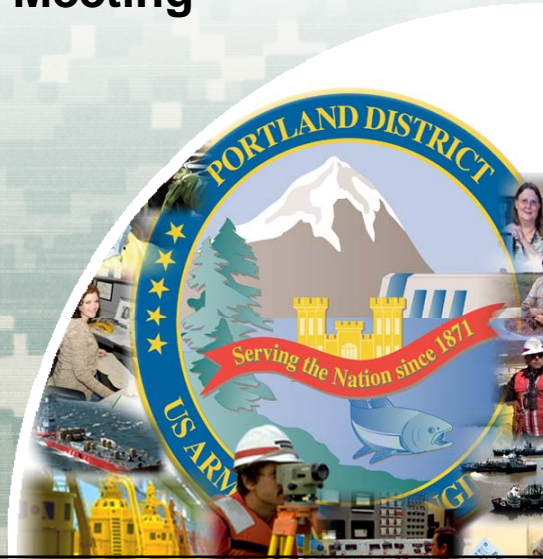


Bonneville Second Powerhouse Fish Guidance Efficiency Special FFDRWG Meeting

5 September 2013



US Army Corps of Engineers
BUILDING STRONG®



Bonneville Second Powerhouse Fish Guidance Efficiency (FGE)

- Background
- Design Process
- Path Forward



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Background

- 1995 – Began Improvements to Improve FGE
 - ▶ JBS Improvements and Outfall Structure
- 1999 – Phased Approach to Improve Guidance and Survival by Increase Flow into the Gatewell
 - ▶ Prototypes in 2001 and 2004
 - ▶ Full Implementation in 2008



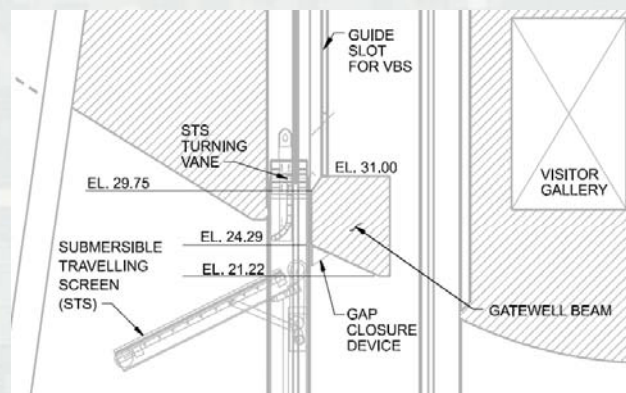
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Bonneville Second Powerhouse FGE Gatewell Modifications (2008)

- Lowered Gatewell Beam, Turning Vane, Gap Closure Device, Vertical Barrier Screen (VBS)



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Background (con't)

- Biological Evaluation in 2008 and 2009

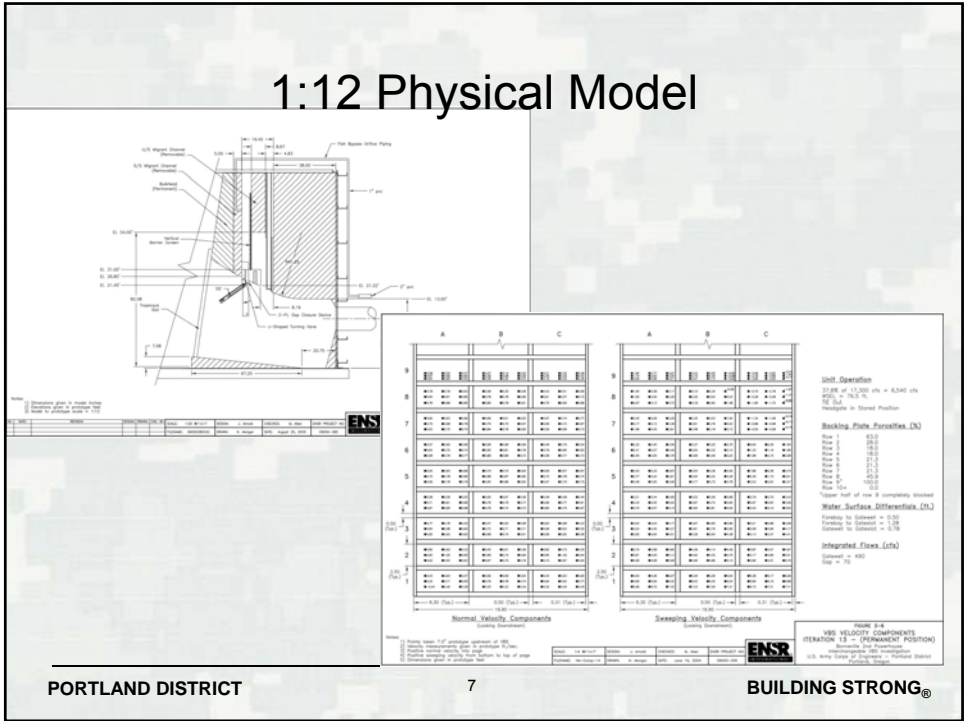


Design Process

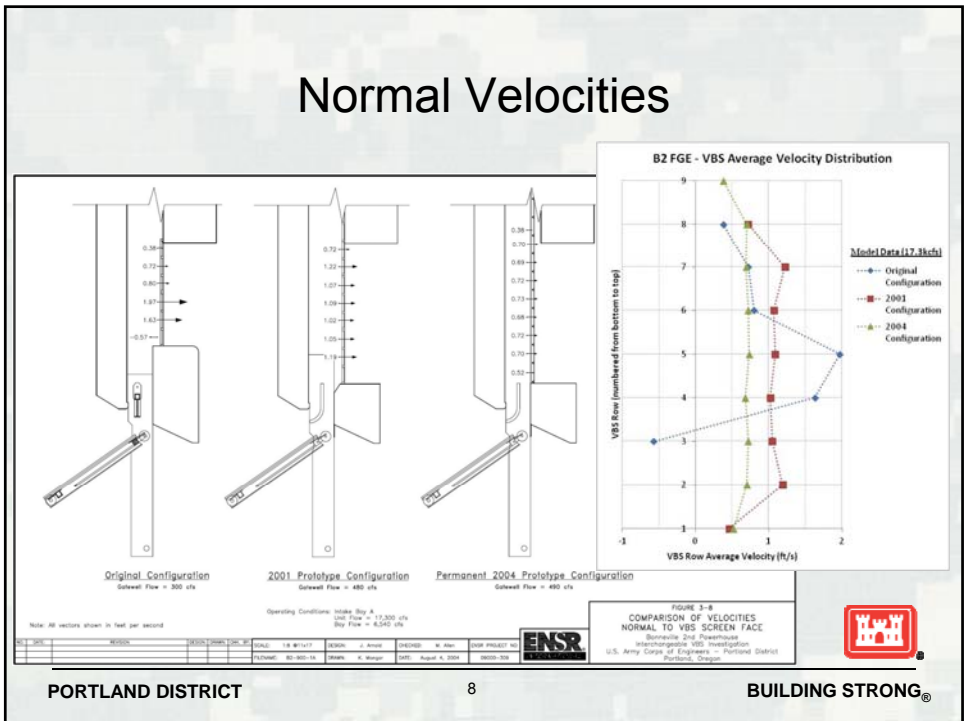
- Pre-construction (2008)
 - ▶ 1:12 Physical Model



1:12 Physical Model



Normal Velocities

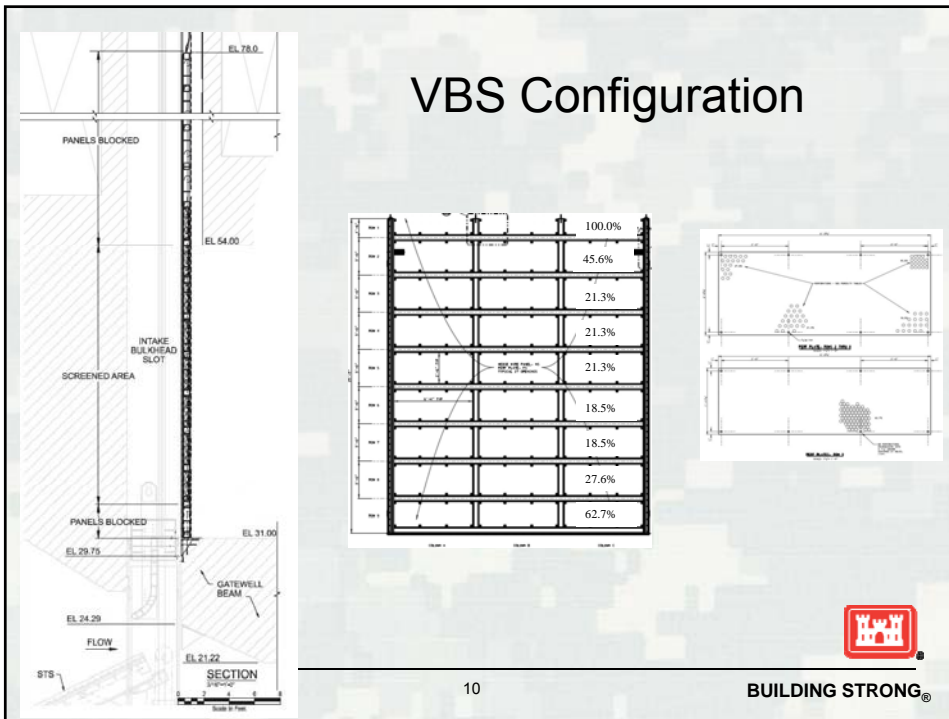


Design Process

- Pre-construction (2008)
 - ▶ 1:12 Physical Model
 - ▶ Prototyped



VBS Configuration



Design Process

- Pre-construction (2008)
 - ▶ 1:12 Physical Model
 - ▶ Prototyped
 - ▶ Tested



Field Verification of Velocities on VBS – PNNL 2010

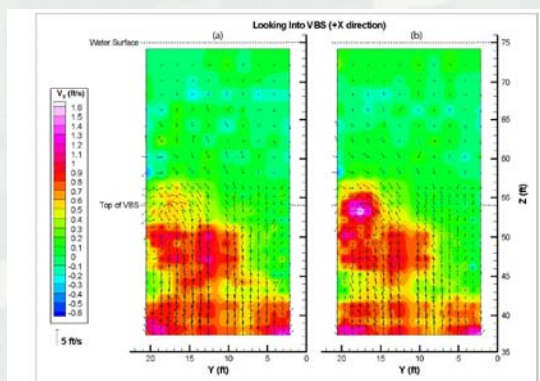


Figure 3.3. X direction velocity contour at Unit 14A, 0.65 ft from the vertical barrier screen and at a flow rate of 15.8 kcfs. Also shown are velocity vectors in the Y-Z plane: (a) B2CC closed; (b) B2CC open.



Design Process

- Pre-construction (2008)
 - ▶ 1:12 Physical Model
 - ▶ Prototyped
 - ▶ Tested
- Post-construction
 - ▶ Problem Identification – Biological evaluations indicated elevated mortality at high turbine discharges

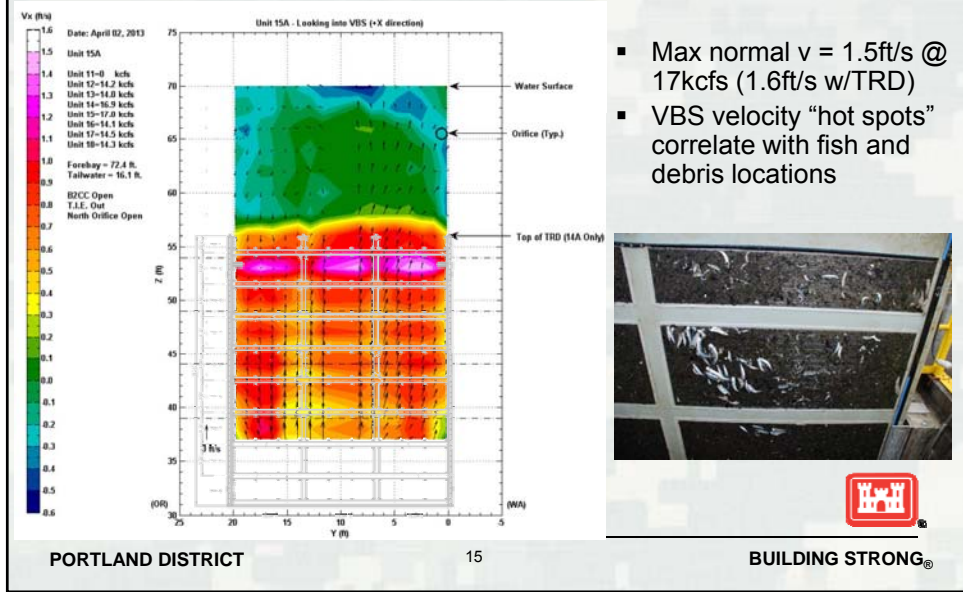


Alternative Study

- Update CFD model to use as design tool for the EDR
- Proof of Concept -Turbulence Reduction Device (TRD)
- Evaluations
 - ▶ Biological – Improvement to survival, but not to the magnitude needed to be considered a standalone alt.
 - ▶ Gatewell Velocity Measurements

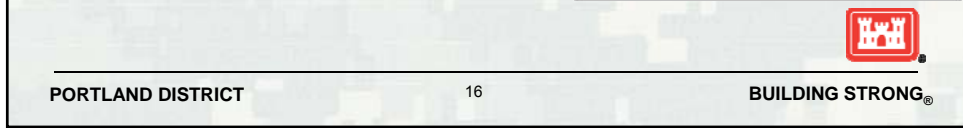
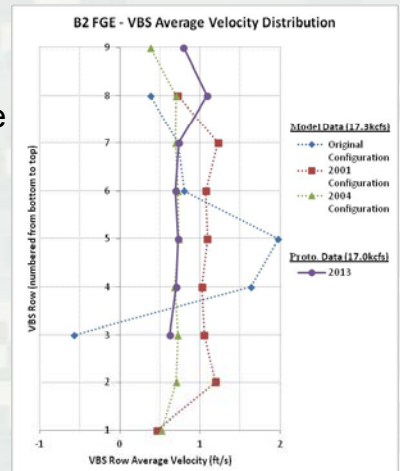


Hot Spots



Normal Velocities

- Physical model used in design
- Velocities in physical model were in criteria
- Prototype velocity hot spots on panel 8-9



Refinement of Existing Tools

- Parametric studies of screens (VBS, STS)
 - ▶ PNNL VBS prototype data (2010)
 - ▶ Harbor VBS prototype data (2013)
 - ▶ Jenson STS prototype data (1987)
- Recalibrate CFD model to prototype data based on parametric study results – high flow
- Validate CFD model – other flows and gate slot fillers
- Identify different porosities to prototype test 1st quarter 2014
- Validate CFD to 2014 prototype data



Path Forward

- EDR Supplement (FY14)
 - ▶ Tool Refinement
 - CFD Model – Recalibration
 - VBS Porosity Plate Change
 - Prototype Velocity Measurements
 - ▶ Est. Hydraulic Baseline
 - ▶ Reassessment of Alternatives
 - ▶ Select Preferred Alternative
- Design Documentation Report (FY15)
 - ▶ Prototype Development and Evaluation
- Full Implementation (FY18-19)

