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SUBJECT CITY OF REDMOND SMITH WOODS – BANKFULL WIDTH DOCUMENTATION MEMORANDUM

INTRODUCTION

This memorandum summarizes the methods and rationale used to determine the bankfull width along Monticello Creek passing through Smith Woods in Redmond, Washington. Bankfull width is the preferred measurement by Washington Department of Fish and Wildlife (WDFW) for designing water crossings. Based on the documentation outlined in this memorandum, the design bankfull width is determined to be 4 feet.

SITE CONDITIONS

Smith Woods is a City-owned, 10-acre parcel located in a rapidly developing neighborhood in Northeast Redmond. The property is mostly undeveloped and provides a great natural area oasis for the residential community as well as valuable habitat at the headwaters of Monticello Creek. Monticello Creek flows from north to south in Smith Woods, through a small pond, and continues south as a small stream through the culvert at NE 122nd St. The Monticello Creek basin is a small urban drainage with predominantly residential land use. One of the main concerns for this section of Monticello Creek passing through Smith Woods is the loss of in-stream habitat at the outlet of the pond forming a barrier to fish passage. This bankfull width determination is necessary to select a preferred alternative for rehabilitating the Monticello Creek and the pond. The bankfull width determination will help to design the channel width and slope for the reconfigured stream in accordance with WDFW stream simulation channel design guidelines.

SITE OBSERVATIONS AND BANKFULL WIDTH ANALYSIS

Osborn Consulting Inc. (OCI) conducted a site visit on May 16, 2019 to determine the bankfull width. The locations of the bankfull width measurements for the length of the project are shown in **Figure 1** and photos of each location are included in the photo log in **Attachment 1**.

The guidance document, **Determining the Ordinary High Water for Shoreline Management Act Compliance in Washington State** by the Department of Ecology (Anderson et. al. 2016) describes the bankfull width as:

“the wetted channel width at bankfull discharge. Often the term bankfull width is used to describe the active stream channel. The active stream channel does not typically include nearby

vegetation except those that can sustain frequent channel scour or grow at or below water's edge for very long durations.”

Field efforts included walking the stream and investigation of the stream channel and culvert locations for conditions characteristic of bankfull width. OCI measured the bankfull width in the field according to guidance provided in the Water Crossings Design Guidelines (WCDG), which recommends taking the average of several random width measurements that reflect the natural channel condition outside the influence of factors that could affect the bankfull width.

It was very difficult to find locations representing natural channel conditions downstream of the NE 122nd culvert as the stream was relatively dry with intermittent ponding and flows going subsurface within. The first bankfull width was measured around 150 feet downstream of the culvert and is believed to be influenced by 12-16-inch size logs on the left bank.

The NE 122nd St culvert measured a span of 12 feet with 3 feet of clearance at the outlet. The stream was dry at the culvert. A 6-inch PVC storm drain pipe discharges into the stream at the outlet of the culvert.

Upstream of the NE 122nd St culvert was comparatively less influenced by logs but was dry with a silty bottom. Moving further upstream closer to the pond, stream was a little wider with no flow and a gravel bottom with some smaller cobbles.

About 144 feet upstream of the culvert is the Smith Woods pond with an approximate area of 0.14 acres surrounded by wetlands. Upstream of the pond, the stream has a silty bottom with intermittent pools of water. About 100 feet upstream of the pond, the stream was well defined with predominately gravel bottom and no flow.

At the north boundary of Smith Woods along the unimproved NE 124th Street right-of-way there was a walking trail beneath which three culverts - 18-inch CMP, 12-inch CMP (crushed) and 12-inch culvert with CMP inlet and CPP outlet were observed. At the outlet of the culverts on the west side there was another 12-inch green plastic pipe draining to the stream. The green plastic pipe is assumed to be draining from the stormwater pond located 500 feet west of the culverts next to the walking trail. No measurements were taken upstream from NE 124th as there was a large wetland which was fenced serving as the headwaters of Monticello Creek.

The locations of the bankfull width measurements for the length of the project are shown in **Figure 1**. Bankfull width measurement for the first location is considered an outlier in calculating the average width as it is double the width of the stream in other locations due to the presence of logs. The bankfull width measurement values used in calculating the average bankfull width for the stream are provided in **Table 1**. Sites were selected in locations where natural indicators could be used to identify bankfull elevation. Bankfull indicators included breaks in bank slope, top of bank, vegetation changes, extent of perennial woody vegetation, undercut banks, water lines, debris lodged in overhanging branches, and root scour on the streambanks. The resulting bankfull widths were calculated to average 3.8 feet downstream and 3.9 feet upstream of the culvert at NE 122nd St.

TABLE 1 SMITH WOODS MONTICELLO CREEK BANKFULL WIDTH FIELD MEASUREMENTS		
Location	Bankfull width (ft)	Notes
BFW 1	7.0	Downstream of the culvert approximately 150 feet. 12-16-inch logs on the left bank.
BFW 2	3.5	Ponded water with silt bottom.
BFW 3	4.0	Dry stream. Influenced by logs.
BFW 4	5.5	No flow. Pebbles and gravels at the bottom.
BFW 5	3.5	Silty bottom. Probably fish larvae present.
BFW 6	3.5	Silty bottom. Well defined channel.
BFW 7	3.5	No flow. Small pebbles and silty bottom.
BFW 8	3.5	No flow. Some pebbles and silty bottom.
BFW 9	3.5	No flow. Angular rocks and concrete pieces. Fairly defined channel.
Average	3.9	
Median	3.5	

RECOMMENDED BANKFULL WIDTH

The average bankfull widths measured in the field was 3.9 feet. The recommended design bankfull depth for Monticello Creek is 4 feet.

REFERENCES

Anderson, P.S., Meyer, S., Olson, P., & Stockdale, E. (2016). Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State. Final Review. Washington State Department of Ecology, Shorelands & Environmental Assistance Program, Olympia WA. Ecology Publication no. 16-06-029.

Barnard, R. J., J. Johnson, P. Brooks, K. M. Bates, B. Heiner, J. P. Klavas, D.C. Ponder, P.D. Smith, and P. D. Powers (2013), Water Crossings Design Guidelines, Washington Department of Fish and Wildlife, Olympia, Washington.

FIGURES

Figure 1 Bankfull Width Measurement Locations

ATTACHMENTS

Attachment 1 Photo Log

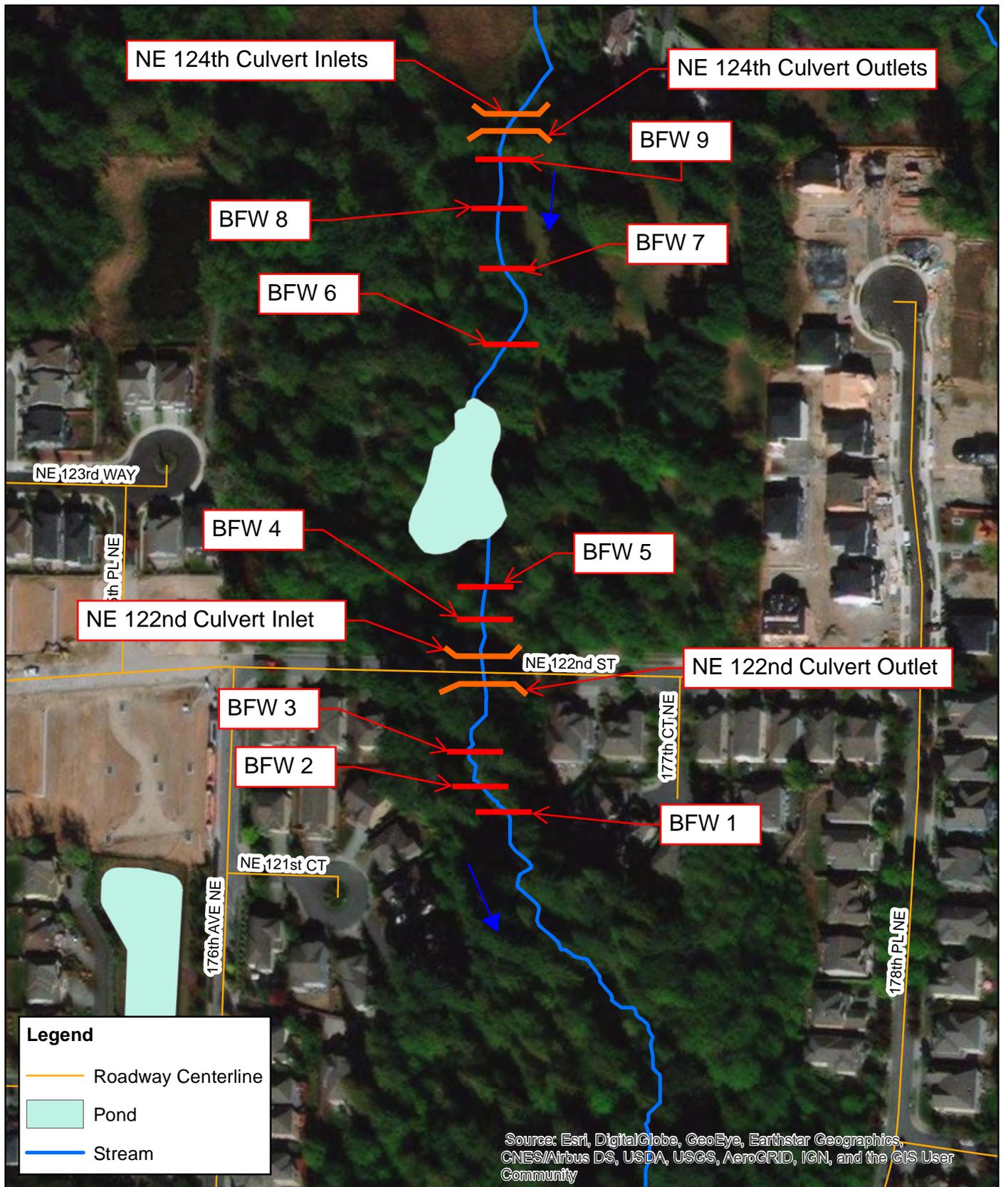


Figure 1: Bankfull Width Measurement Locations
Monticello Creek, Smith Woods

Redmond, WA

ATTACHMENT 1: PHOTO LOG



BFW-1 looking downstream



BFW-2 looking downstream



BFW-3 looking downstream



NE 122nd Culvert Outlet looking upstream



NE 122nd Culvert Inlet looking downstream



BFW-4 looking upstream



BFW-5 looking upstream



Smith Woods Pond looking downstream



BFW-6 looking upstream



BFW-7 looking upstream



BFW-8 looking upstream



BFW-9 looking upstream



Two of the three culvert outlets at NE 124th St



Third culvert with CPP outlet at NE 124th St



Green Plastic Pipe draining to the stream from the west at NE 124th St culverts



Three culvert inlets at NE 124th St walking trail