

# Appendix A

## Level of Development Matrix

# Revisions

VERSION	DATE	SECTIONS	AUTHOR	CHANGE DETAILS
A	n/a			
B	n/a			
C	02/26/2016	All	CH2M Hill	95% Draft
D	03/04/2016	All	CH2M Hill	98% Draft for Final Comments
E	03/11/2016	All	CH2M Hill	100% Draft for Formatting
O	03/21/2016	All	CH2M Hill	Issued

## USAP BIM STANDARD LEVEL OF DEVELOPMENT MATRIX

This worksheet is a guide for the project team to define model creation scope of work and model level of development. Please review the Level of Development (LOD) definitions. This worksheet is intended to assist the project team in achieving project goals, accommodate required BIM uses, and meet schedule requirements for the project.

### ASSUMPTIONS

- See BIMForum Level of Development Specification 2015 for detailed descriptions of numeric values (e.g. LOD 300)
- Section BIM LOD values are the minimum required at the end of that period (the USAP acknowledges actual progress may be greater).
- This matrix is organized by Design Discipline for convenience. However, while this overarching organization differs from the BIMForum LOD Spec, the actual numbers and general following of Unifomat does not.
- Section Items broken out are exceptions to the BIM LOD general values of that particular section.
- Percentage ranges within a design period provide the USAP set points for deliverables.
- Deliverables requested at period starts will be overall less developed than the same deliverables requested at that period end.
- Deliverable requests and their uses are at the USAP's discretion, the frequency and process of which to be included in each BIMxP.
- Some items in the matrix are set to a LOD number with the designation "2D" (e.g. "300/2D"). These items do not have a requirement to be modeled in 3D. However, 2D representation must be at the minimum specified LOD for that item. E.g. D50 Electrical Grounding Systems are not required to have 3D models of raceways, boxes, enclosures, and other electrical equipment but any 2D representation must, at a minimum, illustrate the system to that level of development.
- Refer to the BIMForum LOD Specification 2015 as needed for further explanation and detailed breakdown of each section.

**Each project stakeholder should review, comment, and confirm work efforts and LOD. If an effort has been misassigned, omitted, duplicated, or incorrectly included, please notify the BIM Lead immediately.**

		DESIGN INTENT MODEL			CONSTRUCTION/RECORD MODEL
		15%	30-60%	90-100%	
<b>ARCHITECTURAL</b>					
<b>A20</b>	<b>Subgrade Enclosures (walls)</b>	n/a	n/a	300	300
<b>B10</b>	<b>Superstructure (floor and roof construction, stairs)</b>	100	200	300	300
	Other Floor Construction	n/a	200	300	300
	Flat Roof, Pitched Roof Construction (Membrane, Insulation, etc.)	n/a	200	300	300
	Metal Roof	n/a	200	300	300
<b>B20</b>	<b>Exterior Vertical Enclosures</b>	100	200	300	300
	Parapets	n/a	200	300	300
	Exterior Louvers, Screens, and Facing	n/a	200	300	300
	Exterior Sun Control Devices	n/a	200	300	300
	Balcony Walls and Handrails	n/a	200	300	300
	Exterior Soffits	n/a	200	300	300
	Revolving Doors	n/a	200	300	300
<b>B30</b>	<b>Exterior Horizontal Enclosures</b>	n/a	200	300	300
	Traffic Toppings and Paving Membranes	n/a	n/a	300	300
	Flashings and Trim	n/a	n/a	300	300
<b>C10</b>	<b>Interior Construction</b>	100	200	300	300
	Site Built Compartments Cubicles	n/a	200	300	300
	Interior Balustrades and Screens	n/a	200	300	300
	Interior Windows and Storefronts	n/a	200	300	300
	Interior Door Sidelights and Transoms	n/a	200	300	300
	Interior Hatch and Access Doors	n/a	n/a	300	300
	Storage Shelving and Lockers	n/a	200	300	300
	Ornamental Metals and Handrails	n/a	200	300	300
	Identifying Devices	n/a	n/a	300	300
	Closet Specialties	n/a	n/a	300	300
	General Fittings and Misc. Metals	n/a	n/a	300	300
<b>C20</b>	<b>Interior Finishes</b>	n/a	200	300	300
<b>D10</b>	<b>Conveying (vertical and horizontal systems, material handling)</b>	100	200	300	300
	Pneumatic Tube Systems	n/a	n/a	300	300
<b>D20</b>	<b>Plumbing (dom. water distribution, sanitary drainage, plumbing)</b>	100	200	300	300
<b>D40</b>	<b>Fire Protection (fire suppression, fire protection specialties)</b>	n/a	n/a	300	300
<b>E10</b>	<b>Equipment (vehicle, commercial, institutional, residential, other)</b>	n/a	200	300	300
	Loading Dock Equipment	n/a	n/a	300	300
	Window Washing equipment	n/a	n/a	300	300
<b>E20</b>	<b>Furnishings (fixed and movable)</b>	n/a	200	300	300
	Fixed Mats	n/a	n/a	300	300
	Fixed Multiple Seating	100	200	300	300

		DESIGN INTENT MODEL			CONSTRUCTION/ RECORD MODEL
		15%	30-60%	90-100%	
	Interior Signage	n/a	n/a	300	300
<b>F10</b>	<b>Special Construction</b>	100	200	300	300
<b>G20</b>	<b>Site Improvements</b>	n/a	n/a	300	300
<b>CIVIL</b>					
<b>A10</b>	<b>Foundations (standard, special foundations)</b>	n/a	200	300	300
<b>F30</b>	<b>Demolition (structure, selective, structure moving)</b>	n/a	n/a	n/a	n/a
<b>G10</b>	<b>Site Preparation</b>	n/a	n/a	300	300
	Site Clearing	n/a	n/a	2D	2D
	Site Demolition (will be shown on plans but not modeled)	n/a	n/a	2D	2D
<b>G20</b>	<b>Site Improvements</b>	n/a	2D	2D	2D
<b>G30</b>	<b>Liquid and Gas Site Utilities</b>	n/a	200	300	300
	Water Storage	n/a	n/a	100	100
	Fire Protection Piping, Hydrants, Valves	n/a	n/a	200	200
	Septic Tanks	n/a	n/a	100	100
	Package Waste Water Treatment Plants	n/a	n/a	100	100
	Site Steam Supply System	n/a	n/a	100	100
	Site Condensation Return	n/a	n/a	100	100
	Site Hot Water Supply System	n/a	n/a	100	100
	Site Chilled Water Piping	n/a	n/a	100	100
	Natural/Propane Gas Site Piping	n/a	n/a	100	100
	Gas Equipment (Meter Pads)	n/a	n/a	100	100
	Storage Tanks/Yards	n/a	n/a	100	100
	Petroleum & Lubricant Distribution System	n/a	n/a	100	100
<b>ELECTRICAL</b>					
<b>D50</b>	<b>Electrical</b>	n/a	200	300	300
	Area Classification	n/a	100	2D	2D
	Grounding System	n/a	n/a	300/2D	300/2D
	Lightning Protection System	n/a	n/a	300/2D	300/2D
	Wiring	n/a	n/a	2D	2D
	<b>Lighting, Receptacles, &amp; Branch Circuit Wiring</b>	n/a	200	300	300
	Wiring	n/a	n/a	2D	2D
	<b>Auxiliary (Comm., Fire Alarm, Intercom, Access Control, Security)</b>	n/a	200	300	300
	Risers	2D	2D	2D	2D
	Wiring	n/a	n/a	2D	2D
	<b>Other Electrical Systems</b>	n/a	n/a	2D	2D
<b>G40</b>	<b>Electrical Site Improvements (elec. distribution, site lighting)</b>	n/a	200	300	300
	Wiring	n/a	n/a	2D	2D
	Wiring	n/a	n/a	2D	2D

		DESIGN INTENT MODEL			CONSTRUCTION/ RECORD MODEL
		15%	30-60%	90-100%	
<b>INDUSTRIAL ENGINEERING</b>					
D10	Conveying	100	100	200	200
E10	Equipment	100	200	200	200
<b>INSTRUMENTATION AND CONTROLS</b>					
D50	Electrical (service and distribution, lighting, miscellaneous)	n/a	100	200	200
<b>MECHANICAL - PLUMBING</b>					
D20	Plumbing	n/a	200	300	300
D30	HVAC (heating, cooling, distribution, ventilation, special purpose)	n/a	200	300	300
E10	Equipment	n/a	200	200	200
F10	Special Construction	n/a	200	300	300
<b>MECHANICAL - HVAC</b>					
D30	HVAC (heating, cooling, distribution, ventilation, special purpose)	n/a	200	300	300
G30	Liquid and Gas Site Utilities	n/a	200	300	300
<b>MECHANICAL - FIRE PROTECTION</b>					
D40	Fire Protection (fire suppression systems, fire protection equip.)	n/a	200	300	300
G30	Liquid and Gas Site Utilities	n/a	200	300	300
<b>PROCESS PIPING</b>					
D90	Process Piping	100	200	300	300
	General Arrangement Extractions	100	n/a	n/a	n/a
<b>STRUCTURAL</b>					
A10	Foundations (standard, special foundations)	n/a	200	300	300
A20	Subgrade Enclosures (walls, waterproofing)	n/a	200	300	300
A40	Slabs on Grade	n/a	200	300	300
B10	Superstructure (floor, roof construction, stairs)	n/a	200	300	300
	Lateral Force Resisting System	n/a	200	350	350
	Miscellaneous Structural Items	n/a	200	300	300
	Stairs (Excludes Pan-filled stairs by architects)	n/a	n/a	200	200
	Guardrails and Handrail	n/a	200	200	200
	Monorails	n/a	200	200	200
	Existing Structures (as required by project)	n/a	200	200	200
B20	Exterior Vertical Enclosures	n/a	n/a	200	200
C20	Interior Finishes	n/a	n/a	n/a	n/a