Executive Summary

In order to keep to tight programme deadlines for the construction of a major structure (S1), the Skanska Structures Team adopted the production control technique of daily coordination meetings nicknamed the “5 at 5” to monitor and assure performance of both the project team and supply chain. These meetings incorporated the three principles of Production Management by facilitating collaborative relationships and environment, by having complete transparency and ownership of all tasks involved, and through improvement and adjustment of works from the lessons learnt every day. As a result of the meticulous planning and management of the works, along with the collaborative effort, drive and determination of the entire team, the structure S1 was completed over 4 ½ weeks ahead of the planned programme despite unexpected additional work due to a design change.

Introduction

Scheme Overview:

Located in Leicestershire, Junction 19 of the M1 forms the intersection between three major parts of the motorway and trunk road network - the M1 and M6 motorways and A14 Trunk Road. The existing junction suffers from several problems including congestion, delays and long queues that in turn contribute to accidents that can result in serious injuries and fatalities. The proposed improvement aims to relieve congestion at the junction, making the roads safer and decreasing journey times.
The project has a high structural content requiring the following six new bridges:

- Structure S1 - M1 over M6 to A14 Link;
- Structure S2 - A14 - M1 Northbound Link Flyover;
- Structure S3 - M6 - M1 Southbound Link over the M6 to A14 Link;
- Structure S8 - M1 Southbound - A14 Link over the Local Road Network (LRN);
- Structure S9 - M6 - A14 Link over Swinford Road; and
- Structure S10 - M1 Northbound - M6 Link over Swinford Road.

Structure S1 is a single span fully integral steel composite bridge which will carry the M1 over the new M6-A14 Link Road. The steel beams are supported on abutments consisting of concrete capping beams supported by contiguous bored piles. In order to maintain two lanes of traffic running on the M1 in each direction during construction, the structure is constructed in two halves using top down construction techniques. When the second half of the bridge is constructed, both halves will be stitched together and the area beneath the deck excavated down to the formation level of the M6-A14 link and the contiguous piles exposed and clad with facing blocks.
Image 4, May 2014: TTM has closed the M1 southbound with both directions of traffic running on the northbound carriageway.

Image 5: September 2015

Image 6: November 2014
The Challenge:

The original Clause 31 programme planned for the completion of S1 Phase 1 on 12th December 2014. The challenge with this was that the original planned completion date did not take into account raking piling which was additional scope due to a late design change. All activities on Structure S1 were on the critical path therefore it was vital that the planned dates were met in order to avoid any delay to the overall completion of the project. Any time taken off the programme on S1 works would reduce overall project duration and hence reduce prelim costs. As the initial programme had no float, it was clear that due to the increase in scope, efficient planning and collaboration between the all teams including subcontractors and designers would be required in order to achieve or better the planned switch date.
What We Did – Production Control

In order to reduce the programme it was clear that a number of activities would have to overlap and the interface between activities effectively managed. Daily production management co-ordination sessions (5 at 5) were started which were held at 5pm every evening and lasted approximately 15mins. These were led by the sub-agent and section engineer and involved the foremen, gangers and supervisors for the activities which were planned in the area of S1 in a particular week.

A dedicated room with whiteboard, drawings and programme was set up to create the correct workspace setting for these daily meetings to take place. The day’s progress was discussed, issues and hold ups were identified and actions for solving these issues agreed as a team. The planned work for the coming days was discussed, clashes identified and countermeasures put in place. The upcoming milestones were highlighted at every session so that there was no doubt as to what needed to be achieved by when.

Image 9: Production Control Visual Board
Benefits and Outcomes

The 5 at 5 quickly became a key tool for communicating and organising what was required from each gang or subcontractor on a daily and weekly basis to meet the tight programme deadlines. The benefits of the production control meetings are:

- The right people were involved in planning and programming for the daily and weekly tasks.
- The meetings were kept short and were a productive use of time.
- Meetings clarified what activities were happening and what needed to happen for each subcontractor team to work effectively.
- It provided a forum to discuss issues between gangs / subcontractors so countermeasures could be put in place.
- Encouraged subcontractors to take responsibility for their actions and the knock on effect of their failings.
- Highlighted common and re-occurring problems. This allowed the team to eliminate or mitigate the problems preventing possible delays.
- By involving the subcontractors in the planning sessions, the team set realistic plans and targets based on their expert knowledge.
- The engineers gained better time management on site by having a better understanding of the individual activities taking place on a daily basis. They learnt what the site team actually required from them in terms of engineering information and setting out.
- Improved the management of resources by ordering plant and material more efficiently.
- Better resource management allow just in time ordering and delivery which reduced storage space needs which in turn helped reduce congestion and provide a safer workspace.

As a result of this collaboration and effective planning the switch was achieved on 9th November, more than 4 ½ weeks ahead of the planned programme despite extra work having to be carried out. The benefits of the early completion included:

- Reduced time of overall carriageway closure
- Reduced overall programme duration as S1 was on the critical path
- Savings to traffic management costs as TM was lifted earlier
- By opening early the TM switch was moved ahead of the busy Christmas period
- Road users benefit from having the road opened sooner due to reduced overall programme

Further Information

Tom Curran
Structures Sub-Agent, Temporary Works Co-Ordinator
Skanska Civil Engineering
Mobile: +44 (0)78 7566 3008
tom.curran@skanska.co.uk