

Item 4I.
BCWMC 1-15-15
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Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Item 4I – 2014 Flood Control Project Inspection
BCWMC January 15, 2015 Meeting Agenda
Date: January 7, 2015
Project: 23270051 2014 065

4I 2014 Flood Control Project Inspection

Recommendations

- Accept the report and direct the Engineer to provide copies of the inspection reports to the cities, MnDNR and Corps of Engineers regarding inspection results and recommended actions.

Background

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 inspection program covers the flood control project features completed by the BCWMC between 1974 and 1996. The objective of the inspection program is to identify and address erosion, settlement, sedimentation, and structural issues. Barr performed the annual flood control project inspection on November 24–25, 2014. Golden Valley staff assisted with the inspection for features located in Golden Valley.

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

Attached is the January 6, 2015 inspection report.

Memorandum

To: Bassett Creek Watershed Management Commission
From: Barr Engineering Co.
Subject: Bassett Creek 2014 Flood Control Project Inspection
Date: January 6, 2015
Project: 23/27 0051.35 2014 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 2002-2014. 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 BCWMC is responsible for maintaining the structures and the municipalities are responsible for general debris removal. The 2014 inspection was effected by cold weather and frozen conditions over portions of the creek and ponds that limited inspections of some structures due to unsafe ice conditions (see the attachment for photographs of the flood control project features).

Following are the 2014 inspection comments and recommendations:

Plymouth Features

Inspection Date: November 24, 2012

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. Plymouth Creek Fish Barrier (Constructed 1987)

- a. The water flow over the weir structure was about two inch in depth. There were riprap boulders on the overflow weir that were likely placed to dam up the creek.
- 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.

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

- 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.
- e. Both sides of the downstream banks were stabilized with riprap that was installed 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 last inspection in 2012.
- f. Sediment has continued to accumulated upstream of the structure. The upstream pool is filling with sediment and has formed a delta/island with vegetation growing on it. The island is deflecting the creek current toward the west (right) bank and some erosion was noted along the west bank.
- g. Rust was noted on railings.

Recommended Action:

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

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. There was no water flowing over the weir at the time of the inspection and there was thick ice on the downstream side of the weir limiting the inspection at the base of the weir.
- 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 on the east bank that is tipping and exposing soil and roots. If the tree falls, it will leave a void in the bank.
- e. The channel between the lake and the weir was generally dry except for a localized frozen pool in the middle. The lake staff gauge was removed for the season. Ice was noted along the shoreline at time of inspection.
- 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

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fabric joint could not be found during this year's inspection, the channel had silt and leave accumulated on the bottom and the sediment on the channel bottom was frozen.

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 erosion around the east end of the weir should be repaired with backfill, erosion control blanket or Turf Reinforcement Mats (TRM), and riprap to prevent further erosion around the end of the weir.

Golden Valley Features

Inspection Date: November 25, 2014

Personnel: Jake Burggraff, Patrick Brockamp (Barr), & Eric Eckman (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. Ice conditions prevented walking through the culvert at the time of the inspection.
- c. 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). Deteriorated portion of the gabion baskets could not be inspected because they were under the ice at the time of the inspection.
- d. A small sediment delta has been forming on the south side (right) of the upstream end of the structure as noted in previous inspections.
- e. The flood gate was in the up-position at the time of the inspection; the gate has some rust forming along the bottom of the gate and there is some paint peeling off of the gate.

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.

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

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 riprap in the lower part of the channel. No debris, trees or brush have accumulated in the channel. The Channel was not walked during this inspection because of the ice conditions.
- b. The box culvert structure appears to be satisfactory. No debris was found around the structure to obstruct the flow.
- 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 could not be inspected because of the ice conditions at the time of the inspection.
- 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. 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. We were not able to observe the storm sewer connection due to the ice conditions at the time of inspection.
- e. Westbrook Road was resurfaced in 2010 and since that inspection three minor cracks have appeared in the bituminous road surface, across the road and parallel and directly over the Bebo culvert, during previous inspections. The pavement was not observed during this inspection because the road was covered with ice and snow.

Recommended Action:

- Monitor cracks in the Bebo arch sections and the road surface during future inspections.

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. Inspection of interior of culvert could not be completed because of ice conditions at the time of inspection.
- 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.
- e. Restoration work on the creek channel between Regent and Noble Ave. was observed during the time of inspection.

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.

5. Noble Avenue Crossing (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory. Inspection of interior of culvert could not be completed because of ice conditions at the time of inspection.
- 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 2012. 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. The depth from the Bebo arch culvert crown to the creek bottom was measured this year at each end of the culvert. The measurements were 10.12 feet upstream side and 7.72 feet downstream

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side. The measurements in 2010 were 10.15 feet upstream side and 7.96 feet downstream side. Unable to measure depths because of ice conditions.

- e. 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.
- f. 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.
- g. 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.
- h. The hand rails are in need of some rust removal and painting.

Recommended Action:

- 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 see if spalling is from weathering or movement of the Bebo sections.

Golden Valley/Minneapolis Features

Inspection Date: November 25, 2014

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.
- 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. Steel cable guard rail between trail and structure has been replaced with a new metal guard rail system.

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- e. 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.

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: November 24, 2014

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 2012; 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. The RCP drainage pipe that was noted first in the 2004 inspection ties directly into the left (north) box. No mortar exists on the inside of the connection and exposed wire is visible (no change since 2004).
- f. Trees have been removed at upstream and downstream ends of the box culverts.
- g. New natural boulder riprap has been added to the downstream end of the culverts since the 2012 inspection.

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

Recommended Action:

- Monitor cracks and joint gaps during future inspections.
- Patch exposed end of RCP drain with mortar.

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 was eroded away from the bank and is now sitting in the middle of the channel.
- b. Erosion exists at the toe of the both channel banks along most of the channel, cutting a vertical wall up 2 to 3 feet from the bottom of the channel. This erosion has expanded since the last inspection.
- c. Some retaining walls and fences (likely installed by homeowners) along the channel have are leaning toward the channel and appear to be failing.
- d. The C.M.P. 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:

- All trees, limbs, and brush that may impede creek flows should be removed from the channel and banks.
- Downed trees and woody debris should be removed from the channel.
- 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, CMP storm sewer should be repaired.

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:

- New tree/brush growth should be cut from the gabion baskets.

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

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.

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 has been installed.
- b. Trees have been removed from around outlet.

Recommended Action:

- None.

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

- a. The overall condition of the two culverts is satisfactory.
- b. Repairs have been made to the channel banks, inlet section ends, and outlet section ends. The undermining at the end sections has been filled in and new natural boulder riprap has been placed on the inlet section ends, and outlet section ends.
- 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 and should be reviewed in the future. This was first noted in the 2007 inspection and was noted again during 2014 inspection.
- d. The two large trees are growing on the upstream side between the culvert inlets, first noted in 2009 inspection, have been removed.

Recommended Action

- None.

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

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 have been repaired and new natural boulder riprap has been installed.

Recommended Action

- Remove trees along embankment, as necessary.

8. Douglas Drive (Constructed 1981–1984)

- a. The overall condition of the structure appeared satisfactory. Ice conditions prevented inspection of the culvert at the time of inspection.
- b. Erosion on north (left) side of the downstream end of the box culvert under Douglas was noted.
- c. All trees and brush that could have impeded flow have been removed.

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 has been repaired and natural boulder riprap has been installed.
- c. The creek channel has been restored upstream of the culvert and new natural boulder riprap has been installed and the sanitary sewer manhole in the middle of the creek has been relocated.
- d. Accept 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.

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

- e. The tie rods are rusty and flaking near the center section of the culvert, as noted in previous inspections.
- f. Handrails are rusted and need paint.
- g. Road guardrail cables have been replaced with new galvanized guard rails on both sides of the road.
- h. Sanitary sewer manhole exposed on west (right) creek bank downstream has been tucked into the bank and the channel downstream has been repaired and natural boulder riprap has been placed on both side of the creek.
- i. The home that was adjacent to the steep creek bank on the west side (right side) has been removed.

Recommended Action

- Sand, prime and paint handrails, as necessary.

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 as noted in previous inspections.
- b. The creek upstream and downstream of the culvert has been restored, the channel has been regraded, and natural boulder riprap has been placed along stream channel.
- c. The failing gabion baskets on the downstream end at the north side (left) adjacent to the private driveway has been removed and replaced with a new large boulder retaining wall.
- d. 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.
- e. The pavement over the culverts could not be inspected because the road was covered with snow and ice at the time of the inspection.
- f. New natural boulder riprap has been installed on the upstream end of the two culverts.
- g. 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.

Recommended Action

- Repair pipe ties.
- Monitor concrete pipe joints condition during future inspections.
- Continue to monitor for cracks in pavement.

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

- a. The overall condition of the structure appeared satisfactory. Culvert interior could not be inspected because of ice conditions at time of inspection.
- b. The creek channel upstream of the culvert has been repaired and restored with new natural boulder riprap along each side of the creek.
- c. The upstream and downstream ends of the culvert have been restored and new natural boulder riprap has been installed.
- d. New galvanized guard rails have been installed on each side of the road.

Recommended Action

- None.

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

- a. The overall condition of the outlet pipes appears satisfactory. There are large logs and boulders, woody debris, sticks, and branches in the outlet flared end sections that should be removed.
- b. The creek has been stabilized and new riprap was observed along the reach where the pond outlet culvert discharges to Bassett Creek.
- c. There is a large amount of sediment that has accumulated in the northwest corner of the pond where the creek enters. This has been noted in previous inspections; small trees, brush and vegetation is now growing in these areas on the sediment deltas.
- d. The shoreline of the pond could not be inspected at the time of construction because of the thin ice conditions.

Recommended Action

- The logs, boulders, and debris should be removed as soon as possible from the pond outlet flared ends sections, at the least before spring to prevent any back-up or flooding.
- Survey existing pond bottom so it can be compared to the original design to determine the amount of accumulated sediment and consider future maintenance dredging project.

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

13. Detention Pond and Outlet

- a. The overall condition of the outlet structure appears satisfactory.
- b. Brush has been removed from around the outlet structure.

Recommended Action

- None

Crystal/Golden Valley Features

Inspection Date: November 25, 2014

Personnel: Jake Burggraff & Patrick Brockamp (Barr)

1. HWY 100 Double Box Culverts

- a. The control inlet structure condition appeared satisfactory.
- b. The creek channel upstream of the structure has been improved with new channel section, riprap banks, and rock riffles.
- c. The large cracks and transition joint damage as noted in previous inspections were repaired by Mn/DOT in 2007. The repairs still remain in good shape with just a few hairline cracks observed and should continue to be monitored. During this year's inspection it was noticed that some of the concrete patching has become dislodged at the top of the culvert.
- d. As noted in previous inspections sediment has accumulated in the northern (left) box culvert. The sediment is approximately 12 to 18 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.
- e. The outlet portion of the structure appeared in satisfactory condition some of the pea rock in between the box culvert sections has washed away.

Recommended Action:

- Monitor accumulated silt in northeasterly (left) box culvert and consider removal in future.
- Replace fill and riprap between box culvert end sections.

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

Minneapolis Features

Inspection Date: November 25, 2014

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 were indicated in previous inspections.
- d. A new access gate has been installed in the school board property fence adjacent to the inlet structure allowing for easier access to clean the structure.
- e. Woody debris, from previous removal operations, has accumulated on the creek banks on either side of the creek and should be removed.
- f. There was only a minor amount of debris collected on the inlet structure grate at the time of the inspection.
- g. The creek channel was not observed during the 2014 inspection due to ice conditions.

Recommended Action:

- Remove woody debris from creek banks on each side of the inlet structure.

2. Debris Barrier

- a. The debris barrier cable has come detached from the wood poles and needs to be reinstalled or replaced.

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 will be prepared.

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

Attachment

Photographs of Bassett Creek Flood Control Project Features

November 24 – 25, 2014

Inlet Structure



Debris Barrier



Open Channel



Plymouth Fish Barrier



Medicine Lake Outlet



Wisconsin Ave. Structure



Golden Valley Country Club Control Structures



Westbrook Road Crossing



Regent Ave. Crossing



Noble Ave. Crossing



Highway 55 Control Structure



Highway 100 Double Box Culvert



Bassett Creek Park Pond and Outlet Structures



Bassett Creek Park Pond and Outlet Structures (Cont'd)



32nd Ave. Crossing



Brunswick Ave. Crossing



34th Ave. Crossing



Douglas Drive Crossing



Edgewood Embankment and Ponding Area



Georgia Ave. Crossing



Markwood Box Culverts and Channel Improvements



Markwood Box Culverts and Channel Improvements (Cont'd)

