



# NAC Executive Insights

## Out of Sequence Construction

### Key Points

- Out of sequence work is a telltale sign of a troubled project.
- Out of sequence work differs from contingent execution.
- Common causes of out of sequence work are provided.
- Impact of subcontractors working in multiple locations at the same time is discussed.
- Challenges created by incomplete work areas are laid out.
- Several project management red flags are highlighted.

### Introduction

Out of sequence work is both a source of labor inefficiency (low productivity vs. plan) as well as a telltale sign of a troubled project. This is distinguished from contingent execution,<sup>1</sup> which is the performance of flexibly scheduled activities when the labor force is otherwise delayed in executing planned and scheduled activities. Out of sequence work is differentiated by the pre-planned nature of contingent execution.

While a construction contractor has the right to modify their project execution plan, they should not do so to the detriment of the project. When the contractor's schedule is disrupted, a claim may result for both additional time and cost. To the extent this delay causes the contractor to execute work out of sequence, a causal link must be demonstrated between lower productivity and the out of sequence work that may be undertaken. Delays may be non-excusable, excusable, compensable, concurrent, or pacing<sup>2</sup>.

### Causes of Out of Sequence Construction

Several factors may cause a contractor to undertake out of sequence work. Common causes include:

- Delayed right of way or other property acquisition or easements
- Delayed utility relocations

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<sup>1</sup> NAC Executive Insight, Contingent Execution

<sup>2</sup> Deceleration of the work on the project by one party due to the potential or real delay caused by the other party so as to maintain steady progress with the revised overall project schedule (adapted from Zack, 1999)

- Delayed traffic, work, or other permits
- Differing site conditions
- Late owner approvals
- Delayed receipt of owner furnished equipment or materials
- Delays caused by another contractor in a multi-prime or multi-program site
- Delayed receipt of contractor procured materials or equipment
- Failed quality inspections of workmanship or contractor-procured materials (necessitating rework)
- Late subcontractor performance
- Third-party delays (*force majeure* and standard lists of excusable delays)

Out of sequence work can result from a scheduling artifact, often benign, where:

- Schedules assume linear execution for convenience, or
- Long work plans are broken into segments to better schedule and manage. If one segment becomes unavailable, crews will work another.

Out of sequence work also may be the result of the occurrence of an unexpected event (recognize the plan may have been deficient) or a cascading effect from a prior delay.

## Four Major Causes of Out of Sequence Work

Perhaps more significant and warranting closer attention by the project manager are four particular instances that may cause out of sequence work:

1. **Subcontractors working in multiple locations at the same time** — Concurrent, multiple location work acts to delay the turnover of various work areas to other trades or subcontractors, often consuming project float. Any subcontractor overlap contributes to project execution inefficiency and potential conflicts and perhaps claims. This situation is often noted when a subcontractor is required to add resources and allocates them to new work instead of completing activities in existing work areas. Subcontractors working in multiple locations at the same time (more the norm than the exception) require project management oversight and control. The development of good performance metrics on personnel loading, anticipated productivity, and the project schedule should be one of the award criterion.
2. **Incomplete work areas** — Subcontractors or work crews often bring a work area to 95 percent completion with the intent of returning later to complete it. This often results in the need for workarounds either by follow-on crews or by the returning contractor. In some instances, it may require remobilizing to the work area, often an inefficient process. In other instances the remaining work is added to a punch list and performed on the critical path (it may have previously not been on the critical path). Common results are conflict and congestion. This situation is exacerbated by compensation patterns that encourage overall progress to the detriment of completion of work in a given area. Payments linked to 100 percent completion of a given task or area encourage finishing and clearing a work area for other subcontractors or trades.

3. **Overlapping crews/subcontractors** — Coordination of multiple crews in the same area is difficult. Logistical factors, including total crew loading, become significant with inefficient material laydown, potentially conflicting temporary construction (scaffolding), and equipment and crane conflicts. Trade activities may be offset by using lead/lag scheduling techniques to allow one crew to get far enough ahead to allow successor crews (activities) to proceed. Safety risk is also elevated as one trade may find construction activities occurring overhead or otherwise placing them in a potentially unsafe environment. Disruption in these instances is common and may lead to claims against the prime contractor. Also, overlapping crews can experience 30 percent drops in productivity. The realities of the construction site, however, require these inefficiencies to go through a detailed scheduling process. Having well-developed performance metrics creates the baseline model, where the lack of performance or productivity is immediately known to the project team and subcontractor so that appropriate mitigation measures can be implemented.
4. **Overlapping work areas** — Challenges with overlapping work areas are similar to those faced by overlapping crews. The area overlap may exist solely in the logistical elements (laydown; shared cranes). Additionally, overlapping work areas can occur when one subcontractor is working punch list items while another is in full production mode. These last two areas are often grouped.

Out of sequence work can highlight common scheduling and contracting mistakes, such as:

- A focus on scheduling the start of individual activities with less emphasis on completion, especially for tasks not directly on the critical path (the tendency is to ignore coupling<sup>3</sup>).
- Incentivizing starting (mobilization payments) and often treating task completion no different than any other progress, despite its broader impacts on overall project productivity.

## Project Management Red Flags

Out of sequence construction should raise several red flags to project managers, including:

- Potential errors in providing the status of earlier progress (overstating actual project performance)
- Potential recurrent workarounds due to quality problems in construction materials or workmanship
- Weak construction plan and planning
- Systemic disruptions
- Weak field management
- Recurrent owner or third-party delays
- Poor assessment of progress, earned value, and productivity
- Improperly incentivized contracts or payments
- Labor force training and skills deficiencies
- Low productivity<sup>4</sup>

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<sup>3</sup> NAC Executive Insight, Coupling in Large Complex Projects

<sup>4</sup> Productivity expectations should be included in every bid package, along with resources expectations (journeymen, laborers, non-working foremen, etc.) and be one of the selection criteria. It requires buy-in by the subcontractor and forces them to commit to provide a sufficient and qualified workforce.

Early starts should not be confused with early completion.

## **Summary**

Out of sequence work is a telltale sign of a troubled project and differs from contingent execution. This Executive Insight has reviewed: common causes of out of sequence work; the impact of subcontractors working in multiple locations at the same time; and the challenges created by incomplete work areas.

Importantly, several project management red flags are highlighted. These red flags should be considered early indicators, placing project management on alert that corrective actions may be required.

## **About the Author**

Bob Prieto was elected to the National Academy of Construction in 2011. He is a senior executive who is effective in shaping and executing business strategy and a recognized leader within the infrastructure, engineering, and construction industries.

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