



Volume 1: **Standards Overview for** Building Information Modeling

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1 BIM OVERVIEW

Los Angeles World Airports (LAWA) utilizes a comprehensive Building Information Modeling (BIM) process. LAWA recognizes the industry shift away from 2D CAD (Computer Aided Drafting) documentation toward the use of building information models. LAWA requires Building Information Modeling (BIM) be used on new projects and renovations of their facility.

1.1 Purpose

This document provides an introduction to the Implementation of BIM at LAWA and serves as the record and overview of the LAWA BIM definition, interpretation, expectation, software and file organizational structure for LAWA projects. This document provides an explanation of the terminology and processes implemented by LAWA, so the project teams are prepared to develop the Building Information Modeling Project Execution Plan (BPXP) and work within the requirements of this document and the accompanying LAWA BIM Standards.

1.2 Acronyms Used in this Document

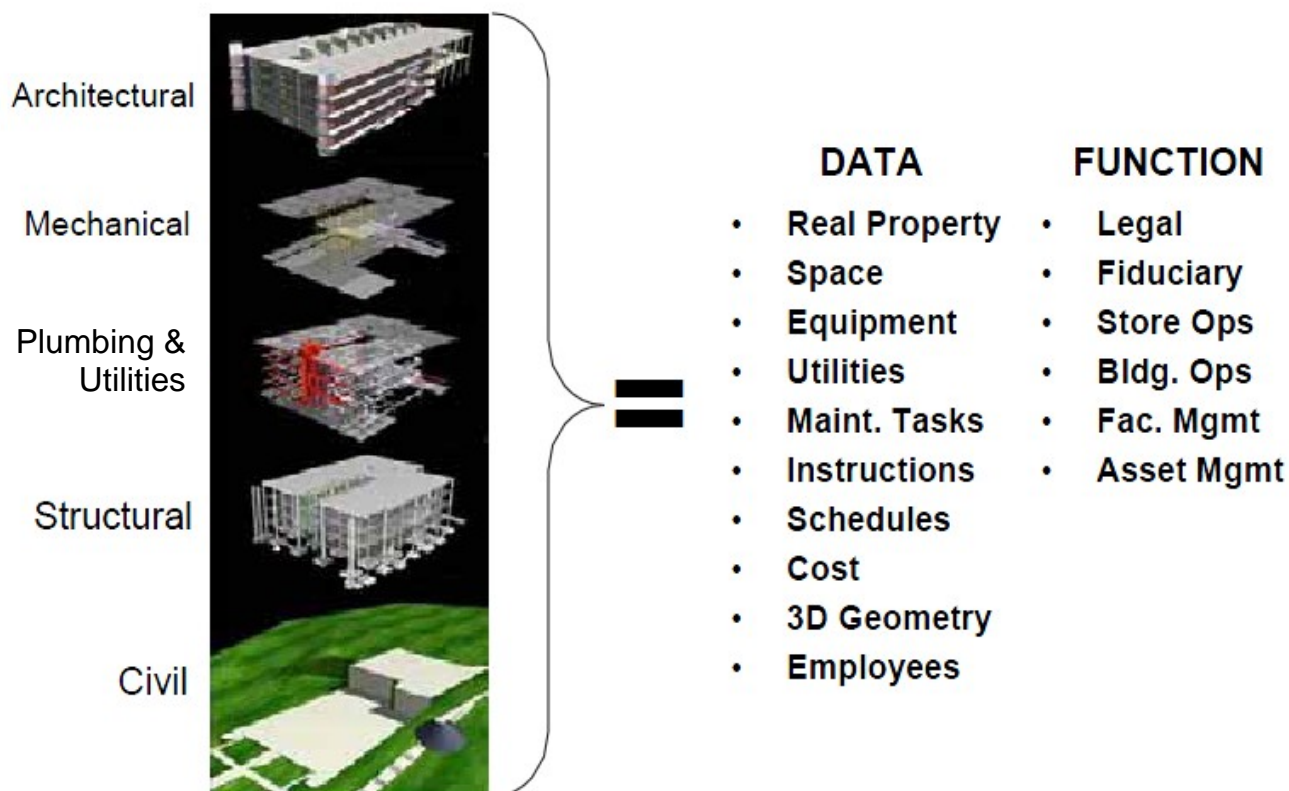
Acronym	
BIM	Building Information Model, Modeling and Management
CAD	Computer Aided Drafting
cBIM	Central Building Information Management
HVAC	Heating, Ventilating and Air Conditioning
LOD	Level of Development is the degree to which the elements geometry and attached information has been thought through – the degree to which project team members may rely on the information when using the model. This base definition is further defined in the attached “Level of Development Specification”, 2014 by <i>BIMForum</i> .
LAWA BS	Los Angeles World Airports BIM Standards
LAWA BPXP	Los Angeles World Airports BIM Project Execution Plan
MEP	Mechanical Electrical Plumbing
O & M	Overview & Maintenance

1.3 Proposing Revisions

For any proposed revisions to this document, please contact the LAWA cBIM Program Group.

1.4 LAWA'S BIM Provides Graphical Coordination

BIM provides a graphical coordinated document set of all building construction trades. BIM also provides a three-dimensional graphical database that allows the spatial coordination of document sets of multiple design disciplines and phasing the project for construction logistics. The preferred BIM software programs that manage the graphical data are produced by Autodesk. Depending on the design discipline, LAWA requires all graphical models to use Autodesk Revit® or Civil 3D® software.

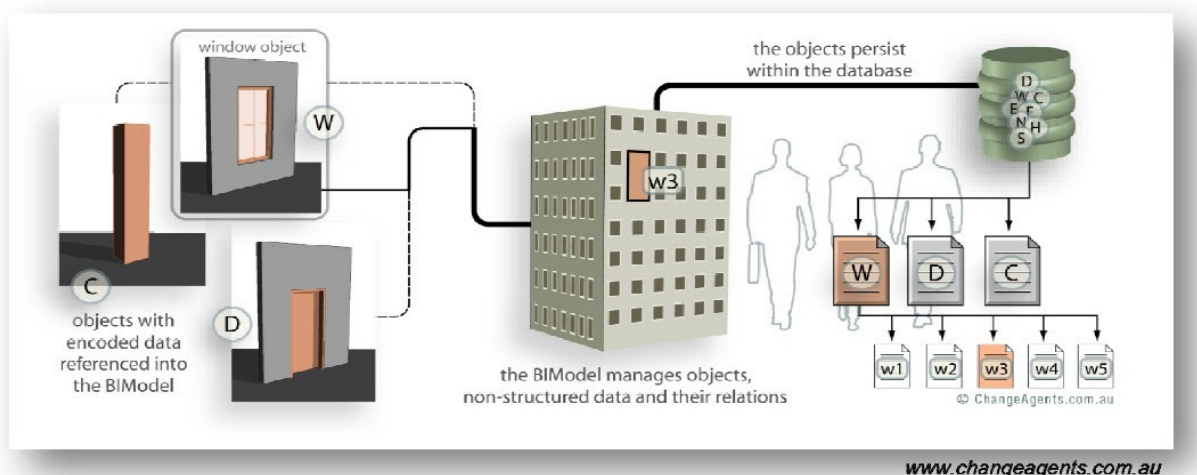


1.5 BIM Provides Data Coordination

The information components in BIM are data rich. For example, a BIM HVAC unit has imbedded data fields (called “parameters”) that can control its size, air flow, cost, maintenance schedule and Operations & Maintenance (O+M) data. These components could be considered micro databases within the larger graphical database.

Each LAWA BIM model will include an internal database linked to the graphic models. LAWA will manage the required components and their parameter data outside the graphical database once the Reconciled Record Model has been completed and delivered as the Facilities Model. This allows bidirectional flow of parameter data to and from the Revit and Civil 3D models.

Electronic File Data Handling – BIM is database and central file driven in its concept of file handling. It changes the entire process of how files are created and managed. A completely new set of processes and rules including the optimization of networks has been created to accommodate this process.



1.6 BIM Bidirectional Links to FM/GIS

Historically, LAWA's 2D CAD setup had no link between the 2D CAD documents and the Facility Management and maintenance (FM) programs, like Maximo, or the Geographic Information System (GIS) programs. Thus, when work order changes occurred at the existing facility, there was no mechanism to relay those changes back into the 2D CAD files. Graphical programs like Revit and Civil 3D do provide a bidirectional link with FM and GIS programs.

LAWA's goal is to assure that the model data is bidirectionally linked to their computerized maintenance management system (CMMS) and GIS platforms. The format of the data shall be defined by the creation of content in conformance with the BIM Standards and LAWA Templates. LAWA's goal is to link the graphical Revit and Civil 3D parameter data to the FM and GIS programs, allowing BIM to facilitate Full Lifecycle Management of the airport as the author of content to LAWA FM and GIS data.

Accessibility to the component data of the building allows the FM and GIS programs to be more productive with the overall management and preventive maintenance of the facility. This, in turn, allows exposure to other management benefits including improvement of building sustainability, scheduled maintenance and overall predictable behavior of the facility.

2 LAWA BIM VISION

2.1 BIM Directive

Integrate BIM as a process and deliverable into the LAWA project organizational and planning structure to take advantage of the data (information) created during design and construction that will enhance and feed the existing and future facilities/operations processes.

2.2 BIM Standards

The BIM Standards are a set of documents provided to aid in the creation, organization and delivery of BIM for all projects. The document package listed below is to be provided to any project managers and external service providers working on BIM projects at LAWA.

LAWA BIM DOCUMENTS:	VOLUME
LAWA BIM STANDARDS	
LAWA BIM OVERVIEW	1
LAWA BIM REQUIREMENTS	2
LAWA BIM PROJECT EXECUTION PLAN	3

2.3 BIM Enhances Vision

BIM is a powerful data authoring and capture platform that takes advantage of supplied As-Built models and moves that data into the FM and GIS databases.

2.4 BIM Alters Vision

Integrating BIM from project inception through facility operations will change the current methods, standards and processes. It also creates new, homogeneous processes to the benefit of all LAWA departments. This is an iterative process that requires a dynamic perspective be maintained by management to institute both strategic and tactical planning in order to stay current with frequent and rapid technological advances. As BIM technology advances, LAWA will look forward to integrating those changes into existing systems and processes. This change is part of adapting a new technology and may be accounted for in future BIM vision statements at LAWA.

2.5 BIM is Data, Not Files

BIM has many meanings in the LAWA BIM Standards documents. BIM can refer to a product of a process (Model) or to the process itself (Modeling) and the Maintenance of the facility.

Examples:

- Even a simple schematic design will have at a minimum a single Revit file as well as a Database. The Database will also be considered to be a part of the Building Information Model and not identified separately in this document.
- A Coordination Model used to illustrate 4D progression of a project may include the Revit model files, the database as well as a Navisworks or Synchro file.

3 LAWLA BIM PROJECT EXECUTION PLAN (BPXP)

3.1 What is the BPXP?

The BIM Project Execution Plan (BPXP) is an agreement by **all parties** of a project to share in the development and use of a common BIM for a LAWLA project. It is a document that helps plan the ownership and scope of the models involved in preparing a BIM project at LAWLA. **The PROJECT TEAM will be required to develop a BPXP (based on a template provided by LAWLA)** to provide a master information/data management plan including assignment of roles and responsibilities for model creation and data integration that includes design professionals of all team members.

3.2 Typical Project Information

Typically included in this plan are records of the following items, agreed to by consensus of all teams involved in the project:

- 1) General Project Information
 - a) Who is involved in this project?
 - b) Contract type / Delivery method
 - c) Milestones of the project
- 2) General File Issues
 - a) Naming conventions (how are the files to be named?)
 - b) How files are transferred between parties

3.3 Typical BIM Information

The preceding items are typical for most project agreements, however, the BPXP adds in several items that help identify qualities of the project unique to BIM:

- **Level of Detail:** How *much* detail is included in the model element. *Level of Detail* can be thought of as input to the element, while *Level of Development* is reliable output.
- **Level of Development (LOD):** is a reference that enables practitioners in the AEC Industry to specify and articulate with a high level of clarity the content and reliability of Building Information Models (BIMs) at various stages in the design and construction process. (re: 2014 BIMFORUM LOD Specification)
- **Authorship:** Who is creating that level of detail at each milestone?
- **BIM Uses:** How does the project team want to use the BIM Model for each milestone?

Each of these last three items is included in a BPXP specifically because they help identify common BIM project collaboration issues before they happen.

3.4 LAWLA BPXP Documents List

The LAWLA BPXP is not a single document, rather a set of documents provided to aid in the creation, organization and delivery of BIM projects. This set of documents serves two main purposes for any LAWLA project:

- 1) Provides a group of tools to facilitate a group consensus/decision making process.
- 2) Provides a format to record the process and final decisions made during that process.

While some of the BIM Project Execution Plan is background information such as project name etc., the bulk of the plan is a set of instruments designed to help focus the expectations and responsibilities of all parties involved in the BIM aspects of the work based on goals set by the team. By working through the BPXP process, each team:

- Clarifies the Level of Detail they will be contributing to the model.
- Clarifies the Level of Development of the model at specific deliverable milestones.

- Identify their processes (BIM Uses) and any unique needs from the model.
- Confirms their compliance with the intent of the BIM Implementation Requirements.

3.4.1 TABLE: BPXP documents:

LAWASM: BIM STANDARDS	TITLE
BPXP Documents	Volume 2: LAWA BIM Requirements.pdf
	Volume 3: LAWA - BPXP Template.docx
BPXP Worksheets	LAWA – BPXP BIM Matrix.xlsx
	01 - Team Members
	02 - BIM Matrix
	03 - Level Of Development
BPXP Process Maps	LAWA - BPXP Process Map Templates.vsd

BIM STANDARDS MANUAL

This document is a more technical overview of the BIM Standards set for the LAWA and outlines LAWA's implementation of the BPXP, the objectives and the core expected BIM deliverables for each phase of the work, from existing conditions through design and construction modeling.

BPXP Template.docx

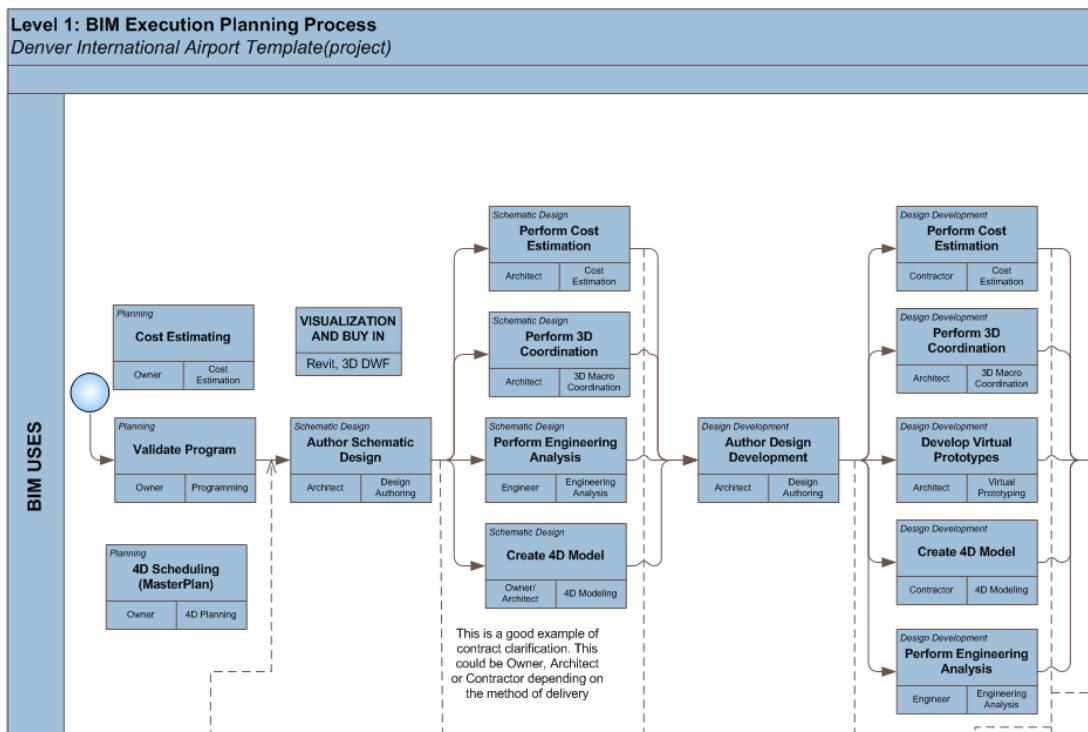
This document is the base file to be completed for all LAWA projects by the Project BIM Team and is the originating document for the BPXP package submitted for LAWA BIM projects.

3.5 BPXP Worksheets

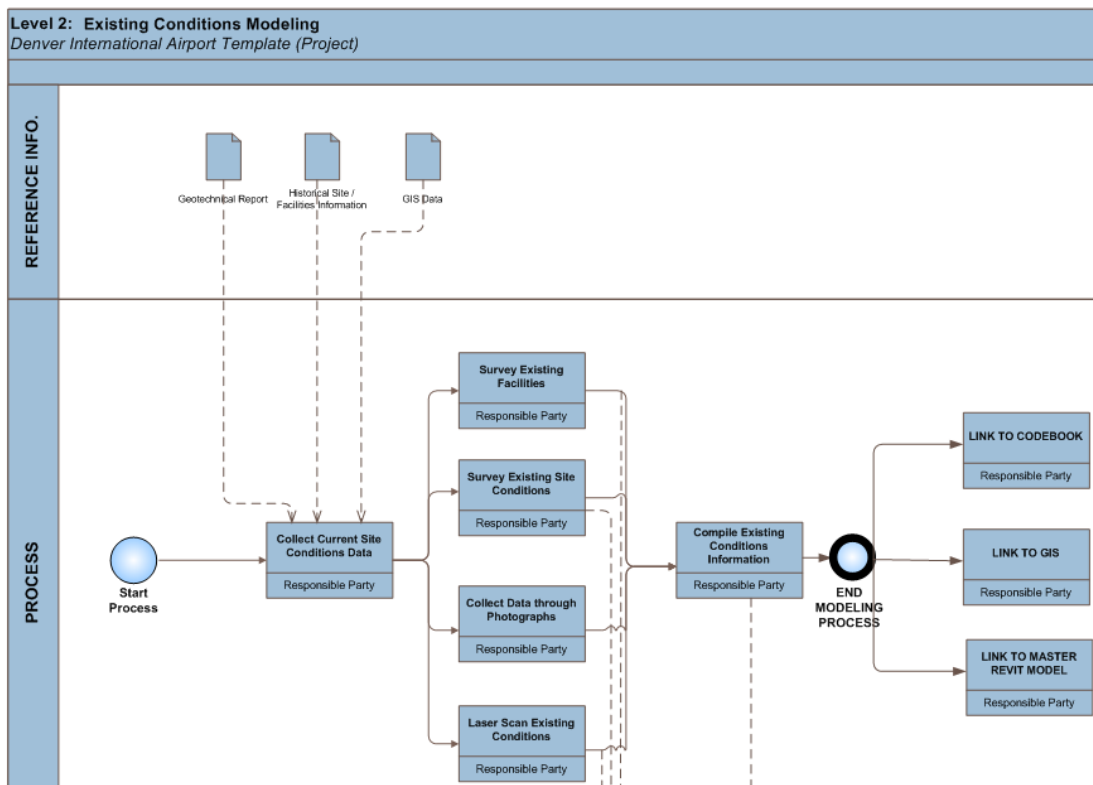
The two worksheets are provided to help clarify the project goals, ownership and deliverables based on the needs of the project and project team makeup. The worksheets, once completed, will become attachments to the submitted BPXP.

3.5.1 BPXP Process Map Templates.vsd

- This Visio file has multiple tabs to identify "process mappings" for all phases of the work. To view a "sample" map, open the example file titled: **LAWA - BPXP Process Map Templates Example.vsd**.
- The Project BIM Team is to create an overall roadmap of the BIM progress from start to end (concept to owner), identifying project milestones (Level 1 map below).



- c) Then, put each BIM Use from Level 1 on the map and identify when and what general information needs to be generated by the BIM Model (output) for each use (Level 2 maps).



3.5.2 LAWA BPXP BIM Matrix


Attachment 1 - BIM Matrix: (Model Progression Specification)				LOD MEA Level of Development Model Element Author												
ASTM D1904-18 Classification of Building Elements (E897-97)				EXISTING CONDITIONS MODELS			DESIGN MODELS							CONSTRUCTION MODELS		
Level 1 Major Group	Level 2 Group Elements	Level 3 Individual Elements	Level 4 Sub-Elements	MEAs	LOD	LOD	MEAs	LOD	LOD	LOD	LOD	LOD	MEAs	LOD	LOD	
A Substructure	A0 Foundations	A00 Standard Foundations	A001 Wall Foundations													
			A002 Column Foundations & Pile Caps													
			A003 Perimeter Drainage & Insulation													
		A002 Special Foundations	A0021 Pile Foundations													
			A0022 Grade Beams													
			A0023 Caltrans													
			A0024 Underpinning													
			A0025 Dowelbars													
			A0026 Rigid Foundations													
			A0027 Pressure Injected Grouting													
			A0028 Other Special Conditions													
		A003 Slab on Grade	A0031 Standard Slab on Grade													
			A0032 Structural Slab on Grade													
			A0033 Insulated Slab on Grade (Rigid Surface Draining)													
			A0034 Transverse Pile & Beams													
			A0035 Under-Slab Drainage & Insulation													
		A004 Basement Excavation	A0041 Excavation for Basements													
			A0042 Structure Back Filling/Compaction													
			A0043 Permanent Shoring													
			A0044 Temporary Shoring													
		A005 Basement Walls	A0051 Basement Wall Construction													
			A0052 Moisture Protection													
			A0053 Basement Wall Insulation													
			A0054 Exterior Sides													
B Shell	B00 Superstructure	B000 Floor Construction	B0001 Suspended Basement Floor Construction													
			B0002 Upper Floor Construction													
			B0003 Balancing Floor Construction													
			B0004 Floors													
			B0005 Exterior Stairs and Fire Escapes													
			B0006 Floor Raising Systems													
			B0007 Other Floor Construction													

Figure: Att 3 Worksheet Tab of the “2016 – LAWA BPXP BIM Matrix.xlsx”

This excel file is a worksheet to be filled completed defining the BIM Level of Development by identifying who is creating the model at each milestone. Each model author answers the question: “What will be in the model at this time”. This is a detailed workbook spreadsheet that is part of the BPXP Package and is included as an attachment when completed and submitted. This same file listed what is needed in the BIM output and when it is to be delivered. The “Fundamental LOD Definitions”, as defined by the 2015 BIM Forum, Level of Development Specification, released August 22, 2015 are as follows:

- LOD 100** The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.
- LOD 200** The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.
- LOD 300** The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.
- LOD 350** The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, orientation, and interfaces with other building systems. Non-graphic information may also be attached to the Model Element.
- LOD 400** The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.

LOD 500 The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.

Level of Development Specification © 2015 by BIMForum

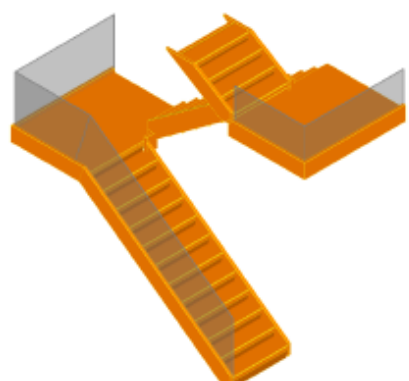
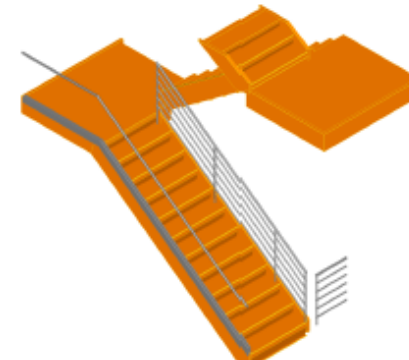
Example – Stairs: from 2015 BIM Forum, Level of Development Specification, www.bimforum.org/lod

B1080 – Stairs

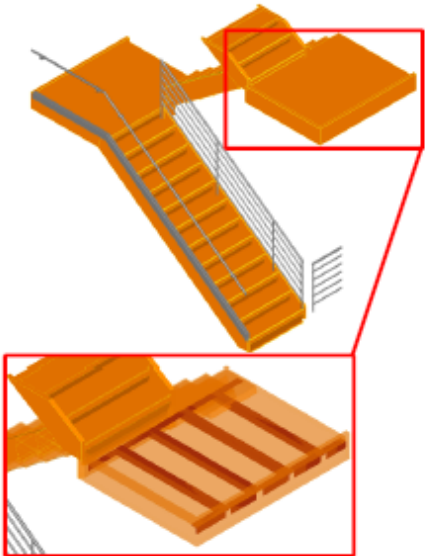
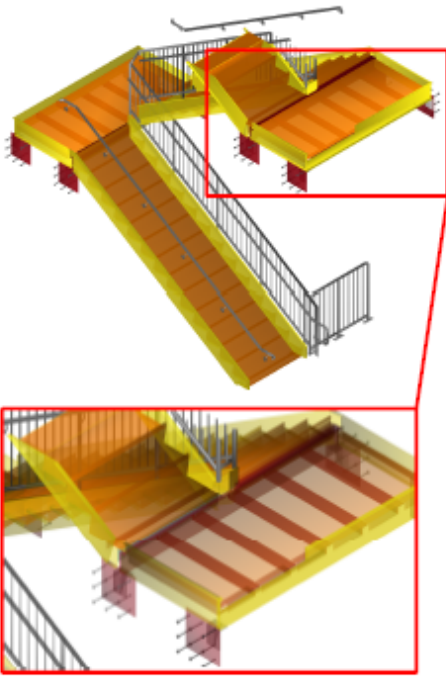
100	Assumptions for all stair systems (including railings, fire escapes, walkways, and ladders) are included in other modeled elements such as a spatial or massing element; or, schematic model element that indicates the approximate overall dimensions of the stair layout.	
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B1080.10 – Stair Construction

Includes: Structural framing for exterior and interior stairs including treads, risers, and landings. Includes fire escapes and ladders.

100	See B1080	
200	<p>Generic model element with simplified treads and risers.</p> <p>Nominal overall unit scope shall include:</p> <ul style="list-style-type: none"> Nominal plan dimensions (length, width) Nominal vertical dimensions (levels, landings) 	 <p>42 B1080.10-LOD-200 Stair Construction</p>
300	<p>Major stair support elements are modeled (stringers).</p> <p>Treads and risers are modeled to indicate design-specified nosing conditions.</p>	 <p>43 B1080.10-LOD-300 Stair Construction</p>

Level of Development Specification © 2015 by BIMForum

<p>350</p>	<p>Secondary stair support elements are modeled (hangers, brackets, etc.).</p> <p>Required clearance/code zones are modeled.</p>	 <p>44 B1080.10-LOD-350 Stair Construction</p>
<p>400</p>	<p>All stair elements are modeled to support fabrication and installation.</p>	 <p>45 B1080.10-LOD-400 Stair Construction</p>

Level of Development Specification © 2015 by BIMForum

LOD 500 Contractor field verified As- Built model properly located.

3.6 LAWA BPXP Notes

All LAWA BIM projects are different from one another for various reasons (i.e.- scope, contract type, location, etc.) illustrating why a standard LAWA BIM package is not possible. Each project will end up as a model coordinated with LAWA's facility software. In order for the record model to be useful, the entire process from conception to record model is influenced by that end goal. Everyone on the team must be aware of the downstream LAWA BIM uses and are required to revise their contribution into the model accordingly, all of which is established in the specific LAWA BPXP.

4 MODELING PLAN

The modeling plan identifies the models anticipated to be utilized when BIM is fully integrated into the workflows and processes for the LAWA project. Two different tables are provided. The first (4.1.2 BIM Use Matrix) defines the uses intended and responsible parties for each use. The second table (4.1.3 Planned Models Overview) is the overview of all models and types that might be utilized by LAWA departments regardless of who authors the models.

4.1 BIM Uses

4.1.1 BIM Modeling Requirements

The following is a partial BIM Use Matrix that indicates which BIM uses will be required for each LAWA project. The table below sets out this list, and resulting requirements, which has been created through interviews with multiple LAWA stakeholders to date.

4.1.2 TABLE: BIM Use Matrix Example (see BPXP for full version)

Key: LAWA PT= Project Team Function: P = PRIMARY S = SECONDARY R = REVIEW

X = Required		X = Desired, but Not Required			X = Not Required			
EXISTING CONDITIONS MODELING								
Description	Pre-Construction		Design		Construction		Facilities Management	
Laser Scanning (Exterior, Interior, Featured MEP)	X	PT / P, LAWA / R	X	PT / P, LAWA / R	X	LAWA / P, PT / R	X	LAWA / P
Development of BIM from existing documents	X	PT / P, LAWA / R	X	PT / P, LAWA / R	X	PT / P, LAWA / S,	X	LAWA / P
Field Capture Model	X	PT / P, LAWA / R	X	PT / P, LAWA / R	X	PT / P, LAWA / R		
DESIGN MODELING								
	Design			Construction			Facilities Management	
Design Authoring								
Design Visualization-all disciplines	X	PT / P, LAWA / R		X	PT / P, LAWA / R			
Design Alternatives-all disciplines	X	PT / P, LAWA / R		X	PT / P, LAWA / R			
Way finding Analysis	X	PT / P, LAWA / S		X	PT / P, LAWA / S		X	LAWA / P
Spatial Coordination	X	PT / P, LAWA / R		X	PT / P, LAWA / R			
Asset Management								
Operational Planning	X	PT / P, LAWA / R		X	PT / P, LAWA / R		X	LAWA / P
Data Normalization	X	PT / P, LAWA / R		X	PT / P, LAWA / R		X	LAWA / P
Room Management and Tracking	X	PT / P, LAWA / R		X	PT / P, LAWA / R		X	LAWA / P
Area Space Management	X	PT / P, LAWA / S			PT / P			LAWA / P
Design Model Reviews								
Space and Equipment review	X	PT / P, LAWA / R		X	PT / P, LAWA / R			LAWA / P
Building code analysis	X	PT / P, LAWA / R		X	PT / P, LAWA / R			
Constructability	X	PT / P, LAWA / S		X	PT / P, LAWA / S			LAWA / P

4.1.3 TABLE: Planned Models Overview

This table provides an overview of models identified by a LAWA project and their potential BIM use in processes and workflows. This chart relates to the BIM Uses identified in the LAWA BPXP.

In all cases, the Models created below are authored with Autodesk Revit software, Civil 3D and Navisworks.

USE	MODEL NAME (S)	REQUIRED ELEMENTS	DOWNSTREAM DATA TOOLS
PLANNING			
Estimating at Planning Level	Existing Conditions Model + Preliminary Design Model	Generic level items, S.F. based estimates	LAWA Estimating Package (TBD)
Scheduling at Planning Level		Overall project scope, massing	Primavera, Synchro,
DESIGN			
Estimating	SD and DD Models	Generic level items, S.F. and count based estimates	LAWA Estimating Package (TBD)
Scheduling	SD and DD Models	Generic Arch/Struct / MEP elements	Primavera, Synchro,
Programming	NA	Rooms and Spaces	Revit
What-If Scenarios Design/MEP	Reconciled Record Model + Preliminary Design Model	Dependent on scenario.	IES<VE>
Early Concept Design	Preliminary Design model	Massing, generic elements,	
Design Visualization and Shareholder Buyoff	SD / DD Models, + could be separate presentation model	The more the better for most presentations. For this reason the presentation model may be separate from the DD or SD model depending on needs of presentation	Navisworks, Image tools
Design Reviews	SD / DD Models	Dependent on phase	Viewing tools: Design Review (dwf) Navisworks
Spatial Program	SD / DD Models	Rooms, Spaces	Revit
Engineering Analysis: Mech, Struct, Daylighting, Fluid Dynamics	SD / DD Models	Dependent on level of analysis	IES, Ecotect, Revit MEP, Honeywell, Others
Sustainability	SD / DD Models		LEED Spreadsheets
Collaboration / Clash Detection	SD / DD / CD Models	All Design Content	Navisworks, Synchro
CONSTRUCTION			
Scheduling (4D)	Construction Models		Primavera, Synchro,
Estimating (5D)	Construction Models	Detailed level items, S.F. and counts	LAWA Estimating Package (TBD)

Procurement (6D)	Construction Models		LAWA Estimating Package (TBD)
Constructability	Construction Models	Detailed assembly	
3D Control and Planning	Construction Models		Primavera, Synchro,

FACILITIES AND OPERATIONS			
Building Maintenance Scheduling (7D)	Existing Conditions Model / Reconciled Record Model	Furniture, Fixtures, Equipment, Rooms, Spaces, Built Elements (walls, doors etc).	Maximo
Asset Management	Existing Conditions Model / Reconciled Record Model	Furniture, Fixtures, Equipment, Rooms, Spaces, Attic Stock, etc.	Maximo
Space Management, Lease Management	Existing Conditions Model / Reconciled Record Model	Massing, Rooms, Spaces	Propworks (or similar)
Emergency Management	Existing Conditions Model / Reconciled Record Model	Massing, Rooms, Spaces, access routes	Maximo, GIS

All model types are subject to modification and are listed above as a point of beginning

4.2 Model Definitions

4.2.1 As-Built Model

The “As-Built Model” is a further development of the “Construction Model” that has been spatially and technically validated in the field. Prior to the start of construction, the contractor shall submit a plan to the Owner for review that outlines the required process for concurrent as-built documentation. This validated Model is generated by the contractor or trade subcontractor incorporating all changes in the project and any deviations between the construction drawings and the work actually built. Validation may occur through physical measurement or electronic measurement techniques.

4.2.2 Construction Model

The Construction Model is generated by the Contractor or trade subcontractor. The Construction Model is developed to be used for generation of Coordinated Construction and Shop Drawing Level Information. It must be clear that each party be able to rely on the fact that the model furnished by others (designer, contractor, or trade subcontractor) “match” the 2D contract documents or shop drawings, generated by the model, in their equivalent state of development.

4.2.3 Design Model

A Model that has reached the stage of completion in 3D that would customarily be expressed by an architect or engineer in two-dimensional construction documents. A Design Model is generally, an assemblage of several Models produced by various disciplines, each of which is comprised of numerous Objects. It must be clear that each party be able to rely on the fact that the model furnished by others (designer, contractor, or trade subcontractor) “match” the 2D contract documents or shop drawings, generated by the model, in their equivalent state of development.

4.2.4 Facilities Model

The Facilities Model is developed from the Reconciled Record Model. It is extracted at a point in time when the 3D content has been substantially reconciled with the Contractors As-Built Models. The Facilities Model shall be purged of all extraneous views, stories, abandoned Design Options,

miscellaneous in-place object creation and testing places, and any other content not represented in sheet views. The majority of details, sections, elevations, and annotation sheets may be removed from this model. Specified plan sheets, schedules, and legends shall remain in the model.

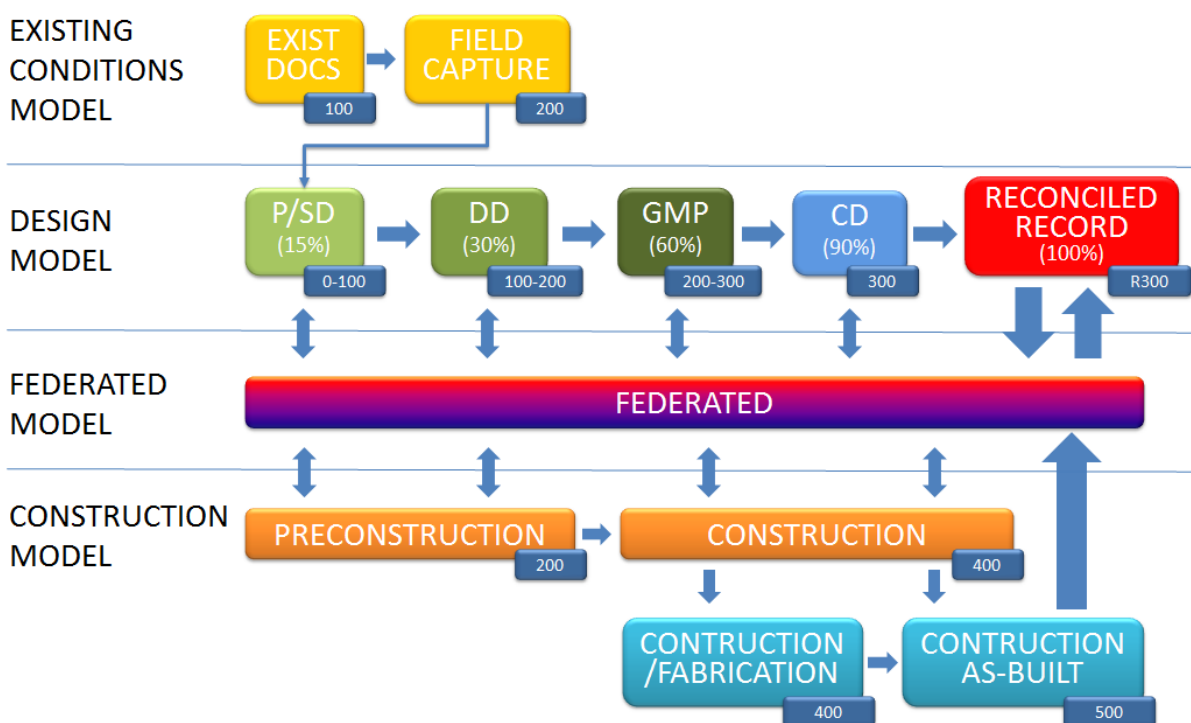
4.2.5 Federated Model (FED)

The Fed Model is comprised of all linked, Native Models and is a virtual representation of the entire Project developed to a specified Level of Development. The FED Model shall consist of all discipline Native Models such as Civil, Architectural, Structural, Mechanical, Electrical, Fire Protection, and Special Equipment, depending on the specific scope of the project.

4.2.6 Reconciled Record Model (RRM)

The model developed as a result of aligning the Design Model with the Contractor provided As-Built Model(s) for spatial coordination. The RRM is the basis BIM model of the "Record Documents" and is submitted as part of project close-out. Prior to the start of construction, the designer shall submit a plan to the Owner for review that outlines the required process for concurrent reconciled record model documentation.

4.2.7 BIM Model Progression Diagram



5 LAWA BIM STANDARDS

LAWA maintains and distributes a series of documents that outline the general modeling standards for BIM projects. The title of this document is "Building Information Modeling Standards". The BIM Standards are used by staff and consultants engaged with the design and modeling of a project, to ensure standardization of core processes producing "downstream" usable building models. This section is to highlight some key aspects of the BIM Standards to provide a basic understanding of the LAWA BIM Process and the accompanying material.

5.1 Graphic and BIM Internal Standards

LAWA maintains Revit and Civil3D templates for consistency in all projects. Separate templates are provided for Architectural, Site/Landscape, Structural, Civil, Construction, and MEP models. LAWA symbols, tags and other graphic standards are built into these templates, and/or are available in the provided container folders.

5.2 Process and Workflow Guidelines

LAWA recognizes that "how a model is constructed", is just as important to the end product as "how the model is documented" using graphic standards. The BIM Requirements provide a guideline process and describes workflow issues such as:

- **Creating a project**
- **Accessing the remote server**
- **Using the Master Grid Revit file for shared coordinates**
- **Starting a project with the LAWA template**

5.3 LAWA BIM Library: Revit and Civil 3D

As per the LAWA BPXP, all BIM projects are to include a corresponding project database. At the start of each project, LAWA will provide the Project BIM Team the *LAWA Library* which will include templates for both Revit and Civil3D, parameter data and Revit family components which exist within the equipment library.

The Project BIM Team will organize the structure of the BIM by linking all the Revit models that make up each building project into the project. Those multiple models are then linked into a single project database. All "rooms" or "spaces" that exist within the Revit project models will be linked to their corresponding room within that project database. The BPXP will define submission requirements that outline BIM models with their linked projects.

- 1) Goals:
 - a) Link and pass data between LAWA BIM and LAWA FM / GIS
 - b) Manage the *LAWA Library* in a single location across the entire facility
 - c) Improve the overall asset capture/content for LAWA Facilities Management
 - d) Establish BIM Standards for today and future projects
- 2) Who:
 - a) LAWA: The Database will be used by LAWA for managing the graphical and parameter information that is passed between the Revit and Civil 3D models and the LAWA FM and GIS group. For example, if Maintenance replaces urinal type "A" with urinal type "B", that change is pushed from Revit via the Database back to that room inside Maximo. This is the true lifecycle management of the entire facility.
 - b) Consultant /Architects and Engineers: The project architects and engineers will be the creators of the BIM data. The use of the Database will have a minimal impact on way they use BIM today. In order to "find" a room in a BIM model, the room needs to be

created within the LAWA Defined parameters and linked to the Revit room. Once that link is established, all types of room data can be passed between each program. Once the room link has been created, Revit family data can pass between each program.

Note that if the AE firms start their Revit models using the *LAWA Library*, all the families in that package will already exist within the database. The Revit user simply places the family from the *LAWA Library* into a single room and once the family is placed, that family can be used as a normal component to be copied and placed across all rooms in the project. When the database rooms are updated, all the Revit rooms linked to the database will find the LAWA Revit family. The other benefit to the *LAWA Library* is the pre-existing data link between the Revit database family parameters and the asset parameters within Maximo.

6 LAWA COLLABORATION/COMMUNICATION PLAN

A project Collaboration/Communication Plan will provide LAWA and its service providers a means to efficiently communicate, share, and retrieve information created with BIM technologies both internally and externally.

6.1 Communicate

Unlike CAD, where a large number of files are operated on by many individuals, BIM systems involve many users simultaneously accessing a few files. Because of this close interaction between team members, communication becomes much more important.

6.1.1 Team to Team Project Communications

While traditional Email systems have been tried and true for many years, other systems for communication developed over the last few years have distinct advantages for project and group specific communication. Specifically, Electronic Document Management Systems (EDMS), that allow **all** team members to store, sort and retrieve communications by project.

These can be part of project management suites, standalone systems or part of other larger communication suites: SharePoint, Newforma, Database drive web communication tools such as Drupal, PHP Forums and wikis.

6.1.2 Communications Security

All communications need to conform to current LAWA communications security standards accounted for in the Communications plan.

END OF BIM STANDARDS OVERVIEW