

BUILDER INSIGHT



BC HOUSING
RESEARCH CENTRE

Bulletin No 5 | 330 Goldstream Avenue

Digital Tools: Social Housing Project

Located in the City of Colwood in the Capital region of Vancouver Island, 330 Goldstream Avenue comprises 102-units of non-market housing for individuals, couples, and families with low-to-moderate income.

Developed by the Greater Victoria Housing Society (GVHS) and funded by BC Housing, the six-storey wood frame building comprises 6,121m² (65,862ft²) of gross floor area over two storeys of underground parking.

The building accommodates a range of unit sizes – 50 studios, 39 one bedroom, one two bedrooms and 12 three bedrooms.

Digital Tools: Project Management and Lean

Kinetic Construction, the general contractor for 330 Goldstream, led the adoption of a suite of digital tools. Kinetic helped the owner, consultants and construction team to build proficiency with the tools, and served as technical support.



Last Planner with Slat Planner software in the Big Room. (Source: Scius)

This bulletin series covers different aspects of this innovative social housing project. Find them all in the BC Housing Research Centre Library.



FACTS AND FIGURES

Construction timeline:

January 2019 – May 2021

Construction budget:

\$18.99m

Residential units:

102

Site area:

3,820m² (41,103 ft²)

Total Gross Floor Area:

8,323m² (89,555 ft²) inc. Parking

Gross Floor Area, Residential:

6,121m² (65,862ft²)

Building Height:

23.9m (78.4ft)

Occupancy Classification:

BCBC 2012, Group C- Residential (6 levels), Group F3 – Garage (2 levels)

PROJECT TEAM

Owner:

Greater Victoria Housing Society

Architect:

Cascadia Architects

Envelope and Energy modelling:

RDH Building Science

Structural Engineering:

RJC Engineers

Building Code and fire science:

GHL Consultants Ltd.

General Contractor:

Kinetic Construction

Timber and prefab. installer:

Ron Anderson & Sons

Timber panel fabricator:

ZyTech

Siding contractor:

Brytar Contracting

Research management:

Scius Advisory

Lean coach:

Shift2Lean

Video, webcam and photography:

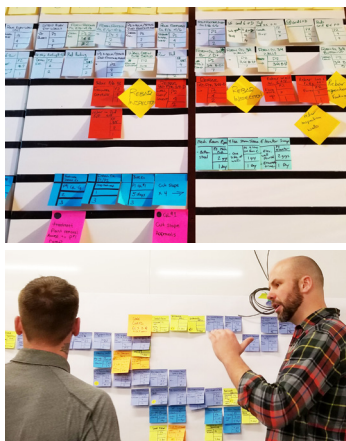
Multivista

Shortcomings of “Analog Lean”

330 Goldstream is an innovative housing project that used Lean project delivery (“Lean”). Lean is a project-wide collaborative process that comprises the application of Target Value Design and Lean Pull Planning (see Bulletin #2: Lean Construction Practices) with a view to improving productivity and efficiency.

Collaboration for Lean is typically done in the “Big Room”: a large permanent meeting space. Over a shared planning board, the team uses sticky notes to plan, replan and adjust the scheduling of activities the project as it progresses. This planning board is left up in the Big Room for reference, allowing the owner, trades and consultants to keep track of what has happened, what will happen, and when. The planning board is updated weekly during pull planning sessions, and maintains a rolling 2-6 week outlook.

This analog method is perfectly serviceable for smaller, simpler projects. However, 330 Goldstream’s tight schedule, ambitious environmental performance goals and the size of the project exposed several weaknesses to the sticky note planning system.



Goldstream’s Lean planning boards.
(Source: Scius)

Right: Digital tools were not a replacement for collaborating in person. (Source: Scius)

Planning Board Management

The wall space needed to properly plan out the 330 Goldstream schedule with all its complexity exceeded what was available in the Big Room. In addition, Lean planning progressed quickly and grew to accommodate more trades as they came on board. The Lean plan became unwieldy and time consuming to continually adjust, with hundreds of sticky notes being added or removed as each week finished.

Team Communication and Lean Plan Dissemination

On simple projects, photos of the board can be shared as it is updated. For projects like 330 Goldstream, multiple photos were needed, which often became confusing. With several team members being based off-island, reviewing the board in-person was not always convenient, eroding the planning board’s usefulness.

Information Management

Lean planning is only one component of understanding the project’s progress. Upcoming tasks and requirements, change orders, site instruction, etc. also need to be read together. This was hard to track in sufficient detail, especially over the 26-week planning board 330 Goldstream needed to manage the project’s schedule.



Digital Tool Suppliers

The 330 Goldstream project and research teams both received active support from the digital tool suppliers. *Contact the suppliers about how they can support your project (pages 4 and 5 of this bulletin).*

330 Goldstream Team Digital Tools Review

As the General Contractor and Lean Champion, Kinetic Construction led the piloting of digital tools to address some of the drawbacks of analog Lean Project Delivery.

Procore Construction Management Platform

www.procore.com

According to Procore’s website, their construction management platform “helps firms drastically increase project efficiency and accountability by streamlining and mobilizing project communications and documentation. This real time data and accessibility minimizes costly risks and delays—ultimately boosting profits.”

Procore is a web browser-based project management program. Kinetic required team-wide adoption of the platform to provide the project team with centralized real-time information on project progress. Lean project delivery relies on all team members having easy access to up-to-date information, so they can make priority decisions at the right time. The Procore platform was the go-to repository for critical information such as change

orders, requests for information (RFIs), site instructions and project communications, as well as for site progress photos.

Information Dissemination

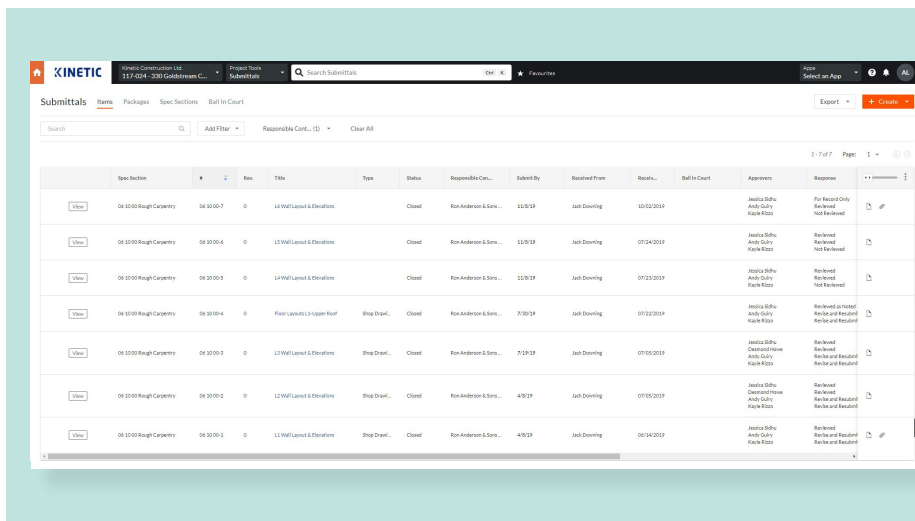
Procore’s platform allowed the 330 Goldstream team to post proposed and approved change orders, change directives, site instructions – their deadlines and who was responsible, as well as other important project and contract information such as change orders.

Official Information Source

The 330 Goldstream team found Procore’s ability to reference emails and communications with project documents very useful. This feature allowed the team to clearly declare and confirm the final approved outcome of a communication and to link it to the correct documentation.

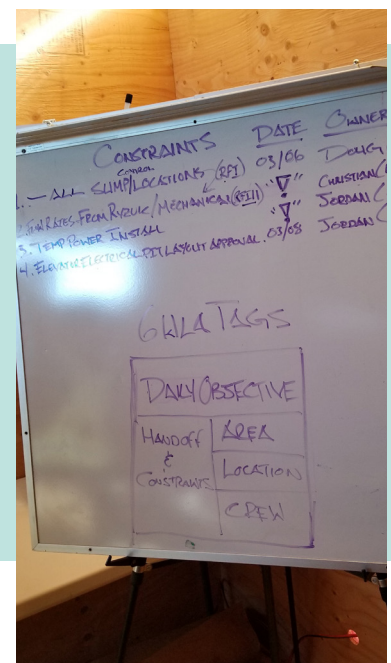
Procore team training

Kinetic assigned a dedicated coordinator to administrate, train and manage the Procore system for the project team. The coordinator was responsible for ensuring that all the team members were able to fully utilize the software, so that the team could hit the ground running once construction picked up.



Procore provided a centralized platform where the project team to access digital versions of project information, contract documents and communications, etc.

(Source: Scius)



Buildfore Slatplanner

www.buildfore.com/products/slatplanner

Buildfore is a US-based start-up that has developed Slatplanner – a digital Lean planning board. A Beta version was tested by Kinetic on the 330 Golstream project, supported by a research funding grant from BC Housing.

Slatplanner digitizes the physical Lean planning board from the Big Room. Re-useable 3D printed plastic slats with scannable QR codes are easily attached to slat boards mounted on the Big Room wall. The system was neat, easy to read, robust and, unlike the paper sticky notes, were not at risk of falling off the wall.

In parallel to the physical slat board, Slatplanner also creates a digital twin of the Lean planning board that can be shared via a companion, smartphone enabled app. The Slatplanner app is designed to be live, updating after each weekly Last Planner session. After each meeting in the Big Room, Kinetic scans the QR codes for edited slats, which updates the digital twin. The app alerts key members, ensuring the project team is aware of changes and are up to date on the Lean schedule and plan. However, there were two challenges.

Updating the app took time

Scanning Slatplanner's QR-coded slats to update the digital twin of the schedule was no faster than the analog sticky note method as the beta version still required Kinetic to manually enter information and check the digital slats.

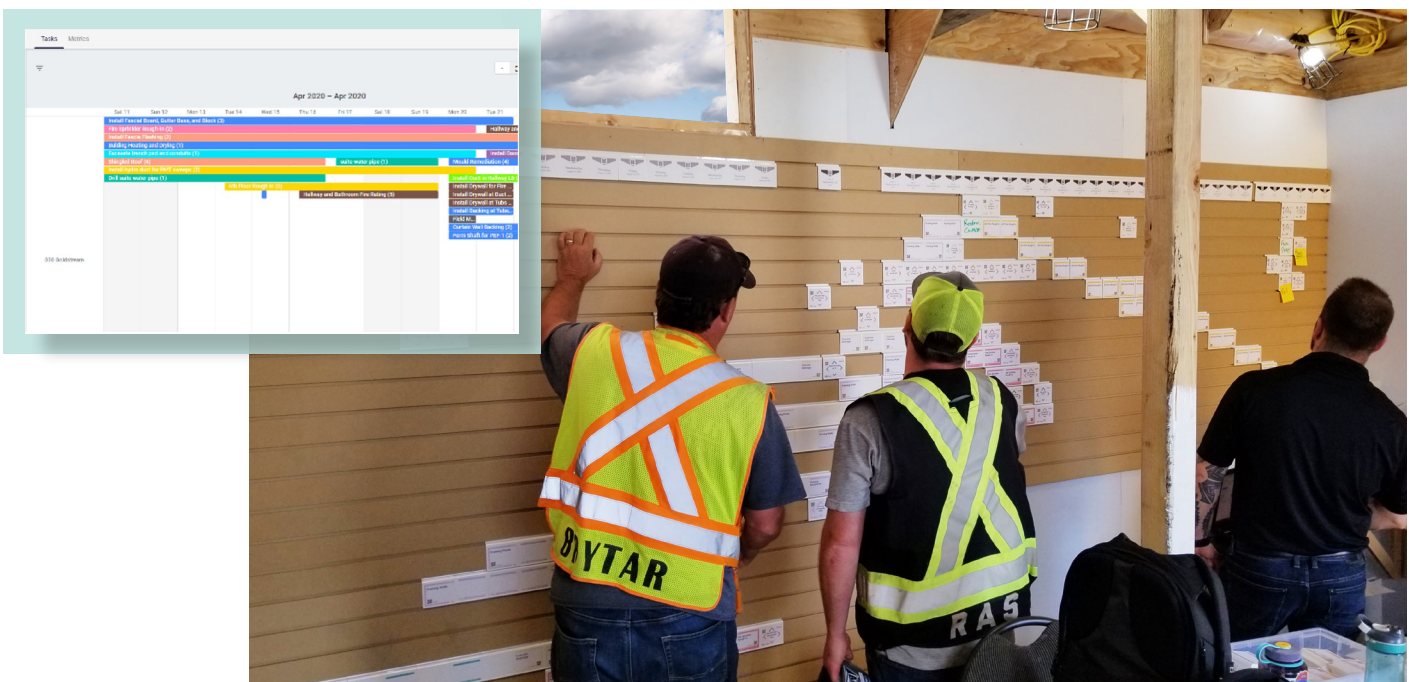
Relationships are not represented

The beta version of Slatplanner had difficulty documenting and showing task relationships. On the physical planning board, the project team could use stickers, mark the slats with reference numbers, or use string to show task associations. The beta release of the digital app did not have a method to document these critical details at the time.

TouchPlan

<https://touchplan.io/>

Due to COVID safety precautions, Kinetic adapted their Last Planner process by utilizing TouchPlan, an on-line, interactive platform that allowed remote connection to planning sessions. Elements of the in-person Last Planner meetings could then continue, such as the use of virtual sticky notes to plan the tasks ahead.



Slatplanner uses 3D printed slats with QR codes to digitize Last Planner for team dissemination and to assist with planning outside of the Big Room. (Source: Scius)

Multivista

(www.multivista.com)

Multivista is a construction photo and video documentation, offering high quality photo, video, and “pan-able” video documentation and webcam services.

Multivista’s Victoria team was engaged as part of the research project to document the entire construction process. Multivista installed a 24/7 webcam, compiled monthly progress shots from fixed locations, inside and outside the building and conducted 3 drone flights:

- At the start, documenting the site,
- When the timber structure was complete, and,
- At project completion.

They also provided video documentation services for project milestones such as team onboarding, Lean coaching, team interviews, a tour of the prefabrication

plant and for the air tightness tests. All of Multivista’s documentation was hosted on their online platform which was accessible to the entire team through Procore. While not directly related to the Lean project delivery process, Multivista proved to be a highly useful tool for the owner and project team.

24/7 video feed

One of Multivista’s most used services for Goldstream was the 24/7 webcam. While this required cooperation and negotiation from a neighbouring property owner to mount and power the camera, the benefit of being able to monitor progress, weather and site activity was helpful.



Multivista’s Webcam, procured as part of the research team’s service, was highly useful for the 330 Goldstream project team. (Source: Multivista)



Multivista provided video documentation of the blower door test.
(Source: Scius)

Milestone documentation

The project team documented the moisture and blower door tests on video – complete with on-camera narration from the envelope consultant. Documenting and disseminating these major milestones provided a useful supplement to traditional testing reports.

Operations manuals

GVHS hired Multivista directly to record high quality instructional videos to supplement 330 Goldstream’s O&M manual. These videos were hosted on the Multivista platform. They are easier to follow than paper-based O&M binders. In the future, GVHS may also consider Multivista services for tenant/occupant user guides that can be hosted and accessed on-line.

More functionality available

Multivista offers more functionality than was used on 330 Goldstream. For example, for projects that use BIM, Multivista offers 3D scans to BIM/CAD, scalable photo records (i.e., measurable images) and virtual walk-throughs linked to BIM models, all accessible from a web-based platform, were of particular interest to the project team for future projects.

Project Challenges

The project team faced several challenges with the Last Planner process as construction progressed, which affected the deployment of digital tools. Nevertheless, except for Slatplanner, all the digital tools were utilized through the entire project, providing the project team with a good depth of technical experience for future projects.

Revit: BIM for construction

The consultants partially utilized Building Information Modelling (BIM) for design, but the digital model was not developed sufficiently for Kinetic to use for construction. The consultants recognized the model was created without input from the general contractor and lacked the detail required for planning or construction. Kinetic noted this is a key benefit to Lean’s early team on-boarding. However, the model was eventually shared “for information only”, where Kinetic found the digital model a very useful 3-dimensional reference for site instructions or change orders.

Last Planner scalability

The level and complexity of Lean and Last Planner deployment can vary depending on the project requirements. Kinetic, the only team member with Lean experience, suggests that other project teams carefully assess the project ambitions and needs as well as the team’s capacity for new practices (i.e. willingness to learn how to use Last Planner) in order to determine what scopes of work will benefit most from Lean practices. Only then can the team collectively make a commitment to follow through fully to completion. On 330 Goldstream, the focus of the Lean process was on the prefabricated wood structure and envelope.

Digital tools: COVID-19

COVID-19 health and safety measures meant that there were limits on the number of workers that could meet face-to-face indoors. Lean meetings had to be abandoned. As a result, Lean shifted into telephone and online meetings, but with mediocre results. After a few months of attempting to continue with Lean through alternative methods, Kinetic made the difficult decision to curtail the weekly all-hands Lean planning sessions.

Lean-related digital tools

Lean's overarching principle of eliminating non-value add activities and waste must guide the selection of the digital technologies. Early on, the project team should assess the cost-benefit of potential digital aids for Lean practices. The 330 Goldstream experience highlights how the practical value of Last Planner comes from the task preparation process, which current software cannot sufficiently support, whereas analog methods such as sticky notes (with notes, string, etc.) can only provide limited functionality.

Digital tools do not replace Lean principles

The use of digital tools for Lean can help to deliver a successful project. Kinetic explained that Lean is a defined management practice that is rooted in constructive and proactive collaboration and joint decision-making. It takes commitment and effort by all parties. Digital tools are enabling tools that do not replace or diminish this commitment.



*Kinetic Construction leading a Big Room planning session during COVID-19.
Source: Kinetic Construction*

Acknowledgement

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