



### 3.1.e.1 Based on current funding levels, control the percent of ferry terminal systems that are past due for replacement from increasing over 6% by 2020 - Supplemental report

February 22, 2017



## Washington State Ferry Vessel and Terminals

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Maintenance

Control the percent of ferry vessel  
systems that are past due for  
replacement from increasing over  
10% by 2020

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Director, Terminal Engineering

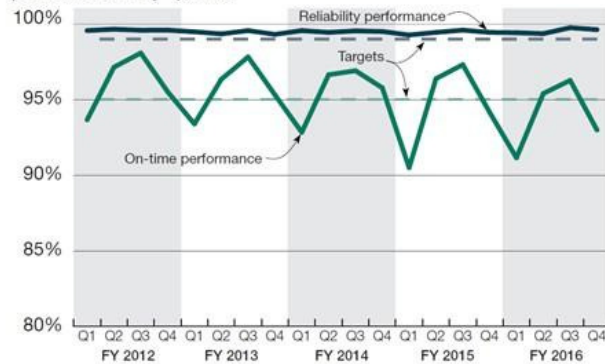
Control the percent of ferry terminal  
systems that are past due for  
replacement from increasing over 6%  
by 2020

## Background:

### Sustained System Reliability: *Getting people where they need to go, safely and reliably, every day and over the long term*

#### WSDOT ferries get people where they need to go safely and reliably over the long-term

Fiscal years 2012 through 2016; Trip reliability and on-time performance by quarter



Data source: WSDOT Ferries Division

Notes: Reliability and on-time goals are 99% and 95%, respectively.

**Performance Goals:** Established by a multi agency team with legislative oversight to provide a benchmark for Ferries Division Performance.

**On-Time Performance:** The percent of vessels leaving the terminal within 10 minutes of the scheduled departure time.

**Service Reliability:** The percentage of sailings compared to the number of scheduled sailings.

#### Service Statistics:

- 162,000 trips per year
- 910,600 miles traveled in 2016
- 22 ½ hours of service each day on some routes

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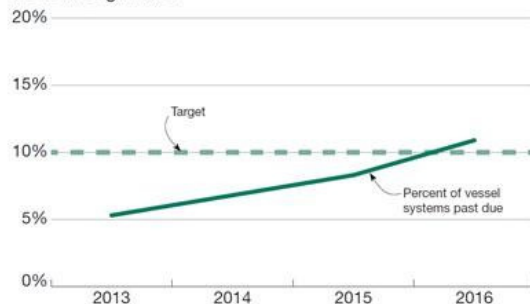
### 3.1.e.2: Control the percent of ferry vessel systems that are past due for replacement from increasing over 10% by 2020

## Current State: Trending Away From Goal

#### Steady Degradation of Fleet Condition

- Over last 10 years, preservation investment averaged 50% of the documented need
- Since 2010, five new vessels have been built; two more will be built by 2018
- Impact of deferred preservation is reduced vessel reliability and increased maintenance and related operations costs
- Attainment of 60 year service life is unlikely

#### Percentage of ferry vessel systems past due for replacement 2013 through 2016



Data source: WSDOT Ferries Division

#### Vessel Age and Preservation Backlog 2016

Class	Vehicle Capacity	Count	Average Age (yrs)	Preservation Backlog (\$M)
Olympic	144	2	2.5	0
Kwa-di Tabil	64	3	6.3	2.9
Jumbo Mark II	202	3	19.3	36.9
Issaquah	124	6	36.5	66.5
Jumbo	188	2	45	27.8
Super	144	4	50	109.6
Evergreen State	87	2	58.5	25.7
		22	32.2	269.3



## Problem/Opportunity: Preservation Program Challenges



- Funding levels are constrained
- Requirements are not even across biennia
- Requirements continue to increase (9% annually over past 3 years)
- Vessel availability is limited by service requirements and fleet size
- Demand for shipyards exceeds capacity
- Emergent work such as emergency repairs and regulatory requirements preclude essential preservation and maintenance
- Current ten year need is \$639.1M

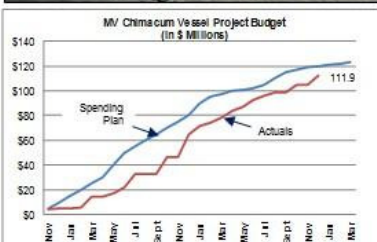
### Projected Preservation Backlog Without Vessel Replacements (\$M)

Vessels	Pre-2017	17-19	19-21	21-23	23-25*	25-27*
New Preservation Needs		109.8	67.3	79	58.8	54.9
Preservation Plan*		65.1	66.1	88.1	137.7	93.8
Backlog change, increase in red		44.7	1.2	(9.1)	(78.9)	(38.9)
Cumulative Backlog	269.3	314	315.2	306.1	227.2	188.3

\* Plan is unconstrained beginning in the 23-25 Biennium

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## Problem/Opportunity: New Construction Program



- Kwa-di Tabil Class – Three 64-car ferries (2010-2012)
- Olympic Class – Four 144-car ferries (2012-2018)
  - MV Tokitae and MV Samish completed on schedule and within budget
  - MV Chimacum is 96% complete, ahead of schedule and within budget
  - MV Suquamish is 40% complete, ahead of schedule and within budget
  - Shipbuilder demobilization is beginning – 166 jobs affected
- Next Program – Replace Tillikum and three Super Class ferries
  - Gap in program construction for new RFP development in 17-19 Biennium
  - Validate requirements and update Long Range Plan
  - Consider alternative designs
  - New RCW requirements apply

### Projected Preservation Backlog With Vessel Replacements (\$M)

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Backlog change, increase in red		44.7	1.2	(9.1)	(78.9)	(38.9)
Vessel Replacements		(52.4)		(10.5)	(20.6)	(20.5)
Cumulative Backlog	269.3	261.6	262.8	243.2	143.7	84.3
Vessels Replaced		Hyak, Klahowya		Tillikum	Kaleetan	Yakima

\* Plan is unconstrained beginning in the 23-25 Biennium

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## Strategies: Identify and implement low cost high impact activities to improve reliability



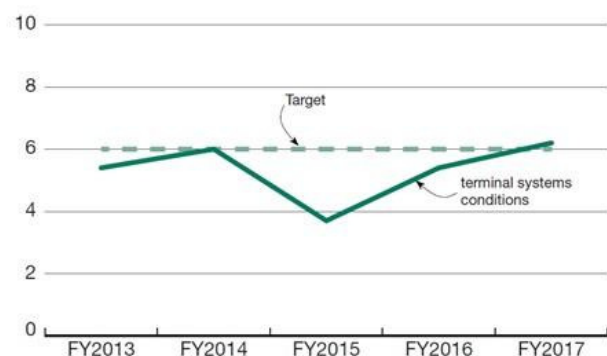
- Prioritize preservation investments to address greatest risks
- Improve Preservation program execution
- Maximize the benefit of our limited excess vessel capacity to support preservation and protect service
- Continue Hull Inspection program
- Cooperate with industry partners to share limited shipyard capacity
- Promote expansion of shipyard capacity
- Strengthen vessel maintenance & reliability program
- Further develop engine and deck training programs
- Fully leverage Eagle Harbor Maintenance Facility

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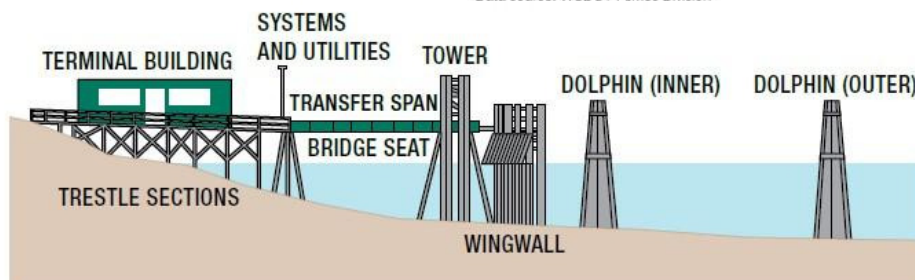
## Current State: Trending Away From Goal

- Terminal assets past due for replacement, or backlog, is projected to increase from 5.4% in 2016 to 6.2% in 2017
- This is slightly over the goal of 6%

Percent of terminal systems past due for replacement  
Fiscal years 2013 through 2017



Data source: WSDOT Ferries Division



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## Current State: Goal on Track!

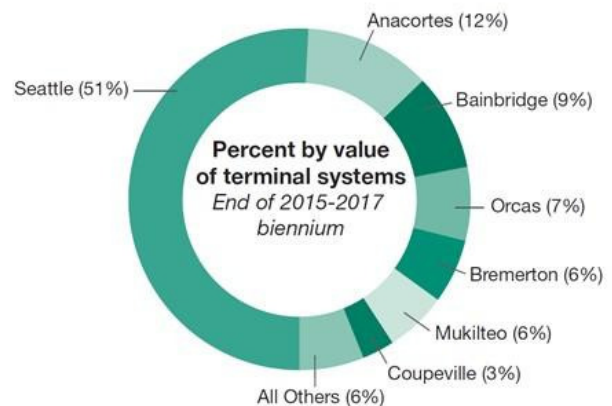
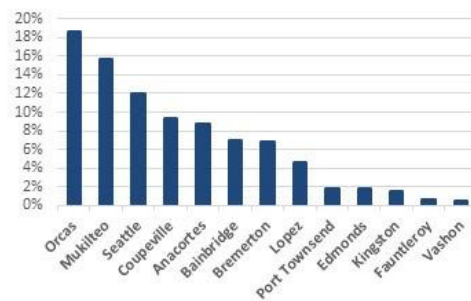
The top bar chart shows percent of systems that are past due by Terminal

- Orcas Ferry Terminal has almost 19% its assets that are past due for replacement
- Mukilteo and Seattle have 14% and 12% respectively

The pie chart shows the percent by value of terminal systems that are past due for replacement

- Seattle has the greatest value of backlog, comprising of over 50%. Seattle is our largest ferry terminal, therefore it contains the most assets.
- Does not included the seismic risk assessment results
  - This is likely to increase the backlog

Percent of systems past due by Terminals

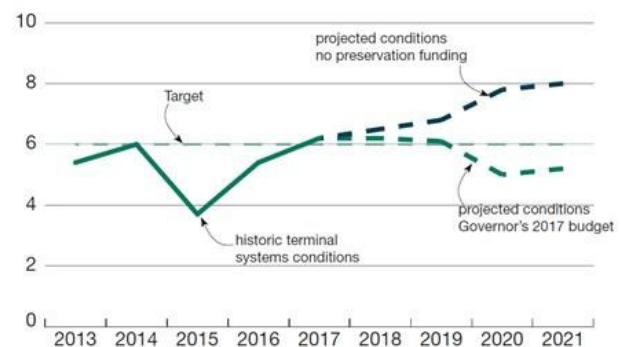


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## Problem/Opportunity:

- 2017 Governor's Budget supports backlog reduction
- Connecting Washington provides funding to replace the following Terminals:
  - Seattle Terminal \$86 million
  - Mukilteo Terminal \$70 million
- Terminal Engineering is applying risk based economic model that identifies the optimal service life for aging assets based on balancing the trade-off between risk and preservation spending.
- The model quantifies risk from the perspective of riders and other stakeholders.
- The model allows the program to prioritize preservation spending.
- Without preservation the backlog will increase

Percent of terminal systems past due for replacement  
Fiscal years 2013 through 2021



Data source: WSDOT Ferries Division

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## Strategies: Identify and implement low cost high impact activities to improve reliability

**Terminal Vehicle Transfer Span Operational Check Report**

Terminal: \_\_\_\_\_ Slip #: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name of Attendee: \_\_\_\_\_ Title: \_\_\_\_\_

Item #	Question	Answer	Notes, if needed
<b>A. HYDRAULIC APRONS</b>			
1.	Operate apron full range. Any unusual noise?	Y / N / NA	
2.	Is hydraulic fluid level OK?	Y / N / NA	
3.	Visible leaks in HPU cabinet?	Y / N / NA	
4.	Visible leaks at hoses or piping?	Y / N / NA	
5.	Leaks on hydraulic rams?	Y / N / NA	
<b>B. CABLE APRON</b>			
1.	Not Applicable to this terminal		
<b>C. TRANSFER SPAN (BRIDGE) / HYDRAULIC PINS</b>			
1.	Visible links or odd wrap in cable on drum?	Y / N / NA	
2.	Operate bridge full available range. Any unusual noise?	Y / N / NA	
3.	Cable spools properly during operation?	Y / N / NA	
4.	Sheaves turn freely?	Y / N / NA	
5.	Lower the span. Is the brake holding?	Y / N / NA	
6.	Counter weights (CW) travel freely?	Y / N / NA	
7.	CW Sheaves turn freely?	Y / N / NA	
8.	Leaks at motor or gear box?	Y / N / NA	
9.	Leaks in hydraulic pins? Or Manual Pins move without binding?	Y / N / NA	
10.	All control panel lights work?	Y / N / NA	
<b>D. ADDITIONAL INFORMATION OR PROBLEMS</b>			
1.			
2.			
3.			
4.			
5.			
6.			

The cursory inspection of the transfer span is completed, and all abnormalities have been documented. Check Performed By: \_\_\_\_\_ Date: \_\_\_\_\_

I have reviewed the completed check report and have taken necessary action on any abnormalities that have been reported. Supervisor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Any questions, comments, or suggestions, please contact Tom Custor at [custor@wsdot.wa.gov](mailto:custor@wsdot.wa.gov)

- Annual tracking of asset failures.
- Investigate repeated critical asset failures.
- Develop targeted strategies to avoid future failures.

### Examples:

- Operating staff use moveable bridge systems checklists regularly.
- Monthly generator inspections
- Increase network connectivity of bridges

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## Strategies: Implement maintenance activities focused on life extensions

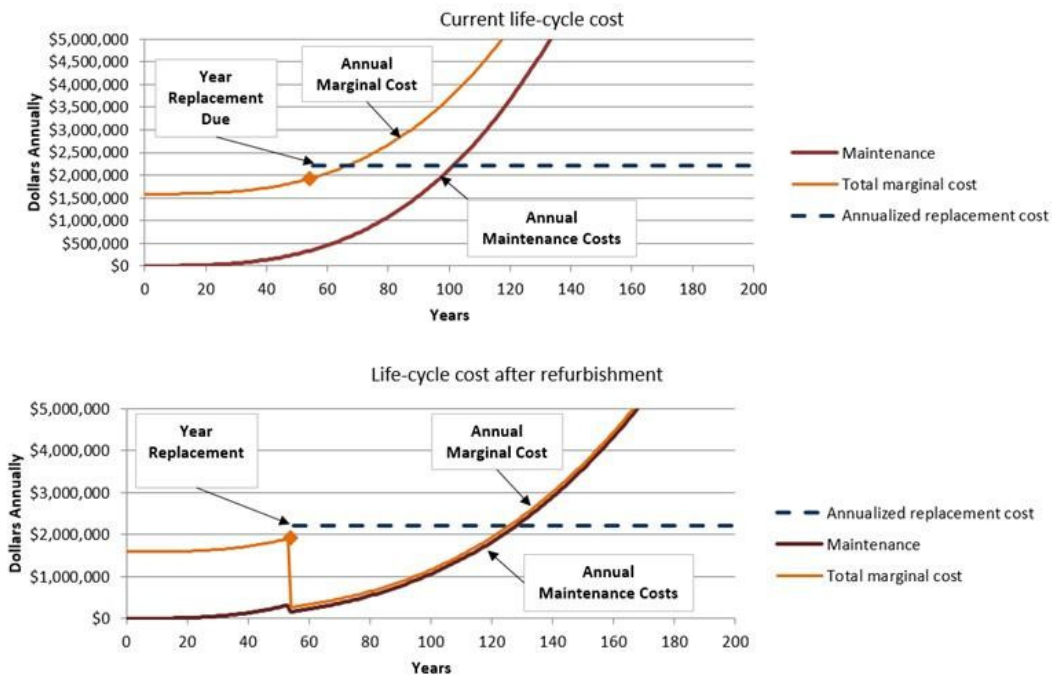
- Inspect critical assets and track condition
  - 68% (514 assets) of all Terminal assets were completed in 2016
  - WSDOT Ferries inspections terminal assets on a two year cycle
- Adapt maintenance plan based on inspection findings
- Extend the useful life of systems by painting
  - 7 assets painted in 2016



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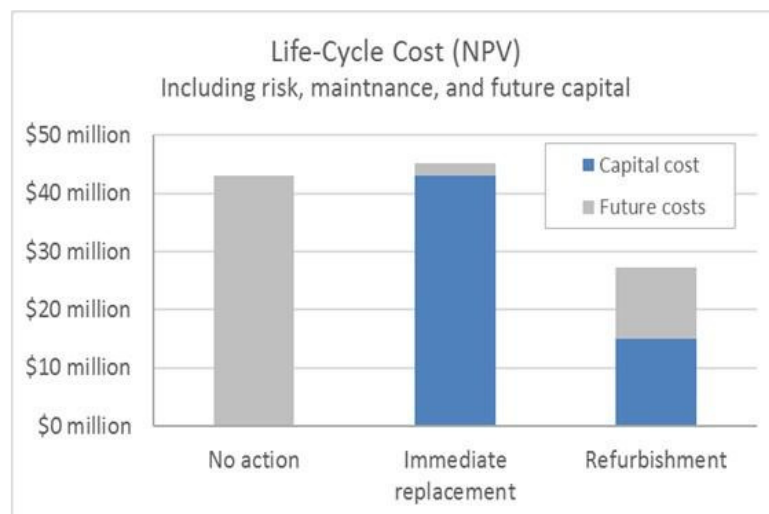


**Strategies:** Identify lower cost solutions that address the problem (Vashon Trestle)



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**Strategies:** Identify lower cost solutions that address the problem



- Saves \$28 million in near-term capital spending over replacement.
- Life-cycle cost savings, including risk and maintenance:
  - \$16 million compared to no action.
  - \$18 million compared to immediate replacement.

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## Assistance Needed:

- Thank you for your support:
  - Connecting Washington Transportation Funding package
    - Funding the construction of the MV SUQUAMISH
    - Colman Dock and Mukilteo terminals
- Continued support for:
  - Practical Solutions: Asset Management
    - Vessel preservation, new construction and maintenance programs
    - Risk-based asset management program for Ferry Terminals
  - Workforce Development
    - Fully leverage Eagle Harbor Maintenance Facility for Ferry Vessels and Terminals
    - 2016 Recruitment and Retention Study
  - Inclusion
    - Local Partnerships & Community Engagement
    - Shipbuilding and ship repair industry
    - Ferry Advisory Groups

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