

May 31, 2006

RECEIVED

Mr. Stephen R. May
Lenawee County Drain Commissioner
320 Springbrook Avenue
Adrian, MI 49221

JUN - 2 2006

LENAWEE COUNTY
DRAIN COMMISSIONER'S OFC.

Re: Seeley Drain Bypass around Posey Lake

ProgressiveAE

Dear Mr. May:

This is an update for the preliminary engineering review previously submitted on June 1, 2004. This review only addresses the feasibility of hydraulically diverting the flow around Posey Lake from the Seeley Drain to the Posey Lake Drain outlet. Potential water quality benefits which may occur as a result of the project will be discussed by others.

A survey of the area around Posey Lake from the Seeley Drain to the Posey Lake Drain was completed by Progressive AE. The County obtained additional survey along Plank Road west to the point where the Posey Lake Drain intersects Plank Road. A location map is attached with proposed routing for the bypass. The Seeley Drain crosses Plank Road through a 72 inch diameter culvert. The upstream invert of the culvert was measured to be 945.90 feet. The Posey Lake Drain has approximately 3.5 feet of fall from the point just downstream of the Posey Lake Dam to the point where it crosses Plank Road. It is assumed that an invert entering the Posey Lake Drain in the vicinity of Plank Road could be as low as 939.8 feet which is the presumed invert of the 7 foot x 10 foot culvert for the Posey Lake Drain under Plank Road. The difference between the Seeley Drain invert at Plank Road and the proposed Posey Lake Drain inlet is 6.1 feet.

A number of different options and routes were evaluated for the bypass. The selected route intercepts the Seeley Drain just north of Plank Road and follows the right-of-way along the north side of Plank Road until it intercepts the Posey Lake Drain approximately 1,500 feet west of the Dowling Highway. This route was selected because it allows for construction of the bypass in the right-of-way of Plank Road. The total length of the proposed drain route is approximately 5,900 feet.

An open cut drain and a buried closed conduit were reviewed as options for the bypass. The invert of the bypass could range from approximately 939.8 feet to 945.9 feet. The surface elevation over the majority of the route ranges from 953 feet to 962 feet. Therefore, the drain would be 10 to over 20 feet deep over much of the route. Assuming just a 10-foot-deep drain with a 5 foot bottom, the total width of the drain would be approximately 45 feet. This assumes a side slope of 1 on 2 for each side and the 5-foot-wide bottom. This equates to the removal of approximately 55,000 cubic yards of soil followed by slope stabilization. Using an excavation and disposal cost of \$8/cubic yard, the excavation cost alone would exceed \$440,000. This does not include land procurement for the 45-foot-wide drain, general conditions, slope stabilization, road crossings, permitting, engineering, etc. . . . The Lenawee County Road Commission has indicated that an open drain would not be allowed within the road right-of-way. Property owners have also expressed that an open cut drain would not be desired if the drain were to cross their property.

The bottom of the closed conduit would also be approximately 10 to 20 feet below grade. However, the pipe trench would be backfilled and have little to no impact on surface uses due to its depth of bury. Manholes would be placed at turns in the conduit and at approximately 500 foot intervals to aid in potential cleaning activities. The closed conduit option along this route would see the conduit installed at a slope of approximately 0.07 percent (requiring approximately 4.1 feet of fall) from Seeley Drain to the Posey Lake Drain. Due to the minimal slope, a smooth pipe with good flow characteristics is desired. In addition, it is recommended that the pipe be watertight as it may be under minimal pressure when flowing full. A number of

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different materials were reviewed. The recommended pipe is an HDPE dual wall pipe with an annular corrugated exterior for strength and a smooth inner wall for maximum flow capacity. The characteristics of this pipe also provide for simplified installation and/or increased longevity over other options such as corrugated metal pipe, ductile iron, or concrete.

It is reported (Posey Lake Water Quality Studies 1995 – 2005, Water Quality Investigators) that the average Seeley Drain flow is 2.8 cubic feet per second (cfs). It is intended that the proposed bypass would divert the full flow from Seeley Drain under normal conditions. During periods of high flow the bypass would handle the initial flush. Flows in excess of the bypasses capacity would then be allowed to flow into Posey Lake. A 24 inch diameter smooth-lined HDPE pipe was sized for the bypass. When flowing full this pipe at a 0.05 percent slope can pass 5.5 cfs, and 7.7 cfs at 0.10 percent slope. This value will increase slightly if the Seeley Drain level rises above the top of the bypass drain pipe. Velocity within the pipe, when flowing full, will be approximately 2 feet/second. This velocity should be sufficient to prevent settling of solids such as clays which are being carried downstream. At this velocity, travel time through the bypass will be approximately 50 minutes.

In order to divert the flow, a berm is proposed to be constructed within the Seeley Drain just south of where the bypass connects to the Seeley Drain. This berm would be armored with rip rap and set at a top elevation equal to or just above the top of the bypass pipe. This would divert all the water through the bypass drain until such a point that the bypass pipe is flowing full. At that flow, the berm would be overtopped and the excess flow would enter Posey Lake via the Seeley Drain. As the flow decreases the level in Seeley Drain would recede and the full flow would again be bypassed around Posey Lake. During periods of draught when flows from the Seeley Drain may be desired to maintain the water level within Posey Lake, the 24 inch bypass pipe could be blocked causing all the flow to enter Posey Lake.

A permit from the Michigan Department of Environmental Quality was issued on October 19, 2005, for this project under Part 301 (Inland Lakes and Streams) of the Natural Resources and Environmental Protection Act, PA 451 of 1994.

In summary, the Seeley Drain can be hydraulically diverted to bypass Posey Lake. The proposed bypass would be a 24 inch diameter, smooth-lined HDPE pipe to the Posey Lake Drain outlet. An open cut drain was reviewed as well but the space requirements coupled with the cost appear prohibitive.

If you have any questions or require additional information, please don't hesitate to contact us at 616/361-2664.

Sincerely,

PROGRESSIVE ARCHITECTURE ENGINEERING



Anthony F. Groves, M.S.
Water Resources Director



Eric Van Orman, P.E.
Project Leader

ELV/msp
50300604/002
Enclosures
cc: Lenawee County – Joe Brezvai
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