



Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Bassett Creek 2015 Flood Control Project Inspection
Date: December 9, 2015
Project: 23/27 0051.36 2015 065

In accordance to the Operation and Maintenance Manual for the Bassett Creek Flood Control Project, an annual inspection is required to review the condition of the flood control features. The flood control project was turned over to the local sponsor during 2002. Therefore, inspection of the flood control features was initialized during the fall of 2002, which was the first formal inspection by the BCWMC. Except as noted the annual inspections have been performed during the years 2002-2015. Inspections were not performed during 2003, 2011, and 2013 due to BCWMC budget considerations. Some of the municipalities have performed independent inspections of several of the structures. The municipalities are responsible for routine cleaning, including debris removal, brushing, and tree removal from the BCWMC Flood Control Project features located within their city. The TAC is in the process of discussing the municipal and BCWMC responsibilities for maintenance and repair of the Flood Control Project features beyond routine cleaning.

Following are the 2015 inspection comments and recommendations:

Plymouth Features

Inspection Date: October 14, 2015

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. Plymouth Creek Fish Barrier (Constructed 1987)

- a. The water flow over the weir structure was about two inches deep.
- b. The overall condition of the structure was satisfactory and appeared similar to the previous inspection (the concrete appeared to be in good condition).
- c. There are a few small cracks in the downstream portion of the left wing wall. No change from previous inspection notes.
- d. The expansion joint in the middle of the right abutment wall appears to be consistent to last few years and the gap was measured at approximately $\frac{3}{4}$ inch.

Note: references to "right" and "left" are with respect to facing downstream.

- e. Both sides of the downstream banks were stabilized with riprap a few years ago. Some of the riprap on the west (right) slope downstream of the structure has slid, exposing the filter fabric underlayment, which was noted on the inspections in 2012 and 2014.
- f. Sediment has continued to accumulate upstream of the structure. The upstream pool is filling with sediment and has formed a delta/island with vegetation growing on it. The island appears to be deflecting flow to the east (left) bank, and sediment is accumulating along the west (right) bank.
- g. Rust was noted on railings. The upstream end of the railing on both sides of the structure has rusted off below the water line where the railing connects to the concrete. The railing is still functional but should be repaired.

Recommended Action:

- Remove accumulation of sediment from upstream pool.
- Monitor west downstream slope and replace riprap as necessary.
- Monitor width of joint opening during future inspection.
- Repair railing connections.

2. Medicine Lake Outlet Structure (Constructed 1996)

- a. The overall condition of the structure appeared satisfactory. The concrete appeared to be in good condition with no major cracks.
- b. Water was trickling over the weir at the time of the inspection.
- c. Some erosion was noted around the east end of the weir where it ties into the east bank of the creek. During high flow conditions this erosion could increase and flow could bypass the weir.
- d. There was a large tree, noted in the 2014 inspection, on the east bank that is tipping and exposing soil and roots. If the tree falls, it will leave a void in the bank. The tree is underneath an existing chain link fence.
- e. The channel between the lake and the weir was full to the level of the weir notch.
- f. Geotextile fabric flap referenced and submerged during previous inspections was observed as a lapped joint in 2008. In 2009 more of the filter fabric was exposed than in the previous year. The fabric joint was submerged during this year's inspection and was not observed.
- g. Private green chain link fence on west end of structure is damaged, missing top rail and tipping over.

Note: references to "right" and "left" are with respect to facing downstream.

Recommended Action:

- The tree that is falling over on the east bank should be removed along with the root ball and the bank should be stabilized with additional riprap. The chain link fence should be repaired after removal.
- The erosion around the east end of the weir should be monitored.

Golden Valley Features

Inspection Date: October 14, 2015

Personnel: Jake Burggraff, Patrick Brockamp (Barr), & Matthew Jefferson (City of Golden Valley)

1. Wisconsin Avenue Control Structure (Constructed 1987)

- a. The overall condition of the structure appeared to be satisfactory.
- b. The culverts appear to have settled approximately 3-4 inches directly under Wisconsin Avenue (water is deeper in the middle). This comment was noted in previous inspections and no noticeable change has occurred since 2005 inspection. The portion of the gabion baskets that were below water have deteriorated and baskets are not intact; riprap has fallen out of the baskets at some locations (the deterioration has increased over the years and since the 2002 inspection).
- c. The flood gate was in the down-position at the time of the inspection; the gate had some rust forming along the bottom of the gate and there was some paint peeling off of the gate during the 2014 inspection. The bottom of the gate was currently under water and could not be inspected.

Recommended Action:

- Monitor gabion baskets and potential erosion during future inspections.
- Sand, prime and paint lower portion of gate and other steel members, as necessary.

2. Golden Valley Country Club—Includes Box Culvert, Overflow Weir, D/S Channel (Constructed 1994)

- a. The channel appeared to be in satisfactory condition with no change as stated in previous inspections. The riprap is in place along the channel and there was no erosion noted on either bank. Some riprap had collected in the channel bottom. Weeds and grass have grown in the

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riprap in the lower part of the channel. No debris, trees or brush have accumulated in the channel.

- b. The box culvert structure appears to be satisfactory. No debris was found around the structure to obstruct the flow. The box culvert was inspected and no issues were found with joints or concrete.
- c. The handrails at each end of the box culvert appeared to be in good condition.
- d. The overflow weir (earth berm) appeared in good condition. The turf grass was in good condition and there was complete coverage of the overflow weir with manicured fairway turf.

Recommended Action:

- None

3. Westbrook Road Crossing (Constructed 1993)

- a. The overall condition of the structure appeared satisfactory.
- b. The interior of the culvert was inspected. Cracking in the ceiling was present in previous inspections and does not appear to have changed.
- c. Spalled concrete (approx. 4 inch x 4 inch) noted at top of wing wall section at downstream right (east) side; there has been no change to the top of the wing wall since the 2007 inspection.
- d. The last Bebo culvert section on the downstream end has separated at the top of the section. The joint gap appears to be wider between the last two sections and there are signs of pressure points where the last section has pushed against the top of the two wing walls, the east side had some concrete fractured out in the last few years, potentially due to the movement. This should continue to be monitored.
- e. Storm sewer pipe entering Bebo from left (west) side has exposed rebar and could use some mortar around the pipe to form a better seal to the Bebo.

Recommended Action:

- Repair/patch storm sewer connection entering Bebo section on west side of culvert.
- Monitor cracks in the Bebo arch sections and the road surface during future inspections.
- Monitor spalling at the top of the wing wall at the downstream right (east) side and last joint gap between the last two sections on the downstream end.

Note: references to "right" and "left" are with respect to facing downstream.

4. Regent Avenue Crossing (Constructed 1981–1984)

- a. The overall condition of the structure is satisfactory. The interior of the culvert was partially inspected. The channel bottom being very soft along with deep water prevented full inspection of the interior. Cracking in the ceiling was present in previous inspections and does not seem to have changed.
- b. Some scour/erosion was observed around the end of the left downstream bank and at the upstream right side wing wall, as noted during previous years. Riprap is gone and filter fabric is now exposed on the south side (right) upstream end of the culvert.
- c. Top of upstream left/north wing wall has minor spalling with a long end section joint as noted in previous inspections.
- d. Diagonal hairline crack near top of upstream left wing wall as noted in previous inspections.

Recommended Action:

- Monitor erosion of bank at downstream of left wing wall and consider repair of bank with riprap.
- Repair erosion at upstream right wing wall by adding new fabric/filter and riprap on creek bank.
- Monitor depth of water at upstream end of culvert for possible scouring, depth of water on upstream end has increased over the past few years.

5. Noble Avenue Crossing (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory.
- b. Hairline cracks were noted along the top of the Bebo arch culvert. Most Bebo pre-cast sections had 2-4 hairline cracks across each section. Most cracks were either along the center or spaced 2 ft. off-center (same comment noted in past inspections since 2002). Spalling has occurred exposing some plastic joint material in some of the culvert sections near the downstream end and along the cracks approximately two feet either side of center, as noted in previous inspections since 2014. The cement paste covering the plastic joint material is separating and exposing the plastic.
- c. Downstream right wing wall tilted in (toward creek) 1-1/8-inch. Measurement increased by 1/8 inch since 2008 inspection.
- d. Spalled concrete noted at top of the left downstream wing wall and cracks nearby as noted in previous inspections. Some of the cracking appears to be expanding.

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- e. Erosion noted along outside edge of the upstream right wing wall. Filter fabric is exposed. Creek is entering the Bebo arch culvert at an angle. Additional riprap may minimize erosion.
- f. Storm sewer pipe on the north side entering the Bebo arch under the road has exposed rebar and should be patched with mortar. This has been noted in previous inspections since 2002.
- g. The hand rails have been painted since last inspection.

Recommended Action:

- Repair/patch storm sewer connection entering Bebo section on north side of culvert.
- Monitor cracks, spalling and scour during future inspections, especially at the downstream left wing wall.
- Repair erosion at upstream wing wall by adding riprap.
- Monitor cracks in crown exposing plastic expansion material to determine if spalling is from weathering or movement of the Bebo sections.
- Monitor depth of water at upstream end of culvert for possible scouring, depth of water on upstream end has increased over the past few years.

Golden Valley/Minneapolis Features

Inspection Date: October 15, 2015

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. Highway 55 Control Structure (Constructed 1987)

- a. The overall condition of the structure appeared satisfactory.
- b. Erosion was observed around both the east and west sides of the structure from water flowing along the sides of the structure that runs off of the bituminous path from above the structure as noted in 2007 inspection. The east side is more noticeable than the west side. Riprap and filter fabric could be placed on both sides. Some gravel had been dumped off the trail down the east side along the structure wall.
- c. There is a small hairline crack in the left wall of the inlet structure. The crack is positioned in the middle of the wall extending full height, this crack has been noted in previous inspections and there is no apparent change.
- d. Silt has accumulated at upstream pool in front of weir. Pool used to be relatively deep and was only 8 to 12 inches deep during inspection. The silt/sediment has filled the pool and was generally the same elevation as the overflow weir.

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Recommended Action:

- Remove accumulation of sediment from upstream pool.
- Monitor cracks and erosion during future inspections
- Consider adding riprap and filter to each side of the structure, same comment since 2010 (not urgent).

Crystal Features

Inspection Date: October 14 & 15, 2015

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. 36th Ave. & Hampshire Ave. Crossing/Markwood 8 ft. x 6 ft. Box Culverts (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory.
- b. Riprap was in the box culverts as noted in previous inspections; most of the riprap was located in the upstream end of the left (north) box culvert. The amount of riprap in the box culverts has decreased since the last inspection in 2014; the riprap has either been removed or has flushed through the culverts.
- c. The crack located in the right/top of the south culvert noted in previous inspections has not changed.
- d. On both culverts, the fifth joint from the downstream end had a 2 ½ inch gap, no change from previous inspections.
- e. Trees have been removed at upstream and downstream ends of the box culverts.
- f. New natural boulder riprap was added to the downstream end of the culverts since the 2012 inspection. Riprap appears undersized and has been redistributed somewhat by high flows.

Recommended Action:

- Monitor cracks and joint gaps during future inspections.

2. Markwood Open Channel (Constructed 1981–1984)

- a. Channel banks have become vegetated with trees and brush as noted in previous inspections. The trees are becoming large now and the brush thick; most of the brush is buckthorn. The bottom of the channel is mostly free of vegetation, there was one large tree that eroded away from the bank and is now in the middle of the channel. There has been significant clearing and

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tree/brush removal throughout the channel. The railing at the downstream end was removed and left nearby; caution tape was put up in its place.

- b. Erosion exists at the toe of both channel banks along most of the channel, cutting a vertical wall 2 to 3 feet up from the bottom of the channel. This erosion has expanded since the last inspection and may have been worsened by clearing activities.
- c. Some retaining walls and fences (likely installed by homeowners) along the channel are leaning toward the channel and appear to be failing. Some of the blocks at one of the retaining walls have been removed from the channel after falling in and placed on top of the wall.
- d. The CMP storm sewer discharging into the channel between 6833 and 6825 Markwood Drive is in poor condition – the pipe bottom is corroded and there is erosion around the pipe.

Recommended Action:

- Erosion on the banks should continue to be monitored.
- Although not part of flood control project, retaining walls should be inspected on regular basis in case they fail and impede the channel flow.
- Although not part of flood control project, City may want to consider CMP storm sewer repairs.

3. Markwood Channel Gabion Section (Constructed 1981–1984)

- a. Most of the trees that were growing through the gabion baskets have been cut to prevent damage to the baskets.

Recommended Action:

- Monitor for new tree/brush growth from the gabion baskets and remove as needed.

4. Markwood D/S Overflow (Constructed 1981–1984)

- a. The inlet to the overflow appears satisfactory; there is a slight build-up of sediment that should be monitored during future inspections.

Recommended Action:

- None.

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5. Markwood 8 ft. x 4 ft. Box Culvert (Constructed 1981–1984)

- a. The undermining of the downstream box culvert has been repaired and new natural boulder riprap was installed in 2014.
- b. Trees were removed from around outlet in 2014.

Recommended Action:

- None.

6. Georgia Ave. Crossing (Constructed 1981–1984)

- a. The overall condition of the two culverts is satisfactory.
- b. Repairs were made to the channel banks, inlet section ends, and outlet section ends in 2014. The undermining at the end sections was filled in and new natural boulder riprap was placed on the inlet section ends, and outlet section ends. Riprap appears undersized and has been redistributed somewhat by high flows.
- c. The casting assembly on the manhole over the north culvert on the east side of Georgia is off-set on the concrete opening of the manhole top exposing soil when observed from below. The manhole is in the boulevard area and the soil around it appears to be stable. This was first noted in the 2007 inspection and was noted again during 2015 inspection.
- d. Some small trees are growing around upstream and downstream ends of the culverts.

Recommended Action

- Remove trees near culvert ends, as necessary

7. Edgewood Embankment (Constructed 1981–1984)

- a. The overall condition of the feature appeared satisfactory.
- b. There is a small amount of erosion on the upstream end, north side (left) of the culvert at the embankment.
- c. There is no visible settlement along the embankment.
- d. The trees on the west side of the berm that have been referenced in previous inspections are now 6 to 8 inches in diameter or larger.
- e. The pool on the downstream side of the culvert and the creek banks downstream of the pool were repaired and new natural boulder riprap was installed in 2014.

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Recommended Action

- Trees should be removed from west side of embankment, as necessary.

8. Douglas Drive (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory.
- b. All trees and brush have been removed from the downstream end of the culvert.
- c. New creek monitoring equipment has been installed on upstream end of box culvert on south side of creek 2015.

Recommended Action

- None.

9. 34th Ave. Crossing (Constructed 1981–1984)

- a. The overall condition of the structure is satisfactory.
- b. Erosion at upstream end of culvert was repaired and natural boulder riprap was installed in 2014.
- c. The creek channel was restored upstream of the culvert, new natural boulder riprap was installed.
- d. Except as noted, the invert of the culvert is generally clean. Twelve to eighteen inches of sediment was accumulated in the bottom of the culvert where a storm sewer discharges from a manhole into the culvert. This may be caused by riprap that has accumulated in front of the pipe and trapped sediment at the downstream end.
- e. The tie rods are rusty and flaking near the center section of the culvert, as noted in previous inspections.
- f. Road guardrail cables have been replaced with new galvanized guard rails on both sides of the road.
- g. Sanitary sewer manhole exposed on west (right) creek bank downstream was relocated in 2014, tucked into the bank. The channel downstream has been repaired and natural boulder riprap has been placed on both sides of the creek.

Recommended Action

- None.

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10. Brunswick Crossing (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory, but the tie rods are broken and the joints have opened up - similar condition noted in previous inspections.
- b. The creek upstream and downstream of the culverts was restored with natural boulder riprap in 2014.
- c. On the south culvert, the fourth pipe joint from the downstream side has two broken ties and had been re-grouted by the City. The joint appears to be moving and is now about a 3-inch opening, with a gap between the pipe joint and the new grout. There is little change with the several other broken culvert tie-rods along each culvert as noted in previous inspections, with joint offsets up to 3/4 inch. Grout that was placed to fill the separating joints has started to detach due to joint movement and is falling out.
- d. The cracks in the pavement over the culverts did not appear to have changed since previous inspection.
- e. New natural boulder riprap that was installed in 2014 on the upstream end of the two culverts is in good condition.
- f. Small trees and brush have started to regrow at the upstream and downstream ends of the culvert.

Recommended Action

- Repair or replace pipe ties, weld new rods on pipe ties.
- Monitor concrete pipe joints condition during future inspections.
- Continue to monitor for cracks in pavement.
- Cut and remove trees and brush near culvert ends. Spray stumps to prevent regrowth.

11. 32nd Ave. Crossing (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory.
- b. The creek channel upstream of the culvert, as well as the upstream and downstream ends of the culvert, was repaired and restored with new natural boulder riprap along each side of the creek in 2014. These repairs are in good condition.
- c. New galvanized guard rails have been installed on each side of the road.

Note: references to "right" and "left" are with respect to facing downstream.

- d. A small amount of debris has started collecting at the upstream end between the 2 flared ends.

Recommended Action

- Monitor debris at culvert inlets and remove as necessary.

12. Bassett Creek Park Pond and Outlet (Constructed 1995)

- a. The overall condition of the outlet pipes appears satisfactory. The large trees present in the 2014 inspection have since been removed from the outlet.
- b. The creek stabilization done in 2014 along the reach where the pond outlet culvert discharges to Bassett Creek is in good condition.
- c. There is a large amount of sediment that has accumulated in the northwest corner of the pond where the creek enters the pond. This has been noted in previous inspections; small and large trees, brush and vegetation is now growing in these areas on the sediment deltas.
- d. The shoreline of the pond was in good condition.

Recommended Action

- Dredging of Bassett Creek Park Pond and upstream channel improvements (BCP-2) is included in the BCWMC CIP Table 5-3. Actual date for performing improvements has not been set.

13. Detention Pond and Outlet

- a. The overall condition of the outlet structure appears satisfactory.
- b. Although the pond appears in good condition from the surface, a survey is needed to assess accumulated sediment.

Recommended Action

- Pond should be surveyed in future to determine if it has accumulated sediment from Highway 100, which would reduce treatment volume.

Note: references to "right" and "left" are with respect to facing downstream.

Crystal/Golden Valley Features

Inspection Date: October 15, 2015

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. HWY 100 Double Box Culverts

- a. The control inlet structure condition appeared satisfactory.
- b. The improvements to the creek channel upstream of the structure are in good condition.
- c. The large cracks and transition joint damage as noted in previous inspections were repaired by Mn/DOT in 2007. The repairs remain in good shape with just a few hairline cracks observed and should continue to be monitored. During the 2014 inspection it was noticed that some of the concrete patching has become dislodged at the top of the culvert, additional deterioration of the patching was noted during this year's inspection.
- d. As noted in previous inspections, sediment has accumulated in the northern (left) box culvert. The sediment is approximately 12 to 24 inches deep. In previous years the sediment had collected downstream of the right angled bend in the northern culvert and is now progressing further upstream in the culvert up to the Mn/DOT storm sewer connection. Although the inlet structure controls the flow into the double box culverts, the accumulated sediment in the north culvert is reducing the capacity of the twin culvert section.
- e. The outlet portion of the structure appeared in satisfactory condition.

Recommended Action:

- Monitor accumulated silt in northeasterly (left) box culvert and consider removal in future.

Minneapolis Features

Inspection Date: October 15, 2015

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. Inlet Structure

- a. The overall condition of the inlet structure appeared satisfactory.
- b. The overall condition of the fence and railing appeared satisfactory.
- c. Minor cracks were noted in the concrete, especially where handrail posts were embedded. Some spalling was noted on the back of the south wing wall as indicated in previous inspections.

Note: references to "right" and "left" are with respect to facing downstream.

- d. There was only a minor amount of debris collected on the inlet structure grate, mostly leaves, at the time of the inspection.
- e. The creek channel was fully inspected this year. The banks are generally covered with brush and trees about 3-4 feet above the channel bottom. Below the level of the trees and brush, the banks are eroding on both sides for most of the length of the channel.

Recommended Action:

- The feasibility study currently underway for the 2017 Bassett Creek Main Stem Erosion Repair Project (CIP 2017 CR-M) should address the noted erosion issues.

2. Debris Barrier

- a. The debris barrier cable has come detached and/or broken off of the wood poles and needs to be reinstalled or replaced.
- b. Barrier is clear of debris.

Recommended Action:

- Repair/replace steel cable on debris barrier.

3. Double Box Culvert

- a. The 5-year double box culvert inspection was performed on December 9-10, 2014. In cooperation with the City of Minneapolis, a separate report was prepared.

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