CITY OF NOVI CITY COUNCIL
SEPTEMBER 25, 2023

SUBJECT: Consideration of approval to award engineering design services to OHM Advisors for the design of streambank stabilization and restoration measures along the Middle Branch of the Rouge River north of Chattman Road and between 10 Mile Road and Novi Road in the amount of $268,220.

SUBMITTING DEPARTMENT: Department of Public Works, Engineering Division

EXPENDITURE REQUIRED	**$ 268,220**
AMOUNT BUDGETED	**$ 902,460**
APPROPRIATION REQUIRED	**$ 0**
LINE ITEM NUMBER	**211-445.00-975.158**

BACKGROUND INFORMATION:

The 2014 Stormwater Master Plan Update identified four priority sites of concern in the Walled Lake Branch of the Middle Rouge River between 10 Mile Road and Novi Road. Priority sites were selected based on a Bank Erosion Hazard Index (BEHI), proximity to infrastructure or private property, and length. This section of the Middle Rouge River is of particular concern because it runs parallel to and crosses under a railroad track. Also included in the design scope is a portion of the Middle Rouge River north of Chattman Road. Initially, this area was partially designed with the Meadowbrook Lake dredging project but was removed from that project scope due to permitting delays with the state. The stabilization measures aim to reduce sediment loading and transport upstream of Meadowbrook Lake, correct bank erosion and channel incision, and improve water quality in the watershed.

The City's engineering consultant, OHM Advisors, performed an environmental assessment of the project area last year to satisfy the state's permitting requirements and provide additional data. The attached engineering design services proposal expands on the data already collected during the assessment and provides more details on the scope of services. The fee for design of both locations will be $268,200, which is based on the engineering fee table.

RECOMMENDED ACTION: Approval to award engineering design services to OHM Advisors for the design of streambank stabilization and restoration measures along the Middle Branch of the Rouge River north of Chattman Road and between 10 Mile Road and Novi Road in the amount of $268,200.

Middle Rouge River Streambank Stabilization and Restoration
North of Chattman Rd and North of 10 Mile Rd
Location Map

Map Author: Rebecca Runkel
Date9/13/22
Project: Middle Rouge, Chattman to Novi
Version #: 1.0

MAP INTERPRETATION NOTICE

Map information depicted is not intended to replace or substitute for any official or primary source. This map was intended to meet National Map Accuracy Standards and use the most recent, accurate sources available to the people of the City of Novi. Boundary measurements and area calculations are approximate and should not be construed as survey measurements performed by a licensed Michigan Surveyor as defined in Michigan Public Act 132 of 1970 as amended. Please contact the City GIS Manager to confirm source and accuracy information related to this map.

Legend

- Project Area
- Railroad
- Stream or Drain

City of Novi
Engineering Division
Department of Public Works
26300 Lee BeGole Drive
Novi, MI 48375
cityofnovi.org

Feet
0 175 350 700 1,050

1 inch = 868 feet

September 7, 2023

Ms. Rebecca Runkel
Project Engineer
City of Novi, Department of Public Works
26300 Lee BeGole Drive
Novi, MI 48375

RE: Scope of Design Services
Middle Rouge Streambank Stabilization – North of Chattman Drive and North of 10 Mile Road

Ms. Runkel,

We are submitting this scope of services as a follow up to our prior discussions and the City of Novi's (city) desire to prepare design documents for construction of the Middle Rouge stream restoration north of Chattman Drive and north of 10 Mile Road. The following outlines our Project Understanding, Scope of Work, Schedule, and Fee for the design and construction phase of this project.

PROJECT UNDERSTANDING

We understand this project to resume engineering and design of stream restoration measures north of Chattman Drive. Engineering and design is resuming following the onsite meeting held on May 4, 2023 with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) regarding Joint Permit Application (JPA) permitting and the use of channel spanning woody structures (CSWS). We also understand this project to include the engineering and design of streambank stabilization measures north of 10 Mile Road for approximately 5,000 feet of the Middle Rouge River between 10 Mile Road and Novi Road.

The stabilization priorities within the Middle Rouge River are:

- Reduced sediment loading and transport resulting from bank erosion, bank failure, channel incision, and upstream sediment loading.
- Demonstration of a functional lift within the Michigan Stream Quantification Tool (MISQT) framework and compliance with Natural Channel Design parameters.

SCOPE OF SERVICES

The scope of work for this project will be consistent with our Agreement for Civil Engineering Consulting Services between the city and OHM Advisors. This includes items related to the design and permitting phases of work for the project areas north of Chattman Drive and north of 10 Mile Road. The following outlines our work plan to accomplish the scope of services for this project related to streambank stabilization noted above:

Task 1 – Data Gathering (Site Inventory, Assessment, and Stream Survey)

Task 1 has been completed north of Chattman Drive. However, if EGLE allows the use of CSWS at this project location, CSWS will need to be installed further upstream than the previously identified project area north of Chattman Drive for stream rerouting. Specific work efforts for the additional project area north of Chattman Drive would include:

1. Contact utility companies to confirm that conflicts do not exist.
2. Perform a field inventory of the site, collecting any additional data related to current channel conditions (degree of incision, bankfull depth, bank slope, percent of vegetative cover, existence of obstructions, man-made features, access potential, hydraulic controls, riffle/pool locations, substrate, etc.) not identified

during the feasibility analysis study, and confirm initial recommended treatment.
3. Obtain topographic survey information required for the additional upstream area north of Chattman Drive. It is anticipated that topographic survey will be collected for the stream corridor along the entire length of the additional upstream area.
4. Process topographic survey for development of base plans. The surveyed data will be collected and presented on 24" x 36" drawings, with appropriate scales, using AutoCAD software. Survey plans will include plan (1"=40'), profile (1"=5' vertical) and cross sections (1"-10' vertical).
5. Tree survey work in the additional proposed restoration project limits to supplement topographical survey data.

For the project area north of 10 Mile Road, we will build upon the previous site inventory and conceptual design presented in the feasibility study. OHM Advisors will walk the river again to carefully identify and document problem areas, indicators of underlying process dysfunction, and intervention opportunities (to include photographs and GPS coordinates, as needed). This effort will supplement the site parameterization work completed as part of the feasibility study analysis. Specific work efforts include:

1. Attend an initial kick-off meeting with city staff to discuss the project scope and schedule.
2. Attend one onsite follow up meeting with EGLE regarding use of CSWS.
3. Contact utility companies to confirm that conflicts do not exist.
4. Perform a field inventory of the proposed restoration site, collecting any additional data related to current channel conditions (degree of incision, bankfull depth, bank slope, percent of vegetative cover, existence of obstructions, man-made features, access potential, hydraulic controls, riffle/pool locations, substrate, etc.) not identified during the feasibility analysis study, and confirm initial recommended treatment.
5. Obtain topographic survey information required for the project area north of 10 Mile Road. It is anticipated that topographic survey will be collected for the stream corridor along the entire length of the proposed project.
6. Process topographic survey for development of base plans. The surveyed data will be collected and presented on 24" x 36" drawings, with appropriate scales, using AutoCAD software. Survey plans will include plan (1"=40'), profile (1"=5' vertical) and cross sections (1"-10' vertical).
7. Create an access plan depicting area that can be used by the Construction Contractor (Contractor) for access to the site and for storing of construction materials and equipment.
8. Tree survey work within the proposed restoration project limits to supplement topographical survey data.

Deliverables:

- Minutes of kickoff meeting and EGLE meeting, available upon request
- Site inventory portion of Design Basis (to be submitted as part of Task 3)
- Base plan drawings

Task 2 – Hydrology and Hydraulics

Task 2 has been completed for the project area north of Chattman Drive.

For the project area north of 10 Mile Road, OHM Advisors will update the existing and proposed conditions HEC-RAS models by integrating the Federal Emergency Management Agency (FEMA) model and as-built information. The revised hydraulic model along with physical stream measurements, will be used to confirm the geometry and planform of an appropriate channel and floodplain, and stabilization measures developed during the concept design phase. Specific work efforts are as follows:

1. Integrate Effective FEMA Flood Insurance Study (FIS) hydraulic model of the project area from the FEMA Engineering Library with existing and proposed conditions models. It is our understanding that the project area falls within an FIS floodplain, and therefore the degree and extents of any

increases to flood stage during design storm events up to and including the 100-year storm must be identified and addressed in the hydraulics report.

2. Use HEC-RAS to calculate channel flow velocities, channel shear stresses and stage-flow hydrograph response to proposed stabilization interventions.
3. Prepare an updated backwater analysis using HEC-RAS for the existing and proposed conditions to obtain final open channel hydraulic parameters. The revised data will be tabulated in an open channel summary that identifies, in locations of significance, the channel cross section location, cross section area, and channel grade along with hydraulic parameters at each cross section.
4. Perform bankfull dimensionless shear stress computations in HEC-RAS and check with hand computations using core sample and cross section data. These computations will aid in determination of the stable channel/bank condition. It should be noted that to maintain stability, a stream must be able to transport the largest size of sediment and have the capacity to transport the load on an annual basis. These computations will be performed as per methods outlined in the NRCS NEH Part 64 Stream Stabilization Guide.
5. Perform scour computations to determine bury depth of proposed toe/in-stream stabilization measures.
6. Prepare the hydraulic portion of the design basis outlining hydraulic findings.

If EGLE allows the use of CSWS north of Chattman Drive, the hydrology and hydraulics will be updated under this task.

Deliverable:

- Hydraulic portion of Design Basis (to be submitted as part of Task 3)

Task 3 – Design Basis Report

Under this task, OHM Advisors will compile data from the previous tasks and develop conceptual alternatives and preliminary cost estimates into a design basis report for the project limits north of Chattman Drive and north of 10 Mile Road. Specific work efforts include:

1. Prepare final conceptual sketches for stabilization measures at the site based on the updated proposed condition hydraulic results. Conceptual plan views will be developed with GIS aerial backgrounds to provide a preliminary indication of access area and associated impacts.
2. Quantify sedimentation prevention benefit (load). Bank Erosion Hazard Index ratings and Near Bank Stress ratings will be used to estimate streambank erosion load in tons per year for both the existing and proposed (stable) conditions. The difference between the existing and proposed condition sediment loads will be used to quantify the sediment prevention benefit. Potential for in-channel storage of sediment will also be quantified.
3. Input stream data into the MISQT.
4. Prepare design basis report and submit to the city for review.
5. Assist with one (1) public meeting.
6. Meet with the city and modify the design basis report in response to stakeholder feedback from the public meeting and city comments. This report will be used for the EGLE JPA submittal.
7. Upon finalization of the design basis report, initiate detailed design.

Deliverables:

- Design basis report
- Public meeting presentation materials

Task 4 – Construction Plan and Specification Development and Permitting

Under this task, OHM Advisors will prepare the EGLE JPA and construction plans and contract documents for the project limits north of Chattman Drive and north of 10 Mile Road. Construction plans and contract documents for both project areas will be combined into one set of bid documents. Specific work efforts include:

1. Prepare full size 50-percent design plans including an access plan, existing conditions plan, tree clearing limits, site stabilization plan, and a soil erosion and sedimentation control (SESC) plan.
2. Compute volumes of cut and fill for EGLE permitting purposes.
3. Provide the city with the anticipated construction impacts to local properties for right-of-way (ROW) and easement acquisition. It is assumed that OHM Advisors will prepare easement documents and the city will acquire any temporary or permanent easements needed for construction.
4. Prepare preliminary schedule for proposed work including construction start, substantial completion, and final completion dates.
5. Review the geotechnical investigation by others. Incorporate the recommendations in the report into the plans and specifications as confirmed by the city.
6. Based on agreed upon conceptual treatment measures, submit 50% plans and specifications including construction quantities, technical specifications, and opinion of construction cost.
7. Prepare SESC plan sheets for soil erosion review by the city.
8. Complete and submit an Inland Lakes and Streams and Floodplain permit application to EGLE. It should be noted that the city will be responsible for EGLE permit fees.
9. Prepare an EGLE JPA for NREPA Part 301 (Inland Lakes and Streams) and Part 31 (Floodplain Regulatory Authority) impacts and submit to EGLE to obtain a permit to construct the project.
10. Submit 50% design plans for review by the city and EGLE.
11. Incorporate stakeholder input on 50% plans and prepare 100% plans for bidding. This will include development of a final engineering cost estimate.
12. Prepare final technical specifications and method of payment entailing materials, equipment, and labor necessary to perform the work.

Deliverables:

- 50% and 100% construction plans and specifications
- SESC permit application including SESC plan sheet
- Engineer's opinion of probable cost (at 50% and 100% design)

Task 5 – Bidding and Award

OHM Advisors will assist the city in bidding and award efforts for the project limits north of Chattman Drive and north of 10 Mile Road. Specific work efforts include:

1. Attend one meeting with the city to review the draft bid plans and specifications and address requested revisions.
2. Prepare final bid set documents for the project.
3. Assist the city with advertising and soliciting bids, printing and distributing bidding documents to interested bidders, tabulate and review the bids, check contractor references and provide a recommendation of award of the project construction to a qualified contractor.
4. Check references for the three lowest bidding contractors.

Deliverables:

- Minutes from bid plan review meeting
- Bid tabulation and recommendation of award

Schedule

Based on past communication with the city, the following is the anticipated schedule for this project and is based upon authorization to proceed given by September 11, 2023:

- Design Basis Report – December 2023
- 50% plans – March 2024
- 100% plans – July 2024
- Prepare Bid Recommendation for Council Award – August 2024

- North of Chattman Drive and North of 10 Mile Road Construction Start – August 2024

CLARIFICATIONS

The following services are not anticipated to be required for this project and/or have not been included in our scope and fee:

1. Permit or application fees – to be paid by the city or as an additional reimbursable expense to OHM Advisors.
2. Coordination or design for private utility relocations or repairs.
3. ROW and/or easement acquisitions – to be acquired by the city.
4. Remediation or removal of contaminated or hazardous soils or materials.
5. Existing culvert assessment and sizing or pavement evaluation.
6. Sediment transport analysis is not included.

In the event any of these or other design related services are required by OHM Advisors, an addendum to the supplemental engineering agreement will be submitted for your approval prior to performing said services.

FEE

A design fee of $15,112 was previously authorized for north of Chattman Drive. An additional design fee is needed due to a scope change. The additional design fee proposed for north of Chattman Drive is 7.75% of the anticipated construction cost less the design fee previously authorized, or $23,196. Due to the complexity and iterative nature of riparian stabilization parameterization, permitting and design, the proposed engineering design fee for north of 10 Mile Road is 7.75% of the anticipated construction cost, or $245,024. Total construction cost for the project areas north of Chattman Drive and north of 10 Mile Road is $3,655,900 (see Table 1).

Table 1. Design Fees

Segment	Design Fee & Construction Cost (% of construction)		Design Fee
Streambank Restoration North of Chattman Drive	7.75%	$494,300	$38,308 - $15,112 = $23,196
Streambank Stabilization North of 10 Mile Road	7.75%	$3,161,600	$245,024
	Total	**$3,655,900**	**$268,220**

Thank you for the opportunity to be of service. If you have any questions or require additional information, please contact me at (734) 466-4567. We look forward to working with you on this project.

Sincerely,
OHM Advisors

Valerie Novaes, P.E.
Principal & Sr. Project Manager

Authorization to Proceed

Signature Date

Printed Name Title

Encl: Cost Estimate

cc: Ben Croy, P.E., City Engineer
Tim Juidici, P.E., OHM Advisors
Steven Siklich, P.E., OHM Advisors

CITY OF NOVI
Middle Rouge Streambank Stabilization - North of Chattman Drive
Probable Opinion of Cost
9/7/2023
Streambank Stabilization

Item No.	Item Description	Unit	Quantity	Unit Price ($)	Item Cost ($)
Streambank Stabilization North of Chattman Drive					
1	Mobilization, Max 5%	Lsum	1	$ 23,600.00	$ 23,600.00
2	Audio-Video Route Survey	Lsum	1	$ 2,000.00	$ 2,000.00
3	Traffic Maintenance and Control	Lsum	1	$ 2,000.00	$ 2,000.00
4	Earth, Excavation, Handling and Placement	Cyd	13831	$ 10.00	$ 138,310.00
5	Erosion Control	Lsum	1.00	$ 29,000.00	$ 29,000.00
7	Detail A, Streambank Stabilization	Ft	1928	$ 70.00	$ 134,960.00
8	Detail B, Streambank Stabilization	Syd	2777	$ 15.00	$ 41,655.00
9	Detail C, Streambank Stabilization	Syd	4737	$ 20.00	$ 94,740.00
10	Partial Tree, Furn and Install	Ea	39	$ 600.00	$ 23,400.00
11	Channel Pool	Ea	11	$ 420.00	$ 4,620.00
	Construction Subtotal				$ 494,300.00
	Contingency (5%)				$ 24,715.00
	Construction Total				**$ 520,000.00**
	Design Engineering Revised Scope	% Fee	7.75		$38,308.25
	Design Engineering Previously Authorized				$15,112.00
	Design Engineering				$23,196.25
	Geotechnical Investigation and Testing	Lsum	1	$ 20,000.00	$20,000.00
	Inspection (Crew Days)	CD	120	$800.00	$96,000.00
	Contract Administration	% Fee	6.75		$33,365.25
	Materials Testing	Lsum	1	$ 20,000.00	$20,000.00
	Permitting Allowance	Lsum	1	$ 2,500.00	$2,500.00
	Total Estimated Cost				**$731,000.00**

Estimate Assumptions:

Detail A - coir fiber toe protection
Detail B - bankfull shelf creation
Detail C - bank stabilization

CITY OF NOVI
Middle Rouge Streambank Stabilization - North of 10 Mile Road
Probable Opinion of Cost
9/1/2023
Streambank Stabilization

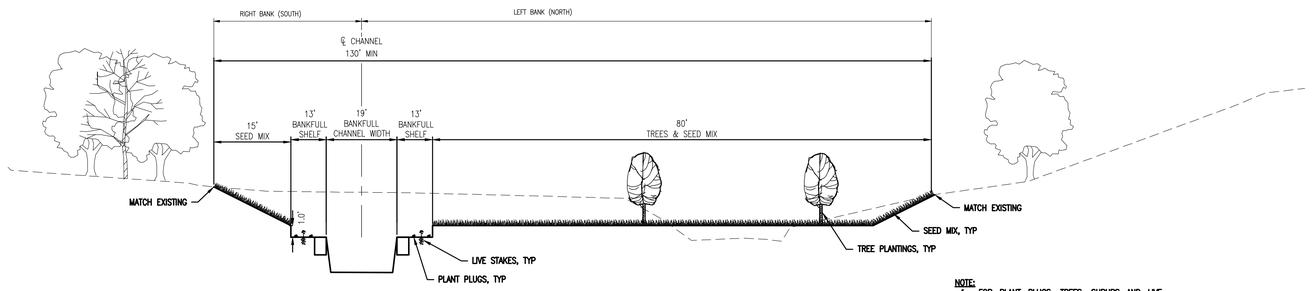
Item No.	Item Description	Unit	Quantity	Unit Price ($)	Item Cost ($)
Streambank Stabilization North of 10 Mile Road					
1	Mobilization, Max 5%	Lsum	1	$ 150,600.00	$ 150,600.00
2	Audio-Video Route Survey	Lsum	1	$ 5,000.00	$ 5,000.00
3	Traffic Maintenance and Control	Lsum	1	$ 10,000.00	$ 10,000.00
4	Soil Erosion and Sedimentation Control	Lsum	1	$ 10,000.00	$ 10,000.00
5	Clearing	Acre	2.00	$ 20,000.00	$ 40,000.00
7	Soil Lifts with Live Stakes, 2 Ft Bank Height	Ft	5000	$ 160.00	$ 800,000.00
8	Whole Tree	Ea	120	$ 1,300.00	$ 156,000.00
9	Log Sill	Ea	25	$ 1,200.00	$ 30,000.00
10	Bankfull Shelf Construction	Cyd	5800	$ 325.00	$ 1,885,000.00
11	Restoration	Lsum	1	$ 75,000.00	$ 75,000.00
	Construction Subtotal				$ 3,161,600.00
	Contingency (15%)				$ 474,240.00
	Construction Total				**$ 3,636,000.00**
	Design Engineering	% Fee	7.75		$245,024.00
	Geotechnical Investigation and Testing	Lsum	1	$ 50,000.00	$50,000.00
	Inspection (Crew Days)	CD	80	$800.00	$64,000.00
	Contract Administration	% Fee	4.5		$142,272.00
	Materials Testing	Lsum	1	$ 20,000.00	$20,000.00
	Easement Acquisition	Lsum	1	$ 4,000.00	$4,000.00
	Permitting Allowance	Lsum	1	$ 2,500.00	$2,500.00
	Total Estimated Cost				**$4,164,000.00**

Estimate Assumptions:

2H:1V slope, 12" soil lift height, 2' soil lift width, 8" agg base depth, 18" o.c. live stake spacing, 24" o.c. hardwood stake spacing

24 log jam locations, 5 ea trees at each location

3' mean depth of excavation, 1300' length, 40' shelf width



MIDDLE ROUGE RIVER WALLED LAKE BRANCH PROPOSED CHANNEL CROSS-SECTION

APPLIES: STA 0+00 TO STA 9+34

NOTE:

1. FOR PLANT PLUGS, TREES, SHRUBS AND LIVE STAKE SPECIES AND SPACING, REFER TO PLANT LIST AND PLANT MATRIX ON THE LANDSCAPE PLAN SHEET #16.
2. CROSS SECTION LOOKS DOWNSTREAM AND IS SHOWN WITHOUT CHANNEL POOLS.

OHM
ARCHITECTS ENGINEERS PLANNERS
34000 Plymouth Road
Livonia, MI 48150
P (734) 522-6711 | F (734) 522-6427
OHM-ADVISORS.COM

REVISIONS:

DATE ###
PROJ NUMBER 0163-21-0010
ENG AKS
PROJ MGR VAN
CADD PR
COUNTY OAKLAND
CITY/VILLAGE/TOWNSHIP NOVI
SCALE H: 1"=40' V:
HORIZ DATUM NAD83
VERT DATUM

CITY OF NOVI

MIDDLE ROUGE STREAMBANK RESTORATION - PHASE 1 AND PHASE 2

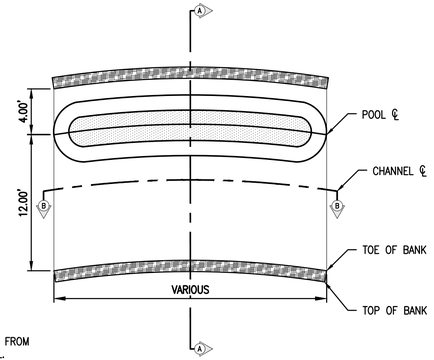
LANDSCAPE TYPICALS

SHEET 5 OF 18

811 Know what's **below.** **Call** before you dig.

DRAWING PATH: P:\0126_0165\0163210010_Middle_Rouge_Streambank\Drawings\Civil\Misc\210010LSCTYP.dwg Aug 25, 2022 - 12:35pm

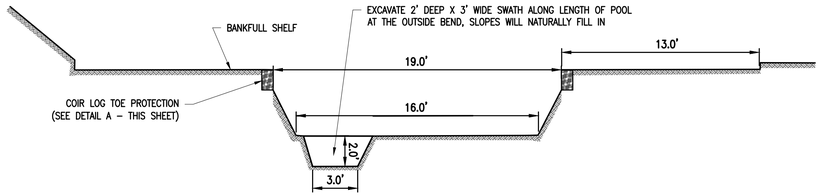
Start Station	Length (ft)
1+25	44
1+91	40
2+56	21
3+31	23
3+88	33
4+50	27
5+23	37
6+71	26
7+40	23
7+74	21
8+90	23



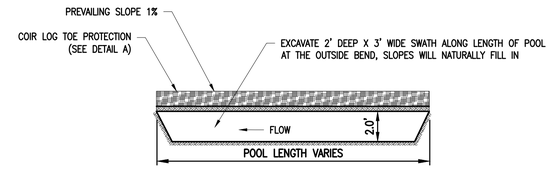
NOTE:
1. STATIONING AS MEASURED FROM THE CENTERLINE OF POOL.
2. ALL WORK DEPICTED IN THIS DETAIL AND REFERENCED CROSS SECTIONS IS INCLUDED IN THE COST OF "CHANNEL POOL"

CHANNEL POOL DETAIL

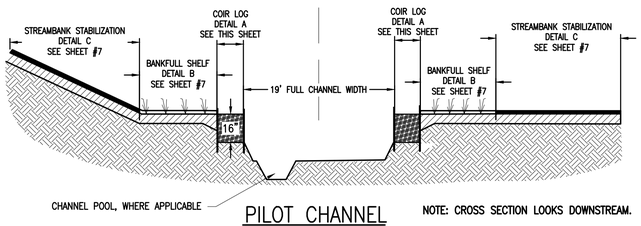
NOT TO SCALE



SECTION A–A



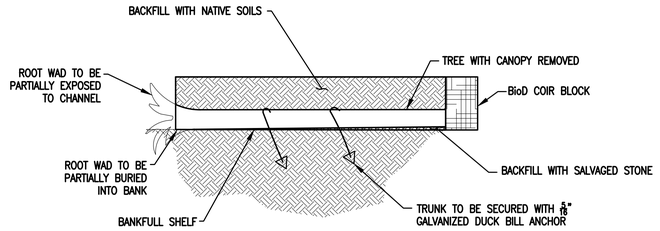
SECTION B–B



PILOT CHANNEL

NOTE: CROSS SECTION LOOKS DOWNSTREAM.

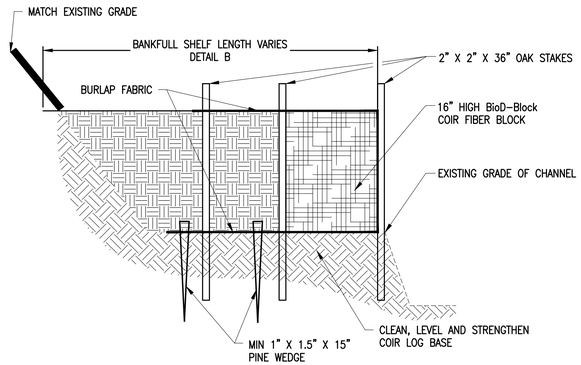
NOT TO SCALE



PARTIAL TREE INSTALLATION HORIZONTAL PLACEMENT

NTS

NOTE:
1. LOCATIONS OF PARTIAL TREE INSTALLATION SHALL BE DETERMINED BY THE ENGINEER. THE TREES SHALL BE SALVAGED FROM THE PROJECT SITE AS IDENTIFIED (SEE SHEET #4).
2. ALL WORK DEPICTED IN THIS DETAIL TO BE PAID FOR AS LINE ITEM 'PARTIAL TREE'.



DETAIL A – COIR FIBER TOE PROTECTION

NOT TO SCALE

NOTE:
1. INSTALL COIR LOG DURING PERIODS OF DRY CHANNEL CONDITIONS OR ISOLATE INSTALL AREA.
2. SECURE LOG WITH WOODEN OR LIVE STAKES WOVEN THROUGH COIR LOG MESH AND DRIVEN INTO EARTH. STAKE LOG INTO PLACE.
3. COMPACT SOIL AROUND LOGS. SECURE THE UPSTREAM AND DOWNSTREAM ENDS BY POSITIONING COIR LOGS SO THEY TRANSITION SMOOTHLY TO STABILIZED BANK.

OHM
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OHM-ADVISORS.COM

REVISIONS:

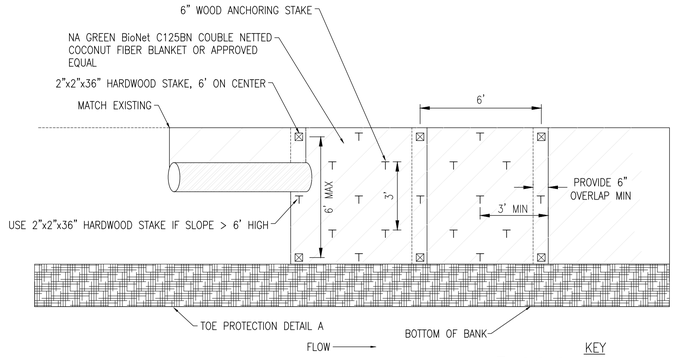
DATE	PROJ NUMBER	ENG	PROJ MGR	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	SCALE	HORIZ DATUM	VERT DATUM
8/25/2022	0163-21-0010	AKS	VAN	PR	OAKLAND	NOVI	H:		
							V:		

CITY OF NOVI
MIDDLE ROUGE STREAMBANK RESTORATION - PHASE 1 AND PHASE 2

STREAM RESTORATION DETAILS

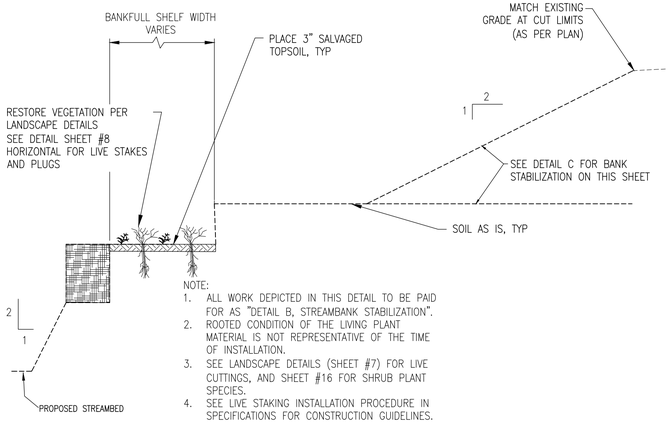
SHEET 6 OF 18

DRAWING PATH: P:\0126_0165\0163210010_Middle_Rouge_Streambank\Drawings\Civil\Details\210010DET.dwg Aug 25, 2022 - 12:28pm



EROSION CONTROL MATTING

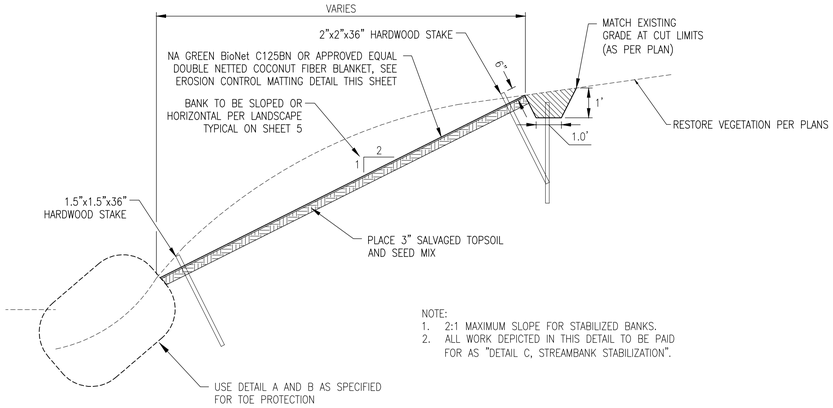
NOT TO SCALE



NOTE:
1. ALL WORK DEPICTED IN THIS DETAIL TO BE PAID FOR AS "DETAIL B, STREAMBANK STABILIZATION".
2. ROOTED CONDITION OF THE LIVING PLANT MATERIAL IS NOT REPRESENTATIVE OF THE TIME OF INSTALLATION.
3. SEE LANDSCAPE DETAILS (SHEET #7) FOR LIVE CUTTINGS, AND SHEET #16 FOR SHRUB PLANT SPECIES.
4. SEE LIVE STAKING INSTALLATION PROCEDURE IN SPECIFICATIONS FOR CONSTRUCTION GUIDELINES.

DETAIL B – BANKFULL SHELF DETAIL

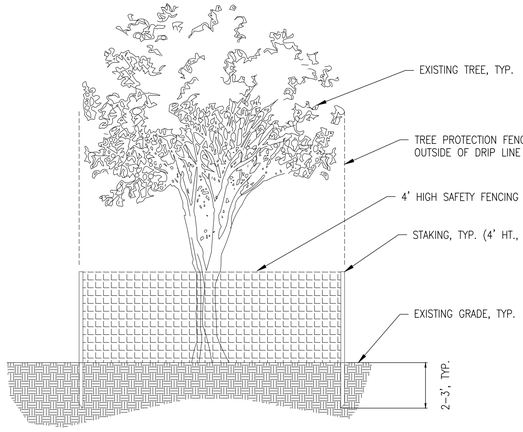
NOT TO SCALE



NOTE:
1. 2:1 MAXIMUM SLOPE FOR STABILIZED BANKS.
2. ALL WORK DEPICTED IN THIS DETAIL TO BE PAID FOR AS "DETAIL C, STREAMBANK STABILIZATION".

DETAIL C – BANK STABILIZATION DETAIL

NOT TO SCALE



NOTE:
1. ALL TREE PROTECTION FENCING SHALL BE ERECTED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES. INSPECTION SHALL BE AT THE DISCRETION OF THE GENERAL CONTRACTOR.

2. NO ACTIVITY SHALL TAKE PLACE WITHIN THE DRIP LINE OF ANY TREE TO REMAIN (GRADING, DIGGING, CUTTING, FILLING, STORAGE OF MATERIALS, ETC.)

3. ANY REQUIRED SILT FENCING SHALL BE LOCATED OUTSIDE THE TREE PROTECTION FENCING.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING TREES SCHEDULED TO REMAIN AND ANY REPLACEMENT TREES REQUIRED AS A RESULT. ANY DAMAGE TO EXISTING TREES TO REMAIN SHALL BE REPORTED TO THE GENERAL CONTRACTOR IMMEDIATELY.

TREE PROTECTION FENCING ELEVATION DETAIL

NOT TO SCALE

OHM
ARCHITECTS ENGINEERS PLANNERS
34000 Plymouth Road
Livonia, MI 48150
P (734) 522-6711 | F (734) 522-6427
OHM-ADVISORS.COM

REVISIONS:

DATE	PROJ NUMBER	ENG	PROJ MGR	CADD	COUNTY	CITY/VILLAGE/TOWNSHIP	SCALE	HORIZ DATUM
8/25/2022	0163-21-0010	AKS	VMN	PR	OAKLAND	NOVI	H:	VERT DATUM

CITY OF NOVI
MIDDLE ROUGE STREAMBANK RESTORATION - PHASE 1 AND PHASE 2

STREAM RESTORATION DETAILS

SHEET 7 OF 18

WALLED LAKE BRANCH OF MIDDLE ROUGE RIVER

JOB BENCHMARK #200
SET GEAR ON N SIDE POWER POLE W/TRANSFORMER BETWEEN HSE #23260 & #23242
ELEV 845.08

JOB BENCHMARK #201
SET GEAR SPIKE ON N FACE POWER POLE @ SE QUAD OF CHATTMAN & ENNISHORE
ELEV 843.89

JOB BENCHMARK #202
SET GEAR SPIKE ON N FACE OF POWER POLE W/TRANSFORM, S SIDE CHATTMAN, E SIDE OF #41645
ELEV 842.31

JOB BENCHMARK #203
SET GEAR IN E FACE OF POWER POLE REAR OF #41662 CHATTMAN DR
ELEV 843.97

JOB BENCHMARK #204
SET GEAR SPIKE IN S FACE OF POWER POLE REAR YARD OF 41644 CHATTMAN DR
ELEV 838.22

TRAVERSE POINT #100
N 350622.77
E 13368303.83 ELEV 844.74

TRAVERSE POINT #101
N 350915.16
E 13368344.52 ELEV 843.38

TRAVERSE POINT #102
N 350950.39
E 13368542.56 ELEV 841.62

TRAVERSE POINT #103
N 351110.46
E 13368359.68 ELEV 841.96

TRAVERSE POINT #104
N 351103.57
E 13368533.38 ELEV 838.04

TRAVERSE POINT #105
N 350576.04
E 13368547.45 ELEV 836.50

TRAVERSE POINT #119
N 350742.63
E 13368544.59 ELEV 841.71

TRAVERSE POINT #120
N 350854.77
E 13368545.69 ELEV 842.13

22-26-426-005
CHARLES & DAYNA BATEMAN
41816 CHATTMAN ST.
NOVI, MI 8375

22-26-426-006
COREY & JASMINE BURNS
41689 CHATTMAN ST.
NOVI, MI 48375

22-26-426-007
PAUL & DIANNE CUSUMANO
41680 CHATTMAN ST.
NOVI, MI 48375

22-26-426-008
LOUIS & PEGGY PRESS
41652 CHATTMAN ST.
NOVI, MI 48375

22-26-426-009
DANIEL & JULIE ARCONIS
41644 CHATTMAN ST.
NOVI, MI 48375

22-26-427-001
RANDALL & ILENE PATTERSON
41626 CHATTMAN ST.
NOVI, MI 48375

22-26-427-002
MATTHEW & TERESA OBLAK
41608 CHATTMAN ST.
NOVI, MI 48375

22-26-428-012
JASON STASZEL
23269 ENNISHORE DR.
NOVI, MI 48375

22-26-428-011
EDWARD & MARY BETH LEWIS
23283 ENNISHORE DR.
NOVI, MI 48375

22-26-428-003
GARY & STACEY BECKER
23260 ENNISHORE DR.
NOVI, MI 48375

22-26-429-001
VANETTA BISHOP
23278 ENNISHORE DR.
NOVI, MI 48375

22-26-429-002
ALICE & MICHAEL ALBU
41645 CHATTMAN ST.
NOVI, MI 48375

22-26-430-001
MICHAEL & LISA BARTON
41635 CHATTMAN ST.
NOVI, MI 48375

22-26-430-002
BARBARA GENDLER
41617 CHATTMAN ST.
NOVI, MI 48375

22-26-430-003
JEFFREY & AMY CHASE
41603 CHATTMAN ST.
NOVI, MI 48375

22-26-201-013
PARK
CITY OF NOVI
45175 W TEN MILE RD
NOVI, MI 48375

CHATTMAN DR (60' R.O.W.)
ENNISHORE DR (60' R.O.W.)

MIDDLE ROUGE RIVER – WALLED LAKE BRANCH OHWM 835.10' [NAVD88]
OBSERVED WATER LEVEL 7/7/2022 834.00' [NAVD88]

PROPOSED BERM, TYP
PAID FOR AS "EARTH, EXCAVATION, HANDLING AND PLACEMENT"

PROP COIR FIBER TOE PROTECTION, TYP
PAID FOR AS DETAIL A, STREAMBANK STABILIZATION

CROSS SECTION, TYP

PROP BANKFULL SHELF, TYP
PAID FOR AS DETAIL B, STREAMBANK STABILIZATION

PROP TEMP EASEMENT

PROP BANKFULL SHELF TO EXISTING GRADE, TYP
PAID FOR AS DETAIL C, STREAMBANK STABILIZATION

PROPOSED BERM, TYP
PAID FOR AS "EARTH, EXCAVATION, HANDLING AND PLACEMENT"

CHANNEL POOL, 11 EA (TYP)

PARTIAL TREE,
FURN AND INSTALL, 39 EA (TYP)

EROSION CONTROL, GRAVEL ACCESS APPROACH, 1 EA
(6" THICK TEMPORARY 21AA LIMESTONE
ON NON-WOVEN GEOTEXTILE FABRIC)

PROP BANKFULL SHELF TO EXISTING GRADE, TYP
PAID FOR AS DETAIL B, STREAMBANK STABILIZATION

PROPOSED BERM, TYP
PAID FOR AS "EARTH, EXCAVATION, HANDLING AND PLACEMENT"

FLAGGED WETLAND BOUNDARY (TYP)
THROUGHOUT ENTIRE PROJECT AREA

100-YEAR FLOODPLAIN BOUNDARY

CONSERVATION EASEMENT

QUANTITIES THIS SHEET

TOTAL	UNIT	DESCRIPTION
13831	Cyd	Earth, Excavation, Handling and Placement
1928	Ft	Detail A, Streambank Stabilization
309	Syd	Detail B, Streambank Stabilization
527	Syd	Detail C, Streambank Stabilization
39	Ea	Partial Tree, Furn and Install
11	Ea	Channel Pool

NOTE: ALL STREAMBANK STABILIZATION DETAIL EARTHWORK TO BE PAID FOR AS "EARTH, EXCAVATION, HANDLING AND PLACEMENT"

Know what's below.
Call before you dig.

OHM
ARCHITECTS ENGINEERS PLANNERS
34000 Plymouth Road
Livonia, MI 48150
P (734) 522-6711 | F (734) 522-6427
OHM-ADVISORS.COM

REVISIONS

DATE	PROJ NUMBER	ENG	PROJ MGR	HORIZ DATUM	VERT DATUM
8/31/23	0163-21-2010	AKS	WAN	NAD83	NAVD88

SHEET	SCALE	H: 1"=40'	V: 1"=4'

CITY/VILLAGE/TOWNSHIP: NOVI
COUNTY: OAKLAND
CADD: PR

CITY OF NOVI
MIDDLE ROUGE STREAM STABILIZATION AND MEADOWBROOK LAKE DREDGING

MEADOWBROOK LAKE CONSTRUCTION PLAN

DRAWING PATH: P:\0126_0165016321010_Middle Rouge Streambank\Drawings\Civil\Plans_Const\2100\10CON.dwg Aug 31, 2023 - 11:45am