### 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></td>
<td>Initial Predicted Project Cost + Approved Changes</td>
</tr>
<tr>
<td><strong>Delta Budget Factor</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Phase Cost Factor (Owner data only)</strong></td>
<td>Actual Phase Cost</td>
</tr>
<tr>
<td></td>
<td>Actual Total Project Cost</td>
</tr>
<tr>
<td><strong>Phase Cost Growth (Owner data only)</strong></td>
<td>Actual Phase Cost – Initial Predicted Phase Cost</td>
</tr>
<tr>
<td></td>
<td>Initial Predicted Phase Cost</td>
</tr>
</tbody>
</table>

### Definition of Terms

**Actual Total Project Cost:**
- Owners –
  - All actual project cost from front end 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 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 Definition Table.

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

<table>
<thead>
<tr>
<th>Metric: <strong>Project Schedule Growth</strong></th>
<th>Formula: ( \frac{\text{Actual Total Proj. Duration} - \text{Initial Predicted Proj. Duration}}{\text{Initial Predicted Proj. Duration}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metric: <strong>Delta Schedule Growth</strong></td>
<td>Formula: (</td>
</tr>
<tr>
<td>Metric: <strong>Project Schedule Factor</strong></td>
<td>Formula: ( \frac{\text{Actual Total Project Duration}}{\text{Initial Predicted Project Duration} + \text{Approved Changes}} )</td>
</tr>
<tr>
<td>Metric: <strong>Delta Schedule Factor</strong></td>
<td>Formula: (</td>
</tr>
<tr>
<td>Metric: <strong>Phase Duration Factor</strong> (Owner data only)</td>
<td>Formula: ( \frac{\text{Actual Phase Duration}}{\text{Actual Overall Project Duration}} )</td>
</tr>
<tr>
<td>Metric: <strong>Total Project Duration</strong></td>
<td>Actual Total Project Duration (weeks)</td>
</tr>
<tr>
<td>Metric: <strong>Construction Phase Duration</strong></td>
<td>Actual Construction Phase Duration (weeks)</td>
</tr>
</tbody>
</table>

## Definition of Terms

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

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

**Actual Phase Duration:**
* Actual total duration of the project phase in question. See the Project Phase Definition Table.

**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

<table>
<thead>
<tr>
<th>Metric: Total Recordable Incident Rate (TRIR)</th>
<th>Formula:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Number of Recordable Cases x 200,000</td>
<td>Total Site Work-Hours</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metric: Dart Rate (LWCIR)</th>
<th>Formula:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Number of DART Cases x 200,000</td>
<td>Total Site Work-Hours</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Metric: Change Cost Factor</th>
<th>Formula:</th>
</tr>
</thead>
</table>
|                           | \[
| Total Cost of Changes    | \]
|                           | \[
| Actual Total Project Cost| \]

<table>
<thead>
<tr>
<th>Metric: Project Development Change Cost Factor</th>
<th>Formula:</th>
</tr>
</thead>
</table>
|                                               | \[
| Total Cost of Project Development Changes    | \]
|                                               | \[
| Actual Total Project Cost                     | \]

<table>
<thead>
<tr>
<th>Metric: Scope Change Cost Factor</th>
<th>Formula:</th>
</tr>
</thead>
</table>
|                                  | \[
| Total Cost of Scope Changes     | \]
|                                  | \[
| Actual Total Project Cost       | \]

### Definition of Terms

- **Total Cost of Changes:**
  - Total cost impact of scope and project development changes.

- **Total Cost of Project Development Changes:**
  - Total cost impact of project development changes.

- **Total Cost of Scope Changes:**
  - Total cost impact of scope changes.

- **Actual Total Project Cost:**
  - Owners –
    - All actual project cost from front end 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>
|                                  | \[
| Total Direct Cost of Field Rework| \]
|                                  | \[
| Actual Construction Phase Cost   | \]

### 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 Definition Table 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>
| **Front End 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 Engineering**      | **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 |                                                                                                                       |                                                                                        |
| **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 |
<table>
<thead>
<tr>
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<th>Start/Stop</th>
<th>Typical Activities &amp; Products</th>
<th>Typical Cost Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Start: Commencement of foundations or driving piles</td>
<td>• Set Up Trailers&lt;br&gt;• Procurement of Bulks&lt;br&gt;• Issue Subcontracts&lt;br&gt;• Construction Plan for Methods/Sequencing&lt;br&gt;• Build Facility &amp; Install Engineered Equipment&lt;br&gt;• Complete Punchlist&lt;br&gt;• Demobilize Construction Equipment</td>
<td>• Owner Project Management Personnel&lt;br&gt;• Project Manager / Construction Manager Fees&lt;br&gt;• Building Permits&lt;br&gt;• Inspection QA/QC&lt;br&gt;• Construction Labor, Equipment &amp; Supplies&lt;br&gt;• Bulk Materials&lt;br&gt;• Construction Equipment&lt;br&gt;• Contractor Management Personnel&lt;br&gt;• Warranties</td>
</tr>
<tr>
<td></td>
<td>Stop: <em>Mechanical Completion</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start-up / Commissioning</td>
<td>• Testing Systems&lt;br&gt;• Training Operators&lt;br&gt;• Documenting Results&lt;br&gt;• Introduce Feedstocks and Obtain First Product&lt;br&gt;• Hand-off to User/Operator&lt;br&gt;• Operating System&lt;br&gt;• Functional Facility&lt;br&gt;• Warranty Work</td>
<td>• Owner Project Management Personnel&lt;br&gt;• Project Manager / Construction Manager Fees&lt;br&gt;• Consultant Fees &amp; Expenses&lt;br&gt;• Operator Training Expenses&lt;br&gt;• Wasted Feedstocks&lt;br&gt;• Supplier Fees</td>
</tr>
<tr>
<td></td>
<td>Note: Not usually applicable to infrastructure or building projects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Typical Participants:**
- Owner Personnel
- Design Contractor (Inspection)
- Construction Contractor and its Subcontractors
- Owner personnel
- Design Contractor
- Construction Contractor
- Training Consultant
- Equipment Suppliers

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