

## Company Overview | JOHN PAUL CONSTRUCTION | johnpaul.ie

John Paul Construction is a leading international construction specialist with expertise across all sectors, including Data Centres, Pharma/Life Sciences, Industrial, Healthcare, Commercial & Retail, Fit-out, Residential & Student Accommodation, Tourism & Leisure, Public, Transport, Energy/Renewables, and Civil Infrastructure.

We are more than just Contractors. We make things happen for the right reasons in the right way and pride ourselves on being good people to do business with. We make a point of understanding our Clients' business requirements and applying our considerable expertise to satisfy their needs effectively and efficiently. The pursuit of excellence is the heartbeat of our organisation and our people are constantly looking at ways to improve our performance. We believe in collaboration and 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 ethos of teamwork, respect, and trust. With more than 70 years' experience across all sectors of the construction industry, our success is built on an uncompromising dedication to quality and service. We put our Clients' interests first, providing a level of service that enables them to concentrate on their business in the knowledge that their project is in safe hands. One of our key strengths is our ability to forge strong partnerships and long-lasting relationships across clients, professionals, and supply chain. We are owner-driven and passionate about our work, with a hands-on collaborative approach and genuine commitment to delivering value and excellence in everything we do. Construction is all about people and performance, and our people are skilled and highly trained with the experience and ability to deliver the most complex and challenging projects within demanding project deadlines and meticulous quality standards.

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## Overview & Background to the Lean Initiative

As John Paul Construction continues to grow and expand as a business, how we deliver our projects continues to evolve and improve, and we continuously seek new and innovative ways to deliver our Clients' projects. As the pressure on project timelines continues, the need for effective and efficient initiatives for managing programmes and short-term planning is ever greater. With this need in mind, John Paul Construction has continued to expand on its Lean initiatives developed over the last number of years.

Our initial Lean initiative was introduced in 2017 with the use of the Last Planner® System (LPS) across several projects. This proved hugely successful and aided in the delivery of some key projects for the company. On the back of this success, the increased use of LPS was promoted and adopted with additional training for site personnel and LPS champions were appointed across the company to drive the process into all our projects. Over the course of 2020 and 2021, we have expanded the use of LPS to over 75% of our current live projects, with all new projects utilising the system from the outset.

In addition to the expanded use of LPS, other Lean initiatives were introduced across the company such as 5S and Overall Equipment Effectiveness (OEE). These were not just used on projects but across all departments of the business such as accounts, HR, safety, quality, IT, and tendering. These areas implemented the 5S model aiming to continuously improve how departments are run, with OEE looking



Figure 1. Lean Initiative Planning

at the effectiveness of not just the equipment but the personnel also. This worked well in line with the adjustment phase that Covid-19 was already creating and led to significant reduction in waste and improvement in standards across each department.

On the project side, this case study focuses on how our Lean Initiatives, and LPS in particular, led to the successful delivery of a high-capacity and fast-track Data Centre to the Client's requirements.

## Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

### Project Overview

The project involved the construction of a new 2-Storey, 28,000m<sup>2</sup>, 36 MW data centre, along with a full M&E fit-out delivered to a fast-track programme over 12 phases. The initial phase of the project was delivered with zero defects and handed-off at IST with zero commissioning tickets.

### Key Features

- Full M&E fit-out including top-down construction of all critical M&E elements using a racking system. Combination of hard wire and busduct power distribution system with back-up diesel generators and UPS 10 min battery autonomy.
- Full BMS & EPMS system.
- CRAC and AHU installations with humidified water system (adiabatic cooling) and complex diesel fuel distribution system.
- Traditional concrete pad foundation with structural steel columns and beams along with the installation of FM2 floors.
- Complex integration of services and utility infrastructure.
- Fit-out of highly finished administration block, along with landscaping, hard standings, roadways, and paths.
- High-specification security fencing and red wall system.

Within John Paul Construction, our Mission Critical Department heads up key projects in the industrial and data centre sectors of the business. It uses a core group of highly experienced personnel, with a track record of managing and delivering fast-track projects for some of our largest Clients. This 36MW Data Centre, with full site infrastructure, was one of the projects delivered by that Mission Critical Team. The project was completed in 43 calendar weeks from commencement on site to hand-over to the client.

From the outset, LPS was used to manage the short-term planning and ensure the flow of work on the project was maintained and unconstrained. As this system was new to several of the John Paul team, plus numerous subcontractors, introductory sessions and walkthroughs were completed, ensuring the team got up to speed quickly. There was excellent buy-in from the subcontractors to LPS as they could quickly see the benefit of having the plan in front of them and any constraints being closed-out to give them a clear flow of work.



Figure 2. Last Planner Meeting

Due to the scale of the project, LPS was implemented in a twin

approach with separate pull plans prepared for the civil works and the building works. The project managers for each section worked with the subcontractors to generate the initial pull plan and agree the key milestones for each section. Crossover points between the building and civil works were managed through regular communication between the team leaders. The implementation of regular meetings and huddles to facilitate the pull plans, weekly planning sessions, and daily huddles was a challenge; however, with continued support, all members of the team ensured that the system was bedded-in over a period of time, thus enabling a successful outcome on the project.

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

### Step 1 – Pull Plan Sessions

- Key milestones were identified for the pending 6-8 weeks and issued to the full site team to allow everyone 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 team, including site managers, engineers, project managers, and M&E coordinators, plus all the relevant subcontractor supervisors.
- Initially, workshops were completed using virtual MS Teams meetings due to Covid-19 restrictions but were then completed in-person in a large external marquee to facilitate adequate social distancing.
- Activities were pulled from the milestone back, thus 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), WWPs 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 week's performance against the WWP was reviewed.
- The upcoming weeks WWPs 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, if required, recovery plans put in place.

## Step 5 – Tracking Variance

- From the WCM, the performance of the week's progress was tracked.
- Regular causes of variance could then be reviewed and appropriate action taken.

Throughout the project, several risks and challenges were encountered. Early in the project, unforeseeable ground condition issues were encountered across a large portion of the building footprint. Working with the client in an open and collaborative manner, we reviewed the problems and generated a ground stabilisation solution that could be employed on the site. As part of the solution presented, a detailed pull plan had been prepared to generate a revised sequence and programme of works. This revised sequence allowed the project to hit its original project completion date, and, following approval of the solution, we utilised LPS to plan and monitor on-site progress to ensure the key milestones were achieved.

Our previous experience on the Lidl Regional Distribution Centre, where we provided an engineered D&B ground treatment solution to provide a suitable platform upon which to build the warehouse, proved invaluable to this process.

Following the initial earthworks element of the project, the next critical phase was to construct multiple reinforced concrete cores to allow the main structural steel frame tie into these cores. From initial scheduling of the works, it appeared there would be a significant out of sequence element of work to the structural steel frame. This is where the LPS became invaluable. Through our pull plan sessions and engagement with the subcontractors, the RC contractor committed to improving the programme dates. As a result, significant time was saved on the completion of the RC cores, thus allowing the structural steel frame to be completed in the correct sequence and saving significant time later in the schedule.

As the project progressed, each new subcontractor was incorporated into LPS with up to 15 different contractors involved during the peak of the project. Due to the fast-track nature of the project, communication was critical between all parties to ensure successful delivery of the project. This was evident in the pull plan sessions wherein each contractor was identifying potential constraints to the works as the plans were being developed. Constraints could take the form of missing information, open RFIs, resource issues, material issues, variations/design changes, scheduling issues, or clashes with access to areas. In certain instances, design issues were beginning to impact the progress of certain areas of the project. In this case, design team members were invited to review the constraints log from the pull plan sessions to aid in resolving constraints on the spot rather than going through the full RFI process. Eliminating the interface of an RFI and getting the designer, who normally wouldn't engage in planning sessions on the project, to assist in closing constraints which were impacting the flow of work proved invaluable at key stages during the project. In addition

to logging future potential constraints, previous constraints were recorded and trends identified so that measures could be put in place to mitigate any risk of reoccurrence.

Following the WCM, updated plans were printed and displayed in the main planning meeting room along with being issued to all contractors. With the plans clearly displayed, the likes of site managers, foremen, and engineers could each review and track works on a day-to-day basis, checking off tasks that were completed or identifying tasks that were delayed.

The Master Weekly Work Plan data was collected every week and used to generate the Percent Planned Complete (PPC), which is the measure of the actual completed activities against the planned activities in a given week. Each week it became clear where constraints were impacting the PPC, which allowed the team to act and prevent further slippage. A simple example of this is where a subcontractor was underperforming on site and the follow-on trades were impacted. The PPC and the data collected would show the requirement for additional resources which could then be communicated to the subcontractor allowing them to better plan their resources and upcoming works. This type of data review and feedback was useful throughout the project, with communication between John Paul Construction, the subcontractors, and the design team key to success.

## Additional Tools Deployed to Deliver the Lean Approach

- Viewpoint – The entire project team used Viewpoint as a Common Data Environment (CDE) for the sharing and dissemination of all information and project records, with bespoke workflows established from the beginning of the project for technical submittal approval processes, benchmarking process, and the tracking of RFIs. This ensured fast-track production could proceed on a large scale with a clear understanding of acceptable standards and performance metrics.
- Fieldview – This is a cloud-based and offline mobile solution that replaces pen and paper in the field, and it was used by the entire team for inspections, including: safety inspections, quality observations (both good and bad), BCAR inspections, snagging, technical queries, benchmarking, and sample approvals to track and close-out issues as they arose. Having single portals for tracking actions and sourcing information proved vital to the delivery of such a large-scale fast-track project.
- BIM – John Paul Construction employed several digital tools to manage the different aspects of the project. The fully integrated, coordinated, and up-to-date BIM model allowed the site team to accurately set-out all elements from the model, to generate live as-built records, and to use tablet applications such as Dalux Viewer to compare virtual views of the planned installation against actual completed works.

## Lean Initiative Improvements & Impact

The communication and shared team goals generated by LPS proved vital to achieving the project milestones. Setting up and implementing LPS was challenging due to the scale, fast-track nature,

and the number of contractors involved. This was a large culture change for several contractors, including members of the John Paul Construction team who were used to a more traditional method

of planning works. However, it was clear to see that, once LPS was embedded into the mindset of everyone involved, it quickly became a powerful tool to drive the project in the right direction.

Not only did it improve the project programme and give certainty on delivering milestones, it improved quality, cost control, and health and safety. Feedback from the contractors involved in LPS was positive, with many mentioning that, by having detailed plans ahead of time, they were able to line up resources with certainty that they would be starting works on the dates in the plans. This ensured that everyone bought-into the plans, with contractors knowing how their element of work was going to affect the follow-on trades if not delivered on time.

LPS gave a flow to the project with synergies between civil teams, building teams, and M&E teams key to delivering the project on time and on budget. Contractors' supervisors became the schedulers,

planning in detail their works and the works of their colleagues around them, thus 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.

### Looking Forward

As John Paul Construction continues to grow, the use of Lean tools and techniques to improve our project delivery will be key. As mentioned, LPS will continue to be implemented on all new projects with over 75% of our live projects currently utilising LPS. As well as this, continued development of our BIM and digital departments will benefit how we deliver projects across all sectors. 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.

