Cost Control

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Project Monitoring and Control

- Monitoring
  - Collecting, recording, and reporting information concerning project performance that project manger and others wish to know
- Controlling
  - Uses data from monitor activity to bring actual performance to planned performance

Project Monitoring and Control

- Why do we monitor?
- What do we monitor?
- When to we monitor?
- How do we monitor?

Why do we monitor?

- Simply because we know that things don't always go according to plan (no matter how much we prepare)

- To detect and react appropriately to deviations and changes to plans

What do we monitor?

- Men (human resources)
- Machines
- Materials
- Money
- Space
- Time
- Tasks
- Quality/Technical Performance

What do we monitor?

Inputs

- Time
- Money
- Resources
- Material Usage
- Tasks
- Quality/Technical Performance

Outputs

- Progress
- Costs
- Job starts
- Job completion
- Engineering / Design changes
- Variation order (VO)

When do we monitor?

- End of the project
- Continuously
- Regularly
- Logically
- While there is still time to react
- As soon as possible
- At task completion
- At pre-planned decision points (milestones)

How do we monitor

- Through meetings with clients, contractor, supplier, etc.
- For schedule – Update CPM, PERT, and Gantt Charts
- Using Earned Value Analysis
- Calculate Critical Ratios
- Milestones
- Reports
- Tests and inspections
- Delivery

Monitoring issues

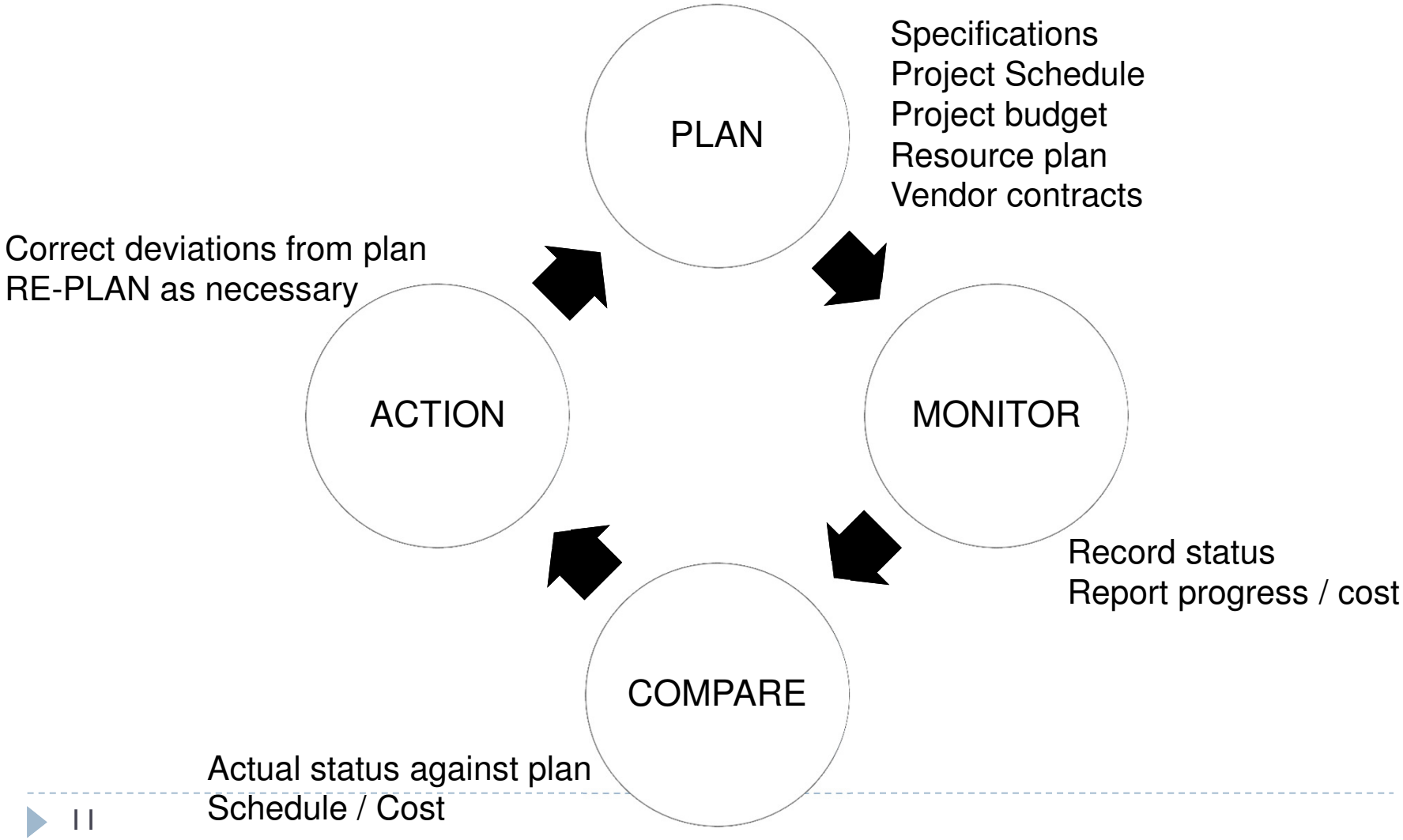
- What problems do you have and what is being done to correct them?
- What problems do you anticipate in the future?
- Do you need any resources you do not yet have?
- Do you know anything that will give you schedule difficulties?
- Any possibility your task will finish early/late?
- Will your task be completed under/over/on budget?

Project Control

- Control – process and activities needed to correct deviations from plan

- Control the constraints
  - Time (schedule)
  - Cost (budget, expenses, etc)
  - Performance (specifications, testing results, etc.)

Project Control Cycle



Techniques for monitoring and control

- Earned Value Analysis
  - A way of measuring overall performance (not individual task) is using an aggregate performance measure - Earned Value

Project Control

- Control the constraints
  - Time (schedule)
  - Cost (budget, expenses, etc)
  - Performance (specifications, testing results, etc.)

Cost Control

- The process of influencing factors that create variances, and controlling changes to the project budget.

Cost Control

- Cost Control includes:
  - Monitoring cost performances to detect variances from plan.
  - Ensuring that all appropriate changes are recorded accurately in the cost baseline
  - Preventing incorrect, inappropriate, or unauthorized changes from being included in the cost baseline.
  - Informing appropriate stakeholders of authorized changes.

Objects of Cost Control

1) To have a knowledge of the profit and loss of the project throughout the:

- Project Profits
  1. Client payments.
  2. Sale of surplus or scrap material and plant
  3. Payments for plants or labor by others

- Project Losses
  1. Labor and site office costs
  2. Plant costs
  3. Site overheads i.e. site facilities, access roads and office etc
  4. Cost of tendering including bonds, insurance, etc.
  5. Material costs.
  6. Head office overheads proportioned over all current projects.
  7. Duration of the project.

Objects of Cost Control

2) To have a comparison between the actual project performance and the original project plan.

3) Provides feedback data on actual project performance to future project planning

4) Predicting Project final cost and completion date

Inputs to Cost Control

- Cost Baseline
- Performance Reports
  - Provide information about cost performance such as which budgets have been met and which have not.
  - It also alerts the project team to issues which may cause problems in the future.
- Change Requests
  - These may occur in many forms-oral or written, direct or indirect, externally or internally initiated, and legally mandated or optional. These may require increasing the budget or may allow decreasing it.

Outputs from Cost Control

- Revised Cost Estimates
- Budget Updates
- Corrective Action
- Estimate at Completion
  - It is a forecast of total project costs based on project performance.
- Lessons Learned

Tools and Techniques for Cost Control

- Cost Change Control System
  - It defines the procedures by which the cost baseline may be changed. It includes the paperwork, tracking systems, and approval levels necessary for authorizing changes.

- Performance Measurement
  - It helps to assess the magnitude of any variations which do occur.

Tools and Techniques for Cost Control

- Additional Planning
  - Perspective changes may require new or revised cost estimates or analysis of alternate approaches.
- Computerized Tools

Earned Value analysis

- A method of integrating scope, schedule, and resources, and for measuring project performance.

- It compares the amount of work that was planned with what was actually earned with what was actually spent to determine if cost and schedule performance are as planned.

Earned Value analysis

- What is needed for Earned Value analysis?
  - A baseline plan
  - A project budget (BAC – Budget at Completion)
  - A project end date
  - Tasks are identified & scheduled
  - Each task has a budget or effort (resource loaded / weighting)
  - Actual tracked

Earned Value analysis

- To perform Earned Value analysis, three values need to be determined
  - Planned Value (PV or BCWS)
  - Actual Costs (AC or ACWP)
  - Earned Value (EV or BCWP)

Planned Value (PV)

- What are the budgeted costs of the work scheduled?
  - Time phased based on baseline budget
  - Only changes when baseline is changed
  - Also referred as "BCWS" & "BAC"

Actual Costs (AC)

- What are the actual costs of the work performed?
  - Based on the actual completion of work packages
  - Actual costs for reported work
  - Also referred as "ACWP"

Earned Value (EV)

- What are the budgeted costs of the work performed?
  - Based on the actual completion of work packages
  - Baseline value of the reported work
  - Also referred as "BCWP"

Earned Value analysis Example

- Task – Drill 10 piles
- Budget - $100,000 ($10,000 per piles)
- Time – 10 weeks (1 pile per week)

- At week 5:
  - 4 piles drilled
  - $47,500 spent to date

- PV = $50,000
- AC = $47,500
- EV = $40,000

Earned Value analysis

- Calculating Earned Value and interpreting results
  - To measure the progress of the project
  - Help identify trends
  - Forecast costs
  - Identify ways to correct/mitigate project pitfalls.

Cost Variance (CV)

- CV = EV - AC
- Good News: If CV value is +ve, the project is currently under budget (spending less than planned for the work)
- Bad News: If CV value is -ve, the project is currently over budget (spending more than planned for the work)

Cost Performance Index (CPI)

- CPI = EV / AC
- Good News: If CPI value is >1 or =1, the project cost trend is currently under or at planned budget
- Bad News: If CPI value <1, the project cost trend is currently over budget

Schedule Variance (SV)

- SV = EV – PV
- Good News: If SV value is +ve, the project is currently ahead of schedule
- Bad News: If SV value is -ve, the project is currently behind schedule

Schedule Performance Index (SPI)

- SPI = EV / PV
- Good News: If SPI value is >1 or =1, the project schedule trend is currently ahead or on planned schedule
- Bad News: If SPI value <1, the project schedule trend is currently behind schedule

Estimate at Completion (EAC)

- Actual costs to date plus remaining budget modified by a performance factor (CPI) (current variances are viewed as typical of future variances).

- EAC = BAC / CPI

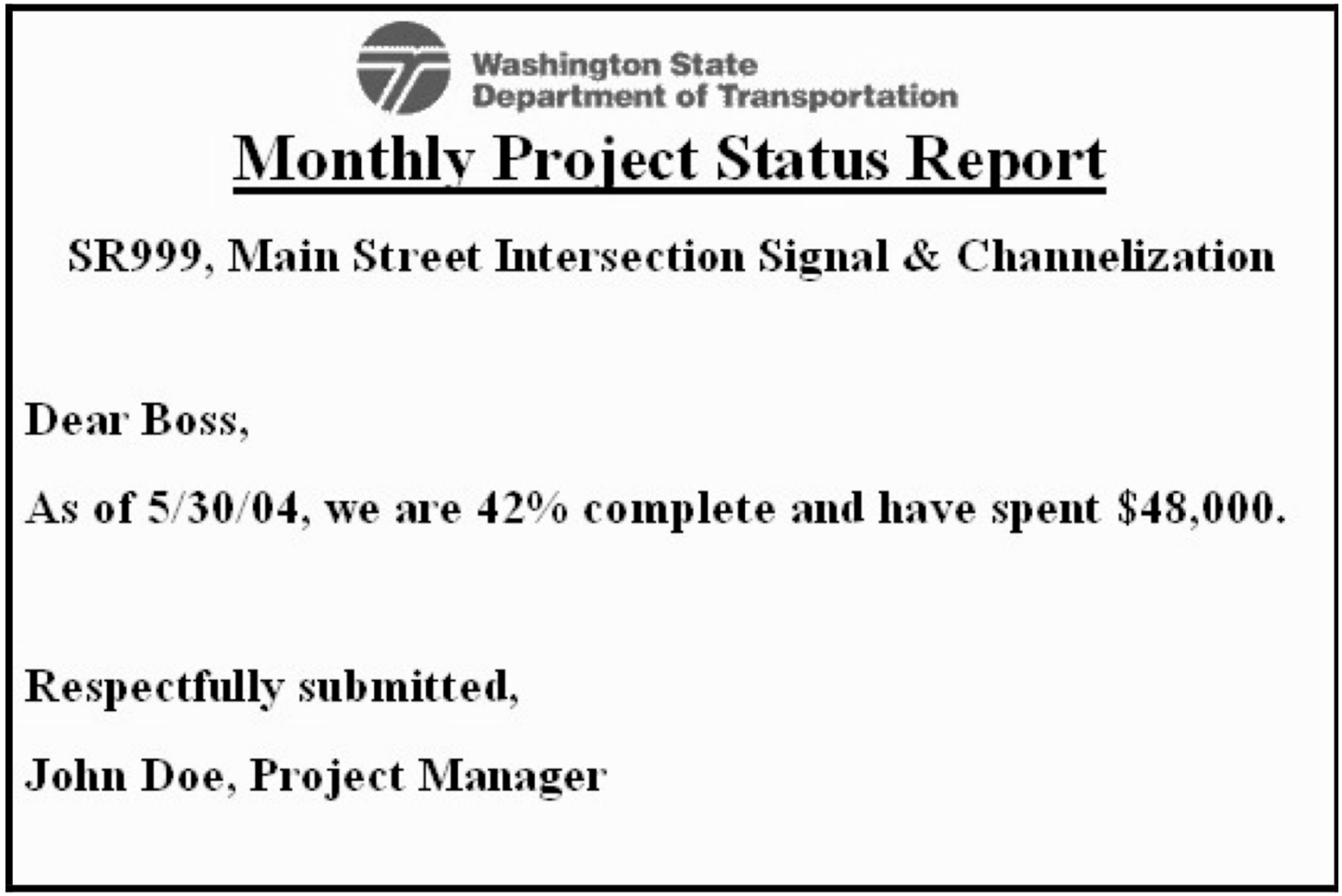
Earned Value analysis Example

- Task – Drill 10 piles
- Budget - $100,000 ($10,000 per pile)
- Time – 10 weeks (1 pile per week)

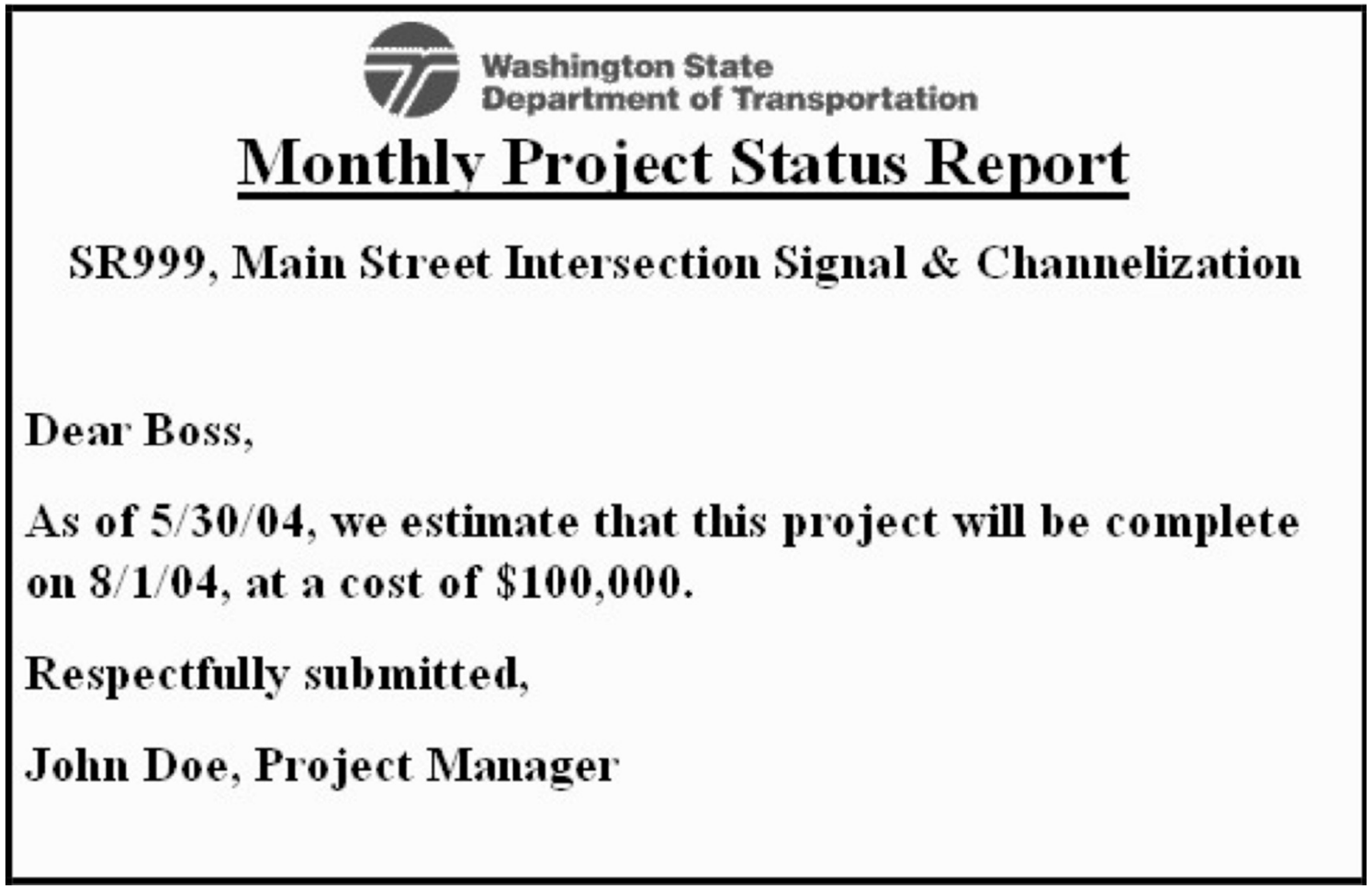
- At week 5:
  - 4 piles drilled
  - $47,500 spent to date

PV = $50,000	CV = -$7,500	SV = -$10,000
AC = $47,500	CPI = 0.82	SPI = 0.80
EV = $40,000	CV% = -19%	SV% = -20%

Earned Value Scenario



Earned Value Scenario



Earned Value Scenario

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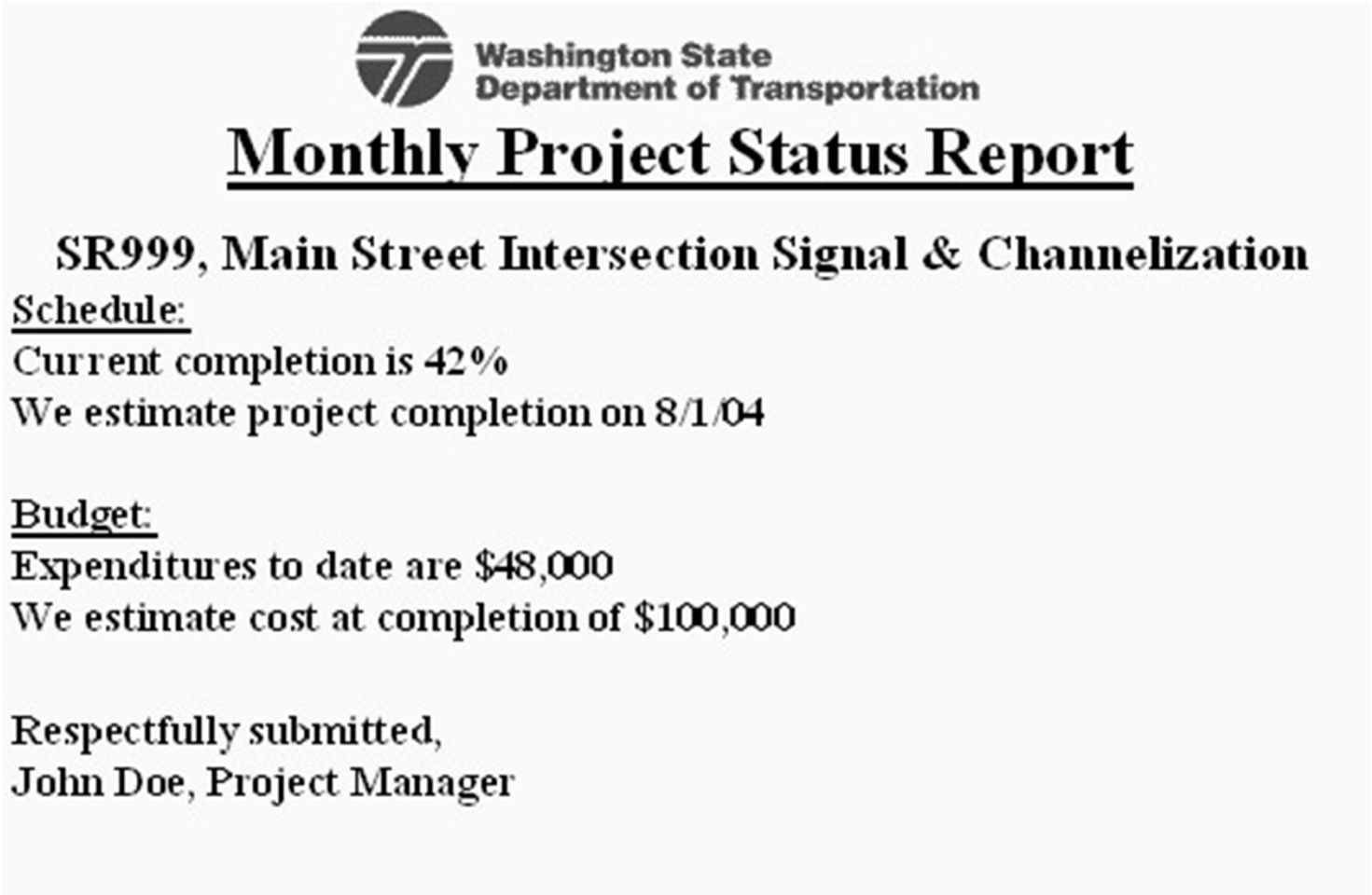


Washington State Department of Transportation

Monthly Project Status Report

SR999, Main Street Intersection Signal & Channelization

Schedule:
Current completion is 42%
We estimate project completion on 8/1/04

Budget:
Expenditures to date are $48,000
We estimate cost at completion of $100,000

Respectfully submitted,
John Doe, Project Manager

Earned Value Scenario

- BAC = $100,000 (current project budget)
- EV = $42,000 (42% of project completed, $100,000 planned)
- PV = $56,000 (56% of project planned $100,000 completed – initial aging report)
- AC = $48,000 (from actual expenditures reporting)
- Is this project on schedule / budget? Or is it in trouble?

Earned Value Scenario

- Cost Variance (CV):
- CV = EV – AC
- = $42,000 - $48,000
- = - $6,000

- Cost Performance Index (CPI):
- CPI = EV / AC
- = $42,000 / $48,000
- = 0.875

Earned Value Scenario

- Schedule Variance (SV):
- SV = EV – PV
- = $42,000 - $56,000
- = - $14,000

- Schedule Performance Index (SPI):
- SPI = EV / PV
- = $42,000 / $56,000
- = 0.750

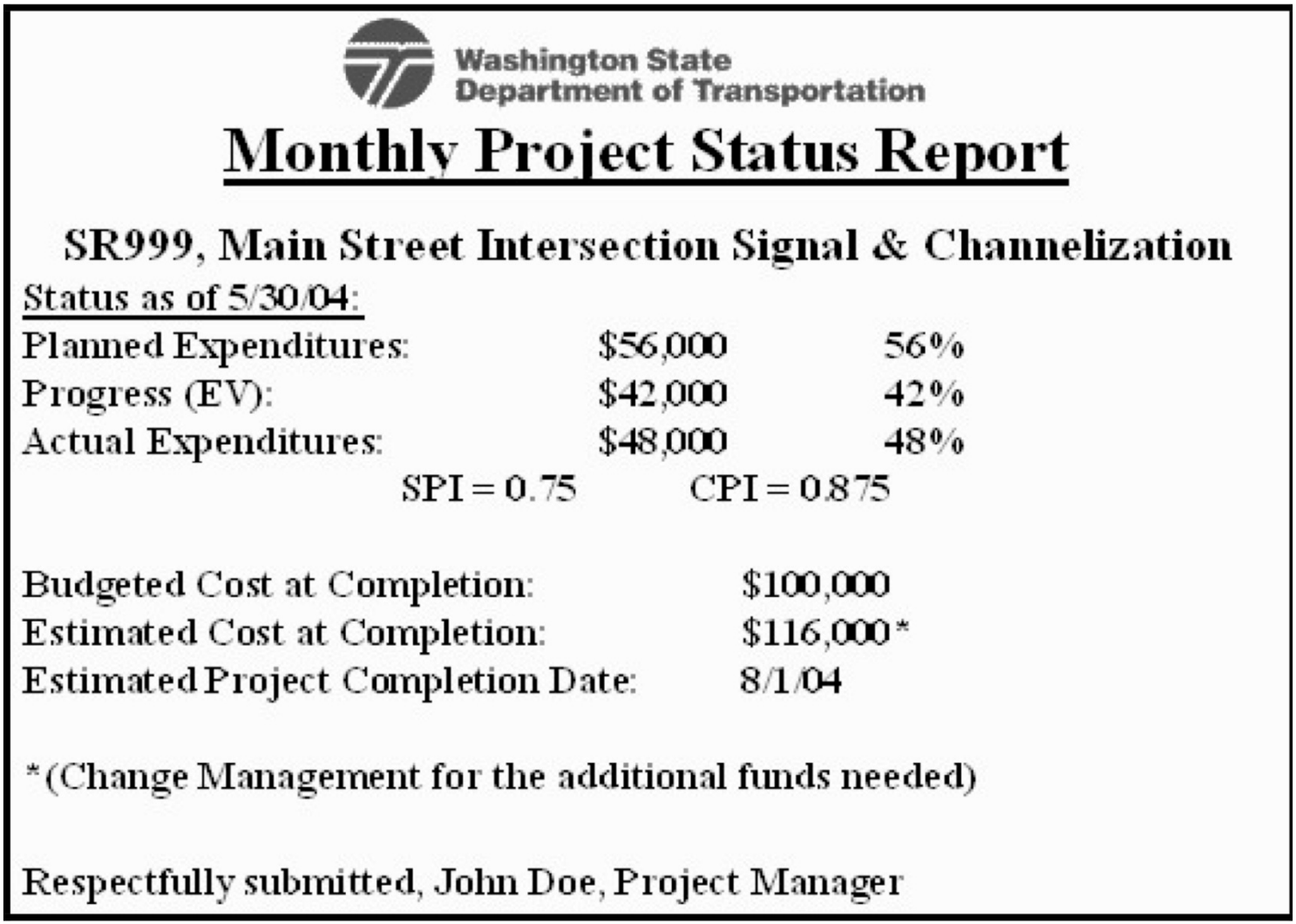
Earned Value Scenario

- Estimate to Complete (ETC):

- EAC = BAC / CPI
- = $100,000 / 0.875
- = $114,285

- (Change Management for $14,285 funds request)

Earned Value Scenario



Washington State Department of Transportation

Monthly Project Status Report

SR999, Main Street Intersection Signal & Channelization

Status as of 5/30/04:

Planned Expenditures:	$56,000	56%
Progress (EV):	$42,000	42%
Actual Expenditures:	$48,000	48%

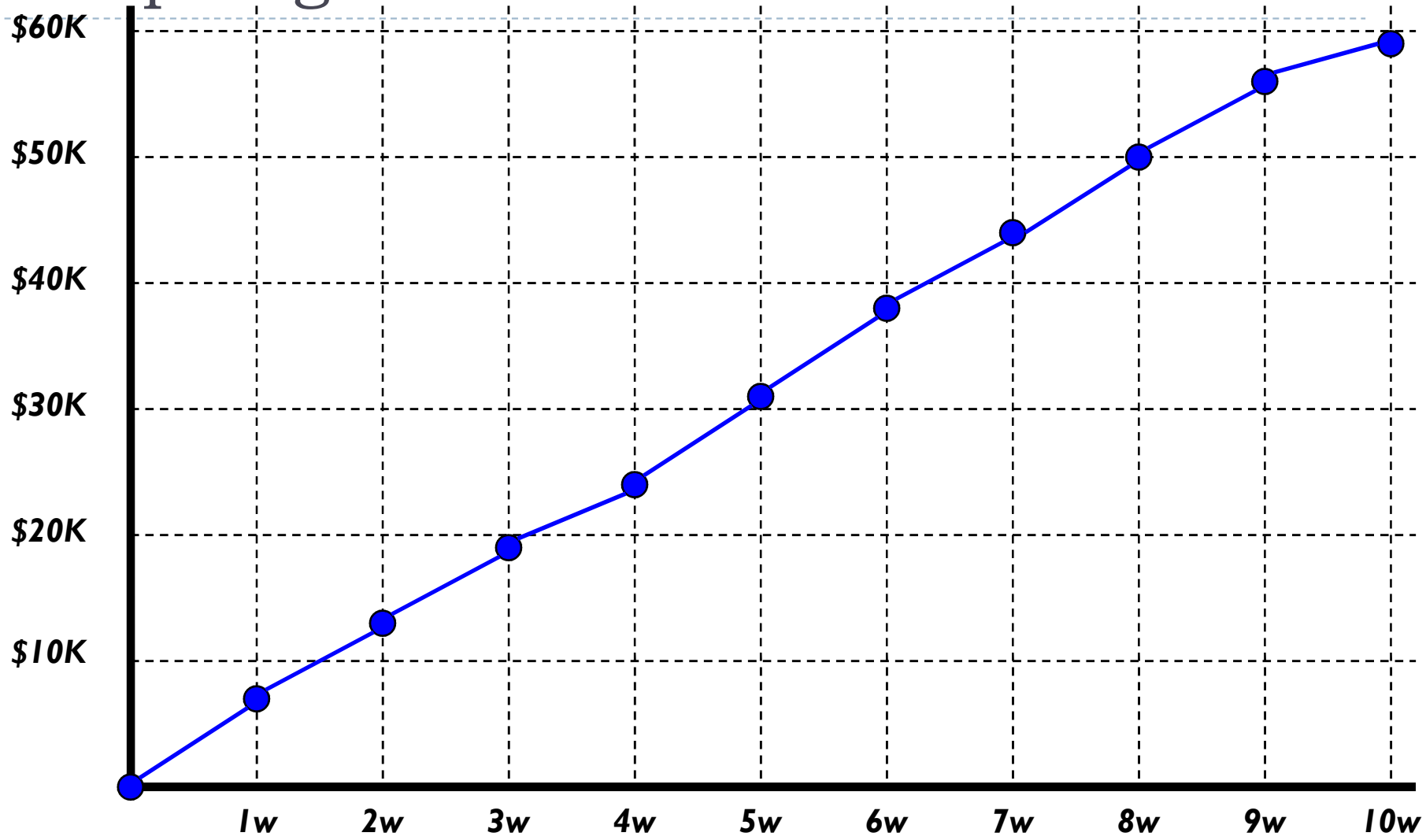
SPI = 0.75 CPI = 0.875

Budgeted Cost at Completion:	$100,000
Estimated Cost at Completion:	$116,000*
Estimated Project Completion Date:	8/1/04

*(Change Management for the additional funds needed)

Respectfully submitted, John Doe, Project Manager

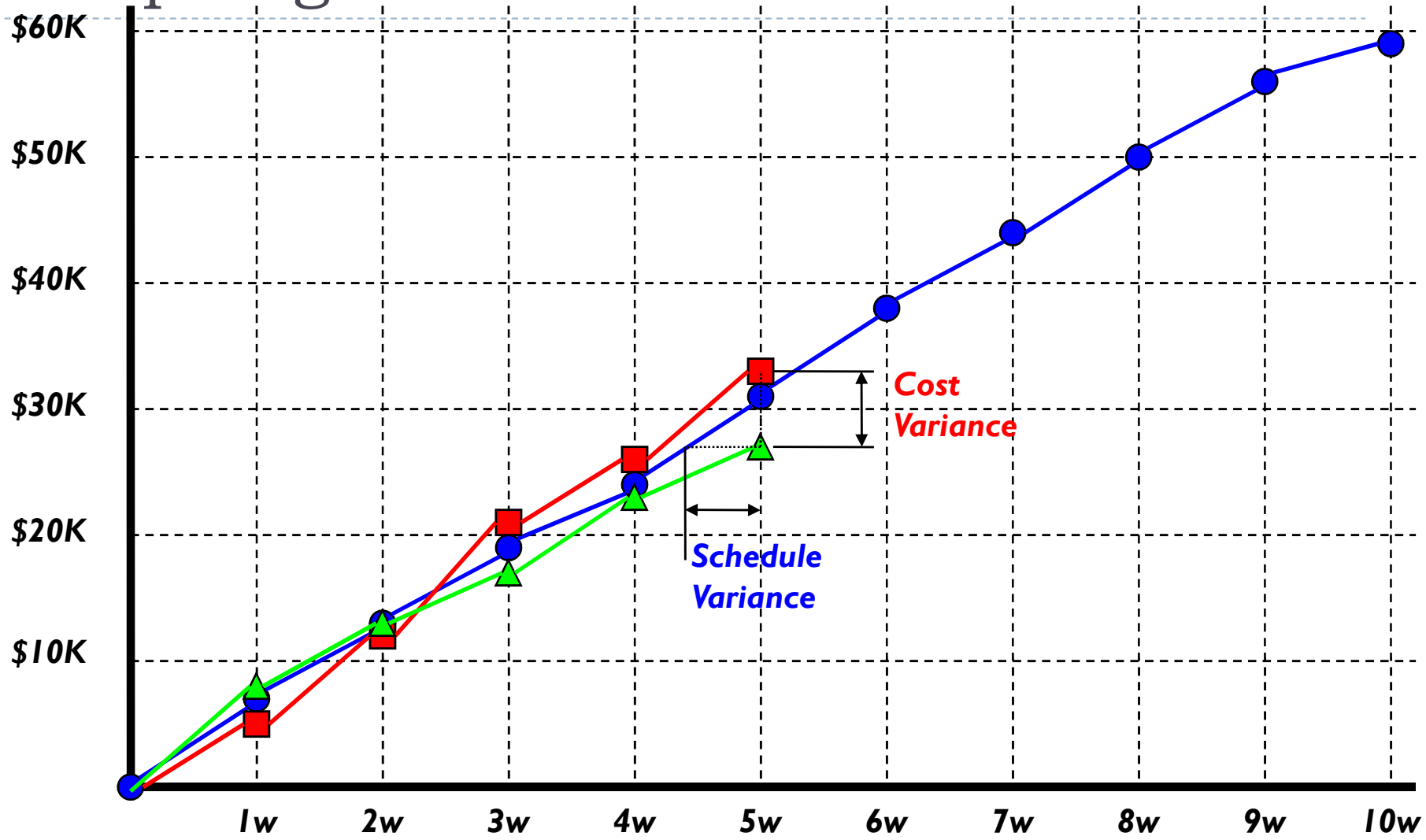
Graphing Earned Value



Graphing Earned Value – week 1

- Task A started on time – 30% complete
- Task B started 2 days late – 30% complete
- Task C started 1 day late – 25% complete
- Tasks D, E, F, G, H, and J have not started
- Project Management is on-going
- Actual Costs reported for week 1 = $5000

Graphing Earned Value – week 1



Questions