



**US Army Corps
of Engineers®**

ENGINEERING AND CONSTRUCTION BULLETIN

No. 2013-11

Issuing Office: CECW-CE

Issued: 11 Apr 2013

Expires: 11 Apr 2015

Subject: USACE Mega-Project Management: Additional Project, Engineering and Construction Management Controls

Applicability: Directive

1. This ECB provides updated guidance on management controls for projects designated by HQUSACE Civil Works and Military Programs Directors as “Mega-Projects” and replaces ECB 2012-2 issued 31 January 2012. The designated mega-projects list has been updated based on input from USACE senior leaders and program maturation.
2. The primary lessons learned from the first year of implementation are:
 - a. MSCs implement the controls more effectively when HQUSACE provides oversight.
 - b. Program and project benefits are proportional to the level of implementation.
 - c. Implementation must be scalable to the program and project needs.
 - d. Management controls are not fully understood or appreciated until implemented.
 - e. Civil Works projects and programs benefit more from the full implementation of all mega-project tenets than Military Programs projects.
3. As we collectively gain additional experience, this initiative will be revised and policy will be issued in the form of an Engineering Regulation.
4. Enclosure 1 is an updated list of projects designated for mega-project management. Enclosure 2 lists the typical attributes of a mega-project and is the basis for project/program selection. Enclosure 3 lists the required additional management controls or tenets for mega-projects. Enclosure 4 contains an example of a mega-project management plan and sample EVMS reports.
5. MSCs are required to implement the management controls at enclosure 3 for the listed projects/programs effective immediately. CECW-CE in coordination with the cognizant MSCs will schedule HQ led DCE evaluations of these projects.

ECB No. XXXX-XX

Subject: USACE Mega-Project Management: Additional Project, Engineering and Construction Management Controls

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USACE MEGA PROJECTS LIST AS OF 01APRIL2013

No	MSC	Project Name (BOLD ADDED FY 13)	Senior Project Executive	Project Phase	HQUSACE led DCE
1.	CELRD	OLMSTED LOCK AND DAM	Mr. Hancock	Construction	Completed
2.	CELRD	EAST BRANCH DAM SAFETY MODIFICATIONS	Mr. Hancock	Procurement	2014 #Program#
3.	CELRD	CENTER HILL DAM SAFETY MODIFICATIONS	Mr. Hancock	Construction	Sept 13 #Program#
4.	CEMVD	PCCP NEW ORLEANS CANAL PUMP STATIONS	Mr. Belk	Procurement	2014
5.	CENAD	LANDSTUHL MEDICAL CENTER	Mr. Leach	Design	July 2013
6.	CENAD	INTEGRATED CYBER CENTER JOINT OPERATIONS CENTER – US CYBERCOM	Mr. Leach	Construction	2015
7.	CENAD	USMA CADET BARRACKS	Mr. Leach	Procurement	2014
8.	CENAD	HURRICANE SANDY RESORATION PROGRAM	Mr. Leach	Various	2014
9.	CENWD	STRATCOM	Mr. Hearn	Construction	May 13
10.	CENWD	FT. RILEY HOSPITAL	Mr. Hearn	Construction	Complete
11.	CESAD	FT. BENNING HOSPITAL	Mr. Dixon	Construction	*Program*
12.	CESAD	HERBERT HOOVER DIKE	Mr. Dixon	Construction	April 2013 #Program#
13.	CESAD	EVERGLADES RESTORATION (CERP)	Mr. Dixon	Various	2016
14.	CESPD	ISABELLA DAM	Mr. Calcara	Design	2015 #Program#
15.	CESPD	JFP-FOLSOM	Mr. Calcara	Construction	Completed
16.	CESPD	FT. IRWIN MEDICAL CENTER	Mr. Calcara	Construction	*Program*
17.	CESPD	UTAH DATA CENTER	Mr. Calcara	Construction	n/a
18.	CESWD	FT. HOOD HOSPITAL	Mr. Slockbower	Construction	*Program*
19.	CESWD	FT. BLISS HOSPITAL	Mr. Slockbower	Construction	*Program*
		PROJECTS REMOVED FROM LIST			
1.	CENAD	MAYWOOD SUPERFUND			
2.	CESAD	PORTUGUESE DAM			
3.	CEMVD	FARGO/MOOREHEAD FRM PROJECT			

Program designation indicates that CECW-CE will work with CEHNC-EDX, and the program managers involved with these hospital projects to develop a program level review, beginning in 2013, with an intent of performing project level DCEs in 2014-15.

#Program# designation indicates that CECW-CE will work with the Risk Management Center (RMC) to implement program level monitoring, controls, and reviews.

Typical Attributes of a Mega-Project (Updated March 2013)

1. Cost and Duration -- The cost of the project or program is one of the most significant attributes of a mega-project. Very large dollar value projects and programs (over \$300M) generally represent more risk in achieving project objectives. Performance periods for mega-projects are generally longer (in excess of three years), indicating more performance risk.
2. Uniqueness -- One of a kind projects or projects involving unique and highly complex systems, processes and technical challenges may be characteristic mega-projects.
3. Acquisition Strategy and Delivery Method – The contract type, solicitation, evaluation, and compensation methods allocate risk between the contracting parties. The spectrum ranges from simple design-bid-build, firm fixed price (FFP) construction contracts to best value or qualifications-based design or design-build contracts. More complexity and pricing flexibility are characteristic of mega projects.
4. National Significance – Projects or programs of national or international significance may be characteristic mega-projects. Examples of this are projects constructed under the Dam Safety Modification and BRAC programs.
5. Critical Nature of Completion Date and/or Funding Constraints-- Projects or programs with completion dates established in law or treaty; tight or incremental funding requirements; and/or other requirements which dictate close control and projection of ultimate cost and completion, may be mega-projects.
6. Coordination of Multiple Prime Contractors – Projects or programs that require USACE coordination of multiple prime construction contractors conducting significant construction operations concurrently on a project site may be characteristic mega-projects.
7. Coordination of Multiple Design Agents and Stakeholders – Projects or programs requiring the coordination of multiple design agents, multiple USACE Districts and Centers, or multiple Federal agencies, may be characteristic of mega-projects.
8. Overlapping or Dependent Project Phases – Projects where authorization, funds, or physical constraints determine the pace of execution may be characteristic mega-projects.

Mega- Project Management Controls
April 2013

These 12 tenets of mega-project management control are intended to be flexible and scalable to accommodate the type, size, and focus of programs and projects. Multiple mega-projects, being accomplished under the same program and/or MSC can be aggregated and managed collectively. Detailed discussion of each tenet will be included in and enhanced Project Management Plan (PMP).

1. Establish Disciplined and Focused Supplemental Governance Structure

A three-tiered governance structure will be established for mega-projects in order to achieve needed accountability, visibility, understanding, and timely decision-making in order to assure effective communication and issue resolution at appropriate levels. CII defines project culture as “the degree to which (1) project leadership is defined, effective, and accountable; (2) communication within the team and with stakeholders is open and effective; and (3) the team fosters trust, honesty, and shared values”.

- The senior level is the Senior Executive Board composed of senior leaders from all stakeholders. The typical member is a GS-15/SES and the contractor’s corporate senior vice president or equivalent. HQUSACE Senior Leaders and HQUSACE Engineering and Construction senior engineers will serve in an oversight and advisory role to the mega-project’s Senior Project Executive who is the Regional Programs or Business Director.
- The mid-level Executive Leadership Team is composed of GS 13/14 and corporate vice president level staff. This team is composed of the senior leaders responsible for day to day operations at the project site. They are responsible and accountable to make decisions and apply resources to solve problems that rise above the typical day-to-day management of the project.
- The working-level Project Leadership Teams are the working level teams assigned to each major phase of the project. This is the level where the typical day-to-day management and engineering work is performed.

This three-tiered governance structure for designated mega-projects will be incorporated in program management plans (PgMPs) and project management plans (PMPs) and recognized and supported by the entire vertical team for the mega-project. The governance structure may be adjusted to accommodate differences in programs, command structures, and funding between Civil Works, Military, and Host Nation Programs etc. Additional elements may be added where other customer and USACE elements (including CX, CoS, IWR, RMC, HNC, and other Design and Production Centers) are involved.

2. Facilitated Partnering -- Professionally facilitated formal partnering will be an integral element of this mega-project governance process. This requirement is not limited solely to contractors and includes facilitated partnering among USACE elements. The following elements of partnering are vital and will be developed and documented for all mega-projects:

- A Facilitator Report, summarizing the workshop activities, including goals, issues, and action plans identified.
- A hierarchical Dispute Resolution Matrix, depicting (by name and title) the lead stakeholder representative at each level, and the amount of time allowed for resolution at that level. It may be necessary to create separate dispute resolution matrices for internal and external disputes, technical or fiscal/time issues, etc.
- A Project Charter, summarizing the common goals and objectives of the stakeholders.

Follow-up workshops will be periodically scheduled to indoctrinate new members, update issues lists, etc. While professional facilitation is recommended, stakeholders may be capable of self-facilitating the follow-up workshops.

3. Evaluations – Design-Construction Evaluations (DCEs) are an essential element in the Quality and Project Management aspects of mega-projects. Across USACE, there are a number of leaders and senior staff who have hands on technical and managerial experience successfully managing them. HQ led DCE teams will be organized by CECW-CW and assigned the task to perform reviews of selected mega-projects. The teams will be multi-discipline and will evaluate procurement, engineering, construction, and project management processes for compliance with USACE policy and their effectiveness in achieving desired project outcomes. They will meet with the appropriate customer, prime contractor(s) and stakeholder(s) to obtain a 360 degree perspective of the project. For mega-projects, approximately 4-6 HQ led DCEs are scheduled to be accomplished each FY subject to travel funding availability. These DCEs are intended to provide regional and HQUSACE senior staff with a second “line of sight” for critical project decisions, and ensuring that USACE products and services are technically excellent, on schedule and within budget. As indicated above, DCEs can be done at program and project levels – HQ will coordinate and accomplish DCEs in concert with MSC level efforts whenever possible, in order to minimize cost and avoid duplication. As a minimum, MSC should plan DCEs in advance of critical project milestones, such as:

- 6 months in advance of any design or construction contract award
- Annually after award of any major construction contract, until substantial completion is achieved
- during the formative stages of any request for funding or schedule increase

4. Enhanced Project Management Plans – These documents will be annually reviewed by the PDT and DCE Team. The PMP Acceptance Sheet shall be signed by the Senior Project Executive. Special emphasis will be placed on well reasoned and thorough Quality Management Plans, Change Management Plans Risk and Management Plans including Cost and Schedule Risk Analyses. PMPs must be regularly reviewed every 6 months by the original signatories or their successors and revised as appropriate for relevance and soundness of the plan going

forward. This is particularly important for longer term projects, where several rotations of command or leadership are likely to occur. Plans will reflect the customer as an active member of the PDT with team members authorized and capable to make decisions consistent with their hierarchical representation on the team as discussed herein. As noted above, plans which intend to aggregate projects, or to implement scaled-down versions of the 12 tenets, will be forwarded to CECW-CE for review and concurrence.

5. Enhanced Project Delivery Team (PDT) – Assign a multi-disciplined PDT early in the project design phase to be responsible and accountable for the project until completion. The team will be chosen by the executing District(s) leadership and approved by the MSC Programs or Business Director who will establish and validate minimum team member competencies, organizational structure, size etc. Selection of team members will be based on competencies established by the Senior Project Executive and may require resourcing the PDT from outside the District or Region. Non-technical competencies will be recognized as equally important to technical competencies. The identity, roles, and responsibilities of a technical Lead Engineer (see ER 1110-2-1150 and ER1110-2-1156) will be described in the PMP irrespective of program (MP, CW, Host Nation, IIS etc). Team building and partnering exercises will initiate early and often in the project life cycle – these efforts will be documented in the semi-annual updates to the PMP.

6. Use of Lessons Learned –Best practices will be used to inform the development of future mega- project PMPs in particular and to inform revisions to the USACE Project Management Business Process. PDTs will populate the Enterprise Lessons Learned (eLL) system on a regular and recurring basis for all projects with special emphasis on mega-projects.

7. Project Senior Executive Accountability – This leader is accountable to the Director of Military Programs or the Director of Civil Works for project/program success and will provide guidance and mentoring to the PDT. The PDT shall be held accountable to the Project Senior Executive.

8. In-Progress Reviews (IPRs) – the Project Senior Executive will establish the format and timing and will chair IPRs. These reviews will serve as both information and decision-making forums. Read aheads (RAHs) will be provided to the Director of Military Programs or the Director of Civil Works for each IPR briefed to HQUSACE. DCE team input, if it exists, will also be briefed at these reviews.

9. Integrated Master Project Schedule, Cost Estimate, Risk Analyses, and Earned Value – USACE mega-project teams must prepare and maintain an Integrated Master Schedule (IMS) throughout the project. The District must have a trained and experienced scheduler recognized by the CECW-CE and the Project Management Community of Practice as a Subject Matter Expert (SME) in network scheduling. SMEs must be on staff at the early stage of the project life cycle to prepare and status the IMS. The IMS will include planning, programming, procurement, design and construction phase activities and will be updated with actual dates and remaining

durations at least monthly. As project phases become more certain (e.g., contracts awarded, milestones missed/met, baselines adjusted, etc.), the IMS will provide a hierarchical “rolling window” focus on details which are important and understandable to the three-tiered mega-project management structure. The IMS will inform the entire team about activities that are on and near the critical path each month. See ER 1105-2-100, ER 1110-2-1302 and ER 1110-3-1300 for basic cost and schedule estimate requirements. Mega-project cost estimates and schedules will be integrated at either the project or program level, utilizing Earned Value Management System (EVMS) principles. PMs will utilize the capabilities of P2 (as outlined in the PM Business Process) or other stand alone COTS software programs for monitoring and reporting cost and schedule metrics during the entire project/program life cycle. Risk analyses will be performed for the project/program utilizing Cost and Schedule Risk Assessment (CSRA) techniques promulgated by the CX (CENWW).

10. Project Controls Sub-Team and Metrics – Each mega-project PDT will establish a project controls sub-team at the project or program level. This sub-team will be staffed with experienced personnel responsible for: managing project and integrated program schedules; project and program budgets; and document and communication controls. The sub-team composition will change over time and will include staff with specialized expertise in project control functions including cost and schedule risk analysis. At least 2 members of this sub-team will be Government employees recognized by CECW-CE as SMEs in cost and schedule risk analysis, cost estimating and network scheduling. The Senior Project Executive will set metrics for monitoring and evaluating performance of all phases of the mega-project, and will ensure timely and accurate reporting by the Controls Sub-Team. Cost and schedule metrics will be in Earned Value format and technical metrics will follow existing program requirements. Existing District, Region, and HQUSACE management and monitoring elements (RMB, RIT, PID, etc.) will retain their administrative and reporting responsibilities, but will participate in and be guided by the Governance Structure and the Project Senior Executive.

11. Enhanced Recruitment and Staffing of Project Team Members– A mega-project may adversely impact any District’s manpower and personnel management when the project office is initially stood up and when it shuts down. Standard HR processes are not designed for standing up and closing down a large office in a timely and orderly fashion, so additional planning and incentives may be required to ensure that the best and brightest PDT members from across the Command are recruited, selected, assigned, retained and/or returned to their home station. These processes should be similar to those used to deploy staff for contingency operations on long term TDY or TCS, with return rights to their home Districts. Participation and communication across the Command, including Regional and HQUSACE leaders, may be required to ensure that sufficient incentives are in place to attract and retain these individuals for the life of the mega-project. Examples of staffing challenges and plans from past mega-projects will be published in Enterprise Lessons Learned (eLL).

12. Certified Project Managers – The Project Manager must be: certified as a Project Management Professional by the Project Management Institute; certified Level II pursuant to the USACE Program and Project Management Career Development Plan; and must have sufficient technical experience in the appropriate engineering and/or construction function. These minimum qualification levels will be demonstrated by certification, licensure, and experience as determined by the Senior Project Executive.



REPLY TO
ATTENTION OF

CESPK---PM-C

DEPARTMENT OF THE ARMY
SACRAMENTO ENGINEER DISTRICT
U.S. ARMY CORPS OF ENGINEERS (USACE)
1325 J STREET
SACRAMENTO, CALIFORNIA, 95814-2922

27 June 2012

MEMORANDUM FOR USACE, Sacramento District, CESPK - Joint Federal Project (JFP)
Implementation and Lessons Learned of MEGA Project Guidance

Because of the Joint Federal Project's uniqueness and complexity, critical delivery date, and national significance in providing flood protection and dam safety features for the Sacramento area coupled with significant cost and schedule risk, the Director of Civil Works and Emergency Operation, HQ USACE, designated this project as one of the first Corps Mega-Projects in January 2012. The JFP meets six of the seven Attributes of a Mega-Project. The following is a summary of the management controls associated with the JFP Mega-Project. The degree of implementation of these controls and the path forward to full implementation as outlined in the Engineering and Construction Bulletin No. 2012-2, dtd 31 Jan 12.

Management Controls

1. Establish Disciplined and Focused Supplemental Governance Structure – three tiered governance structure aimed at establishing accountability, visibility, understanding and timely decision making. The three tiers for the JFP are Senior Executive Board (Strategic), Executive Leadership Team (Operational) and Project Leadership Teams (Tactical).
 - Senior Executive Board – comprised of Sr. leaders from all stakeholders (GS-15/SES) serving in oversight and advisory roles to the mega-project's senior project executive (Mr. Calcara). This board meets quarterly to discuss the JFP and other District projects in the region with two meetings held to date (18 JAN 12 and 23 APR 12). The boards' composition is the State of California (DWR, CVFBP), SAFCA, USBR and USACE's vertical leadership.
 - SPK has established monthly Sr. Partnering Sessions with the prime contractor's senior leaders to develop and establish leadership decisions for both USACE and Contractors staff to execute.

Lessons Learned: Executives from partnering agencies have communicated that while meeting on a quarterly basis is beneficial, they do not necessarily want to focus on just one project. Partner agency leadership feels that project specific coordination and oversight should happen at the Executive Leadership Team level and for the JFP in particular, the monthly Oversight Management Group (OMG-see below) is filling the need for oversight and direction at this level. Because the OMG meets once a month, near real-time information is communicated to these executives consistently.

- Executive Leadership Team – GS13/14/15 and corporate vice president level staff responsible to supply resources and make project decisions to solve problems above the typical day to day operations of the project delivery teams.
 - Executive Leadership Board (ELB) – comprised of GS 13/14/15s leaders within USACE only. The ELB was established in September 2011 and meets bi-weekly to discuss overall project status, unresolved issues from PDT level, and change management. This board sets the agenda for the OMG.
 - The Oversight Management Group (OMG) was established in 2007 and is comprised of senior leaders responsible for day to day operations of the project from both USACE and the Partner agencies (DWR, SAFCA, USBR). The group meets monthly to discuss overall project status, unresolved issues from the PDT level and change management decisions. The meeting also includes status updates and partnering with the construction contractor currently on site. In January 2011, the group conducted an offsite meeting to reestablish its charter and align with the mega-project initiatives. This charter is included in the PMP appendices.

Lessons Learned: Because the JFP has so many facets to track and monitor, the Program Director established weekly Director’s Updates using a quad-chart format. Individual offices (PM, CT, ED, CO, OC, RE, and PD) that touch this project are required to brief their project components for both phases III and IV directly to the Director and receive necessary guidance and direction. This has served as a huge benefit on many fronts: 1) Individual PDT/office staffs know what other PDT staffs are working and need. 2) Direction is set with due dates of tasks. 3) Material and format from the Director’s Update is used in the bi-weekly ELBs.



Sample quad
chart.pptx

The ELBs have a different membership level than the Director’s Update so the information presented at the ELB sets the agenda for the monthly OMGs. This staircase tiered information leveling approach has created order from chaos. Example quad chart is attached (ED Ph IV).

- Project Level Teams – working level teams assigned to each major phase of the project. There are several JFP Project Teams (PDTs) that meet regularly to discuss and plan each major component of the project. They include:

- Phase IV Chute & Stilling Basin and Approach Channel technical teams (meets bi-weekly)
- Dam Raise/Bridge technical teams (meets monthly)
- Water Control Manual Update technical team (meets monthly)
- Schedule Implementation Team (SIT) – overall schedule of Spillway project (meets monthly and as needed)
- Project Management Groups – PDT level meetings that include NF and Fed partners (meet monthly)
- Phase III Construction and scheduling meetings with Contractor and partners – meet weekly

There are numerous PDTs associated with the JFP with each PDT focuses on different aspect of the project. An example of the various PDTs and responsible person is annotated in the Battle Rhythm attachment.



JFP Battle Rhythm (7
Jun 12).xlsx

2. Facilitated Partnering - professionally facilitate formal partnering has occurred in the following forums:
 - a. Internal USACE facilitated partnering session – 28 OCT 11.
 - i. Developed internal dispute resolution.
 - ii. Developed common goals for project success and completion.
 - b. OMG partnering session - 17 JAN 12.
 - i. Developed group charter.
 - ii. Developed dispute resolution (included in charter)
 - c. Senior Executive Boards – all meetings are professionally facilitated and the group charter was developed under the guidance of a professional facilitator.
 - d. Quarterly partnering sessions with the Phase III contractor and partners.

3. Project Quality Evaluations (PQE's - formerly DCE's) – shall occur a minimum of twice a year and in advance of critical milestones.
 - a. 6 month in advance of design or construction award.
 - b. Semi-annually after award of any major construction contract.
 - c. During formative stages of any request for funding or schedule increase.

The JFP has had two PQE's to date: September 2011 and January 2012. Recommend the next PQE occur in August 2012 to coincide with the completion of the 95% Phase IV design and ATR and in advance of RTA (7 Dec 12). This PQE should focus on Phase IV and not backwards.

What works: Expertise from HQ and throughout USACE to discuss and resolve critical project issues are beneficial in keeping the project moving forward. Leadership visibility on project issues helps move to resolution faster.

Lessons Learned: Week long PQE's had the potential to tie up critical project resources and can result in conflicts with project milestones and critical activities already scheduled. Scheduling these visits should take into account project activities occurring at that time; balancing need for evaluations ahead of major critical milestones with the activities needed to reach those milestones.

Additionally, these evaluations should be more focused on resolution to current project issues vs. evaluating past decisions. While lessons learned are beneficial in moving forward and should be part of these visits, defending all decisions during a time crunch in moving the project forward isn't always beneficial.

4. Enhanced Project Management Plans

The JFP PMP was completed in Oct 11 and revised in Feb 12. It includes Quality Management, Change Management and Risk Management. A preliminary cost risk analysis was conducted with Walla district experts in April 2012 and a more comprehensive cost and schedule risk analyses are ongoing as the Master Integrated Schedule is being refined. These analyses will be incorporated upon completion. The PMP will be reviewed annually at a minimum just after the President's Budget is released. It will also be reviewed, revised, and rerouted after major milestones (e.g. Phase IV contract award) to include updated schedules and funding streams. To further enhance the PMP, the Director's PDT will review and initial the PMP monthly ensuring that no changes have occurred or that changes that have occurred are incorporated. The Director's PDT is also required to insure that the PMP is being implemented as intended during

these monthly reviews. This approach is a forcing function that requires the PDT to follow the plan as intended.

5. Enhanced Project Delivery Team (PDT) – multi-disciplined team formed and assigned early in project design phase to be responsible and accountable for project through completion.

The JFP PDT is comprised of local and national USACE assets that have been approved by the District Engineer and MSC Director. SPK and SPD leadership are continuing to recruit and fill critical positions designed to complement the existing team. SPK's approach for consistency of PDT members was to build an organization chart based on all the skills required to manage this project with consistent membership vs. a revolving door membership. The JFP organization has been reviewed signed and approved by both SPK and SPD leadership and is well on its way to staffing levels.

Lessons Learned: It is difficult to insure/require team members to stay onboard throughout life of a Mega Project – usually years until completion. Need to provide opportunity for advancement to retain personnel. Consider implementing sound turnover and continuity/overlap plans to ensure project knowledge/experience is never lost. A lesson learned from other major projects within USACE shows that those that find a job will and those that can't will remain at the critical juncture of project turnover to the customer. Key historical knowledge is lost or never transferred to those that stay. Need to look at how to retain key personnel as a project nears completion (e.g. selecting office holds the position open until Project Leadership declares victory and allow the employee to transfer).

6. Use of Lesson's Learned – SPK's input into the eLL database is as follows:
 - a. PM – Analyze key personnel before, during and after a major contact award. Teams must be prepared to bring appropriate skill sets in early (TDY if necessary) until permanent parties can be resourced. A KO with national recognition and capabilities should be brought in at least one year prior to a major award. A pre-advanced virtual team one year in advance, an advanced team on the ground at least 6 months out and a permanent team ready to go prior to award versus the approach currently taken which is to staff up after project is awarded. Program Directors and USACE recognized master schedules, cost estimators are key assets that resourcing early.
 - b. Contracting - In accordance with ECB 2012-2 for USACE Mega-Projects, Enclosure 3 “Mega – Project Management Controls”, Oversight and advisory role of HQUSACE Senior Leaders, and “Use of Lessons Learned”, SPK will request

“over the shoulder review” by the Principal Authority Responsible for Contracting (PARC) Office. This request would be for the Peer Review and regular Review and Approval of acquisition documents. Other disciplines have had great success in having Senior Leaders perform these over the shoulder reviews on Mega Projects, saving considerable time in the review and approval process, and we see the potential for significant time savings in the contracting process as well. SPK will ask for USACE’s assistance in creating an “over the shoulder review” for the upcoming PH IV acquisition. This will be invaluable to shaving off acquisition time.

c. Engineering –

1) DCE Reviews - The JFP has undergone two DCE Reviews over the course of the last 9 months. The PDT and ED leadership felt both of these reviews resulted in objective and constructive feedback. However, both DCE Reviews were scheduled on very short notice without regard for how the timing of the review might impact product delivery. The first DCE Review was scheduled during the last month of the fiscal year; and, the second was scheduled with less than two-week notice.

Recommendation - Provide District with no less than 30-days notice of the firm dates for a DCE Review. If possible, collaborate with the District regarding less disruptive timing for a DCE Review based on the project schedule.

2) Waiver Requests - Recent experience requesting a design waiver associated with rock anchors in the approach channel of the JFP brought to light the need for improved/updated guidance regarding this process. While the waiver request was ultimately evaluated and resolved objectively and collaboratively, significant time was wasted between multiple organizational elements determining the appropriate process for evaluation of the request.

Recommendation - Establish QMS procedure outlining minimum waiver submittal requirements and general process for consideration of a technical waiver on a mega-project. Procedure should also identify the approving authority within each level of the organization.

3) Expedited Reviews - The aggressive design schedule for Phase IV of the JFP has required improved efficiency in our independent technical review processes. For Phase IV, all required independent technical reviews have been conducted as face-to-face review conferences. This approach has been used for ATR, Type 2 - IEPR (SAR), and BCOE Reviews. Aside from reducing the duration of the review, the PDT and reviewers have agreed that the collaboration in conjunction with a site visit have resulted in better quality review comments.

Recommendation - Encourage professionally facilitated face-to-face independent technical review conferences which include a site visit early in the review process.

7. Project Senior Executive – Mr. Joe Calcara, SPD. COL Leady, SPK District Commander, Mr. Alan Feistner, SPD RBC and Mr. David Thomas, JFP Director. Mr. Calcara has bi-weekly telecoms with both COL Leady and Mr. Thomas to not only stay informed, but to understand the Mega-Projects aspects and set the strategic direction. Mr. Thomas converses with SPD's Mr. Feistner and Mr. Rod Markuten at least three times per week on operational and tactical aspects of the project and staffing.
8. In-Progress Reviews – Occurs monthly with SPD and quarterly with HQUSACE. In addition, the Program Director is able to conduct consistent vertical communication as needed to foster support and efficient decision making. This is a force multiplier for a mega-project by allowing the project director the vertical communications paths.
9. Integrated Master Project Schedule and Cost Estimate –



SPK Plan for
Finalizing the JFP Mas

10. Project Controls Sub Team -The technical complexity of the JFP in combination with its aggressive schedule have required dedicated expertise in project scheduling and cost engineering. This expertise has been critical in evaluating project phasing, constructability, and the development of independent government estimates for both new contracts and modifications. Both disciplines have proven instrumental in advising District leadership of the financial and schedule risks associated with various project delivery strategies. For the JFP, immediate assistance has was provided through both consultants and assistance from other Districts. The long-term strategy is to have in-house expertise in both areas. Both positions are currently being recruited and will ultimately become regional assets available to the SPD DSPMC.
Recommendation - Require regular engagement of both scheduling and cost engineering expertise in all mega-projects. Level of involvement will depend on the project and its current status.
11. Enhanced Recruitment and Staffing of Project Team Members – SPK has established a separate JFP Organization, headed by a GS-15 Program Director. This new organization, while still in the developmental stages, focuses on the specific resourcing needs of the JFP vs. the general needs of other projects. See attached JFP Organizational Chart with its cross-matrixed team geared for delivery.



SPK-JFP-OrgChart
18 JUN 12.ppt

Lessons Learned: As soon as a mega-project is identified, engage the MSC CoP, Regional HR Forwards, the servicing CPAC director and the local RM. Identify a senior mega project POC (e.g., local command deputy, GS15 division chief or GS14 deputy or branch chief) that is or can be authorized to make at least preliminary decisions on behalf of the local commander. Form a PDT of these individuals or their representatives and others as to develop the way ahead, identify potential issues, milestones, communication points, etc. and prepare a reorg schedule to meet the anticipated P2 change window. Determine need for and establish sub-PDTs to focus on specific reorg requirements (e.g., development of mission and function statement, reorg justifications, position classification, recruitment/placement strategies, logistical requirements for cubes, computers, vehicles, etc.).

Not a SPK issue, but a noteworthy comment: The local commander should devote the best command assets to a mega-project along with a sense of urgency in establishing a mega project organization.

P2 change window minus six months.

- Convene PDT and sub-PDTs (as appropriate).
- Develop the org chart.

- a. The mega project organization should be a stand-alone organization on par with division chiefs.
- b. The mega project director should report directly to the local commander and be senior rated by the MSC Commander, again on par with division chiefs.
- c. The mega project director must be given full command and control of assets required to accomplish the project work.
- d. Depending on the size, complexity and/or duration of the mega project, a deputy director/chief position may be warranted.
- e. The PDT must consider how mega-project position requirements are optimally organized. Ideally, all mega-project positions are aligned in the stand-alone organization. However, current practice is to accomplish technical work via matrix management across the functional divisions (e.g., PPM, Planning, and Engineering). The matrix approach must be carefully considered to ensure optimum availability of assets when needed to accomplish project work.

f. The organizational chart must reflect all required and/or projected positions and competencies needed to accomplish the lifecycle phases of the project (from start up, through execution, and ramp down). The names and positions of staff currently working on project features should be included on the org chart. This not only identifies work in progress but will also avoid overlap of functions and unnecessary recruitment activity. (NOTE: It is critical for an HR specialist with org design/classification expertise to be dedicated to the PDT during development of the org chart. This will enable more expeditious identification of usable PDs and development of PDs for new positions. It will also enable development of a "most efficient organization" structure and foster a "once and done" approach to the reorg.)

g. Complete all classification of new positions.

h. Finalize the org chart.

i. If needed, identify immediate recruit/placement actions and IMD approval requirements, and coordinate with RM, CoPs, HR, etc., to take appropriate action.

Develop the mission and function statements. Work closely with RM to initiate development of required analysis and justifications. P2 change window minus four months.

--Submit reorg package with org chart, PDs, analysis, justification, and etc. to RM for review/approval and submission to MSC RM.

As needed, refine hiring/placement milestones, obtain any required hiring approvals, and initiate placement activities.

P2 change window minus two months.

--MSC approved reorg package submitted to HQUSACE.

--Reorg established in P2/CEFM/DCPDS, etc.

--Initiate/process realignment actions.

--Continue hiring/placement activities.

Mega project director, senior staff and HR develop mega- project ramp down plan.

Lessons Learned: Once a mega-project director is assigned or selected provide them classification authority.

Lessons Learned: If there are fourteen Mega-Projects ongoing per the ECB, why not steal shamelessly the Position Descriptions from other projects and site adapts them for

the new organization. This would save countless personnel staffing hours to create and classify position descriptions.

Recommendation: USACE establish a cadre of mega project directors and mega project teams who can be assigned to districts w/ mega projects. The directors will initiate the reorg process and readily determine required assets. This will save valuable time establishing/classifying mega project directors every time a new mega project is identified, enable experienced directors to set the path forward and not struggle with rediscovering the wheel each time. Further, as USACE assets, the mega project directors will have clear access to USACE to facilitate resolution of issues that may arise.

12. Certified Project Managers

FE-3 – Mr. David Thomas, Program Director

PMP – Beth Salyers, Sr. PM, and Cameron Sessions, Integration PM.

PE – Beth Salyers, Sr. PM

LEED – Cameron Sessions, Integration PM

Engineering/construction experience – Beth Salyers, Pamela Amie, Cameron Sessions.


13. This section is not part of the twelve Mega-Project Management Controls, but merits discussion.

- a. Type of Design used – in-house vs. AE or neither. Based on the project industry Design-Build should be considered for mega-projects. Type of Acquisition method used. DBB, DB, ECI or typical in-house design with FFP.
- b. Look at exploring two similar but distinct ECBs for Mega-Projects, one for Milcon and one for CW. These types of projects might look the same, but with CW sponsorship, annual funding and typically longer durations, the ECB's need adjustment.

JFP - Spillway PH 4

A

ED

<p>Successes (last month)</p> <ul style="list-style-type: none"> • RFP for remaining civil design work to URS • Met with DWR/DSOD to discuss common ground and reach resolution regarding potential implementation of V-notch • Transmitted design docs to SAR for June review conference • Civil transfer meeting with URS • Meetings with USBR for disposal areas • Received tentative approval of temp. dam from USBR 	<p>Significant Events/Tasks (next month)</p> <ul style="list-style-type: none"> • SAR review conference 13-15 June • 7 June work session with URS • Site walk for pilot shaft program 12 June • Award pilot shaft program
<p>Challenges</p> <ul style="list-style-type: none"> • Update EIS to allow for expanded spur dike in-reservoir placement to improve schedule • HQ approval of permanent anchors of approach walls • Hydraulics confirmation on final geometry • Prison crossing as potential batch plant • USBR approval of temporary dam 	<p>Way Ahead</p> <ul style="list-style-type: none"> • Finalize URS task order modification • 95% design docs due 10 August • Incorporate lessons learned from Phase 3, industry day, pilot shaft findings • Planning of 95% review conference(s) 

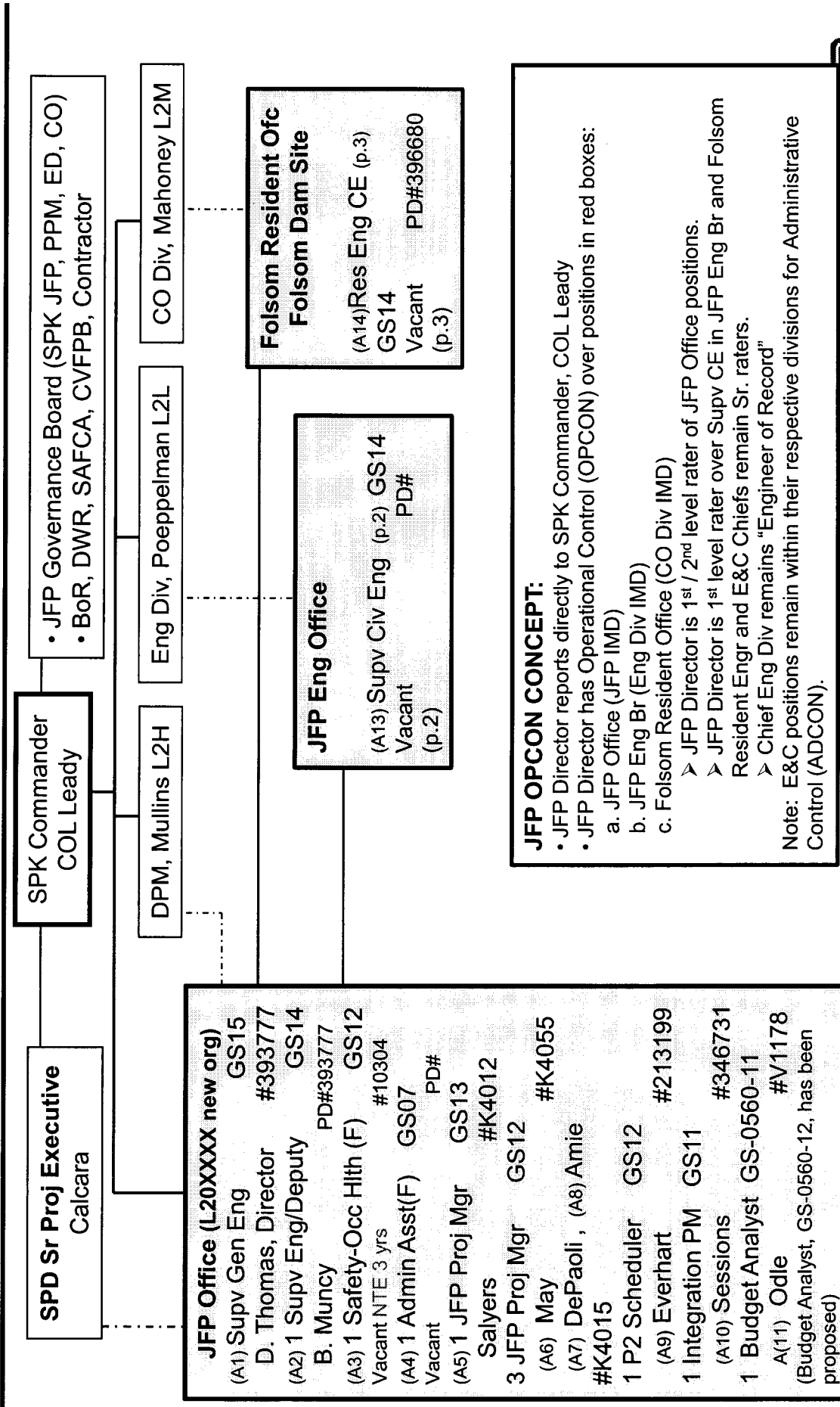
BLUF: The Sacramento District (SPK) will produce a Joint Federal Project (JFP) master schedule by 30 June 2012. This paper explains SPK's milestones to meet this target.

Background: To obligate FY10 funding, SPK contracted the JFP construction knowing at time of award there was pending design changes. Since award, SPK made multiple design changes, some w/o time impact definitization; some changes are still in negotiation. An example change was to accelerate the Phase III Control Structure to be watertight w/bulkhead gates operational by 25 Jul 2014. A combination of such initiatives impacted the baseline construction schedule from which to negotiate changes; to date, contractor schedules have not met contract requirements. To produce an approved schedule, SPK is conducting weekly schedule reviews using the following milestones to update the master schedule:

5 Mar	<ul style="list-style-type: none"> SPK hired consultant (Projectaide) to support resident office construction schedule reviews.
10-15 Mar	<ul style="list-style-type: none"> Construction schedule disapproved for not meeting contract specifications, etc. SPK sent formal letter to contractor w/11 May resubmit suspense. Coached contractor on requirements.
20 Mar – 9 Apr	<ul style="list-style-type: none"> As designs are revised and updated, review and update approach channel schedule
23 Mar	<ul style="list-style-type: none"> MWH (engineering schedule consultant) to provide draft schedule for cut-off wall, excavation sequence, and approach channel walls/slab
30 Mar	<ul style="list-style-type: none"> Draft 65% design schedule updates due to ATR and constructability review team. Final modifications 2 & 6 direct cost awards
4 Apr	<ul style="list-style-type: none"> Finalize Phase IV procurement schedule; incorporate activity sequence into master schedule.
9 Apr	<ul style="list-style-type: none"> Begin 65% technical and constructability review of approach channel schedule.
16 Apr	<ul style="list-style-type: none"> Mr. David Thomas onsite to assume PM duties.
23 Apr	<ul style="list-style-type: none"> Based on 65% review, incorporate approach channel/rock plug work into master schedule. JFP Executive Committee meeting w/BoR/DWR/SAFCA
27 Apr	<ul style="list-style-type: none"> HQUSACE quarterly JFP IPR
1 May	<ul style="list-style-type: none"> Complete mod for Grade Beam
11 May	<ul style="list-style-type: none"> Phase III contractor provides revised baseline construction schedule
12 May	<ul style="list-style-type: none"> Proposal and IGE received for Impact/Acceleration/Differing Site/Land Take Away mod
6 Jun	<ul style="list-style-type: none"> Review Phase III contractor mod proposals, schedule and time impact analysis; prepare technical analysis and initiate Pre-negotiation Objectives Memorandum.
15 Jun	<ul style="list-style-type: none"> ProjectAide and SPK reviews Phase III contractor time impact analysis & schedule proposals.
18 Jun	<ul style="list-style-type: none"> Decision point for Impact/Acceleration/Differing Site/Land Take Away mod.
18-30 Jun	<ul style="list-style-type: none"> Revise master schedule logic to incorporate approved modifications to Phase III contract. Adjust sequencing to complete project by Oct 2017; validate changes through SPK team.
20 Jul	<ul style="list-style-type: none"> Complete review and release revised master schedule.

As of 3/27/2012

JFP ORG CHART



JFP OPCON CONCEPT:

- JFP Director reports directly to SPK Commander, COL Lead
 - JFP Director has Operational Control (OPCON) over positions in red boxes:
 - a. JFP Office (JFP IMD)
 - b. JFP Eng Br (Eng Div IMD)
 - c. Folsom Resident Office (CO Div IMD)
 - JFP Director is 1st / 2nd level rater of JFP Office positions.
 - JFP Director is 1st level rater over Supv CE in JFP Eng Br and Folsom Resident Engr and E&C Chiefs remain Sr. raters.
 - Chief Eng Div remains "Engineer of Record"
- Note: E&C positions remain within their respective divisions for Administrative Control (ADCON).

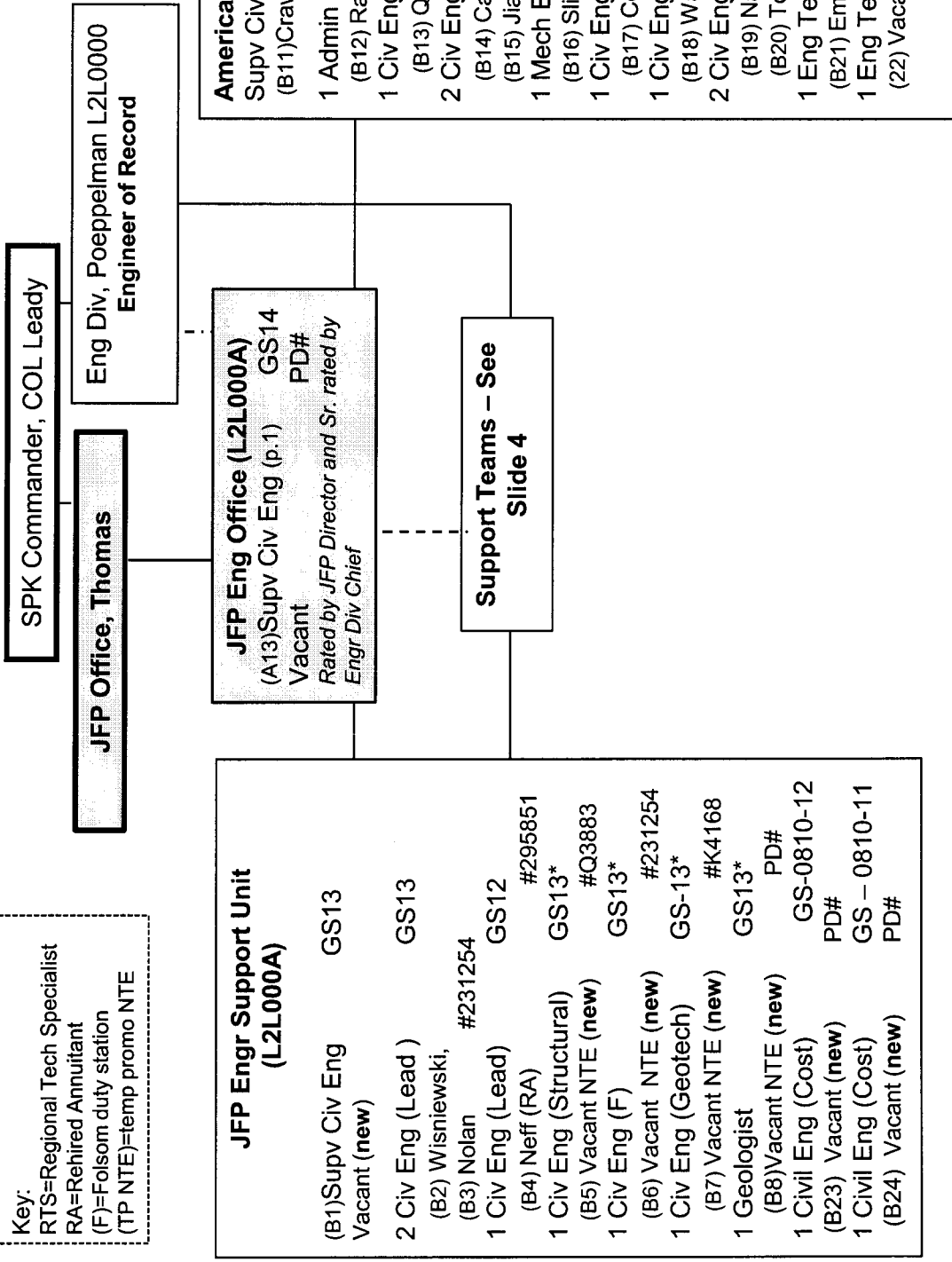


JFP ORG CHART – Engr Br

Key:
 RTS=Regional Tech Specialist
 RA=Rehired Annuitant
 (F)=Folsom duty station
 (TP NTE)=temp promo NTE

 Rated by JFP Director,
 Sr Rated by ED Ch

 Assigned to JFP Rated
 by Engr Div Chain



JFP Engr Support Unit (L2L000A)

(B1)Supv Civ Eng Vacant (new)	GS13
2 Civ Eng (Lead) (B2) Wisniewski, (B3) Nolan #231254	GS13
1 Civ Eng (Lead) (B4) Neff (RA) #295851	GS12
1 Civ Eng (Structural) (B5) Vacant NTE (new) #Q3883	GS13*
1 Civ Eng (F) (B6) Vacant NTE (new) #231254	GS13*
1 Civ Eng (Geotech) (B7) Vacant NTE (new) #K4168	GS-13*
1 Geologist (B8) Vacant NTE (new) PD#	GS13*
1 Civil Eng (Cost) (B23) Vacant (new) PD#	GS-0810-12
1 Civil Eng (Cost) (B24) Vacant (new) PD#	GS - 0810-11

JFP Eng Office (L2L000A)

(A13)Supv Civ Eng (p.1)	GS14
Vacant	PD#

Rated by JFP Director and Sr. rated by Engr Div Chief

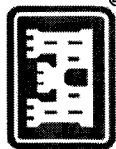
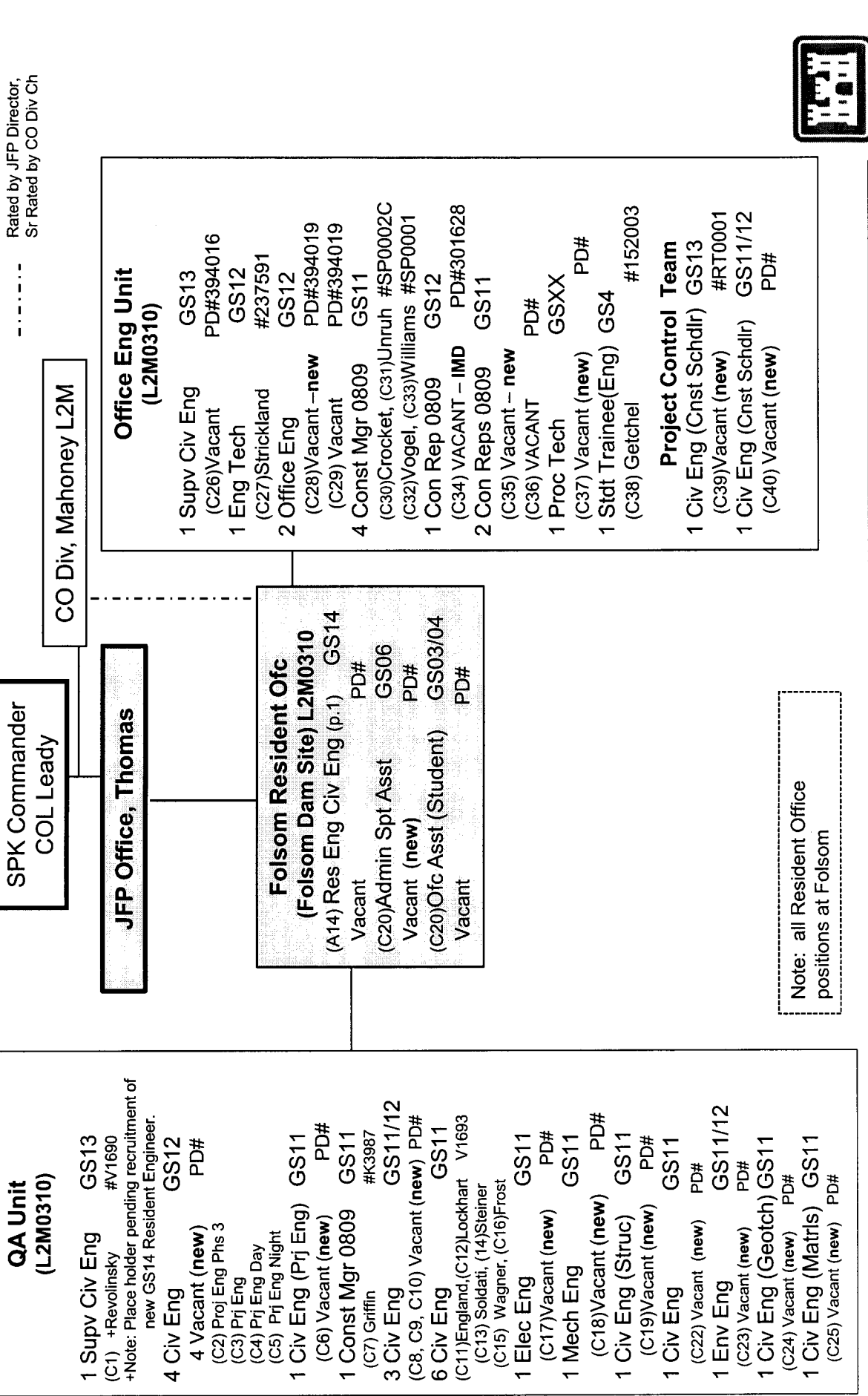
Support Teams – See Slide 4

American Rv Design Unit (2L000A)

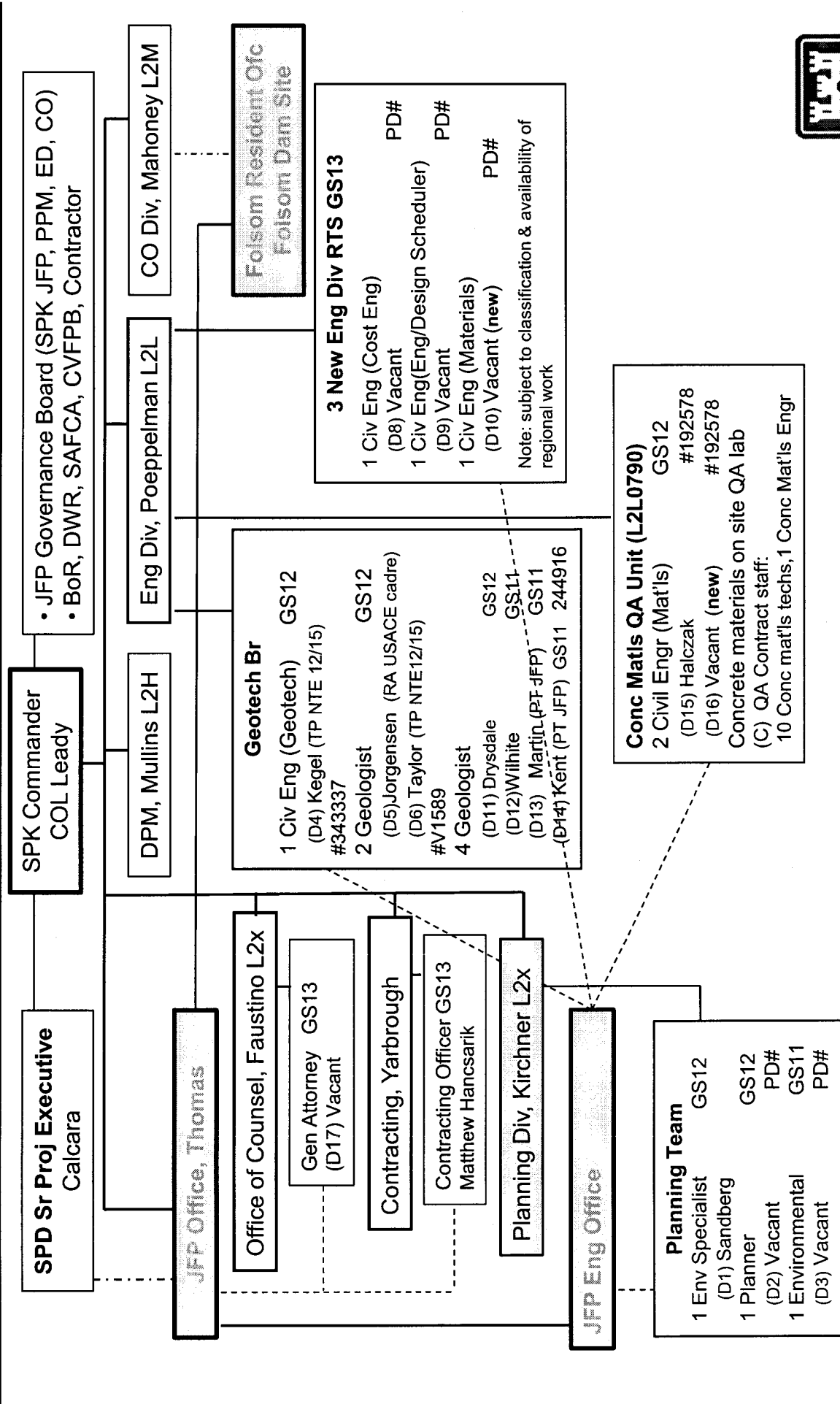
Supv Civ Eng (B11)Crawley	GS13 #V2783
1 Admin Asst (B12) Ramos	GS05 #202079
1 Civ Eng (Lead) (B13) Qunell	GS13 #231254
2 Civ Eng (B14) Catarella (B15) Jiang	GS12 #K4186 #00712
1 Mech Eng (B16) Slinkard (RA)	GS12 #V1910
1 Civ Eng (B17) Conn #K4185	GS11
1 Civ Eng (Structural) (B18) Wan #286192	GS12
2 Civ Eng (Structural) (B19) Nakashima #01422 (B20) Tom (ACTEDS GS5/11) #AJ835	GS11
1 Eng Tech (Civ) (B21) Emanuel Matthews #306943	GS10
1 Eng Tech (Civ) (22) Vacant (new) PD#	GS11



JFP ORG CHART – Resident Office



JFP ORG CHART – Spt Teams from EN, PL, OC and CO Divisions



JFP OPCON CONCEPT

- **Operational control (OPCON)** is a doctrinal term that reflects a more temporary arrangement and includes the authority to organize personnel and to direct the staff as the receiving Supervisor to perform all functions necessary to accomplish the *assigned* mission. OPCON does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or training.
- **Administrative control (ADCON)** responsibilities include internal organizational support, training, logistics, equipment, and administrative support. This allows for staff growth/development/training using home room concept and for substitutions if needed (sickness/different skill set requirements over time).



Example Mega-Project Earned Value Management Objectives

NOTE : THIS IS A PROTOTYPE/EXAMPLE BEING APPLIED ON THE DAM SAFETY MODIFICATION PROGRAM AND PROJECTS. IT INCLUDES A TABLE INDICATING HOW USACE MANAGEMENT CAPABILITIES MIGHT SATISFY THE ANSI STANDARD FOR EVMS, AND HOW OMB METRICS FOR EVMS CONTROL MIGHT BE APPLIED.

Obligations

The project will meet the obligation schedule as planned and submitted through the appropriate MSC PRB and the HQ PRB.

Earned Value Management

At the beginning of a project, the PDT should propose baseline values to the Project Senior Executive for the following:

- Planned Value (PV) Curve
- Budget at Completion (BAC) – This is the total investment cost expected by the PDT at the completion of the project.
- Total Authorized Project Cost (TAB) – This is typically the authorized cost estimate for the project – including Cost and Schedule Risk Analysis (CSRA). It does not include costs above the authorized project cost.
- Project Cost Reserve
- Project Schedule Reserve
- HQ Management Cost Reserve
- HQ Management Schedule Reserve

. Rebaseling may be necessary at seminal points or episodic events in the project lifecycle, such as major procurement bid openings, addition or revocation of appropriated funds, etc. Re-baselining must be reported to the Project Senior Executive. Re-baselining that moves the cost into the Project Cost Reserve or the schedule into the Project Schedule Reserve can only be done with the approval of the Project Senior Executive. Re-baselining that moves the cost into the HQ Management Cost Reserve or the schedule into the HQ Management Schedule Reserve can only be done with the approval of the Project Senior Executive and the concurrence of HQUSACE.

The following are the EVMS Guidelines from ANSI 748-B and adapted as noted by USACE. Mega-Projects use 29 of the 34 EVMS guidelines listed in ANSI 748-B as noted in the table below.

ANSI 748-B Guideline	USACE Mega-Project Adoption or Adaption
Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.	The PDT will define authorized work elements for each project using WBS in P2.I think there are pre-defined fields for this already.

ANSI 748-B Guideline	USACE Mega-Project Adoption or Adaption
Identify the program organizational structure including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.	Each organization responsible for accomplishing the authorized work and the organizational elements in which work will be planned and controlled will be identified.
Provide for the integration of the planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.	The PDT will provide the integration of the planning, scheduling, budgeting, work authorization and cost accumulation processes with the program work breakdown structure and the program organizational structure
Identify the organization or function responsible for controlling overhead (indirect costs).	Each organization performing work is responsible for predicting, monitoring, and controlling overhead (indirect costs). <i>Note that this deviates from ANSI 748-B, which requires indirect costs / overhead to be managed per project.</i>
Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.	The PDT will provide for integration of the program work breakdown structure and the project organizational structure to allow cost and schedule performance measurement.
Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.	The PDT will schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the project.
Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.	The PDT will identify physical products, milestones, significant project funding, program funding, decisions, technical performance goals, or other indicators or milestones that will be used to measure progress.
Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost including estimates for authorized but undefinitized work. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. If an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.	The PDT will establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Initial budgets established for performance measurement will be based on either internal management goals. Budget for far-term efforts will be held in higher level accounts until an appropriate time for allocation at the control account level.
Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.	The PDT will establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of organizations performing work including contractors.

ANSI 748-B Guideline	USACE Mega-Project Adoption or Adaption
To the extent it is practicable to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far-term effort in larger planning packages for budget and scheduling purposes.	The PDT will identify the authorized work in discrete work packages and establish budgets for this work in terms of dollars and other measurable units.
Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.	The PDT will ensure that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.
Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is not measurable or for which measurement is impracticable may be classified as level-of-effort.	The PDT will identify and control level of effort activity by time-phased budgets established for this purpose.
Establish overhead budgets for each significant organizational component for expenses that will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.	Each organization performing work will establish overhead budgets for their respective organizations. <i>Note that this deviates from ANSI 748-B, which requires indirect costs / overhead to be managed per program.</i>
Identify management reserves and undistributed budget.	The PDT will identify management reserves and undistributed budget and manage those funds at the project level with the approval of the Project Senior Executive. Terminology for these budget and reserve amounts differ across USACE programs and customers.
Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.	The PDT will ensure that the project target cost goal is reconciled with the sum of all internal program budgets and management reserves.
Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.	The PDT will record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account..
When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.	For the project, direct costs from control accounts will be summarized into the work breakdown structure.
Summarize direct costs from the control accounts into the organizational elements without allocation of a single control account to two or more organizational elements.	For the project, direct costs from control accounts will be summarized into the organizational breakdown structure.
Record all indirect costs that will be allocated to the program consistent with the overhead budgets.	Indirect costs will be managed by each individual organization. <i>Note that this deviates from ANSI 748-B, which requires indirect costs / overhead to be managed per project..</i>

ANSI 748-B Guideline	USACE Mega-Project Adoption or Adaption
Identify unit costs, equivalent unit costs, or lot costs when needed.	Unit costs, equivalent unit costs, or lot costs will be identified when needed
<p>For EVMS, the material accounting system will provide for:</p> <ol style="list-style-type: none"> 1) Accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques. 2) Cost recorded for accomplishing work performed in the same period that earned value is measured and at the point in time most suitable for the category of material involved, but no earlier than the time of actual receipt of material. 3) Full accountability of all material purchased for the program including the residual inventory. 	<p>The project does not track materials. <i>Note that this deviates from ANSI 748-B, which requires tracking and accountability for all material.</i></p>
<p>At least on a monthly basis, generate the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system:</p>	<p>Monthly, the PDT will report the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system. Generation of these data normally require additional aggregation and manipulation of information outside of CEFMS and P2.</p>
<ul style="list-style-type: none"> • Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance. 	<ul style="list-style-type: none"> • Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.
<ul style="list-style-type: none"> • Comparison of the amount of the budget earned and the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance. 	<ul style="list-style-type: none"> • Comparison of the amount of the budget earned and the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.
<ul style="list-style-type: none"> • Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management. 	<ul style="list-style-type: none"> • Indirect Costs – Not reported. <i>Note that this deviates from ANSI 748-B, which requires indirect costs / overhead to be reported per control account.</i>
<ul style="list-style-type: none"> • Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances. 	<ul style="list-style-type: none"> • Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by the PDT.
<ul style="list-style-type: none"> • Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract. 	<ul style="list-style-type: none"> • Summarize the data elements and associated variances through the program organization and/or work breakdown structure needed by the PDT.

ANSI 748-B Guideline	USACE Mega-Project Adoption or Adaption
<ul style="list-style-type: none"> Implement managerial actions taken as the result of earned value information. 	<ul style="list-style-type: none"> The PDT will implement managerial actions taken as the result of earned value information.
<ul style="list-style-type: none"> Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements. 	<ul style="list-style-type: none"> With the approval of the Project Senior Executive, the PDT will develop revised estimates of cost at completion based on performance to date and estimates of future conditions. Project managers will compare this information with the performance measurement baseline to identify variances at completion important to the PDT.
<p>Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.</p>	<p>The PDT will incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules</p>
<p>Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.</p>	<p>The PDT will reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by the PDT for effective control. Control bands and targets are program and project specific within USACE.</p>
<p>Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of customer or management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.</p>	<p>The PDT will control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.</p>
<p>Prevent revisions to the program budget except for authorized changes.</p>	<p>The PDT will not revise the program budget except when authorized by the Project Senior Executive.</p>
<p>Document changes to the performance measurement baseline.</p>	<p>These determinations are made on program and project-specific bases within USACE.</p>

Terminology

ACTUAL COST (AC or ACWP) - The costs actually incurred and recorded in accomplishing work performed also referred to as Actual Cost of Work Performed (ACWP).

ACTUAL DATE - The date on which a milestone or scheduled work task is completed.

APPORTIONED EFFORT - Effort that by itself is not readily measured or divisible into discrete work packages but which is related in direct proportion to the planning and performance on other measured effort.

AUTHORIZED WORK - Effort (work scope) on contract or assigned by management.

BUDGET AT COMPLETION (BAC) - The total authorized budget for accomplishing the

program scope of work. It is equal to the sum of all allocated budgets plus any undistributed budget. (Management Reserve is not included.) The Budget at Completion will form the Performance Measurement Baseline as it is allocated and time-phased in accordance with program schedule requirements. This is equivalent to the expected project cost NOT including Cost and Schedule Risk Analysis (CSRA).

CONTROL ACCOUNT - A management control point at which budgets (resource plans) and actual costs are accumulated and compared to earned value for management control purposes. A control account is a natural management point for planning and control since it represents the work assigned to one responsible organizational element on one program work breakdown structure element.

COST VARIANCE (CV) - A metric for the cost performance on a program as of a specified date. It is the difference between earned value and actual cost (Cost Variance = Earned Value – Actual Cost). A positive value indicates a favorable position and a negative value indicates an unfavorable condition.

CRITICAL PATH ANALYSIS - See NETWORK SCHEDULE.

DIRECT COSTS - The costs or resources expended in the accomplishment of work, which are directly charged to the affected program.

DISCRETE EFFORT - Tasks that are related to the completion of specific end products or services and can be directly planned and measured. (Also may be known as work packaged effort.)

DUE DATE - The date by which a milestone or task is scheduled to be completed.

EARNED VALUE (EV) - The value of completed work expressed in terms of the budget assigned to that work, also referred to as Budgeted Cost for Work Performed (BCWP).

ESTIMATE AT COMPLETION (EAC) - The current estimated total cost for program authorized work. It equals actual cost to a point in time plus the estimated costs to completion (Estimate To Complete).

ESTIMATE TO COMPLETE - Estimate of costs to complete all work from a point in time to the end of the program.

ESTIMATED COST - An anticipated cost for specified work scope.

EXPECTED COMPLETION DATE - The date on which a scheduled milestone or task is currently expected to be completed.

HQ MANAGEMENT RESERVE - An amount of the total budget withheld for management control purposes rather than being designated for the accomplishment of a specific task or set of tasks. This value is equal to the authorized limit of expenditures including Cost and Schedule Risk Analysis (CSRA).

INDIRECT COST - The cost for common or joint objectives that cannot be identified specifically with a particular program or activity. Also referred to as overhead cost or burden.

INTERNAL REPLANNING - Replanning actions for remaining work scope. A normal program control process accomplished within the scope, schedule, and cost objectives of the program.

LEVEL OF EFFORT - Unmeasured effort of a general or supportive nature usually without a deliverable end product. Examples are supervision, program administration, and contract administration.

MILESTONE - A schedule event marking the due date for accomplishment of a specified effort (work scope) or objective. A milestone may mark the start, an interim step, or the end of one or more activities.

NETWORK SCHEDULE - A schedule format in which the activities and milestones are represented along with the interdependencies between activities. It expresses the logic of how the program will be accomplished. Network schedules are the basis for critical path analysis, a method for identification and assessment of schedule priorities and impacts.

ORGANIZATION STRUCTURE - The hierarchical arrangement for the management organization for a program, graphically depicting the reporting relationships. The organizational structure will be by work team, function, or whatever other units are used.

OTHER DIRECT COSTS - Usually the remaining direct costs, other than labor and materiel, such as travel and computer costs.

OVER-TARGET BASELINE (OTB) - Replanning actions involving establishment of cost and/or schedule objectives that exceed the desired or contractual objectives on the program. An over-target baseline is a new baseline for management when the original objectives cannot be met and new goals are needed for management purposes.

PERFORMANCE MEASUREMENT BASELINE - The total time-phased budget plan against which program performance is measured. It is the schedule for expenditure of the resources allocated to accomplish program scope and schedule objectives, and is formed by the budgets assigned to control accounts and applicable indirect budgets. The Performance Measurement Baseline also includes budget for future effort assigned to higher level accounts, also referred to as summary level planning packages, plus any undistributed budget. Management Reserve is not included in the baseline, as it is not yet designated for specific work scope.

PERFORMING ORGANIZATION - The organization unit that applies resources to accomplish assigned work.

PLANNED VALUE (PV) – The time-phased budget plan for work currently scheduled, also referred to as Budgeted Cost for Work Scheduled (BCWS).

PLANNING PACKAGE - A logical aggregation of work within a control account, usually future efforts that can be identified and budgeted, but which is not yet planned in detail at the work package or task level.

PROJECT BUDGET - The total budget for the program including all allocated budget, management reserve, and undistributed budget.

PROJECT TARGET COST - The program cost objective based on the negotiated contract target cost, or the management goal value of the authorized work, plus the estimated cost of authorized unpriced work.

PROJECT MANAGEMENT RESERVE - An amount of the total budget withheld for management control purposes rather than being designated for the accomplishment of a specific task or set of tasks.

RESOURCE PLAN - The time-phased budget, which is the schedule for the planned expenditure of program resources for accomplishment of program work scope.

RESPONSIBLE ORGANIZATION - The organizational unit responsible for accomplishment of assigned work scope.

SCHEDULE - A plan that defines when specified work must be done to accomplish program objectives on time.

SCHEDULE TRACEABILITY - Compatibility between schedule due dates, status, and work scope requirements at all levels of schedule detail (vertical traceability) and between schedules at the same level of detail (horizontal traceability).

SCHEDULE VARIANCE (SV) - A metric for the schedule performance on a program. It is the difference between earned value and the budget (Schedule Variance = Earned Value – planned value). A positive value is a favorable condition while a negative value is unfavorable.

STATEMENT OF WORK - The document that defines the work scope requirements for a program.

UNDEFINITIZED WORK - Authorized work for which a firm contract value has not been negotiated or otherwise determined.

UNDISTRIBUTED BUDGET - Budget associated with specific work scope or contract changes that have not been assigned to a control account or summary level planning package.

WORK BREAKDOWN STRUCTURE (WBS) - A product-oriented division of program tasks depicting the breakdown of work scope for work authorization, tracking, and reporting purposes.

WORK BREAKDOWN STRUCTURE DICTIONARY - A listing of work breakdown structure elements with a description of the work scope content in each element. The work descriptions are normally summary level and provide for clear segregation of work for work authorization and accounting purposes.

WORK PACKAGE - A task or set of tasks performed within a control account.

EVM Metric Definitions

Term	Equation	Description
Planned Value (PV)		(Scheduled Expenditures) * (Planned % completed per WBS)
Earned Value (EV)	$EV = \sum_{Start}^{Current} PV(Completed)$	(Scheduled Expenditures) * (Actual % completed per WBS)
Schedule Variance (SV)	$SV = EV - PV$	SV greater than 0 is good (ahead of schedule). The SV will be 0 at project completion because then all of the planned values will have been earned.
Schedule Variance % (SV%)	$SV\% = \frac{SV}{PV}$	SV > 0 is good. This means the project is ahead of schedule.
Schedule Performance Index (SPI)	$SPI = \frac{EV}{PV}$	SPI greater than 1 is good (ahead of schedule).
Cost Variance (CV)	$CV = EV - AC$	CV greater than 0 is good (under budget).
Cost Variance % (CV%)	$CV\% = \frac{CV}{EV}$	CV % > 0 is good. This means the project is under budget.

Term	Equation	Description
Cost Performance Index (CPI)	$CPI = \frac{EV}{AC}$	CPI greater than 1 is good (under budget): <ul style="list-style-type: none"> • < 1 means that the cost of completing the work is higher than planned (bad); • = 1 means that the cost of completing the work is right on plan (good); • 1 means that the cost of completing the work is less than planned (good or sometimes bad).
Manager's Estimate at Completion (EAC ₁)	$EAC_1 = AC + \frac{BAC - EV}{CPI} = \frac{BAC}{CPI}$	EAC ₁ is the manager's projection of the total cost of the project at completion using solely the cost performance so far.
Independent Estimate at Completion (EAC ₂)	$EAC_2 = \sum AC + \frac{BAC - \sum EV}{CPI}$	EAC ₂ is the manager's projection of the total cost of the project at completion using both the cost performance and schedule performance so far.
Variance at Completion 1	$VAC_1 = BAC - EAC_1$	VAC ₁ is the difference between the budgeted cost at completion and the manager's projection of the total cost of the project at completion using solely the cost performance so far.
VAC ₁ %	$VAC_1\% = \frac{VAC_1}{BAC}$	
Variance at Completion 2	$VAC_2 = BAC - EAC_2$	VAC ₂ is the difference between the budgeted cost at completion and the manager's projection of the total cost of the project at completion using both the cost performance and schedule performance so far.
VAC ₂ %	$VAC_2\% = \frac{VAC_2}{BAC}$	

Term	Equation	Description
To Complete Performance Index (BAC) (describes the project performance required to meet the original BAC budgeted total)	$TCPI_{BAC} = \frac{BAC - EV}{BAC - AC}$	TCPI < 1 is good. This describes how much effort (cost and schedule) would be required to meet the original BAC.
To Complete Performance Index (EAC) (describes the performance required to meet a new revised budget total EAC)	$TCPI_{EAC} = \frac{BAC - EV}{EAC - AC}$	TCPI < 1 is good. This describes how much effort (cost and schedule) would be required to meet the new EAC.

Metrics

OMB uses the following metrics for capital investments:

Goal	Metric	Red	Yellow	Green	Blue
Cost Performance (CV%)	Variance %	< -8%	-5% -8%	+10% -5%	>+10%
Schedule Variance (SV%)	Variance %	< -8%	-5% -8%	+10% -5%	>+10%
Estimate at Completion (VAC ₁ %)	Variance at Completion %	< -8%	-5% -8%	+10% -5%	>+10%
Estimate at Completion (VAC ₂ %)	Variance at Completion %	< -8%	-5% -8%	+10% -5%	>+10%
Overall Score	Minimum of All Above Metrics				

How OMB METRICS FOR EVMS CONTROL might be applied to mega-projects:

Goal	Metric	Very Poor (Red)	Poor (Orange)	Fair (Yellow)	Good (Lt. Green)	Excellent (Green)
Actual Obligations vs. Planned Obligations	Variance %	-30% -40%	-10% -30%	-5% -10%	-3% -5%	+anything - 2%
Actual Expenditures vs. Planned Expenditures	Variance %	+30% -40%	+ 20% -30%	+5% -10%	+3% -5%	+/- 2%

Goal	Metric	Very Poor (Red) 	Poor (Orange) 	Fair (Yellow) 	Good (Lt. Green) 	Excellent (Green)
Cost Performance (CV%)	Cost Variance %	+30% -40%	+ 20% -30%	+5% -10%	+3% -5%	+/- 2%
Cost Performance (CPI)	Cost Performance Index	0.70-1.30	0.80-1.20	0.90-1.10	0.95-1.05	0.98-1.02
Schedule Performance (CV%)	Schedule Variance %	+30% -40%	+ 20% -30%	+5% -10%	+3% -5%	+/- 2%
Schedule Performance (SPI)	Schedule Performance Index	0.70-1.30	0.80-1.20	0.90-1.10	0.95-1.05	0.98-1.02
Estimate at Completion	VAC ₁ %	+30% -40%	+ 20% -30%	+5% -10%	+3% -5%	+/- 2%
Estimate at Completion	VAC ₂ %	+30% -40%	+ 20% -30%	+5% -10%	+3% -5%	+/- 2%
To Complete Performance Index (BAC)	TCPI _{BAC}	0.70-1.30	0.80-1.20	0.90-1.10	0.95-1.05	0.98-1.02
To Complete Performance Index (EAC)	TCPI _{EAC}	0.70-1.30	0.80-1.20	0.90-1.10	0.95-1.05	0.98-1.02
Average Score	Average for All Metrics Listed Above where:	Very Poor = 1	Poor = 2	Fair = 3	Good = 4	Excellent = 5




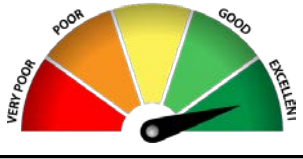


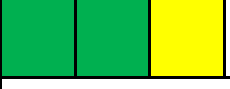

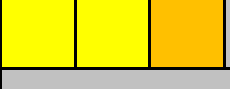





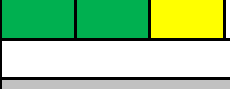

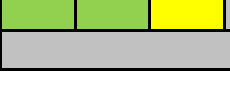

Quarterly Reporting

Quarterly reports will be transmitted to the Project Senior Executive and will include the following:

- Project schedule
- Progress Towards Significant Milestones
- Significant Technical Decisions Made
- Significant Upcoming Technical Decisions
- Project budgets
- % Complete for projects
- % Complete for Significant WBS items
- \$ Expended for Significant WBS Items
- \$ Expended for projects
- \$ Obligated for projects

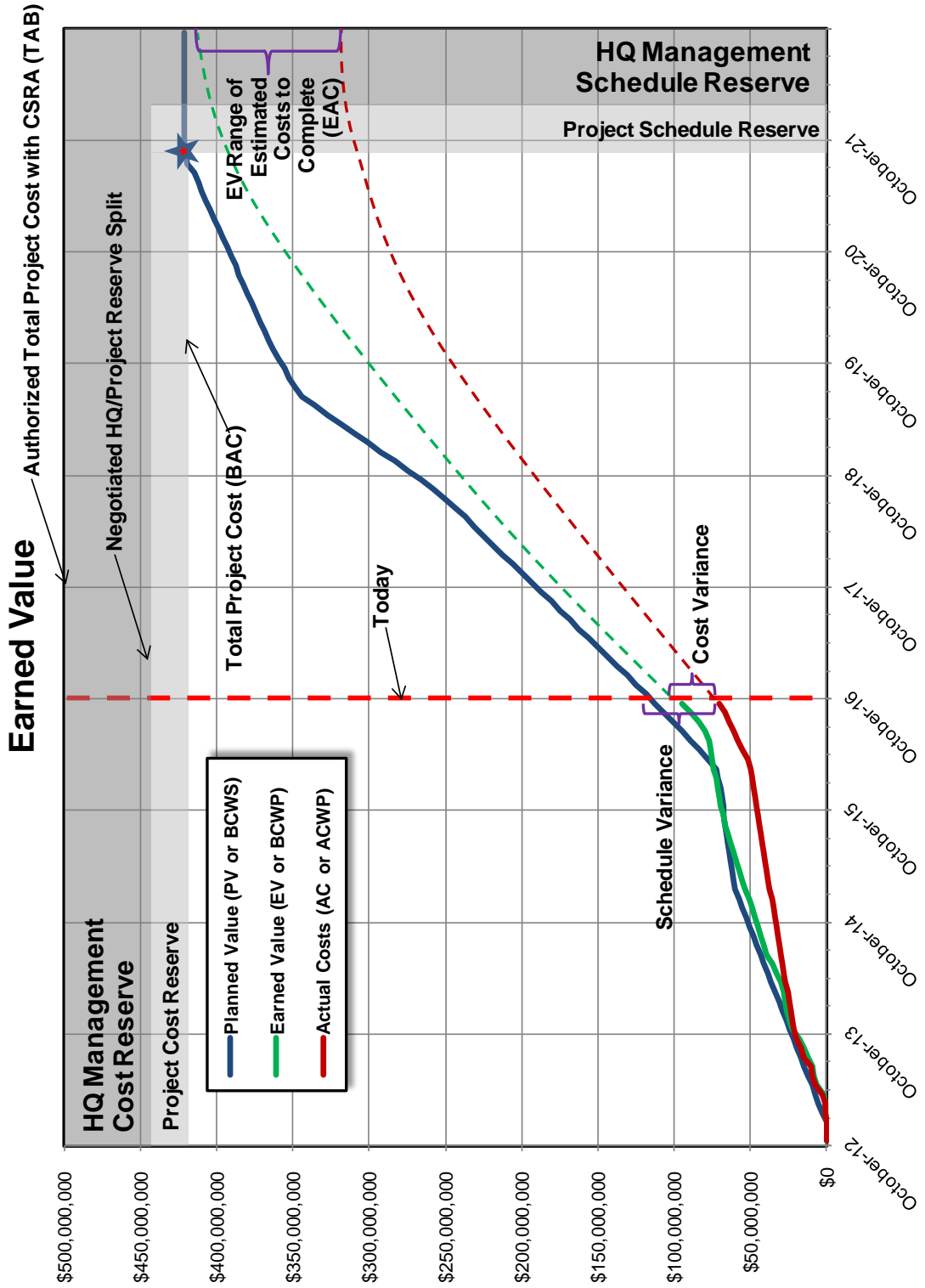
- \$ Obligated for projects compared to 2101 goals
- Earned Value Metrics;
 - CPI
 - CV (%)
 - SPI
 - SV (%)
 - VAC_1 (%)
 - VAC_2 (%)
 - EAC_1 (\$)
 - EAC_2 (\$)
 - $TCPI_{BAC}$
 - $TCPI_{EAC}$

The reports should contain a table in the format shown in the example below:

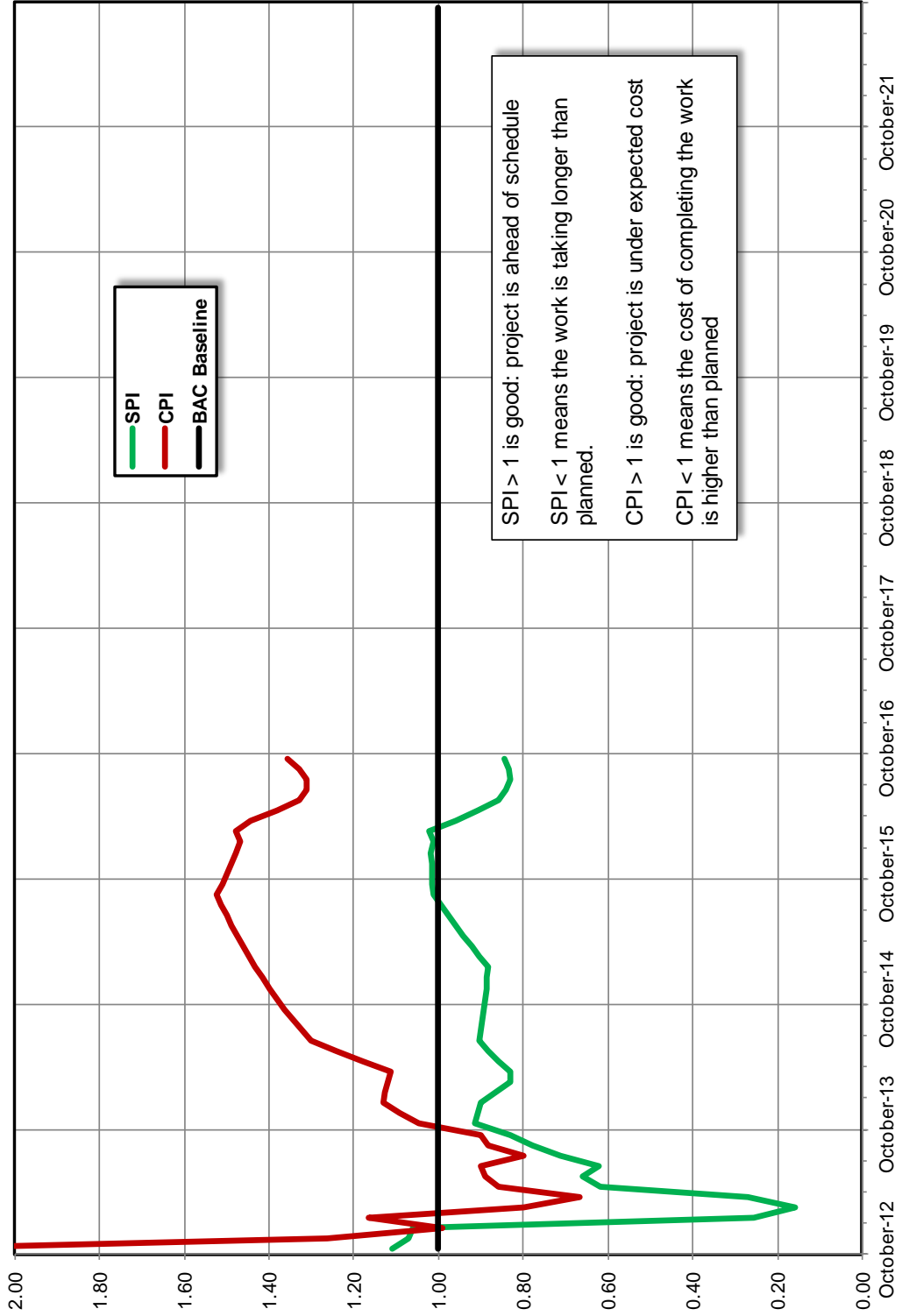
Goal	Metric	Value	Quarterly Trend	Measure
Overall	Average Rating	3.4		
Expenditures	Expenditure %	101.4%		
Obligations	Obligation %	98.0%		
Cost Performance	Cost Variance %	16.8%		
Cost Performance	Cost Performance Index	1.20		
Schedule Performance	Schedule Variance %	-0.4%		
Schedule Performance	Schedule Performance Index	1.00		
Estimate at Completion	VAC ₁ %	16.8%		
Estimate at Completion	VAC ₂ %	16.4%		
Corrective Actions	List corrective actions if any metrics are poor or very poor.			

The following charts shall be included in the quarterly report:

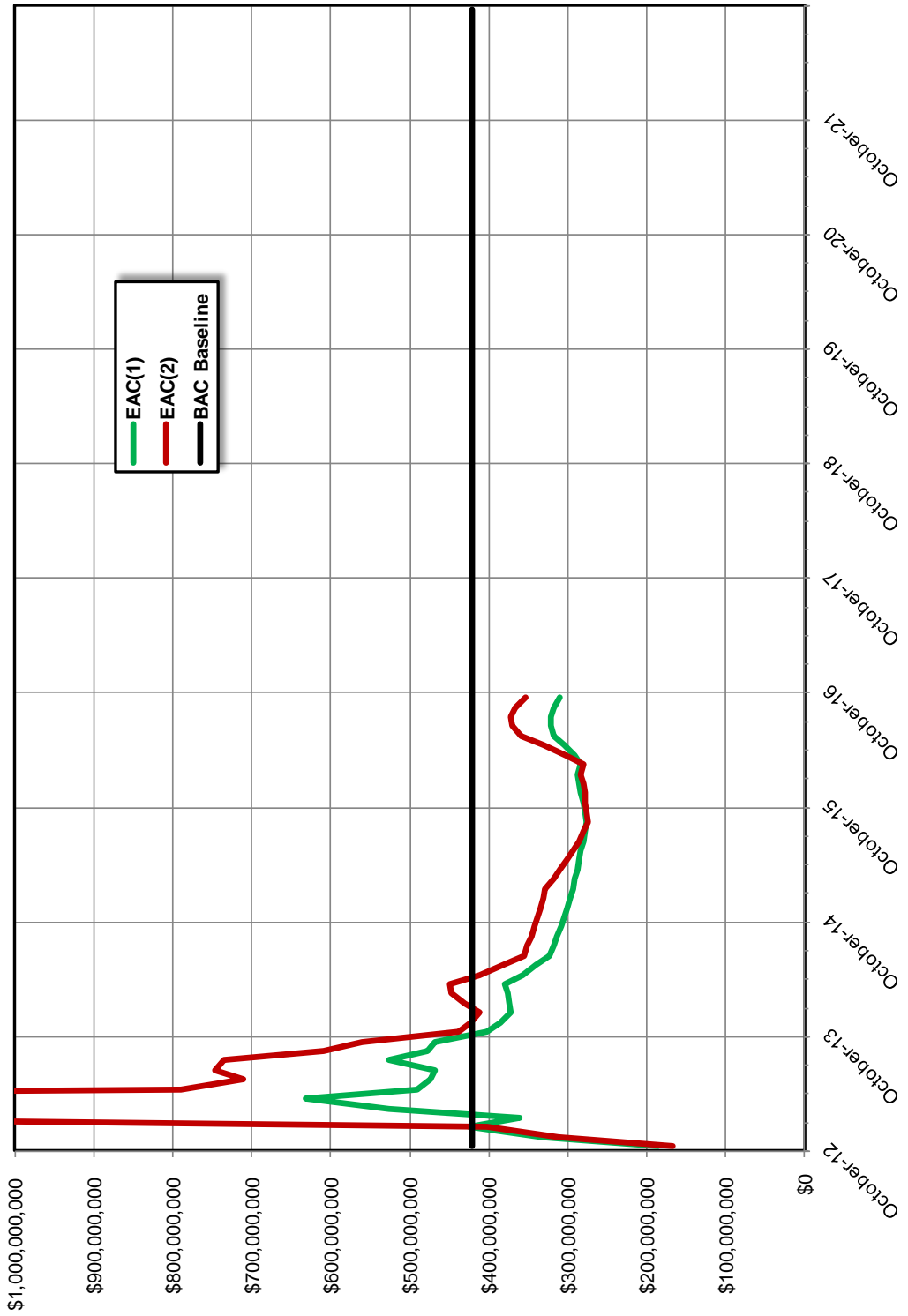
- EVM (PV, EV, ACWP)
- CPI Trend
- SPI Trend
- EAC Trend



Performance Indices Trend



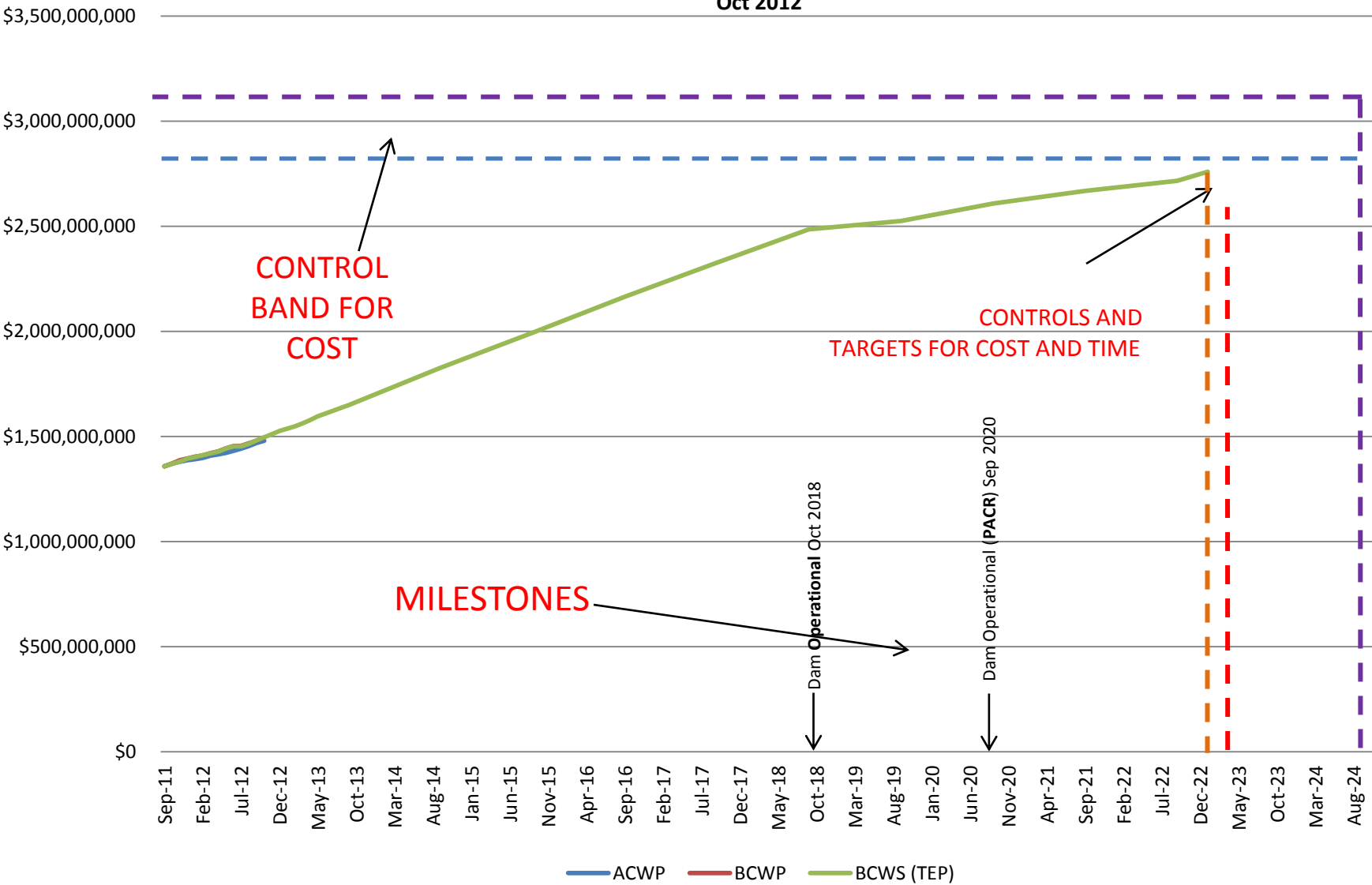
Estimated Completion Cost Trend



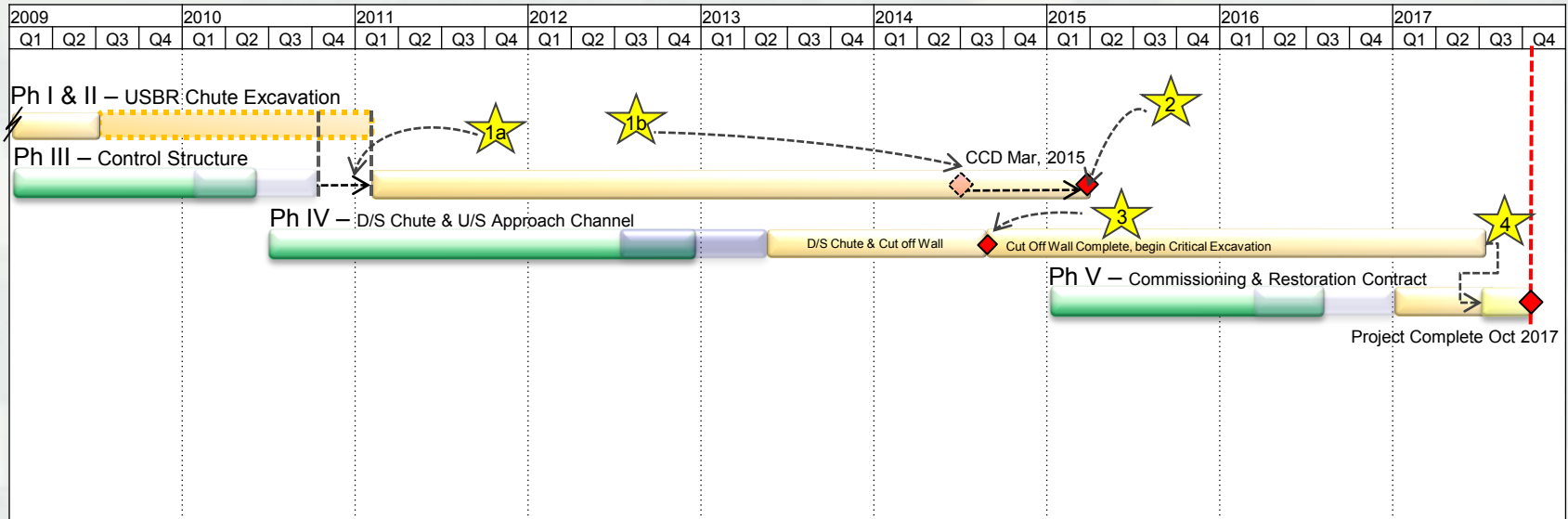
Example Earned Value Analysis Chart

(Based on DOD Gold Card)

Oct 2012



Example Integrated Master Schedule (IMS) Gantt Briefing Chart

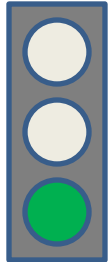


- Ph I & II Duration beyond the planned completion of July 2009 resulted in an impact to Ph III start
- Ph III CCD later than anticipated due to late start, changes in design, and site conditions
- Contractor's projected completion base on current negotiations
- Corps working to negotiate Contractor's schedule completion to Mar 31, 2015
- Ph IV Critical Elements to begin by August 2014 to meet Oct 2017 completion
- Ph IV upstream excavation and approach wall work is dependent on seasonal lake levels. Note: Additional duration of the low lake level in 2015/2016 season will advance excavation in the dry and save time over Blasting/excavating underwater

- Milestone
- Planning/Design (Planned)
- Acquisition (Planned)
- Construction (Planned)
- Commissioning (Planned)
- Actual
- Forecast



Example Quad Chart Balanced Scorecard



Expenditures

Planned \$ 1.496B
Actual \$ 1.479B

Measures: Total expenditures to date. Planned vs Actual does not necessarily reflect behind or ahead of schedule or over or under budget.

Target: Actuals as compared to Planned: (<1% = Green) (>1% and <3% = Yellow) and (>3% = Red)

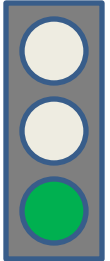
METRICS AND CONTROL BANDS

Schedule

Project Compl.
Dam Operational

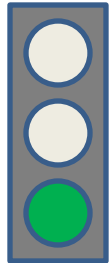
Rating

(PACR)/(Current)
Sep 2024/Jan 2023
Sep 2020/Oct 2018



Measures: Planned project completion and Dam contract operational dates

Target: Green; Current = PACR-18months, Yellow; Current = PACR-17 month to PACR- 7 months Red ; Current = PACR – 6months to after PACR date



Total Estimated Price (TEP)

PACR \$3.099B
Current Estimated \$2.756B

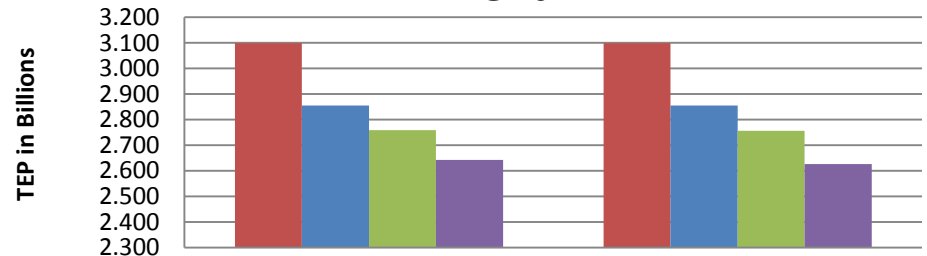
EVMS Calculated \$2.626B

The Difference between the Estimated and the Calculated is that the Calculated has the weighted CPI and SPI applied to the TEP.

Measures: Total, fully inflated, price for the project.

Target: Green < 2.8B, Yellow > 2.8B and < 3.1B, Red >\$3.1B

TEP Trend



	Sep-12	Oct-12
PACR w/ risk	3.099	3.099
PACR	2.855	2.855
Estimated	2.759	2.756
Calculated	2.642	2.626