



Construction Industry Institute®

Sustainability during Construction: Process and Actions

Construction Industry Institute

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**Prepared by
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Construction Sustainability**

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Executive Summary

Construction sustainability is the construction phase implementation of practices, strategies, and actions that address current and future environmental, social, and economic needs, while considering capital project safety, quality, cost, and schedule. Current literature on capital project sustainability focuses almost exclusively on the early concept planning and design phases. This research gap on sustainability in the construction phase shows the need for information, support tools, and guidance in this area. To fill this knowledge void, Research Team 304 identified 54 unique actions that project teams can take during construction to enhance overall project sustainability. The team classified, gauged, and modeled these construction phase sustainability actions (CPSAs) to allow a project team to implement them strategically.

In order to simplify the CPSA selection process, the research team created an implementation work process, a spreadsheet-based CPSA screening tool, and additional in-depth guidance for two selected CPSAs. The team also identified both input- and output-oriented construction sustainability metrics. Implementation Resource 304-2, *A Framework for Sustainability during Construction*, presents these support tools within a framework for integrating sustainability actions throughout the project construction phase. To make the CPSA screening tool more accessible to field practitioners, the team produced it in two formats: 1) the Excel®-based workbook format; and 2) a Web “app” tool format. Collectively, these tools will help project teams assess strategy, study implementation, and suggest quantifiable metrics for the construction phase of all their capital projects.

Introduction

Construction sustainability involves the construction phase processes, decisions, and actions that address current and future environmental, social, and economic needs while considering project safety, quality, cost, and schedule. Capital project owners and constructors increasingly seek guidance and resources to integrate and evaluate sustainability decisions and actions into their project construction services. Major project stakeholders desire enhanced and transparent sustainability strategies and metrics in order to promote project sustainability culture, engagement, participation, and performance.

To respond to this trend, RT 304 established structured approaches to determining, executing, and judging effective sustainability solutions during the construction phase of capital projects. Specifically, this research effort included the following objectives:

1. Build upon the established literature and the pioneering work of Research Team 250, Sustainable Design and Construction for Industrial Construction, with a focus on construction phase-related elements.
2. Identify construction decisions and actions that can significantly enhance sustainability, with emphasis on finding and analyzing innovative solutions.
3. Give project owners/contractor managers a tool for screening the high-impact construction sustainability decisions/actions with the most relevance to project objectives and conditions.
4. Use demonstration application case studies to validate selected research tools and to gain further insight into their implementation.

5. Provide a framework for preparing a field operations sustainability plan. Within the framework, recommend sustainability metrics and key performance indicators as bases for benchmarking.
6. Identify specific issues for future research.
7. Through the RT research products, educate the industry on field sustainability opportunities.

The scope of this research is limited to the construction phase, which the team defined as starting at the contractor's initial planning for jobsite presence and as ending with the final commissioning report. The research scope included only those construction decisions and actions performed at the discretion of the construction manager (whether contractor or owner). Examples of such construction discretionary decisions and activities include the following: temporary facility design and construction; construction means and methods; and management of the worksite, workforce, subcontractors/suppliers, and temporary facilities. Examples of sustainability actions outside the research scope include those required by either project designs or broad-based regulatory compliance. Also, although safety is a factor in any successful sustainability implementation, the team excluded actions that affect only safety, since CII has chartered many research teams focused solely on improving safety.

The primary beneficiaries of this research will be contractor and owner managers of capital facility projects and any communities adjacent to construction projects. Equipped with the study's findings—the CPSAs developed by the team—owners and construction contractors will be better prepared to implement sustainability actions. Improving construction sustainability will yield positive environmental, social, and economic results. Moreover, these CPSA actions will frequently support and improve the performance of the traditional project goals of safety, quality, cost, and schedule.

In addition to this research summary (RS), RT 304 produced an implementation resource (IR) and a research report (RR). This RS offers a high-level overview of key findings and summarizes the team's research methodology. IR 304-2, *A Framework for Sustainability during Construction*, provides case studies, tools for screening CPSAs and assessing CPSA implementation, sustainability performance metrics, and useful, detailed implementation guidance on sustainability-related construction decision-making. RR 304-11, *Study of Construction Sustainability Opportunities*, presents the methodological details, steps, and tools used in this study, and offers recommendations for future research.

Methodology

The research process began with team discussions on the meaning of key terms. The following definitions were developed for the purposes of this research:

Construction Sustainability: The construction phase processes, decisions, and actions that enhance current and future environmental, social, and economic needs while considering project safety, quality, cost, and schedule.

Construction Phase: All fabrication/jobsite/field activities and decisions, from construction/fabrication contracting and planning for site mobilization, through initial operations, final performance testing, and handover of the completed facility.

Conventional Project Performance Criteria: Typical criteria for assessing project success: safety, quality, cost, and schedule.

Figure 1 illustrates the RT 304 research process.

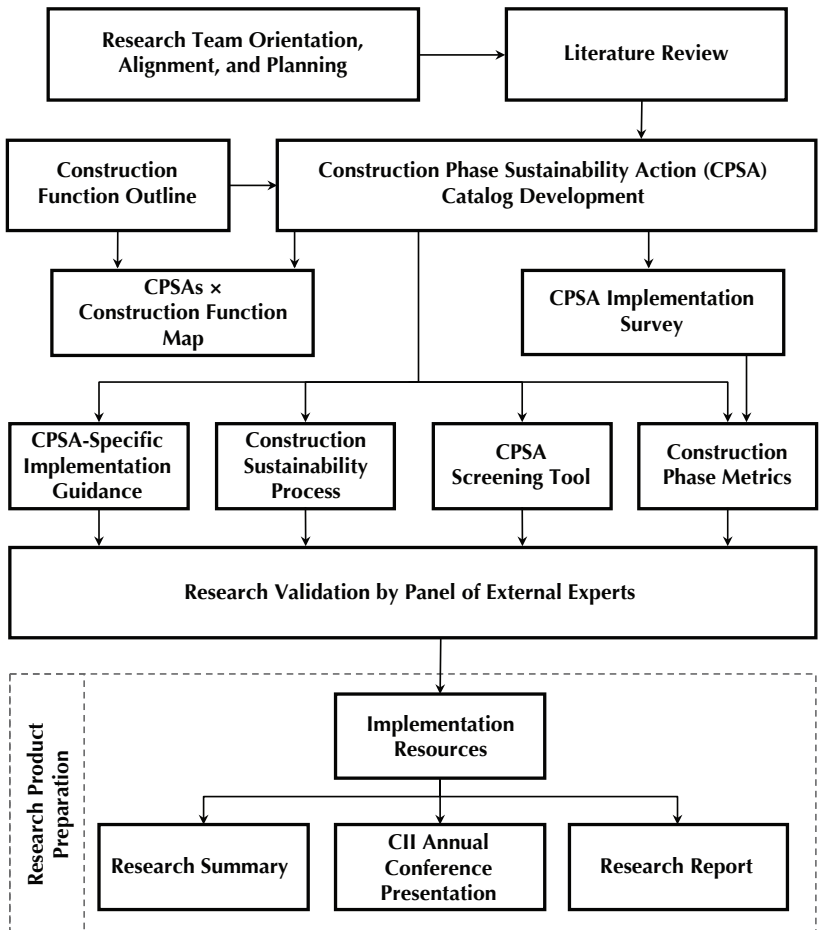


Figure 1. Research Methodology Overview