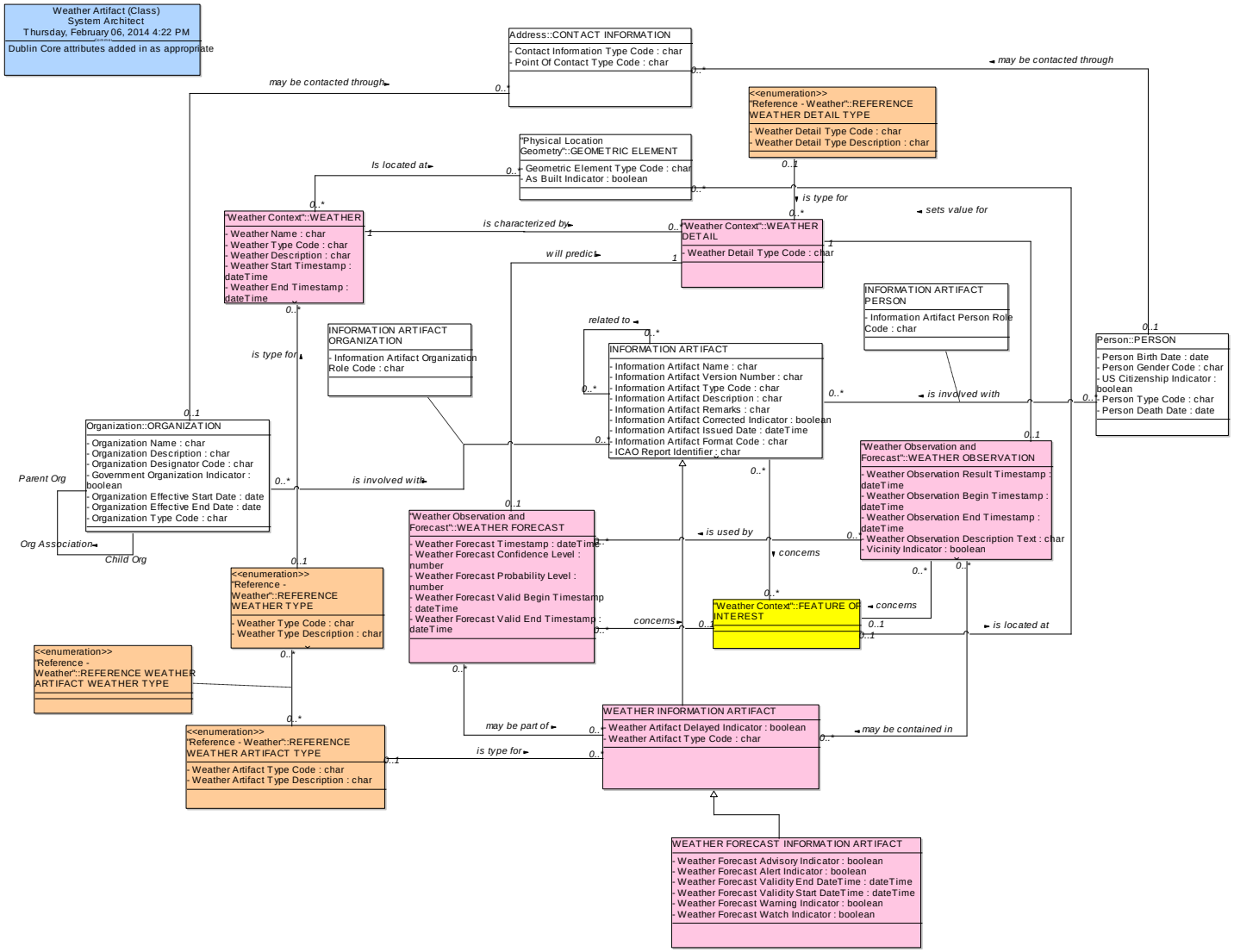

Figure 33 Weather Artifact Diagram

3 Product Maturity/Next Steps

The general stability of logical enterprise data over time means that the Mid-Term OV-7 will serve as the FAA's data definition across all future timeframes unless the mission of the NAS changes. The OV-7 itself will continue to evolve and expand as existing models are refined according to new modeling standards, and previously un-modeled subject areas are captured.

Detailed Next Steps for the Mid-Term OV-7 include:

- Extending the Mid-Term OV-7 to include:
  - Security and Safety data
  - Certification (Aircraft and Crew) and Inspection data
  - Technical Operations data
- Refining additional diagrams to be in conformance with all FAA modeling standards
- Working with Program architects to ensure their physical data models are in alignment with the Mid-Term OV-7, and extending the Mid-Term OV-7 with any newly discovered data.

Appendix A: Acronyms

AC	Advisory Circular
AIXM	Aeronautical Information Exchange Model
ANG	Office of NextGen
ATC	Air Traffic Control
ATM	Air Traffic Management
EA	Enterprise Architecture
FAA	Federal Aviation Administration
FIXM	Flight Information Exchange Model
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
METAR	Meteorological Aerodrome Report
MT	Mid-Term
NAS	National Airspace System
NAVAID	Navigation Aid
NextGen	Next Generation Air Transportation System
OV	Operational View
PIREP	Pilot Report
SME	Subject Matter Expert
TAF	Terminal Area Forecast
UML	Unified Modeling Language