CONTENTS

PAGE	REFERENCE	DATE

Location MKE MMSD Diversion Date 09-21-12

Project / Client MMSD River walk

Confluence of Underwood Creek / Menomonee River, Menomonee River Upstream of confluence

weather: overcast, ~55°F, showers in forecast.

river stage: unknown

personnel: BMY

equipment: Canon Powershot camera, Garmin GPS, meter stick, tape measure

objective: geomorphic recon of Menom River upstream of confluence w/ Underwood Creek → map changes in channel geometry / morphology, and biotic habitat

Location _____ Date 09-21-12

Project / Client _____

Pictures

492 (100-2136) - looking US @ confluence. Menom - right, UC - left

493 - US Menom River @ confluence

494 - @ GPS 081. Note bank erosion on RB. View US

495 - LWD → left bank @ GPS 086

496 - eroding bank → right bank → rip rap @ GPS 086

497 - culvert @ base of North St bridge → Right bank → GPS 091

498 - upstream underneath North St. bridge. Gravel deposition → R bank
current flow only ~3 m under bridge

499 - upstream of bridge. Culvert on r bank (no flow)

500 - Chute channel on left bank ~2 m wide → 100% covered in tall grass

501 - view upstream at GPS-103. Note - channel narrows, rip rap on both banks. Tall banks and houses/yards on right bank.

502 - eroding right bank @ GPS-104 with makeshift stabilization structures. Note meter stick for scale.

503 - undercut tree roots @ GPS-104 along left bank. Note vertical meter stick for scale.

504 - undercut banks/exposed roots on right bank

505 - "finer" deposition in pools common throughout reach

506 - upstream view @ GPS-105. Riffle ⇒ Δ bed elevation/gradient?

Location _____ Date _____

Project / Client _____

507 - eroding right bank. Note size of substrate. cobble / boulder

508 - eroding left bank @ GPS-108

509 - rip rap and high banks along right bank @ GPS-111

510 - standing @ edge of large scour pool (GPS-112) between approx 1 m from rip rapped right bank.

511 - looking downstream. Bank erosion left bank and artificial riffle(s). Vertical meter stick on left for scale. GPS-112 is on right side of picture.

512 - large bar complex on left side (gravel). Fining upward. Channel becoming more sinuous → lateral aggradation

513 @ GPS-118

514 - @ GPS-119. Scour pool. Culvert (no flow...yet)

515 @ GPS-122. LWD pileup right bank

Location _____ Date _____

Project / Client _____

GPS points

080 - confluence. Mlenem ~15 m wide, grassy floodplain ~5-10 m wide on each side. Dominant substrate → large cobbles (20 cm B axis) with embedded fines. little to no bank erosion. Banks ~1.5 m high, fine sand/silt. Water depth @ twag - 2 cm max. Riparian vegetation - mixed deciduous trees. Most large cobbles on bed covered in algae. Riffle

081 - bank erosion (undercut/toe erosion) ~30 m long along right bank. Both banks ~1 m high. Riffle

082 - downstream extent on scour pool → right bank.

083 - upstream extent of scour pool → RB. Max depth ~ 1.0 meters and 3 m wide. Deposition of finer materials (very fine gravel/sand) in relation to larger boulder-like bed materials

084 downstream extent of scour pool #2. Large (1.0 meter axis) bedrock or concrete slabs in middle of channel forming scour pool upstream

085 upstream extent of scour pool #2. Similar morphology to pool #1. Max depth - 1.0 m+, width - ~3 m.

086 - LWD complex on left bank. Eroding banks on right bank. Channel narrows to ~12 meters. Rip rap along right bank. Water depth @ twag ~58 cm.

087 RB ~ 2.5+ m high. Dominant substrate - fine to medium gravel. Channel narrows/deepens

Location _____ Date _____

Project / Client _____

088 - flood debris ~1 m above channel bed on overhanging limb on left bank. Channel ~10 m wide. Deep (over hip waders at ~1 m).

089 - left bank riparian changing to wooded. Right bank → rip rap with trees lining channel.

090 - culvert mid way up right bank (no flow)

091 - culvert at base of North Street bridge (small trickle)

092 - just upstream of bridge. Left bank ~1.3 m high. Right bank still 2+ m high. Dominant bed substrate - cobble (→ rip rap). 50-60% embeddedness. No major changes in BF or wetted channel widths. Depth at twag - 30 cm

093 - pool. 60 cm deep. Deposition of finer materials. Channel straight upstream. Dominant substrate → very fine to fine gravel. few cobbles throughout.

094 - upstream extent of rip rap on right bank. rip rap beginning on left bank

095 - rebar on left bank (T1 or T11?) from geomorphic assessment/surveying. Riffle/Run WD @ twag ~25 cm See detailed geomorph assessment/pictures/survey

096 - Riffle @ T10 or T2? Left bank ~1.5 m above thalweg and riparian land use changing to residential yards/tree lined channel. See detailed geomorph assessment for BF and wetted widths/depths.

Location _____ Date _____

Project / Client _____

097 - pool ~0.5 m deep. Seeing more biota (crayfish/minnows)

098 - riffle

099 - occupy point used during topo survey. Rebar, Riffle ~ 2 m upstream

100 - pool.

101 - downstream extent of chute channel → left bank. Gravel bar deposition and bar formation @ base of chute channel

102 - upstream extent of intensive geomorphic assessment. Rebar on left bank. Substrate - medium gravel to cobble left bank ~1 m high, grassy/stable w/ woods behind, right bank ~ rip rap. BF ~ 1.2 m above t-wag. Total bank height 4+ m.

103 - wetted width ~4.5 m. BF width ~ 8.5 m. BF height 1.1-1.2 m. More embeddedness of finer material than downstream. Rip rap on both banks. Water depth @ twag - 30 cm

104 - eroding right bank with stabilization and undercut tree roots on left bank

105 - scour pool. Finer deposition of fine gravel/sand. ~60 cm deep. ~10 m downstream of riffle (106)

same

106 - riffle → change in bed elevation/gradient?

107 - pool

108 - eroding left bank. BF height ~1.2 m. Wetted width ~4 m. BF width ~9 m. WD @ twag - 37 cm. Left FP - grass/woods

Location _____ Date _____

Project / Client _____

109 - riffle - change in bed elevation/gradient?

110 - pool ~75 cm deep against right bank

111 - downstream extent of rip rap along right bank. Wetted width ~4 m. BF width ~4.5 m. BF height (left bank - T&B) ~80 cm. Channel narrowing/shallowing. WD @ twag - 14 cm. Little to no (0-10%) embeddedness of fine material.

112 - upstream extent of rip rap along right bank. Large scour pool 1+ meter deep. Channel makes abrupt curve. Bank erosion/LWD pileup on left bank. 2 manmade (concrete) riffles upstream

113 - manmade riffle(s). Widespread channel instability in the form of gravel deposition, eroding banks, slumping banks, LWD build up. Channel widening → Wetted width ~7-8 m. BF - width - ? bankfull height ~1.2 m (left bank). WD @ twag - 20 cm. Wide/shallow. Right bank now ~1.2 m high. Dominant substrate - fine gravel/medium gravel. No cobbles. Plane bed upstream

114 - long pool ~50 cm deep and 10-15 m long

115 - wetted width ~4 m. WD @ twag ~20 cm. downstream extent of bar complex (medium gravel) on left bank

Location _____ Date _____

Project / Client _____

116 - pool. 1.0+ m deep. Channel widens (doubles in wetted width) and deepens

117 - mid channel bar (silt), silt depth ~ 45 cm

118 - riffle: Substrate - large cobbles/small boulders eroding/undercut left bank

119 - culvert (no flow) and scour pool. ~ 20 meters from road.

120 riffle. Substrate → large cobble/small boulder

121. BF height ~1.0 m. increasing sinuosity

122. large LWD pileup on right bank,

123. - wetted width ~ 8.5 m. Bank full width ~ 13 m. WD @ thalweg - 50 cm. Right bank → silt, eroding, toB ~ 1.8 m. Left bank → grassy, toB ~ 1.8 m.

125 - sandier bed upstream throughout

126 - riffle. Both banks 1.4-1.5 m high → BF tool. Upstream extend of riverwalk, near W Center St.

Location MKE MMSD Riverwalk Date 09-27-12

Project / Client _____

objective: MMSD Underwood Creek geomorphic river walk. Beginning at proposed diversion working upstream natural Underwood Creek.

personnel: BMY & JDB

weather: Mid 50's, overcast, breezy

river stage: unknown, (no known precip for 1 week +)

Location _____ Date _____

Project / Client _____

Pictures (Olympus GPS camera)

213 - upstream @ proposed diversion
214 - slow pool DS of culvert
215 - riffle @ GPS point 130
216 - culvert @ GPS point 131 on left bank.
217 - gps 132
218 - gps 137
219-220 gps-138
220-221 gps-139
222 - concrete structures US of gps 139 on right bank → confine or restrict higher flows
223 - US of gps 140. Dry channel. Large clast substrate. Relatively high cut bank on right bank
224 - culvert @ gps 141
225 - US @ gps 141
226 - @ gps 142.
227-229 @ gps 143
230 - large culvert @ gps 144
231 @ gps 145
232 @ gps 149 US
233 @ gps 149 DS
234 @ gps 150 US
235 ~~US~~ @ undercut/eroding right bank @ GPS 151
236 - culvert near Tapio @ gps 153
237 - bridge ~7 m US of gps 153

Location _____ Date _____

Project / Client _____

238 ~~239~~ - cut bank @ GPS 154.
239-240 - bed elevation change @ gps 155
241 - in between T1 and T2 @ site 1.
242 - US T1 or T11 @ site 1. Dry bed.
243 - underneath bridge @ Wall St. US
244 - upstream @ gps 159
245-246 - upstream @ gps 160
247-248 dark underground channel → long
249 - buckling of concrete channel. "US"
250 → "DS"
251 - culvert on west side
252 - "upstream"

18226 N Maytan

Location Need to convert Date

Project / Client yds to m

GPS points (Garmin Oregon 450)

127 - confluence of Underwood natural/concrete lined. Substrate is boulder (30-40 cm B axis). Wetted width - 10 yds. right and left bank height - 30 cm. → rip rap → grassy. Depth @ twag - 11 cm.

128 - scour pool downstream of culvert → depth - 56 cm. Rip rap banks. Potential change in elevation/gradient — 18 yds long

129 - scour pool US of culvert → 7 yds wide, 16 yds long, water depth ~ 70 cm. Deposition of fines/organics ~ 7 + cm.

130 - channel narrows to 1.8 m (wetted), 5.6 m (BF). Bank height ~ 90 cm from thalweg. WD @ twag - 9 cm. Substrate - coarse sand/cobbles. Banks composition - silt with grass/undercut toe. Riffle

131 - culvert, left bank. Substrate - gravel. right bank - 1.9 m high → rip rap, cut trees.

132 - wetted width - 1 m, depth - 4 cm @ twag, substrate - cobble (90-128 mm) w/ embedded fines. Dry for most of channel.

133 - footbridge @ park where detailed geomorph assess began. Undercutting of bridge foundation. Rip-rap banks.

134 - downstream extent detailed geomorphic assessment. See those notes for geomorphology and pictures. → site 8.

135 - US extent of site 8. Wetted width - 1.2 m. BF width - 5.6 m BF height - 1.4 m. Water depth @ twag - 5 cm. Right bank - 60°, undercut, silt w/ grass. Left bank - 10°, silt w/ grass. Substrate - large gravel w/ ~80 embeddedness of fines

Location Date

Project / Client

136 - slow, stagnant water → depth - 27 cm. 4 m wide. rip rap on left bank. ~8 cm deep of silt on right bank for ~8 meters long.

137 - large concrete blocks. Little to no flow → potentially underground?

138 - pool. WD depth - 48 cm. Deposition of fines (silt/organic) ~ 15 cm thick. Right bank (cut bank) ~ 1.6 m high. Wetted width - 5.2 m, BF width - 7.4 m. substrate - fine gravel, few boulders and covered with dead organic material

139 - old relic bridge. Concrete banks confining higher flows → 51 cm water depth.

140 - little to no flow. Substrate - large clasts (large gravel to boulder). Cut bank on right bank ~ 2.1 m high. widespread channel disturbance → flow spreads over FP/eroding right bank.

141 - culvert (no flow) on right bank. Right bank decreasing in height upstream.

142 - LWD and scour pool — 55 cm deep.

143 - dry channel, still large clast substrate. Right bank - cut bank, exposed roots - 1.75 m high, silt, buried/exposed debris. Channel width - 7.4 m. Wooded on left bank

Location _____ Date _____

Project / Client _____

144 - large culvert on right bank and subsequent scour pool ~85 cm deep.

145 - Width ~2.6 wetted, 7.5 m BF. Banks ~30-40°, grass, silt composition. Substrate - large gravel

146 - pool, 51 cm deep

147 - riffle. 4 m long

148 - pool. 31 cm deep. ToB ~1.6 m high

149 - downstream extent of losing reach?

150 - stagnant pool - 55 cm deep, ~15 m long

151 - bank total height - 1.75 m. Eroding right bank substrate - small gravel / silt

152 - pool - 67 cm deep

153 - culvert near SW corner of Tapco Building

154 - change in bed elevation, potential Δ in gradient. Still dry channel → large gravel to boulder substrate, 0.5 m high cut bank on left bank. Widespread disturbance

155 - 0.7 m high old concrete barrier → altering bed elevation and gradient

156 - downstream extent of site #1. See more detailed notes for morphology / pictures ** channel is now dry **

left bank ~~for~~ between T1-2 ~1.6 m high

157 - upstream extent of site 1. Same morphology as T1 / T1.7

158 - bridge @ Wall street

159 - straight concrete lined (~7.5 m) high right bank. 8.5 m wide from concrete wall to left ToB (parking lot)

Left ToB height - 2 meters above twag

Location _____ Date _____

Project / Client _____

160 - scour pool below concrete lined channel ~ 60 cm deep

161 - downstream extent of underground / concrete channel

162 - ~~the~~ upstream extent of underground / concrete channel. (and ~~c~~ furthest upstream most extent of river walk @ Water Town Plank Road.