# 3. [DESIGN FOR SAFETY (RS101-1)](https://www.construction-institute.org/design-for-safety)

**Report Summary:** Incorporating safety measures in the design phase directly improves safety on the job site, and ultimately leads to lower total installed cost due to fewer dollars spent on mediating hazards and acquiring construction insurance.

This study involved accumulating a large number of design suggestions that focus on improving construction worker safety and creating the “Design for Construction Safety ToolBox,” (Toolbox) an interactive computer program to aid in planning and designing facilities. ToolBox allows the user to identify potential safety hazards and offers design suggestions that may be used either to control or to eliminate the hazards. ToolBox allows for both the identified hazards and the design suggestions to be documented in a report format. A project history of construction safety design issues and actions is automatically accumulated and can be easily monitored for completeness of review and status of design decisions.

**Key Takeaways:**

## (1) Reduce worker exposure to falls and being struck by falling objects.

## (Project Phase: Feasibility through Operate Facility)

* Design components for prefabrication in the shop to reduce worker exposure to falls from elevation and being struck by falling objects.
* Facilitate prefabrication of components on the ground.
* Ensure components can be erected in place as complete assemblies.

## (2) Eliminate the need to connect special guardrail or lifeline connections to facilitate worker safety.

## (Project Phase: Feasibility through Operate Facility)

* Design steel columns with holes in the web at 21 inches above floor level.
* Add holes in the web at 42 inches above floor level.
* Provide support locations for guardrails and lifelines at these heights.

## (3) Eliminate falls due to unexpected vibrations, misalignment, and/or unexpected loads.

## (Project Phase: Feasibility through Operate Facility)

* Design beam-to-column double connections for continual support during connection.
* Add a beam seat to support beams during the connection process.
* Include an extra bolt hole for additional support.
* Incorporate other redundant connection points for stability.

## (4) Prevent fall hazards by simplifying the work area for workers.

## (Project Phase: Detailed Scope through Operate Facility)

* Minimize the number of offsets in a building plan.
* Ensure offsets are consistent in size.
* Make offsets as large as possible.

## (5) Monitor overhead power lines that are in service during construction.

## (Project Phase: Detailed Scope through Construction)

* Allow adequate clearance between the structure and overhead power lines.
* Bury existing power lines around the project.
* Disconnect existing power lines around the project.
* Reroute power lines around the project before construction begins.

## [(6) Tool: Design for Construction Safety ToolBox (prompt hazard considerations, offer suggestions, and maintain records).](https://www.construction-institute.org/design-for-construction-safety-toolbox-version-2-0)

## (Project Phase: Detailed Design and Procurement through Operate Facility)

* Prompt hazard considerations: Identify potential construction hazards across phases, such as layout, sitework, and structural components, to enhance safety preemptively.
* Offer actionable suggestions: Provide best-practice design recommendations for specific safety concerns, including stable walkways, clear access points, and safety features for elevated structures​.
* Conduct record-keeping for accountability: Maintain a log of safety measures and suggestions that can be applied to aid tracking and verification for future assessments and compliance.
* Optimize planning phases: Integrate safety considerations early in the project planning and design stages to prevent costly modifications later and to streamline construction processes.
* Enhance site safety features: Design components, such as guardrails, secure scaffolding points, and marked hazards, for improved mitigation of safety risks throughout construction​.