Cheongmi Stream Hydraulic Modeling Analysis

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Abstract. There is an increase in environmental concerns about rivers and stream in South Korea. Cheongmi Stream is one of the main tributaries on the South Han River. When Cheongmi Stream was channelized, an abandoned channel was formed. The study reach is 1.6 kilometers of Cheongmi Stream from station 17+000 to Sulsung Stream at station 15+400. The hydraulic parameters using HEC-RAS were examined for various discharges and reach-averaged spatial trends showed that the hydraulic parameters are relatively constant upstream of the confluence with Sulsung Stream. The median particle diameter is investigated to 1.48 mm. In the sediment transport capacity analysis, Engelund-Hansen and Yang's total bed material equations provided reasonable results. The stable channel design using SAM program was used for stable channel slope, width, and depth, which are compared to HEC-RAS hydraulic modeling results. The equilibrium channel width and slope were examined at discharge with period of return ranges from 1.58 to 100 years and Julien-Wargadalam's method had good results compared with measured data. The changes in channel planform geometry using aerial photographs in 1930 and 2006 showed that the planform was changed meandering to straight and the methods of Leopold and Wolman, and Schumm and Khan are the best methods for identifying the planform geometry for Cheongmi Stream. The thalweg and mean bed elevation profile were analyzed using field measurement in 1983, 1994, and 2004. The results indicated that the channel has degraded about 2 meters over the 20 years. The flow duration analysis was performed and 565 cms is the best estimation of the dominant discharge at Cheongmi Stream. The alternate bars have a tendency to migrate downstream at an approximated average rate of 8m/year. A sill, such as a drop structure or a weir, could be built just downstream of the intake structure to maintain a sufficient water level at low flow conditions. Flow diversions to the abandoned channel at low flows are recommended. During floods, sediment concentration at high flows may be high and diversions during flood may result in sedimentation in the abandoned channel area.

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