

Case Study Title: The Grange Development

Company Overview | JOHN PAUL CONSTRUCTION | johnpaul.ie

Established in 1949, John Paul Construction are leading international construction specialists with expertise across all sectors, including Data Centres, Pharma / Life Sciences, Industrial, Healthcare, Commercial and Retail, Fitout, Residential and Student, Tourism and Leisure, Public, Transport, Energy / Renewables and Civil Infrastructure.

The pursuit of excellence is at the heartbeat of our organisation, and our people are constantly exploring ways to improve our performance. We believe in collaboration and an all-party alignment as the best way of achieving maximum results for our clients, and this approach to project delivery is built around our core values of

Excellence, Respect and Teamwork.

We provide a comprehensive range of construction services to our clients, such as Early Contractor Involvement (ECI), preconstruction services, Integrated Project Delivery (IPD), management contracting, design and build, partnerships/turnkey arrangements as well as traditional contracting.

With offices in Dublin, Cork, Galway, London, Amsterdam, Riyadh, and Bahrain, we have the scale and resources to deliver large and complex projects.

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Overview & Background to the Lean Initiative

As John Paul Construction expands and grows as a business, how we deliver our projects continues to evolve and improve. We continuously seek new and innovative ways to deliver our client's projects and as the pressure to reduce project programmes increases, the need for efficient management and short-term planning is ever greater. With this in mind, we have continued to expand on our Lean Initiatives.

Having successfully used a Lean approach on multiple projects over the past 5 years, we are continuously expanding our knowledge and expertise of Lean techniques across the company. In the last 12 months, we have successfully delivered several large projects including a 48MW data centre in Louth, a 34,000m² beverage manufacturing facility in Kildare, and the Civil-Structural-Architectural (CSA) scope for 19,000m² Biopharma facility in Meath. All these projects were delivered on time and to the highest quality utilising lean techniques throughout. To the forefront of this was the implementation of the Last Planner® System (LPS). The use of LPS was key on all three projects as the fast-track nature of the projects required communication, collaboration, and teamwork to ensure successful delivery. As well as the LPS, digital tools such as Field View, Dalux, and BIM 360 were also used to great effect for managing and tracking these projects

The following case study will focus on how Lean initiatives, and in particular, the Last Planner® System (LPS) along with the cloud-based software FieldView, is aiding the successful delivery of the Grange Development in Stillorgan, a 287-unit residential scheme, as it enters its final phase.

Project Overview:

The project comprises the construction of a 287-unit residential scheme, a creche to accommodate 23 staff and 115 children, a substation for the development, along with all ancillary external works and utilities to service the site. The 287 residential units are spread across six new blocks ranging in height from 5 to 9 storeys. The project commenced in October 2020 and is scheduled for completion in Q2 2023.



Figure 1: Digital Render of Grange Development

Key Features:

- Design, construction, and fitout of 287 apartments over a 3,500 m² basement.
- 6 blocks ranging in height from 5 to 9 storeys.
- Precast concrete twin wall frame.
- Cast-in electrical services in precast walls.
- Use of Sapphire light weight glide-on balcony system.
- Exhaust air heat pump system to achieve Part L.
- BREEAM Excellent rating.

**Figure 2:** Grange Development

Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

The overall project duration for the Grange Development is 2.5 years, including covid delays. On projects of this duration, it is important that our planning approach keeps both medium and long term milestones in mind. This is where we feel Lean initiatives and techniques have proved invaluable in ensuring the project team continuously tracks the work and monitors progress against agreed milestone dates, while also striving for improvement on site to see if enhancements to the construction cycles can be implemented.

Last Planner

From the outset, the goal for implementing the Last Planner® System (LPS) on this project was to manage the short-term planning and ensure the flow of work on the project was maintained and unconstrained. Although we had implemented LPS on previous projects, it was new to some members of both our management and subcontractor teams, and we therefore organised introductory sessions where walkthroughs were completed, ensuring the team got up to speed quickly. There was excellent buy-in from the subcontractors to the LPS as they could immediately see the benefit of having the plan in front of them and any constraints closed out to give them a clear flow of work.

The LPS was key to driving the coordinated planning of the basement construction right through to the main structures and envelope for each block. Due to the scale of the project, the LPS was implemented on a block-by-block basis with separate pull plans prepared for each, and an overall master pull plan tracking the main overall deliverables. The project managers for each section worked with the sub-contractors to generate the initial Pull Plan and agreed the key milestones for each section. Following this, crossover points between the blocks were managed via regular communication between the team leaders. The organisation of regular meetings and huddles to facilitate the pull plans, weekly planning sessions, and daily huddles proved a challenge, but all members of the team, with continued support, ensured that the system was bedded-in over time, allowing for a successful outcome on the project.

The system was broken into several steps to give everyone a clear understanding of what was involved in each step.

Step 1 – Pull Plan Sessions

- Key milestones were identified within 6-8 weeks and issued to the full site team to allow everyone to prepare information for the Pull Plan Sessions.
- Pull Plan Sessions took place every 3-4 weeks with new 'trains' and milestones 'pulled' as the project progressed.
- The session involved all the relevant John Paul Construction (JPC) team including site managers, engineers, project managers and M&E coordinators, plus all relevant subcontractor supervisors.
- Initially, workshops were completed using virtual MS Teams meetings due to Covid-19 restrictions but were then completed in-person in an external marquee to facilitate adequate social distancing.
- Activities were 'pulled' back from the milestone, creating 'trains' or flows of work.
- Any constraints were logged, a person assigned to close out, and a 'need by' date identified.

Step 2 – Weekly Work Plans (WWP)

- Ahead of the Weekly Coordination Meeting (WCM), Weekly Work Plans were submitted by the subcontractors outlining their intended work for the upcoming week.
- This would be in line with the Pull Plans with more detail on required resources and work fronts.
- These were coordinated into a Master-WWP document ahead of the WCM.

Step 3 – Weekly Coordination Meetings

- These weekly meetings took place on the same day and same time every week for 1 hour only.
- Pull Plans were reviewed along with any overdue or new constraints.
- The previous weeks performance against the WWP was reviewed.
- The upcoming weeks WWP's would be reviewed, coordinated, and agreed.

Step 4 – Daily Huddle

- Daily huddles took place every day for 10-15 minutes to discuss the planned works for the day.
- Any new constraints were discussed, and recovery plans put in place, if required.

Step 5 – Tracking Variance

- From the Weekly Coordination Meetings, the performance of the weeks progress was tracked.
- Regular causes of variance could then be reviewed, and appropriate action taken.

The system worked well throughout the basement, substructure, superstructure, and envelope works of the project, ensuring we kept on track, with what was a complex and aggressive programme sequence. As the project progressed and fitout works commenced, we looked at utilising a digital approach to tracking progress on the project.

FieldView

To accurately track our fitout works, we switched the approach and began using the cloud-based software FieldView. This software allowed the entire team, including subcontractors, to manage safety inspections, quality observations, BCAR inspections, snagging, technical queries, benchmarking, and sample approvals, as well tracking the fitout works through the QC Internal Finishes Tracker. This tracker controlled both the programme and quality documentation required during each phase of the fitout process.

The first step in setting up the FieldView tracker was to agree the detailed fitout sequence with the site management team. This set the cycle for each floor of each block for the entire project. Next the required quality control documentation was assigned to the tasks which meant at certain stages, a mandatory form would need to be completed before the next step of the sequence could proceed. This was key to ensuring that at each phase of the fitout, areas were inspected and signed off before proceeding with follow on works. For example, all 1st fix partitions, and M&E items needed to be inspected and signed off with the correct QC document as a record before closing walls or ceilings. This inspection and sign off process was completed using tablets and phones in the field, leading to a more efficient sign-off process, and therefore releasing follow on works quicker.

After agreement on the sequence and the required quality controls needed, the next step was to generate the planned dates for each activity in the tracker. This was typically produced using the site target programme. Once the tracker was populated with dates, it was then set up live on FieldView. The geometry of the tracker was set up to match the requirements of the project Inspection and Test Plan (ITP), which means that as the works and associated quality documents were completed, they were linked straight into to the ITP for the project as the fitout cycle progressed.

With the tracker set up, it was a simple process to update works through the FieldView application and assess if works were in progress, completed, or had a constraint preventing progress. The option to add constraints to tasks was key as this allowed the site team to highlight any blockers and record them, which could then be reviewed in the daily huddles and weekly coordination meetings. Constraints could take the form of missing information, open RFI's, resource issues, material issues, design changes, scheduling issues, or clashes with access to areas.

Each subcontractor completed a weekly update of their items on the FieldView tracker; this was verified by the JPC site team by the end of each Wednesday. On Thursdays, the Weekly Coordination Meeting (WCM) took place, where the progress for the week was assessed against what was planned. Constraints were reviewed and closed out where possible to free up the flow of work. Any tasks that had constraints were highlighted in the tracker. Following the WCM, updated plans were printed and put on the wall in the main planning meeting room along with electronic issue to all contractors. With the plans on the wall, site managers, foremen, engineers etc. could review and track works on a day-to-day basis, checking off tasks that were completed or identify tasks that were delayed.

The data that was generated through the FieldView tracker was extremely beneficial for monitoring the performance of subcontractors. The quantity of tasks a contractor planned to complete in a week was compared against the actual and trends monitored where underperformance took place. Due to the volume of different trades required in a fitout cycle, if one contractor was underperforming it could quickly impact others, but this was immediately identified using the FieldView tracking tools.

A significant challenge with this digital approach to quality control and planning was people's lack of trust in the software and data being generated. It can be a large change for some members of the workforce who are more familiar with more traditional methods of construction and monitoring progress. However, there was excellent buy in from all parties involved and as people saw the benefits and the ease in which the job could be progressed, tracked, and quality controlled, the benefits of the process overcome any previous worries.

Thus far, the use of the digital tools on this project has been extremely beneficial. The ability to update live data in the field through a cloud-based system is saving significant man hours from a planning, quality, and safety perspective. This along with the initial use of the Last Planner System, has given a level of certainty that the project will be completed for the required dates and to the client's satisfaction.

Lean Initiative Improvements & Impact

The communication and shared team goals generated by the LPS, and cloud-based FieldView system is vital in achieving the project milestones. Setting up and implementing the LPS on the Grange development was challenging due to the scale of the project, and the number of contractors involved. However, once the LPS was bedded into the mindsets of everyone involved, it quickly became a powerful tool to drive the project in the right direction.

The FieldView trackers throughout the fitout cycle proved invaluable, as we were able to accurately track the progress of the fitout while

managing quality control documentation. This was all carried out in the field using tablets and phones, saving significant man hours on the project from what would be inefficient manual updating of trackers and paperwork. These tools also improved the project programme, giving certainty on delivering milestones, and improved quality, cost control, and safety. Feedback from the contractors involved in the LPS was positive, with many mentioning that by having detailed plans ahead of time they were able to accurately schedule resources in line with the dates in the plans. This ensured that everyone bought-in to the plans, with contractors knowing how their element of work was

going to affect the follow-on trades if it was not delivered on time.

The transition from the LPS to the FieldView system gave a flow to the project with synergies between civil, building, and M&E teams being key to the current success. Contractors' supervisors became the schedulers, planning in detail their works and the works of their colleagues around them, creating predictable workflows. Communication was continuous throughout, with the many challenges of such a fast-track project overcome through proper team planning, coordination, and driving for the same shared goal.

Several additional tools are being deployed to deliver the Lean Approach as follows:

Viewpoint: The entire project team uses Viewpoint as a Common Data Environment (CDE) for the sharing and dissemination of all information and project records. Bespoke workflows are established

from the beginning of the project for technical submittal approval processes, benchmarking process, and the tracking of RFIs. This ensures fast-track production proceeds on a large scale with a clear understanding of acceptable standards and performance metrics.

BIM: John Paul Construction utilises several digital tools to manage the different aspects of a project. The fully integrated, coordinated, and up-to-date BIM models allow site teams to accurately set-out all elements from the model, generate live as-built records, and use tablet applications such as "DaluxViewer" to compare virtual views of the planned installation against actually completed works.

DaluxViewer: DaluxViewer is a computer/mobile based tool that provides an easy spread of information, and visualisation of the model. A portable solution for accessing design models and changes on the ground or at the office.

Summary and Lessons Learned

As John Paul Construction continues to grow, the use of Lean tools and techniques to improve our project delivery is key. The use of VDC (Virtual Design and Construction) will also be critical to ensure continuous improvement in our industry. Continued upskilling of staff to better understand the benefits of these advanced analytic

methods and technologies will be vital, as well as generating a proactive culture for quality, safety, scheduling, and cost control. The future looks bright for these digital tools and can only boost productivity in our challenging sector and attract more young and talented people to take lean construction to the next level.