

THE LEAN CONSTRUCTION DEVELOPMENT PATHWAY



Final Report
31st July 2023

Start date: November 2019
End date July 2023



Balfour Beatty



SKANSKA

FOREWORD

The Lean Construction Development Programme (LCDP) is LCI-UK's response to combatting inefficient procurement practices, a major contributor to the Construction sector's ongoing productivity challenges.

In collaboration with the CITB, leading Tier 1 Construction companies and National Highways, we've created and delivered an integrated, strategic work-based learning programme. This initiative not only elevates procurement standards but also enhances the competencies and capabilities of all involved in construction projects. It empowers LCI-UK's partner contractors and their supply chains to collectively deliver projects more cost-effectively and efficiently.

Despite the challenges we faced, notably the Covid-19 Pandemic, we met them head-on, fortifying our program and deepening industry relationships. The result is a gold-standard learning management system, a scalable programme, and a level of cross-industry collaboration rarely witnessed before.

By collaborating with our partners, we've established a common language for improvement, a streamlined logistics system, and nurtured a culture of constructive continuous improvement through Lean skills development.

Deployed across projects, this programme has fostered continuous strategic improvement at both micro and macro levels, transforming works collaboratively across entire supply chains for the benefit of all participants and empowering them to create a healthy culture of challenge and improvement.

The LCI-UK project team extend our heartfelt gratitude to everyone involved in the programme, from on-site personnel to the extended operational deployment team and the executive leadership, all of whom have contributed to the project's success while helping us continuously refine and enhance it.

Brian Swain, Chairman LCI-UK



"Created for the Industry, by the industry"

A comprehensive training programme and delivery system to upskill the UK construction supply chain in applying Lean tools and methodologies to improve performance.

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The Lean Construction Institute UK (LCI-UK) is a not-for-profit educational charity dedicated to researching and disseminating best practice and knowledge about Lean Construction throughout the UK construction industry

CONTEXT

The Issue

50% of construction projects are completed late and 1/3 go over budget causing

- Unhappy customers
- Reputational damage
- Cost overruns
- Unpredictable performance

The Challenge

Increase productivity and performance across construction contractors and their supply chain

Improve competence and capability across the UK construction industry by training the workforce

The Goal

Improve productivity and performance on National Highways schemes and their supply chain.

Develop a blended programme of continuous improvement and learning, inked to strategic priorities and project delivery process.

End to end improvement process

- Strategic deployment
- Supply chain integration
- Focused, work-based Lean training to a recognisable standard

The Solution

The Lean Construction Development Programme
'Designed for the industry by the industry'

An aligned industry-wide standard and comprehensive competency framework collaboratively designed with the client, partner companies, their supply chain and subject matter experts.

A programme that builds Lean construction knowledge, skills and achievements, through work-based learning on improvement projects that align to strategic objectives collaboratively agreed by all stakeholders at the outset of deployment.

Lean working effectively address the issues that lead to late and over budget projects, and creates the conditions needed for continued improvement and development.

The Lean Construction Development Pathway is capable of shining through the fog which has enveloped the UK Construction industry over the last 25 years. With the unswerving purpose of cutting the productivity gap, improving efficiency and adding a new level of professionalism to the construction industry, the LCDP can truly revolutionise the sector.

Executive Summary

Overview

The **Lean Construction Development Pathway** (LCDP) significantly enhanced productivity and performance on six major infrastructure projects. It established a fully integrated, evidenced-based Lean Construction standard that developed the capabilities of Tier 1 contractors and their supply chains' participants for a more cost-effective, and high-quality project delivery.

Through collaborative efforts with seven partner companies and industry experts, a comprehensive competency framework was created, enabling a transferrable **standardised approach** to Lean Construction across the supply chain.

LCI-UK's unique Lean learning pathways offer a blended learning experience, integrating e-learning, animations, quizzes, assessments, videos and graded evidenced work-based Lean activities. This approach ensures the learning is seamlessly embedded into the daily work, following a **Know-Do-Show** methodology.

These pathways are supported by an innovated **Learning Management System** and **digital database** of improvement projects and their related benefits.

Visual, dynamic, role-driven dashboards provide an instant overview of progress, capabilities, and achievements allowing for sorting, filtering and aggregation at multiple levels.

Outcome



6 schemes
Strategic deployment
launched on National
Highways schemes
Target 3



Dynamic
digital database of
capabilities,
achievements and
outcomes



1,408
Learner
Beneficiaries
trained in Lean
Target: 800-1200



77
Improvement projects
Identified, started and
completed.
Target 40



£24.1 million
Estimated £ benefits.
£13.2 million
Realised £ benefits
Target 12 million



Standardised
Transferable
Skill

Objectives

Create a training, facilitation & benchmarking structure that is focused on specific procurement requirements, targets and goals at every stage in the construction process

Implement a value-driven approach to procurement, which will replace the current cost/price-driven, low margin and low-investment transactional procurement model.

Establish clear goals and prioritise benefit creation for clients, investors and companies at every level and in every element of the value stream.

Create the conditions for, and a culture of, continuous improvement, individual development and collaborative working practices.

Allow all workers and organisations (from Tier 1 management to SME employees) to identify as stakeholders in the entire enterprise and produce tangible achievements in their work and companies.

Deliverables

ENGAGEMENT

- Engage with project stakeholders, project director, procurement and construction teams and their key supply.
- Draw up a strategic development plan which identifies the value creation imperatives which determine the procurement objectives for the entire project

DEVELOPMENT

- Develop a comprehensive competency framework and training credits system which defines the knowledge and skills required to improve productivity at all levels in the construction industry supply chain.
- Submit to CITB training standard team a matrix-based training standard productivity improvement that can be delivered by LCI-UK approved facilitators.
- Create standardised learning and development resources and integration into the Learning Management System.
- Develop systems for the collection and analysis of improvement data on individual, project-based and organisational skills and capabilities attainments. Collate and analyse standardised meta-data about Lean improvements and providing customisable dashboards and reports on the benefits achieved.

DEPLOYMENT

- Roll out the programme to between 800 - 1200 beneficiaries on Highways schemes with partner companies and their subcontractors targeting 40 improvement projects

DISSEMINATION

- Develop and disseminate a common approach to measure, and calculate productivity improvement, return on investment and apply to effective collaborative practices
- Productivity improvements, savings and other impacts generated will be disseminated to the UK Construction Industry through ongoing PR activities

What distinguishes this approach is its understanding of procurement - not as a discrete stage early in a single project but as a continuing, integrating process and development opportunity.

THE LEAN CONSTRUCTION DEVELOPMENT PROGRAMME

Major construction clients have high expectations for their supply chain to demonstrate Lean construction capability. However, training staff and the supply chain is a substantial endeavour; without an industry standard, both time and money are wasted.

The Lean Construction Institute UK is an independent **non-profit organisation** that actively promotes Lean construction standards across the industry. The **Lean Construction Development Programme** is thoughtfully designed by the industry for the industry. It adheres to agreed-upon standards and a comprehensive competency framework involves clients and the entire supply chain.

The programme cultivates **Lean construction knowledge skills** and achievement through work-based learning on improvement projects, fostering a **portable transferrable skillset**. Just-in-time learning validates work-based learning with proven tracked results.

Improvement projects and priorities are **aligned to strategic objectives** collaboratively established by the client and delivery partners at the programme outset. Staff and their supply chain develop **practical Lean construction skills** and competencies while working on their projects, receiving ongoing coaching and support, participating in **structured collaborative learning**.

LCI-UK's Learning Management System and digital database diligently tracks and records participants' progress and achievements along with improvement project outcomes and benefits. As participants and partners accumulate an ongoing record of transferrable accredited Lean construction skills and a detailed **dynamic database of improvement information**, a strategy-led culture of collaborative continuous improvement emerges. This culture empowers and engages individuals to deliver projects, cheaper, faster and better **transforming construction outcomes** and turning on-going issues into good news stories.



- Portable** Transferable qualifications across the industry
- Practical** Just-in-time learning plus work-based development
- Proven** Tracked results



ENGAGEMENT – STRATEGIC DEPLOYMENT

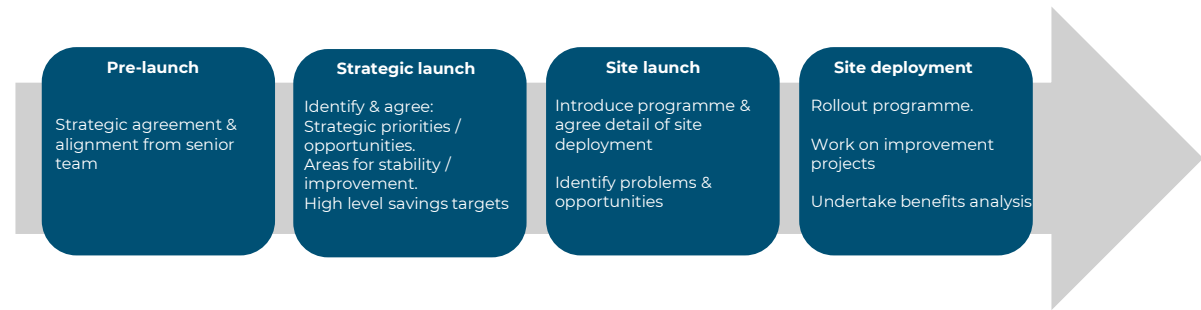
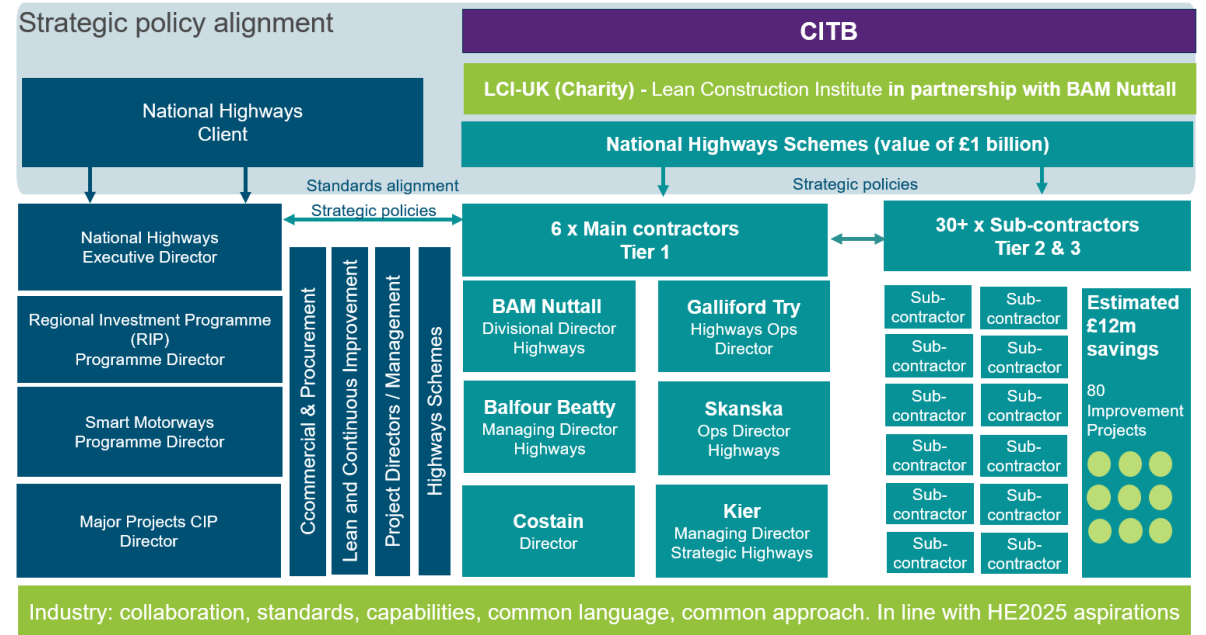
The program's success hinged on securing **strategic alignment** among all participating companies right from the start, particularly at the highest level. Commitment was visibly demonstrated by **senior executives** from the client, Tier 1, and supply chain companies, with a shared expectation of successful program outcomes at every stage. For each designated scheme, LCI-UK, in collaboration with **key stakeholders**, conducted several workshops to establish and agree on the **strategic deployment priorities**.

Simultaneously, LCI-UK actively engaged with key stakeholders at the executive and operational levels, which led to the establishment of an **Executive Steering Group (ESG)** for governance and guidance and an **Operational Steering Group (OSG)** comprising lean coaches and leaders responsible for delivering and managing the LCDP programme within each scheme. These groups played an essential role in ensuring the success and efficacy of the overall strategy.

During early engagement, the program faced COVID-19 challenges, including CITB funding suspension and a work-from-home directive. LCI-UK collaborated with all parties to address these issues, with discussions on funding with partners and National Highways coinciding with the program's expansion from 3 to 6 schemes.

As a result, partner companies increased their match funding significantly, and National Highways joined as an equal seventh partner. These discussions not only strengthened partner relationships but also demonstrated the industry's substantial commitment to the programme.

While there was a delay in funding that led to the loss of a key supplier, LCI-UK quickly engaged a new supplier, and the development of the Learning Management System (LMS) continued without significant interruption.



Multi-disciplinary, multi-company, integrated project groups will train together, plan together, work together, solve problems together and improve together.

DEVELOPMENT | FRAMEWORKS

LEARNING RESOURCES & PATHWAYS

With industry leaders we collaboratively established an industry-wide Lean construction **competency framework** and credits system fully integrated in learning pathways. These pathways define essential knowledge, skills and achievements.

Our work-based **training standards** focus on outcomes that align to the strategic objectives.

Comprehensive **blended learning resources** were delivered by Lean construction experts to an agreed industry standard delivering measurable benefits.

Learning pathways are broken down into a variety of core and elective / optional activities, incorporating e-learning, animations, quizzes, assessments, videos and graded evidenced based Lean activities.

The transferable **accredited** skills and achievements result in a fully portable training record.

We employ a consistent **benefits tracking** framework ensuring clear, standardised improvement data.

Benefit categories and subcategories that can be aggregated at multiply levels: Company, Scheme, Cohort, and years.



The programme supports the first 3 stages of LCI-UK's Lean construction competency framework

My LCDP Pathways

Category	Activity	Progress
Core Workshops & Reviews	Customers, Value and Waste	100%
	Manage Improvement Projects	100%
Core Online Learning	Manage and Record Own and Others' Learning	100%
	Customers, Value and Waste	100%
	Analysing and Improving Processes - Foundation	100%
	Analysing and Improving Processes - Intermediate	100%
	Collaborative Planning and Production Control	100%
	Gather, Analyse and Monitor Data, and Report on Results	100%
	Manage Improvement Projects	100%
	Manage People and Resources	100%
	Knowledge Assessment	
	Evaluation	
Certificate		
Core Lean Activities	Customers, Value and Waste	100%
	Regular Lean Activities	100%
	Analysing and Improving Processes - Foundation	100%
	Collaborative Planning and Production Control	100%
	Gather, Analyse and Monitor Data, and Report on Results	100%
Manage Improvement Projects	100%	
Optional Learning & Lean Activities	Customers, Value and Waste	50%
	Analysing and Improving Processes - Foundation	
	Analysing and Improving Processes - Intermediate	
	Collaborative Planning and Production Control	
	Manage People and Resources	100%



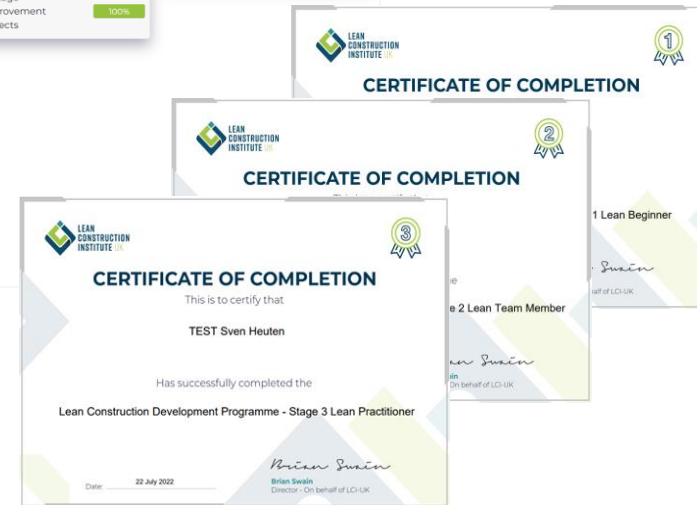
Stage 1 Lean Beginner



Stage 2 Lean Team Member



Stage 3 Lean Practitioner



“The Lean Construction Development Programme is a blueprint to scale up Lean capability and benefits across UK construction.”

DEVELOPMENT | A DYNAMIC LEARNING PLATFORM & DATABASE OF ACHIEVEMENTS AND OUTCOMES

We have created a state-of-the-art, tailored digital platform. This platform is intuitive, well-organized, and proficient at analysing and presenting results through a suite of reports and dynamic visual dashboards in a clear and visually appealing manner

The system serves Learners, Lean Coach's and Management teams by enabling:

- ✓ **Event management**, tracking attendance, **coaching sessions** with associated resources and guidance.
- ✓ Curated **learning pathways & courses**, monitoring completion towards accredited stages and on-the-job projects.
- ✓ **Dashboards** for Learners and Lean coaches displaying progress and gap analysis for each stage pathway
- ✓ Learners to complete **improvement projects** through DMAICT stages, including data entry and evidence capture at various points with estimate, baseline and final values within structured **benefit categories and sub-categories**. Specific stages include tutor review points, with catalogued feedback for future reference.
- ✓ Collating and presenting data in a **digital A3's** that can later become **case studies accessed by all**.
- ✓ A searchable, filterable **Case Study Catalogue** designed to facilitate effortless knowledge transfer.
- ✓ Visual company data within an interactive **Management Dashboard**, allowing managers to view collated impact data, Lean capabilities and efficiencies that can be filtered, sorted and **aggregated** by company, cohort, scheme, improvement projects and the individual. Data can also be exported for further analysis.

The image displays a comprehensive digital learning platform. At the top, three devices (laptop, tablet, smartphone) show the user interface. A large 'DEMO DATA' watermark is present. Below are several screenshots of the platform's content:

- A3 Report:** A detailed report titled 'Reducing the Carbon Footprint in the Pavement Design'. It includes sections for 'DEFINE', 'ANALYSE', 'MEASURE', and 'IMPROVE'. Key findings include a 12% reduction in embodied carbon and a 17% reduction in CO2e. The report also lists 'Stakeholder benefits' and 'Success criteria'.
- Company & Scheme Selector:** A dashboard for selecting organizations and schemes. It shows a list of companies and their associated schemes.
- Company Details:** A page for 'BAM Nuttal Ltd' showing details like 'CITB key and grant registration number: 10090' and a table of 'Associated Companies'.
- My Badges & My Certificates:** Sections for tracking progress and achievements. 'My Badges' shows 'Stage 2 Lean Team Member' and 'Stage 1 Lean Beginner'. 'My Certificates' shows 'Stage 2 - Lean Team Member Certificate' and 'Stage 1 - Lean Beginner Certificate'.
- My Improvement Projects & My Bookmarks:** Lists of projects and bookmarks with filters for status, project creator, and start/end dates.
- My Assignee Pathways:** A section for a 'Stage 3 - Lean Practitioner' showing a list of assigned projects and their progress.

“This is a world leading Lean digital system for content, scope, usability and potential to influence the construction industry. I’m honoured to be a part of this project, it is an outstanding piece of work.”

DEPLOYMENT | ROLLOUT

Key to the success of the programme was to ensure that all participating companies were strategically aligned to the programme's objectives from the outset, and at the highest level. Commitment was demonstrated through the participation of senior executives at all stages of the strategic deployment, with a united expectation that the programme would be delivered with successful outcomes across the board.

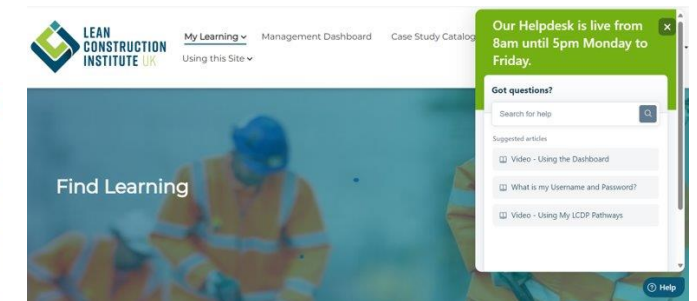
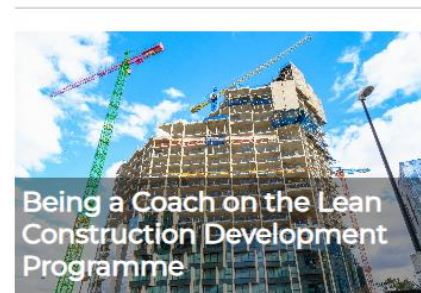
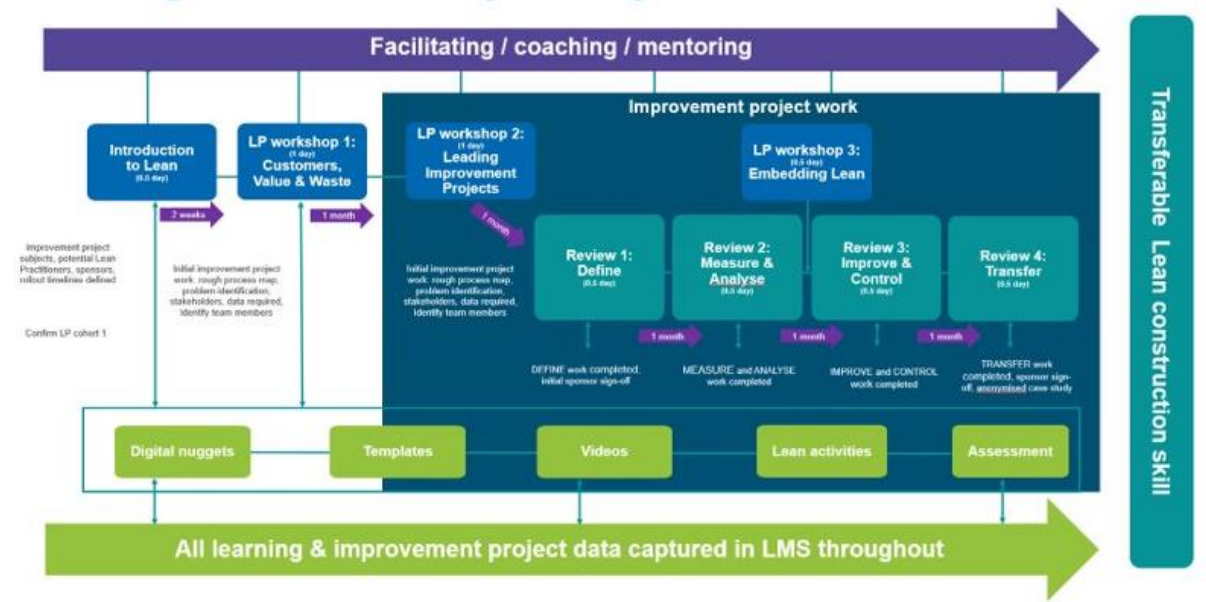
LCI-UK ran four workshops with each nominated scheme to agree the **strategic deployment process**: Pre-launch secured commitment at the executive level and was crucial in laying the foundation for the subsequent phases. The strategic launch engaged with integrated project teams at a senior level identifying **strategic priorities, high-level opportunities, areas for stability and improvement** and setting **high-level cost-saving targets and training goals**. Wider Site launches were conducted to zoom in on the previously identified priorities such as drainage, focusing on opportunities, earmarking both potential **improvement projects** and cohorts of learning beneficiaries.

Lean coaches and coordinators completed a **streamlined four-part LMS onboarding process**, covering the LMS from all perspectives: learners, coaches, and Lean activities & learning pathways, thereby enabling them to facilitate training, conduct workshops, and support beneficiaries through the blended learning programme.

Expanding from 3 to 6 schemes presented its challenges, including doubling the number of strategic deployment workshops. During the pandemic, we **adapted our all materials** for remote training, and despite the national lockdown, we exceeded our learning targets due to increased engagement hours.

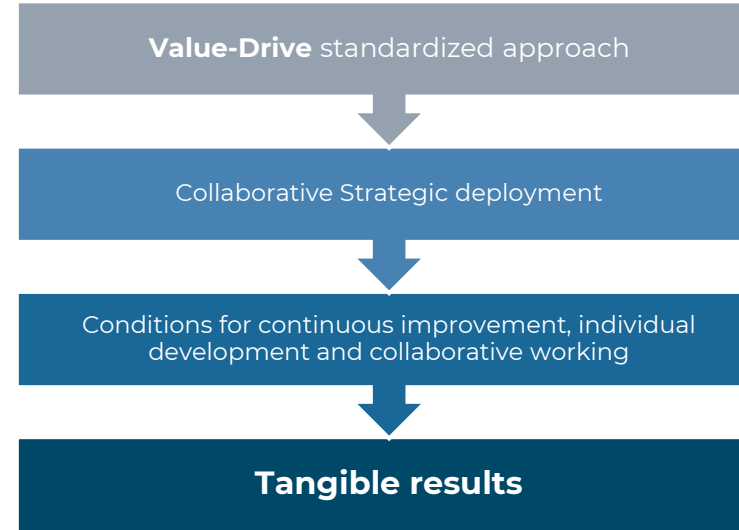
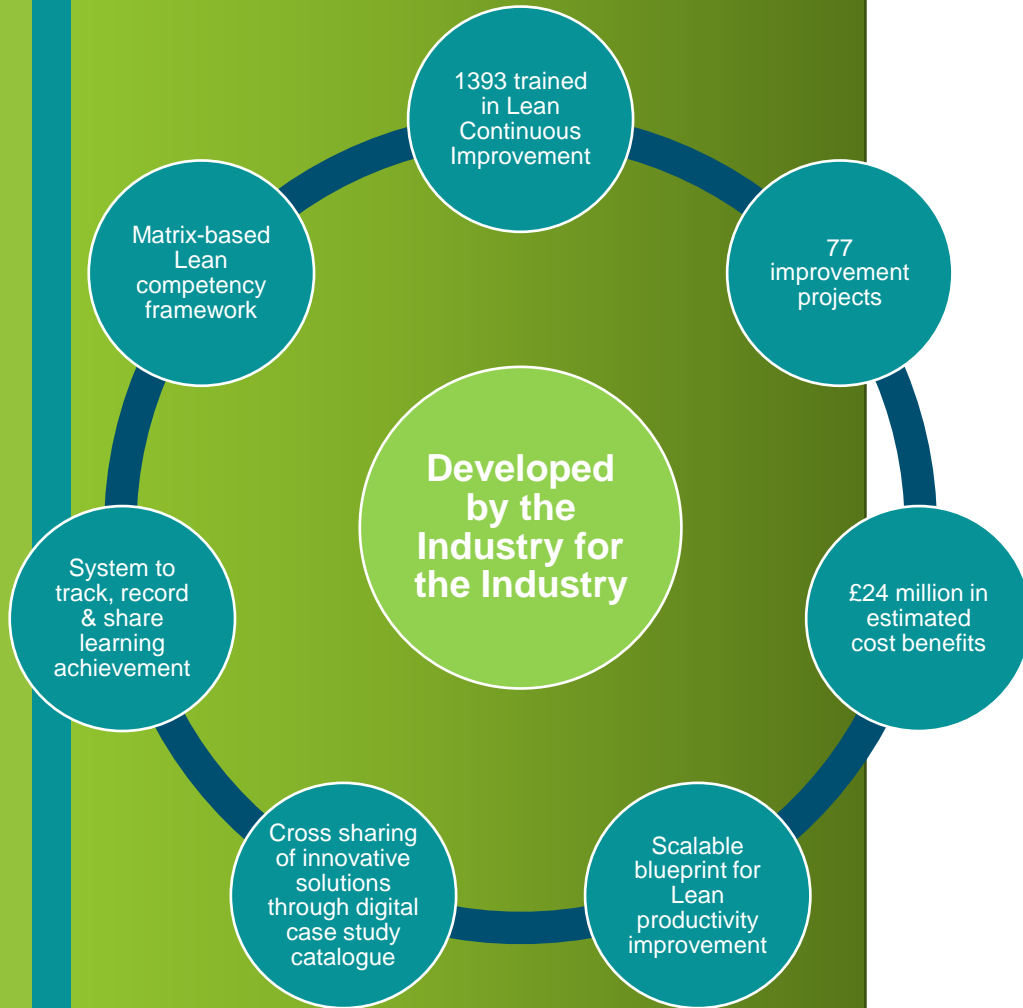
Responding to actively sought feedback FAQs, a digital lean coach course and video walk-throughs were added to the LMS, alongside existing online helpdesk support. LCI-UK also provided in-person guidance and additional support during launches and workshops when necessary.

Challenges and successes were discussed at OSG & ESG meetings, which facilitated the sharing of progress, exchange of best practices, transference of knowledge, and showcased improvement projects, fostering **a new level of transparency and collaboration rarely seen in the Construction Industry**.

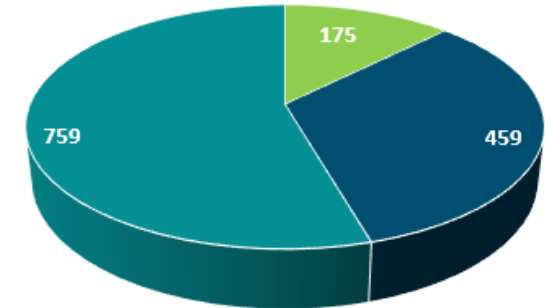


“We selected younger people (for the Lean Practitioner training) as we wanted to use the LCDP programme as a springboard in developing our future leaders into Lean leaders.” - Galliford Try

THE RESULTS | CLIENT, COMPANIES & PEOPLE



Continuous Lean improvement 1,393 Beneficiaries



■ Strategic deployment ■ In Progress ■ Completed

7 partner companies	6 National Highways Schemes	Dynamic digital database of capabilities achievements and outcomes
Company profiles of Lean maturity and improvement outcomes	44 supply chain companies trained to a recognised standard	Transferrable accredited skills & achievements creating a fully portable training record.
Personal learner profiles evidencing capability and accomplishments	Evidence work-based training standard focused on outcomes being rolled out to the wider industry	A VALUE-DRIVEN approach

Providing Lean training to our supply chain partners, knowing there is a standard approach developing across the industry can ONLY be beneficial

THE RESULTS | BENEFITS

Realised cost benefit of **18.4 million** with a **forecast** estimate of **24.1 million** by the end of 2023

Each benefit category is broken down further into sub-categories highlighting trends within a particular area.

The benefit data, categories and sub-categories can be aggregated as a whole or drilled down into company, scheme or by individual improvement project.

In addition to the cost benefits targeted in the pilot programme **ALL benefit categories** are captured in the system and aggregated.

Delivery

Reduced lead time
6,977

Measure:
Hours

Reduce Risk rate
2

Measure:
10 (high)
0 (none)

Environment

Reduced carbon emissions.
4,279

Measure:
emission reduction
Tons CO2

Quality

Reduce rework rate
350

Measure:
number decrease

Engagement

Increase in staff engagement
40

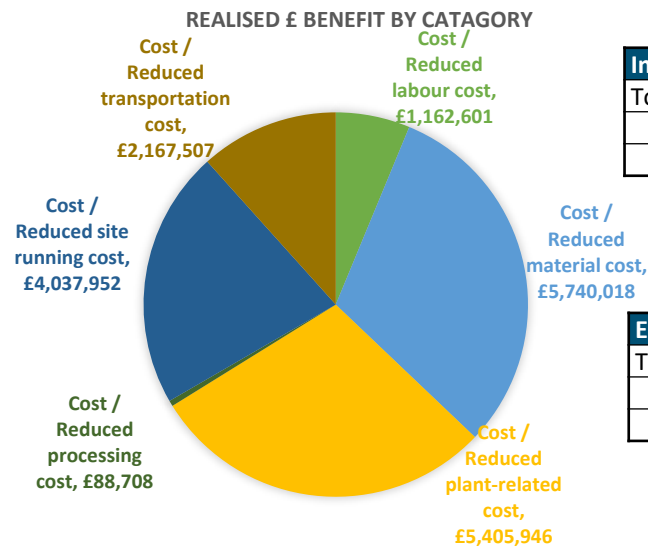
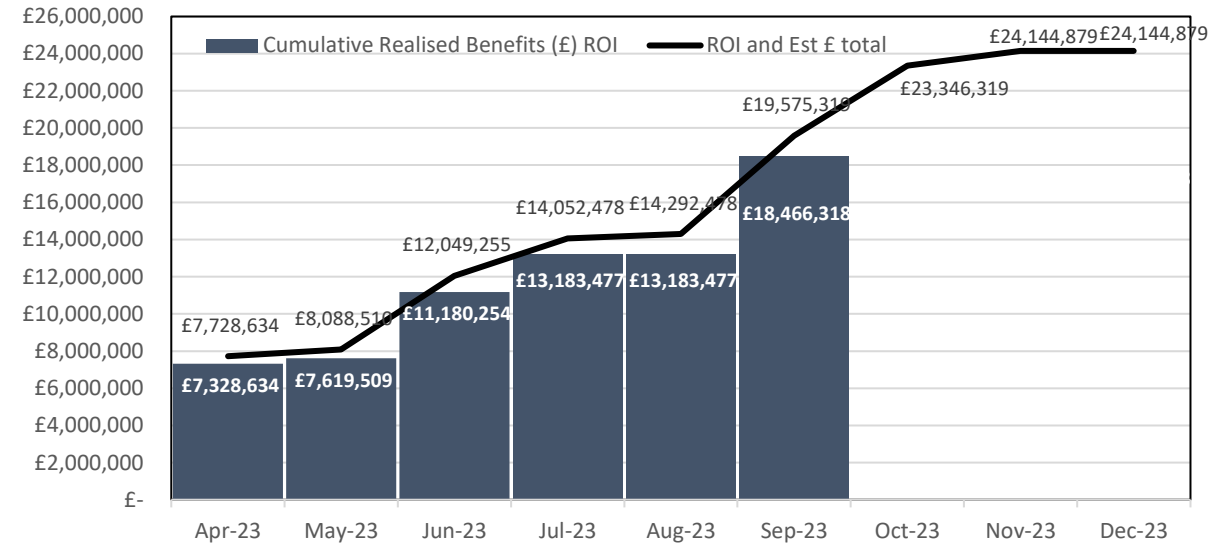
Measure:
number Increase

Safety

Increase H&S observations
5

Measure:
number Increase

Estimated and ROI £



Improvement Projects	Target	Actual
Total	Between 40-80	77
Identified / In Progress		44
Completed		33

Estimated benefits	Target	Actual
Total	12m - 20m	£ 24,144,879
Est £ (forecast)		£ 5,678,561
ROI £		£ 18,466,318

Learner: "It really opened my eyes to the potential benefits to my Lean project"

THE IMPACT

The impact of the LCDP has been evident across the six partner schemes in terms of **widespread supply chain participation, productivity, scalability, and cross-company collaboration.**

The reach of the programme far **exceeded our expectation** with **44 supply chain companies** engaged in the programme, including 285 individual learners, 195 of which completed Stage 1 training to 100%

Lean skillset – empowered to improve

- Skills acquired are transferrable between projects - without need to retrain.
- Learning pathways post-stage 1 available for continuing their lean journey
- Using their lean toolbox, workers have been empowered with the knowledge to seek continuous process improvements for increased productivity & benefit savings.

Increased productivity and cost savings

- In addition to the cost savings realised, activities recorded via the LMS included increased Health and Safety observations, reduced carbon emissions, risk taking, lead times and rework rate, alongside early asset availability and increased staff engagement.

Cross company collaboration

- A desire for companies to work together to improve industry productivity has grown from the operational deployment of the LCDP, particularly through the OSG.
- Collaboration is evidenced in company exchange visits and readily shared improvement projects that can be easily replicated in other companies / projects

The multiplier effect

- Two leading Tier 1 companies (Morgan Sindall & Sir Robert McAlpine) seconded personnel to the LCI-UK during the pilot to learn about the programme, help deliver the programme for LCI-UK, and have deployed / are about to deploy onto their own construction schemes.



Lean Coach: "Our Lean training with our leadership team could not have gone better, so many light bulb moments – thank you LCI-UK"

THE IMPACT | EXAMPLE 1

Cross Industry Collaboration – Balfour Beatty M3 and Costain M62

Balfour Beatty visited Costain's M62 site to work value stream map the Davidson Concrete Barrier (DCB) via a time & motion study to create a business as usual, production, baseline.

The M3 team wanted to improve process and predict/remove blockers to optimise output by taking a step-by-step look at process replacement from construction to assembly, and to simultaneously reduce carbon from a logistics process.

With parameters set on the M62 – and an output of 135m³ set as an aspiration – Balfour Beatty' focused on "what does a perfect day look like?". The delegate team concluded that due to the different width & construction details, 135m³ delivered per day is used, instead of a linear metre figure. 1km is required ahead of them to keep them moving, including an ideal location for the batching plant, with 3 to 4 wagons on turn around to optimise output (traffic depending) not forgetting enough width length in the central

reserve working area for two concrete wagons to pass each other.

By understanding this detail Balfour Beatty were able to manage for today, giving PJD the best chance.

The proactive support of the supply chain meant that time was allowed for the team to break down the process, identify what good looks like and share blockers with the M62 team, thereby improving productivity on two construction schemes.



THE IMPACT | EXAMPLE 2

Empowered with skills to seek continuous improvements

In 2022 Kier challenged its Major Project schemes to increase the number of environmental observations raised each month. Two Kier employees, with limited or no prior Lean experience, set about achieving this objective via an improvement project initiated through LCDP training & coaching, working meticulously through the whole Lean DMAICT improvement cycle to achieve their business aim.

Using a defined SIPOC (suppliers, inputs, process, outputs, customers) diagram and Voice-of-the-Customer they identified what was 'critical-to-quality' to develop performance metrics that would baseline the current performance, and then identified causes for the performance gap using a fishbone cause and effect diagram. Having identified underlying problems with key stakeholders, they were then able to create an action plan to resolve the main root causes of underperformance.

The results to date have been outstanding and projected to achieve the projects target, whilst outlining a plan to improve performance five-fold. Both employees are now working to attaining Stage 3 Lean Practitioner via the LCDP programme.

On their achievement, Kier's Lean Coach noted: *"What has been truly amazing for me, is getting people in our business who are relatively new to many Lean concepts to learn Lean ways of working. They have shown tenacity and passion and can now confidently talk about and use many key Lean tools to deliver outstanding results for Kier. They both have been inspiring with respect to their passion and commitment for Lean."*



"We came away from the M62 visit excited for the industry and with the realisation that as a collective we are making a difference, changing behaviors, and enabling the supply chain to not only deliver their daily output but also remove blockers to enabling them to increase production rates."

THE IMPACT | CATALOGUE OF CASE STUDIES

Each improvement project can automatically generate an anonymised case study at a push of a button with the meta-data contain within the improvement project. These are displayed in an effective searchable **Case study catalogue** accessed by all users of the system.

Each case study includes both quantitative and qualitative data to substantiate the outcomes. Percentage-based metrics are employed to illustrate the influence of the improvement project, whether it pertains to cost savings, heightened efficiency, or other pertinent **key performance indicators**. As such the catalogue becomes a valuable resource for learning, **sharing best practices**, conducting research, and fostering professional development. It functions as a repository of real examples, enabling readers to acquire insights, sharpen their **problem-solving skills**, and deepen their understanding of a diverse array of issues and solutions.

The data can be sorted, filtered by benefit categories, company, tags and Lean tools.

The screenshot displays the 'Case Study Catalogue' interface. On the left, a sidebar lists various case studies with their respective icons and titles, such as 'CPF/RDP Performance Model', 'M54-M6 Link Improving Logistics for Early Works Inductions', 'Alternative Sprayed Concrete Cladding to contiguous piled walls / abutments', 'A30 – Site Access', 'ITP Rationalisation', and 'Reducing the Carbon Footprint in the Pavement design'. The main area shows a detailed view of the 'Reducing the Carbon Footprint in the Pavement design' case study. This view includes a title, a brief description, a list of 'Lean tools used on project', and a 'Benefits' section with a table of metrics.

Benefit Category	Value
Cost saving	Reduced material costs by 2.3%
Environment	Reduced carbon emissions (Tons CO2) by 17.1%
Customer	Earlier availability of asset to customer
Environment	Reduced use of natural resources
Return on investment	58,351.41%

At the bottom of the detailed view, there are logos for 'LEAN CONSTRUCTION INSTITUTE' and 'citb', along with the website 'www.leanconstruction.org.uk' and email 'info@leanconstruction.org.uk'.

This screenshot shows the 'Case Study Catalogue' interface with a grid of case study cards. On the left, there is a 'Filters' sidebar with sections for 'Benefit Category' (Cost, Quality, Delivery, Safety, Environment, Engagement, Customer, Other benefit), 'Tags', and 'Company' (Select Company). The grid contains 12 cards, each with a thumbnail image, title, and publication date. The cards include: 'CPF/RDP Performance Model', 'M54-M6 Link Improving Logistics for Early Works Inductions', 'Alternative Sprayed Concrete Cladding to contiguous piled walls / abutments', 'Current State for External communications Approval Process', 'Earthworks balance', 'Communications Sign Off Process', 'M54 Blockade Programme', 'Environmental Reporting', 'End of Month Reporting Process', 'Review of the Excavation Process (drainage)', 'Improvement to construction of Emergency Areas', and 'Improved Management of Keys'. A vertical label on the right side of the grid reads 'Lean Construction Development Programme (LCDP) Case Study'.

LEARNER FEEDBACK

Throughout the program, we diligently collected feedback from learners through our Learning Management System at various stages. This feedback was solicited upon completing individual workshops, whether conducted virtually or in-person, as well as completion of learning pathways. Stage 1 - Lean Beginner, Stage 2 - Lean Team Member, and Stage 3 - Lean Practitioner.

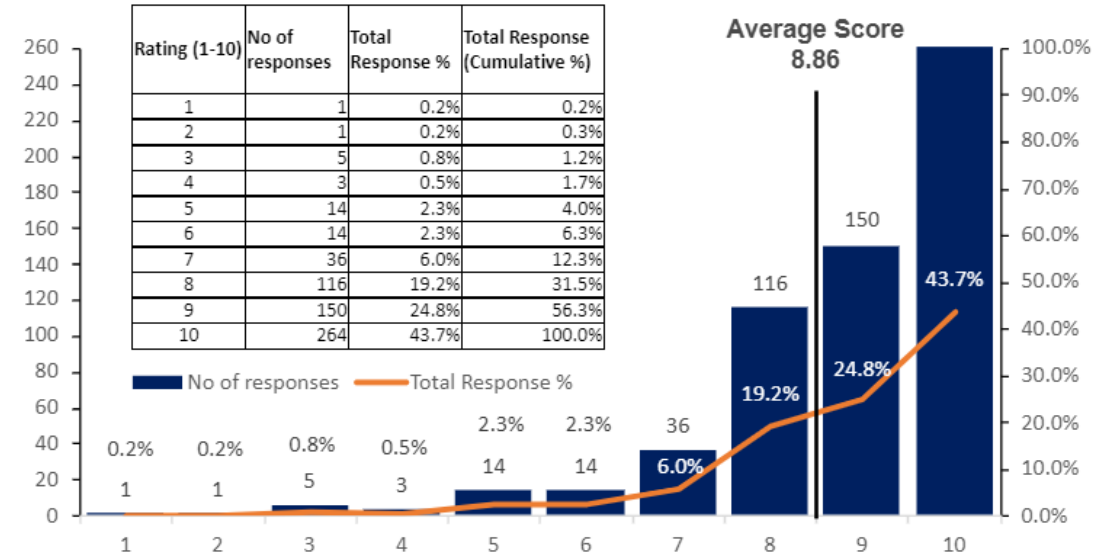
At the conclusion of each learning event, learners were invited to rate the training on a scale of 1 to 10 and respond to four additional feedback questions. We've meticulously gathered and analysed these responses, which included the following inquiries:

1. What was your main reason for the score?
2. What did you like most?
3. What did you like least?
4. What one thing would have made it even better?

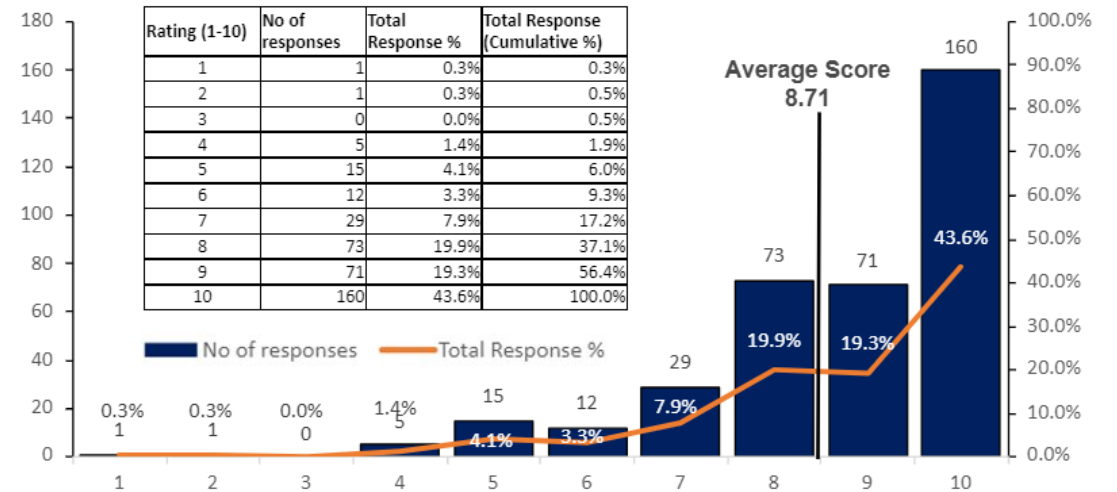
The **outcomes are impressive**, with nearly 1,000 responses obtained (367 from learning pathways and 604 from workshops). We are delighted to report that our workshops received an average score of 8.86, while the learning pathways garnered an average of 8.71. This culminates in an **outstanding overall learner experience score exceeding 8.7**.

Furthermore, in addition to learner feedback, each company has the opportunity to review their individual feedback through the Management Dashboard of the LMS. This feature is instrumental for continuous improvement, validating the excellence of delivery, and gaining a comprehensive overview of their cohort's learning experience.

Workshops



Learning Pathways



AWARDS | RECOGNITION

WINNER: National Highways RIP 2022 Awards - 'Collaboration' Category. This award celebrated the exceptional collaborative efforts of our partners. Together, we co-created the Lean construction competency framework, benefits tracking methodology, and 'best in class' learning pathways and training materials. This initiative has been instrumental in driving Lean continuous improvement and aligning the Highways sector with its strategic priorities and long-term aspirations.

FINALIST: The Lean Construction Development Pathway program was selected as a finalist in the **National Highways Industry Awards**. It was recognized in the 'transforming our industry through innovation' category, acknowledging the remarkable input and collaboration that shaped its development and launch. This accomplishment was made possible through the joint efforts of LCI-UK and our esteemed partner companies, including National Highways - Lean Division, Kier Highways, BAM Nuttall, Balfour Beatty, Costain, Galliford Try, and Skanska.

NOMINATED: While we didn't secure an award, we were honoured to receive a nomination for the **Totara Awards 2023**. These awards highlight the innovation and global impact of our Totara community. Lars Hyland, Managing Director EMEA, expressed, "The standard and diversity of solutions using the Totara platform continue to rise each year."



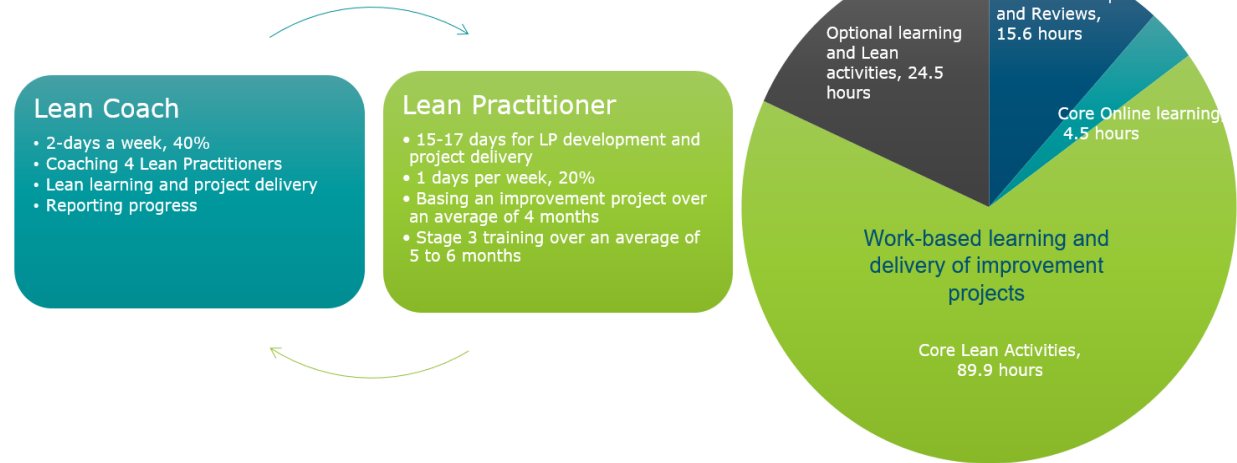
LESSONS LEARNT

This initiative triggers a cultural shift at all organisation levels.

To successfully execute a training and development program, it's crucial to comprehend the resource and time commitment required by both a Lean Coach and a learning Lean Practitioner.

Upon assessment the time commitment by both Lean Coach and the Learning Lean Practitioner to acquire the skills and complete an improvement project is depicted in the left-hand graph.

While this commitment is a challenge you will see the **average cost savings of £559.5k per project speak volumes.**



Benefits

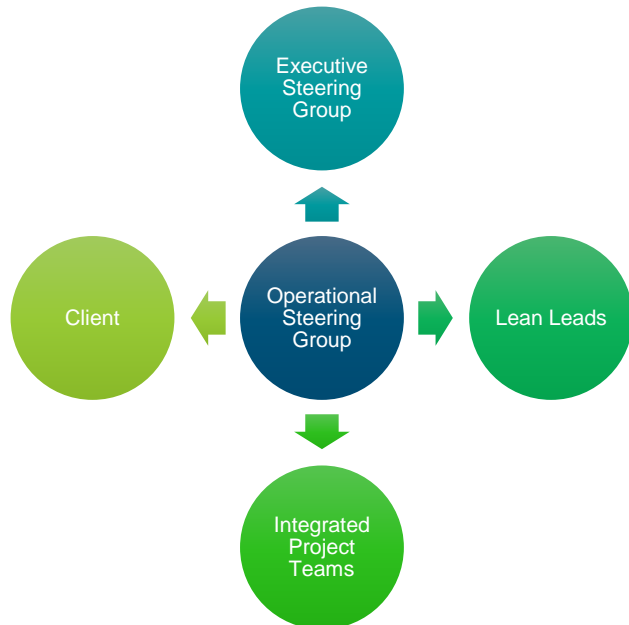
- A3 Reporting
- Case studies sharing best practice
- Accredited Lean Practitioner skills
- Lean know-how for future projects
- Average of £559.5k benefit per improvement project

The Critical Element: Collaboration across all levels.

Testimonial from **National Highways, Martin Bolt, Head of Lean and Continuous Improvement.**

"The Lean Construction Development Programme has brought together a core of our key suppliers to agree a standard and an approach to disseminate and consolidate Lean learning bespoke to the Highways sector. A fundamental factor in this is applying the learning in a practical way on-site to increase the efficient delivery of the works, while embedding the knowledge in the individual. This approach brings benefits to the individual, the host company and the client. As a result of the programme, we have a core of workers who will be carrying their learning forward as they move on to other jobs and this provides an opportunity to expand this core over future months and years to make Lean working the norm.

A key benefit has been how the programme has brought together the companies at both strategic and operational levels. The executive group have agreed the way forward and helped to steer the programme. At operational level, the group have really gelled as a community with mutual support and co-operation not just on building the programme but in sharing best practice which has seen reciprocal visits to each other's schemes.



"Alone we can do so little, together we can do so much"

SUSTAINABILITY

In developing the Lean Construction Development Pathway as part of the CITB Better Procurement Approaches Commission, LCI-UK considered sustainability from the outset and have created a standardised model of lean training, and a staged 'commercial model' to enable the programme to be deployed outside of the pilot.

Pending the lean maturity of any company this model can offer an initial discovery package to those companies at the start of the lean journey, to full deployment utilising our state-of-the-art learning management systems and work-based learning pathways, which provides an effective platform to support roll-out throughout the industry, not just within the Highways sector. As such LCI-UK have been building functionality and infrastructure to support extended demand.

This model has been taken up by five of our partners companies, who are strategically deploying the programme across multiple construction schemes with National Highways continued endorsement and support, and Morgan Sindall who are already seeing very positive results. We have received significant interest from other client companies – Network Rail and the Environment Agency; and we are currently working with other Tier 1's, such as Sir Robert McAlpine who are interested in deploying LCDP in their Health sector.

LCI-UK have also held discussions with influential bodies within the industry, such as the Institute for Civil Engineers, who are beginning to recognise and appreciate how this programme can positively affect the industry and fit into the wider construction agenda e.g., Project 13, Construction 2025.

FUTURE

Working with our partner companies at the Executive level through the LCDP Executive Steering Group it has been clear that there is significant interest for more Lean programmes and continual professional development for those that have already started on their lean journey.

We will continue to work closely with these industry leaders, the CITB and other funders to develop and disseminate future learning pathways to benefit the construction industry.

Suggestions garnered from this group so far include development of:

Lean Leadership
programme

Advanced Lean
Practitioner
programme

Lean Coach
programme

Lean Expert
programme

Value Stream
Mapping
programme

Qualification /
NVQ

Sustainability lies in the ability to nurture knowledge, empower individuals, and adapt to the ever-changing landscape of learning, ensuring that the impact endures for the long-term benefit of all.

CASE STUDY | BAM NUTTALL

SCOPE The RDP M54-M6 link is approx. 2.5km of new dual carriageway to be built near Wolverhampton. In October 2021, the Planning Inspectorate notified there would be a 6-month delay to a decision on the Development Consent Order (DCO). The integrated project team took a decision to use this as an opportunity to revisit and improve elements of the **detailed design**.

We wanted the M54-M6 scheme to be an **exemplar lean scheme** i.e., a leading example of lean thinking and use of lean tools for problem solving with improved production outputs.

LCDP DEPLOYMENT Initially a high-level proposal was prepared to identify topics with potential for improvement which was shared with the scheme leadership team who would become our Sponsors. We followed the LCDP Roadmap with Pre-launch meeting, Strategic launch workshop and then a Site launch workshop with the wider team. The ideas from the proposal were developed at these workshops resulting in a decision on 4 topics to run as lean improvement projects: M54 Blockade, Earthworks balance, Reducing carbon in pavement design and alternative methods for bridge wing wall construction.

OUTCOMES Our working groups supported our Lean Practitioners to complete the four projects by September 2022 with resultant benefits of £5.3m & **3,521 TCO2e** saved. After the initial projects were complete the Practitioners started new Projects. The total benefits to date is now **£6.5m**

LESSONS LEARNT The challenge of workshop and e-learning training for the Stage 1 certificate was managed by extending the workshop time and making the online modules part of the course.

Lean coach support is essential for success to both mentor the practitioners and carry out the stage gate reviews. Creating small working groups for lean Projects helped to keep momentum

SUCCESSSES Our management showed great leadership in sponsoring this work. We have trained 144 people in Intro to Lean broadening awareness and have 4 people complete the Stage 3 Lean Practitioner certificate

TESTIMONIALS

"This is a world leading Lean digital system for content, scope, usability and potential to influence the construction industry. I'm honoured to be a part of this project it is an outstanding piece of work." *Stuart Willis BAM UK&I Company Lean Improvement Lead*

FUTURE We started LCDP on our M54-M6 link scheme. We have now broadened the reach to our other Highways Schemes and are now sharing the training with wider sections of BAM

Scheme	M54-M6 Link
Value	£
Start date	
End date	September 2022



£6.5 million
Realised £ benefits

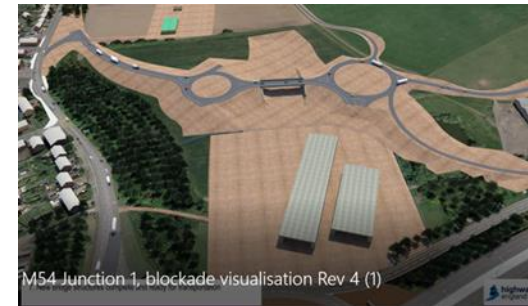


3,521 TCO2e
Realised £ benefits



Approved LCI-UK Lean Coaches
to deliver the programme

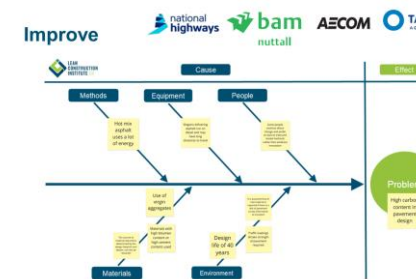
M54 Blockade



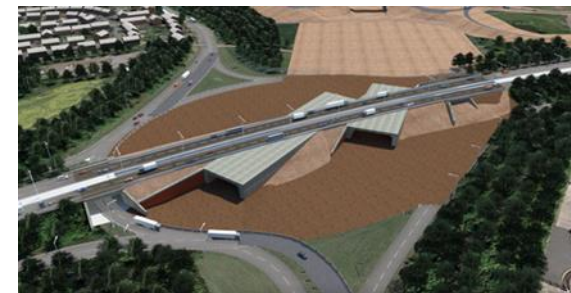
Earthworks balance

Project Name	Contract description	Client
M54-M6 Link	Earthworks balance	AECOM ARCADIS
Problem	Background	Context
The M54-M6 Link has a large volume of earthworks. It is required that there is a balance of cut and fill to avoid a need for off-site disposal, or to be used for other purposes. The project team has identified a number of areas where earthworks are not balanced, and a number of areas where earthworks are not balanced.	The project team has identified a number of areas where earthworks are not balanced, and a number of areas where earthworks are not balanced. The project team has identified a number of areas where earthworks are not balanced, and a number of areas where earthworks are not balanced.	The project team has identified a number of areas where earthworks are not balanced, and a number of areas where earthworks are not balanced. The project team has identified a number of areas where earthworks are not balanced, and a number of areas where earthworks are not balanced.
Goal	Deliverables	Key Results
Identify areas where earthworks are not balanced, and a number of areas where earthworks are not balanced.	Develop a plan to balance earthworks, and a number of areas where earthworks are not balanced.	Reduce the volume of earthworks, and a number of areas where earthworks are not balanced.
Additional information	Date: 12 September 2022	

Reducing carbon in pavement design



Alternative methods for wing wall construction



Learner quote: "A good mix of 'theory' and 'practice' that brings it to life in an engaging way"

TESTIMONIALS

Martin Bolt – National Highways – Head of Lean and Continuous Improvement

The Lean Construction Development Programme (LCDP) has brought together a core of our key suppliers to agree a standard and an approach to disseminate and consolidate Lean learning bespoke to the Highways sector. A fundamental factor in this is applying the learning in a practical way on-site to increase the efficient delivery of the works, while embedding the knowledge in the individual. This approach brings benefits to the individual, the host company and the client. As a result of the programme, we have a core of workers who will be carrying their learning forward as they move on to other jobs and this provides an opportunity to expand this core over future months and years to make Lean working the norm.

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Balfour Beatty – Phil Clifton:

"...lean is at the heart of what we do in Balfour Beatty as we continue to improve how we go to work each and every day. We cannot improve alone and ensuring everyone in our supply chain and all our stakeholders has an understanding of lean and how to apply the principles is where the LCI-UK's LCDP pilot has been successful. It is clear where there is a shared knowledge of lean and a desire to improve productivity across a project, we see the productivity improve. The LCDP pilot has provided a consistent way of upskilling project teams that is accessible across the industry and can be taken from project to project..."

Costain – Vicky Pattie:

"Thanks to the LCDP lean programme, the training material provided is specific to the construction industry and created by the construction industry. This has made it more relatable to our teams and supply chain partners. Being able to provide lean awareness training to our supply chain partners, knowing there's a standard approach developing across the industry can only be beneficial in the long term.

Our greatest success of the lean programme has to be with the openness and collaborating of all of the delivery partner teams in the programme. Being part of the programme has enabled the Costain lean community to easily reach out to others and share best practice. We've shared efficiencies, lean initiatives and lean tool templates with ease thanks to the community that has been formed as a result of the lean programme."

Skanska – Tyrone Fletcher

"The LCDP programme has enabled us to create a solution for the sector by the sector. An added benefit from both the Executive Board and Operational Board is how the different organisations, including our Client National Highways, have openly shared, collaborated and discussed the development of the programme. The Learning Management System provides for a standard and consistent approach to developing all tiers of the supplier chain. The support of the CITB has helped to elevate and create momentum for this programme."



TESTIMONIALS

Galliford Try – David Lowrey – Managing Director

The LCDP programme set out to increase the maturity of the Construction Industry when it comes to understanding and applying Lean thinking across a number of large construction partners. It sets out to enable them to demonstrate the large tangible savings through a focus on waste. The ethos and approach deployed by LCI-UK is founded on a sound and well tested approach of creating a common goal, engaging & empowering frontline people within a project or company, creating awareness and developing capability via a development pathway.

The LCDP proposition is construction focused and maturing against a backdrop of other offerings, many are already established and recognised but not tailored to our industry. Training materials and assessment standards drive greater maturity and eventual performance. All generally leverage a requirement for internal resource and planning to bring it to life and effectively communicate the goal and approach to their internal audiences.

LCI-UK supplement this with a supported Learning Management system and digital database tracking capability and outcomes, of use and benefit in particular to those organisations of potentially smaller scale or relatively new to deploying Lean. The tracking of practitioner progress is offered as a service, alongside the administration and reporting governance to National Highways.

LCI-UK's focus is on growing the maturity of an organisation through individual qualifications. Company accreditation is out of scope but potentially an ambition. Training materials have been developed collaboratively and quality is maturing, as are the further levels of individual accreditation beyond Lean Practitioner. The standard to which people are effectively trained is largely a result of the capability of the people in the respective organisations.

Dependent upon the level of organisational maturity, the LCDP is a good entry point. Assessment levels can take many hours and so company commitment and a long-term strategy is key. Later qualifications, if developed will eventually help organisations develop more capable leaders, self-sufficiency and eventual sustainability.

Benefits delivered have been significant, as have the number of people being trained, however the LCDP greatest strength has been its ability to act as a hub for multitude of large organisations seeking to demonstrate their current and growing capability to a client. The collaborative nature applied to the development of the materials, by those companies is I think unique in the market.

