

# Alaskan Way Viaduct **REPLACEMENT** PROGRAM

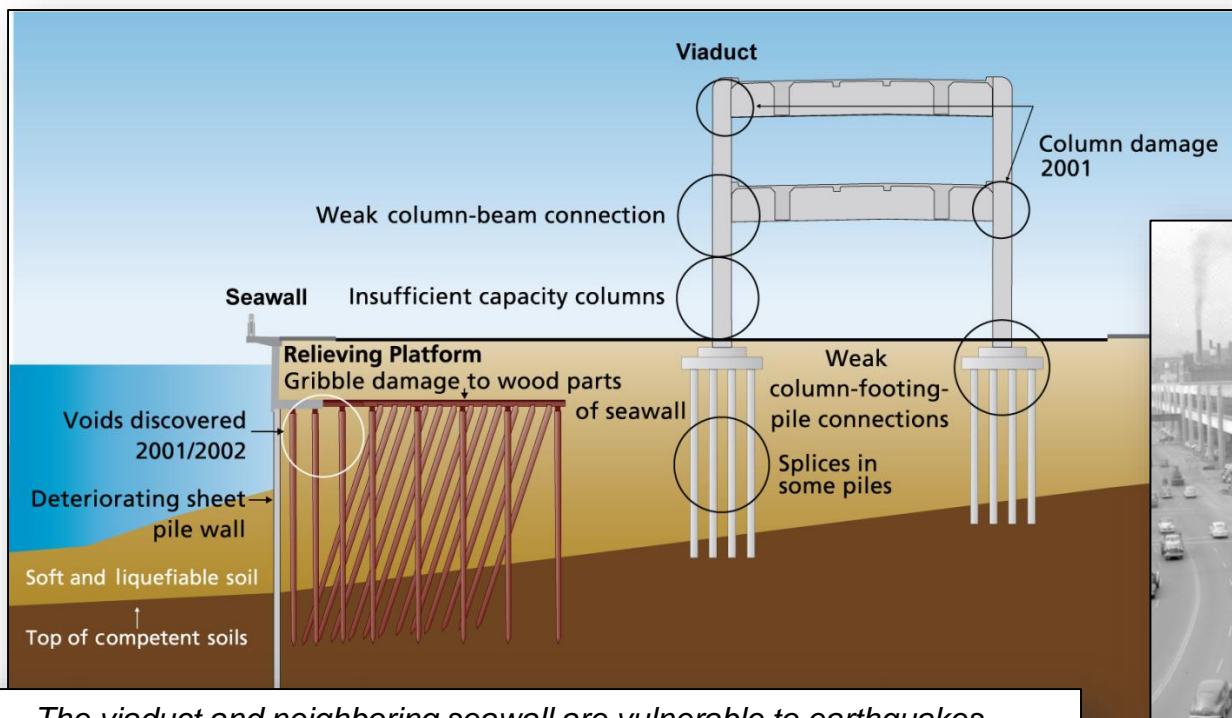


**Western Bridge Engineer's Seminar 2015**  
**Seattle's Not-So-Boring SR99 Bored Tunnel Project**  
**Tim Moore PE, SE**

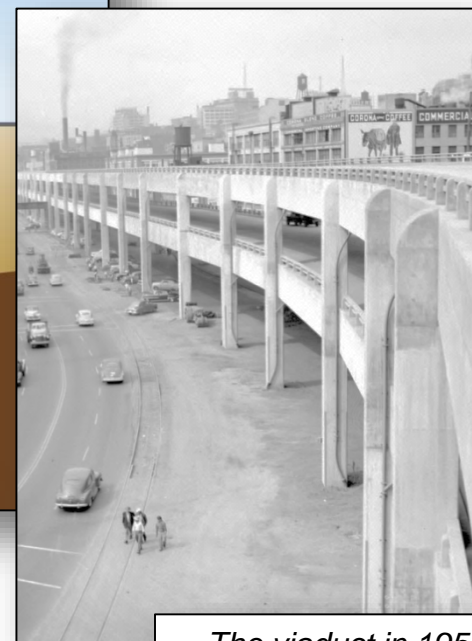
*Project Location -* **SEATTLE**



This is a **SAFETY** project



*The viaduct and neighboring seawall are vulnerable to earthquakes*

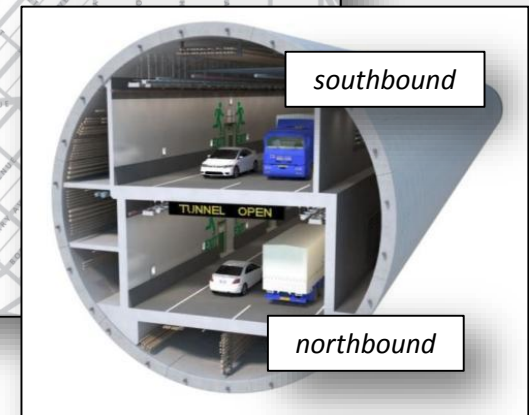


*The viaduct in 1953*





*Building a new* **SR 99**  
**Corridor**





# BUDGET *overview*



= \$3.1 billion

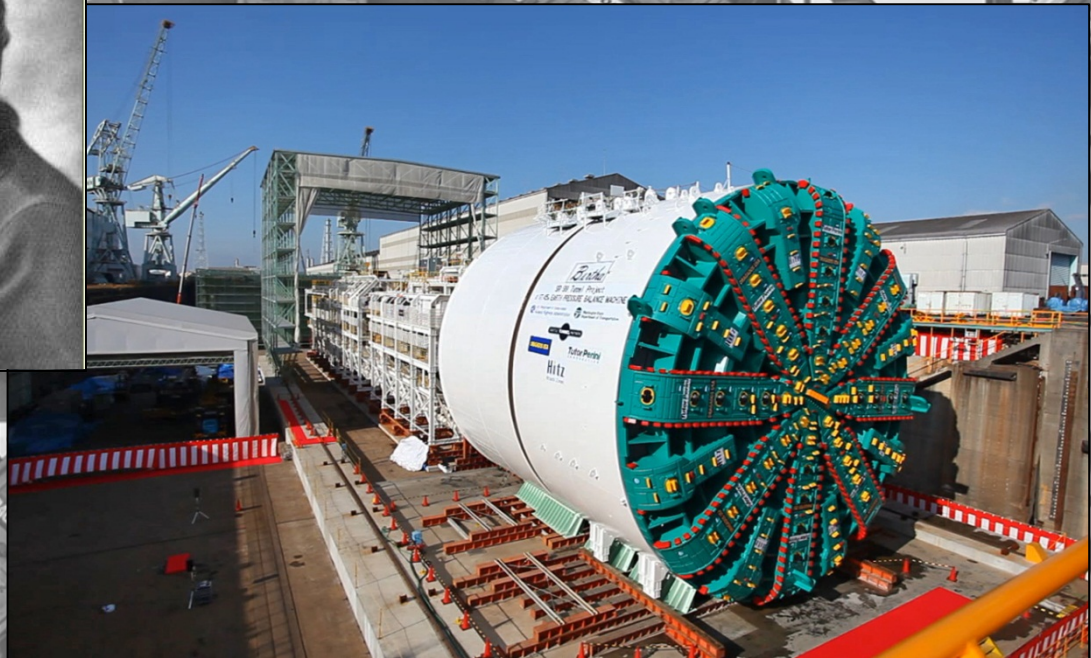


# SR99 Bored Tunnel Design-Build Contract

## Alaskan Way Viaduct Bored Tunnel Contract

- Tunnel Boring Machine, TBM
- Access Shaft
- Modular Lift Gantry
- Bearing and Seal Replacement
- Current Work
- Tunneling Start

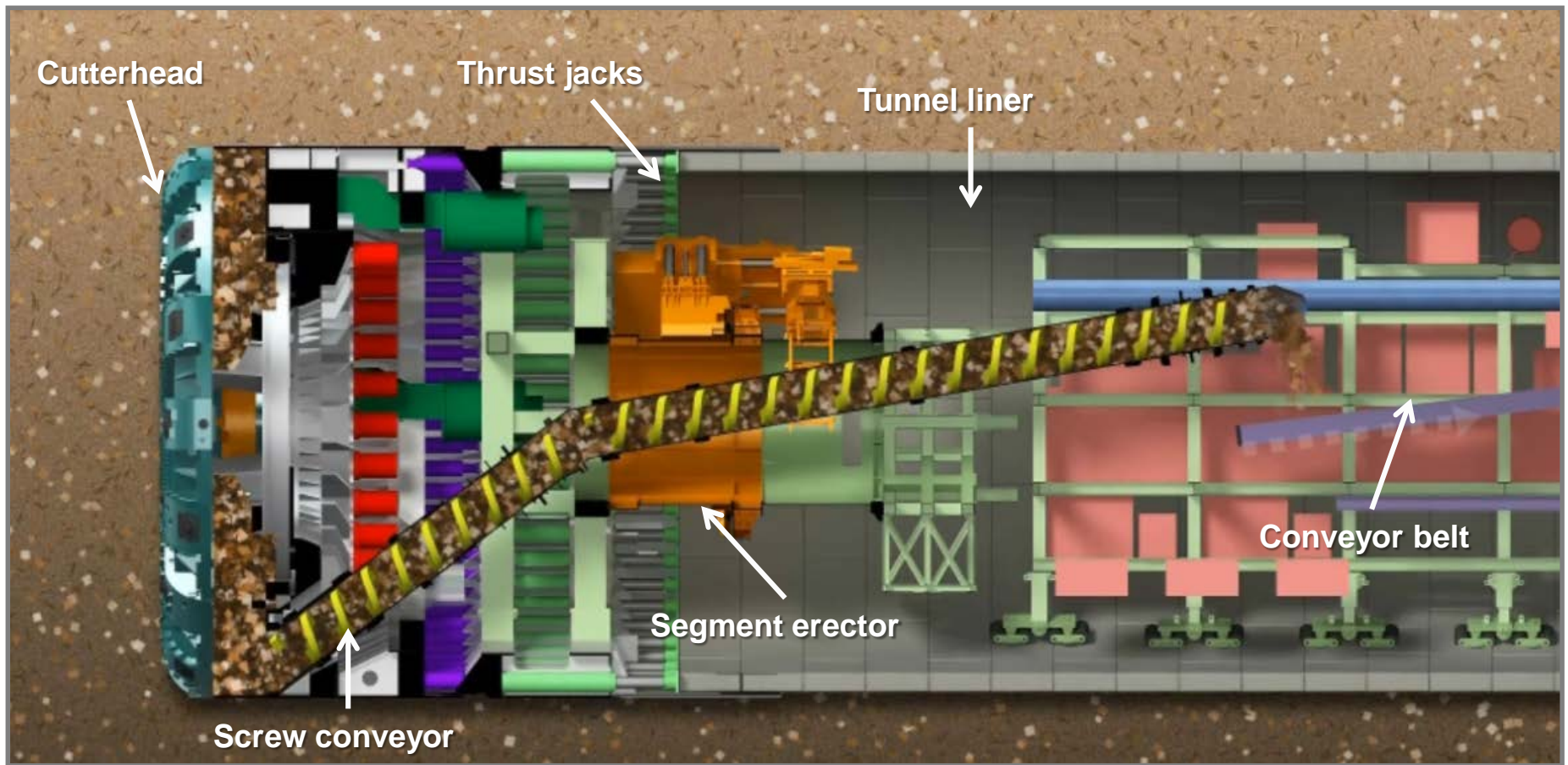
# About **Bertha**



## Vital stats:

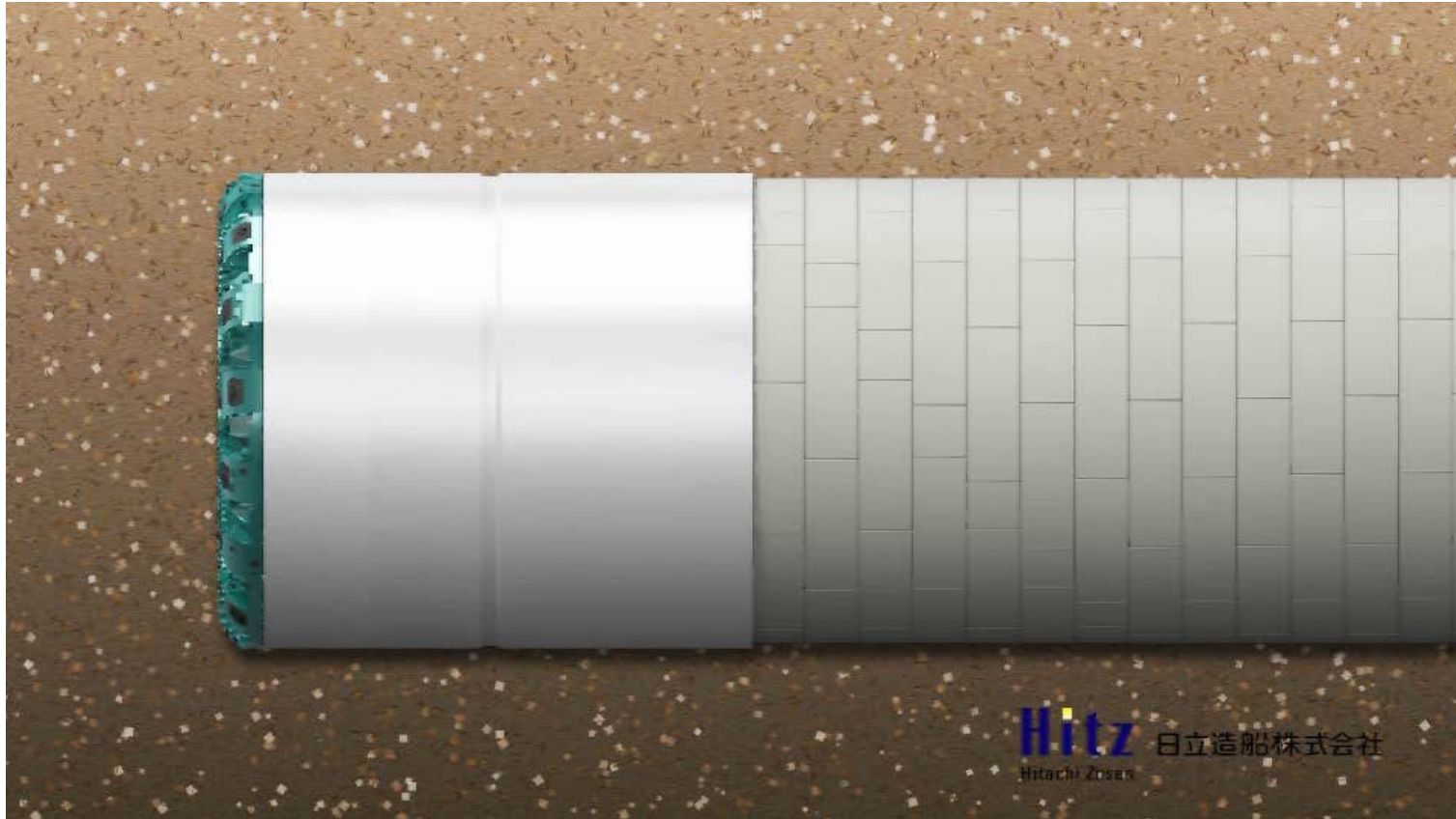
- 57.5 feet in diameter
- 326 feet long
- Nearly 7,000 tons





*Meet*

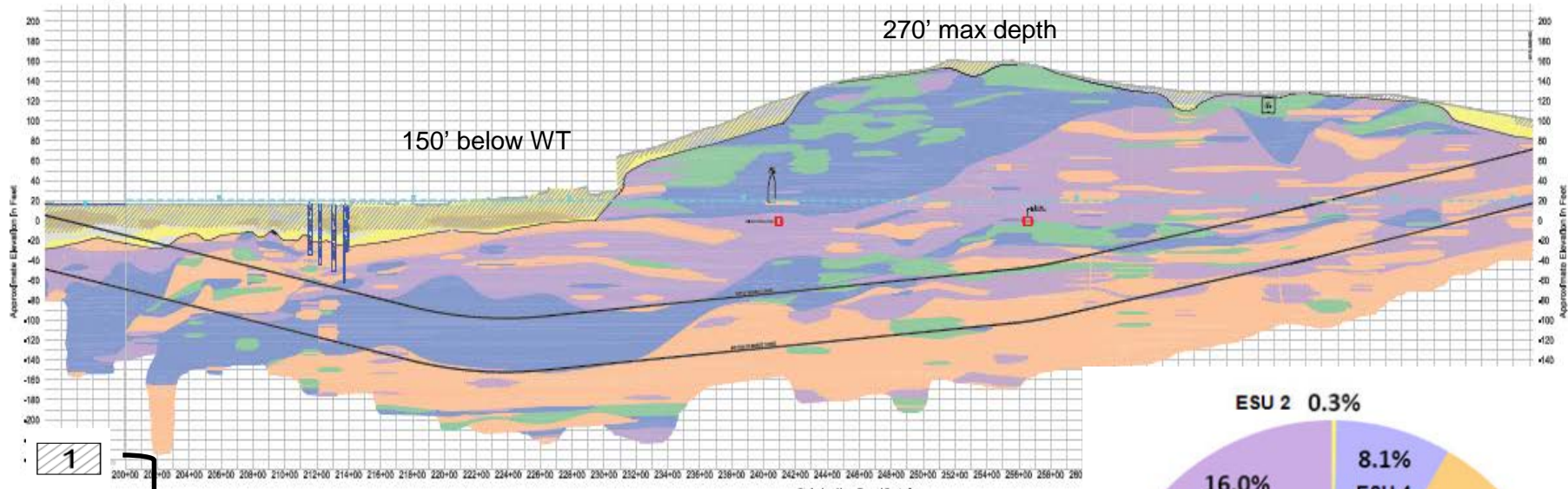
**BERTHA**



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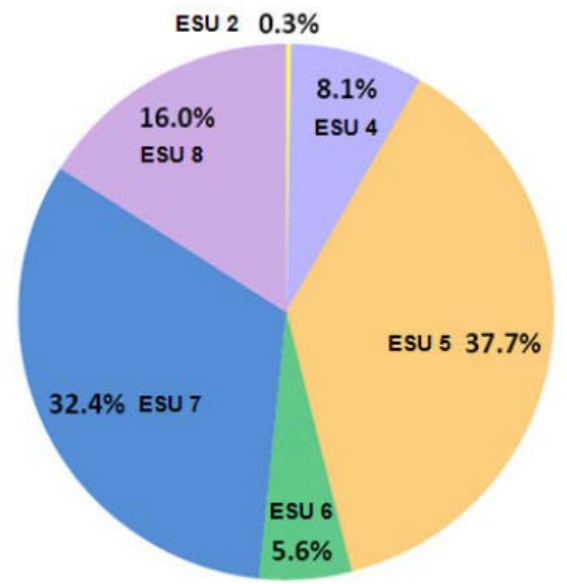
*Understanding*

**BERTHA**



- 1 } Poor, unconsolidated soils
- 2 }
- 3 }

- 4 Till deposits
- 5 Cohesionless sand and gravel – regional aquifer
- 6 Cohesionless silt and fine sand
- 7 Cohesive clay and silt
- 8 Till-like deposits



# GEOLOGIC *Profile*



# On Dec. 6, 2013,

just hours after the machine passed the 1,000 foot mark ...

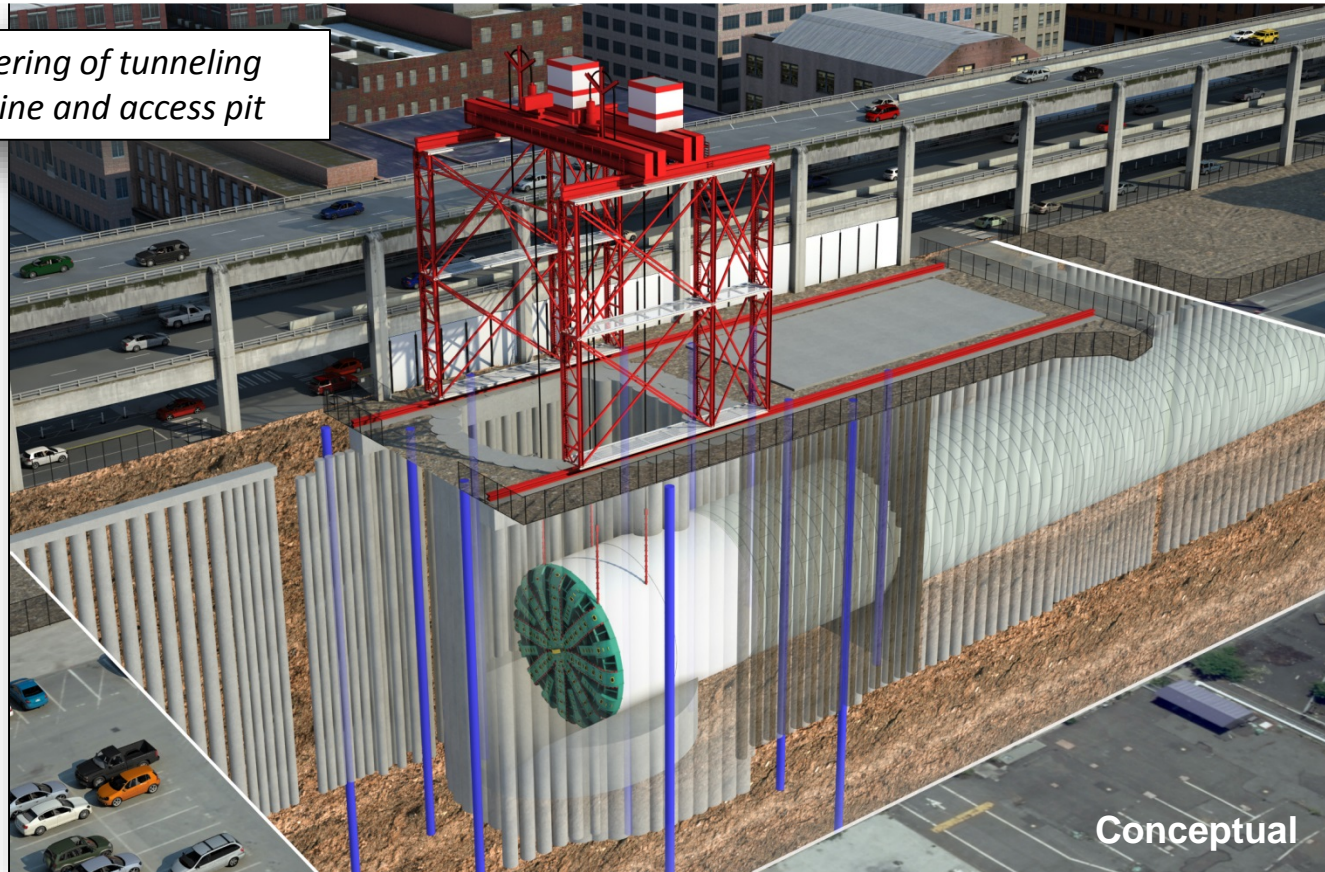
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Crews stopped tunneling after measuring increased temperatures in the machine



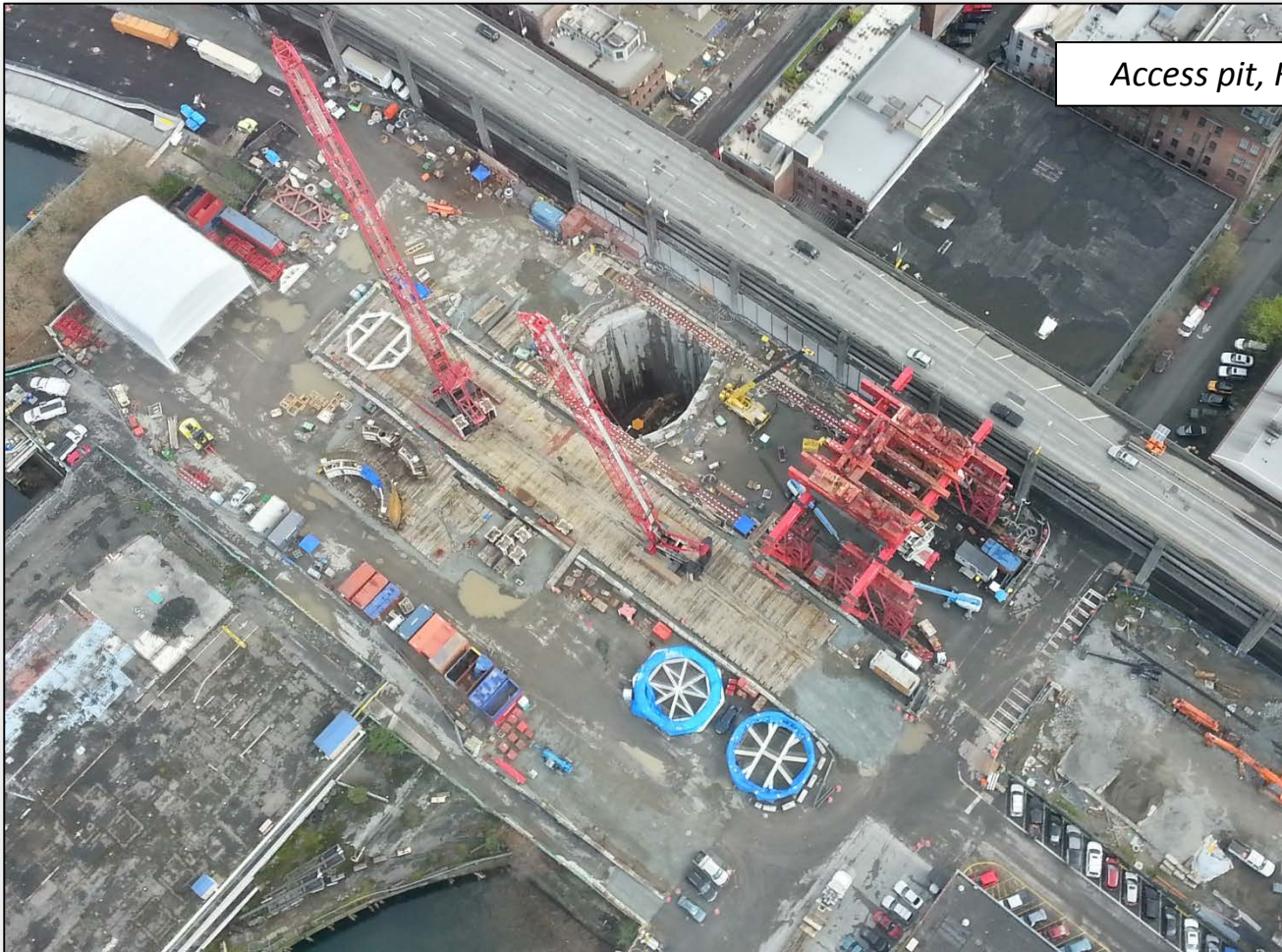
*Rendering of tunneling machine and access pit*



*Repairing*

**BERTHA**

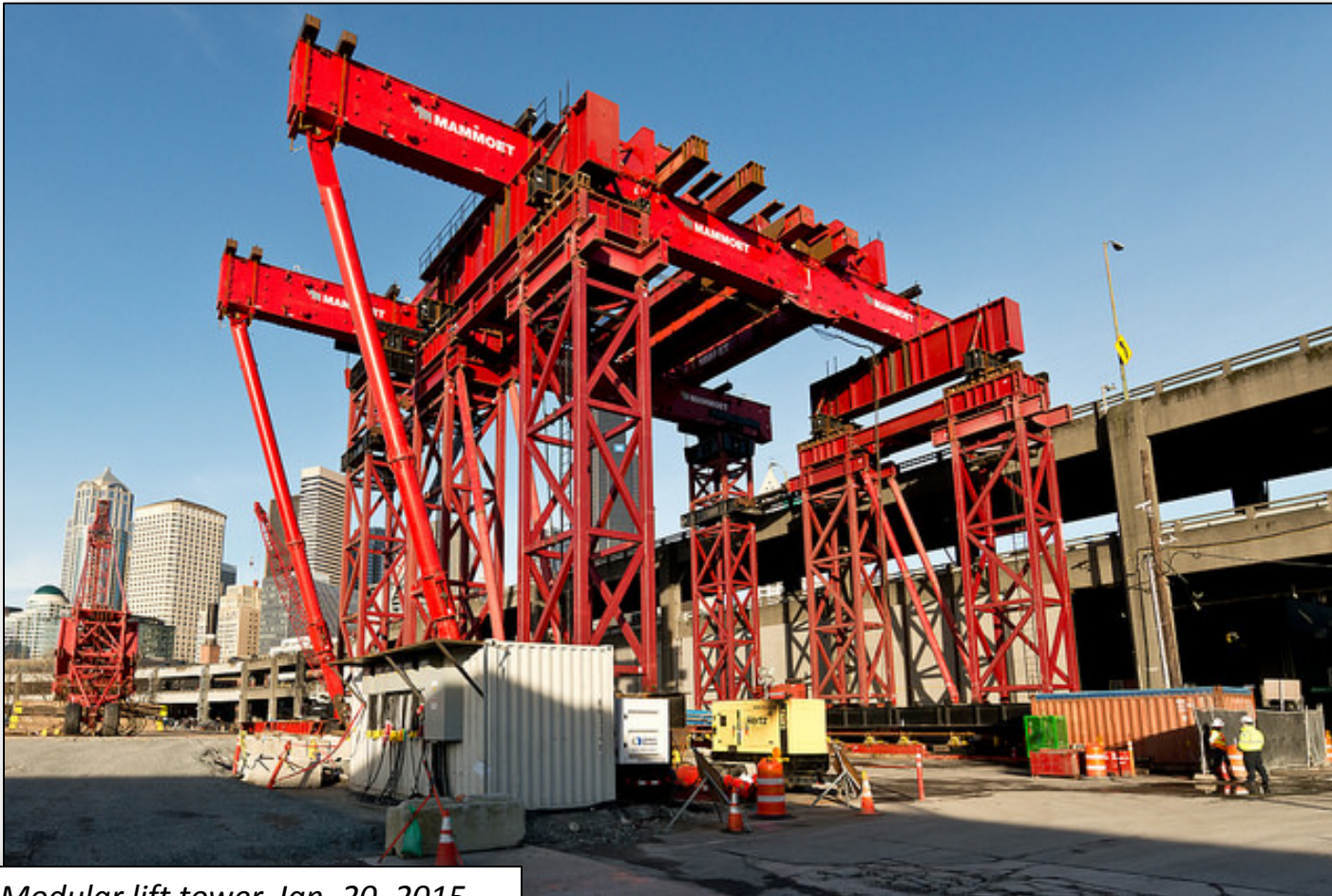
*Access pit, February 2015*



*Repairing*

**BERTHA**





*Modular lift tower, Jan. 20, 2015*

## Mammoet

- Skid track
- 48 rams equalize load
- Strand jacks (2200 tons)

*Repairing*

# BERTHA



*Access pit excavation,  
Jan. 7, 2015*

*Repairing*

**BERTHA**





*Bertha's breakthrough,  
Feb. 19, 2015*

# BERTHA

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*reaches daylight*



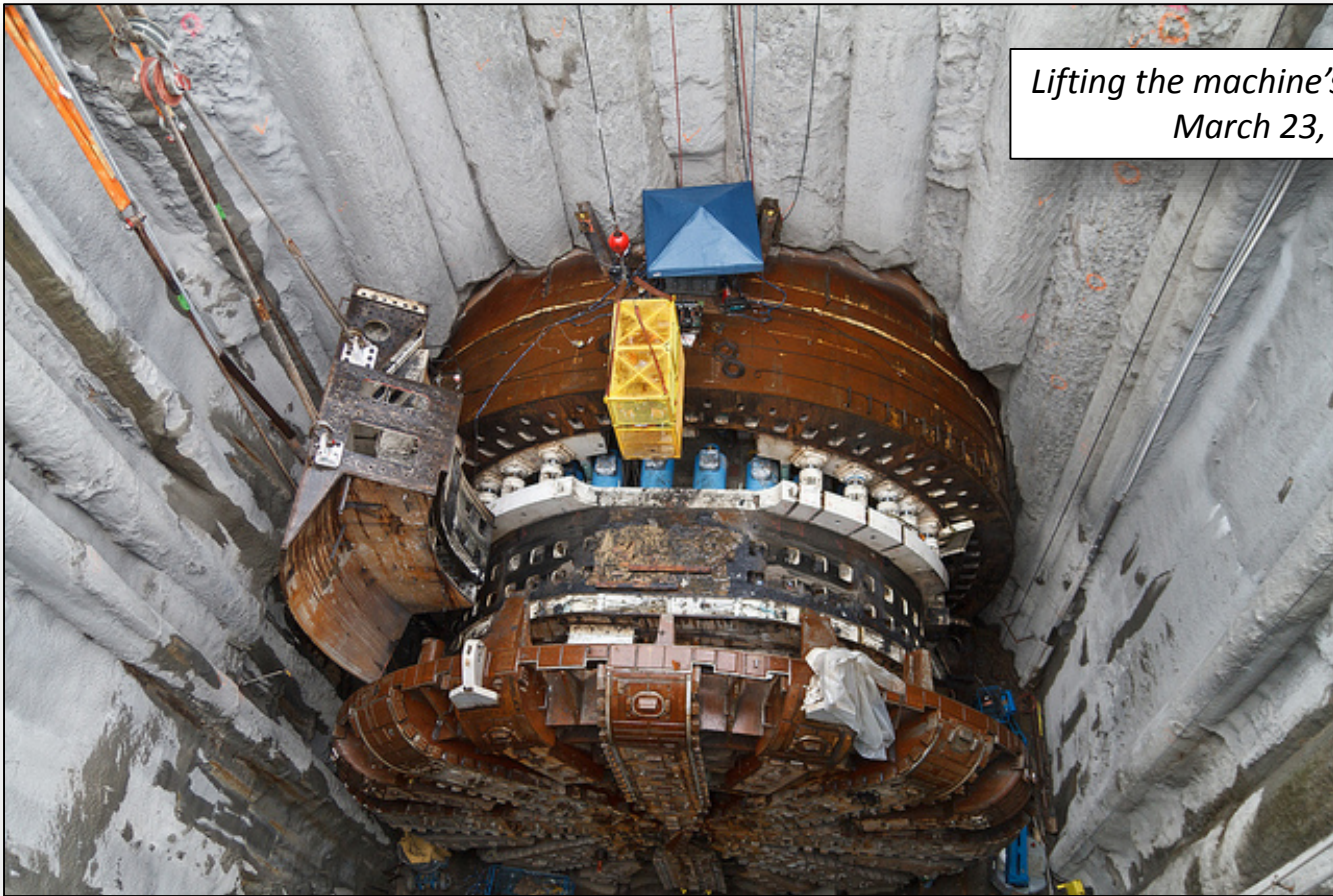


*Bertha's breakthrough,  
March 4, 2015*

# BERTHA

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*reaches daylight*



*Lifting the machine's shield pieces,  
March 23, 2015*

# BERTHA

*reaches daylight*



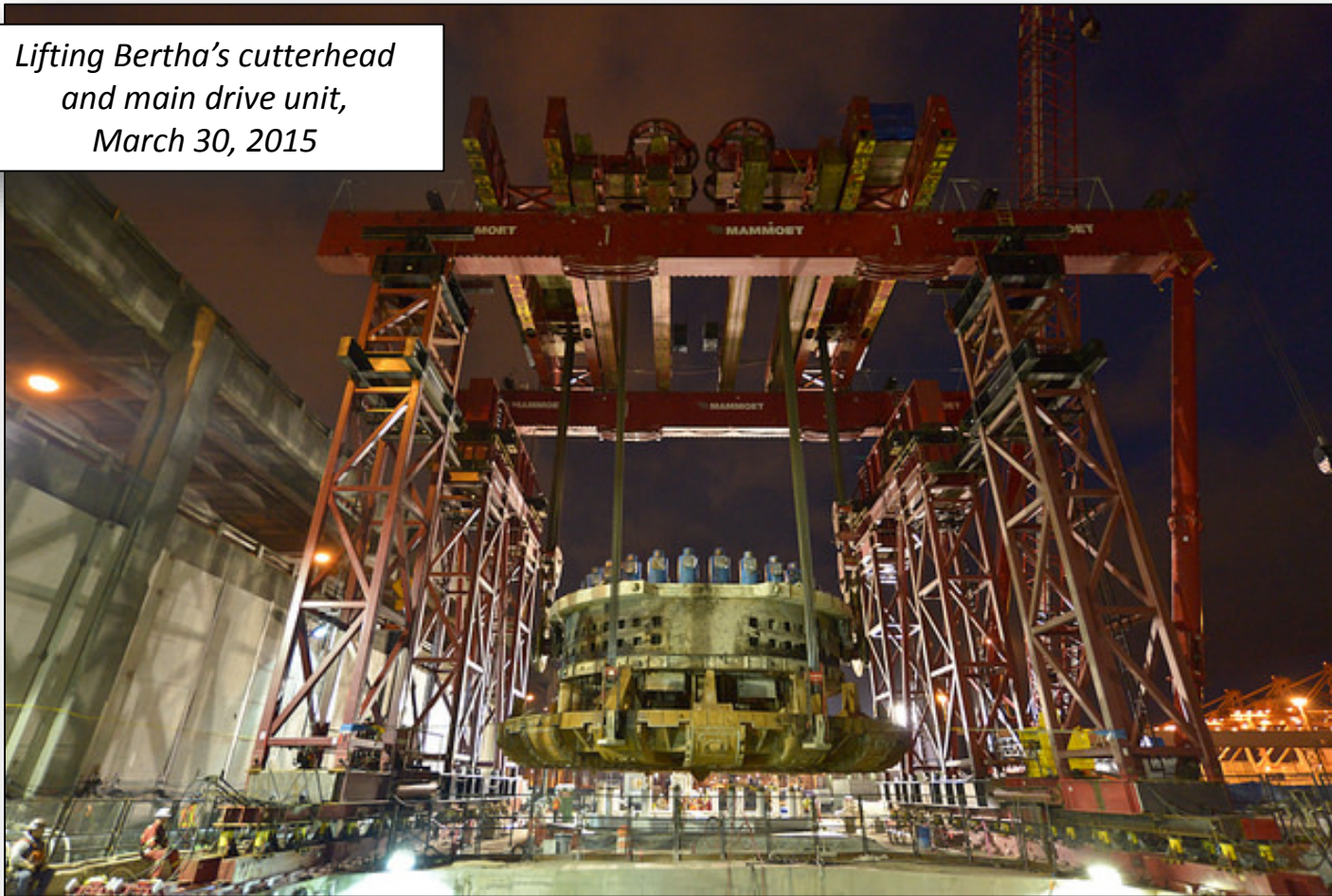


*Lifting Bertha's  
cutterhead and main  
drive unit,  
March 30, 2015*

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**BERTHA** *reaches daylight*

*Lifting Bertha's cutterhead  
and main drive unit,  
March 30, 2015*



*Repairing*

**BERTHA**





*The drive unit is removed  
from the cutterhead  
April 3, 2015*

*Repairing*  
**BERTHA**



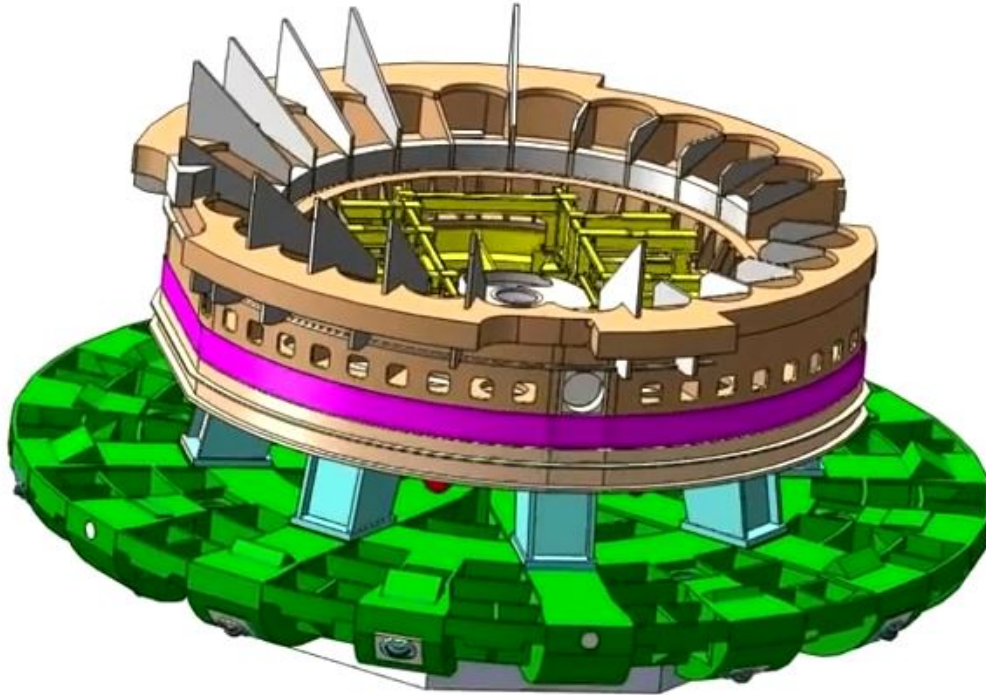
*SR 99 tunneling machine  
repairs June 4, 2015*

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*Repairing*  
**BERTHA**

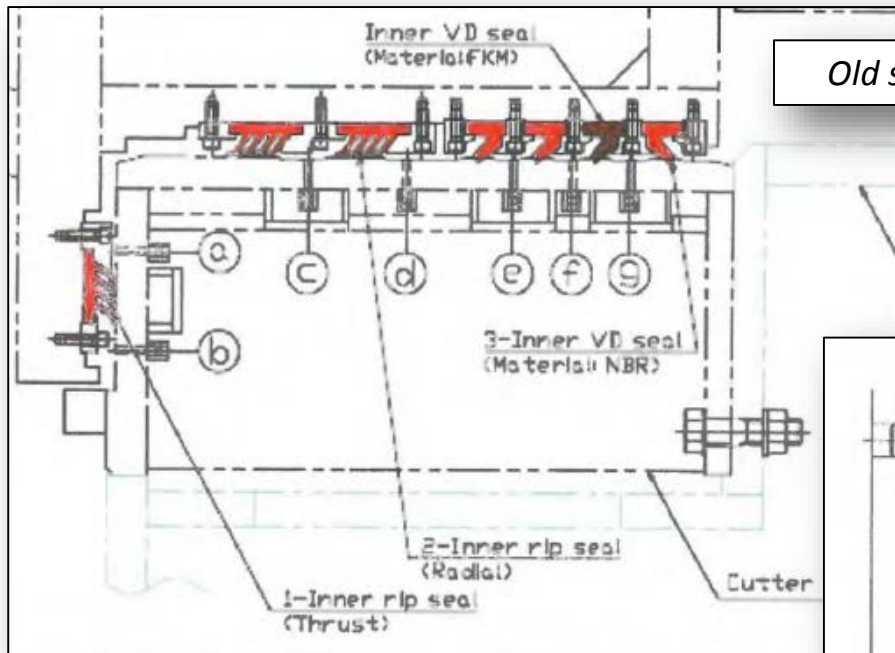


*Building a better Bertha*

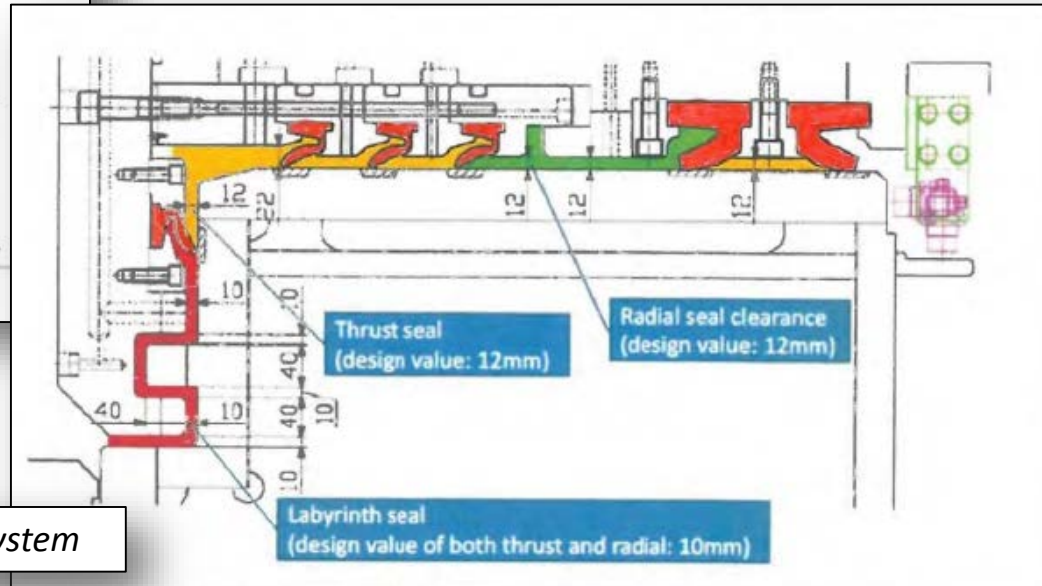


*Repairing*

**BERTHA**



Old seal system



New seal system

Repairing

**BERTHA**





*Aerial view of machine repairs,  
May 8, 2015*

*Repairing*

**BERTHA**

*The new outer seal ring and bearing block arrived in Seattle in late October*



*Repairing*

**BERTHA**





*Assembly of the new main bearing, July 2015*

*Repairing*

**BERTHA**



*Installing main bearing rollers, July 2015*

*Repairing*

**BERTHA**





*Lowering the cutterhead and drive unit into the access pit, Aug. 24, 2015.*

*Repairing*

**BERTHA**



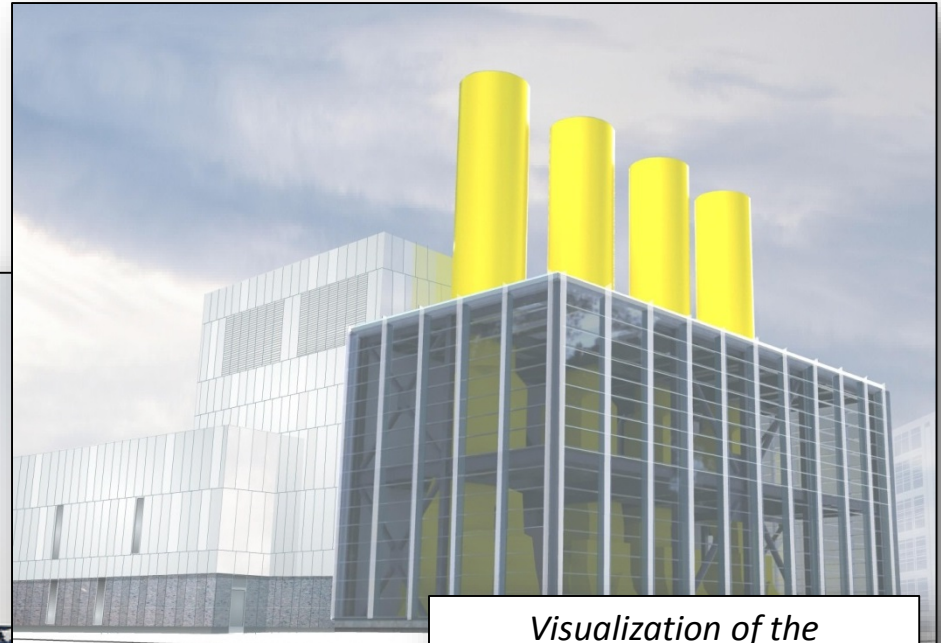
*Northbound tunnel approach lanes taking shape in SODO, June 24, 2015*



**Building the** SOUTH  
PORTAL



*South operations building is taking shape, July 8, 2015*



*Visualization of the completed building*

**Building the SOUTH  
PORTAL**

*The north portal,  
Aug. 7, 2015*



*Building the* **NORTH**  
**PORTAL**



*North portal in June 2015*



**Building the** NORTH  
PORTAL



# BUILDING THE HIGHWAY

*inside the tunnel*





*Southbound roadway deck construction  
January 2015*

**BUILDING THE HIGHWAY**  
*inside the tunnel*



*Southbound roadway deck construction  
January 2015*



**BUILDING THE HIGHWAY**  
*inside the tunnel*



# How to **REACH US**



*Our information center,  
Milepost 31, is located  
at 211 First Ave. S. in  
Seattle's Pioneer  
Square neighborhood.*

**Website:**  
[www.AlaskanWayViaduct.org](http://www.AlaskanWayViaduct.org)

**Twitter:**  
[@BerthaDigsSR99](https://twitter.com/BerthaDigsSR99)

**Email:**  
[viaduct@wsdot.wa.gov](mailto:viaduct@wsdot.wa.gov)

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1-888-AWV-LINE





