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1.0 INTRODUCTION

The Hurlbut Drain is an established County Drain located in Sections 25, 26, 35 and 36 of Muskegon Township, Muskegon County, Michigan. The drain was legally established in 1912 and discharges to the legally established Barnes County Drain, approximately 400 feet south and 100 feet west of the intersection of Laketon Avenue and Walker Road.

The Hurlbut Drain is an open drain approximately 1.30 miles in length which extends from the Barnes Drain easterly and northeasterly across vacant industrial lands south of Laketon Avenue before crossing under Dangl Road, approximately 300 feet south of Laketon Avenue. The drain then crosses Laketon Avenue approximately 800 feet east of Dangl Road and continues along the northern right-of-way line of Laketon Avenue to Mill Iron Road and the point of ending. The drain continues from this point as the legally established Laurene Taylor County Drain.

In addition, a Section 433 agreement is in place for the drainage course within the P. Don Aley Industrial Park, located on Dodson Road, which outlets to the Hurlbut Drain west of Dodson Road. The industrial park has a history of drainage issues and prolonged flooding. The area within and around the park is generally flat with a very high water table (12 to 48 inches below grade) throughout the year.

The existing Drainage District boundary contains approximately 674 acres of lands wholly within Muskegon Township. The lands in the District are comprised of vacant industrial land to the west of Dangl Road, primarily owned by Marathon Oil, and rural residential and single family residential lands in the remainder of the District to the east of Dangl Road.

The Hurlbut Drain is a tributary of the legally established Barnes Drain and the Barnes Drain Drainage District. The Hurlbut Drain is also adjacent to the established drainage districts of Laurene Taylor Drain, Holland Drain and Kent Drain.

Two projects are currently in progress which are being coordinated as part of this report. The first is the Marathon Oil proposed stream relocation on the Hurlbut Drain beginning at the outlet to the Barnes Drain and concluding approximately 450 feet west of Dangl Road. The second is the improvements proposed as part of the recently petitioned Laurene Taylor Drain, located upstream of the Hurlbut Drain.

The study areas of this report will focus on the connecting portions of the Hurlbut Drain between the aforementioned two projects, and include the Industrial Park drainage course and surrounding conditions.

Eng., Inc. analyzed the existing storm water drainage conditions and delineated a proposed Drainage District boundary based upon contour maps and an existing site review.
The following tasks were performed to accomplish these services:

- Review the file and history of the drain system at the MCDC’s office.

- Review and research existing record information [County maps, aerial photographs, topographic information, Muskegon County Road Commission (MCRC) records, existing land use information, etc.]

- Review any documented drainage complaint records and any adjacent district boundary or drainage district information maps.

- Review any wetland information available from the DEQ for the immediate area, which may impact potential options for improvement.

- Review any available USDA Soil Survey Map information for the immediate area.

- Survey and inspect the existing route of the Hurlbut Drain between the Marathon Oil proposed stream relocation point of ending and continuing upstream to the point of beginning of the Laurene Taylor Drain. Obtain sufficient survey information to examine drain elevations, including existing crossing and driveway culverts and any private drainage ditches entering the system(s).

- Provide an independent and unbiased assessment of the storm water conditions within the study area.

- Compile analysis in a conditions summary report.
2.0 EXISTING CONDITIONS

Hurlbut Main Drain

The Hurlbut Drain is an open drain system with a typical cross section consisting of a 4 to 8-foot bottom section and 1:1 to 1:2 vegetated side slopes. Several inspections were performed between April and July of 2016, with water depths observed varying between 6 inches and 24 inches.

The last documented maintenance to the Hurlbut Drain was completed in 1968. In review of the 1968 construction drawings, apparently several of the roadway culverts have since been replaced and enlarged. The Dangl Road culvert which was a 42-inch CMP culvert in 1968 has been replaced with a 43-inch by 68-inch horizontal elliptical pipe. The Laketon Road culvert which was a 36-inch concrete pipe in 1968 has been replaced with a 60-inch diameter concrete pipe along with a change in alignment. The Laketon Road culvert replacement appears to have been set well higher than the historical grade of the drain indicates.

In addition, several private culverts have been constructed since the 1968 project was completed. Along the overhead utility line corridor west of Dangl Road, a 36-inch concrete culvert has been placed which is significantly smaller than the upstream culvert (42-inch by 66-inch at Dangl Road). The pipe is also approximately 50% full of sediment with significant erosion occurring at the downstream end due to an apparent ATV crossing, further reducing capacity at this location.

The culvert under the driveway at 3370 E. Laketon Avenue which was a 42-inch boiler tube culvert has been replaced with a 42-inch concrete culvert with concrete flared end sections.

Two new culverts have been placed along the north side of Laketon Avenue in close proximity which may have been installed to accommodate future driveways at these locations. These culverts consist of a 42-inch diameter RCP pipe with concrete flared end sections and a 48-inch diameter RCP pipe with no end treatments.

A 48-inch RCP culvert has been placed under Dodson Road with a concrete flared end section on the east (upstream) side and a concrete block headwall on the west (downstream) side of the roadway. The pipe inverts of the Dodson Road culvert are approximately 0.60 feet lower than the culvert across Laketon Avenue located 1500 feet downstream, resulting in permanent standing water and poor hydraulics for moving water away from the area around and within the Industrial Park.

The drain channel contains heavy, grassy vegetation which appears to be slowing water velocity. The heavy vegetation also exists along the drain banks where it has helped stabilize and reduce erosion from the dominant sandy soils within the vicinity of the drain.
The drain also contains several pockets of standing water and stagnant water flow. These pockets appear to be occurring for two main reasons:

1. Culverts have been placed at incorrect elevations.
2. Natural sediment accumulation and lack of periodic maintenance, some of which may be a result of incorrect culvert elevations.

The above occurrences have resulted in a much higher hydraulic grade line in the upstream portions of the District.

**P. Don Aley Industrial Park (Section 433 Drain)**

The industrial park was constructed in 2004 and consists of five units ranging in size from 3.06 acres to 6.38 acres. In addition, an unplatted parcel is located along the frontage of Laketon Avenue and Dodson Road. The Section 433 Drain is located within a 20-foot wide drainage easement along the western and northern borders of the industrial park, which ultimately discharges to the Hurlbut Drain. A drainage easement which existed along the south 20 feet of Unit 3 has been built over by the property owner with a permanent building. This exacerbates the lack of drainage relief along the west side of Dodson Road south of Lund Drive.

A control structure exists approximately 300 feet south of Lund Avenue consisting of small (approximately 1-inch diameter) orifice holes near the top of the structure which are completely encapsulated in geotextile fabric. The fabric reduces the ability for water to enter the structure through the orifice holes. An 8-inch discharge pipe is extended from the structure to the Hurlbut Drain a distance of 450 feet. The rim elevation (645.98) of the control structure is located 2.5 feet above the bottom of the drain channel. The elevation of the orifice holes (0.81 feet below the rim elevation, or 645.17) and the fabric wrapped around the holes creates a surcharged condition in the drain channel, which consequently must rely entirely on soil infiltration to dissipate. The situation becomes most problematic when groundwater levels are high (spring) and infiltration is non-existent. A basis of design for the control structure was not located at the MCDC office.

The industrial park is completely built out with the exception of Unit 1 (6.38 acres) on the east side of the park. Within the industrial park, only one of the units has been designed with on-site detention, and the remainder have a direct discharge. Storm water runoff from Unit 1 will likely be routed (following detention) directly to the Laurene Taylor Drain along Mill Iron Road or to the Hurlbut Drain along Laketon Avenue.

Of the approximately 19 acres which contribute runoff to the Section 433 Drain, only 5.81 acres has storm water detention incorporated. The result is approximately 13.25 acres of industrial lands (corresponding to a runoff coefficient of 0.75) which are not detained and which rely on an 8-inch outlet pipe. The Muskegon County Drain Commissioner Draft Storm Water Rules and rational method detention calculator indicates that approximately 118,000 cubic feet of storage would be required for this amount of runoff. Currently, only 16,000 cubic feet is provided in the swale along the west side of the industrial park.
Scherdel Sales, which encompasses the southwest portion of the industrial park including the unplatted portion, has experienced significant difficulties controlling and moving storm water away from their property. Their loading docks, located along the frontage of Dodson Drive, are negatively affected by high groundwater levels as well as inefficient storm water runoff.

Although many of the issues at the subject site were created by development, a reliable outlet which does not surcharge under routine conditions was not created, but can be provided through the recommendations and improvements outlined later in this report.
EXISTING HURLBUT DRAIN CONDITION LOG

PHOTO #1

36-inch crossing at overhead utility corridor west of Dangl Road – 50% of full of sediment and degradation on upstream end of culvert.

PHOTO #2

ATV crossing on south (downstream) end of culvert causing sediment accumulation and disrupting channel flow.
Typical section west of Dangl Road with heavy vegetation in the main channel.

42-inch by 66-inch HE pipe crossing at Dangl Road with concrete headwall in good condition.
Typical section between Dangl Road and Laketon Avenue with heavy vegetation in the main channel.

60-inch diameter RCP crossing and concrete headwall at Laketon Avenue. The pipe is in good condition although the north side is perched.
PHOTO #7

Typical channel section along the north side of Laketon Avenue with heavy vegetation in the main channel.

PHOTO #8

42-inch RCP culvert to 3370 E. Laketon Avenue with concrete end sections in good condition.
PHOTO #9

42-inch RCP culvert with concrete end sections in good condition. The culvert is believed to be in place to accommodate a utility crossing.

PHOTO #10

Typical channel section along the north side of Laketon Avenue just west of Dodson Road with heavy vegetation in the main channel.
PHOTO #11

48-inch utility crossing culvert with no end treatments. The pipe is in good condition.

PHOTO #12

48-inch RCP culvert at Dodson Road with concrete block headwall on the west side in good condition.
PHOTO #13

East side of the 48-inch culvert at Dodson Road with concrete end section in good condition. A 12-inch HDPE pipe from the roadway catch basin discharges here.

PHOTO #14

Typical channel section east of Dodson Road looking east towards Mill Iron Road with heavy vegetation in the main channel.
PHOTO #15

The control structure in the southwest corner of the industrial park.

PHOTO #16

Looking east from the control structure at a flow channel towards Scherdel Sales’ new building which drains the west portion of the site.
PHOTO #17

Looking north from the control structure towards Lund Avenue at the main drain channel.

PHOTO #18

Looking south from the Lund Avenue at the main drain channel.
Looking east from the end of Lund Avenue along the south side of the roadway. A recently constructed ditch and associated sediment deposition.

Looking south from the north property line of the Jackson-Merkey property at the vegetated main channel, in good condition.
PHOTO #21

18-inch RCP culvert near the southwest corner of the Jackson-Merkey property.

PHOTO #22

24-inch ductile iron pipe crossing near the northwest corner of the Jackson-Merkey property.
PHOTO #23

Typical channel section along the north property line of Jackson-Merkey and Emergency Services with heavy vegetation in the main channel.

PHOTO #24

Emergency Services detention basin on the left side and main drain channel on the right side of the photo. Discharge is controlled to the drain channel.
3.0 RECOMMENDATIONS

The following recommendations address drainage issues in areas within the proposed Hurlbut Drain Drainage District:

- Based on the conditions which exist today along the main Hurlbut Drain and also the Section 433 Drain within the industrial park, simple maintenance activities (i.e. open drain cleanout) will not fully remedy the stagnant flow conditions and periodic flooding which occur within the District. If a petition is secured, we would recommend conducting a Board of Determination meeting as outlined in Chapter 8 of the Michigan Drain Code of 1956.

- The existing 36-inch culvert located within the overhead utility corridor west of Dangl Road should be replaced with an appropriately sized culvert and the drain channel and banks stabilized upstream and downstream.

- The entire length of the main drain within the study area of this report should be cleaned out to the historical grades of the drain or re-graded to a deeper elevation. The deepening of the drainage channel will assist with lowering the high groundwater levels in the area although would require Michigan DEQ permitting for the deeper grade.

- Although the 60-inch diameter RCP culvert at Laketon Avenue is in good condition, its vertical elevation is too high and water backs up in the upper portions of the Hurlbut Drain to Mill Iron Road. Three culverts east of this location, ranging in size from 42-inch to 48-inch, were also set much too high. The existing 60-inch pipe and three driveway culverts could likely be salvaged and re-set to the appropriate grade to reduce costs.

- If the recommendations to clean out and re-set the culverts (as mentioned above) are enacted, a much deeper outlet will be available for the industrial park. The lower outlet elevation (approximately two feet deeper), in addition to the improved hydraulics from the previous recommendations, will provide significant drainage relief to the park.

- Additional storm water detention areas should be explored within the industrial park or neighboring areas to accommodate the increased runoff when the park becomes fully developed.

- Drainage calculations indicate an allowable outflow of 0.13 cubic feet per second (cfs) per acre from the industrial park which results in 2.48 cfs total discharge (19 acres contributing). A 12-inch pipe would be ideal to allow passage of this discharge rate. The pipe set at an appropriate elevation would provide significant improvement to the existing condition.

If a petition does not come forward, it is unlikely that significant improvements could be made to the flooding which currently occurs within the industrial park, due to the limitations of the $5000 per mile per year allocation which the Drain Code allows for maintenance. The existing culvert and drain centerline elevations will continue to surcharge water in the upper portions of the District and park.
APPENDIX A
Exhibit A: Drainage District Boundary Exhibit
APPENDIX B
Exhibit B: Proposed Lands to be Added Exhibit
BRENDA M. MOORE
MUSKEGON COUNTY DRAIN COMMISSIONER
HURLBUT DRAIN DRAINAGE DISTRICT

PART OF SECTIONS 25, 26, 35 & 36 OF MUSKEGON TWP., T10N, R16W AND
PART OF SECTION 30 OF EGELESTON TWP., T10N, R15W
MUSKEGON COUNTY, MICHIGAN

LEGEND
- EXISTING HURLBUT DRAIN CENTERLINE
- PROPOSED RELOCATED HURLBUT DRAIN
- PROPOSED RELOCATED HURLBUT DRAIN CENTERLINE
- EXISTING HURLBUT DRAIN CENTERLINE
- PROPOSED HURLBUT DRAIN CENTERLINE
- EXISTING HURLBUT DRAIN DRAINAGE DISTRICT BOUNDARY
- PROPOSED HURLBUT DRAIN DRAINAGE DISTRICT BOUNDARY

LINES ADDED
LINES REMOVED
APPENDIX C
Preliminary Drawings