Massachusetts Bay Transportation Authority

Warehousing and Logistics Flexible Contracting Business Case

Fiscal Management and Control Board

June 13, 2016

Central Warehouses Have Been Poorly Maintained And Are Very Inefficient

Examples of Modern Warehouse Operations

Problem: The Current Warehousing And Logistics Systems Are Completely Broken

Warehouse & Logistics Standard Operating Practices:

- Inventory turnover (24 months very high even for Maintenance Organizations & Transit Authorities)

- Inventory accuracy (at 50%: evidence of severe dysfunction)

- Stockouts/Parts not available to Customer *(Not currently measured)*

- On time delivery *(delivery performance is not measured and not fully reliable)*

- Warehouse productivity (at < 10 Lines per hour; should be 10x higher)

- Parts warranty management *(Does not exist)*

- Process discipline (different processes in different carhouses/garages, low adherence)

Good Performance

Partially good

Below standard

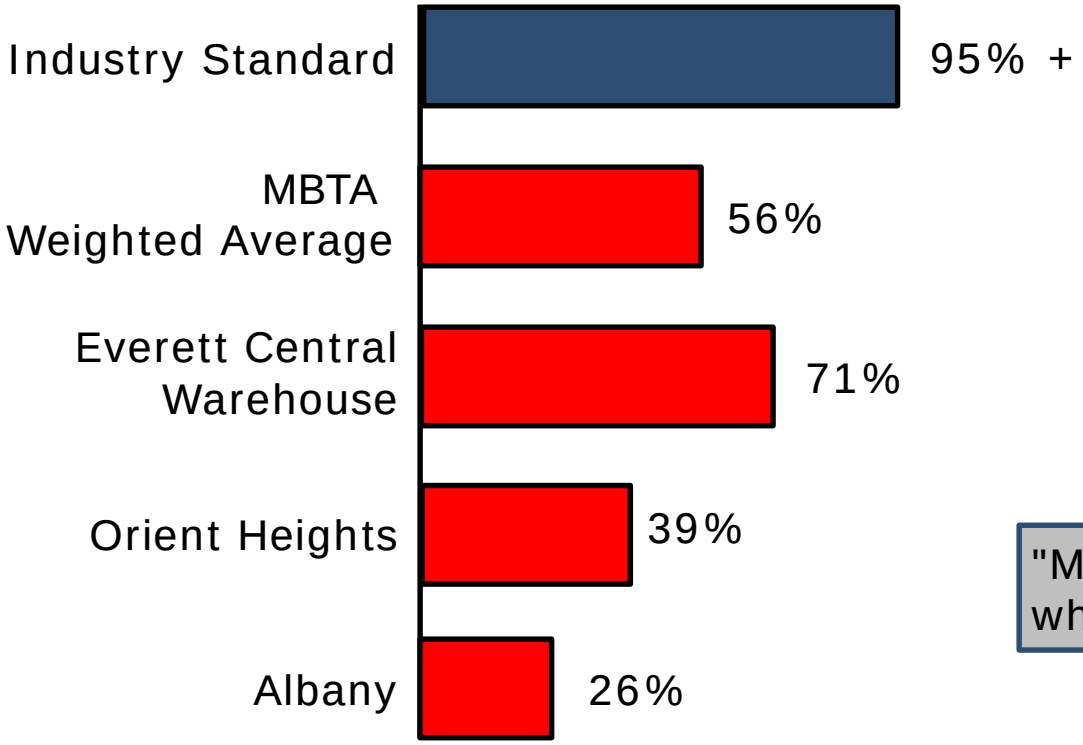
Poor

Very Poor Performance

MBTA Performance Would Be Completely Unacceptable At Any Company

Inventory Accuracy 40 Points Below Standard

100% = 100% of items counted had the exact amount as in the system of record

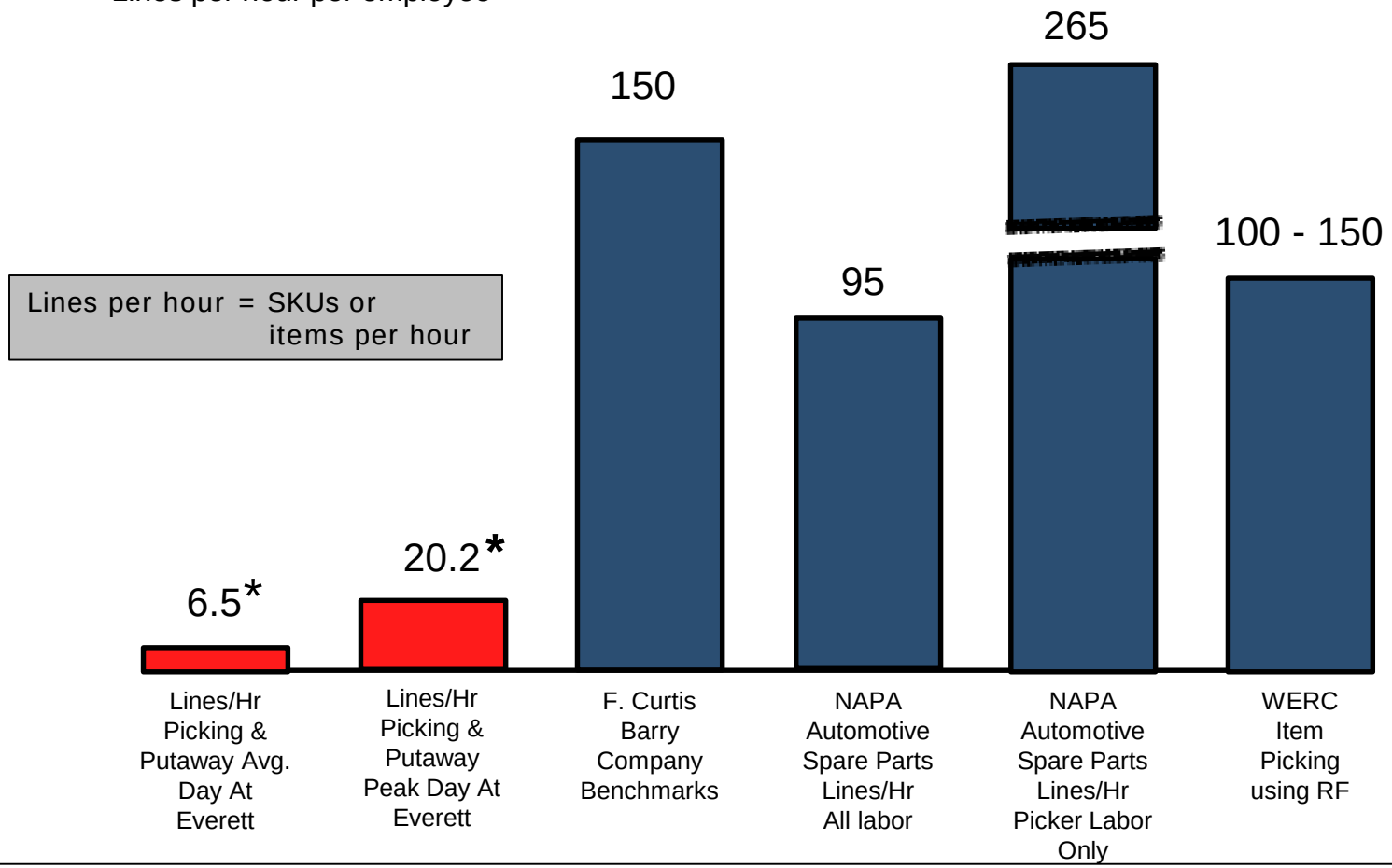


"MBTA simply doesn't know what parts it has"

Warehouse Efficiency Is Extremely Low

Warehouse Productivity Is 5X Below Industry Standard

Lines per hour per employee



Source: FMIS past total picks, with all Sunday activity & days removed

*** Assumes 6 pickers**

Parts Delivery Process Is 6X Longer Than Industry Standard

Time To Respond & Deliver Requested Parts

Hours of clock time

Standard Industry Practices Not Used By MBTA:

1) Use evening shift at warehouse to select parts for replenishment
2) Deliver parts to maintenance facilities during the night
3) Dedicated times for pick-up/ drop-off and same daily routes

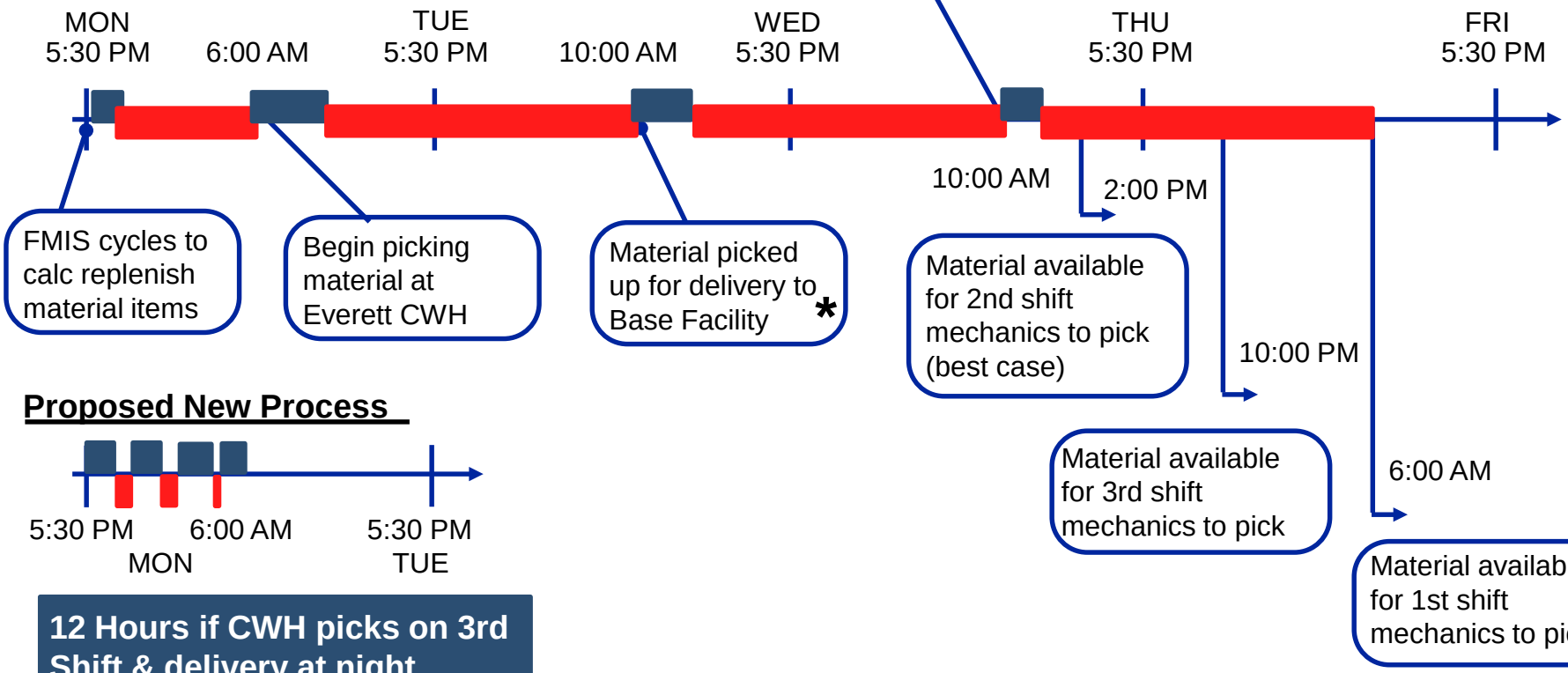
It Takes 82 Hours To Move A Part From Central Warehouse To Maintenance Garage, Which Reduces Maintenance Productivity And Wait Time

Value added work

Wait time

Current 82 Hours +

Current Process



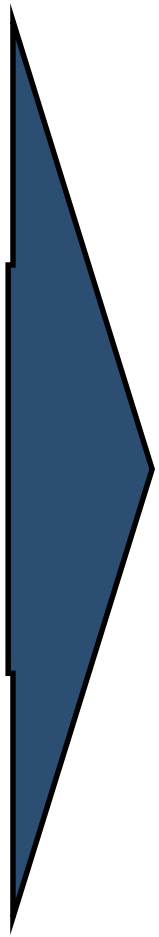
Proposed New Process

12 Hours if CWH picks on 3rd Shift & delivery at night

* If Operations Transport has space available and truck runs that day

MBTA Wastes Millions On An Ineffective and Broken System

MBTA is spending millions of $ above the needed amount on a system which delivers very poor performance and does not effectively support the bus and train maintenance which is critical to optimal transit performance for riders.



Outsource to an Experienced 3rd Party Vendor Like Those Used By World-Class Operators Including Ford, Honda, Caterpillar, GE And Others

- Negligible capital investment
- Reduced operating expense
- Implementation in 6 to 12 months
- Full $22 million in inventory reduction within 3 years

3rd Party Vendors already deliver 95% accuracy & overnight delivery as a standard practice

Comparison: Third Party Vendor Vs MBTA Current Insourced

Third Party Standard Operations

- Provides 24 hour service 7 days a week to customers and 365 days if needed by a client
- Guaranteed parts delivery in less than 12 hours for standard requests and 2 hours or less for emergency parts
- Firm scheduled pick up and delivery times and dedicated routes for parts transportation
- Provides superior efficiencies and inventory accuracy at or above Industry Standards
  - **Productivity – 90% above MBTA**
  - **Accuracy – (95.00-99.95%)**

MBTA Current Operations

- Provides 8 hour, 5 days a week service to maintenance which operates 24 hours a day 7 days a week.
- Parts delivered 80 hours after they were requested and mechanics retrieve their own emergency parts
- No fixed pick up and delivery times and some days parts are not transported to maintenance garages at all
- Inaccurate inventory tracking. Not sure what is on the shelves and how much is on the shelves.
  - Productivity – 5% of Industry Standards
  - Accuracy – 50 basis points below Industry Standards

Overview: Business Case For RFP To Outsource Warehouse & Logistics Activity

Current status

- The review of Warehouse & Logistics material management processes revealed a completely broken system with standard business procedures not in place and where processes existed they were not followed. The analysis revealed inventory accuracy well below inventory standards and frequent stockouts, but total operating costs are high with excess inventory and low productivity.

Business imperative

- Effective parts supply is critical to effective maintenance and high uptime on train and bus operations
- Current system cost is high despite providing poor service, with $22.7 million in excess inventory
- Future purchase of new buses and rail vehicles with their compliment of spare parts will have no place to be stored and will overwhelm the warehouse system when they arrive.

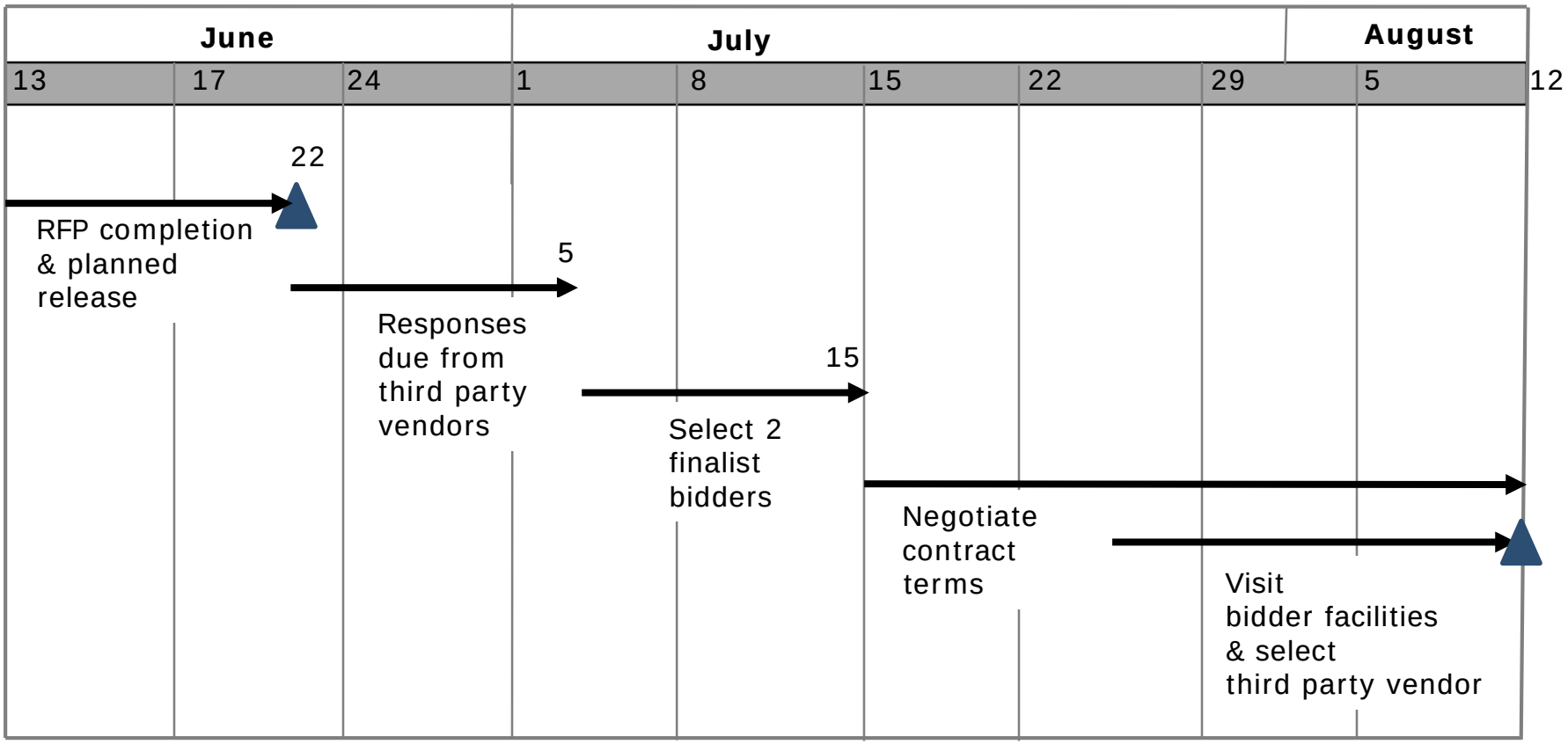
Financial summary

- $22.7 million in excess inventory has been identified
- $4.2 million in current annual operating costs
- $14.5 million in avoided capital investment
- Additional savings in mechanic time and effectiveness will be realized, but not yet quantified

Recommendation

- The Procurement & Logistics Dept. is planning to release a RFP to identify an effective Warehouse & Logistics firm to better manage the Warehouse & Logistics processes on or shortly after June 22, 2016.

The MBTA Plans To Move Forward With A RFP For Warehousing & Logistics Services On The Timeline Shown Below

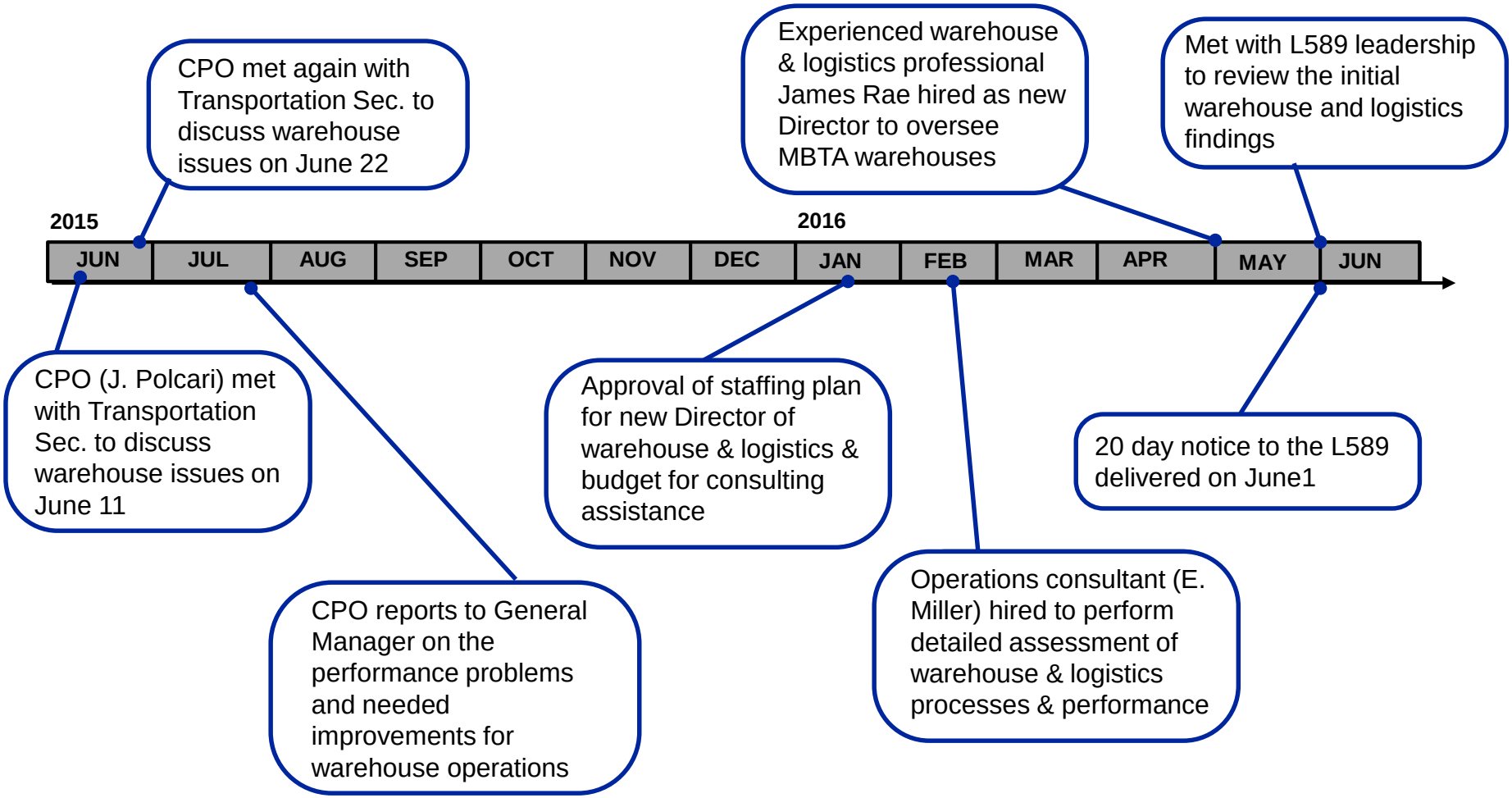


Backup

Objectives for Warehouse & Logistics Improvement

- **Partner with an outside firm who can leverage materials mgt expertise & existing facilities**
  - 3rd Party Logistics firms routinely exceed 95% in inventory accuracy
  - 3rd Party Logistics firms routinely operate on 24X7 schedule and have existing facilities, processes & transport
  - 3rd Party Logistics firms routinely operate expedited picking & delivery processes with success
- **Reduce operating costs (annual and long-term)**
  - Current annual operating costs of $ 4.2 M and many millions more in parts purchases
  - Avoid future investment in scanning guns, fork trucks, racking etc
- **Re-deploy current capital invested in excess inventory**
  - $ 22.7 million inventory reduction opportunity available
- **Improve availability of correct parts to mechanics**
  - Current inventory accuracy is below 50% at base locations & only 70% at central warehouse
  - Current materials organization operates on a 5X8 schedule, while MBTA maintenance operates 24X7
  - Current parts delivery process is lengthy (80+ hours) and unreliable (parts are not delivered every day)
  - Current process has no designed, effective expedite process

The MBTA Has Been Diligently Examining The Issues With Warehousing & Logistics For Many Months Using Experienced Professional Experts



MBTA Has Formed An Internal Steering Committee To Drive The Proposed Project From RFP Development Through Outsourcing Implementation

Steering Committee Members

- Gerard Polcari – Chief Procurement Officer
- Michael Abramo – Chief Financial Officer
- Steven Hicks – Chief Mechanical Officer, Rail
- Richard Dooley – Chief Mechanical Officer, Bus
- Todd Johnson – Chief Transportation Officer
- James Rae – Director of Warehousing and Logistics
- Ernest Miller – Warehouse Operations Consultant

APPENDIX – (Section A) Business Case Information

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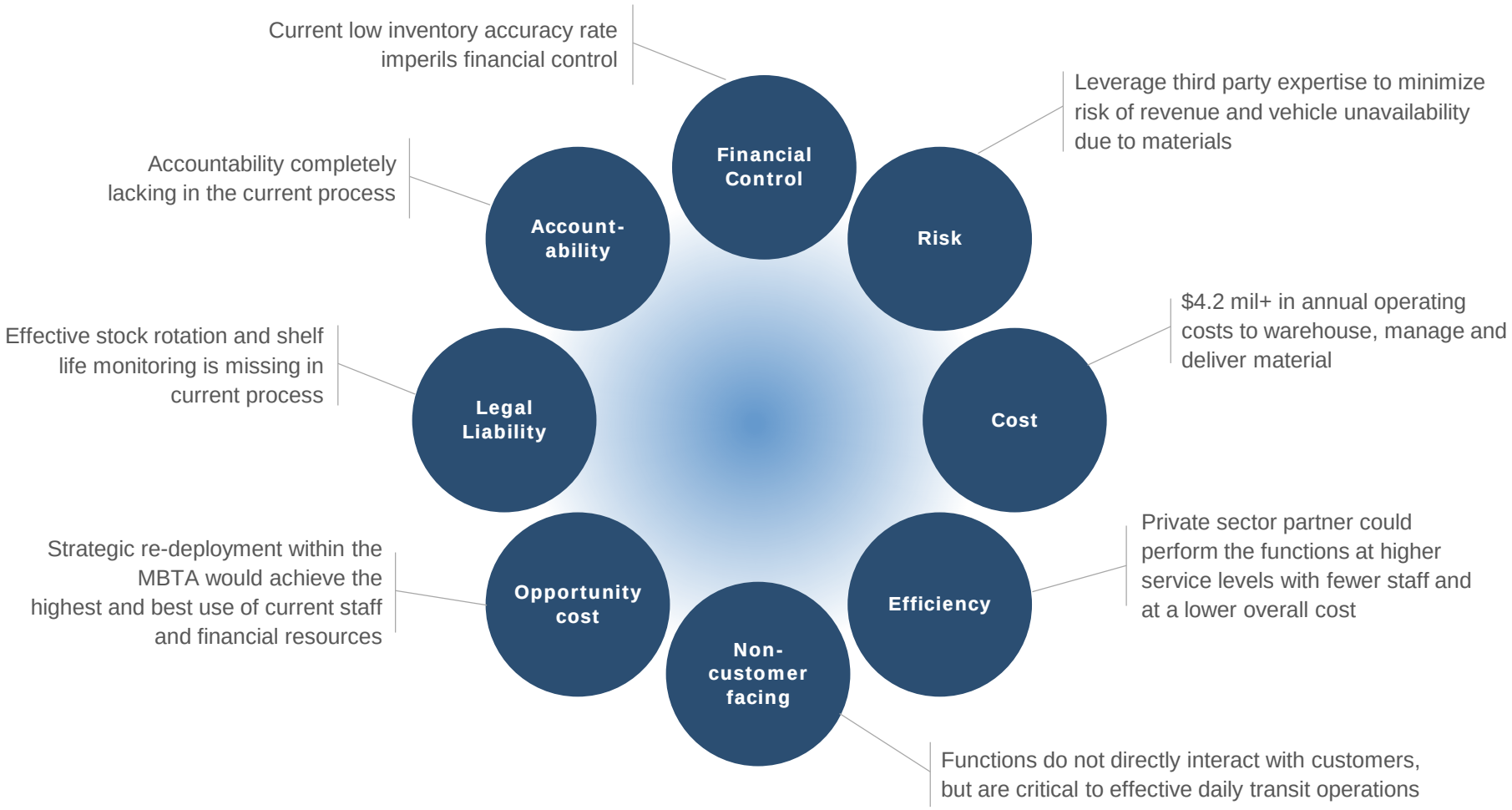
Current State Assessment For Warehouse & Logistics

Area	Present performance level	Summary observations	Desired future state
Material warehouse & logistics service /effectiveness	Poor Excellent 	• Current inventory accuracy is well below industry standards (should be > 95%) • Standard inventory management processes are not in place or not followed • Maintenance operations mechanics, supervisors have no confidence in system • Materials org. operates 8X5 but maintenance operates 24X7 • Current delivery process from Central warehouse to Base Locations requires over 80 hours to respond to part request (could be 12 hours)	**• Inventory accuracy > 95%** **• Stockouts less than 5%** **• Order to Delivery < 12 hrs**
Capital Cost		• Current inventory turns are below 0.6 annually (should be 1.0 or above; NY MTA at 1.7 turns currently) • Avoided capital of $13 million by not upgrading or replacing Everett Central warehouse & material handling equipment	**• Inventory turns > 1.0**
Operating Cost		• Current productivity is less than 5% of comparable private companies • Current 5X8 material operation cannot efficiently support 24X7 maintenance ops • Current delivery process is unreliable and 6X longer than comparable private	**• Leverage high productivity of 3PL firm** **• Current operating costs of $4.2 million**
Business risk of in material management		• Severe risk to effective maintenance operations and revenue vehicle availability when new vehicles arrive with thousands of new spare parts but no space in which to store them • Plus continued risk of disrupted passenger service due to high inaccuracy of parts inventory leading to critical stockout and inability to service vehicles	**• A place for everything and everything in its place**

Business Imperatives Demanding Outsource Of Warehouse & Logistics



Public Sector Comparators (PSC) Allow Comparison Across Sectors

- A PSC is a common tool used to assess the financial viability of public-private partnerships. Provides a hypothetical risk-adjusted cost if a project were to be financed, built, and operated by the public sector

Typical PSC Inputs	Rationale
Capital	**Private costs of carry**
Operating	**Efficiency/Innovation gains**
Projected revenues	New project risk
Asset values	When transferring asset
Risk matrix	**Always**
Sensitivity analysis	**Sometimes**
DCF	When revenues produced
Bid comparison	**Always**

Key: **RED** Can Do
BLUE Optional
BLACK Not Applicable

Warehouse & Logistics Risk Matrix Reveals Manageable Risks

Risk Type	Impact	Mitigation Strategy
Issues with transition from internal to outsourced operations	• Delayed gains • Negative publicity • Disruptions to maintenance	• Sequenced implementation • Work closely w/ union • Allow substantial overlap between old process & new • Aggressive communications
3PL underperforms	• Gains remain unrealized	• Clear metrics & service level agreements • Regular service audits & reviews
Implementation costs exceed estimates	• Reduces ROI	• Place implementation cost & risk on 3PL
Mixing of private workers w/MBTA at Base location	• Reduced or delayed gains	• Clearly define processes & work responsibilities • Keep main link foremen to 3PL
Resistance from Foremen	• Delayed gains • Disruptions to maintenance	• Thorough training • Clear consequences for non-compliance • Transition support

APPENDIX – (Section) B Other Supporting Data

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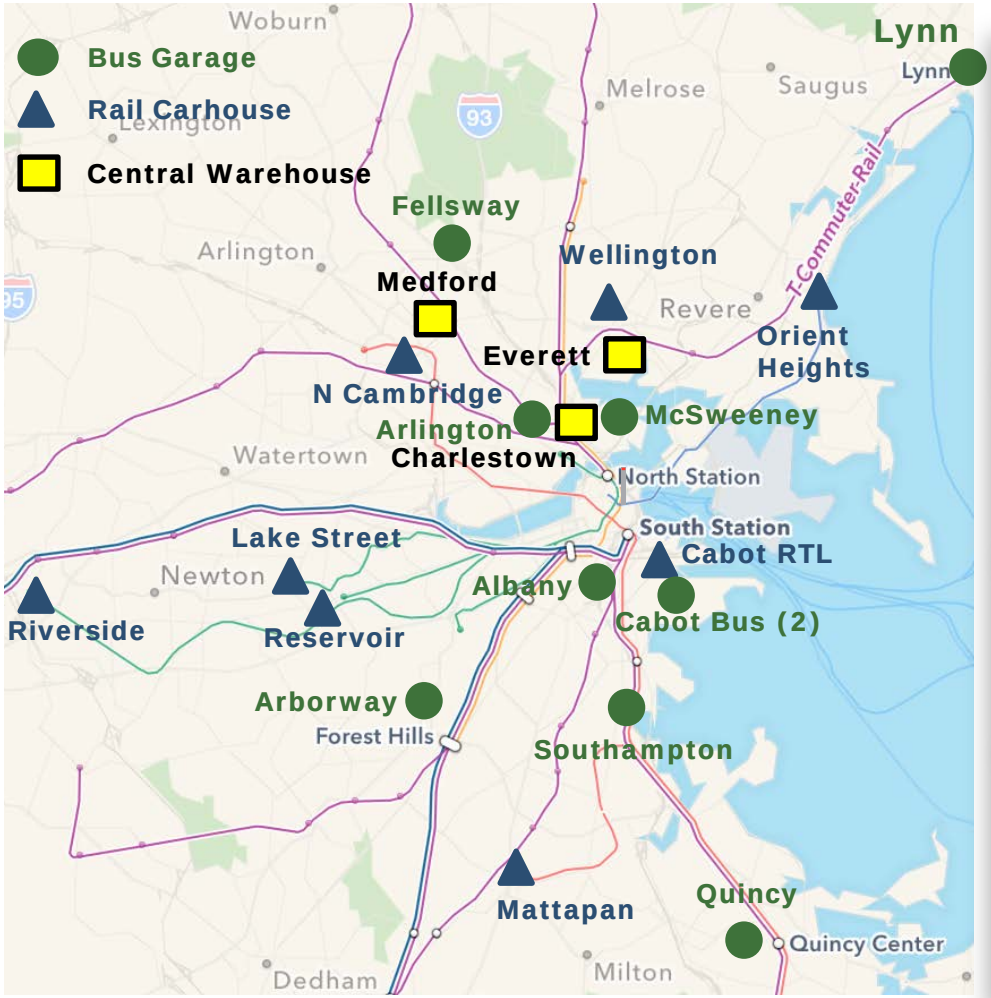
MBTA has a warehouse network of 21 locations that house the parts inventory for all Rail and Bus Operations



Central Stores

- 2 Locations (Everett & Charlestown)
- 80,000 sqft Avg
- $38,000,000 in known serialized inventory
- 16,383 SKUs

Non Serialized Spares

- 1 Location (parts - not serialized) (Medford)
- 30,000 sqft

Rail Carhouses

- 8 Locations
- 5,600 sqft Avg per Stock Room
- $14,000,000 in known serialized inventory

Bus Garages

- 10 Locations
- 4,600 sqft Avg per Stock Room
- $10,700,000 in known serialized inventory

Current Parts Process Badly Flawed At Every Step In The Sequence

Central Stores

Activity Levels
- Receiving – 65 transactions per day on average
- Picking - 250 transactions per day on average

Employees - 16
- 1 Manager of Stores (TEA)
- 2 Storekeepers (Local 453)
- 1 Foreperson (Alliance)
- 2 Receiving Clerks (Local 589)
- 10 Roving Stock Keepers (Local 589)

(No Inspection) → **Receive** → (Low Accuracy) → **Store** → (Intermittent Delivery) → **Deliver to Carhouses & Garages**

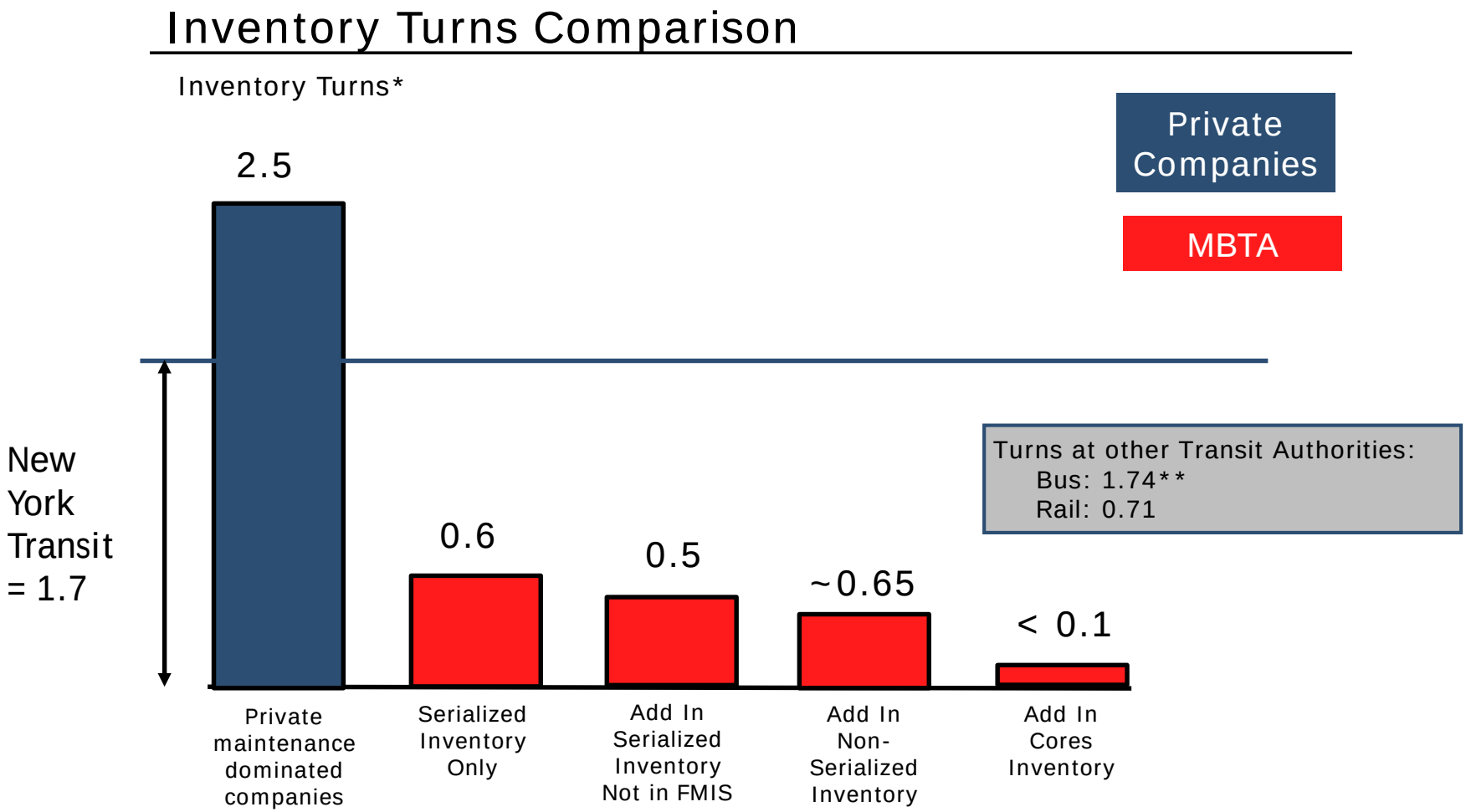
Carhouses & Garages

Receive (Erratic Put-Away) → **Store** (Low Accuracy) → **Disburse To Maintenance Mechanics** (Often Not Recorded)

Activity Levels
- Receiving – 12 transactions per day at each location on average
- Disbursement of parts to Mechanics – 12 transactions per day per location on average

Employees - 22
- 22 Roving Stock Keepers (Local 589)

Turns Are Very Low Even in a Transit Context



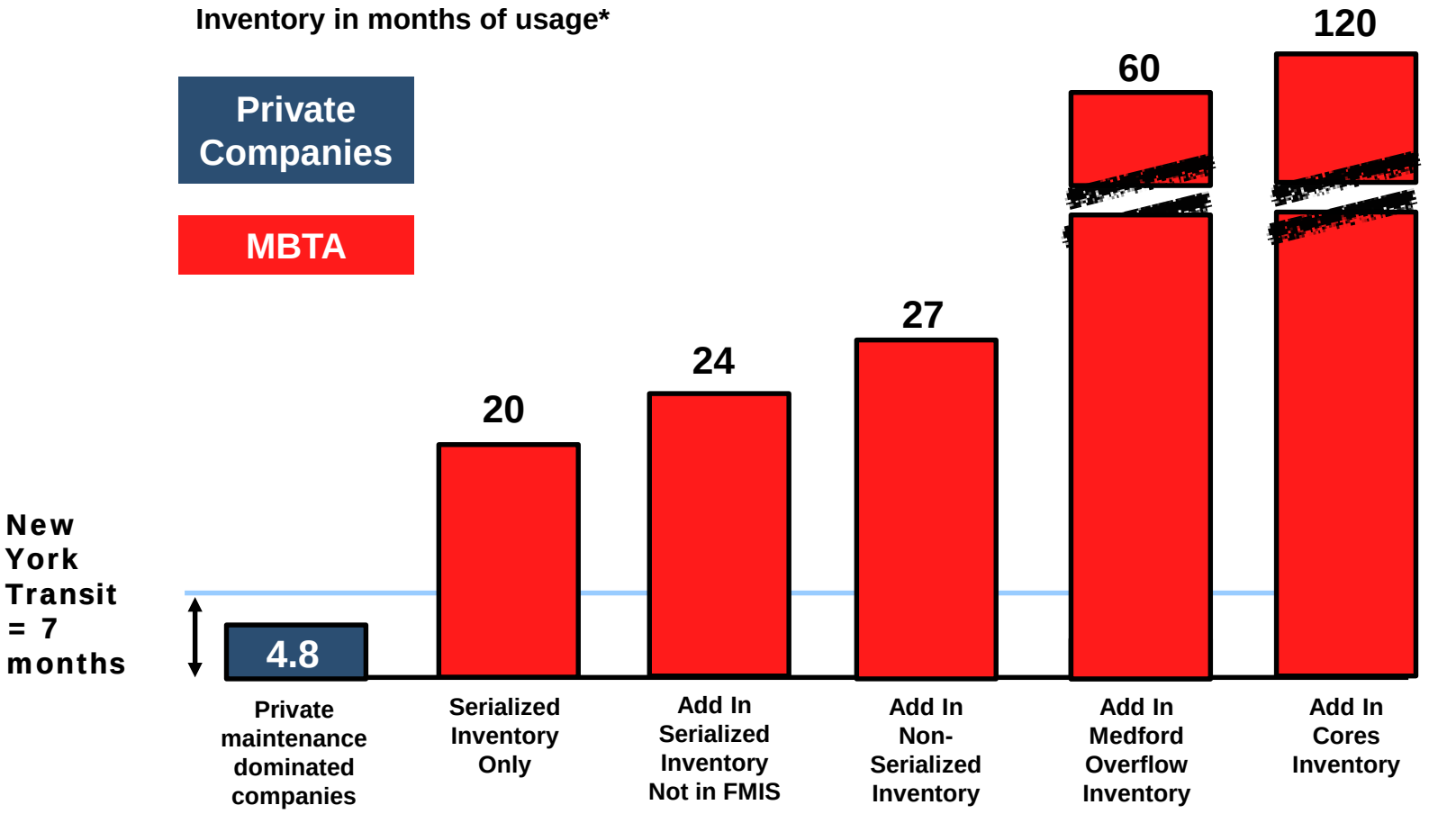
Source: MARCON at Univ. of Tennessee (http://www.maintenancebenchmarking.com/best_practice_maintenance.htm)

* Inventory Turns = Annual Usage in $/ $ of Total Inv

** American Public Transit Association1993 & 1994

Another Way to Compare Is By Months Of Inventory On Hand *

Months of Inventory Comparison

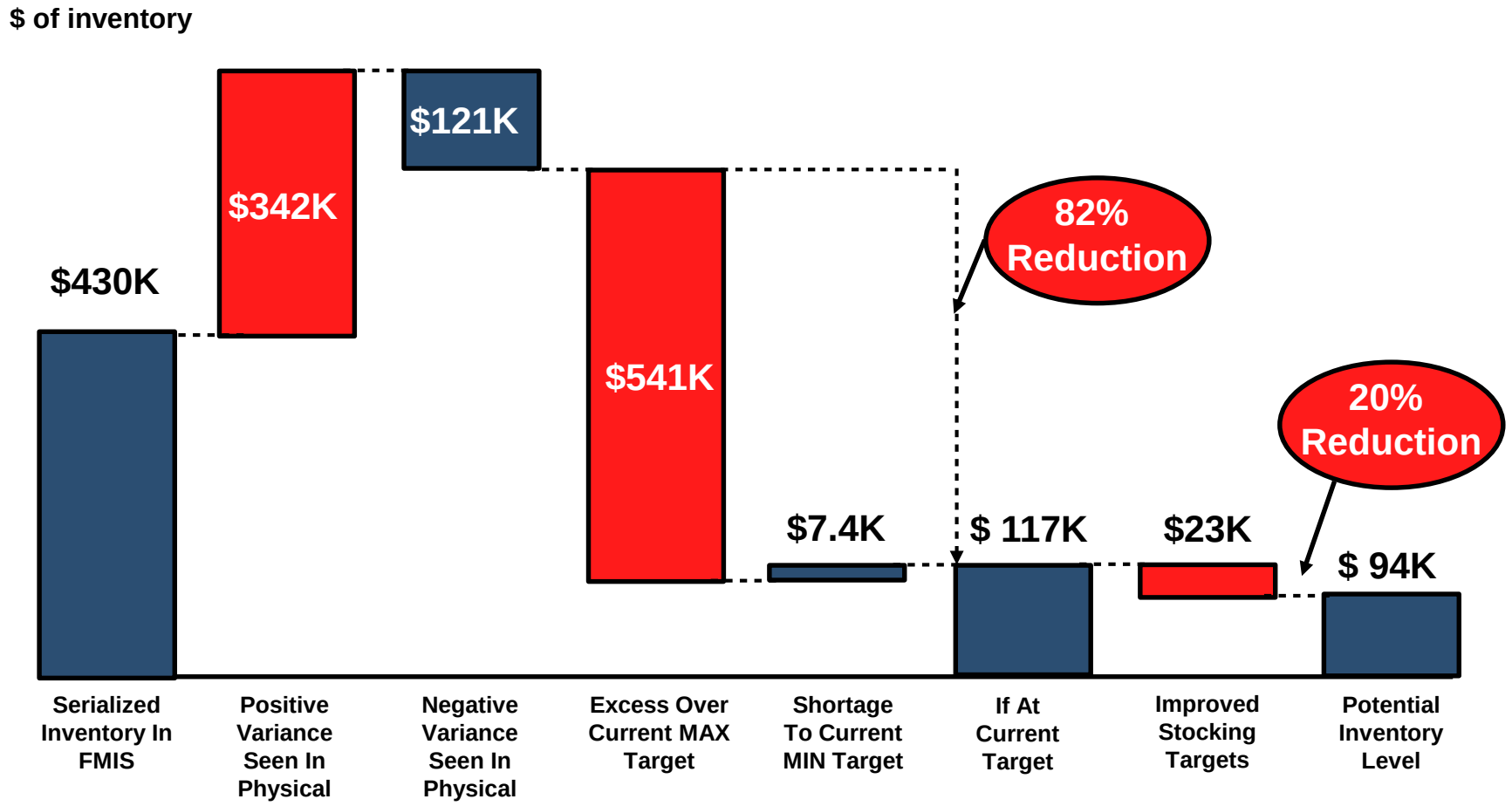


Source: MARCON at Univ. of Tennessee (http://www.maintenancebenchmarking.com/best_practice_maintenance.htm)

*** Months On Hand = ($ of Total Inventory/$ Annual Usage) X 12**

Inventory Reduction Opportunity - Albany Example

Albany Bus Garage Is $534,000 Over Current Max Settings



Source: FMIS, Physical Inventory conducted 4/2 & 4/3, OPTIO analysis

Targeted Excess