OGC CDB Core Model and Physical Structure Annexes (Best Practice)

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License Agreement

i. Abstract

This document provides the Annexes for the CDB Core: Model and Physical Structure Standard. The only exception is Annex A, Abstract Test Suite (ATS). The CDB ATS Annex is in Volume 1: Core document.

ii. Keywords

The following are keywords to be used by search engines and document catalogues.

ogcdoc, OGC document, ogcdoc, CDB, annexes

iii. Preface

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium shall not be held responsible for identifying any or all such patent rights.

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

iv. Submitting organizations

The following organizations submitted this Document to the Open Geospatial Consortium (OGC):

Organization name(s)

- CAE Inc.
- Carl Reed, OGC Individual Member
- Envitia, Ltd
- Glen Johnson, OGC Individual Member
- KaDSci, LLC
- Laval University
- Open Site Plan
- University of Calgary
- UK Met Office

The OGC CDB standard is based on and derived from an industry developed and maintained specification, which has been approved and published as OGC Document 15-003: OGC Common Data Base Volume 1 Main Body. An extensive listing of contributors to the legacy industry-led CDB specification is at Chapter 11, pp 475-476 in that OGC Best Practices Document (https://portal.opengeospatial.org/files/?artifact_id=61935).

v. Submitters

All questions regarding this submission should be directed to the editor or the submitters:

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Chapter 1. Scope

This document contains a number of annexes related to the OGC CDB Core standard.

For the purposes of being able to cross reference this OGC Best Practice with the previous versions of the CDB standard, the following annex “crosswalk” is provided.

OGC Best Practice and CDB 3.2	**OGC CDB Standard Version 1.0**
Formerly Annex A10 in Volume 2	Annex B Rationale: Sensor Simulation - Achieving Device-Independence
Main Body: Rationale for using JPEG	Annex C Reasons for Using JPEG
Formerly Annex B in Volume 2	Annex D: TIFF Implementation Requirements
Formerly Annex D in Volume 2	Annex E: ShapeFile dBASE III Guidance
Formerly Annex A.11 in Volume 2	Annex F: Annex F Rationale: Partitioning the Earth into Tiles
Formerly Annex A.12	Annex G Rationale: Importance of Level of Detail
Formerly Annex A.17 Volume 2	Annex H: JPEG Informative annex
Was Annex U, Volume 2	Annex I ZIP File Informative annex
Formerly Annex E, Volume 2	Annex J: Light Hierarchy
Formerly Annex M, Volume 2	Annex M: CDB Directory Naming and Structure
Formerly Annex O, Volume 2	Annex O: List of Texture Component Selectors
Formerly Annex Q, Volume 2	Annex Q: Table of Dataset Codes
Formerly Annex R, Volume 2	Annex R: Derived Datasets within the CDB
Formerly Annex S, Volume 2	Annex S: Default Read and Write values to be used by Simulator Client-Devices

For ease of editing and review, the standard has been separated into 12 Volumes and a schema repository.

- Volume 0: OGC CDB Companion Primer for the CDB standard (Best Practice).
- Volume 1: OGC CDB Core Standard: Model and Physical Data Store Structure. The main body (core) of the CDB standard (Normative).
- Volume 2: OGC CDB Core Model and Physical Structure Annexes (Best Practice).
- Volume 3: OGC CDB Terms and Definitions (Normative).
- Volume 4: OGC CDB Rules for Encoding CDB Vector Data using Shapefiles (Best Practice).
- Volume 5: OGC CDB Radar Cross Section (RCS) Models (Best Practice).
- Volume 6: OGC CDB Rules for Encoding CDB Models using OpenFlight (Best Practice).
- Volume 7: OGC CDB Data Model Guidance (Best Practice).
- Volume 8: OGC CDB Spatial Reference System Guidance (Best Practice).

- Volume 9: OGC CDB Schema Package: http://schemas.opengis.net/cdb/ provides the normative schemas for key features types required in the synthetic modelling environment. Essentially, these schemas are designed to enable semantic interoperability within the simulation context (Normative).
- Volume 10: OGC CDB Implementation Guidance (Best Practice).
- Volume 11: OGC CDB Core Standard Conceptual Model (Normative).
- Volume 12: OGC CDB Navaids Attribution and Navaids Attribution Enumeration Values (Best Practice).
- Volume 13: OGC CDB Rules for Encoding CDB Vector Data using GeoPackage (Normative, Optional Extension).
- Volume 14: OGC CDB Guidance on Conversion of CDB Shapefiles into CDB GeoPackages (Best Practice).
- Volume 15: OGC CDB Optional Multi-Spectral Imagery Extension (Normative).

Chapter 2. Conformance

This section is not applicable to this document.

Chapter 3. References

The following normative documents contain provisions that, through reference in this text, constitute provisions of this document. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

Chapter 4. Terms and Definitions

This document uses the terms defined in Sub-clause 5.3 of [OGC 06-121r8], which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this Best Practice.

Other Terms and Definitions may be found in Volume 3: OGC CDB Terms and Definitions (normative) of Best Practice.

Chapter 5. Conventions

This section provides details and examples for any conventions used in the document. Examples of conventions are symbols, abbreviations, use of XML schema, or special notes regarding how to read the document.

5.1. Identifiers

The normative provisions in this Best Practice are denoted by the URI

http://www.opengis.net/spec/CDB/1.0/annexes

All requirements and conformance tests that appear in this document are denoted by partial URIs which are relative to this base.

Annex A: Conformance Class Abstract Test Suite (Normative)

Not applicable for this document.

Annex B: Rationale: Sensor Simulation - Achieving Device-Independence

Formerly Annex A10 in Volume 2

One of the primary objectives of the CDB Standard is to provide and integrate all of the data required by all sensor devices, not just Image Generators producing the Out the Window (OTW) scenes. The purpose of this integration, among other things, is to achieve and maintain a high level of correlation among the many client-devices (subsystems) within a simulator. Furthermore, this integration must be done independently of the client-device or the sensor type, with little or no duplication of data amongst clients. In addition to the OTW, many simulator client-devices are required to simulate the synthetic environment over different portions of the electromagnetic spectrum, infrared (e.g. FLIR, NVG), microwaves (e.g. radar), audio (e.g. sonar), etc. Up to now, the current state of the art approaches to the simulation of sensors has typically been quite proprietary to the client-device implementation of the various vendors. There have been no universally accepted simulation models suitable for use in simulation.

Sensor simulation typically requires a simulation of the device itself, supplemented by a complete simulation of the synthetic environment over the portion of the electromagnetic spectrum that is relevant to this device. The former simulation is referred to as the **S**ensor **S**imulation **M**odel (SSM) while the latter is called the **S**ensor **E**nvironmental **M**odel (SEM). In the past, the SEM relied heavily on environmental databases whose content was designed to match the functionality, fidelity, structure and format requirements of the SEM. The level of realism possible by the SEM depended **heavily** on the quality, quantity and completeness of the data available. The environmental database was highly device-specific and could not be readily ported to other platforms.

A SEM is usually based on mathematical model of the environment for the portion of the electromagnetic spectrum of interest. The SEM acts much as a black box that produces a response in accordance to input data. A significant portion of this data must come from the CDB; however, the key is to segregate all device-dependent data and all SEM-dependent data from the modeling data that represents the synthetic environment. In order to accommodate the most different kind of sensors possible, a common denominator must be chosen. In the CDB standard, this common denominator is called a material. This is the subject of this annex.

One of the fundamental issues of sensor simulation involves the handling of material properties. As discussed earlier, the determination of which material properties should be supported heavily depends on:

1. the sensor types to be supported;
2. the vendors’ sensor simulation implementations to be supported; and
3. the level of fidelity, functionality and precision of the SEMs to be supported.

Clearly, the task of determining a definitive list of material properties that would accommodate all of the above requirements for the today’s sensor types, vendor implementations and SEMs would be a significant challenge. Furthermore, once released, the materials properties would limit any SEM innovation by the industry. As a result, the CDB Standard limits its jurisdiction over the material properties.

Instead, the CDB standard defines and publicly defines a list of materials that can be used in a CDB. It is the responsibility of each vendor to define the properties (that satisfies the sensor type) for these CDB materials. As a result, vendors are totally free to select material properties that satisfy the fidelity, functionality and precision requirements of the SEM for the sensor type of interest. Alternately, if the vendors have their own list of materials, they can create a mapping between CDB materials and their internally supported list of materials. This approach allows client-devices to retain their SEMs as well as their own sets of material properties.

The materials.xsd and materials.xml schema in the CDB schema package enumerates the base materials supported by this standard.

Annex C: Reasons for Using Jpeg

(Formerly from body of Best Practice Volume 1)

The CDB Standard prescribes the use of an industry standard compression algorithm for its storage intensive raster imagery datasets. This not only provides a substantial reduction in storage, but also reduces the data transmission bandwidths associated with simulator's access to the synthetic environment database at runtime. As a result of its storage efficiency, the CDB Standard relies on relatively few data formats for storing its datasets. There is no benefit (other than storage efficiency) to be gained in supporting any other specialized data formats whose underlying objective is only for storage efficiency. The CDB Standard embodies the JPEG 2000 industry standard format for raster imagery because it has comparable storage efficiency to all of these image formats without sacrificing any generality. JPEG 2000 has been chosen by the CDB Standard as a format for the storage of OTW raster imagery because of the following characteristics.

1. High compression efficiency: Compression better than 0.25 bits per pixels. Virtually indiscernible loss in image quality for 10:1 – 20:1 compression.
2. Lossless and lossy compression: Lossless compression ratios approx. 1.7:1
3. Perceptual color space internal coding: Allow dark images to be reconstructed without banding artifacts.
4. High dynamic range: Compress and decompress images with various dynamic ranges (e.g., 1-bit to 16-bit) for each color component.
5. Large images sizes: Up to (2^32 - 1)

There are other characteristics of the JPEG 2000 that are worth mentioning but are not directly beneficial to the CDB Standard. Those are:

1. Progressive image reconstruction: Allow images to be reconstructed with increasing pixel accuracy and resolution.
2. Region of interest coding: Permits certain Region of Interest (ROI's) in the image to be coded and transmitted with better quality and less distortion than the rest of the image.
3. Seamless quality and resolution scalability: Without having to download the entire file
4. Error resilience during transfers.

JPEG 2000 will be solely targeted at Raster Imagery data only. The reason is simply because of its highly efficient compression scheme that fits well with the goal of reducing the huge datasets associated with Imagery. Other raster-based datasets defined in the CDB will solely be using the TIFF format due to their more manageable size.

Annex F: Rationale: Partitioning the Earth into Tiles

Formerly Appendix A11 in Volume 2 of the CDB Best Practice.

This section provides rationale for partitioning the world into tiles.

The design of the CDB standard tile representation is centered on three primary considerations.

1. A tile representation comprehensive enough to accommodate the entire earth.
2. A tile representation that lends itself to real-time implementation by a CDB system and all of its attached simulator client-devices.

   A numerically straightforward mapping (such as a simple scaling) to map lat-long coordinates into CDB coordinates and vice versa is highly desirable for real-time implementation considerations.

3. A tile representation with a system of units that conforms as much as possible to geographic standards.

   One of the underlying motivations driving the CDB tile representation is the need for a system that will remain as close to the raw source data as possible which currently is DTED and GeoTIFF; DTED uses a geographic coordinate system defined by latitudes and longitudes. The basic unit in DTED is a geo-cell, which always has a height and width of one degree. In order to maintain a density of data that does not increase inordinately when moving towards the poles, the grid post intervals (measured in degrees or arc-sec) along the longitudinal axis are increased at specific latitudes; for instance, at DTED level 2, the latitude interval is always one second of arc but the longitude interval is one second of arc at latitudes from 0 to 50 degrees, from latitudes 50 to 70 the interval is two arc seconds and so on as shown in Table A-3. INTERVALS FOR DTED LEVEL 2.

Table A-3. INTERVALS FOR DTED LEVEL 2

DTED Zone	Latitude Range (Degrees)	Latitude Interval (Arc seconds)	Longitude Interval (Arc seconds)
I	0 – 50 N-S	1	1
II	50 – 70 N-S	1	2
III	70 – 75 N-S	1	3
IV	75 – 80 N-S	1	4
V	80 – 90 N-S	1	6

Before going into the detailed design of the CDB tile representation, it is worth stating the guiding principles that constrain the approach used by the CDB tile representation.

1. The earth model is divided (in latitude) into slices.

2. The slice’s x-axis is aligned to WGS-84 lines of latitude.
3. The slice’s y-axis is aligned to WGS-84 lines of longitude.
4. The number of units along the slice’s y-axis for a given level of detail is the same for all slices.

   The earth surface geodetic dimension in arc-second of y-axis units within an earth slice and in all earth slices is exactly the same, regardless of latitude.

5. The geodetic dimension of an x-axis unit in arc-second is constant within a zone, but is re-defined at pre-selected latitudes to achieve a greater level of spatial sampling uniformity in all tiles; this overcomes the narrowing effect of increased latitudes on longitudinal distances. The definition of zones in the CDB is the same as those in DTED (with the exception of the poles).
6. The number of units along the slice’s x-axis for a given level of detail is the same within each zone.
7. The number of units along the slice’s y-axis is constrained to a 2^n-multiple in all slices.

   Many simulator client devices impose constraints related to the run-time use of binary pyramidal structures (such as mip-maps, quadtrees, etc.). A binary pyramidal structure is simply a collection of two-dimensional arrays; each array represents the same content but at successively finer levels of resolution.

8. The number of units along the slice’s x-axis will vary depending on which zone the latitude of the slice belongs. At this point we introduce the concept of a CDB Geocell, which differs slightly from a DTED Geocell. A DTED cell is always 1 × 1 degrees. In contrast, a CDBGeocell always has a height of 1 degree but has a varying width depending on its latitude. Table A-4. Size of CDB Geocell per zone shows the dimensions of a CDB Geocell per zones of latitude. For instance, in latitude zone 5, which goes from –50 to 50 degrees latitude, a CDB Geocell is 1 × 1 degree, in zone 4 and 6 which goes from latitude 50 to 70 degrees the cell size is 1 × 2 degrees. The main reason to introduce this concept is to maintain a reasonable eccentricity between the sides by trying to keep them as close to a square as possible. Two criteria are used to define the size of a CDB Geocell.
   1. A CDB Geocell must contain a whole number of DTED Geocells; in other words a CDB Geocell must start and end on a whole degree along the longitudinal axis. This is done so as to facilitate mapping from CDB Geocells to DTED Geocells.
   2. The length of the CDB Geocell must be a whole factor of 180, in other words length of 1, 2, 3, 4, 6 and 12 degrees are legal but lengths of 7 and 8 degrees would not be since these are not exact factors of 180.

Table A-4. Size of CDB Geocell per zone

CDB Zone	Latitude Range (Degrees)	CDBGeocell size (deg Lat × deg Lon))	Number of DTED Geocells
0	–90 ≤ lat < –89	1 X 12	12
1	–89 ≤ lat < –80	1 X 6	6
2	–80 ≤ lat < –75	1 X 4	4
3	–75 ≤ lat < –70	1 X 3	3

CDB Zone	Latitude Range (Degrees)	CDBGeocell size (deg Lat × deg Lon))	Number of DTED Geocells
4	–70 ≤ lat < –50	1 X 2	2
5	–50 ≤ lat < +50	1 X 1	1
6	+50 ≤ lat < +70	1 x 2	2
7	+70 ≤ lat < +75	1 x 3	3
8	+75 ≤ lat < +80	1 x 4	4
9	+80 ≤ lat < +89	1 x 6	6
10	+89 ≤ lat < +90	1 x 12	12

The variable CDB Geocell size in the CDB standard has the following benefits.

1. Reduces the simulator client processing overheads associated with the switching from one zone to another. (Due to the small number of zones across the earth.)
2. Reduces the variation of longitudinal dimensions (in meters) to a maximum of 50%.
3. Improves storage efficiency.

Annex G: Rationale: Importance of Level of Detail

Formerly Appendix A-12 of Volume 2 of the OGC CDB Best Practice.

The availability of LODs for most datasets is critical for real-time performance. Many simulator client-devices can readily take advantage of an LOD structure because many clients naturally require less detail with increasing distance away from the simulated own ship position. For example, the projection of screen pixels (i.e. pixels in an IG image plane) onto near-field terrain subtends much less area than the projection of screen pixel onto far-field terrain near the horizon; as a result, much less detail is required at far range. In addition, clients may need to revert to an alternate coarser representation if they cannot cope with the paging bandwidths, memory footprint or computational requirements of finer LODs. This provides a solid basis on which client-devices can build paging managers, load management and memory management algorithms.

The following example illustrates the important performance considerations and the inherent performance advantage that can be achieved with an LOD structure. Consider a simulator client-device, with a capability to display terrain imagery out to 128 km; the imagery is 1m at its finest available resolution and the simulated ownship is flying at 100 m/s. Under these conditions, and without the benefit of an LOD organization (as illustrated in Figure A-15: Paging of Terrain Imagery without an LOD Structure), the client-device would require access to the imagery at a rate of ~100 Mpixels/sec. Consider on the other hand the same operating conditions but with the client-device accessing LOD-organized imagery (as illustrated in Figure A-14: Paging of Terrain Imagery with an LOD Structure). Furthermore, assume that the client-device only requires 1m imagery for ranges less than 1/2 km, 2m for ranges less than 1km, 4m for ranges less than 2km, and so on. With the benefit of an LOD structure, the client-device would require access to the imagery at a much lower rate of ~1 Mpixels/sec, reducing access bandwidth by a factor of ~100x over the non-LOD approach. Clearly, such performance gains cannot be ignored for real-time applications such as flight simulators, especially when one realizes that access bandwidth increases as the square of the imagery resolution.

In addition to a reduction in access bandwidth, the LOD structure also benefits simulator client-devices that have a requirement to dynamically filter the data to control aliasing. In effect, part of the client-device filtering process is relegated to an off-line process.

The CDB standard does not enforce, nor does it specify the type of filter used to compute the data element values of raster-organized or list-organized datasets. Yet, it is clear that inadequate off-line filter may affect the rendering quality of the affected client-devices. As a result, the CDB standard provides guidelines to govern the quality of the off-line LOD process; these guidelines are provided with each of the raster-organized dataset (or list-organized datasets in future releases of the CDB standard).

Figure A-14: Paging of Terrain Imagery with an LOD Structure

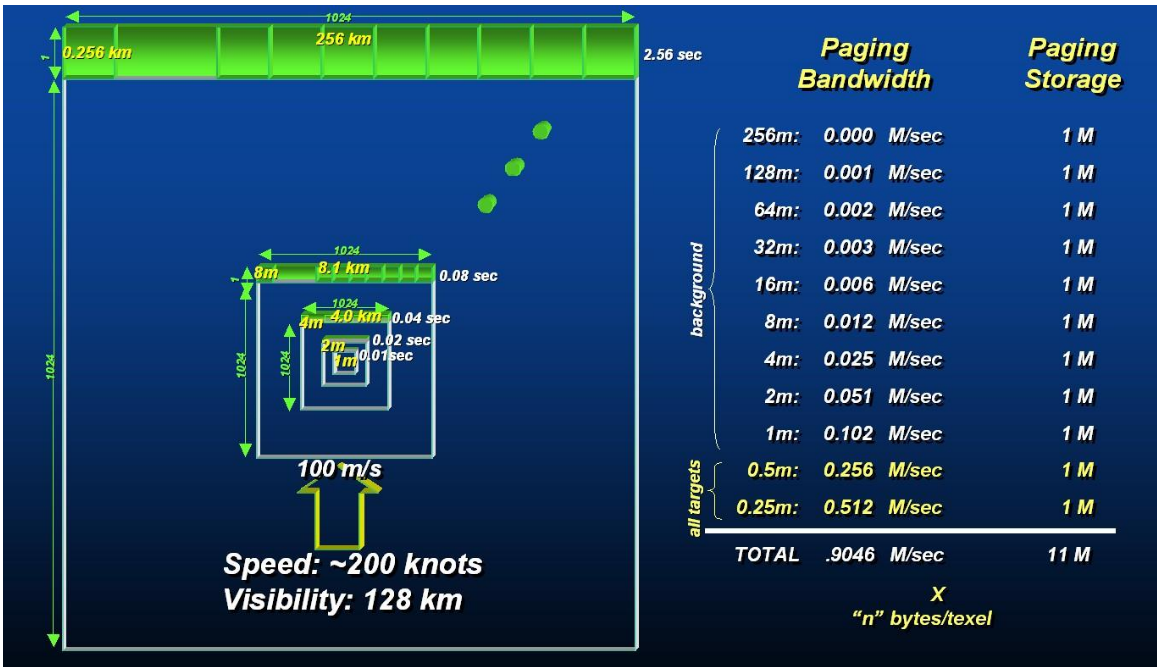
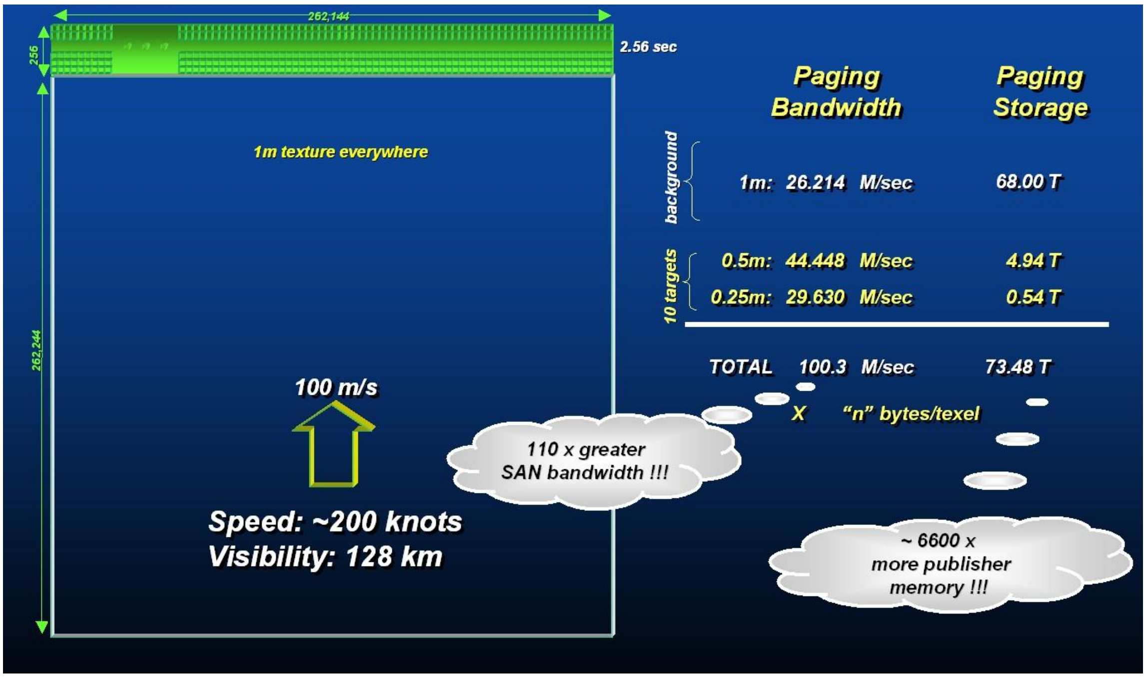


Figure A-15: Paging of Terrain Imagery without an LOD Structure



Annex H: Informative: JPEG

Formerly Appendix A.17 in Volume 2 of the OGC CDB Best Practice

The CDB standard supports JPEG2000 for both VSTI and VSTLM component data.

As a result of the high rates of compression there are no real advantages to be gained in supporting a broad range of alternate color representations (such as single channel representations, indexed color representations, RGB-triplet color encoding such as 5-6-5, etc.). The underlying motivation behind all such schemes is driven by a desire to reduce storage and transmission bandwidths. JPEG-2000 achieves these goals and many others, refer to Table A-8 JPEG 2000 Features.

Table A-8 JPEG 2000 Features

High compression efficiency: Compression better than 0.25 bits per pixels, 20% compression efficiency improvement over JPEG.	**High dynamic range: Compress images with various dynamic ranges (e.g. 1-16 bit) for each color component.**
Lossless and lossy compression: Lossless compression ratios approx. 1.7:1.	**Seamless quality / resolution scalability:** Without having to download the entire file.
Progressive image reconstruction: Allows images to be reconstructed with increasing pixel accuracy and resolution.	**Large images sizes - up to (2^{32} - 1).**
Perceptual color space internal coding.	**Single decompression architecture.**
Region of interest coding: Permits certain ROI’s in the image to be coded and transmitted with better quality and less distortion than the rest of the image.	**Error resilience during transfers.**

Annex I: Informative: ZipFile Format Notes

Formerly Annex U in Volume 2 of the OGC CDB Best Practice

The archive zip format used in the CDB standard is based on

```
APPNOTE.TXT - .ZIP File Format Specification

URL: http://www.pkware.com/documents/APPNOTE/APPNOTE-6.3.1.TXT

Version: 6.3.1

Revised: April 11, 2007

Copyright (c) 1989 - 2007 PKWARE Inc., All Rights Reserved.

The use of certain technological aspects disclosed in the currentAPPNOTE
is available pursuant to the below section entitled "Incorporating
PKWARE Proprietary Technology into Your Product".
```

CDB zip compliant reader is required to support as a minimum the following features defined in APPNOTE.TXT:

- Local file header (Note: Extra field can be inserted but not required to be read)
- File data
- Data descriptor:
- Central directory structure (Note: Digital signature is supported but will not be read)
- End of central directory record: (Note: ZIP file comments are supported but will not be read)

The compression methods supported:

- No compression
- Deflate (Enhanced Deflate is not required to be supported)

The following features are not required to be supported thus are optional and left to the implementation:

- Archive decryption header
- Archive extra data record.
- Zip64 end of central directory record
- Zip64 end of central directory locator
- Splitting and Spanning ZIP files
- Encryptions of any type

Note that anything not listed in this section is by default assumed not to be supported.

Annex J: Light Names and Hierarchy

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
1	Light	0	0	0	All purpose generic Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
2	Platform	1	1	1	Generic Platform Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
3	Air	2	2	2	Generic Aircraft Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
4	Aircraft Helos	3	3	3	Generic Light for Aircraft and Helicopters	0.8	1 | 1 | 1	Omni	—	—	—	—	—
5	Anti-collision	4	4	4	Generic Anti collision Light - normally red flashing	0.8	1 | 0 | 0	Omni	—	—	—	—	—
6	Bottom Light	5	5	5	Anti-collision found on bottom of the fuselage	0.8	1 | 0 | 0	Omni	—	—	—	—	—
7	NVG Bottom Light	6	6	6	Anti-collision found on bottom of the fuselage in NVG Mode	0.8	1 | 0 | 0	Omni	—	—	—	—	—
8	Top Light	7	7	7	Anti-collision found on Top of the fuselage	0.8	1 | 0 | 0	Omni	—	—	—	—	—
9	NVG Top Light	8	8	8	Anti-collision found on Top of the fuselage in NVG Mode	0.8	1 | 0 | 0	Omni	—	—	—	—	—
10	High Intensity		501	501	High Intensity Anti-collision Light	0.95	1 | 0 | 0	Omni	—	—	—	0.7	0.25
11	Formation Light	9	9	9	Florescent formation strip Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
12	Flood Light	10	10	10	White flood Lights used to illuminate the ground or part of the aircraft	0.8	1 | 1 | 1	Omni	—	—	—	—	—
13	Head Light	11	11	11	Head Light used to allow pilots to see ahead	0.8	1 | 1 | 1	Omni	—	—	—	—	—
14	Identification Strobe	12	12	12	Generic Strobe Lights used in flight to indicate position	0.8	1 | 1 | 1	Omni	—	—	—	1	0.05
15	Red Light	13	13	13	Red identification strobe Light	0.8	1 | 0 | 0	Omni	—	—	—	1	0.05
16	White Light	14	14	14	White identification strobe Light	0.8	1 | 1 | 1	Omni	—	—	—	1	0.05
17	IR Light	15	15	15	Infrared Lights used to indicate position using infrared instruments	0.8	1 | 1 | 1	Omni	—	—	—	—	—
18	Landing Light	16	16	16	White Lights used on Landing approach	0.9	1 | 1 | 1	Dir	60	60	—	—	—
19	Navigation	17	17	17	Generic Lights used in flight to indicate position	0.8	1 | 1 | 1	Omni	—	—	—	—	—
20	Red Light	18	18	18	Red Navigation Light found on the left wing	0.8	1 | 0 | 0	Omni	—	—	—	—	—
21	Flashing Red Light		502	502	Flashing Red Navigation Light found on the left wing	0.8	1 | 0 | 0	Omni	—	—	—	1	0.5
22	Green Light	19	19	19	Green Navigation Light found on the right wing	0.8	0 | 1 | 0	Omni	—	—	—	—	—
23	Flashing Green Light		503	503	Flashing Green Navigation Light found on the right wing	0.8	0 | 1 | 0	Omni	—	—	—	1	0.5
24	White Light	20	20	20	White Navigation Light found on the tail wing	0.8	1 | 1 | 1	Omni	—	—	—	—	—
25	Flashing White Light		504	504	Flashing White Navigation Light found on the tail wing	0.8	1 | 1 | 1	Omni	—	—	—	1	0.5
26	NVG Light	21	21	21	Navigation Light used in NVG Mode	0.8	1 | 1 | 1	Omni	—	—	—	—	—
27	Tail Light	22	22	22	White Tail Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
28	Tail Flood	23	23	23	Flood Light used to illuminated the tail, showing of the logo or markings	0.8	1 | 1 | 1	Omni	—	—	—	—	—
29	Taxi Light	24	24	24	White Lights used when Aircrafts taxi on the ground	0.8	1 | 1 | 1	Dir	40	40	—	—	—
30	Wingtip Obstruction	25	25	25	Generic Wintip obstruction Light	0.8	1 | 0 | 0	Omni	—	—	—	0.5	0.33
31	Red Light	26	26	26	Red Obstruction Light found on left wing	0.8	1 | 0 | 0	Omni	—	—	—	0.5	0.33
32	Green Light	27	27	27	Green Obstruction Light found on right wing	0.8	0 | 1 | 0	Omni	—	—	—	0.5	0.33
33	Civil	28	28	28	Generic Civil aircraft Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
34	Business	29	29	29		0.8	1 | 1 | 1	Omni	—	—	—	—	—
35	Regional	30	30	30		0.8	1 | 1 | 1	Omni	—	—	—	—	—
36	Transport	31	31	31		0.8	1 | 1 | 1	Omni	—	—	—	—	—
37	Widebody	32	32	32		0.8	1 | 1 | 1	Omni	—	—	—	—	—
38	Military	33	33	33	Generic Military aircrafts Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
39	Cargo Light	34	34	34	Cargo Light	0.8	1 | 1 | 1	Dir	180	60	—	—	—
40	IR	35	35	35	Infrared Cargo Light	0.8	1 | 1 | 1	Dir	180	60	—	—	—
41	Refueling Light	36	36	36	Refueling Light	0.8	1 | 1 | 1	Dir	60	60	—	—	—
42	Search Light	37	37	37	Search Light	0.9	1 | 1 | 1	Dir	10	10	—	—	—
43	NVG Light	38	38	38	Search Light used in NVG Mode	0.9	1 | 1 | 1	Dir	10	10	—	—	—
44	ASW_Patrol	39	39	39	Generic ASW Patrol Aircraft Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
45	Bomber	40	40	40	Generic Bomber Aircraft Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
46	Cargo Tanker	41	41	41	Generic Cargo Tanker Aircraft Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
47	Pod Light	425	466	466	Generic Pod Lights on Cargo Tanker	0.8	1 | 1 | 1	Omni	—	—	—	—	—
48	Starboard	426	467	467	Generic Starboard Pod Lights on Cargo Tanker	0.8	1 | 1 | 1	Omni	—	—	—	—	—
49	Green Light	427	468	468	Green Light Aft of Starboard pod	0.8	0 | 1 | 0	Omni	—	—	—	—	—
50	Red Light	428	469	469	Red Light Aft of Starboard pod	0.8	1 | 0 | 0	Omni	—	—	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
51	Yellow_Light	429	470	470	Yellow Light Aft of Starboard pod	0.6	1 | 1 | 0	Omni	—	—	—	—	—
52	Port	430	471	471	Generic Port Pod Lights on Cargo Tanker	0.6	1 | 1 | 1	Omni	—	—	—	—	—
53	Green_Light	431	472	472	Green Light Aft of Port pod	0.6	0 | 1 | 0	Omni	—	—	—	—	—
54	Red_Light	432	473	473	Red Light Aft of Port pod	0.6	1 | 0 | 0	Omni	—	—	—	—	—
55	Yellow_Light	433	474	474	Yellow Light Aft of Port pod	0.6	1 | 1 | 0	Omni	—	—	—	—	—
56	Aldus_Light	434	475	475	Generic Aldus Lights on Cargo Tanker	0.6	1 | 1 | 1	Omni	—	—	—	—	—
57	Starboard	435	476	476	Generic Starboard Aldus Lights on Cargo Tanker	0.6	1 | 1 | 1	Omni	—	—	—	—	—
58	Amber_Light	436	477	477	Amber aldus Light at Starboard Aft door	0.6	1 | 0.6 | 0	Omni	—	—	—	—	—
59	Green_Light	437	478	478	Green aldus Light at Starboard Aft door	0.6	0 | 1 | 0	Omni	—	—	—	—	—
60	Red_Light	438	479	479	Red aldus Light at Starboard Aft door	0.6	1 | 0 | 0	Omni	—	—	—	—	—
61	Yellow_Light	439	480	480	Yellow aldus Light at Starboard Aft door	0.6	1 | 1 | 0	Omni	—	—	—	—	—
62	Port	440	481	481	Generic Port Aldus Lights on Cargo Tanker	0.6	1 | 1 | 1	Omni	—	—	—	—	—
63	Amber_Light	441	482	482	Amber aldus Light at Port Aft door	0.6	1 | 0.6 | 0	Omni	—	—	—	—	—
64	Green_Light	442	483	483	Green aldus Light at Port Aft door	0.6	0 | 1 | 0	Omni	—	—	—	—	—
65	Red_Light	443	484	484	Red aldus Light at Port Aft door	0.6	1 | 0 | 0	Omni	—	—	—	—	—
66	Yellow_Light	444	485	485	Yellow aldus Light at Port Aft door	0.6	1 | 1 | 0	Omni	—	—	—	—	—
67	Fighter	42	42	42	Generic Fighter Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
68	Helicopter	43	43	43	Specific Military Helicopter Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
69	Slung_Load_Light	44	44	44	Light used to illuminate objects carried on a slung load	0.7	1 | 1 | 1	Omni	—	—	—	—	—
70	Attack	45	45	45	Generic Attack Helicopter Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
71	Cargo	46	46	46	Generic Cargo Helicopter Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
72	Special_Ops	47	47	47	Generic Special-Ops Helicopter Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
73	MH47-E	445	486	486	Generic Special-Ops MH47-E Helicopter Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
74	Porch_Light	446	487	487	Lower White on bottom of Aft pylon near exhaust	0.6	1 | 1 | 1	Omni	—	—	—	—	—
75	Utility	48	48	48	Generic Utility Helicopter Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
76	Tanker	49	49	49	Generic Tanker Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
77	Unmanned	50	50	50	Generic Military Unmanned Aerial Vehicle (UAV) Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
78	Navigation		494	494	Generic Nav Lights on UAVs to indicate position	0.6	1 | 1 | 1	Omni	—	—	—	—	—
79	Red_Light		495	495	Red navigation Light found on left wing	0.6	1 | 0 | 0	Omni	—	—	—	—	—
80	Green_Light		496	496	Green navigation Light found on right wing	0.6	0 | 1 | 0	Omni	—	—	—	—	—
81	White_Light		497	497	White navigation Light usually on the tail	0.6	1 | 1 | 1	Omni	—	—	—	—	—
82	Position		498	498	Generic Position Lights on UAVs to indicate position	0.6	1 | 1 | 1	Omni	—	—	—	—	—
83	Orange_Light		499	499	Orange position Light	0.6	1 | 0.5 | 0	Omni	—	—	—	—	—
84	White_Light		500	500	White position Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
85	Land	51	51	51	Generic Land Vehicle Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
86	Backup_Light	52	52	52	White Lights that indication a vehicle backing up	0.3	1 | 1 | 1	Omni	—	—	—	—	—
87	Blinking_Emergency_Light	53	53	53	Yellow flashing emergency Lights (i.e. 4-way flashing indicator Light	0.4	1 | 1 | 0	Omni	—	—	—	0.5	0.5
88	Blinking_Turn_Light	54	54	54	Yellow blinking turning indicator Light	0.4	1 | 1 | 0	Omni	—	—	—	0.5	0.5
89	Brake_Light	55	55	55	Red Lights when brakes are applied	0.4	1 | 0 | 0	Omni	—	—	—	—	—
90	Headlight	56	56	56	Generic Headlight on a Land Vehicle that allow a driver to see ahead	0.5	1 | 1 | 1	Omni	—	—	—	—	—
91	Low_Beam_Light	57	57	57	Low beam head Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
92	High_Beam_Light	58	58	58	High beam head Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
93	Perimeter_Amber_Light	59	59	59	Perimeter Lights	0.4	1 | 0.6 | 0	Omni	—	—	—	—	—
94	Strobing_Blue_Light	60	60	60	Blue strobe (Flashing)	0.5	0 | 0 | 1	Omni	—	—	—	1	0.05
95	Strobing_Red_Light	61	61	61	Red strobe (Flashing)	0.5	1 | 0 | 0	Omni	—	—	—	1	0.05
96	Strobing_White_Light	62	62	62	White Strobe (Flashing)	0.5	1 | 1 | 1	Omni	—	—	—	1	0.05
97	Strobing_Yellow_Light	63	63	63	Yellow Strobe (Flashing)	0.5	1 | 1 | 0	Omni	—	—	—	1	0.05
98	Tail_Light	64	64	64	Red tail Lights	0.4	1 | 0 | 0	Omni	—	—	—	—	—
99	Turn_Signal_Light	65	65	65	Yellow turning indicator Light	0.4	1 | 1 | 0	Omni	—	—	—	—	—
100	Car	66	66	66	Generic Car Lights	0.4	1 | 1 | 1	Omni	—	—	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
101	Transport_Van	67	67	67	Generic Transport Lights	0.4	1 | 1 | 1	Omni	—	—	—	—	—
102	Truck	68	68	68	Generic Truck Lights	0.4	1 | 1 | 1	Omni	—	—	—	—	—
103	Ambulance	69	69	69	Generic Ambulance Lights	0.4	1 | 1 | 1	Omni	—	—	—	—	—
104	Firetruck	70	70	70	Generic Fire truck Lights	0.4	1 | 1 | 1	Omni	—	—	—	—	—
105	Train	71	71	71	Generic Train Lights	0.4	1 | 1 | 1	Omni	—	—	—	—	—
106	Caboose Rear Light	72	72	72	Caboose red Light at rear of a train	0.4	1 | 0 | 0	Omni	—	—	—	—	—
107	Engine Head Light	73	73	73	Train engine white head Light	0.7	1 | 1 | 1	Omni	—	—	—	—	—
108	Tank	74	74	74	Generic Tank Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
109	Surface	75	75	75	Generic Surface Vehicle Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
110	Buoy	76	76	76	Generic Buoy Lights found on a Surface Vehicle	0.8	1 | 1 | 1	Omni	—	—	—	0.22	0.5
111	Green Light	77	77	77	Green Buoy Light	0.8	0 | 1 | 0	Omni	—	—	—	0.22	0.5
112	Red Light	78	78	78	Red Buoy Light	0.8	1 | 0 | 0	Omni	—	—	—	0.22	0.5
113	White Light	79	79	79	White Buoy Light	0.8	1 | 1 | 1	Omni	—	—	—	0.22	0.5
114	Yellow Light	80	80	80	Yellow Buoy Light	0.8	1 | 1 | 0	Omni	—	—	—	0.22	0.5
115	Marine entry	81	81	81	Generic Marine Entry Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
116	Green Light	82	82	82	Green Light	0.8	0 | 1 | 0	Omni	—	—	—	—	—
117	Red Light	83	83	83	Red Light	0.8	1 | 0 | 0	Omni	—	—	—	—	—
118	Ship Boat	84	84	84	Generic Ship/boat Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
119	Navigation	85	85	85	Generic Navigation Lights on a Ship Boat	0.8	1 | 1 | 1	Omni	—	—	—	—	—
120	Directional	86	86	86	Generic Directional navigation Lights	0.8	1 | 1 | 1	Dir	180	180	—	—	—
121	Green Light	87	87	87	Green directional navigation Light	0.8	0 | 1 | 0	Dir	180	180	—	—	—
122	Red Light	88	88	88	Red directional navigation Light	0.8	1 | 0 | 0	Dir	180	180	—	—	—
123	White Light	89	89	89	White directional navigation Light	0.8	1 | 1 | 1	Dir	180	180	—	—	—
124	Omnidirectional	90	90	90	Generic Omnidirectional navigation Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
125	Green Light	91	91	91	Green omnidirectional navigation Light	0.8	0 | 1 | 0	Omni	—	—	—	—	—
126	Red Light	92	92	92	Red omnidirectional navigation Light	0.8	1 | 0 | 0	Omni	—	—	—	—	—
127	White Light	93	93	93	White omnidirectional navigation Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
128	Search Light	94	94	94	Search Light	0.9	1 | 1 | 1	Dir	10	10	—	—	—
129	NVG Light	95	95	95	Search Light used in NVG mode	0.9	1 | 1 | 1	Dir	10	10	—	—	—
130	Civil	96	96	96	Generic Ship/boat civil Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
131	Anchor Light	97	97	97	Lights used to illuminate the anchor	0.8	1 | 1 | 1	Dir	180	120	—	—	—
132	Flood Light	98	98	98	Lights used to illuminate the ground or the deck	0.8	1 | 1 | 1	Dir	30	30	—	—	—
133	Mast	99	99	99	Generic Lights found on a mast of the civilian ship	0.8	1 | 1 | 1	Dir	225	120	—	—	—
134	Amber Light	100	100	100	Amber Mast Light	0.8	1 | 0.8 | 0	Dir	225	120	—	—	—
135	Green Light	101	101	101	Green Mast Light	0.8	0 | 1 | 0	Dir	225	120	—	—	—
136	Red Light	102	102	102	Red Mast Light	0.8	1 | 0 | 0	Dir	225	120	—	—	—
137	White Light	103	103	103	White Mast Light	0.8	1 | 1 | 1	Dir	225	120	—	—	—
138	Cargo	104	104	104	Generic Cargo Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
139	Container_Vessel	105	105	105	Generic Container Vessel Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
140	Ferry	106	106	106	Generic Ferry Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
141	Fishing_Vessel	107	107	107	Generic Fishing Vessel Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
142	Ocean_Liner	108	108	108	Generic Ocean Liner specific Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
143	Oil_Rig	109	109	109	Generic Oil Rig Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
144	Tanker	110	110	110	generic Tanker Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
145	Military	111	111	111	Generic Military Ship/Boat Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
146	Flare Light	112	112	112	Light effect from a Flare	0.5	1 | 1 | 1	Omni	—	—	—	—	—
147	Flood Light	113	113	113	Lights used to illuminate the ground or the deck	0.8	1 | 1 | 1	Dir	30	30	—	—	—
148	Mast	114	114	114	Generic Lights found on a mast of the military ship	0.8	1 | 1 | 1	Dir	225	120	—	—	—
149	Amber Light	115	115	115	Amber Mast Light	0.8	1 | 0.8 | 0	Dir	225	120	—	—	—
150	Green Light	116	116	116	Green Mast Light	0.8	0 | 1 | 0	Dir	225	120	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
151	Red Light	117	117	117	Red Mast Light	0.6	1 | 0 | 0	Dir	22.5	120	—	—	—
152	White Light	118	118	118	White Mast Light	0.6	1 | 1 | 1	Dir	22.5	120	—	—	—
153	HIRF	447	447	447	Generic High-Intensity Radiated Fields Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
154	Amber Light	448	448	448	Amber HIRF Light	0.6	1 | 0.6 | 0	Omni	—	—	—	—	—
155	Red Light	449	449	449	Red HIRF Light	0.6	1 | 0 | 0	Omni	—	—	—	—	—
156	Horizon Bar	119	119	119	Generic Horizon Bar Lights for landing on ship	0.5	0 | 1 | 0	Omni	—	—	—	—	—
157	Green Light	120	120	120	Green horizon bar Light	0.5	0 | 1 | 0	Omni	—	—	—	—	—
158	White Light	121	121	121	White horizon bar Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
159	Stern	450	450	450	Generic Stern Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
160	Port Light	451	451	451	Port stern Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
161	Starboard Light	452	452	452	Starboard stern Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
162	VertRep Light	453	453	453	Vertical Replenishment Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
163	Aircraft Carrier	122	122	122	Generic aircraft carrier Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
164	Approach Light	123	123	123	Aircraft Carrier approach Lights	0.5	1 | 1 | 1	Dir	75	75	—	—	—
165	Approach Strobe Light	124	124	124	Aircraft Carrier approach strobe Lights	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
166	Deck	125	125	125	Generic Deck Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
167	Aft Light	126	126	126	Deck Aft area 1/4 mark	0.5	1 | 1 | 1	Omni	—	—	—	—	—
168	Fore Light	127	127	127	Deck Fore area 3/4 mark	0.5	1 | 1 | 1	Omni	—	—	—	—	—
169	Edge	128	128	128	Generic Edge Light found on a Deck	0.5	0 | 0 | 1	Omni	—	—	—	—	—
170	Blue Light	129	129	129	Blue Deck edge Light	0.5	0 | 0 | 1	Omni	—	—	—	—	—
171	Red Light	454	454	454	Red Deck edge Light	0.5	1 | 0 | 0	Omni	—	—	—	—	—
172	White Light	130	130	130	White Deck edge Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
173	Obstruction Light	131	131	131	Deck Light indicating the presence of an object which is dangerous to an aircraft	0.5	1 | 0 | 0	Omni	—	—	—	0.5	0.33
174	Mark Area	132	132	132	Generic Mark Area found on a deck	0.7	1 | 0.6 | 0	Omni	—	—	—	—	—
175	Amber Light	133	133	133	Amber deck Light	0.7	1 | 0.6 | 0	Omni	—	—	—	—	—
176	Green Light	134	134	134	Green deck Light	0.7	0 | 1 | 0	Omni	—	—	—	—	—
177	Red Light	135	135	135	Red deck Light	0.7	1 | 0 | 0	Omni	—	—	—	—	—
178	Ready Light	136	136	136	Generic Deck Ready Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
179	Status	137	137	137	Generic Status Light indicating the authority for flying operations to the FLight Deck Officer or Pilot	0.5	1 | 0.6 | 0	Omni	—	—	—	—	—
180	Amber Light	138	138	138	Amber status Light	0.5	1 | 0.6 | 0	Omni	—	—	—	—	—
181	Green Light	139	139	139	Green status Light (Go signal)	0.5	0 | 1 | 0	Omni	—	—	—	—	—
182	Red Light	140	140	140	Red status Light (Stop signal)	0.5	1 | 0 | 0	Omni	—	—	—	—	—
183	Flood Light	141	141	141	Lights used to illuminate the ground or the deck	0.5	1 | 1 | 1	Dir	30	30	—	—	—
184	GPI	142	142	142	Generic Glide path indicator Lights	0.7	1 | 0.6 | 0	Dir	180	54	—	—	—
185	Flashing Green Light	143	143	143	Green Flashing GPI	0.7	0 | 1 | 0	Dir	120	30	—	1.5	0.17
186	Flashing Orange Light	144	144	144	Orange Flashing GPI	0.7	1 | 0.6 | 0	Dir	180	54	—	3.9	0.065
187	Amber Light	145	145	145	Amber GPI Light	0.7	1 | 0.6 | 0	Dir	30	5	—	—	—
188	Green Light	146	146	146	Green GPI Light	0.7	0 | 1 | 0	Dir	30	2	—	—	—
189	Red Light	147	147	147	Red GPI Light	0.7	1 | 0 | 0	Dir	30	6	—	—	—
190	HAPI	148	148	148	Generic Horizontal Approach Path Indicator Lights	0.5	1 | 1 | 1	Dir	50	15	—	—	—
191	Red Light	149	149	149	Red HAPI Light	0.5	1 | 0 | 0	Dir	50	15	—	—	—
192	White Light	150	150	150	White HAPI Light	0.5	1 | 1 | 1	Dir	50	15	—	—	—
193	Homing Beacon Light	151	151	151	Used to identify the vessel to an approaching aircraft	0.5	1 | 1 | 1	Omni	—	—	—	—	—
194	HPI Light	152	152	152	Horizontal Path Indicator	0.5	1 | 1 | 1	Omni	—	—	—	—	—
195	No-Go Light	153	153	153	Abort go Light	0.5	1 | 1 | 1	Dir	180	180	—	—	—
196	Nozzle Rotation Light	154	154	154	Nozzle rotation Light	0.6	1 | 1 | 1	Omni	—	—	—	—	—
197	Pri-Fly Light	455	455	455	Primary FLight control Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
198	SGSI	155	155	155	Generic Stabilized Glide Slope Indicator (approach Light indicator)	0.5	1 | 0.6 | 0	Dir	40	6.5	—	—	—
199	Amber Light	156	156	156	Amber SGSI Light	0.5	1 | 0.6 | 0	Dir	40	1.5	—	—	—
200	Blue Light	157	157	157	Blue SGSI Light	0.5	0 | 0 | 1	Dir	40	1	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
201	Green Light	158	158	158	Green SGSI Light	0.5	0 | 1 | 0	Dir	40	1	—	—	—
202	Red Light	159	159	159	Red SGSI Light	0.5	1 | 0 | 0	Dir	40	6.5	—	—	—
203	Standby Light	160	160	160	A means of indicating an aircraft to be at standby	0.5	1 | 1 | 1	Omni	—	—	—	—	—
204	Steady Ship Light	161	161	161	Steady ship Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
205	STOL	162	162	162	Generic Short Takeoff and landing Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
206	Dropline Light	163	163	163	STOL Dropline Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
207	Lineup Centerline Light	164	164	164	STOL Lineup Centerline Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
208	Waveoff Light	165	165	165	A means of indicating to approaching aircraft that recovery is not permitted and should be aborted immediately.	0.5	1 | 1 | 1	Omni	—	—	—	2	0.33
209	Cruiser	166	166	166	Generic Cruiser Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
210	Destroyer	167	167	167	Generic Destroyer Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
211	Frigate	168	168	168	Generic Frigate Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
212	Patrol	169	169	169	Generic Patrol ship Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
213	Battleship	170	170	170	Generic Battleship Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
214	Cargo	171	171	171	Generic Cargo Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
215	Subsurface	172	172	172	Generic Subsurface Vehicle Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
216	Submarine	173	173	173	Generic Submarine Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
217	Munition	174	174	174	Generic Munition Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
218	Tracer Light	175	175	175	Light created by tracer fire effect in a bullet	0.5	1 | 0.8 | 0	Omni	—	—	—	—	—
219	Decoy Flare Light	176	176	176	Decoy flare Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—
220	Distress Flare Light	177	177	177	Distress flare Light	0.9	1 | 0 | 0	Omni	—	—	—	—	—
221	Fireworks Distress Flare Light	178	178	178	Fireworks flare Light	0.9	1 | 0 | 0	Omni	—	—	—	—	—
222	Flare Light	179	179	179	Flare defensive counter measure Light effect (ie. IR guided missile)	0.9	1 | 1 | 1	Omni	—	—	—	—	—
223	Chaff Light	180	180	180	Chaff defensive counter measure Light effect (ie. Radar guided missiles)	0.5	1 | 1 | 1	Omni	—	—	—	—	—
224	Lifeform	181	181	181	Generic Lifeform Light (regroups all Lights that could be assigned to any human lifeforms)	0.7	1 | 1 | 1	Omni	—	—	—	—	—
225	Flashlight Light	182	182	182	Hand held flashLight	0.5	1 | 1 | 1	Dir	45	45	—	—	—
226	Marshaller	183	183	183	Generic Marshaller Lights	0.7	1 | 1 | 1	Omni	—	—	—	—	—
227	Ground_Personel	184	184	184	Generic Ground Personnel Lights	0.6	1 | 1 | 1	Omni	—	—	—	—	—
228	Survivor	185	185	185	Generic Survivor Lights (on ground or sea)	0.7	1 | 1 | 1	Omni	—	—	—	1	0.33
229	Cultural	186	186	186	Generic Cultural Ground base Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
230	Point-Based	187	187	187	Generic Point based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
231	Flood Light	188	188	188	Lights used to illuminate the ground	0.5	1 | 1 | 1	Omni	—	—	—	—	—
232	Obstruction	189	189	189	Generic Obstruction Light - A Light indicating the presence of an object which is dangerous to an aircraft in flight.	0.9	1 | 0 | 0	Omni	—	—	—	—	—
233	Red			514	Generic Red Obstruction Light	0.9	1 | 0 | 0	Omni	—	—	—	0.5	0.5
234	Type L864 Light			515	A flashing red obstruction Light with 20-40 flashes per minute (FAA type L-864)	0.9	1 | 0 | 0	Omni	—	—	—	0.5	0.5
235	Type L885 Light			516	A flashing red obstruction Light with 60 flashes per minute (FAA type L-885)	0.9	1 | 0 | 0	Omni	—	—	—	1	0.5
236	Type L810 Light			517	A steady-burning red obstruction Light (FAA type L-810)	0.5	1 | 0 | 0	Omni	—	—	—	—	—
237	White			518	Generic White Obstruction Light	1.0	1 | 1 | 1	Omni	—	—	—	0.66	0.1
238	Type L856 Light			519	A high intensity flashing white obstruction Light with 40 flashes per minute (FAA type L-856)	1.0	1 | 1 | 1	Omni	—	—	—	0.66	0.1
239	Type L857 Light			520	A high intensity flashing white obstruction Light with 60 flashes per minute (FAA type L-857)	1.0	1 | 1 | 1	Omni	—	—	—	1	0.1
240	Type L865 Light			521	A medium intensity flashing white obstruction Light with 40 flashes per minute (FAA type L-865)	0.5	1 | 1 | 1	Omni	—	—	—	0.66	0.1
241	Type L866 Light			522	A medium intensity flashing white obstruction Light with 60 flashes per minute (FAA type L-866)	0.5	1 | 1 | 1	Omni	—	—	—	1.0	0.1
242	Strobe Light	190	190	190	Flashing Ground Light that helps to indicate position	0.5	1 | 1 | 1	Omni	—	—	—	1	0.05
243	Communication_Tower	191	191	191	Generic Communication Tower Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
244	FARP	192	192	192	Generic Forward Area Rearm/Refuel Point Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
245	IR Light	193	193	193	Forward Area Rearm/Refuel Point IR Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
246	Strobe Light	194	194	194	Forward Area Rearm/Refuel Point strobe Light	0.9	1 | 1 | 1	Omni	—	—	—	1	0.05
247	Y Light	195	195	195	Forward Area Rearm/Refuel Point Y-shaped Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
248	Harbour Light	196	196	196	Harbour Light	0.7	1 | 1 | 1	Omni	—	—	—	—	—
249	Pylon	197	197	197	Generic Power Pylon Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
250	Railroad Junction	198	198	198	Generic Railroad Junction Lights	0.5	1 | 0 | 0	Omni	—	—	—	0.67	0.5

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
251	Flashing Red Light	199	199	199	Flashing Red rail road crossing stop Lights	0.5	1 | 0 | 0	Omni	—	—	—	0.67	0.5
252	Highway_Junction	200	200	200	Generic Highway Junction Lights	0.7	1 | 1 | 1	Omni	—	—	—	—	—
253	Bridge	201	201	201	Generic Bridge Lights	0.7	1 | 1 | 1	Omni	—	—	—	—	—
254	Hazard	202	202	202	Generic Hazard Light - A White Light indicating the presence of an hazard around the airport	0.5	1 | 1 | 1	Omni	—	—	—	—	—
255	Flashing Light	203	203	203	White hazard flashing Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
256	Hi Intensity Light	204	204	204	White Hi-Intensity hazard Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—
257	Line-Based	205	205	205	Generic Line based Lights (Linear features as Roads)	0.5	1 | 1 | 1	Omni	—	—	—	—	—
258	Fluorescent Light	206	206	206	Fluorescent based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
259	Incandescent Light	207	207	207	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
260	Mercury Light	208	208	208	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
261	Metal Halide Light	209	209	209	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
262	Sodium Light	210	210	210	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
263	Multilane Divided Hwy	211	211	211	Generic Multi-lane divided highway Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
264	Incandescent Light	212	212	212	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
265	Mercury Light	213	213	213	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
266	Metal Halide Light	214	214	214	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
267	Sodium Light	215	215	215	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
268	Median	216	216	216	Median divider Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
269	Edge	217	217	217	Highway edge/sidewalk Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
270	Multilane Hwy	218	218	218	Generic Multi-lane highway Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
271	Incandescent Light	219	219	219	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
272	Mercury Light	220	220	220	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
273	Metal Halide Light	221	221	221	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
274	Sodium Light	222	222	222	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
275	Median	223	223	223	Median divider Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
276	Edge	224	224	224	Highway edge/sidewalk Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
277	Highway	225	225	225	Generic Single Lane Highway	0.5	1 | 1 | 1	Omni	—	—	—	—	—
278	Incandescent Light	226	226	226	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
279	Mercury Light	227	227	227	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
280	Metal Halide Light	228	228	228	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
281	Sodium Light	229	229	229	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
282	Road	230	230	230	Generic Road Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
283	Incandescent Light	231	231	231	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
284	Mercury Light	232	232	232	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
285	Metal Halide Light	233	233	233	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
286	Sodium Light	234	234	234	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
287	Boulevard	235	235	235	Generic Boulevard Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
288	Incandescent Light	236	236	236	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
289	Mercury Light	237	237	237	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
290	Metal Halide Light	238	238	238	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
291	Sodium Light	239	239	239	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
292	Street	240	240	240	Generic Small street Lights	0.5	1 | 1 | 1	Omni	—	—	—	—	—
293	Incandescent Light	241	241	241	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
294	Mercury Light	242	242	242	Mercury based Light	0.5	0.9 | 0.9 | 1	Omni	—	—	—	—	—
295	Metal Halide Light	243	243	243	Metal Halide based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
296	Sodium Light	244	244	244	Sodium based Light	0.5	1 | 1 | 0	Omni	—	—	—	—	—
297	Lane	245	245	245	Generic line based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—
298	Incandescent Light	246	246	246	Incandescent based Light	0.5	1 | 0.6 | 0.3	Omni	—	—	—	—	—
299	Area-Based	247	247	247	Generic Area Lights which cover a larger area	0.5	1 | 1 | 1	Omni	—	—	—	—	—
300	Fluorescent Light	248	248	248	Fluorescent based Light	0.5	1 | 1 | 1	Omni	—	—	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
301	Incandescent Light	249	249	249	Incandescent based Light	0.8	1 | 0.8 | 0.3	Omni	—	—	—	—	—
302	Mercury Light	250	250	250	Mercury based Light	0.8	0.9 | 0.9 | 1	Omni	—	—	—	—	—
303	Metal Halide Light	251	251	251	Metal Halide based Light	0.8	1 | 1 | 1	Omni	—	—	—	—	—
304	Sodium Light	252	252	252	Sodium based Light	0.8	1 | 1 | 0	Omni	—	—	—	—	—
305	Residential Area	253	253	253	Generic Residential Area based Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
306	Bright	254	254	254	Generic Bright residential area Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
307	Incandescent Light	255	255	255	Incandescent bright Light	0.8	1 | 0.8 | 0.3	Omni	—	—	—	—	—
308	Mercury Light	256	256	256	Mercury bright Light	0.8	0.9 | 0.9 | 1	Omni	—	—	—	—	—
309	Dim	257	257	257	Generic Dim residential area Lights	0.7	1 | 1 | 1	Omni	—	—	—	—	—
310	Incandescent Light	258	258	258	Incandescent dim Light	0.7	1 | 0.8 | 0.3	Omni	—	—	—	—	—
311	Mercury Light	259	259	259	Mercury dim Light	0.7	0.9 | 0.9 | 1	Omni	—	—	—	—	—
312	Industrial Area	260	260	260	Generic Industrial Area based Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
313	Bright	261	261	261	Generic Bright industrial area Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
314	Incandescent Light	262	262	262	Incandescent bright Light	0.8	1 | 0.8 | 0.3	Omni	—	—	—	—	—
315	Mercury Light	263	263	263	Mercury bright Light	0.8	0.9 | 0.9 | 1	Omni	—	—	—	—	—
316	Dim	264	264	264	Generic dim industrial area Lights	0.7	1 | 1 | 1	Omni	—	—	—	—	—
317	Incandescent Light	265	265	265	Incandescent dim Light	0.7	1 | 0.8 | 0.3	Omni	—	—	—	—	—
318	Mercury Light	266	266	266	Mercury dim Light	0.7	0.9 | 0.9 | 1	Omni	—	—	—	—	—
319	Downtown Area	267	267	267	Generic City Downtown Area Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
320	Bright	268	268	268	Generic bright downtown area Lights	0.8	1 | 1 | 1	Omni	—	—	—	—	—
321	Incandescent Light	269	269	269	Incandescent bright Light	0.8	1 | 0.8 | 0.3	Omni	—	—	—	—	—
322	Mercury Light	270	270	270	Mercury bright Light	0.8	0.9 | 0.9 | 1	Omni	—	—	—	—	—
323	Dim	271	271	271	Generic dim downtown area Lights	0.7	1 | 1 | 1	Omni	—	—	—	—	—
324	Incandescent Light	272	272	272	Incandescent dim Light	0.7	1 | 0.8 | 0.3	Omni	—	—	—	—	—
325	Mercury Light	273	273	273	Mercury dim Light	0.7	0.9 | 0.9 | 1	Omni	—	—	—	—	—
326	Airport_Lighting	274	274	274	Generic Airport Lighting	0.9	1 | 1 | 1	Omni	—	—	—	—	—
327	Apron	275	275	275	Generic Apron Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—
328	Entrance Light	276	276	276	Apron entrance Light from runway or taxiway	0.9	1 | 1 | 1	Omni	—	—	—	—	—
329	Flood Light	277	277	277	Flood Light to illuminated the Apron	0.9	1 | 1 | 1	Omni	—	—	—	—	—
330	Beacon	278	278	278	Generic Beacon Light	0.9	1 | 1 | 1	Omni	—	—	—	0.33	0.33
331	ID Beacon Light	279	279	279	Identification Beacon Light	0.9	1 | 1 | 1	Omni	—	—	—	0.33	0.33
332	UK Pundit Light-XX			523	Red UK Pundit Light where XX denotes two-letter Pundit code. NOTE: Red Omni flashing pattern is equivalent to the two-letter morse code for XX)	0.9	1 | 0 | 0	Omni	—	—	—	—	—
333	Double White Rotating 2sec Light	427	427	427	Double peak White 2sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.5	0.33
334	Double White Rotating 3sec Light	428	428	428	Double peak White 3sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.33	0.33
335	Double White Rotating 5sec Light	429	429	429	Double peak White 5sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.2	0.33
336	Double White Rotating 10sec Light	439	439	439	Double peak White 10sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.1	0.33
337	White Rotating 2sec Light	280	280	280	White 2 sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.5	0.33
338	White Rotating 3sec Light	281	281	281	White 3 sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.33	0.33
339	White Rotating 5sec Light	282	282	282	White 5 sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.2	0.33
340	White Rotating 10sec Light	445	445	445	White 10 sec interval Rotating Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.1	0.33
341	Green Rotating 2sec Light	283	283	283	Green 2 sec interval Rotating Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.5	0.33
342	Green Rotating 3sec Light	284	284	284	Green 3 sec interval Rotating Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.33	0.33
343	Green Rotating 5sec Light	285	285	285	Green 5 sec interval Rotating Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.2	0.33
344	Green Rotating 10sec Light	440	440	440	Green 10 sec interval Rotating Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.1	0.33
345	Yellow Rotating 2sec Light	430	430	430	Yellow 2 sec interval Rotating Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.5	0.33
346	Yellow Rotating 3sec Light	431	431	431	Yellow 3 sec interval Rotating Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.33	0.33
347	Yellow Rotating 5sec Light	432	432	432	Yellow 5 sec interval Rotating Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.2	0.33
348	Yellow Rotating 10sec Light	441	441	441	Yellow 10 sec interval Rotating Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.1	0.33
349	Double White Flashing 2sec Light	433	433	433	Double peak White 2sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.5	0.33
350	Double White Flashing 3sec Light	434	434	434	Double peak White 3sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.33	0.33

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
351	Double White Flashing 5sec Light	435	435	435	Double peak White 5sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.2	0.33
352	Double White Flashing 10sec Light	442	442	442	Double peak White 10sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.1	0.33
353	White Flashing 2sec Light	286	286	286	White 2 sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.5	0.33
354	White Flashing 3sec Light	287	287	287	White 3 sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.33	0.33
355	White Flashing 5sec Light	288	288	288	White 5 sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.2	0.33
356	White Flashing 10sec Light	445	445	445	White 10 sec interval Flashing Beacon	0.9	1 | 1 | 1	Omni	—	—	—	0.1	0.33
357	Green Flashing 2sec Light	289	289	289	Green 2 sec interval Flashing Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.5	0.33
358	Green Flashing 3sec Light	290	290	290	Green 3 sec interval Flashing Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.33	0.33
359	Green Flashing 5sec Light	291	291	291	Green 5 sec interval Flashing Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.2	0.33
360	Green Flashing 10sec Light	443	443	443	Green 10 sec interval Flashing Beacon	0.9	0 | 1 | 0	Omni	—	—	—	0.1	0.33
361	Yellow Flashing 2sec Light	436	436	436	Yellow 2 sec interval Flashing Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.5	0.33
362	Yellow Flashing 3sec Light	437	437	437	Yellow 3 sec interval Flashing Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.33	0.33
363	Yellow Flashing 5sec Light	438	438	438	Yellow 5 sec interval Flashing Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.2	0.33
364	Yellow Flashing 10sec Light	444	444	444	Yellow 10 sec interval Flashing Beacon	0.9	1 | 1 | 0	Omni	—	—	—	0.1	0.33
365	Docking System	292	292	292	Generic Docking System Light	0.9	1 | 0.8 | 0	Omni	—	—	—	—	—
366	Amber Light	293	293	293	Amber Docking System Light	0.9	1 | 0.8 | 0	Omni	—	—	—	—	—
367	Green Light	294	294	294	Green Docking System Light	0.9	0 | 1 | 0	Omni	—	—	—	—	—
368	Red Light	295	295	295	Red Docking System Light	0.9	1 | 0 | 0	Omni	—	—	—	—	—
369	Obstruction	296	296	296	Generic Obstruction Light - A red Light indicating the presence of an object which is dangerous to an aircraft in flight.	0.85	1 | 0 | 0	Omni	—	—	—	0.5	0.33
370	Flashing Light	297	297		Red Obstruction flashing Light (deprecated in CDB v3.2)	0.85	1 | 0 | 0	Omni	—	—	—	0.5	0.33
371	Hi Intensity Light	298	298		Red Hi-intensity obstruction Light (deprecated in CDB v3.2)	0.9	1 | 0 | 0	Omni	—	—	—	0.5	0.33
372	Runway	299	299	299	Generic Runway Lights	0.9	1 | 1 | 1	Omni	—	—	—	—	—
373	Approach System	300	300	300	Generic Airport Approach Lighting Systems	0.9	1 | 1 | 1	Dir	75	75	—	—	—
374	Barrette	301	301	301	Generic Barrette Light	0.9	1 | 1 | 1	Dir	75	75	—	—	—
375	Red Light	302	302	302	Red barrette Light	0.9	1 | 0 | 0	Dir	75	75	—	—	—
376	White Light	303	303	303	White barrette Light	0.9	1 | 1 | 1	Dir	75	75	—	—	—
377	Green Light	455	455	455	Green barrette Light	0.9	0 | 1 | 0	Dir	75	75	—	—	—
378	Circling Guidance Light	304	304	304	Circling Guidance Light which helps on a circling approach	0.9	1 | 1 | 1	Dir	75	75	—	—	—
379	Landing Marking Light	305	305	305	Marking Lights that illuminate any markings that need to be visible on the runway in low visibility	0.9	1 | 1 | 1	Omni	—	—	—	—	—
380	Lead-in Light	306	306	306	LDIN - lead-in Light system Lights	0.9	1 | 1 | 1	Dir	50	110	—	—	—
381	Optical Landing System	307	307	307	Optical landing system Lights	0.9	1 | 1 | 1	Omni	—	—	—	—	—
382	High Intensity Light	308	308	308	High intensity approach Light	0.9	1 | 1 | 1	Dir	75	75	—	—	—
383	Low Intensity Light	309	309	309	Low intensity approach Light	0.85	1 | 1 | 1	Dir	75	75	—	—	—
384	ODAL Light	310	310	310	Omni directional approach Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—
385	PAPI	311	311	311	Generic Precision approach path indicator. Provides visual glideslope indication using a single row of two or four Light units.	0.95	1 | 1 | 1	Dir	75	10	—	—	—
386	APAPI Close Light	312	312	312	Abbreviated Precision Approach Path Indicator closest to runway	0.95	1 | 1 | 1	Dir	75	10	—	—	—
387	APAPI Far Light	313	313	313	Abbreviated Precision Approach Path Indicator farthest to runway	0.95	1 | 1 | 1	Dir	75	10	—	—	—
388	TypeA Light	314	314	314	PAPI A (farthest from runway)	0.95	1 | 1 | 1	Dir	75	10	—	—	—
389	TypeB Light	315	315	315	PAPI B (3rd from runway)	0.95	1 | 1 | 1	Dir	75	10	—	—	—
390	TypeC Light	316	316	316	PAPI C (2nd from runway)	0.95	1 | 1 | 1	Dir	75	10	—	—	—
391	TypeD Light	317	317	317	PAPI D (Closest from runway)	0.95	1 | 1 | 1	Dir	75	10	—	—	—
392	RAIL Light	318	318	318	Runway alignment indicator Lights	0.9	1 | 1 | 1	Dir	75	75	—	—	0.33
393	REIL Light	319	319	319	Runway End Identifier Lights	0.95	1 | 1 | 1	Dir	75	75	—	2	0.1
394	SFL	320	320	320	Generic Sequence Flashing Lights	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
395	CAT-I	321	321	321	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
396	CAT-II	322	322	322	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
397	CALVERT-I	323	323	323	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
398	CALVERT-II	324	324	324	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
399	ALSF-I	325	325	325	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
400	ALSF-II	326	326	326	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
401	SSALF	327	327	327	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
402	SSALR	328	328	328	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
403	MALSF	329	329	329	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	0.1
404	MALSR	330	330	330	Approach Lighting System with sequenced flashing	0.9	1 | 1 | 1	Dir	75	75	—	2	—
405	VASI	331	331	331	Generic Visual Approach Slope Indicator System (VASI)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
406	2bar	332	332	332	Generic 2 Bar Component VASI	0.9	1 | 1 | 1	Dir	75	10	—	—	—
407	First Light	333	333	333	2-Bar VASIS (1st bar closest to threshold)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
408	Second Light	334	334	334	2-Bar VASIS (2nd bar farthest from threshold)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
409	3bar	335	335	335	Generic 3 Bar component VASI	0.9	1 | 1 | 1	Dir	75	10	—	—	—
410	First Light	336	336	336	3-Bar VASIS (1st bar closest to threshold)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
411	Second Light	337	337	337	3-Bar VASIS (2nd bar, in between 1st and 3rd)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
412	Third Light	338	338	338	3-Bar VASIS (3rd bar farthest from threshold)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
413	LCVASI Light	339	339	339	Low-cost VASI Light	0.9	1 | 1 | 1	Dir	75	10	—	—	—
414	typeP Light	340	340	340	PVASI pulsating Light	0.9	1 | 1 | 1	Dir	75	10	—	—	—
415	typeT	341	341	341	Generic T Shaped VASI (T-VASIS)	0.9	1 | 1 | 1	Dir	75	10	—	—	—
416	Fly-down Light	342	342	342	Fly Down Lights	0.9	1 | 1 | 1	Dir	75	7	—	—	—
417	Wing Bar Light	343	343	343	T-VASIS wing bar Light	0.9	1 | 1 | 1	Dir	75	10	—	—	—
418	2.50 Degree	344	344	344	Generic 2.50 degree T-VASI	0.9	1 | 1 | 1	Dir	75	2.5	—	—	—
419	Fly-Up1 Light	345	345	345	T-VASIS Fly-up 1 (closest to Wing Bar) for 2.5 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.5	—	—	—
420	Fly-Up2 Light	346	346	346	T-VASIS Fly-up 2 (closest to Wing Bar) for 2.5 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.4166	—	—	—
421	Fly-Up3 Light	347	347	347	T-VASIS Fly-up 3 (farthest to Wing Bar) for 2.5 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.3334	—	—	—
422	2.75 Degree	348	348	348	Generic 2.75 degree T-VASI	0.9	1 | 1 | 1	Dir	75	2.75	—	—	—
423	Fly-Up1 Light	349	349	349	T-VASIS Fly-up 1 (closest to Wing Bar) for 2.7 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.75	—	—	—
424	Fly-Up2 Light	350	350	350	T-VASIS Fly-up 2 (closest to Wing Bar) for 2.7 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.6666	—	—	—
425	Fly-Up3 Light	351	351	351	T-VASIS Fly-up 3 (farthest to Wing Bar) for 2.7 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.5834	—	—	—
426	3.00 Degree	352	352	352	Generic 3.00 degree T-VASI	0.9	1 | 1 | 1	Dir	75	3	—	—	—
427	Fly-Up1 Light	353	353	353	T-VASIS Fly-up 1 (closest to Wing Bar) for 3.0 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3	—	—	—
428	Fly-Up2 Light	354	354	354	T-VASIS Fly-up 2 (closest to Wing Bar) for 3.0 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.9166	—	—	—
429	Fly-Up3 Light	355	355	355	T-VASIS Fly-up 3 (farthest to Wing Bar) for 3.0 degree Glide slope	0.9	1 | 1 | 1	Dir	75	2.8334	—	—	—
430	3.25 Degree	356	356	356	Generic 3.25 degree T-VASI	0.9	1 | 1 | 1	Dir	75	3.25	—	—	—
431	Fly-Up1 Light	357	357	357	T-VASIS Fly-up 1 (closest to Wing Bar) for 3.25 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.25	—	—	—
432	Fly-Up2 Light	358	358	358	T-VASIS Fly-up 2 (closest to Wing Bar) for 3.25 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.1666	—	—	—
433	Fly-Up3 Light	359	359	359	T-VASIS Fly-up 3 (farthest to Wing Bar) for 3.25 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.0834	—	—	—
434	3.50 Degree	360	360	360	Generic 3.5 degree T-VASI	0.9	1 | 1 | 1	Dir	75	3.5	—	—	—
435	Fly-Up1 Light	361	361	361	T-VASIS Fly-up 1 (closest to Wing Bar) for 3.5 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.5	—	—	—
436	Fly-Up2 Light	362	362	362	T-VASIS Fly-up 2 (closest to Wing Bar) for 3.5 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.4166	—	—	—
437	Fly-Up3 Light	363	363	363	T-VASIS Fly-up 3 (farthest to Wing Bar) for 3.5 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.3334	—	—	—
438	3.75 Degree	364	364	364	Generic 3.75 degree T-VASI	0.9	1 | 1 | 1	Dir	75	3.75	—	—	—
439	Fly-Up1 Light	365	365	365	T-VASIS Fly-up 1 (closest to Wing Bar) for 3.75 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.75	—	—	—
440	Fly-Up2 Light	366	366	366	T-VASIS Fly-up 2 (closest to Wing Bar) for 3.75 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.6666	—	—	—
441	Fly-Up3 Light	367	367	367	T-VASIS Fly-up 3 (farthest to Wing Bar) for 3.75 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.5834	—	—	—
442	4.00 Degree	368	368	368	Generic 4.00 degree T-VASI	0.9	1 | 1 | 1	Dir	75	4	—	—	—
443	Fly-Up1 Light	369	369	369	T-VASIS Fly-up 1 (closest to Wing Bar) for 4.0 degree Glide slope	0.9	1 | 1 | 1	Dir	75	4	—	—	—
444	Fly-Up2 Light	370	370	370	T-VASIS Fly-up 2 (closest to Wing Bar) for 4.0 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.9166	—	—	—
445	Fly-Up3 Light	371	371	371	T-VASIS Fly-up 3 (farthest to Wing Bar) for 4.0 degree Glide slope	0.9	1 | 1 | 1	Dir	75	3.8334	—	—	—
446	Centerline	372	372	372	Generic runway centerline Light	0.9	1 | 1 | 1	Bi-Dir	75	75	—	—	—
447	Red Light	373	373	373	Unidirectional Red runway centerline Light	0.9	1 | 0 | 0	Dir	75	75	—	—	—
448	White Light	374	374	374	Unidirectional White runway centerline Light	0.9	1 | 1 | 1	Dir	75	75	—	—	—
449	White White Light	375	375	375	Bidirectional White runway centerline Light	0.9	1 | 1 | 1	Bi-Dir	75	75	—	—	—
450	White Red Light	376	376	376	Bidirectional White/Red runway centerline Light	0.9	1 | 1 | 1	Bi-Dir	75	75	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
451	Red Red Light		511	511	Bidirectional Red runway centerline Light	0.9	1 | 0 | 0	Bi-Dir	75	75	—	—	—
452	Edge	377	377	377	Generic Runway Edge Lights	0.9	1 | 1 | 1	Bi-Dir	180	180	—	—	—
453	White Light	378	378	378	Unidirectional White Edge Light	0.9	1 | 1 | 1	Dir	180	180	—	—	—
454	Amber Light	379	379	379	Unidirectional Amber Edge Light	0.9	1 | 0.8 | 0	Dir	180	180	—	—	—
455	Red Light	380	380	380	Unidirectional Red Edge Light	0.9	1 | 0 | 0	Dir	180	180	—	—	—
456	Blue Light	381	381	381	Unidirectional Blue Edge Light	0.9	0 | 0 | 1	Dir	180	180	—	—	—
457	White White Light	382	382	382	Bidirectional White Edge Light	0.9	1 | 1 | 1	Bi-Dir	180	180	—	—	—
458	White Amber Light	383	383	383	White-Amber Edge Light	0.9	1 | 1 | 1	Bi-Dir	180	180	—	—	—
459	White Red Light	384	384	384	White-Red Edge Light	0.9	1 | 1 | 1	Bi-Dir	180	180	—	—	—
460	White Blue Light	385	385	385	White-Blue Edge Light	0.9	1 | 1 | 1	Bi-Dir	180	180	—	—	—
461	Amber Amber Light	386	386	386	Bidirectional Amber Edge Light	0.9	1 | 0.8 | 0	Bi-Dir	180	180	—	—	—
462	Amber Red Light	387	387	387	Amber-Red Edge Light	0.9	1 | 0.8 | 0	Bi-Dir	180	180	—	—	—
463	Amber Blue Light	388	388	388	Amber-Blue Edge Light	0.9	1 | 0.8 | 0	Bi-Dir	180	180	—	—	—
464	Blue Red Light	389	389	389	Blue-Red Edge Light	0.9	0 | 0 | 1	Bi-Dir	180	180	—	—	—
465	Red Red Light	390	390	390	Bidirectional Red Edge Light	0.9	1 | 0 | 0	Bi-Dir	180	180	—	—	—
466	Blue Blue Light	391	391	391	Bidirectional Blue Edge Light	0.9	0 | 0 | 1	Bi-Dir	180	180	—	—	—
467	End Wing Light	392	392	392	Runway End Wing Lights	0.9	1 | 0 | 0	Dir	180	180	—	—	—
468	End Light	393	393	393	Runway End Lights	0.9	1 | 0 | 0	Dir	180	180	—	—	—
469	Flood Light	394	394	394	Runway flood Lights	0.9	1 | 1 | 1	Omni	—	—	—	—	—
470	Overrun	395	395	395	Generic Overrun Light - A Light which indicated runway over run area	0.9	1 | 0.8 | 0	Dir	180	90	—	—	—
471	Amber Light	396	396	396	Amber overrun Light	0.9	1 | 0.8 | 0	Dir	180	90	—	—	—
472	Blue Light	397	397	397	Blue overrun Light	0.9	0 | 0 | 1	Dir	180	90	—	—	—
473	Red Light	398	398	398	Red overrun Light	0.9	1 | 0 | 0	Dir	180	90	—	—	—
474	Threshold Wing Light	399	399	399	Threshold wing Lights	0.9	0 | 1 | 0	Dir	180	180	—	—	—
475	Threshold Light	400	400	400	Runway threshold Lights: used to identify the landing threshold of the runway	0.9	0 | 1 | 0	Dir	180	180	—	—	—
476	Touchdown Zone Light	401	401	401	Touchdown Zone Lights: used to identify the appropriate landing area on the runway after the threshold	0.9	1 | 1 | 1	Dir	180	180	—	—	—
477	LAHSO Light	402	402	402	Land and hold Short Operations Light: runway intersecting stop Lights	0.9	1 | 0.8 | 0	Omni	—	—	—	—	—
478	Taxiway	403	403	403	Generic Airport Taxiway Lights	0.9	0 | 0 | 1	Omni	—	—	—	—	—
479	Apron Entrance Light	404	404	404	Apron Entrance Light which indication area where taxi enters apron area	0.9	0 | 0 | 1	Omni	—	—	—	—	—
480	CAT-III Hold Bar Light	405	405	405	Category III Hold bar Light	0.9	0 | 1 | 0	Dir	180	180	—	—	—
481	Centerline	406	406	406	Generic Centerline Taxiway Lights	0.9	0 | 1 | 0	Dir	90	110	—	—	—
482	Aligned Light	407	407	407	ALighted Light for a straight sequence of a taxiway	0.9	0 | 1 | 0	Dir	90	110	—	—	—
483	Curved Light	408	408	408	Curved Lights for a curved sequence of a taxiway	0.9	0 | 1 | 0	Dir	50	110	—	—	—
484	Edge	409	409	409	Generic Taxiway edge Lights	0.9	0 | 0 | 1	Omni	—	—	—	—	—
485	Blue Light	425	425	425	Blue Taxi edge Light	0.9	0 | 0 | 1	Omni	—	—	—	—	—
486	White Light	426	426	426	White Taxi edge Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—
487	High-speed	410	410	410	Generic Taxiway high speed area Lights	0.9	1 | 0.8 | 0	Dir	50	110	—	—	—
488	Amber Light	411	411	411	Amber high-speed Lights	0.9	1 | 0.8 | 0	Dir	50	110	—	—	—
489	Green Light	412	412	412	Green high-speed Lights	0.9	0 | 1 | 0	Dir	50	110	—	—	—
490	Lead-on	413	413	413	Generic Lead-On Light	0.9	0 | 1 | 0	Omni	—	—	—	—	—
491	Green Light		489	489	Green Lead-On Light	0.9	0 | 1 | 0	Omni	—	—	—	—	—
492	Yellow Light		490	490	Yellow Lead-On Light	0.9	1 | 1 | 0	Omni	—	—	—	—	—
493	Lead-off		491	491	Generic Lead-Off Light	0.9	0 | 1 | 0	Omni	—	—	—	—	—
494	Green Light		492	492	Green Lead-Off Light	0.9	0 | 1 | 0	Omni	—	—	—	—	—
495	Yellow Light		493	493	Yellow Lead-Off Light	0.9	1 | 1 | 0	Omni	—	—	—	—	—
496	No-entry Light	414	414	414	No entry zone Lights	0.9	1 | 0 | 0	Omni	—	—	—	—	—
497	Runway Guard	415	415	415	Runway guard Lights	0.9	1 | 1 | 1	Omni	—	—	—	—	—
498	Stop Bar Light	416	416	416	Stop Bar Lights	0.9	1 | 0 | 0	Dir	180	180	—	—	—
499	Clearance	417	417	417	Generic Clearance bar Light. They are located at "hold short" positions on taxiways in order to increase the visibility of	0.9	1 | 1 | 0	Dir	—	—	—	—	—
500	Unidirectional Light			512	Unidirectional Taxiway Clearance Light (used when the hold is intended for one direction only)	0.9	0 | 1 | 0	Dir	7	7	—	—	—

	Light Hierarchy	v3.0 Light Code	v3.1 Light Code	Light Code	Description	Intensity (normalized)	Color (normalized RGB)	Directionality (type)	Width_Hor (degrees)	Width_Vert (degrees)	Intensity_Res (normalized)	Frequency (Hz)	Duty_Cycle (normalized)
501	Bidirectional Light			510	Bidirectional Taxiway Clearance Light (used when the hold is intended for two directions)	0.9	1 | 1 | 0	Dir	7	7	—	—	—
502	Guard	418	418	418	Generic RGL (Runway Guard Light) is used to enhance the visibility of taxiway holding positions on an airport	0.9	1 | 1 | 1	Omni	—	—	—	—	—
503	type1 Light	419			(deprecated in CDB v3.1)	0.9	1 | 1 | 1	Omni	—	—	—	—	—
504	type2 Light	420			(deprecated in CDB v3.1)	0.9	1 | 1 | 1	Omni	—	—	—	—	—
505	type3 Light	421			(deprecated in CDB v3.1)	0.9	1 | 1 | 1	Omni	—	—	—	—	—
506	type4 Light	422			(deprecated in CDB v3.1)	0.9	1 | 1 | 1	Omni	—	—	—	—	—
507	Wind Indicator Light	423	423	423	Wind Indicator Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—
508	Windsock Light	424	424	424	Windsock Light used to illuminate the windsock in poor visibility	0.9	1 | 1 | 1	Omni	—	—	—	—	—
509	Heliport	457	457	457	Generic Heliport Lights	0.9	0 | 0 | 1	Omni	—	—	—	—	—
510	Approach System	458	458	458	Generic Heliport Approach System Lights	0.9	0 | 1 | 0	Dir	90	110	—	—	—
511	Landing Marking	460	460	460	Generic Landing Marking Light on Heliport Approach System	0.9	1 | 1 | 1	Dir	75	10	—	—	—
512	Amber Light	465	465	465	Heliport Approach Landing Marking Amber Light	0.9	1 | 1 | 1	Dir	75	10	—	—	—
513	Green Light	463	463	463	Heliport Approach Landing Marking Green Light	0.9	1 | 1 | 1	Dir	75	10	—	—	—
514	Red Light	464	464	464	Heliport Approach Landing Marking Red Light	0.9	1 | 1 | 1	Dir	75	10	—	—	—
515	Edge	459	459	459	Generic Heliport Edge Lights	0.9	0 | 0 | 1	Omni	—	—	—	—	—
516	White White Light	462	462	462	White White Heliport Edge Light	0.9	0 | 0 | 1	Omni	—	—	—	—	—
517	White Light	461	461	461	White Heliport Edge Light	0.9	1 | 1 | 1	Omni	—	—	—	—	—

Annex M: CDB Directory Naming and Structure

Formerly Appendix M, Volume 2 of the OGC CDB Best Practice

With CDB version 3.2 (prior to the submission into the OGC), Appendix M was used to present the complete list of names allowed to construct the directories of the CDB. As of version 3.2 (as submitted into the OGC standards process), the appendix has been replaced by a combination of folder hierarchy and metadata files and controlled vocabularies delivered with the CDB Distribution Package.

The /CDB folder hierarchy provides a complete list of directory and file name patterns of the CDB; it summarizes the structure of the CDB presented in chapter 3, Volume 1: Core. The following files are necessary to expand the patterns:

- /CDB/Metadata/Feature_Data_Dictionary.xml provides the list of directory names associated with feature codes;
- /CDB/Metadata/Moving_Model_Codes.xml provides the list of names for DIS Entity Kinds, Domains, and Categories; and
- /CDB/Metadata/DIS_Country_Codes.xml contains the list of DIS Country Names.

Together, these files provide all the information required to build the names of all directories permitted by the CDB standard.

Annex O: List of Texture Component Selectors

Formerly Appendix O, Volume 2 of the OGC CDB Best Practice

The following table provides the list of codes to use to build CDB model texture filenames.

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description
002 – Month	001	January
	002	February
	003	March
	004	April
	005	May
	006	June
	007	July
	008	August
	009	September
	010	October
	011	November
	012	December
003 – Season	001	Spring
	002	Summer
	003	Autumn
	004	Winter

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description
004 – Uniform Paint Scheme	001	Grey
	002	White
	003	Green
	004	Black
	005	Beige
	006	Blue
	007	Red
	008	Yellow
	009	Brown
	010	Pink
	011	Purple
	012	Burgundy
	013	Orange
	014	Light Blue
	015	Khaki
	016	Dark Grey
	017	Amber
	018	Gold
	019	Silver
	020	Copper
005 – Camouflage Paint Scheme	001	Desert
	002	Winter
	003	Forest
	004	Generic
	005	Urban

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description
006 – Airline Paint Scheme		

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description

Texture Kind CS1 (Sxxx)	Texture Index CS2 (Txxx)	Description
	286	RAR Air Rarotonga
	287	CJR Caverton Helicopters
	288	KZR Air Astana
	289	ROU Air Canada Rouge
	290	DWT Darwin Airline
	291	UTA UTair Aviation
	292	AZN Amaszonas
	293	FDB Flydubai
	294	UZB Uzbekistan Airways
	295	PGT Pegasus Airlines
	296	ABY Air Arabia
	297	AXB Air India Express
009 – Quarter	001	First quarter of the year
	002	Second quarter of the year
	003	Third quarter of the year
	004	Fourth quarter of the year
054 – Contaminant	001	Wet Surface
	002	Snowy Surface
	003	Icy Surface
	004	Slushy Surface
	005	Patchy Wet Surface
	006	Patchy Snowy Surface
	007	Patchy Icy Surface
	008	Patchy Sandy Surface
	009	Patchy Dirty Surface
	010	Volcanic Ash
	011	Patchy Volcanic Ash
055 – Skid Mark	001	Tire Mark

Examples:

- A geospecific City Hall especially decorated for the Halloween during the month (S002) of October (T010) could have a texture named Geocell_D301_S002_T010_LOD_UREF_RREF_City-Hall.rgb.
- The texture of a geotypical house used during the first (T001) quarter (S009) of the year could be named D501_S009_T001_Wxx_House.rgb.
- Similarly, the uniform (S004) grey (T001) texture used with a Cobra helicopter could be named D601_S004_T001_Wxx_Cobra.rgb.
- A 1024 by 1024 (W10) texture representing an M1A2 tank desert (T001) camouflage (S005) could

be stored in a file named D601_S005_T001_W10_M1A2.rgb.

- An Airbus 380 model 800 operated by the Emirates (T221) Airlines (S006) could be stored in a file named D601_S006_T221_Wxx_A380-800.rgb.

Notes:

- Texture Kind 002 and 009 are complete; the number of months and quarters will not change.
- Texture Kind 004 will expand as new colors are added. Color names are defined here: http://en.wiktionary.org/wiki/Appendix:Colors.
- Texture Kind 005, the Camouflage Paint Scheme, follows a similar numbering scheme as the HLA's RPR-FOM Version 2 Draft 17. The list will expand as new camouflages are needed or new values added to the RPR-FOM.
- Texture Kind 006 will expand as ICAO assigns new airline acronyms.
- Texture Kind 054 and 055 will expand as new contaminants and skid marks are deemed necessary.

Annex Q: Table of Dataset Codes

Formerly Appendix Q in Volume 2 of the OGC CDB Best Practice.

The table below summarizes the CDB dataset codes along with their names and their applicability to the community 3.0 specification and the OGC standard, which is based on CDB version 3.2.

Dataset		Specification	
Name	**Code**	**3.0**	**OGC**
Elevation	001	√	√
MinMaxElevation	002	√	√
MaxCulture	003	√	√
Imagery	004	√	√
RMTexture	005	√	√
RMDescriptor	006	√	√
Reserved	007		
Reserved	008		
Reserved	020		
GSFeature	100	√	√
GTFeature	101	√	√
GeoPolitical	102	√	√
VectorMaterial	200	√	√
RoadNetwork	201	√	√
RailRoadNetwork	202	√	√
PowerLineNetwork	203	√	√
HydrographyNetwork	204	√	√
GSModelGeometry	300	√	√
GSModelTexture	301	√	√
GSModelSignature	302	√	√
GSModelDescriptor	303	√	√
GSModelMaterial	304		√
GSModelInteriorGeometry	305		√
GSModelInteriorTexture	306		√

Dataset		Specification	
GSModelInteriorDescriptor	307		√
GSModelInteriorMaterial	308		√
GSModelCMT	309		√
T2DModelGeometry	310		√
GSModelInteriorCMT	311		√
T2DModelCMT	312		√
T3DModelGeometry	320		√
T3DModelTexture	321		√
T3DModelMaterial	322		√
T3DModelInteriorGeometry	323		√
T3DModelInteriorTexture	324		√
T3DModelInteriorMaterial	325		√
NavData	400	√	√
Navigation	401	√	√
GTModelGeometry	500	√	√
	510		√
GTModelTexture	501	√	
	511		√
GTModelSignature	502	√	
	512		√
GTModelDescriptor	503	√	√
GTModelMaterial	504		√
GTModelCMT	505		√
GTModelInteriorGeometry	506		√
GTModelInteriorTexture	507		√
GTModelInteriorDescriptor	508		√
GTModelInteriorMaterial	509		√

Dataset		Specification	
GTModelInteriorCMT	513		√
MModelGeometry	600	√	√
MModelTexture	601	√	√
MModelSignature	602	√	
	606		√
MModelDescriptor	603	√	√
MModelMaterial	604		√
MModelCMT	605		√
Metadata	700		√
ClientSpecific	701		√
Reserved for CDB Extensions	9xx		

	Dataset Code is not used
√	Dataset Code is in use
	Dataset Code is deprecated
	Dataset Code is reserved

Annex R: Derived Datasets within the CDB

By using Industry Standards throughout this document, the CDB Standard defines the means and mechanisms to populate all the simulation datasets without involving data duplication. However, there are situations where a specific dataset information type needs to be derived from another existing one in order to specialize further the information into another dataset type or form.

This consideration becomes a grey area where the off-line tools' capability and the run-time simulation clients' performance levels enforces this data derivation.

It is such a case with the Mip-Map data, Min-Max Elevation data, Tile Presence data, RCS data, and Raster Material data for example.

Source Dataset	Data Manipulation Description	Resulting Dataset(s)
Elevation Dataset	In order to produce the various Level Of Details within the Elevation Dataset, it is often necessary to over-sample or sub-sample a primary set of data values. Since those values within the LOD hierarchy may come from a single data source, the LODs can be seen as derived information which can better accommodate the client needs based on their performance level.	Elevation LODs

Source Dataset	Data Manipulation Description	Resulting Dataset(s)
Elevation Dataset	For clients that need to compute line of sights (LOS) between simulation entities spread across a vast terrain area, it is imperative to have a fast way of knowing the minimum and maximum elevations within a tile without loading the entire elevation data grid. The min/max elevation dataset can be used to ensure a fast pre-determination of entities occultation state with the terrain. The min/max data is stored in the form of a quad-tree pyramid and is based on the area covered at the given depth level of the quad-tree. For example, for the maximum dataset the top will contain the maximum for the whole of the geocell, the next pyramid level contains maximum data for each the quarter geocells and so on. Similarly for the minimum the top represents the minimum for the whole of the geocell going down as for maximums. Currently the pyramid size is fixed and goes down to level 9 which covers areas that are approximately 256x256 meters square; note that the depth level can be modified to a finer or coarser level but level 9 is suggested as a reasonable compromise of performance vs. storage. A tool will pre-determine the minimum and maximum elevations within a geocell's elevations and generate the quad-trees described previously; note that the tool will use all of the elevation data that is present in the elevation dataset to determine the maximums or minimums in a	Min-Max Elevation

Source Dataset	Data Manipulation Description	Resulting Dataset(s)
Vector Datasets (Point, Lineal and Areal Features)	The Max Culture Height data is produced for clients that need to compute line of sights (LOS) between simulation entities spread across a vast terrain area that take into account the maximum cultural feature heights. The dataset helps rapidly assess an intersection status of line-of-sight with cultural features. This dataset is derived from the Vector Datasets of the CDB for corresponding tiles. The storage is done via a quad-tree similar to that of the min/max elevation the top of the pyramid represents the height of the highest cultural feature in the dataset going down to a suggested depth level of 9.	Max Culture Height
3D Model (GT, GS, MM) Datasets	The polar diagram data (covering all aspect angles) of the RCS dataset for Geotypical, Geospecific or Moving Models cannot readily be computed at run-time due to the complex mathematical computing algorithms and resources required to determine the Electro-Magnetic Energy absorption levels by the model's materials, the corner reflections, the multi-path reflections, EM parameters (frequency, polarization) effects, and so on. Therefore, off-line COTS tools are used to analyze the 3D model geometry and its materials in order to produce the RCS dataset specifically for different frequencies and polarizations.	RCS (Radar Cross Section)

Source Dataset	Data Manipulation Description	Resulting Dataset(s)
Vector Datasets (Point, Lineal and Areal Features)	Since the material attribution is normally done in the vector data, a rasterization operation among all features is required to come up with a raster grid of attributed materials.	Raster Material

Annex S: Default Read and Write values for Simulator Client-Devices

As seen throughout this document, the CDB standard provides guidelines with respect to default values in cases where no data could be read from the CDB for requested datasets. Those default parameters are captured in a Metadata file within the CDB. The Table below summarizes all the Default Parameters Names and the suggested initial values to be used by client-devices. In cases where the default parameter would be missing altogether from **\CDB\Metadata\Defaults.xml**, Client-Devices shall use the “Default Value” found in the fourth column. A “Read” default refers to the value being assumed while reading the CDB data. A “Write” default refers to the value being written to the file when content-generation tools have partial source data.

Parameter Name	Dataset	Type	Default Value	R/W
Default_Elevation-1	001_Elevation	float	0 m	R
Default_Elevation-[2-99]	001_Elevation	float	0 m	R
Default_Primary_Elevation_Control	001_Elevation	integer	INSIDE (1)	R
Default_Subordinate_Elevation_Control	001_Elevation	integer	NO_ELEVATION (0)	R
Default_Bathymetry	001_Elevation	float	0 m	R
Default_Tide	001_Elevation	float	2.5 m	R
Default_MinElevation_CaseI	002_MinMaxElevation	float	Default_Elevation-1	R
Default_MaxElevation_CaseI	002_MinMaxElevation	float	Default_Elevation-1	R
Default_MinElevation_CaseII	002_MinMaxElevation	float	-400 m	R
Default_MaxElevation_CaseII	002_MinMaxElevation	float	8846 m	R
Default_MinElevation_CaseIII	002_MinMaxElevation	float	8846 m	W
Default_MaxElevation_CaseIII	002_MinMaxElevation	float	-400 m	W
Default_MaxCulture_CaseI	003_MaxCulture	float	600 m	R
Default_MaxCulture_CaseII	003_MaxCulture	float	0 m	R

Parameter Name	Dataset	Type	Default Value	R/W
Default_VSTI_Y_Mono	004_Imagery	float	0.5	R
Default_VSTI_Y_Red	004_Imagery	float	0.5	R
Default_VSTI_Y_Green	004_Imagery	float	0.5	R
Default_VSTI_Y_Blue	004_Imagery	float	0.5	R
Default_VSTLM_Mono	004_Imagery	float	0.0	R
Default_VSTLM_Red	004_Imagery	float	0.0	R
Default_VSTLM_Green	004_Imagery	float	0.0	R
Default_VSTLM_Blue	004_Imagery	float	0.0	R
Default_Imagery_Gamma	004_Imagery	float	1.0	R
Default_RoadNetwork_LTN	201_RoadNetwork	integer	2	R
Default_RailRoadNetwork_LTN	202_RailRoadNetwork	integer	1	R
Default_GSModelTexture_Gamma	301_GSModelTexture	float	1.0	R
Default_GSModelInteriorTexture_Gamma	306_GSModelInteriorTexture	float	1.0	R
Default_GTModelTexture_Gamma	511_GTModelTexture	float	1.0	R
Default_GTModelInteriorTexture_Gamma	507_GTModelInteriorTexture	float	1.0	R
Default_MModelTexture_Gamma	601_MModelTexture	float	1.0	R
Default_Base_Material		string	BM_LAND-MOOR	R
Default_Material_Layer		integer	0	R
Default_AO1		float	0.0	R

Parameter Name	Dataset	Type	Default Value	R/W
Default_SCAL[x,y,z]		float	1.0	R
Default_TRF		integer	4	R

Annex Y: Revision History

Date	Release	Editor	Primary clauses modified	Description
2017-02-23	1.0	C. Reed	All	
2018-08-28	1.1	C. Reed	All	
2019-12-16	1.2	C. Reed	Various	Changes for version 1.2

Annex Z: Bibliography