

## **Section 5 - Capital Project Cost, Schedule and Risk Reporting**

A. Introduction - The Director of Engineering has been providing quarterly briefings to the Commission that include information on the performance of staying on schedule and within budget for capital projects. Comparisons are made to actual project budget versus planned project budget, and actual project duration versus planned project duration for each capital project underway with PER, design, or construction efforts. Both project costs and schedules tend to grower higher and longer due to a number of justified reasons as compared to the figures that HRSD includes in our published CIP manual. For projects such as those included in the EPA Rehabilitation Action Plan where missing a completion deadline comes with stipulated penalties and damage to our credibility, it is critical that HRSD have accurate assessment of schedules, costs, and risks that may jeopardize these desired outcomes.

HRSD has adopted the Association for the Advancement of Cost Engineering (AACE) construction cost estimate classes for the various stages of study and plan development as listed below. These classifications are to be used for reporting to HRSD at these described milestones the Opinion of Probable Construction Costs (OPCC) along with the upper and lower range of the class estimate.

- Class 5: up to 2% project definition (Initial Budget Development stage) with expected accuracy range of -20% to -50% under and +30% to +100% above calculated cost.
- Class 4: project definition between 1% and 15% (Study or PER stage) with expected accuracy range of -15% to -30% under and +20% to +50% above calculated cost.
- Class 3: project definition between 10% and 40% (Preliminary Design stage) with expected accuracy range of -10% to -20% under and +10% to +30% above calculated cost.
- Class 2: project definition between 30% and 70% (Pre-Final Design stage) with expected accuracy range of -5% to -15% under and +5% to +20% above calculated cost.
- Class 1: project definition between 70% and 100% (Bid Advertisement or Preconstruction stage) with expected accuracy range of -3% to -10% under and +3% to +15% above calculated cost.

This Section identifies tracking total project costs, OPCC, schedule and risks to cost / schedule against the CIP baseline during the life of each project. HRSD desires to learn what is happening on individual projects as well as have an opportunity to make changes to compress budget or schedule at earlier stages if needed. Cost estimates should include design, construction, land acquisition and all other project related costs.

B. Professional Services Firm (FIRM) Responsibilities - The FIRM shall provide a report to HRSD's Project Manager for each project that details the projected completion project costs; duration to reach both Substantial Completion and Final Completion; anticipated risks to these updated costs and durations for each project, and a discussion on possible risk mitigation measures for schedule and budget recovery.

1. Each report will reflect the original CIP project schedule and budget, as well as the previous stage report findings on schedule, budget, and risks.

2. This singular report for each CIP project will be modified and updated such that all information throughout the life of the project will be contained in a single document. The document will be in format as approved by the HRSD Project Manager and will accompany the monthly payment request unless otherwise approved by the HRSD Project Manager.
- 
- C. An example of a report for a hypothetical CIP in shown in Exhibit A. The FIRM to coordinate with the HRSD Project Manager on proposed format for this type report.
  - D. A template summary report for Project Estimate History and AACE Classification reporting is included as Exhibit B.

## Exhibit A – Project Costs, Schedule and Risks Report

### CIP Baseline at Activity Start (June 1, 2015)

#### Capital Budget:

Phase	Costs	Details
Pre-planning:	\$142,885	All project costs prior to start of PER.
PER:	\$196,467	Professional Services costs as well as all other PER phase costs
Design:	\$375,073	Professional Services costs, condition assessment, easements, as well as all other Design Phase costs
Pre-Construction:	\$71,442	Bid stage activities
Construction:	\$5,715,400	Includes CA/CI costs, construction contract, and all other construction phase costs
Estimated Program Cost:	\$6,501,267	
Contingency (20%):	\$1,143,080	Contingency set at 20%
Estimated Project Cost:	\$7,644,347	

#### Schedule:

Phase	Schedule	Details
Pre-planning start:	June 2015	5 month duration
PER start:	November 2015	8 month duration
Design start:	July 2016	21 month duration
Pre-Construction start:	April 2018	4 month duration
Construction start:	August 2018	21 month duration
Project Completion:	May 2020	

#### Risk Assessment and Mitigation Discussion:

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Professional Services Selection delayed from original schedule by 1 month. Likely impact to remainder of schedule.	Evaluate compressing PER or Design phase to account for lost time.
PER:		
Design:		
Pre-Construction:		
Construction:		
Project Completion:		

**Draft PER (February 15, 2016)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$550,000	+47%	Delta: +\$174,927. Incorporation of additional pipe condition assessment and hydraulic modeling for alternate pipe diameters.
Pre-Construction:	\$25,000	-65%	Delta: -\$46,442. Closer estimate of costs to be expended during Construction bid and award stage.
Construction:	\$7,000,000	+20%	Delta: +\$1,284,600. Complexity of construction along corridor and alternatives.
Estimated Program Cost:	\$7,825,000	+20%	Delta: +\$1,323,733.
Contingency (20%):	\$1,565,000	+37%	Delta: +\$421,920.
Estimated Project Cost:	\$9,393,000	+23%	Delta: +\$1,745,653.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-28%	Delta: -6 months from baseline date. Duration reduced to 15 months from baseline duration of 21 months for Design phase to reach bid ready stage.
Construction start:	February 2018	0%	Delta: -6 months from baseline date. Same duration as baseline for pre-construction phase.
Project Completion:	February 2020	+14%	Delta: -3 months from baseline date. Duration is 3 months longer than the baseline Construction phase of 21 months due to constructability issues.

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Several alternative routes identified in the PER that have higher projected construction costs and longer construction schedules as compared to the preliminary recommended route and pipe length.	Explore alternate construction means and methods to reduce cost.
Design:		
Pre-Construction:		
Construction:	Depending on the pipe alignment selected by HRSD, the construction could result in higher traffic disruption and therefore limited work hours / days by either Norfolk or Virginia Beach.	Coordinate with locality traffic maintenance group to clarify expectations and collaborate on construction duration reducing opportunities.
Project Completion:		

**Final PER (July 1, 2016)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$550,000	+47%	Delta: +\$174,927. Incorporation of additional pipe condition assessment and hydraulic modeling for alternate pipe diameters.
Pre-Construction:	\$25,000	-65%	Delta: -\$46,442. Closer estimate of costs to be expended during Construction bid and award stage.
Construction:	\$7,200,000	+26%	Delta: +\$1,484,600. A pipe alignment selected by HRSD from PER alternatives that added more length to avoid future O&M issues.
Estimated Program Cost:	\$8,025,000	+23%	Delta: +\$1,523,733.
Contingency (15%):	\$1,203,750	+5%	Delta: +\$60,670. Contingency adjusted to 15%.
Estimated Project Cost:	\$9,228,750	+21%	Delta: +\$1,584,403.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-28%	Delta: -6 months from baseline date. Duration reduced to 15 months from baseline duration of 21 months for Design phase to reach bid ready stage.
Construction start:	February 2018	0%	Delta: -6 months from baseline date. Same duration as baseline for pre-construction phase.

Project Completion:	February 2020	+14%	Delta: -3 months from baseline date. Duration is 3 months longer than the baseline Construction phase of 21 months due to constructability concerns.
---------------------	---------------	------	--

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Closed out	
Design:	The timing for construction of the new Outlet Mall and access road may create coordination issues and adjustments for the design phase.	
Pre-Construction:		
Construction:	The timing for construction of the new Outlet Mall and access road may create coordination issues and adjustments for the construction phase. Construction could result in higher traffic disruption and therefore limited work hours / days by either Norfolk or Virginia Beach.	Coordinate with Developer and Locality to clarify expectations and collaborate on construction duration reductions and ways to lessen anticipated disruptive construction impacts.
Project Completion:	Issues discussed above may delay project completion.	

**90% Design (August 1, 2017)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$580,000	+55%	Delta: +\$204,927. Incorporation of additional pipe condition assessment, hydraulic modeling for alternate pipe diameters, detailed traffic maintenance plans for both Norfolk and Va Beach.
Pre-Construction:	\$25,000	-65%	Delta: -\$46,442. Closer estimate of costs to be expended during Construction bid and award stage.
Construction:	\$7,200,000	+26%	Delta: +\$1,484,600. A pipe alignment selected by HRSD from PER alternatives that added more length to avoid future O&M issues.
Estimated Program Cost:	\$8,055,000	+24%	Delta: +\$1,553,733.
Contingency (10%):	\$805,500	-30%	Delta: -\$337,580. Contingency adjusted to 10%.
Estimated Project Cost:	\$8,860,500	+16%	Delta: +\$1,216,153.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-24%	Delta: -5 months from baseline date. One month added to Design duration evaluated at Final PER for total of 16 months for additional review times for Norfolk and Virginia Beach.
Construction start:	March 2018	0%	Delta: -5 months from baseline date. Same duration as baseline for pre-construction phase.



Project Completion:	March 2020	+14%	Delta: -2 months from baseline date. Duration is 3 months longer than the baseline Construction phase of 21 months due to constructability concerns.
---------------------	------------	------	--

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Closed out	
Design:	Final review and approval by cities of Norfolk and Virginia Beach.	Clarify with locality the plan approval process.
Pre-Construction:		
Construction:	The timing for construction of the new Outlet Mall and access road will create coordination issues during the construction phase if changes by either HRSD contractor or developer of outlet mall from current state. Construction could result in higher traffic disruption and therefore limited work hours / days by either Norfolk or Virginia Beach.	Consider frequent meetings between locality, developer team, and HRSD team to heighten opportunities for early knowledge of conflicting matters and schedules for collaboration decisions.
Project Completion:	Issues discussed above may delay project completion.	

**PreConstruction (October 1, 2017)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$580,000	+55%	Delta: +\$204,927. Incorporation of additional pipe condition assessment, hydraulic modeling for alternate pipe diameters, detailed traffic maintenance plans for both Norfolk and Va Beach.
Pre-Construction:	\$21,000	-71%	Delta: -\$50,442. Actual expenditures.
Construction:	\$7,003,000	+23%	Delta: +\$1,287,600. New figures based on OPCC and construction schedule.
Estimated Program Cost:	\$7,854,000	+20%	Delta: +\$1,352,733.
Contingency (5%):	\$392,700	-64%	Delta: -\$750,380. Contingency adjusted to 5%.
Estimated Project Cost:	\$8,246,700	+8%	Delta: +\$602,353.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-24%	Delta: -5 months from baseline date. One month added to Design duration evaluated at Final PER for total of 16 months for additional review times for Norfolk and Virginia Beach.
Construction start:	March 2018	0%	Delta: -5 months from baseline date. Same duration as baseline for pre-construction phase.
Project Completion:	December 2019	+5%	Delta: -5 months from baseline date. Duration is 1 month longer than the baseline Construction phase of 21 months due to Bid Document allowable duration.

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Closed out	
Design:	Final review and approval by cities of Norfolk and Virginia Beach.	Clarify with locality the plan approval process.
Pre-Construction:		
Construction:	The timing for construction of the new Outlet Mall and access road will create coordination issues during the construction phase if changes by either HRSD contractor or developer of outlet mall. Construction could result in higher traffic disruption and therefore limited work hours / days by either Norfolk or Virginia Beach.	Consider frequent meetings between locality, developer team, and HRSD team to heighten opportunities for early knowledge of conflicting matters and schedules for collaboration decisions.
Project Completion:	Issues discussed above may delay project completion.	

**Evaluation of Construction Bids (November 1, 2017)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$580,000	+55%	Delta: +\$204,927. Incorporation of additional pipe condition assessment, hydraulic modeling for alternate pipe diameters, detailed traffic maintenance plans for both Norfolk and Va Beach.
Pre-Construction:	\$21,000	-71%	Delta: -\$50,442. Actual expenditures.
Construction:	\$6,927,150	+21%	Delta: +\$1,211,750. <b>Lowest responsible and responsive bid was less than OPCC.</b>
Estimated Program Cost:	\$7,778,150	+20%	Delta: +\$1,276,883.
Contingency (5%):	\$388,908	-66%	Delta: -\$754,172. <b>Contingency held at 5%.</b>
Estimated Project Cost:	\$8,167,058	+7%	Delta: +\$522,711.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-24%	Delta: -5 months from baseline date. One month added to Design duration evaluated at Final PER for total of 16 months for additional review times for Norfolk and Virginia Beach.
Construction start:	March 2018	0%	Delta: -5 months from baseline date. Same duration as baseline for pre-construction phase.
Project Completion:	December 2019	+5%	Delta: -5 months from baseline date. Duration is 1 month longer than the baseline Construction phase of 21 months due to Bid Document allowable duration.

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Closed out	
Design:	Closed out	
Pre-Construction:	Closed out	
Construction:	The timing for construction of the new Outlet Mall and access road will create coordination issues during the construction phase if changes by either HRSD contractor or developer of outlet mall. Construction could result in higher traffic disruption and therefore limited work hours / days by either Norfolk or Virginia Beach.	Consider frequent meetings between locality, developer team, and HRSD team to heighten opportunities for early knowledge of conflicting matters and schedules for collaboration decisions.
Project Completion:	Issues discussed above may delay project completion.	

**Mid Point of Construction (January 1, 2019)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$580,000	+55%	Delta: +\$204,927. Incorporation of additional pipe condition assessment, hydraulic modeling for alternate pipe diameters, detailed traffic maintenance plans for both Norfolk and Va Beach.
Pre-Construction:	\$21,000	-71%	Delta: -\$50,442. Actual expenditures.
Construction:	\$7,027,150	+23%	Delta: +\$1,311,750. Approved Change Orders of \$30,000 (Owner Requested) and \$70,000 (field changes).
Estimated Program Cost:	\$7,878,150	+21%	Delta: +\$1,376,883.
Contingency (5%):	\$393,908	-65%	Delta: -\$749,172. Contingency held at 5%.
Estimated Project Cost:	\$8,272,058	+8%	Delta: +\$627,711.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-24%	Delta: -5 months from baseline date. One month added to Design duration evaluated at Final PER for total of 16 months for additional review times for Norfolk and Virginia Beach.
Construction start:	March 2018	0%	Delta: -5 months from baseline date. Same duration as baseline for pre-construction phase.
Project Completion:	January 2020	+10%	Delta: -4 months from baseline date. Duration is 2 month longer than the baseline Construction phase of 21 months due to Bid Document allowable duration + 30 day CO time extension.

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Closed out	
Design:	Closed out	
Pre-Construction:	Closed out	
Construction:	Likelihood of addition change orders for time extension and costs due to conflicts with undocumented private utilities along the force main corridor.	Evaluation of additional subsurface explorations ahead of Contractor's installation crews to heighten efficiency.
Project Completion:	Issues discussed above may delay project completion.	

**Construction Closeout (February 1, 20209)**

**Updated Capital Budget:**

Phase	Revised Costs	% Change from CIP Baseline	Details
Pre-planning:	\$0	-100%	Delta: -\$142,885. The earlier anticipated costs for this phase were reassigned under Design.
PER:	\$250,000	+27%	Delta: +\$53,533. Negotiated PER work including Additional Services for SUE and meetings with Virginia Beach, Norfolk, and other stakeholders.
Design:	\$580,000	+55%	Delta: +\$204,927. Incorporation of additional pipe condition assessment, hydraulic modeling for alternate pipe diameters, detailed traffic maintenance plans for both Norfolk and Va Beach.
Pre-Construction:	\$21,000	-71%	Delta: -\$50,442. Actual expenditures.
Construction:	\$7,127,150	+25%	Delta: +\$1,411,750. Additional approved Change Orders of \$60,000 (field changes) plus additional \$40,000 in CA/CI for approved time extension.
Estimated Program Cost:	\$7,978,150	+22%	Delta: +\$1,476,883.
Contingency (0%):	\$0	-100%	Delta: -\$1,143,080. No contingencies.
Estimated Project Cost:	\$7,978,150	+4%	Delta: +\$333,803.

**Updated Schedule:**

Phase	Revised Schedule	% Change from CIP Baseline	Details
Pre-planning start:	July 2015	0%	Delta: +1 month from baseline date.
PER start:	December 2015	0%	Delta: +1 month from baseline date. Same duration as baseline between pre-planning and PER start.
Design start:	August 2016	0%	Delta: +1 month from baseline date. Same duration as baseline for PER phase.
Pre-Construction start:	October 2017	-24%	Delta: -5 months from baseline date. One month added to Design duration evaluated at Final PER for total of 16 months for additional review times for Norfolk and Virginia Beach.
Construction start:	March 2018	0%	Delta: -5 months from baseline date. Same duration as baseline for pre-construction phase.



Project Completion:	February 2020	+14%	Delta: -3 months from baseline date. Duration is 3 month longer than the baseline Construction phase of 21 months due to Bid Document allowable duration + 60 day CO time extension.
---------------------	---------------	------	--

**Risk Assessment and Mitigation Discussion:**

Phase	Risk Assessment	Risk Mitigation Consideration
Pre-planning:	Closed out	
PER:	Closed out	
Design:	Closed out	
Pre-Construction:	Closed out	
Construction:	Closed out	
Project Completion:		Document and incorporate lessons learned for planned and future projects.

**Exhibit B – Project Estimate History and AACE Classification Report**

CIP Project Name  
 CIP Project Number – Cost History and AACE Report

Stage of Estimate	PER Costs	Design Costs	Bid Phase Costs	Construction Administration Costs	Construction Inspection Costs	Construction Costs	Total Costs
Initial Budget Development [Class 5]							
Final PER [Class 4]							
Preliminary Design [Class 3]							
Pre-Final Design [Class 2]							
Construction Bid Advertisement [Class 1]							

Round all estimates to nearest \$1000.

**End of Section**