BRIDGE PRESERVATION AT ODOT
AND
THE ST. JOHNS BRIDGE

National Concrete Consortium

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ODOT BRIDGE PRESERVATION
THE BEGINNING

- The Conde McCullough-designed 1936 Alsea Bay Bridge was replaced due to extensive corrosion damage in 1991.
- Backlash in the Waldport community over losing their McCullough bridge.
- ODOT started the Bridge Preservation Engineering unit to apply Impressed Current Cathodic Protection and preserve the remaining coastal McCullough bridges.

ODOT BRIDGE PRESERVATION

THE BEGINNING

- Arc-sprayed zinc anode technology was adapted from CalTrans research.
  - Excellent anode properties
  - Gray concrete-like appearance
- In 1991, impressed current cathodic protection of Cape Creek Bridge was the first project for the unit.
  - Concrete repairs
  - Impressed-current cathodic protection – electrically driven reversal of driving forces of corrosion
- In 1995 the unit became known as Bridge Preservation Engineering unit

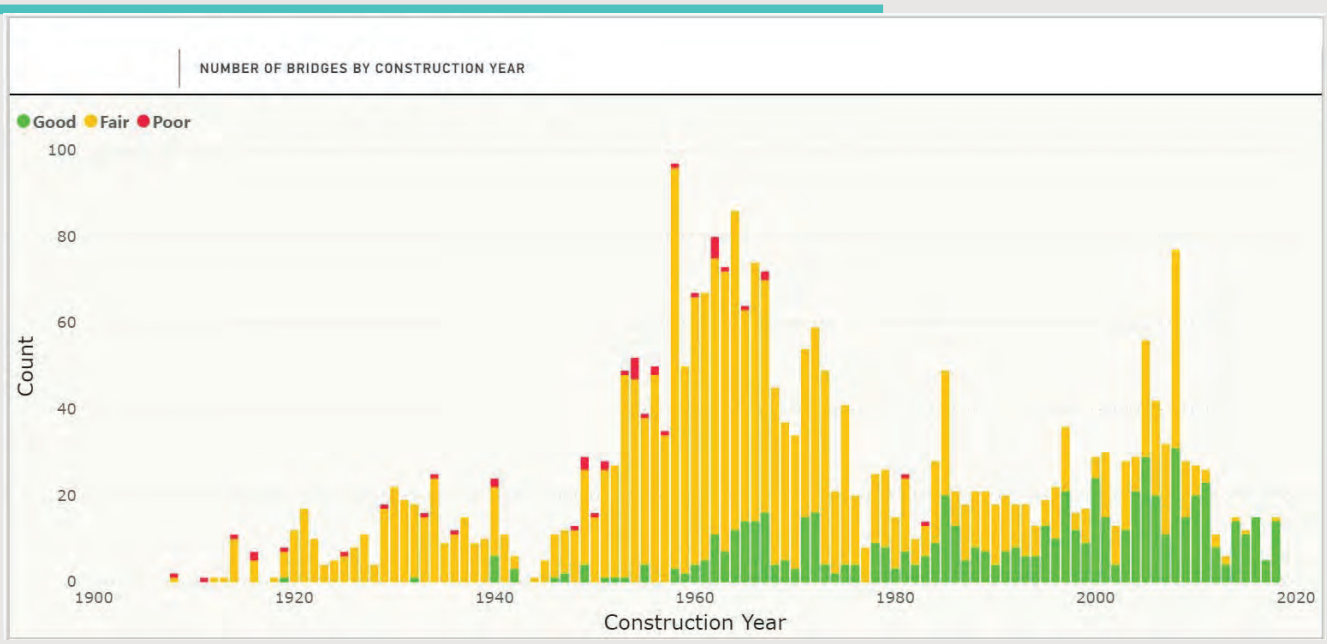
ODOT BRIDGE PRESERVATION

THE BEGINNING

- The Cape Creek Bridge project was successful, and Preservation focused on the most at-risk of the McCullough coastal concrete bridges:
  - Depoe Bay Bridge 1996
  - Yaquina Bay Bridge 1997
  - Big Creek Bridge 1997
  - Cape Perpetua Half-Viaduct 1998
- The engineers ODOT used to deliver the cathodic protection projects began to be tapped for other types of specialty work:
  - Movable bridge maintenance and mechanical/electrical rehabilitation
  - Steel bridge painting
  - Covered bridge preservation

ODOT BRIDGE PRESERVATION

WHY WE DO WHAT WE DO.....



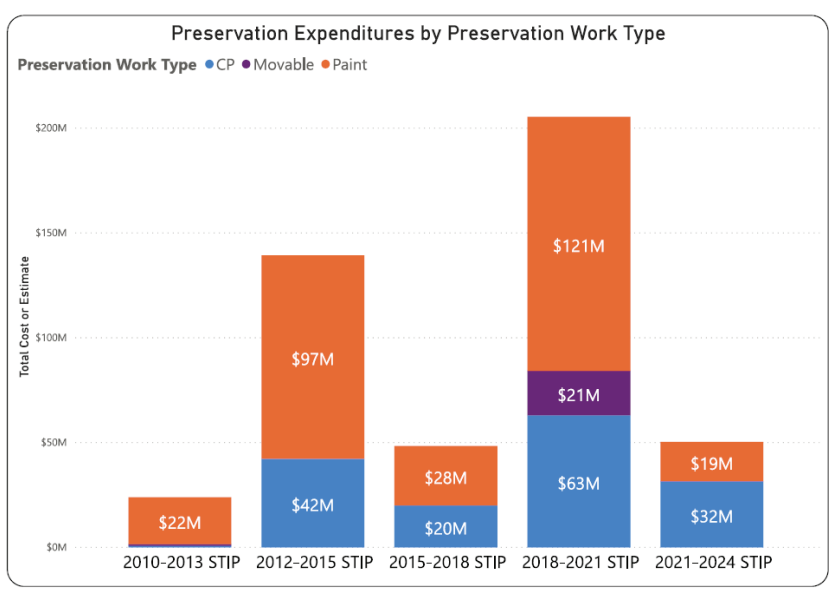
ODOT BRIDGE PRESERVATION

WHAT WE DO.....

- Cathodic Protection
- Bridge Painting
- Movable Bridges
- Covered Bridges
- Historic Bridge Rehabilitation
- Structural Health Monitoring
- Bridge Decks
- Specialty Engineering

ODOT BRIDGE PRESERVATION

WHAT WE DO.....



STIP Name	CP	Movable	Paint	Total
2010-2013 STIP	1	1	1	**3**
2012-2015 STIP	5		11	**16**
2015-2018 STIP	2		4	**6**
2018-2021 STIP	6	3	14	**23**
2021-2024 STIP	2		4	**6**
Total	**15**	**4**	**34**	**53**

ODOT BRIDGE PRESERVATION

WHO WE ARE.....

- Civil/Structural Engineers (4)
- Mechanical Engineers (3)
- Electrical Engineers (1)
- CADD Tech (2)
- Chemical Engineers (formerly)
- Metallurgical Engineers (formerly)
- Statewide focus
- Hands-on engineers with lots of field exposure
  - climbing
  - UBIT and bucket truck
  - confined spaces
  - respirator use

ODOT BRIDGE PRESERVATION

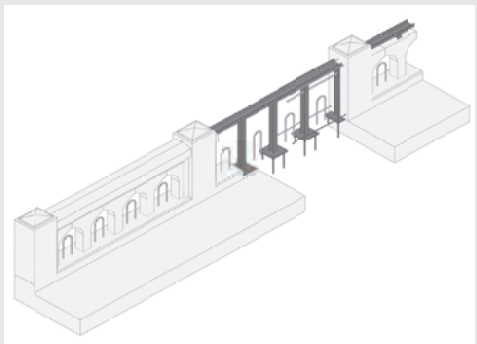
WHAT IT TAKES.....

- Field measurements
- Good as-builts
- Historical research (historic photo collection)
- Accurate condition data
- Core samples & petrography
- Advanced investigation
- Refined load ratings
- Flexible designs that can adapt to conditions revealed during construction
- Heavy attention to temporary works
- Lots of construction support
- Adept handling of calculated risks

ODOT BRIDGE PRESERVATION

WHAT IT TAKES.....

- Coast Guard permits
- SHPO coordination
- NMFS/USFW permits
- Hazmat surveys
- Utility coordination
- Staging Areas
- Containment
- Design exceptions for elements such as “Stealth Rail”
- Letters of Public Interest Finding (this requirement for patented, proprietary and sole-source products is being relaxed)
- Buy American Act waivers
- Third-party inspection



ODOT BRIDGE PRESERVATION

WHAT OREGONIANS GET.....

- Historic and aesthetic values
- Cost savings
  - Some non-historic bridges preserved for cost savings
- Reduction in traffic impacts
- Reduction in community impacts
- The right action at the right time
- Environmental benefits
  - “Reduce, Reuse, Recycle” applies to bridges too

PROJECT PHOTO GALLERY
COSTS SHOWN NOT INFLATED

ODOT BRIDGE PRESERVATION

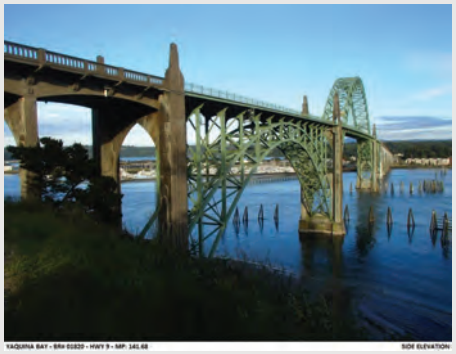
PROJECT PHOTO GALLERY

- Coos Bay (McCullough) Bridge No. 01823
  - Replacement is not planned, would cost on the order of $1B
  - This bridge is over 1 mile long
  - Built in 1936, historic
  - Conde McCullough design
  - As a steel bridge in a marine environment, it requires repainting on a 20 year cycle
    - Painting cost is about $1.6 Million per year
  - Concrete portions of the bridge require cathodic protection, on a 20 year cycle
    - Cathodic protection cost is about $2.2 Million per year

ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- Yaquina Bay Bridge No. 01820
  - Replacement is not planned, would cost on the order of $1B
  - Built in 1936, historic
  - Conde McCullough design
  - As a steel bridge in a marine environment, it requires repainting on a 20 year cycle
    - Painting cost is about $1.6 Million per year
  - Concrete portions of the bridge require cathodic protection, on a 20 year cycle
    - Cathodic protection cost is about $1.3 Million per year



ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- Siuslaw River (Florence) Bridge No. 01821
  - Replacement is not planned, would cost on the order of $500 Million
  - Built in 1936, historic
  - Conde McCullough design
  - As a steel bridge in a marine environment, bascule spans require repainting on a 20 year cycle
    - Painting cost is about $120,000 per year
  - Concrete portions of the bridge require cathodic protection, on a 20 year cycle
    - Cathodic protection cost is about $650,000 per year
  - Movable bridge mechanical, electrical and traffic systems require major rehabilitation on a 40 year cycle, hardware and software upgrades on about a 8 year cycle

ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- Lint Creek (Indian Slough) Bridge No. 04166, in Waldport
  - Replacement planned for $9.7 Million to address corrosion damage
  - 2010 concrete repair with passive zinc anodes bid cost $499,000
  - Project allows ODOT flexibility to schedule replacement when this section of highway is expanded to four lanes
  - Repairs remain in excellent condition

ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- Pistol River Bridge No. 08719 between Brookings and Gold Beach
  - Replacement planned for $30 Million to address extensive corrosion damage
  - Endangered plants at 3 corners
  - 2013 concrete repair with impressed current cathodic protection bid cost $3.6 Million
    - Life cycle for cathodic protection is 20 years
  - Even with change orders, claim settlement, and over 2000 hours of CE the total cost is less than $4.7 Million
  - Project allows ODOT flexibility to schedule replacement when or if this section of highway is expanded to four lanes

PISTOL RIVER - BR# 08719 - HWY 9 - MP: 339.10 SIDE ELEVATION

ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- Ashland Creek Bridge No. OM274
  - Replacement planned for $1.9 Million to remove load posting
  - Urban site
  - Built in 1911, historic
  - Unreinforced concrete
  - Load rating was incomplete due to unreinforced concrete and lack of as-built plans, and assumed to be deficient
  - Preservation found a British technique for unreinforced arch load rating – rating factors improved to 6 or 7
  - No work necessary

ASHLAND CREEK - BR# 0M274 - HWY 63 SB - MP: 19.09 SIDE ELEVATION (INLET)

ASHLAND CREEK - BR# 0M274 - HWY 63 SB - MP: 19.09 DATE AND CONTRACTOR STAMP

ODOT BRIDGE PRESERVATION

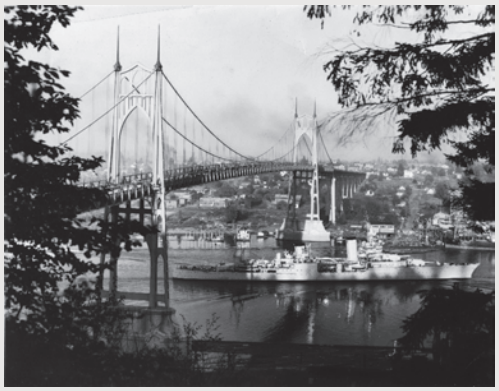
PROJECT PHOTO GALLERY

- Dry Canyon Bridge No. 00524
  - 1920 Conde McCullough design, historic
  - In Columbia Gorge Scenic Area on Historic Columbia River Highway
  - Replacement cost based on deck area was estimated at $1.3 Million
  - Spalling concrete was investigated, determined to be due to 2" to 4" of carbonation
  - Alternatives analysis suggested re-alkalization
    - Electrochemical process similar to impressed current cathodic protection – therefore low-risk
  - Re-alkalization project was performed
    - Damaged concrete and reinforcement was repaired
    - Bid cost was $375,000 for re-alkalyzation
    - Project included the first re-alkalization of a bridge in the United States
    - Concrete was coated with a skim coat product to add a degree of protection and provide uniform appearance

ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- St. Johns Bridge No. 06497
  - Built in 1931, historic
  - Replacement is not planned, would cost on the order of $2 Billion
  - Rehabilitation with new deck, painting, and cable protection completed in 2005
  - Main cables need corrosion monitoring
  - Deck issues, approximately $26 Million needed for overlays in the future
  - Concrete piers supporting east approach need galvanic cathodic protection on an estimated 30 year cycle
    - Galvanic cathodic protection cost is about $20 Million, or $670,000 per year
  - As a steel bridge, it requires repainting on approximately a 30-40 year cycle
    - Painting cost is about $1.5 Million per year



ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- St. Johns Bridge No. 06497
  - Spalling of pier concrete over structural steel frame

ODOT BRIDGE PRESERVATION

PROJECT PHOTO GALLERY

- St. Johns Bridge No. 06497 – Project Underway
  - Provide access/containment
  - Clean structural steel
  - Install anchors
  - Install zinc anodes
  - Patch concrete
  - Skim coat


Oregon
Department
of Transportation
QUESTIONS?
YouTube
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