Case Study Title: 5S Project Improvement Programme

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Since entering the Irish market in 2006, our service and sector offer has grown considerably to cover aviation, data centres, technology, and commercial offices.

Today, we are an established top 10 construction contractor in the country and our consultancy team has been instrumental in delivering a series of major projects and programmes across the breadth of the infrastructure industry.

With Irish infrastructure schemes receiving significant investment as part of Project Ireland 2040, there is a healthy long-term pipeline for Mace Consultancy and Contractors for major projects and programmes in the country.

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Overview & Background to the Lean Initiative

Standardised work areas and collaboration have increased productivity in construction. Collaboration meetings have shown lapses in material storage and waste management. While acceptable standards are communicated to the trade partners, the pace of modern construction projects means that managing the process has been reactive.

Production control meetings highlighted the need for continuous improvement as the project moved from construction phase to handover. It was noted that agreed storage areas were too large and that improved material and waste management was required. Increased visual management was highlighted as an improvement strategy with increased engagement required from the site production teams.

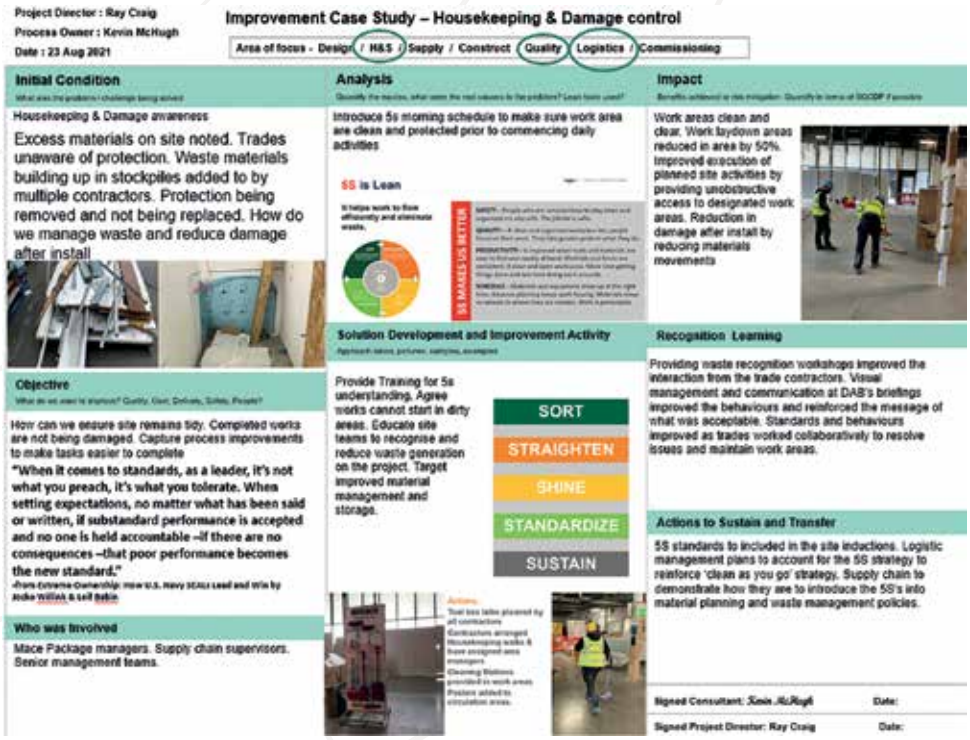

Figure 1: A3 Summary for waste management

This would improve communication and the organisation of work zones. The focus would be on continuous improvement of processes and people. It was decided to implement the '5S' method to collectively improve the management of materials and the removal of waste from the project. This gave management teams and trade supervisors a mechanism to communicate and manage material storage areas and to ensure all contractors had free access to their designated work areas. The 5S program was designed to increase the awareness of waste on the project and to provide a platform for project continuous improvement.

Lean Initiative Undertaken – Lean Thinking, Tools, Techniques

We arranged waste walks and discussed the 8 wastes in construction. We worked as teams to review work areas and identify wastes. We then introduced the 5S system to the team to help identify and eliminate wastes and to continuously improve our operations. We realised that 5S is more than a project tidy up, it is a philosophy to develop a systematic approach to organisational cleanliness and standardisation that can motivate and be beneficial to the workforce. It allows teams to recognise waste and identify improvement

opportunities. It also increases the communication between site teams and managers.

What are the 5S?

- **Sort – Determine what is required and remove everything else.** If it is not needed it is waste, less waste equals less hazards.
- **Straighten - Set in Order, a place for everything.** Reduce time looking for things. Ensure what you need is close to hand.
- **Shine - Clean & kept clean.** Clean as you go is more efficient and provides a safer work environment. Keep tools and machinery in good order.
- **Standardise - Create and agree a standard to maintain order.** It allows teams to expand and keep standards high. Work collaboratively to simplify the process. It increases improvements across the organisation.
- **Sustain - Self-discipline to keep going!** Be responsible by having a working team to keep it going. Make the work area more visual to help identify something out of place.

We then recognised the benefits that could be realised by a systematic approach to managing work areas on the project. It was clear that the message would need to be shared project wide so that all stakeholders could understand the effort required to implement the 5S programme and that all stakeholders got the required organisational support to participate in the programme. We highlighted where the 5S programme could be improved:

- **Safety:** We recognised that if we keep our work areas clean and tidy the workplace is safer.
- **Quality:** We agreed that a clean and organised work area allows people to focus on the tasks at hand, where people can take pride in their work.
- **Productivity:** When tools and materials are readily to hand and access to the work area is clear, teams can focus on getting the right work done, spending less effort on doing work arounds.
- **Schedule:** Have materials and equipment ready and plan in advance to keep the work flowing, materials moving where required and work is more predictable.

Figure 2: The 5s & 8 wastes presentation

Waste walks

An important part of introducing the 5S strategy was the introduction of waste walks. Initial training was provided to recognise the different types of waste. This was then followed up by groups who provided feedback from different work areas. This allowed teams to recognise the current wastes and identify opportunities for improvement. This was an important step as it gave the trade contractors ownership of the areas and allowed them to make commitments collectively to improve the work environment.

Continuous Improvement

Following the introduction of waste walks and an awareness program for 5S, we set up a 5S timetable so that areas can be walked, and improvement strategies developed. As a team, we collaboratively worked together to continuously improve the culture and practices on the project.

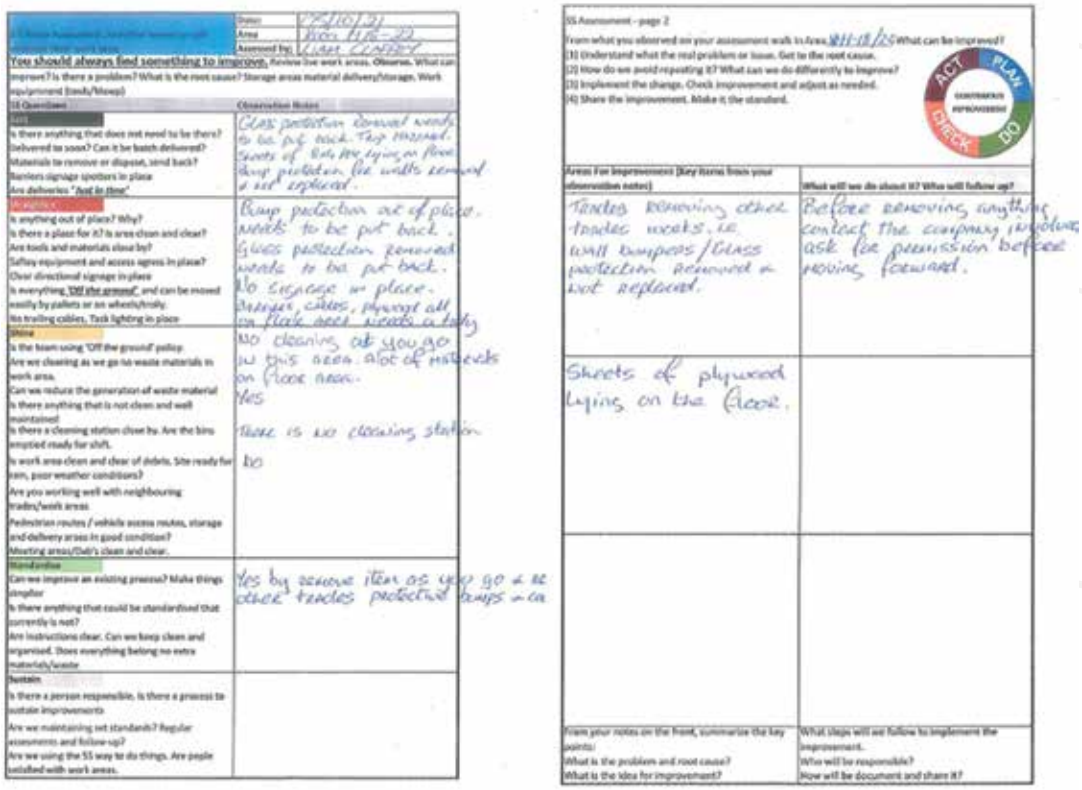

Figure 3: Team waste walk audit

Material storage

It was agreed to reduce storage areas. The type and quantity of materials that were being stored were evaluated and removed, as necessary. It was also agreed that the materials would be stored 'off the ground' so that they could be moved easily. Materials that were stored were identified as required during the next 10 days' work.

Waste removal

It was noted that unnecessary amounts of waste materials were being stored in lay down areas. It was also noted that waste bins were not being removed systematically by trades. This prevented the 'clean as you go' strategy from being implemented. A removal strategy was initiated to ensure that bins were empty and available for operatives during the day as the lack of empty bins prevented trades from clearing their areas effectively.

Waste Reduction

Delivery processing was monitored and revealed that excessive packages were being brought on to the project site. Instead, the deliveries were sent to contractors' yards where they were segregated and delivered in batches. Transport packaging was removed prior to delivering materials to the project. The deliveries were sorted and protected for transport to the location for use by the trades.

5S cleaning stations were introduced to each work area, where operatives had easy access to cleaning tools.

Figure 4: 5S in the field

Visual Management

Visual Management is an important tool for effective project communication. 5S communication boards were placed in each work area. Teams used these boards to highlight storage and delivery routes. Storage standards were communicated on the boards through 'What good looks like' posters. This helped to standardise the operation and communicate the acceptable standard. The 5S process was demonstrated on the boards, where the teams could collaborate to improve the 5S application on the project. Colour coded cleaning stations were positioned in each work area. This further promoted the use of 5S on the project and allowed teams to implement the 'clean as you go' regime.

Collaboration

Collaboration is an important technique used to manage the production control system on the project. Work areas and storage areas were defined collaboratively. This encouraged ownership of the project from the trade partners. Standards have been communicated from the main contractor. However, it is not what we say or write that is the standard, it is what we tolerate that is the standard we set. As there are many different trades and vendors working near each other, it is important that we identify areas for improvement and action these areas collectively. Poor housekeeping can only be improved by a collective effort to manage and maintain active work areas.

Managing Behaviours

At the beginning of this process, it was identified that a siloed mentality was in place on the project. Contractors were communicating to achieve their intended production goals. There was not a systematic regime to maintain the work areas. Contractors set up storage areas and while they were in good condition, the size of these areas was not regularly reviewed. This resulted in a reactive management process where works were paused in an area, while trade contractors returned the area to an acceptable standard. The 5S programme brought all contractors to the work area where they reviewed and identified opportunities for improvement. Each contractor could learn from each other and communicate waste and standards that could be improved upon.

The areas were then managed collaboratively, the waste was viewed as project waste rather than individual's waste. The areas were maintained collaboratively where each contractor reduced the waste and improved the storage and housekeeping of their work areas. As the process became standardised, contractors were collectively managing the areas, and the process for managing housekeeping moved from a reactive to a proactive form of management.

Lean Initiative Improvements & Impact

The initial waste walks highlighted the lack of standardisation for material and waste management. Each trade contractor approached this objective differently. It was recognised that there was improvement needed to remove waste generated on the project and to maintain the bin emptying schedule. The lack of available empty bins at the start of the shift hindered the area management.

The review of storage areas by contractors revealed that they were carrying excess materials on the site. This allowed them to propose and implement solutions to decrease storage areas and reduce the number of materials stored in the work areas. This type of action improved the communication of the standards required to manage the project. This resulted in reduced storage zones and all storage was palletised or on trollies so that they were easily moved.

Systematic reviews of storage and work areas improved the quality of storage areas where materials that were required during the next 10 days' work were located on the project.

Plant reviews ensured that equipment was in good condition. Mobile Elevated Work Platforms (MEWP's) were cleaned and the platform cleared of debris at the end of the shift. This reduced the waste appearing on the floor and allowed the next user to operate the MEWP unimpeded. By keeping plant and equipment keep in good condition, the waste produced was reduced and became part of the 'clean as you go' strategy.

The project benefited from this process as areas were always clear and clean. Plant and equipment were clear of debris, clean and in

good condition. The work areas were more organised and the there was less risk of accidental damage. There was also easier access to work areas and reduced activity associated with moving and removing materials which was causing damage to finished works. This in turn allowed site teams to focus on the task at hand, which improved coordination and allowed works to progress more efficiently. Project teams worked collectively to improve the project and then to maintain the standard. This increased collaboration, which benefited the project and improved the quality of the finished work.

Summary and Lessons Learned

Production wastes were not effectively being recognised on the project. This prevented workers improving the work areas. The introduction of waste walks improved the awareness of wastes and allowed teams to recognise and remove wastes from their processes. Teams collaborated during waste walks to manage their work areas collectively. There was an increased understanding between the trades.

The introduction of the 5S process defined an acceptable standard, where all trades work collaboratively to achieve. The impact of excessive storage and poor waste management was identified through this process. Improvement plans were agreed, and a process was put in place for reviewing work areas and ensuring they were acceptable before work started.

The process was implemented across all work areas, both internally and externally. It worked best when both principal contractor and trade contractor reinforced the message. Recognising peoples' efforts reinforced the programme. The process was less impactful when it was not supported and communicated fully by supervision. It is important that acceptable standards are defined and that they are reached collectively. This increases the visibility and the effectiveness of the initiative.

Sustaining the initiative was the most difficult process. When work areas were brought to an acceptable standard there was a perception that you had to fully engage the 5S process. Work areas were maintained. However, isolated areas of waste appeared as the standardisation and sustain period were not embedded.