Appendix A Windshield Survey Report
Memo

Date: Friday, January 13, 2017
Project: E Avenue NW Watershed Stormwater Drainage Study
To: City of Cedar Rapids
From: Brice Stafne/HDR, Steph Then/HDR
Subject: Windshield Survey of E Avenue NW Watershed

Background
HDR conducted a windshield survey of several stormwater management features in the E Avenue NW Basin on December 20, 2016. Photographs were taken and observations were noted at some of the hydraulic features associated with Vinton Ditch and the associated drainageways, locations of these observations are shown in Figure 1. The observations are summarized in the memo. Additional notes can be accessed through the attached electronic document.

Figure 1: Location of photographs and observations discussed in this memo
Open Channel Drainageways near 25th Street SW and 1st Avenue SW

There are two open channel drainageways that enter the storm sewer system west of 25th Street SW. The open channel flowing from the south drains the residential area between 12th Avenue SW and 10th Avenue SW, and enters twin 54" reinforced concrete pipes (RCP), near the intersection of 25th Street SW and 8th Avenue SW. The channel is shown in Figure 2.

The second drainageway is a small open channel segment that drains the area north of 1st Avenue SW near 27th Street NW. The channel enters the storm sewer system via 30" corrugated metal pipe (CMP). Figure 3 shows the channel.

This area has storage potential, as there are approximately 3 acres of undeveloped land surrounding the two open channel drainageways.
Figure 3: Open channel drainageway south of 1st Avenue near 25st Street SW
Detention Basin near 1st Avenue SW and Norwick Road SW (Cedar Hills Basin – C-205)
This detention basin is located near the upstream end of the E Avenue NW Basin. It collects storm sewer inflow from the surrounding residential areas. The basin has two concrete channels and short prairie grass vegetation. The outlet structure has a series of orifices that release flow at multiple elevations. The outlet structure is show in Figure 4.

Figure 4: Outlet structure at Cedar Hills Detention Basin
Detention Basin near Shetland Drive NW (Bel Air West Basin – C-207)
This detention basin is located north-west of Cherokee Park and collects storm sewer inflow from the surrounding residential area. The basin is vegetated and the outlet to the storm sewer system is a 30” RCP flared head wall section. The detention basin is shown in Figure 5 and the outlet is shown in Figure 6.

Figure 5: Bel Air West Detention Basin near Shetland Drive NW
Figure 6: Bel Air West Detention Basin outlet structure
Open Channel and Detention at Cherokee Trail Park
The Cherokee Trail Park is located south of Midway Drive NW, between Wiley Blvd NW and Edgewood Road NW. The open channel drainageway (Figure 7) through Cherokee Trail Park flows from west to east and enters a box culvert north of Shelly Lane NW. The original box culvert has been retrofitted with a 6’ X 6’ opening (Figure 8) to increase storage.

The majority of the Cherokee Trail Park is short prairie grass. Other vegetation includes tall prairie grass near the open channel banks, and scattered trees. Downstream of the Cherokee Trail Park box culvert, the open channel vegetation includes dense trees (Figure 9).
Figure 8: Cherokee Trail Park Detention Basin outlet structure
Figure 9: Open channel vegetation downstream of the Cherokee Trail Park outlet structure
Box Culvert under F Avenue NW near 29th Street NW

An open channel drainageway, in the northwest quadrant of the E Ave watershed, enters the storm sewer system via box culvert under F Avenue NW near 29th Street NW. The 4.5’ X 10’ box culvert is shown in Figure 10.

Upstream of the box culvert is an open channel that drains residential and open spaces near Edgewood Road NW and H Avenue NW. The open channel is shown in Figure 11.
Figure 11: Open channel drainingway north of F Avenue NW near 29th Street NW
Open Channel at Jacolyn Drive NW, south of Johnson Avenue NW.

The open channel drainageway south of Johnson Avenue NW is in the southwest area of the E Avenue NW basin. The open channel is shown in Figure 12. This drainageway flows from southwest to northeast and through a 72" equivalent arch pipe culvert at Jacolyn Drive NW. The flared headwall has a partial trash rack and was semi-blocked on the day of the site visit. The flared headwall is shown in Figure 13. The endwall also has a trash rack and is shown in Figure 14.

Figure 12: Open channel at Jacolyn Drive NW, south of Johnson Avenue NW
Figure 13: Flared headwall with modified trash rack at Jacolyn Drive NW culvert
Figure 14: Flared endwall with trash rack at Jacolyn Drive NW culvert
Storm Sewer at Jacolyn Park

An overland flow inlet structure at Jacolyn Park is shown in Figure 15. The inlet is three office flow openings, each having dimensions of 16” x 48” (H:W). There is one 54” equivalent arch pipe entering the storm sewer structure, and twin 72” equivalent arch pipes leaving the structure. The twin arch pipes leaving the structure are shown in Figure 16.

East of Jacolyn Park the storm sewer outlets to the Vinton Ditch open channel drainageway. The twin 72” equivalent arch pipes at Jacolyn Park transition to a 72” equivalent elliptical pipe (northern pipe) and a 72” equivalent arch pipe (southern pipe) at the outlet. The southern arch pipe has flared endwalls, while the elliptical pipe is projecting at the outlet. The outlet is shown in Figure 17.

Figure 15: Overland flow inlet structure at Jacolyn Park
Figure 16: Twin 72” equivalent arch pipes at the overland flow structure at Jacolyn Park
Figure 17: Storm sewer system outlet to Vinton Ditch, east of Jacolyn Park
Vinton Ditch at 19th Street NW

The open channel drainageway, Vinton Ditch, flows through a split box culvert at 19th Street NW. The natural channel upstream of the box culvert is shown in Figure 18. The split box culvert has two 12’ X 8.5’ openings, and is shown in Figure 19. Downstream of the box culvert, Vinton Ditch has higher, steeper side slopes that required some bank stabilization (Figure 20).

Figure 18: Vinton Ditch upstream of 19th Street NW
Figure 19: Split box culvert under 19th Street NW
Figure 20: Vinton Ditch downstream of the 19th Street NW culvert
Vinton Ditch at E Avenue NW
Vinton Ditch crosses E Avenue NW via split box culvert. Each opening in the split box culvert has dimensions of 6’ X 8’. The downstream end of culvert is shown in Figure 21. Upstream of the E Avenue NW crossing, Vinton Ditch has a narrow channel with gabion baskets lining the banks (Figure 22). Downstream of the E Ave crossing, the Vinton Ditch channel widens with less steep side slopes, see Figure 23.

Figure 21: Split box culvert north of E Avenue NW
Figure 22: Vinton Ditch upstream of the E Avenue NW culvert
Figure 23: Vinton Ditch downstream of the E Avenue NW culvert
Vinton Ditch Downstream of Edgewood Road NW

Vinton Ditch crosses Edgewood Road NW via two 54” equivalent elliptical pipes. The square endwall section of the Edgewood Road NW culvert is shown in Figure 24.

![Image of Edgewood Road NW culvert](image)

Figure 24: Square endwall of the Edgewood Road NW culvert
Vinton Ditch near 28th Street NW (Hagan’s 2nd Detention Basin)

A footbridge crosses Vinton Ditch near 28th Street NW. The footbridge is shown in Figure 25. There is a weir outlet structure for the Hagan’s 2nd Detention Basin (C-209) upstream of the footbridge. The weir opening is approximately 4’ X 6’ (H:W) and is also shown in Figure 25. The Hagan’s 2nd Detention Basin area is shown in Figure 26. The basin’s vegetation is primarily prairie grass.

Vinton Ditch downstream of the detention basin outlet is lined with gabion baskets and is shown in Figure 27.

Figure 25: Footbridge near 28th Street NW with Hagan’s 2nd Detention Basin outlet structure
Figure 26: Hagan’s 2nd Detention Basin
Figure 27: Vinton Ditch downstream of Hagan’s 2nd
Vinton Ditch Tributary near 28th Street NW
A tributary enters Hagan’s 2nd on the north side of the basin via split box culvert under E Avenue NW, shown in Figure 28. The two openings in the split box culvert have dimensions of 4’ X 12’. The tributary channel upstream of the E Avenue NW box culvert is lined with Gabion baskets and is shown in Figure 29.

Figure 28: Split box culvert under E Avenue NW
Figure 29: Open channel upstream of the E Avenue NW box culvert