Transit Asset Management System

Chicago Transit Authority (CTA)
July 2012
Overview

• History of Asset Management at Chicago Transit Authority
• Transit Asset Management Initiative
  – Project Approach
  – Long Term Inspection Approach
  – Project Status
  – Project Schedule
• Future Goals
History of TAM

- 1992 - Initial asset inventory and engineering condition assessment completed
- 2007 - Vehicle maintenance management system implemented
- 2008 - Facilities management system upgraded (EAM – Infor)
- 2010 - Regional capital asset inventory completed
- 2011 - Regional capital decision tool upgraded
- 2011 - CTA Transit Asset Management System Completed
Transit Asset Management Initiative

- CTA received $5.4 million grant through the US Dept. of Transportation State of Good Repair Initiative (SGR) 2010
- Focus on Bus Maintenance Facility Assets:
  - Goal is to establish baseline structure for future expansion into other asset categories
  - Project Efficiencies lead to scope expansion to include some rail maintenance facilities
- Four phases of work:
  1. Phase A: Software Enhancement and Data Migration
  2. Phase B: Facility Asset Inventory and Assessment
  3. Phase C: Reporting and Prioritization
  4. Phase D: Process Evaluation and Training
Asset Class Definition

• Classify and standardize assets within CTA’s portfolio
• Maintenance perspective used to create classification

• Establish baseline considering expected level of problem reporting
• Ensure reasonable level for data maintenance

• Develop flexible framework for future expansion
• Multiple Tiers of Detail and Roll-up Reporting Capability
Asset Attribute Inventory

Critical asset information collection including the following attributes:

- Type
- Size
- Replacement Value
- Condition
- Expected Life
- Vulnerability to climate
- Install Year
- Location
- Deficiency Type(s)
- Total Quantity
- Deficiency Quantity
Condition Assessment Criteria

- Established continuity with Regional (RTA) and National (FTA) Nomenclature and Criteria
- Expanded descriptions associated with Transit Economic Requirements Model (TERM)
- Expanded criteria to address unique assets within CTA’s portfolio
- Highlighted importance of institutional knowledge and available work order history

<table>
<thead>
<tr>
<th>Description</th>
<th>Rating</th>
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<tbody>
<tr>
<td></td>
<td>New (5)</td>
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<tr>
<td>NEW</td>
<td>X</td>
</tr>
<tr>
<td>ROUTINE MAINTENANCE</td>
<td>X</td>
</tr>
<tr>
<td>MINOR REPAIR</td>
<td></td>
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<tr>
<td>MAJOR REPAIR</td>
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<tr>
<td>REPLACEMENT</td>
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Data Collection Methodology

• Two multi-disciplinary teams of engineers perform the survey: 7 garages, 3 maintenance shops and 10 rail maintenance facilities

• Collect key inventory and perform condition assessments on over 3 million square feet of facilities

• Develop cost estimates for identified deficiencies

• Involvement of organization personnel to observe contractor assessment to promote learning with the ultimate goal of self-performance
Data Modeling

Project prioritization based on asset criticality, condition, and criteria including nearness of asset failure, safety risks, and funding availability.

Comparative analysis of facilities at the building and system level.
Long Term Inspection Approach

- Routine assessments completed by trained in-house staff
- Prioritized inspections based on asset criticality and condition
- Inspections treated as required work orders within EAM
- Utilize available technology to streamline deficiency tracking and reporting
- LTI approach allows for continued migration to proactive versus reactive maintenance utilizing updated inventory and assessment data
Inspection Technology

• Goal for inspections is to maximize available technology to streamline inspection process for all asset types
• Pilot program used hand held devices for a subset of assets
  – Difficult to read data based on screen size
  – Speed and coverage of network affected certain CTA locations
• Currently exploring the use of tablets for future data collection
  – Intent to minimize manually tedious data entry
# Project Schedule

## Schedule by Month

<table>
<thead>
<tr>
<th>Phase A: Software Enhancement and Data Migration</th>
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</thead>
<tbody>
<tr>
<td>Develop Software Requirements Documentation</td>
</tr>
<tr>
<td>Determine Appropriate Asset Tracking and Hierarchy</td>
</tr>
<tr>
<td>Map and Modify Database</td>
</tr>
</tbody>
</table>

## Phase B: Facility Asset Inventory and Assessment

| Develop Facility Assessment Criteria           |
| Field Assessment and Documentation             |
| Documentation and Entry into the Asset Management System |

## Phase C: Reporting and Prioritization

| Estimate Identified Deficiencies               |
| Develop Reports                                |
| Determine Project Priorities                   |

## Phase D: Process Evaluation and Training

| Determine Long Term Approach to Data Management |
| Training and Support                           |

Current Progress
Future Goals

1. Development of an overarching asset management plan that creates a cohesive link between business processes and EAM technology

2. Further expansion of the transit asset management system to include:
   a) Preventive maintenance schedules,
   b) Updated staffing information, and
   c) Work order prioritization functionality for the facilities management group;

3. Incorporate rail infrastructure assets in EAM System

4. Include better tracking and managing of warranty information

5. Develop methods to automate asset updates when capital projects completed
Thank You
1992 Engineering Condition Assessment

• CTA Consultant teams:
  – Inventory existing assets
  – Perform engineering condition rating (1-5 scale)
• Inputs for “20 Year Needs” and capital project list
  – $6.8B unfunded capital need
  – $800m annual need to stay in good repair, once attained
• Updates performed via desk audits (consultant staff)
  – Capital projects performed
  – Assets replaced in maintenance cycle
• Provided baseline data for RTA Capital Asset Condition Assessment
  – Condition rating data omitted
Vehicle Maintenance Management System

- Vehicle Fleet Maintenance Management Information System (MMIS) fully implemented by 2007
- Work order based approach
  - Labor, materials utilization and costing for all maintenance activities
  - Scheduling of preventive maintenance activities
  - Automated identification/analysis of vehicle/component failure trends
- MMIS process
  - Work orders created, stored and maintained in MMIS
  - Online processing of Work Orders
  - Annual updates based on user input
- Vehicle PM work well-defined
  - Regular maintenance cycles
  - Capital overhaul programs
Asset Management Challenges

- Fragmented existing information
  - Legacy systems, excel spreadsheets
- Stale condition assessments
  - How to keep updated over time?
- Coordination with maintenance activities
  - Leverage field resources efficiently
  - Informed capital decisions
Enterprise Asset Management System

• Facilities Maintenance replaced legacy work order management system in 2008 (Infor EAM)
  – New work order based approach
  – Preventive maintenance activities scheduled

• EAM Process
  – Work orders created, stored and tracked
  – Configuration changes done in-house or by consultants

• On-Going Rollout to Agency
  – Signal, Track, Structure, Power & Way
    Maintenance implementation ongoing
  – Other areas: Safety, GPS Equipment, Revenue Technology
Phase A: Incorporate Assets into EAM System

Initial Database Requirements

Field Condition Assessment

Modify Fields Initial Inputs

Input Data and QA Check

Update database requirements

- Initial information from existing EAM asset data and 1992 Inventory
- Validate database structure
- Add required fields: age, quantity, location, cost
- Create placeholder fields for condition data
- Add data from condition assessment
- 2012 condition assessments may create new requirements for database
Phase B: Engineering Condition Assessment

- Multi-disciplinary teams of engineers survey CTA facilities
- Produce condition ratings to be incorporated in EAM system
- Engineers also develop:
  - Recommendations on future data collection: methods and timeframe
  - Work processes to be incorporated into preventive maintenance SOPs
  - Checklists to guide PM and identify elements to trigger future reviews
- Develop cost estimate data to be incorporated into database
Phase C: Develop Reporting & Modeling Tools

• Develop ad hoc reporting for CTA use in policy/planning
  – Initial phase for immediate functionality
  – Incorporate vehicle and facilities information

• Model Development
  – Coordinate with regional project: provide better inputs
  – Consider development of “higher resolution” modeling tool
Phase D: Develop Plan to Maintain Data

- Incorporate recommendations of multidisciplinary engineering teams:
  - Where possible leverage maintenance efforts
  - Adopt recommendations for frequency of inspections
  - Identify “triggers” for additional engineering review

- Establish data owners to manage subsections of data
  - Engineering owners responsible for updating based on capital investment
  - Maintenance updates based on repair/replace work orders
  - Visibility into system allows discrepancies to be reconciled

- Longer Term: Develop methods to automate updates of assets associated with capital project completion
Project Budget

• Total Project Budget = $5.4 million
  – Developed for grant based on man-hours calculation

• Current Working Budget Breakdown
  – Phase A: Software Enhancement and Data Migration $1,000,000
  – Phase B: Facility Asset Inventory and Assessment $3,000,000
  – Phase C: Reporting and Prioritization $900,000
  – Phase D: Process Evaluation and Training $500,000
# Project Status Timeline

Completion 24 months from grant award (May 2011)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Status</th>
</tr>
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<tbody>
<tr>
<td>Project Work Plan</td>
<td>Completed November, 2011</td>
</tr>
<tr>
<td>Facility Assessment Criteria</td>
<td>Completed April, 2012</td>
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<tr>
<td>Software Requirement Document</td>
<td>In progress (August 2012)</td>
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<tr>
<td>Software Enhancements</td>
<td>September 2012 through January 2013</td>
</tr>
<tr>
<td>Field Assessments</td>
<td>June through October 2012</td>
</tr>
<tr>
<td>Capital Planning &amp; Data Migration</td>
<td>Commence in November 2012 with completion by end of January 2013</td>
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<tr>
<td>Training &amp; Implementation</td>
<td>Commence in February 2013 with completion by end of May 2013</td>
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