Miller
Santo
Haugh

ELEVEN AND ONE HALF MILE RELIEF DRAIN
INTRA-COUNTY DRAINAGE BOARD
JUNE 14, 2021
10:15 A.M.
AGENDA

NOTE: THIS MEETING WILL BE HELD IN PERSON WITH TELECONFERENCE OPTION

Call in Number: 1-304-406-4075
Access Code: 656 796 376

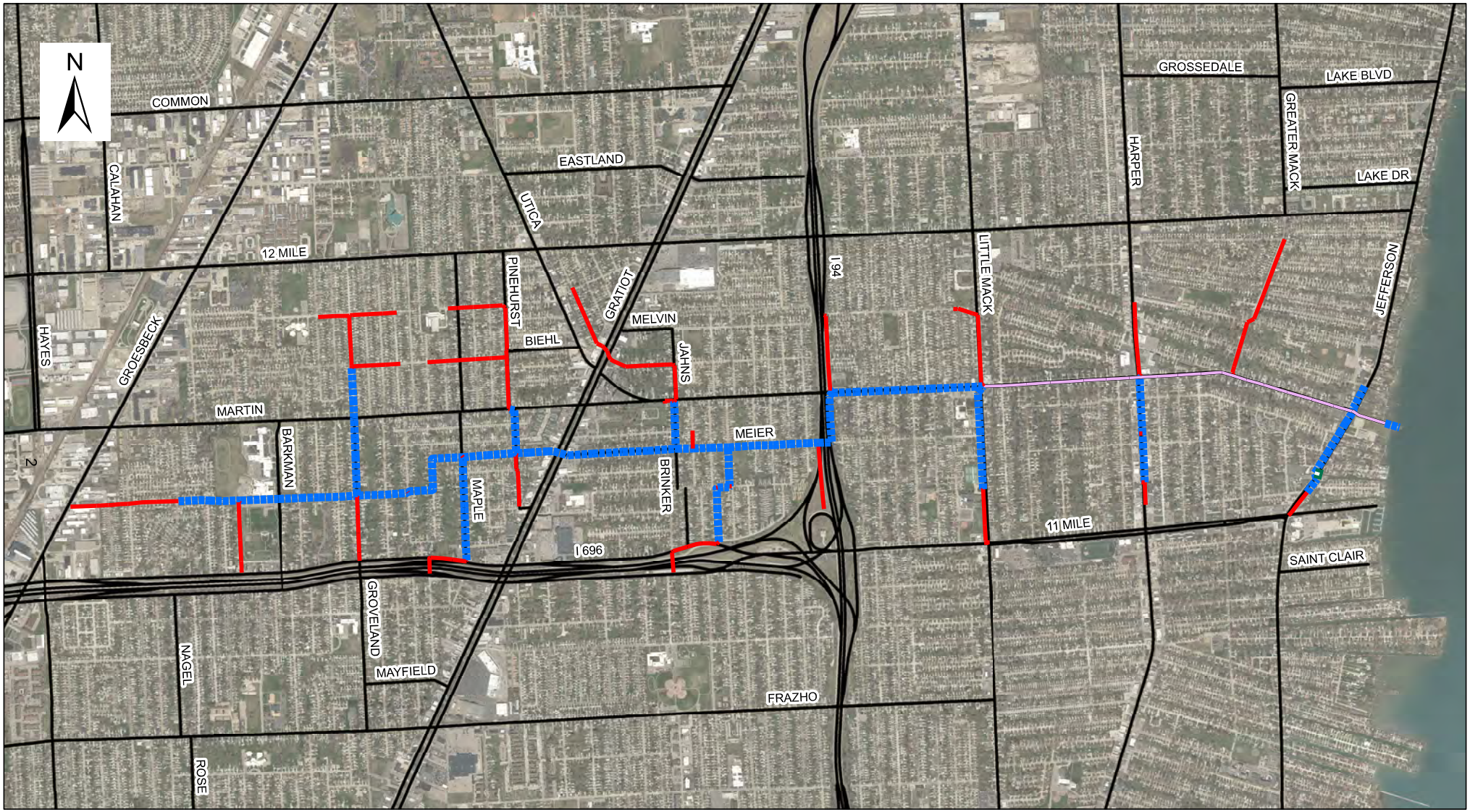
Page

1. Call of meeting to order and roll call
2. Approval of Agenda for June 14, 2021
3. Approval of Minutes for November 9, 2020 — 3
4. Public Participation
5. Trash Capture Pilot Project Proposal - Jeff Bednar — 5

   Motion: To approve the Trash Capture Pilot Project Proposal from Doetsch Environmental Services for a not to exceed cost of $25,880
6. Consideration for approval of invoices (see attached) — 61
7. Financial Report – Bruce Manning — 62
8. Adjourn

11 & 1/2 MILE RELIEF DRAIN

ROSEVILLE/ST CLAIR SHORES



MACOMB COUNTY MICHIGAN PUBLIC WORKS

0 1,250 2,500 5,000 Feet

Drain Length (Feet/Miles):
64,387.97 / 12.19

Legend

Enclosed Gravity

- < 60" Dia
- >= 60" Dia
- Multiple Pipes

Open Channel

- Ditch
- Pond

- Culvert

An adjourned meeting of the Intra-County Drainage Board for the **ELEVEN AND ONE HALF MILE RELIEF DRAIN INTRA-COUNTY DRAIN** was held via telephone conference per the State Public Act 228 of 2020 due to the COVID-19 pandemic, on November 9, 2020, at 10:38 A.M.

PRESENT: Candice S. Miller, Chair

Harold Haugh, Member

Bryan Santo, Member

ALSO PRESENT: Robert Mijac, Joseph Romano, Macomb County Board of Commissioners; Brian Baker, Chief Deputy, Karen Czernel, Deputy, Stephen Downing, Construction & Maintenance Manager, Bruce Manning, Financial Manager, Tom Stockel, Construction Engineer, Jeff Bednar P.E., Environmental Resources Manager, Vince Astorino, Operations & Flow Manager, Kellie Kource, Drain Account Specialist, Macomb County Public Works, Ben Aloia, Attorney

The meeting was called to order by the Chair, Candice S. Miller. A motion was made by Mr. Santo, supported by Mr. Haugh to approve the agenda as presented.

Adopted: YEAS: 3
NAYS: 0

Minutes of the meeting of October 19, 2020 were presented. A motion was made by Mr. Haugh, supported by Mr. Santo to approve the minutes as presented.

Adopted: YEAS: 3
NAYS: 0

The meeting was opened to public participation, then closed, there being no comments from the public.

Mr. Bednar updated the board that we have completed the feasibility study for public access to the lake and pollution abatement. We will be going out for public comment this month to meet our requirement with SEMCOG and will get together with the City to decide how the City and Public Works want to proceed with seeking potential grant funds.

A motion was made by Mr. Santo, supported by Mr. Haugh to receive and file the project update by Mr. Bednar.

Adopted: YEAS: 3
NAYS: 0

Mr. Aloia updated the board that we reached a resolution with the VFW Post regarding the property lines. Our agreement with VFW is that they would get title to the property, but we will maintain our easement rights to complete the projects that we intend to use this property for.

A motion was made by Mr. Haugh, supported by Mr. Santo to approve the Consent Judgment and Amended Right of Way and Drainage Easement agreement with the VFW Post.

Adopted: YEAS: 3
NAYS: 0

The Chair presented the invoices totaling $1,311.50 to the board for review and approval.

A motion was made by Mr. Haugh, supported by Mr. Santo to approve the invoices as presented.

Adopted: YEAS: 3
NAYS: 0

A motion to receive and file the financial report given by Mr. Manning was made by Mr. Santo and supported by Mr. Haugh.

Adopted: YEAS: 3
NAYS: 0

There being no further business, it was moved by Mr. Santo, supported by Mr. Haugh, that the meeting of the Eleven and One-Half Mile Relief Intra-County Drain Board be adjourned.

Adopted: YEAS: 3
NAYS: 0

The meeting was adjourned at 10:52 a.m.

Candice S. Miller, Chair
Macomb County Public Works Commissioner

STATE OF MICHIGAN
COUNTY OF MACOMB

I certify that the foregoing is a true and correct copy of proceedings taking by the Intra-County Drainage Board for the Drainage District shown on the attached set of minutes, on November 9, 2020 the original of which is on file in the Public Works Commissioner's Office. Public notice of the meeting was given pursuant to Act No. 267, Public Acts of Michigan, 1975, including, in the case of a special or rescheduled meeting or a meeting secured for more than 36 hours, notice by posting at least 18 hours prior to the time set for the meeting.

Candice S. Miller, Chair
Macomb County Public Works Commissioner

DATED: 11/9/20

Candice S. Miller
Public Works Commissioner
Macomb County

Memo

To: Eleven and One-Half Mile Relief Drainage Board

From: Jeff Bednar, PE, Environmental Resources Manager

Date: June 14, 2021

Re: Request for Approval of 11.5 Mile Relief Drain Trash Capture Pilot Project

The 11.5 Mile Relief Drain services a 2,192 acre drainage district in Roseville and St. Clair Shores that is over 50% impervious. Because it drains directly into Lake St. Clair, many floatables and other pollutants from the district are transported into the lake. A bulkhead and boom placed at the outfall will capture sediments and floatable trash carried from the district.

Please see the attached information and proposal for installation and maintenance of a trash capture pilot project for the 11.5 Mile Relief Drain outfall. In order to capture floatable trash and sediment as it flows to the lake, Doetsch Environmental Services proposes to:

- Fabricate and install a low head bulkhead to capture sediment,
- Install a turbidity curtain/boom to capture floatables,
- Place a metal grated platform and remove concrete decking slabs as needed to install bulkhead and boom.

Doetsch proposes to provide these construction services for $18,200.

The Doetsch proposal also includes service and maintenance of the trash capture system, estimated to be $640 per removal occurrence or $160 per hour straight time. It is recommended to contract with Doetsch for maintenance for a minimum of one year. During that time, staff will monitor the trash accumulation, frequency of maintenance and feasibility for permanent use.

This proposal is generated from recommendations from a study to reduce stormwater pollution into Lake St. Clair partially funded by a SEMCOG planning grant. The study also explored options for increasing public recreational access to the property containing the drain should the city of St. Clair Shores wish to operate and maintain the area as a small pocket park after a drain retrofit. It is hoped that this project, if successful, will serve as a pilot and generate grant funding to retrofit the other eleven Macomb County drains emptying into Lake St. Clair, greatly reducing the amount of trash entering the lake from drains.

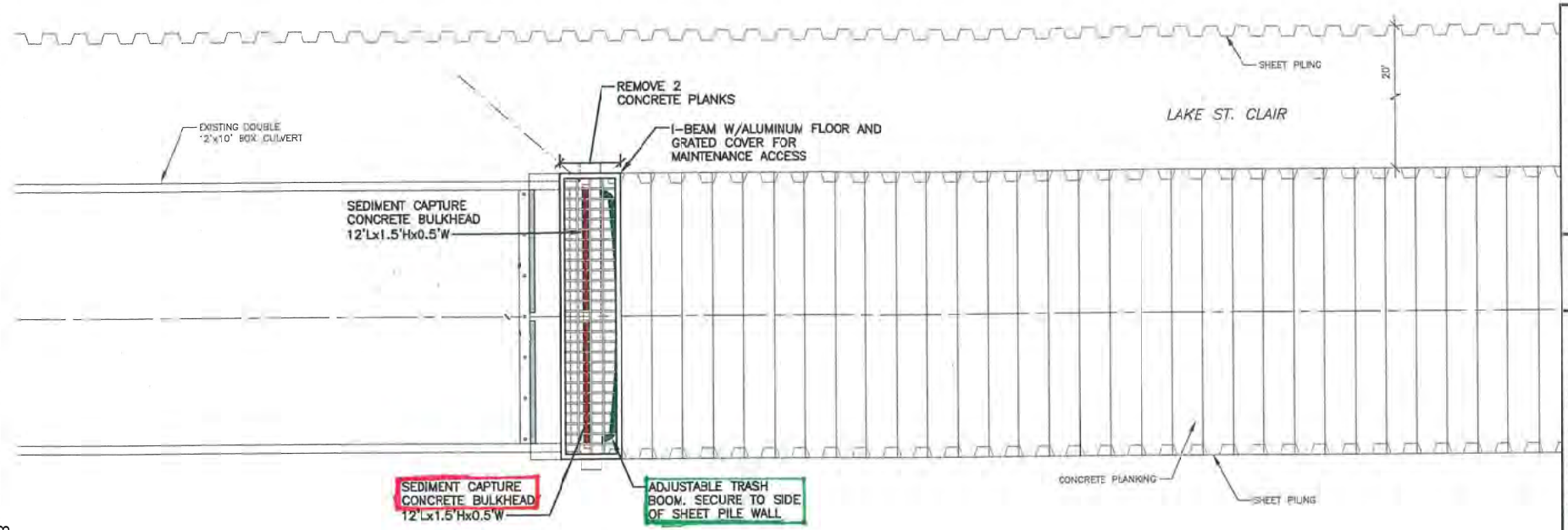
We are requesting authorization to execute the proposed installation and one year of maintenance at a cost not to exceed $25,880.

Aerial view of drain property and bulkhead/boom location

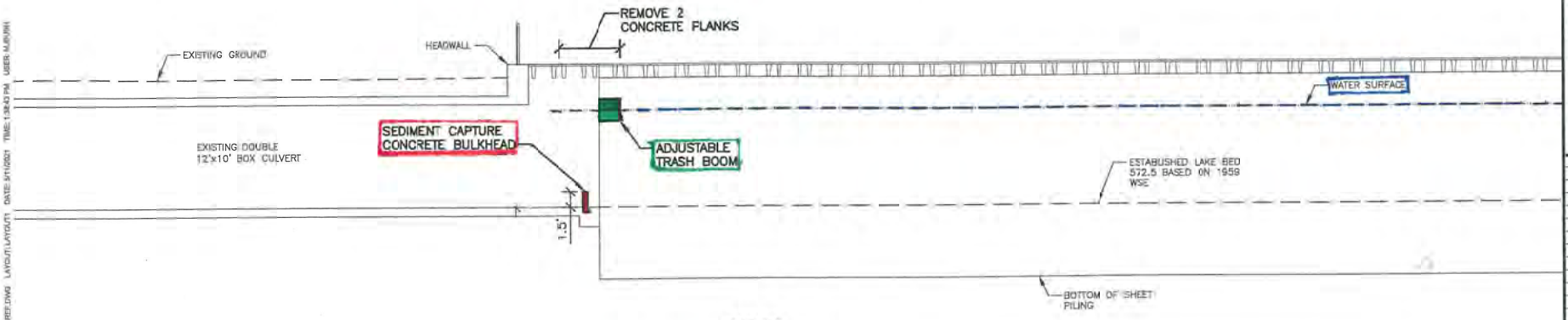
End of pipe and bulkhead with concrete decking looking towards Lake St. Clair

Floatable trash collecting at Jefferson Avenue manhole

Concrete plank removal



PLAN



PROFILE

NORTH

PLAN/PROFILE

SCALE: 1" = 10'

0 5 10

VERT SCALE: 1" = 10'

PLOT INFO: Z:\2020\2020130\CAD\REF\2013SREF.DWG LAYOUT: LAYOUT1 DATE: 3/11/2021 TIME: 1:38:43 PM USER: MJRUH

fishbeck
Engineers | Architects | Scientists | Constructors

Hardcopy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Macomb County Public Works Comm.
Village of Roseville, Macomb County, Michigan

11.5 Mile Relief Drain Pilot Project - Boom and Sediment Sump

PROJECT NO.
NA

FIGURE NO.
1

Doetsch
ENVIRONMENTAL SERVICES
21221 Mullin Ave. Warren MI 48089

May 2, 2021

Jeff Bednar PE
Macomb County Public Works
21777 Dunham Road
Clinton Township, MI 48036

RE: Trash containment pilot at 11-1/2 Mile Drain

Mr. Bednar,

Doetsch Environmental Services will provide necessary labor and equipment to remove slabs, clean gate wells, fabricate and install 18" bulkheads and install a turbidity curtain.

- Temporary matting will be set up for installation equipment only.
- Gate wells will be high pressure washed to remove debris and allow for proper seating of bulkheads
- Two slabs will be removed using boom truck.
- Removed slabs will be stored onsite.
- 2 – 18" Bulkheads will be fabricated prior and installed
- Turbidity curtain will be installed.
- 1 – 24" wide x 8' long metal grated platform with handrails will be fabricated prior and installed for safe observation.
- Wood platforms will be installed for safety to bridge open area due to slab removal.
- Matting will be removed.
- Duration of work: 3 days

After installation, trash accumulation will be monitored by others.

- Expected trash removal process will be to remove wood platforms and rake floatables. Debris to be disposed as solid waste. Expected 2 man crew and pickup truck.

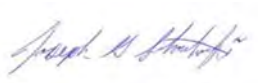
Pricing:

Install mats, remove slabs, clean well, furnish and install bulkheads (2), furnish and install observation grating with railing, furnish and install wood platforms.
Lump sum: $18,200.00

Maintenance of trash: 2 man crew with pick up truck, includes removal of trash. T & M basis, expect approx. $640.00 per occurrence or $160.00 per hour straight time.

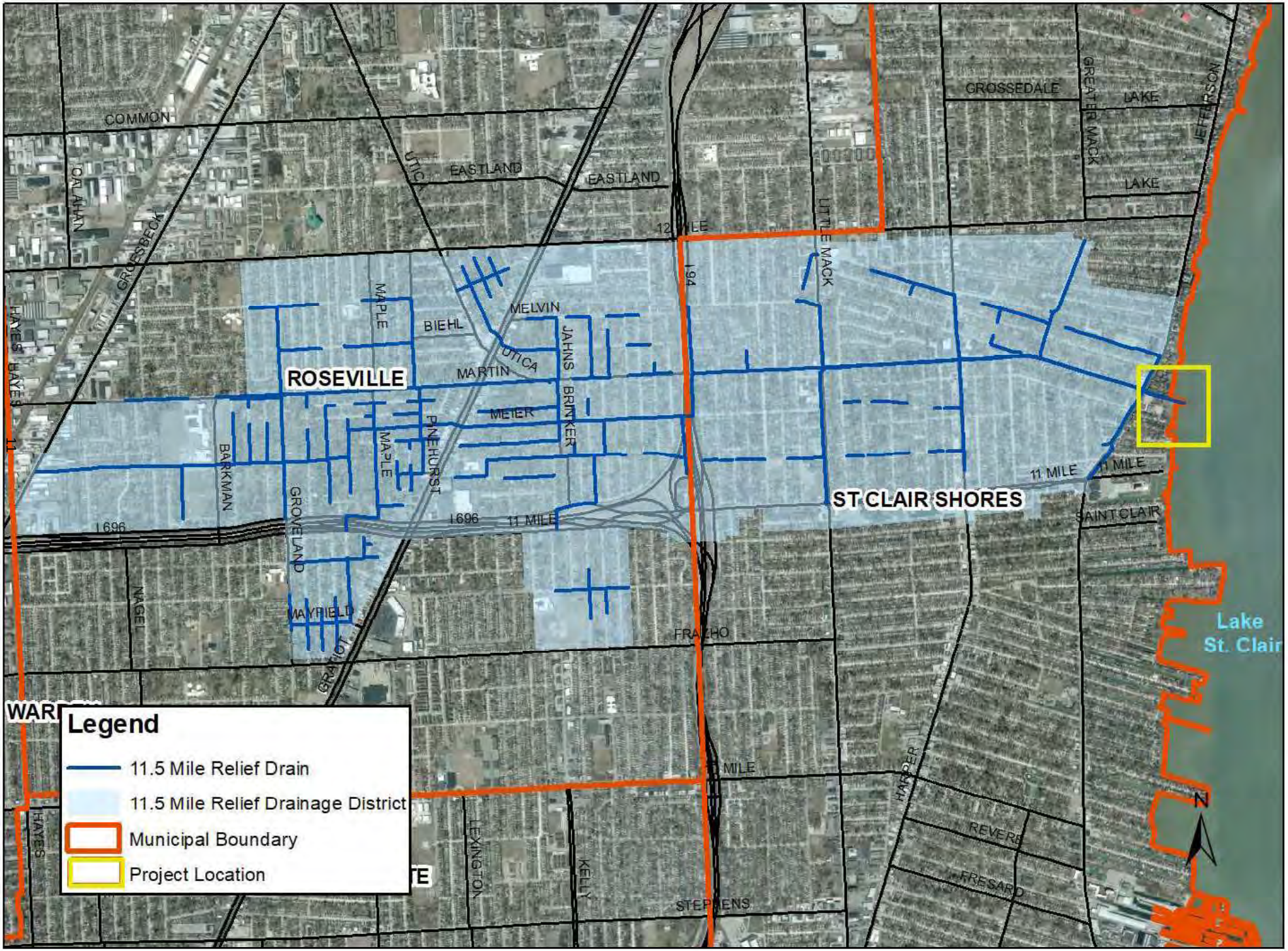
Please contact me with any questions or concerns.

Thank you for the opportunity to be of service,



Joseph G Schotthoefer IV

Project Location



11.5 Mile Relief Drain
Retrofit and Access Study

Macomb County Public Works Office

Project No. 200158
February 24, 2021

REVIEW DRAFT

fishbeck
Engineers | Architects | Scientists | Constructors

fishbeck
Engineers | Architects | Scientists | Constructors

45200 Card Road, Suite 128
Macomb Township, Michigan 48044

586.412.1406 | fishbeck.com

11.5 Mile Relief Drain Retrofit and Access Study

Prepared For:
Macomb County Public Works Office
Macomb County, Michigan

February 24, 2021
Project No. 200158

Review Draft

List of Graphics

List of Tables

List of Appendices

List of Abbreviations/Acronyms

AMP	Asset Management Plan
ASI	Applied Science, Inc.
cfs	cubic feet per second
CRWC	Clinton River Watershed Council
City	City of St. Clair Shores
Drain	11.5 Mile Relief Drain
EGLE	Michigan Department of Environment, Great Lakes, and Energy
FEMA	Federal Emergency Management Agency
GLRI	Great Lakes Restoration Initiative
HA	Hamilton Anderson
MCPWO	Macomb County Public Works Office
SEMCOG	Southeast Michigan Council of Governments
USACE	United States Army Corp of Engineers
USEPA	U.S. Environmental Protection Agency
VFW	Veterans of Foreign Wars

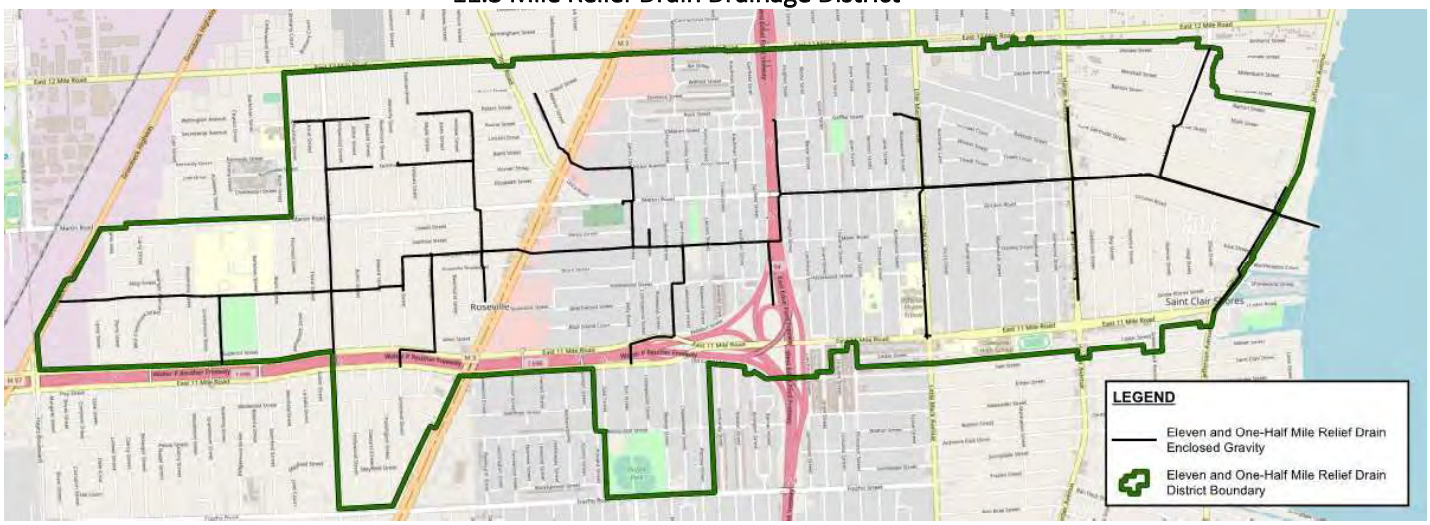
Introduction

The Macomb County Public Works Commissioner's Office (MCPWO) and partners have prioritized improving water quality and public access to Lake St. Clair by a retrofit of the 11.5 Mile Relief Drain (Drain). The drain retrofit is intended to reduce stormwater pollutants conveyed through the drain system. The outfall of the drain is situated on a vacant lot which is an ideal location for a passive park with lake access. A planning grant was obtained from Southeast Michigan Council of Governments (SEMCOG) to develop conceptual design plans for the drain retrofit and public access to the lake. Summary of planning efforts are provided below, and site photographs are provided in Appendix 1.

Project Background and Necessity

The 11.5 Mile Relief Drain (Drain) is a designated county drain under Michigan Drain Code, Act 40 of 1956, and is in southeast Macomb County. The drain's service area is 2,192 acres and includes the Cities of St. Clair Shores and Roseville and discharges directly to Lake St. Clair. MCPWO oversees operation and maintenance of the drain, which was originally constructed in 1969. The drain consists of 13.5 miles of enclosed storm sewer ranging in size from 12-inch diameter to a 12-foot x 10-foot double box system. A combined total of 650 manholes and catch basins also exist throughout the system. The drain at the outlet consists of twin 12-foot x 10-foot wide box culverts and extends into the lake via a sheet pile channel covered by a concrete deck. Secondary sheet pile walls adjacent to the channel serve as sea walls and help to form a pier into the lake. A triangular sheet pile structure exists in the lake at the end of the drain to protect the outlet from ice damage.

11.5 Mile Relief Drain Drainage District



Aerial view of 11.5 Mile Relief Drain

An asset management plan (AMP) was completed in 2018 to evaluate overall condition and performance of the drain. Results from the AMP indicated the drain was structurally sound, however, pollutants commonly associated with urbanized drainage areas were being captured and transported through the system and discharged directly to Lake St. Clair. Floatable trash, sediment, oils/grease, road salt, and nutrients from fertilizer are examples of pollutants being conveyed through the drain. These pollutants result in poor water quality, impair fish and aquatic habitat, and present public health and safety concerns as well. Based on these concerns, the MCPWO prioritized reducing stormwater pollution through the drain to improve water quality in the lake.

The drain's watershed is entirely urbanized and has over 50% imperviousness. Stormwater treatment throughout the watershed is insufficient and opportunities to implement new green stormwater best management practices, such as rain gardens, infiltration, or detention basins, is very limited. Capturing pollutants within the drain system was therefore determined prudent to improve water quality in Lake St. Clair. Given the extent of the drain system, capturing pollutants closest to the drain's outfall in Lake St. Clair is also most practicable.

In addition to improving water quality in Lake St. Clair, increasing public access to the lake has been a priority for the City of St. Clair Shores (City) for over a decade. Currently, the City owns and operates 3 large waterfront parks and 8 neighborhood parks, of which only two of the neighborhood parks (Alexander and Champine) offer lake access. The City's 2016 Master Plan objectives focus on offering improved public access to the lake. Goals and objectives in the City's 2019-2023 Recreation Master Plan also reflect a desire to improve underused open space and expand public lake access areas.

An opportunity for addressing both water quality concerns associated with the drain and improving lake access was determined possible as the drain discharges directly to Lake St. Clair in a vacant lot, which is owned by the 11.5 Mile Relief Drainage Board and maintained by the MCPWO. The lot is in a residential area, adjacent to the VFW (Veterans of Foreign Wars) Hall, and offers suitable location for a neighborhood park with lake access. Notably, Hamilton Anderson (HA) had prepared a conceptual design for the site in 2004, which included a walking pathway, plantings, boardwalk, and a raised decking area over Lake St. Clair.

A partnership between the Drain Board, MCPWO, Macomb County Planning and Economic Development, City of St. Clair Shores, and City of Roseville was formed to improve water quality and public access to the lake. A $45,000 ($36,832.50 funded and $8,167.40 match) community planning grant from SEMCOG was awarded to project partners in 2019 to develop design concepts for reducing stormwater pollution and improving public

access to the lake. In January 2020, a team of engineers (Fishbeck and Applied Science, Inc.[ASI]) and architects (HA) were hired to prepare the conceptual design plan and develop cost estimates to reduce pollutants and improve public access to the lake. This report summarizes the work activities completed under the grant, including alternative analysis, public comment, funding research, and final recommendation.

Water Quality Improvements

Alternative Analysis

Six stormwater treatment facility design alternatives were evaluated by ASI, including sumps, bar screens, swirl concentrators, netting and/or booms to effectively capture pollutants. ASI's August 3, 2020 design summary memorandum and February 18, 2021 addendum, including conceptual design schematics, can be found in Appendix 2. Hydraulic analysis was completed using FEMA (Federal Emergency Management Agency) approved Stormwater Management Model 5 (SWMM5) to calculate flow rates within the drain and confirm hydraulic capacity for each alternative considered. NOAA lake level gauge station data from Blossom Heath Park in St. Clair Shores was used as the basis for hydraulic analysis and design of water quality devices. The 10-year, 24-hour peak flow rate of 2,223 cubic feet per second (cfs) was used as basis for design. A passive treatment facility that did not require active operation of pumps, gates, and screening equipment during rain events was desired by MCPWO. Summary of alternatives considered, cost estimates, regulatory requirements, and other pertinent data for each alternative considered is provided below. Itemized cost estimates can be found in Appendix 3.

1.0 – Bar Screen

Bar screens were considered but quickly determined not feasible given the high velocities within the drain and damage to screens and frames that would occur during rain events. Use of the entire MCPWO lot and drain easement would be necessary to afford sufficient space to construct a bar screen that could withstand velocities within the drain. Bar screens are above grade facilities, require real-time operations, and typically have significant operations and maintenance costs. This alternative was determined infeasible and not further developed.

1.1 – Swirl Concentrator

Swirl concentrators were determined not appropriate for the size, capacity, and wide range of water surface elevations in the drain. Treatment capacity of swirl concentrators is only 30 cfs; however, the drain design flow requirement for a 10-year, 24-hour event is 2,223 cfs. Gates would be required to handle the large rain events to ensure conveyance is maintained. Large volumes of untreated stormwater would be discharged to the lake. This alternative was determined infeasible and not further developed given capital costs, real-time flow metering, and operating requirements of the gates.

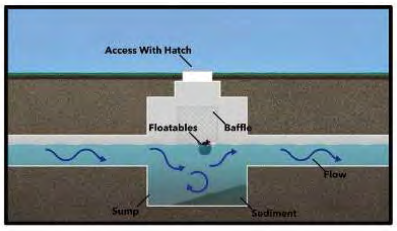
1.2 – Netting Facility

The netting facility would be constructed entirely below grade and operate passively. Channels on both north and south sides of the existing outfall would be constructed and interconnected to the existing box conduits upstream of the nets. Four sets of frames and platforms, each with 8 nets, (30-inches wide by 54-inches high by 8-feet long) would serve to capture trash and debris. In addition to the netting system, check valves would be incorporated to automatically open during rain events to protect the nets and ensure no head loss. Total capacity of the netting system, including check valves, is 2,160 cfs which is 63 cfs less than desired 10-year, 24-hour design. An approximate 2,800 FT^3 debris storage area would be provided with this alternative. A permit from the United States Army Corps of Engineers (USACE) would be required. Cost estimate, including construction, design, permitting, and contingencies is $5.7 million. Annual operation and maintenance expenses are estimated at $150,000, and includes removing floatables and replacing nets.

1.3 – Sump and Boom System

This alternative considers reconfiguration of the drain top and constructing 2 parallel 3-feet deep below grade sediment sumps approximately 12 feet in length. To construct the sump, approximately 36-lineal feet of drain would be uncovered, top be removed and reconstructed. As water flows through the pipe, sediment will drop to the bottom of the sump and floatable trash will be captured by the baffles. Access hatches would be constructed, including a clear viewing hatch for observation and educational purposes. Floatable booms will be placed to capture trash and debris. Approximately 936 FT^3 of sediment and floatable storage area would be realized. A USACE permit will be required. Cost estimate, including construction, design, permitting, and contingencies is $1.7 million. Operation and maintenance expenses are estimated at $20,000 per year, assuming quarterly cleaning with vactor truck.

1.4 – Sump and Baffle System with Observation Lid



This alternative is similar to the sump and boom system described above, however two parallel adjustable baffles would be installed to capture floatables. Baffles would need to be adjusted four times per year. A USACE permit will be required. Cost estimate, including construction, design, permitting, and contingencies is $1.89 million. Operation and maintenance expenses are estimated at $20,000 per year, assuming quarterly cleaning with vactor truck.

1.5 – Stop Log and Baffle System with Observation Lid

The stop log and baffle system includes two parallel 3-feet high stop logs to capture sediment rather than a sediment sump ($0.3 million cost savings). Baffles would be secured to channels mounted in the walls to capture floatables and would need to be adjusted four times per year. A USACE permit will be required. Cost estimate, including construction, design, permitting, and contingencies is $1.6 million. Operation and maintenance expenses are estimated at $20,000 per year, assuming quarterly cleaning with vactor truck.

1.6 – Reduced Stop Log and Baffle System without Observation Lid

This alternative considers uncovering and removing top of the drain in two places for about 7-lineal feet each. The new drain top would consist of cross beams and hatches rather than an observation lid. A USACE permit will be required. Cost estimate, including construction, design, permitting, and contingencies is $690,800. Operation and maintenance costs are estimated at $20,000 per year.

1.7 – Boom – Lake St. Clair

The boom alternative includes 6-inch diameter horizontal floats and 12-inch weighted curtains (skirts) to capture floatables. Two 50-foot booms would be placed at the drain outlet in Lake St. Clair and automatically adjust to fluctuating lake levels. Booms would be installed in the spring and removed prior to lake freeze. While cost effective, this alternative can be aesthetically unpleasing as floatables remain on top of the water surface until removed. Booms have an approximate 3 to 5-year life cycle. Permits from both the Michigan Department of Environment, Great Lakes and Energy (EGLE) and USACE would be required. Cost to purchase booms is estimated to be $200, and a detailed cost estimate is not provided for this alternative. Annual initial installation and removal costs are $2,000 and $4,000 respectively. Removal costs are higher to accommodate added cost of capturing and disposing of floatables.

1.8 – Boom and Sump – Box Culvert Outfall

To minimize costs, MCPWO and Fishbeck evaluated placement of stormwater devices where the box culvert outlets to the sheet pile channel. This alternative is similar to alternative 1.3 described above, however only one boom would be installed approximately 10 to 15 feet downstream from the box outfall within the steel sheeting channel. The boom would automatically adjust to water elevations and capture floatables. A sediment sump would be constructed using concrete bulkheads in the same location. Approximately 4 lineal feet of concrete decking would be permanently removed, to allow for construction, and replaced with a grate cover for maintenance access and educational purposes. The grate cover would not be as elaborate as the observation lid proposed in ASI's alternatives. Conceptual design drawing can be found in Appendix 2. A USACE permit would be required. Costs are estimated at $178,00 including design, permitting, and construction. Operation and maintenance costs are estimated to be $20,000 year, assuming quarterly cleaning with a vactor truck.

All the drain retrofit alternatives will require construction of a 16-foot wide maintenance lane suitable for heavy equipment. Alternatives considered for the maintenance lane were gravel (MDOT 21AA), asphalt and brick pavers. However, MDOT 21AA was determined to be most appropriate for the site. Cost estimate for the maintenance lane is $100,000, including design, construction and contingencies and is included in each alternative costs, except alternative 1.7 – boom and 1.8 boom and sump.

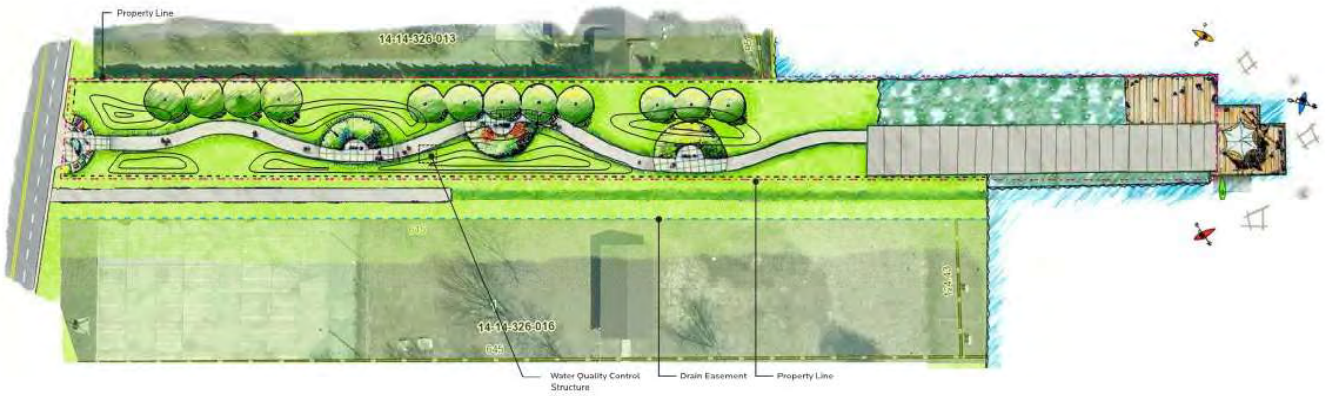
2. 0 – Wetland Complex

Creating an emergent wetland complex at the drain outfall was also considered to facilitate improved water quality in the lake. Wetland plants play a vital role in uptake of pollutants, water purification, shoreline stabilization, and offer aquatic habitat foraging and refuge areas. Two alternatives were considered, including a 0.14-acre area within the MCPWO drain easement and 0.22-acre area outside of the drain easement. Modification of the seawalls, removal of concrete decking, and strategic placement of diversion weirs to direct flows and protect wetland area from lake energies would be required for both wetland areas. Construction challenges include retaining topsoil and plantings until wetland plants fully established. Fluctuating water levels and wave energy from the lake present challenges, making constructed shoreline wetland success somewhat uncertain. Permits would be required from USACE and EGLE for development of wetland areas. A five-year post construction monitoring period may also be required for constructed wetlands. Cost estimates were not prepared for the wetland area given modification of seawall and concrete planking would be necessary to construct wetlands and is not preferred by MCPWO. The MCPWO also determined constructing wetlands outside their drain easement was not feasible, although doing so would have been necessary to achieve water quality goals.

A pre-application meeting was held with USACE and EGLE to discuss potential wetland design concept. The design concept was received favorably, although it was determined not practicable for this site. Use of this concept at other areas along the lake's shoreline should be considered.

Improved Access to Lake St. Clair

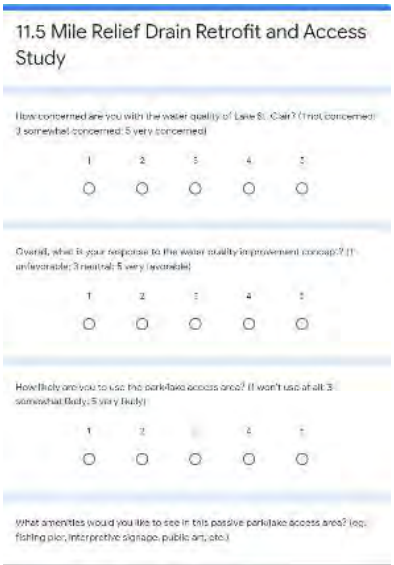
The 2004 HA park concept was used as a basis for developing a final conceptual plan which includes a paved walking pathway, educational signage, perennial plantings, bike rack, bench seating, and trash receptacles throughout. Conversion of the existing concrete decking to wood was considered but determined not cost effective. Painting a mural (i.e. sailboat, fish, etc.) on the concrete planking will revitalize appearance of the existing planking. A wooden boardwalk and platform area with shading is proposed to be constructed over the existing ice pier. This area will offer fishing area and safe harbor area for kayakers. The area between the concrete planking and outer seawalls will be restored and planted with water-tolerant native vegetation to improve aesthetics. Guardrail will be mounted to the concrete decking and boardwalk to ensure public safety. Stormwater in the park will be managed through construction of swales and native vegetation. New fencing will surround the park with a double swing access gate to deter access to the drain maintenance lane. Both USACE and EGLE permits will be required. Construction challenges are primarily associated with the new wooden decking area and work activities directly associated with the lake. It is anticipated a barge may be required for a portion of construction activities. Construction cost estimate, including design, permitting, and contingency is $1,425,469.00. Detailed cost estimate and assumptions can be found Appendix 4.



Public Comment

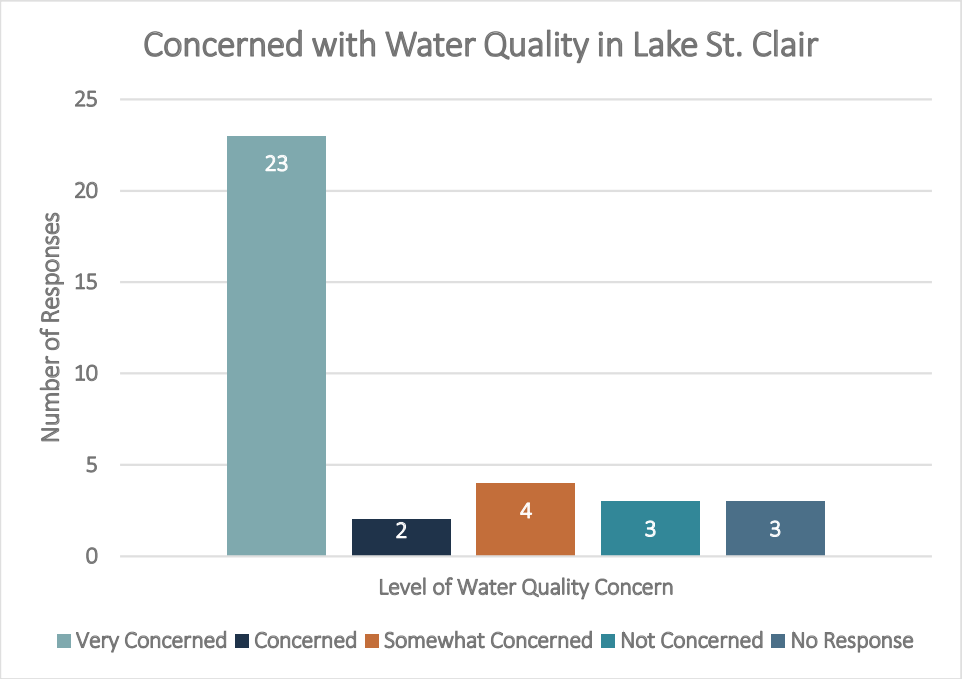
A requirement of the grant included receiving public comment regarding the conceptual designs. Given COVID-19 restrictions, a Google Survey was developed to solicit public opinion regarding the conceptual storm sewer retrofit and park access designs. The survey was posted on the MCPWO's and City of St. Clair Shores' websites from December 7, 2020 through January 7, 2021, and accessed 43 times. Eight incidences of time stamped access were deemed accidental as they were 1 or 2 seconds apart with no comment submitted. A total of 35 responses were used to tally results.

The survey was structured to determine public concern with Lake St. Clair water quality, the proposed water quality treatment device, and anticipated use of the park. Survey results indicate majority of respondents are concerned with water quality in Lake St. Clair and are in favor of the water quality device, as shown in Graphics 1 and 2, below. General comments received regarding water quality improvements in Lake St. Clair were associated with use of bio-engineering practices

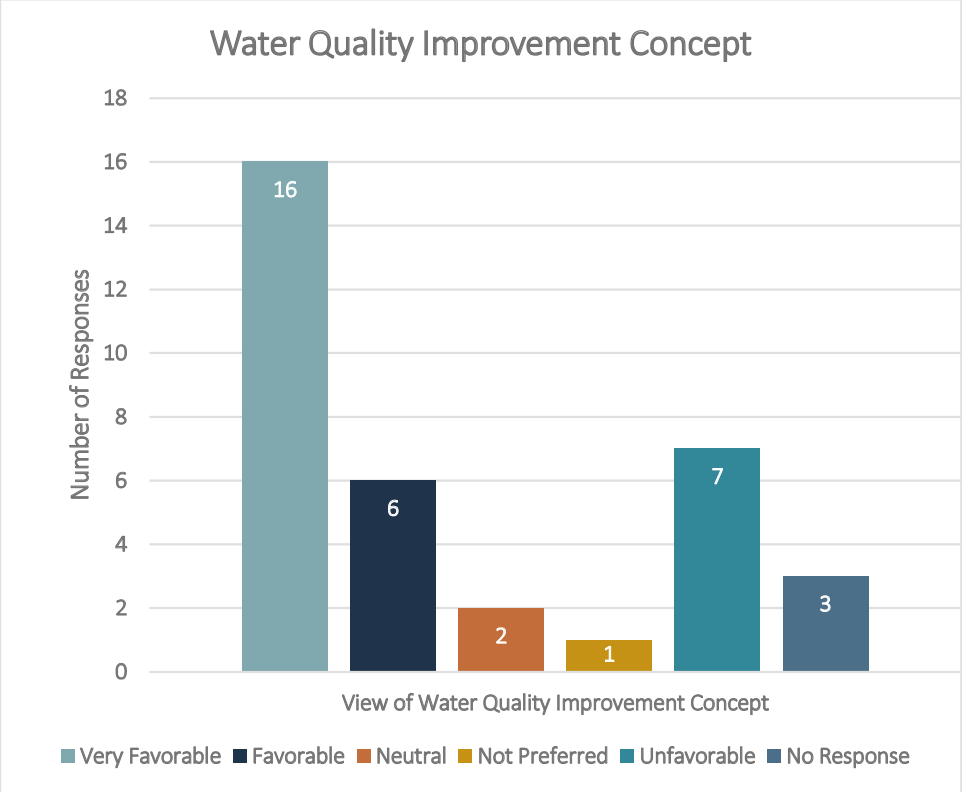


(e.g. wetlands, bioswales, raingardens, etc.) to infiltrate stormwater and capture pollutants.

Graphic 1 – Concern with Water Quality in Lake St. Clair

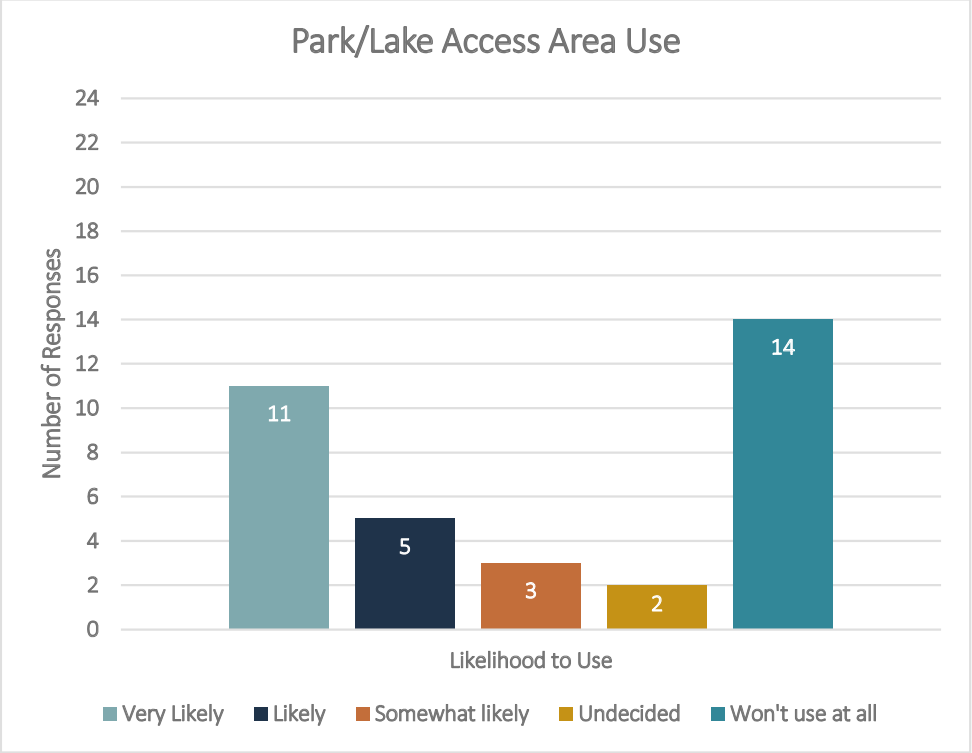


Graphic 2 – Response to Water Quality Improvement Concept



Fourteen respondents indicated they would not use the park at all, while 11 noted they would be very likely to use the park/lake access area, as shown in Graphic 3, below.

Graphic 3 – Park/Lake Access Area Use



Respondents provided general comments and offered ideas for suggested park amenities, which are summarized below. Majority of the concerns are associated with ensuring safety in the area, maintenance, parking, and impacts to property adjacent the park area.

Suggested Park Amenities

- Kayak launch
- Swimming area
- Fishing area
- Interpretative signage
- Native plantings
- Picnic tables and seating areas
- Art
- Bike rack
- Geese deterrent

General Comments/Concerns

- No parking area
- Safety and vandalism
- Increased trespass on private property
- Maintenance
- No restrooms
- Property tax increases

- Remove ice pier entirely; convert entire area to coastal wetland

Recommendation

Shared use of the lot where the drain outlets to the lake is recommended and is consistent with many public comments. The shared-space allows for opportunity to educate/inform the community about proper stormwater management techniques through the use of clear observation hatches on the drain, swales, native plantings, and interpretive signage. The shared-space also allows for all improvements (drain and lake access) to be constructed without purchase of property or acquisition of additional easement areas. Improving lake access will work to meet the City's goals and objectives outlined in planning documents and encourage healthy lifestyles. Although a shared space, project partners should consider drain retrofit and the park area two separate projects, as funding sources will likely be different.

A pilot project approach is recommended to allow for phased implementation and evaluation of effectiveness of water quality device measures prior to making large capital expenditures. We recommend installing the boom to capture floatables, as described in Alternative 1.8. Concrete planking removed during construction can be temporarily stacked onsite during the evaluation period and construction fencing placed around the area to prohibit access. (This approach will minimize cost associated with construction of a permanent access lid). Cost estimate for the pilot project is $53,000. During the pilot period, MCPWO crews can visually inspect the boom to determine if floatables are being adequately captured, obtain a measured pollutant load removal quantity, and monitor volume of sediment capture. Adjustments to the boom can be made and re-evaluated again.

Once the MCPWO determines effectiveness of the boom and concrete bulkheads, a decision can be made to construct a permanent clear maintenance lid (for public viewing of the water quality devices), and a maintenance access lane. Implementing other alternative methods previously discussed could occur should placement of the boom and bulkheads at the box outfalls be determined insufficient.

Permanent retrofit of the drain below grade (in open lot area) will require significant ground disturbance and cannot be constructed in a phased approach. Drain retrofit should occur before or concurrent with construction of the lake access area. The existing fence and gate should remain in place until the park's new fencing and gate are installed. The park can be constructed in a phased approach. However, it is recommended work activities commence in an east to west manner to minimize disturbance.

Funding Research

A variety of grant opportunities were evaluated to assist with design and/or implementation of the water quality improvements and park/lake access area. Table 1 summarizes potential funding sources, timing for request for proposals, and site access links. It should also be noted that funding priorities and requirements can vary from year to year, therefore it is prudent to review each source on an annual basis.

Table 1 – Funding Opportunities

Project Initiative	Funding Source	Grant Name	Timing of Request for Proposals (typical)	Website
Park/lake access	State of Michigan	Coastal Zone Management	Fall	EGLE – Coastal Management (michigan.gov)
Stormwater improvements	USEPA [1]-GLRI [2]	GLRI	Fall/winter	Search for grants | Great Lakes Restoration Initiative (glri.us)
Stormwater improvements	USEPA	Pollution Prevention (P2)	Fall/winter	Grant Programs for Pollution Prevention | Pollution Prevention (P2) | US EPA
Park/lake access	National Fish and Wildlife Foundation	SE Michigan Resilience Fund	Fall	Southeast Michigan Resilience Fund
Park/lake access and stormwater improvements	USEPA	319 Non-Point Source	Mid-summer/ early fall	Clinton River Watershed System | Clinton River Watershed Council (crwc.org)

1. *USEPA (U.S. Environmental Protection Agency)*
2. *GLRI (Great Lakes Restoration Initiative)*

The Clinton River Watershed Council (CRWC) is an excellent source for a variety of partnering opportunities. The CRWC has prepared the 2006 Lake St. Clair Direct Drainage Watershed Management Plan, which is a critical first step in leveraging 319 Non-Point Source grant opportunities.

Summary

Community officials have recognized drainage systems are conveying stormwater pollutants to Lake St. Clair and few public access areas exist along the lakeshore. The efforts from the planning grant have resulted in design concepts that can be used to address both concerns. The currently vacant lot can be used for dual purpose to meet project partners' goals. Drain retrofit will result in improved water quality in Lake St. Clair and the community will gain a park and access to the lake it currently does not have. Information derived from this planning grant can be utilized to apply for grant funding to aid in design, permitting, and implementation of improvement measures.

Appendix 1

Looking east to ice capture pier

Looking west from outfall

North seawall

South seawall

Trash and debris observed during 2018 dewatering

Looking east from Jefferson

Concrete planking

Appendix 2

Applied Science, Inc.

M E M O R A N D U M

To: Brian McKissen, P.E., Fishbeck
Cheryl Pitchford, Fishbeck

From: Karen Ridgway, P.E., Applied Science, Inc.

Project: 11-½ Mile Drain Outlet Project

Subject: Stormwater Treatment Alternatives Analysis

Date: August 3, 2020

Introduction

The hydraulic design criteria for a new stormwater treatment facility on the outlet of the 11-½ Mile Drain to Lake St. Clair was developed and is presented in this memorandum. Also, conceptual alternatives were developed and are presented.

The 11-½ Mile Drain serves Roseville and St. Clair Shores and has a drainage area of about 2,600 acres. Its outlet to Lake St. Clair is a shallow 10-feet high by 12-feet wide double box conduit. The invert elevation of the box conduit is about 566.23-feet and the design slope is 0.02%. The ground elevation is about 579 to 580-feet with only about 2 to 3-feet of earthen cover over the top of the box conduit. The outlet conveys stormwater to Lake St. Clair and discharges to the lake through property owned by the MCPWO as shown on Figure 1.

Lake St. Clair Levels

The new stormwater treatment facility must properly operate over a wide range of Lake St. Clair levels. NOAA operates a lake level gauging station in Blossom Heath Park in St. Clair Shores. Data for the St. Clair Shores gauge is available from 1969 to present. The minimum, average, and maximum daily lake levels expected are given on Table 1 for this gauge for the period of record. These levels are proposed to be used in the facility design. The 100-year flood level also is given in Table 1 and is only about 1 to 2-feet lower than the ground elevation.

Table 1 – Expected Lake Levels

Lake Level Condition	Lake St. Clair Level at St. Clair Shores (feet-NAVD88)
Minimum	571.63
Average	575.03
Maximum	577.80
100 Year Flood Level	578.6

Peak Flow Rates

A SWMM5 model of the 11-½ Mile Drain was obtained from Fishbeck and run for a range of 24-hour, Type II design storms. The drain capacity under a surcharged gradient varies with lake level and is higher with lower lake levels. With an about average lake level of about 575-feet, the drain capacity is summarized on Table 2 for the range of design storms.

Table 2 – Expected Design Storm Flow Rates in 11-½ Mile Drain Outlet

Design Storm	Peak Flow Rate (cfs)
1-year, 24-hour	1,261
2-year, 24-hour	1,510
5-year, 24-hour	1,970
10-year, 24-hour	2,223

The open channel flow capacity of the drain at the outlet is about 1,074-cfs. This means that the drain will likely flow under surcharged conditions and with upstream street flooding even for the 1-year storm. The cross-sectional area of the drain is about 240-square feet. Therefore, the peak velocities in the drain outlet for these design storms varies from 5.25 feet/second to 9.26-feet/second with an average lake level of 575-feet.

These high design flow rates and velocities present a significant design challenge for a new stormwater treatment facility. The area-weighted average directly connected impervious area (DCIA) factor of the drainage area is about 51% in the Fishbeck SWMM5 model. The model was not calibrated to flow meter data. If the actual area weighted average DCIA is less, then the design storm flow rates will be lower, and the new facility can be downsized. Flow metering on

the drain at multiple locations would be useful for model calibration to refine the SWMM5 model and correctly size a new facility.

Facility Alternatives

A new stormwater treatment facility including sumps, bar screens, swirl concentrators, netting, and/or booms is desired to be added along the drain outlet to remove trash,litter and sediment from the stormwater. It is desirable that a new facility operate passively and not require active operation in wet weather of pumps, gates, and screening equipment. Any alternative is limited by the peak flow rates that are required to be conveyed and the range in lake levels. Manufacturers information for each type of alternative considered is found in Appendix A.

Bar Screen Alternative

A mechanically cleaned bar screen alternative was considered. Bar screens require approach velocities less than 3 feet/second to properly work. With higher velocities, the screenings may be "blown through" the slots, and forces on the screen frame and head losses through the screens could be excessive. Screens and screen frames can be damaged by high flow conditions. Therefore, a about 740-square feet of screen area would be required to handle the peak flow rate condition. With a screen depth of 10-feet, at least 74-feet of screen length would be required. This option would require use of the entire MCPWO property and adjacent easement. Also, real-time operations of the screens and above grade facilities would be required to collect screenings. There would be significant O&M costs. Therefore, this alternative was considered infeasible and not further developed.

Swirl Concentrator Alternative

A swirl concentrator alternative was proposed in the grant application. In-line swirl concentrators are infeasible and have not been applied to a storm drain of this size, capacity, and range of operating water surface levels. However, gates could be placed on a new wall across the existing box conduits and low flow rates diverted into higher elevation conduits that connect to offline swirl concentrators on both sides of the box conduit as shown on Figure 2. The swirl concentrators create a vortex action with low velocities in the center where sediment can accumulate. Floatables and some sediment would be removed periodically, typically by a

vacuum truck. The gates across the box conduit would need to open when higher than design flow conditions occur. The hydraulic and treatment capacity of each of the swirl concentrator is about 30-cfs so only extremely low flow rates would be skimmed and settled. Given the capital cost and real-time flow metering and operating requirements of the gates, this alternative is considered infeasible.

Netting Facility Alternative

A netting facility concept was developed and is presented on Figure 3. The netting facility can work with approach velocities of up to 5 feet/second. Channels would be built on both the north and south sides of the existing outfall conduit and interconnected to the existing box conduits upstream and downstream of the nets. There would be 4 sets of frames and platforms each with 8 nets. Each net is 30-inches wide by 54-inches high by about 8-feet long. The flow through capacity of each set of 8 nets would be about 450-cfs. Therefore, the total capacity of the netting facility would be about 1,800-cfs. Hatches would exist above the nets for removal and replacement of the nets. The netting facility would exist completely below grade and operate passively.

A divider wall would be built across the existing box conduits on which two rows of duckbill style rubber check valves would be mounted. The check valves would automatically open if the head loss across the nets becomes greater than a few inches thereby protecting the nets from damage. The check valves each have a capacity of 45-cfs with a head loss of about 1-feet. Therefore, the total capacity of the 8 check valves is about 360-cfs.

The total capacity of the nets and check valves together is about 1,800 + 360 = 2,160-cfs which is close to the peak flow rate for the 10-year, 24-hour design storm and hydraulically acceptable.

Sump and Boom Alternative

This alternative is depicted on Figure 4 and involves uncovering and removing the top of the drain for about 36-lineal feet and extending the outside and divider walls to the surface. A new drain top would be constructed with cross beams and multiple hatches/gratings. Two (2)

parallel 3-feet deep sumps would be constructed at the upstream end with a total length of about 12-feet. Sediments would be monitored and periodically removed using a vactor truck.

Two (2) parallel floating booms would be installed in a 24-feet long downstream section of the opened drain. The 18-inchhigh booms would have 6-inch horizontal floats and 12-inch ballasted (weighted) curtains or skirts to capture floatables. The booms would automatically adjust to the range of lake levels and provide minimal resistance to the peak flow rates. The floatables would be contained and periodically removed by manual netting or vactor truck.

Boom Alternative

The least costly method to remove floatables is to add booms to the drain outlet in Lake St. Clair. The booms would have a 6-inch diameter horizontal floats and 12-inch ballasted (weighted) curtains or skirts that capture floatables. The booms would automatically adjust to the range of lake levels and provide minimal resistance to the peak flow rates. The floatables would be contained and removed seasonally. The booms would need to be removed before the lake freezes in winter. This option has many drawbacks, but this alternative is simple and low cost.

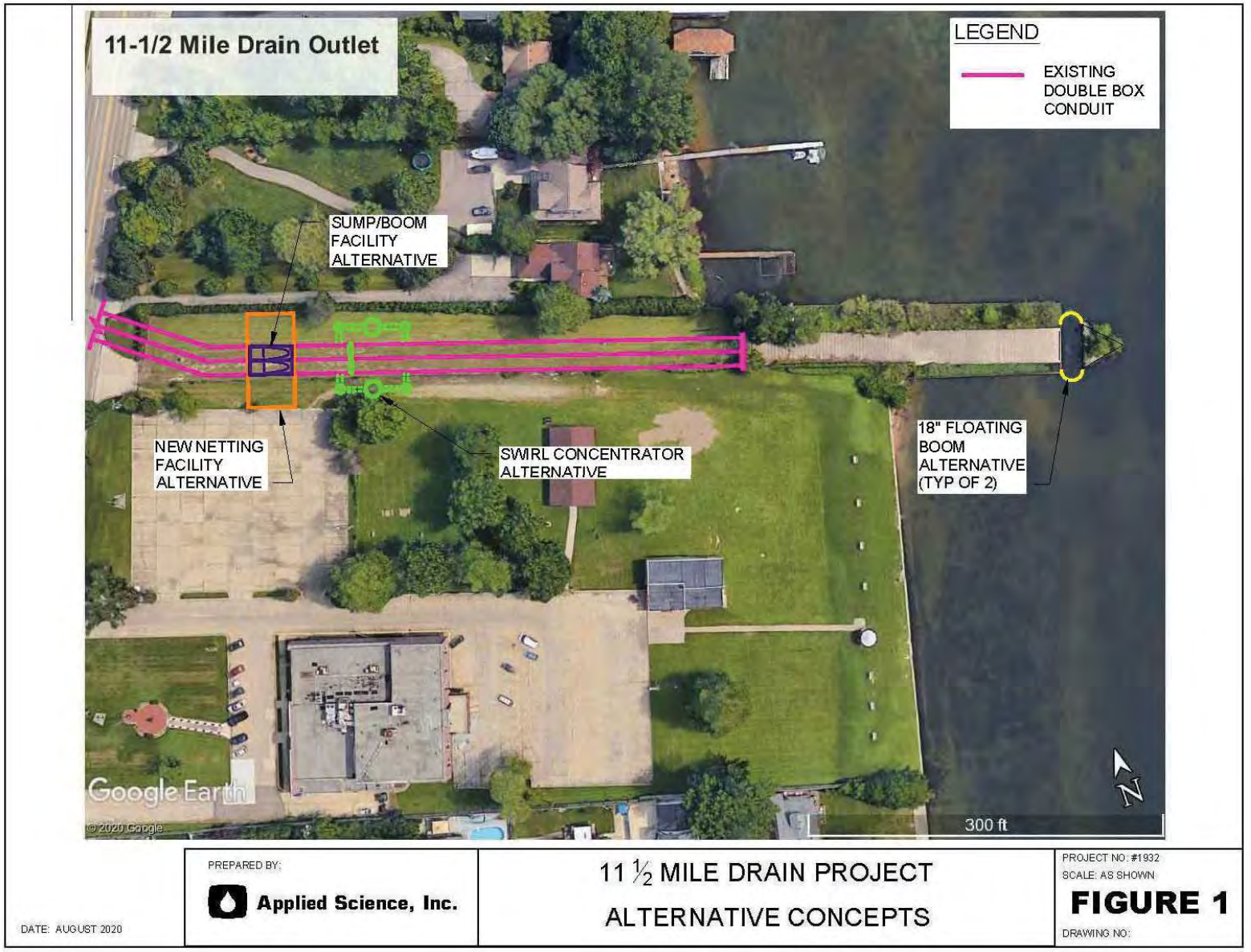
Capital and O&M Costs

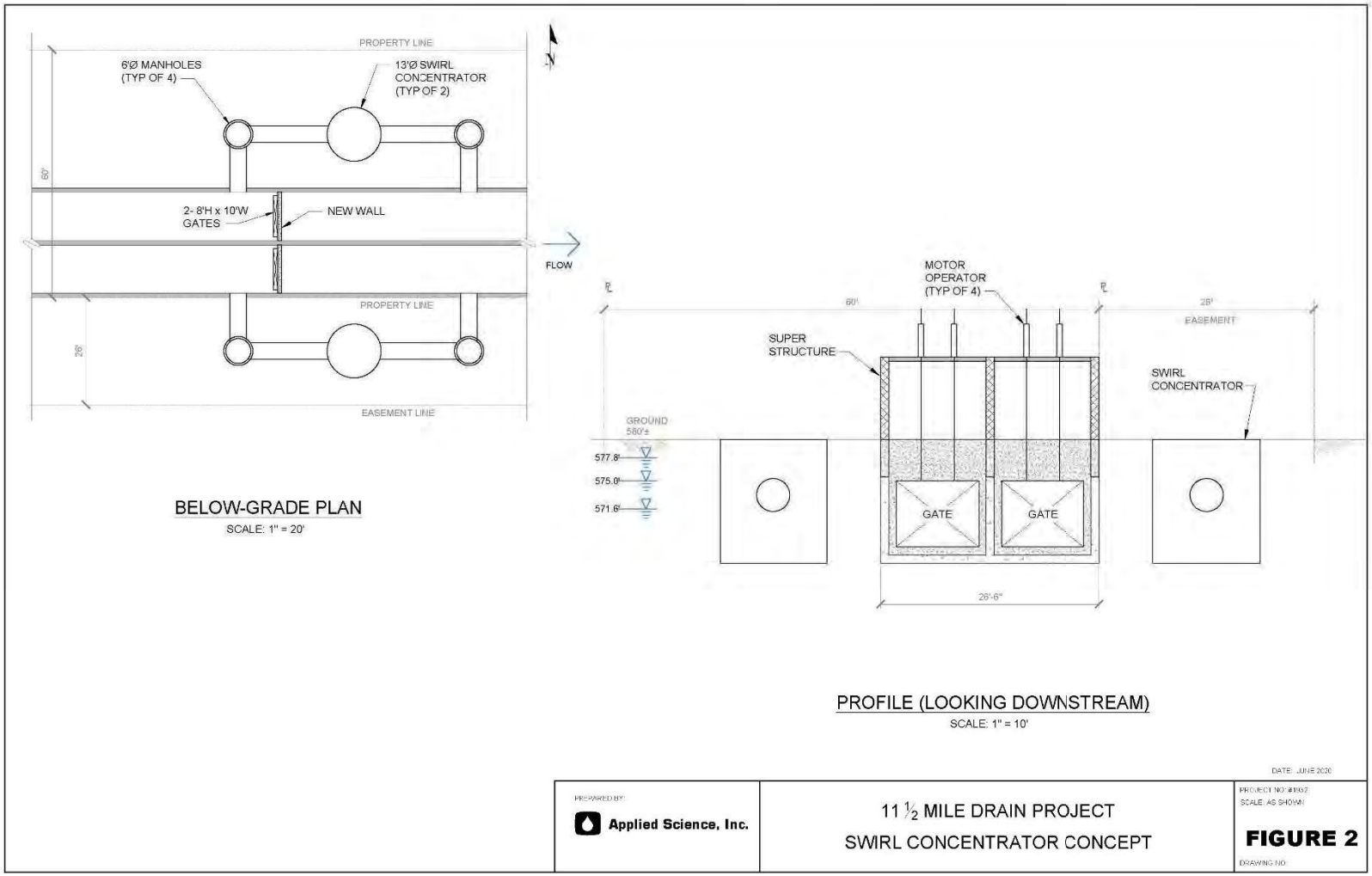
The as-built drawing of the drain outlet is shown on Figure 5 for reference.

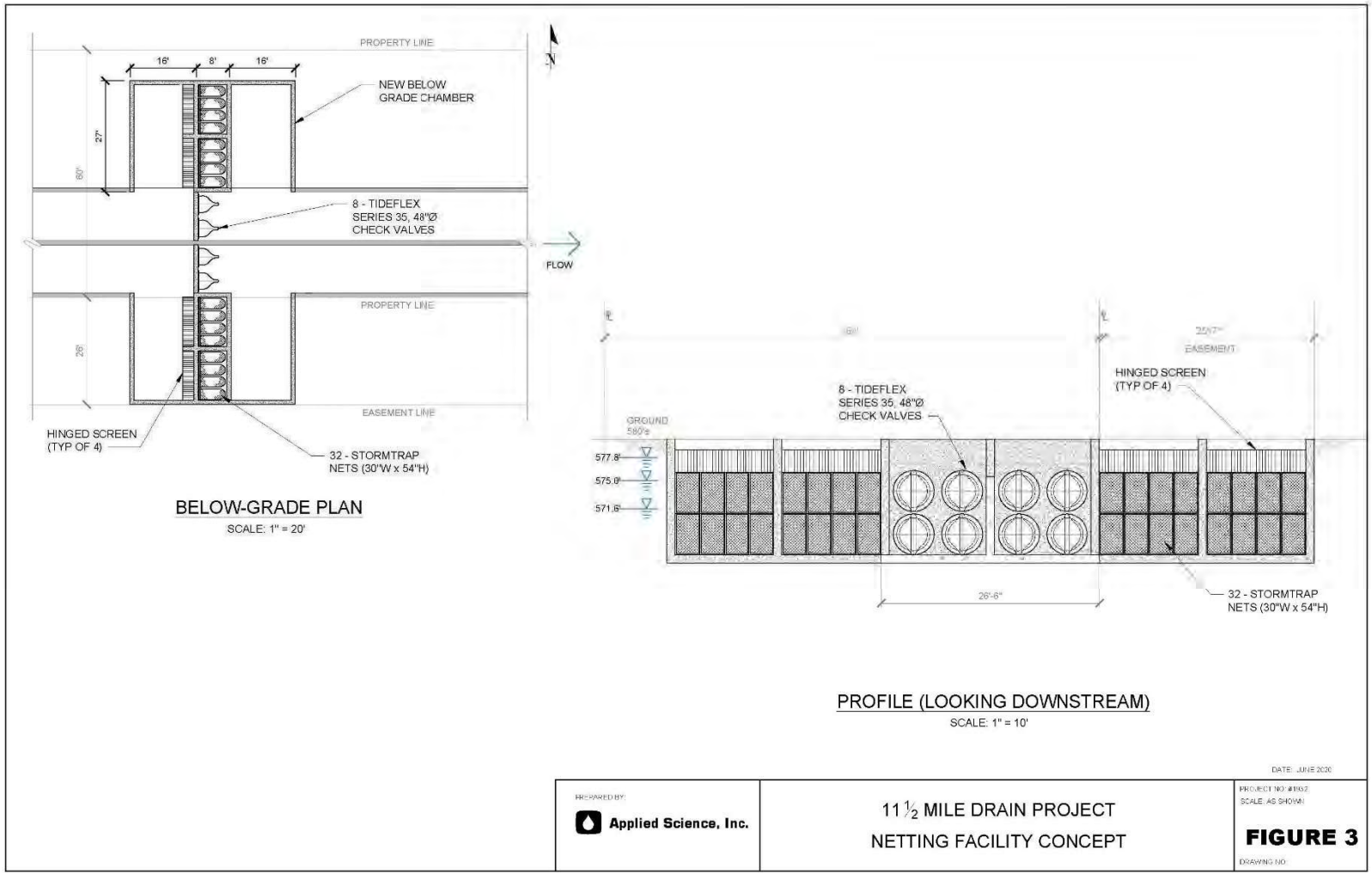
The netting facility is expected to cost about $5.6 million to build. This cost covers the excavation of the new side channels with dewatering and temporary earth retention systems, new concrete walls for the channels, a divider wall across the existing box conduits, the nets and frames, the 8 duck bill check valves, a concrete top for the structure and hatches over the nets and check valves. Each year, it is expected that the nets would be removed and replaced, and the nets and floatables would be disposed of in a landfill. The O&M cost for the nets would be about $150,000 per year and covers nine (9) net replacements per year.

The sump and boom alternative is expected to cost about $1.6 million to build. This cost includes uncovering and removing the top of the existing drain for about 36-lineal feet, excavating and building two parallel 3-feet deep and 12-feet wide by 12-feet long sumps, extending the walls of the existing drain to the surface, constructing a new top for the drain with beams, hatches and/or gratings, and installation of floating booms. The O&M cost depends on the rate of accumulation of sediments and floatables. Quarterly cleaning by vactor truck is estimated to cost $20,000 per year.

Booms are relatively inexpensive and may be purchased for about $8 to $10 per linear foot. Two 50-feet long booms would be needed at the outlet with a total length of about 100-feet. The booms would be installed every spring as soon as ice melts from the lake. The booms would be removed with the captured floatables every fall before ice forms on the lake. Installation may cost about $2,000 per year and removal may cost about $4,000 per year. Removal costs for the booms are higher because of the added cost to handle the captured floatables. The booms would be stored during the winter and could be reused for about 3 to 5 years in a row.


11-1/2 Mile Drain Outlet
LEGEND
EXISTING DOUBLE BOX CONDUIT
SUMP/BOOM FACILITY ALTERNATIVE
NEW NETTING FACILITY ALTERNATIVE
SWIRL CONCENTRATOR ALTERNATIVE
18" FLOATING BOOM ALTERNATIVE (TYP OF 2)
Google Earth
© 2020 Google
300 ft
N
PREPARED BY:
Applied Science, Inc.
11 ½ MILE DRAIN PROJECT
ALTERNATIVE CONCEPTS
PROJECT NO: #1932
SCALE: AS SHOWN
FIGURE 1
DRAWING NO:
DATE: AUGUST 2020


PROPERTY LINE
6'Ø MANHOLES
(TYP OF 4)
13'Ø SWIRL
CONCENTRATOR
(TYP OF 2)
N
60'
2- 8'H x 10'W
GATES
NEW WALL
FLOW
PROPERTY LINE
28'
EASEMENT LINE
BELOW-GRADE PLAN
SCALE: 1" = 20'
MOTOR
OPERATOR
(TYP OF 4)
60'
28'
EASEMENT
SUPER
STRUCTURE
SWIRL
CONCENTRATOR
GROUND
580'±
577.8'
575.0'
571.6'
GATE
GATE
26'-6"
PROFILE (LOOKING DOWNSTREAM)
SCALE: 1" = 10'
DATE: JUNE 2020
PREPARED BY:
Applied Science, Inc.
11 ½ MILE DRAIN PROJECT
SWIRL CONCENTRATOR CONCEPT
PROJECT NO: #1952
SCALE: AS SHOWN
FIGURE 2
DRAWING NO:


PROPERTY LINE
16'
8'
16'
NEW BELOW GRADE CHAMBER
27'
60'
8 - TIDEFLEX SERIES 35, 48"Ø CHECK VALVES
FLOW
PROPERTY LINE
26'
EASEMENT LINE
HINGED SCREEN (TYP OF 4)
32 - STORMTRAP NETS (30"W x 54"H)
N
BELOW-GRADE PLAN
SCALE: 1" = 20'
8 - TIDEFLEX SERIES 35, 48"Ø CHECK VALVES
HINGED SCREEN (TYP OF 4)
GROUND
577.8'
575.0'
571.6'
26'-6"
32 - STORMTRAP NETS (30"W x 54"H)
PROFILE (LOOKING DOWNSTREAM)
SCALE: 1" = 10'
DATE: JUNE 2020
PREPARED BY:
Applied Science, Inc.
11 ½ MILE DRAIN PROJECT
NETTING FACILITY CONCEPT
SCALE: AS SHOWN
FIGURE 3
DRAWING NO.

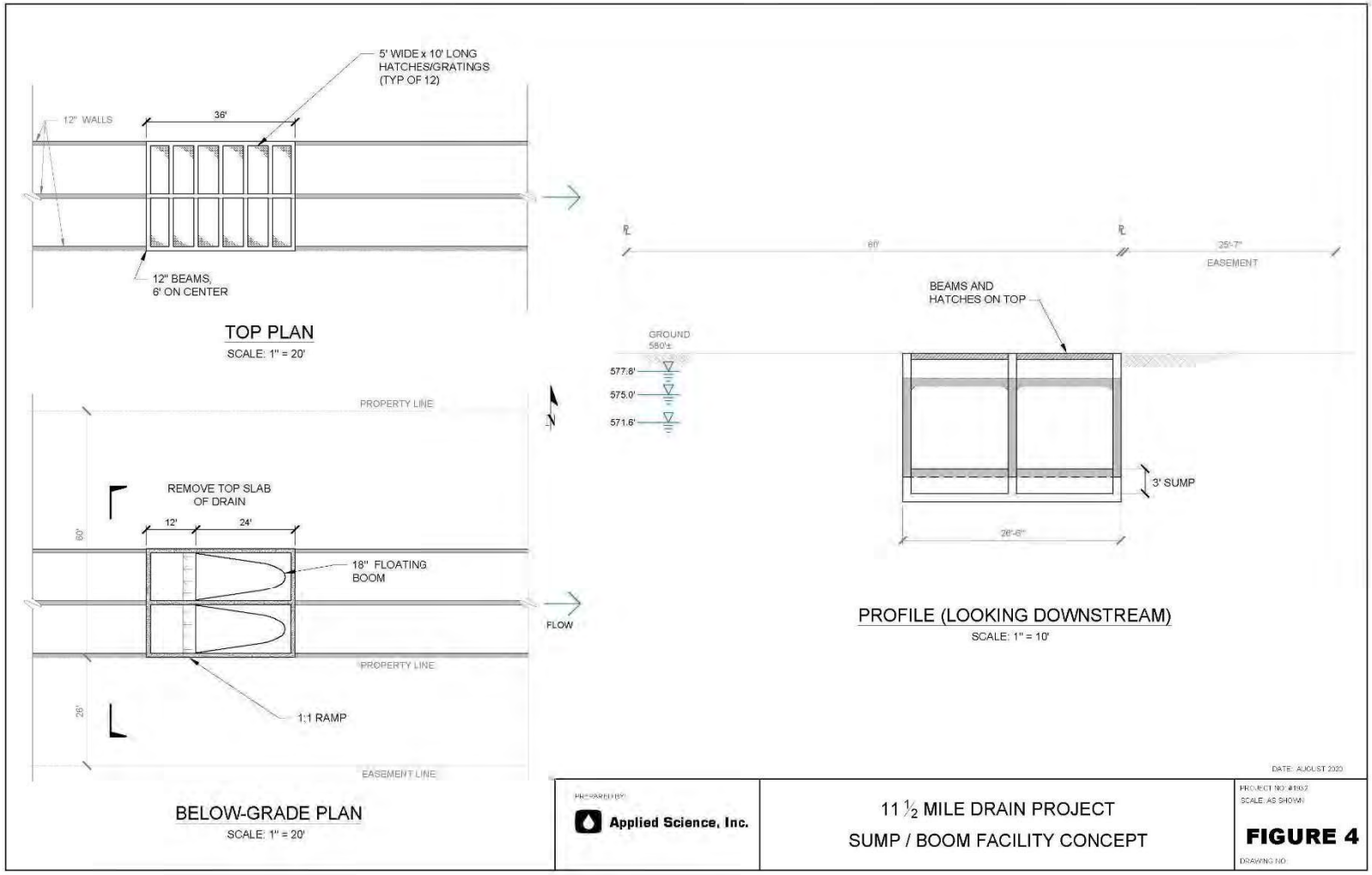
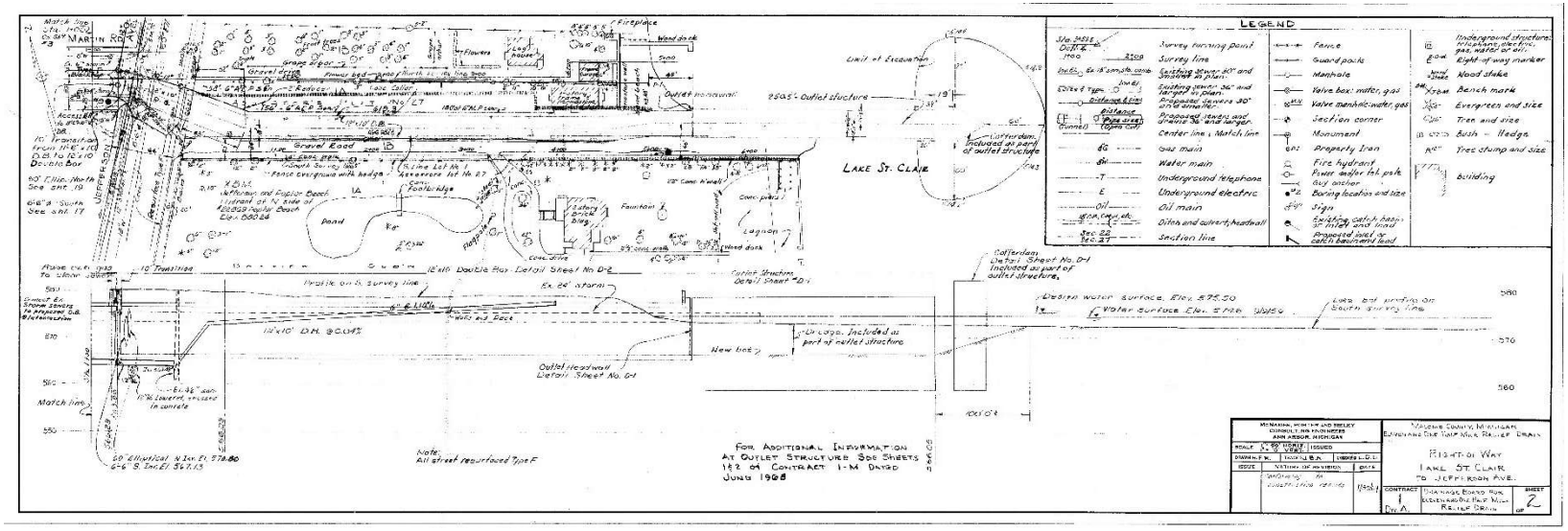

5' WIDE x 10' LONG
HATCHES/GRATINGS
(TYP OF 12)
12" WALLS
36'
12" BEAMS,
6' ON CENTER
TOP PLAN
SCALE: 1" = 20'
PROPERTY LINE
REMOVE TOP SLAB
OF DRAIN
12'
24'
60'
18" FLOATING
BOOM
FLOW
PROPERTY LINE
1:1 RAMP
26'
EASEMENT LINE
BELOW-GRADE PLAN
SCALE: 1" = 20'
N
℄
60'
℄
25'-7"
EASEMENT
BEAMS AND
HATCHES ON TOP
GROUND
580'±
577.8'
575.0'
571.6'
3' SUMP
26'-8"
PROFILE (LOOKING DOWNSTREAM)
SCALE: 1" = 10'
DATE: AUGUST 2020
PREPARED BY:
Applied Science, Inc.
11 ½ MILE DRAIN PROJECT
SUMP / BOOM FACILITY CONCEPT
PROJECT NO: #1902
SCALE: AS SHOWN
FIGURE 4
DRAWING NO:

Figure 5 – As-Built Plan of Drain Outlet



Applied Science, Inc.

M E M O R A N D U M

To: Cheryl Pitchford, Fishbeck

From: Karen Ridgway, P.E., Applied Science, Inc.

Project: 11-½ Mile Drain Outlet Project

Subject: Final Stormwater Treatment Alternatives Analysis

Date: February 18, 2021

Introduction

This memorandum is a follow up to a memorandum prepared by ASI on August 3, 2020 regarding storm water treatment alternatives for the 11 ½ Mile Drain outlet in St. Clair Shores. Alternatives involving sumps, stop logs and baffles were preferred for the removal for sediment, debris, and floatable items from the 11 ½ Mile Drain. The concepts for three alternatives with estimated costs are presented herein. Conceptual cost estimates of each alternative were prepared including a 15% markup for mobilization and insurance, a 40% contingency, and a 15% markup for engineering and administration.

Sump and Baffle Alternative

This alternative is depicted on Figure 1 and involves uncovering and removing the top of the drain for about 36-lineal feet and extending the outside and divider walls to the surface. A new drain top would be constructed with cross beams and multiple hatches/gratings. Observation lids would be placed on some of the top openings for public education purposes.

Two (2) parallel 3-feet deep sumps would be constructed at the upstream end with a total length of about 12-feet. Sediment and debris accumulation would be monitored and periodically removed using a vactor truck.

Two (2) parallel adjustable baffles would be installed in a downstream section. The baffles would be constructed of reinforced fiberglass beams/plates and installed in channels mounted to the walls. The baffle would be about 2-feet high and adjusted to have about 1-foot

underwater. It would need to be adjusted about 4 times per year. The floatables would be contained and periodically removed by manual netting or vactor truck.

The estimated cost of design and construction of this alternative is about $1.8 million. The observation lids are estimated to cost about 50% more than the hatches. However, most of the estimated cost is in the structural work required for a 36-feet long by 24-feet wide opening over the conduits.

Stop Log and Baffle Alternative

This alternative is depicted on Figure 2 and involves uncovering and removing the top of the drain for about 36-lineal feet and extending the outside and divider walls to the surface. A new drain top would be constructed with cross beams and multiple hatches/gratings. Observation lids would be placed on some of the top openings for public education purposes.

Two (2) parallel 3-feet high stop logs would be constructed near the upstream end. Sediment and debris accumulation would be monitored and periodically removed using a vactor truck from the drain upstream of the stop logs. Two (2) parallel adjustable baffles would be installed in a downstream section. The baffles would be constructed of reinforced fiberglass beams/plates and installed in channels mounted to the walls. The baffle would be about 2-feet high and adjusted to have about 1-foot underwater. It would need to be adjusted about 4 times per year. The floatables would be contained and periodically removed by manual netting or vactor truck.

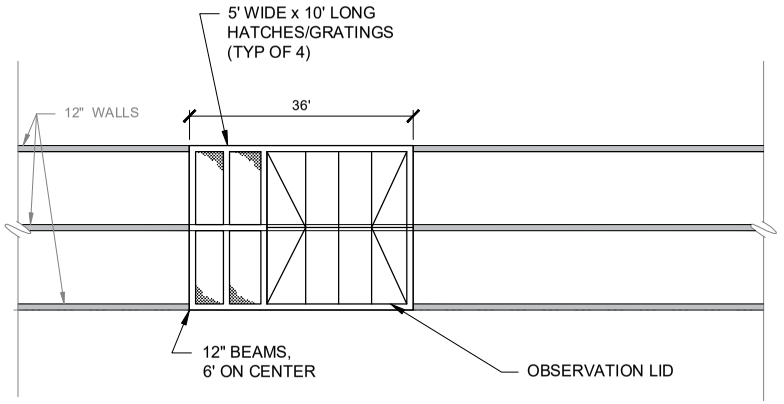
The estimated cost of design and construction of this alternative is about $1.5 million. This alternative cost is about $0.3 million less than the Sump and Baffle Alternative dur to the elimination of the sump.

Reduced Stop Log and Baffle Alternative

This alternative is depicted on Figure 3 and involves uncovering and removing the top of the drain in two places for about 7-lineal feet each. A new drain top would be constructed with cross beams and four hatches. No observation lids is included with this alternative.

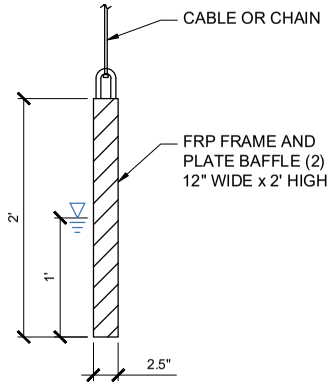
Two (2) parallel 3-feet high stop logs would be constructed near the upstream end. Sediment and debris accumulation would be monitored and periodically removed using a vactor truck from the drain upstream of the stop logs. Two (2) parallel adjustable baffles would be installed in about 12-feetof the stop logs. The baffles would be constructed of reinforced fiberglass beams/plates and installed in channels mounted to the walls. The baffle would be about 2-feet high and adjusted to have about 1-foot underwater. It would need to be adjusted about 4 times per year. The floatables would be contained and periodically removed by manual netting or vactor truck.

The estimated cost of design and construction of this alternative is about $0.6 million. This alternative cost is about $0.9 million less than the Stop Log and Baffle Alternative due to the elimination of the extensive opening of the box conduit and observational lids.



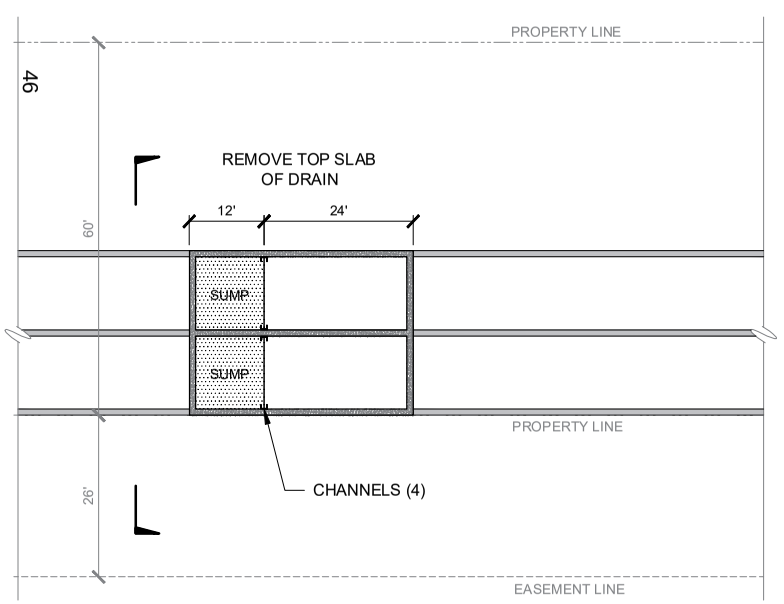
TOP PLAN

SCALE: 1" = 20'



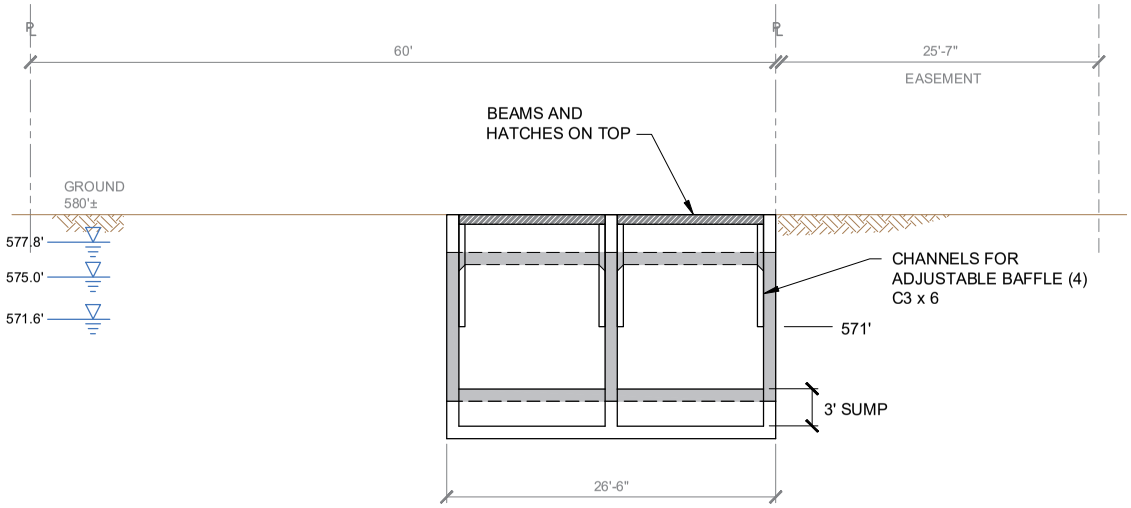
ADJUSTABLE BAFFLE

OBSERVATION LID



BELOW-GRADE PLAN

SCALE: 1" = 20'



PROFILE (LOOKING DOWNSTREAM)

SCALE: 1" = 10'

DATE: FEBRUARY 2021

PREPARED BY:

Applied Science, Inc.

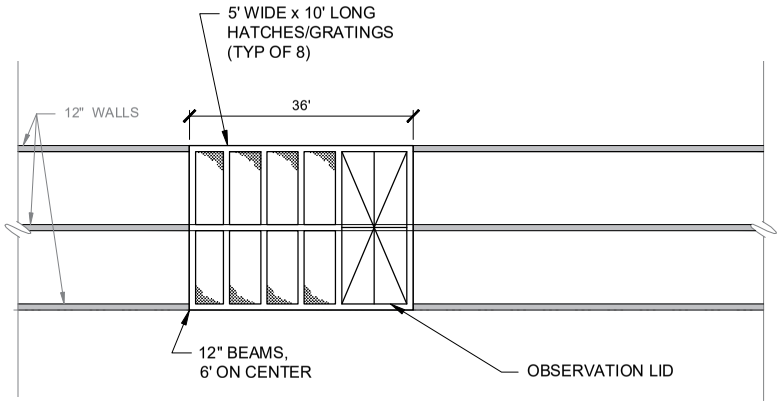
11 ½ MILE DRAIN PROJECT
SUMP AND BAFFLE OPTION

PROJECT NO: #1932

SCALE: AS SHOWN

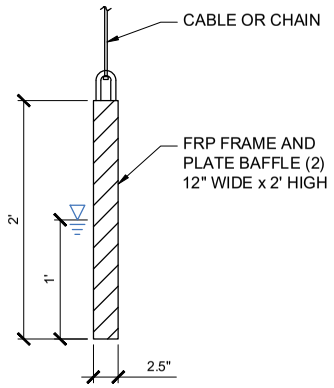
FIGURE 1

DRAWING NO:



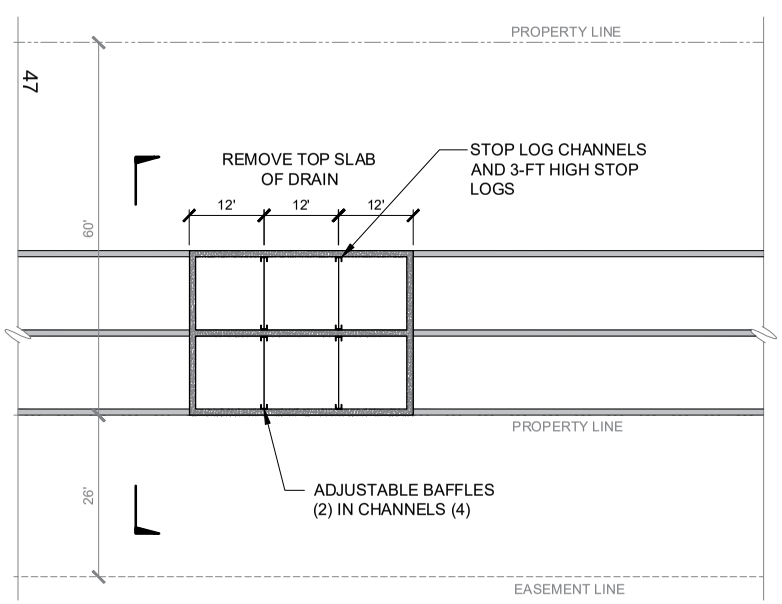
TOP PLAN

SCALE: 1" = 20'



ADJUSTABLE BAFFLE

OBSERVATION LID

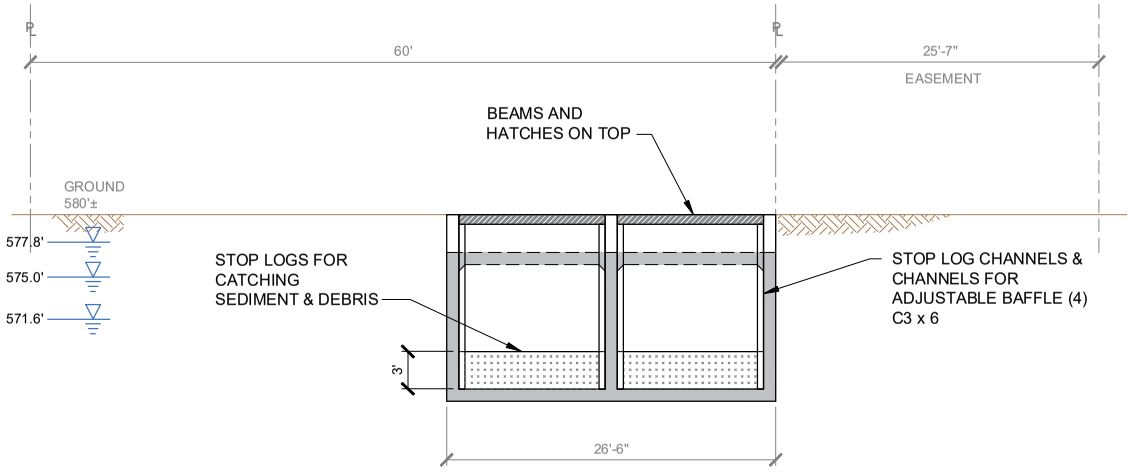


BELOW-GRADE PLAN

SCALE: 1" = 20'

N

FLOW



PROFILE (LOOKING DOWNSTREAM)

SCALE: 1" = 10'

DATE: FEBRUARY 2021

PREPARED BY:

Applied Science, Inc.

11 ½ MILE DRAIN PROJECT

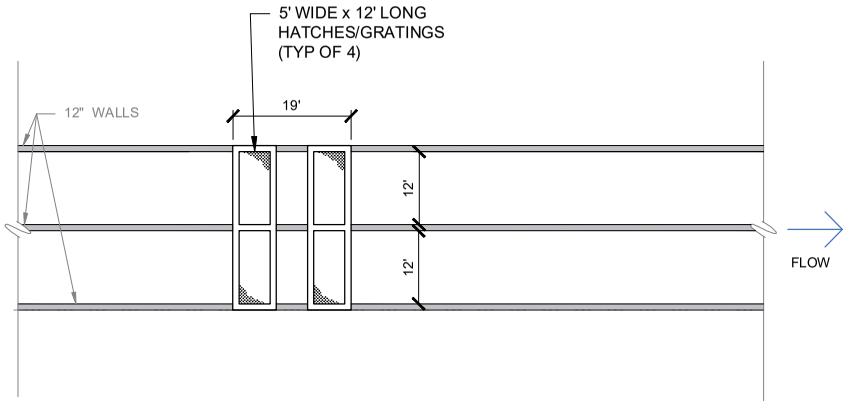
STOP LOG AND BAFFLE OPTION

PROJECT NO: #1932

SCALE: AS SHOWN

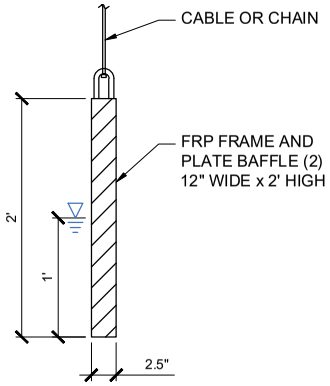
FIGURE 2

DRAWING NO:

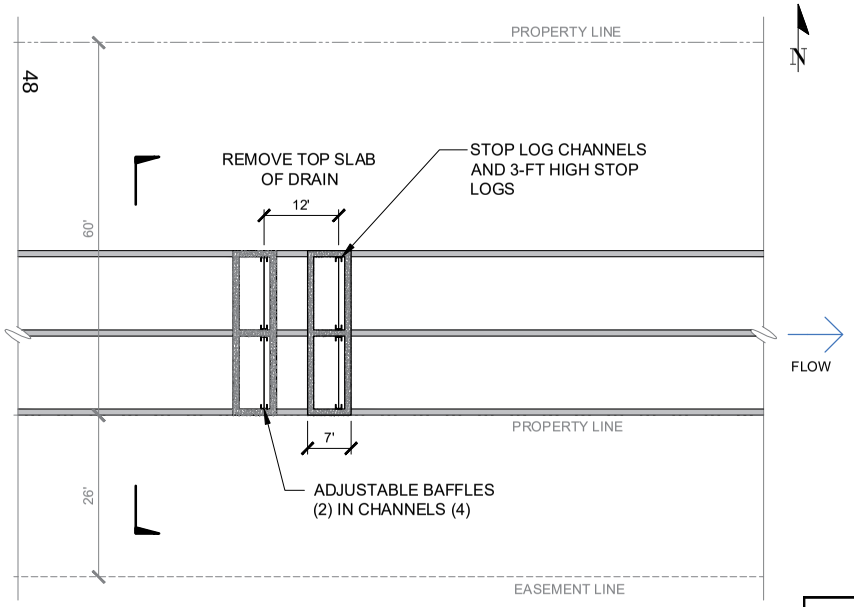


TOP PLAN

SCALE: 1" = 20'

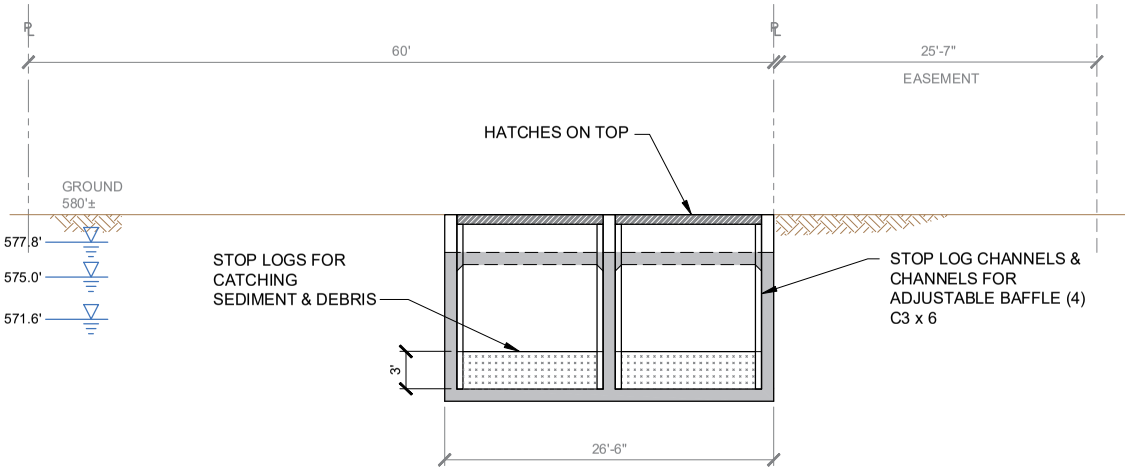


ADJUSTABLE BAFFLE



BELOW-GRADE PLAN

SCALE: 1" = 20'



PROFILE (LOOKING DOWNSTREAM)

SCALE: 1" = 10'

DATE: FEBRUARY 2021

PREPARED BY:

Applied Science, Inc.

11 ½ MILE DRAIN PROJECT

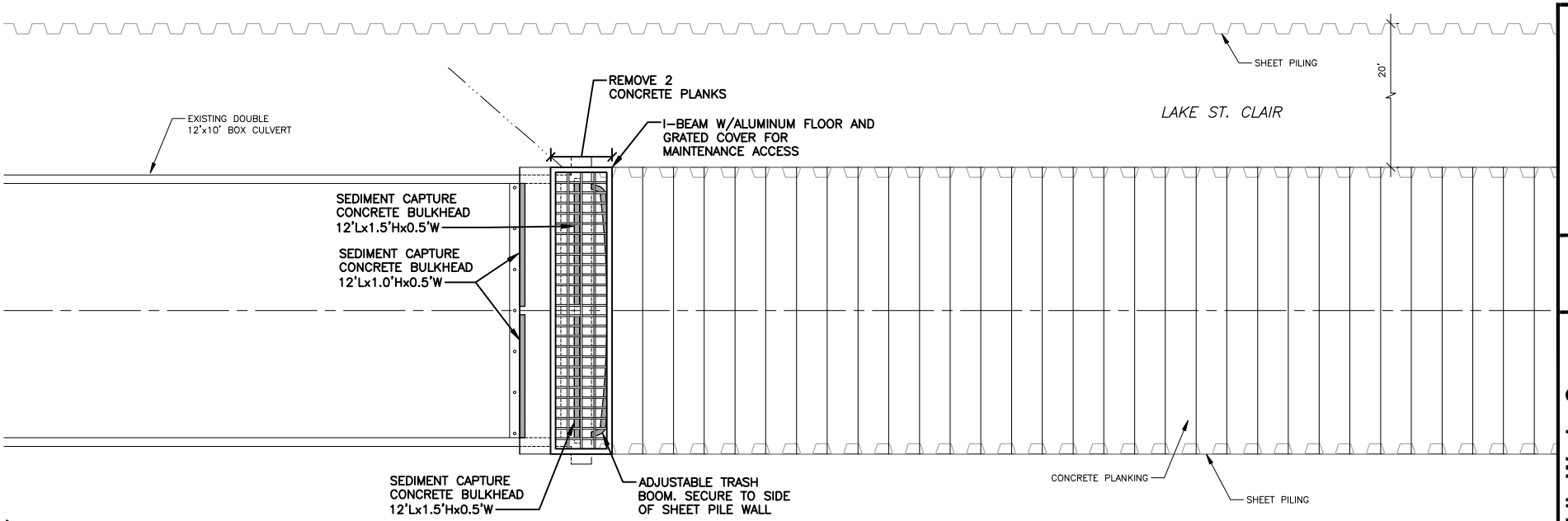
REDUCED STOP LOG AND BAFFLE OPTION

PROJECT NO: #1932

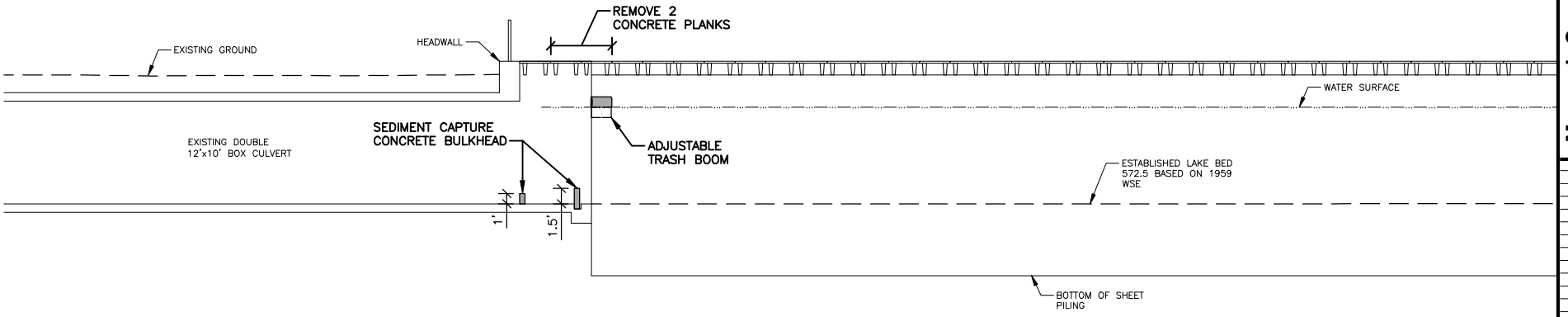
SCALE: AS SHOWN

FIGURE 3

DRAWING NO:



PLAN



PROFILE

NORTH

PLAN/PROFILE

SCALE: 1" = 10'

0 5 10

VERT SCALE: 1" = 10'

PLOT INFO: Z:\2020\20015\8\CAD\REF\20015\8REF.DWG LAYOUT: LAYOUT1 DATE: 5/11/2021 TIME: 1:38:43 PM USER: MJBUSH

fishbeck
Engineers | Architects | Scientists | Constructors

Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

Macomb County Public Works Comm.
Village of Roseville, Macomb County, Michigan

11.5 Mile Relief Drain Pilot Project - Boom and Sediment Sump

PROJECT NO.
NA

FIGURE NO.
1

Appendix 3

Preliminary Construction Cost Estimate

11.5 Mile Relief Drain Outfall Retrofit Netting Facility - 21AA Access Road

St. Clair Shores, MI

Fishbeck - Construction Division

February 19, 2021

ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
31 00 00	**EARTHWORK**				
31 23 16.00	Excavate for Primary Access Road	8.0	BCY	$30.00	$239
31 23 16.00	Excavate for Secondary Access Road	7.0	BCY	$30.00	$211
31 23 23.00	Haul Excess Dirt to Dump	21.0	LCY	$45.00	$945
31 99 99.00	Dump Tipping Fee	33.0	TONS	$74.00	$2,442
				Sub-Total for Earthwork:	**$3,837**
32 00 00	**EXTERIOR IMPROVEMENTS**				
32 12 16.13	Primary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 12" aggregate base*	215	LF	$31.00	$6,665
32 12 16.13	Secondary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 8" aggregate base*	285	LF	$23.00	$6,555
32 99 99.99	Mobilization/Demobilization - Access road	1	LS	$12,000.00	$12,000
				Sub-Total for Exterior Improvements:	**$25,220**

TOTAL BARE CONSTRUCTION COST:	**$29,057**
DESIGN AND ESTIMATING CONTINGENCY (7%):	$2,034
BUILDING PERMITS ALLOWANCE (1%):	$291
GENERAL CONTRACTOR FEE (6%):	$1,883
GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$50,000
CONSTRUCTION CONTINGENCY (8%):	$6,662
BASE CONSTRUCTION BUDGET:	**$89,927**
BONDING FEE (1%):	$899
WATER QUALITY DEVICE (ESTIMATE FROM ASI):	$5,600,000
TOTAL PROJECT BUDGET:	**$5,690,826**

EXCLUSIONS

1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Preliminary Construction Cost Estimate

11.5 Mile Relief Drain Outfall Retrofit Sump and Boom System - 21AA Access Road

St. Clair Shores, MI

Fishbeck - Construction Division

February 19, 2021

ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
31 00 00	EARTHWORK				
31 23 16.00	Excavate for Primary Access Road	8.0	BCY	$30.00	$239
31 23 16.00	Excavate for Secondary Access Road	7.0	BCY	$30.00	$211
31 23 23.00	Haul Excess Dirt to Dump	21.0	LCY	$45.00	$945
31 99 99.00	Dump Tipping Fee	33.0	TONS	$74.00	$2,442
				Sub-Total for Earthwork:	$3,837
32 00 00	EXTERIOR IMPROVEMENTS				
32 12 16.13	Primary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 12" aggregate base*	215	LF	$31.00	$6,665
32 12 16.13	Secondary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 8" aggregate base*	285	LF	$23.00	$6,555
32 99 99.99	Mobilization/Demobilization - Access road	1	LS	$12,000.00	$12,000
				Sub-Total for Exterior Improvements:	$25,220

TOTAL BARE CONSTRUCTION COST:	$29,057
DESIGN AND ESTIMATING CONTINGENCY (7%):	$2,034
BUILDING PERMITS ALLOWANCE (1%):	$291
GENERAL CONTRACTOR FEE (6%):	$1,883
GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$50,000
CONSTRUCTION CONTINGENCY (8%):	$6,662
BASE CONSTRUCTION BUDGET:	$89,927
BONDING FEE (1%):	$899
WATER QUALITY DEVICE (ESTIMATE FROM ASI):	$1,600,000
TOTAL PROJECT BUDGET:	$1,690,826

EXCLUSIONS
1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Preliminary Construction Cost Estimate

11.5 Mile Relief Drain Outfall Retrofit Sump and Baffle System - 21AA Access Road

St. Clair Shores, MI

Fishbeck - Construction Division

February 19, 2021

ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
31 00 00	**EARTHWORK**				
31 23 16.00	Excavate for Primary Access Road	8.0	BCY	$30.00	$239
31 23 16.00	Excavate for Secondary Access Road	7.0	BCY	$30.00	$211
31 23 23.00	Haul Excess Dirt to Dump	21.0	LCY	$45.00	$945
31 99 99.00	Dump Tipping Fee	33.0	TONS	$74.00	$2,442
				Sub-Total for Earthwork:	**$3,837**
32 00 00	**EXTERIOR IMPROVEMENTS**				
32 12 16.13	Primary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 12" aggregate base*	215	LF	$31.00	$6,665
32 12 16.13	Secondary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 8" aggregate base*	285	LF	$23.00	$6,555
32 99 99.99	Mobilization/Demobilization - Access road	1	LS	$12,000.00	$12,000
				Sub-Total for Exterior Improvements:	**$25,220**

TOTAL BARE CONSTRUCTION COST:	**$29,057**
DESIGN AND ESTIMATING CONTINGENCY (7%):	$2,034
BUILDING PERMITS ALLOWANCE (1%):	$291
GENERAL CONTRACTOR FEE (6%):	$1,883
GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$50,000
CONSTRUCTION CONTINGENCY (8%):	$6,662
BASE CONSTRUCTION BUDGET:	**$89,927**
BONDING FEE (1%):	$899
WATER QUALITY DEVICE (ESTIMATE FROM ASI):	$1,800,000
TOTAL PROJECT BUDGET:	**$1,890,826**

EXCLUSIONS

1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Preliminary Construction Cost Estimate

11.5 Mile Stop Log and Baffle with Observation Lid - 21AA Access Road

St. Clair Shores, MI

Fishbeck - Construction Division

February 18, 2021

ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
31 00 00	**EARTHWORK**				
31 23 16.00	Excavate for Primary Access Road	8.0	BCY	$30.00	$239
31 23 16.00	Excavate for Secondary Access Road	7.0	BCY	$30.00	$211
31 23 23.00	Haul Excess Dirt to Dump	21.0	LCY	$45.00	$945
31 99 99.00	Dump Tipping Fee	33.0	TONS	$74.00	$2,442
				Sub-Total for Earthwork:	**$3,837**
32 00 00	**EXTERIOR IMPROVEMENTS**				
32 12 16.13	Primary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 12" aggregate base*	215	LF	$31.00	$6,665
32 12 16.13	Secondary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 8" aggregate base*	285	LF	$23.00	$6,555
32 99 99.99	Mobilization/Demobilization - Access road	1	LS	$12,000.00	$12,000
				Sub-Total for Exterior Improvements:	**$25,220**

TOTAL BARE CONSTRUCTION COST:	**$29,057**
DESIGN AND ESTIMATING CONTINGENCY (7%):	$2,034
BUILDING PERMITS ALLOWANCE (1%):	$291
GENERAL CONTRACTOR FEE (6%):	$1,883
GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$60,000
CONSTRUCTION CONTINGENCY (8%):	$7,462
BASE CONSTRUCTION BUDGET:	**$100,727**
BONDING FEE (1%):	$1,007
WATER QUALITY DEVICE (ESTIMATE FROM ASI):	$1,500,000
TOTAL PROJECT BUDGET:	**$1,601,734**

EXCLUSIONS

1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Preliminary Construction Cost Estimate

11.5 Mile Reduced Stop Log and Baffle without Observation Lid - 21AA Access Road

St. Clair Shores, MI

Fishbeck - Construction Division

February 18, 2021

ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
31 00 00	**EARTHWORK**				
31 23 16.00	Excavate for Primary Access Road	8.0	BCY	$30.00	$239
31 23 16.00	Excavate for Secondary Access Road	7.0	BCY	$30.00	$211
31 23 23.00	Haul Excess Dirt to Dump	21.0	LCY	$45.00	$945
31 99 99.00	Dump Tipping Fee	33.0	TONS	$74.00	$2,442
				Sub-Total for Earthwork:	**$3,837**
32 00 00	**EXTERIOR IMPROVEMENTS**				
32 12 16.13	Primary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 12" aggregate base*	215	LF	$31.00	$6,665
32 12 16.13	Secondary Access Road, 16' wide *Road Type: 21AA* *Assembly price includes: fine grading, compaction, 8" aggregate base*	285	LF	$23.00	$6,555
32 99 99.99	Mobilization/Demobilization - Access road	1	LS	$12,000.00	$12,000
				Sub-Total for Exterior Improvements:	**$25,220**

TOTAL BARE CONSTRUCTION COST:	**$29,057**
DESIGN AND ESTIMATING CONTINGENCY (7%):	$2,034
BUILDING PERMITS ALLOWANCE (1%):	$291
GENERAL CONTRACTOR FEE (6%):	$1,883
GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$50,000
CONSTRUCTION CONTINGENCY (8%):	$6,662
BASE CONSTRUCTION BUDGET:	**$89,927**
BONDING FEE (1%):	$899
WATER QUALITY DEVICE (ESTIMATE FROM ASI):	$600,000
TOTAL PROJECT BUDGET:	**$690,826**

EXCLUSIONS

1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Preliminary Construction Cost Estimate

11.5 Mile - Trash Boom and Sump

St. Clair Shores, MI

Fishbeck - Construction Division

May 11, 2021

ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
03 00 00	CONCRETE				
	New precast concrete bulkhead - Furnish & Install 12' x 1' x 6" - sediment capture concrete bulkhead Attached to double box culvert floor	2	ea	$1,590.00	$3,180
	New precast concrete bulkhead - Furnish & Install 12' x 1'-6" x 6" - sediment capture concrete bulkhead Attached to double box culvert floor	2	ea	$1,590.00	$3,180
				Sub-Total for Concrete:	$6,360
31 00 00	EARTHWORK				
	Install Temporary access mats for equipment	1	LS	$5,000.00	$5,000
	Dewatering *Install pumps & bulkhead to remove water before construction*	1	ls	$60,000.00	$60,000
				Sub-Total for Earthwork:	$65,000
32 00 00	EXTERIOR IMPROVEMENTS				
	Install temporary construction fence	200	LF	$17.00	$3,400
	Remove Concrete planks - Includes mobilization and demobilization of equipment	2	EA	$2,500.00	$5,000
	Relocate on site and store	1	LS	$1,500.00	$1,500
	Install trash boom with adjustable mechanism fixed to sea wall	30	LF	$175.00	$5,250
	New alum. I beam floor system with cover(grated)	1	LS	$40,000.00	$40,000
	Removal of sediment to install new precast structures	8	hrs	$75.00	$600
				Sub-Total for Exterior Improvements:	$55,750
				TOTAL BARE CONSTRUCTION COST:	$127,110
				DESIGN AND ESTIMATING CONTINGENCY (7%):	$8,898
				USACE JOINT PERMIT APPLICATIONS PERMITS ALLOWANCE:	$2,500
				GENERAL CONTRACTOR FEE (6%):	$8,311
				GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$18,000
				CONSTRUCTION CONTINGENCY (8%):	$13,186
				BASE CONSTRUCTION BUDGET:	$178,005
				TOTAL PROJECT BUDGET:	$178,005

EXCLUSIONS
1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Preliminary Construction Cost Estimate

11.5 Mile Pilot Project

St. Clair Shores, MI

Fishbeck - Construction Division

February 16, 2021

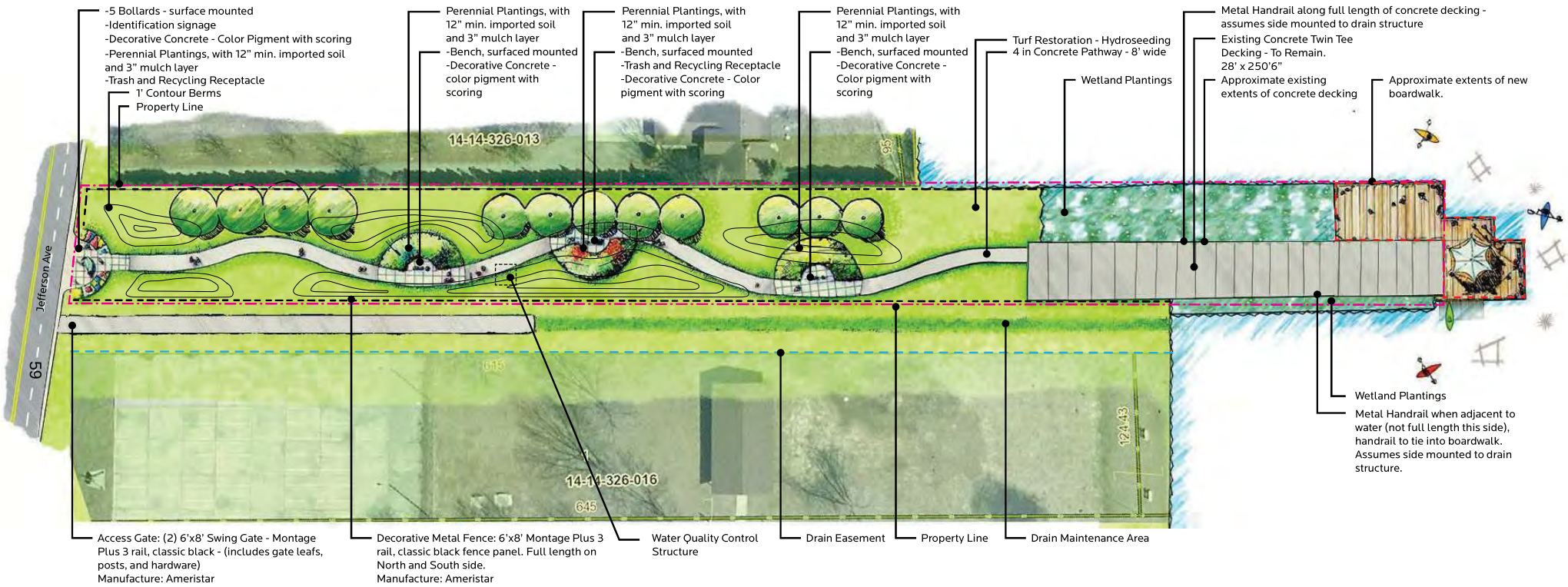
ESTIMATE DETAIL

CSI CODE	WORK DESCRIPTION	QUANTITY	UNIT	PRICE/UNIT	TOTAL PRICE
31 00 00	EARTHWORK				
	Install Temporary access mats for equipment	1	LS	$5,000.00	$5,000
				Sub-Total for Earthwork:	**$5,000**
32 00 00	EXTERIOR IMPROVEMENTS				
	Install temporary construction fence	200	LF	$17.00	$3,400
	Remove Concrete planks - Includes mobilization and demobilization of equipment	5	EA	$2,500.00	$12,500
	Install trash boom with adjustable mechanism fixed to sea wall	30	LF	$175.00	$5,250
				Sub-Total for Exterior Improvements:	**$21,150**
				TOTAL BARE CONSTRUCTION COST:	**$26,150**
				DESIGN AND ESTIMATING CONTINGENCY (7%):	$1,831
				BUILDING PERMITS ALLOWANCE (1%):	$262
				GENERAL CONTRACTOR FEE (6%):	$1,695
				GENERAL CONTRACTOR OVERHEAD & GENERAL CONDITIONS:	$18,000
				CONSTRUCTION CONTINGENCY (8%):	$3,836
				BASE CONSTRUCTION BUDGET:	**$51,774**
				BONDING FEE (1%):	$518
				WATER QUALITY DEVICE (ESTIMATE FROM ASI) (0%):	—
				TOTAL PROJECT BUDGET:	**$52,292**

EXCLUSIONS
1. Premium time or restrictions on contractor working hours.
2. Environmental testing and abatement costs (including but not limited to: asbestos and contaminated soils).

Appendix 4

11.5 Mile Relief Drain Retrofit and Lake Access Study



Products - Basis of Pricing:

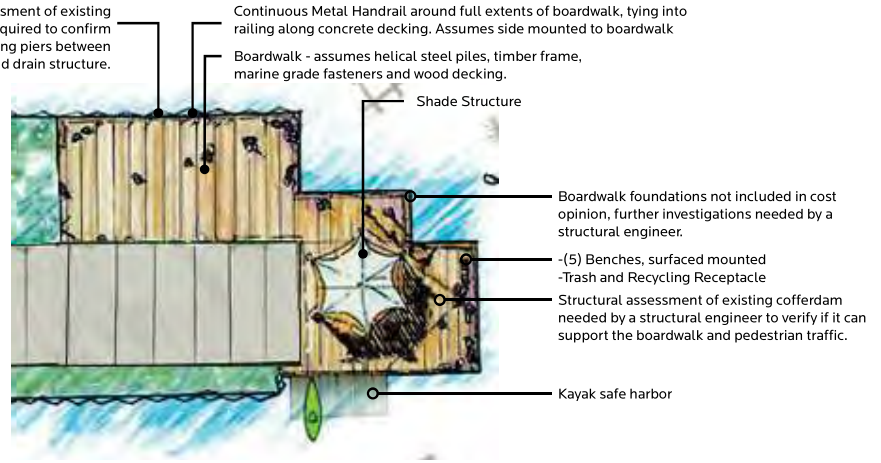
-Bollards
Product: Stop
Manufacture: LandscapeForms
Details: 7"x35"x7", Surface Mounted

-Trash and Recycling Receptacle
Product: Lakeside Litter - Grass Design
Manufacture: LandscapeForms
Details: 21"x36" 30 Gal. Side Opening, Surface Mounted

-Bench
Product: Parc Vue Bench
Manufacture: LandscapeForms
Details: 26"x36"x72" Backed bench with Arms, Surface Mounted

-Railing
Product: Cable Railing
Details: 42"x2"x2" Metal Post Surface Mounted, with wood handrail

-Shade Structure
Details: 16'x24'x8', Steel structure with metal roof



Opinion of Probable Cost

Martin Rd Park Improvements

Hamilton Anderson Associates

St. Clair Shores, MI

2/6/2021

Site Preparation				
Item	Count	Unit	Cost/Unit	Subtotal
Mobilization	1	LS	$10,000.00	$10,000.00
Remove and Dispose of Chain-link Fence	1220	LF	$5.00	$6,100.00
Strip and Stockpile Topsoil (6" Depth)	463	CY	$40.00	$18,520.00
Site Clearing	0.15	AC	$17,000.00	$2,550.00
Import Clean Fill for Grading	363	CY	$40.00	$14,520.00
Excavation and Earthwork	437	CY	$17.00	$7,429.00
Subtotal				**$59,119.00**

Site Improvements				
Item	Count	Unit	Cost/Unit	Subtotal
Shade Structure - inclusive of posts, frame, roof - incorporate to boardwalk (no foundation)	1	LS	$50,000.00	$50,000.00
Boardwalk - inclusive of piles, posts, framing, decking	3000	SF	$160.00	$480,000.00
Guardrail - inclusive of 42" metal post w/cable, wood top rail, mount to decking/boardwalk (no footing)	560	LF	$104.00	$58,240.00
Kayak Safe Harbor Area	1	EA	$2,000.00	$2,000.00
Concrete Paving - 4" over 4" base - broom finish	2848	SF	$7.00	$19,936.00
Concrete Paving - 4" over 4" base - decorative	1900	SF	$12.00	$22,800.00
Metal Fence - 6' H, 8' panels, incl. footings	1150	LF	$123.00	$141,450.00
Double Swing Access Gate - 6'x8', incl footing	2	EA	$4,404.00	$8,808.00
Benches	8	EA	$3,010.00	$24,080.00
Trash and Recycling Receptacles	6	EA	$2,430.00	$14,580.00
Bollards - Surface Mounted	5	EA	$1,000.00	$5,000.00
Bike Racks	2	EA	$500.00	$1,000.00
Soil Preparation - Import and Place 18" Topsoil	115	CY	$65.00	$7,475.00
Turf Restoration - Seed and Hydromulch	2019	SY	$1.00	$2,019.00
Perennial Planting in Mulch	8731	SF	$3.00	$26,193.00
Trees (3.5 caliper)	12	EA	$1,500.00	$18,000.00
Signage - Graffiti Resistant Interpretative	3	EA	$800.00	$2,400.00
Signage - Park Identity	1	EA	$3,000.00	$3,000.00
Subtotal				**$886,981.00**

Project Budget	
Site Preparation	$59,119.00
Site Improvements	$886,981.00
Total Opinion of Construction Cost - without Contingency	**$946,100.00**
Geotechnical Survey (contingency allowance)	$30,000.00
Seawall Repairs (contingency allowance)	$100,000.00
Design and Estimating Contingency - 7%	$66,227.00
Building Permits Allowance - 1%	$9,461.00
General Contractor Fee - 6%	$56,766.00
General Contractor Overhead and General Conditions	$75,000.00
Construction Contingency - 8%	$141,915.00
Total Opinion of Construction Cost - with Contingency	**$1,425,469.00**

Assumptions and Exclusions
1. Irrigation not included.
2. Site Electrical and Lighting not included
3. Sea wall assessment and geotechnical borings required to confirm feasibility and placement of boardwalk piers. Contingency allowance carried but costs are unknown.
4. Assume no hazardous materials abatement.
5. Cost opinion is based on conceptual drawings developed based on aerial imagery and without a topographic survey. Quantities and costs to be refined as plans are developed and conformed to surveyed existing conditions.

Funding Source	Apportionment	Manager	Vendor	Amount	Invoice Detail	Project Summary	Project Balance
Eleven and One Half Mile Relief	Chapter 20 St. Clair Shores						
		Baker	Aloia & Associates, P.C.	$ 1,007.00	Invoice #20789 - 10.1.20	VFW Post - Quiet Title	
		Baker	Aloia & Associates, P.C.	$ 1,111.50	Invoice #20912 - 11.1.20	VFW Post Property	
		Baker	Aloia & Associates, P.C.	$ 2,052.00	Invoice #21087 - 12.1.20	VFW Post	
		Baker	Aloia & Associates, P.C.	$ 988.00	Invoice #21275 - 1.1.21	VFW Post	
	SEMCOG Grant	Bednar	Fishbeck	$ 604.00	Invoice #396591 - 11.9.20	Professional Services through 10.30.20	$ 7,013.70
	SEMCOG Grant	Bednar	Fishbeck	$ 784.00	Invoice #397930 - 1.4.21	Drain Outfall Retrofit	$ 6,229.70
	SEMCOG Grant	Bednar	Fishbeck	$ 6,229.68	Invoice #400882 - 4.26.21	Drain Outfall Retrofit - Final	
	SEMCOG Grant	Bednar	Hamilton Anderson	$ 4,255.00	Invoice #2019131.01-1 - 3.12.21 - Final	Design/Feasibility - Park	
			Total	$ 17,031.18			

YTD Trial Balance
Fund: 11.5 Mile
As of Fiscal Period: Oct 1, 2020-May 31, 2021

	O&M Balance 9/30/2020	O&M	Total 5/31/2021
Cash - Operating	401,621	(9,256)	392,365
Accounts Receivable			0
Assets			0
Liabilities			0
Revenues		793	793
Expenditures		7,325	7,325
Encumbered for SEMCOG		2,724	2,724
Equity	401,621		392,365

NOTES	Grant	Match	Total
SEMCOG Retrofit & Public Access	36,832	8,168	45,000
YTD	(24,551)	(5,444)	(29,995)
Remaining	12,281	2,724	15,005