# Performance Metric Formulas and Definitions

**Performance Metric Category: COST**

<table>
<thead>
<tr>
<th>Metric:</th>
<th>Formula:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Cost Growth</strong></td>
<td>Actual Total Project Cost - Initial Predicted Project Cost</td>
</tr>
<tr>
<td></td>
<td>Initial Predicted Project Cost</td>
</tr>
<tr>
<td><strong>Delta Cost Growth</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Project Budget Factor</strong></td>
<td>Actual Total Project Cost</td>
</tr>
<tr>
<td>(Contractor data only)</td>
<td>Initial Predicted Project Cost + Approved Changes</td>
</tr>
<tr>
<td><strong>Delta Budget Factor</strong></td>
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<tr>
<td><strong>Phase Cost Factor</strong></td>
<td>Actual Phase Cost</td>
</tr>
<tr>
<td>(Owner data only)</td>
<td>Actual Total Project Cost</td>
</tr>
<tr>
<td><strong>Phase Cost Growth</strong></td>
<td>Actual Phase Cost - Initial Predicted Phase Cost</td>
</tr>
<tr>
<td>(Owner data only)</td>
<td>Initial Predicted Phase Cost</td>
</tr>
</tbody>
</table>

## Definition of Terms

**Actual Total Project Cost:**
- Owners –
  - All actual project cost from pre-project planning through startup
  - Exclude land costs but include in-house salaries, overhead, travel, etc.
- Contractors – Total cost of the final scope of work.

**Initial Predicted Project Cost:**
- Owners – Budget at the time of authorization.
- Contractors – Cost estimate used as the basis of contract award.

**Actual Phase Cost:**
- All costs associated with the project phase in question.
- See the Project Phase Table in Appendix C for phase definitions.

**Initial Predicted Phase Cost:**
- Owners – Budget at the time of authorization.
- Contractors – Budget at the time of contract award.
- See the Project Phase Table in Appendix C for phase definitions.

**Approved Changes:**
- Estimated cost of owner-authorized changes.
### Performance Metric Category: SCHEDULE

| Metric: Project Schedule Growth | Formula: \( \text{Actual Total Proj. Duration} - \text{Initial Predicted Proj. Duration} \) / \( \text{Initial Predicted Proj. Duration} \) |
| Metric: Delta Schedule Growth | Formula: \( | \text{Schedule Growth} | \) |
| Metric: Project Schedule Factor (Contractor data only) | Formula: \( \frac{\text{Actual Total Project Duration}}{\text{Initial Predicted Project Duration} + \text{Approved Changes}} \) |
| Metric: Delta Schedule Factor (Contractor data only) | Formula: \( | 1 - \text{Schedule Factor} | \) |
| Metric: Phase Duration Factor (Owner data only) | Formula: \( \frac{\text{Actual Phase Duration}}{\text{Actual Overall Project Duration}} \) |
| Metric: Total Project Duration | Actual Total Project Duration (weeks) |
| Metric: Construction Phase Duration | Actual Construction Phase Duration (weeks) |

### Definition of Terms

**Actual Total Project Duration:**
(Detail Design through Start-up)
- Owners – Duration from beginning of detail design to turnover to user.
- Contractors - Total duration for the final scope of work from mobilization to completion.

**Actual Overall Project Duration:**
(Pre-project Planning through Start-up)
- Unlike Actual Total Duration, Actual Overall Duration also includes time consumed for the Pre-Project Planning Phase.

**Actual Phase Duration:**
- Actual total duration of the project phase in question. See the Project Phase Table in Appendix C for phase definitions.

**Initial Predicted Project Duration:**
- Owners – Predicted duration at the time of authorization.
- Contractors - The contractor's duration estimate at the time of contract award.

**Approved Changes**
- Estimated duration of owner-authorized changes.
### Performance Metric Category: SAFETY

| Metric: Total Recordable Incident Rate (TRIR) | Formula: \[
\frac{\text{Total Number of Recordable Cases} \times 200,000}{\text{Total Site Work-Hours}}\] |
|---|---|

| Metric: Dart Rate (LWCIR) | Formula: \[
\frac{\text{Total Number of DART Cases} \times 200,000}{\text{Total Site Work-Hours}}\] |
|---|---|

**Definition of Terms**

- **Recordable Cases:** All work-related deaths and illnesses, and those work-related injuries which result in: death, loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid.
- **DART Cases:** Incidents resulting in days away from work, restricted activity, or transfer.

### Performance Metric Category: CHANGES

| Metric: Change Cost Factor | Formula: \[
\frac{\text{Total Cost of Changes}}{\text{Actual Total Project Cost}}\] |
|---|---|

**Definition of Terms**

- **Total Cost of Changes:** Total cost impact of scope and project development changes.
- **Actual Total Project Cost:**
  - **Owners:**
    - All actual project cost from pre-project planning through startup
    - Exclude land costs but include in-house salaries, overhead, travel, etc.
  - **Contractors:** Total cost of the final scope of work.
### Performance Metric Category: REWORK

<table>
<thead>
<tr>
<th>Metric: Total Field Rework Factor</th>
<th>Formula:</th>
</tr>
</thead>
</table>
|                                  | \[
|                                  | \frac{\text{Total Direct Cost of Field Rework}}{\text{Actual Construction Phase Cost}} \] |

#### Definition of Terms

- **Total Direct Cost of Field Rework**: Total direct cost of field rework regardless of initiating cause.
- **Actual Construction Phase Cost**: All costs associated with the construction phase. See the Project Phase Table in Appendix C for construction phase definition.
## Project Phase Definition Table

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Start/Stop</th>
<th>Typical Activities &amp; Products</th>
<th>Typical Cost Elements</th>
</tr>
</thead>
</table>
| Pre-Project Planning               | Start: Defined Business Need that requires facilities   Stop: Total Project Budget Authorized | • Options Analysis   
• Life-cycle Cost Analysis   
• Project Execution Plan   
• Appropriation Submittal Pkg   
• P&IDs and Site Layout   
• Project Scoping   
• Procurement Plan   
• Arch. Rendering | • Owner Planning team personnel expenses   
• Consultant fees & expenses   
• Environmental Permitting costs   
• Project Manager / Construction Manager fees   
• Licensor Costs |
| Typical Participants:             |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Owner personnel                  |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Planning Consultants             |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Constructability Consultant     |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Alliance / Partner              |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Detail Design                      | Start: Design Basis   
Stop: Release of all approved drawings and specs for construction (or last package for fast-track) | • Drawing & spec preparation   
• Bill of material preparation   
• Procurement Status   
• Sequence of operations   
• Technical Review   
• Definitive Cost Estimate | • Owner project management personnel   
• Designer fees   
• Project Manager / Construction Manager fees |
| Typical Participants:             |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Owner personnel                  |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Design Contractor               |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Constructability Expert         |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Alliance / Partner              |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Demolition / Abatement            | Start: Mobilization for demolition   
Stop: Completion of demolition | • Remove existing facility or portion of facility to allow construction or renovation to proceed   
• Perform cleanup or abatement / remediation | • Owner project management personnel   
• Project Manager / Construction Manager fees   
• General Contractor and/or Demolition specialist charges   
• Abatement / remediation contractor charges |
| (see note below)                   |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Typical Participants:             |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Owner personnel                  |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • General Contractor              |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Demolition Contractor           |                                                 |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| • Remediation / Abatement Contractor |                                             |-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|

Note: The demolition / abatement phase should be reported when the demolition / abatement work is a separate schedule activity (potentially paralleling the design and procurement phases) in preparation for new construction. Do not use the demolition / abatement phase if the work is integral with modernization or addition activities.
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| **Procurement** | **Start:** Procurement Plan for Engineered Equipment **Stop:** All engineered equipment has been delivered to site | • Supplier Qualification  
• Supplier Inquiries  
• Bid Analysis  
• Purchasing  
• Engineered Equipment  
• Transportation  
• Supplier QA/QC | • Owner project management personnel  
• Project/Construction Manager fees  
• Procurement & Expediting personnel  
• Engineered Equipment  
• Transportation  
• Shop QA/QC |
| **Construction** | **Start:** Beginning of continuous substantial construction activity **Stop:** Mechanical Completion | • Set up trailers  
• Site preparation  
• Procurement of bulks  
• Issue Subcontracts  
• Construction plan for Methods/Sequencing  
• Build Facility & Install Engineered Equipment  
• Complete Punchlist  
• Demobilize construction equipment | • Owner project management personnel  
• Project Manager / Construction Manager fees  
• Building permits  
• Inspection QA/QC  
• Construction labor, equipment & supplies  
• Bulk materials  
• Construction equipment  
• Contractor management personnel  
• Warranties |
| **Start-up / Commissioning**  
*Note: Not usually applicable to infrastructure or building projects* | **Start:** Mechanical Completion **Stop:** Custody transfer to user/operator (steady state operation) | • Testing Systems  
• Training Operators  
• Documenting Results  
• Introduce Feedstocks and obtain first Product  
• Hand-off to user/operator  
• Operating System  
• Functional Facility  
• Warranty Work | • Owner project management personnel  
• Project Manager / Construction Manager fees  
• Consultant fees & expenses  
• Operator training expenses  
• Wasted feedstocks  
• Supplier fees |