Capital Program, Planning and Real Estate Committee

Item III - A

October 13, 2016

Capital Needs Inventory Progress Update

Washington Metropolitan Area Transit Authority

Board Action/Information Summary

○ Action ◉ Information	MEAD Number: 201787	Resolution: ○ Yes ◉ No

TITLE:

Capital Needs Inventory - Progress Update

PRESENTATION SUMMARY:

The Capital Needs Inventory (CNI) will identify and prioritize Metro's capital safety, repair, rehabilitation, enhancement and compliance requirements in a transparent and Federal Transit Administration (FTA)-compliant manner.

This presentation updates the Board on the progress on the CNI to-date.

PURPOSE:

Provide progress report on WMATA's Capital Needs Inventory (CNI).

DESCRIPTION:

The CNI provides an unconstrained and prioritized list of needs over a 10-year horizon. This will articulate the potential magnitude of WMATA's capital requirements, including those for rehabilitation, replacement and enhancement, as well as those needed to comply with new mandates. The CNI will be coordinated with WMATA's estimate of ongoing maintenance capital expenses to provide a holistic picture of WMATA's total capital requirements.

Key Highlights:

- The 2016 CNI represents a significant advancement from the prior CNI process used to evaluate and prioritize WMATA's capital needs.
- The 2016 CNI represents the first time the Authority has catalogued its asset inventory and used this inventory to estimate replacement and rehabilitation needs.
- The current CNI will be based on useful life benchmarks, while future versions of the CNI will augment these findings with actual physical conditions assessments. This effort will be annually updated with increasingly specific information.

Background and History:

Beginning in 2007, WMATA staff began a three-year long process to develop a new capital needs inventory in support of a new long-term funding agreement. In February 2010, a 2011-2020 CNI was published that led to the July 2010 execution of a new six-year Capital Funding Agreement (CFA), which included an agreement on local match for new federal Passenger Rail Investment and Improvement Act (PRIIA) capital funding.
In 2010, Metro developed the ten-year capital needs inventory through a joint process of call for needs and a prioritization platform that aligned with Metro's strategic goals. The 2010 process included the following major steps:

- Formation of a Capital Program Advisory Committee (CPAC) that addressed policy issues and provided oversight for the process, and a CPAC Technical Committee (CPAC-T) that included representatives of each department and mode;
- Development of an asset breakdown structure that grouped capital needs into broad categories and defined and compiled the size of capital needs projects or programs; and
- A "Call for Capital Needs Projects" that requested department representatives to submit capital requirements based primarily on previous studies, department asset inventories, and capital budget projections.

Metro staff presented to the Board a CNI, which outlined over $11 billion in needs over 10 years (FY2011 to FY2020). The CNI included performance/safety projects ($7.6 billion, 67% of total) and customer/demand/safety projects ($3.8 billion, 33% of total).
Some limitations of the previous process included:

- Lack of Asset Inventory/Condition Data – At the time the process was initiated, WMATA did not have a comprehensive asset inventory, although some detailed data existed for certain asset classes, particularly vehicles.
- Qualitative Assessment of Project Benefits – The evaluation of project benefits and the ratings were based on the qualitative assessment by the project sponsor and the CPAC-T members.

Dependence on Individual Departments for Needs – the lack of a central asset inventory or condition ratings led to individual departmental submissions that could not be verified.

- In 2014, Mero developed a draft asset inventory based on a variety of asset databases and other financial and purchasing records. In 2016, Metro initiated its comprehensive Transit Asset Inventory and Conditions

Assessment (TAICA) which will, when completed, allow Metro to employ a more, analytically-based, and FTA-compliant CNI.

- At this time, Metro is approximately six months into a two year process for constructing the TAICA.
    - Phase I of this effort will construct a top-level asset inventory and be completed by October 16, 2016
    - Phase II will provide finer levels of detail – at the sub component level – to this inventory and also deliver physical conditions assessments. This work will conducted in 2017 and 2018
- Combined, this puts Metro in a position to create an analytically based, and transparent CNI that can be used over time to better guide and inform funding and capital investment decisions of the Authority.

Discussion:

Phase I of the CNI has yielded an inventory comprised of over 74,000 individual assets and has provided staff with information on asset age and expected useful life. During Phase I, WMATA used statistical data from the FTA's Transit Economic Requirements Model (TERM) to estimate current asset condition based on measurable data such as age and history of rehabilitation. Once Phase I and Phase II are completed in 2018, the asset inventory will have physical condition measures for the aforementioned assets as well as their subcomponents, which will result in a more accurate and robust database. This will also allow WMATA to comply with the FTA MAP-21 requirement to submit a Transit Asset Management Plan (TAMP) in 2018.

Phase I of the CNI reflects the work completed to-date and provides WMATA and its funding jurisdictions with a preliminary planning order of magnitude estimate of the hard costs associated with asset replacement and/or rehabilitation necessary to advance the Authority to a state of good repair over the next ten years. This prioritized list of needs can then be migrated into a project development phase whereby definitive scope, cost, designs/specifications, schedule and construction parameters can be created. From this project development phase, a set of project readiness criteria will be applied to ensure adherence to project budgets and scheduling.

WMATA will update the CNI once a year to reflect assets being funded and new program level needs as they occur. In the meantime, the upcoming TAICA Phase II will provide more robust data on the physical condition of assets. Accordingly, the TAICA and CNI processes will be coordinated and deliver greater levels of precision. These processes will inform the requirements for WMATA to submit to the FTA a Transit Asset Management Plan (TAMP) every four years, starting in 2018.

The Office of Planning is currently analyzing the inventory data and constructing a prioritized list of assets, grouped by asset classes that represent needs over the next 10 years. This list is being augmented with safety and compliance requirements, as well as staff and jurisdictional requests.

The Phase I CNI will then guide the development of the Capital Investment Program and capital planning effort, which is being redesigned to provide more precise cost and scope based subsequent project engineering phases. The new development process should enhance overall efficiencies in capital program delivery at WMATA.

FUNDING IMPACT:

For information only.	
Project Manager:	Shyam Kannan
Project Department/Office:	ENG/PLAN

TIMELINE:

Previous Actions	2009 Capital Needs Inventory
Anticipated actions after presentation	Capital Needs Inventory to be transmitted to the Board in December 2016

RECOMMENDATION:

None. For information only.

Washington Metropolitan Area Transit Authority

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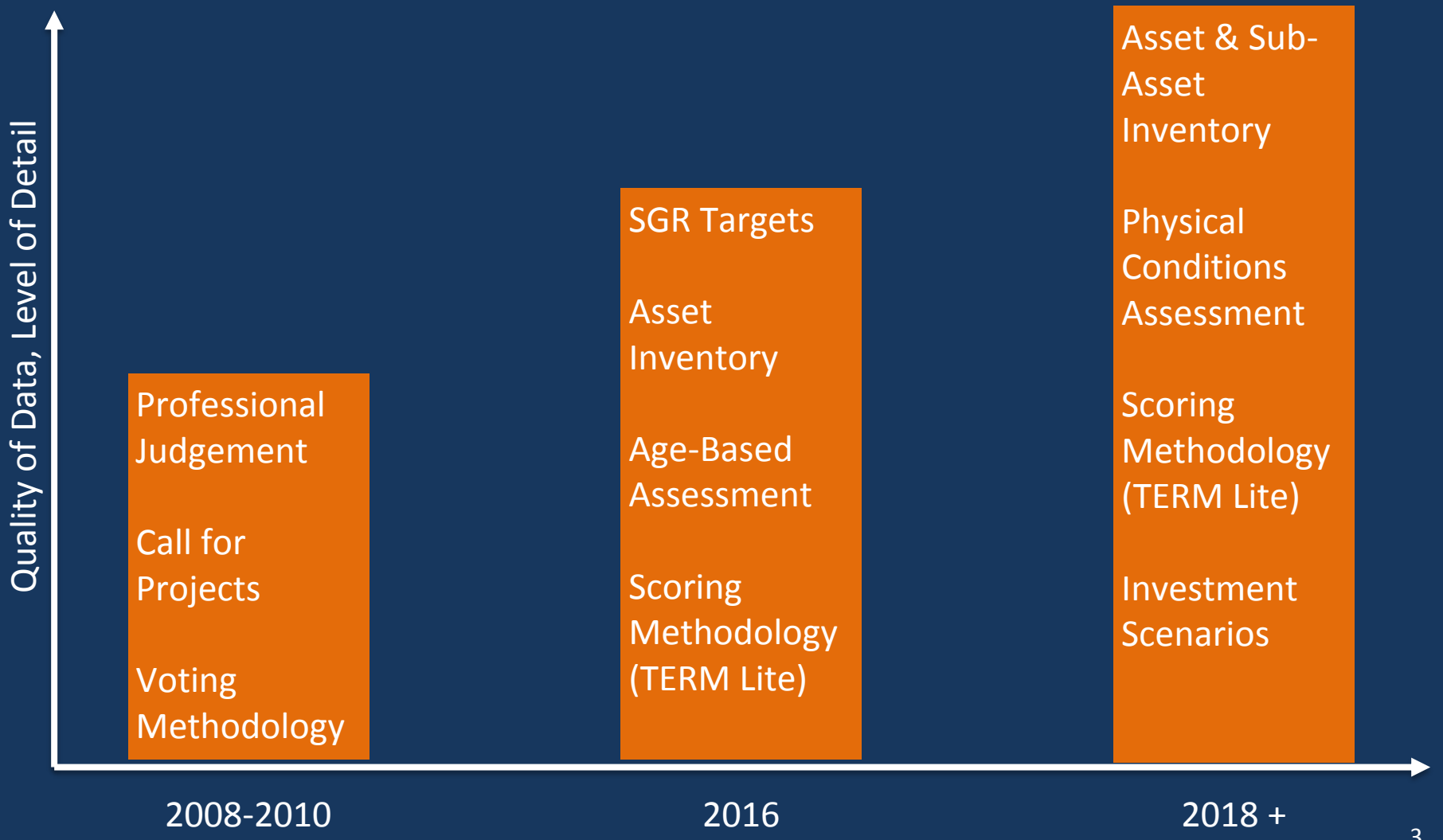
Capital Planning, Programming, and Real Estate Committee

October 13 2016

Agenda

Capital Needs Inventory Evolution and Improvements



CNI Phase I – 2016
Six Months into a Multi-Year Effort

Asset Inventory

- Approximately 75,000 Individual Assets Catalogued
- Inventory of Age, Useful Life
- Replacement cost in Year of Expenditure ($YOE)

Risk Assessment

- FTA Model to Estimate Probability of Asset Failure
- Validation with Asset Managers

Investment Need Prioritization

- Safety
- Regulatory Compliance
- Service Delivery
- Ridership Impact

Categorization

- Existing vs. New Assets
- Asset to Program Grouping

CNI Phase II
2018 and Beyond

Asset Inventory

- Assets and sub-Assets Inventoried – Many More Datapoints
- Inventory of Age, Useful Life, Physical condition
- Replacement Cost in $YOE

Risk Assessment

- Asset Failure Based on Actual Asset Conditions*
- Validation with Asset Managers

Investment Need Prioritization

- Safety
- Regulatory Compliance
- Service Delivery
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Categorization

- Existing vs. New Assets
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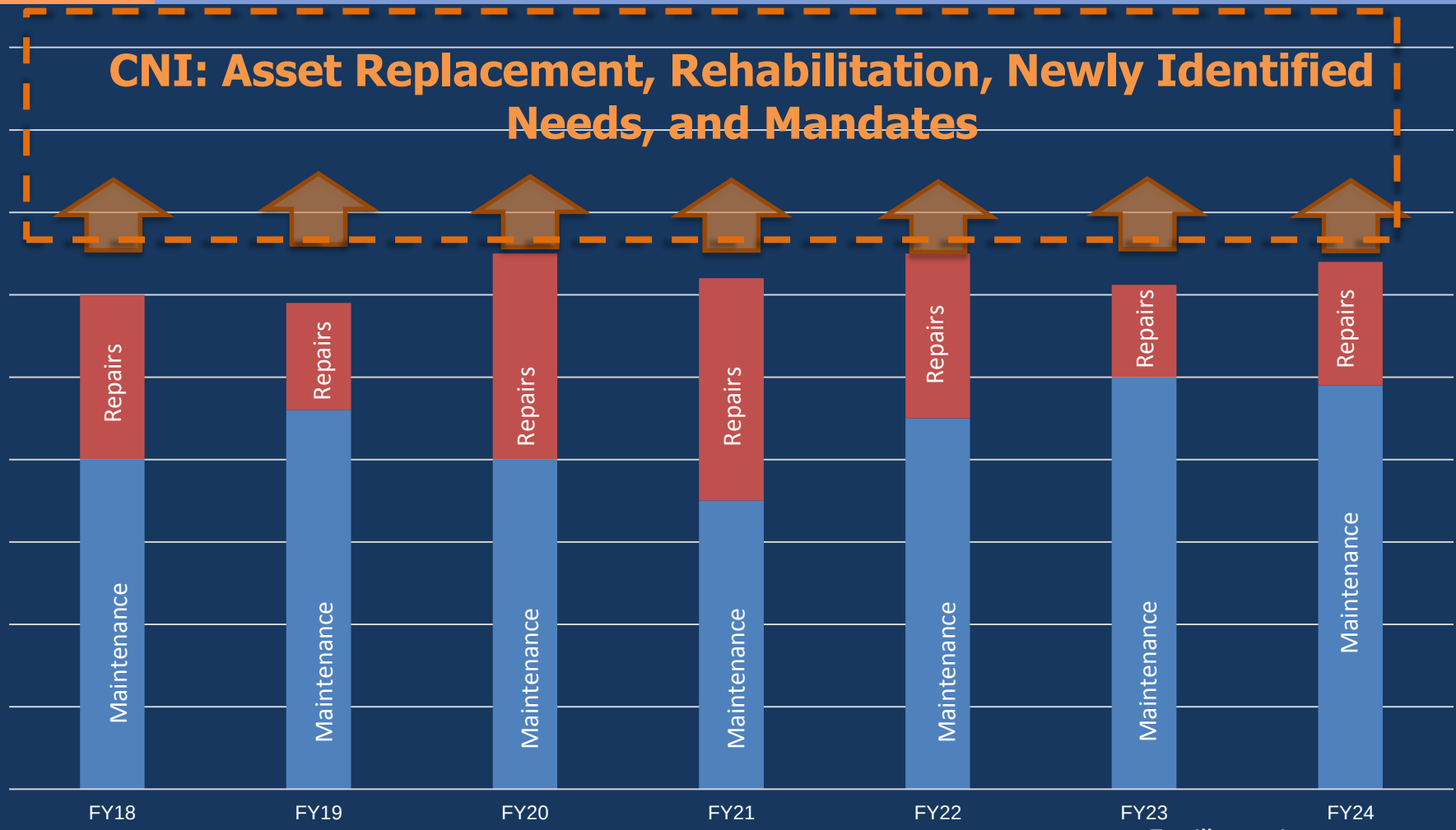
Capital Needs Inventory
What Does it Tell Us?



For illustration purposes only

CNI Phase I Progress To-Date
Inventory Data Near Completion

Completed:

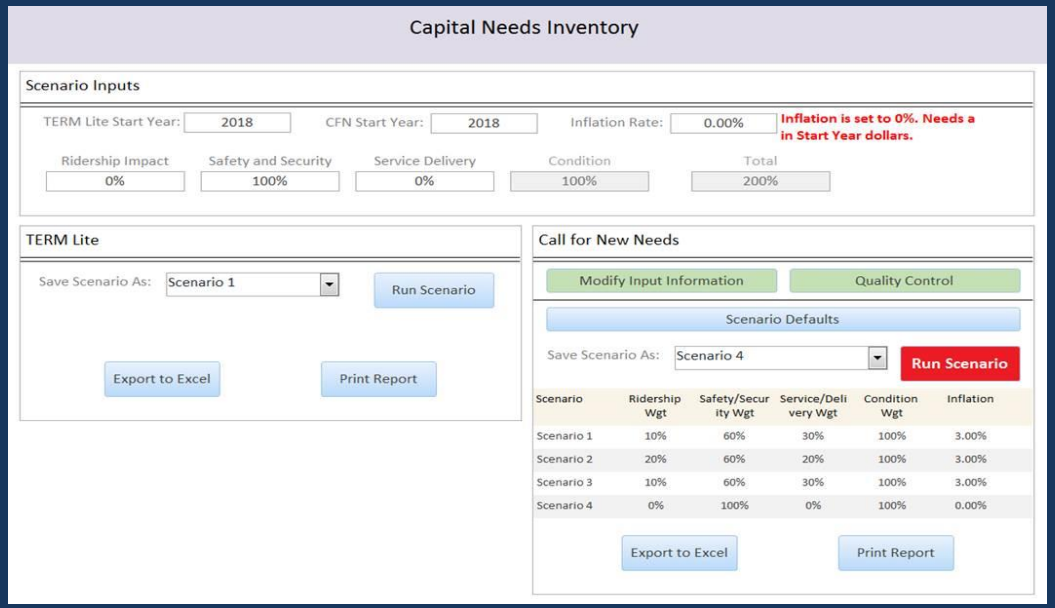
- Vehicles
  - Buses, railcars, access vans, and non-revenue vehicles
- Guideways
  - Structures: bridges, tunnels, retaining walls, fence, footwork
  - Trackwork: ballasted, direct fixation, floating slabs, crossovers
- Systems
  - Train control, electrification, revenue collection, IT

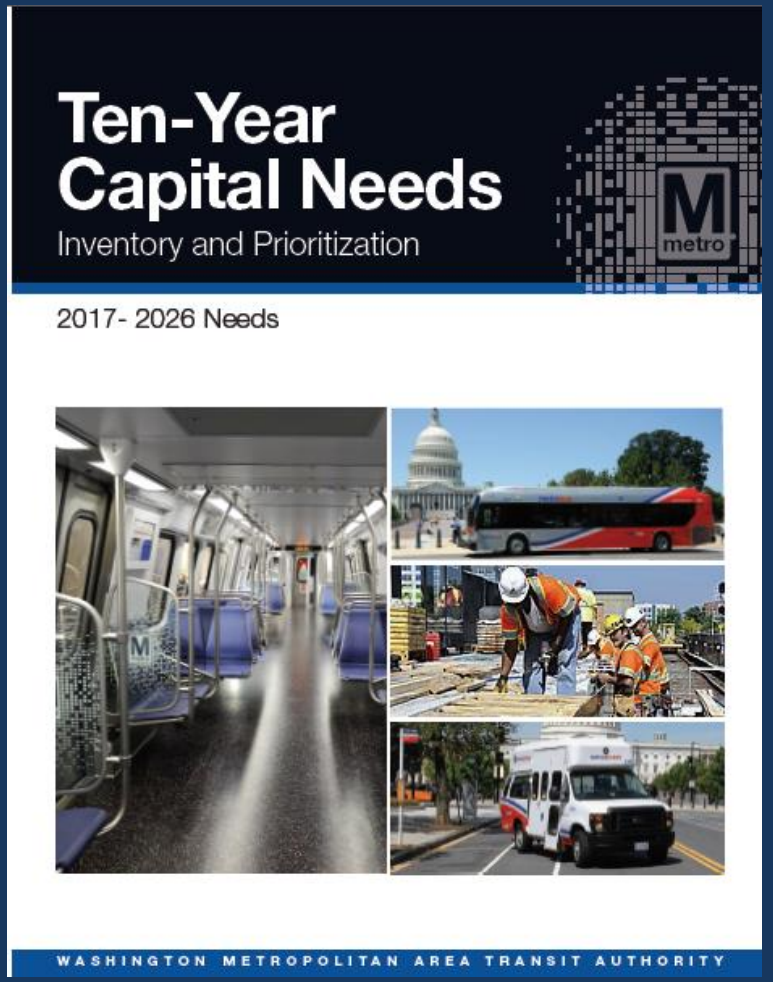
Near Completed:

- Systems
  - Utilities: vent fans, fire lines, pumping stations, drainage, emergency exist, lighting
  - Communication: radio systems, PIDS
- Facilities
  - Buildings, central control, maintenance equipment, major shops, yards
- Stations
  - Parking, vertical circulation, station platforms

What to Expect In December

- Phase I CNI report
- A prioritized, unconstrained list of ten-year asset needs at the program level
- A CNI asset database





Preliminary Asset Value Summary

Asset Category	Value ($m) ($2016)
Vehicles	**$ 6,042**
Non-Revenue Vehicles	$ 323
Revenue Vehicles	$ 5,719
Guideway Elements	**$ 18,841**
Guideway	$ 17,139
Special Structures	$ 449
Trackwork	$ 1,252
Systems	**$ 4,118**
Communications	$ 47
Electrification	$ 1,854
Revenue Collection	$ 276
Train Control	$ 962
Utilities	$ 978
Facilities	**$ 2,679**
Buildings	$ 1,474
Central Control	$ 107
Equipment	$ 167
Major Shops	$ 291
Storage Yard	$ 640
Stations	**$ 7,663**
Access	$ 2,719
Building	$ 4,944
Grand Total	**$ 39,343**

- WMATA's asset base is approximately $39B
- Many assets have aged beyond their useful life, especially:
  - Track
  - Train control
  - Structures
  - Railcars

Note: Updated September 29, 2016

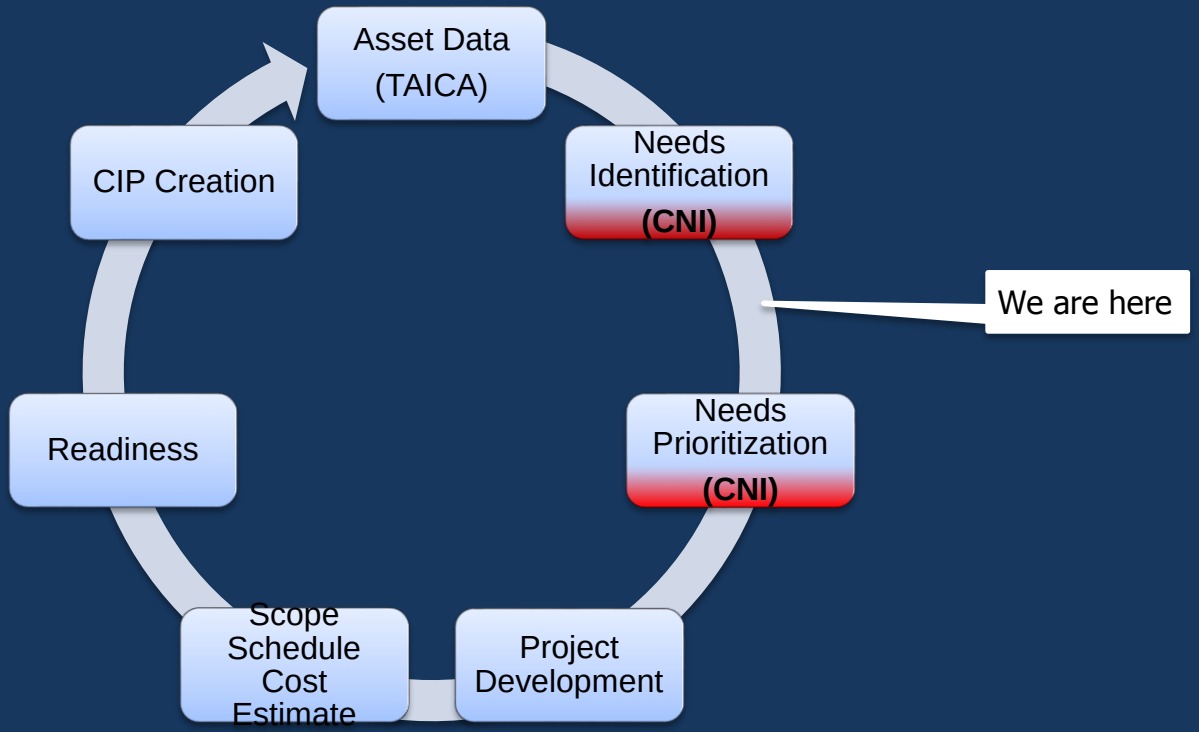
State of Good Repair Inventory Sample Data – Top 30 Needs

Capital Needs Inventory Preliminary Assessments	Rank	Example Elements	Quantity	
			Feet (Track or Linear)	Elements
Electrification Distribution, L, HR	1	Substations, Power Cable	11,000	3
Trackwork, A, HR	2	Curved/Tangent Track, Crossovers, Platforms	273,000	27
Trackwork, C, HR	3	Curved/Tangent Track, Crossovers, Platforms	251,895	45
Trackwork, D, HR	4	Curved/Tangent Track, Crossovers, Platforms	189,864	
Trackwork, B, HR	5	Curved/Tangent Track, Crossovers, Platforms	270,072	51
Trackwork, F, HR	6	Curved/Tangent Track, Crossovers, Platforms	1,044,000	90
Trackwork, K, HR	7	Curved/Tangent Track, Crossovers, Platforms	173,670	39
Revenue Vehicles, , HR	8	1/2/3/5k Retirements, 4k/6k Mid Life Overhauls		3,200
Trackwork, G, HR	9	Curved/Tangent Track, Crossovers, Platforms	103,461	21
Signals/Interlockings, Switch Machine, HR	10	Motorized Ballasted Switch Machines		84
Electrification Substations, D, HR	11	Switchgears, Transformers		975
Trackwork, L, HR	12	Curved/Tangent Track, Crossovers, Platforms	122,139	
Electrification Substations, K, HR	13	Switchgears, Transformers		1,056
Trackwork, E, HR	14	Curved/Tangent Track, Crossovers	193,230	48
Electrification Substations, A, HR	15	Switchgears, Transformers		1,542
Electrification Substations, C, HR	16	Switchgears, Transformers		1,095
Electrification Distribution, A, HR	17	Power Cable	98,382	
Electrification Distribution, D, HR	18	Power Cable	16,675	
Electrification Distribution, C, HR	19	Power Cable	18,078	
Electrification Substations, G, HR	20	Power Cable, AC Switchgear, Transformer	55,992	48
Trackwork, J, HR	21	Curved/Tangent Track, Crossovers	52,665	30
Electrification Distribution, G, HR	22	Power Cable	28,035	
Cable Transmission System (CTS), , SY	23	Fiber Optic Cable Transmission System (FOCS)		1,950
Electrification Distribution, B, HR	24	Power Cable	65,961	
Electrification Distribution, K, HR	25	Power Cable	55,344	
Electrification Substations, B, HR	26	Switchgears, Transformers		1,158
Signals/Interlockings, , HR	27	Wayside Train Control, Cable, Switch Machine	36,769,266	10,638
Electrification Distribution, Un-named, HR	28	Heaters		3,507
Electrification Substations, F, HR	29	AC/DC Switchgears, Transformer		774
Revenue Vehicles, , MB	30	Bus Rehabs or Replacements		4,767

Newly Identified Needs or Mandates

Name	Description
PENTA Development	Update communications software for central command to improve announcements.
2K/3K Fleet HVAC Compressor R407C Conversion	Comply with EPA regulations and reduce maintenance costs.
Signage Updates (first responders)	Develop signage for emergency first responders per NSTB recommendation R-16-27.
Positive Train Stop for Non Revenue Vehicles	Develop design and implement solution to prevent nonrevenue rail vehicle red signal over-runs per TOC recommendation 15-008.
Tunnel Smoke Detection System	Install a system that will detect the presence and location of tunnel fire and smoke per NTSB R-16-16 and FTA SMI R5-35-c.
Buy Rail Cars to Operate Full 8-Car Trains	Purchase rail cars to operate 100% 8-car trains to assist with NFPA 101 and 130 compliance and WMATA crowding guidelines.

CNI in Context of WMATA's Capital Program Process



Project Development Programming

Previous Typical Approach driven by Professional Judgement

Identify Capital Need → Budget Order-of-Magnitude Estimate & Launch Project

- ✓ Delays
- ✓ Project Management & Procurement Challenges
- ✓ Scope Creep
- ✓ Cost Increases
- ✓ Difficult to forecast
- ✓ Over Programming

New Policy and Practice

Identify Capital Need → Determine Prospects for Investment → Plan for Investment at Asset Program Level → Create Project through Project Development Program → Conduct Readiness Evaluation → Program Specific Project in Six-Year CIP → Complete Design and Engineering and Begin Acquisition/ Construction

Capital Project Readiness Evaluation

- ❑ Project Justification
- ❑ Defined Scope & Deliverables
- ❑ Schedule
- ❑ Cost Estimates
- ❑ Internal "Customer" Concurrence
- ❑ Stakeholder Awareness
- ❑ Project Management Plan
- ❑ Capacity to Manage/Deliver
- ❑ Alternatives Considered
- ❑ Leverage/Bundling Opportunities
- ❑ Procurement Strategy
- ❑ Safety & Security Considerations
- ❑ Environmental Requirements
- ❑ Regulatory/Oversight
- ❑ Sites Known/Controlled
- ❑ Permits, Utilities, CSX
- ❑ Right-of-Way Access
- ❑ Workforce Requirements
- ❑ Impacts on Operations/Customers
- ❑ Operating/Lifecycle Cost & ROI
- ❑ Risks Documented/Mitigated
- ❑ Priority/Urgency
- ❑ Jurisdictional Coordination

Approved FY2017-2022 Capital Program

Investment Category	FY2017	FY2018	FY2019-22	Total
Railcars	$354	$386	$1,082	$1,822
Bus & Paratransit Vehicles	$218	$259	$831	$1,308
Stations & Passenger Facilities	$133	$234	$629	$997
Rail Systems	$104	$162	$522	$788
Track & Structures Rehabilitation	$89	$108	$469	$666
Business Support	$52	67	$235	$353
Contingency	$13	$13	$53	$66
Total	**$950**	**$1,229**	**$3,821**	**$6,000**

Capital Program Structure

	FY2017	FY2018	FY19-22	Total
Capital Improvement Program	$950	$1,229	$3,821	$6,000
Investment Category				
Stations & Passenger Facilities	$133	$234	$629	$996
Station & Passenger Facility Programs				
Platforms & Structures	$46	$94	$170	$310
Fare Collection	$10	$34	$107	$152
Station Systems	$24	$37	$107	$168
Parking Facilities	$4	$8	$28	$41
Vertical Transportation	$48	$62	$233	$342
Vertical Transportation Projects				
Elevator Rehabilitation	$9	$9	$33	$50
Escalator Rehabilitation	$8	$13	$49	$69
Elevator/Escalator Repairables	$4	$6	$22	$32
Escalator Replacement	$28	$35	$128	$191

Next Steps

- October 2016
  - ✓ Draft prioritized list of capital needs
- November 2016
  - ✓ Develop Phase I CNI report
- December 2016 – January 2017
  - ✓ Distribute Phase I CNI report to GM and Board to inform CIP Development
- 2017 and 2018
  - ✓ Conduct Condition Assessments to inform CNI/CIP
- 2018 and Beyond
  - ✓ Annual CNI for Regular Updating of Forecasted Needs