

SOP EV-001: Progress Measurement and Earned Value Management

EV-001 | v01

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1. Purpose and Scope

Purpose

This procedure establishes the standard methodology for measuring physical progress and calculating Earned Value (EV) on capital projects. It ensures consistent, auditable reporting of project performance against baseline cost and schedule.

Scope

Applies to all capital projects where an approved Performance Measurement Baseline (PMB) exists. Covers:

- Physical progress measurement at activity and control account level
- EV calculation and variance reporting (CV, SV, CPI, SPI)
- Forecasting (EAC, ETC, TCPI)
- Reporting cadence and escalation thresholds

Excludes: feasibility studies, early-phase estimates where no PMB has been established.

2. Definitions and Abbreviations

Term	Definition
BAC	Budget at Completion. Total authorised budget for a control account or project.
EV (BCWP)	Earned Value (Budgeted Cost of Work Performed). The budget value of work physically completed.
PV (BCWS)	Planned Value (Budgeted Cost of Work Scheduled). The budget value of work planned to be completed by the status date.
AC (ACWP)	Actual Cost (Actual Cost of Work Performed). Total costs incurred for work performed.
CV	Cost Variance. EV minus AC. Negative = over budget.
SV	Schedule Variance. EV minus PV. Negative = behind schedule.
CPI	Cost Performance Index. EV divided by AC. Less than 1.0 = over budget.
SPI	Schedule Performance Index. EV divided by PV. Less than 1.0 = behind schedule.

Term	Definition
EAC	Estimate at Completion. Forecast of total project cost at completion.
ETC	Estimate to Complete. Forecast of remaining cost to complete.
TCPI	To-Complete Performance Index. Required future CPI to meet a cost target.
PMB	Performance Measurement Baseline. Time-phased budget against which project performance is measured.
WBS	Work Breakdown Structure.
CA	Control Account. A management control point where scope, budget, actual cost, and schedule are integrated.
CAM	Control Account Manager. The individual responsible for a control account.
IMS	Integrated Master Schedule.
EVM	Earned Value Management.
MR	Management Reserve. Budget set aside for unforeseen scope within project authorisation.
UB	Undistributed Budget. Authorised budget not yet assigned to a control account.

3. Roles and Responsibilities

Role	Responsible	Accountable	Consulted	Informed
Define progress measurement method per activity	CAM	Project Controls Manager	Scheduler	PMO
Approve progress measurement methods	Project Controls Manager	Project Manager	-	PMO
Collect and validate physical progress data	CAM	Project Controls Manager	Field Supervisor	-
Calculate EV, CV, SV, CPI, SPI	Project Controls Analyst	Project Controls Manager	CAM	-
Prepare EVM performance report	Project Controls Analyst	Project Controls Manager	CAM	Project Manager, PMO
Review and approve EVM report	Project Controls Manager	Project Manager	-	Sponsor, Client
Issue corrective action on variance breach	CAM	Project Manager	Project Controls Manager	PMO, Sponsor
Maintain PMB integrity (no unauthorised changes)	Project Controls Manager	Project Manager	CAM	PMO
Approve baseline changes (formal change control)	Project Manager	Sponsor	Project Controls Manager	CAM

4. Procedure

4.1 Establish the Performance Measurement Baseline

1. Confirm the project WBS and OBS are approved and integrated.
2. Assign all authorised budget to control accounts via the responsibility assignment matrix (RAM). Ensure Management Reserve and Undistributed Budget are held separately and not included in the PMB.
3. For each control account, agree with the CAM on the progress measurement method (see Section 4.2).
4. Time-phase the PMB using the approved IMS. The sum of all CA budgets plus MR and UB must equal the Total Authorised Budget (TAB).
5. Baseline freeze: once approved, the PMB may only be changed through formal change control. Document the baseline date and version.

4.2 Select Progress Measurement Method

Select the most appropriate method for each activity or work package based on its nature:

Method	Description	Applicable To
Units Complete	$EV = (\text{units done} / \text{total units}) \times BAC$	Repetitive, measurable work (piling, formwork, cable pulls)
Weighted Milestones	Assign % values to discrete milestones; earn on achievement	Engineering deliverables, procurement phases
Fixed Formula (0/100, 25/75, 50/50)	Earn a fixed % on start, balance on completion	Short-duration activities (less than 2 reporting periods)
Percent Complete (Subjective)	CAM estimates completion percentage	Acceptable only with documented objective criteria; avoid where measurable methods exist
Level of Effort (LOE)	EV always equals PV; no variance generated	Project management, supervision, ongoing support functions
Apportioned Effort	EV is a fixed ratio of a related discrete effort	QA/QC tied to direct construction work

Decision rule: Use objective methods (Units Complete, Weighted Milestones, Fixed Formula) wherever possible. LOE must not exceed 15% of total project budget without PMO approval (reference: PMI Standard for EVM).

4.3 Collect Physical Progress Data

1. At each reporting cycle (weekly or monthly per project schedule), field supervisors and CAMs collect raw progress data against the agreed measurement method.
2. Progress data is recorded in the project controls system (Primavera P6, or equivalent) against the relevant activity.
3. CAMs review and approve progress entries for their control accounts before the data cut-off. No retroactive adjustments without Project Controls Manager approval.
4. Progress data cut-off: data must be submitted by [project-defined cut-off time, typically 08:00 on the first working day of the reporting week or month].

4.4 Calculate Earned Value Metrics

Apply the following formulas at control account and project level:

Core metrics:

Metric	Formula
PV	Time-phased budget to status date (from PMB)
EV	BAC x % complete (per approved method)
AC	Total actual cost incurred to status date
CV	EV minus AC
SV	EV minus PV
CPI	EV / AC
SPI	EV / PV

Forecast metrics:

Metric	Formula	Notes
EAC (CPI-based)	BAC / CPI	Standard forecast; appropriate when current CPI is expected to continue
EAC (independent)	AC + ETC	Use when a formal re-estimate of remaining work has been produced
ETC	EAC minus AC	-
TCPI (BAC target)	(BAC minus EV) / (BAC minus AC)	Required future efficiency to meet BAC
TCPI (EAC target)	(BAC minus EV) / (EAC minus AC)	Required future efficiency to meet current EAC
VAC	BAC minus EAC	Variance at completion; positive = forecast under budget

Decision point: If EAC (CPI-based) exceeds EAC (independent) by more than 5%, escalate to Project Controls Manager for reconciliation before reporting.

4.5 Variance Analysis and Thresholds

1. Calculate $CV\% = CV / BAC \times 100$ and $SV\% = SV / BAC \times 100$ at control account level.
2. Apply variance thresholds (adjust per project-specific requirements):

Threshold	CV% or SV%	Required Action
Green	Within +/- 5%	No action required
Amber	-5% to -10%	CAM provides written variance analysis and recovery plan
Red	Greater than -10% or trend worsening over 3 periods	Formal corrective action plan required; escalate to Project Manager

3. Variance analysis must address: root cause, forecast impact, corrective action, and responsible party.

4.6 Prepare and Issue EVM Performance Report

1. Consolidate all control account data into the project-level EVM report.
2. Report must include: PV, EV, AC, CV, SV, CPI, SPI, EAC, VAC, % complete, and variance narrative for amber/red accounts.

3. Include S-curve showing cumulative PV, EV, and AC to date.
4. Review draft report with Project Controls Manager before issue.
5. Issue report to distribution list per the project communications plan. Report is due by [project-defined date, typically 3 working days after data cut-off].

4.7 Baseline Change Control

1. No changes to the PMB are permitted without a formal change request.
2. Changes that increase or decrease BAC require sponsor/client approval.
3. Internal replanning (re-distributing budget between control accounts without changing TAB) requires Project Controls Manager and Project Manager approval.
4. All baseline changes must be version-controlled and audit-trailed. Document: change reference, date, reason, accounts affected, budget moved.
5. Management Reserve drawdown requires Project Manager approval and must be logged against a specific scope event.

5. Inputs and Outputs

Item	Type	Description	Owner
Approved WBS and RAM	Input	Defines control account structure	Project Manager
Approved IMS	Input	Provides time-phased PV	Scheduler
Approved PMB	Input	Authorised time-phased budget	Project Controls Manager
Field progress data	Input	Physical quantities or milestone achievements per reporting period	CAM / Field Supervisor
Actual cost data	Input	Incurred costs from finance/cost system	Finance / Cost Engineer
Approved change requests	Input	Scope or budget changes affecting PMB	Project Manager
EVM Performance Report	Output	Project-level CPI, SPI, EAC, variance narratives, S-curve	Project Controls Analyst
Control Account Status	Output	CA-level EV metrics and variance analysis	CAM
Corrective Action Plan	Output	Written response to amber/red variances	CAM / Project Manager
Updated EAC	Output	Revised forecast at completion	Project Controls Manager

6. Tools and Templates

Tool / Template	Purpose	Location
Primavera P6 (or equivalent scheduling tool)	IMS management, time-phasing, EV calculation	Project server

Tool / Template	Purpose	Location
EVM Performance Report Template	Standardised reporting format (PV/EV/AC table, S-curve, variance narrative)	`05_Templates/EV/`
Control Account Plan (CAP) Template	Documents scope, budget, schedule, and measurement method per CA	`05_Templates/EV/`
Variance Analysis Template	Structured root-cause and recovery plan	`05_Templates/EV/`
RAM Template	Responsibility Assignment Matrix	`05_Templates/EV/`
Cost control system (e.g., JD Edwards, SAP, or equivalent)	Actual cost data source	Finance system

7. References

1. **PMI Standard for Earned Value Management** (Project Management Institute) — Foundational EVM methodology: PMB structure, formula definitions, LOE limits, and reporting requirements.
2. **Barrick CPS4 PC PD 04001** — Owner-operator EVM procedure for capital projects. Key guidance: control account structure, variance thresholds, CAM responsibilities, and baseline change control.
3. **Glencore EVM Procedure (070)** — Major mining capital project EVM standard. Key guidance: progress measurement method selection hierarchy, data cut-off discipline, and EAC reconciliation requirements.
4. **AACE International Recommended Practice 10S-90** — EVM terminology and formula definitions (informing definitions in Section 2).

Note: Source documents are cited by reference ID for synthesis purposes. Verbatim reproduction of proprietary owner procedures is prohibited.

8. Quality Criteria and Checklist

Before reporting cycle closes

- PMB is approved and version-controlled. BAC = sum of all CA budgets (MR and UB held separately).
- All control accounts have an assigned CAM and an approved progress measurement method on file.
- LOE does not exceed 15% of total project budget.
- Progress data submitted by all CAMs before data cut-off.
- No retroactive progress adjustments without Project Controls Manager approval.
- Actual costs reconciled with finance system for the reporting period.

EVM report quality

- PV, EV, AC, CV, SV, CPI, SPI calculated at both control account and project level.
- EAC calculated using CPI-based and independent methods; reconciled if divergence exceeds 5%.
- All amber and red variances have written root-cause analysis and corrective action.
- S-curve updated with current period data.
- Report reviewed and approved by Project Controls Manager before issue.
- Report issued within [project-defined] working days of data cut-off.

Baseline integrity

- No unauthorised changes to the PMB this period.
 - Any MR drawdown logged with approved change reference.
 - Cumulative baseline changes audit trail is current.
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9. Revision History

Version	Date	Author	Changes
v01	2026-04-03	Forge (#1)	Initial draft

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