

ENGINEERING REPORT

LITTLE TOBACCO INTERCOUNTY DRAIN

ISABELLA AND CLARE COUNTIES, MICHIGAN

PREPARED FOR:

LITTLE TOBACCO INTERCOUNTY DRAINAGE BOARD

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**BRADY HARRINGTON – MICHIGAN DEPARTMENT OF AGRICULTURE
AND RURAL DEVELOPMENT - CHAIRMAN**

RICHARD F. JAKUBIEC – ISABELLA COUNTY DRAIN COMMISSIONER

CARL PARKS – CLARE COUNTY DRAIN COMMISSIONER

BRADY HARRINGTON - CHAIRMAN

P.O. BOX 30017

LANSING, MICHIGAN 48909

TELEPHONE: (517) 335-9324

FAX: (517) 335-3329

**PREPARED BY:
BRUCE E. ROHRER P.E.
ENGINEERING CONSULTANT
TELEPHONE: 989-330-2150**

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OVERVIEW OF STUDY

Field elevation data was gathered by the subcontracted firm of CMS & D, Mt. Pleasant, Michigan, at drain crossings and 100 ft. or closer points along the centerline of the drain including periodic cross sections sufficient to develop a realistic profile of the drain. Elevation data was obtained on several dwellings that may be subject to potential flooding. The survey datum used was NAVD 1988 currently being utilized by FEMA (Firm Community Panel Number 26035C0434C) using the Michigan State Plain Central Coordinate System. Establishment of this system was obtained by the utilization of nearby NGS Control Points. Stationing was established commencing at the intersection of the Little Tobacco Drain and the Tobacco River and proceeding upstream along the centerline of the drain to Herrick Rd. Information was obtained concerning utilities that cross the drain.

Ten soil borings were obtained along the drain including road bridge locations by the subcontracted firm of SME, Inc., Bay City Michigan. Flood frequency discharges were obtained from the Michigan MDEQ. The one percent peak flow (550 cfs) was used to evaluate structures regarding flooding.

A review of the MDEQ Wetland Map Viewer site Part 303 Final Wetlands Inventory Map indicates there are a significant amount of wetlands along the drain as defined by National Wetlands Inventory (NWI) and Michigan Resource Information System (MIRIS). Clearing and grubbing operations, placement of excavated spoil and other kinds of work will be impacted by wetland regulations.

An evaluation was conducted by the subcontracted firm of Great Lakes Engineering Group, LLC, Lansing Michigan concerning the condition of all bridge crossings and recommendations developed concerning bridge replacement, repairs, and underpinning requirements. Bridge maintenance recommendations focused on structural adequacy related to the drain and not on traffic concerns such as road surface conditions.

The proposed channel configuration and grade was evaluated presuming that the existing concrete box culvert inverts under Westbound U.S.-10 and U.S.-127 highways were fixed and would not be altered. Special consideration was given to alleviating potential flooding problems west of McEwan Street and residential areas along the drain downstream from McEwan Street to a point in the drain north of Cleveland Street and the residence on Eberhart Rd.

The proposed channel grade commencing at the outlet of the Little Tobacco Joint Drain in the Tobacco River upstream to Westbound U.S.-10 highway is established by the Tobacco River bottom grade and the invert of the box culvert under Westbound U.S.-10 highway. Meandering ox-bows were assessed for straightening including impacts on future encroachments within the channel corridor, and channel bank erosion. It was concluded that the channel was in a relative stable equilibrium state through the flood plain corridor requiring minor straightening and moderate control of bank erosion at the outer limits of the corridor.

The proposed channel grade between Westbound U.S.-10 and Northbound U.S.-127 highways was established by the invert elevations of the respective box culverts under each highway. The perched culvert under Eastbound U.S. 10 and Eberhart Rd. were evaluated for possibly lowering or upsizing using the HY8 computer design program. The program indicates both culverts should be enlarged and lowered. MDOT will perform this upgrade to Eastbound U.S.-10 in 2018.

Two proposed channel grade configurations are designed using a HEC-RAS Design Program, upstream from Southbound U.S.-127 for the Drain Board to consider. The recommended option is a 0.19 percent channel grade extended upstream to Station 103+63.1 at the upstream side of the 5th Street Bridge. The grade is then flattened to 0.10 percent slope upstream with the McEwan St. culvert lowered 1.0 ft. and increased in size. This additional channel depth and increased flow capacity of the McEwan Street culvert will have a distinguishable impact on flood reduction west of McEwan Street. MDOT will be responsible for a large portion of the replacement costs as McEwan St. is a state trunkline.

The second option extends the 0.19 percent grade an additional 862 ft. upstream to Station 112+25 near the abandoned 3rd Street bridge thereby reducing the channel depth by one ft. compared to the first option. The grade is then flattened upstream to 0.10 percent slope and the McEwan St. culvert left undisturbed.

Either option requires that 2nd Street and the upstream Great Lakes Central Railroad culverts be enlarged and lowered. The recommended alternative is to remove the Rail to Trail bridge deck and install one long culvert through the 2nd St., Rail to Trail and Railroad crossings.

The drain crossing at Dunlop Rd. should be replaced for structural and hydraulic reasons. The remaining bridges were evaluated at 6th St., 5th St., 4th St. and Maple St. They do not significantly impact flooding, however maintenance work and footing protection are required. The Railroad Bridge south of Dunlop Rd. also requires footing protection.

The drain should be cleaned out in Section 3 of Vernon Township and the Wood Bridge under Herrick Rd. replaced to alleviate flooding problems in Isabella County.

The office building at 314 E. 5th St. in Clare is located very close to the drain. Recent floor settling and ceiling cracking has been caused by partial failure of a retaining wall along the drain bank. Repair alternatives were evaluated and were very expensive with no absolute certainty of success. The recommended solution is to purchase and remove the structure.

The engineering firm of Gourdie-Fraser, Traverse City Michigan, were asked to provide the relocation cost estimates for six sanitary sewer and seven watermain relocations along the drain. This firm provides technical assistance to the City of Clare regarding utilities. They will be subcontracted to provide engineering services for the sewer and water relocations if the project moves forward.