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Erosion Assessment of the Root River - Racine, Wisconsin

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1. SUMMARY

This erosion assessment was conducted to evaluate the condition of the streambanks and the storm sewer outfalls along the Root River within the City of Racine (the City) and the associated erosion and erosion potential. The study area includes approximately 14 miles of streambank, which equates to roughly seven miles of evaluation along the left and right banks.

The project goal was to develop baseline data that includes identifying, characterizing, and mapping current erosion problems associated with the 50-plus stormwater outfalls and hydromodifications such as riprap, concrete, and retaining walls, and associated erosion problems along the streambanks of the Root River. This baseline data is critical for monitoring changes in erosion and streambank conditions throughout time. This baseline data is also necessary to measure the success of future post-construction best management practices and bioengineering implementation.

1.1 Data Collection and Analysis

To help determine the overall condition and stability of the streambank, a visual inspection of the streambanks and outfalls was conducted using a Global Positioning System (GPS) unit to record the observations. Nine stream cross sections were surveyed to gather additional information for the erosion assessment.

For this project, four methods and factors of evaluating erosion and erosion potential were utilized. These methods and factors included a Bank Erodibility Hazard Index (BEHI) analysis, Pfankuch rating, visual observations, and adjacent landuse. A composite score of each method and factor was then developed to arrive at an erosion rating for each streambank section.

The results of the four ratings were combined to develop an overall erosion rating for each stream assessment point. Each criterion was given a different weighting, based upon how critical each rating is on determining the erosion potential of each location. The assessment of each outfall included the condition of the outfall and the amount of sediment buildup within the outfall. Several corrugated metal outfalls were rusted or corroded, while some were crushed. One concrete outfall was cracked and crushed.

1.2 Recommendations

Based upon the analysis completed for this project, there are a total of eight high erosion areas located along the Root River within the City. These areas were prioritized for future implementation of streambank stabilization measures.

Recommendations were designed to address short- and long-term needs. The recommendations include combinations of techniques to satisfy unique site-specific requirements. Installation of fiber rolls, stabilization seed mix and live cuttings would be suitable for shallow banks that are slightly eroded with more bare soil and some undercutting evident at the toe, as well as at intact retaining walls where toe scour is apparent. In areas where the banks are less than four feet in height and there are no site constraints at the top of bank, regrading the slope and installing fiber roll, stabilization seed mix and cuttings is recommended. If there is adequate lateral area to regrade banks that are five to six feet high, this treatment can also be used. Where scour at the toe is more prominent, stone or A-Jacks could be installed at the toe, along with erosion control blanket, seeding and cuttings. Installation of geogrids with stone, gabions or A-Jacks are possible solutions for repairing banks where maintaining steep slopes with minimal property loss is a concern. J-Hook vanes could be placed in the stream to reduce the stresses on the bank, along with providing fish habitat. Trees that need to be removed for bank regrading could be used as root wad structures for bank protection and fish habitat. Cross vanes can also be used to direct the flows away from the streambank and toward the center of the stream.