

**CHARTER TOWNSHIP OF MERIDIAN
ENVIRONMENTAL COMMISSION
AGENDA
Wednesday, November 2, 2016**

**Town Hall Room
Meridian Municipal Building
5151 Marsh Road, Okemos, MI 48864**

Work Session

1. Call to Order at 6:30 p.m.
2. Approval of the work session agenda
3. Work Items
 - a. Recommendations for draft Master Plan
4. Public remarks
5. Adjournment

Regular Meeting

1. Call to Order at 7:30 p.m.
2. Approval of agenda
3. Approval of minutes of the October 5, 2016 meeting
4. Public Remarks
5. Chair's Report
6. Staff Report
7. Commission Liaison/Workgroup Reports (Land Preservation, Energy, Parks)
8. ACTION ITEM: Wetland Use Permit #16-05 (Mayberry Homes)
9. Public Remarks
10. Adjournment

**CHARTER TOWNSHIP OF MERIDIAN
ENVIRONMENTAL COMMISSION MINUTES
Meridian Municipal Building – Town Hall Room
October 5, 2016 - DRAFT**

REGULAR MEETING

PRESENT: Chair McConnell, Vice-Chair Schools, Commissioners Dickmann, Sarver, Holland, Jackson, and Kielbaso

ABSENT: Commissioner Masten

STAFF: Harmony Gmazel, Associate Planner

OTHERS:

1. CALL REGULAR MEETING TO ORDER

Chair McConnell called the meeting to order at 7:01 p.m.

2. APPROVAL OF THE REGULAR MEETING AGENDA

Approved by consent without objection.

3. REVIEW AND APPROVAL OF SEPTEMBER 7, 2016 WORK SESSION

Approved by consent without objection.

4. PUBLIC REMARKS

None

5. CHAIR'S REPORT

Chair McConnell announced he would be reporting on Environmental Commission activities at the Meridian Leadership Group meeting scheduled for Friday, October 7, 2016 at Coral Gables restaurant.

6. STAFF REPORT

Associate Planner Gmazel explained her memorandum describing the process for the internal review of wetland use permits. She noted that wetland use permits are decided by either the Director of Community Planning and Development or the Planning Commission or Township Board if there is a concurrent land use permit.

Environmental Commission discussion:

- Appreciation for memorandum
- Desire for mechanism to share outcome on wetland use permit decision with Environmental Commission
- Desire for feedback on helpfulness of Environmental Commission permit review comments

7. COMMISSIONER SUBCOMMITTEE REPORTS

Land Preservation: Site visit planned for Lake Lansing Park North for update on controlled burn

Energy Team: Attended presentations held on solar panel installations. Site visit planned to resident's home to view solar energy system installed there, invitation to Environmental Commission forthcoming.

Student Engagement: None

Parks: None

a. Special Signage Project Update by Commissioner Holland

Commissioner Holland provided a brief explanation of an Eagle Scout project to install endangered species signs at Red Cedar Preserve.

8. WETLAND USE PERMIT #16-04 (NEMOKA DRAIN IMPROVEMENTS)

Ingham County Drain Commission staff Paul Pratt provided a description of the drain project. The project includes the opening of a portion of the Nemoka Drain.

- **MOTION TO SUPPORT ENVIRONMENTAL CONSULTANT RECOMMENDATION ON WUP #16-04. MOTION APPROVED WITHOUT OBJECTION.**

9. SAFE DRINKING WATER INITIATIVE

Chairperson McConnell noted Commissioner Masten was not in attendance and suggested this item be instead discussed at the November Environmental Commission meeting.

10. PUBLIC REMARKS

None

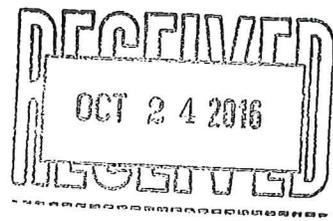
11. ADJOURNMENT

- **MOTION** by Commissioner Kielbaso to adjourn. **SUPPORTED** by Vice Chair Schools. Motion approved 7-0. The regular meeting was adjourned at 7:49 p.m.



October 24, 2016
Project No. G150126W10

Mr. Mark Kieselbach
Charter Township of Meridian
5151 Marsh Road
Okemos, MI 48864



Re: Wetland Use Permit No. 16-05 Application Review
Mayberry Homes, Silverstone Estates

Dear Mr. Kieselbach:

Mr. Bob Schroeder of Mayberry Homes (Applicant) is proposing to develop the Silverstone Estates subdivision, located east of Powell Road in Section 23 of the Township of Meridian (Township). As part of site development, the applicant proposes to enclose 192 feet of the Unruh Drain with a 192-foot long, 4-foot-diameter culvert and 1,032 cubic yards of backfill resulting in 0.11 acre of wetland impact. Wetland Use Permit No. 16-05 (WUP) was submitted by the Applicant in accordance with the Township Wetland Protection Ordinance (Article IV of Chapter 22 of the Code of Ordinances of the Charter Township of Meridian).

At the request of the Township, FTCH reviewed the WUP Application, including the following:

- The State of Michigan Department of Environmental Quality (MDEQ) Public Notice for Application No. 2FF-AV1R-2XBD, dated September 8, 2016;
- A Joint Permit Application (JPA), dated July 21, 2016, prepared by Marx Wetlands LLC. The permit application relied upon a wetland delineation completed by FTCH in November 2015. However, the wetland determination data form submitted with the permit application was completed by Mr. Gary Marx and presumably describes wetland in the proposed area of disturbance within the Unruh Drain channel.

This report provides a brief description of the resources that would be impacted by the proposed work, evaluates WUP Application No. 16-05 according to review standards in the Township Wetland Protection Ordinance (Article IV of Chapter 22 of the Code of Ordinances of the Charter Township of Meridian), and makes recommendations to the Township regarding issuance or denial of the WUP Application. This evaluation is limited to a review of wetland impacts and does not assess broader hydrologic and hydraulic issues pertaining to the Unruh Drain and proposed improvements.

Overview of Proposed Wetland Impacts

The proposed activities are located on Parcel No. 33-02-02-23-151-001. The parcel is 25.52 acres in size and contains undeveloped property, the Unruh Drain (both enclosed and open on the site), the enclosed Hathaway Drain, the enclosed Daniels Drain, and Township Wetlands No. 23-2A (associated with the Unruh Drain) and No. 23-15C. The drains fall under the jurisdiction of the Ingham County Drain Commission (ICDC).

FTCH delineated three wetlands on the site in 2015:

- Wetland A, located at the site's southeastern corner and within 500 feet of a pond
- Wetland B, located adjacent to the open channel of the Unruh Drain
- Wetland C, located at the south end of the site, within 500 feet of the Unruh Drain



A figure noting the locations of these wetlands is included in the MDEQ Public Notice (i.e., Figure 1, Wetland Delineation). All three wetlands are regulated by the State of Michigan and the Township based upon their proximity to a body of water.

The following activities are proposed in the WUP:

- Enclose 192 feet of open drain, including 0.04 acre of wetland (Wetland B, in the bottom of the Unruh Drain's open ditch). Enclosing a portion of the drain will facilitate construction of a road, with associated sidewalk and utilities, and safety grading of the slope adjacent to the sidewalk.
- Place one cubic yard of riprap at the downgradient end of the new culvert, within Wetland B. This wetland fill is noted on Sheet 3 of 7, but is not noted in Section 10A (Projects Requiring Fill) and Section 10C (Projects Requiring Riprap) in the JPA.
- Excavate a "water retention area" in upland adjacent to the beginning of the open ditch, where the enclosed Unruh Drain and Daniels Drain converge and outlet. This area is also referred to as a stormwater detention basin and a dry basin in the permit application's project description (JPA Section 3). The WUP Application stated this area could be used for wetland mitigation, if required by regulatory authorities. Sheet 6 in the JPA notes the dimensions of the excavated basin, but does not state the size of the resulting wetland.
- Remove soil and vegetation from the wetland impact area and place in the newly excavated basin to provide a source of wetland vegetation.

FTCH noted several discrepancies in the WUP Application:

- Section A of the JPA notes the maximum width of fill within regulated wetland is 25 feet. Sheet 3 of 7 indicates the width of fill within wetland varies from approximately 21 to 32 feet. It is FTCH's opinion that the average width of fill is approximately 25 feet.
- The WUP Application states the area of wetland impact is 0.04 acre. However, the submitted plans indicate wetland impact of 0.11 acre: $192 \text{ feet (length of fill)} \times 25 \text{ feet (average width of wetland impact)} / 43,560 \text{ square feet per acre} = 0.11 \text{ acre}$.
- The project description notes the excavated basin will consist of a dry basin. However, the bottom of elevation of the basin will be the same as the bottom of the adjacent Unruh Drain. Therefore, the excavated basin should maintain sufficient hydrology to support wetland vegetation and will not be dry.
- The Wetland Determination Data Form notes the presence of invasive, non-native species within the proposed wetland impact area (i.e., reed canarygrass (*Phalaris arundinacea*) and common reed (*Phragmites australis*). Removing soil and vegetation from the wetland impact area for use in the proposed excavated basin is not appropriate, since it introduces undesirable species to the area.
- Section 6 of the JPA did not note that the Applicant must obtain a permit from the ICDC to enclose the Unruh Drain.

Review of WUP Application

The review standards used to evaluate WUP Applications are found in Section 22-157 of Article IV (Wetland Protection) of Chapter 22 of the Township's Code of Ordinances. WUPs are not to be issued, unless the proposed activity is found to be in the public interest, the permit is necessary to realize the benefits from the activity, and the proposed activity is otherwise lawful in all respects. Section 22-157(2) lists eleven general



criteria to be considered when evaluating whether or not a proposed activity is in the public interest. An evaluation of the proposed activity, according to each of the eleven criteria, is as follows:

Section 22-157(2)(a) *The relative extent of the public and private need for the proposed activity.*

- FTCH was not provided information regarding the relative extent of the public and private need for the proposed activity. We do not know if there is a need for additional housing in Meridian Township.

Section 22-157(2)(b) *The availability of feasible and prudent alternative locations and methods to accomplish the expected benefits from the activity.*

- Crossing the open ditch appears to be necessary and unavoidable in order to access 18 potential building sites to the east.
- The original site design included enclosing the entire ditch. The proposed alternative shortened the open ditch enclosure by approximately 75 feet.
- Impacts to all other site wetlands have been avoided.

Section 22-157(2)(c) *The extent and permanence of the beneficial or detrimental effects which the proposed activity may have on the public and private uses to which the area is suited, including the benefits the wetlands provide.*

- The proposed development provides positive public benefits by providing housing on land that is currently vacant.
- Construction of a mitigation wetland in the proposed stormwater detention basin would replace wetland functions and values that will be lost by filling 0.11 acre of low-quality wetland. Benefits the existing wetland provides are groundwater recharge, water storage, water quality improvement, and limited wildlife habitat.

Section 22-157(2)(d) *The probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated activities in the watershed.*

- There are no identified cumulative impacts of the proposed project.

Section 22-157(2)(e) *The probable impact on recognized historic, cultural, scenic, ecological, or recreational values and on the public health or safety, or fish or wildlife.*

- FTCH has no direct information pertaining to historic, cultural, scenic, or recreational value or issues relating to impacts on public health or safety, or fish, or wildlife. Based on water levels, it is our opinion that insufficient habitat exists to support a viable fish community.
- Enclosing the drain will destroy aquatic and wildlife habitat values in the wetland impact area. Construction of a mitigation wetland will replace some of these values. However, the overall site development will have a greater impact upon wildlife habitat at the site.

Section 22-157(2)(f) *Economic value, both public and private, of the proposed land change to the general township area.*

- The question of economic value associated with the proposed activity is beyond the scope of the issues FTCH was retained to address. Accordingly, FTCH offers no opinion, recommendations, or advice with respect to this criterion.



Section 22-157(2)(g) *The size and quality of the wetland being considered.*

- Wetland impact is limited to 0.11 acre of low-quality emergent and scrub-shrub wetland.

Section 22-157(2)(h) *The findings of necessity for the proposed activity which have been made by other agencies.*

- FTCH is not aware of any findings of necessity for the proposed activity which have been made by other agencies.

Section 22-157(2)(i) *Amount of wetland remaining in the general area and proximity to a waterway.*

- The subject property contains three wetlands (Wetlands A, B, and C described above). All three wetlands extend offsite. The Unruh Drain flows through Wetland B. The Township wetland map notes the wetland contiguous to the Unruh Drain is 41.78 acres in size, and is part of a larger wetland complex that extends to the north, east, and south.

Section 22-157(2)(j) *Proximity to any waterbody.*

- The proposed impacts to regulated wetlands are located within the Unruh Drain.

Section 22-157(2)(k) *Extent to which upland soil erosion adjacent to the protected wetland is controlled.*

- The WUP Application does not discuss soil erosion and sedimentation control.

Recommendations

Based upon our review of the submitted materials, it is our opinion that the proposed project meets the Township's requirements for permit issuance. FTCH recommends the WUP be issued, with the following conditions:

- Implement appropriate Soil Erosion and Sedimentation Control measures during construction to ensure there are no impacts to wetlands, outside of project activities, as a result of soil erosion.
- Submit a wetland mitigation and monitoring plan for Township approval. The wetland mitigation area must equal or exceed 0.165 acre of emergent wetland. The mitigation plan shall include:
 - Specifications for the recommended native seed mixtures, including species name (both botanical and common), ounces per acre (on a pure, live seed basis), the total seeding rate, and the seed mix supplier.
 - A figure noting the locations where native seed mixtures will be planted, including wetland and upland locations.
 - A figure noting vegetative monitoring sampling plots within the mitigation area and photo points. Establish a minimum of five sample plots.
- Do not utilize soil or plants from the wetland impact area in the mitigation wetland due to the prevalence of invasive species.
- Place a minimum of six inches of upland topsoil within the mitigation wetland to achieve final grade.
- Conduct wetland monitoring for five years, between July 15 and August 31.



Mr. Mark Kieselbach
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- The performance standards for the wetland mitigation area are:
 - Ten percent cover or less of invasive species.
 - Sixty percent cover of native wetland plant species.

FTCH appreciates the opportunity to assist in the review of this file. If you have any questions or require additional information, please contact me at 616.464.3738 or ehtripp@ftch.com.

Sincerely,

FISHBECK, THOMPSON, CARR & HUBER, INC.

A handwritten signature in black ink that reads "Elise Hansen Tripp". The signature is written in a cursive, flowing style.

Elise Hansen Tripp, PWS

lkj
By email



MARX
WETLANDS
LLC

July 22, 2016

Ms. Carol Valor
MDEQ Land & Water Mgmt. Division
P.O. Box 30242
Lansing, MI 48909-7704

Re: Inland Lakes & Streams/Wetland Permit Application
Mayberry Homes – Silverstone Estates Drain Enclosure
Section 23, T4N, R1W, Meridian Township, Ingham County

Dear Ms. Valor:

Enclosed please find an application for a permit, submitted on behalf of Mayberry Homes, for the enclosure of 192 feet of the Unruh Drain for a road crossing. The application package includes a site location map, plan and cross-section view drawings, a letter authorizing Marx Wetlands LLC to act as agent and the required application fee.

Thank you for your consideration in this matter. If you have any questions or if any additional information is required, please contact me at your convenience.

Sincerely,

Marx Wetlands LLC
Gary F. Marx

Enclosures

cc: Bob Schroeder, Mayberry Homes
Scott Fairmont

2990 Lake Lansing Rd.
Suite 201
East Lansing, MI 48823
Tel: 517.333.8833
Mobile: 517.898.4187
e-mail
gmarx@marxwetlands.com



AGENCY USE	Previous USACE File Number	Date Received	DEQ File Number	
	USACE File Number		Fee received \$	
<p>Validate that all parts of this checklist are submitted with the application package. Fill out application and additional pages as needed.</p> <p><input type="checkbox"/> All items in Sections 1 through 9 are completed.</p> <p><input type="checkbox"/> Project-specific Sections 10 through 20 are completed.</p> <p><input type="checkbox"/> Dimensions, volumes, and calculations are provided for all impact areas.</p> <p><input type="checkbox"/> All information contained in the headings for the appropriate Sections (1-20) are addressed, and identified attachments (➔) are included.</p> <p><input type="checkbox"/> Map, site plan(s), cross sections; one set must be black and white on 8 ½ by 11 inch paper; photographs.</p> <p><input type="checkbox"/> Application fee is attached.</p>				
1 Project Location Information For Latitude, Longitude, and TRS info anywhere in Michigan see www.mcgi.state.mi.us/wetlands/				
Project Address (road, if no street address) Powell Road		Zip Code 48864	Municipality (Township/Village/City) Meridian Township	County Ingham
Property Tax Identification Number(s) 33-02-02-23-151-001		Latitude 42.7184 N		Township/Range/Section (TRS) T 4N N or S; R 1W E or W;
Subdivision/Plat and Lot Number		Longitude - 84 4015 W		Sec 23 OR Private Claim # _____
2 Applicant and Agent Information				
Owner/Applicant (individual or corporate name) Mayberry Homes/ c/o Bob Schroeder		Agent/Contractor (firm name and contact person) Marx Wetlands LLC - Gary F Marx		
Mailing Address 1650 Kendale Blvd #200		Mailing Address 2990 E Lake Lansing Rd., Ste 201		
City East Lansing	State MI	Zip Code 48823	City East Lansing	State MI Zip Code 48823
Contact Phone Number 517.371.5000	Fax	Contact Phone Number 517.898.4187	Fax	
Email bob@mayberryhomes.com		E-mail gmarx@marxwetlands.com		
<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes Is the applicant the sole owner of all property on which this project is to be constructed and all property involved or impacted by this project? ➔ If no, attach letter(s) of authorization from all property owners including the owner of the disposal site.				
Property Owner's Name (If different from applicant)		Mailing Address		
Contact Phone Number		City	State	Zip Code
3 Project Description				
Project Name Silverstone Estates		Preapplication File Number - - -P		
Name of Water body Unruh Drain		Date project staked/flagged No wetland involved		
<p>The proposed project is on, within, or involves (check all that apply)</p> <p><input type="checkbox"/> an inland lake (5 acres or more) <input type="checkbox"/> a Great Lake or Section 10 Waters</p> <p><input type="checkbox"/> a pond (less than 5 acres) <input type="checkbox"/> a wetland</p> <p><input checked="" type="checkbox"/> a stream, river, ditch or drain <input type="checkbox"/> a 100-year floodplain</p> <p><input type="checkbox"/> a legally established County Drain <input type="checkbox"/> a dam</p> <p>Date Drain was established <input type="checkbox"/> a designated high risk erosion area</p> <p><input type="checkbox"/> a channel/canal <input type="checkbox"/> a designated critical dune area</p> <p><input type="checkbox"/> 500 feet of an existing water body <input type="checkbox"/> a designated environmental area</p>				<p>Project Use</p> <p><input type="checkbox"/> private</p> <p><input type="checkbox"/> commercial</p> <p><input type="checkbox"/> public/government</p> <p><input type="checkbox"/> project is receiving federal/state transportation funds</p> <p><input type="checkbox"/> Wetland Restoration</p> <p><input type="checkbox"/> other</p>
Indicate the type of permit being applied for: <input type="checkbox"/> General Permit <input type="checkbox"/> Minor Project <input checked="" type="checkbox"/> Individual (All other projects.) ➔ See Appendix C.				
Written Summary of All Proposed Activities Applicant proposed to enclose 192 feet of open drain, including 0.04 acre of wetland area (in the bottom of the existing ditch) to construct a residential subdivision. The enclosure will allow the construction of the subdivision road with it's appurtenant sidewalks and utilities, and the safety grading of the slope adjacent to the sidewalk. See the attached narrative for more details. In addition, a detention basin will be constructed in upland adjacent to the drain to allow detention of water flowing onto the property through the existing county drains. The dry basin will be contiguous with the bottom of the drain.				
Construction Sequence and Methods Standard construction sequence and methods will be employed.				

**4 Project Purpose, Use and Alternatives** *Attach additional sheets as necessary.*

Describe the purpose of the project and its intended use; include any new development or expansion of an existing land use.

The purpose of the project is to allow the residential development of this parcel of land, by construction of a road to access the buildable lots.

Describe the alternatives considered to avoid or minimize resource impacts. Include factors such as, but not limited to, alternative locations, project layout and design, and construction technologies. For utility crossings include alternative routes and construction methods.

*An alternative design was considered that would have enclosed the drain the full width of the lots on the property, but this was shortened by 75 feet as the additional enclosure was not critical to the development of the site.***5 Locating Your Project Site** *Attach a legible black and white map with a North arrow.*Names of roads of closest intersection *Powell Road & Grand River Avenue*Directions from main intersection to the project site, with distances from the best and nearest visible landmark and water body *Site is 1/4 mile north of intersection on the east side of Powell Road*

Description of buildings on the site (color; 1 or 2 story, other)

Description of adjacent landmarks or buildings (address; color; etc)

*Site is vacant*How can your site be identified if there is no visible address? *The site is the vacant property north of the golf driving range***6 Easements and Other Permits** No Yes Is there a conservation easement or other easement, deed restriction, lease, or other encumbrance upon the property?

♦ If yes, attach a copy. Provide copies of court orders and legal lake levels if applicable.

List all other federal, interstate, state, or local agency authorizations including required assurances for Critical Dune Area projects.

Agency	Type of Approval	Number	Date Applied	Date approved /denied	Reason for denial
<i>Meridian Twp</i>	<i>Site Plan</i>				
<i>Meridian Twp</i>	<i>SESC</i>				

7 ComplianceIf a permit is issued, when will the activity begin? (M/D/Y) *ASAP*

Proposed completion date (M/D/Y)

 No Yes Has any construction activity commenced or been completed in a regulated area?

♦ If Yes, identify the portion(s) underway or completed on drawings or attach project specifications and give completion date(s).

 No Yes Were the regulated activities conducted under a DEQ and/or USACE permit?

♦ If Yes, list the permit numbers

 No Yes Are you aware of any unresolved violations of environmental law or litigation involving the property?

♦ If Yes, attach explanation.

8 Adjoining Property Owners *Provide current mailing addresses. Attach additional sheets/labels for long lists.* Established Lake Board

Contact Person

Mailing Address

City

State and Zip Code

 Lake Association*n/a*

List all adjoining property owners.

If you own the adjoining lot, provide the requested information for the first adjoining parcel that is not owned by you.

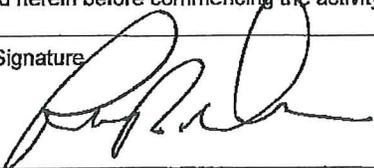
Property Owner's Name	Mailing Address	City	State and Zip Code
<i>See attached sheet</i>			



9 Applicant's Certification

Read carefully before signing.

I am applying for a permit(s) to authorize the activities described herein. I certify that I am familiar with the information contained in this application; that it is true and accurate; and, to the best of my knowledge, that it is in compliance with the State Coastal Zone Management Program. I understand that there are penalties for submitting false information and that any permit issued pursuant to this application may be revoked if information on this application is untrue. I certify that I have the authority to undertake the activities proposed in this application. By signing this application, I agree to allow representatives of the DEQ, USACE, and/or their agents or contractors to enter upon said property in order to inspect the proposed activity site before and during construction and after the completion of the project. I understand that I must obtain all other necessary local, county, state, or federal permits and that the granting of other permits by local, county, state, or federal agencies does not release me from the requirements of obtaining the permit requested herein before commencing the activity. I understand that the payment of the application fee does not guarantee the issuance of a permit.

Property Owner Agent/Contractor Corp. or Public Agency / Title	Printed Name FODONT K. SETHI	Signature 	Date 7/21/16
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10 Projects Impacting Inland Lakes, Streams, Great Lakes, Wetlands or Floodplains

- Complete only those sections A through M applicable to your project.
- If your project impacts wetlands also complete Section 12. If your project impacts regulated floodplains also complete Section 13.
- To calculate volume in cubic yards (cu yd), multiply the average length in feet (ft) times the average width (ft) times the average depth (ft) and divide by 27. Example: (25 ft long x 10 ft wide x 2 feet deep) / 27 = 18.5 cubic yards
- Some projects on the Great Lakes require an application for conveyance prior to Joint Permit Application completeness.
 - ➔ Provide a black and white overall site plan, with cross-section and profile drawings. Show existing lakes, streams, wetlands, and other water features; existing structures; and the location of all proposed structures, land change activities and soil erosion and sedimentation control measures. Review Appendix B and EZ Guides for aid in providing complete site-specific drawings.
 - ➔ Provide tables for multiple impact areas or multiple activities such as multiple fill areas or multiple culverts. Include your calculations.

Water Level Elevation

On inland waters NGVD 29 NAVD 88 other Observed water elevation (ft) date of observation (M/D/Y)
 On a Great Lake IGLD 85 surveyed converted from observed still water elevation.

A. PROJECTS REQUIRING FILL (See All Sample Drawings)

- ➔ Attach a site plan and cross-section views to scale showing maximum and average fill dimensions with calculations.
- ➔ For multiple impact areas on a site provide a table with location, dimensions and volumes for each fill area.

Purpose bioengineered shore protection boat ramp boat well bridge or culvert crib dock
 riprap seawall swim area other

Dimensions of fill (ft) Length 192 Width 25 Maximum Depth 5.6	Total volume (cubic yards) 1032	Volume below OHWM (cubic yards) n/a
Maximum water depth in fill area (ft) 1	Area filled (sq ft) 4960	Will filter fabric be used under proposed fill? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes (If Yes, type)

Fill will extend **n/a** feet into the water from the shoreline and upland feet out of the water.

Type of clean fill peastone % sand % gravel % other **On site material**

Source of clean fill commercial on-site ➔ If on-site, show location on site plan.
 other ➔ If other, attach description of location.

B. PROJECTS REQUIRING DREDGING OR EXCAVATION (See Sample Drawings)

- Refer to www.mi.gov/jointpermit for spoils disposal and authorization requirements.
- ➔ Attach a site plan and cross-section views to scale showing maximum and average dredge or excavation dimensions with calculations.
- ➔ For multiple impact areas on a site provide a table with location, dimensions and volumes for each dredge/excavation area.

Purpose boat ramp boat well bridge or culvert maintenance dredge
 navigation pond/basin other

Dimensions (ft) Length Width Maximum Depth	Total volume (cu yds)	Volume below OHWM (cu yds)
Has this same area been previously dredged?	<input type="checkbox"/> No <input type="checkbox"/> Yes	If Yes, provide date and permit number:
Will the previously dredged area be enlarged?	<input type="checkbox"/> No <input type="checkbox"/> Yes	If Yes, when and how much?
Is long-term maintenance dredging planned?	<input type="checkbox"/> No <input type="checkbox"/> Yes	If Yes, how often?

Dredge or Excavation Method Hydraulic Mechanical other

Spoils Disposal
 Dredged or excavated spoils will be placed on-site landfill USACE confined disposal facility other upland off-site
 For disposal, provide a ➔ Detailed spoils disposal area location map and site plan with property lines.
 ➔ Letter of authorization from property owner of spoils disposal site, if disposed off-site.
 For volumes less than 5,000 cu yards, has proposed dredge material been tested for contaminants within the past 10 years?
 No Yes ➔ If Yes, provide test results with a map of sampling locations.

C. PROJECTS REQUIRING RIPRAP (See Sample Drawings 2, 3, 8, 12, 14, 22, and 23)

Riprap water ward of the ordinary high water mark: dimensions (ft) length width depth	Volume(cu yd)
Riprap landward of the ordinary high water mark: dimensions (ft) length width depth	Volume(cu yd)
Type and size of riprap (inches) <input type="checkbox"/> field stone <input type="checkbox"/> angular rock <input type="checkbox"/> other	Will filter fabric or pea stone be used under proposed riprap? <input type="checkbox"/> No <input type="checkbox"/> Yes, Type



12 Activities That May Impact Wetlands (See Sample Drawings 8 & 9). Complete other Sections as applicable.

- Locate your site and wetland information with the DEQ Wetlands Map Viewer at www.mcqi.state.mi.us/wetlands/
- For information on the DEQ's Wetland Identification Program (WIP) visit www.mi.gov/wetlands.
 - ➔ Provide a detailed site plan with labeled property lines, upland and wetland areas, and dimensions and volumes of wetland impacts.
 - ➔ Complete the wetland dredge and wetland fill dimension information below for each impacted wetland area.
 - ➔ Attach tables for multiple impact areas or activities.
 - ➔ Attach at least one cross-section for each wetland dredge and/or fill area; show wetland and upland boundaries on the cross-section.

Has the DEQ conducted a wetland assessment for this parcel?		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	➔ If Yes, provide a copy or WIP number:	
Has a professional wetland delineation been conducted for this parcel?		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	➔ If Yes, provide a copy with data sheets	
Is there a recorded DEQ easement on the property?		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	➔ If Yes, provide the easement number	
Did the applicant purchase the property before October 1, 1980?		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	➔ If Yes, provide documentation.	
Is any grading or mechanized land clearing proposed?		<input type="checkbox"/> No <input checked="" type="checkbox"/> Yes	➔ If Yes, label the locations on the site plan.	
Has any of the proposed grading or mechanized land clearing been completed?		<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	➔ If Yes, label the locations on the site plan	
Proposed Activity <input type="checkbox"/> boardwalk or deck (Section 10I) <input checked="" type="checkbox"/> bridges and culverts (Section 14) <input type="checkbox"/> designated environmental area <input type="checkbox"/> dewatering <input type="checkbox"/> draining surface water <input type="checkbox"/> driveway / road <input type="checkbox"/> fences (Section 10L) <input type="checkbox"/> fill or dredge <input type="checkbox"/> restoration <input type="checkbox"/> septic system <input type="checkbox"/> stormwater discharge (Section 10J) <input type="checkbox"/> other				
FILL	Dimensions maximum length (ft) 192 maximum width (ft) 25	Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> sq ft 0.04	Average depth (ft) 5.6	Volume (cu yd) 1032
	Dimensions maximum length (ft) maximum width (ft)	Area <input type="checkbox"/> acres <input type="checkbox"/> sq ft	Average depth (ft)	Volume (cu yd)
Spoils Disposal	Dredged or excavated spoils will be placed <input type="checkbox"/> on-site <input type="checkbox"/> landfill <input type="checkbox"/> USACE confined disposal facility <input type="checkbox"/> other upland off-site			
	For disposal, provide a ➔ Detailed spoils disposal area location map and site plan with property lines. ➔ Letter of authorization from property owner of spoils disposal site, if disposed off-site.			
Septic System	The proposed project will be serviced by: <input checked="" type="checkbox"/> public sewer <input type="checkbox"/> private septic system ➔ Show system on plans.		If a private septic system is proposed, has an application for a permit been made to the County Health Department? <input type="checkbox"/> No <input type="checkbox"/> Yes If Yes, has a permit been issued? <input type="checkbox"/> No <input type="checkbox"/> Yes ➔ Provide a copy of the permit.	
	Describe the wetland impacts, the proposed use or development, and the alternatives considered: See attached narrative.			
Does the project impact more than 1/3 acre of wetland? <input type="checkbox"/> No <input type="checkbox"/> Yes ➔ If Yes, submit a Mitigation Plan with the type and amount of mitigation proposed. For more information go to www.mi.gov/wetlands				
Describe how impacts to waters of the United States will be avoided and minimized: A short area of an existing county drain is proposed for enclosure. The drain is dry for much of the time, and provides little in the way of wetland function. The enclosure was minimized to the extent possible while still achieving the goals of the development.				
Describe how the impact to waters of the United States will be compensated. OR Explain why compensatory mitigation should not be required for the proposed impacts. Only 0.04 acre of wetland in the bottom of the ditch is being impacted. No mitigation is proposed.				



14 Bridges and Culverts Including Foot and Cart Bridges. (See EZ Guides and Sample Drawings 5, 14A, 14B, 14C, 14D.)

- Complete other applicable Sections, including 10A-C.
- A hydraulic analysis or hydrologic analysis may be required to fully assess impacts. ➔ Attach hydraulic calculations.
- High Water Elevation - describe reference point and highest known water level above or below reference point and date of observation.
 - ➔ Attach additional sheets for multiple bridges and/or culverts.
 - ➔ Provide detailed site-specific drawings of existing and proposed Plan and Elevation View at a scale adequate for detailed review.
 - ➔ Provide all information in the boxes below; do not write in a reference to plan sheets. Show reference datum used on plans.

Stream Information	The site has a high water elevation (ft) <input type="checkbox"/> above or <input type="checkbox"/> below the Reference Point of _____ Date observed _____	
	Reference datum used <input type="checkbox"/> NGVD 29 <input checked="" type="checkbox"/> NAVD 88 <input type="checkbox"/> IGLD 85 (Great Lakes coastal areas) <input type="checkbox"/> other _____	
	Average stream width (ft) at the ordinary high water mark (OHWM) outside the influence of any ponding or scour holes around the structure	Upstream 11
		Downstream 17
	Cross-sectional area of primary channel (sq ft) 17 (See Sample Drawing 14C for more information)	
	The width of the stream where the water begins to overflow its banks. Bankfull width (ft) 24	
	The invert of the stream 100-feet from structure (ft)	Upstream 852.5
	Downstream 852.1	
Is the existing culvert perched? <input type="checkbox"/> No <input type="checkbox"/> Yes If Yes, provide a profile of the channel bottom at the high and low points for a distance of 200 feet upstream and downstream of the culvert.		

Complete this form for each bridge / culvert location.		Existing	Proposed
Bridge	Number of bridge spans		
	Bridge type (concrete box beam, concrete I-beam, timber, etc.)		
	Bridge span (length perpendicular to stream) (ft)		
	Bridge width (parallel to stream) (ft)		
	Bottom of bridge beam (ft)	Upstream	
		Downstream	
	Stream invert elevation at bridge (ft)	Upstream	
		Downstream	
Bridge rise from bottom of beam to streambed (ft)			
Culvert	Number of culverts	0	1
	Culvert type (arch, bottomless, box, circular, elliptical, etc.)		circular
	Culvert material (concrete, corrugated metal, plastic, etc.)		concrete
	Culvert length (ft)		192
	Culvert <input type="checkbox"/> width <input checked="" type="checkbox"/> diameter (ft)		4
	Culvert height prior to any burying (ft)		4
	Depth culvert will be buried (ft)		0.0
	Elevation of culvert crown (ft)	Upstream	856.4
		Downstream	856.2
	Higher elevation of <input checked="" type="checkbox"/> culvert invert OR <input type="checkbox"/> streambed within culvert (ft)	Upstream	852.4
	Downstream	852.2	
Complete for both Bridges and Culverts	Entrance design (mitered, projecting, wingwalls, etc.)		projecting
	Total structure waterway opening above streambed (sq ft)		
	Total structure waterway area below the 100-year elevation (sq ft) (if known)		
	Elevation of road grade at structure (ft)		864.0
	Elevation of low point in road (ft)		863.8
	Distance from low point of road to mid-point of bridge crossing (ft)		40
	Length of approach fill from edge of bridge/culvert to existing grade (ft)		45
	A Licensed Professional Engineer may certify that your project will not cause a harmful interference for a range of flood discharges up to and including the 100-year flood discharge. The "Required Certification Language" is found under "forms" on the "maps, forms and documents" link from the www.mi.gov/jointpermit page or a copy may be requested by phone, email, or mail. A hydraulic report supporting this certification may also be required.		
Is Certification Language attached? <input type="checkbox"/> No <input type="checkbox"/> Yes			

MDEQ Permit Application

Mayberry Homes/Silverstone Estates

Adjacent Property Owners

David & Jane Ledebuhr
4767 Cornell Rd.
Okemos, MI 48864

Gaetano Perna
1410 Grand River
Okemos, MI 48864

Okemos Public Schools
4406 Okemos Rd.
Okemos, MI 48864

Meridian Meadows
4555 Paddock
Okemos, MI 48864

Newman Equities II LLC
HDI Builders
4217 Okemos Rd
Okemos, MI 48864

Frank & Christine McQuaid
4777 Powell Rd
Okemos, MI 48864

Joshua & Amanda Birkitt
4739 Powell Rd
Okemos, MI 48864

Haibiao & Liu Liu Zhang
6954 Abbey Lane
Grand Ledge, MI 48837

Jo Don Apartments
4714 Powell Rd
Okemos, MI 48864

Frederick Beckett Jr
4684 Powell Rd
Okemos, MI 48864

Crossroads Investment Inc.
1476 Grand River
Okemos, MI 48864

Friedrich Buehler
1448 Grand River
Okemos, MI 48864

MDEQ APPLICATION - NARRATIVE/DESCRIPTION

Project: Silverstone Estates
Location: Meridian Township.

Meridian Township approved a "Tentative Preliminary Plat" for a 25 lot subdivision known as Silverstone Estates. Silverstone Estates is located on the east side of Powell Road, 350 feet north of Grand River Avenue. The project encompasses 25.5 acres of land. There are 18 contiguous upland acres that occur between two wetlands. An enclosed section of the Daniels Drain ends at the same location as an enclosed section of the Unruh Drain ends. The two drains converge into an open ditch; which flows in a northerly direction and is an extension of the Unruh Drain.

The open ditch is located about 250 feet east of Powell Road. Seven (7) of the lots in Silverstone are between Powell Road and the open ditch. Eighteen (18) lots are east of the open ditch. These lots will be accessed from a new public road (Silverstone Way) which requires enclosing a section of the open ditch. The width of the Road Right of Way is 60 feet. This will accommodate a roadway 30 feet in width, green space for street trees and street lights, and five (5) foot city sidewalks on both sides of the street, as required by Meridian Township. Consumers Energy requires ten (10) foot easements on both sides of the R.O.W. for installation of underground natural gas and electric lines. So with the 60 foot right of way and 25 on each side of the road required for sidewalks and utilities, an enclosure of 110 feet is necessary.

Our proposal shortens the open ditch enclosure by about 75 feet from our original plans, which would have enclosed the drain the full width of the property.

In addition, we would like approval to extend the open ditch enclosure by 41 feet past the Consumer's Energy easement on each side. In our grading plan, we propose to slope the ground down to the top of the pipe which will be installed to replace the open ditch. Justification for this is based on both safety and maintenance reasons. We believe Silverstone Estates will be occupied by families with children. We would like to create some space between the city sidewalk and the open ditch by creating a gentle gradient from the sidewalk down to the top of the open ditch. This eliminates the chance that pedestrians or children on bicycles or scooters could fall into the ditch. Regarding maintenance, we will install ground cover that can be mowed and maintained on the slope. We believe this landscaping is preferable to a guardrail protecting a six to eight-foot drop from the "street grade" to the "bottom of the open ditch". A gentle, sloping, landscaped area is much more aesthetically attractive and practical than a flat area with a precipitous drop.

In total, we request approval to enclose 192 feet of the open ditch: 110 feet for the road and utilities, 82 feet to allow the safety/maintenance grading to the drain adjacent to the sidewalk. This will disturb approximately 1,750 square feet of wetland, which is 0.04 acre.

In the area where the Daniels and Unruh Drain converge, at the beginning of the open ditch, we are planning to create a water detention area. If wetland mitigation is required, which we do not anticipate, we propose creating this new wetland in that location. It would be contiguous with the current wetland at the bottom of the open ditch. We would create this wetland before enclosing the open ditch and use the soils and plants that currently exist in the wetland of the area that we are going to enclose as the basis for the new wetland. Stated simply, we will excavate the upland next to the open ditch and connect it to the existing open ditch. Then we will remove the soil from the area that is going to be enclosed, and place it in the newly excavated area. This new wetland will become part of the existing ditch/wetland using the native soils and plants/seeds.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Silverstone Estates City/County: Ingham Co, Meridian Twp Sampling Date: 6/16/2016
 Applicant/Owner: Mayberry Homes State: MI Sampling Point: A
 Investigator(s): G Marx Section, Township, Range: S23, T4N, R1W
 Landform (hillside, terrace, etc.): Gently Rolling Local relief (concave, convex, none): concave Slope (%): _____
 Subregion (LRR or MLRA): LRR K Lat: 42.7184 Long: -84.4015 Datum: _____
 Soil Map Unit Name: ThA, Thetford Loamy Sand NWI classification: SS/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>x</u> No _____ Hydric Soil Present? Yes <u>x</u> No <u>0</u> Wetland Hydrology Present? Yes <u>x</u> No _____	Is the Sampled Area within a Wetland? Yes <u>x</u> No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) _____ <input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input checked="" type="checkbox"/> FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes <u>XX</u> No _____ Depth (inches): _____ Water Table Present? Yes <u>XX</u> No _____ Depth (inches): _____ Saturation Present? Yes <u>XX</u> No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
---	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
 Soil was saturated in much of the larger wetland.

VEGETATION – Use scientific names of plants.

Sampling Point: A

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status		
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
_____ =Total Cover					
Sapling/Shrub Stratum (Plot size: <u> 5 sq meter </u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u>Cornus amomum</u>	<u> 5 </u>	<u> Yes </u>	<u> FACW </u>		
2. <u>Cornus racemosa</u>	<u> 2 </u>	<u> No </u>	<u> FAC </u>		
3. <u>Sambucus canadensis</u>	<u> 5 </u>	<u> Yes </u>	<u> FACW </u>		
4. <u>Salix exigua</u>	<u> 2 </u>	<u> No </u>	<u> FACW </u>		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
_____ =Total Cover					
Herb Stratum (Plot size: <u> 1 sq meter </u>)	Absolute % Cover	Dominant Species?	Indicator Status		
1. <u>Typha latifolia</u>	<u> 70 </u>	<u> Yes </u>	<u> OBL </u>		
2. <u>Phalaris arundinacea</u>	<u> 10 </u>	<u> No </u>	<u> FACW </u>		
3. <u>Phragmites australis</u>	<u> 10 </u>	<u> No </u>	<u> FACW </u>		
4. <u>Leersia oryzoides</u>	<u> 2 </u>	<u> No </u>	<u> OBL </u>		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
9. _____	_____	_____	_____		
10. _____	_____	_____	_____		
11. _____	_____	_____	_____		
12. _____	_____	_____	_____		
_____ =Total Cover					
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status		
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
_____ =Total Cover					

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u> 72 </u>	x 1 = <u> 72 </u>
FACW species <u> 32 </u>	x 2 = <u> 64 </u>
FAC species <u> 0 </u>	x 3 = <u> 0 </u>
FACU species <u> 0 </u>	x 4 = <u> 0 </u>
UPL species <u> 0 </u>	x 5 = <u> 0 </u>
Column Totals: <u> 104 </u> (A)	<u> 136 </u> (B)
Prevalence Index = B/A = <u> 1.31 </u>	

Hydrophytic Vegetation Indicators:

Rapid Test for Hydrophytic Vegetation

Dominance Test is >50%

Prevalence Index is ≤3.0¹

Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

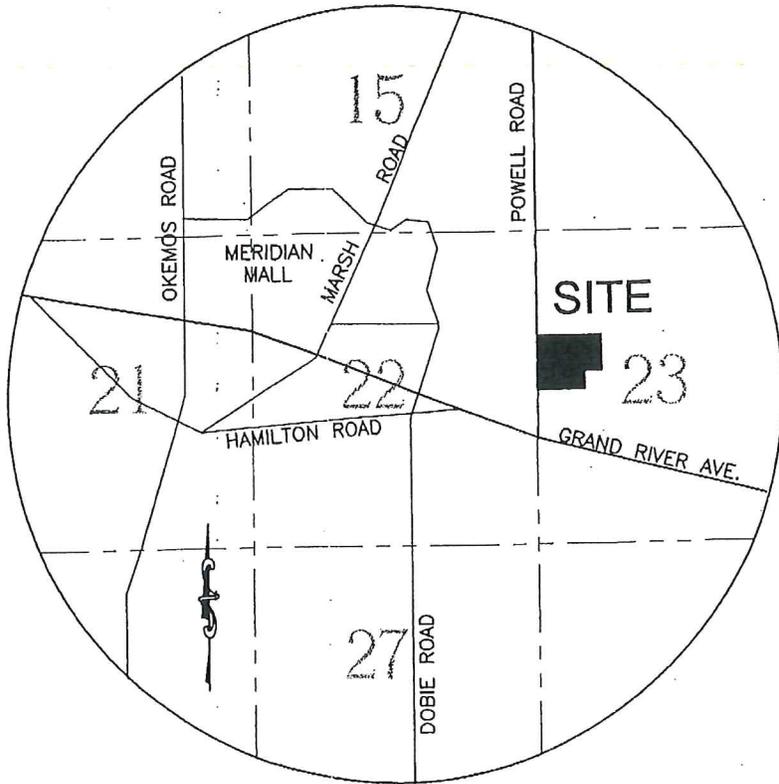
Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)



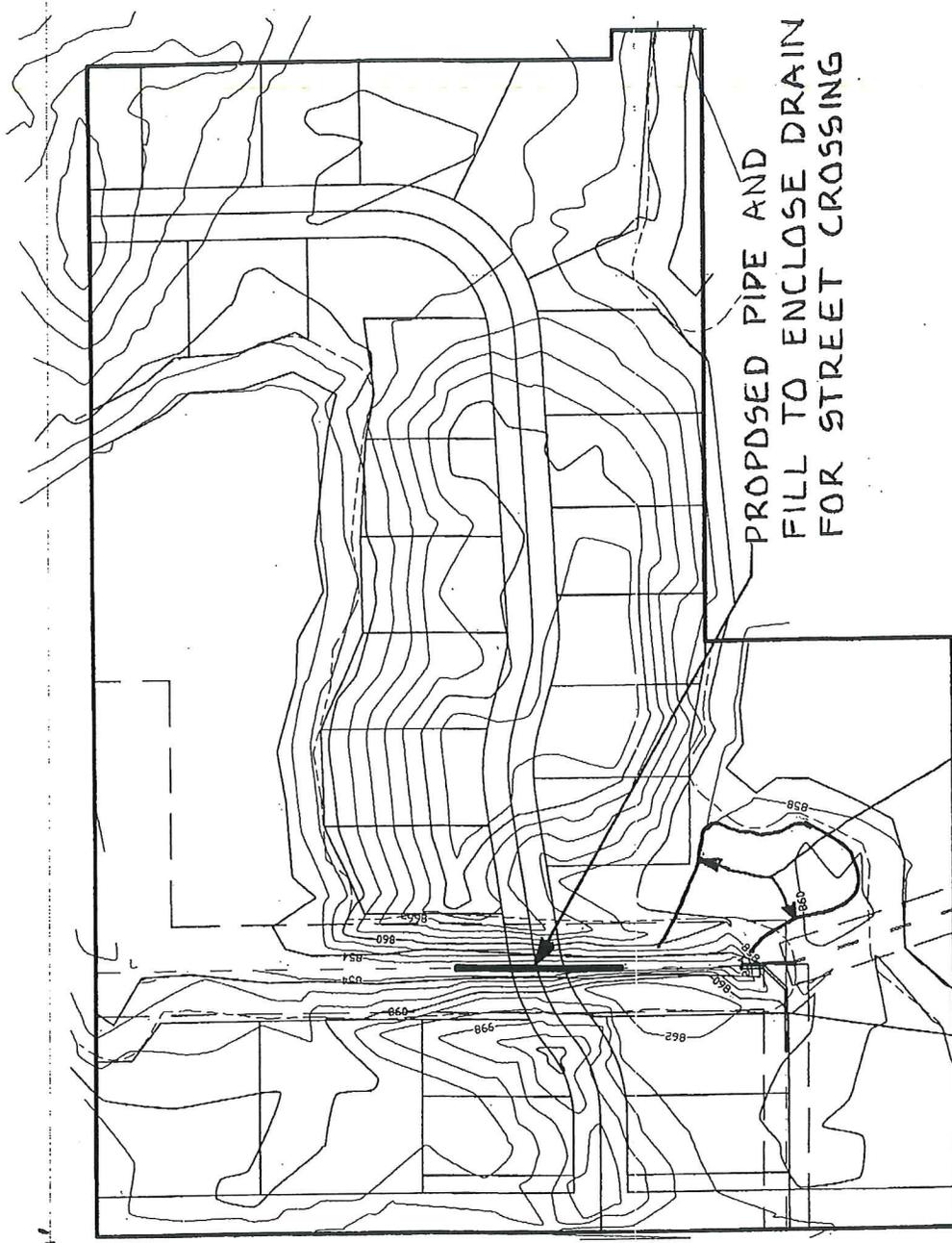
LOCATION MAP

SECTION 23 T4N R1W
 MERIDIAN TOWNSHIP
 INGHAM COUNTY

PROJECT NAME: SILVERSTONE ESTATES
 POWELL ROAD
 NW 1/4 AND SW 1/4 SECTION 23
 T4N R1W MERIDIAN TOWNSHIP
 INGHAM COUNTY MICHIGAN



N
1"=200'

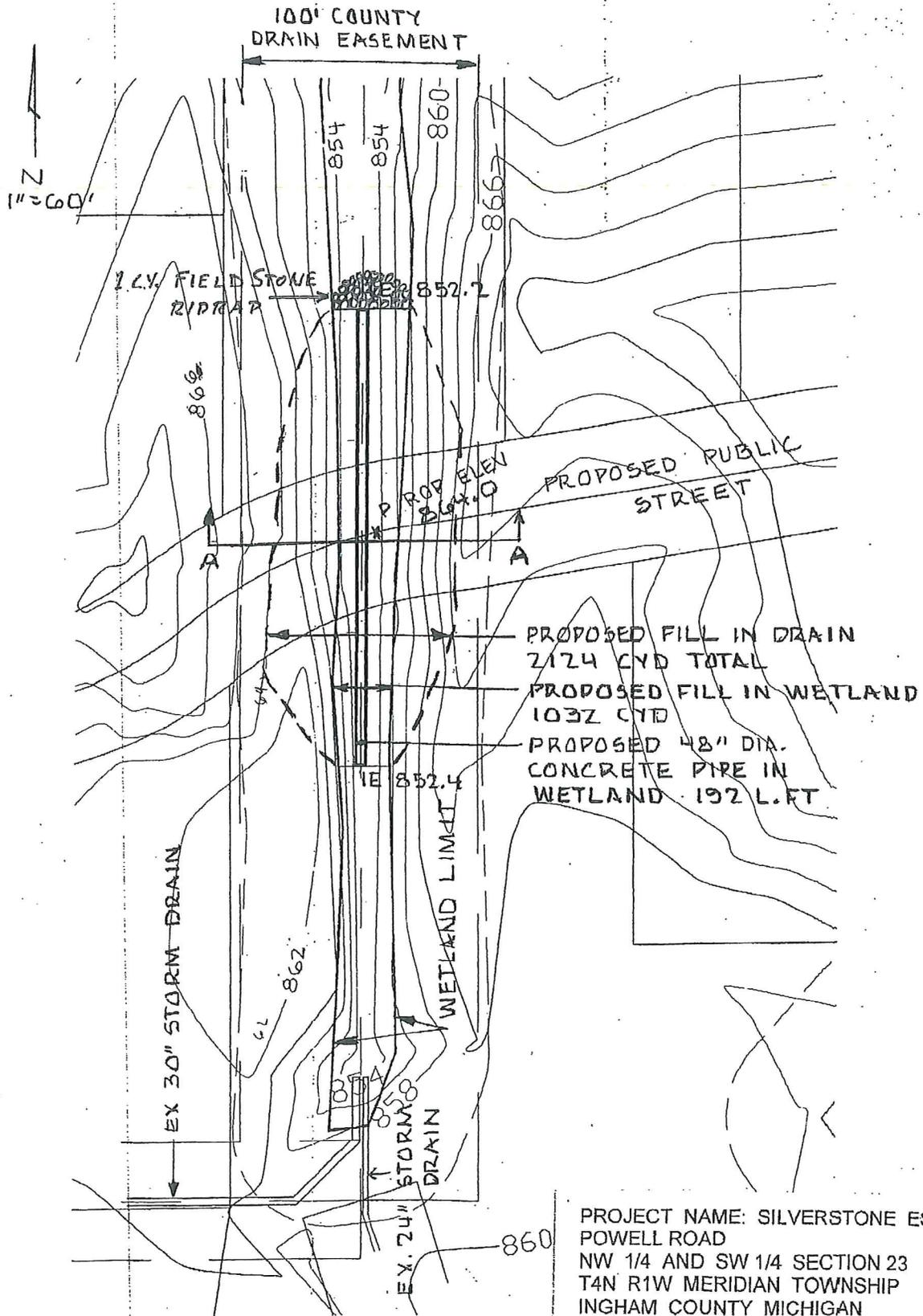


PROPOSED PIPE AND
FILL TO ENCLOSE DRAIN
FOR STREET CROSSING

PROPOSED EXCAVATION IN
UPLAND FOR STORM WATER
DETENTION AND WETLAND
MITIGATION

PROJECT NAME: SILVERSTONE ESTATES
POWELL ROAD
NW 1/4 AND SW 1/4 SECTION 23
T4N R1W MERIDIAN TOWNSHIP
INGHAM COUNTY MICHIGAN

JULY 20, 2016 SHEET 2 OF 7

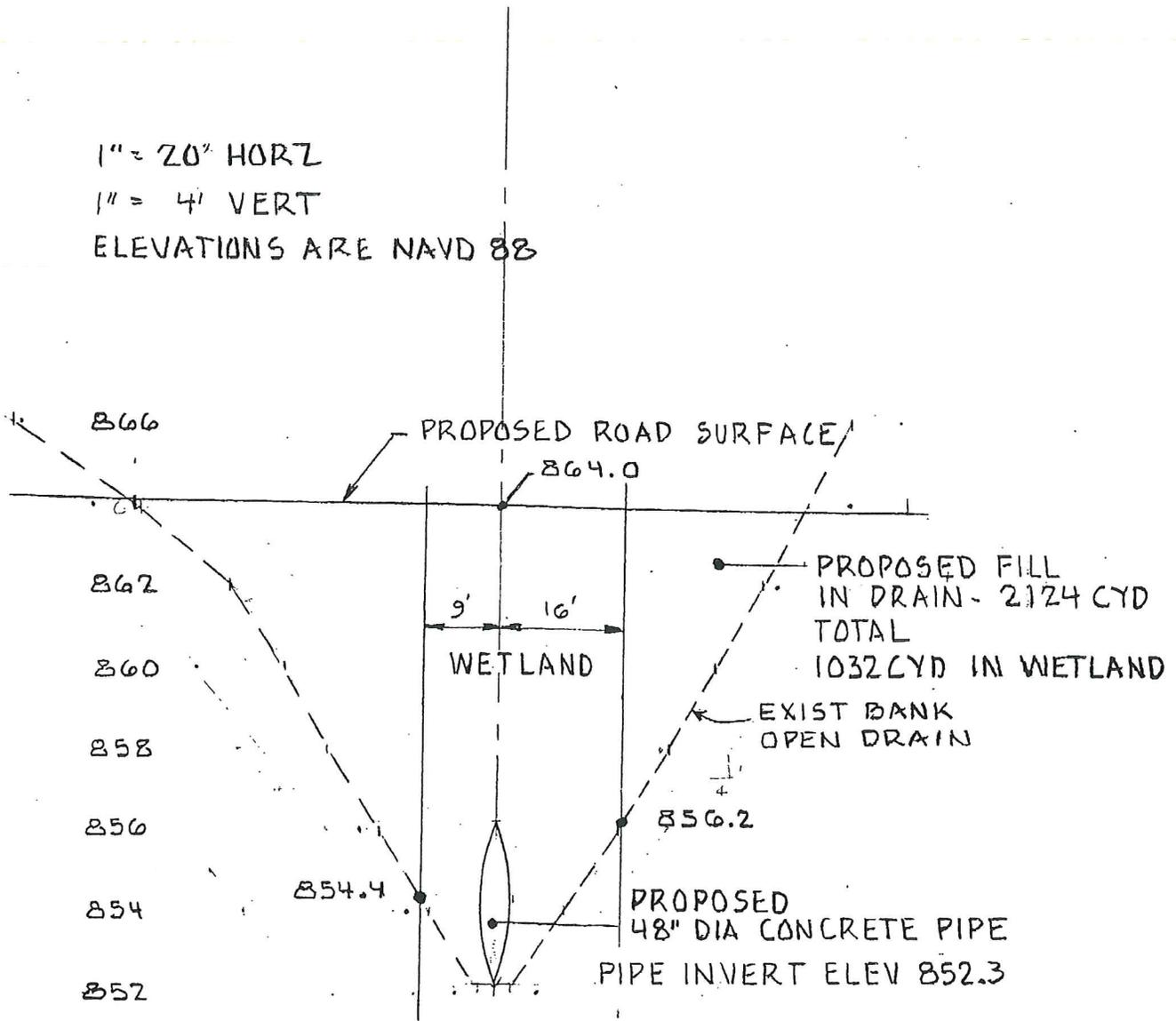


PLAN VIEW
DRAIN ENCLOSURE

PROJECT NAME: SILVERSTONE ESTATES
POWELL ROAD
NW 1/4 AND SW 1/4 SECTION 23
T4N R1W MERIDIAN TOWNSHIP
INGHAM COUNTY MICHIGAN

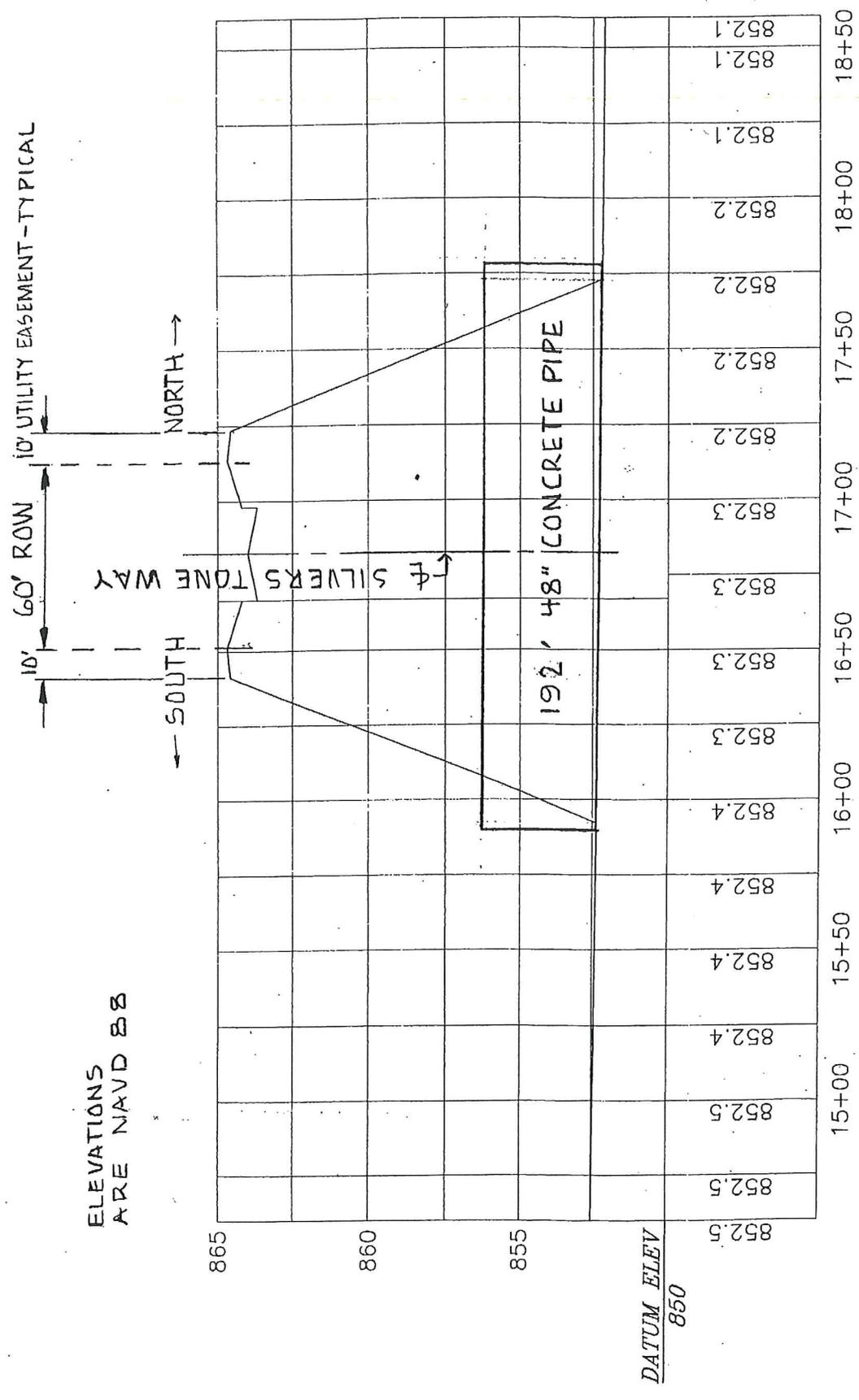
JULY 20, 2016 SHEET 3 OF 7

1" = 20' HORIZ
 1" = 4' VERT
 ELEVATIONS ARE NAVD 88



SECTION A-A

PROJECT NAME: SILVERSTONE ESTATES
 POWELL ROAD
 NW 1/4 AND SW 1/4 SECTION 23
 T4N R1W MERIDIAN TOWNSHIP
 INGHAM COUNTY MICHIGAN



ELEVATIONS ARE NAVD 88

10' SOUTH
 10' UTILITY EASEMENT - TYPICAL
 60' ROW
 NORTH →

→ S SILVERSTONE WAY

192' 48" CONCRETE PIPE

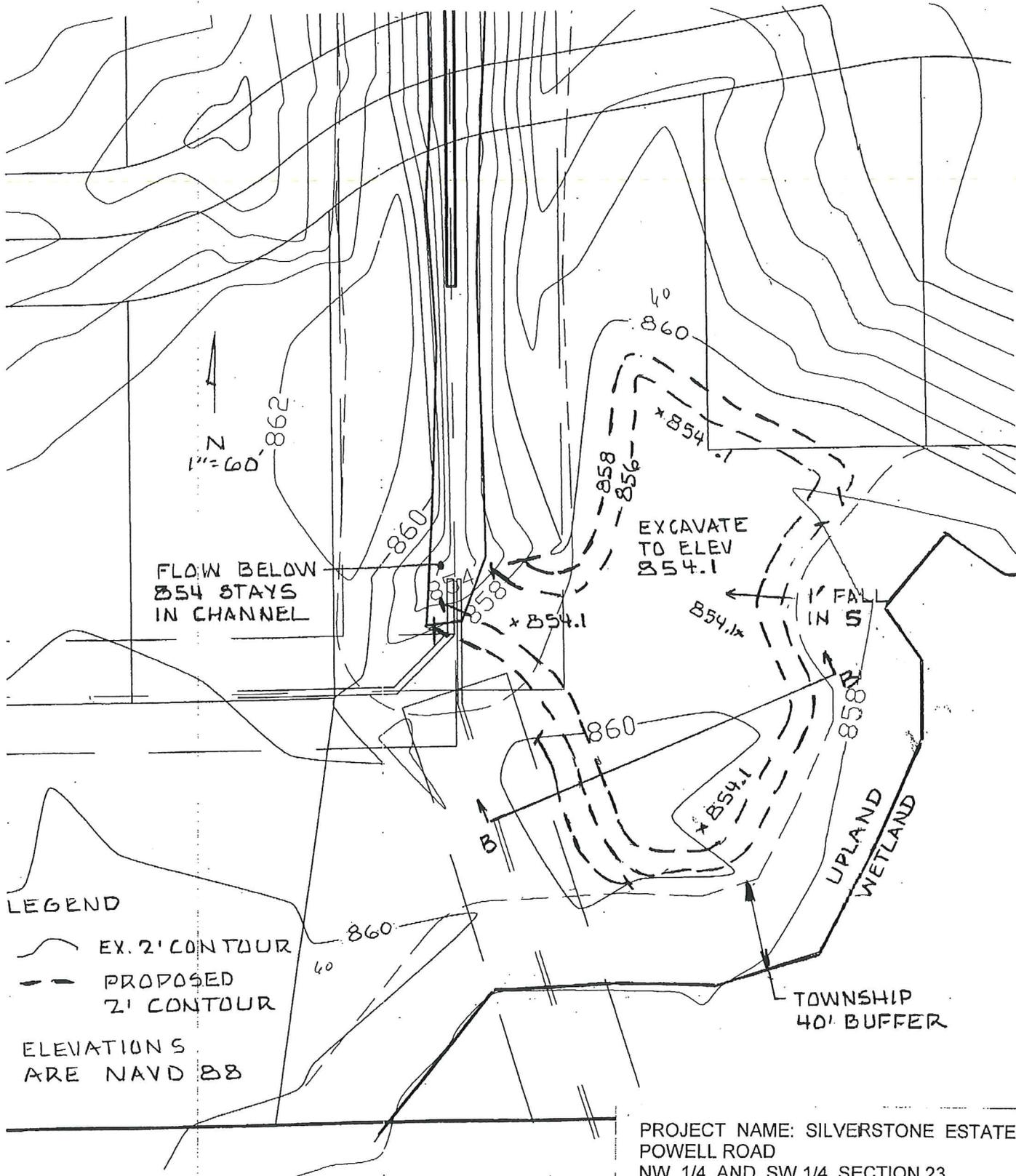
DATUM ELEV
 850

852.5 15+00 852.4 15+50 852.4 16+00 852.4 16+50 852.3 17+00 852.3 17+50 852.2 18+00 852.1 18+50

PIPE PROFILE
 1" = 50' HORIZ
 1" = 5' VERT

PROJECT NAME: SILVERSTONE ESTATES
 POWELL ROAD
 NW 1/4 AND SW 1/4 SECTION 23
 T4N R1W MERIDIAN TOWNSHIP
 INGHAM COUNTY MICHIGAN

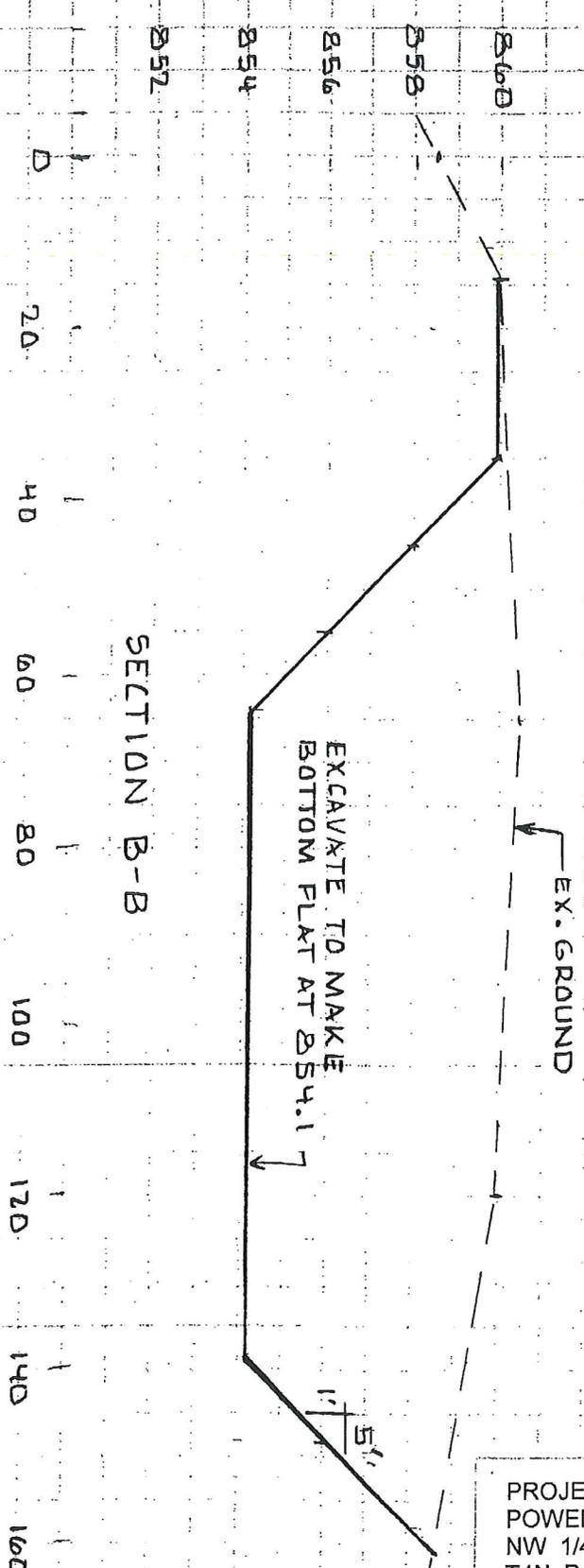
JULY 20, 2016 SHEET 5 OF 7



LEGEND
 ~~~~~ EX. 2' CONTOUR  
 - - - - - PROPOSED 2' CONTOUR  
 ELEVATIONS ARE NAVD 88

PLAN VIEW  
 STORM WATER DETENTION AREA.

PROJECT NAME: SILVERSTONE ESTATES  
 POWELL ROAD  
 NW 1/4 AND SW 1/4 SECTION 23  
 T4N R1W MERIDIAN TOWNSHIP  
 INGHAM COUNTY MICHIGAN  
 JULY 20, 2016 SHEET 6 OF 7



SECTION B-B

PROJECT NAME: SILVERSTONE ESTATES  
 POWELL ROAD  
 NW 1/4 AND SW 1/4 SECTION 23  
 T4N R1W MERIDIAN TOWNSHIP  
 INGHAM COUNTY MICHIGAN

JULY 20, 2016 SHEET 7 OF 7

TWP WETLAND  
 BUFFER

SILVERSTONE SUBDIVISION

33-2952

PICK SIZE FOR CULVERT... PIPE UNDER SILVERSTONE WAY  
FOR ENCLOSING UNRVH DRAIN, USE REINFORCED CONCRETE  
EXISTING PIPES FOR DANIELS AND UNRVH DRAIN ARE

1 - 30" DIA  $CSA = \pi \times 1.25^2 = 4.9 \text{ FT}^2$

2 - 24" DIA  $CSA = \pi \times 1.0^2 = 3.1 \text{ FT}^2$  8.0 FT<sup>2</sup> SUM

TRY THESE TO EXCEED CSA OF CONTRIBUTING PIPES:

48" DIA  $CSA = \pi \times 2.0^2 = 12.5 \text{ FT}^2$  FS  $12.5/8.0 = 1.6$  USE

42" DIA  $CSA = \pi \times 1.75^2 = 9.6 \text{ FT}^2$  FS =  $9.6/8.0 = 1.2$

36" DIA  $CSA = \pi \times 1.5^2 = 7.0 \text{ FT}^2$  TOO SMALL

USE 48" CONCRETE C76 CLASS III PIPE

DRAIN OFFICE SAID MATCH CROSS SECTIONAL AREA (CSA)

FS IS FACTOR OF SAFETY.

ESE 31 MAR 2016