



## **In-Line Ditch BMP Installations**

### ***SE Petrovitsky Road***

The in-line ditch best management practices (BMPs) for SE Petrovitsky Road were installed on Tuesday, June 30, 2009 in a long section of roadside ditch located on the south side of SE Petrovitsky Road between SE 192<sup>nd</sup> Drive and 170<sup>th</sup> Avenue SE and 172<sup>nd</sup> Avenue SE. The BMPs use a flow control treatment design that are comprised of a series of modified rock check dams that contain washed, coarse sand encased in geotextile fabric. A total of five BMPs were installed at this location following engineering designs prepared by King County Roads Maintenance Section (KCRMS) and approved by the Washington Department of Ecology (Ecology) under Stormwater Management Implementation Grant Number G0900039. The installation was completed by a KCRMS crew from the Summit Maintenance Facility (Division 4).

### **BMP Design Description**

#### *Rock Check Dam with Treatment Cell*

The BMPs are based on a modified angular rock check dam design (see Figures 1 and 2) that encase a media filled “treatment cell” (in this case washed coarse sand) wrapped<sup>1</sup> in a highly permeable, non-woven geotextile (Figure 1, C). The BMPs are used to provide stormwater retention and energy dissipation while providing some filtration through the treatment cells. The BMPs are designed to allow higher flows to bypass over the top of the check dam.

The rock check dams consist of two ramps built from a mix of 2”-4” and 4”-8” angular rock (Figure 1, A and B). Larger rock (> 4”) was primarily used for the BMPs at the SE Petrovitsky Road site due to larger seasonal volumes and flow rates documented during pre-construction flow monitoring. The check dam ramps are installed with a 3 to 1 slope; each ramp is three-feet long, sloping up to a peak height of one foot above the floor of the ditch. The treatment cell is placed in a two-foot gap left between the upper and lower ramps.

When the rock structure of the BMP ramps are complete, a section of geotextile fabric is placed between the ramps and filled with coarse, washed sand to a level even with the top of the ramps. The fabric is wrapped (footnote <sup>1</sup>) over the media

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<sup>1</sup> Note: The geotextile fabric wrap procedure is as follows: (1) fold the lower ramp (downstream) fabric edge upstream, (2) fold the sides inward toward the center, then (3) fold the upper ramp (upstream) fabric edge down toward the lower ramp. The fabric is secured with rock.



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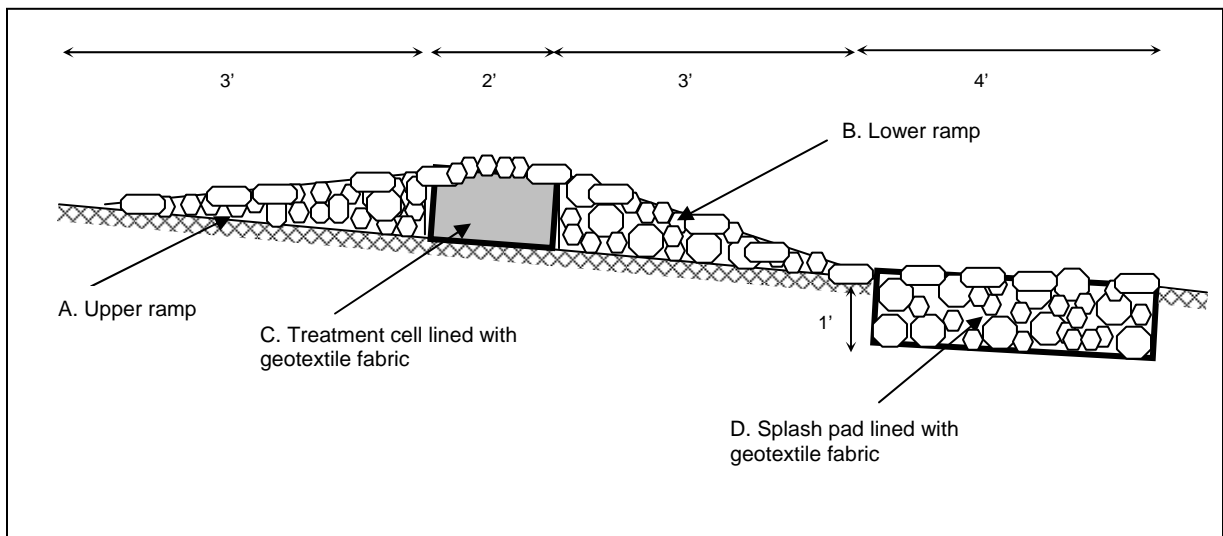
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with the outer fabric edge facing down-slope and secured (or capped) with additional rock.

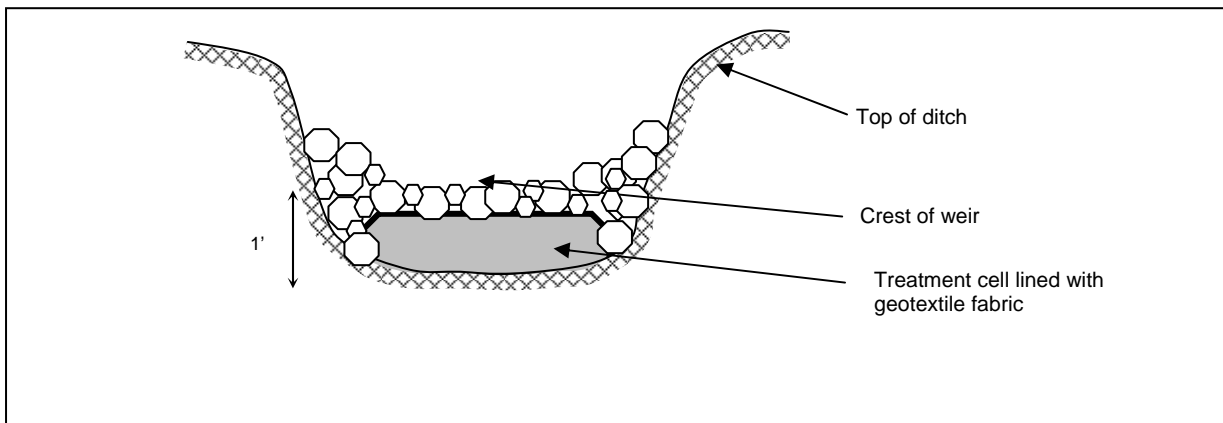
## Splash Pad

A “splash-pad” consisting of a four-foot long by one-foot deep trench that is lined with geotextile fabric and filled with 2”-8” angular rock is located just downstream of each check dam (Figure 1, D). The splash pads provide permanent energy dissipation, BMP erosion control, and stormwater storage and infiltration areas. The complete footprint of each BMP, including the splash-pad, is approximately 12-feet in length.

**Figure 1. In-Line Ditch Modified Rock Check Dam BMP**



**Figure 2. Cross-section of ditch with In-Line Ditch Modified Rock Check Dam BMP**





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### **King County Roads Maintenance Crew**

The KCRMS crew used to install the in-line ditch BMPs consisted of a crew chief, two utility workers, two truck drivers, a backhoe operator and two flaggers. One KCRMS Environmental Unit (EU) staff was on site during the entire installation to provide quality control and document that the installation was completed per the design specifications. Documentation included a hand written record and photos.

### **Materials**

- Angular rock (a mix of approximately 2"-8" rock with the majority of the rock sized in the 4"-8" range) was staged at the King County Roads Summit Maintenance Facility. Approximately 8-10 yards of rock were used for BMP installation of seven splash pads and five modified rock check dams.
- Five yards of washed, coarse sand purchased from Palmer Coking Coal was brought to the site in a 5-yard dump truck. Approximately 0.6 cubic yards of sand were used per BMP, or approximately 3 yards total for the site.
- Washed, coarse sand purchased from Palmer Coking Coal was used to fill 30 sandbags for the flume installation. The sandbags were filled on site and placed on the right bank of the roadside ditch at each flume location.
- BMP fabric (801 geotextile) purchased from ACF West, Inc. of Woodinville, Washington was brought to the site by EU staff in pre-cut sections measuring 10' long x 7.5' wide.
- Two sections of coir log were placed above and below the driveway culvert located downstream of the study area for temporary construction erosion and sediment controls.

### **Site Prep**

During a pre-construction site visit by the Division 4 crew chief and EU staff, the location of each BMP was located using spray paint on the paved road shoulder adjacent to the ditch. A utility locate, requested by the crew chief, was done several days prior to the BMP installation work. The KCRMS Division 4 crew prepared the site by cutting vegetation throughout the BMP study location several days prior to the BMP installation.

### **BMP Installation**

The Division 4 crew assembled on site by 7:00am on the day of the BMP installation and immediately placed appropriate traffic control signage. Once the flaggers were positioned, the backhoe operator began the BMP installation by excavating all seven of the splash pads. The excavated soil was loaded into a 10-yard dump truck, which transported the soil to the Summit Maintenance Facility for disposal. The truck was then loaded with the angular rock mix and returned to the BMP site.



As described above in the BMP Design Description, the splash pad trenches were excavated four-feet long by one-foot deep as shown below in Figure 3.



*Figure 3. Ditch section prepped for BMP placement with excavations for spill pads. Lower end of ditch looking east.*

The splash pad trenches were lined with geotextile fabric and filled with the angular rock mixture. The ends of the fabric were partially wrapped inward over the splash pads and secured with additional rock as shown in Figure 4.



*Figure 4. Splash pad trench lined with geotextile fabric, filled with angular rock mixture, and wrapped inward over the splash pad edges, which is then secured with angular rock.*

When each splash pad was completed, the backhoe placed mixed rock immediately upslope from the pad. This rock was positioned by hand to form the lower ramp. Additional rock was placed two feet above the lower ramp to form the upper ramp while leaving an open space for the treatment cell as shown below in Figure 5.



*Figure 5. Lower rock ramp and upper rock ramp installation with 2-foot long gap left to allow for treatment cell installation.*

A pre-cut piece of geotextile was laid over the area of the treatment cell in the gap between the two check dam ramps. The fabric covered cell was then filled with washed, coarse sand as shown below in Figure 6. Approximately 0.6 yards of sand was used to fill each treatment cell.



*Figure 6. Crews fill the treatment cell with washed, coarse sand.*



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The fabric was folded over the sand (Figure 7) and was then secured with rock to complete the BMP (Figure 8).



**Figure 7. Treatment cell geotextile fabric filled with washed, coarse sand and wrapped.**



**Figure 8. Completed BMP.**



Figure 9 shows three of the five flow control BMPs installed along the south side of SE Petrovitsky Rd.



**Figure 9. In-line  
Ditch BMPs  
looking  
upstream (west)  
along SE  
Petrovitsky Rd.**

This section of ditch is located within the service area of KCRMS Division 4. Crews were asked to periodically check the site to document any changes, problems, observations and/or recommendations since effectiveness and maintenance requirements for these in-line ditch BMPs are currently not known.