The Dalles Lock and Dam
East Fishladder
New 159 Weirs

Background: The existing 159 weirs were modified from the original weirs in the mid 80's to their current configuration. Originally the weirs spanned the entire width of the ladder. As part of the count station modifications changes to the exit were also performed, this included moving weir 159, creating a concrete middle non overflow weir, and modification of the existing steel telescoping weirs. Modification to the steel weirs included removal of the middle portion of the weir so that two sets of telescoping weirs could be installed at each side of the fishladder. The "new weirs" are 6 feet wide and vary in height from 3'-1$^{7/8}$" to 3'-3$^{7/8}$".

The weirs are 60 years old and are showing signs of advanced deterioration, items such as paint failure, failing seals, and frozen wheels. During the FY 14 East ladder outage the weirs were removed so that repairs could be done to the weirs and embedded guides to ensure correct operation of these critical weirs. Once the weirs were cleaned and inspected it was apparent that extensive rehab work was needed to be done to just return the weirs to an acceptable level of service again.
The main problems identified during the repair work are as follows:

1. The weirs have extensive corrosion and pitting that would require many man hours to repair. The corrosion is extensive enough that the labor hours to do the repairs properly far exceed the labor to purchase and build new weirs. These weirs are also painted with lead paint that would require special abatement, thus greatly increasing the cost to rehab the weirs.

2. The current axle and wheel configuration is causing extensive corrosion/damage to the embedded carbon steel guides. The stainless steel wheel in contact with the embedded carbon steel guides creates galvanic corrosion in which the carbon steel sacrifices itself in the presence of the stainless. It was noted that during repair of the embedded guides many places the 3/8" carbon steel plate was completely gone and the wheels were directly against concrete. It was noted that many of the wheels are frozen in place to point that flat spots on face of the wheel were present, this combined with the galvanic corrosion problem helped accelerate the damage to the guides. These guides are only 30 years old and should last more than 50 years.

3. The existing seals were worn to the point they no longer functioned as intended.

New Weirs: The new purposed weirs will provide improved levels of service and reduced maintenance for years to come. Listed below are the purposed changes and why they are an improvement over the original design.

    1. **Reduction in number of Weirs.** Currently each set includes 3 weirs for a total of 6 weirs. By increasing the weir height to 3'-4$^{3/8}$" the need for 3 weirs is eliminated. The required operating range of the forebay is EL 155 to EL 160. Two of the bigger same sized weirs will accomdate this range. In house estimates show that the need to build 4 weirs instead of 6 weirs will save roughly 30K. See attached images showing new weir configurations.
    2. **Replacement of stainless steel wheels with UHMW wheels.** UHMW wheels are extremely durable, significantly cheaper to purchase, readily machine able, never require grease to operate, and do not cause any corrosion issues to surrounding metal. The existing stainless steel wheels require greasing of the inner bushing on a regular basis in order to keep them rotating freely. Switching to UHMW wheels provides two major improvements; first it eliminates the need to grease the inner bushing on the wheels and secondly it eliminates the dissimilar metal issue thus saving the embedded guides.
    3. **Addition of Downstream face skin plate.** A new downstream skin plate will be bolted onto the new weirs. The skin plate will be made from UHMW to save on weight and to allow for easy removal to inspect the weirs. This skin plate will also allow for the removal of the top engagement seals that are currently used. By only having 2 weirs instead of 3 engagement seals will not be

required because the typical forebay elevation will have the two weirs engaged with each other, thus eliminating the need for a top rubber seal.