MANAGING OWNER’S COST AND DEVELOPING EARNED VALUE (EV) METRICS.

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Presented by:

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• “You cannot manage what you cannot measure…and what gets measured gets done.”

— Bill Hewlett, Hewlett Packard
Outline

• Introduction
  – Project Life Cycle
  – Organizational Challenges

• Cost Management
  – Establish UCC
  – PMIS Technology

• Project Costs
  – Design
  – Operations
  – Construction

• EV Reporting Metrics
Introduction – Project Life Cycle

- Traditional project delivery method
  - Plan > Design > Bid > Build
- Costs and related documents in individual silos
- Disconnected costs information
- Inability to forecast costs
- Lessons Learned

**Planning (Conceptual Estimate)**
- Conceptual Planning
- Traffic Impact Studies
- Community Outreach

**Design (Engineer's Estimate)**
- Bridge Design
- Pavement Designs
- Sidewalks and Reconstruction

**Construction (Bid Costs)**
- Bridges
- Reconstruction
- Resurfacing
- Allys and Footways
Introduction – Organizational Challenges

• General
  – Communication within the agency
  – Costs data in excel silos

• Project Delivery Challenges
  – Skilled resources
  – Definition of requirements

• Organization Challenges
  – Planning
  – Design
  – Construction
Introduction - Challenges

• Planning
  – Efforts are not estimated per project
  – Operational costs

• Design
  – Lack of consistency between bid items
  – Accuracy and validation of engineer’s estimate
  – Budget for construction contracts

• Construction
  – Status of the project
  – Tools and resources to track and compare progress
Cost Management

• Total Cost Management
  – Inception in planning
  – Completion in construction

• Owner Agency
  – Public funding for budget

• Tool set for the agency
  – Track project from design estimate (PS&E)
  – Comparison of bids during advertisement
  – Construction costs tracking in construction phase
Cost Management - UCC

- Traditional method
  - Agency accounting
  - Not so standardized
  - Lack of enforcement

- Establishment of UCC
  - Not an innovation
  - Old recipe in new package
  - Enforcement

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>100</td>
<td>General Requirements Items</td>
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<tr>
<td>200</td>
<td>Excavation and Concrete Items</td>
</tr>
<tr>
<td>300</td>
<td>Storm Drain and Utilities Items</td>
</tr>
<tr>
<td>400</td>
<td>Bridge Items</td>
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<tr>
<td>500</td>
<td>Asphalt Concrete Items</td>
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<td>600</td>
<td>Miscellaneous Concrete Items</td>
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<tr>
<td>700</td>
<td>Landscape Items</td>
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<td>800</td>
<td>Signs and Signals Items</td>
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<table>
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<th>Cost Category</th>
<th>Item Number</th>
<th>Description</th>
<th>Unit</th>
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<tbody>
<tr>
<td>400 340</td>
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<td>Steel HP 10 x 42 Bearing Pile</td>
<td>LF</td>
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<tr>
<td>200 010</td>
<td></td>
<td>Class 1 Excavation</td>
<td>CY</td>
</tr>
<tr>
<td>300 090</td>
<td></td>
<td>Flowable Backfill for Utility Cuts</td>
<td>CY</td>
</tr>
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</table>
Cost Management - UCC

• Benefits of UC
  – Standardization
  – Similar to account codes
  – Step closer to total cost management

• Agency Account Codes
  – 26 digit code shared across multiple agencies
  – Includes operational budget
  – Initiated in project planning phase
Cost Management - UCC

• Benefits of UCC
  – Standardization
  – Similar to account codes
  – Step closer to TCM

• Agency Account Codes
  – 26 digit code shared across multiple agency
  – Includes operational budget
  – Initiated in project planning phase
Cost Management - PMIS

• Project Management Information Systems
  – Not an agency information systems
  – Project cost accounting
  – Spanned across departments
  – All project related information
    • Documents (IDR, Submittals, RFI, Meetings)
    • Contracts / Payments
    • Change Orders
    • Schedule and Costs
  – Ability to report on-demand and on everything !!!
Cost Management - Technology

• Resistance for custom solution
• Off-the-shelf product
  – Licensing
  – Implementation
  – Configuration
  – Plug-ins or customization
  – Reports
• Schedule driven organization
  – P6: a must have ???
• Paper process replication
Cost Management - Technology

- Program Schedule
- CTP Planning
- Contractor Schedules

P6 Schedule & Costs

PCM – Contracts
- Bids and Award
- Contracts & Payment
- Documentation

OBIP - Reporting
- Default application
- Validation Reports
- Reports delivery
Cost Management - Goal

- 30%, 60%, 90% Design Estimates
- Final Engineer’s Estimate
- Contract Document and Addendums

- Engineer’s Estimate Validation
- Bid Tabulation
- Contract Award (SOV)

- Pay Quantity Reconciliation
- Cost Accounts Reconciliation
- Contract Documentation

- Schedule of Values
- Change Orders
- Progress Estimate
- Inspector’s Daily Report
Project Costs

- Design Costs
- Consulting Costs
  - Advertisement
  - Award
- Administration Costs
  - Addendum
  - RFI Response
  - CO Review

- Construction Costs
  - General Contractor
- CMI Costs
  - Inspection Costs
  - Material Testing
  - Schedule Review

- Agency Internal Costs (Operational)

- Internal Costs
  - Payroll
  - Reproductions
  - Audit & Others
Project Costs - Design

• Challenges
  – Unique identifier for tasks under a contract
  – Use of UCC for engineer’s estimate

• Tools

<table>
<thead>
<tr>
<th>UCC ID</th>
<th>UCC Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Estimated Costs</th>
<th>No. of Items</th>
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<tbody>
<tr>
<td>400 340</td>
<td>Steel HP 10 x 42 Bearing Pile</td>
<td>LF</td>
<td>200</td>
<td>$47.69</td>
<td>$9,538.00</td>
<td>12</td>
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<tr>
<td>200 310</td>
<td>Class 1 Excavation</td>
<td>CY</td>
<td>4,500</td>
<td>$34.43</td>
<td>$154,935.00</td>
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<td>300 090</td>
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<td>750</td>
<td>$20.00</td>
<td>$15,000.00</td>
<td>3</td>
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Report Date: 02/01/2016

Total: $179,473.00
Project Costs - Design

- Tools – Estimate Validation Tool

```
Engineer’s Estimate Validation Tool / Report

Enter values for UCC Code and Quantities

Yes

UCC Code available in Database

Query and Filter ± 20% Quantities

Calculate weighted average from selected records for each UCC

No

Return with Error

Produce validation report
```
Project Costs – Bid Costs and Evaluation

- Comparison to Engineer’s Estimate
- Linked with UCC
- Estimate Validation Tool
- Bid Comparison Report

<table>
<thead>
<tr>
<th>ITEM #</th>
<th>LINE ITEM</th>
<th>QTY</th>
<th>UNIT</th>
<th>PRICE</th>
<th>TOTAL</th>
<th>ENG ESTIMATE</th>
<th>ENG TOTAL</th>
<th>DIFF</th>
<th>% DIFF</th>
<th>Suggested UP</th>
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<td>100470</td>
<td>MAINTENACE OF TRAFFIC</td>
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<td>$5,000.00</td>
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<td>100000</td>
<td>TRAFFIC CONTROL SIGNS</td>
<td>200.00</td>
<td>SF</td>
<td>$16.00</td>
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<td>100840</td>
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<tr>
<td>100520</td>
<td>HOT MIX ASPHALT FOR MAINT</td>
<td>5.00</td>
<td>TON</td>
<td>$200.00</td>
<td>$1,000.00</td>
<td>$500.00</td>
<td>$2,500.00</td>
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<td>$5,000.00</td>
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<td>$10.00</td>
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<td>-70.00%</td>
<td>$10.00</td>
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<tr>
<td>100245</td>
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<td>20.00</td>
<td>EA</td>
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<td>$3,000.00</td>
<td>$140.00</td>
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<td>$200.00</td>
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<tr>
<td>100345</td>
<td>REMOVAL OF PREFORMED PAVE</td>
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<td>$1,250.00</td>
<td>$3,750.00</td>
<td>300.00%</td>
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</tr>
</tbody>
</table>
Project Costs – Bid Costs and Evaluation

- Trend Analysis using UCC codes
- Accepted bid costs values
- Received bid costs values
- Engineer’s Estimate comparison

![Avg Item Pricing Graph](http://pmsysposium.umd.edu/)

|$-|\$100.00|\$200.00|\$300.00|\$400.00|\$500.00|\$600.00$

|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

Avg Item Pricing
Project Costs – Construction Costs

- Contract Pay Items in IDR module
- Weekly reconciliation of recorded quantities
- Review on-going cost trends using UCC

Change Order Negotiation
Extra Work Order Authorization
Project Costs – Construction Costs

- Cost loaded schedule and approved updates
- Reconciliation with installed quantities
- Update Program Schedule using installed quantities
- Manage program cash-flow using P6
Project Costs – Construction Costs

Construction – Installed Quantities & Costs

- Bid Costs Tabulation
- Construction Contracts / Approved CO
- UCC - Unit Price
- Budgeted Quantities
- Inspector Daily Report
- Installed Quantities – Field Records
- UCC - Unit Prices
- Approved Quantities
- CPM Schedule
- Monthly Progress Updates with Costs
- Contract Costs
- Actual Costs
- Installed Costs Daily/Weekly
- Installed Costs Monthly
EV Reporting Metrics

- Project Status Report
  - Installed Costs
  - Approved Costs
  - CO Costs
  - Duration % Complete (Approved CPM)

<table>
<thead>
<tr>
<th>Project Name: Reconstruction of Footways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contract No(s): ABC 1234</td>
</tr>
<tr>
<td>Contractor: Field Office: Local Construction Company Inc</td>
</tr>
<tr>
<td>Address Line 1, City, State, ZIP [1234567890]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NTP: 06/29/15</th>
<th>OCD: 06/29/16</th>
<th>RCD: 07/29/16</th>
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</thead>
<tbody>
<tr>
<td>Time Extension: 30</td>
<td>Approved EW Amount: $30,470.00</td>
<td></td>
</tr>
<tr>
<td>Revised Duration: 396</td>
<td>Revised Contract Amount: $1,212,985.30</td>
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</tr>
<tr>
<td>Duration to Date : 257</td>
<td>Estimate To Date: $736,146.27</td>
<td></td>
</tr>
<tr>
<td>Duration % Complete: 64.90%</td>
<td>Installed To Date: $756,146.27</td>
<td></td>
</tr>
<tr>
<td>Remaining Duration: 139</td>
<td>Cost % Complete: 60.69%</td>
<td></td>
</tr>
<tr>
<td>Remaining Balance: $476,839.03</td>
<td>NTP = Notice to Proceed</td>
<td>OCD = Original Completion Date</td>
</tr>
</tbody>
</table>
EV Reporting Metrics

- Program Report
  - Basic project information
  - Installed costs and Estimate to Complete
  - SPI using installed and approved costs
### EV Reporting Metrics

<table>
<thead>
<tr>
<th>Amount Awarded</th>
<th>Amount Added</th>
<th>Current Const. Cost</th>
<th>Amount Paid</th>
<th>% $ Paid</th>
<th>Estimate to Complete</th>
<th>SPI</th>
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<tbody>
<tr>
<td>$996,660</td>
<td>$0</td>
<td>$996,660</td>
<td>$776,668.11</td>
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<td>$219,992</td>
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<td>$5,086,629</td>
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</tbody>
</table>

**Created Date:** 8/5/2015

**Last Edit Date:** 8/5/2015

**Date Opened:** 8/5/2015
EV Reporting Metrics

- P6 EPPM Dashboards
  - Cost loaded program schedule
  - Standard portlets and indicators
  - Construction
Summary

- Challenges with public agencies
  - Paper to electronic processes
- Standardization across the department using UCC
- Enabled better estimates for construction projects
- Provided EV metrics to manage construction performance
- Improved construction budget through validation of engineer’s estimate
Questions/Comments?