INSPECTION REPORT

FOR

Hickory Creek

Part I – St. Joseph River to Marquette Woods Road

Berrien County, MI

Prepared for:

Berrien County Drain Commissioner

July 2008

Project No. 115671.08

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INTRODUCTION

The intent of this Hickory Creek Drain Maintenance Inventory and Plan project is to:

1. Document and inventory the existing condition of the Hickory Creek Drain and its crossings. Identify possible sources of flooding near Cleveland Avenue.

2. Provide an overall drain maintenance plan with recommendations for both normal maintenance and improvement projects so that the drain operates and functions for the purposes, which it was previously designed and constructed. The plan will also incorporate erosion control and stream protection measures in critical areas.

This report is intended to be used in conjunction with the Geographic Information System (GIS) based products. A goal of this project was to produce a user friendly, dynamic product that will be useful for years to come. A CD is also included in Appendix F of this report that includes all of the information found in this text as well as referenced GIS data. It has been produced on an ESRI ArcGIS platform that will be compatible with other data sets that Berrien County currently has and will likely have in the future.

DRAIN DESCRIPTION

Hickory Creek flows north from its headwaters in northern Weesaw Townhip to its confluence with the St. Joseph River. The Hickory Creek inspection was performed over an approximate 4.6 mile section with the downstream study limit at its confluence with the St. Joseph River and the upstream study limit at West Marquette Woods Road. For the purposes of readily identifying different sections of the creek which exhibit similar characteristics, our study has separated the study reach into four reaches. These reaches will be described in more detail in succeeded sections.

The Hickory Creek watershed encompasses approximately 53 sq. mi. and is located in parts of St. Joseph, Lincoln, Royalton, Lake, Baroda, Oronoko, Buchanan, and Weesaw Townships. The watershed is composed of primarily sandy soils and a variety of different land uses with the majority being agricultural, residential, forested or industrial. The watershed appears to be relatively well drained.

Recently localized flooding has been experienced for relatively high frequency rainfall events along Hickory Creek between Niles Avenue and Cleveland Avenue. Since flooding in this area has been more prominent in recent years, the source of the flooding was thought to have been due to recent changes in the stream flow or channel characteristics. The primary reason for this drain inspection was to identify possible sources of the flooding problems as well as to document the existing conditions of the drain.

The contents and recommendations of this report are based on the visual inspection of the drain. Hydrologic and hydraulic calculations (or other analyses) have not been completed and are not included in the scope of this report. A field survey of the drain was not conducted as part of this study.

INSPECTION METHODS

BASE MAPPING

Hydrography, street centerlines, political boundaries, aerial photography, etc. used for preparation of the deliverables for this project were obtained from Berrien County. Other data was obtained and prepared by Spicer Group, Inc. The horizontal datum used for this project is the North American Datum of 1983 (NAD 83) Michigan State Plane, South Zone, with all units in international feet. The drainage district boundary was developed using EPA – Hydrologic Unit Code (HUC-14).

DATA INVENTORY COLLECTION

A Trimble GeoXT handheld Global Positioning System (GPS) unit was utilized in the field to track the location of all inventoried drain maintenance features. The GPS unit has sub meter horizontal accuracy. It was also used to provide the locations for all digital photographs taken during the inspection. A data dictionary (inventory checklist) was prepared for this project for use in the GPS unit. This data dictionary includes all of the possible features that could be found on the drain. Once loaded onto the GPS unit computer, this data dictionary allowed the Inspecting Engineer to efficiently document the existing conditions of the drain and make recommendations for improvement.

All GPS data along with the associated photograph locations are shown in the Drain Maintenance Inventory Maps in Appendix A. The GPS unit output has been prepared as shape files and can be viewed from the CD enclosed in Appendix F.

MAINTENANCE AND IMPROVEMENT RECOMMENDATIONS

Upon completion of the maintenance inventory for Hickory Creek, recommendations for improvement and/or maintenance were compiled. Depending on length and condition similarities, Hickory Creek was broken down into reaches to allow for easier descriptions of drain conditions and proposed improvements.

The following is a summary of the visual inspection on a reach-by-reach basis. All reference to left and right are assumed to be looking upstream (up station).

OBSERVATIONS AND RECOMMENDATIONS

Reach A

Length: 3,670 Feet, 0.70 Miles

Limits: Confluence with St. Joseph River (Sta. 0+00) to M-63/Niles Avenue (Sta. 36+70)

Observations:

Overall

In general, the drain appears to be in a relatively stable, fair condition. The only drain crossing is a concrete bridge at M-63/Niles Avenue. The bridge appears to be in good condition although the configuration of the riprap scour protection beneath its deck appears to be causing a significant hydraulic restriction. At the time of the inspection, there was an approximately 2 foot head loss across the structure. With the exception of the head losses created by the riprap, the bridge appears to be appropriately sized although no formal hydrologic or hydraulic calculations were performed as part of this study.

Figure 1: Head loss at M-63/Niles Ave

A typical drain cross section in this reach would have an approximate 25 to 35 foot water width and a 2 to 4 foot depth. The channel bottom is generally sandy with a few areas of deadfall and woody debris. The channel banks are generally sloped at 2 horizontal to 1 vertical or greater. The left channel bank is wooded on the downstream section, while on the upstream section some broken concrete riprap protect the bank as the marina parallels Hickory Creek in the overbank. The right channel bank varies between trees and brush and grassed areas. There was one isolated section of bank sloughing along the left channel bank.

Figure 2: Typical Cross Section Reach A

In this section, the sediment depths were typically approximately 3 feet deep. Sediment depths were also probed in the St. Joseph River in the vicinity of the confluence of Hickory Creek. As probes were taken further from the confluence, the sediment depth decreased. Upstream of the confluence of Hickory Creek the sediment depth in the St. Joseph River was 0.5 feet. At the time of the inspection, the flow did exhibit moderate turbidity with the drain having a light brown, murky appearance.

Recommendations:

Reach A

- Sta. 6+00 – Install riprap splash pad at storm sewer outlet.
- Sta. 8+80 to 10+30 – Repair bank sloughing by use of bank protection or pull slopes and establish vegetation.
- Sta. 10+90 – Remove deadfall and debris.
- Sta. 36+70 – Adjust riprap scour protection beneath M-63/Niles Ave bridge to be at grade with the existing channel bottom.
- Sta. 0+00 to 36+70 – Remove sediment from drainage channel.

Reach B

Length: 6,070 Feet, 1.15 Miles

Limits: M-63/Niles Avenue (Sta. 36+70) to Cleveland Avenue (Sta. 97+40)

Observations:

Overall

In general, the drain appears to be in a fair to poor condition. The two major crossings in this section are the concrete bridges at Washington Avenue and Cleveland Avenue. Both crossings appear to be in fair to good condition and properly sized. An abandoned railroad crossing is located at Station 43+30. Although the deck has been removed from this crossing, its abutments do constrict the channel down to approximately 16 foot width, which is approximately 10-15 foot narrower than the channel.

Figure 3: Abandoned Railroad Crossing

Hickory Creek possesses a well established and vegetated floodplain which varies in width between approximately 400 and 1500 feet along this corridor. The overbanks in this floodplain are generally undeveloped and contain wetlands, wooded areas and tall grasses. The channel banks are generally sloped at 1 horizontal to 1 vertical or greater. A typical drain cross section in this reach would have an approximate 25 to 35 foot water width and a 1 to 4 foot depth. The water depth increased at the downstream end of the reach due to backwater effects of the constriction at M-63/Niles Avenue. The channel bottom is generally sandy with some areas of deadfall and woody debris.

Figure 4: Typical Cross Section Reach B

Very large deadfall jams are located near Stations 77+00 and 82+00. These jams are most likely are significant contributor to the recent flooding problems experienced near Cleveland Avenue. At the time of the inspection, the water level was approximately 3 feet below the top of the channel banks and the head loss across the jams was approximately 0.5 to 1.0 feet. The stream velocity was visibly higher downstream of the jam and the backwater effects of the jam appeared to extend up to Cleveland Avenue. During times of high flow, these jams could essentially act as dams until Hickory Creek floods out of bank and the floodplain storage is utilized. Drain maintenance such as the removal of this deadfall would be aided by a cleared easement for the sanitary sewer that runs along the right channel bank between Washington Avenue and Cleveland Avenue.

In this section the sediment depths increased in the downstream direction as they were approximately 3 feet and 2 feet at Niles Avenue and Cleveland Avenue respectively. At the time of the inspection the flow did exhibit moderate turbidity, with the drain having a light brown, murky appearance. The drain does appear to be carrying a moderate suspended sediment load. Many of the small tributaries which drain the wetland areas in the overbanks appear to be relatively clean and not significant contributors of sediment to Hickory Creek. The only exception is the tributary that outlets near Station 56+70. A large alluvial fan was noted at the confluence of this tributary.

Recommendations:

Reach B

- Sta. 36+90 to 97+40 – Selective clearing of channel.
- Sta. 43+40 – Remove abutments from abandoned railroad crossing.
- Sta. 56+50 – Install sediment basin or trap near outlet of drain in left bank.
- Sta. 77+00 to 82+00 – Remove deadfall and debris jams.

Figure 5: Deadfall Jam near Sta. 80+00

Reach C

Length: 9,210 Feet, 1.74 Miles

Limits: Cleveland Avenue (Sta. 97+40) to Glenlord Avenue (Sta. 189+50)

Observations:
Overall
In general, the drain appears to be in a fair to poor condition. Consistent with all other study reaches, this section of Hickory Creek contains significant amounts of sediment. The sediment depths in this reach typically range from 1 to 2 feet. Channel banks in this section are often 1 horizontal to 1 vertical or greater. They range in height from 2 to 8 feet and often have bare soils exposed. Erosion along the channel banks is most likely a significant source of the sedimentation problems in Hickory Creek.

Figure 6: Typical Cross Section Reach C

At the time of the inspection, the flow was moderately turbid and had a brown, murky appearance. The water depth typically ranges from 1 to 3 feet, while the stream width is between 20 and 30 feet. The channel bottom is generally sandy with a few areas of deadfall and woody debris. This reach has a well established and vegetated floodplain which varies in width between approximately 100 and 1500 feet. As in Reach B, the overbanks in this section are generally undeveloped and contain wetlands, wooded areas and tall grasses. The sanitary sewer parallels the right bank in this reach and its cleared easement provides a land access route. Manhole locations were documented as part of the drain inspection. Between River Stations 124+00 and 128+00 the right channel bank is protected by a steel retaining wall which appears to be in fair condition.

The two major road crossings in this section are a wood bridge at Maiden Lane and a concrete bridge at Glenlord Avenue. The bridge at Maiden Lane appears to be in good condition while the bridge at Glenlord Avenue is in fair condition. Both crossings appear to be properly sized. There is also an abandoned steel bridge approximately 100 upstream of Maiden Lane. This crossing is no longer utilized and does not appear to be constrictive or detrimental to the hydraulics of Hickory Creek.

Recommendations:
Reach C
- Sta. 97+40 to 189+50 – Selective clearing of channel.
- Sta. 130+90 – Install riprap spillway at outlet of side drain.
- Sta. 131+40 – Remove deadfall and debris.
- Sta. 161+70 – Install cobblestone splash pad at outlet of on right bank.
- Sta. 171+00 – Install cobblestone splash pad at outlet on right bank.

- Sta. 172+60 – Repair bank sloughing by use of bank protection or pull slopes and establish vegetation.
- Sta. 183+00 – Install cobblestone splash pad at outlet on right bank.
- Sta. 189+20 – Fill undercut areas beneath concrete apron for 48 inch outlet and install additional riprap.

Reach D

Length: 5,370 Feet, 1.02 Miles

Limits: Glenlord Avenue (Sta. 189+50) to Upstream Study Limit at West Marquette Woods Road (Sta. 243+20)

Observations:

Overall

This study reach appears to be in fair to poor overall condition. The channel banks are often very steep in this section, with slopes of 1 horizontal to 1 vertical or greater. Vegetation is not very well established on the channel banks and bare soils are often exposed. Flow conditions in Hickory Creek were moderately turbid with a brown, murky appearance. The channel bottom is typically sandy and sediment depths varied between 0.5 and 2 feet.

Figure 7: Typical Cross Section Reach D

The presence of deadfall in the stream has aided the formation of sandbars in a few locations. A typical cross section in this reach would have channel banks between 2 and 8 feet, while the stream is 20 to 25 feet wide and 1 to 2 feet deep. This section of Hickory Creek flows through mainly wooded areas where the overbanks are generally undeveloped and provide floodplain storage. The cleared easement for the sanitary sewer ends just downstream of Interstate 94.

The crossing at Interstate 94 is composed of two separate steel beam bridge decks with one continuous concrete abutment. The crossing appears to be adequately sized and in fair condition. This bridge is much wider than the channel in this area and large sandbars have formed near the bridge abutments. The West Marquette Woods Road crossing is constructed of timber beams and has one center bridge pier approximately 16 inches wide. This crossing also appears to be in fair condition and properly sized.

Recommendations:

Reach D

- Sta. 189+50 to 243+20 – Selective clearing of the channel.
- Sta. 205+00 – Remove heavy deadfall and debris.
- Sta. 210+00 - Remove sediment at outlet of tile outlet and install cobblestone splash pad.
- Sta. 214+00 – Install riprap spillway at drain outlet.
- Sta. 218+60 – Install riprap spillway at drain outlet.
- Sta. 223+00 – Install riprap spillway at drain outlet.

Figure 8: Looking at Sandbars below I-94 Bridge