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AMTRAK ENGINEERING PRACTICES CAD/BIM IMPLEMENTATION	RECOMMENDED M. Sparks D. Pittman	DATE 4/24/23	PAGE 1 OF 7
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INTRODUCTION

The Computer-Aided Design (CAD) / Building Information Modeling (BIM) Implementation plan outlines the requirements for deploying BIM technology on Amtrak projects. The plan identifies the Level of Development (LOD) and expectations for CAD and BIM deliverables.

SOFTWARE AND PLATFORM REQUIREMENTS

Projects can utilize a combination of software and platforms to model plans for production requirements. A summary table of these preferred platforms can be found below:

DISCIPLINE	PLATFORM
Architecture	Autodesk AutoCAD / Autodesk Revit
Track / Rail	Bentley MicroStation / AutoCAD Civil 3D (requires approval)
Electric Traction / Catenary	Autodesk AutoCAD (Refer to Amtrak Specification AED-1)
Building Structures	Autodesk Revit
Building Systems	Autodesk Revit
Street Level Utilities / Survey / Site Civil	Autodesk AutoCAD / Autodesk Civil 3D
Geotechnical	Autodesk AutoCAD / Autodesk Civil 3D
Infrastructure Structures (Bridges / Tunnels)	Autodesk AutoCAD / Autodesk Revit / Autodesk Civil 3D

Deviations from these preferred platforms shall be confirmed by the Amtrak Project Manager. Amtrak Project Manager shall confirm platform with Amtrak Engineering Services.

CAD TEMPLATES

Contact the Amtrak Project Manager for the standard Amtrak title block and plot style files for use on your project.

The Amtrak typical full-size drawing sheet size shall be 22”x34” and the Amtrak C&S full-size drawing sheet size shall be 16”x28”.

LAYER AND SHEET NAMING CONVENTIONS

CAD / BIM layer naming conventions shall follow current United States National CAD Standard. https://www.nationalcadstandard.org/

Sheet Number Fields:

Discipline	G	General – Title sheets, general notes, code reference sheets etc.
	C	Civil Engineering
	L	Landscape
	A	Architectural
	S	Structural
	M	Mechanical
	E	Electrical
	EL	Electrical Lighting
	P	Plumbing
	FP	Fire Protection
	FA	Fire Alarm
	FL	Fire Life Safety (smoke / heat detection, ventilation master modes, egress pathing)
	DT	Technology
	ES	Security
	CS	Communication Systems
	SC	SCADA
	SG	Signage
	ET	Electrified Traction
	TP	Traction Power
	TR	Third Rail
	T	Track
	HM	Hazardous Material Mitigation

Demolition drawings shall have “D” as a suffix and demolition drawings shall be included in the drawing sets before the new work drawings.

Drawing Series	001,002, ...	Informational Sheets i.e. title sheets, drawing lists, general notes, code sheets, etc.
	101,102, ...	Floor Plans
	201, 202, ...	Reflected Ceiling Plans
	301, 302, ...	Elevations
	401, 402, ...	Sections
	501, 502, ...	Partition Types
	511, 512, ...	Wall Sections
	601, 602, ...	Details / Plan Details
	651, 652, ...	Section Details
	701, 702, ...	Window/Curtain Wall Schedules, Elevations and Details
	751, 752, ...	Door and Frame Schedules, Elevations, and Details
	801, 802, ...	Large Scale Plans and Interior Elevations
	811, 812, ...	Toilet Room Plans, Elevations, Details, and Schedules
	851, 852, ...	Stair Plans, Sections, and Details
	881, 882, ...	Elevator/Escalator Plans, Sections, and Details
	901, 902, ...	Millwork/Finish Details

BIM GOALS / OBJECTIVES

GOALS	BIM TOOLS
Coordination between design / construction disciplines	Coordination between disciplines / Clash detection
Model based development for better visualization of the 3D space(s)	Design Review Process
Improved capture of existing conditions	Existing Condition Modeling
Improved project planning through constructability and phasing	Phase Planning / Constructability
Utilize models for asset tracking and monitoring	Asset Identification / Information Modeling

MODEL DEVELOPMENT

The exact Level of Development (LOD) shall be determined and agreed between the Design / Survey Contractor and the Amtrak discipline lead as communicated through the Amtrak Project Manager. Amtrak Engineering Services recommends following Level 300 as a minimum for designs. BIM As-Built models should follow Level 500 requirements.

BIM LOD	LOD TITLE	LOD DESCRIPTION
100	Conceptual	Model elements are approximately graphically represented. Any information derived from model elements shall be considered approximate.
200	Approximate Geometry	Model elements are modeled as generic systems. Any information derived from model elements shall be considered approximate.
300	Precise Geometry	Model elements are modeled as specific systems. Components are specifically located. Non-graphic information may also be attached to model elements/assets.

350	Precise Geometry with Connections	Same as Level 300, but with connected systems and interfaces with other building systems.
400	Fabrication-ready Geometry	Same as Level 300, but geometry is considered ready for fabrication. Components from the model can be fabricated as designed.
500	Operational/As-built Models	Model elements are field verified and representative of the as-built condition in 3D space.

Model asset information should follow UniFormat classification system.

Amtrak's Electric Traction design requirements for BIM are below:

- Per AED-1 "plans shall be submitted in AutoCAD format". This is not a conflicting requirement for projects delivered in the BIM format. Established workflows will be required to ensure the BIM model is updated routinely and the final design documents are provided to Amtrak in the AutoCAD format.
- Elements that can be model to aid in clash detection include the following.
    - Existing Conditions
    - Foundations and Guy Strands
    - Steel Structures and Drop Brackets (Plate clearances)
    - Catenary Wires (Plate Clearances and Clearances to OH Structures)
    - Ancillary Wires (static, feeder, signal power) - Clearances to OH Structures
    - Signal Mast and Signal Bridges (sight distance assessment)
    - Cross Arms and Disconnects
    - Amtrak Substations
    - Amtrak ET Wayside Equipment and troughs (SHUS and RTUs)

DRAWING CLEANUP

Prior to submission to Amtrak, purge all drawings and model of any unused elements including families. Do not leave any debris / elements outside of title block border or outside of areas represented in view windows. Audit drawings and correct any errors. Revision cloud layers are to remain in final deliverables to Amtrak.

SUBMISSIONS

Drawings shall be submitted in PDF format from conceptual to final design stages. DWG files and RVT project files shall be submitted to Amtrak at final acceptance of the design. RVT model sheets shall also be exported to DWG format. Coordinate final deliverable requirements with Amtrak Project Manager.

RESPONSIBILITY

Design Contractor / Designer of Record ..... Comply with procedures
Amtrak Project Manager ..... Ensure Compliance with Procedure
Amtrak Program Manager ..... Ensure Compliance with Procedure

END OF PRACTICE