Overview of Construction Sustainability Research Products

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Who Wants to be ... More Sustainable?
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Introduction: NEED

- Guidance and resources for sustainable construction activities

[Source]
Research Objectives

• Scope: Construction-phase on capital projects
  (from site mobilization to turnover to the owner)

• Objectives (CII 2014)

  (1) To provide practical sustainability guidance for construction field operations

  (2) To develop tools to support sustainability implementation during the construction

  (3) To provide sustainability metrics for benchmarking

[Source]
Research Methodology

- Research methodology *(CII 2014)*

Research Methodology

• Definitions by the research team *(CII 2014)*
  – Construction sustainability: … enhance current and future environmental, social, and economic performance
  – Construction phase: … starting with site mobilization to handover to the owner
  – Conventional project performance criteria: Typical criteria for assessing a project’s success

• Development of a catalog of CPSAs *(CII 2014)*

Research Products: CPSAs

Number of CPSAs in the primary construction function (adapted from CII 2014)

[Source]
## Research Products: CPSA Catalog

<table>
<thead>
<tr>
<th>CPSA NO: 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CPSA TITLE: Sustainable Temporary Facilities</td>
</tr>
<tr>
<td>2. PRIMARY CONSTRUCTION FUNCTION: Site Facilities &amp; Operations</td>
</tr>
<tr>
<td>3. SECONDARY CONSTRUCTION FUNCTION: Field Engineering</td>
</tr>
</tbody>
</table>

**B. CPSA DESCRIPTION:**

Optimize the planning of temporary site facilities. Consider the sustainability impacts related to the sizing, siting, location, and layout of the construction site. Include areas such as material storage, fabrication shops, stockpiles, borrow pits, fuel storage, refueling stations, tool storage, washing lots, field offices, and break facilities. Select facilities, erecting storage, storm drainage, temporary power generation, site lighting, and infrastructure in ways that optimize sustainability. Consider both mobile/temporary, semi-permanent options. Consider related impacts from any separate, remote locations. Also evaluate the overall cost of special challenges and opportunities associated with projects located in dense urban areas or extremely remote rural areas (e.g., self-service commuting capacity). Consider the implications of sourcing temporary facilities and construct site sanitation for these projects.

**C. SUSTAINABILITY IMPACTS CHARACTERIZATION:**

<table>
<thead>
<tr>
<th>IMPACT MAGNITUDE</th>
<th>IMPACT AFFECTED AREAS/RESOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIMARY IMPACTS</td>
<td>MOST AFFECTED AREAS/RESOURCES</td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td>Energy consumption</td>
</tr>
<tr>
<td>SOCIAL</td>
<td>Health &amp; safety</td>
</tr>
<tr>
<td>ECONOMIC</td>
<td>Project failure</td>
</tr>
</tbody>
</table>

**D. THIS CPSA HAS A SIGNIFICANT POSITIVE INFLUENCE ON THE FOLLOWING CONVENTIONAL PROJECT PERFORMANCE CRITERIA:**

1. Project safety performance: ☐
2. Project cost performance: ☐
3. Project schedule performance: ☐
4. None: ☐

**E. EASE OF ACCOMPLISHMENT/IMPLEMENTATION:**

- Easy: ☐  
- Moderate: ☐  
- Challenging: ☐

**F. PROJECT CONDITIONS THAT LEVERAGE BENEFITS FROM THE CPSA:**

- The project is long and complex. ☐
- Project involves a weather camp. ☐
- The project is located in an environmentally/socially-sensitive area. ☐

**G. POTENTIAL SUSTAINABILITY IMPACT PERFORMANCE OUTPUT METRICS:**

<table>
<thead>
<tr>
<th>METRIC</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| Site of carbon footprint from project. | ☐
| Proportion of sensitive vegetation not impacted from project. | ☐

**H. BARRIERS TO SUCCESSFUL CPSA IMPLEMENTATION:**

- Inadequate information to identify sustainability impacts of temporary site facilities. ☐
- Limited project resources – first-come, first-served. ☐

**REFERENCES**


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Image of the CPSA catalog *(adapted from CII 2014)*

[Source]
Research Products: CPSA Screening Tool

- To select the most appropriate and relevant CPSAs *(CII 2014)*

- Inputs
  - Weighted priorities for sustainability
  - Project characteristics

- Output
  - Rank-order of CPSAs

[Source]
## Overview of Construction Sustainability Research Products

### Research Products: CPSA Screening Tool

#### Implementation Resource 304-3: The CPSA Screening Tool

<table>
<thead>
<tr>
<th>Rank</th>
<th>CPSA #</th>
<th>CPSA Title and Description</th>
<th>Leveraging Project Conditions</th>
<th>RI</th>
<th>CPSA Link</th>
</tr>
</thead>
</table>
| 1    | 4      | Sustainability Provisions in Construction Execution Plans: Incorporate sustainability provisions and solutions in the construction execution plan similar to such provisions for safety, quality, cost, schedule, and resource management, among others. Include a discussion on sustainability requirements and opportunities as part of the preconstruction/kick-off meeting to better align the project team on sustainability. When needed, incorporate a training component and confirm that the team understands sustainability specifications and associated responsibility assignments. | a) Project management has taken a lead role in endorsing sustainable solutions  
  b) The project is large and complex  
  c) The project team has experience incorporating sustainability provisions | 0.06 | CPSA #1 |
| 2    | 5      | Sustainability Risk Management: Ensure that sustainability risks are incorporated into the project risk management process by addressing environmental, social, and economic threats and opportunities. Perform a sustainability risk assessment to identify sources and root causes of accidents, releases or spills of hazardous material (i.e., exposure to the worker, community, and environment), and cultural clashes, among other events. Record such events in a risk register. Mitigation measures should be developed and employed to minimize negative sustainability impacts. | a) The project is large and complex  
  b) The project is located in an environmentally/socially-sensitive area  
  c) The project owner, stakeholders, and/or local community have diverse interests relative to sustainability | 0.06 | CPSA #2 |
| 3    | 9      | Paperless Communication and Construction Documentation: Replace hardcopy-based communications with electronic/digital forms wherever possible. Consider developing and implementing digital data collection systems and real-time field reporting technologies to electronically streamline traditional paper-based processes and further reduce the reliance on paper files, drawings, and other documents during construction. Adopting green meeting practices can further reduce negative sustainability impacts. Examples of eco-friendly meeting practices include distributing meeting materials electronically, arranging meetings via telephone or Internet to reduce travel, and encouraging carpools or public transportation when travel cannot be avoided. If printing is required, modify the default setting of the printer to print double-sided and encourage recycling of all documents. | a) All parties are willing to use electronic communications and align on same electronic systems  
  b) Electronic programs/forms are available and individuals with expertise are available to run them  
  c) Projects where all parties have computers or tablets and knowledge of electronic systems | 0.06 | CPSA #9 |
| 4    | 13     | Contractor Prequalification Based on Safety and Sustainability Performance: Consider employing contractors and subcontractors with sustainability experience and knowledge (e.g., LEED accredited or Envision certified staff). Routinely include safety performance in the prequalification of contractors, subcontractors, and suppliers. Enhanced safety performance can have a major impact on the local community and on project economics. Extending the prequalification requirement to include environmental aspects of sustainability can positively impact the community and project economics as well. | a) Sufficient number of contractors are available  
  b) The project is large and complex  
  c) The project owner, stakeholders, and/or local community have diverse interests relative to sustainability | 0.06 | CPSA #13 |

**Output tab (adapted from CII 2014)**

[Source]
Research Products: CPSA Implementation Index

• To assess the sustainability performance *(CII 2014)*

• Input
  - Extent of CPSA Implementation

• Outputs
  - CPSA Implementation Index
  - 59 metrics (7 categories) associated with impacts from CPSA

[Source]
Conclusions

- Construction-phase sustainability implementation

  **CPSA Catalog**
  54 Construction-Phase Sustainability Actions

  **CPSA Screening Tool**
  To prioritize relevant CPSAs

  **CPSA Implementation Index**
  To assess the level of CPSA implementation

- CPSA Implementation Index demonstration:
  - Current level of CPSA implementation is 60% *(CII 2014)*

[Source]
Acknowledgements and References

• Acknowledgements
  – Construction Industry Institute (CII)
  – CII Research Team 304
  – Survey respondents

• References
Thank you.

Contact information

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