



**Massachusetts Bay  
Transportation Authority**

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## **Lean at the MBTA**

**Quarterly update**

**May 13<sup>th</sup>, 2019**



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## Lean at the MBTA – Recap & Executive Summary

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- **What is Lean?** Lean is a systematic approach to continuous improvement by applying principles and tools to eliminate waste
- **Why are we here?** MBTA has an opportunity to address broken processes and inefficiencies
- **What is our opportunity?** By providing **collaboration tools and establishing approaches for employees** to solve problems together, we can create lean and efficient processes that generate **productivity** - creating bandwidth to invest in other critical needs for the MBTA
- **For FY19, goal is to achieve operationalized 5% (\$30M) productivity targets included in operating budgets** and ensure all employees have access to Lean tools and approaches
- **How are we doing?** Organization continues to manage to FY19 financial and operational expectations
  - 4 key Lean initiatives underway for highest potential/risk areas
  - ~420 number of people received White Belt Training (~185 MBTA)



## Key objectives for FY19 and example accomplishments to date

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- **4 main objectives for Lean in FY19:**

- Create tools & review processes to enable senior leadership to drive accountability

- Directly support 4 key initiatives in Vehicle Maintenance and E&M to help drive financial and operational results *FOCUS OF TODAY*

- Support Lean Liaisons throughout organization to drive own improvement initiatives
- Ensure all employees have access to tools and training to empower continuous improvement

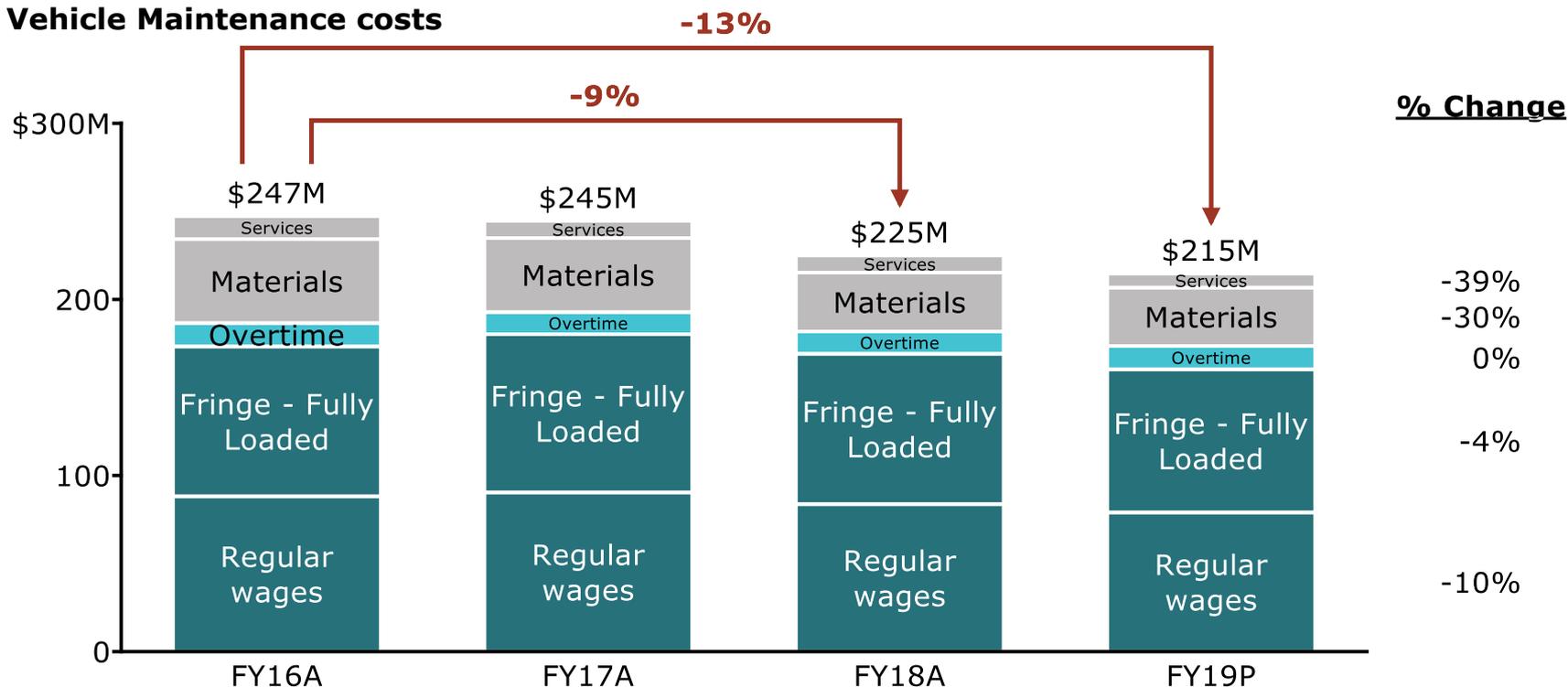
- **Example of major accomplishments over past months:**

- Southampton Bus Garage → wrapping up 8 month project and developed internal playbook to be used for other Bus Garages and Car Houses
- Everett Shops → completed 1:1 exchange pilot for critical component, and completed 56 new Standard Repair Times since start of FY19 (40% complete)
- Riverside Car House → completed 4 month initial project, establishing baseline and implementing improved processes and controls



## Vehicle Maintenance costs from FY16 to today

### Vehicle Maintenance costs



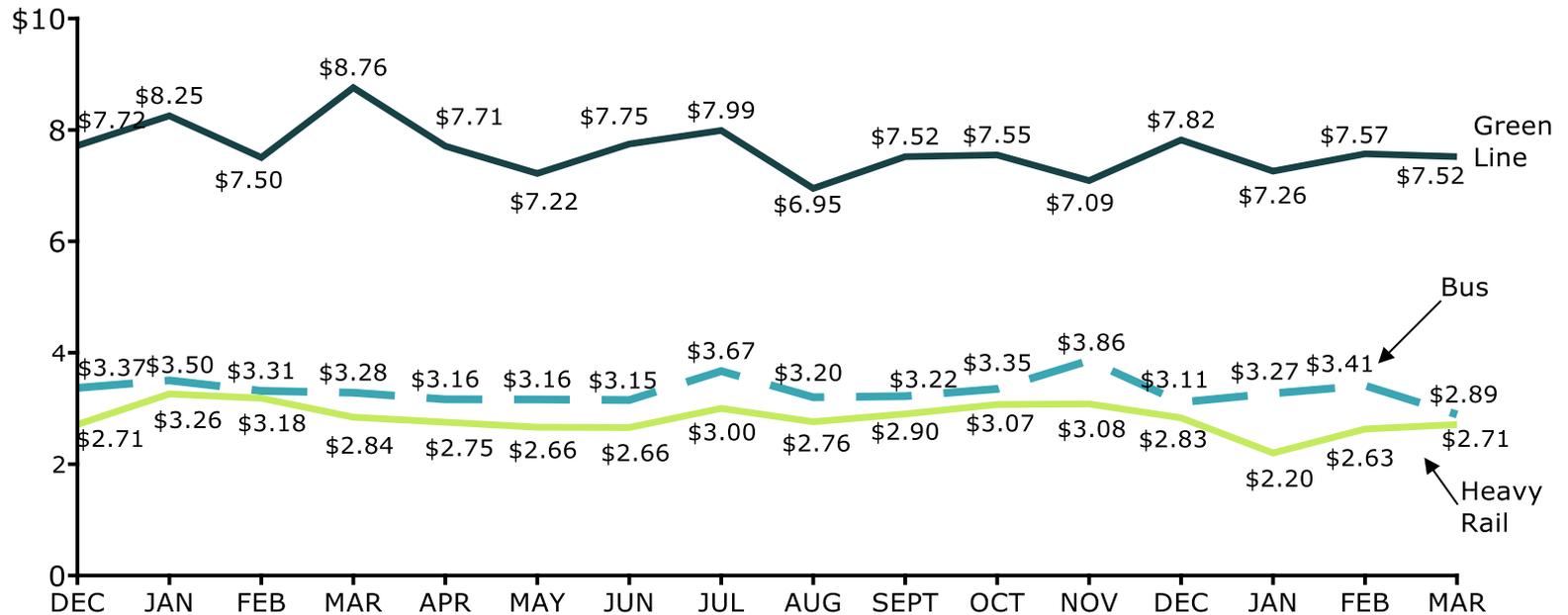
- 18% reduction in Bus Maintenance costs since FY16
- 10% reduction in Rail Maintenance costs since FY17

Note: Costs include Everett Bus & Rail shops, exclude Non-Revenue Shop, and excludes fuel; fully loaded fringe costs include pension costs if funded at 5% discount rate instead of 7.75% and retire health (OPEB) costs if fully funded; FY19P is FY19 YTD through March 31<sup>st</sup> plus run rate



## Fully loaded cost per mile trend – Dec. 2017 to Mar. 2019

Fully Loaded  
Cost per mile (\$)



Green Line MMBF (K)	9	10	10	8	9	7	6	6	4	5	6	7	9	10	10	15
Heavy Rail MMBF (K)	39	31	85	56	62	62	40	52	50	28	51	34	40	28	43	47
Bus MMBF (K)	24	25	26	27	23	19	19	24	30	19	23	21	24	27	24	28

Notes: Cost per mile for Bus include Everett Bus shop, exclude Non-Revenue Shop and North Cambridge, and exclude fuel and cleaning contract; CPM for Rail includes Everett Rail shop; fully loaded fringe costs include pension costs if funded at 5% discount rate instead of 7.75% and retire health (OPEB) costs if fully funded; Bus and Heavy Rail are weighted by mileage across garages/car houses  
Source: FMIS; MCRS2; Monthly Bus Report



## Targeted Lean efforts continue, areas of focus represent some of greatest challenges for Bus and Rail Maintenance

Focus	KPI	Q4 FY18 Avg.	Q1 FY19 Avg.	Q2 FY19 Avg.	Q3 FY19 Avg.	Q2 vs Q3 Δ	FY19 Target
Southampton <i>Bus Maintenance</i>	Cost per mile	\$6.12	\$5.32	\$5.59	\$5.60	↔	<\$5.00
	MMBF	13K	19.3K	8.0K	11.5K	↑	>12.5K
	SRT compliance	48%	69%	80%	86%	↑	>75%
Riverside <i>Rail Maintenance</i>	Cost per mile	\$7.56	\$7.57	\$7.54	\$7.45	↓	<\$7.00
	MMBF	7K	5K	7.2K	11.2K	↑	>5K
	SRT compliance	No SRTs	No SRTs	No SRTs	No SRTs	-	>50%
Everett Rail	Cost per mile	\$0.79	\$0.87	\$0.86	\$0.78	↓	\$0.80
	MMBF	(N/A)	(N/A)	(N/A)	(N/A)	-	(N/A)
	SRT compliance	No SRTs	No SRTs	9 New SRTs Created	9 New SRTs Created	↑	>50%

Draft for Discussion & Policy Purposes Only

Note: Total cost per mile includes fully-loaded fringe costs and Everett Allocation, Bus Maintenance costs also exclude Non-Revenue Shops and Fuel costs; Reservoir costs included in CPM listed for Riverside



## Lean Initiatives at Riverside

### Standardizing work

- Set **baseline** of current operations, processes, and overall skills, and **goal end state**
- Established **visual management boards** in each area to help with work handover and communicate work status
- Created **non-serialized parts tracker**
- Conducted **5S** throughout Car House

### Management best practices

- Launched “walk the floor” **checklists** for foremen and **weekly safety checklists** for supervisors
- Established **Lean Council** with weekly meeting cadence

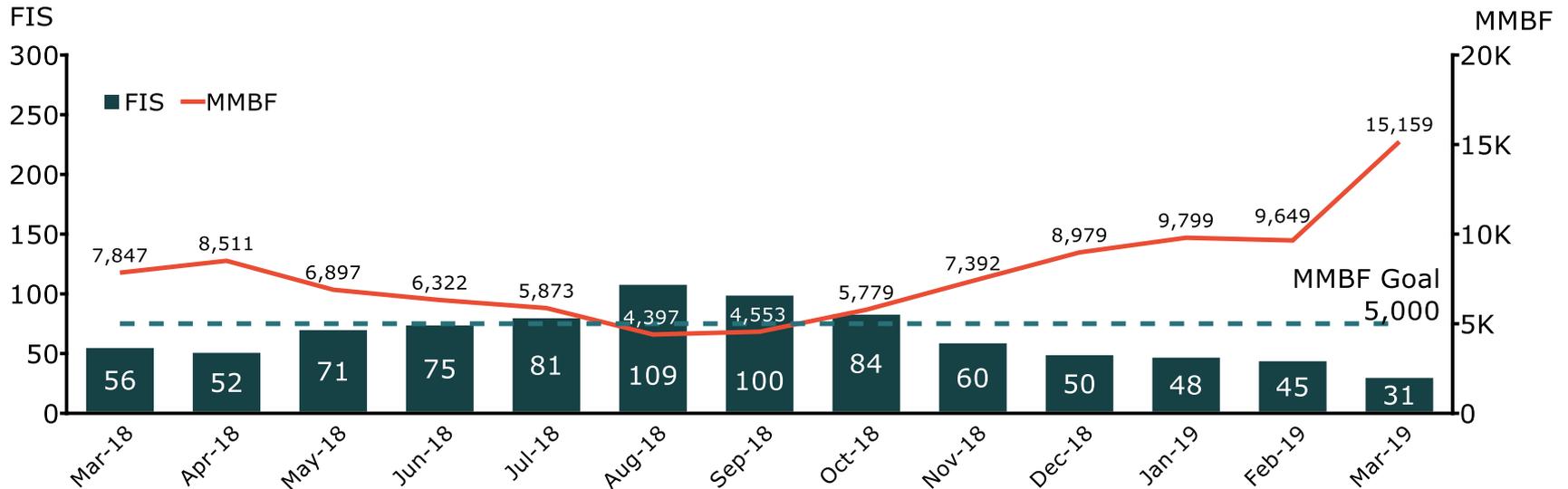
### Training

- Weekly training for all Lean Council members and foremen

FOREMAN:		REPAIRERS:		DATE
7 TRUCK		VIC / BARRY		5.9-19
TRUCK #	TASKS			Notes
19583	BRKN MTR BOAS			
	INSP			
	TRX BRK INSP			
24640	GB LEAK			
	INSP			
	TRX BRK INSP			
	WIRE BRKT			
6 TRUCKS		4 MTR	2 STR	PERMANENTLY OUT OF SERVICE
2 MTR TRKS			*	WAITING ON TIRE WORK
4 BACK TO BACK		2 MTR	2 STR	BACK TO BACK
NEED TIRES	+ INSPECTIONS			
	24640			
COLOR CODE				
GREEN	DONE			
YELLOW	WORKING			
SILVER	NEXT			
REMINDERS / SAFETY				
* 18 TRUCKS NEED TO BE REDUCED SAFETY PART OF AUSTON PROGRAM *				



## Example of impact from numerous related efforts at Riverside: Mean Miles Between Failures and Failures in Service



- Improved processes, tools, and communication recommended by Lean project which started in November 2018
- Completing multi-year Type 7s overhauls
- Began targeted evaluation and maintenance of Type 8 'worst performers'
- **Combined impact:**
  - 2-3x increase in MMBF
  - Reduction in CPM equates to \$500K/year annualized cost avoidance



## Next steps

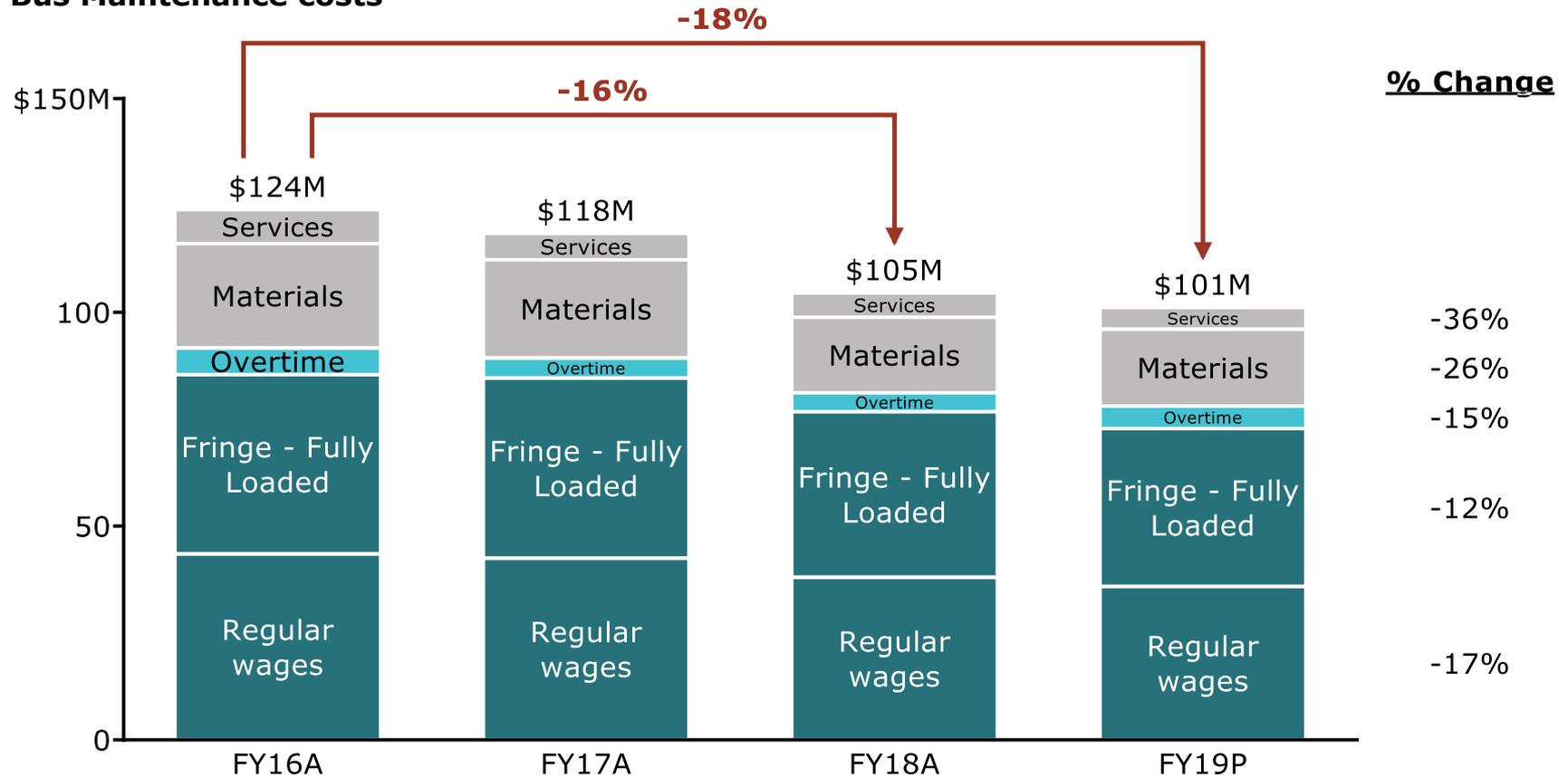
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- **Develop and plan for FY20 priorities and focus areas**, with deeper focus on process improvement:
  - **Engineering & Maintenance** processes, tools, and metrics (leveraging new asset management system)
  - **Orange Line** Vehicle Maintenance
  - **Procurement and Warehousing/Logistics** (with focus on impacts to Garages and Car Houses)
- Continue White Belt training, and procure **Green Belt training** as pilot
- Start **Standard Repair Times for Blue Line** (Vehicle Maintenance targeting Q3 FY20 start)



## Appendix: Bus Maintenance costs

### Bus Maintenance costs

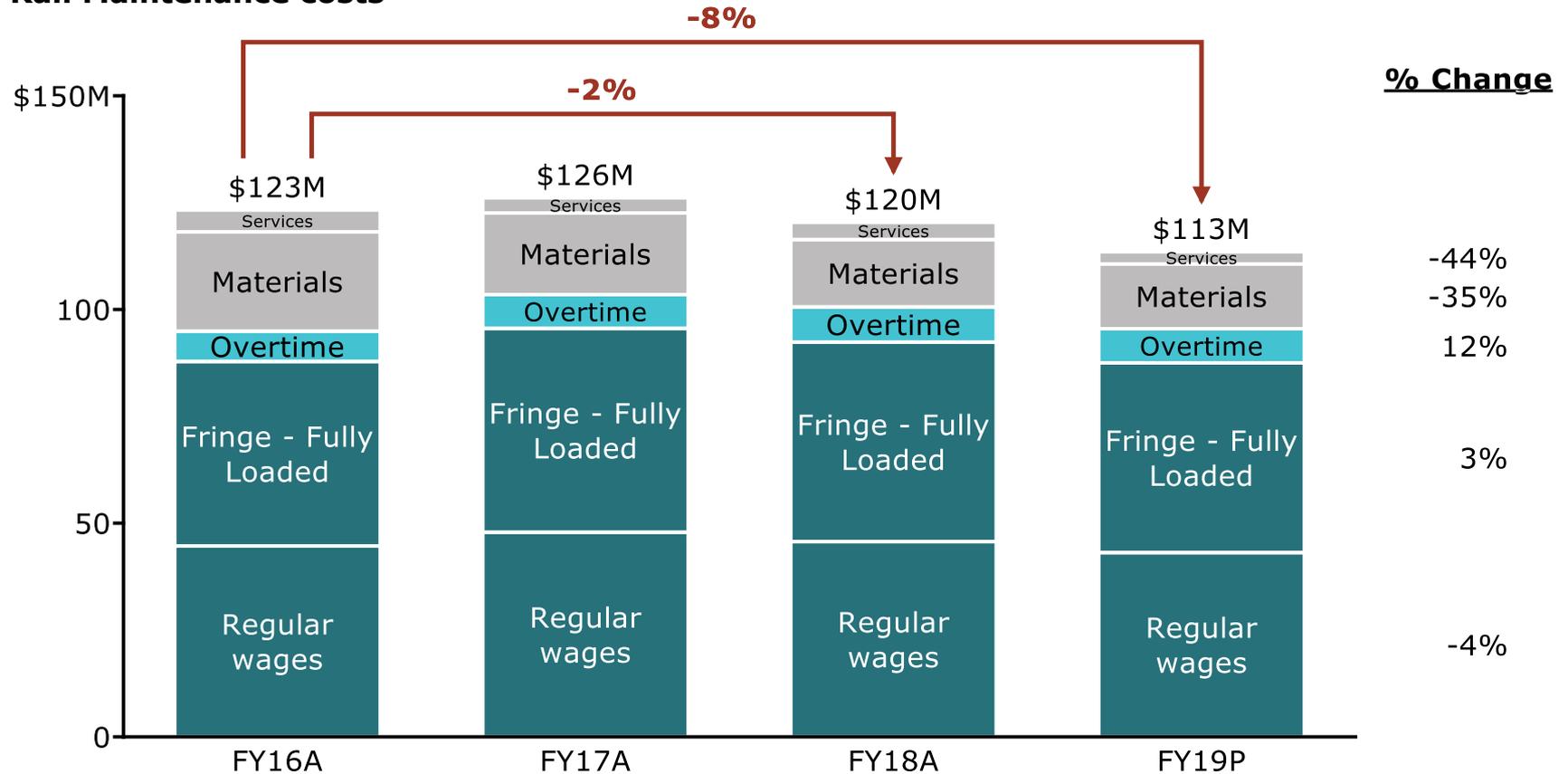


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## Appendix: Rail Maintenance costs

### Rail Maintenance costs



Note: Costs include Everett Rail shops, cleaning contract, and exclude fuel; fully loaded fringe costs include pension costs if funded at 5% discount rate instead of 7.75% and retire health (OPEB) costs if fully funded; FY19P is FY19 YTD through March 31<sup>st</sup> plus run rate