

MULTI AR

AUTOMATED PERMITTING VIA BIM MODELS FOR FASTER APPROVAL

C A S E S T U D Y R E P O R T

DRAFT- FOR INTERNAL REVIEW

Prepared by: Arno Matis Architecture + Urbanism Inc. Team. March 2026

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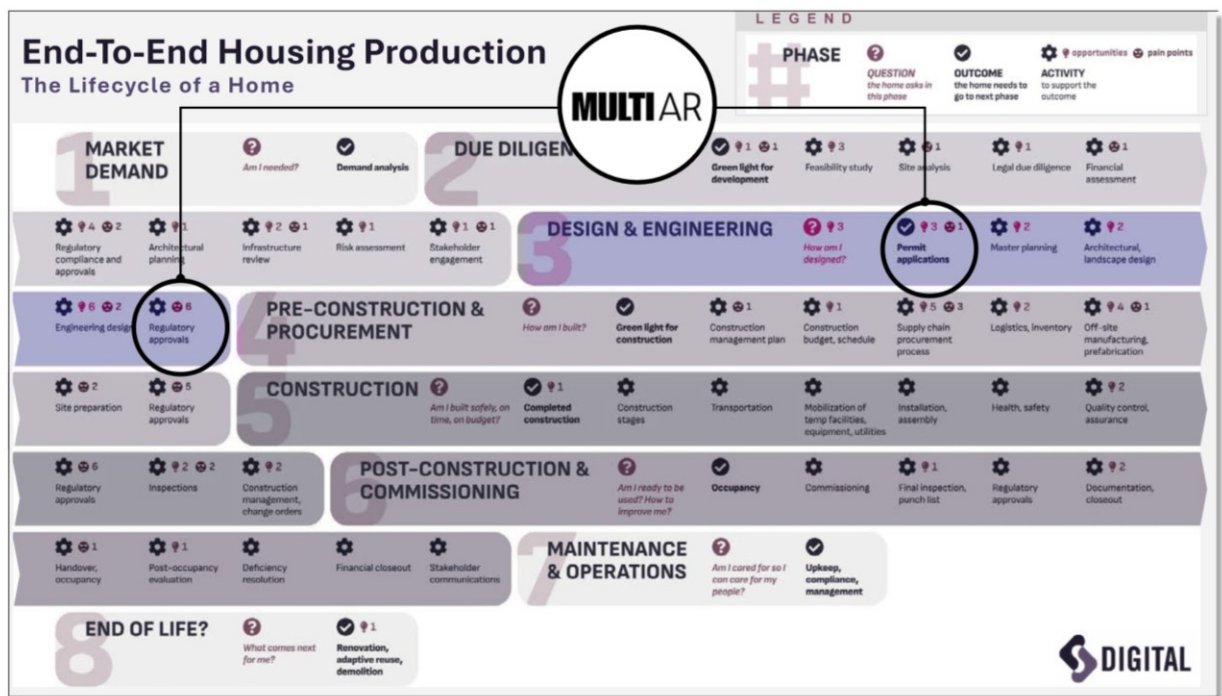
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1.0 EXECUTIVE SUMMARY

1.1 Brief

Multi-AR supports Digital's objectives to use technology to speed up the housing production by streamlining permit processing through digital automation, supported by a co-investment between AMA+U, Archistar and the provincial and federal government of Canada.

This executive summary provides an overview of the intent and progress on the federally funded project to digitize municipal plan-checking for mid-scale housing. The work builds on commitments made in the Expression of Interest (EOI) and formalized in the Master Project Agreement (MPA) with DIGITAL



1.2 Purpose Of The Report

This report examines the adoption of Building Information Modeling (BIM) to improve development permitting and digital drawing review processes within the Canadian regulatory environment context. Canada's cities face increasing pressure to accelerate housing approvals while maintaining compliance with the local bylaws. The implementation of digital automation and a common digital approach to the development industry and the development of housing in particular, could unlock dramatic efficiencies that could lead to significant improvements in the affordability and speed of delivery of housing in Canada.

1.2A-PROJECT GOALS & OBJECTIVES

Provide enhanced municipal plan-checking by embedding zoning and building rules into BIM models and by creating a BIM-based auto-review software.

- Develop a standardized BIM framework aligned with ISO 19650, with templates designed for automated checking.
- Assess automation through regulatory framework such as parking, setbacks, and unit counts.
- Create a BIM-based enhanced auto-review software that can instantly read, review and check project compliance.
- Delivering case studies targeting faster, more cost-effective, and sustainable housing approvals.

1.2B- THE PROJECT INTENT:

Improving approval process capacity to increase housing supply. Housing delivery is directly affected by municipal approval timelines.

This project aims to develop a software solution combined with dynamic BIM (Building Information Model) data submission protocols that will assist in automating regulatory and bylaw compliance reviews in complex, multi-residential regulatory environments. The aim is to reduce processing times for complex mid-to-large-scale housing projects within the Canadian regulatory environment.

1.2C- DEFINING THE PROJECT BASED ON PERCEIVED NEEDS: MULTI- AR

Enhanced BIM(3D) Automated plan checking to speed up the municipal permitting review process and housing delivery.

The project is designed to cross-check BIM models against city bylaws to accelerate permit approvals while freeing staff to focus on design quality and urban outcomes. This report highlights key milestones, technical progress, EOI/MPA alignment, and results analysis.

** MULTI-AR Definition:*

Multi-AR is a smart software tool that helps cities review building applications faster. It automatically checks Building Information Models and speeds up the permit approval process. By enabling consistent, data-driven review, Multi-AR allows municipalities to process more applications efficiently and respond better to the growing demand for housing, with a focus on creating consistent digital standards for building models to ensure regulations are checked accurately and efficiently.



1.3 Key Findings And Recommendations

1.3 A - SUMMARY:

Early system testing indicates that BIM together with structured data and automated review software, can significantly reduce permitting timelines and costs by enabling model-based submissions, automated compliance checks, and improved coordination between applicants and the City. BIM also enhances regulatory compliance by embedding regulation-relevant structured data directly into digital models. This report outlines the concept of Structured Data Plugin Libraries (SD-DPLs) deployed within a Common Digital Environment working in tandem with enhanced auto-review software as key concepts in the implementation of digital automation in the municipal permitting process.

1.3 B - KEY FINDINGS: THE BIM CHALLENGE

To fully understand the BIM opportunity, Multi-AR seeks to harness its capabilities to lay out an implementation vision to gain these potential efficiencies.

Regulatory compliance automation software has historically been limited to reviewing static pdf files, which limits the potential of digital automation to improve efficiency, particularly in more complex, multi-residential projects. Implementing technology to improve regulatory approval efficiency is key to providing large scale housing solutions.

THE GOAL IS TO PROVIDE AN INDUSTRY STANDARD TO ENABLE AUTOMATED APPROVALS:

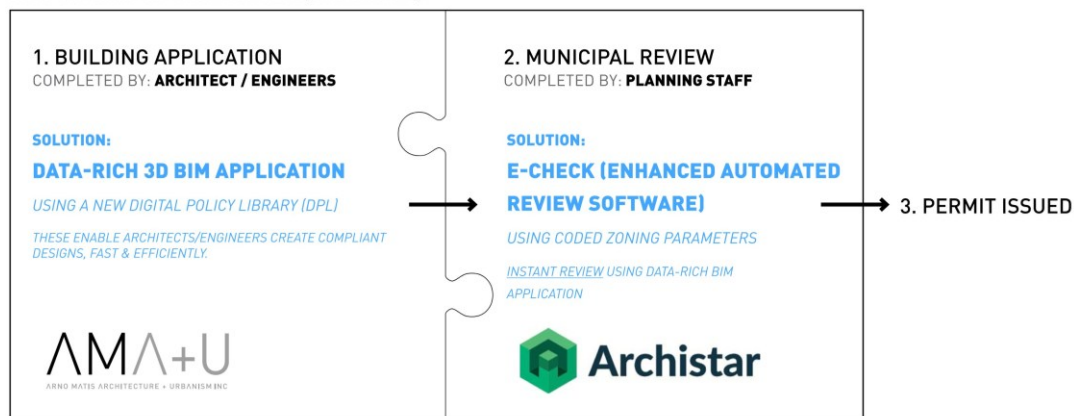
What information needs to be embedded in the model, where it should live, and how it should be expressed so that regulatory questions can be answered clearly and consistently to enable faster reviews, clearer submissions and ultimately faster housing delivery.

1.3C- KEY FINDINGS: THE HYPOTHESIS AND TRANSITION TO 3D DATA ARCHITECTURE

Advancements in digital technology have made it possible to implement modern technology solutions to inefficiencies inherent in the development industry.

BIM is a digital 3D representation of a building's physical and function characteristics providing a shared knowledge resource for collaboration amongst architects, engineers, and construction to enable better planning, design, and management of projects. Automation is not about 2D versus 3D; it is about metadata. Regulatory intent must be embedded as structured data for software readability. While 2D and 3D are both representations, only 3D BIM models can carry extractable data. Moving to 3D does not solve the issue unless regulations are authored as data. This requires regulatory information to be embedded, structured, and extractable within BIM models to align designers with automated plan-checking systems. Multi-AR will be able to read data-rich BIM files and complete complex multi-stage regulatory reviews, streamlining approvals, accelerating project review timelines, and permitting.

MULTI-AR PERMIT APPROVALS PROCESS (STREAMLINED):



EXISTING TWO-DIMENSIONAL AUTOMATED DRAWING REVIEW TOOLS:

Speed: BIM is automatic, accurate and instant whereas pdf requires a human in the loop for verification.

Historically, plan checking has focused on two-dimensional drawings, where rules are interpreted visually and manually with human input each time even when automation is incorporated. This has proven to be a promising initial step along the path toward automation. The primary challenge is the scalability of this model. For the purposes of this study we looked to transition toward a more data rich (BIM-based) digital platform that would support increasing volumes and project scale to unlock even greater potential to increase efficiencies through automated review systems.

IMPLICIT VS COMPLICIT COMPLIANCE:

Automated review only works when a building model clearly shows how it complies with regulations.

The project discovered that switching from 2D to BIM is still missing a step which is demonstrating explicit compliance. Currently, architects often know their designs comply with regulations. That knowledge is frequently implicit, not explicitly represented in the model, and different teams' model differently, even when arriving at the same compliant outcome.

THE IMPLICATION

A compliant design does not automatically mean compliance logic exists in the model. This project explores how compliance logic can be explicitly represented within the BIM model. The intended outcome is for compliance to be verified, not recalculated.

- An architect may know the correct answer to an equation or rule.
- Today, reviewers must re-solve the equation for every submission.
- This project explores how models can show their work, so compliance is verified, not recalculated thus deleting a step.

1.3 D- RECOMMENDATIONS

When models are authored clearly, automation becomes reliable, which in turn enables faster review, clearer submissions, and faster housing delivery.

The report recommends that Canada's largest cities could lead adoption through pilot programs, integration with BIM-centered digital permitting systems, and collaboration with industry stakeholders. This positions these cities as the benchmark for broader implementation across Canada.

1.4 Expected Impact

Enhanced (BIM) automated plan checking can unlock faster approvals, lower costs, and better housing outcomes.

- Faster drawing application creation
- Faster development permit approvals
- Potential reduction of processing costs
- Potential reduction in embodied carbon through optimized housing design
- Replicable municipal rules as datasets for easy adoption across Canadian municipalities
- Shift in city staff time from manual compliance checks to higher value urban design and livability considerations

2.0 INTRODUCTION

2.1 Current Context: The State of Housing Delivery in Canada

Municipal permitting delays are slowing housing delivery in Canada. Increasing approval timelines have had a significant impact on project delivery, cost, and certainty throughout the architecture and development industry. Automating the permit review process for multi-family housing is one of the most impactful ways to accelerate housing delivery at scale.

Municipalities face growing pressure to deliver more housing, faster. Requirements are becoming increasingly complex as cities strive for sustainable, energy-efficient, code-compliant buildings that also enhance urban quality. The project team has identified that any meaningful response to the housing crisis must operate on a large scale and that multi-residential buildings represent the most effective opportunity to address housing supply, as opposed to single-family or small multiplex developments.

2.2 Key Challenges: The Authoring Gap and Structuring Data

2.2A TOWARD BIM AUTOMATION

The scope of the project included theorizing a practical approach to embedding complex municipal policies into structured digital data so that regulatory compliance could be verified through an automated and scalable software process with limited or no manual operations.

The team based their research on existing municipal written policies and actual housing projects to create real-world scenarios and models:

- Project A: Social Housing- 11 storeys – City of Vancouver Bylaw
- Project B: Multi Housing 18 storeys– City of Vancouver Bylaw

Applicable Municipal codes (Outright Zoning and Development Bylaws) were reviewed and categorized as qualitative or quantitative. For the purposes of the project, only quantifiable policies and regulations were selected to be adapted to the digital review process. The quantifiable data was structured and ordered in collaboration with the BIM consultant and automated review software consultant to ensure a consistent logic and data format. The research project was completed in three phases introducing increasing complexity in formatting and logic as the study advanced. Of the entire scope of development bylaws applicable to the project approximately 60% of the applicable policies could be adapted to structured data, leaving approximately 40% of the policies for manual discretionary review by planning authorities responsible for permitting.

Of the quantifiable regulations, they were divided into three phases:

- - **Phase/Iteration 1:** single parameter policies
- - **Phase/Iteration 2:** simple multi-parameter policies
- - **Phase/Iteration 3:** complex multi-parameter policies

2.3 Project Team Overview

2.3A-TEAM AND APPROACH

The team was composed of the project partner **DIGITAL**, project partner and lead **AMA+U** and a team of consultants, each with their own areas of expertise and roles and responsibilities. **AMA + U** was focused on areas of structured data and authoring. **Archistar** was focused on data extraction, software creation and automated checking while **SolidCAD** was responsible for BIM management, BIM standards and guiding best practices. The approach is to illustrate how a project can demonstrate compliance with a quantifiable regulation and show the compliance calculations and verifications through an automated digital process.

2.3B- Digital Supercluster

Project Team Research Partner

Established in 2018 under the Government of Canada's Cluster Initiative, **DIGITAL** brings together industry leaders, SMEs, and post-secondary institutions to collaborate on large-scale projects that drive innovation and the development of technology solutions in sectors critical to Canada, such as mining and energy, housing, workforce development and health. Since inception, **DIGITAL** has delivered billions in projected revenue for Canadian companies, retained sovereign IP, launched hundreds of commercial products, and helped tens of thousands of Canadians gain the skills needed for the digital economy.

2.3 C- A M A + U

Project Team Partner/Research Lead: Structured Data Plugin Libraries

AMA + U, established in 2006 is a recognized expert and consultant within the municipal approvals landscape. Based in Canada and the USA, the architecture and urban design firm specializes in the design and development of complex mixed-use housing projects and their compliance within complex municipal regulatory environments. With over 30 years of experience firm principal architect Arno Matis has a deep knowledge of the operational structure of municipal regulatory environments and continues to sit on numerous urban design boards, planning commissions, development permitting boards.

Research Roles:

- Overall project coordination and translating municipal regulations into structured, importable datasets for architectural building information models (BIM).
- Turning architectural models into automation-ready regulatory data and aligning BIM authoring with regulatory requirements.
- Gathering rules / regulations from fragmented regulatory bodies
- Identifying quantifiable rules from automation (vs qualitative)
- Embedding data by creating BIM families and schedules (importable, 3D building objects) that are deliberately linked to rules and ready for extraction
- Creation of Structured Data Libraries (SD-DPLs)

2.3D- ARCHISTAR PTY LTD

Research Consultant: Automated Review Software

Founded in 2010, Archistar originally began life as an education portal. As they worked with more cities, states, and global clients, they discovered a deeper need—not just to generate buildings, but to get them approved faster and more reliably. This led to the creation of Archistar AI PreCheck (formerly eCheck), a new open standard that ties building designs to the rules they must follow. With AI PreCheck, every line in a design can be automatically checked against planning and building codes. Archistar now building an open ecosystem—uniting generative design, site intelligence, and digital permitting into a seamless, automated workflow. Our tools plug into the design software people already use, and our SDKs and APIs open the door to integrations at scale. Today, Archistar powers digital planning for over 30 cities and governments across Australia, Canada, and the United States to enable the next generation of digital cities. They operate out of offices across Los Angeles, Vancouver, and Sydney to support the largest municipalities in the world including LA County, the City of Los Angeles, the City of Austin, and the City of New York

Research Roles:

- Platform deployment & integration (white label, hosted, municipal API integration).
- Zoning & planning rule digitization (convert bylaws into machine-readable rules).
- Digital precheck processing pipeline (compliance rule engine), BIM ingestion.

2.3 E- SOLIDCAD

Project Team: BIM Management and Standards

SolidCAD, a Symetri company, is a Canadian technology consulting firm helping architecture, engineering, and construction teams improve how they design, collaborate, and deliver projects. We focus on connecting technology, workflows, and people, ensuring organizations get real value from their digital investments.

Role

SolidCAD partnered with Arno Matis Architecture to enhance their BIM and project delivery practices.

- Assessing existing workflows and identifying areas for improvement
- Supporting BIM strategy and standards development
- Strengthening model management and coordination processes
- Providing training and guidance to support team adoption

Expertise:

BIM implementation and optimization, Autodesk solutions, data and model management, and workflow standardization.

3.0 INDUSTRY CONTEXT OVERVIEW

(BACKGROUND RESEARCH)

3.1 Overview

While Single family development once dominated the housing market, since mid-2023 this proportion now is less than 50% of the total new housing starts in Canada. This is an important statistic since most multifamily projects fall within the jurisdiction of bylaws and codes that require professionals to engage in their design and construction supervision. While single family projects still utilize predominantly CAD software, larger projects typically executed by professionals in larger firms typically utilize (50-97%) BIM software. A rough estimate of BIM adoption to the total residential sector is somewhere between 25-45% of all residential development.

Barriers to adoption of BIM include cost of the software, hardware and the advanced training required to operate it and lack of mandates to require broader adoption of the advanced software. Academic research also confirms that skills gaps, workflow integration, and lack of investment as significant barriers to broader adoption of BIM.

There are some areas of development toward a standardization of software and submission platforms including the province of BC's Digital Permit Hub, an online platform for permitting submissions across the province, and the city of Vancouver's PRET digital permitting tools.

3.2 The Current Context of Housing Production in BC, Canada

In BC, multi-residential building supply remains well below demand. On a per capita basis, BC is experiencing a severe housing to population imbalance with 420 homes per 1000 inhabitants compared to the OECD average of 468 per 1000 inhabitants. With rezoning and development approvals limiting delivery and stagnant wage growth, affordability and supply are resulting in new home production failing to keep pace with demand.

SUPPLY-SIDE BARRIERS TO HOUSING PRODUCTION

Supply side barriers to housing production include areas that are zoned for single-family or low-density only, limiting supply of multi-unit options and affordability, and making multi-unit housing harder by requiring going through the lengthy rezoning process.

High cost of land is also a major restriction:

Land in desirable areas is expensive, limiting where developers can build affordably.

Development cost charges, fees, and regulations:

Permitting costs and development charges upfront are major financial burdens.

Slow and uncertain approvals / rezoning process:

Complexity + delays + risk make projects costlier or risky, especially for smaller or non-profit developers.

Limited supply of developable land:

Especially in high demand or urban cores. Restricted availability and high cost of land create supply constraints.

DEMAND-SIDE BARRIERS TO HOUSING PRODUCTION

Demand side barriers to housing projection include

Population growth & migration:

Rapid population increases and immigration amplifies demand faster than supply can catch up.

Income stagnation vs housing cost rise:

Many households' incomes are not keeping pace with rising home prices and rent.

Financialization/speculation:

Investment demand (foreign buyers, speculation) increases prices, making housing less affordable.

Costs of borrowing & interest rates:

When interest rates are high, financing costs rise, increasing overall cost to build or buy.

3.3 Overview of BIM Technology and Standards in the Industry:

DRAWING PRODUCTION AND PERMIT SUBMISSION STANDARDS

Skills and software use vary widely across the industry with no common digital environment currently in place. This also results in inconsistent submission formats. While municipal permit submission standards exist for basic information requirements, the standards do not extend to drawing format standards, level of detail package presentation and firms often estimate the discretionary minimums for permit submissions.

CURRENT PROCESSING TIMES AND CONSTRAINTS

The application of BIM is typically not monitored as submissions are typically converted to two-dimensional formats prior to submission. With the application of BIM submissions requirements and drawing standards, the overall quality of submissions will improve along with consistency in permit review times through automation efforts.

City of Vancouver Annual Progress Report (Nov 2024) Indicates planning work underway for new zoning and pre-rezoning policies, simplified schedules, etc. But it does not give a firm timeline for every project.

3.4 Ongoing Research and Development in the Industry

Research and Development in the application of BIM as a common digital environment and the application of automation software for permitting is ongoing. Denmark has developed (Molio / Leksicon): a standardized data meaning and national classifications. In Australia (NATSPEC): improved baseline BIM quality through shared templates and guidance. France has authored (semantics4BIM): focused on semantic consistency and data dictionaries. Singapore (Corenet x): enabled automation through tightly defined digital submission rules. United kingdom (ISO 19650): strengthened information management and governance processes. In the United States and Canada there are a number of key initiatives underway: ICC Digital Codes Initiatives are working toward Building and Zoning Code Digital Standards, while companies such as Archistar are advancing automated permitting software (e Comply) adoption in municipalities such as Los Angeles, Austin and Vancouver.

3.6 concurrent studies

3.5A- CLARITY BC

**Survey closed. Results will be available on the website May-June 2026.*

Report assessing and analyzing survey data on digital permitting processes that are currently used in BC

OVERVIEW

Clarity BC is a provincial initiative assessing current digital permitting practices across British Columbia. Led by Radical I/O Technology and SimpliCity Digital, in collaboration with DIGITAL and municipal partners (District of North Vancouver and City of Salmon Arm), the project collected survey data from planning, engineering, and IT professionals involved in housing approvals.

CURRENT STATUS

- Survey completed (Nov 2025 – Jan 2026)
- Data analysis and report development underway
- Final report expected May-June 2026

Relevance to This Project

The study aims to identify existing tools, common challenges, and opportunities to improve permitting efficiency, reduce delays, and enhance service delivery.

Findings are expected to reinforce the need for more structured, digital-first submission methods. In this context, BIM-based data submissions may provide a pathway to support many of the improvements being explored through Clarity BC.

TIMELINE

- Survey: Nov 2025 – Jan 2026
- Analysis: Jan – Feb 2026
- Report Development: Mar – Apr 2026
- Publication: May – June 2026

PARTICIPANTS

Radical I/O Technology, SimpliCity Digital, DIGITAL, District of North Vancouver, City of Salmon Arm

3.5B- BIM STANDARDS: IFC PERFORMANCE STANDARDS

SUMMARY

IFC (Industry Foundation Classes) is an open, standardized data format developed by buildingSMART that enables the exchange of BIM data across different software platforms without loss of information [1]. It supports open BIM workflows by allowing stakeholders to collaborate, share, and access a common model regardless of authoring tools [1].

IFC models store structured building information—including geometry, object classification, properties, and relationships—enabling consistent data exchange across all project phases, from design through construction and operation [5][7].

KEY COMPONENTS

- Geometry: Physical elements (walls, doors, slabs, etc.) [6]
- Classification: Standard object types (e.g., IfcWall, IfcDoor) [6]
- Properties (Metadata): Performance and asset data (e.g., fire rating, materials, cost, phase) [2]
- Relationships: Logical connections between elements (e.g., door within wall) [6]

IFC VERSIONS

IFC2x3: Widely used, stable, common in existing workflows

IFC4: Improved data structures and precision; increasing adoption

IFC4.3: Expanded support for infrastructure (roads, bridges, rail)

[1] <https://www.buildingsmart.org/standards/bsi-standards/industry-foundation-classes/#learn-more>

[2] <https://www.united-bim.com/ifc-revit-family-relationship-explained/>

[3] <https://www.buildingsmart.org/standards/bsi-standards/standards-library/>

[4] https://www.buildingsmart.org/wp-content/uploads/2021/05/20210425_MVD-policy_IFC4.x.pdf

[5] <https://globalbim.org/news/info-type/standards/>

[6] <https://www.bimcollab.com/en/resources/blog/what-is-ifc/>

[7] <https://revizto.com/resources/blog/what-is-ifc-format>

<https://technical.buildingsmart.org/standards/ifc/mvd/>

<https://bimcorner.com/everything-worth-knowing-about-the-ifc-format/>

**4.0 PROJECT
APPROACH:
THE GUIDING PILLARS**

4.1 Digital Policy & Rules Lifecycle Management

Translation into structured, testable logic is not a one-time exercise but an ongoing process of alignment, testing, and versioning as policies evolve.

PILLAR 1 DEFINITION

Translates zoning, building, and regulatory requirements into machine-readable digital rules that can be applied directly to BIM data. Uses structured BIM schemas, parametric rule definitions, and cloud-based code engines to enable automated compliance assessments for mid-scale and multi-residential housing projects.

PILLAR 1 OBSERVATIONS

Regulatory rules are fragmented across departments, documents, and formats, requiring interpretation before they can be applied. This fragmentation introduces variability and limits consistency in review outcomes.

4.2 Local Government Capacity & Engagement

Adoption is driven by clarity of output, not the underlying technology.

1. PILLAR 2 DEFINITION

Generates automated assessment reports from test BIM models, demonstrating a clear pathway for municipalities to adopt digital review workflows. The project supports planners, reviewers, and design teams by introducing repeatable BIM-based submission protocols and shared digital templates that can be transferred to other jurisdictions.

PILLAR 2 OBSERVATIONS

Planners and reviewers engage when results are presented in familiar formats: drawings, clause-level checks, and summaries rather than abstract data or system outputs. Demonstrating how automated results integrate into existing workflows is critical for uptake.

4.3 Data Infrastructure and Interoperability

A Common Data Environment (CDE) is a shared system where all official project information lives. This setup enables structured data exchange across municipal departments and external partners.

PILLAR 3 DEFINITION

Integrates BIM files, digital rulesets, and metadata through interoperable APIs, reducing duplication and minimizing errors caused by siloed information.

PILLAR 3 OBSERVATIONS

Automated review is highly dependent on the consistency and structure of BIM data inputs. Variability in modeling practices directly impacts the reliability of outputs. Interoperability is not only a technical issue but a coordination challenge across tools, teams, and data standards. Without consistent data structures, integration between systems produces inconsistent results.

4.4 Governance & Inclusion

Automation exposes gaps in responsibility for data creation, validation, and approval.

PILLAR 4 DEFINITION

Establishes standardized roles and responsibilities for information management within a CDE framework, enabling transparent collaboration between architects, engineers, and municipal reviewers. Supports governance models that ensure consistent use of BIM data, shared workflows, and accountable digital decision-making.

PILLAR 4 OBSERVATIONS

Without clearly defined roles, information becomes inconsistent, difficult to verify, and hard to govern. Establishing accountability across contributors is necessary to enable coordinated and scalable digital workflows.

4.5 Trust & Certification

Trust in automated systems depends on transparency of logic and traceability of results.

PILLAR 5 DEFINITION

Applies predefined digital audit criteria, automated drawing validation, and structured BIM quality checks to increase reliability and consistency of submitted information. Transparent, machine-readable outputs help reviewers verify compliance and build confidence in digital review processes.

PILLAR 5 OBSERVATIONS

Digital review systems must produce structured, auditable outputs that make logic, assumptions, and evidence explicit. Outputs must clearly show how conclusions were reached, including the rules applied and the data evaluated. Black-box results limit adoption, regardless of technical accuracy.

4.6 Equity & Regional Support

Automated plan checking could help bridge capacity gaps, but depends on accessible tools and structured regulatory data

PILLAR 6 DEFINITION:

Develops an accessible, BIM-powered automated review tool designed for adoption by municipalities of varying scales and digital maturity levels. By reducing manual workload and accelerating processing timelines, the solution helps smaller and resource-constrained communities achieve parity in review efficiency and capability.

PILLAR 6 OBSERVATIONS

Solutions must operate across a range of conditions, from highly resourced municipalities to those with limited technical capacity, without requiring significant changes to existing processes.

5.0 PROJECT CASE STUDIES

5.1 Methodology

5.1A - PROCESS

The research methodology included the creation of structured data that could be derived through any municipal policy parameters. The approach was broken down into three distinct steps and ordered from the least complex to the most complex:

Phases

- **Phase/Iteration 1:** Single Parameter Policies
- **Phase/Iteration 2:** Simple Multi-Parameter Policies
- **Phase/Iteration 3:** Complex Multi-Parameter Policies

Steps

- Step 1: Define Quantifiable Rules and Organize Rules into structured Data Sets
- Step 2: Author the Structured Data Sets directly into a BIM model
- Step 3: Author Structured Data into Automated Review Software and Enable Review

5.1B- REGULATORY FRAMEWORK

The project tested the creation of a database where municipal rules and regulations are defined as machine-checkable requirements. Bringing fragmented municipal rules together by organizing by building department.

The regulatory framework is the technical backbone of this project, converting municipal bylaws into automated digital checks. Each municipal rule is mapped by the project team to BIM parameters in Revit, enabling verification of compliance. By expanding coverage to over 70 discrete checks, the project creates a digital framework for municipalities to automate development permit review. The goal is to reduce staff time on quantitative compliance checks and allow staff to focus on design quality, livability, and long-term city-building. This in turn reduces applicant approvals waiting time and supplies housing to the market faster.

STEPS: DATA PREPARATION FOR POLICY/REGULATION (QUANTITATIVE & QUALITATIVE):

- Municipal By-Laws, bulletins, zoning schedules, and prior-to letters compiled
- Rules categorized as quantitative (measurable) or qualitative (design-based)
- Quantitative rules screened for automation eligibility
- Qualitative rules flagged for continued human review
- Regulations organized by city department for clarity and traceability

CATEGORIES UNDER ACTIVE DEVELOPMENT- BY CITY DEPARTMENT

Zoning & planning:

Building height, setbacks, site area, fsr, step-backs.

Engineering

Parking ratios (residential, non-residential, visitor, acc), loading dimensions, bicycle stall counts, aisle widths, ramp geometry.

Housing Policy:

Unit counts, family unit mix, minimum unit sizes, indoor/outdoor amenity areas.

Urban Design

Balconies, thermal envelope exclusions, window-to-wall ratios.

Fire & Rescue:

Hydrant distances, hose reach, access clearances.

Landscape:

Tree canopy coverage, spacing requirements.

Solid Waste

Bin counts, enclosure dimensions

URBAN DESIGN

DEVELOPMENT REVIEW BRANCH

LANDSCAPE DESIGN

ENGINEERING SERVICES

HOUSING POLICY PROJECTS

CONTAMINATED SITES

PUBLIC ART

FIRE AND RESCUE SERVICES

5.1C- STRUCTURING POLICY DATA

DATA PREPARATION FOR POLICY REGULATION

SUB-DEPARTMENT	CATEGORY	SUBCATEGORY	RULE	EQUATION	REVIT	DP CHECKLIST	AUTOMATABLE ?	PRIORITY 55%	PRIORITY 75%	PRIORITY 100%	DP DRAWING	POLICY
BIM CODE A ACCESSIBILITY	TRAVEL DISTANCE	HEAD END CORRIDOR	DISTANCE OF DEAD END CORR.	MAX 4M	DIM	N	-	NA	NA	NA	NA	
		FROM PK GARAGE	DISTANCE TO EXIT STAIR	MAX 45M	DIM	N	-	NA	NA	NA	NA	
		TO EXIT STAIR LOBBY					-	NA	NA	NA	NA	
	BARRIER-FREE ACCESS	ACCESSIBLE	ACCESSIBLE PATH LENGTH	PATH LENGTH	DIM	N	-	NA	NA	NA	NA	
		DOOR CLEAR WIDTH					-					
		EXIT STAIR	LEAF WIDTH (MM)	MIN 800MM	DOOR PARAM	N	-	Y	Y	COMPLETE		
	DOOR CLEAR SPACES	SUITE ENTRY	LEAF WIDTH (MM)		DOOR PARAM	N	-	Y	Y	COMPLETE		
		INTERIOR SUITE	LEAF WIDTH (MM)		DOOR PARAM	N	-	Y	Y	COMPLETE		
		FRONT ENTRY	LEAF WIDTH (MM)		DOOR PARAM	N	-	Y	Y	COMPLETE		
	FIRE SEPARATION	ACCESSIBLE					-	Y	Y	COMPLETE		
		BEHIND SWING	AREA	1.2M2	DOOR PARAM	N	-	Y	Y	COMPLETE		
		IN FRONT OF SWING	AREA	1.5M2	DOOR PARAM	N	-	Y	Y	COMPLETE		
	TURNING RADI ZONES	WALL TYPES	VARIES	TAGS	N	-	-	NA	NA	NA		
		DM	1100MM MIN	DM	N	-	-	NA	NA	NA		
		DM	CLEARANCES	FAM PARAM	N	-	-	Y	Y	COMPLETE		
DBB	BULK STORAGE	AREAS/ZONES	CLEARANCES	FAMILY	N	-	-	NA	NA	NA		
		EXTENSIVE LIST					-					
							-					
	IN TAKE/WHOLESALE VENTING DESIGN	MAX VOL (BELOW GRADE)	5.7 M3	MASS VOL	N	-	-	Y	Y	COMPLETE	PLANS/STATS	RESIDENTIAL LIVABLE
		IN SUITE AREA	3.7M2	AREA SCHEDULE	N	-	-	Y	Y	COMPLETE	PLANS/STATS	
		IN SUITE MIN DIM	1.2M	DIM	N	-	-	Y	Y	COMPLETE	PLANS/STATS	
	DIMENSIONING HIERARCHY AND CLARITY	IN SUITE MIN HEIGHT	2.1M	DIM	N	-	-	Y	Y	COMPLETE	SECTIONS	
		NA	NA	NA	N	-	-	NA	NA	NA		
		NA	NA	NA	N	-	-	NA	NA	NA		
	HEIGHT CALCULATION	OVERALL BUILDING WIDTH & DEPTH	PROVIDE ROOM ENVE DIM	Y	-	-	-	NA	NA	NA	PLANS	DP CHECKLIST
		DM OF ALL ROOMS	LABEL USES AND SIZE DM	Y	-	-	-	NA	NA	NA	PLANS	
		GRADE TO ROOF APPURTENANCE MAX DM INTERPOLATED	NA	Y	-	-	-	NA	NA	NA	STATS/SUMMARY	
	AREA SUMMARIES	OVERLAP/MECH IF -10% ROOF AREA	PROVIDE SUMMARY	Y	-	-	-	NA	NA	NA	STATS/SUMMARY	
		NA	AREA SCHEDULE	Y	-	-	-	Y	Y	COMPLETE	AREA OVERLAYS/STATS	
		PLAN DWG					-	NA	NA	NA	PLANS	
TOT	13 OF 25							0	9	4		

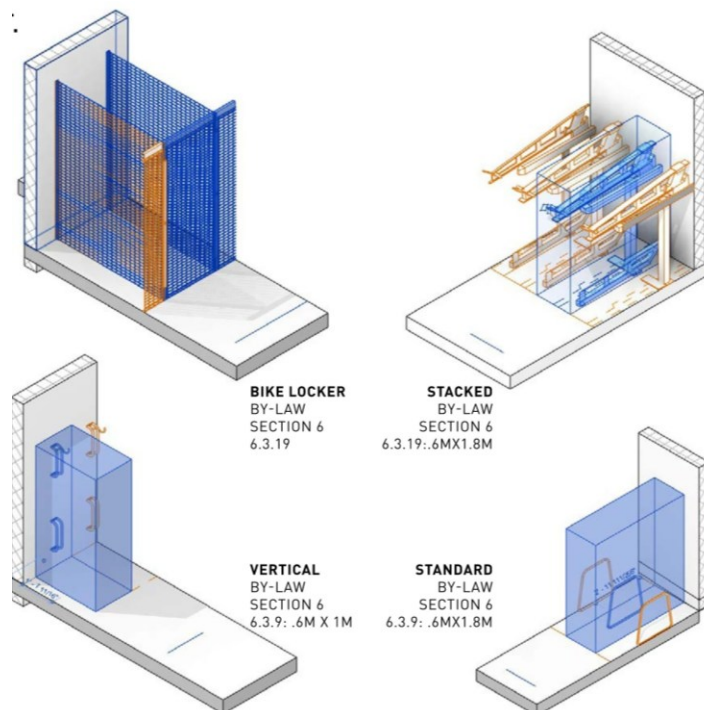
5.2 Complex Analytics

Regulatory frameworks that on the surface appear to be simple to review are often in reality complex and require multiple analytical step to confirm compliance. We have included just a few examples that the team resolved and illustrate them here order to demonstrate how regulatory requirements can often quickly become complex due to the high level of design configurations possible to meet the regulatory requirement. Not only do these regulatory parameters take a significant effort to review manually in today's two-dimensional plan checking environment, by automating these more complex design parameters we can theoretically achieve the highest level of efficiency gains through automated reviews.

5.2A- THE BICYCLE EXAMPLE

Bike rules can demonstrate how simple requirements quickly become complex logic.

We are using bicycle parking as an opening example because it is easy to understand but governed by layered and conditional rules.



THE RULES (VANCOUVER EXAMPLE)

1: Size rules (-Dimensions & Clearances):

- 1.9m vert. Clearance
- 1.2m aisles (1.5 for oversize)
- Dims in diagrams below, + oversized: .9m x 2.4m

2. Use rules

- Requirements vary by unit size:
- Under 65 m² → 1.5 stalls
- 65–105 m² → 2.5 stalls
- Over 105 m² → 3 stalls

3: Stall Type Rules

- Additional ratio rules apply:
- Oversized: minimum 5%
- Locker: minimum 10%
- Vertical + stacked: maximum 60%.

IF/THEN LOGIC

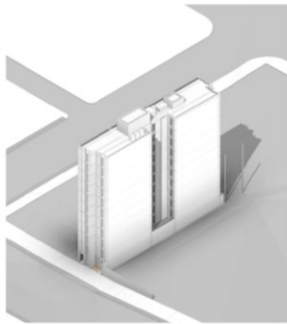
These are all expressed as if/then conditions which is how rules get complicated and layered.

FAMILIES & SCHEDULES

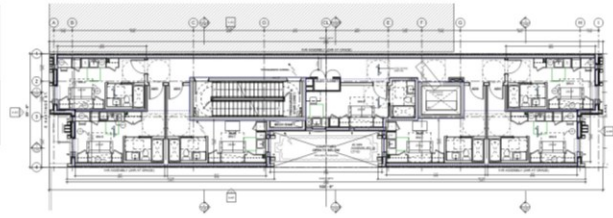
This gets captured in schedules which can be cross checked in excel because it has the capacity for more complex(matrix) math: These families feed schedules capturing unit counts, unit sizes, bike types, and quantities. Compliance logic is authored in the model from the start, rather than inferred during review. Designed, by-law specific spreadsheets automatically compare required versus provided results.

5.2B- THE TRIAL MODELS

PROTOTYPE BUILDING A



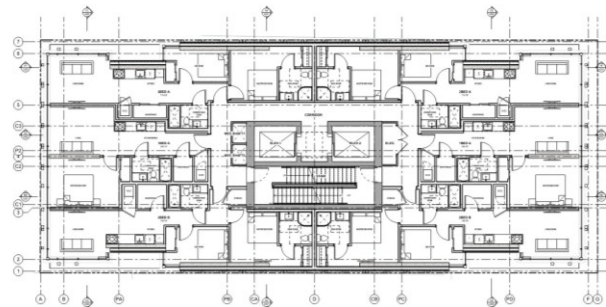
PROTOTYPE PROJECT A
 GFA: 88,348SF/8209M²
 HEIGHT: 173/52.73M - 18 STORIES
 PROGRAM: RESIDENTIAL - 80 UNITS
 LOCATION: VANCOUVER



PROTOTYPE BUILDING B



PROTOTYPE PROJECT B
 GFA: 32,729SF/3,040M²
 HEIGHT: 99/30M - 11 STORIES
 PROGRAM: SOCIAL HOUSING- 70 UNITS
 LOCATION: VANCOUVER



5.2C- STRUCTURED DATA – DIGITAL POLICY LIBRARIES (SD-DPLS)

WHAT IS A DIGITAL POLICY LIBRARY?

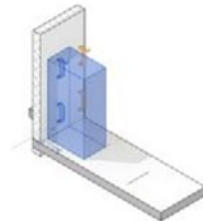
A library of 3d Digital Revit objects embedded with municipal data that can be seamlessly imported into Revit models. They could have the potential to streamline compliance review and permitting processes through integration with e-check software.

The concept of the Digital Policy Library evolved out of the need to structure zoning policy data in a way that could be repeatable and logically organized into a readable standard for both BIM drawing production and automated review software policy review. The DPLs could readily be created and stored and controlled as Digital Zoning Bylaws or Policies by a municipality. The critical consideration is that they must adhere to a recognizable standard to be adopted and utilized by BIM authors (typically architects and engineers) and automated review software provider (Archistar). Once created, these Digital Libraries can easily be installed into programs to allow for quick and efficient drawing production and automated review.

3D VIEW – BICYCLE MODULES

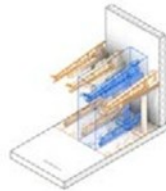
VERTICAL:

Locked Constraints:
Dimensions: .6m x 1m
Clearance Box Height: 1.9m
Aisle Dim: 1.2m



STACKED:

Locked Constraints:
Dimensions: .6m x 1.8m
Clearance Box Height: 1.9m
Aisle Dim: 1.2m



3D VIEW – WASTE MODULES

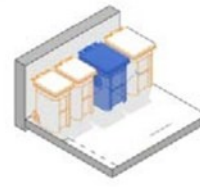
240 L CART:

Locked Constraints:
Dimensions: .7m x .6m
Aisle Dim: 1.2m



360 L CART:

Locked Constraints:
Dimensions: .9m x .7m
Aisle Dim: 1.2m



3D VIEW – ENTRY RAMP MODULES

NON-HARDSHIP SITE/3.6MW:

Locked Constraints:
Dimensions: 3.6m w
Clearance Box Height: 2.3m
Slopes: 10% for first 6.1m, 12.5%

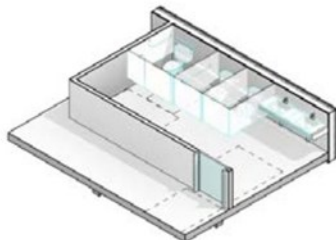


HARDSHIP SITE/3.6MW:

Locked Constraints:
Dimensions: 3.6m w
Clearance Box Height: 2.3m
Slopes: 10% for first 6.1m, 15%, 10% transition for last 4m



PUBLIC WASHROOMS – ACCESSIBILITY



ORGANIZING STRUCTURED DATA – DIGITAL POLICY LIBRARIES (SD-DPLs)

That same logic is embedded directly in the BIM model. We are exploring the creation of model components with built-in dimensions, clearances, and types aligned to bylaw rules, this way regulatory intent is embedded up front.

A development of the DPL concept includes capturing the data from each example into a central data base (XL) embedded in each BIM drawing. This permits the data to be cross checked and be subject to complex calculations beyond the limitations of the BIM software. These families feed schedules capturing unit counts, unit sizes, bike types, and quantities. Compliance logic is authored in the model from the start, rather than inferred during review. Designed, by-law specific spreadsheets automatically compare required versus provided results.

THE RATIONALE FOR STRUCTURED DATA – DIGITAL POLICY LIBRARIES (SD-DPLs)

The approach for the creation of Digital Policy Libraries is derived from a need to greatly simplify the process of providing a standardized approach to BIM drawing creation. Most importantly, it gives the BIM author (architects and engineers) clarity on what information needs to be embedded, where it belongs, and how it should be expressed so regulatory questions can be answered consistently.

DIGITAL POLICY LIBRARY EXAMPLES:

The Bicycle Storage Example

6.3.9 Bicycle Space Size: All required Class A bicycle spaces shall have a minimum vertical clearance of 1.9 metres, shall be a minimum of 0.6 metres in width and shall be: (a) (b) a minimum of 1.8 metres in length if the bicycles are to be placed horizontally; or a minimum of 1.0 metres in length if the bicycles are to be placed vertically, except that a minimum of 5% of the spaces must be oversized spaces of 2.4 metres in length and 0.9 metres in width, and may not be vertical or stacked spaces.

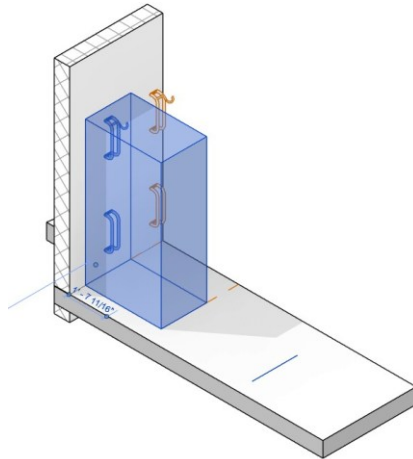
VERTICAL:

Locked Constraints:

Dimensions: .6m x 1m

Clearance Box Height: 1.9m

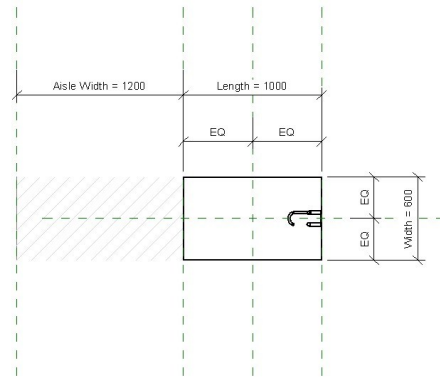
Aisle Dim: 1.2m



PARAMETERS EXAMPLE:

VISUAL:

Vertical Stall



Family Types

Type name: Bike Class A - Vertical - Vancouver Parking ByLaw Sec 06

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Clearance Box Height	1900.0	=	☐
Default Elevation	0.0	=	☐
Dimensions			
Aisle Width	1200.0	=	☐
Length	1000.0	=	☒
Width	600.0	=	☒
IFC Parameters			
Type IFC Predefined Type		=	
Export Type to IFC As		=	
Other			
clearance box (default)	☒	=	

Bulk Storage Example

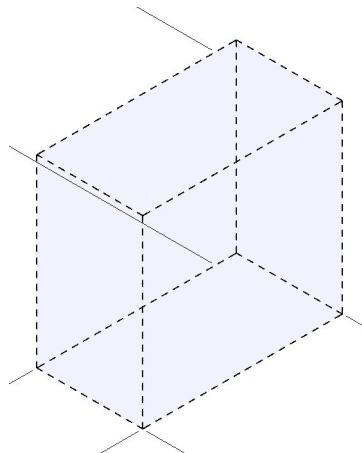
A maximum of 3.7 m² of storage space per dwelling unit may be excluded; storage space may be located in a single room, not exceeding 3.7 m² (if storage spaces exceed 3.7 m², the total area will be included in FSR) or combined in one area above base surface provided the total area, including access, does not exceed the maximum permitted exclusion of 3.7 m² per unit; must be full floor-to-ceiling height (min 2.1 m) and have a minimum clear horizontal dimension of 1.2 m in all directions;

BELOW BASE SURFACE(GRADE):

Locked Constraints:

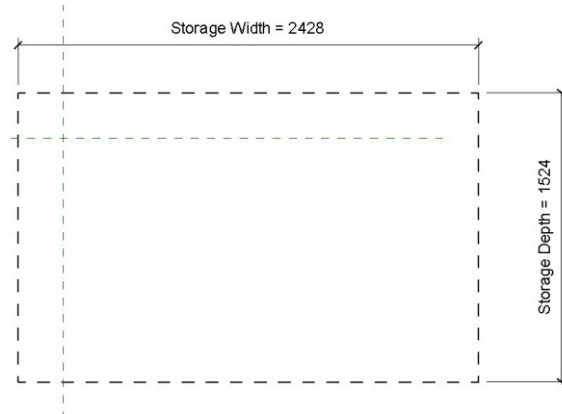
Min: 1.2m w or d

Min Height: 2.1m



Min Volume: 5.7m³

PARAMETERS EXAMPLE: VISUAL:



Family Types			
Type name: 2022 Bulk Storage Bulletin - Below Base Surface			
Search parameters			
Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0	=	☐
Min Volume	5.700	=	☐
Min Dim	1200.0	=	☐
Min Height	2100.0	=	☐
Dimensions			
Requested Depth	1500.0	=	☐
Requested Height	2100.0	=	☐
Requested Width	0.0	=	☐
Storage Height	2100.0	= if(Requested Height < Min Height, Min Height, Requested Height)	☐
Storage Depth	2261.9	= Min Volume / (Storage Width * Storage Height)	☐
Storage Width	1200.0	= if(Requested Width < Min Dim, Min Dim, Requested Width)	☐
IFC Parameters			
Type IFC Predefined Type		=	☐
Export Type to IFC As		=	☐
Analysis Results			
Volume Calc	5.700	= Storage Depth * Storage Width * Storage Height	☐

Automated Software Review

**“With the workflow now stabilized and the key constraints understood, the focus has been to progress clause by clause through the City of Vancouver zoning and related requirements and apply them directly against real multifamily project models”
-Archistar.**

Automation Proof Part 1 – Project A

- **Phase/Iteration 1:** single parameter policies
- **Phase/Iteration 2:** simple multi-parameter policies
- **Phase/Iteration 3:** complex multi-parameter policies

Automation Proof Part 2 – Project B

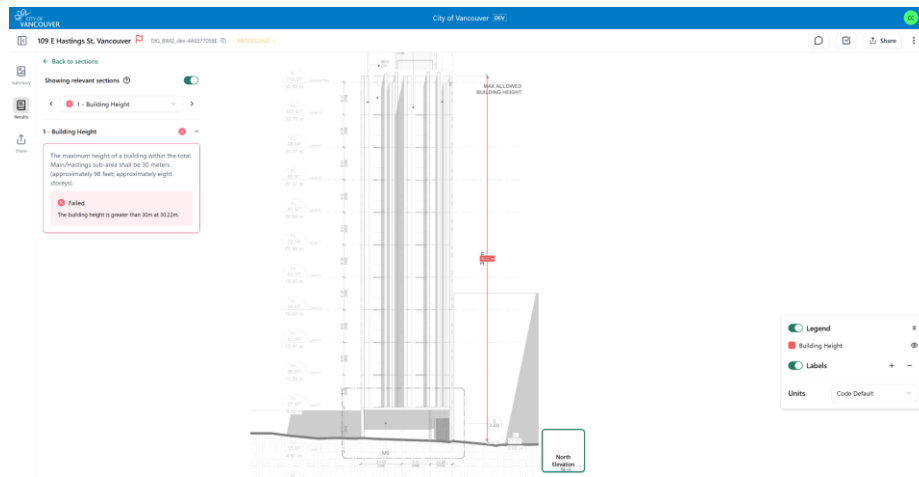
- **Phase/Iteration 1:** single parameter policies
- **Phase/Iteration 2:** simple multi-parameter policies
- **Phase/Iteration 3:** complex multi-parameter policies

5.3A- AUTOMATION EXAMPLE CLAUSE 1: ZONING/ PLANNING- BUILDING HEIGHT

- Zone / By-law reference:
- Rule value: MAX 30M
- Assessment approach: Building height measured to natural ground line and assessed against by law.

Project 1: 109 E Hastings St, Vancouver / Report ID: DIG_BIM2_dev-4A9277058E

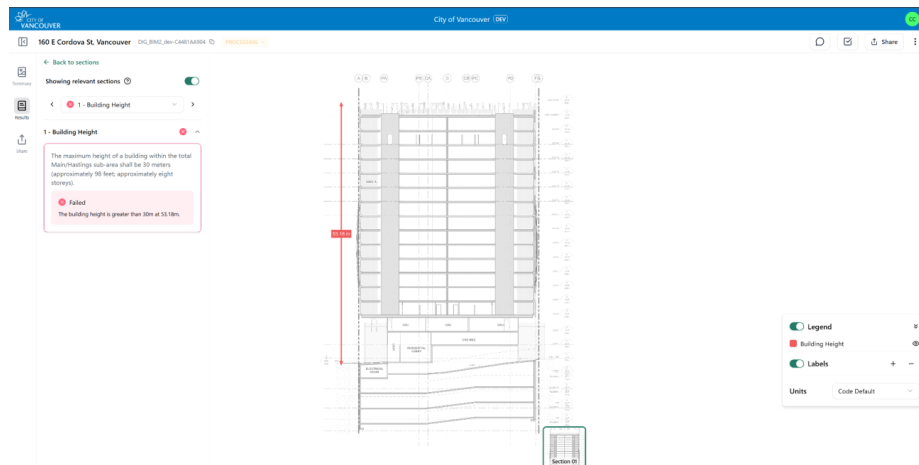
Outcome: Fail – height measured at 30.22m when the limit is 30m



This image shows building height as measured on the elevation drawing

Project 2: 160 E Cordova St, Vancouver / Report ID: DIG_BIM2_dev-C4481AA904

Outcome: Fail – height measured at 53.18m when the limit is 30m



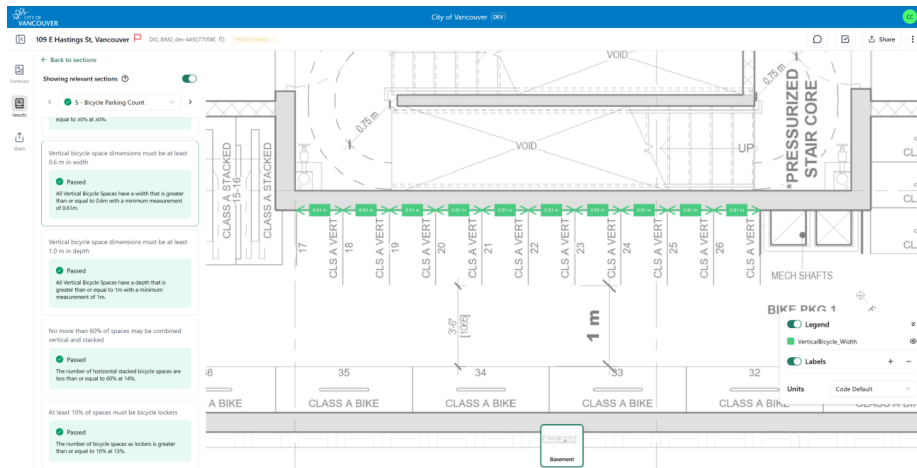
This image shows building height as measured on the elevation drawing

5.3B- AUTOMATION EXAMPLE CLAUSE 5: ENGINEERING- BICYCLE PARKING COUNT

- Zone / By-law reference: Parking By-law Section 6
- Rule value: Min 0.75 Class A space per unit is required
- Rule conditions:
- Assessment approach: Unit count total multiplied by 0.75 = min number of spaces

Project 1: 109 E Hastings St, Vancouver | Report ID: DIG_BIM2_dev-4A9277058E

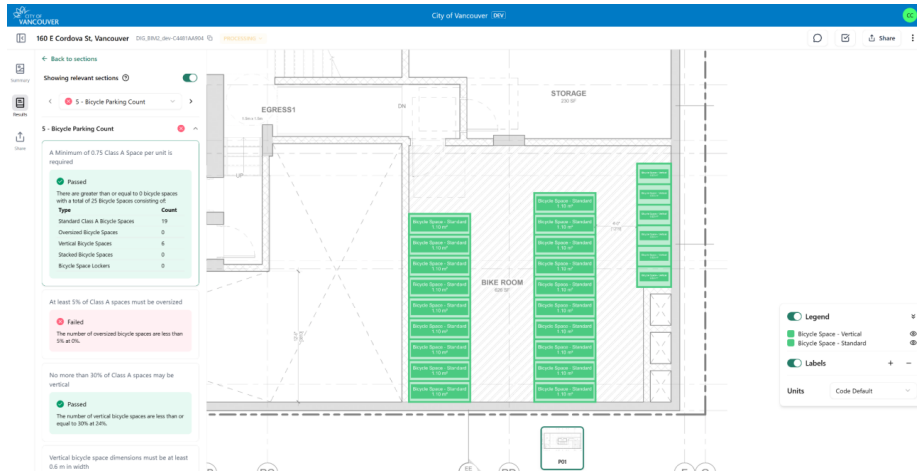
Outcome: Pass - 50 spaces provided = 50 required



This image shows rule relating to width of bike spaces meeting requirements - also note additional rules on left hand side

Project 2: 160 E Cordova St, Vancouver | Report ID: DIG_BIM2_dev-C4481AA904

Outcome: Pass - 25 spaces provided = 25 required



This image shows number of spaces provided meets requirements

6.0 IMPACT ANALYSIS

6.1 Overview

On a typical multi-residential development permit schedule this could result in permitting time reductions of 12-24 months

It is estimated that the implementation of a common digital environment (CDE) based on BIM in the development of housing projects could reduce construction costs by 12-15%* depending on the type of project. Centralized platforms could reduce rework as a result of poor coordination. In addition, a common coordinated digital model creates additional efficiency through the elimination of data segregation, breaking down silos between various disciplines that are typically required for a typically multi-residential project. An utilizing a BIM digital twin for facility management could save 10-15% in operational costs.

Where approvals timelines can typically run beyond the time to build a multi-residential housing project, the benefits of adopting BIM as a CDE is even more compelling. **New data suggest that time savings from traditional permitting processes can meet or exceed 50%* reduction in permitting times.** In high demand urban centres in Canada, the development approval times can often stretch to 15-30 months. A rezoning process could double these times. **On a typical multi-residential development permit schedule this could result in permitting time reductions of 12-24 months.** The impact of automated permitting is therefore significant on a number of levels:

6.2 Reduced Carrying Costs

On an urban multi-residential development site in a large urban centre in Canada, carrying costs can include mortgage, interest, property taxes and utilities. These costs can exceed \$100k per year per \$1m of property value in larger Canadian cities. Reducing the approvals timelines by 50% could result in significant savings in overall project costs and contribute significantly to increased housing affordability.

6.3 Project Risk and Certainty

Risks related to lengthy permitting times can also contribute significantly to overall project costs. Financing risk, delays, lost opportunity and project approval uncertainty all can contribute to increasing project risk and costs and can often result in the difference between a multi residential project proceeding to construction or being shelved. Reducing project risk must be a critical consideration in the adoption of automated permitting technologies. Being able to consistently deliver on predictable permitting timelines is a fundamental consideration in being able to reduce risk and attract investors. Since the housing sector is primarily supplied (approx. 95%) by the private investor market, addressing permit time certainty through automation is a compelling risk management tool.

7.0 IMPLEMENTATION STRATEGIES

7.1 Overview:

Implementation of Automated Permitting Review Systems in Canada have currently been following a path of experimental applications in small scale development. Foreseeable next steps could include:

7.2 Toward a Transition Period

Initial steps toward implantation of digital permitting will require careful design and adoption of a transition plan. The transition period itself may be broken down into a number of phases from experimental, to optional early adoption, to final adoption. Each phase itself could involve a transition period of a number of months and years. A transition plan toward adoption of a common digital platform and digital permitting will require broad acceptance and buy-in from the industry with benefits to all stakeholders being clearly communicated.

7.3 Outreach and Communication

It is clear that in an industry as large as the Canadian construction industry with a large number of stakeholders representing both public and private interests the change landscape is as complex as it gets. The industry has often been criticized as a slow adopter of new technologies and resistant to change. This could be more a function of the size and complexity of the industry as a whole and how it has evolved to manage risks in the Canadian regulatory and economic context. Any contemplated transition as significant as a transition to a fully digital industry deploying digital permitting will require significant outreach and communication. First steps toward this transition could include a coordinated outreach and communications plan designed to address and consider the concerns and comments from the full diversity of the industry and its stakeholders.

7.4 Changes in Production of Data (BIM)

Embedding critical data for digital review will eventually replace the need for multiple review cycles needed to data due to lack of consistent standards. In the future, quantifiable rules embedded in BIM models will be able to instantaneously establish regulatory compliance. While this transition will require standardization through adoption of structured data such as SD – DPL's, once adopted, these standards will unlock dramatic efficiencies. The creation of these standards will likely require third-party development of standardized BIM authoring frameworks and rule libraries to support consistent adoption without overburdening architectural firms.

7.5 Changes to Permit in Processing

Reviewer workload for repetitive quantitative checks could be significantly reduced.

Currently municipal reviewers manually verify quantifiable requirements (e.g., parking ratios, FSR, unit mix, loading counts) for each submission and revision. Recalculation is repeated across review cycles. Quantifiable rules are validated through automated checking software, generating structured compliance reports prior to or during submission. Reviewers receive measurable results in report form rather than recalculating from drawings. Shift from manual recalculation of measurable rules to verification of pre-validated compliance data. Reviewer workload for repetitive quantitative checks could be significantly reduced.

7.6 Change in Regulation Structure

Zoning Policy and Regulations have been evolved in the Canadian context since the early 1900s. They exist as codes and bylaws that have been edited and expanded over many years. The transition to a structured digital policy system will require careful consideration over time. We have demonstrated through this research project that under current structure, the current structure of zoning regulation does not easily convert to a structured data architecture and at best a portion of current bylaws can be directly transitioned. Regulations that require qualitative interpretation will require additional effort and sophistication to automate.

7.7 Structured Data DPL Adoption Models

7.7A- BUILDING A LIBRARY OF COMPONENTS PER MUNICIPALITY (CONTINUED)

AUTHORING REALITY AND THE NEED FOR A CLEAR DIRECTION

The project addresses the practical question faced by architects: what information needs to be embedded in the model, where it should live, and how it should be expressed so that regulatory questions can be answered clearly and consistently.

Standardized families (e.g., Parking stalls, loading bays) used to embed dimensions, requirements, and rule logic within parameters, naming structures, and family types. Much of the current discussion around digital permitting and automated review focuses on data, governance, and interoperability. While these considerations are important, they often overlook a more fundamental question: how regulatory information enters a BIM model in the first place.

KEY MODELLING DECISIONS INCLUDE:

- How rooms are defined
- How families are classified
- How parameters are filled in
- How measurements are represented

A common issue in digital automation projects is the assumption that this information already exists in a clear, consistent format. In practice, this is often not the case, for this reason, this work deliberately includes the authoring layer as well as downstream automation.

APPROACH/IMPLEMENTATION:

The implementation of digital systems has the capability of generating the data required (BIM). The implementation of preset municipal data rules embedded into 3d objects (Revit families) can configure this software to make the data readable, comparable, and instantly automated. The approach applies to zoning regulations and policies as well as building codes and other regulations.

The question for Canada is not if to adopt these new technologies, but how and when to begin broad implementation to maintain competitiveness.

7.8 Outreach & Sector Adoption Data Gathering

The Proposal Will Share Its Benefits / ROI In A Public Case-Study: Encouraging Further Adaptation Of Technology Across The Industry

PRESENTATIONS DELIVERED

- Canada Builds — January 29, 2026.
- BIMbc February Industry Event at Ledcor — February 18, 2026.
- Taylor, Texas — February 24, 2026.
- MISA BC Conference, Kelowna — September 22, 2026.
- BIM BC Summit — October 26, 2026.

EDUCATIONAL RESOURCES & KNOWLEDGE SHARING

- Prepared a public case study documenting the research, findings and recommendations.
- Developed a free, four-module online course with video lessons, practical BIM demonstrations and a completion quiz.
- Improved graphics, diagrams and explanations to make the findings clearer and easier to share.
- Enhanced the Multi-AR website to provide access to the course and supporting resources.
- Prepared social media materials to promote the course and project findings.
- Submitted the course for AIBC learning-credit eligibility review; confirmation remains pending.

UPCOMING OUTREACH:

- HGI Open House to Open Doors — November 13, 2026.
- BUILDDEX Vancouver— February 10/11 2027.

8.0 RESEARCH & DEVELOPMENT OPPORTUNITIES

8.1 Overview

Beyond the scope of this research study we see a number of opportunities to develop the emerging concepts outlined in this report:

8.2 Development of Structured Data Library Systems (SD-DPLs) at Scale

A compelling next step along the path to scaling the automated permitting project would be to advance the concept of structuring zoning and development regulations for broad digital adoption at scale. This could involve developing systems to interpret and convert existing analogue systems into structured digital data for implementation into BIM and automated permitting review systems. This could also include the establishment of standards that could facilitate efficient policy library creation. As an extension to this project, a scale rollout of a permit processing path that could permit a broad range of projects to be processed at scale and reviewed by automated review systems. This would be an important first step to open broad based automated permitting options.

8.3 Development of Technical Architecture and Integration with Existing Systems

It is one thing to execute experimental or small scale approval projects, but accommodating large volumes of live BIM permit review submissions, will require new technical solutions to store, process and manage at scale. Bringing digital permitting into reality will require innovation in both the private and public sector in order to implement cost effective solutions. Large data submissions and processing will increase costs in some areas while dramatically reducing others through efficiency gains.

8.4 Organizational and Regulatory Readiness

The implementation of new technologies will undoubtedly require organizational change and training. From adopting new processes and BIM production standards within architecture and engineering offices to establishing new permit submission protocols, establishing organizational readiness for the digital transformation of the construction industry will be an on-going effort in the coming years. An important project will be to establish training systems and organizational protocols that will facilitate the transition.

9.0 CONCLUSION

9.1 Summary

This project demonstrates that meaningful progress can be made toward automating elements of development application review through the structured use of BIM data and rule-based evaluation. By translating a portion of regulatory requirements into measurable, machine-readable criteria, the team validated that automated compliance checking is feasible for a defined subset of planning and building rules. The work highlights both the potential for efficiency gains in review timelines and the importance of consistency in how data is authored and managed within design models.

At the same time, the project surfaced key gaps that must be addressed for broader adoption. These include the need for more standardized approaches to encoding municipal policies, improved interoperability between authoring tools and checking platforms, and the absence of a common data environment for regulatory information. Addressing these challenges will be critical to scaling the approach across jurisdictions. With continued refinement, the framework developed through this project provides a practical foundation for more transparent, consistent, and scalable digital permitting workflows that can support increased housing delivery across Canada.

It is challenging to extrapolate the full spectrum of implications derived from a focused research project such as this. This study have permitted a number of important observations as follows:

9.2 Advantages of BIM as a Digital Permitting Software Platform

It is clear that the adoption of BIM as a digital platform for digital permitting offers significant advantages over its two-dimensional or analogue options. From its inception, BIM was designed to create a three-dimensional data rich environment aligned with the actual context. Its broad acceptance within the industry, its capability to model reality to full digital twin standards, makes this platform the obvious choice as the benchmark standard for a digital permitting

9.3 Technology Exists to Implement Digital Permitting

The current level of development and adoption of BIM software coupled with Ai, cloud, digital review software and other digital technologies have evolved to make digital permitting a real possibility. While still in its infancy, there is no doubt the efforts current underway both nationally and internationally in this area are evidence that digital permitting will become a reality throughout the industry in the near future.

9.4 The Feasibility of Scale in Question

While current efforts in the area of digital permitting are contained to experimental options, it is still an open question in what format and structure the scaling and full implementation of digital permitting will roll out throughout the industry both nationally and internationally. We have laid out a number of possibilities and directions herein

9.5 Further Research and Development

The efficiencies that are possible and the economic value to be gained within the construction industry offer fertile ground for further research and development in this area. The evidence of a global effort in this area is significant and progress has been significant in a relatively short time. We have no doubt that this work will continue at a rapid pace.

9.6 Toward Implementation of Digital Permitting

We are honored together with our research partners to have played a small role in the advancement of work and thought in the area of the adoption of digital permitting. We are excited to continue to play a collaborative role in a bright new future for the construction industry.

10.0 APPENDIX: REPORTS

10.1 AMA 11: Multi-AR – Digital Policy Library (DPL):

10.1A- BICYCLE PARKING MODULES

REGULATORY SOURCE: VANCOUVER PARKING BYLAW SECTION 6:

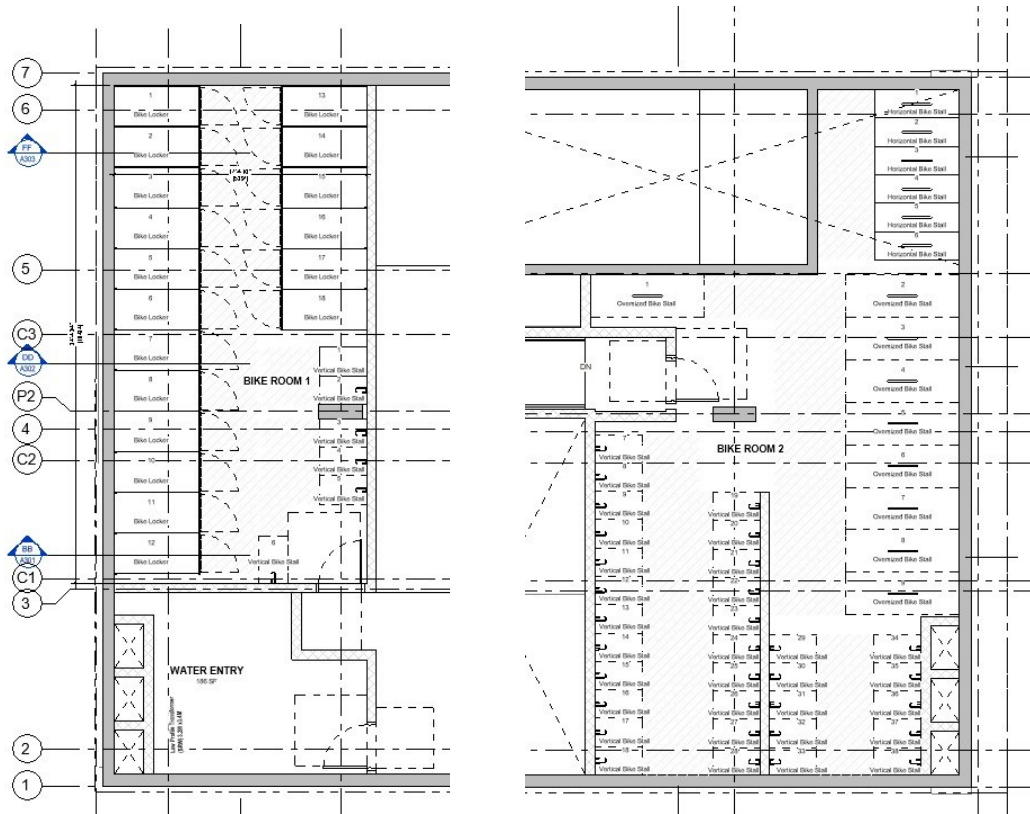
OFF-STREET BICYCLE SPACE REGULATIONS

<https://bylaws.vancouver.ca/parking/sec06.pdf>

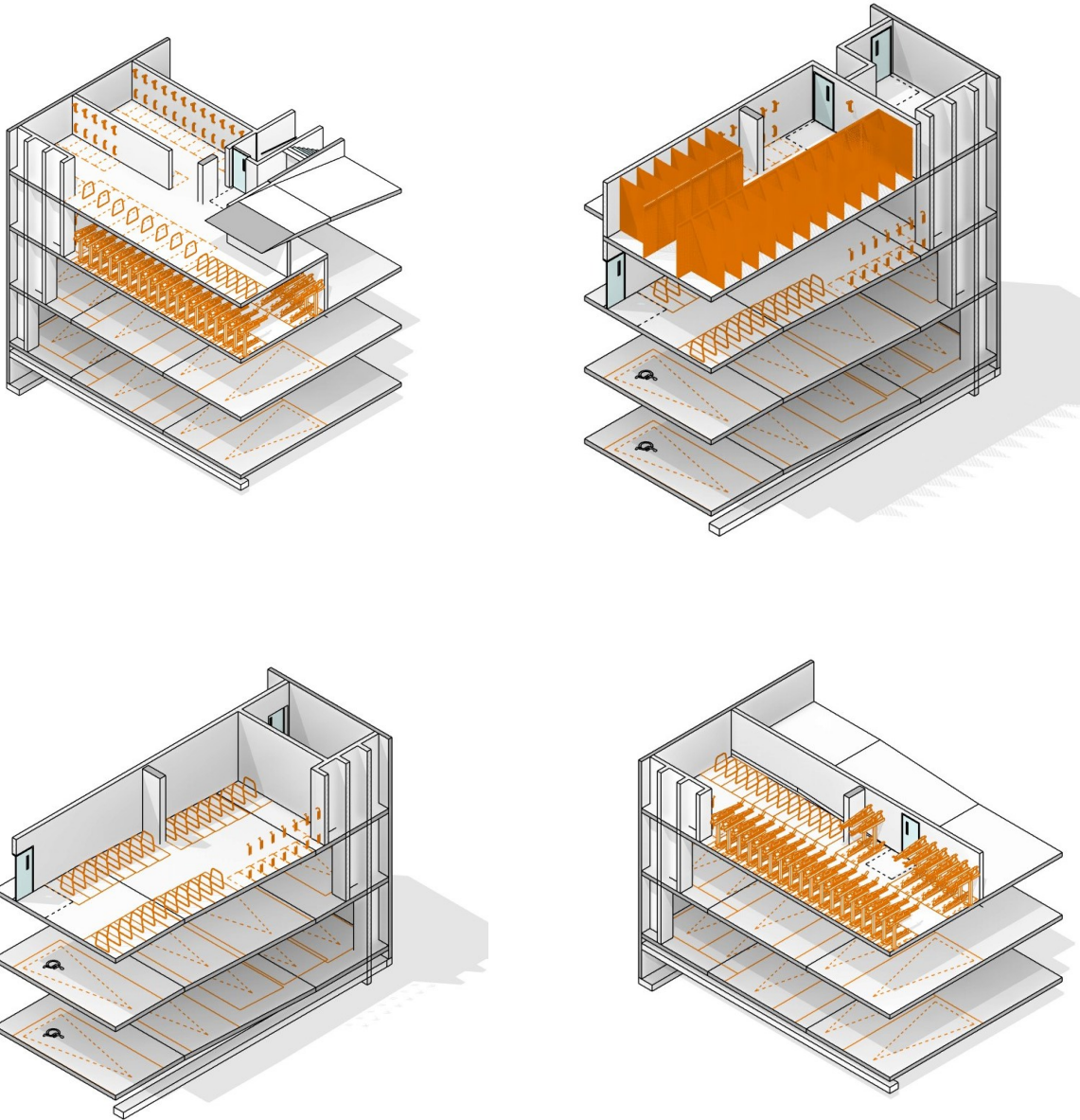
6.3.9 *Bicycle Space Size:* All required Class A bicycle spaces shall have a minimum vertical clearance of 1.9 metres, shall be a minimum of 0.6 metres in width and shall be: (a) (b) a minimum of 1.8 metres in length if the bicycles are to be placed horizontally; or a minimum of 1.0 metres in length if the bicycles are to be placed vertically, except that a minimum of 5% of the spaces must be oversized spaces of 2.4 metres in length and 0.9 metres in width, and may not be vertical or stacked spaces.

FLOOR PLAN VIEW

Bike Modules depicted in floor plans – as seen by city staff. Shows: Bike stalls with type tags, counts, and hatched aisle clearances:



3D VIEW – BICYCLE ROOMS CONFIGURATION EXAMPLES



3D VIEW – BICYCLE MODULES

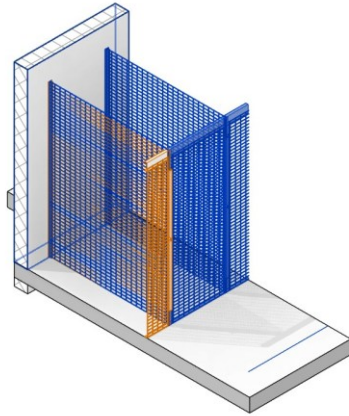
LOCKER:

Locked Constraints:

Dimensions: .8m x 1.8m

Clearance Box Height: 1.9m

Aisle Dim: 1.2m



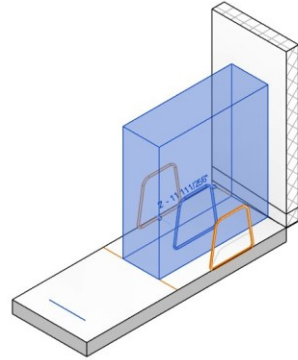
STANDARD:

Locked Constraints:

Dimensions: .6m x 1.8m

Clearance Box Height: 1.9m

Aisle Dim: 1.2m



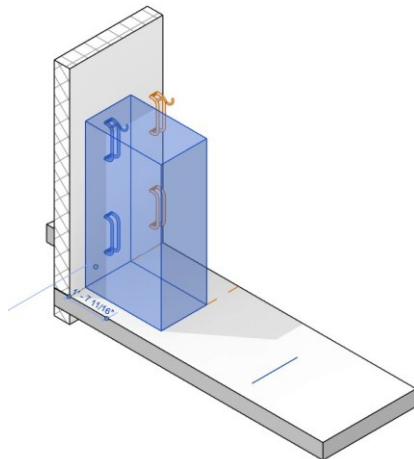
VERTICAL:

Locked Constraints:

Dimensions: .6m x 1m

Clearance Box Height: 1.9m

Aisle Dim: 1.2m



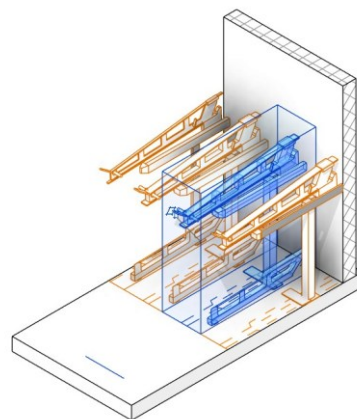
STACKED:

Locked Constraints:

Dimensions: .6m x 1.8m

Clearance Box Height: 1.9m

Aisle Dim: 1.2m



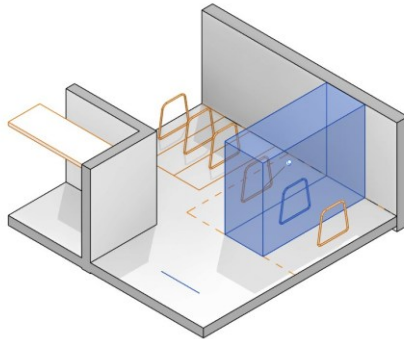
OVERSIZED:

Locked Constraints:

Dimensions: .9m x 2.4m

Clearance Box Height: 1.9m

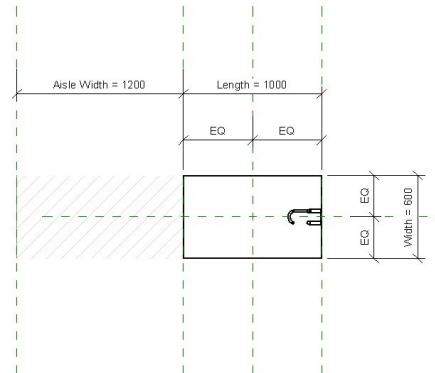
Aisle Dim: 1.2m



PARAMETERS EXAMPLE:

VISUAL:

Vertical Stall



PARAMETERS EXAMPLE: DATA:

Vertical Stall

Family Types

Type name: Bike Class A - Vertical - Vancouver Parking ByLaw Sec 06

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Clearance Box Height	1900.0	=	☐
Default Elevation	0.0	=	☐
Dimensions			
Aisle Width	1200.0	=	☐
Length	1000.0	=	☒
Width	600.0	=	☒
IFC Parameters			
Type IFC Predefined Type		=	
Export Type to IFC As		=	
Other			
clearance box (default)	☒	=	
Identity Data			

How do I manage family types?

Manage Lookup Tables

OK Cancel Apply

10.1B- WASTE MODULES

REGULATORY SOURCE: GUIDELINES-GARBAGE-RECYCLING-STORAGE-FACILITY-DESIGN - 2022

GARBAGE AND RECYCLING STORAGE AMENITY DESIGN SUPPLEMENT

<https://guidelines.vancouver.ca/guidelines-garbage-recycling-storage-facility-design.pdf>

Typical Storage Container Volume Length (m) Width (m) Footprint (m²)

240 L cart 0.7m x 0.6m, 0.42m² footprint

360 L cart 0.9m x 0.7m, 0.63m² footprint

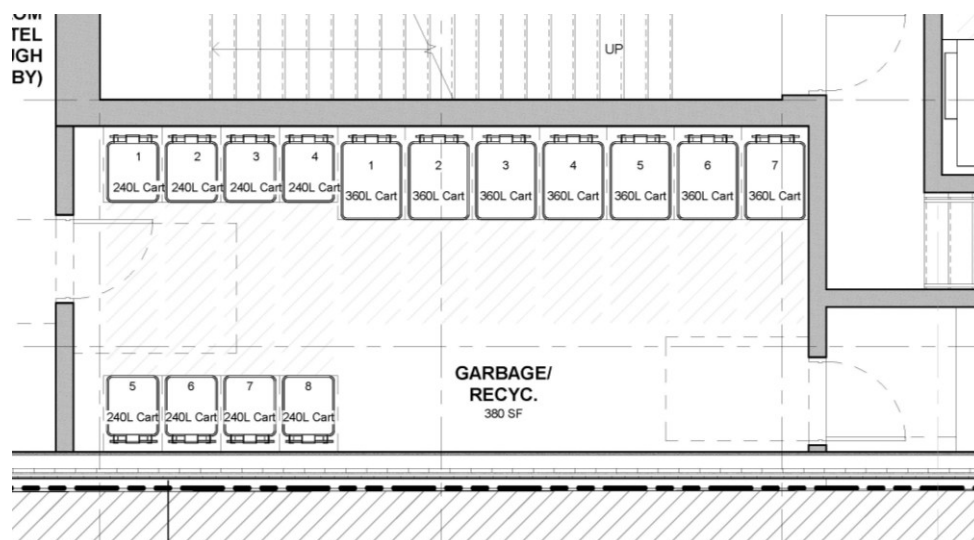
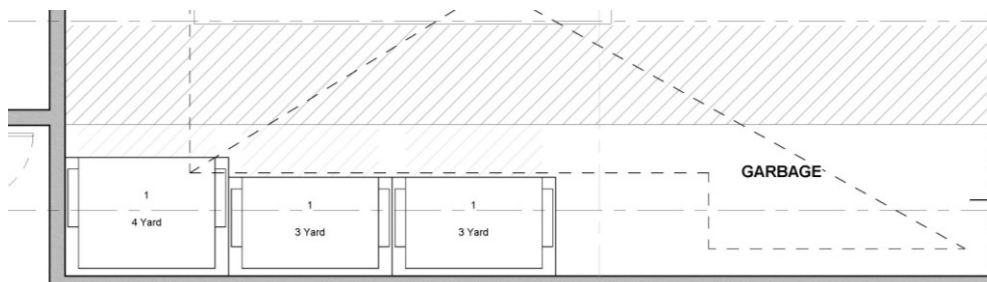
3 Yard³ Bin (2,294 L) 2.1m x 1.2m, 1.98 m² footprint

4 Yard³ Bin (3,058 L) 2.1m x 1.4m, 2.52m² footprint

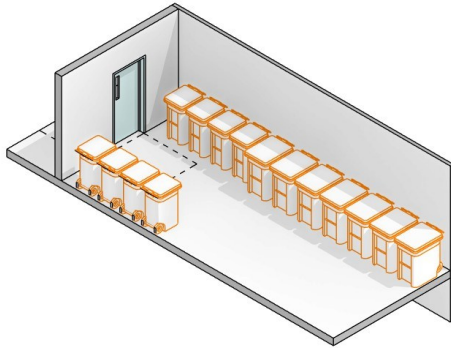
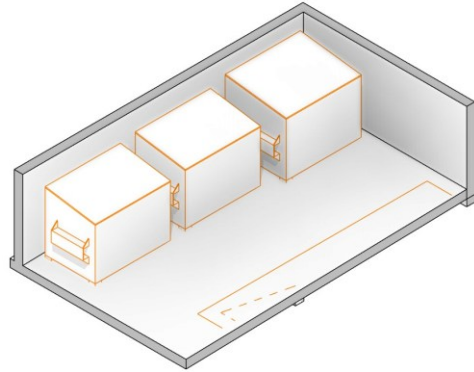
FLOOR PLAN VIEW

Waste Modules depicted in floor plans – as seen by city staff.

Shows: Waste bins with type tags, counts, and hatched aisle clearances.



3D - WASTE ROOMS



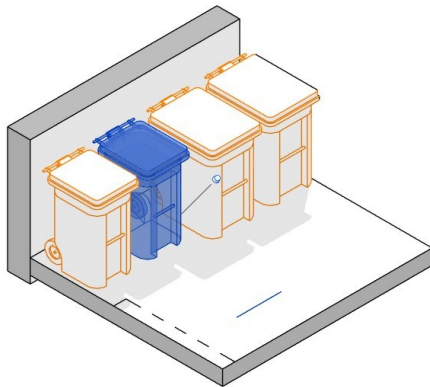
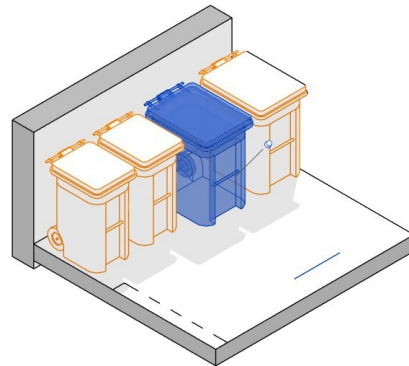
3D VIEW - WASTE MODULES

240 L CART:

Locked Constraints:
Dimensions: .7mx.6m
Aisle Dim: 1.2m

360 L CART:

Locked Constraints:
Dimensions: .9mx.7m
Aisle Dim: 1.2m

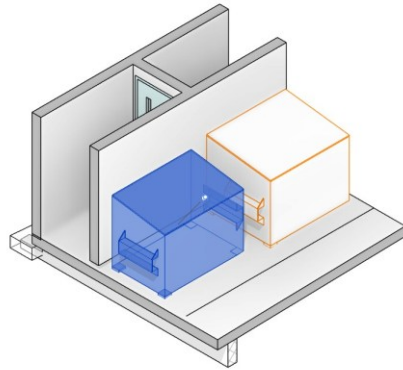


3 YARD BIN:

Locked Constraints:

Dimensions: .7mx.6m

Aisle Dim: 1.2m

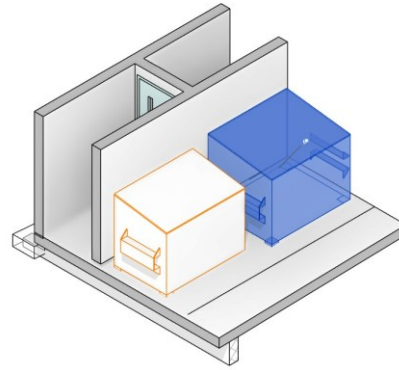


4 YARD BIN:

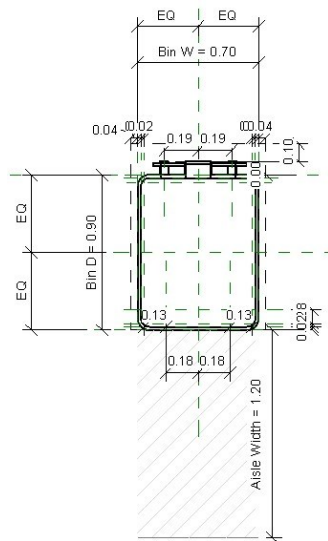
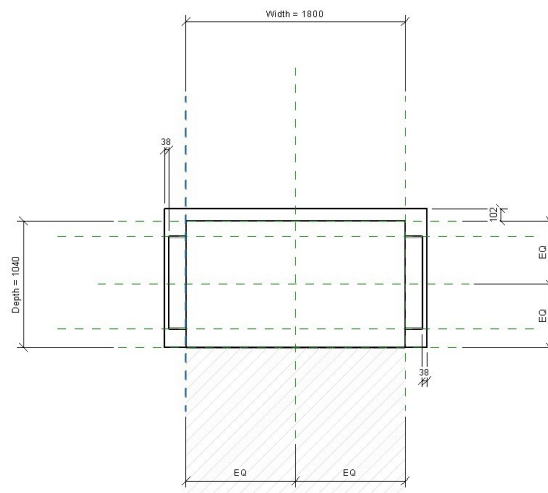
Locked Constraints:

Dimensions: .9mx.7m

Aisle Dim: 1.2m



PARAMETERS EXAMPLE VISUAL:



PARAMETERS EXAMPLE: DATA:

Wheeled Bin – 360 L

Family Types

Type name:    

Search parameters 

Parameter	Value	Formula	Lock
Constraints 			
Aisle Width	<input type="text" value="1200.0"/>	=	☐
Default Elevation	<input type="text" value="0.0"/>	=	☐
Dimensions 			
Bin D	<input type="text" value="900.0"/>	=	☐
Bin Height	<input type="text" value="1200.0"/>	=	☐
Bin W	<input type="text" value="700.0"/>	=	☐
IFC Parameters 			
Type IFC Predefined Type	<input type="text"/>	=	☐
Export Type to IFC As	<input type="text"/>	=	☐
Identity Data 			

[How do I manage family types?](#)

Manage Lookup Tables

OK Cancel Apply

10.1C- PARKING ENTRY RAMP

REGULATORY SOURCE: PARKING BY-LAW NO. 6059 DESIGN SUPPLEMENT PARKING AND LOADING DESIGN SUPPLEMENT

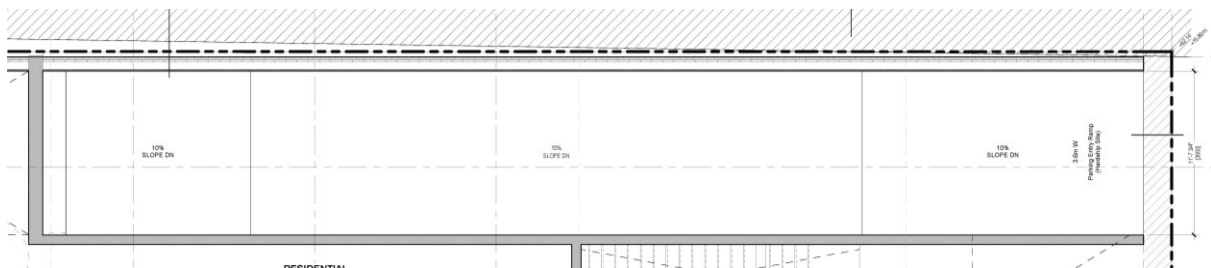
<https://guidelines.vancouver.ca/bulletins/bulletin-parking-loading-design-supplement.pdf>

The maximum slope after the first 6.1 m from the property line is 12.5%. On extreme hardship sites, slopes up to 15% may be acceptable if a 7.5% to 10% transition ramp or continuous transition curve is provided at the bottom for at least 4 m in length. Ramps which have a 15% slope and are exposed to the weather should be heated.

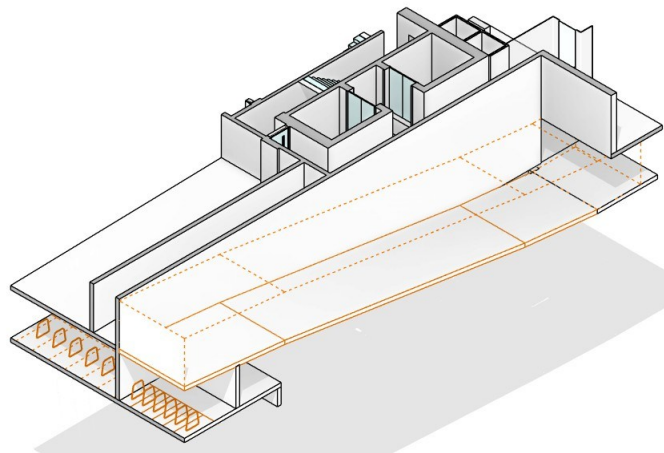
FLOOR PLAN VIEW

Parking Entry Ramp depicted in floor plan- as seen by city staff.

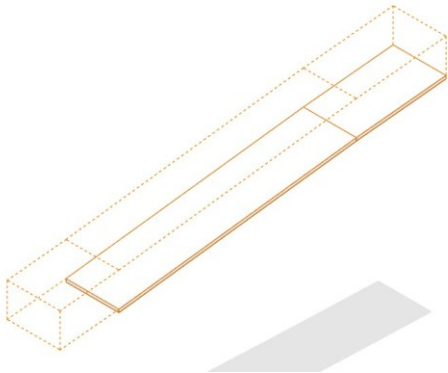
Shows: Entry ramp with type tag, with, and slopes.



3D- PARKING ENTRY RAMP

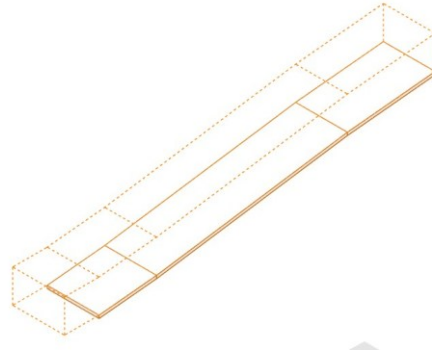


3D VIEW – ENTRY RAMP MODULES



NON-HARDSHIP SITE/3.6MW:

Locked Constraints:
 Dimensions: 3.6m w
 Clearance Box Height: 2.3m
 Slopes: 10% for first 6.1m, 12. 5%,



HARDSHIP SITE/3.6MW:

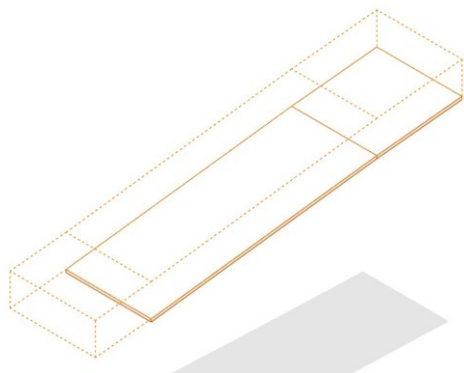
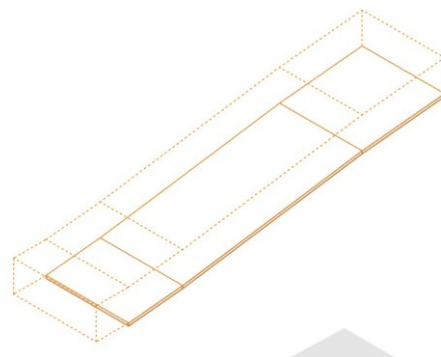
Locked Constraints:
 Dimensions: 3.6m w
 Clearance Box Height: 2.3m
 Slopes: 10% for first 6.1m, 15%, 10% transition for last 4m

NON-HARDSHIP SITE/6.1MW:

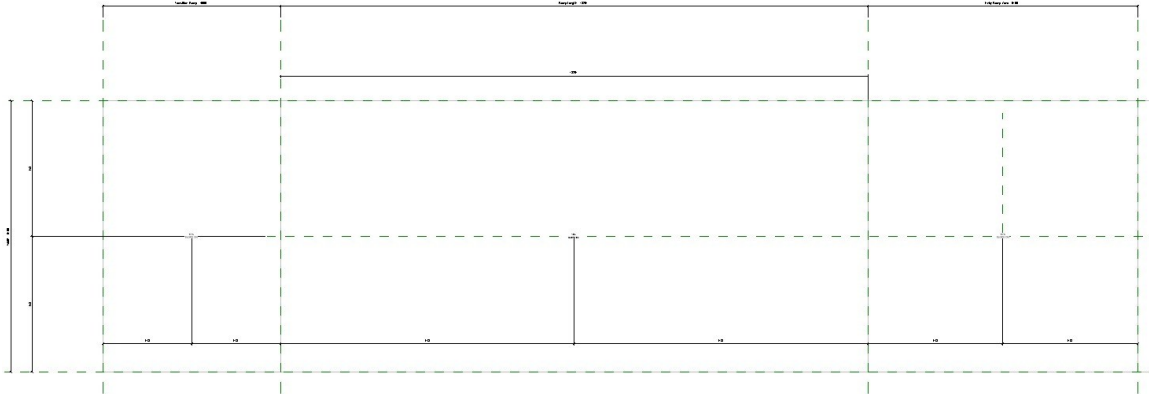
Locked Constraints:
 Dimensions: 6.1m w
 Clearance Box Height: 2.3m
 Slopes: 10% for first 6.1m, 12. 5%,

HARDSHIP SITE/6.1MW:

Locked Constraints:
 Dimensions: 6.1m w
 Clearance Box Height: 2.3m
 Slopes: 10% for first 6.1m, 15%, 10% transition for last 4m



PARAMETERS EXAMPLE: VISUAL:



PARAMETERS EXAMPLE: DATA:

Family Types

Type name: Parking Entry Ramp - 6.1mW - Hardship Site

Search parameters

Parameter	Value	Formula	Li
Constraints			
Default Elevation	1219.2	=	☒
Middle Ramp Slope	0.150000	=	☒
Entry Ramp Zone	6100.0	=	☒
Entry Ramp Rise	610.0	= Entry Ramp Zone * 0.1	☒
Transition Ramp	4000.0	=	☐
Transition Ramp Rise	400.0	=	☒
Width	6100.0	=	☒
Materials and Finishes			
Ramp Entry	Concr	=	☒
Dimensions			
Default Rise	1010.0	=	☒
Ramp Length (default)	1394.7	= Ramp Rise / Middle Ramp Slope	☒
Ramp Rise (default)	209.2	= if(Requested Rise < 1010 mm, Default Rise, Requested Rise) - (Transition Ramp Rise + En	☒
Requested Rise (default)	1219.2	=	☒
IFC Parameters			
Type IFC Predefined Type		=	☒

How do I manage family types?

Manage Lookup Tables

OK Cancel Apply

10.1D- BULK STORAGE

REGULATORY SOURCE: BULLETIN STORAGE MULTIPLE DWELLINGS

BULK STORAGE AND IN-SUITE STORAGE – MULTIPLE DWELLING RESIDENTIAL DEVELOPMENTS

<https://guidelines.vancouver.ca/bulletins/bulletin-parking-loading-design-supplement.pdf>

A maximum of 3.7 m² of storage space per dwelling unit may be excluded; storage space may be located in a single room, not exceeding 3.7 m² (if storage spaces exceed 3.7 m², the total area will be included in FSR) or combined in one area above base surface provided the total area, including access, does not exceed the maximum permitted exclusion of 3.7 m² per unit; must be full floor-to-ceiling height (min 2.1 m) and have a minimum clear horizontal dimension of 1.2 m in all directions; the storage space cannot be part of or adjunct to any other closet in the unit and must be accessed from a common area or hallway within the dwelling unit; the storage space can be located adjacent to an independent laundry area and need not be physically separated, however the laundry area and access to the laundry area cannot be included as part of the floor area exclusion for storage; excluded storage space is not included in the minimum dwelling unit size requirements of the Zoning and Development By-law; and the storage space must not contain windows.

IN-SUITE:

Locked Constraints:

Min: 1.2m w or d

Min Height: 2.1m

Max Area: 3.7m²

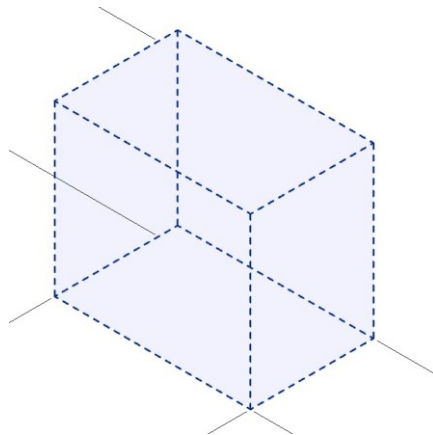
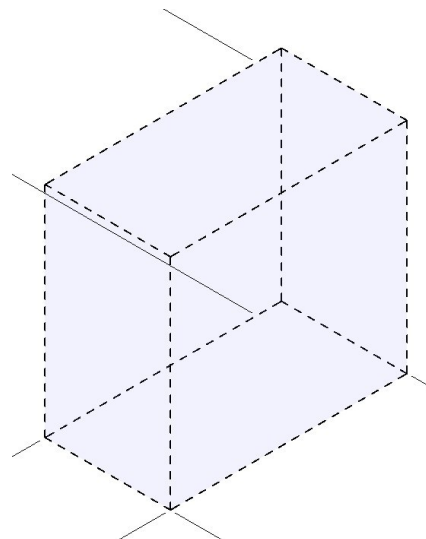
BELOW BASE SURFACE(GRADE):

Locked Constraints:

Min: 1.2m w or d

Min Height: 2.1m

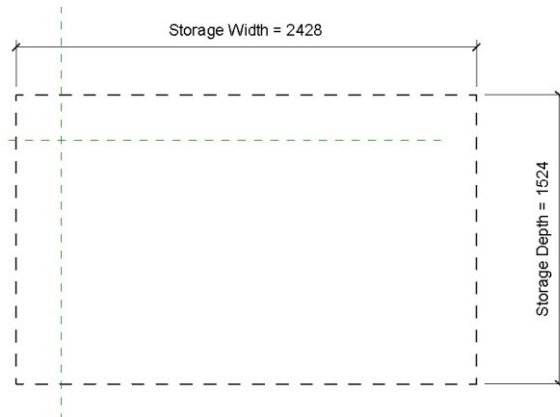
Min Volume: 5.7m³



PARAMETERS EXAMPLE:

VISUAL:

In Suite



PARAMETERS EXAMPLE: DATA:

Below Grade

Family Types

Type name: 2022 Bulk Storage Bulletin - Below Base Surface

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Default Elevation	0.0	=	☐
Min Volume	5.700	=	☐
Min Dim	1200.0	=	☐
Min Height	2100.0	=	☐
Dimensions			
Requested Depth	1500.0	=	☐
Requested Height	2100.0	=	☐
Requested Width	0.0	=	☐
Storage Height	2100.0	= if(Requested Height < Min Height, Min Height, Requested Height)	☐
Storage Depth	2261.9	= Min Volume / (Storage Width * Storage Height)	☐
Storage Width	1200.0	= if(Requested Width < Min Dim, Min Dim, Requested Width)	☐
IFC Parameters			
Type IFC Predefined Type		=	☐
Export Type to IFC As		=	☐
Analysis Results			
Volume Calc	5.700	= Storage Depth * Storage Width * Storage Height	☐
Other			

How do I manage family types?

OK Cancel

10.1E- PUBLIC WASHROOMS - ACCESSIBILITY

REGULATORY SOURCE: VBBL 2025

PUBLIC WASHROOM DESIGN & TECHNICAL GUIDELINES

<https://guidelines.vancouver.ca/guidelines-technical-public-washroom-design.pdf>

□ Stall types for multi-stall layouts:

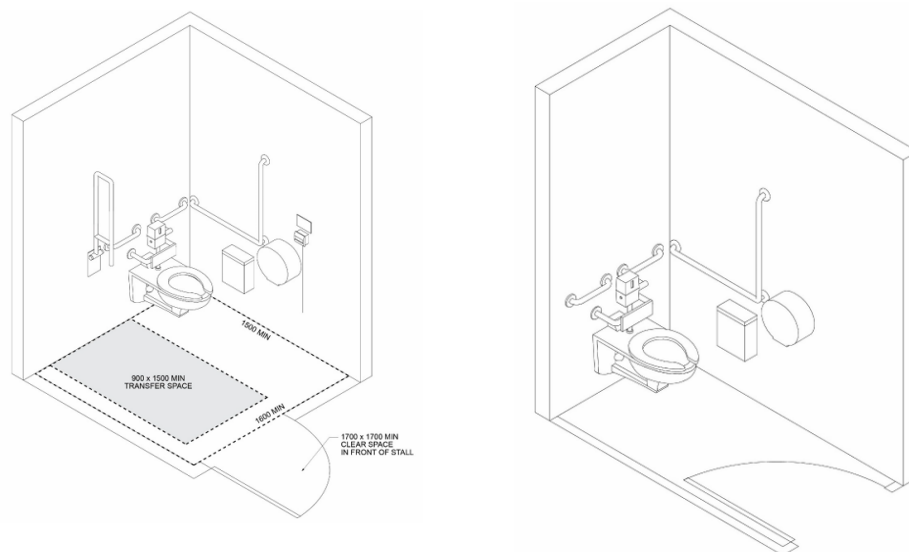
- **Accessible stall** PUBLIC WASHROOM DESIGN & TECHNICAL GUIDELINES REAL ESTATE, ENVIRONMENT AND FACILITIES MANAGEMENT Facility Planning and Development July 2024 o Contains required clear space / turning radius, transfer space, accessible toilet with back rest, grabs bars, and accessories. See Appendix B: Figure 3.
- **Limited mobility stall** Contains accessible toilet with back rest, grabs bars, and accessories. Beneficial in facilities used by high numbers of seniors, or people with limited mobility and strength, for example. See Appendix B: Figure 4.

Regular stall Contains standard toilet and accessories.

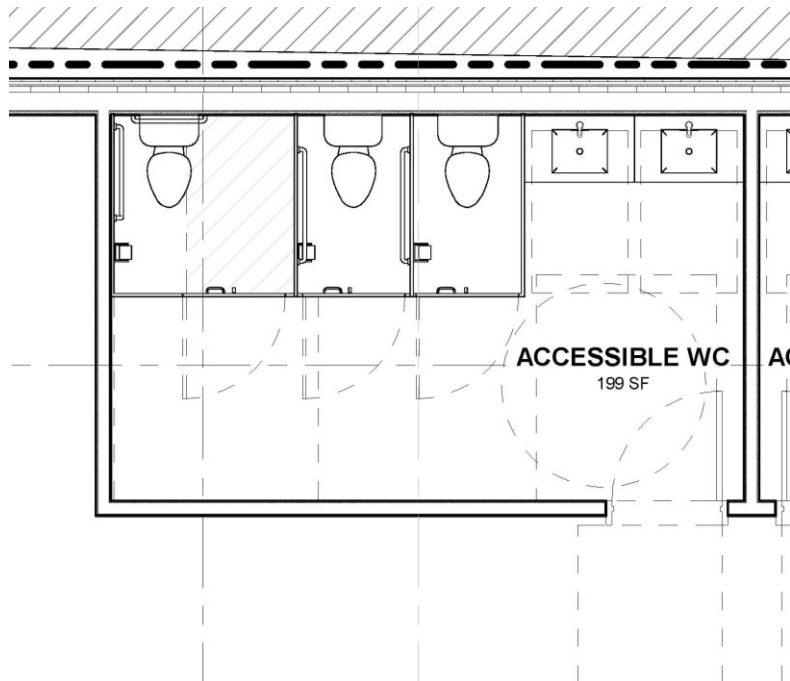
Accessible stall: Provide minimum internal dimensions of at least 1600 x 1500 mm, and 1700 x 1700 mm clear space in front of accessible stall. Increase internal dimensions whenever possible to City of Vancouver Public Washroom Design & Technical Guidelines 10 PUBLIC WASHROOM DESIGN & TECHNICAL GUIDELINES REAL ESTATE, ENVIRONMENT AND FACILITIES MANAGEMENT Facility Planning and Development July 2024 accommodate a minimum 1700 x 1700 mm clear space, the minimum required to enable turning inside the stall. All doors to open outward regardless of internal dimensions. • Ensure internal clear space as per VBBL. All accessible stalls to include the transfer space required for an accessible toilet as per Sections 2.5.8 in these Washroom Guidelines. See Appendix B: Figures 3 and 6.

FLOOR PLAN VIEW

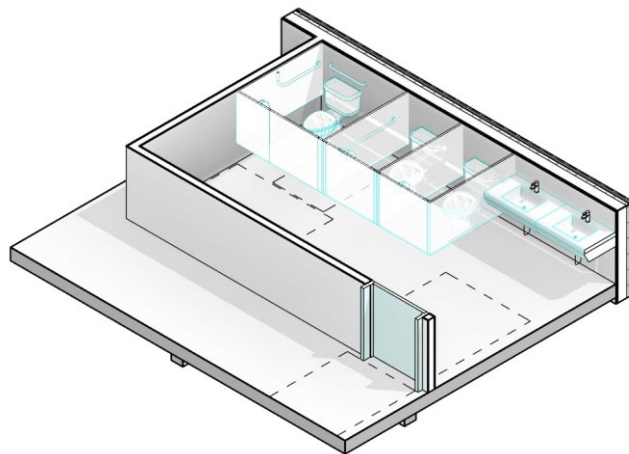
Accessible public washroom depicted in floor plan- as seen by city staff.



Shows: Accessible washroom stall, limited mobility washroom stall, standard stall, sink and public washroom accessible clearances.



3D- ACCESSIBLE PUBLIC WASHROOM

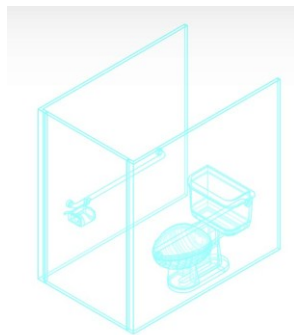


LIMITED MOBILITY STALL:

Locked Constraints:

Clear Width/Depth: .94m x 1.5m

Fixed Heights for: Grab Bars, Toilet Paper
Dispenser, Door Pull, Hook



ACCESSIBLE STALL:

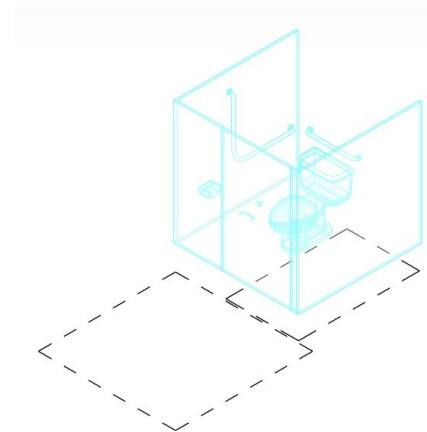
Locked Constraints:

Accessible Clearance at Door: 1.7mx1.7m

Accessible Clearance in Stall: .9mx1.5m

Clear Width/Depth: 1.5m x 1.5m

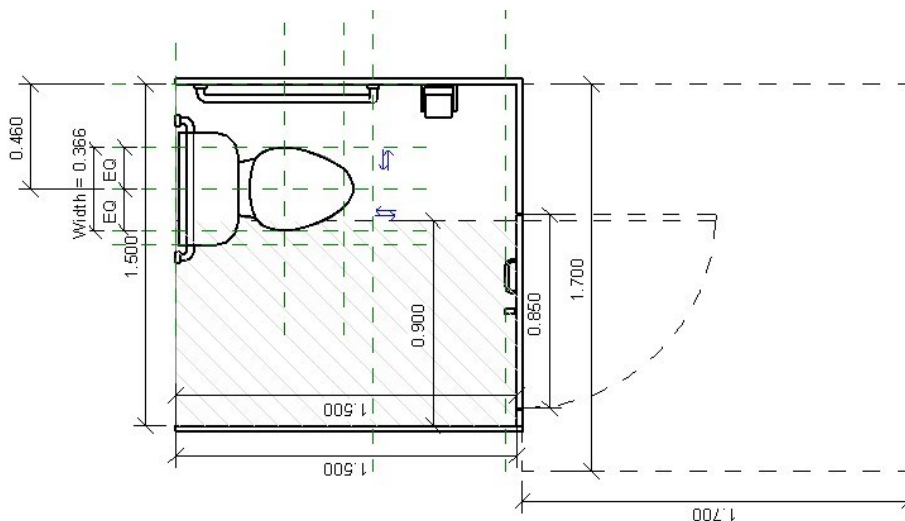
Fixed Heights for: Grab Bars, Toilet Paper
Dispenser, Door Pull, Hook



PARAMETERS EXAMPLE:

VISUAL:

Accessible Stall



PARAMETERS EXAMPLE: DATA:

Accessible Stall

Family Types

Type name: 2025 VBBL - Accessible Washroom Stall

Search parameters

Parameter	Value	Formula	Lock
Constraints			
Accessible Clearance Depth at Door	1700.0	=	☒
Accessible Clearance Width at Door	1700.0	=	☐
Accessible In Stall Clearance Depth	1500.0	=	☐
Accessible In Stall Clearance Width	900.0	=	☐
Accessible Stall Clear Width	1500.0	=	☐
Default Elevation	0.0	=	☐
Door Hook Height	1200.0	=	☐
Door Pull Height	1000.0	=	☐
Grab Bar Dist from Floor	850.0	=	☐
Grab Bar Height	760.0	=	☐
Toilet Paper Dispenser Height	700.0	=	☐
Materials and Finishes			
Toilet - Bowl/Basin Material	Porcelain, Linen	=	
Toilet - Seat Material	Laminate, Linen, Matte	=	
Plumbing			
Vent Connection	☐	=	
Waste Connection	☐	=	
CW Connection	☐	=	
HW Connection	☐	=	
Dimensions			
Accessible Stall Clear Depth (report)	1500.0	=	
Depth	740.9	=	☐
Width	365.7	=	☐

How do I manage family types?

Manage Lookup Tables

OK Cancel Apply

10.2 AMA + U : Milestone 1 Report

MILESTONE ACCOMPLISHMENTS

STAGED WORKPLAN ASSESSMENT

Key Milestones / Deliverables for this Milestone	Responsible Organization	Metrics / Acceptance Criteria	On Track (Yes/No)	Comment (If not on track, identify the core issue and corrective actions)
<ul style="list-style-type: none"> - Establish BIM Standards and digital automated processing Rules - Kickoff Meetings 	AMA+U, SolidCAD & Archistar	Prepare/Establish the BIM Framework, Initial Review and Audit of the Schematic BI Model Digitize Zoning Codes & Bylaws BIM Plugin Development	Yes	-AMA received an ISO 19650 standards workshop from SolidCAD and began developing internal Revit standards (templates, naming rules, and model structure). Initial automated processing rules were drafted based on Vancouver zoning codes and bylaws. -Archistar has started testing the automation of these rules. -Overall, the project is on track: BIM standards are in place and automation testing is now underway.
Prepare digital concept model (Rhino to Revit) (BIM LOD 200 and 300)	AMA+U	Concept model complete. (BIM LOD 200+)	Yes	-AMA+U prepared two pilot Revit models, progressing toward LOD 200 and 300 detail levels. -The models were distributed to the project team for review and testing.
DA optimization of the design model using IDP and digital collaboration tools. Compliance check to ensure the following BIM standards. Iterative coordination and testing with Archistar.	AMA+U, SolidCAD & Archistar	1-2 Design iterations with the project team Design Coordination / Processing for Digital Assessment Web Visualization Development PDF Assessment Report Development	Yes	-SolidCAD assessed AMA+U's Revit model against ISO 19650 criteria and provided feedback for improvements. -Development Permit submission requirements were itemized against parametric capabilities.

		UAT Testing		-BIM standards are on track and ongoing; Archistar automation testing is ongoing.
Analysis and benchmarking of project schedule, cost, and project KPIs	AMA+U	Data tables complete as Draft 1.0. Comparison to typical project benchmarks.	Yes	-Ongoing schedule review and coordination at each meeting- 13 initial KPIs selected from DP requirements and scheduled for tracking with Archistar.
Optimization of Building Schematic Design + Development Permit Level Dwgs (BIM Model 200+)+ MODEL health check.	AMA+U & SolidCAD	(BIM Model 200+)	Yes	AMA+U revised the BIM model at LOD 200+ based on the first assessment comments from SolidCAD. -SolidCAD provided a Model Health Check (Excel), which AMA+U has been using to guide updates.
Develop digital BIM model – including DA optimization of key, time-consuming review elements by authorities.	AMA+U	3-4 Design iterations with the project team.	Yes	KPIs will be added gradually, in stages of about 10 to 20 items each.
Optimization of the design model for construction using digital collaboration tools.	AMA+U	1 Design review rounds with trades. Review of Design Development Building Systems for Fabrication	No	We have not discussed it with the project team yet, and we are aiming to complete it during the next milestone.
Run BIM File as “Development Permit Submissions” to test applications with a DA system	AMA+U & Archistar	BIM file processed as a completed application using digitally automated tools. Processing time recorded.	No	It is in progress with the project team, but we have not yet finalized the BIM model to test the application using the DA system.

RISKS & OPPORTUNITIES

RISKS.

List any new significant risks identified during this Milestone and how the consortium plans to address them. A risk is something unplanned that might happen that could have a negative impact on the planned outcomes (e.g., emerging competitor). Identify if any of these risks are anticipated to result in a change order for the project.

1. AUTOMATION LIMITATIONS

Only quantitative rules can be automated; qualitative rules require human review.

Risk Reduction: Separate and document both rule types, explore structured inputs for future automation. This will help quantify the number of quantitative rules and clarify the potential speed gains achievable through automation.

2. REGULATORY CHANGE

Frequent bylaw updates make parameters difficult to keep consistent.

Risk Reduction: Standardize KPI update and version control process.

3. FRAGMENTED REGULATIONS

Rules come from multiple documents and bodies, complicating automation.

Risk Reduction: Shifted to mapping rules by government department; AMA+U prepared a departmental flow chart.

4. REQUIREMENTS BY ZONE AND BUILDING USE

DA requirements differ by region and building use, requiring tailored automation processes for each.

Risk Reduction: Prioritize high-demand uses such as multi-family housing and hotels, then gradually expand to other uses.

OPPORTUNITIES.

List any new project-related opportunities identified in this Milestone, their status and how the project plans to leverage them. How might they improve this project or lead to a future project? An opportunity is something unplanned that the consortium could leverage to have a positive impact on the overall project (e.g., emerging market trends, sector investment). Identify if any of these opportunities are anticipated to result in a Change Order for the project.

1. EXPANDED KPI FRAMEWORK

Over 70 automated checks establish a digital framework for development permit review.

Impact: Improves consistency for architects, supports city automation, and shortens approval timelines.

2. EFFICIENCY AND FOCUS

Automation reduces staff time on quantitative checks.

Impact: City staff can prioritize design quality, while applicants and the public benefit from faster housing delivery.

3. BENCHMARKING AND STANDARDS

Creates clear benchmarks for drawing requirements at each phase.

Impact: Helps architects prepare accurate fee proposals and establishes consistency across the field.

IMPACT HIGHLIGHTS AND PROJECT INSIGHTS**Impact Stories and Key Learnings.**

Can you share any impactful stories or key insights that have emerged from this milestone? Describe how the consortium is achieving its core objectives, delivering value to target customers, or influencing sector change. If applicable, indicate whether DIGITAL can amplify this story or if it is currently confidential, and include any links to public announcements or media releases.

KEY LEARNING:

- Only quantitative rules can be automated; qualitative rules require professional judgment.
- Regulations were fragmented across multiple documents.
- No city standard exists for drawing detail or model expectations.
- ISO 19650 requires significant discipline from the architectural side.

IMPACT:

For Architects: Clear standards and benchmarks improve drawings, fee proposals, and consistency across the field. By integrating LOD and ISO into the BIM automation process, management, design quality, and drawing quality are refined to align with international standards.

For the City: Automated checks reduce staff time on routine reviews, allowing more focus on design quality and livability. Consistent BIM data accelerates reviews, reduces administrative burdens, and increases confidence in compliance and approvals.

For the Public: Faster approvals accelerate delivery of multi-residential housing to meet urgent demand. Adopting BIM with LOD, ISO 19650, and KPI mapping enhances transparency—clarifying permit drawings, municipal review processes, and public understanding.

ACHIEVEMENTS AND DISCOVERIES.

What are some notable achievements and discoveries from the project to date? List 2-3 key accomplishments that can be publicly disclosed, and explain how any discoveries or lessons learned are being applied to enhance project outcomes or processes. Are there potential benefits or applications for other projects?

1. REVIT STANDARDS ESTABLISHED

Base templates, welcome sheets, and management rules created and aligned with ISO 19650 guidance.

Discovery: Consistent templates and cleanup practices reduce errors and set a strong foundation for automation.

2. KPI FRAMEWORK AND RULE MAPPING

160 rules compiled, with 72 identified as quantitative and automatable.

Rules reorganized by the municipal department into a policy standards matrix.

Discovery: Clarifying automation limits and mapping regulations by department created a clear roadmap for compliance and future automation.

3. PILOT MODELS FOR APPLICATION TESTING

Two Revit pilot models (25ft and 50ft sites) were developed in parallel with standards applied. Discovery: Testing across different building scales validates standards and highlights practical requirements for automation.

10.3 AMA + U Milestone 2 Report:

MILESTONE ACCOMPLISHMENTS

STAGED WORKPLAN ASSESSMENT

Key Milestones / Deliverables for this Milestone	Responsible Organization	Metrics / Acceptance Criteria	On Track (Yes/No)	Comment (If not on track, identify the core issue and corrective actions)
- Establish BIM Standards and digital automated processing Rules	AMA+U, SolidCAD & Archistar	Prepare/Establish the BIM Framework, Initial Review and Audit of the Schematic BI Model Digitize Zoning Codes & Bylaws BIM Plugin Development	Yes	<p>BIM Framework: BIM standards were developed based on ISO guidance from SolidCAD, including a welcome sheet, file organization protocols, Revit templates, BIM schedules, file-cleaning standards, and established family naming conventions.</p> <p>Review and Audit: The first round of SolidCAD ISO review comments was incorporated into the BIM model in accordance with the model health check report. A follow-up model audit was requested and completed, with the second review confirming measurable improvements to overall model quality.</p> <p>Digitized Zoning Codes and BIM Plugin Development: Archistar tested the first 50% of key performance indicators (KPIs) to confirm the feasibility of automated data extraction required to assess pass/fail compliance. AMA+U provided a comprehensive KPI matrix categorized by government department. Archistar demonstrated the ability to automatically retrieve the required data for the initial 50% of KPIs and issued a Digital Progress Report</p>

				documenting this capability in October 2025.
Prepare digital concept model (Rhino to Revit) (BIM LOD 200 and 300)	AMA+U	Concept model complete. (BIM LOD 200+)	Yes	<p><u>Model Development:</u> AMA+U updated two pilot Revit concept models, advancing them toward BIM LOD 200 and 300 levels of development.</p> <p><u>Model Distribution:</u> The models were issued to SolidCAD and Archistar for review and software testing.</p> <p><u>Social Housing Prototype:</u> The first model was developed as a social housing prototype to support exploration in this sector.</p> <p><u>Conventional Residential Model:</u> As many municipal regulations are written for multi-family residential use, a second residential model was developed.</p> <p><u>Cross-Project Validation:</u> Utilizing two distinct project types enabled testing to confirm that data retrieval and automated plan-checking workflows function consistently across different project files.</p>
DA optimization of the design model using IDP and digital collaboration tools. Compliance check to ensure the following BIM standards. Iterative coordination and testing with Archistar.	AMA+U, SolidCAD & Archistar	1-2 Design iterations with the project team Design Coordination / Processing for Digital Assessment Web Visualization Development PDF Assessment Report Development UAT Testing	Yes	<p><u>Design Iterations and Coordination:</u> Two rounds of BIM model checking were completed by SolidCAD to support design coordination and readiness for digital assessment.</p> <p><u>Web Visualization Development:</u> Development is ongoing</p> <p><u>PDF Assessment Reporting:</u> Archistar generated two digital assessment/progress reports reflecting automated rule-checking outputs to date.</p> <p><u>User Acceptance Testing (UAT):</u> UAT activities are anticipated in a subsequent project phase.</p>

Analysis and benchmarking of project schedule, cost, and project KPIs	AMA+U	Data tables complete as Draft 1.0. Comparison to typical project benchmarks.	Yes	<p><u>Schedule and KPIs:</u></p> <p>Project schedule is updated monthly by Arno Matis with KPIs linked to the schedule.</p> <p>Schedule is approximately one month behind; plans to fast-track January work to finalize Phase 1 and begin Phase 2.</p> <p>Phase 2 Final Report Drafting started Q4 2025 while awaiting Phase 1 automation results to balance the schedule.</p> <p><u>Cost:</u></p> <p>Cost review on track and ongoing; conducted by AMA+U accounting.</p> <p><u>Benchmarking and Reporting:</u></p> <p>Archistar's Oct. 2025 report highlighted successful BIM data extraction at 50% milestone, with completed digitized zoning codes, BIM plugin, web visualization, and initial parameter checks.</p>
Optimization of Building Schematic Design + Development Permit Level Dwgs (BIM Model 200+)+ MODEL health check.	AMA+U & SolidCAD	(BIM Model 200+)	Yes	AMA+U revised the BIM model at LOD 200+ based on the first assessment comments from SolidCAD. SolidCAD provided a Model Health Check (Excel), which AMA+U has been using to guide updates.
Develop digital BIM model – including DA optimization of key, time-consuming review elements by authorities.	AMA+U	3–4 Design iterations with the project team.	Yes	<p><u>Design Iterations:</u></p> <p>Three design iterations completed to date: two updates for Project A (Social Housing) — initial version plus one revision after addressing comments from SolidCAD and Archistar — and one iteration for Project B (Residential), which was issued once.</p>

				KPI Testing: KPIs are being added gradually in batches of 10 to 20 items. Out of 72 total quantitative KPIs, approximately 70% have been tested so far.
Optimization of the design model for construction using digital collaboration tools.	AMA+U	1 Design review rounds with trades. Review of Design Development Building Systems for Fabrication	No	Trades Design Review and Fabrication Systems: Design review with trades and building systems review have not yet occurred. These activities are planned for the next project stage.
Run BIM File as "Development Permit Submissions" to test applications with a DA system	AMA+U & Archistar	BIM file processed as a completed application using digitally automated tools. Processing time recorded.	Yes	Archistar Digital Progress Report/s First ~70% of KPI parameters were tested on BIM model 1

KEY OBJECTIVES PLANNED FOR THE NEXT MILESTONE.

Describe the planned objectives for the next work period based on the milestones listed in the mpa. If there are any changes resulting from the work completed during this milestone, please detail them.

- Phase 2.0: Case Study Report (Duration:1-2 months *some overlap with Phase 1.0)
- Data Analysis(AMA+U & Entire Team to Comment): Completed data tables reviewed, Draft 1.0 summary of early findings.
- Draft 1.0 Report(AMA +U): Initial draft report to cover: Summary of process/data; Synthesis of data against KPIs; Key findings (pros and cons); Best practices for Digital files set with new BIM standards\for digital automated review; High-level process in working with main sub-consultants (i.e. structural) in setting up files as the prime coordination consultant (Architect); Recommendations for DA optimization in BIM; Overview of how the approach can be easily replicated across the industry;
- Draft 2.0 Report(AMA +U): Team review and revision of the initial report.
- Draft 3.0 Report(AMA + U & Entire Team to Comment): Further refinement of the report. Draft layout + key graphics (data tables etc.)
- Final Report(AMA + U): Report Complete (8.5x11 pdf document)

- Formatting for Web, Slides (AMA+U): Formatting reports for simple websites + slideshow presentations at conferences.

RISKS & OPPORTUNITIES

RISKS.

List any new significant risks identified during this Milestone and how the consortium plans to address them. A risk is something unplanned that might happen that could have a negative impact on the planned outcomes (e.g., emerging competitor). Identify if any of these risks are anticipated to result in a change order for the project.

ADOPTION CHALLENGES:

Concerns over intellectual property and liability when submitting live digital files could slow acceptance.

Mitigation: Develop liability frameworks to address concerns.

Automation Limitations: Only quantitative rules can be automated; qualitative rules still require human review.

Mitigation: Opportunity for more guidelines and regulations to have measurable rules, and for qualitative aspects to be reviewed by people in a meaningful way.

SUPPLY-SIDE BARRIERS AND RESISTANCE TO CHANGE:

- Zoning restrictions often limit development to low-density housing, complicating multi-unit projects and requiring rezoning.
 - o *Mitigation:* Focus automation on high-demand uses like multi-family housing to build momentum.
- High land costs and upfront development fees create significant financial barriers.
 - o *Mitigation:* Explore financial or timeline incentives to sign up for automated plan checking to ease developer burden.
- Slow, uncertain approvals increase project risk, especially for smaller developers.
 - o *Mitigation:* Engage municipalities early to streamline processes and reduce delays.
- Fragmented Regulations: Multiple authorities complicate automation.
 - o *Mitigation:* AMA+U mapped rules by department to simplify workflows and improve clarity.

DEMAND-SIDE BARRIERS AND RESISTANCE TO CHANGE:

- Rapid population growth and immigration outpace housing supply.
 - o *Mitigation:* Scale automation to address demand, prioritizing high-impact projects.
- Income stagnation amid rising housing costs worsens affordability.
 - o *Mitigation:* Collaborate with affordable housing advocates for aligned solutions.
- Affordable and non-market housing supply is insufficient.
 - o *Mitigation:* Expand automation to affordable housing and rental projects to improve efficiency and lower costs.
- Rising borrowing costs increase development expenses.
 - o *Mitigation:* Adapt financial planning and pursue flexible financing.
- Varying Requirements by Zone and Use: Tailored automation is needed for different DA requirements.
 - o *Mitigation:* Prioritize automation for high-demand urban zones.

OPPORTUNITIES.

List any new project-related opportunities identified in this milestone, their status and how the project plans to leverage them. How might they improve this project or lead to a future project? An opportunity is something unplanned that the consortium could leverage to have a positive impact on the overall project (e.g., emerging market trends, sector investment). Identify if any of these opportunities are anticipated to result in a change order for the project.

IMPROVED AUTOMATION EFFICIENCY

- Automation is streamlining quantitative rule checks, freeing city staff to focus on design quality and complex qualitative reviews.
- *Impact:* Enhances overall workflow efficiency and contributes to faster housing delivery, benefiting municipalities, developers, and the public.

STRENGTHENED STANDARDS AND MODELING PRACTICES

- Established ISO-aligned Revit templates and consistent BIM management rules reduce errors and improve interoperability.
- *Impact:* Supports architects in producing compliant, high-quality submissions and enables benchmarking that improves fee and resource planning.

SECTOR ENGAGEMENT AND ADOPTION POTENTIAL

- Upcoming workshops and presentations scheduled for early 2026 provide opportunities to promote the BIM platform and automation benefits to industry and government.
- *Impact:* These outreach efforts position the project as a leader in digital plan review, potentially unlocking future funding and partnerships for expanded adoption.

IMPACT HIGHLIGHTS AND PROJECT INSIGHTS

IMPACT STORIES AND KEY LEARNINGS.

Can you share any impactful stories or key insights that have emerged from this milestone? Describe how the consortium is achieving its core objectives, delivering value to target customers, or influencing sector change. If applicable, indicate whether DIGITAL can amplify this story or if it is currently confidential, and include any links to public announcements or media releases.

KEY LEARNINGS:

AUTOMATION & REGULATORY INSIGHTS

- Automation currently works well for quantitative rules; qualitative rules still need professional judgment.
- Regulations are fragmented across multiple documents and departments, complicating automation.
- Departmental mapping of rules and a KPI framework clarified compliance pathways and automation potential.
- No standard city requirements for drawing detail or BIM expectations exist, making consistent standards essential.

DEVELOPING MODELING STANDARDS

- Consistent modeling and view standards, aligned with ISO 19650, are critical to avoid silent errors and ensure reliability. Establishing a clear baseline model expectation is key for accuracy and trust in automation results.

AUTOMATED PLAN CHECKING ANTICIPATED IMPACT:

- **Architects:** Availability of clear standards improve drawing quality, consistency, and fee proposal accuracy while supporting better design management.
- **City Staff:** Automation reduces routine workloads, allowing focus on design quality and accelerating plan reviews.
- **Public:** Faster approvals speed multi-residential housing delivery and enhance transparency in municipal processes, increasing public trust.

ACHIEVEMENTS AND DISCOVERIES.

What are some notable achievements and discoveries from the project to date? List 2-3 key accomplishments that can be publicly disclosed, and explain how any discoveries or lessons learned are being applied to enhance project outcomes or processes. Are there potential benefits or applications for other projects?

REVIT STANDARDS ESTABLISHED

The team developed base templates, welcome sheets, and management rules aligned with ISO 19650, incorporating SolidCAD's feedback. We created consistent file organization, naming conventions, BIM schedules, and project stage guidelines (Rezoning, Development Permit, Building Permit, Construction). Model cleanup included purging and restructuring naming for groups, line types, filters, and worksets.

Discovery: Consistent templates and cleanup practices reduced errors and laid a strong foundation for automation.

KPI FRAMEWORK, RULE MAPPING AND AUTOMATION TESTING

We Compiled over 160 rules in a KPI workbook; 72 identified as quantitative and automatable. During the process we shifted from organizing rules by type to mapping by municipal department, creating a policy standards matrix and a preliminary Vancouver department flow chart. Screening focused on automation eligibility, distinguishing quantitative/measurable rules from qualitative ones requiring human review. KPI automation check performed by Archistar using Project A(Social Housing) Revit files, including zoning/planning (building height), engineering (bike parking, loading counts, passenger counts), and housing policy (unit counts, mix, minimum sizes).

Discovery: Departmental mapping clarified compliance pathways and automation limits, helping prioritize future automation efforts. Early KPI validation supports phased automation, increasing confidence and guiding next steps.

DATA MAPPING FOR MUNICIPAL TIMELINES

The team-initiated collection of approval timeline data from major municipalities in British Columbia to establish baseline benchmarks for comparing automated

10.4 AMA + U Milestone 3 Report:

PURPOSE

The purpose of this final report is to provide an overview of the last and final work period, followed by a comprehensive summary of the project's overall accomplishments and outcomes. The information provided in this report may be used by DIGITAL to create case studies for marketing and communications purposes and may be used by the Housing Growth Innovation (HGI) program for reporting to the B.C. Government. The first half of the report will follow the same format as previous work period reports. The second half will focus on the entire project, highlighting key outcomes and achievements.

PART A – FINAL WORK PERIOD

OVERVIEW

Project Name	Multi-Automated Review (Multi-AR)
Project Lead Organization	Arno Matis Architecture + Urbanism
Final Milestone Number	Milestone #3
Milestone Period	December 1 st 2025 – March 31 st 2026
Submission Date	March 31 st 2026

MILESTONE ACCOMPLISHMENTS

Staged Workplan Assessment

Key Milestone / Deliverable	Responsible Organization	Metrics / Acceptance Criteria	Complete (Yes/No)	Comments (If not on track, identify the core issue and corrective actions)
Data Analysis	AMA+U, Entire team to comment.	Completed data tables reviewed, Draft 1.0 summary of early findings.	Yes	Completed; data compiled and reviewed as part of draft report development
DRAFT 1.0 Report	AMA+U	Initial draft report to cover: -Summary of process/data; -Synthesis of data against KPIs; -Key findings (pros and cons);	Partial	Core sections completed; some areas (e.g., formalized best practices, replication) explored but not fully developed

Key Milestone / Deliverable	Responsible Organization	Metrics / Acceptance Criteria	Complete (Yes/No)	Comments (If not on track, identify the core issue and corrective actions)
		<ul style="list-style-type: none"> -Best practices for BIM files set with new standards for DA review; -High-level process in working with main sub-consultants (i.e. structural) in setting up files as the prime coordination consultant (Architect); - Recommendations for DA optimization in BIM; -Overview of how the approach can be easily replicated across the industry (private and public); 		
DRAFT 2.0 Report	AMA+U	Team review and revision of the initial report.	Yes	Iterative review completed across project timeline
DRAFT 3.0 Report	AMA+U + Entire Project Team to comment.	Further refinement of the report. Draft layout + key graphics (data tables etc.)	Yes	Report refined with supporting visuals and structured layout

Key Milestone / Deliverable	Responsible Organization	Metrics / Acceptance Criteria	Complete (Yes/No)	Comments (If not on track, identify the core issue and corrective actions)
FINAL REPORT	AMA+U	Report Complete (8.5x11 pdf document)	Yes	Final report completed
Formatting for Web, Slides	AMA+U	Formatting reports for simple website + slideshow presentations at conferences.	Yes	Content summary version adapted for web and presentation formats

PART B – OVERALL PROJECT ASSESSMENT

PROJECT SUMMARY

PROBLEM STATEMENT.

Briefly describe how the challenge identified in your original proposal manifested during the project. *Using the table provided, highlight any deviations from the approved proposal and explain how the context or key issues may have evolved during delivery.*

Problem Statement (as per proposal)	Deviations from Original Proposal
<p>Metro Vancouver is continuously struggling with an undersupply of housing. Vancouver, for example, is currently falling short of housing targets by up to 9,500 units per year 1,2. Falling short of these targets will create increasingly unaffordable housing.</p> <p>Further adding to this bottleneck, construction starts in Vancouver down 20% in 2024 likely due to:</p> <ul style="list-style-type: none"> - Permitting delays and uncertainty. - Prolonged Timelines (translating to additional financing cost). - Inflation and uncertain construction costing. <p>Lack of transparency and information sharing in the private sector escalates uncertainty.</p>	<p><u>Permitting Timelines Remains The Core Issue</u></p> <p>The original problem of prolonged and uncertain permitting timelines remains unchanged.</p> <p><u>Focus On Automation As A Potential Solution</u></p> <p>The project explored automated plan checking (e.g., Archistar eCheck) as a way to reduce timelines, shifting the focus toward what is required to make this viable.</p> <p><u>Identification Of Key Barriers To Automation</u></p> <ul style="list-style-type: none"> -Inconsistent modelling practices and lack of standardized metadata (authoring gap) -Regulatory data owned by municipalities and not consistently structured -Variability in regulations across jurisdictions -Uneven adoption of BIM across industry -No shared Common Data Environment (CDE) or standardized language for regulatory data

SOLUTION SUMMARY.

Provide a high-level description of the core solution that was proposed in the original project proposal. Using the table provided, highlight any deviations from approved proposal.

Solution Summary (as per proposal)	Deviations from Original Proposal
<p>To encourage the private housing sector to adapt advanced digital tools (BIM) through a case study that demonstrates its process, benefits and ROI.</p> <p>Wide-spread adoption of BIM will enable the use of other advanced digital tools that increase housing delivery speed and lower costs, including digitally automated municipal processing and construction prefabrication.</p> <p>The proposal notes that without private industry adoption of BIM, many other advanced digital tools, including advanced digitally automated municipal processing, would not be possible.</p>	<p><u>Bim Adoption</u> Reframed value proposition theory for BIM adoption</p> <p>BIM adoption is currently limited by cost, particularly for smaller firms. However, automated plan checking requires BIM with structured data. Reductions in permitting timelines could shift incentives, with developers requiring BIM from consultants to accelerate approvals.</p> <p><u>Beyond Bim Adoption To Structured Data For Automation</u> BIM adoption alone is insufficient; models must be authored with machine-readable data to support automated review.</p> <p><u>Introduction Of A Digital Policy Library (DPL) Concept</u> Early-stage exploration of structuring municipal regulations into a consistent, machine-readable format.</p>

PROJECT OUTPUTS & OUTCOMES

PROJECT RESULTS.

Using the table provide, list the project results the project delivered, and outcomes realized. For the purposes of this report: Output refers to the direct deliverables or products produced by the project (e.g., digital code modules, APIs, dashboards, training sessions, products, solutions, reports) and Outcome refers to the immediate effects or results of those outputs on users, participants, or processes (e.g., increased adoption of a tool, improved skills, validated workflows).

Output	Outcomes
Analysis of permitting workflows and automation opportunities	Identified key bottlenecks and confirmed where automation could reduce timelines.
Structured breakdown of Vancouver regulations into rule sets	Demonstrated that regulatory requirements can be translated into testable, machine-readable logic.
Digital Policy Library (DPL) concept and sample rules	Established a potential framework for organizing regulatory data in a consistent format.
Prototype Revit families and schedules with embedded metadata	Validated how regulatory data can be embedded directly into BIM models for automated checking.
Joint integration of BIM model with Archistar eCheck workflow	Demonstrated automated rule checking on BIM data and clarified dependencies on model structure, metadata, and consistency.
Identification of BIM authoring requirements for automation	Defined the need for standardized modelling practices and metadata to support automated review.
Project report documenting findings and approach	Provided a foundation for future development and implementation.

PROJECT PILOTS & PROTOTYPES.

Using the table provided, list any pilots or prototypes that were launched. For each, summarize the outcomes achieved and highlight any lessons learned or adaptations made during delivery.

Pilot / Prototype	Outcomes	Lessons Learned / Key Findings
BIM Model Pilot – Structured Authoring for Automated Review	<ul style="list-style-type: none"> -Produced BIM models structured for rule-based checking -Enabled successful ingestion into automated plan checking -Identified gaps in model consistency, metadata, and authoring practices 	<ul style="list-style-type: none"> -BIM alone is insufficient; structured, consistent data is required -Model quality directly impacts automation reliability -Early-stage authoring decisions significantly affect downstream validation
BIM model integration with Archistar eCheck	<ul style="list-style-type: none"> -Demonstrated automated rule checking on a BIM model -Confirmed feasibility of BIM-based permitting review -Established clear dependencies between model structure and rule execution 	<ul style="list-style-type: none"> -Model consistency is critical for reliable results -Significant variation in modelling practices affects automation -Automated checks require clearly defined and measurable rules
Digital Policy Library (DPL) concept (sample rule structuring)	<ul style="list-style-type: none"> -Demonstrated that regulatory requirements can be translated into structured, machine-readable rules -Established a basis for linking regulations to model data 	<ul style="list-style-type: none"> -Regulatory data is fragmented and not standardized -Interpretation of rules varies and requires clear definitions -Municipal ownership of data adds complexity to implementation

Pilot / Prototype	Outcomes	Lessons Learned / Key Findings
Prototype Revit families and schedules for metadata extraction	<ul style="list-style-type: none"> -Tested how regulatory data can be embedded directly into BIM elements -Demonstrated potential for model-based validation inputs 	<ul style="list-style-type: none"> -Embedding metadata is feasible within existing tools -Requires consistent authoring practices across industry -Not all regulatory requirements are easily represented in model elements
Model Health Check & QA Pilot (with SolidCAD)	<ul style="list-style-type: none"> - Identified model performance, organization, and data quality issues -Improved model readiness for automated checking workflows -Established baseline for BIM quality requirements 	<ul style="list-style-type: none"> -Model "health" (warnings, duplication, naming, etc.) directly impacts automation -Poor practices (e.g., excessive lines, inconsistent parameters) break downstream use -QA/QC needs to be continuous, not a final step

MISSED OUTCOMES

Highlight any planned outcomes that the project did not achieve. For each, explain why the outcome was missed and describe any lessons learned or key findings that could inform future projects.

Planned Outcome	Reason Not Achieved	Lessons Learned / Adaptations
Comprehensive ROI Analysis Across the Housing Delivery Cycle and BIM Implementation	The project focused on workflow validation rather than full quantitative analysis across all stages of the housing delivery cycle	<ul style="list-style-type: none"> -ROI potential is evident, but requires controlled and consistent measurement methods -Establishing comparable benchmarks is necessary to validate time and cost impacts -The project established feasibility and clarified the conditions required to

Planned Outcome	Reason Not Achieved	Lessons Learned / Adaptations
		measure performance improvements, particularly around benchmarking, workflow alignment, and data consistency.
Validation of Downstream Construction Efficiencies (Prefabrication, Cost Certainty)	The study did not extend into construction phases or detailed cost analysis required to measure these impacts	<ul style="list-style-type: none"> -BIM-enabled data supports improved construction coordination and certainty -Quantifying these benefits requires integration with construction-stage data and processes
Formalized BIM Authoring Guidelines for Industry Use	Authoring approaches were explored through models and testing, but not formalized into a complete, publishable guideline	Early explorations (including DPL concepts) indicate a clear path toward standardized authoring frameworks
Digitized and Unambiguous Rule Framework for Automated Checking	Municipal regulations are not consistently structured or machine-readable, and often require interpretation rather than direct translation into rules	<ul style="list-style-type: none"> -The primary bottleneck is not BIM, but policy digitization and clarity -Rule definition must precede and align with model standardization

ALIGNMENT WITH PROVINCIAL ROADMAP.

Describe which provincial pillars your project addressed directly and how. For each pillar, indicate the outcomes achieved and how they were measured. If a pillar is not relevant to your project, enter N/A.

Pillar	Outcomes	Measurements
Digital Policy & Rules Lifecycle Management	<ul style="list-style-type: none"> -Translated select municipal regulations into machine-readable rules (with Archistar) -Established approach for structuring regulatory data for BIM workflows -Identified challenges in rule interpretation and standardization 	<ul style="list-style-type: none"> -Successful automated rule checks using Archistar eCheck -Validation of rule interpretation through coordination with Archistar -Observed complexity in regulatory data (variation, ongoing updates, and municipal ownership)
Local Government Capacity & Engagement <i>Highlight underserved or rural communities.</i>	<ul style="list-style-type: none"> - Demonstrated potential to reduce manual review workload through BIM-enabled automated checking -Identified opportunity for municipalities to shift from routine compliance checks to higher-value planning review -Highlighted potential for smaller or resource-constrained municipalities to improve review capacity 	<ul style="list-style-type: none"> -Successful testing of automated rule checks (Archistar eCheck) on BIM models -Observed reduction in manual, repetitive checks (e.g., counting, basic compliance validation) -Dependency on municipal willingness to structure and share regulatory data
Data Infrastructure & Interoperability	<ul style="list-style-type: none"> -Demonstrated exchange between BIM models and automated rule-checking systems (Archistar eCheck) -Identified need for structured, inconsistent metadata to enable interoperability Highlighted challenges in aligning model data with rule-based systems 	<ul style="list-style-type: none"> -Successful ingestion of BIM models into automated checking workflows, based on sample rules -Demonstrated interoperability between BIM models and Archistar eCheck, enabling rule-based compliance assessment outputs -Validation of rule execution against model data inputs using selected test cases
Governance & Inclusion	<ul style="list-style-type: none"> -Identified need for clear roles and responsibilities across BIM and automated checking workflows -Observed importance of coordination between model 	<ul style="list-style-type: none"> -Coordination between project partners during testing and validation

Pillar	Outcomes	Measurements
	authors, checking tools, and QA processes	
Trust & Certification	Defined roles across design, model development, and automated checking workflows Established need for clear responsibilities in how BIM data is created and used	Coordination between model authors, checking tools, and QA processes Observed dependency on clear roles for consistent results
Equity & Regional Support <i>Highlight steps taken to ensure solutions are accessible to small, rural, or Indigenous communities.</i>	-Demonstrated potential for automated plan checking to reduce resource requirements for permitting -Identified that this approach could serve as a tool for smaller or resource-constrained municipalities where plan checking exceeds available capacity	-Use of BIM + automated checking as a scalable approach -Observed potential to reduce manual workload and increase review efficiency

CHALLENGES AND LESSONS LEARNED.

What challenges or barriers did the project encounter in aligning with the provincial pillar, and what lessons were learned that could inform future efforts? If a pillar is not relevant to your project, enter N/A.

Pillar	Challenges	Lessons Learned
Digital Policy & Rules Lifecycle Management	<ul style="list-style-type: none"> -Municipal regulations are not structured or machine-readable Rules are complex, variable across municipalities, and frequently updated -Interpretation required to translate rules into testable logic 	<ul style="list-style-type: none"> -Policy digitization is a prerequisite for scalable automation -A structured approach (e.g., DPL concept) is needed before full implementation -Alignment between rule logic and model data is critical
Local Government Capacity & Engagement	<ul style="list-style-type: none"> -Limited direct engagement with municipalities to validate workflows in real conditions -Dependence on municipal willingness to structure and share regulatory data 	<ul style="list-style-type: none"> -Automation can reduce workload, but requires alignment with municipal processes -Adoption depends on clear incentives and accessible tools for varying capacity levels
Data Infrastructure & Interoperability	<ul style="list-style-type: none"> -Inconsistent BIM data and lack of standardized metadata limited reliable data exchange -Limited visibility into how model data is interpreted within automated checking workflows 	<ul style="list-style-type: none"> -Consistent data structure is critical for interoperability -Improved integration and feedback between model authoring and checking systems would strengthen workflows
Governance & Inclusion	<ul style="list-style-type: none"> -Lack of a common data environment (CDE) for sharing and accessing municipal rules and BIM data 	<ul style="list-style-type: none"> -Clear ownership of data creation and use is essential
Trust & Certification	<ul style="list-style-type: none"> -Limited ability to validate automated results against real municipal approval outcomes 	<ul style="list-style-type: none"> -Trust depends on clear alignment between model data, rules, and outputs
Equity & Regional Support	<ul style="list-style-type: none"> -Limited ability to test applicability in smaller or resource-constrained municipalities 	<ul style="list-style-type: none"> -Automated plan checking could help bridge capacity gaps, but depends on accessible tools and structured regulatory data

PROVINCIAL AND FEDERAL INITIATIVES.

Describe how the project and its outcomes are aligned to British Columbia's Provincial initiatives, and broader Federal housing initiatives. Highlight specific policies, programs, or strategies that your project supports, and explain the connections between your project's deliverables, outcomes, and these broader initiatives.

The project aligns with provincial and federal priorities to increase housing supply, reduce permitting timelines, and advance digital adoption in the housing sector. At the provincial level, it supports efforts to streamline approvals and modernize permitting processes. By demonstrating BIM-enabled automated plan checking, the project contributes to reducing delays and improving predictability. At the federal level, it aligns with initiatives focused on housing affordability, productivity, and innovation, supporting faster and more efficient housing delivery through digital tools. Overall, the project supports a shift toward data-driven and scalable approaches to housing delivery.

SCALING HOUSING PRODUCTION IN CANADA.

Outline how the project's outcomes will help scale housing production in Canada. Consider factors such as adoption by builders or municipalities, replication of solutions in other regions, improvements to delivery timelines, or contributions to increasing the availability of housing units.

The project demonstrates how BIM-enabled automated plan checking can reduce permitting timelines, a key bottleneck in housing delivery. By linking BIM models with rule-based checking systems, the approach creates a pathway for faster approvals, increased predictability, and reduced risk for developers. This can incentivize broader adoption of BIM across the industry. The approach is replicable across municipalities, as it is based on structuring regulatory data and model inputs rather than location-specific tools. If adopted, it could help scale housing production by accelerating approvals and improving coordination across the development process.

SECTOR ADOPTION.

Describe where the project's outcomes have been adopted, or are planned to be adopted, within industry. Include details such as the types of organizations or users adopting the solution, the scale of adoption, and any early results or benefits observed.

The project outcomes have not yet been formally adopted at scale, but demonstrate a clear pathway for adoption across the architecture, development, and municipal sectors. Potential adopters include architects and consultants using BIM, municipalities exploring automated review processes, and technology providers supporting digital permitting workflows. Early results show that BIM-enabled automated checking can support faster review processes and improve consistency, indicating strong potential for broader industry uptake where aligned standards and workflows are implemented.

SCALABILITY.

Describe how the outcomes of the project are being sustained beyond the funded period and how they could be scaled. Consider factors such as adoption by additional users or organizations, replication in other regions, integration into existing systems or workflows, and plans for long-term maintenance or expansion.

The project establishes a replicable approach for linking BIM models with automated plan checking, which can be applied across different municipalities and project types. Scalability depends on broader adoption of BIM with structured data, along with alignment between model authoring practices and regulatory requirements. The approach can integrate with existing design workflows and emerging digital review tools.

PROJECT CELEBRATIONS**ACHIEVEMENTS TO SHARE.**

Tell us about the key achievements or standout moments from your project that can be highlighted publicly by digital or other project partners. For each achievement, provide the following details: a brief summary of the achievement, explain the significance of this achievement and its impact on the project and stakeholders and include any relevant metrics, statistics that reinforce the achievement

First BIM-Based Automated Plan Checking Test (with Archistar)

Summary: Successfully tested BIM models within Archistar eCheck for automated rule-based compliance (sample rules)

Significance: Demonstrates that automated plan checking using BIM is feasible, moving beyond theory into practical application

Impact / Metrics: Successful rule execution and compliance outputs generated from BIM data

Identification of the "Authoring Gap" in BIM for Automation

Summary: Identified that BIM models must include structured, machine-readable data to support automated review

Significance: Defines a critical missing layer in current industry practice, shaping how BIM must evolve

Impact / Metrics: Observed dependency between model structure, metadata, and rule execution reliability

Early Development of a Digital Policy Library (DPL) Concept

Summary: Explored structuring municipal regulations into consistent, machine-readable formats

Significance: Provides a potential framework for standardizing regulatory data across municipalities

Impact / Metrics: Demonstrated ability to translate sample rules into testable logic

End-to-End Workflow Validation (BIM → Automated Check → Output)

Summary: Established a working workflow connecting BIM models to automated compliance outputs

Significance: Validates a pathway for reducing permitting timelines and improving predictability

Impact / Metrics: Successful model ingestion and rule-based output generation using test cases

10.5 AMA + U Milestone 4 Report:

PURPOSE

The purpose of this final report is to provide an overview of the last and final work period, followed by a comprehensive summary of the project's overall accomplishments and outcomes. The information provided in this report may be used by DIGITAL to create case studies for marketing and communications purposes and may be used by the Housing Growth Innovation (HGI) program for reporting to the B.C. Government. The first half of the report will follow the same format as previous work period reports. The second half will focus on the entire project, highlighting key outcomes and achievements.

PART A – FINAL WORK PERIOD

OVERVIEW

Project Name	Multi-Automated Review (Multi-AR)
Project Lead Organization	Arno Matis Architecture + Urbanism
Final Milestone Number	Milestone #4
Milestone Period	June 15th, 2026 – October 31st, 2026
Submission Date	October 31st, 2026

MILESTONE ACCOMPLISHMENTS

Staged Workplan Assessment

Key Milestone / Deliverable	Responsible Organization	Metrics / Acceptance Criteria	Complete (Yes/No)	Comments (If not on track, identify the core issue and corrective actions)
1.0 Live presentation Slideshow	Arno Matis Architecture + Urbanism Inc.	Develop a reusable slideshow for industry outreach, supported by research, testing and project examples.	Yes	
2.0 MultiAR Online Course	Arno Matis Architecture + Urbanism Inc.	Develop a free course of approximately four short modules, totaling about one hour, with a	Yes	

Key Milestone / Deliverable	Responsible Organization	Metrics / Acceptance Criteria	Complete (Yes/No)	Comments (If not on track, identify the core issue and corrective actions)
		quiz or knowledge check.		
3.0 Enhanced Multi-AR website	Arno Matis Architecture + Urbanism Inc.	Host course and presentation materials and provide links to supporting educational resources.	Yes	
4.0 Social media strategy	Arno Matis Architecture + Urbanism Inc.	Prepare promotional content for the website, presentation, course and speaking opportunities.	Yes	
5.0 Updated Case Study	Arno Matis Architecture + Urbanism Inc.	Update the case study to incorporate Phase 2 activities and supporting materials.	Yes	Removed draft wording; updated outreach activities and appended the Phase 2 final report, work plan and events, BIMbc slideshow, and course slides and script.
6.0 Final Milestone Report	Arno Matis Architecture + Urbanism Inc	Prepare and submit the Phase 2 final milestone report.	No	Narrative report submitted; financial portion to follow by the November 11 deadline.

CHANGES IN THE STAGED WORKPLAN

Outline any changes to the project plan from the last Milestone Report.

- Funds were redistributed from the proposed social media allocation to support additional development of the online course and video content. The social media approach was streamlined to focus on targeted post/s that direct audiences to the course and related project resources, supporting continued promotion of the work.
- The completion date for Phase 2 activities was extended from September 30 to October 31, 2026, to allow additional time to complete the course and remaining outreach activities. The extension did not change the project scope or overall budget.

PART B - OVERALL PROJECT ASSESSMENT

PROJECT SUMMARY

PROBLEM STATEMENT.

Briefly describe how the challenge identified in your original proposal manifested during the project. *Using the table provided, highlight any deviations from the approved proposal and explain how the context or key issues may have evolved during delivery.*

Problem Statement (as per proposal)	Deviations from Original Proposal
<p>Metro Vancouver is continuously struggling with an undersupply of housing. Vancouver, for example, is currently falling short of housing targets by up to 9,500 units per year 1,2. Falling short of these targets will create increasingly unaffordable housing.</p> <p>Further adding to this bottleneck, construction starts in Vancouver down 20% in 2024 likely due to:</p> <ul style="list-style-type: none"> - Permitting delays and uncertainty. - Prolonged Timelines (translating to additional financing cost). - Inflation and uncertain construction costing. <p>Lack of transparency and information sharing in the private sector escalates uncertainty.</p>	<p>Original Problem Remained Relevant</p> <p>The project continued to address lengthy and uncertain permitting timelines and their impact on housing delivery.</p> <p>Continued Learning Through Phase 2</p> <p>Preparing the course and conference materials helped refine the team's understanding of a connected digital permitting ecosystem. This reinforced the importance of a flexible approach that can start with selected rules, grow across jurisdictions and accommodate changing regulations and professional judgment.</p> <p>Building Shared Understanding</p> <p>Phase 2 addressed the need to communicate these ideas across the public and private sectors. The course, presentation and supporting resources were developed to build shared understanding of how the ecosystem's components could work together and support practical adoption.</p>

SOLUTION SUMMARY.

Provide a high-level description of the core solution that was proposed in the original project proposal. Using the table provided, highlight any deviations from approved proposal.

Solution Summary (as per proposal)	Deviations from Original Proposal
<p>To encourage the private housing sector to adapt advanced digital tools (BIM) through a case study that demonstrates its process, benefits and ROI.</p> <p>Wide-spread adoption of BIM will enable the use of other advanced digital tools that increase housing delivery speed and lower costs, including digitally automated municipal processing and construction prefabrication.</p> <p>The proposal notes that without private industry adoption of BIM, many other advanced digital tools, including advanced digitally automated municipal processing, would not be possible.</p>	<p><u>Expanded Focus on Industry Adoption</u></p> <p>The original solution focused on demonstrating the benefits of BIM and digital tools through a case study. Phase 2 built on that work by translating the project's findings into accessible resources for industry.</p> <p><u>Online Course and Presentation</u></p> <p>A free online course and reusable presentation were developed to explain BIM-based review, digital policy and the components of a digital permitting ecosystem.</p> <p><u>Website and Promotion</u></p> <p>The Multi-AR website was enhanced to bring the course and supporting resources together. Promotional materials were prepared to direct audiences to these resources and support continued awareness of the project.</p>

PROJECT OUTPUTS & OUTCOMES

PROJECT RESULTS.

Using the table provide, list the project results the project delivered, and outcomes realized. For the purposes of this report: Output refers to the direct deliverables or products produced by the project (e.g., digital code modules, APIs, dashboards, training sessions, products, solutions, reports) and Outcome refers to the immediate effects or results of those outputs on users, participants, or processes (e.g., increased adoption of a tool, improved skills, validated workflows).

Output	Outcomes
Core output: Four-module online course	Developed a free educational resource translating the project's findings into video lessons, practical BIM examples and a completion quiz. The course is available on the website, with public promotion forthcoming; participation results are not yet available. AIBC review for potential learning-credit eligibility is underway.
Supporting course content and presentation materials	Developed additional BIM and DPL examples to demonstrate the concepts in practice, alongside a reusable slideshow presentation for industry outreach. Substantially refined the project's graphics, diagrams and visual demonstrations to make complex BIM and digital permitting concepts clearer and more accessible across the course, conference presentations and website resources.
Course delivery through the Multi-AR website	Established a central location for the course and supporting resources, including video hosting, a completion quiz and attendance tracking.
Conference outreach	Shared the project's findings at the MISA BC event in Kelowna on September 22, 2026, with approximately 50 session attendees (Third-party listings estimate 301–500 delegates, or around 500 people, for the full conference. These are estimates, not confirmed turnout), and the BIM BC Summit on October 26, 2026, with approximately 100 attendees. Audience figures are team estimates.
Promotion and continued outreach	Prepared initial social media content to direct audiences to the course and supporting resources. Further outreach is planned through HGI Open House to Open Doors event on November 13, 2026, and BUILDDEX Vancouver on February 10/11 2027, extending opportunities to share the project beyond the reporting period.

PROJECT PILOTS & PROTOTYPES.

Using the table provided, list any pilots or prototypes that were launched. For each, summarize the outcomes achieved and highlight any lessons learned or adaptations made during delivery.

Pilot / Prototype	Outcomes	Lessons Learned / Key Findings
Pilot online course for BIM-based digital permitting education	Developed an initial four-module course combining video lessons, practical BIM/DPL demonstrations and a completion quiz. Established website delivery and attendance tracking. The course provides a reusable format for sharing the project's findings, with learner participation and feedback to be assessed following public promotion.	Translating the research into course content helped refine the explanation of the digital permitting ecosystem. Practical examples connected technical concepts to familiar design and review tasks. The modular format provides a basis for future updates as rules, tools and industry practices evolve.
Interactive zoning DPL prototypes	Developed working BIM components that respond to user inputs through calculations and adjustable geometry. The height prototype calculates the base-surface elevation at a selected check location from entered site grades, then calculates building height using the entered building-top elevation. Changing the inputs updates the calculated results and associated geometry within BIM. Setback and tower-separation components represent adjustable spatial requirements, while interference checking identifies potential conflicts with building elements. These working examples were incorporated into the course.	DPL components can function as interactive calculation tools within the design model, helping users explore requirements and receive immediate feedback as inputs change. Their usefulness depends on clear inputs, measurement assumptions and rule references. Calculated results and detected conflicts support professional review, including consideration of exemptions and interpretation.

MISSED OUTCOMES

Highlight any planned outcomes that the project did not achieve. For each, explain why the outcome was missed and describe any lessons learned or key findings that could inform future projects.

Planned Outcome	Reason Not Achieved	Lessons Learned / Adaptations
AIBC learning-credit eligibility	Review pending at reporting date.	Accreditation request completed, Course and quiz completed; confirmation to follow.
Further DPL expansion (future opportunity)	Phase 2 focused on completing the course and outreach resources.	The interactive zoning examples showed how much value a single DPL component can offer when it combines clear inputs, calculations and visual feedback. This reinforced the potential to grow the library incrementally, with each new component adding a practical capability.

ALIGNMENT WITH PROVINCIAL ROADMAP.

Describe which provincial pillars your project addressed directly and how. For each pillar, indicate the outcomes achieved and how they were measured. If a pillar is not relevant to your project, enter N/A.

Pillar	Outcomes	Measurements
Digital Policy & Rules Lifecycle Management	Demonstrated how regulations can be represented through BIM-based DPL components, including interactive calculations and visual checks. Improved graphics and explanations made these concepts easier to communicate through the course.	Course content and working zoning examples covering setbacks, building height and tower separation.
Local Government Capacity & Engagement <i>Highlight underserved or rural communities.</i>	Shared findings with municipal technology professionals and created a free educational resource available to local government staff.	Presented at the MISA BC conference and the BIM BC Summit, reaching municipal technology professionals and the broader BIM industry. Four-module course completed; learner participation not yet measured.
Data Infrastructure & Interoperability	Explained how structured building information, regulatory data and review tools could communicate within a connected digital permitting ecosystem.	Course lessons, workflow diagrams and practical BIM/DPL demonstrations developed.
Governance & Inclusion	Supported cross-sector dialogue on a shared digital permitting approach.	Presentations at MISA BC and BIM BC, reaching municipal, provincial housing and industry audiences.
Trust & Certification	Demonstrated how clear inputs, calculation assumptions and rule references can support transparent, traceable review while retaining professional judgment.	Rule references and labelled inputs incorporated into DPL examples and course demonstrations. No formal certification framework
Equity & Regional Support <i>Highlight steps taken to ensure solutions are accessible to small, rural, or Indigenous communities.</i>	Developed a free online course to make the project's findings accessible beyond in-person events, supported by clearer visual materials and explanations.	Four modules available online. Reach among small, rural or Indigenous communities has not yet been measured.

CHALLENGES AND LESSONS LEARNED.

What challenges or barriers did the project encounter in aligning with the provincial pillar, and what lessons were learned that could inform future efforts? If a pillar is not relevant to your project, enter N/A.

Pillar	Challenges	Lessons Learned
Digital Policy & Rules Lifecycle Management	Rules vary by jurisdiction, change over time and may require interpretation.	Developing interactive examples reinforced the value of a flexible library that can start small and continually grow.
Local Government Capacity & Engagement	Audiences have different levels of familiarity with BIM and digital review. Making the research relevant to audiences with different backgrounds.	Practical demonstrations helped turn interest in the permitting problem into discussion about possible approaches.
Data Infrastructure & Interoperability	Making the relationships between regulatory data, BIM and review software understandable.	Developing the course helped clarify how the individual components fit within a connected ecosystem.
Governance & Inclusion	Bringing different sectors together around the permitting challenge	Cross-sector outreach provides opportunities to exchange perspectives and identify common needs. Conference discussions revealed strong interest in digital permitting and a desire for people to help coordinate progress.
Trust & Certification	Explaining what the demonstrated tools can calculate and what requires professional review.	Working examples helped make the capabilities, assumptions and limits of automated checks more tangible.
Equity & Regional Support	Sharing the work beyond in-person events.	Packaging the findings into a free, reusable course created an opportunity for broader access beyond conference audiences.

PROVINCIAL AND FEDERAL INITIATIVES.

Describe how the project and its outcomes are aligned to British Columbia's Provincial initiatives, and broader Federal housing initiatives. Highlight specific policies, programs, or strategies that your project supports, and explain the connections between your project's deliverables, outcomes, and these broader initiatives.

Provincial Alignment

Phase 2 aligns with B.C.'s Homes for People and Housing Growth Innovation objectives by sharing research into how BIM and digital permitting could support future improvements to housing approvals. The course and outreach resources build understanding of the proposed approach and the further development needed.

Federal Alignment

The work aligns with federal Global Innovation Clusters objectives through research, knowledge sharing and digital skills development. It introduces housing-sector professionals to emerging approaches, without claiming a fully implemented permitting system or demonstrated reductions in approval timelines.

SCALING HOUSING PRODUCTION IN CANADA.

Outline how the project's outcomes will help scale housing production in Canada. Consider factors such as adoption by builders or municipalities, replication of solutions in other regions, improvements to delivery timelines, or contributions to increasing the availability of housing units.

Phase 2 created a foundation for broader understanding and future adoption of BIM-based digital permitting through a free, reusable course, practical demonstrations and industry outreach. These resources can be shared across Canada to help designers, builders and municipalities explore the approach and the steps needed for implementation.

The proposed framework can start with selected rules and expand to additional requirements and jurisdictions. With further development and adoption, it could support more efficient review processes and help address permitting barriers to housing delivery. The project's contribution at this stage is research, demonstration and education; impacts on approval timelines and housing production have not yet been measured.

SECTOR ADOPTION.

Describe where the project's outcomes have been adopted, or are planned to be adopted, within industry. Include details such as the types of organizations or users adopting the solution, the scale of adoption, and any early results or benefits observed.

Phase 2 has established resources to support future adoption by design professionals, municipalities and technology providers. Industry outreach has generated interest, while course participation and external implementation remain to be assessed following public promotion.

SCALABILITY.

Describe how the outcomes of the project are being sustained beyond the funded period and how they could be scaled. Consider factors such as adoption by additional users or organizations, replication in other regions, integration into existing systems or workflows, and plans for long-term maintenance or expansion.

The course and supporting resources will remain available through the Multi-AR website, with further outreach planned beyond the funded period. The modular approach provides a foundation for future expansion to additional rules, jurisdictions and project types, subject to further development and collaboration.

PROJECT CELEBRATIONS**ACHIEVEMENTS TO SHARE.**

Tell us about the key achievements or standout moments from your project that can be highlighted publicly by digital or other project partners. For each achievement, provide the following details: a brief summary of the achievement, explain the significance of this achievement and its impact on the project and stakeholders and include any relevant metrics, statistics that reinforce the achievement.

Turning Research into Accessible Learning

Completed a free, four-module online course with video lessons, practical demonstrations and a completion quiz. The course translates complex research into a reusable resource for understanding a digital permitting ecosystem.

Interactive Zoning Tools Within BIM

Developed zoning prototypes that respond to project inputs through calculations and visual feedback—including a building-height calculation. These examples demonstrate how digital policy components could actively support design and review.

Sharing the Work Across Sectors

Presented at MISA BC and the BIM BC Summit, reaching approximately 150 attendees combined (team estimates). Discussions

10.6 Archistar Milestone 1 Report (August 31st 2025):

1. EXECUTIVE SUMMARY

Archistar has successfully completed the 50% milestone of Phase 1 (Design to Permit Automation). This stage included automation development for zoning, parking/loading, bicycle parking, and housing policy checks. Given the complexity of the project, the remaining 50% will be delivered in line with Milestone / Phase 2 for the end of January 2026.

2. PROJECT CONTEXT

- Address: 427 E Hastings St., Vancouver (DTES - Sub Area 1)
- Reference Policy: DTES Policy Plan
- Automation Inputs:
- Development Permit checklist (drawing list requirements)
- Vancouver Bulletin requirements (quantifiable guidelines)
- Vancouver Department requirements (structured rules by department)

3. PHASE 1 DELIVERABLES (50% COMPLETION)

-  Digitised zoning codes (partial)
-  Full BIM plugin development completed
-  Full web visualisation development completed
-  Initial parameter checks live for:
- Building height compliance
- Parking and loading counts
- Bicycle parking compliance
- Passenger stall counts
- Housing unit counts, mixes, and minimum sizes

4. KPI OUTCOMES

- Urban Design: Height compliance integrated
- Engineering: Parking, loading, and bicycle parking automation checks
- Housing Policy: Unit counts and family housing compliance integrated
- Total Phase 1 Checks Delivered: 13

5. RESULTS

Here is the interface for the results. There main UI/UX elements are:

- The summary / results panel on the left
- The interactive drawing on the main canvas
- The list of drawing view thumbnails that allow you to switch between drawings

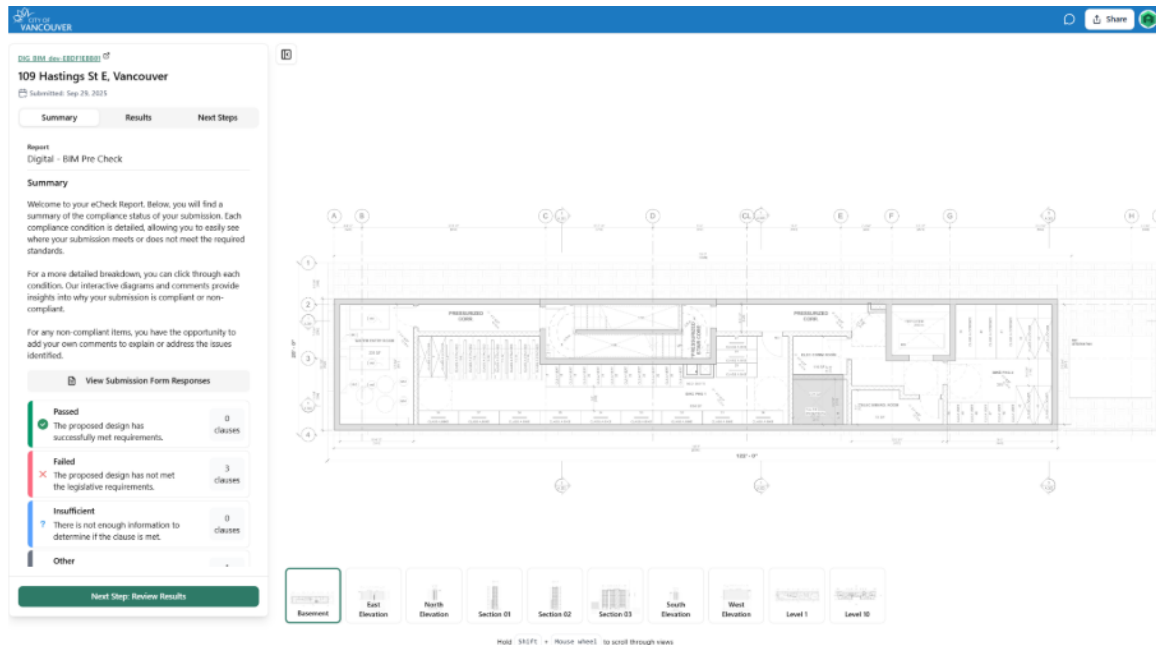


Image. Main Interface

Each view matches the style of the drawing automatically extracted from the BIM model. This allows the Architect to maintain their drawing style and maintain all their standard elements and visual graphics with the analysis.

All drawing views are captured - for example every floor plan is available - not just the 'typical floor plan'. Below you will see Level 1, Level 6 and Level 4 highlighted.

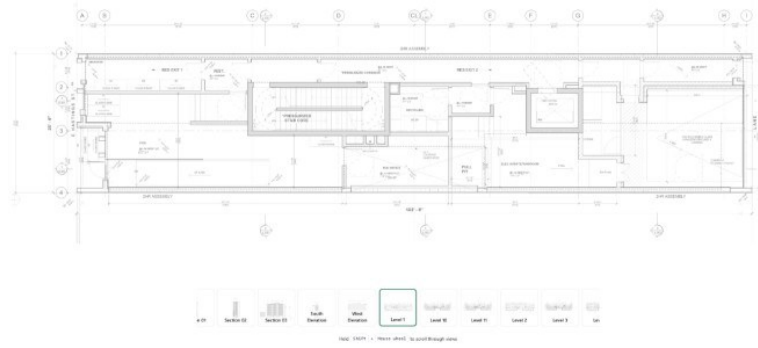


Image. Level 1

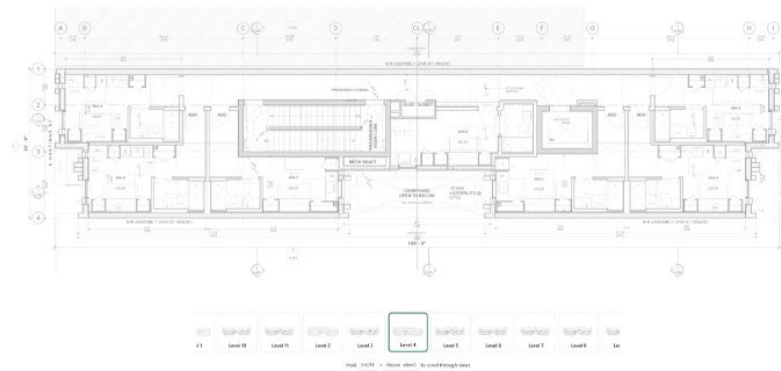


Image. Level 4

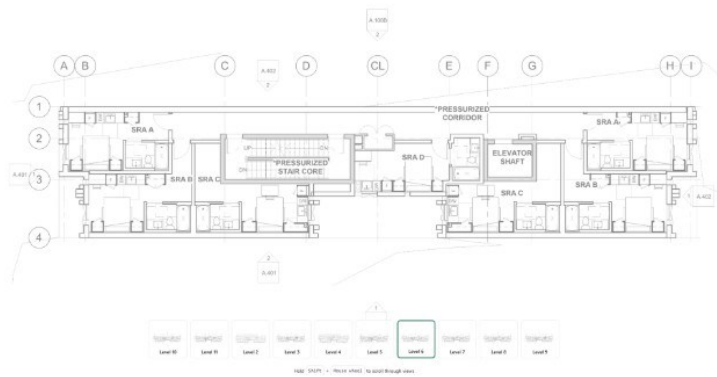


Image. Level 6

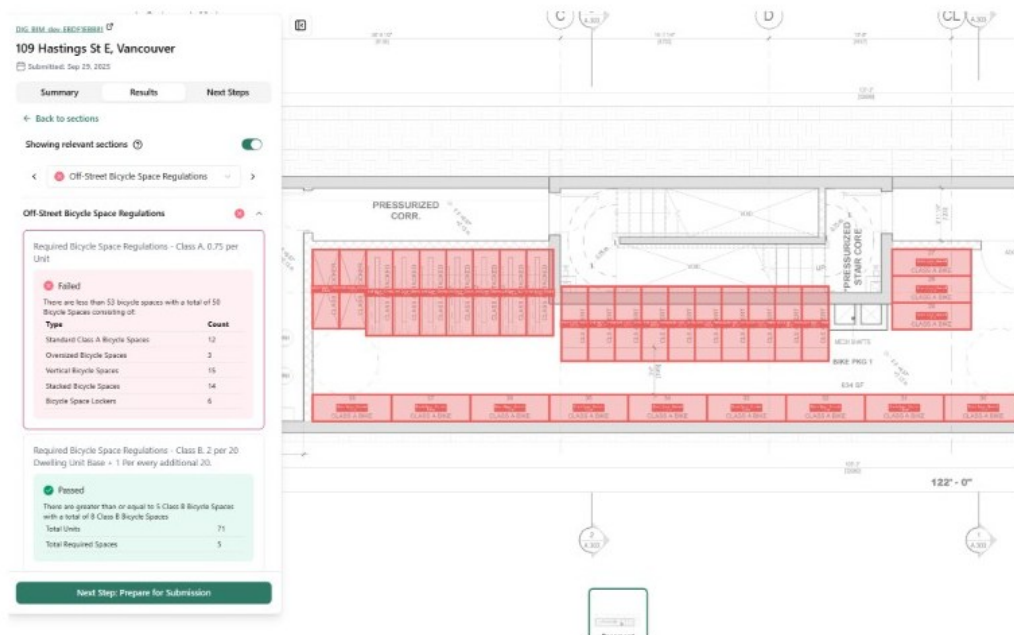
There is a summary breakdown of the rules that are automatically assessed with ticks and crosses to demonstrate compliance or non-compliance.



Each check can be drilled down into individual clause assessments. This one below shows the minimum unit size. For each detailed assessment, you will see the relevant elements highlighted on the drawings as well as a summary of the compliance on the left.



The counts from the number of units are connected to the calculations for minimum requirements for Bicycle Spacing.



The platform categorises the bicycle spaces by type and counts them individually outputting the results in a table. Different clauses check different elements - for example this second clause checks 'Class B' spaces.

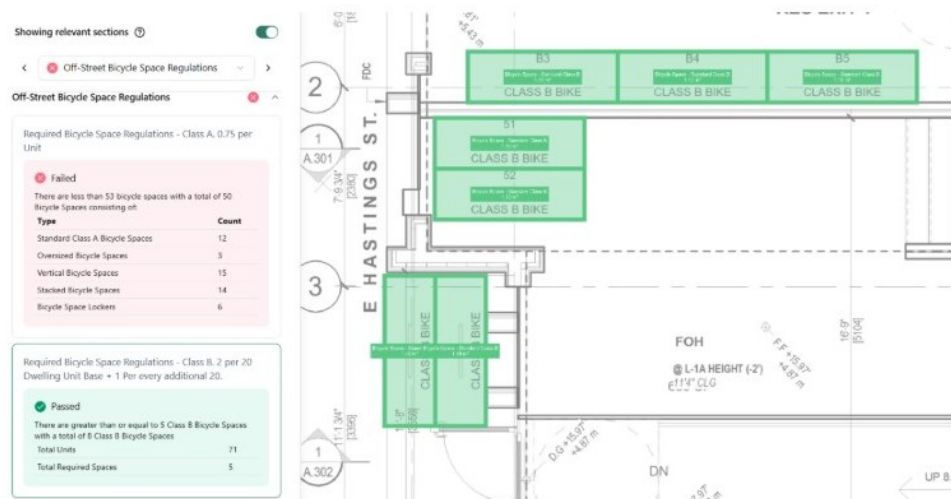
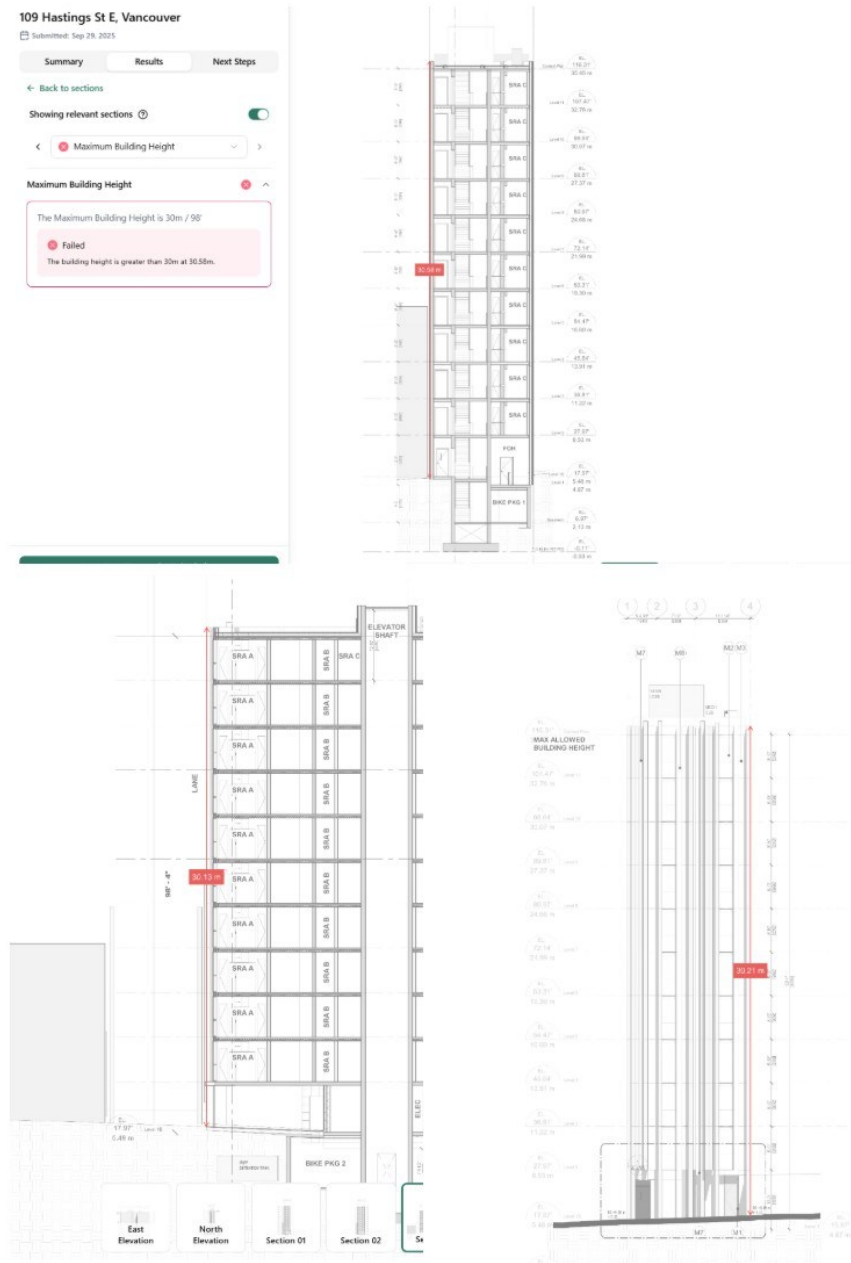


Image. Class B Spaces on Level 1

The maximum building height is checked across multiple drawings.



The main emphasis of this phase was on developing and testing the BIM plugin to ensure that the right elements could be extracted from architectural models and linked with the digitised planning and policy rules.

- Primary Goal: Establish the data flow pipeline between the BIM model and the digitised zoning codes.
- Outcome: The system successfully demonstrated that key building elements (such as units, doors, parking spaces, and bicycle facilities) can be:
 - Automatically detected from the BIM model
 - Correctly linked to digital code criteria
 - Displayed interactively in the interface for instant feedback and review

It is important to note that this milestone was focused on data flow and integration, not full validation:

- The results have not yet undergone UAT testing for compliance against actual City of Vancouver regulations.
- The digital rules criteria still require validation and confirmation with stakeholders to ensure accuracy.

This 50% milestone confirms the proof of concept: the technology can extract and connect BIM data to digital rules, paving the way for more robust compliance checking.

NEXT PHASE – UAT TESTING

- Phase 2 and final Phase 1 milestones will focus on UAT testing of actual criteria and outputs.
- Testing will be expanded across different projects to ensure that results are consistent, reliable, and representative of diverse development types.
- Validation will confirm that the extracted data not only flows correctly but also meets policy and regulatory standards.

6. FINDINGS AND LEARNINGS

During Phase 1, several important findings and learnings emerged which will directly shape improvements for Phase 2 and beyond.

1. BIM MODELS VS STANDARD DRAWING SETS

Architectural drawing sets submitted to the City typically include only the “Standard” floor plan. This means City staff often need to either perform their own analysis or rely on manually prepared table summaries. By analysing directly from the BIM model, the system can automatically assess units across all floors, producing complete and reliable compliance outputs.

2. IMPORTANCE OF LINKED ELEMENTS AND CALCULATIONS

Ensuring that all relevant elements are captured is critical, because calculations are interdependent. For example, the required bicycle parking ratio depends on the number and type of units. If every unit is not properly recognised by the system, the results risk being incomplete or inaccurate.

3. CONSISTENCY OF FLOOR PLAN VIEWS

Because architects usually present only one “typical floor plan” for documentation, other floor plans may not be formatted to the same standard. It is recommended that the same view template style used for PDF documentation is applied consistently to all floor plan views. Using scope boxes and controlled annotations will ensure that the extracted views remain clean, uniform, and analysis-ready.

4. NEED FOR A DEFINED VISUAL STYLE TEMPLATE

Every view intended for automated analysis should be governed by a defined visual style template. This ensures that only relevant elements are displayed and guarantees consistency across drawings, facilitating automated extraction and analysis.

5. COMPLEX ELEMENTS NOT EASILY EXTRACTABLE

Certain parameters, such as building height, cannot be easily captured through standard Revit elements. Height requires combining ground spot RL points with Revit ‘Levels’ to determine the true building height. To accommodate parapets and lift core overruns, multiple levels may be required. Alternatively, the Archistar plugin can insert direct building height measurements for analysis and display.

6. IMPORTANCE OF FAMILY AND INSTANCE NAMING

Clear and consistent naming of Revit families and instances is vital for bulk tagging and analysis. For example, bicycle parking is divided into several types. By ensuring that family instances are properly named and classified, the system can automatically distinguish between different bicycle parking categories and apply the correct compliance checks.

7. LIMITATIONS OF A SINGLE UNIT TYPE PROJECT

The pilot project in Phase 1 involved a single unit type development. While valuable, this limited testing of family housing policy compliance. In Phase 2, projects with multiple unit types will be included to allow for robust testing of unit mix ratio policies.

10.7 Archistar Milestone 2 Report (December 18, 2025):

EXECUTIVE SUMMARY

Over the last 3 months, the work has shifted from proving the concept to hardening it for real project use. Phase 1 demonstrated an end to end workflow between the Revit model and the digitised criteria, and confirmed we can capture key building information and present it in a reviewable format.

Phase 2 is focused on making that experience reliable, explainable, and repeatable across projects, so it performs consistently under real delivery conditions rather than only in a single pilot file.

In practice, this period has been about strengthening the foundations. The most time has gone into aligning definitions, stabilising the data flow end to end, ensuring predictable behaviour across views and levels, and tightening the relationship between how the model is authored and how the compliance logic needs to interpret it. The outcome is a clearer capture approach, fewer ambiguous results, and a set of concrete improvements already embedded into the workflow.

PHASE 1 RECAP AND WHAT WE SET OUT TO ACHIEVE

Phase 1 was the proof of concept stage. The aim was to establish the pipeline between BIM content and digitised requirements, and to demonstrate that key elements can be detected, measured, and represented in a way that supports design review and discussion.

Phase 1 was intentionally not full validation. It was about proving the mechanics, identifying where model conventions matter, and creating a practical baseline for Phase 2 work around reliability and trust.

PHASE 2 INTENT AND WHAT “SUCCESS” LOOKS LIKE

Phase 2 is where the pilot transitions from a workable demonstration into a dependable workflow. The focus is:

- Consistency: stable outputs between captures and between revisions
- Confidence: results that can be reviewed, discussed, and defended
- Repeatability: the approach holds across different projects and modelling styles
- Traceability: clear visibility into what was captured, what was inferred, and why a result was produced
- Practical workflow: predictable authoring and capture expectations, with minimal manual rescue steps

CHALLENGES OVER THE LAST 3 MONTHS

1) DEFINITION ALIGNMENT ACROSS THE WORKFLOW

A recurring challenge has been keeping definitions aligned across the plugin, certificate configuration, and portal interpretation. When definitions shift or are inconsistent, results can appear missing or behave unpredictably. This creates unnecessary churn because the symptoms often look like extraction failures when the root cause is configuration mismatch.

Typical symptoms included captures present in the exported data but not visible in the portal as expected, or categories not appearing in the plugin even though they existed in the underlying configuration.

2) THE REALITY GAP BETWEEN DESIGN MODELLING AND AUTOMATED INTERPRETATION

Revit models are authored for design, documentation, coordination, and delivery. Automated interpretation assumes consistency in categorisation, naming, and placement that is not always prioritised in day to day modelling. Small authoring choices can have a disproportionate impact on automated classification and reporting.

In practice this showed up as elements that a reviewer would interpret one way being authored in a way that the system interpreted differently, and in a few cases, modelling inconsistencies presenting as “application issues.”

3) LEVELS, VIEWS, AND CONTEXT AFFECTING RELIABILITY

A major reliability theme has been how building information is represented through levels, views, templates, and view ranges. Reviewers understand this context intuitively, but automation needs deterministic rules to avoid ambiguity, duplication, or exclusion.

This surfaced as missing levels in some captures, mismatches between capture content and portal presentation, and duplication risk where multiple views could cause instances or rooms to be included more than once unless constrained.

4) COUNTS THAT ARE CORRECT BUT COUNTERINTUITIVE

Counting becomes more complex when an object represents multiple capacity units, or when a requirement is expressed as a rule of thumb rather than a one to one element count. Even correct outcomes can be challenged if the output does not make the logic visible.

This became especially apparent where the model representation and the regulatory intent diverge, and the system needs to translate “what is modelled” into “what is permitted or required.”

5) REQUIREMENTS THAT DO NOT MAP CLEANLY TO STANDARD REVIT OBJECTS

Some requirements are derived, composite, or require interpretation. These are the areas where a hybrid approach is often more robust: use direct extraction where possible, and apply a controlled capture method where the model does not provide an unambiguous object to read from.

This was particularly relevant for certain measurements, where a practical capture method was more reliable than relying on indirect model structure.

LEARNINGS FROM THE LAST 3 MONTHS

1) RELIABILITY IS DRIVEN BY STANDARDS AND REPEATABLE CONVENTIONS

The more a workflow depends on implicit knowledge, the less dependable it becomes under delivery pressure. Establishing a minimal set of modelling and view conventions has proven to be one of the biggest levers for improving consistency and reducing rework.

2) A CLEAR BASELINE MODEL EXPECTATION IS ESSENTIAL

Automation needs a minimum set of required inputs. When certain metadata, view setups, or conventions are missing, the right response is to surface it clearly and provide guidance, rather than attempting to infer and risking silent errors.

3) EXPLAINABILITY IS AS IMPORTANT AS CORRECTNESS

Architectural review is interpretive. Even when outputs are correct, they need to be presented in a way that supports scrutiny. Results that clearly show what was captured, how it was classified, and how the result was derived are far more likely to be trusted and adopted.

4) VALIDATION MUST EXTEND BEYOND THE PILOT FILE

Phase 1 was constrained by the pilot design's specific characteristics. Introducing a second project design earlier provides better coverage for variability, and helps identify assumptions sooner, particularly for parking and other high variability domains.

5) A CONTROLLED CAPTURE METHOD IS A VALID APPROACH WHERE AMBIGUITY EXISTS

For parameters that cannot be reliably inferred from the model alone, a controlled, traceable capture method is not a compromise. It is an appropriate strategy when it is consistent, visible, and auditable, especially in early stages of automation.

TECHNICAL EXAMPLES: CHALLENGES, LEARNINGS, AND HOW WE ADDRESSED THEM

EXAMPLE A: CAPTURED ITEMS PRESENT IN EXPORTED DATA BUT NOT VISIBLE IN THE PORTAL

CHALLENGE

We encountered cases where a capture workflow appeared to complete successfully in Revit and the exported data contained the captured values, but the portal did not render those captures as expected in the assessment view. From an architectural perspective, this felt like “the capture didn’t work,” even though the underlying file suggested it had.

LEARNING

In a pipeline like this, visibility is a separate problem from extraction. If certificate definitions, category mappings, or configuration versions are not aligned end to end, the portal may not recognise or display a captured item even when it exists. This creates a reliability issue because the same user action can appear to succeed or fail depending on configuration state.

HOW WE ADDRESSED IT

We treated certificate configuration and category mapping as a controlled dependency rather than a background assumption. The remediation path became: confirm the capture exists in the export, validate the category is defined and enabled, then confirm the portal is interpreting the same definition set. Once aligned, the portal began rendering the captured items consistently and reduced the “invisible results” problem.

WHAT THIS MEANS FOR ARNO MATIS

Fewer “ghost” results and less time troubleshooting whether something was captured. When a capture is made, you can expect it to appear predictably in the portal, and when it does not, the root cause is faster to isolate.

EXAMPLE B: BICYCLE PARKING TYPES INITIALLY TREATED AS A SINGLE GROUP

CHALLENGE

Bicycle parking was a stress test because different bicycle provisions often have different requirements, but the model content can be authored in a way that collapses distinctions.

Early capture behaviour grouped bicycle parking too broadly (for example, treating multiple types as one family), which made the assessment less meaningful because the rule intent depends on type.

LEARNING

Automated assessment needs semantic categories that match regulatory intent, not just modelling organisation. A single “bicycle parking” bucket is rarely sufficient. If the model stores distinct provisions as different symbols or types, the extraction needs to preserve that structure so that the compliance logic can apply the right thresholds or calculations.

HOW WE ADDRESSED IT

We refined the approach to capture and classification so it could differentiate at a more granular level (symbol or type level, rather than only family level). This allowed each bicycle parking provision to be represented as its own category in outputs, enabling clearer review and reducing manual interpretation. In parallel, this highlighted the value of authoring guidance so the model consistently distinguishes these types in ways the workflow can read.

WHAT THIS MEANS FOR ARNO MATIS

Assessments will better reflect how the City actually interprets bike parking, and reviews become more straightforward because each provision type is visible and explainable, rather than being lumped into one number that needs manual unpacking.

EXAMPLE C: “DOUBLE COUNTING” THAT REFLECTED CORRECT CAPACITY LOGIC

CHALLENGE

Some results initially appeared to be over-counted in review. A common instance was stacked bicycle parking, where the model may represent one stacked unit as a single object, but the real capacity is two bicycles. Without context, the reported count looked doubled, which naturally triggered concern.

LEARNING

Correctness alone is not enough. Where capacity logic diverges from one-to-one object counting, the output needs to make the rule interpretation explicit. Otherwise, reviewers will reasonably assume the system has duplicated elements. This is especially important for anything where the design object is a proxy for capacity.

HOW WE ADDRESSED IT

We clarified the counting logic to ensure it matched the intended capacity interpretation, and we focused on making the result easier to read and defend. Practically, this means expressing counts in terms of capacity where relevant (or clearly stating the conversion being applied), so the output reads like an assessment rather than a raw object tally. This reduces unnecessary rework cycles caused by “correct but confusing” results.

WHAT THIS MEANS FOR ARNO MATIS

Less time spent debating whether results are “wrong,” and more time spent making design decisions. Outputs become easier to defend because the capacity logic is explicit, not implied.

EXAMPLE D: LEVEL AND VIEW MAPPING CREATING DUPLICATION AND OMISSION RISK

CHALLENGE

We saw that the same physical information could be exposed differently depending on view setup, view range, and how views relate to levels. Automation can accidentally include the same rooms or instances multiple times if multiple views overlap the same content, or exclude content if a view range is not aligned to the intended level.

LEARNING

Views are not neutral containers. They are filters and contexts. For deterministic extraction, the workflow needs predictable view conventions: how levels are defined, what “belongs” to a level, and how view ranges and templates are set so the same element is not captured twice or dropped.

HOW WE ADDRESSED IT

We tightened expectations around view-to-level association and view range, treating these as part of the baseline model requirements for automation. The operating principle became: use level-scoped views that isolate content to the associated level, and avoid overlapping scopes that create duplication risk. This reduces ambiguity and gives the extraction process a stable frame of reference.

WHAT THIS MEANS FOR ARNO MATIS

More reliable level-by-level reporting with fewer surprises, and clearer modelling expectations upfront.

When view conventions are consistent, the assessment becomes repeatable across revisions and across projects.

EXAMPLE E: BUILDING HEIGHT CAPTURE AND CATEGORY VISIBILITY

CHALLENGE

Building height is a good example of a requirement that often needs interpretation. Depending on the project, the “height” a reviewer cares about may not be represented by a single, reliable object in the model. Additionally, we encountered situations where a measurement category existed in the configuration but was not visible in the plugin UI, making it impossible to capture in a way that felt natural to the user.

LEARNING

Two things matter here: a reliable capture method and a usable workflow. A perfectly valid data structure is not helpful if the user cannot see the category or if the capture method requires too many assumptions. For adoption, height capture needs to be straightforward, visible, and consistent.

HOW WE ADDRESSED IT

We enabled category visibility so the user experience matched what was supported in configuration, and we adopted a practical line-based height capture method as the current robust approach. This allows a reviewer to explicitly define the measurement intent (for example, from ground to roof datum) rather than relying on inferred geometry. It also improves traceability because the captured element itself becomes the evidence of how the measurement was taken.

WHAT THIS MEANS FOR ARNO MATIS

Height compliance becomes easier to evidence and explain, because the measurement intent is captured explicitly and is reviewable. It also reduces back-and-forth on “which height did we mean” during stakeholder review.

EXAMPLE F: MODELLING INCONSISTENCY PRESENTING AS AN APPLICATION ERROR

CHALLENGE

We encountered a case where a room assignment or placement issue in the model (such as a room assigned to a service duct or an unexpected spatial assignment) created an error condition downstream. From the outside, this looked like a software defect, but the root cause was authoring inconsistency.

LEARNING

Automated assessment is a fast way to surface modelling QA issues. That is not a negative, it is a feature, but it needs to be handled carefully so that errors are attributed correctly and the fix path is clear. If model QA issues are indistinguishable from system errors, confidence can degrade quickly.

HOW WE ADDRESSED IT

We treated this as a model QA feedback loop rather than a platform failure. The key outcome was reinforcing baseline expectations for models intended to be assessed, and improving how we interpret and respond to these situations in the workflow. Over time, this becomes part of the authoring guidance, so design teams know the modelling patterns that support reliable assessment outcomes.

WHAT THIS MEANS FOR ARNO MATIS

Faster identification of modelling issues that might otherwise surface later in documentation or coordination. It also clarifies the boundary between model QA fixes and platform fixes, which reduces uncertainty and rework.

NEXT STEPS

- 1. Continue hardening the pipeline so captures reliably appear in the portal with consistent interpretation and minimal edge case behaviour
- 2. Formalise a short set of modelling and view standards so extraction has a stable baseline
- 3. Bring a second project design into validation earlier to test variability and reduce pilot specific assumptions
- 4. Improve explainability in outputs, particularly where capacity logic or derived metrics can appear non obvious
- 5. Maintain a controlled, traceable approach for parameters that are not reliably inferable from model objects alone

CLOSING SUMMARY

Phase 2 progress over the last 3 months has been focused on turning the proven mechanics from

Phase 1 into a dependable workflow that supports architectural review.

The key gains have come from tighter definition alignment, clearer model and view conventions, stronger traceability between capture and reported result, and more deliberate handling of cases where regulatory intent does not map neatly to standard model objects.

These learnings have already reduced ambiguity and rework, and they set the foundation for broader validation across multiple designs.

10.8 Archistar Milestone 3 Report (January 30, 2026):

(MID-MULTI - ADVANCING MID-SCALE MULTI-UNIT HOUSING USING BIM & DIGITAL AUTOMATION)

1 EXECUTIVE SUMMARY

With the workflow now stabilized and the key constraints understood, the focus has been to progress clause by clause through the City of Vancouver zoning and related requirements and apply them directly against real multifamily project models

This final phase marks a shift from building the foundations to applying the system at scale.

In Phase 1, the focus was establishing the end to end pipeline between Revit and the digital assessment environment. That phase proved we could extract the right model information, present it in a familiar drawing context, and begin testing early checks while the workflow, UI and capture approach matured.

In Phase 2, the work moved into the reliability layer. We spent significant effort identifying and resolving the practical constraints that affect trust in automated assessment, including definition alignment between the plugin and portal, view and level consistency, modelling conventions, and cases where regulatory intent does not map cleanly to standard Revit objects. That phase clarified what can be assessed reliably, what requires controlled capture, and what requires specific model setup conventions.

This final report is about execution and evidence. With the workflow now stabilized and the key constraints understood, the focus has been to progress clause by clause through the City of Vancouver zoning and related requirements and apply them directly against real multifamily project models. Rather than describing capability in principle, this report documents the assessed outcomes in practice, including how each clause was assessed, whether it was assessable on each project, and the pass or fail outcome with supporting screenshots from the assessment environment.

Across the 63 original clauses in scope, a subset are not applicable to these specific building types or are not currently assessable with sufficient confidence based on current model inputs. The practical target for this phase is to complete robust, reviewable assessment coverage for the clauses that can be assessed across both projects, expected to be in the order of 52 clauses, and to clearly identify the reasons where clauses were excluded or constrained.

The result is a long form evidence pack intended for architectural review. It shows not only which clauses were assessed, but also what was required in the model to support assessment, how the logic was applied, and what the system highlighted as the basis for each result. This positions the next phase around two clear levers: expanding assessable coverage and reducing friction through agreed Revit project setup standards.

2 PROJECT CONTEXT

Our final Progress Report covers two multifamily development projects in Vancouver. These projects were selected to validate clause assessment in real design conditions, confirm repeatability of the workflow across different models, and identify which clauses are assessable, not applicable, or constrained by model setup.

PROJECT 1

- Address: 109 E Hastings St, Vancouver
- Project type: Multifamily development
- Digital report ID: DIG_BIM2_dev-4A9277058E

PROJECT 2

- Address: 160 E Cordova St, Vancouver
- Project type: Multifamily development
- Digital report ID: DIG_BIM2_dev-C4481AA904

REFERENCE MATERIALS AND ASSESSMENT INPUTS

The clause assessments in this report are based on digitized City of Vancouver zoning and related requirements, applied directly to each project model and reviewed through the digital assessment interface. Inputs include the relevant zoning and policy references for each site, plus the Revit model views and captured elements used to evidence each clause outcome.

WHY TWO PROJECTS

Using two projects in parallel enables the team to:

- Confirm whether clauses and workflows behave consistently across different model structures
- Identify clauses that are project specific or building type specific
- Surface modelling and view setup requirements that materially affect assessability.
- Separate “not applicable” clauses from “not currently assessable” clauses, with clear reasons

3 FINAL DELIVERABLES

Archistar has successfully completed the final deliverables for this project. This final phase focused on applying digitized City of Vancouver zoning and related requirements clause by clause across two multifamily development projects, producing a structured evidence pack of real assessment outcomes.

PHASE 3 DELIVERABLES

CLAUSE BY CLAUSE ASSESSMENT PACK PRODUCED FOR BOTH PROJECTS

A standardized clause page format has been applied across the scope, documenting for each clause:

- Zone and by law reference, rule value and conditions
- Whether the clause was assessable on the specific project
- How the rule was assessed
- Pass or fail outcome with a brief explanation
- Screenshot evidence and caption

TWO PROJECT VALIDATION COMPLETED

The assessment workflow has been applied to:

- 109 E Hastings St, Vancouver (DIG_BIM2_dev-4A9277058E)
- 160 E Cordova St, Vancouver (DIG_BIM2_dev-C4481AA904)
- This confirms repeatability and highlights differences in applicability and model readiness across projects.

APPLICABILITY AND CONSTRAINTS IDENTIFIED ACROSS THE ORIGINAL CLAUSELIST

Across the 63 original clauses in scope, the outcome for each clause has been categorized as:

- Assessable and evidenced
- Not applicable to these building types
- Not currently assessable with sufficient confidence (with documented constraints)

MODEL SETUP GUIDANCE CAPTURED FROM ASSESSMENT OUTCOMES

A consolidated set of Revit modelling and view setup requirements has been compiled based on observed assessment friction, to improve future assessability and reduce rework.

PHASE 3 COMPLETION STATUS:

All planned Phase 3 deliverables for this period have been completed and documented in this report.

4 CLAUSE SCOPE SUMMARY

This section provides a consolidated overview of the regulatory clause set considered within Phase 3 prior to presenting the full clause list. It establishes the scope boundaries for assessment, explains how clauses are grouped, and clarifies how applicability and assessability are treated throughout the remainder of the report.

The Phase 3 clause set is drawn from the City of Vancouver Zoning and Parking By-laws, Housing Policy Technical Guidelines, Urban Design requirements, and related engineering and servicing standards. The original scope comprised 63 individual clauses, spanning multiple regulatory domains including zoning, housing policy, urban design, engineering, landscape, fire and rescue, and development review.

For the purposes of this report, clauses are treated in one of three ways:

ASSESSABLE AND EVIDENCED

Clauses where sufficient model information, tagging, and spatial definition existed to allow a reliable automated assessment. These clauses are documented in detail later in this report with pass/fail outcomes and screenshot evidence.

NOT APPLICABLE TO THE SUBMITTED LAND USE

Clauses that apply to land uses not present in the submitted projects (eg childcare, office, retail, industrial). These clauses are explicitly identified and excluded to keep the evidence pack focused on the multi-family residential scope.

NOT CURRENTLY ASSESSABLE WITH SUFFICIENT CONFIDENCE

Clauses that are theoretically applicable but could not be assessed reliably due to model setup limitations, ambiguous representation, or missing reference information. Where relevant, the constraints preventing assessment are documented.

Both case-study projects are treated consistently as multi-family residential submissions. This allows a like-for-like comparison of clause behaviour across different models and confirms whether assessment logic and workflows remain stable across variations in project structure and authoring approach.

The table that follows lists the full clause inventory, including all clauses originally considered within scope, regardless of whether they were assessed, excluded due to land use, or constrained. This provides transparency on coverage and creates a clear reference point for the detailed analysis sections that follow.

CLAUSE

1. Zoning/Planning - Building Height	23. Engineering - Bicycle Room Ratios
2. Engineering - Parking Summary	24. Engineering - Access Aisle Width
3. Engineering - Loading Residential	25. Engineering - Access Turning Radii
4. Engineering - Loading Commercial	26. Housing Policy - Indoor Amenity Area
5. Engineering - Bicycle Parking Count	27. Housing Policy - Outdoor Amenity Area
6. Engineering - Bicycle Parking Count - Residential	28. Fire and Rescue - Hydrant Distance
7. Engineering - Bicycle Parking Count - Office	29. Fire and Rescue - Hose Reach and Clearance
8. Engineering - Bicycle Parking Count - Retail	30. Urban Design - FSR/Density
9. Engineering - Bicycle Parking Count - Industrial	31. Urban Design - Total Areas and Inclusions
10. Engineering - Passenger Parking Count	32. Urban Design - Site Coverage
11. Housing Policy - Unit Count/summary	33. Urban Design - Setbacks
12. Housing Policy - Unit Mix	34. Urban Design - Step backs
13. Housing Policy - Min Unit Size	35. Urban Design - Sustainability - Window to Wall Ratio
14. Urban Design - FSR Exclusions	36. Urban Design - Sustainability - Mech Chase Exclusion
15. Urban Design - Site Area	37. Urban Design - Childcare - Min Outdoor
16. Urban Design - Balconies/Private Outdoor Space	38. Urban Design - Childcare - Min Indoor Area

17. Urban Design - Thermal Envelope Exclusion 39. Urban Design - Childcare - Min Staff PK

18. Development Review - Ramp Dim and Landings

40. Development Review - Bulk Storage Below Grade

19. Development Review - Ramp Turning Radius Zones

41. Development Review - Bulk storage in suite min dim

20. Engineering - Visitor Parking

42. Development Review - Bulk storage in suite min height

21. Engineering - Parking and ACC Residential

43. Development Review - Area Summaries

22. Engineering - Parking and ACC Non-Residential

44. Landscape Design - Tree Canopy

45. Landscape Design - Tree Distance to Building

55. Engineering - Bicycle Parking - Stall

46. Engineering - Vehicle Parking - small car ratio

56. Engineering - Bicycle Parking - Aisle width

47. Engineering - Vehicle Parking - use typ tag

57. Engineering - Passenger Stall - Use type tag

48. Engineering - Vehicle Parking - stall dimensions

58. Engineering - Passenger Stall - Stall dimensions

49. Engineering - Vehicle Parking - Aisle dimensions

59. Engineering - Ramps - Slope

50. Engineering - Vehicle Parking - ACC dimensions

60. Engineering - Ramp - Width

51. Engineering - Loading - Use type tag

61. Engineering - Ramp - Interior Ramp Width and Slope

52. Engineering - Loading - Stall dimensions

62. Engineering - Solid Waste - Garbage Enclosure Size

53. Engineering - Loading - Throat width dimensions

63. Engineering - Solid Waste - Bin Count

54. Engineering - Bicycle Parking - Use type tag

5 CLAUSE CATEGORIES AND DEEP-DIVE OVERVIEW

Before moving into the clause-by-clause assessment (starting at Clause 1), this section explains how the rules are structured, what types of checks are being performed, and which clauses are explored in detail within this report.

The clauses assessed in Phase 3 fall into a number of recurring rule patterns. While each clause references a specific by-law or policy requirement, the underlying assessment logic typically belongs to one of the following categories:

QUANTITATIVE COUNT AND RATIO-BASED RULES

These clauses rely on counting objects or spaces and applying ratios or thresholds defined in policy or by-law tables.

Examples include:

- Parking and bicycle parking counts
- Visitor and accessible stall ratios
- Loading space requirements based on unit count
- Garbage and recycling provision based on dwelling numbers

These rules depend heavily on clear object classification, semantic type naming, and complete capture of all relevant instances.

DIMENSIONAL AND CLEARANCE-BASED RULES

These clauses assess minimum or maximum dimensions such as widths, lengths, heights, slopes, or clearances.

Examples include:

- Parking stall and aisle dimensions
- Bicycle aisle widths
- Ramp slopes and ramp widths
- Garbage enclosure sizes

These rules require measurable geometry, stable views, and unambiguous boundaries to support defensible measurement.

AREA-BASED POLICY RULES

These clauses derive compliance outcomes from calculated areas and spatial extents. Examples include:

- Unit minimum sizes
- Indoor and outdoor amenity areas
- Site coverage
- FSR-related inclusions and exclusions

Accuracy here depends on spatial integrity, correct room or area plan setup, and consistent boundary definition.

CLASSIFICATION-DRIVEN POLICY RULES

Some clauses rely less on raw geometry and more on correct categorization of spaces or elements.

Examples include:

- Unit mix (studio, 1BR, 2BR, 3BR)
- Parking stall use types (visitor, accessible, small car)
- Bicycle parking classes (Class A, Class B, oversized, accessible)

These rules highlight the importance of semantic naming conventions and consistent modelling intent.

EXPLICIT MEASUREMENT INTENT RULES

A smaller subset of clauses requires a clearly defined measurement method rather than inference from generic geometry.

The most prominent example is:

- Building height measured to natural ground line

These clauses require agreed reference structures, consistent datum strategies, and controlled capture approaches to ensure repeatability.

CLAUSES SELECTED FOR DETAILED EVIDENCE IN THIS REPORT

From the full list of 63 clauses, this report presents deep-dive evidence pages for the clauses that were assessable on one or both projects within the multi-family residential scope. These include representative examples from each rule category above, such as:

- Building height (explicit measurement intent)
- Loading provision (count and threshold logic)
- Bicycle parking counts and aisle widths (ratio + dimensional rules)
- Unit counts, unit mix, and minimum unit sizes (area and classification rules)
- Visitor and accessible parking (ratio + dimensional validation)
- Ramp slopes and widths (engineering dimensional rules)
- Garbage and recycling enclosure sizing (area-based servicing rules)
- Each clause page that follows documents:
 - The relevant by-law or policy reference
 - The rule value and any conditional logic
 - How the rule was assessed digitally
 - Whether the clause was assessable on each project
 - The pass or fail outcome, supported by visual evidence

Together, these deep dives demonstrate not only compliance outcomes, but how regulatory intent can be translated into repeatable, auditable digital assessment logic when models are authored with the right conventions.

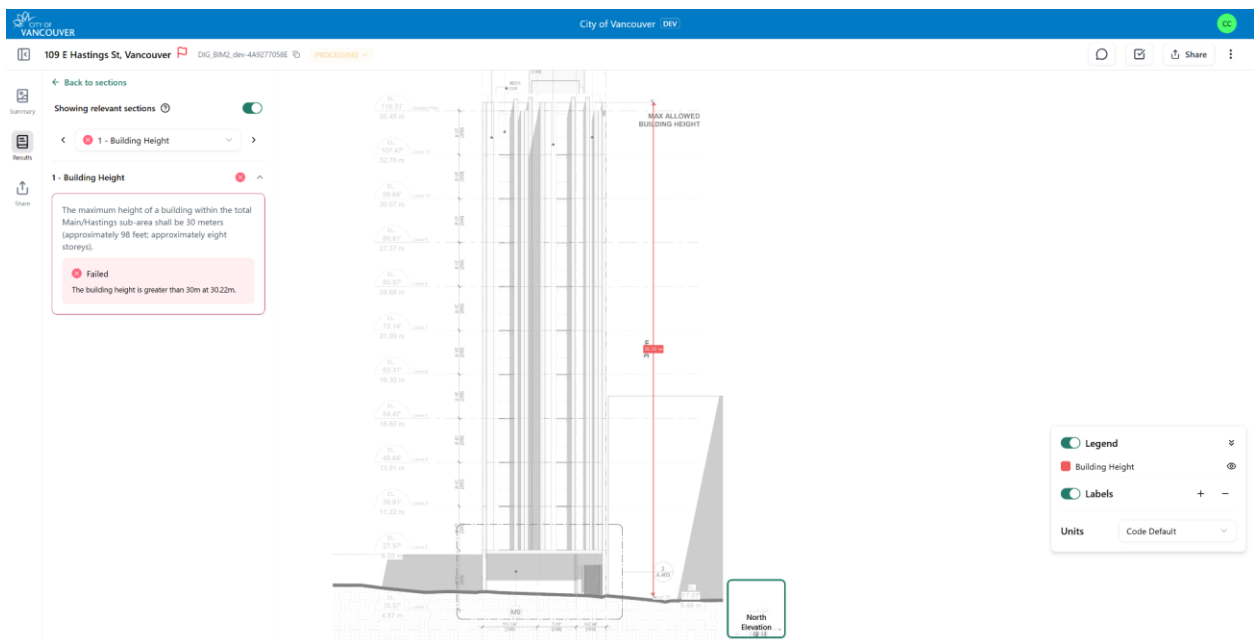
6 DEEP DIVE CLAUSE REVIEW

CLAUSE 1: ZONING/PLANNING - BUILDING HEIGHT

- Zone / By-law reference:
- Rule value: MAX 30M
- Assessment approach: Building height measured to natural ground line and assessed against by law.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

Outcome: Fail - height measured at 30.22m when the limit is 30m

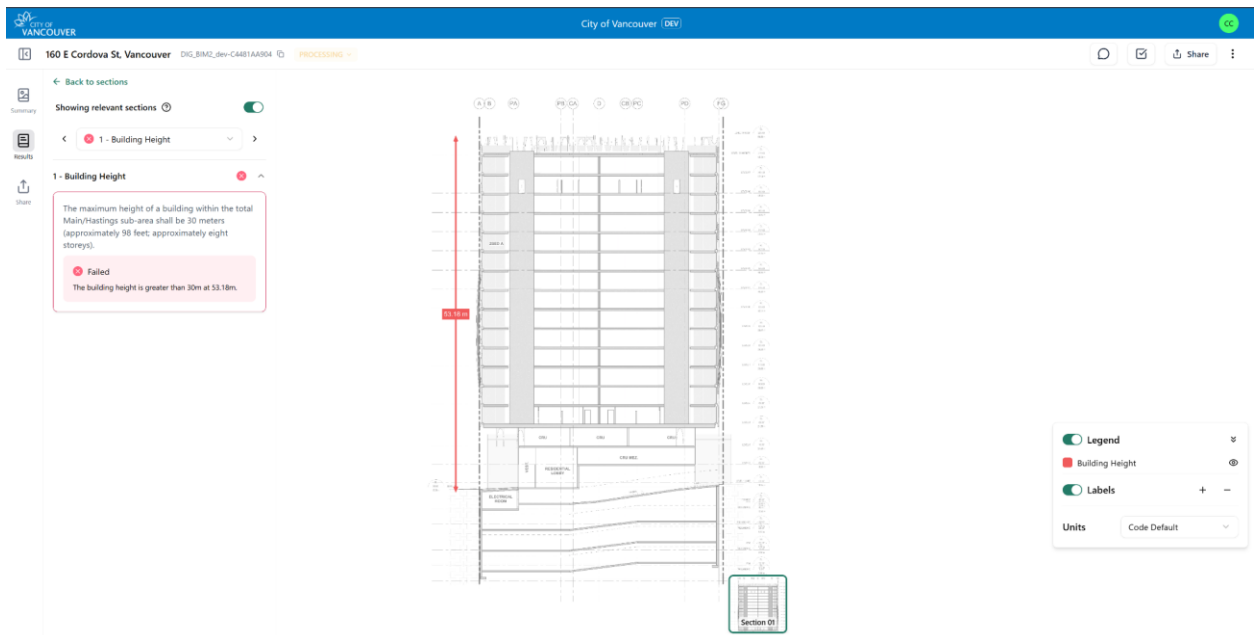


This image shows building height as measured on the elevation drawing

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Fail - height measured at 53.18m when the limit is 30m

This image shows building height as measured on the elevation drawing

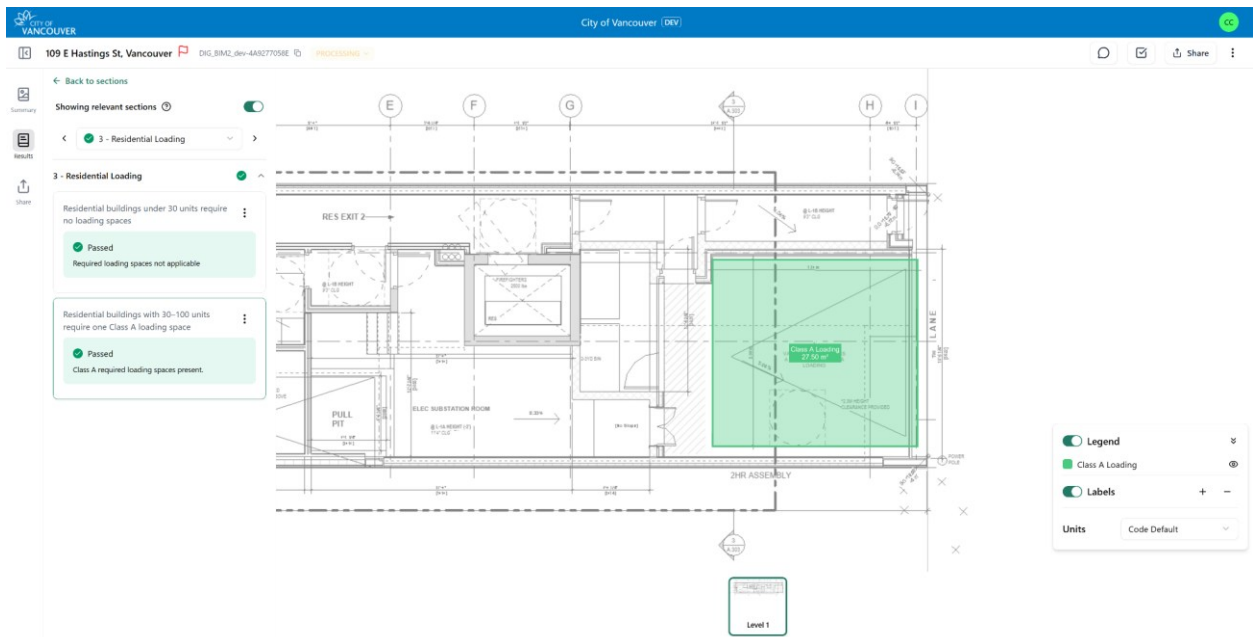


CLAUSE 3: ENGINEERING - LOADING RESIDENTIAL

- Zone / By-law reference: Parking By-law Section 5
- Rule value: <30 units - no requirement
- Rule conditions: 30-100 - 1 Class A space; 101-300 - 1 Class A + 1 Class B; 300 units - 2 Class A + Class B; Note: Loading polygon Class A, Class B + unit count
- Assessment approach: Tag loading areas as Class A or Class B spaces in plan. Use the residential unit count to determine the required loading provision from the threshold table, then confirm the required spaces are present.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

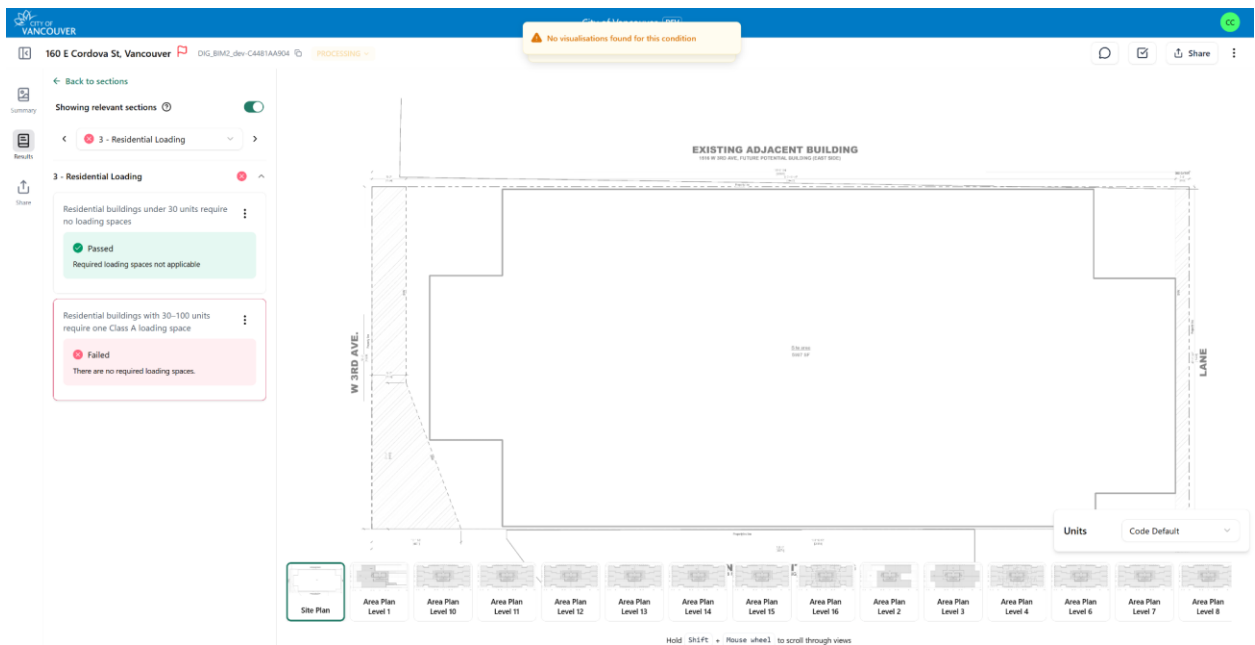
Pass - Buildings under 30 units require no loading spaces, 1 Class A space provided



This image shows the rule passed due to the number of units and space provided.

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Failed - No loading space provided.



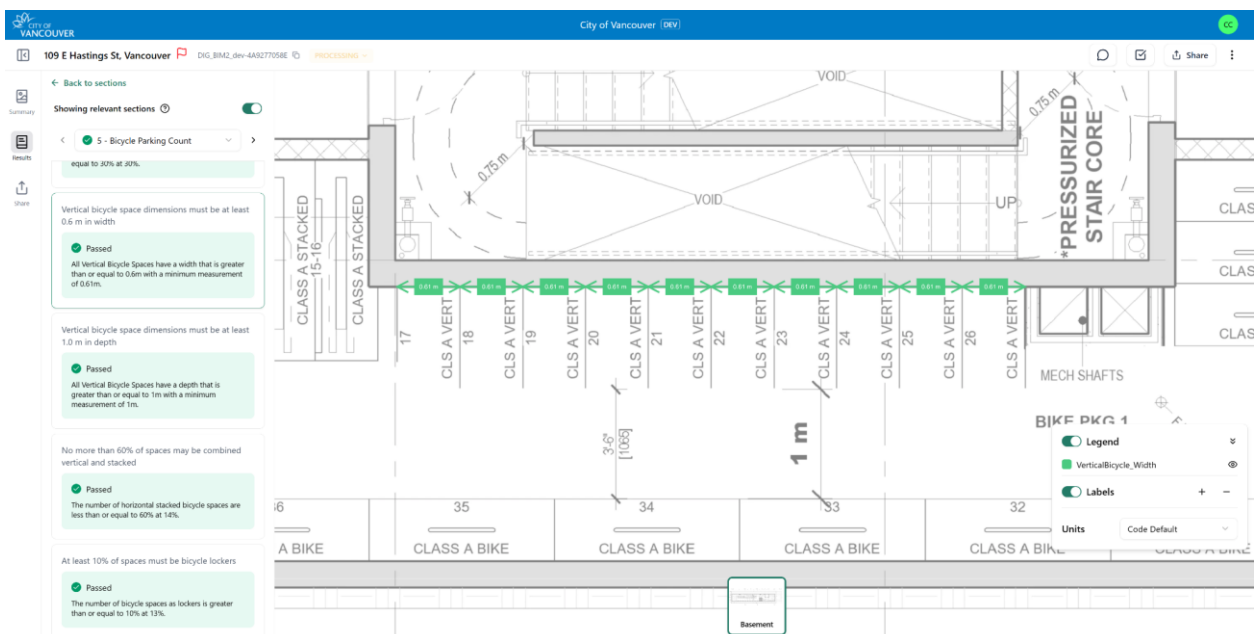
This image shows the rule failed due to no space being provided.

CLAUSE 5: ENGINEERING - BICYCLE PARKING COUNT

- Zone / By-law reference: Parking By-law Section 6
- Rule value: Min 0.75 Class A space per unit is required
- Rule conditions:
- Assessment approach: Unit count total multiplied by 0.75 = min number of spaces

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

Outcome: Pass - 50 spaces provided = 50 required



This image shows rule relating to width of bike spaces meeting requirements - also note additional rules on left hand side

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - 25 spaces provided = 25 required



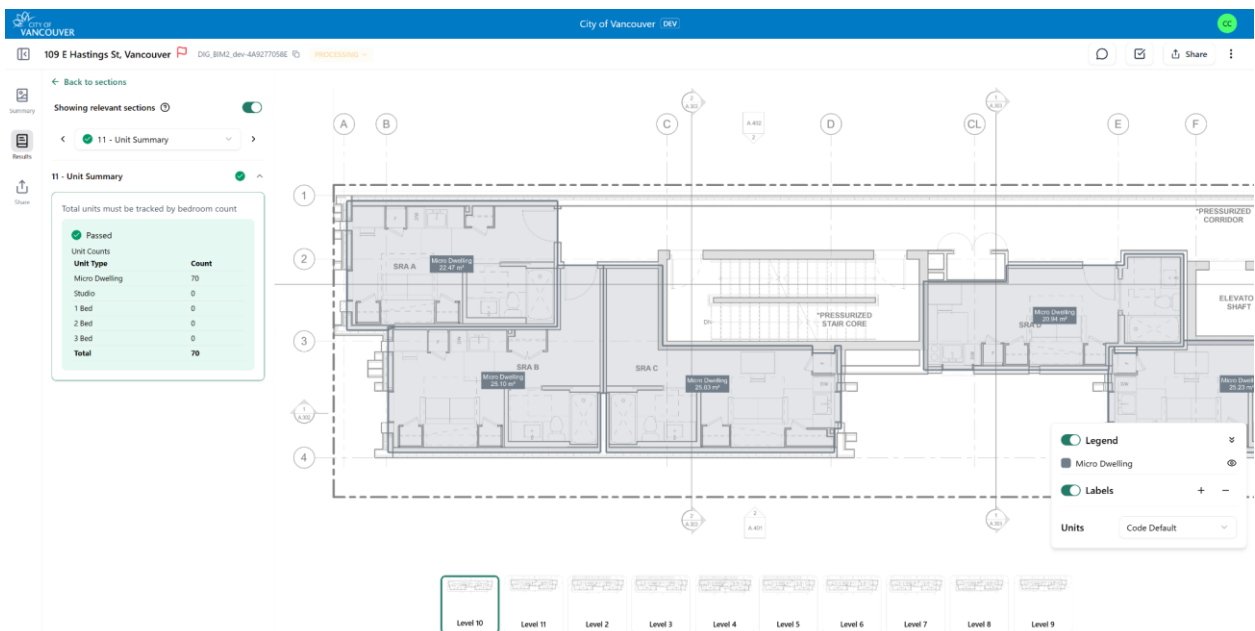
This image shows number of spaces provided meets requirements

CLAUSE 11: HOUSING POLICY - UNIT COUNT/SUMMARY

- Zone / By-law reference: Housing Mix Policy, Technical Guidelines
- Rule value: Number, Types, Sizes - Count
- Rule conditions:
- Assessment approach: Use dwelling unit boundaries as room or area polygons to count total units. Cross-check the unit totals against the architectural schedule and confirm each unit boundary is closed so counts are reliable.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

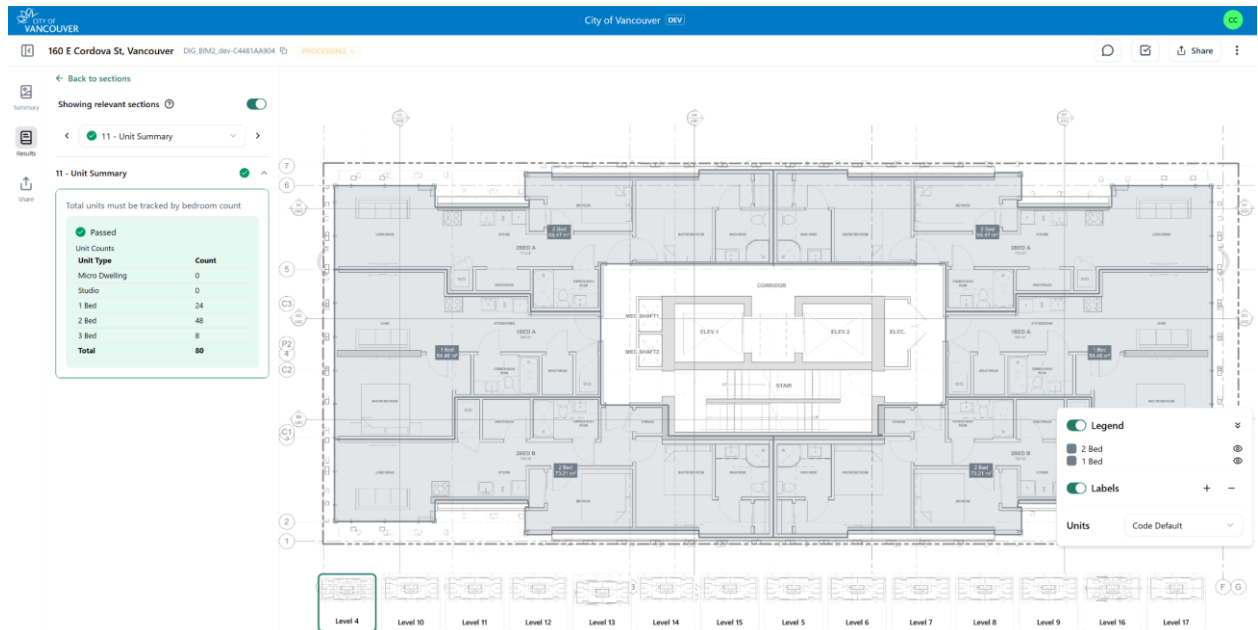
Outcome: Pass



This image shows unit counts floor by floor.

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass



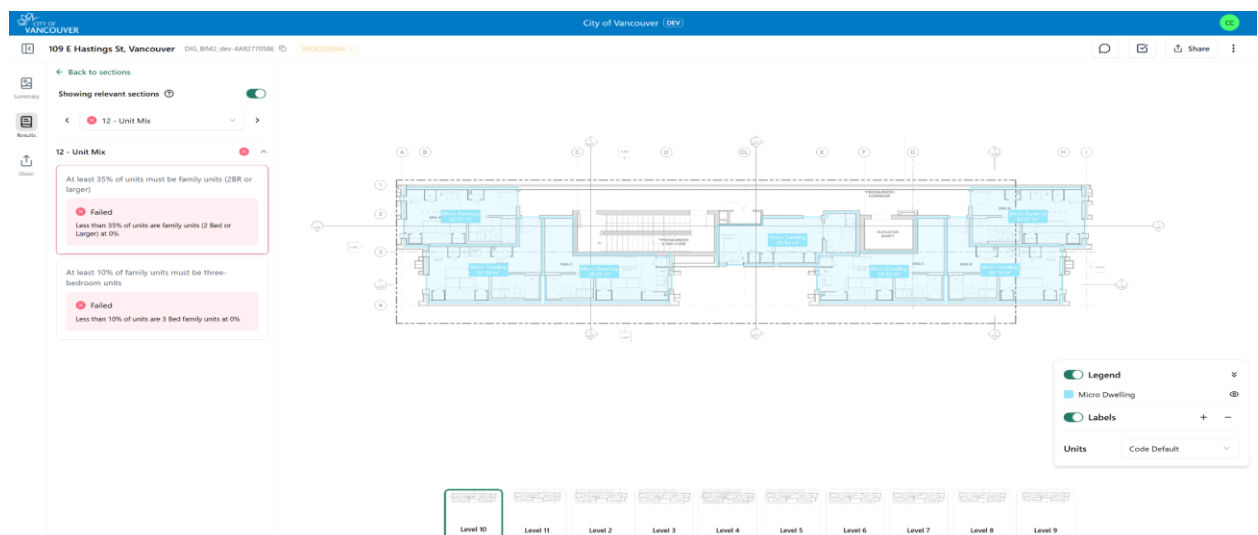
This image shows unit counts floor by floor.

CLAUSE 12: HOUSING POLICY - UNIT MIX

- Zone / By-law reference: Housing Mix Policy, Technical Guidelines
- Rule value: MIN % OF FAMILY UNITS - 10% 3BD,35%2BD
- Rule conditions:
- Assessment approach: Assign a unit type label to each dwelling unit such as studio, 1 bedroom, 2 bedroom using room parameters. Generate a mix summary and check the distribution against the policy targets.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

Outcome: Fail - 0% of the units in this building are 2 bedrooms or larger



This image shows units have been measured and tagged as micro dwellings

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - At least 35% of the units in this building are 2br or larger & 10% are 3br or larger

This image shows units have been measured and tagged as 3 bedroom units

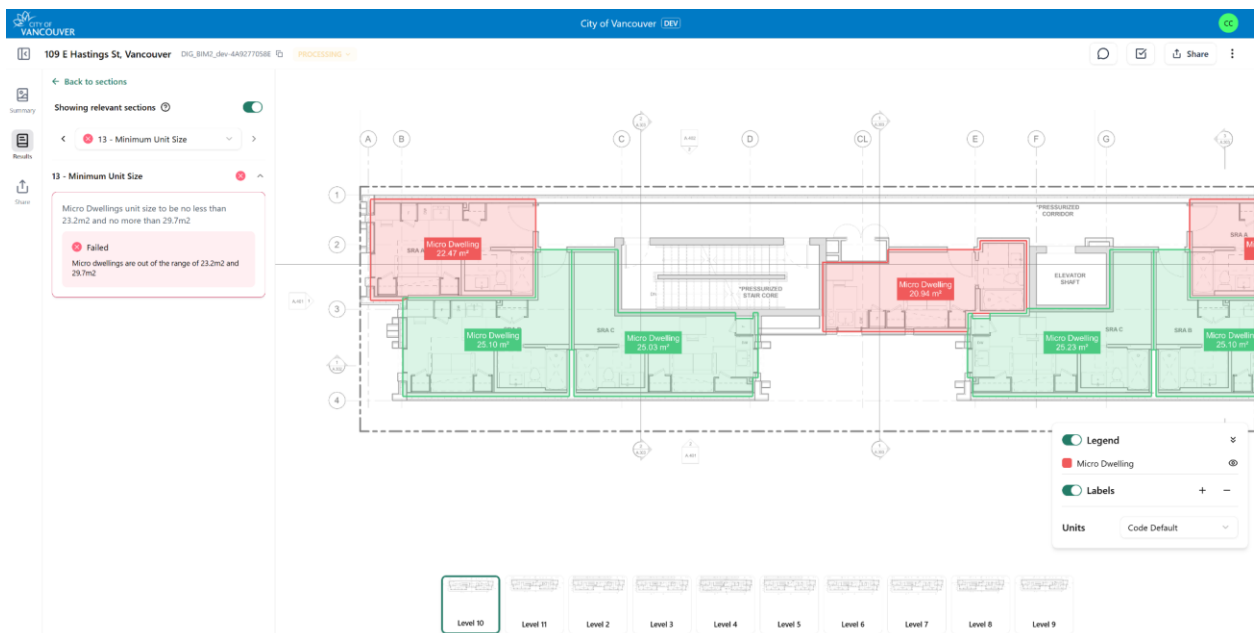


CLAUSE 13: HOUSING POLICY - MIN UNIT SIZE

- Zone / By-law reference: Housing Mix Policy, Technical Guidelines
- Rule value: MIN ALLOWED UNIT AREA - $\geq 37M^2$ STUDIO
- Rule conditions:
- Assessment approach: Calculate each dwelling unit net area from the unit boundary polygon. Compare unit areas against the minimum size thresholds for each unit type and flag any units below the minimum.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

Outcome: Fail - Not all Micro dwelling units are within the compliant area range.

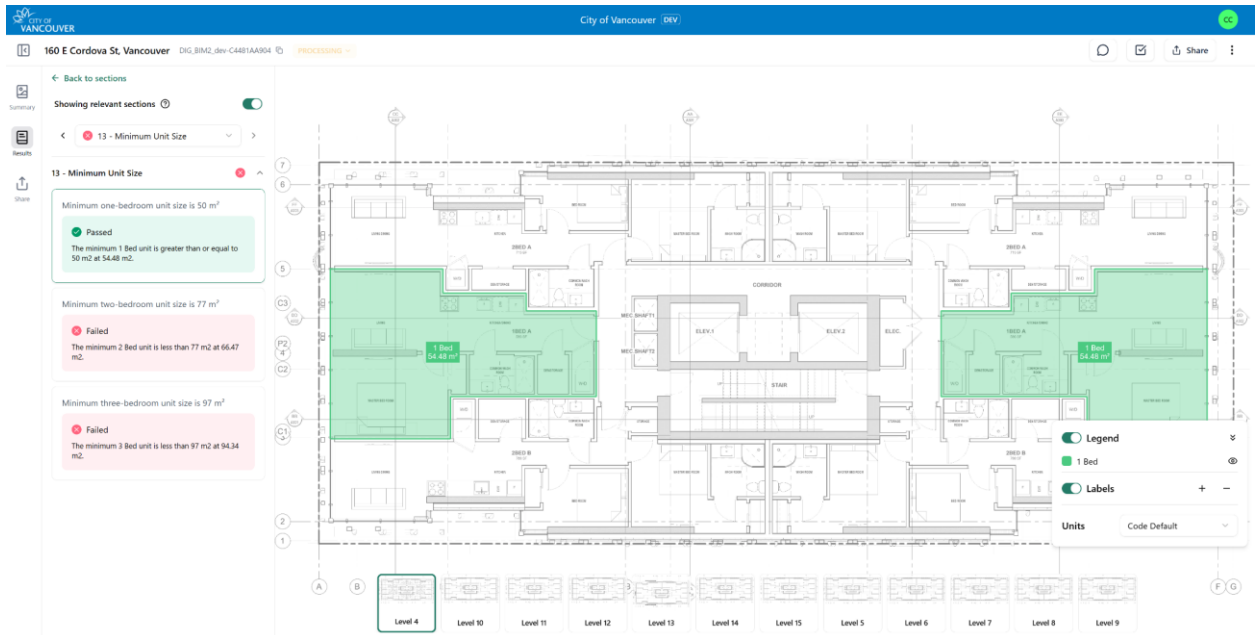


This image shows which units have failed the area requirements.

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass / Fail - Both - Some units pass and some fail.

This image shows 1 bedroom units which have passed the area requirement checks.

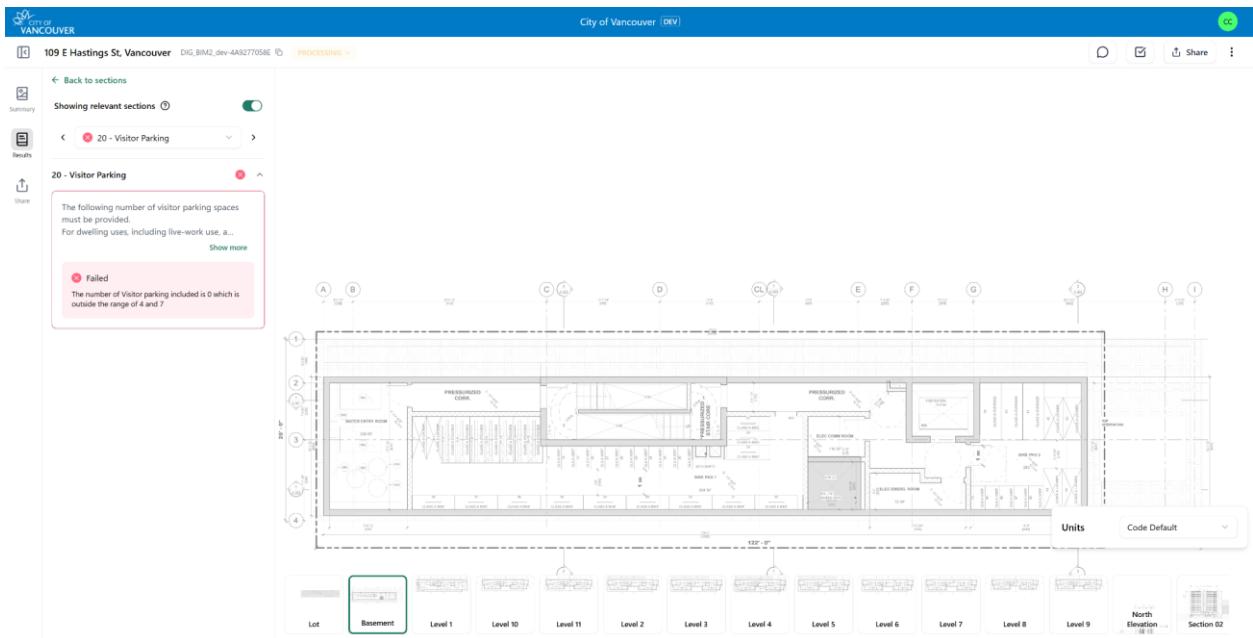


CLAUSE 20: ENGINEERING - VISITOR PARKING

- Zone / By-law reference: DTES ODP, Zoning By-law
- Rule value: VISITOR - $0.05-0.1 \times \text{UNITS}$
- Rule conditions:
- Assessment approach: Tag visitor stalls as a distinct parking use type. Count visitor stalls from the captured stall geometry and compare against the required visitor rate based on total dwelling units.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

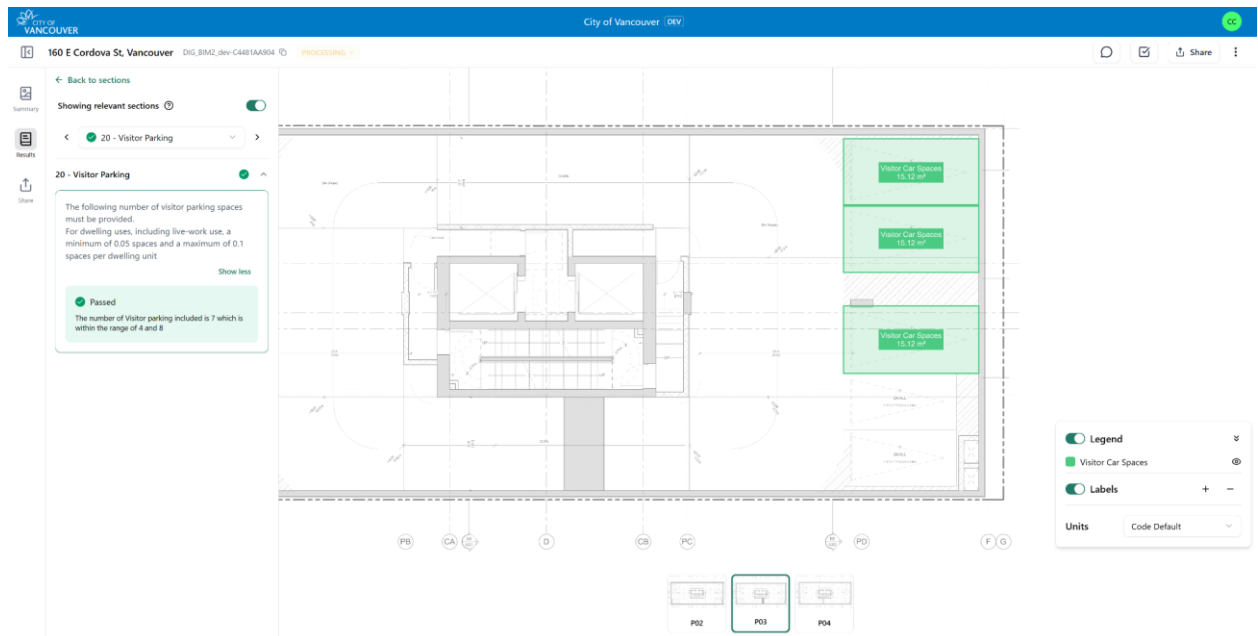
Outcome: Fail – No Visitor parking is provided



This image shows failed rule and no visualisation on the basement plans

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - Number of visitor spaces is within the accepted range.



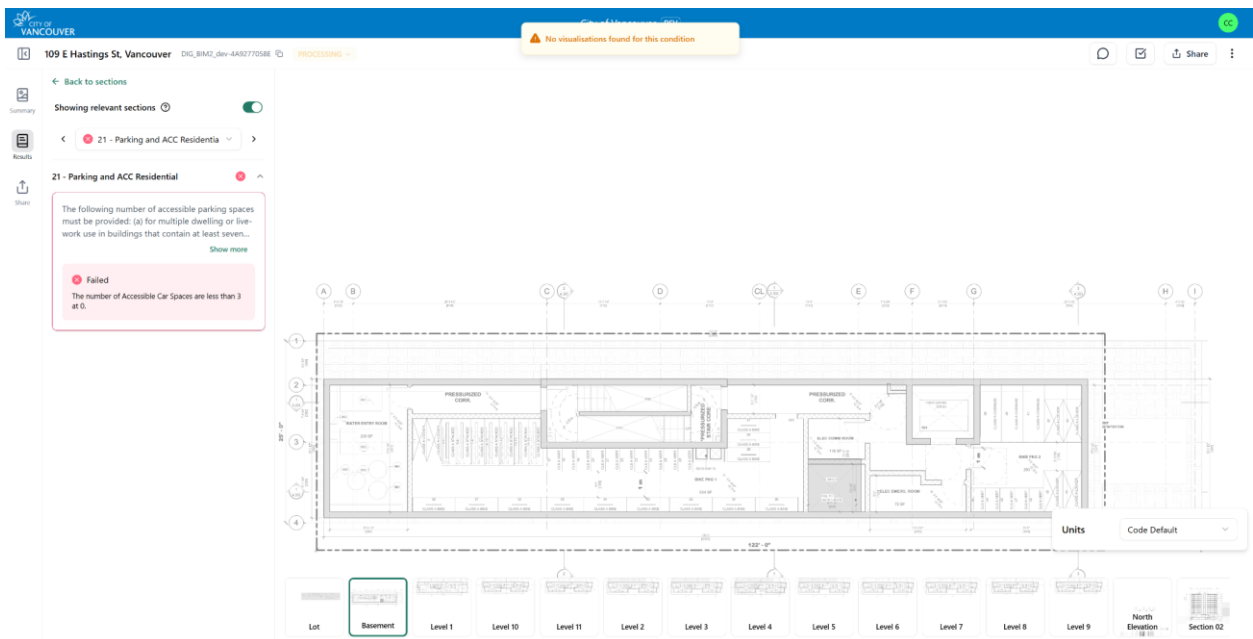
This image shows passed rule and visitor parking spaces indicated on the basement plans

CLAUSE 21: ENGINEERING - PARKING AND ACC RESIDENTIAL

- Zone / By-law reference: DTES ODP, Zoning By-law
- Rule value: ACCESSIBLE - RES - $1 + 0.034 \times (\text{UNITS} - 7)$ IF ≥ 7 UNITS
- Rule conditions:
- Assessment approach: Tag accessible residential stalls and their access aisles. Verify required counts and check stall and aisle dimensions and proximity to accessible entries using viewer measurements.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

Outcome: Fail - No accessible parking spaces provided in this building

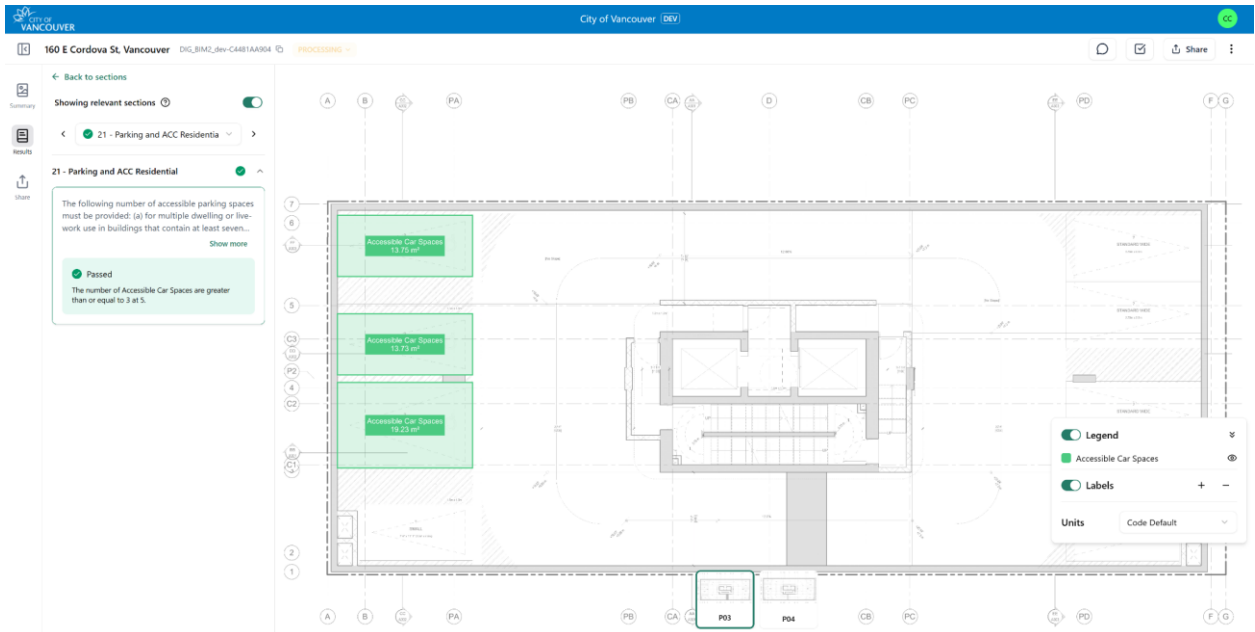


This image shows failed rule and no visualization on the basement plans

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - As the number of accessible parking spaces is within the required range.

This image shows passed rule and visitor parking spaces indicated on the basement plans



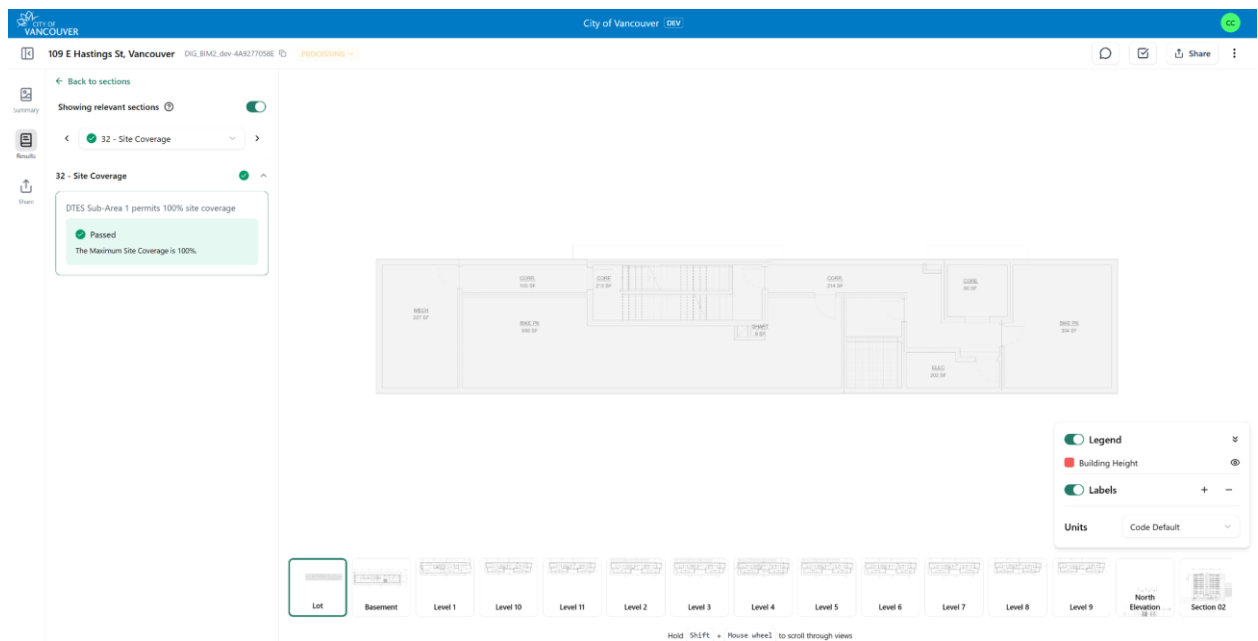
CLAUSE 32: URBAN DESIGN - SITE COVERAGE

- Zone / By-law reference:
- Rule value: Building Footprint/lot area | DTES Sub-Area 1 | 1
- Rule conditions: Other zones - Varies 40-70%; Note: Lot polygon, building polygon
- Assessment approach:

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

Outcome: Pass - 100% Site cover is permitted

This image shows the passed condition with no visualisation.



PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - 100% Site cover is permitted



This image shows the passed condition with no visualisation.

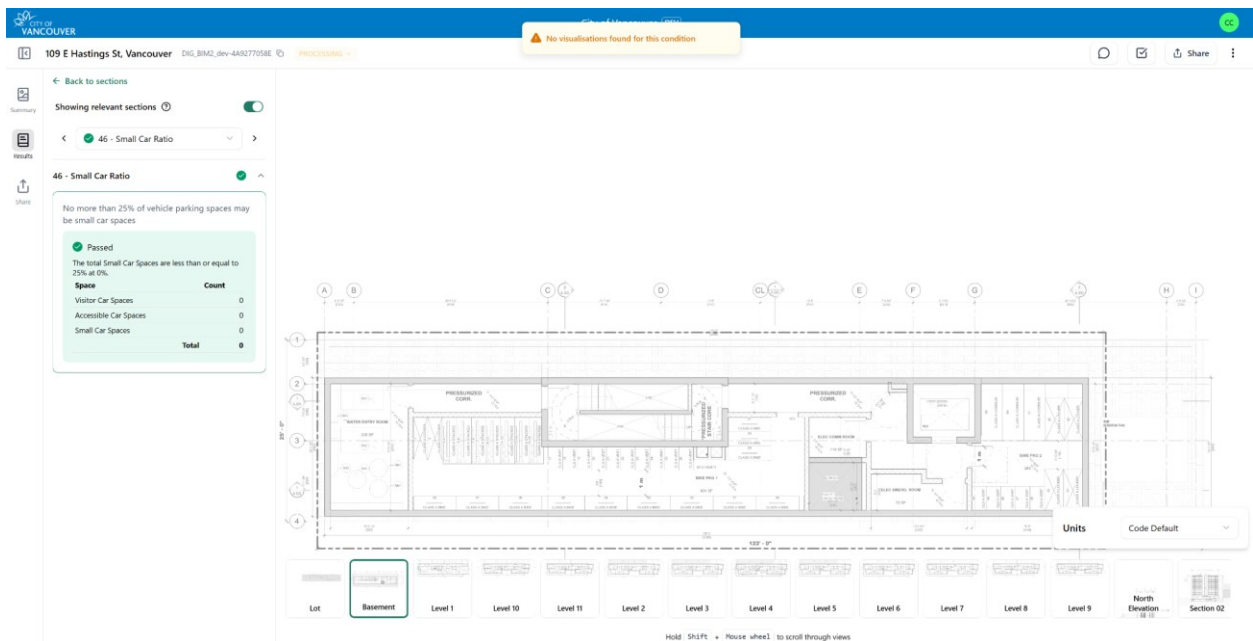
CLAUSE 46: ENGINEERING - VEHICLE PARKING - SMALL CAR RATIO

- Zone / By-law reference: Parking By-law Section 4
- Rule value: RATIO - 40% of total spaces
- Rule conditions: DIMENSIONS - 2.3m x 4.6m x 2.0m height
- Assessment approach: Classify vehicle stalls as standard or small car using a capture tag. Calculate the percentage of small car stalls and confirm it complies with the by-law maximum ratio.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

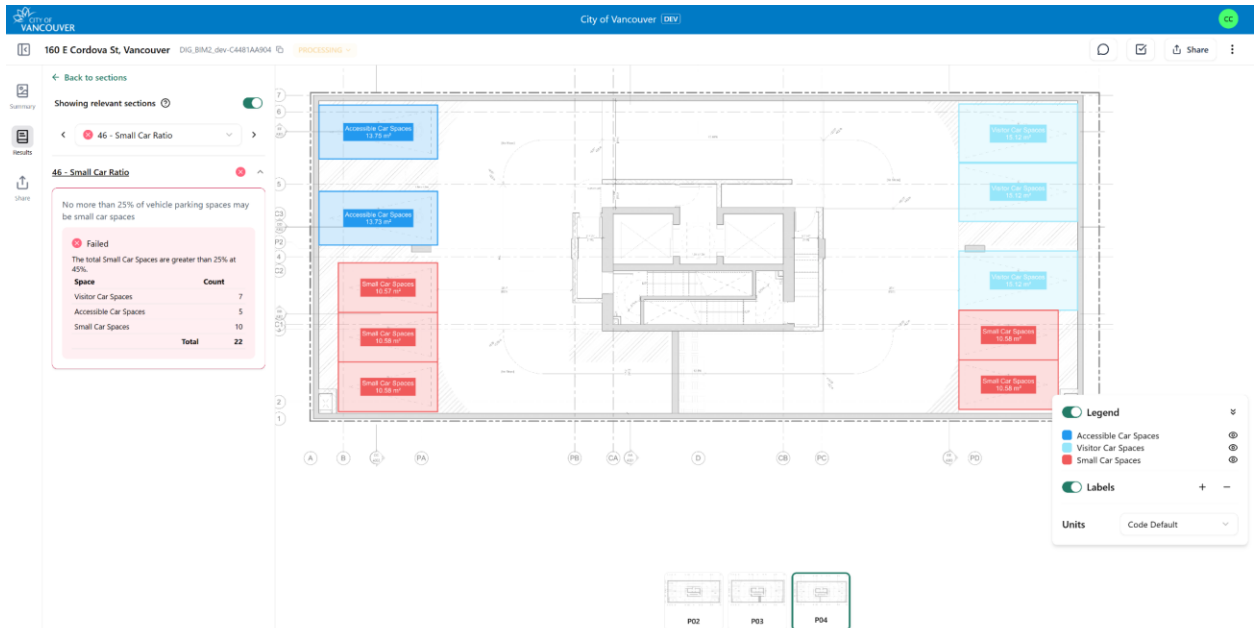
Outcome: Pass - No Small Car spaces provided

This image shows the passed condition with no visualisation on the plans



PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Fail - There are too many small car parking spaces.



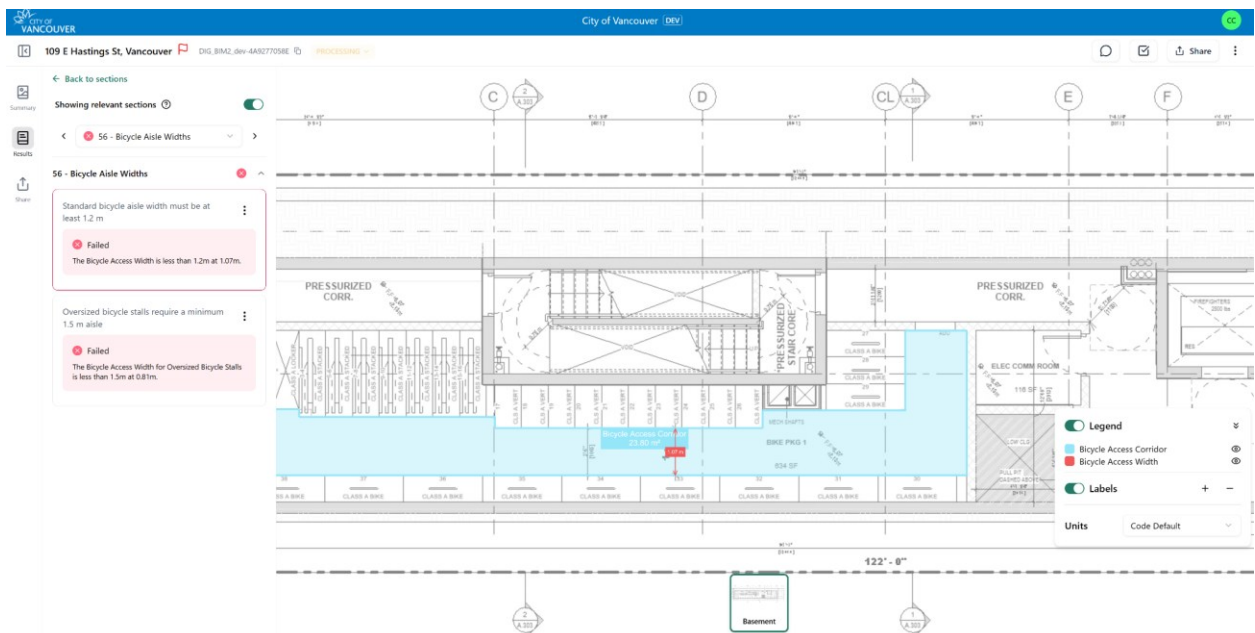
This image shows the failed condition and small car spaces indicated in red on the basement plans.

CLAUSE 56: ENGINEERING - BICYCLE PARKING - AISLE WIDTH

- Zone / By-law reference: Parking By-law Section 6
- Rule value: Standard - 1.2m min
- Rule conditions: Oversized - 1.5m min; Between rows - 2.4m recommended
- Assessment approach: Capture bicycle aisles and measure clear aisle width, particularly at doors and turns. Confirm the aisle supports safe bicycle manoeuvring and access to all stalls.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

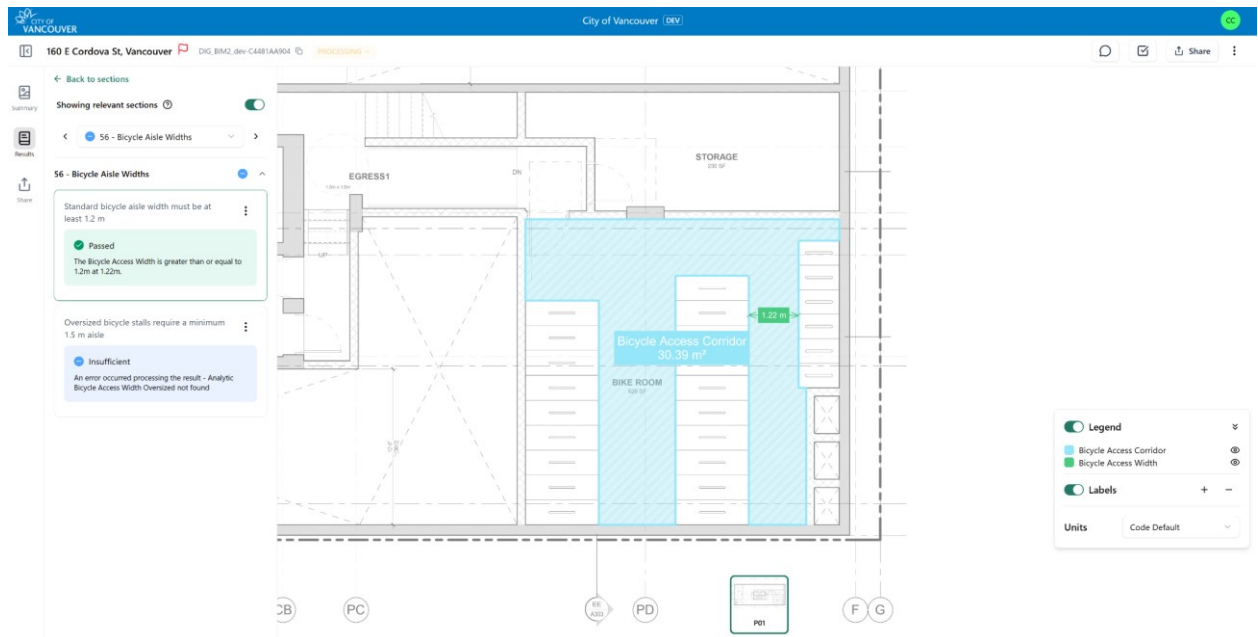
Outcome: Fail - Bicycle aisle width is narrower than the required 1.2m min in some sections.



This image shows minimum width of bicycle aisle measured in basement

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - Bicycle aisle is more than 1.2m wide at it's narrowest point.



This image shows minimum width of bicycle aisle measured in basement

CLAUSE 59: ENGINEERING - RAMPS - SLOPE

- Zone / By-law reference: Parking By-law Sections 4.13, 4.5.6
- Rule value: Slope | Covered ramps | 15% max
- Rule conditions: Uncovered - 12.5% max; Transition zones - 7.5-10% for 4.0m min; Within parking areas - 6% max; Loading bay access - 5% max
- Assessment approach: Derive ramp slope from elevation difference and run length using section views or ramp element parameters. Confirm maximum slope compliance and identify any local steep sections.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

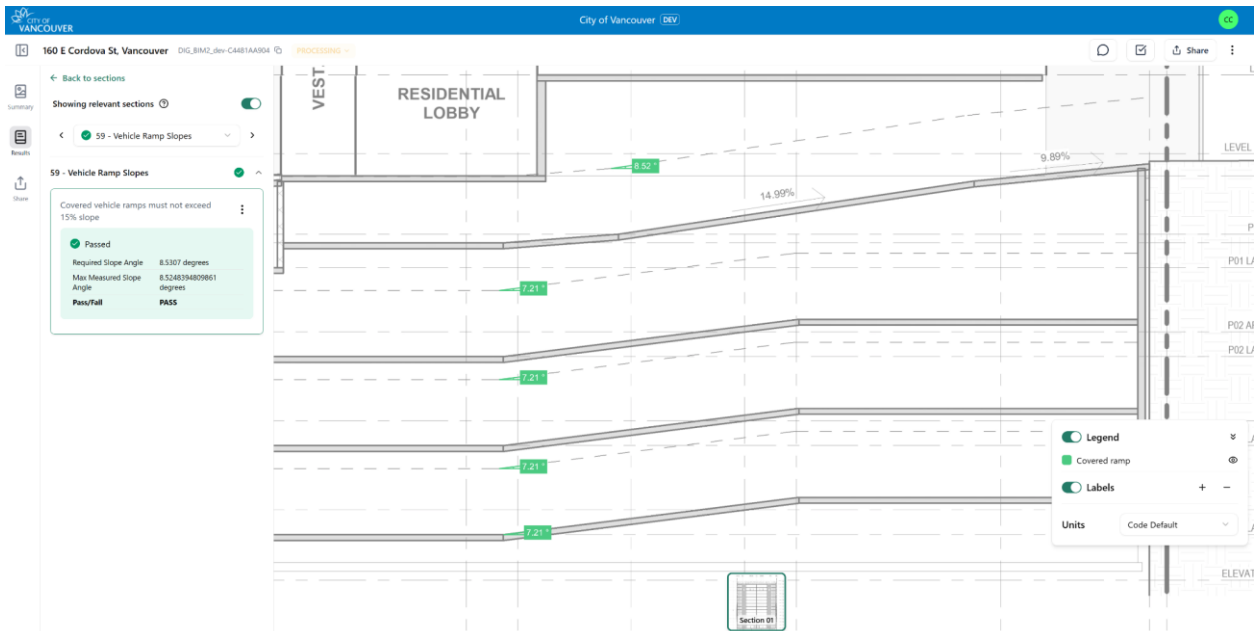
Outcome: Pass - the ramps do not exceed 15% slope



This image shows calculated angle on ramp and passed condition description.

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - the ramps do not exceed 15% slope



This image shows calculated angle on ramp and passed condition description.

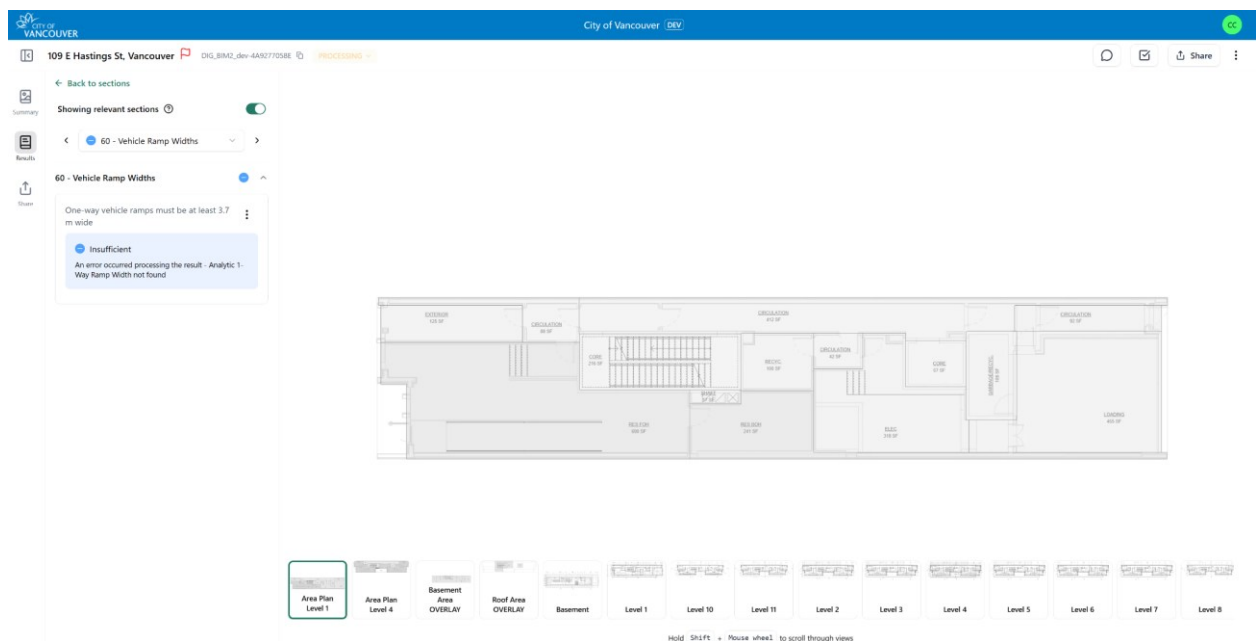
CLAUSE 60: ENGINEERING - RAMP - WIDTH

- Zone / By-law reference: Parking By-law Sections 4.13, 4.5.6
- Rule value: Dimensions | One-way | 3.7m
- Rule conditions: Two-way - 6.0m min; With passing bay - 3.7m + 3.0m bay every 30m
- Assessment approach: Measure clear ramp width between edges or handrails at pinch points in plan and section. Confirm the width meets the minimum accessibility requirement.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

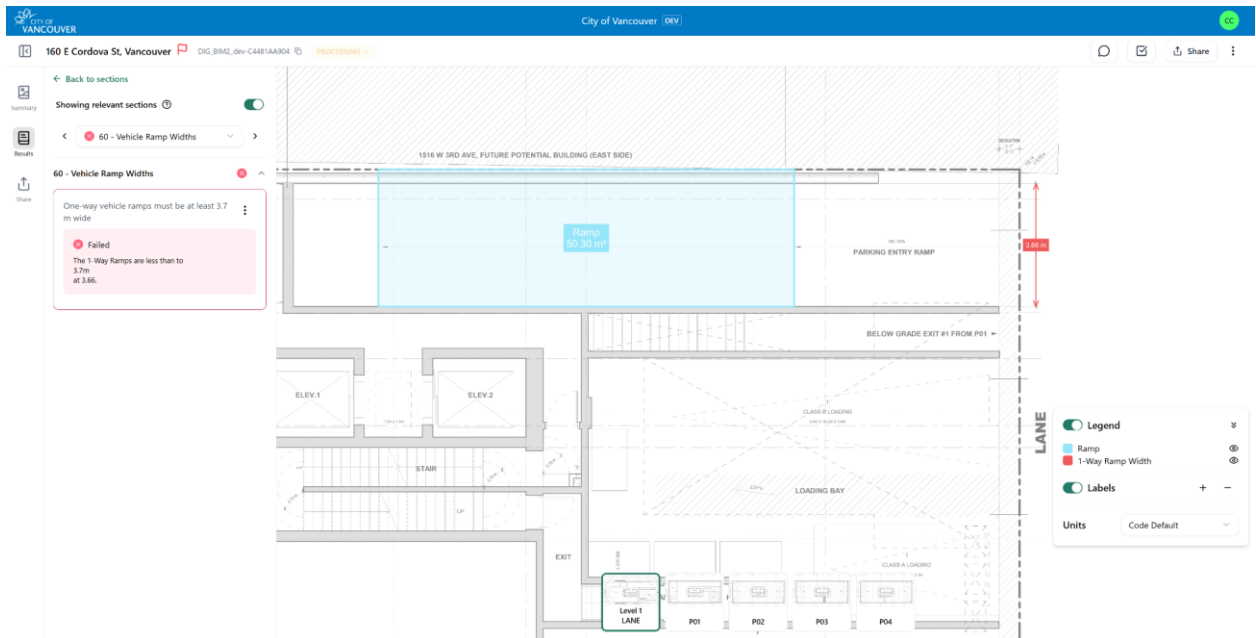
Outcome: Insufficient information to assess ramp width

This image shows ramp width measured and condition assessed.



PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Fail - Ramp did not meet the minimum width



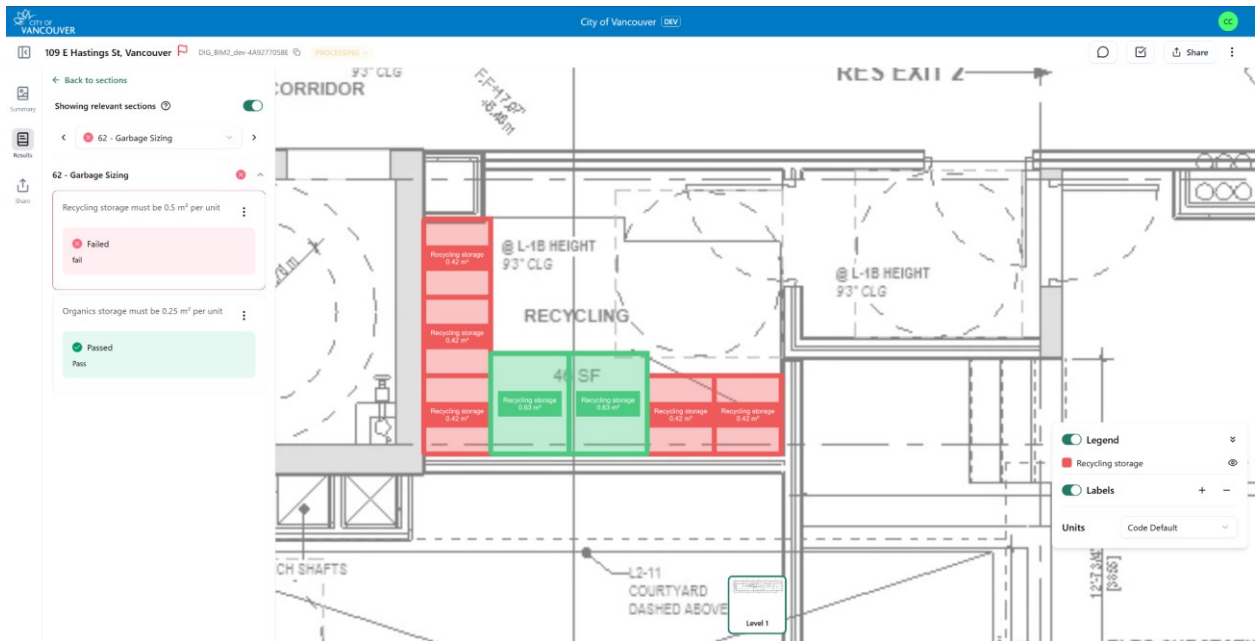
This image shows ramp width measured and condition assessed.

CLAUSE 62: ENGINEERING - SOLID WASTE - GARBAGE ENCLOSURE SIZE

- Zone / By-law reference: Garbage & Recycling Storage Supplement
- Rule value: Residential | Garbage | .1m3 per unit per week
- Rule conditions: Recycling – .5m2 storage per unit; Organics – .25m2 per unit; Green waste – Additional for ground level units; Ground floor location preferred – 1.5m clearance around bins; Refrigeration for organics – >50 units
- Assessment approach: Capture garbage and recycling rooms or enclosures as polygons and calculate net clear area. Compare against required enclosure size based on dwelling unit count and required bin types.

PROJECT 1: 109 E HASTINGS ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-4A9277058E

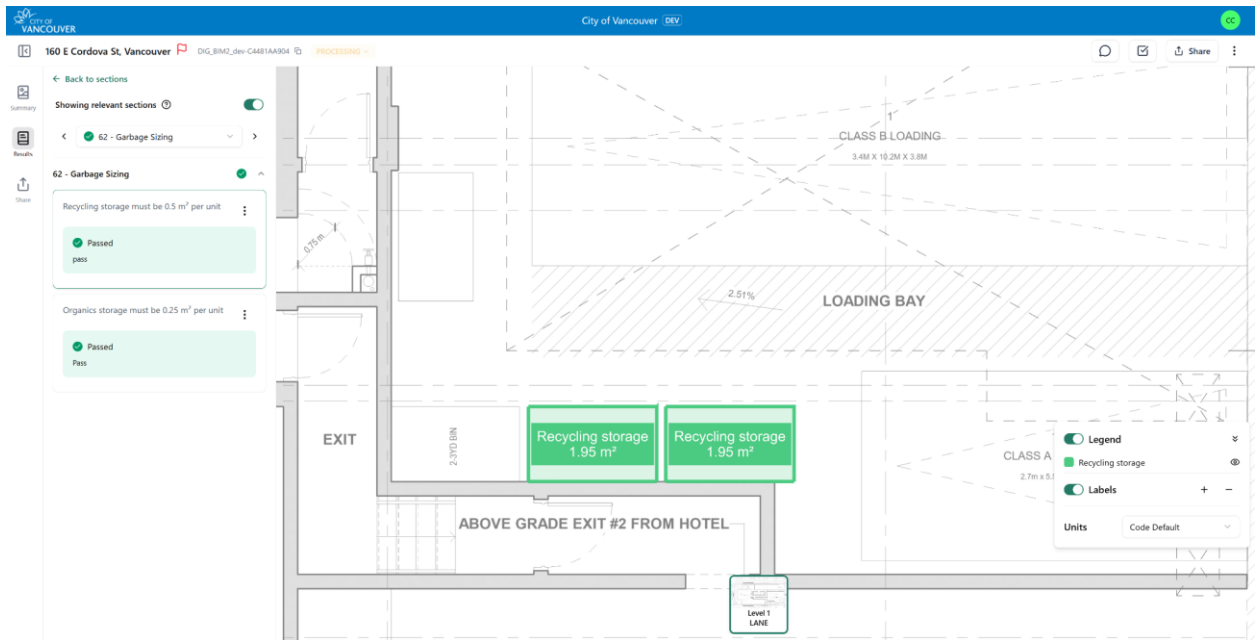
Outcome: Fail - 5 of the recycling storage units did not meet the area requirements



This image shows recycling storage areas measured on the basement plans, green pass, red fail the size requirements.

PROJECT 2: 160 E CORDOVA ST, VANCOUVER | REPORT ID: DIG_BIM2_DEV-C4481AA904

Outcome: Pass - Recycling storage meets required area



This image shows recycling storage areas measured on the basement plans, green pass, red fail the size requirements.

7 DEVELOPMENT CONTEXT FOR THE TWO CASE-STUDY PROJECTS

This Phase 3 report covers two multi-family residential developments submitted in Vancouver and assessed against the relevant City of Vancouver by-law and zoning requirements using our Revit → digital assessment workflow.

- Project 1: 109 E Hastings St, Vancouver – Multi-family development (DIG_BIM2_dev-4A9277058E)
- Project 2: 160 E Cordova St, Vancouver – Multi-family development (DIG_BIM2_dev-C4481AA904)

For the purpose of this report, both submissions were treated as multi-family (residential) land use case studies. That means clauses that only apply to other land uses (eg childcare, office, retail, industrial) were intentionally excluded so the clause-by-clause evidence pack stays relevant to what was actually submitted.

Clauses skipped because they do not relate to the submitted land use type and were not present in the submissions.

The following clauses were not assessed in this report because they relate to land uses that are not part of the multi-family residential scope for these submissions:

- Clause 4 – Engineering – Loading Commercial
- Skipped: commercial land use requirement
- Clause 7 – Engineering – Bicycle Parking Count – Office
- Skipped: office land use requirement
- Clause 8 – Engineering – Bicycle Parking Count – Retail
- Skipped: retail land use requirement
- Clause 9 – Engineering – Bicycle Parking Count – Industrial
- Skipped: industrial land use requirement
- Clause 37 – Urban Design – Childcare – Min Outdoor Area
- Skipped: childcare land use requirement
- Clause 38 – Urban Design – Childcare – Min Indoor Area
- Skipped: childcare land use requirement
- Clause 39 – Urban Design – Childcare – Min Staff PK
- Skipped: childcare land use requirement

8 REVIT MODEL SETUP LEARNINGS AND REQUIRED STANDARDS

This phase confirmed that reliable clause assessment is driven as much by model authoring conventions as it is by the assessment logic itself. Across the two multi family projects, we were able to consistently assess a large subset of the clause set when the model contained unambiguous objects, consistent view structure, and stable naming. Where friction occurred, it was almost always traceable to one of three causes: inconsistent representation of the same intent, missing context needed for interpretation (levels, datums, view scope), or elements authored in a way that is valid for documentation but difficult to classify automatically.

This section summarizes what we discovered, what we changed during Phase 3, and the setup requirements for third party CAD and Revit contractors going forward.

1) WHAT WE DISCOVERED

1.1 CONSISTENCY BEATS COMPLEXITY

The assessment workflow performs best when a model is consistent, even if it is not “perfectly” modelled. Small inconsistencies create disproportionate downstream ambiguity, particularly when a clause depends on categorization or counting.

1.2 VIEWS ARE PART OF THE DATA, NOT JUST PRESENTATION

Automated assessment is sensitive to how views are constructed. View range, view discipline, detail level, filters, and view templates can cause duplication, omission, or noisy extraction if not standardized.

1.3 SEMANTIC NAMING IS ESSENTIAL FOR CLASSIFICATION

Where clauses depend on type (for example bicycle parking categories, stall types, loading bays, accessible spaces), family and type naming must carry meaning. If naming is inconsistent or generic, automated categorization becomes unreliable.

1.4 SOME CLAUSES REQUIRE EXPLICIT MEASUREMENT INTENT

Not all compliance questions are represented as a clean Revit object. Measurements such as building height often require explicit intent, supported by a consistent method rather than inference from geometry.

1.5 SPATIAL INTEGRITY AFFECTS POLICY OUTCOMES

Room bounding, area plans, and spatial assignments can materially affect unit metrics and derived calculations. If rooms are misassigned, unbounded, or inconsistently defined, results become hard to trust.

2) WHAT WE CHANGED IN SETUP DURING PHASE 3

2.1 STANDARDISED VIEW APPROACH FOR EXTRACTION

We moved toward a more controlled set of level-scoped views to support consistent extraction and reduce duplication risk. This included tightening expectations around view-to-level alignment and view range.

2.2 IMPROVED CATEGORISATION READINESS FOR KEY OBJECT SETS

Where early results showed “lumping” of types (especially bicycle parking and related facilities), we refined the approach so that model content could be separated at the appropriate level of granularity (type or symbol level rather than broad family buckets).

2.3 ADOPTED CONTROLLED CAPTURE WHERE INFERENCE WAS UNRELIABLE

For requirements where the model did not provide a single unambiguous source of truth, we adopted controlled capture methods so the assessment remained repeatable and evidence-based rather than guess-driven.

2.4 CLARIFIED MINIMUM VIABLE MODEL EXPECTATIONS

We tightened the baseline expectation that certain elements and metadata must exist consistently for the assessment workflow to be dependable, particularly where downstream ratios or linked calculations rely on complete recognition.

3) SETUP REQUIREMENTS FOR THIRD PARTY CAD AND REVIT CONTRACTORS

This is the practical standard to follow for future projects. These requirements are designed to reduce rework, prevent “unassessable” outcomes, and ensure clause assessment outputs are consistent and defensible.

3.1 PROJECT AND MODEL ORGANISATION

- Use a consistent project template that includes the required view templates, filters, and naming conventions listed below
- Maintain consistent level naming and avoid ad hoc level creation that breaks grouping and reporting
- Keep model elements on the correct categories and avoid using generic model elements where a native Revit category exists (native categories are easier to classify)

3.2 LEVELS, GRIDS, AND DATUMS

- Ensure all primary levels are present and correctly defined for the building
- Avoid duplicate or redundant levels that represent the same intent
- Use a consistent datum strategy so height and vertical relationships can be measured reliably.

3.3 VIEWS AND VIEW TEMPLATES (CRITICAL)

- Create a dedicated set of “assessment-ready” views per level (plans, basements, typical levels, roof)
- Apply the same view template logic consistently across all levels, not only the “documentation” level plans
- Ensure view range is constrained to the associated level to prevent element duplication from adjacent floors
- Avoid view-specific overrides that hide or alter assessable elements inconsistently
- Use scope boxes consistently if they are required to control crop regions and graphical uniformity

3.4 ROOMS, UNIT TAGGING, AND SPATIAL INTEGRITY

- Ensure all units and rooms that drive housing metrics are properly bounded and consistently defined
- Avoid placing rooms into unintended spaces (service voids, shafts)
- Ensure area plans (where required for GFA or similar outcomes) exist per relevant level and are consistently prepared

3.5 FAMILY, TYPE, AND INSTANCE NAMING (SEMANTIC NAMING)

- Adopt explicit naming conventions for object sets that require categorization:
- Bicycle parking types (Class A, Class B, vertical, stacked, lockers, oversized, accessible)
- Vehicle parking stall types (standard, compact, accessible, EV, visitor, etc., as applicable)
- Loading and service bays
- Do not rely on generic family names where the type distinction matters for compliance logic
- Avoid mixing different compliance-relevant types under one ambiguous family without clear type naming

3.6 MEASURABLE ELEMENTS AND CONTROLLED CAPTURE READINESS

- Where a requirement requires an explicit measurement intent (for example building height), provide the required reference structure and follow the agreed capture method
- Do not assume that geometry alone will produce the intended measurement without a consistent reference approach

3.7 MINIMUM VIABLE COMPLIANCE-READY MODEL CHECKLIST

- A model is considered assessment-ready when:
- All levels are present and correctly named
- Assessment-ready views exist and use the agreed templates and view range rules
- Units, rooms, and key spatial drivers are complete and bounded
- Key compliance object sets are modelled using native categories and meaningful type naming
- Any required datums or reference structure for measurements are in place

4) WHAT THIS ENABLES NEXT

By aligning third party modelling practices to these standards, the assessment workflow becomes:

- Faster to run and easier to repeat across revisions
- Easier to audit and defend in architectural review
- Less dependent on manual fixes and one-off interpretation
- Capable of expanding clause coverage with fewer “unassessable” outcomes

9 CLOSING SUMMARY

Phase 3 represents the transition from capability development into applied delivery. With the workflow stabilised and key constraints understood from Phases 1 and 2, the focus of this period was to execute clause-by-clause assessments against two real multi-family projects and produce a structured evidence pack suitable for architectural review.

The report demonstrates what is assessable in practice, how each clause was assessed, and the basis for each result using consistent screenshot evidence. It also consolidates the Revit setup standards required to improve assessability and reduce rework when models are produced by third-party CAD and Revit contractors. This positions the next phase around expanding coverage, improving repeatability across more project types, and embedding authoring conventions that make compliance assessment faster and more reliable.

REVIT COMPLIANCE ASSESSMENT SETUP CHECKLIST

Appendix for Phase 3 Progress Report | Vancouver multi-family projects

Purpose: Ensure models are assessment-ready for clause-by-clause zoning and policy checks (minimise rework and unassessable outcomes).

A) PROJECT TEMPLATE AND FILE SETUP

- ☐ Use the agreed assessment template (views, filters, naming).
- ☐ Confirm Revit version, shared coordinates, and linked files strategy.
- ☐ Keep compliance-critical elements modelled (avoid drafting-only geometry).

B) LEVELS, GRIDS, AND DATUMS

- ☐ All building levels exist and are consistently named (no duplicate intent levels).
- ☐ Basements, roof, and any rooftop overruns are represented explicitly.
- ☐ Vertical datums support repeatable height measurement (ground + roof references).

C) ASSESSMENT-READY VIEWS (MANDATORY)

- ☐ One assessment floor plan view per level using the agreed view template.
- ☐ Assessment roof plan view and required elevations/sections are created and named.
- ☐ View range is constrained to the associated level (prevents duplication).
- ☐ No ad hoc overrides that hide or alter assessable objects inconsistently.

D) ROOMS, UNITS, AND SPATIAL INTEGRITY

- ☐ All units/rooms that drive policy metrics are placed and properly bounded.
- ☐ No rooms misassigned to shafts/voids/ducts; resolve unbounded rooms.
- ☐ Area plans exist where required for derived checks (per relevant level).

E) SEMANTIC NAMING FOR CLASSIFICATION

- ☐ Bicycle parking types are explicitly named (e.g., Class A, Class B, stacked, vertical, lockers, oversized, accessible).
- ☐ Vehicle stall and loading types are explicitly named where relevant (e.g., accessible, EV, visitor).
- ☐ Do not group different compliance-relevant types under generic family/type names.

F) NATIVE CATEGORIES AND MODELLING CONVENTIONS

- ☐ Use native Revit categories for compliance-critical objects (avoid Generic Models).
- ☐ Model the same intent the same way across levels (consistent families/types).
- ☐ Avoid duplicated objects representing the same physical item.

G) MEASUREMENT READINESS (HEIGHT AND SIMILAR RULES)

- ☐ Provide the reference structure needed for the agreed measurement approach.
- ☐ Keep key section/elevation views clean and stable for evidence screenshots.

H) PRE-HANDOFF VALIDATION

- ☐ Assessment views open cleanly and show required objects per level.
- ☐ Naming conventions are consistently applied across all critical families/types.
- ☐ Quick visual check: counted objects are visible, unique, and correctly typed.

DELIVERABLES WITH EACH HANDOFF

- ☐ Revit model file(s) and linked file list.
- ☐ Named assessment views set (plans per level, basements, roof, key sections/elevations).
- ☐ Short note listing known exceptions or modelling assumptions.

Note: All items are required unless agreed otherwise for a specific clause or project constraint.

10.9 Archistar Technical Documentation & Workflow

PURPOSE AND SCOPE

This document describes the system architecture and end-to-end workflows used to assess City of Vancouver by-law and policy clauses directly from Revit BIM models, producing traceable pass/fail outcomes with visual evidence.

Scope includes the Revit plugin capture process, ingestion and processing services, rule execution and reporting, the web-based review interface, and the AI precheck components used for imaging and computer vision.

- Primary users: Architects and reviewers (Arno Matis), Archistar Digital Automation team
- Primary outputs: Clause-by-clause assessment results, evidence screenshots, PDF/report exports
- Case studies: Two multi-family Vancouver projects assessed in Phase 3

SYSTEM ARCHITECTURE OVERVIEW

The platform is deployed in AWS and is separated into a control plane and application plane. It uses a VPC with public, private, and secure subnets, and relies on managed services for compute, storage, networking, and security controls.

2.2 CORE COMPONENTS (HIGH LEVEL)

- Front-end delivery: CloudFront and S3-hosted web apps for assessment review
- API layer: API Gateway protected by WAF
- Compute: Backend services in an auto-scaling group; serverless Lambda workers for ingestion, eCheck, imaging, and reports
- Data stores: Amazon RDS (master/replica) for transactional data; Redis for caching/queueing
- Storage: S3 for uploaded assets, intermediate artifacts, and report outputs
- AI precheck: Computer Vision components and Bedrock integration for model/image understanding tasks
- Security: IAM, KMS, Certificate Manager, Guard Manager, VPN for admin access

WORKFLOW: REVIT MODEL TO ASSESSED CLAUSES

3.1 REVIT PLUGIN CAPTURE AND EXPORT

Architects or project teams use the Revit plugin to capture analysis-ready views and compliance-relevant objects. The plugin extracts geometry, metadata, and structured tags needed to support rule execution and evidence display.

- Select assessment-ready views (plans, basements, roof, key elevations/sections) aligned to project levels
- Identify and tag compliance objects (parking stalls, bike stalls, loading bays, unit/room elements) where required
- Capture measurement intent where inference is unreliable (e.g., height lines)
- Export capture package (assets + metadata) for upload

3.2 INGESTION AND NORMALIZATION

Uploaded capture packages are stored in S3 and processed by ingestion workers. The pipeline normalizes units, types, level context, and category mappings so downstream rule logic receives consistent inputs.

- Validate required fields and schema version alignment
- Normalize categories (family/type/symbol mapping) into semantic buckets used by clauses
- Associate objects to levels and views deterministically to reduce duplication risk
- Persist normalized entities in a relational store (RDS) and cache summaries in Redis

3.3 RULE EXECUTION AND RESULT GENERATION

Rule execution applies digitized clauses to normalized model entities. Each clause produces an outcome (pass/fail/not assessed) and links to evidence elements for display.

- Evaluate thresholds and ratios (e.g., unit-driven parking/bike requirements)
- Apply conditional logic based on use context and captured tags
- Generate structured results with traceability: clause → inputs → calculation → outcome
- Store outcomes for web review and reporting

WORKFLOW: REVIEW INTERFACE AND REPORTING

4.1 WEB-BASED ASSESSMENT REVIEW

Reviewers access results via a web interface that mirrors architectural drawing context. Clause summaries link to detailed clause views that highlight relevant elements and show calculations or measurement evidence.

- Summary panel: pass/fail overview and navigation by department
- Clause view: highlighted elements, counts, measurements, and clause rationale
- View thumbnails: switch between extracted drawing views for spatial context
- Evidence-first presentation designed for architectural review

4.2 REPORT OUTPUTS

The system supports report generation workflows that compile clause outcomes and evidence into shareable artifacts (e.g., PDF outputs). In Phase 3, the evidence pack format is optimized for one page per clause with two project case studies.

- Export structured results for downstream formatting
- Generate PDF artifacts and store outputs in S3
- Support versioned report IDs and repeatable regeneration when models update

4.3 OBSERVABILITY AND QA

QA refinements focus on reducing ambiguity and ensuring repeatability between revisions.

Validation checks detect missing inputs, version drift, or misaligned category mappings.

- Schema/version compatibility checks during ingestion
- Deterministic view/level mapping to avoid duplication
- Clear error surfacing (avoid silent missing results)

AI PRECHECK COMPONENTS AND OPERATIONAL CONSIDERATIONS

5.1 AI PRECHECK ROLE IN THE PIPELINE

AI precheck components support imaging, computer vision, and assisted interpretation tasks where raw geometry or documentation artifacts require additional processing. This includes extracting features from views, validating capture completeness, and enabling future expansion into automated plan reading.

- Imaging: generation and management of view images used as evidence in clause reviews
- Computer Vision: feature extraction and validation to support measurement and completeness checks
- Bedrock integration: optional LLM-assisted workflows for summarization, anomaly detection, and QA explanations

5.2 SECURITY AND DATA GOVERNANCE

The architecture uses layered security controls across network boundaries and services. Public access is restricted to the front door (WAF/CloudFront/API Gateway), while stateful services run in private/secure subnets. Encryption is managed via KMS and service-native encryption.

- Network isolation via VPC with public/private/secure subnets
- WAF protection on ingress paths; TLS via Certificate Manager
- IAM least-privilege roles for services and workers
- KMS-managed encryption for sensitive data at rest

5.3 KNOWN CONSTRAINTS AND MITIGATION PATTERNS (PHASE 3 LEARNINGS)

- Area/polygon integrity: complex boundaries or imported reference geometry can affect reliable area extraction; mitigate via controlled area standards and model hygiene
- Semantic classification: naming and type consistency are required for reliable categorization; mitigate via contractor checklist and template enforcement
- Conditional attributes: some clauses require explicit flags when inference is unreliable; mitigate via capture UI fields or standardized tagging
- End of document.

10.10 SolidCAD Report: Design to Design Permit :

DESIGN TO DESIGN PERMIT - MARCH 30 2026

BIM File Optimization for Digitally Automated Processing

EXECUTIVE SUMMARY

This executive summary outlines a structured approach to implementing ISO 19650-aligned information management and model quality practices for Development Permit (DP) workflows.

Step 1 establishes the foundation by leveraging ISO 19650 Parts 1 and 2 to define key concepts such as the Common Data Environment (CDE), roles and responsibilities, and standardized information delivery processes, ensuring consistent data flow, clear accountability, and properly structured BIM execution planning. It also introduces requirements for naming conventions, data standards, and model validation protocols, while optionally incorporating ISO 19650-5 for security considerations.

Step 2 involves a high-level Model Health Check (MHC), which is a diagnostic review of BIM models to assess data integrity, consistency, and compliance with defined standards—focusing on elements such as naming conventions, parameter usage, level of development (LOD), level of information (LOI), and overall model organization to identify gaps and inform improvements.

Step 3 expands this into a detailed MHC with KPI-based compliance, where measurable performance indicators are applied to evaluate model quality, completeness, and readiness for submission or automation workflows.

This last stage is divided into two complementary components: (a) a Revit family review, which evaluates existing families against best practices for performance, consistency, parameter usage, and standardization, providing targeted recommendations for improvement; and (b) the development of family setup guidelines and best practices, which establish clear standards for family including naming conventions, parameter structures, data consistency, and modeling efficiency to ensure long-term usability, scalability, and alignment with organizational BIM standards.

This phase remains in progress and will continue to be refined as additional validation steps are completed. Further alignment and verification against Vancouver bylaw requirements are ongoing to ensure full compliance, with subsequent updates to processes, standards, and recommendations to follow as these requirements are confirmed and integrated.

FAMILY SETUP STANDARDS

Guidelines And Best Practices for Data Consistency and Performance

1. FAMILY AND PROJECT SETUP

- Ensure all required shared parameters are properly exported to the shared parameter file.
- Rename materials to align with company standards
- Verify family subcategories to ensure line weights display correctly
- Insert schedules from the sample file to maintain consistent formatting
- The families were developed in accordance with Vancouver Bylaw requirements, with certain parameters constrained to ensure compliance with those regulations

2. IMPORTANT CONSIDERATIONS

- Do not delete shared parameters unless they are confirmed to be unnecessary
- Do not modify core family data (e.g., family name or family type), as these are used for filtering and sorting within schedules

3. FAMILIES OVERVIEW

3.1. BIKE PARKING

- Bike Parking Tag uses the following parameters:
 - o Mark: Populates the bike parking number
 - o Description: Populates the bike parking description

3.2. WASTE MODULES

- Waste Modules are organized under the Specialty Equipment families.
- Waste Modules Tag uses the following parameters:
 - o Mark: Populates the waste modules number
 - o Type Name: Populates the waste module type

3.3. PARKING ENTRY RAMP

- When working with the Parking Entry Ramp for Hardship Site, the Transition Tamp Rise can be adjusted to fit in the 7.5% to 10% slope as per Vancouver Bylaw
- Use the slope measuring tool after placing the family in the project to ensure slope numbers are correct

FAMILY HEALTH CHECK

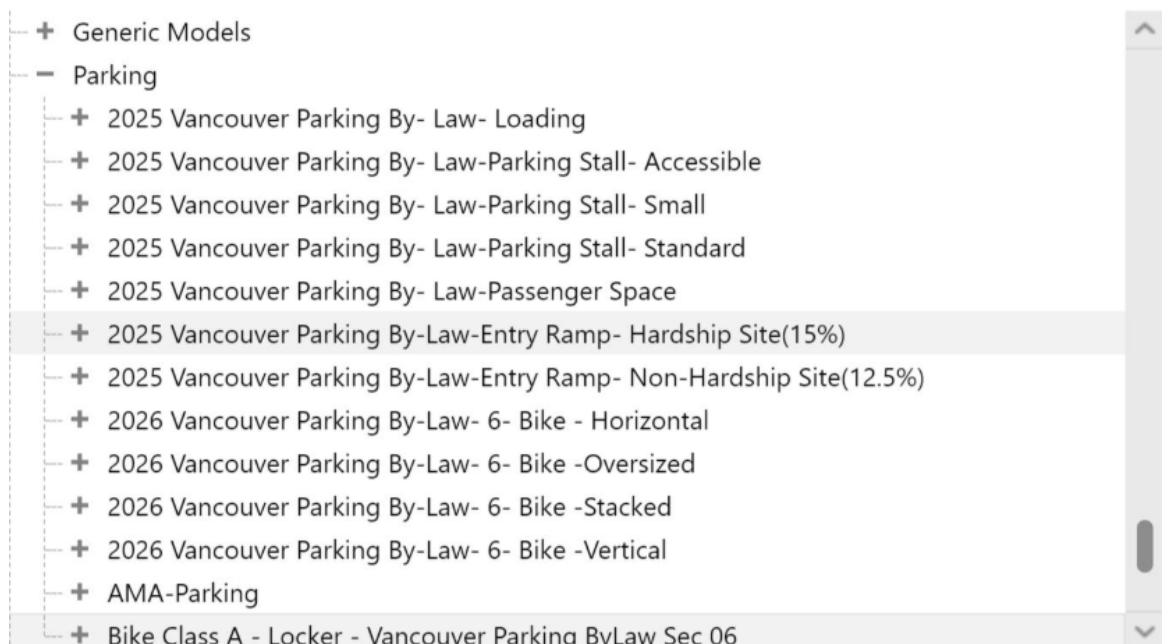
For Internal Use Only

1. PARKING STALL - OVERALL

- Consider using Description parameter for describing main information and type comments for additional information
- If scheduling sizes, consider using shared parameters

2. BIKE PARKING - OVERALL

- Review the naming convention. Make sure spaces and dashes are the same across the families.



- Consider using the Level parameter to sort the parking stalls the per level instead of using Comments.
- Many ways of organizing the schedule. On the left, you can see an example on how we could improve the schedule.

<BK COUNT P01 Copy 1	
A	B
Description	Count
Bike Class A - Horizontal - Vancouver Parking ByLaw Sec 06	
Horizontal Bike Stall	3
Bike Class A - Oversized - Vancouver Parking ByLaw Sec 06	
Oversized Bike Stall	7
Bike Class A - Vertical - Vancouver Parking ByLaw Sec 06	
Vertical Bike Stall	32
Grand total	42

<BK COUNT P01>		
A	B	C
Count	Type	Description
Bike Class A - Horizontal - Vancouver Parking ByLaw Sec 06	Bike Class A - Horizontal - Vancouver Parking ByLaw Sec 06	Horizontal Bike Stall
3		
Bike Class A - Oversized - Vancouver Parking ByLaw Sec 06	Bike Class A - Oversized - Vancouver Parking ByLaw Sec 06	Oversized Bike Stall
7		
Bike Class A - Vertical - Vancouver Parking ByLaw Sec 06	Bike Class A - Vertical - Vancouver Parking ByLaw Sec 06	Vertical Bike Stall
32		
Grand total	42	

- Level of Detail – How did you determine the LOD?

- Consider cleaning up the families and the geometry of the families to include only what you need to show.
- Data versus Model
- Remove unused parameters

About parking tags

- Consider standardizing the type of information used in the tags, for example, the Description could be used to add Main information about the parking, and type comments could be used for additional information such as the size of the parking stall
- Check if the parameters are grouped in the same way
 - For example, if Width, Aisle Width, Clearance Box Height and Depth are grouped under “Constraints”; any other dimension will be grouped under “Dimensions”; Yes/No graphics are grouped under “Visibility”
 - Keeping the grouping consistent will improve the understanding of the family construction and make it easier for other users too.
- Consider applying the same Clearance material to all Bike Clearance boxes and add them to Hidden Lines subcategory. That way you don't need to turn on and off the clearance box. (Unless there is another reason)
- Standardize object styles subcategories.

A. PARKING – BIKE LOCKER

- Door 2d graphic only works for panel line, not for swing line
- Brackets – check if they suppose to be offset. Consider locking them.
- Clearance box overlaps the locker geometry.
- Either remove clearance box or create parameter to control the clearance box height.
- Verify height of geometry. It is not 1.9m as it says in the DRAFT Report file.
- There is shelf support but no shelf. Is that how it suppose to be?
- Are all parameters controlling a geometry or is needed for data? If not, clean up the parameters
- Check if origin point makes sense. Can also use reference lines for aligning / snapping when placing the family
- Width and Height are shared parameters (although not used in schedule), Depth is family parameter. Consider using all as shared parameters and schedule the sizes for accuracy. Same for Clearance Height. Or if you are not scheduling the sizes, turn all shared parameters into project parameters.
- You can also gray out the “Locked” Dimensions such as Width, Height, Depth and Clearance Height so other users don't modify those dimensions.
- Are you scheduling material finishes? If not, consider creating those are family parameters instead of shared parameter

B. PARKING – BIKE – HORIZONTAL AND OVERSIZED

- Verify if all geometries have the material associated to a parameter or if has a material assigned to it. Check all families

C. PARKING – BIKE – STACKED

- Clean up materials
- Consolidate the parameters, for example Unit Width and Width, Unit Depth and Depth
- Clean up Parameters: Convert Shared Parameters into Family Parameters if not used for Tagging or Scheduling.
- This family is a face base family. Consider recreating it as non hosted family to match the other bike parking families.

-

3. WASTE MODULES – OVERALL

- Clean up parameters and unused reference planes
- Consider renaming parameters to match parking stalls, try to make them as similar as possible.
- If using abbreviations, use in all of them.
- Consider adding material parameters to all families
- Check the aisle dimensions, some says 1.5 instead of 1.2. Then consider creating the
- Aisle distance parameter to match the other families

4. PARKING ENTRY RAMP

- Make sure the Type Comments and Description match the for Non Hardship families.
- Verify if Clearance box exists in the family.
- Use the Slope measuring tool to measure the slope of the ramp. That way you have a accurate slope in case client uses a different slope for example in the transition ramp that could vary from 7.5% to 10%
- Remove excess of geometry, dimensions and reference plane if not in use – Non Hardship 12.5% family.

5. BULK STORAGE

- Consider organizing any fixed value under Constraint similar to how the report shows.
- The family in the project seems different than the family in the Report.
- Under Storage Width parameter, if Max Area is a fixed number, could the formula be “Max Area / Storage Depth”?
- As best practices, create reference planes and lock the family geometry to the reference planes. The dimensions should be associated to the reference planes. This gives stability in the family.
- As an option, you can also add a label in the family that represents dimensions of the storage unit. Or add it to a schedule
- Duplicate the types, to separate In suite from below base surface, similar to how it is indicated in the report.
- Analyse if the parameters could be created as instance parameters. That way the sizes can be adjusted using the grips to fit in the space without the need of creating multiple types.

6. PUBLIC WASHROOMS

- The parameters of the family in the project is different than family in the report
- Check if all geometry has material parameter assigned to it.
- Check origin point, does it makes sense?
- Create reference planes, especially the ones the determine the boundaries of the overall stall, this helps alignment when placing in the project.
- If the families nested in the Accessible stall will be scheduled, consider creating the components as Shared families.
- If not in use, clean up Depth and Width parameters
- Consider adding the washroom accessories a material parameter as well

7. BEDROOM – VANCOUVER HOUSING DESING & GUIDELINES

- Consider combining the parameters below and add a not(Parameter) formula if only two options are available. When more than one option, consider using if-clause.

11.0 APPENDIX: EVENTS

Milestone 1 Events: APRIL – NOVEMBER 2025: PROJECT INITIATION & SETUP: DATA GATHERING:

-Meeting: digital grant kick-off mtg

June 16

-BIM protocols discussion with SolidCAD, automation discussion with ArchiSTAR

-AMA + U prepared address selection #1 & policies

-DTES Zoning Review

-Downtown Zoning Review

-Downtown Zoning Review /Site Search

Issued June 27.

-427 E Hastings St. (Downtown East Side- sub area 1)

-AMA + U regulatory framework automation options- draft 1 for ArchiSTAR/SolidCAD review

Issued June 27.

-Development permit (DP) automation components:

-Drawing list requirements - based on the DP checklist.

-Automating DP Application Items Spreadsheets

-Vancouver bulletin requirements -quantifiable guidelines extracted from city bulletins.

-Vancouver department requirements - quantifiable items organized by department.

-AMA + U prepared a master schedule

11.1A- JULY 2025: STANDARDS & EARLY AUDITS: DATA GATHERING:

-Establishing Revit Models: Revit Plans/Sections/Model

July 07

- Create Map of Departments- high level regulations

-Digital Project Schedule

July 09

-AMA + U + u prepared address selection #2 & policies:

Issued July 10.

-109 e hastings St. (Downtown East Side- sub area 1)

-Meeting: digital grant meeting

July 11

-AMA + U prepared base Revit files established for pilot sites (25ft and 50ft).

July 11:

-Case study projects confirmed; 50% audit milestone defined.

-Meeting: SolidCAD review

July 16

- BIM standards clarified; naming conventions agreed.

- Meeting: digital supercluster meeting

July 21

- Regulatory Data framework initiated; iso workshop planned; audit framework in development.

- Master schedule- SolidCAD comments received/coordinated

July 21.

- Developing Revit Files Ongoing

July 23

- Marketing meeting with Sydney.

- Internal Standards Review

July 28

- Report Draft Created

- AMA + U regulatory framework automation ongoing

July 31

11.1B- AUGUSTUST 2025: REFINEMENT & REGULATORY DATA DEVELOPMENT: DATA GATHERING

- Meeting: SolidCAD ISO workshop mtg

August 1

- Iso series doc and model health check received from SolidCAD.

- Meeting: digital grant mtg

- Schedules/Standards Guidelines Established per Workshop

- Prioritizing and Scheduling Regulatory Checks per level of difficulty

August 12

- Marketing

- Master Schedule Ongoing

- Digital Standards Templates

August 14

- Meeting: digital grant mtg (Meeting with Archistar and SOLIDCAD)

- Drawing sets updated following SolidCAD review.

- AMA + U updated the schedule and Regulatory Data excel sheet organized per department

- Policy standards matrix created: automatable items categorized by department.

- Draft BIM standards formatted to align with iso 19650.

August 18.

- Review of SoliCAD Model Health Check(7/30/2025)

August 20

- Model/s Cleanup & Standards

+ Keynote Research, +Model Health Checklist

August 25

-Promo Roll Out: Name Options, Pitch, Long Description

August 26

-Review ISO governance task list, Review/Edit wall type and Family

-Model/s Cleanup & Standards

+Model Health Checklist

+ISO Terminology Review/Translation

August 27

-Excel Spreadsheet Response to SoliCAD:

-ISO & Model Health Report

-109/1580 Cleanup per Model Health Report

+Python

+Dynamo

+TwinMotion Review

August 28

11.1C - SEPTEMBER 2025: EXPANDED REGULATORY DATA & AUTOMATION

FOCUS: DATA GATHERING

AMA ISO Doc Response

AMA Model Health Checklist Response

AMA DRAFT Standards Template Sent

AMA Summary of Work(Templates/Standards, BIM Management, Cleanup Report)

Redacted Prior to Letter Out

Sept 02

Digital Grant Meeting

Sept 2

Draft Report Outline Ongoing

Sept 3

Establishing Revit Families Library

Sept 05

-Meeting with SOLIDCAD.

-Digital- Report Outline Brainstorm Session- Internal Mtg

Sept 09

-Latest Revit Files Issued (109 & 1580)

Sept 11

-Digital Promo.

Sept 19

-Report Ongoing

Sept 22

-Digital Grant Meeting

-Digital- Report Outline Brainstorm Session Internal

Sept 23

11.1D- OCTOBER 2025: EXPANDED REGULATORY DATA & AUTOMATION FOCUS DATA GATHERING

Milestone Report.

Meeting with SolidCAD and Archistar

Digital Internal- Archistar Package Review

October 06

Marketing materials issued

October 09

MULTI-AR Logo created. Article publication.

October 16

Residential unit mix layout 1,2BED

1580 Residential unit mix layout 3BED

October 20/21

Prepared 1580 drawing set, check list and AMA standard sheets

Digital Grant Meeting

October 22

DIGITAL – Checkin and Report Framework Internal Mtg

October 24

Review Minutes/Issue Report

October 27

AMA+U / Archistar—Arno & Markkus customer story interview

October 29

SolidCAD blog post. Newsletter Analytics.

October 31

11.1E- NOVEMBER 2025: TESTING & REPORTING

Digital Internal Team Meeting

Digital Grant Meeting

November 5

Research Data.(AM) Ongoing

November 06

**Proofreading: Aligning Projects to the Digital Roadmap Pillars
& Internal Mtg**

Digital Transformation Webinar on Municipal adoption

November 13

Data research. Archistar package for publication.

November 14

Modern methods of construction workshop attendance with Arno (Amey)

November 18

AMA Digital Meeting

Digital Grant Meeting

November 19

Pillars and publication.

November 20

Data Research Ongoing

November 24

Archistar Publication.

November 25

Milestone 2 Events: DEC 2025 – FEBRUARY 2026:

11.2A- DECEMBER 2025: TESTING & REPORTING

Multi-AR Project Meeting.

Digital Grant Meeting

December 3

Archistar article. (Karla)

December 18

Milestone Report #2

December 29

11.2B- JANUARY-FEBRUARY 2026 SYNTHESIS & REPORTING

-Formalized authoring-layer thesis

-Completed structured report draft.

-Prepared demonstration models and compliance outputs.

-Concurrent Projects Research

General

-Report

General/Ongoing

-Canada Build Homes Slideshow Presentation Setup

Jan 13-Jan27

-Mtg

Jan 28

-Digital-Revit MiltiAR plugin set up for DPL (digital public library)

Jan28

-Build Canada – Presentation

Jan 29

-Families/Research – Setting up DPL

Feb 04

-DPL: VBBL WC Stalls: Accessible/Mobility/Standard

Feb 06

-BIMbc Slideshow Presentation Setup

Feb 17

-BIMbc February Industry Event at Ledcor

Feb 18

Website Development/Setup for Multi-Ar.

Feb 19

Digital Policy Library, Research, and Reporting

Feb 20- Ongoing

Milestone 3 Events: DECEMBER 2025 – FEBRUARY 2026: DATA ANALYSIS, FINDINGS & REPORT DEVELOPMENT

11.3 A: REPORT DEVELOPMENT & TEAM REVIEW

- Compiled and reviewed project data tables.
- Summarized the BIM and automated review process and early findings.
- Prepared the initial case study report.

11.3 B: JANUARY 2026: FINDINGS, RECOMMENDATIONS & TEAM REVIEW

- Examined BIM authoring practices and data requirements for automated review.
- Developed recommendations for optimizing BIM information for digital assessment.
- Explored opportunities for replication across private- and public-sector workflows.
- Reviewed and revised the report with project team input.

11.3 C: FEBRUARY 2026: REPORT REFINEMENT & PRESENTATION MATERIALS

- Refined the report's findings, supporting graphics, data tables and layout.
- Completed the case study report in PDF format.
- Adapted summary content for website use and conference slideshow presentations.

Milestone 4 Events: Phase 2

JUNE 15 – OCTOBER 31, 2026: COURSE DEVELOPMENT & INDUSTRY OUTREACH

11.4 A: JUNE 15–30: WORK PLANNING & PRESENTATION DEVELOPMENT

- Prepared the Phase 2 work plan.
- Began updating the presentation slideshow around Phase 2 objectives.
- Organized research and case study findings for educational use.

11.3 4: JULY–AUGUST: COURSE DEVELOPMENT & SUPPORTING RESEARCH

- Developed the four-module course outline and knowledge-check requirements.
- Adapted report and presentation content into course lessons.
- Advanced BIM research, testing and practical demonstrations.
- Refined graphics, diagrams and explanations.
- Developed interactive zoning DPL examples for setbacks, building height and tower separation.
- Created and edited course video content.
- Received access to Archistar's video courses.
- Explored continuing education recognition through AIBC.

11.4 C: SEPTEMBER: WEBSITE PREPARATION & CONFERENCE OUTREACH

- - Advanced the course slideshow and presentation materials.
- - Prepared the Multi-AR website for course delivery, including video hosting, a completion quiz and attendance tracking.
- Presented at the MISA BC Conference in Kelowna, September 21–24.
- Advanced promotional planning and materials.

11.4 D: OCTOBER: COURSE COMPLETION & CONTINUED OUTREACH

- Extended the Phase 2 completion date to October 31 through approved Change Order 002.
- Completed the four-module course, voiceover and supporting demonstrations.
- Made the course and supporting resources available on the Multi-AR website.
- Prepared the first social media post for public promotion.
- Continued the AIBC review process for learning-credit eligibility.

- Presented at the BIM BC Summit, October 26.

11.4 E: UPCOMING OUTREACH BEYOND THE REPORTING PERIOD

- DIGITAL Open Doors — November 12, 2026.
- BUILDDEX — February 2027.