



Antrim County Road Commission

DIETER AMOS, Kewadin
GODFREY "PETE" HOOGERHYDE, Elmira
FRED HUNT, Jr., Bellaire
BURT R. THOMPSON, P.E., Engineer-Manager
DALE E. FARRIER, Office Manager

June 17, 2020

REQUEST FOR BIDS – SHORE PROTECTION

Sealed bids will be received until 1:00 PM, Wednesday, July 15, 2020, at which time they will be publicly opened and read. Bids shall be received at the office of the Antrim County Road Commission, PO Box 308, 319 E. Lincoln St, Mancelona, Michigan 49659-0308. Bids will be tabulated and a recommendation will be made to the Board of County Road Commissioners at their next regular meeting.

The Antrim County Road Commission (ACRC) requests bids for the following:

N. Baysore Drive Shore Protection: In Elk Rapids Township at two locations along N. Bayshore Drive. Installation of shore protection measures in accordance with enclosed Project Description and plans. US Army Corps of Engineers permits can be viewed using this link:

<http://www.antrimcrc.org/bid-information-2020/>

Traffic control plan will be uploaded to the same link as soon as available.

Bid must be submitted on the attached Itemized Bid Sheet.

No work shall begin before notice to proceed is received from ACRC. All work shall be completed by April 30, 2021 unless otherwise agreed to by the contractor and road commission.

The successful bidder shall enter into a contract with and provided by the road commission.

Successful bidder shall provide a performance bond equal to the total amount of the contract.

Label bid "**SHORE PROTECTION BID**" plainly on the outside of a sealed envelope.

Burt R. Thompson, P.E.
Engineer-Manager

encl: Schedule of Items (Itemized Bid Sheet)
N. Bayshore South Shore Protection Plans
N. Bayshore North Shore Protection Plans

Antrim County Road Commission

Schedule of Items (Itemized Bid Sheet)

Letting Date: Monday, July 13, 2020 1:00 PM

Contract ID: 2020-4
Location: N. Bayshore Dr
Description: Shore protection

Project Number: 2020-4	Project Engineer: Burt Thompson
Estimate Number: 1	Date Created: 12/10/2019
Project Type: Miscellaneous	Fed/State #:
Location: N. Bayshore Dr	Fed Item:
	Control Section:

Description: Shore protection

Instructions to Bidders: IMPORTANT NOTICE:
If the proposal establishes a maximum price for any of the following work items, and if you bid a price higher than that maximum price, your bid will be considered to have quoted the maximum price and your bid total will be adjusted to reflect that maximum price.

If the proposal provides a specified price for any of the following work items, and if you bid a price higher or lower than that specified price, your bid will be adjusted to reflect that specified price.

If your bid is the lowest accepted bid, and if you refuse to accept the award of the contract due to the change in what you quoted as a maximum or specified price, you will forfeit your proposal guaranty.

Pay Item	Description	Quantity	Units	Unit Price		Bid Amount	
				Dollars	Cts	Dollars	Cts
1500001	Mobilization, Max \$30,000	1	LSUM				
2050023	Granular Material, CI II	500	Cyd				
2057002	_ Earth Excavation	3.5	Sta				
3080005	Geotextile, Separator 16oz Non-woven	625	Syd				
7040001	Steel Sheet Piling, Permanent	5,764	Sft				
8120012	Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	6	Ea				
8120013	Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	6	Ea				
8120170	Minor Traf Devices	1	LSUM				
8120252	Plastic Drum, Fluorescent, Furn	25	Ea				
8120253	Plastic Drum, Fluorescent, Oper	25	Ea				
8120350	Sign, Type B, Temp, Prismatic, Furn	63	Sft				
8120351	Sign, Type B, Temp, Prismatic, Oper	63	Sft				
8130006	Riprap, Heavy 400 to 600 lb Quarried Splash Stone	230	Ton				
8137031	_ 4000 to 6000 lb Quarried Armor Stone	620	Ton				
8160020	Fertilizer, Chemical Nutrient, CI A	22	Lb				
8160027	Mulch Blanket	580	Syd				
8160037	Seeding, Mixture TDS	20	Lb				
8160062	Topsoil Surface, Furn, 4 inch	440	Syd				

Pay Item	Description	Quantity	Units	Unit Price		Bid Amount		
				Dollars	Cts	Dollars	Cts	
Total Bid:								

Contractor: _____

 (Signature) (Date)

Contact Name: _____

Contact Phone Number: _____

Contractor Address: _____

N. Bayshore Dr. Shore Protection Project Description

Location

The project is divided into two separate locations, both on N. Bayshore Dr. Location 1 (north) is approximately 0.7 mile north of Dexter St and includes the steel sheet pile. Location 2 (south) is approximately 0.3 mile north of Dexter St. This is just north of the Village of Elk Rapids and west of US 31 in Antrim County.

Description of work

North Location:

Work shall consist of excavating and shaping existing grade to the proposed cross sections on the plans, paid for as Earth Excavation. Fill may be used if needed and as directed by the engineer and paid for as Granular Material, CI II. Steel sheet pile shall be furnished and driven as specified, paid for as Steel Sheet Piling, Permanent. Bent sheet pile cap shall be furnished and welded in place and is to be included in Steel Sheet Piling, Permanent pay item. Armor stone shall be placed at the toe of the sheet pile, paid for as 4000 to 6000 lb Quarried Armor Stone, and splash stone placed at the top as specified, paid for as Riprap, Heavy 400 to 600 lb Quarried Splash Stone. 82 tons of temporary armor stone was placed fall of 2019 and shall be salvaged and reused, salvage and placing of armor stone shall be included in costs for other items. North location of project requires 402 tons of armor stone, 82 tons already on site. All stone shall be placed on Geotextile, Separator and paid for as such. All disturbed soils on the slope above the splash stone shall have 4" topsoil placed on it with seed at 220 lbs/acre and fertilizer at 240 lbs/acre, paid for as Topsoil Surface, Furn, 4 inch, Seeding, Mixture TDS and Fertilizer, Chemical Nutrient, CI A respectively. All topsoil, seed and fertilizer to be covered with Mulch Blanket as specified in plans and paid for as such, with 12" spikes spaced at manufacturers recommend spacing and toed in at top of slope. Mobilization shall be paid only once for the entire project and includes both locations.

<u>Pay Item</u>	<u>Quantity</u>	<u>Unit</u>
Mobilization, Max	1	LSUM
Granular Material, CI II	500	Cyd
Earth Excavation	2.5	Sta
Erosion Control, Silt Fence	310	Ft
Geotextile, Separator	375	Syd
Steel Sheet Piling, Permanent	5764	Sft
Riprap, Heavy, 400 to 600 lb Quarried Splash Stone	230	Ton
4000 to 6000 lb Quarried Armor Stone	320	Ton
Fertilizer, Chemical Nutrient, CI A	22	Lb
Mulch Blanket	580	Syd
Seeding, Mixture TDS	20	Lb
Topsoil Surface, Furn, 4 inch	440	Syd

South Location:

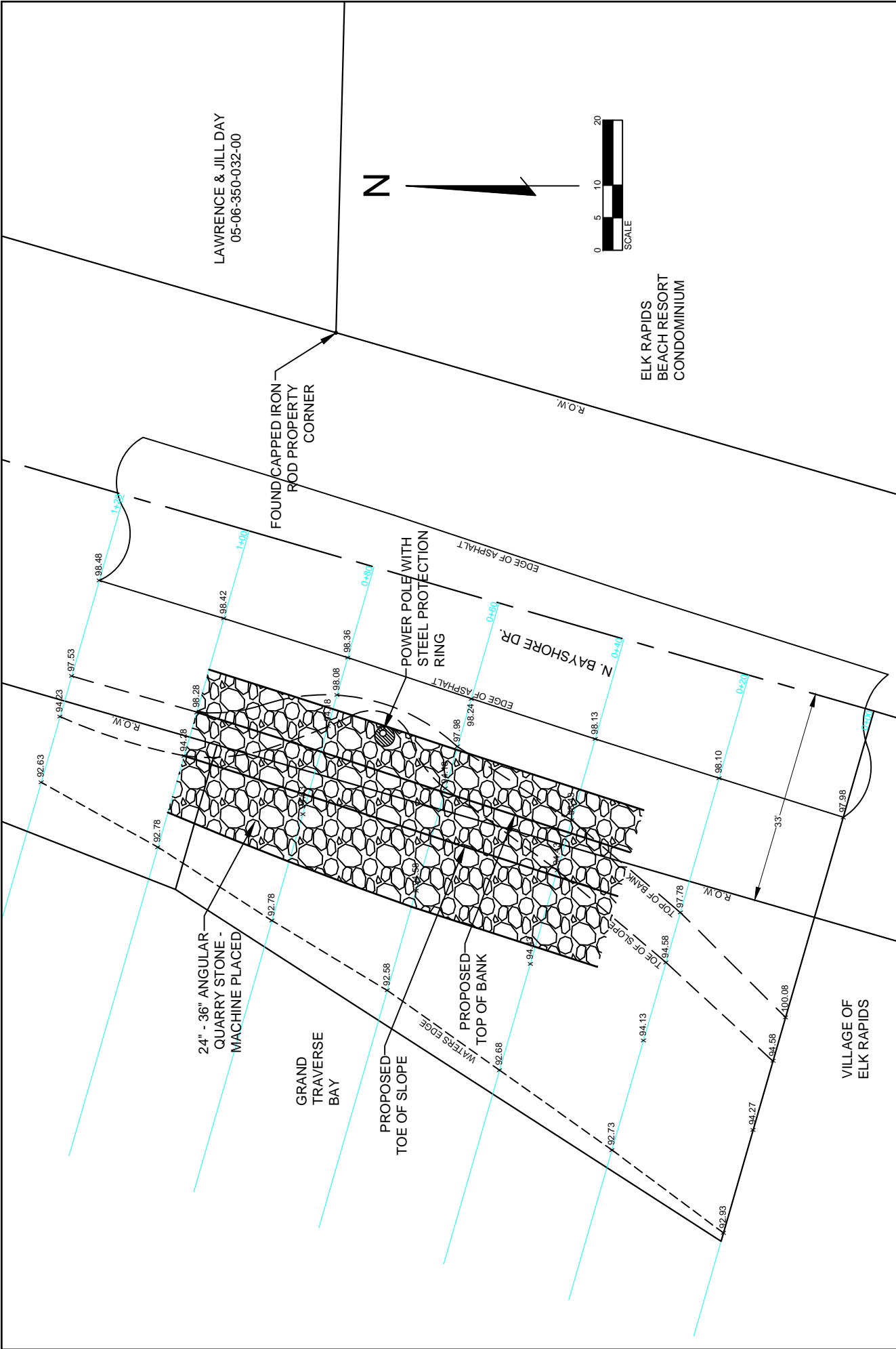
Work shall consist of excavating and shaping existing grade to the proposed cross sections on the plans, paid for as Earth Excavation. Armor stone shall be placed as specified and paid for as 4000 to 6000 lb Quarried Armor Stone, and shall be placed on Geotextile, Sparator and paid for as such. 25 tons of temporary armor stone was placed fall of 2019 and shall be salvaged and reused, salvage and placing of armor stone shall be included in costs for other items. South location of project requires 325 tons of armor stone, 82 tons already on site. Any excess excavated sand may be cast over the toe of stone upon completion of stone placement.

<u>Pay Item</u>	<u>Quantity</u>	<u>Unit</u>
Earth Excavation	0.8	Sta
Erosion Control, Silt Fence	120	Ft
Geotextile, Separator	250	Syd
4000 to 6000 lb Quarried Armor Stone	300	Ton

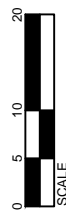
Traffic Control

Road shall be closed to through traffic for duration of project. Signs and barricades shall be placed according to the attached Traffic Control Plan. The following pay items shall apply to payment of required traffic control.

<u>Pay Item</u>	<u>Quantity</u>	<u>Unit</u>
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	6	Ea
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	6	Ea
Minor Traf Devices	1	LSUM
Plastic Drum, Fluorescent, Furn	25	Ea
Plastic Drum, Fluorescent, Oper	25	Ea
Sign, Type B, Temp, Prismatic, Furn	63	Sft
Sign, Type B, Temp, Prismatic, Oper	63	Sft



LAWRENCE & JILL DAY
05-06-350-032-00

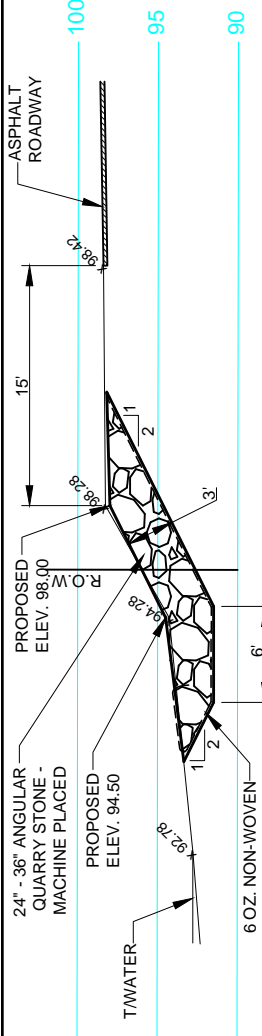


ELK RAPIDS
BEACH RESORT
CONDOMINIUM

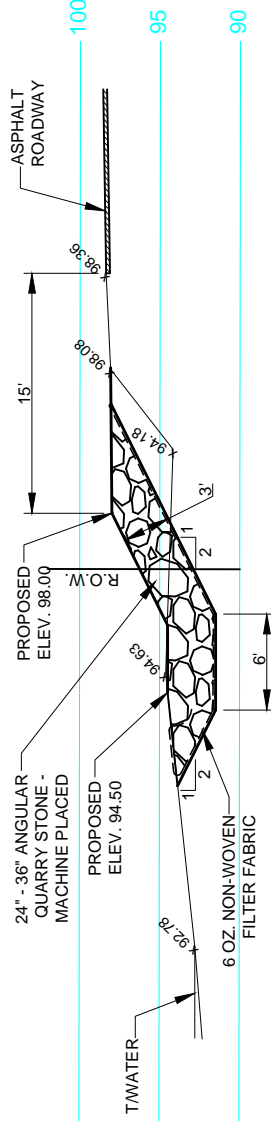
Date	Revisions	Proposed Work	Drawn By
		N. BAYSHORE DR. EROSION	RJF
		Drawing	Field Bk./Pg.
		PROPOSED PLAN VIEW	
		Sec., Town, Range	Date
		SEC. 16, T. 29 N.-R. 9 W.	11/22/19
		Twp., Co., State	Sheet No.
		ELK RAPIDS TWP., ANTRIM CO., MICHIGAN	1 of 2

ANTRIM COUNTY ROAD COMMISSION
 319 E. Lincoln St., P.O. Box 308
 Marcellona, MI. 49659-0308
 ph. 231-587-8521 fax: 231-587-8156
 E-mail: email@antrimcroc.org

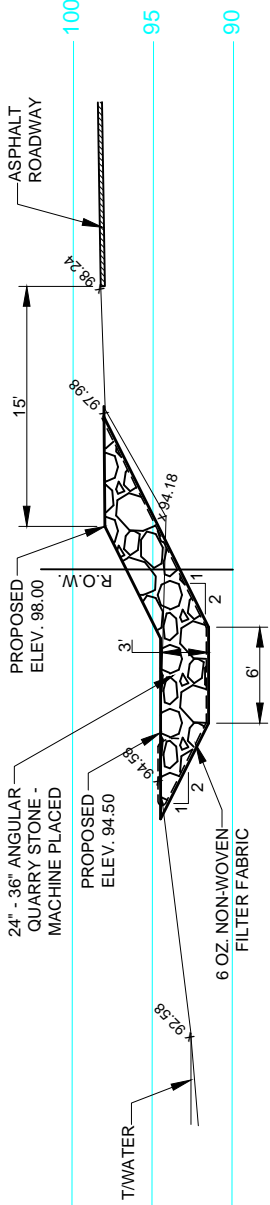




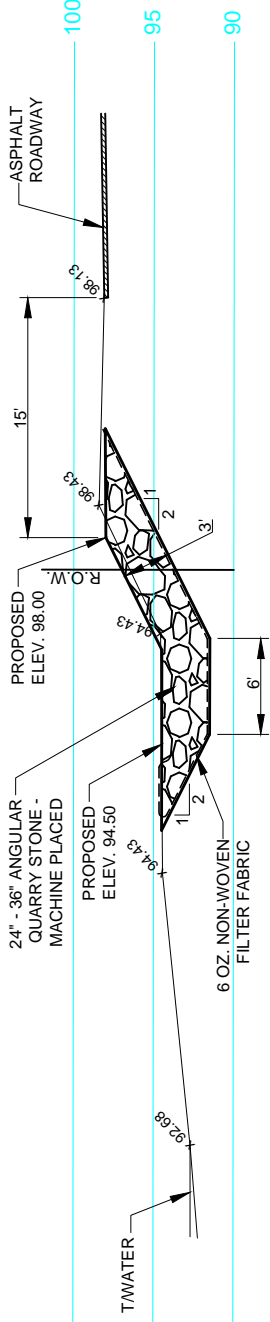
CROSS SECTION STA. 1+00



CROSS SECTION STA. 0+80




CROSS SECTION STA. 0+60



CROSS SECTION STA. 0+40

Date	Revisions	Proposed Work		Drawn By
		N. BAYSHORE DR. EROSION		RJF
		Drawing		Field Bk./Pg.
		PROPOSED CROSS SECTIONS		
		Sec., Town, Range	Sec. 16, T. 29 N.-R. 9 W.	Date
		Twp., Co., State	ELK RAPIDS TWP., ANTRIM CO., MICHIGAN	11/22/19
				Sheet No.
				2 of 2

ANTRIM COUNTY ROAD COMMISSION



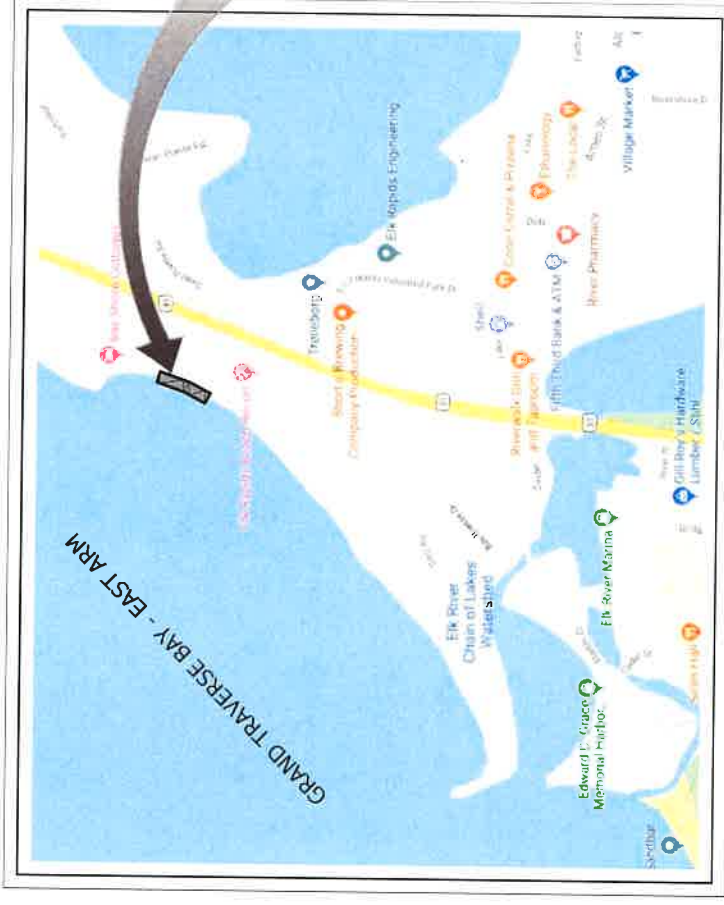
319 E. Lincoln St., P.O. Box 308
 Marcellona, MI. 49659-0308
 ph. 231-587-8521 fax: 231-587-8156
 E-mail: email@antrimcroc.org

ANTRIM COUNTY ROAD COMMISSION N BAYSHORE DR SHORELINE IMPROVEMENTS CIVIL SITE PLAN



ANTRIM COUNTY

VICINITY MAP



PROJECT LOCATION

LOCATION MAP

SECTION 16, T29N, R9W, ANTRIM CO, MI
NO SCALE

MAP PROVIDED BY GOOGLE, INC.

CLIENT

ANTRIM COUNTY ROAD COMMISSION
319 E LINCOLN STREET, PO BOX 308,
MANCERLONA, MI 49659



Know what's below.
Call before you dig.
(3 WORKING DAYS)

THE LOCATION OF THE EXISTING UTILITIES, AS SHOWN ON THIS PLAN, ARE APPROXIMATE ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ACTUAL LOCATION AND DEPTH OF ALL EXISTING UTILITIES. THE OWNER AND THE SURVEYOR SHALL NOT BE RESPONSIBLE FOR ANY OMISSION OR VARIATION FROM THE LOCATION SHOWN. THE CONTRACTOR SHALL NOTIFY "MISS DIG" AT 1 (800) 482-7171 OR 811 THREE (3) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION.

SHEET INDEX

T1	COVER SHEET
R1	NOTES & SPECIFICATIONS
R2	NOTES & SPECIFICATIONS
C1	SITE PLAN
C2	SITE PLAN
C3	DIAGRAM CUT & FILL
C4	DESIGN CROSS SECTIONS
C5	DESIGN CROSS SECTIONS
C6	DESIGN SHEET PILE PROFILE
C7	DESIGN SHEET PILE PROFILE
C8	STRUCTURAL DETAILS



TRAVERSE CITY, MI PH 231.935.1530
LUDINGTON, MI
www.machinengineering.net

REGISTRATION:
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER LAWS OF THE STATE OF MICHIGAN

PATRICK J. MACHIN
PRINT NAME

SIGNATURE
6201051471
REG. NO.
EXP. 10/31/2020
DATE

MACHIN ENGINEERING, INC
ORIGINAL DOCUMENT(S) ARE STORED AT

REV.#	DESCRIPTION	DATE
A	REVIEW - 50% DESIGN	04/13/2019
B	REVIEW - 60% DESIGN	04/15/2019
C	REVIEW - 90% DESIGN	04/15/2019
D	ISSUED FOR CLIENT REVIEW	04/15/2019
E	ISSUED FOR CONSTRUCTION	04/15/2019
DATE BY	CHECK BY	APPROVED BY
04/15/2019	PM	04/15/2019

PROJECT TITLE:

N BAYSHORE DR
SHORELINE
IMPROVEMENTS

CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCERLONA, MI 49659

SHEET TITLE:
COVER
SHEET

PROJECT
NUMBER
19209

SHEET
NUMBER
T1

SPECIFICATIONS:

DIVISION 01-GENERAL NOTES

GENERAL

- SOIL BORINGS WERE COMPLETED BY OTWELL MAWBY, PC BORINGS 1 AND 2.
- ANY DISCREPANCIES OR IRREGULARITIES BETWEEN ANY PART OF THE DESIGN DOCUMENTS OR BETWEEN THE DESIGN DOCUMENTS AND APPLICABLE CODES, LAWS OR ORDINANCES, SUCH DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND THE MORE STRINGENT REQUIREMENTS SHALL GOVERN.
- TYPICAL DETAILS AND OTHER SECTIONS / DETAILS APPLY TO CONDITIONS THAT ARE SIMILAR TO THE CONDITIONS DESCRIBED IN THE SECTIONS / DETAILS, EVEN IF THEY ARE NOT SPECIFICALLY REFERENCED ON THE PLANS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEANS, METHODS, SEQUENCES, AND PROCEDURES OF CONSTRUCTION.
- NO OPENING SHALL BE MADE IN ANY STRUCTURAL MEMBER WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
- NO CHANGE IN SIZE OF DIMENSION OF STRUCTURAL MEMBERS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
- DO NOT SCALE THESE DRAWINGS; USE DIMENSIONS, DIMENSIONS SHOWN ON STRUCTURAL DRAWINGS ARE FOR REFERENCE ONLY; CONTRACTOR SHALL VERIFY ALL DIMENSIONS WITH CIVIL DRAWINGS.
- THE CONTRACTOR SHALL INFORM THE ENGINEER IN WRITING OF ANY DEVIATION FROM THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL NOT BE RELIEVED OF THE RESPONSIBILITY FOR SUCH DEVIATION BY THE ENGINEER'S APPROVAL OF SHOP DRAWINGS, PRODUCT DATA, ETC, UNLESS THE CONTRACTOR HAS SPECIFICALLY INFORMED THE ENGINEER OF SUCH DEVIATION AT THE TIME OF SUBMISSION, AND THE ENGINEER HAS GIVEN WRITTEN APPROVAL TO THE SPECIFIC DEVIATION.
- CONSTRUCTION SHALL COMPLY FULLY WITH THE APPLICABLE PROVISIONS OF OSHA AND THE LOCAL GOVERNING CODES, CURRENT EDITION, AND ALL REQUIREMENTS SPECIFIED IN THE CODES SHALL BE ADHERED TO AS IF THEY WERE CALLED FOR OR SHOWN ON THE DRAWINGS. THIS SHALL NOT BE CONSTRUED TO MEAN THAT REQUIREMENTS SET FORTH ON THE DRAWING MAY BE MODIFIED BECAUSE THEY ARE MORE STRINGENT THAN THE CODE REQUIREMENTS OR BECAUSE THEY ARE NOT SPECIFICALLY REQUIRED BY CODE.
- WORK CONSTRUCTED PER THESE DRAWINGS SHALL BE INSPECTED BY AN INDEPENDENT TESTING AGENCY RETAINED TO ENSURE COMPLIANCE WITH THE REQUIREMENTS SHOWN ON THE DRAWINGS. SPECIAL INSPECTIONS REQUIRED BY THE GOVERNING BUILDING CODE, LOCAL BUILDING DEPARTMENT AND THE CONTRACT DOCUMENTS SHALL BE PERFORMED BY A QUALIFIED SPECIAL INSPECTOR; PROJECT SITE VISITS BY THE ENGINEER DOES NOT CONSTITUTE OR REPLACE INSPECTION.

DIVISION 32 - EARTHWORK

SITE CLEARING

- CONTACT MISS DIG AT 8-1-1 A MIN. OF 72 HOURS PRIOR TO COMMENCING WORK.
- INSTALL TEMPORARY SOIL AND EROSION CONTROL MEASURES. REMOVE UPON COMPLETION OF PROJECT AND ONCE VEGETATION IS ESTABLISHED. MAINTAIN THESE MEASURES IN WORKING ORDER AT ALL TIMES.
- COMPLY WITH THE INDIVIDUAL REQUIREMENTS ON THE AGENCY PERMITS.

EARTHWORK

- PROTECT ALL STRUCTURES AND THOSE AREAS DESIGNATED FOR PROTECTION.

EARTHWORK (CONTINUED)

- CONSTRUCT ALL GRADES TO THAT DESIGNATED ON THE PLANS.
- ALL STORED MATERIALS SUCH AS FILL MATERIALS, TOPSOIL, AND ANY OTHER TEMP. STOCKPILES SHALL NOT BE STORED ON NEIGHBORING PARCELS NOR THE RIGHT-OF-WAY.
- MAINTAIN ALL SLOPES TO A MIN OF 2H:1V UNLESS WHERE SLOPES ARE GREATER THAN 2H:1V.
- ALL SUBBASE MATERIAL SHALL BE MDOT CLASS II
- COMPACT ALL BACKFILLS AND FOUNDATIONS SOILS TO A MIN. OF 95% OF MAX. DRY DENSITY.
- THE CONTRACTOR SHALL PROVIDE TEMPORARY SOIL EROSION CONTROL MEASURES PER P.A. 451 AS AMENDED. THE CONTRACTOR SHALL MEET WITH THE SOIL EROSION CONTROL OFFICER BEFORE STARTING CONSTRUCTION TO REVIEW THE TEMPORARY SOIL EROSION CONTROL MEASURES AND REQUIREMENTS, WITH THE USE OF SILT FENCE AND OTHER TEMPORARY MEASURES THE CONTRACTOR SHALL PROTECT THE ADJACENT AREA FROM ACCELERATED EROSION AND SEDIMENTATION FLOWS RESULTING FROM CONSTRUCTION. THE CONTRACTOR SHALL INSTALL ADDITIONAL TEMPORARY AND PERMANENT SOIL EROSION CONTROL MEASURES, IF DIRECTED BY THE ENGINEER OR SOIL EROSION CONTROL OFFICER, AT NO ADDITIONAL COST TO THE PROJECT.
- CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING GROUND COVER ON AREAS DISTURBED BY CONSTRUCTION AND SHALL REPAIR ALL WASHOUTS AND EROSION DURING THE GUARANTEE PERIOD ON ONE (1) YEAR AFTER GROUND COVER IS ESTABLISHED AT NO ADDITIONAL COST TO THE OWNER.

STEEL SHEET PILE

- SHEET PILE HAS BEEN DESIGNED IN ACCORDANCE WITH ASD CRITERIA.
- SHEET PILE WAS DESIGNED USING SHORING SUITE V8 BY CIVILTECH.
- SHEET PILE, HOT ROLLED: ASTM A572, GRADE 50KSI. SIZE AND SHAPE PER DRAWINGS OR EQUAL.
- DESIGN SHEET PILE WITH A SURCHARGE LOAD OF 240 PSF LL MINIMUM. CRANE LOADS AND OTHER CONSTRUCTION LOADS SHALL BE MAINTAINED AWAY FROM WALLS TO MINIMIZE SURCHARGE LOADS. EQUIPMENT SURCHARGE WAS NOT CONSIDERED IN THE DESIGN OF THE SHORING SYSTEMS. ACCESS MUST BE MAINTAINED FOR EQUIPMENT IMMEDIATELY BEHIND THE WALL.
- INSPECT ALL INTERLOCKS OF SHEETS ABOVE GRADE. SHEETS NOT INTERLOCKED SHALL BE REMOVED AND REINSTALLED.

- ALL WELDING SHALL BE PERFORMED USING THE ELECTRIC ARC METHOD IN ACCORDANCE WITH THE LATEST EDITION OF THE AMERICAN WELDING SOCIETY (AWS) D1.1 "STRUCTURAL WELDING CODE". E70XX ELECTRODES CONFORMING TO AWS A5.1 OR A5.5 SHALL BE USED SHIELDED METAL ARC METHOD Fx7-ECXX FLUX ELECTRODE COMBINATION CONFORMING TO AWS A5.17 FOR SUBMERGED ARC METHOD.

- MAINTAIN SHEETS PLUMB DURING INSTALLATION.
- PROVIDE A TEMPORARY FRAME WORK FOR SHEET INSTALLATION.
- DRIVING HAMMERS SHALL MAINTAIN ALIGNMENT DURING DRIVING OPERATIONS. THE USE OF VIBRATORY HAMMERS SHALL BE DISCONTINUED AND IMPACT HAMMERS EMPLOYED WHEN THE PENETRATION RATE DUE TO VIBRATORY LOADING IS LESS THAN 4-INCHES PER MINUTE.
- WHEN USING IMPACT HAMMERS A PROTECTIVE CAP SHALL BE EMPLOYED TO PROTECT TOP OF SHEETS.
- USE CORNER SHEET AT EACH 90° CHANGE IN SHEETING DIRECTION.

STEEL SHEET PILE (CONTINUED)

- CONTACT ENGINEER IF PILE TIP AND OR CUT-OFF ELEVATIONS VARY FROM THE PLANS.
 - SHEET SPLICES ARE PROHIBITED.
- #### MONITORING
- PRIOR TO DRIVING OPERATIONS:
- CONTRACTOR TO PERFORM A VISUAL INSPECTION OF ANY NEIGHBORING STRUCTURES AND NOTE CONDITION PRIOR TO DRIVING SHEET PILE. ADJUSTMENTS SHOULD BE MADE TO THE PROPOSED MONITORING SCHEDULE AS REQUIRED BASED ON THE OUTCOME OF THE INSPECTION.
 - CONTRACTOR SHALL PROVIDE DOCUMENTATION AN INSPECTION WAS MADE NOTING THE OUTCOME OF SUCH INSPECTION.

DIVISION 32 - EXTERIOR IMPROVEMENTS

LAWNS AND GRASSES

- PROCEED WITH PLANTING ONLY WHEN EXISTING AND FORECASTED WEATHER CONDITIONS PERMIT PLANTING TO BE PERFORMED WHEN BENEFICIAL AND OPTIMUM RESULTS MAY BE OBTAINED.
- SEEDING ON NON-MAINTAINED AREAS: CEREAL RYE MIX
- SEEDING ON MAINTAINED AREAS: KENTUCKY BLUEGRASS
- FERTILIZER: 240 LBS/ACRE
- MULCH: STRAW MULCH AT 2 TONS/ACRE OR SPRAY APPLIED TACKIFIER.
- EXCELSIOR MULCH BLANKETS: NORTH AMERICAN GREEN DS150
- ROLL AND RAKE TOPSOIL, REMOVE RIDGES, FILL DEPRESSIONS, REMOVE ALL DELETERIOUS DEBRIS, ROCKS GREATER THAN 1 INCH IN DIAMETER, CONSTRUCTION DEBRIS, ET CETERA.
- PROMPTLY CLEANUP DEBRIS FROM OPERATIONS.

SPECIFICATIONS (CONTINUES ON SHEET R2)



TRAVERSE CITY, MI PH 231-935-1530
LUDINGTON, MI
www.machineengineering.net

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REV#	DESCRIPTION	DATE
A	REVIEW-30% DESIGN	4/5/2019
B	REVIEW-50% DESIGN	4/5/2019
C	REVIEW-80% DESIGN	4/5/2019
D	ISSUED FOR PERMIT REVIEW	4/5/2019
E	ISSUED FOR CONSTRUCTION	6/14/2019

DRAWN BY: KAS
CHECKED BY: P.M.
APPROVED BY: P.M.
CREATED: 12/06/2019

PROJECT TITLE:

N BAYSHORE DR
SHORELINE
IMPROVEMENTS

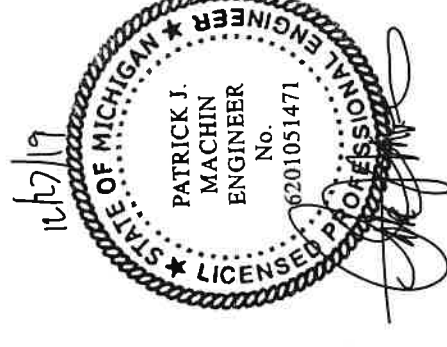
CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCERLONA, MI 49659

SHEET TITLE:

NOTES
&
SPECIFICATIONS

PROJECT NUMBER
19209

SHEET NUMBER
R1



SPECIFICATIONS:

DIVISION 35 - STONE REVETMENTS

STONE REVETMENTS

1. ALL STONE SHALL BE DURABLE, HIGHLY RESISTANT TO WEATHERING AND DISINTEGRATION UNDER FREEZING AND THAWING, FREE FROM DETRIMENTAL CRACKS, SEAMS, DEFECTS AND OTHER DEFECTS WHICH TEND TO LEAD TO DETERIORATION FROM NATURAL CAUSES OR CAUSE BREAKAGE IN HANDLING.
2. ALL ARMOR STONE AND UNDERLAYMENT SHALL HAVE ANGULAR FACES THAT ARE FRACTURED, SPLIT OR THE ACTUAL BEDDING PLANE SURFACE, ROUNDED STONE OR BOULDERS WILL NOT BE ACCEPTED UNLESS AUTHORIZED BY SPECIAL PROVISIONS.
3. STONE SHALL BE HANDLED, TRANSPORTED AND STORED WITH CARE TO MINIMIZE CRACKING, CHIPPING, SPLITTING AND EXCESSIVE WEAR THAT WOULD OTHERWISE LEAD TO REJECTION AT THE JOB SITE.
4. EACH INDIVIDUAL STONE SHALL COMPLY WITH THE FOLLOWING SPECIFICATIONS:
 ARMOR STONE:
 LOS ANGELES ABRASION, % OF WEAR: 28% MAXIMUM
 SPECIFIC GRAVITY (DRY): 2.6 MINIMUM
 WATER ABSORPTION: 2% MAX GAIN BY WT
 MEDIAN WEIGHT: 5,000 LBS
 WEIGHT RANGE: 4,000 LBS - 6,000 LBS
 AVG DENSITY: 167 PCF
 SPLASH STONE:
 LOS ANGELES ABRASION, % OF WEAR: 28% MAXIMUM
 SPECIFIC GRAVITY (DRY): 2.6 MINIMUM
 WATER ABSORPTION: 2% MAX GAIN BY WT
 MEDIAN WEIGHT: 500 LBS
 WEIGHT RANGE: 400-600 LBS
 AVG DENSITY: 167 PCF
5. ARMOR STONE SIZES SHALL BE SUCH THAT A MINIMUM OF 90% OF THE INDIVIDUAL STONES WEIGH FROM 4,000 LBS TO 6,000 LBS AND SHALL HAVE A WELL GRADED DISTRIBUTION OF THESE SIZES THROUGH THESE LIMITS. NOT MORE THAN 10% OF THE INDIVIDUAL STONES SHALL WEIGH MORE THAN 6,000 LBS. NO ARMOR STONES SHALL WEIGH LESS THAN 4,000 LBS.
6. STONE SOURCE: SPECIFICATION STONE PRODUCT, ALPENA, MI OR EQUAL.
7. CERTIFICATION
 PRIOR TO INSTALLATION, THE CONTRACTOR SHALL OBTAIN FROM THE QUARRY AND SUBMIT TO THE OWNER A CERTIFICATE INDICATING THE FOLLOWING:
 A. STONE CLASSIFICATION,
 B. STONE WEIGHT PER CUBIC FOOT.
 C. THE STONE FURNISHED WILL MEET THE REQUIREMENTS OF THE SPECIFICATIONS, GRADATION, AND DURABILITY.
8. FILTER FABRIC: 16OZ. NON-WOVEN GEOTEXTILE FILTER FABRIC BY CSI GEOTURF OR EQUAL.
9. ARMOR STONE DIMENSIONS SHALL BE SUCH THAT THE LEAST DIMENSION IS NO LESS THAN ONE-THIRD OF ITS GREATEST DIMENSION.
10. ARMOR STONE AND SPLASH STONE SHALL BE STOCKPILED SEPARATELY, AND THEY SHALL NOT BE MIXED. STOCKPILING OF STONES WILL NOT BE PERMITTED WITHIN THE RIGHT-OF-WAY UNLESS PERMITTED BY THE ANTRIM COUNTY ROAD COMMISSION.

STONE REVETMENTS (CONTINUED)

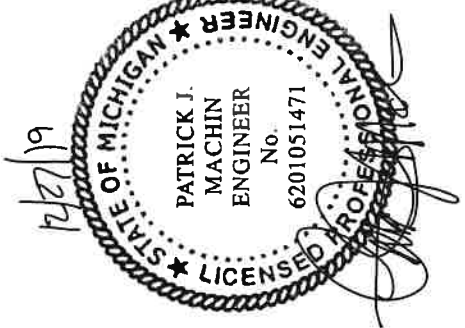
11. CONSTRUCTION TOLERANCES
 THE FINISHED SURFACE AND STONE LAYER THICKNESS SHALL NOT DEVIATE FROM THE LINES AND GRADES SHOWN BY MORE THAN THE TOLERANCES LISTED BELOW. TOLERANCES ARE MEASURED PERPENDICULAR TO THE INDICATED PLANNED GRADE MEASURED FROM THE TOP OF STONE. EXTREME LIMITS OF THE TOLERANCES GIVEN SHALL NOT BE CONTINUOUS IN ANY DIRECTION FOR MORE THAN FIVE TIMES THE NOMINAL STONE DIMENSION. ALL TOLERANCES SHALL BE CONSIDERED AS AVERAGE ACROSS THE MEASURED AREA. PLANNED GRADE TOLERANCES

MATERIAL	APG (INCHES)	BPG (INCHES)
SPLASH STONE	6	6
ARMOR STONE	12	12

APG - ABOVE PLANNED GRADE
 BPG - BELOW PLANNED GRADE

THE INTENTION IS THAT THE WORK SHALL BE BUILT GENERALLY TO THE REQUIRED ELEVATIONS, SLOPE AND GRADE, AND THAT THE OUTER SURFACES SHALL BE EVEN AND PRESENT A NEAT APPEARANCE. PLACED MATERIAL NOT MEETING THESE LIMITS SHALL BE REMOVED OR REWORKED AS DIRECTED BY THE ENGINEER.

12. CHECK SURVEY
 SURVEYS MADE BY THE CONTRACTOR ARE REQUIRED ON EACH MATERIAL PLACED FOR DETERMINING THAT THE MATERIALS ARE ACCEPTABLY PLACED IN THE WORK. MAKE CHECKS AS THE WORK PROGRESSES TO VERIFY LINES, GRADES AND THICKNESSES ESTABLISHED FOR COMPLETED WORK. AT LEAST ONE (1) CHECK SURVEY AS SPECIFIED BELOW SHALL BE MADE FOR EACH TWENTY-FIVE (25) FOOT SECTION AS SHOWN AS PRACTICABLE AFTER COMPLETION. FOLLOWING PLACEMENT OF EACH TYPE OF MATERIAL, THE CROSS SECTION OF EACH STEP OF THE WORK SHALL BE APPROVED BY THE OWNER BEFORE PROCEEDING WITH THE NEXT STEP OF THE WORK. APPROVAL OF CROSS SECTIONS BASED UPON CHECK SURVEYS SHALL NOT CONSTITUTE FINAL ACCEPTANCE OF THE WORK. CROSS SECTIONS SHALL BE TAKEN ON LINES 25 FEET APART, MEASURED ALONG THE STRUCTURE REFERENCE LINE, WITH READINGS AT 5-FOOT INTERVALS AND AT BREAKS ALONG THE LINES. HOWEVER, OTHER CROSS SECTION SPACING AND READING INTERVALS MAY BE USED IF DETERMINED APPROPRIATE BY THE ENGINEER. ADDITIONAL ELEVATIONS AND SOUNDINGS SHALL BE TAKEN AS THE ENGINEER MAY DEEM NECESSARY OR ADVISABLE. THE SURVEYS SHALL BE CONDUCTED IN THE PRESENCE OF AN AUTHORIZED REPRESENTATIVE OF THE OWNER, UNLESS THIS REQUIREMENT IS WAIVED BY THE OWNER.
 A. THE ELEVATION OF STONE ABOVE AND BELOW THE WATER SURFACE SHALL BE DETERMINED BY THE USE OF A LEVELING INSTRUMENT AND A ROD HAVING A BASE 12 INCHES IN DIAMETER. IF APPROVED BY THE ENGINEER OTHER MEANS MAY ALSO BE USED.



MACHINEENGINEERING
 incorporation

TRAVERSE CITY, MI PH 231-935-1530
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 www.machineengineering.net

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PATRICK J. MACHIN
 PRINT NAME

SIGNATURE

6201051471 EXP 10/31/2020
 REG. NO. DATE

MACHIN ENGINEERING, INC
 ORIGINAL DOCUMENT(S) ARE STORED AT

REV#	DESCRIPTION	DATE
A	REVIEW - 20% DESIGN	04/12/2019
B	REVIEW - 60% DESIGN	04/12/2019
C	REVIEW - 90% DESIGN	04/12/2019
D	ISSUED FOR CLIENT REVIEW	04/12/2019
E	ISSUED FOR CONSTRUCTION	04/12/2019
DRAWN BY	CHECK BY	CREATED
KAS	FJM	02/26/2018

PROJECT TITLE:
**N BAYSHORE DR
 SHORELINE
 IMPROVEMENTS**

CLIENT:
 ANTRIM COUNTY ROAD COM
 319 E LINCOLN ST., PO BOX 308
 MANCERLONA, MI 49669

SHEET TITLE:
**NOTES
 &
 SPECIFICATIONS**

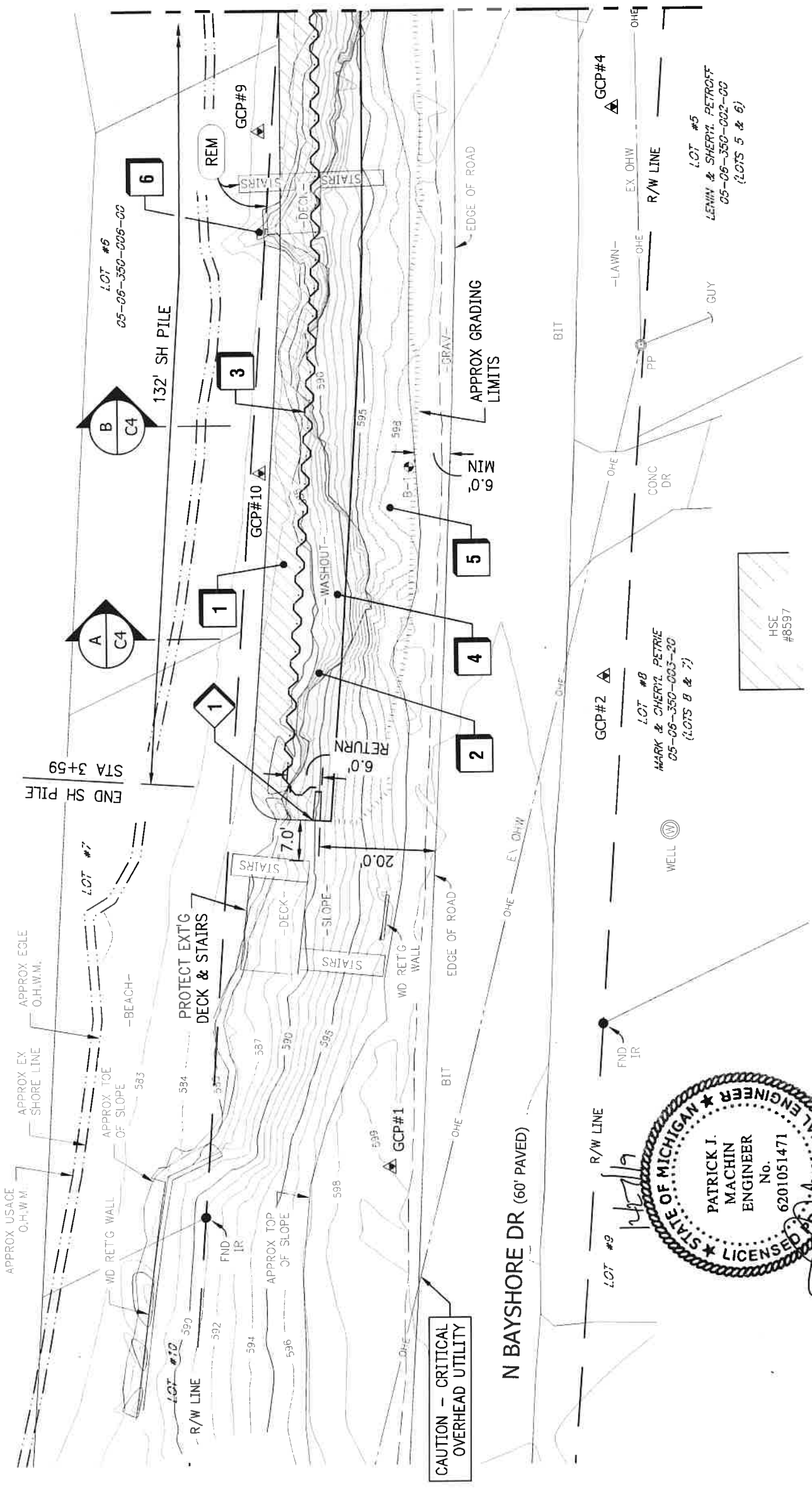
PROJECT NUMBER
19209

SHEET NUMBER
R2



WATER SURFACE
EL=581.58
(11/29/2019)

GRAND TRAVERSE BAY - EAST ARM



MATCH LINE - SEE SHEET C-2

KEY NOTES

- 1** INSTALL ARMOR STONE. SEE DESIGN CROSS SECTION SHEETS
- 2** INSTALL SPLASH STONE. SEE DESIGN CROSS SECTION SHEETS
- 3** INSTALL PROPOSED EZ88 SHEET PILE WALL W/ ST CAP SEE DETAIL '1/C8'
- 4** FILL WASH OUT AREA WITH LOCAL SAND
- 5** INSTALL SLOPE ARMOR W/ TRM P300 OR EQUAL
- 6** EXCAVATE & REMOVE PENINSULA FEATURE TO MATCH PROP WORK
- 1** TAPER STONE TO TIE IN FLUSH

LEGEND

- REM** REMOVE ITEM
- Tree Line
- Wetland
- PROP ARMOR STONE
- PROP STONE
- PROP TURF REINF'T MAT
- HORIZ CONTROL PNT
- SOIL BORING
- Gravel
- Ditch Line
- GRADING LIMITS

NOTE:
1. TOPOGRAPHIC CONTOURS ARE FOR REFERENCE ONLY AND ARE NOT INTENDED FOR DESIGN AND SHOULD BE USED W/CARE THEY ARE REPRESENTATIVE OF AN AERIAL IMAGING PERFORMED BY MACHIN ENGINEERING, INC NOVEMBER 25, 2019
2. BASIS OF BEARING IS THE SUPERVISOR'S PLAT OF ELK RAPIDS SHORES, OF LOTS 3, 4, 5, 6, 7, 8, 9, 10



CAUTION - CRITICAL OVERHEAD UTILITY

N BAYSHORE DR (60' PAVED)



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LUDINGTON, MI
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PRINT NAME

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6201051471
REG. NO.
MACHIN ENGINEERING, INC
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EXP 10/31/2020
DATE

REV#	DESCRIPTION	DATE
A	REVIEW - 30% DESIGN	4/5/2019
B	REVIEW - 60% DESIGN	4/5/2019
C	REVIEW - 90% DESIGN	4/5/2019
D	DESIGN FOR CONSTRUCTION	4/5/2019
E	ISSUED FOR CONSTRUCTION	4/5/2019

DESIGNED BY: [Signature]
CHECKED BY: [Signature]
APPROVED BY: [Signature]
DATE: 12/06/2019

PROJECT TITLE:
**N BAYSHORE DR
SHORELINE
IMPROVEMENTS**

CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCLONA, MI 49659

SHEET TITLE:
**SITE
PLAN**

PROJECT NUMBER
19209

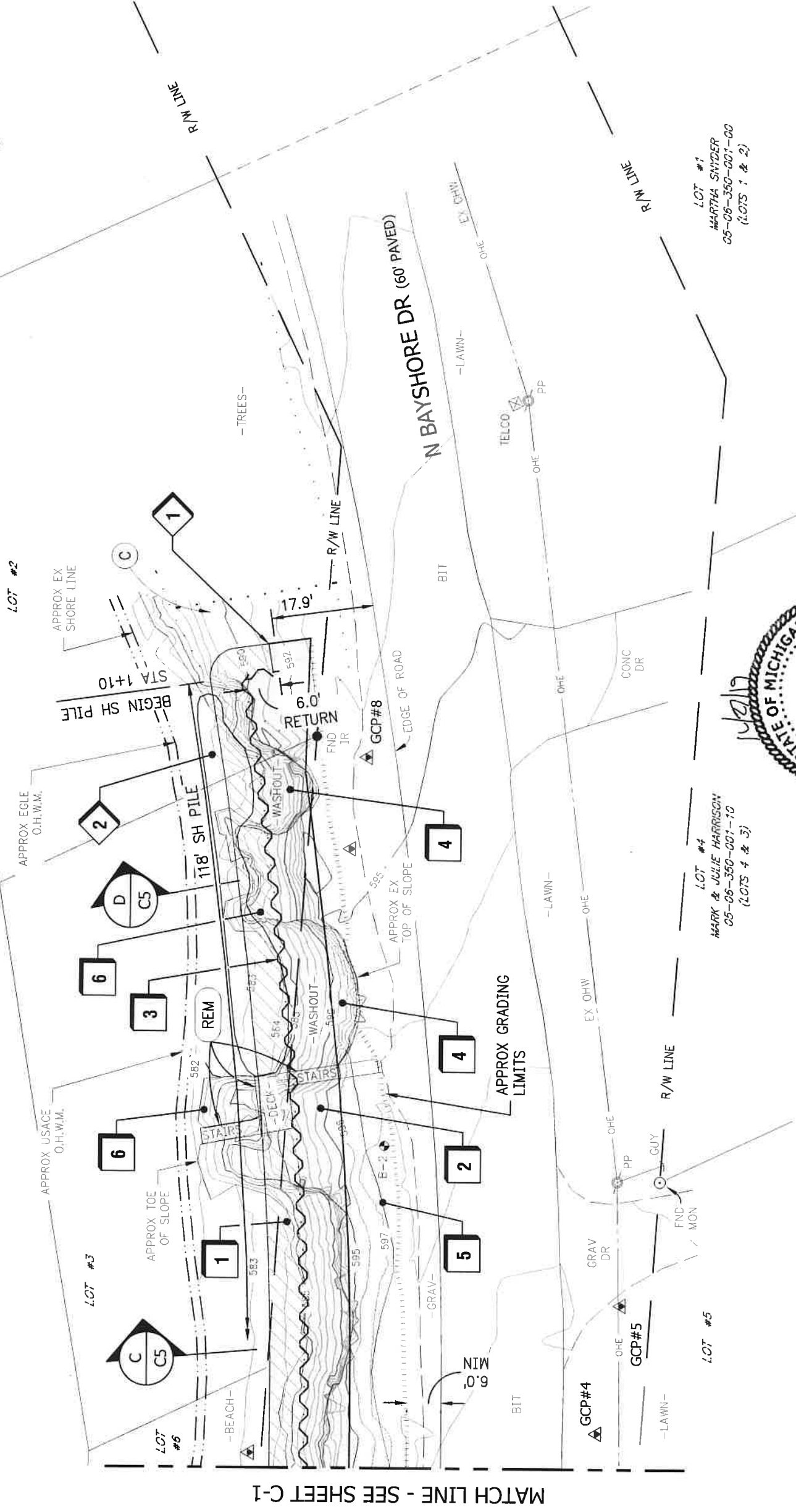
SHEET NUMBER
C1

GRAPHIC SCALE: 1 inch = 20 feet



WATER SURFACE
EL=581.68
(11/29/2019)

GRAND TRAVERSE BAY - EAST ARM



MATCH LINE - SEE SHEET C-1

KEY NOTES

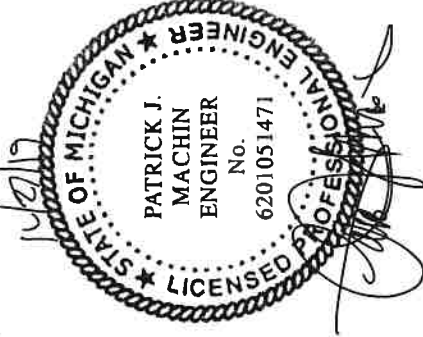
- 1** INSTALL ARMOR STONE. SEE DESIGN CROSS SECTION SHEETS
- 2** INSTALL SPLASH STONE. SEE DESIGN CROSS SECTION SHEETS
- 3** INSTALL PROPOSED E288 SHEET PILE WALL W/ ST CAP SEE DETAIL '1/C8'
- 4** FILL WASH OUT AREA WITH LOCAL SAND
- 5** INSTALL SLOPE ARMOR W/ TRM P300 OR EQUAL
- 6** EXCAVATE & REMOVE PENINSULA FEATURE TO MATCH PROP WORK
- 1** TAPER STONE TO TIE IN FLUSH
- 2** REMOVE & REUSE EXT'G RIP RAP AS ARMOR STONE APPROX 82 TONS IN PLACE

LEGEND

- C** CLEARING
- REM** REMOVE ITEM
- Tree Line
- Wetland
- Gravel
- Ditch Line
- PROP ARMOR STONE
- PROP STONE
- PROP TURF REINFT MAT
- GRADING LIMITS
- HORIZ CONTROL PNT
- SOIL BORING

NOTE:

1. TOPOGRAPHIC CONTOURS ARE FOR REFERENCE ONLY AND ARE NOT INTENDED FOR DESIGN AND SHOULD BE USED W/CARE. THEY ARE REPRESENTATIVE OF AIR AERIAL IMAGING PERFORMED BY MACHIN ENGINEERING, INC NOVEMBER 25, 2019
2. BASIS OF BEARING IS THE SUPERVISOR'S PLAT OF ELK RAPIDS SHORES, OF LOTS 3, 4, 5, 6, 7, 8, 9, 10



LOT #4
MARK & JULIE HARRISON
05-06-350-001-70
(LOTS 4 & 3)

LOT #1
MARTHA SNYDER
05-06-350-001-00
(LOTS 1 & 2)



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PRINT NAME

SIGNATURE
6201051471
REG. NO.

EXP 10/31/2020
DATE

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REV#	DESCRIPTION	DATE
A	REVIEW - 30% DESIGN	PAS 02816
B	REVIEW - 60% DESIGN	PAS 12119
C	REVIEW - 90% DESIGN	PAS 12219
D	ISSUED FOR CLIENT REVIEW	PAS 12219
E	ISSUED FOR CONSTRUCTION	EMT 12219
DATE	CHECK BY	APPROVED BY
6/26/2019	RAM	RAM

PROJECT TITLE:

N BAYSHORE DR
SHORELINE
IMPROVEMENTS

CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCELONA, MI 49659

SHEET TITLE:

SITE
PLAN

PROJECT NUMBER
19209

SHEET NUMBER
C2



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PATRICK J. MACHIN
PRINT NAME

SIGNATURE
6201051471 EXP. 10/31/2020
REG. NO. DATE

MACHIN ENGINEERING, INC
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REV#	DESCRIPTION	DATE
A	REVIEW - 30% DESIGN	6/5/2019
B	REVIEW - 50% DESIGN	6/5/2019
C	REVIEW - 30% DESIGN	6/5/2019
D	ISSUED FOR CLIENT REVIEW	6/5/2019
E	ISSUED FOR CONSTRUCTION	6/21/2019

DRAWN BY: PAM
CHECKED BY: PAM
DATE: 12/06/2019

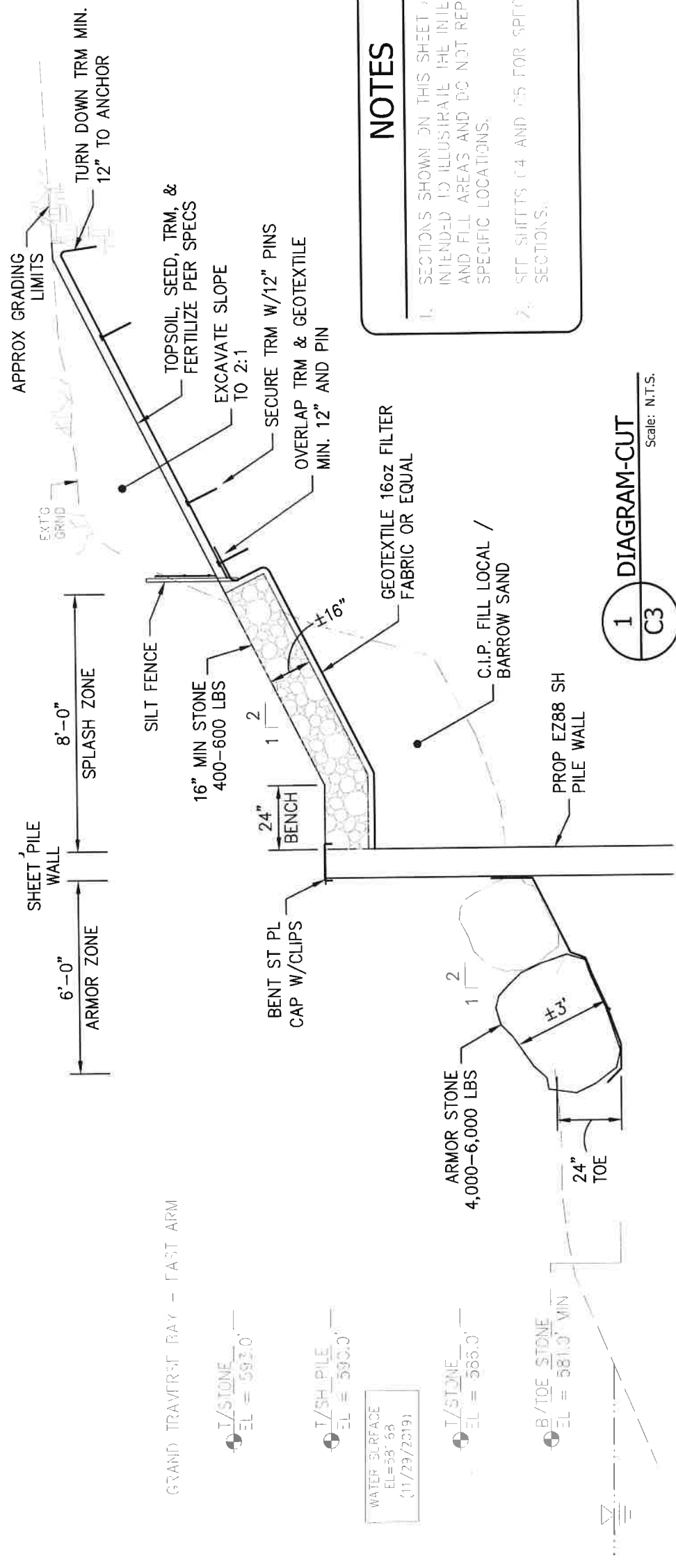
PROJECT TITLE:
**N BAYSHORE DR
SHORELINE
IMPROVEMENTS**

CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCELONA, MI 49659

SHEET TITLE:
**DIAGRAM
CUT
&
FILL**

PROJECT NUMBER
19209

SHEET NUMBER
C3

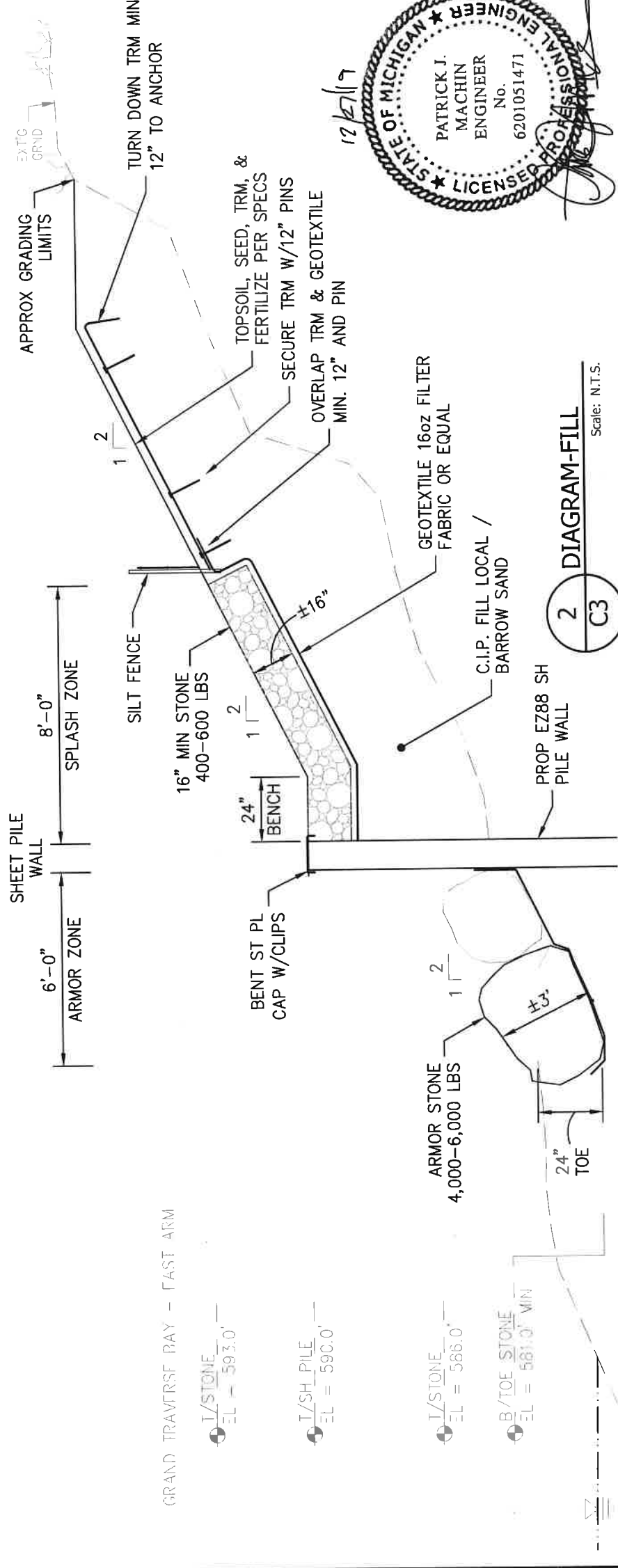


NOTES

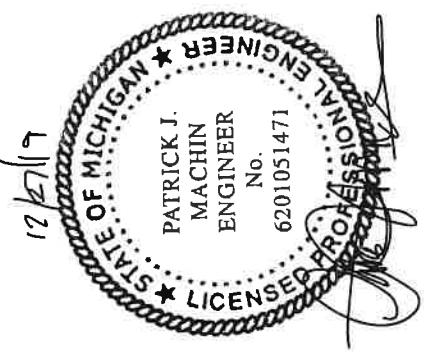
1. SECTIONS SHOWN ON THIS SHEET ARE INTENDED TO ILLUSTRATE THE INTENDED CUT AND FILL AREAS AND DO NOT REPRESENT SPECIFIC LOCATIONS.

2. SET SHIFTS C4 AND C5 FOR SPECIFIC CROSS SECTIONS.

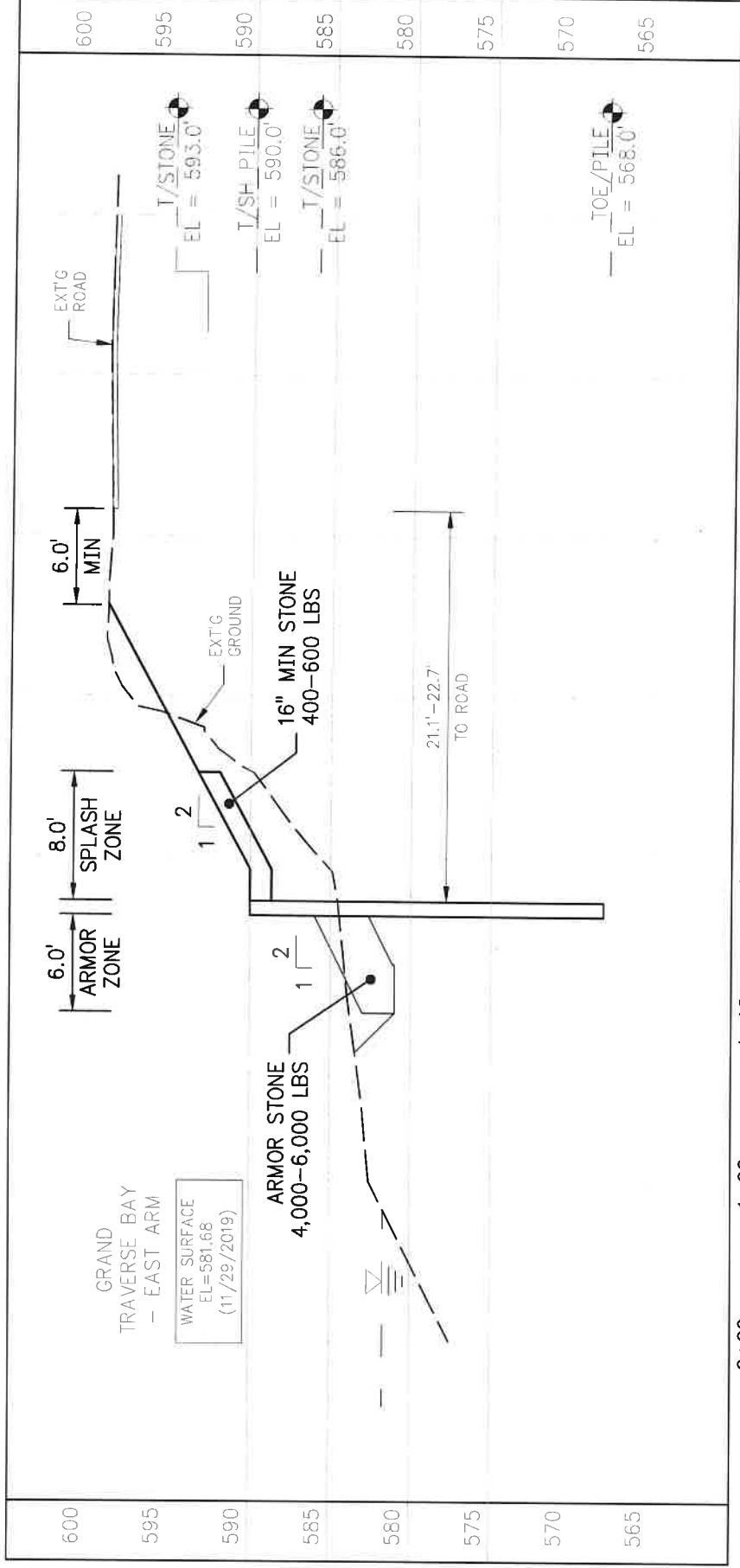
1 **DIAGRAM-CUT**
Scale: N.T.S.



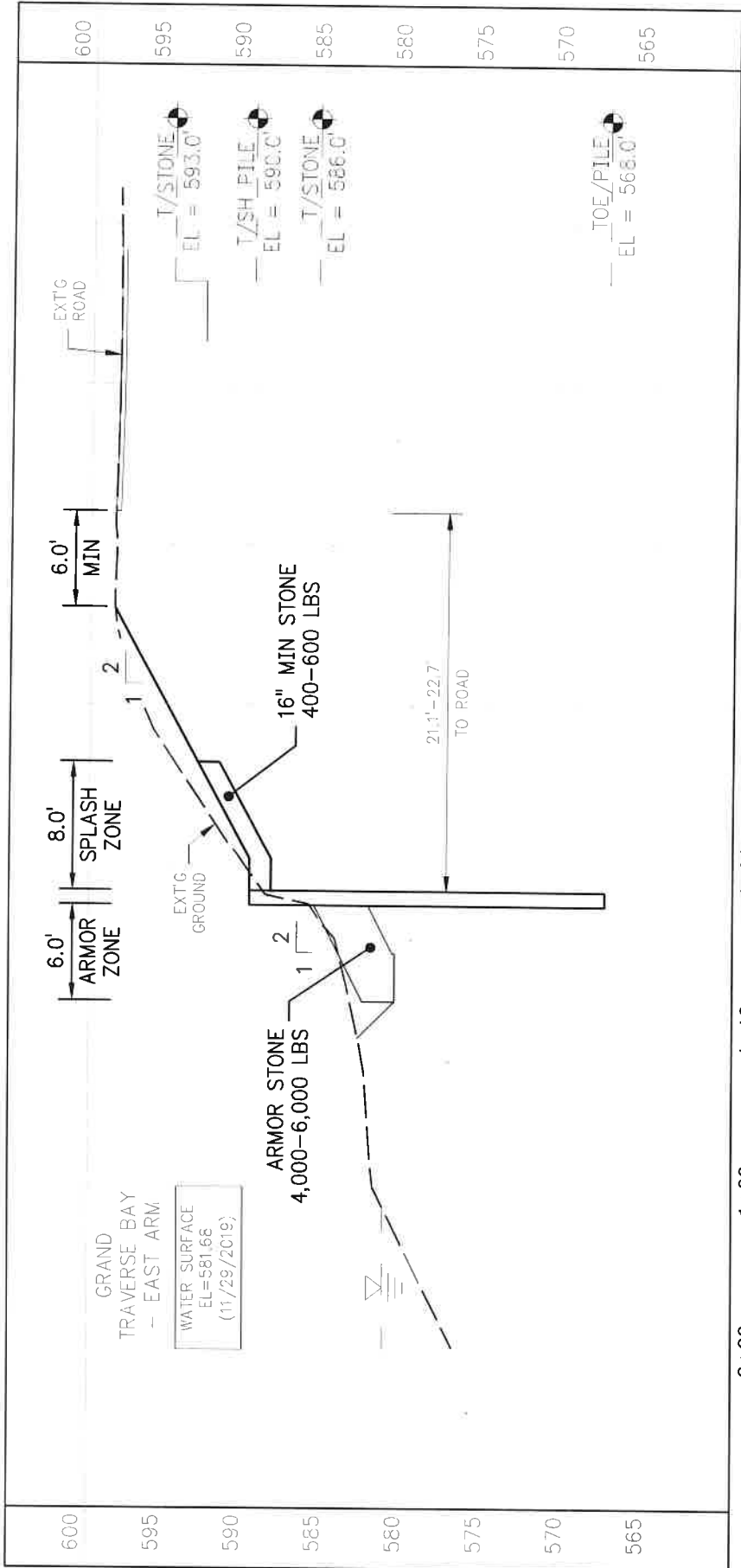
2 **DIAGRAM-FILL**
Scale: N.T.S.



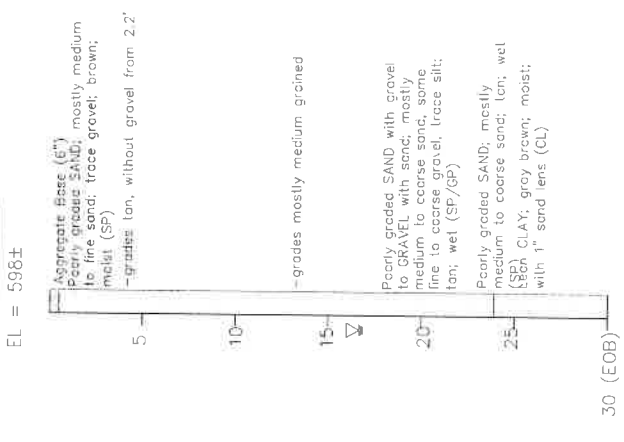
CROSS SECTION A-A (TYP)



CROSS SECTION B-B (TYP)



BORING B-1



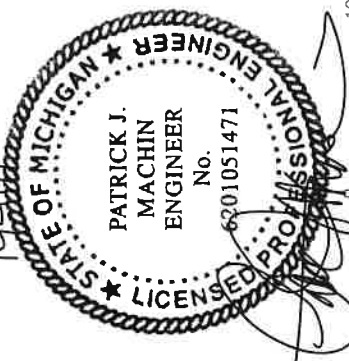
NOTES

- SECTIONS ARE TO SHOWN TO REPRESENT THE GENERAL REQUIREMENTS OF THE PROJECT FOR MAINTAINING ALIGNMENT OF THE SHEETING WITH RESPECT TO CUT AND FILL SECTIONS.
- EXCAVATED SOILS ARE INTENDED FOR USE IN FILL AREAS TO MAINTAIN LINE AND GRADE. IMPORTED FILL MAY BE REQUIRED TO MEET THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

ARMOR STONE TOTAL QTY:

SECTION A:
 68' x 8' = 544 SFT
 544 SFT x 3' / 27 CFT / CYC = 60 CYC

SECTION B:
 63' x 8' = 504 SFT
 504 SFT x 3' / 27 CFT / CYC = 56 CYC



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PATRICK J. MACHIN
 PRINT NAME

SIGNATURE
 6201051471 EXP 10/31/2020 DATE

REG. NO. DATE

MACHINEENGINEERING, INC
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REV#	DESCRIPTION	DATE
A	REVIEW - 50% DESIGN	KAS120619
E	REVIEW - 60% DESIGN	KAS121119
C	REVIEW - 90% DESIGN	KAS122119
D	ISSUED FOR CLIENT REVIEW	KAS122119
E	ISSUED FOR CONSTRUCTION	EVA122619

DRAWN BY: KAS
 CHECK BY: FJM
 APPROVED BY: FJM
 CREATED: 10/26/2019

PROJECT TITLE:
**N BAYSHORE DR
 SHORELINE
 IMPROVEMENTS**

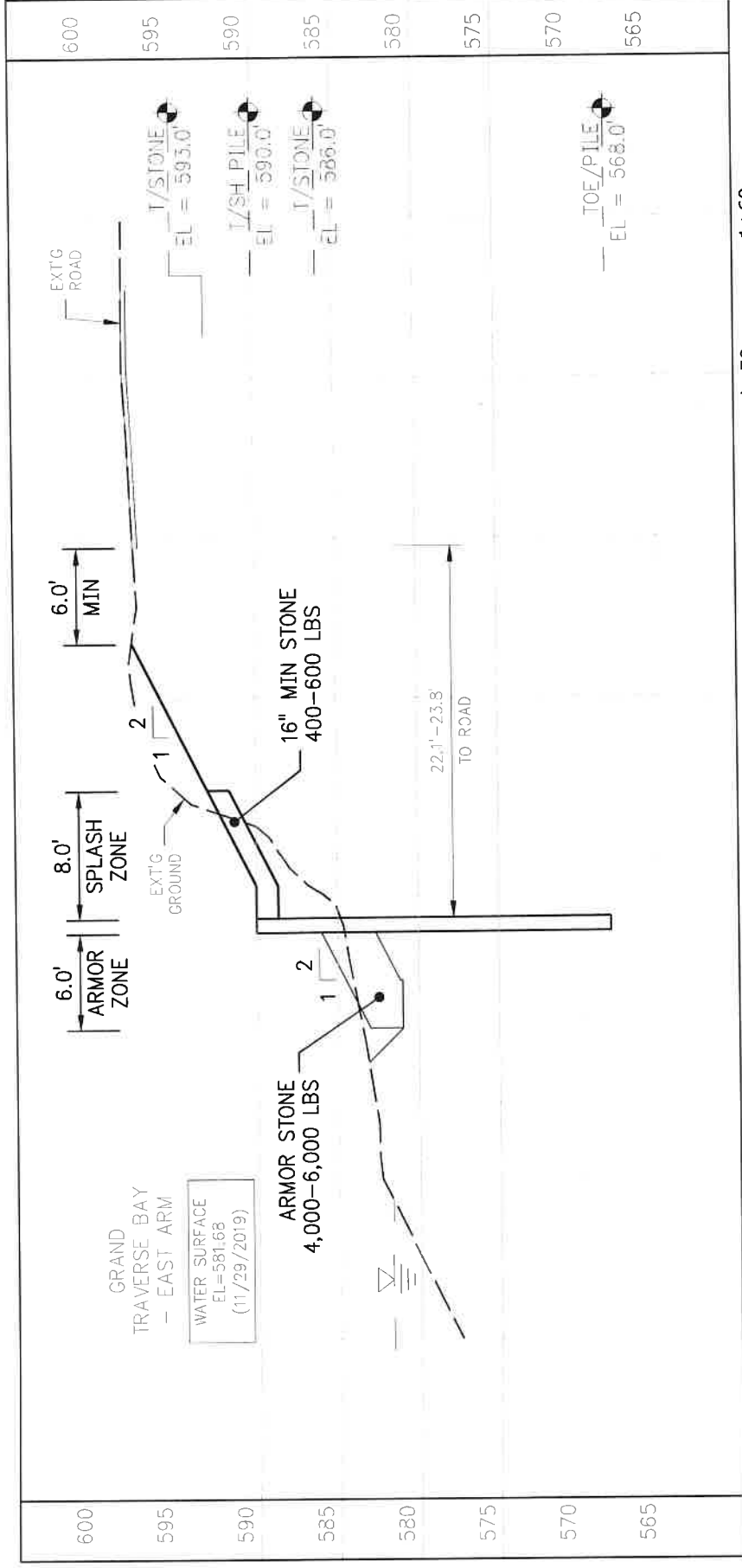
CLIENT:
 ANTRIM COUNTY ROAD COM
 319 E LINGOLN ST., PO BOX 308
 MANCERONA, MI 49659

SHEET TITLE:
**DESIGN
 CROSS SECTIONS**

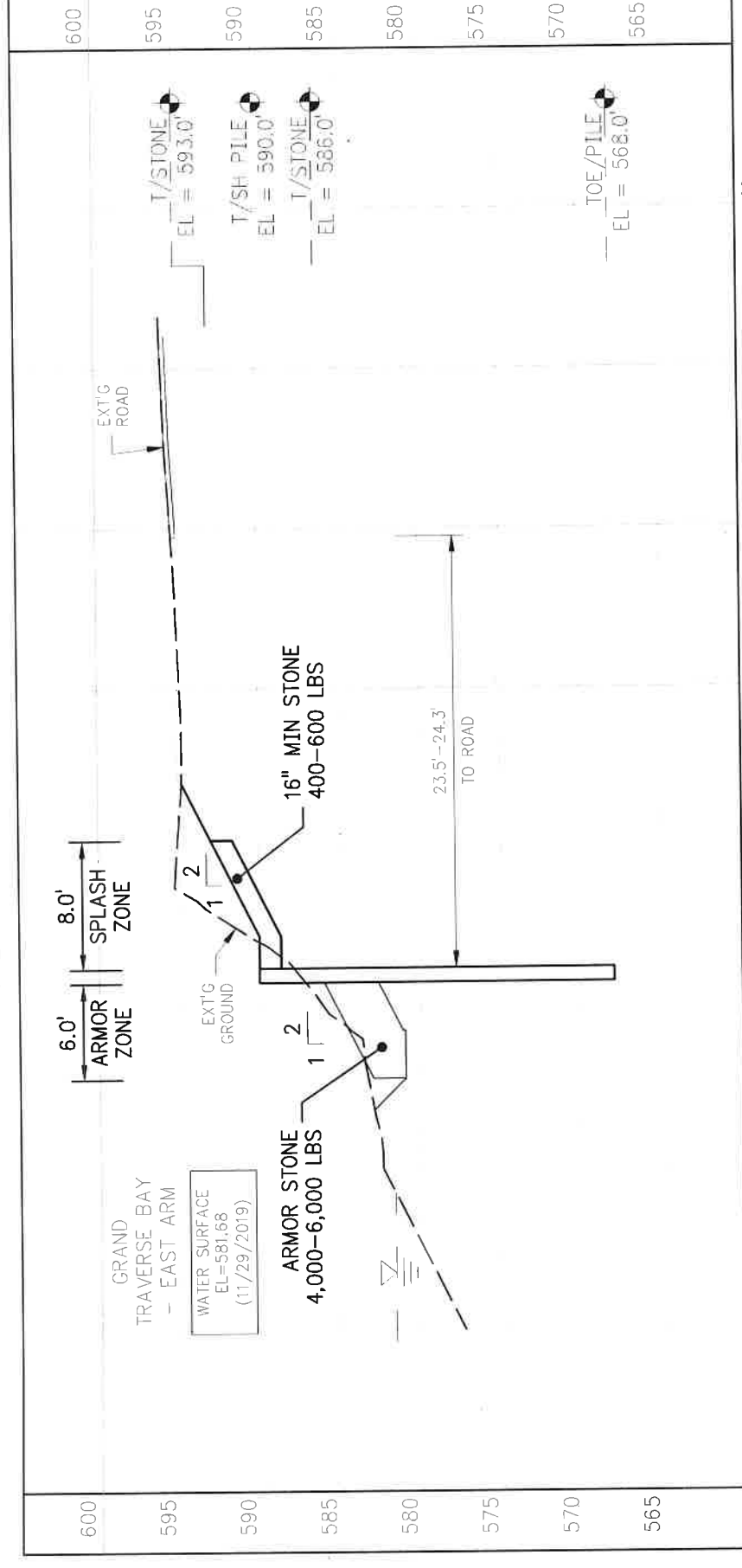
PROJECT NUMBER
19209

SHEET NUMBER
C4

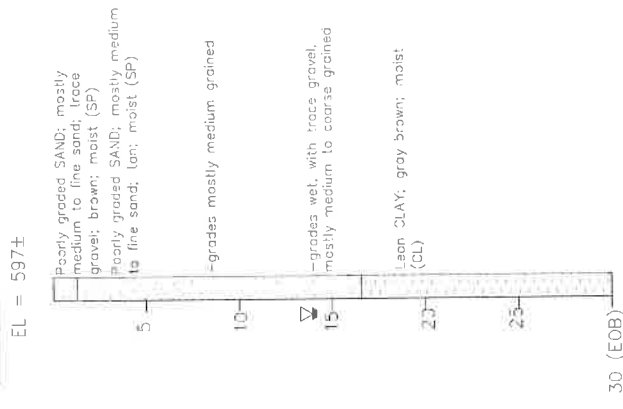
CROSS SECTION C-C (TYP)



CROSS SECTION D-D (TYP)



BORING B-2



NOTES

- SECTIONS ARE TO SHOWN TO REPRESENT THE GENERAL REQUIREMENTS OF THE PROJECT FOR MAINTAINING ALIGNMENT OF THE SHEETING WITH RESPECT TO CUT AND FILL SECTIONS.
- EXCAVATED SOILS ARE INTENDED FOR USE IN FILL AREAS TO MAINTAIN LINE AND GRADE. IMPORTED FILL MAY BE REQUIRED TO MEET THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.

ARMOR STONE TOTAL QTY'S:

SECTION C:
 63' x 8' = 504 SFT
 504 SFT x 3' / 27 CFT / CYD = 56 CYD

SECTION D:
 68' x 8' = 544 SFT
 544 SFT x 3' / 27 CFT / CYD = 60 CYD



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A	REVIEW - 30% DESIGN	04/12/2019
B	REVIEW - 60% DESIGN	04/12/2019
C	REVIEW - 90% DESIGN	04/12/2019
D	ISSUED FOR CLIENT REVIEW	04/12/2019
E	ISSUED FOR CONSTRUCTION	04/12/2019
DATE	APPROVED BY	CREATED
04/12/2019	PJM	04/12/2019

PROJECT TITLE:
**N BAYSHORE DR
 SHORELINE
 IMPROVEMENTS**

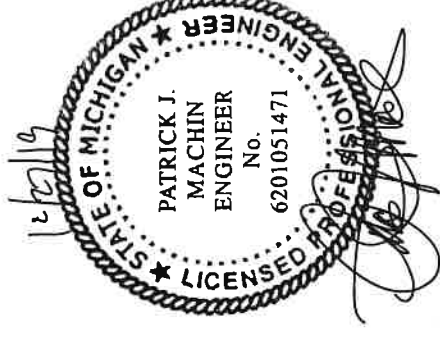
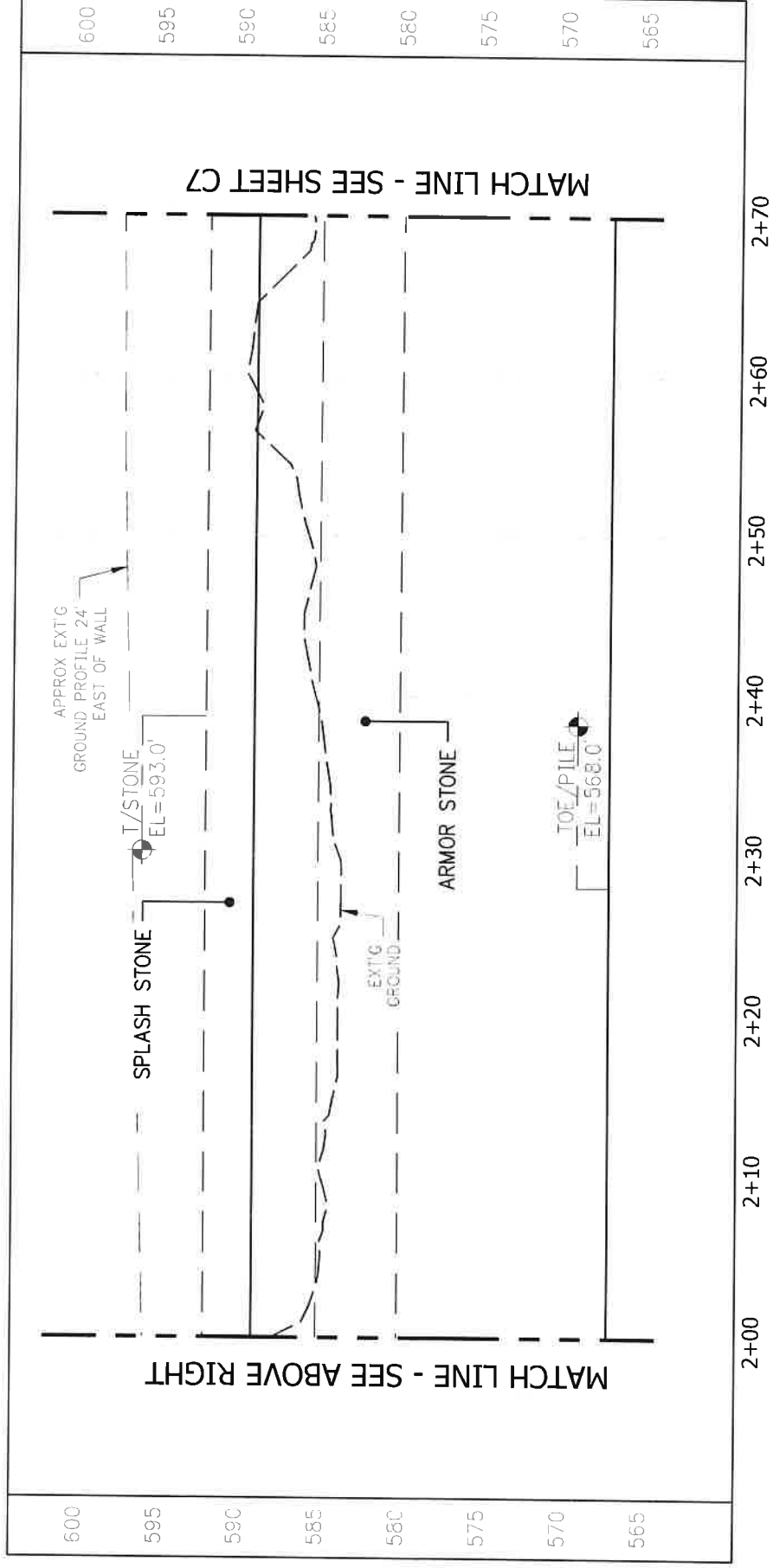
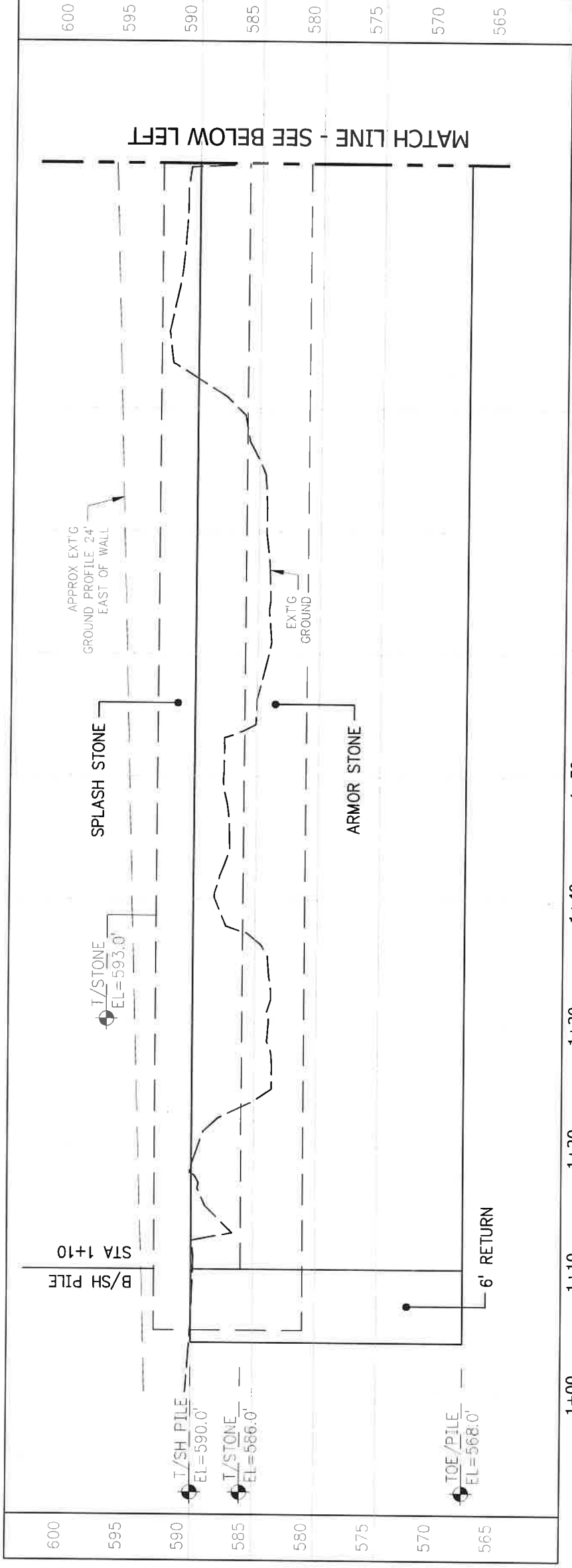
CLIENT:
 ANTRIM COUNTY ROAD COM
 319 E LINCOLN ST., PO BOX 308
 MANCILONA, MI 49659

SHEET TITLE:
**DESIGN
 CROSS SECTIONS**

PROJECT NUMBER
19209

SHEET NUMBER
C5

SHEET PILE PROFILE



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Incorporation

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PATRICK J. MACHIN
PRINT NAME

SIGNATURE
6201051471 EXP 10/31/2020 DATE

REG. NO. DATE

MACHIN ENGINEERING, INC
ORIGINAL DOCUMENT(S) ARE STORED AT

REV#	DESCRIPTION	DATE
A	REVIEW - 20% DESIGN	KAS 08/13/19
B	REVIEW - 50% DESIGN	KAS 09/11/19
C	REVIEW - 50% DESIGN	KAS 10/23/19
D	ISSUED FOR CLIENT REVIEW	KAS 10/23/19
E	ISSUED FOR CONSTRUCTION	ENV 10/23/19

DRAWN BY: KAS
CHECK BY: RSM
APPROVED BY: ENV
CREATED: 12/02/2019

PROJECT TITLE:
**N BAYSHORE DR
SHORELINE
IMPROVEMENTS**

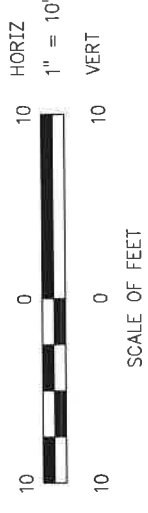
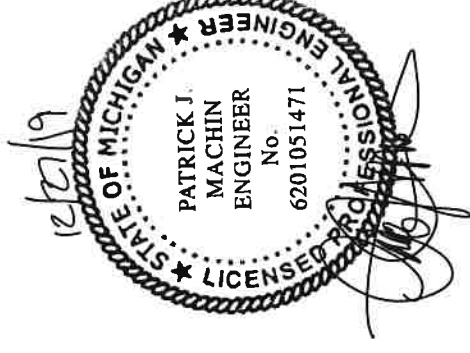
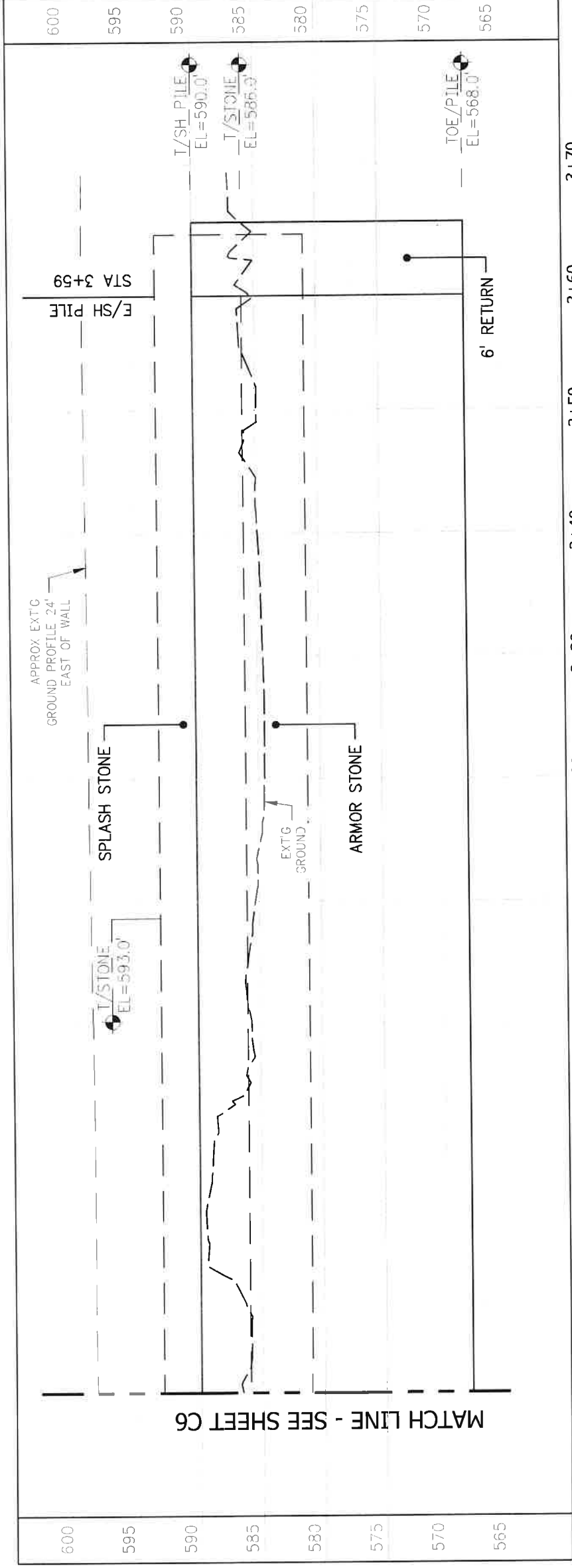
CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCERLONA, MI 49659

SHEET TITLE:
**DESIGN
SHEET PILE
PROFILE**

PROJECT NUMBER
19209

SHEET NUMBER
C6

SHEET PILE PROFILE



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incorporation
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LUDINGTON, MI
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PATRICK J. MACHIN
PRINT NAME

SIGNATURE
6201051471 EXP. 10/31/2020 DATE
REG. NO.

ORIGINAL DOCUMENT(S) ARE STORED AT
MACHIN ENGINEERING, INC.

REV#	DESCRIPTION	DATE
A	REVIEW - 30% DESIGN	KAS120619
B	REVIEW - 60% DESIGN	KAS121113
C	REVIEW - 90% DESIGN	KAS122113
D	ISSUED FOR CLIENT REVIEW	KAS122119
E	ISSUED FOR CONSTRUCTION	EMM122519

DRAWN BY: PSM
CHECKED BY: PSM
APPROVED BY: PSM
DATE: 12/06/2019

PROJECT TITLE:
**N BAYSHORE DR
SHORELINE
IMPROVEMENTS**

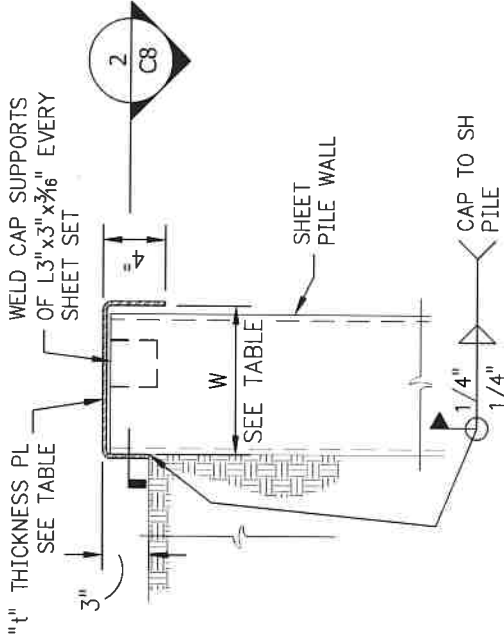
CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCILONA, MI 49659

SHEET TITLE:
**DESIGN
SHEET PILE
PROFILE**

PROJECT NUMBER **19209**
SHEET NUMBER **C7**

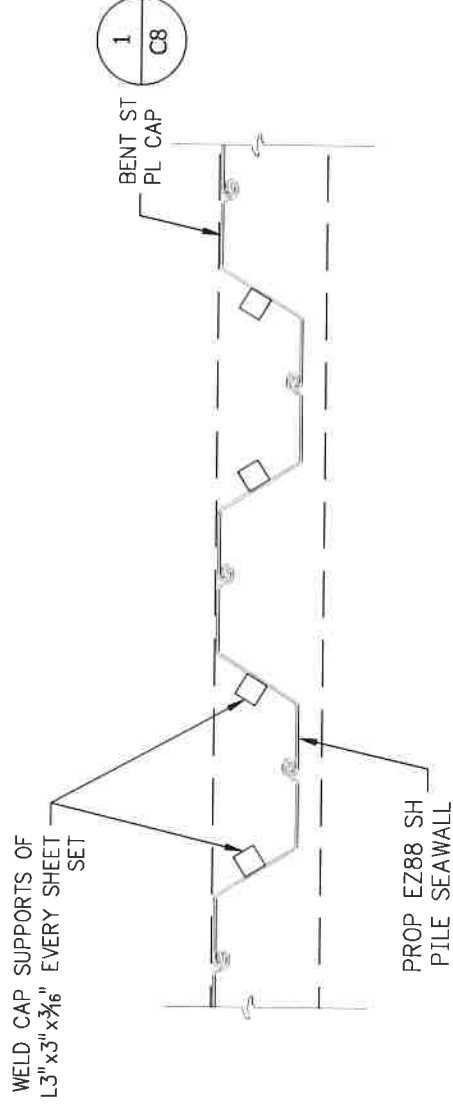
PILE CAP SCHEDULE

SHEET PILE	"W"	"t"
EZ88	14"	1/4"



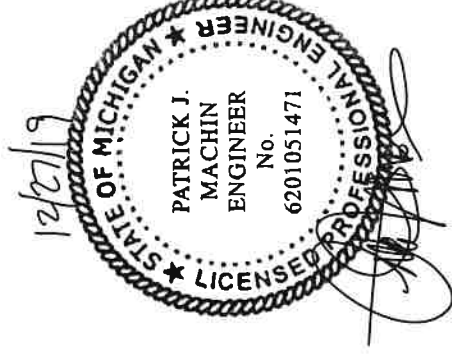
1 BENT SHEET PLATE CAP DETAIL

Scale: 1"=1'-0"



2 SECTION

Scale: 1"=1'-0"



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LUDINGTON, MI
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PATRICK J. MACHIN
PRINT NAME

SIGNATURE
6201051471 EXP. 10/31/2020
REG. NO. DATE
MACHIN ENGINEERING, INC.

ORIGINAL DOCUMENT(S) ARE STORED AT

REV#	DESCRIPTION	DATE
A	REVIEW - 30% DESIGN	MS120615
B	REVIEW - 40% DESIGN	MS121115
C	REVIEW - 50% DESIGN	MS122319
D	ISSUED FOR CLIENT REVIEW	MS122319
E	ISSUED FOR CONSTRUCTION	EM122815
DRAWN BY	CHECKED BY	APPROVED BY
MS	PM	EM
		DATE
		12/26/2019

PROJECT TITLE:

**N BAYSHORE DR
SHORELINE
IMPROVEMENTS**

CLIENT:
ANTRIM COUNTY ROAD COM
319 E LINCOLN ST., PO BOX 308
MANCERONA, MI 49659

SHEET TITLE:

**STRUCTURAL
DETAILS**

PROJECT NUMBER
19209

SHEET NUMBER
C8