



# Maryland

## Department of the Environment

Larry Hogan, Governor  
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary  
Horacio Tablada, Deputy Secretary

January 21, 2022

Tim Whittie, City of Havre de Grace  
c/o Joshua Hansen  
Underwood & Associates  
PO Box 6593  
Annapolis, MD 21078  
Via Email: [joshua@ecosystemrestoration.com](mailto:joshua@ecosystemrestoration.com)

Re: Agency Interest Number: 167832  
Tracking Number: 202060853  
Tidal Authorization Number: 21-WQC-0330

Dear Mr. Whittie:

Your project did not qualify for approval under the Maryland State Programmatic General Permit (MDSPGP); therefore a separate review and issuance of the federal permit will be required by the U.S. Army Corps of Engineers. The federal permit is not attached.

A project that does not qualify for approval under the MDSPGP requires an individual Water Quality Certification (WQC) to be issued by the Maryland Department of the Environment, which is attached. Please take a moment to read and review your WQC to ensure that you understand the limits of the authorized work and all of the general and special conditions.

You should not begin any work until you have obtained all necessary State, local, and federal authorizations. Please contact Danielle Spendiff at 410-537-4023 or [danielle.spendiff1@maryland.gov](mailto:danielle.spendiff1@maryland.gov) with any questions.

Sincerely,

A handwritten signature in black ink that reads "Tammy K. Roberson".

Tammy K. Roberson  
Division Chief  
Tidal Wetlands Division



STATE OF MARYLAND  
DEPARTMENT OF THE ENVIRONMENT  
WATER AND SCIENCE ADMINISTRATION  
WATER QUALITY CERTIFICATION



**21-WQC-0330**

EFFECTIVE DATE: **1/21/2022**  
CERTIFICATION HOLDER: **City of Havre de Grace**  
**Attn: Tim Whittie**  
ADDRESS: **711 Pennington Ave.**  
**Havre de Grace, MD 21078**  
PROJECT LOCATION: **Water Street & Otsego Street**  
**Havre de Grace, MD 21078**  
**Susquehanna River in Harford County**

**UNDER AUTHORITY OF SECTION 401 OF THE FEDERAL WATER POLLUTION CONTROL ACT AND ITS AMENDMENTS AND IN ACCORDANCE WITH § 9-313 THROUGH § 9-323, INCLUSIVE, OF THE ENVIRONMENT ARTICLE, ANNOTATED CODE OF MARYLAND, THE MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE or DEPARTMENT), WATER AND SCIENCE ADMINISTRATION HAS DETERMINED THAT THE REGULATED ACTIVITIES DESCRIBED IN THE REQUEST FOR CERTIFICATION FOR THE PROPOSED HAVRE DE GRACE LIVING SHORELINE AND BOAT RAMP AND AS DESCRIBED IN THE ATTACHED PLAN SHEETS DATED 12/21/2021 AND 1/7/2022 AND ANY SUBSEQUENT MODIFICATIONS TO STATE ISSUED AUTHORIZATIONS WILL NOT VIOLATE MARYLAND'S WATER QUALITY STANDARDS, IF CONDUCTED IN ACCORDANCE WITH THE CONDITIONS OF THIS CERTIFICATION.**

THIS CERTIFICATION DOES NOT RELIEVE THE APPLICANT OF RESPONSIBILITY FOR OBTAINING ANY OTHER APPROVALS, LICENSES, OR PERMITS IN ACCORDANCE WITH FEDERAL, STATE, OR LOCAL REQUIREMENTS AND DOES NOT AUTHORIZE COMMENCEMENT OF THE PROPOSED PROJECT. A COPY OF THIS REQUIRED CERTIFICATION HAS BEEN SENT TO THE CORPS OF ENGINEERS. THE CERTIFICATION HOLDER SHALL COMPLY WITH THE CONDITIONS LISTED BELOW.

## **PROJECT DESCRIPTION**

1. Fill and grade with 2.73 acres (18,136 cubic yards) of sand, gravel, cobble and boulders along 2,482 feet of shoreline to create a living shoreline consisting of headland structures with embayments in between;
  - a. construct 5 headland structures utilizing cobble and boulders up to a maximum of 91 feet channelward of the existing mean high water line (MHWL);

- b. emplace fill on top of 1,389 linear feet of existing bulkhead and 896 linear feet of existing revetment;
  - c. remove or grade 50 linear feet of existing revetment; place fill within 4 embayment areas up to a maximum of 103 feet from existing MHWL and to plant with 48,321 square feet of marsh vegetation and 23,990 square feet of transitional vegetation,
2. Emplace anchored coarse woody debris to provide habitat and to function as containment structures and trap debris;
  3. Construct 3 stormwater outfall reconnections within the proposed living shoreline utilizing step-pool conveyance systems and cobble/gravel aprons up to a maximum of 68 feet from existing MHWL;
  4. Construct 2, 4-foot wide soft sand kayak launches within the proposed living shoreline up to a maximum of 51 feet from existing MHWL;
  5. Relocate an existing floating pier and platform structure a maximum of 41.3 feet channelward of the proposed mean high water line.
  6. Construct a new 80-foot long by 37-foot wide boat ramp extending a maximum of 80 feet channelward from the mean high water line;
  7. Remove 147 linear feet of existing steel and wood bulkhead and excavate to construct the new boat ramp and install 129 linear feet of new steel bulkhead along the south perimeter;
  8. Construct a 7-foot by 49-foot concrete pier ramp and a 6-foot by 60-foot floating pier with one guide pile at the end extending a maximum of 110 feet from the mean high water line; and
  9. Construct 112 linear feet of new steel bulkhead a maximum of 10 feet from the existing wood bulkhead along the north perimeter of the proposed ramp, and backfill with a total of 595 cubic yards of material.

## **GENERAL CONDITIONS**

1. This Certification does not obviate the need to obtain required authorizations or approvals from other State, federal or local agencies as required by law.
2. The Certification Holder shall obtain any and all additional authorizations or approvals, including self-certifying General Permits issued by the Department, and shall comply with all conditions of such authorizations.
3. All fill and construction materials not used in the project shall be removed and disposed of in a manner which will prevent their entry into waters of this State.
4. The proposed project shall be constructed in accordance with the approved final plan by the Department, or, if Department approval is not required, the plan approved by the U.S. Army Corps of Engineers; and its approved revisions.
5. This Certification does not authorize any injury to private property, any invasion of rights, or any infringement of federal, state, or local laws or regulations.

6. The Certification Holder shall allow authorized representatives of the Department access to the site of authorized activities during normal business hours to conduct inspections and evaluations of the operations and records necessary to assure compliance with this Certification.
7. This Certification is valid for the project identified herein and the associated U.S. Army Corps of Engineers authorization until such time that it expires or is not administratively extended.

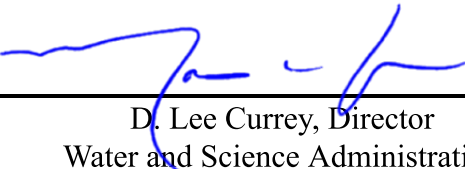
## **SPECIAL CONDITIONS**

1. The Certification Holder shall meet all water quality-related performance standards and conditions required by the Department in any state issued authorization for activities in tidal wetlands to ensure that any discharges will not result in a failure to comply with water quality standards in COMAR 26.08.02. or other water quality requirements of state law or regulation.
2. The Certification Holder shall not perform any in-water work from April 15th through October 15th of any year due to the presence of submerged aquatic vegetation, unless waived or amended by the Department.
3. The Certification Holder shall complete construction of the bulkhead prior to filling behind the bulkhead. The bulkhead shall be designed and constructed to prevent the loss of fill material to waters of the United States and waters of the state. . Only clean fill, which is free of organic, toxic, contaminated, or deleterious materials, shall be used.
4. The Certification Holder shall comply with all requirements of the attached Soil Management Plan dated August 24, 2021 (Revised November 23, 2021) or as modified and approved by MDE's Land & Materials Administration.
5. The Certification Holder shall construct the marsh establishment area in accordance with the following conditions:
  - a) The Certification Holder shall use clean substrate fill material, no more than 10% of which shall pass through a standard number 100 sieve.
  - b) The marsh establishment area shall be planted within one year following completion of the filling operation.
  - c) The marsh establishment project shall be maintained as a wetland, with non-nuisance species' aerial coverage of at least 85% for three consecutive years. If 85% coverage is not attained, the reasons for failure shall be determined, corrective measures shall be taken, and the area shall be replanted.
  - d) If the fill is graded hydraulically, the Certification Holder shall use a turbidity curtain around the perimeter of the instream work.
  - e) If the existing bank is to be cleared or graded:
    - 1) The Certification Holder shall perform all work under and in accordance with an approved Soil Erosion and Sediment Control Plan from the applicable sediment and erosion control agency; and
    - 2) The Certification Holder shall perform all work under and in accordance with the Critical Area requirements of the local jurisdiction in the form of an approved Buffer Management Plan.

6. The Certification Holder shall accept and comply with the terms of the marsh maintenance plan by providing to the U.S. Army Corps of Engineers a copy of the signed marsh maintenance plan and copy of the standard plan as provided to the Water and Science Administration, Tidal Wetlands Division in accordance with state authorizations prior to commencement of any work subject to this Certification. If the Certification Holder wishes to propose an alternative marsh maintenance plan, the alternative plan must be submitted to and approved by the Tidal Wetlands Division, Water and Science Administration, and provided to the U.S. Army Corps of Engineers prior to commencement of any work subject to this Certification. Any alternative plan must provide assurances of success that are at least equivalent to those of the standard plan as provided to the Water and Science Administration, Tidal Wetlands Division in accordance with state authorizations , in terms of the extent of native marsh plant coverage, elimination of invasive species and timeframe for plant establishment.
7. The Certification Holder shall submit photographs on an annual basis for the first five growing seasons to the Water and Science Administration, Tidal Wetlands Division in order to document the success of the project in terms of the extent of native marsh plant coverage. Photographs shall be taken from at least two directions, as necessary to fully depict the living shoreline.
8. The Certification Holder will be required to conduct compensatory mitigation in accordance with state issued authorization for any area(s) of marsh creation not meeting the 85% native wetlands species coverage criteria after the first three years of monitoring.
9. Prior to the completion of work authorized under this Certification, the Certification Holder shall provide an SAV Monitoring Plan to the Water and Science Administration, Tidal Wetlands Division, with the area proposed for 21,107 square feet of SAV recolonization defined and documented. The SAV monitoring plan will receive final concurrence from the MDE Tidal Wetlands Division and the BPW Wetlands Administration, in consultation with Maryland Department of Natural Resources.. The area to be monitored shall include the entire impact area, as well as an area extending 200 meters upstream and downstream of the project area and extending to a depth of 2 meters channelward, in order to determine if adjacent SAV has been impacted. Reference sites outside the potential zone of effects should also be monitored to help differentiate between construction effects and any regional changes that may affect SAV survival.
10. The Certification Holder shall monitor annually the entire project site, and submit an annual report to the Water and Science Administration, Tidal Wetlands Division for a period of 3 years post-construction in accordance with the approved SAV Monitoring Plan to determine if there are additional SAV losses resulting from the proposed project which require mitigation and to determine the success of recolonization. Compensatory mitigation will be required for permanent loss of SAV beyond the proposed 15,408 square feet of net SAV loss from the project.
11. The Certification Holder conducting activities which result in the loss of tidal wetlands shall implement mitigation in accordance with state issued authorizations and in accordance with a plan approved by the U.S. Army Corps of Engineers.
12. The Certification Holder shall maintain the mitigation site and monitor for 5 years subsequent to the completion of site construction. The Certification Holder shall submit a monitoring report to the Water and Science Administration, Tidal Wetlands Division verifying that the wetland construction has been successful no later than December 31 of each year per the required 5 years of monitoring.

13. The Certification Holder shall not stockpile any material in Waters of the U.S. or state or private tidal wetlands.
14. The Certification Holder shall securely anchor the woody debris depicted on the plan sheets dated December 21, 2021. Prior to the commencement of any work authorized under this Certification, the Certification Holder shall submit an action plan to the Water and Science Administration, Tidal Wetlands Division providing assurances that the woody debris is properly anchored and actions that will be taken if the woody debris becomes unanchored and/or becomes a navigation hazard.
15. The Certification Holder shall deploy and maintain a turbidity curtain tightly around and channelward of the project area prior to any excavation and backfilling along the shoreline through completion of any excavation and backfilling along the shoreline.
16. The Certification Holder shall obtain and comply with the appropriate stormwater management approval authority authorization to ensure that discharges from the constructed facility do not violate water quality standards and result in erosive flows downstream.
17. Prior to the commencement of any work authorized under this Certification, approved sediment and erosion control plans and stormwater management plans shall be submitted to the Water and Science Administration, Tidal Wetlands Division.
18. Stormwater discharges shall have velocity no greater than four feet per second for the two-year storm in order to prevent erosion in the receiving waterway or wetland.

**CERTIFICATION APPROVED**

  
\_\_\_\_\_  
D. Lee Currey, Director  
Water and Science Administration

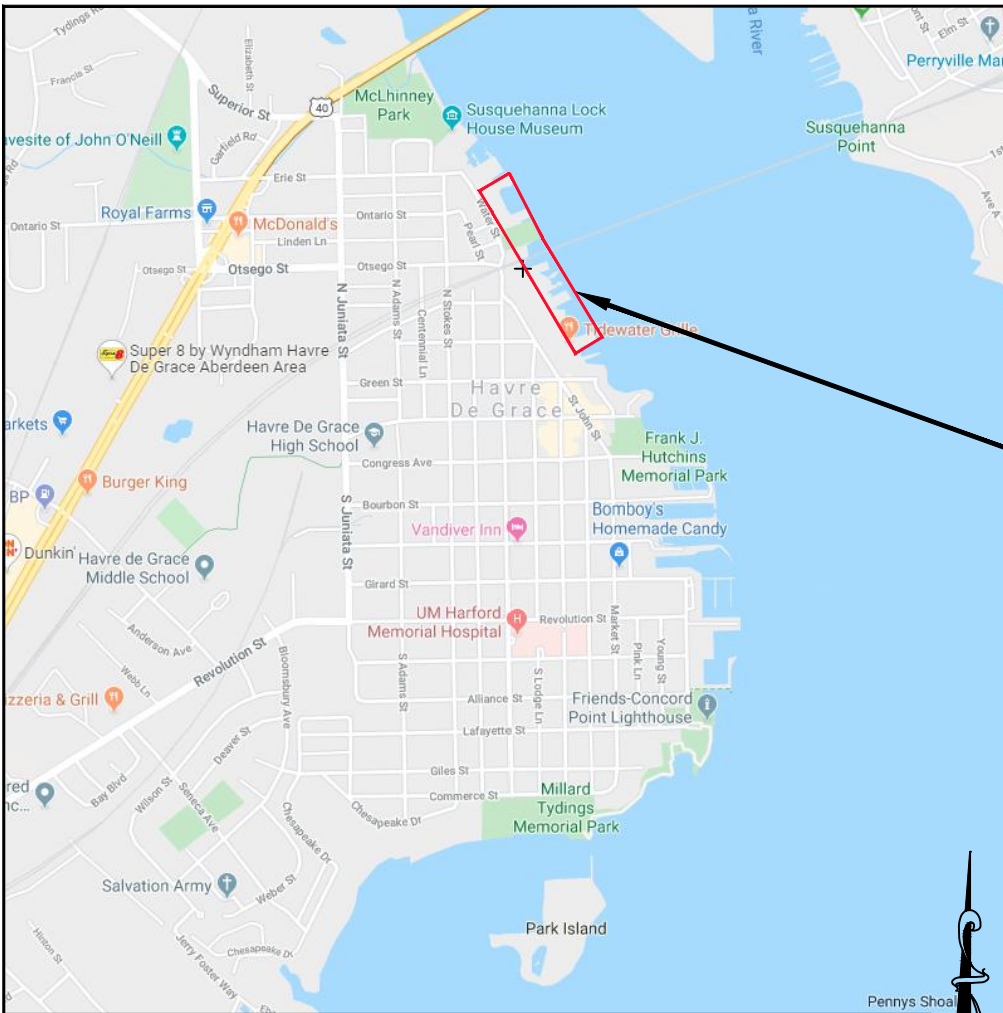
1/24/2022  
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Date

Tracking Number: 202060853  
Agency Interest Number: 167832

Effective Date: January 21, 2022

Enclosure: Plan Sheets dated 12/21/2021 (20-WL-0558) and 1/7/2022 (20-WL-0531)  
Soil Management Plan

cc: WSA Inspection & Compliance Program  
Army Corps of Engineers



VICINITY MAP



PROJECT AREA

PLAN

SCALE: 1"=500'

**SHEET INDEX**

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 202060853  
 12/21/2021  
 Sheet 1 of 25

**UNDERWOOD & ASSOCIATES**  
 LANDSCAPE ARCHITECTURE ♦ ECOLOGICAL RESTORATION  
 A DESIGN/BUILD Co.  
 1753 EBLING TRAIL • ANNAPOLIS, MD 21401  
 Tel. 410-849-9211 Fax. 410-849-2136

|                   |                |
|-------------------|----------------|
| December 16, 2021 |                |
| Scale             | AS SHOWN       |
| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 1 Of 25        |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

**VICINITY MAP AND AERIAL PHOTO**

**WATER STREET LIVING SHORELINE**  
 HAVRE DE GRACE  
 TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
 653, 652, 473, 472, 470, & 463  
 6TH ELECTION DISTRICT, HARFORD COUNTY



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NOTE: DUE TO THE RIVER'S CURRENT, GRAVITY WAVES ARE NOT TYPICALLY PROPAGATED UPSTREAM UNLESS WAVE CELERITY REACHES 2x RIVER VELOCITY.

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**PLAN**

SCALE: 1"=1000'

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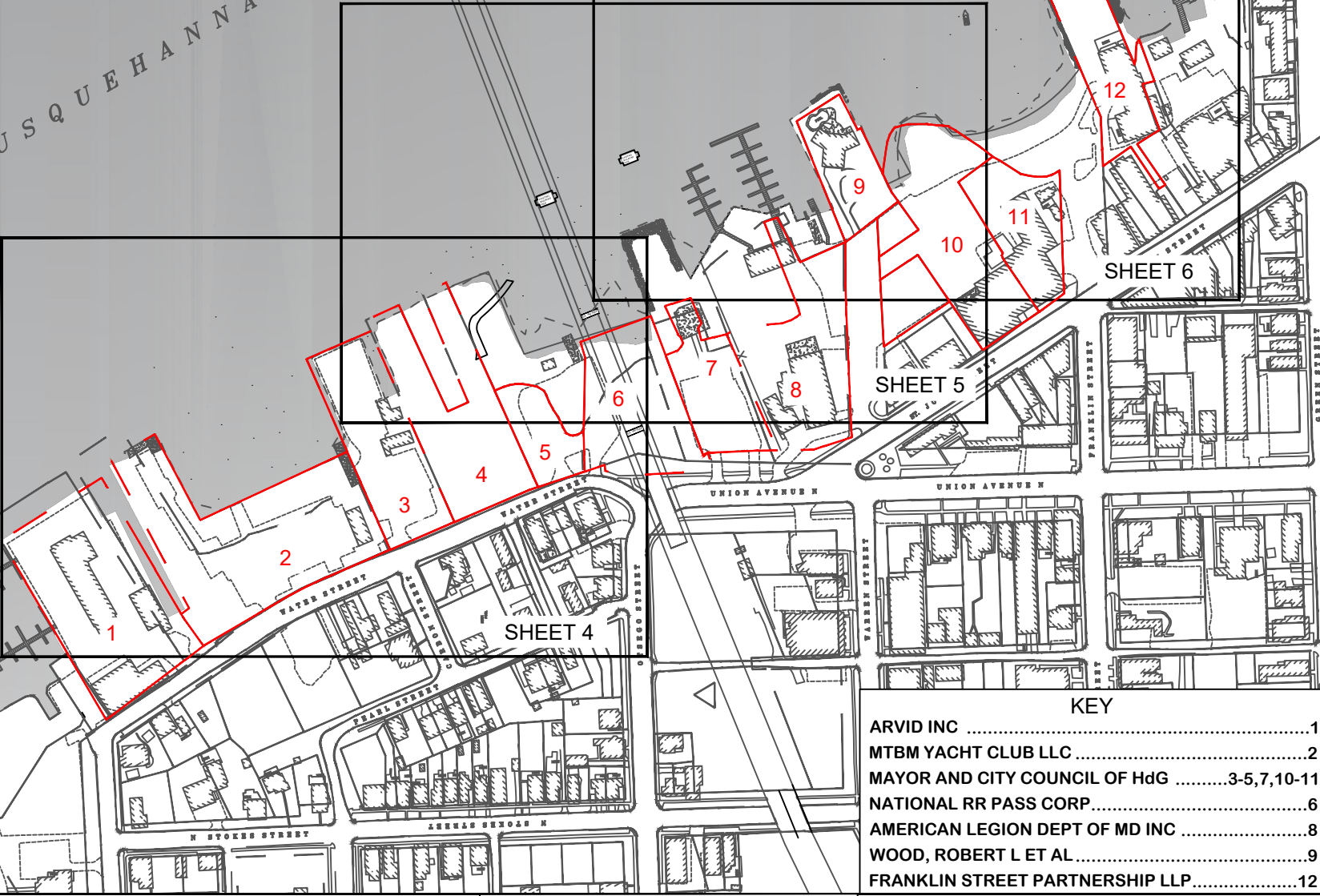
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| Drawn By          |  | J.H./J.K./K.B. |  |
| Approved By       |  | D.W.           |  |
| Sheet No.         |  | 2 Of 25        |  |
| USACE Project No. |  | NAB-2020-60853 |  |
| MDE Permit No.    |  | 20-WL-0558     |  |

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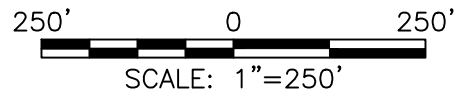
SUSQUEHANNA RIVER



| KEY                                   |             |
|---------------------------------------|-------------|
| ARVID INC .....                       | 1           |
| MTBM YACHT CLUB LLC .....             | 2           |
| MAYOR AND CITY COUNCIL OF HdG .....   | 3-5,7,10-11 |
| NATIONAL RR PASS CORP .....           | 6           |
| AMERICAN LEGION DEPT OF MD INC .....  | 8           |
| WOOD, ROBERT L ET AL .....            | 9           |
| FRANKLIN STREET PARTNERSHIP LLP ..... | 12          |

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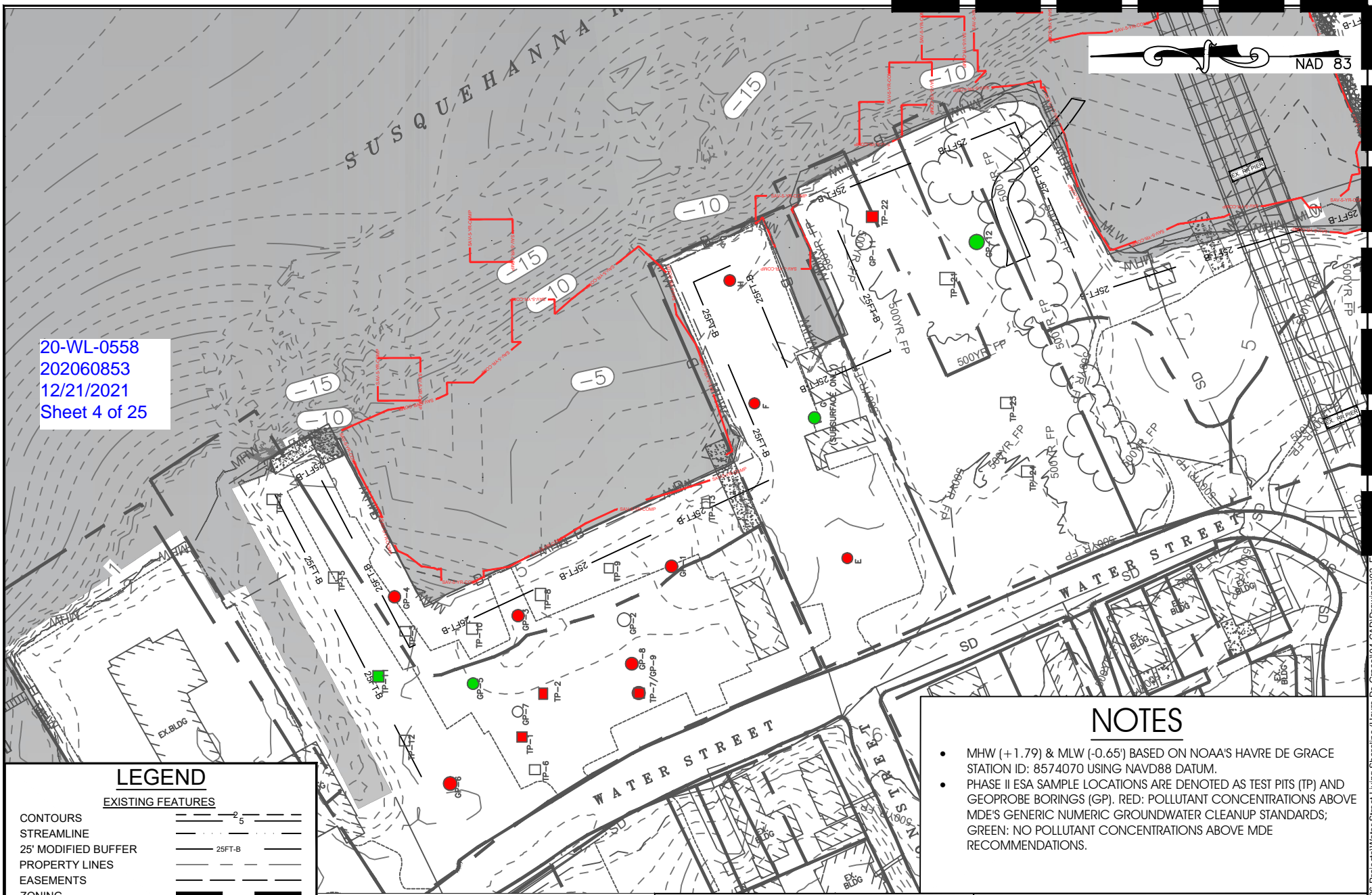
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| Approved By       | D.W.           |
| Sheet No.         | 3 Of 25        |
| USACE Project No. | NAB-2020-60853 |
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**EXISTING CONDITIONS INDEX**

**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
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6TH ELECTION DISTRICT, HARFORD COUNTY

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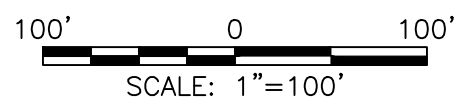
20-WL-0558  
202060853  
12/21/2021  
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**LEGEND**

**EXISTING FEATURES**

- CONTOURS -2 5
- STREAMLINE
- 25' MODIFIED BUFFER 25FT-B
- PROPERTY LINES
- EASEMENTS
- ZONING
- STORM DRAIN SD
- TREE CANOPY
- FENCE X
- 25' STEEP SLOPE BUFFER
- BUILDINGS
- ROADS
- DRIVEWAY
- TREES



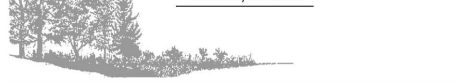
**NOTES**

- MHW (+1.79) & MLW (-0.65') BASED ON NOAA'S HAVRE DE GRACE STATION ID: 8574070 USING NAVD88 DATUM.
- PHASE II ESA SAMPLE LOCATIONS ARE DENOTED AS TEST PITS (TP) AND GEOPROBE BORINGS (GP). RED: POLLUTANT CONCENTRATIONS ABOVE MDE'S GENERIC NUMERIC GROUNDWATER CLEANUP STANDARDS; GREEN: NO POLLUTANT CONCENTRATIONS ABOVE MDE RECOMMENDATIONS.

December 16, 2021

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| Scale             | AS SHOWN       |
| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 4 Of 25        |
| USACE Project No. | NAB-2020-60853 |
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**EXISTING CONDITIONS**

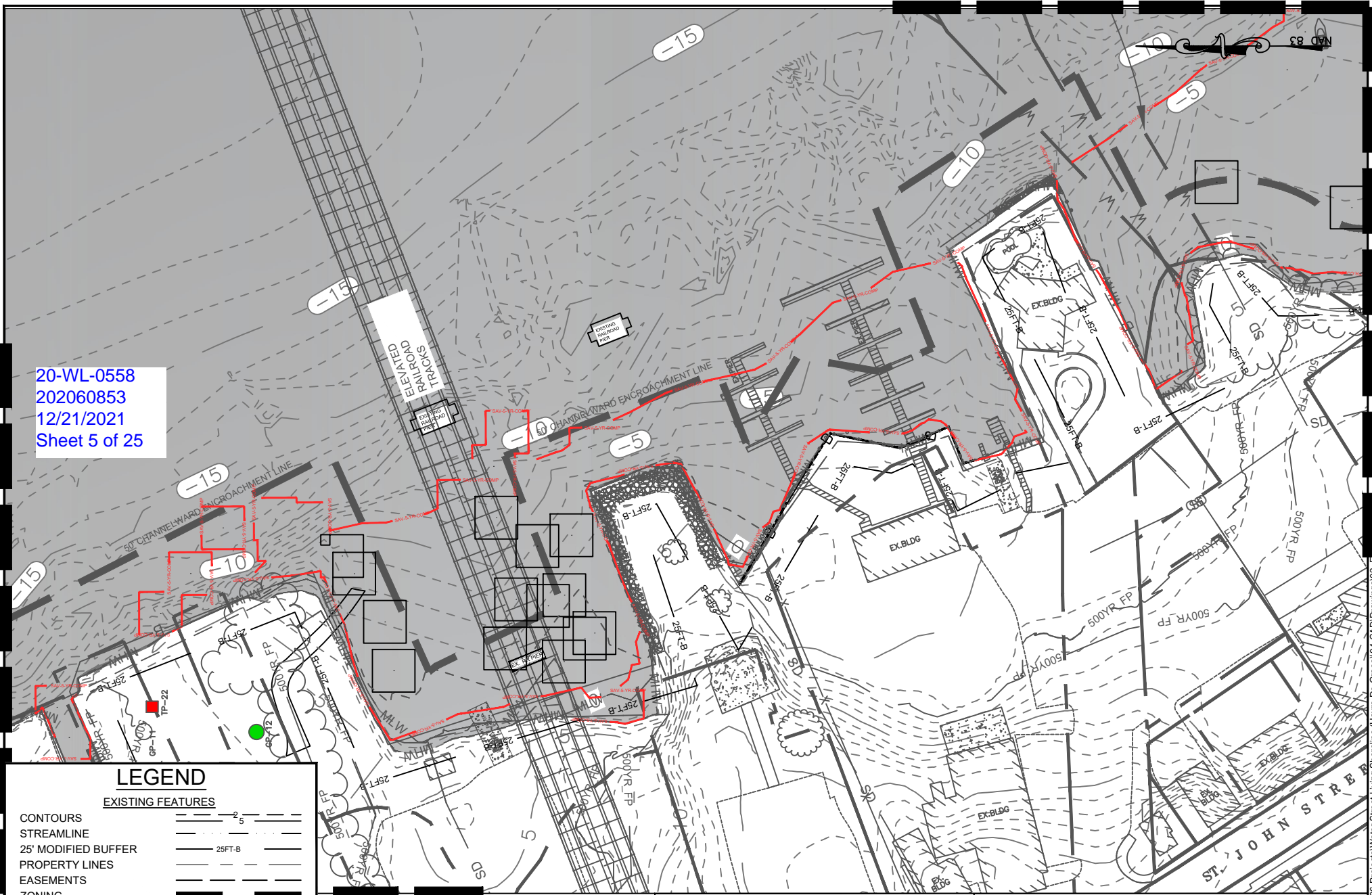
**WATER STREET LIVING SHORELINE**

HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
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202060853  
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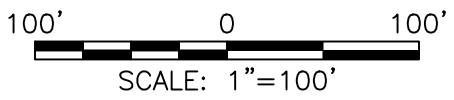
SEE SHEET 4



**LEGEND**

**EXISTING FEATURES**

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- STREAMLINE: [Symbol]
- 25' MODIFIED BUFFER: 25FT-B
- PROPERTY LINES: [Symbol]
- EASEMENTS: [Symbol]
- ZONING: [Symbol]
- STORM DRAIN: SD
- TREE CANOPY: [Symbol]
- FENCE: X
- 25' STEEP SLOPE BUFFER: [Symbol]
- BUILDINGS: [Symbol]
- ROADS: [Symbol]
- DRIVEWAY: [Symbol]
- TREES: [Symbol]
- WATER INTAKE PIPES: [Symbol]



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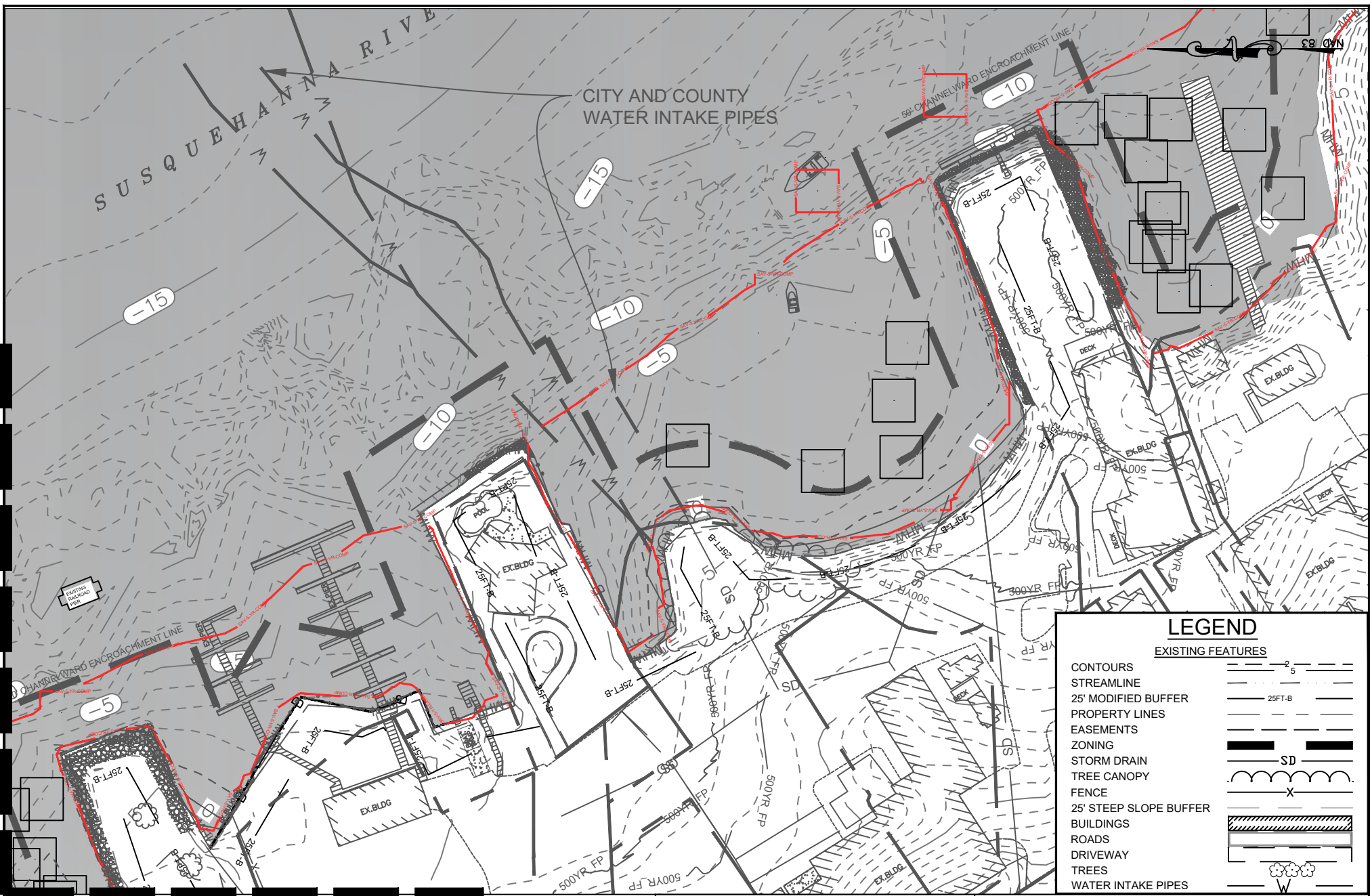
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| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 5 Of 25        |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

December 16, 2021

**EXISTING CONDITIONS**

**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
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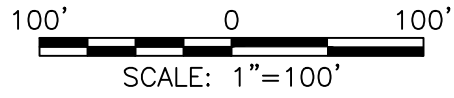
**LEGEND**

| EXISTING FEATURES      |        |
|------------------------|--------|
| CONTOURS               | -5     |
| STREAMLINE             |        |
| 25' MODIFIED BUFFER    | 25FT-B |
| PROPERTY LINES         |        |
| EASEMENTS              |        |
| ZONING                 |        |
| STORM DRAIN            | SD     |
| TREE CANOPY            |        |
| FENCE                  | X      |
| 25' STEEP SLOPE BUFFER |        |
| BUILDINGS              |        |
| ROADS                  |        |
| DRIVEWAY               |        |
| TREES                  |        |
| WATER INTAKE PIPES     |        |

December 16, 2021

SEE SHEET 5

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12/21/2021  
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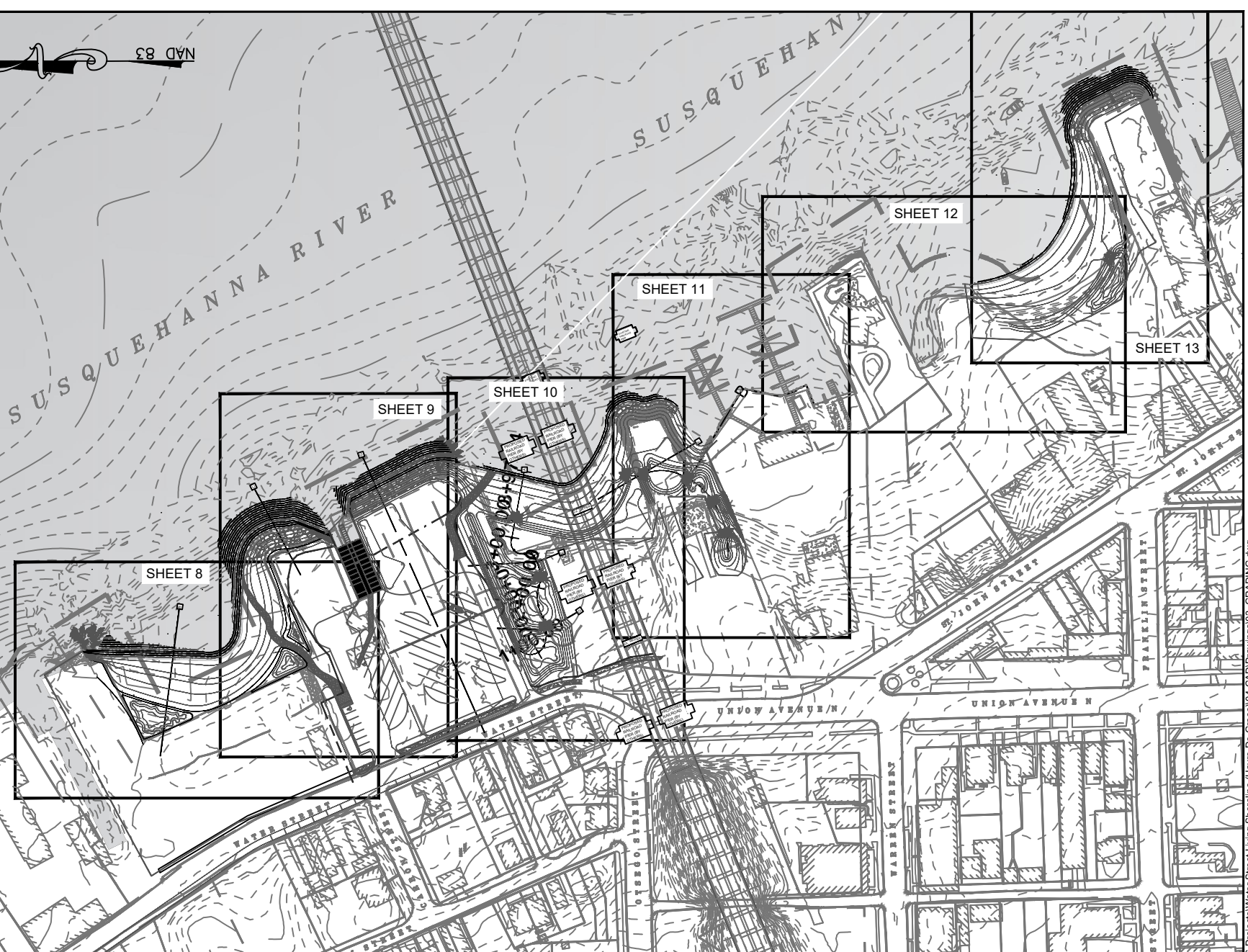
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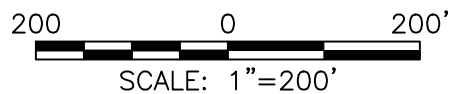
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| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

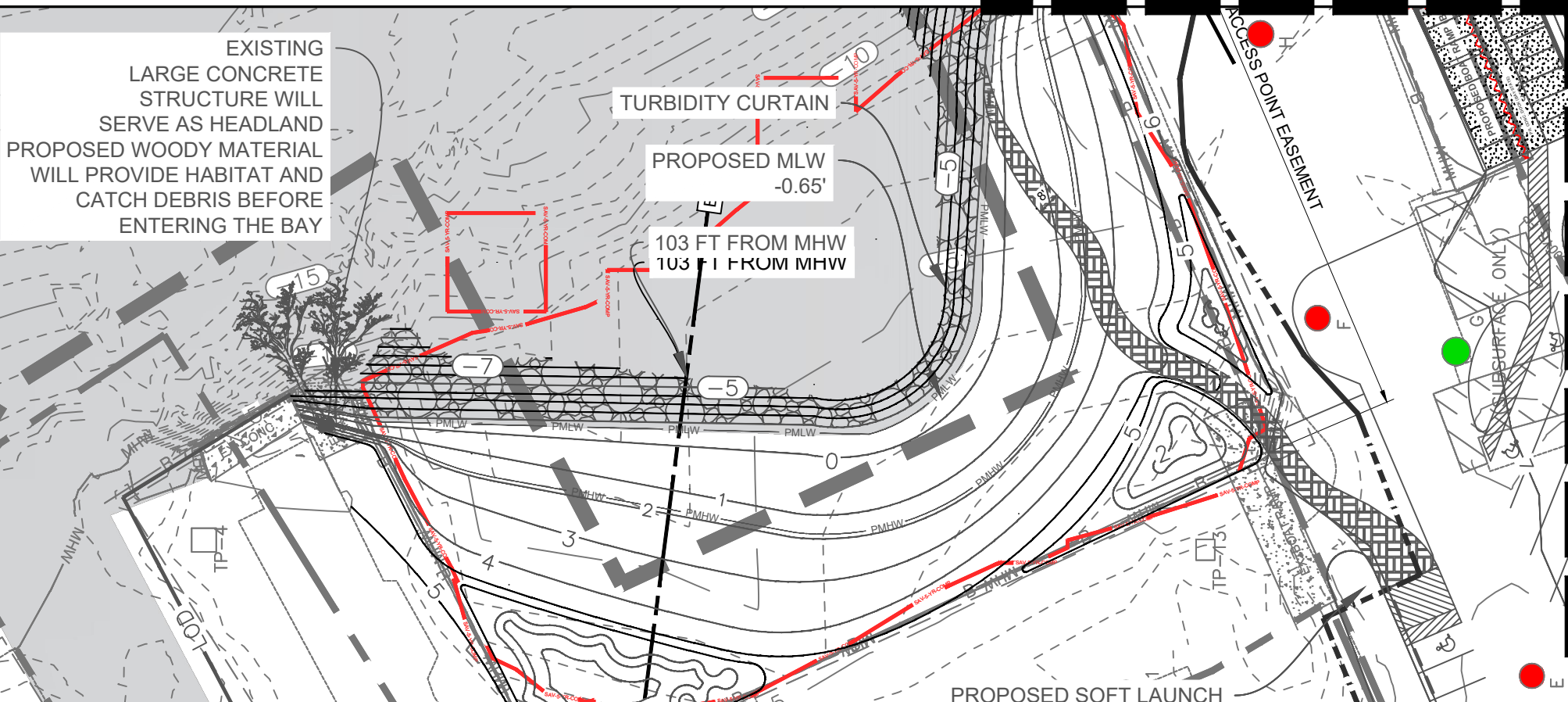
December 16, 2021

**PROPOSED CONDITIONS INDEX**

**WATER STREET LIVING SHORELINE**  
 HAVRE DE GRACE  
 TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
 653, 652, 473, 472, 470, & 463  
 6TH ELECTION DISTRICT, HARFORD COUNTY

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EXISTING LARGE CONCRETE STRUCTURE WILL SERVE AS HEADLAND PROPOSED WOODY MATERIAL WILL PROVIDE HABITAT AND CATCH DEBRIS BEFORE ENTERING THE BAY



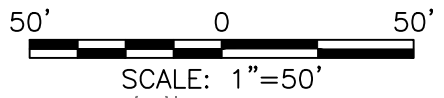
**NOTES**

- MHW (+1.79') & MLW (-0.65') BASED ON NOAA'S HAVRE DE GRACE STATION ID: 8574070 USING NAVD88 DATUM.

**LEGEND**

**PROPOSED FEATURES**

- CONTOUR ——— 1 ———
- DESIGNED BY BAY STATE ———
- MEAN HIGH WATER ——— PMHW ———
- MEAN LOW WATER ——— PMLW ———
- SUBMERGED COBBLE TOE
- BOULDERS
- COARSE WOODY DEBRIS



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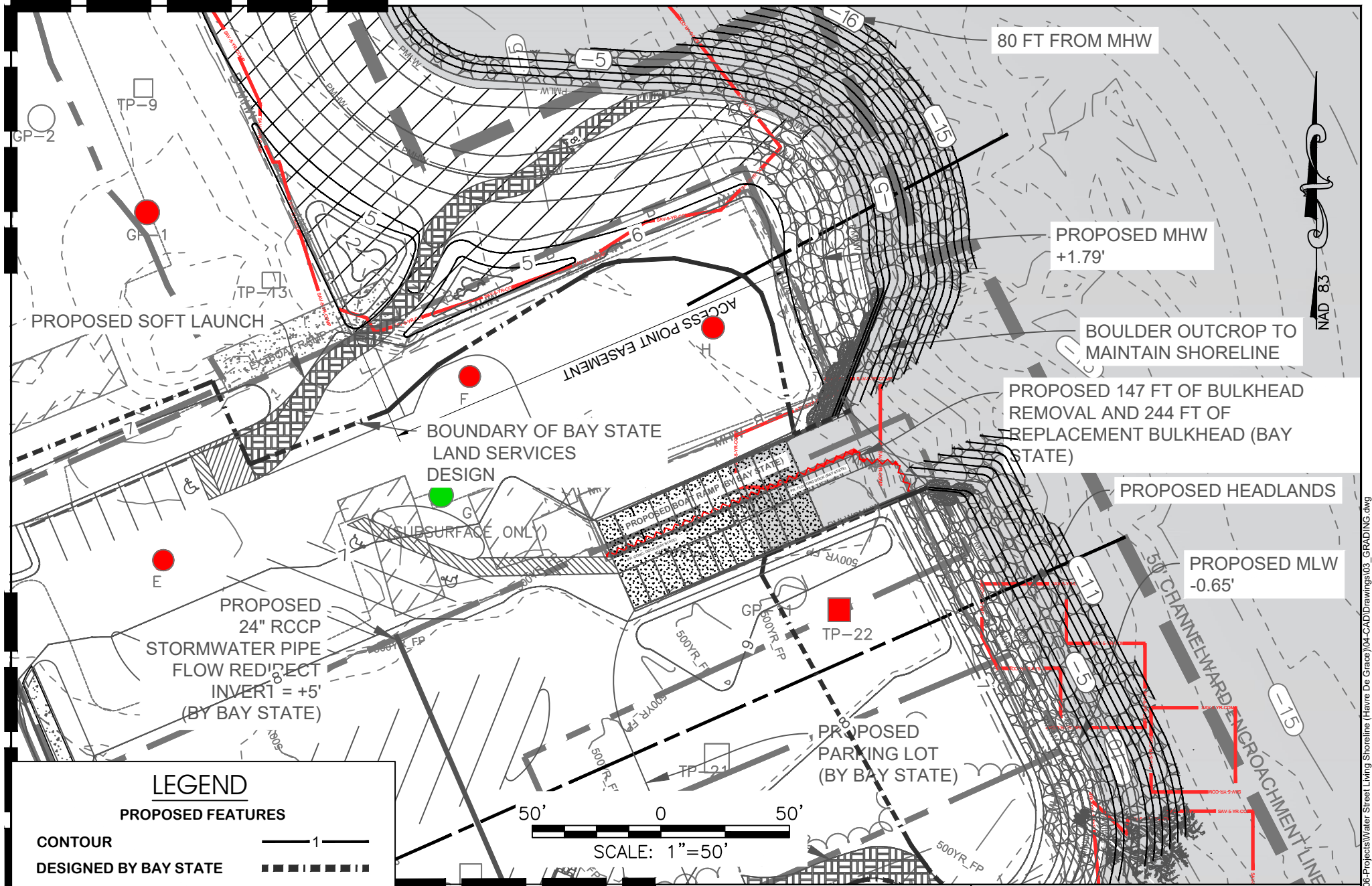
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A DESIGN/BUILD Co.  
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|                   |                |
|-------------------|----------------|
| Scale             | AS SHOWN       |
| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
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**PROPOSED CONDITIONS**

**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
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6TH ELECTION DISTRICT, HARFORD COUNTY



80 FT FROM MHW

PROPOSED MHW  
+1.79'

BOULDER OUTCROP TO  
MAINTAIN SHORELINE

PROPOSED 147 FT OF BULKHEAD  
REMOVAL AND 244 FT OF  
REPLACEMENT BULKHEAD (BAY  
STATE)

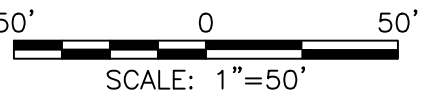
PROPOSED HEADLANDS

PROPOSED MLW  
-0.65'

**LEGEND**

**PROPOSED FEATURES**

- CONTOUR 1
- DESIGNED BY BAY STATE
- MEAN HIGH WATER PMHW
- MEAN LOW WATER PMLW
- SUBMERGED COBBLE TOE
- BOULDERS
- COARSE WOODY DEBRIS



SEE SHEET 10

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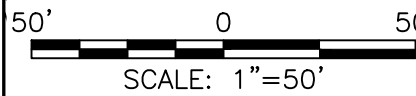
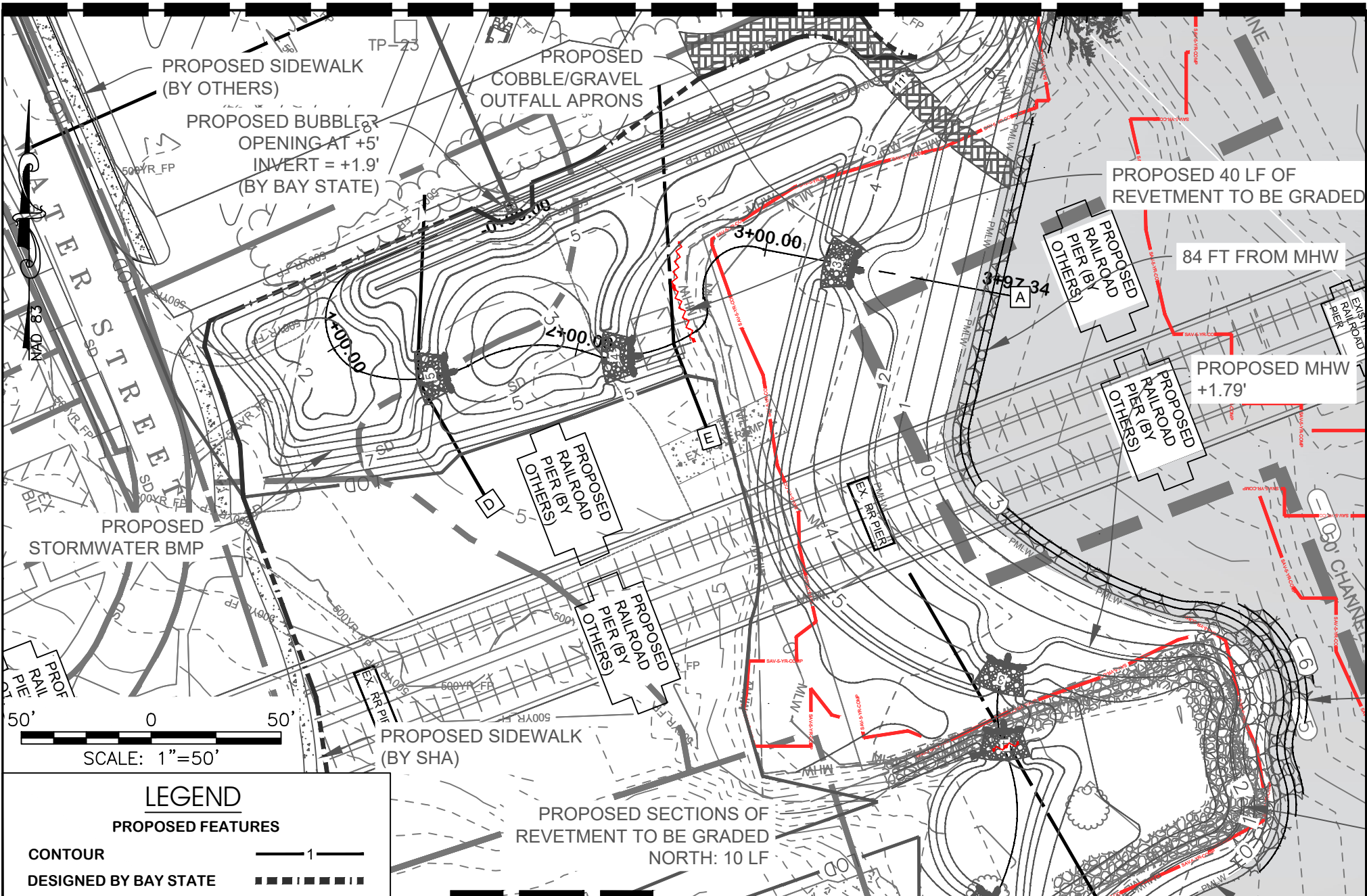
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| Approved By       | D.W.           |
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**PROPOSED CONDITIONS**

**WATER STREET  
LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
653, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY



**LEGEND**

**PROPOSED FEATURES**

- CONTOUR  1
- DESIGNED BY BAY STATE
- MEAN HIGH WATER  PMHW
- MEAN LOW WATER  PMLW
- SUBMERGED COBBLE TOE
- BOULDERS
- COARSE WOODY DEBRIS

SEE SHEET 11

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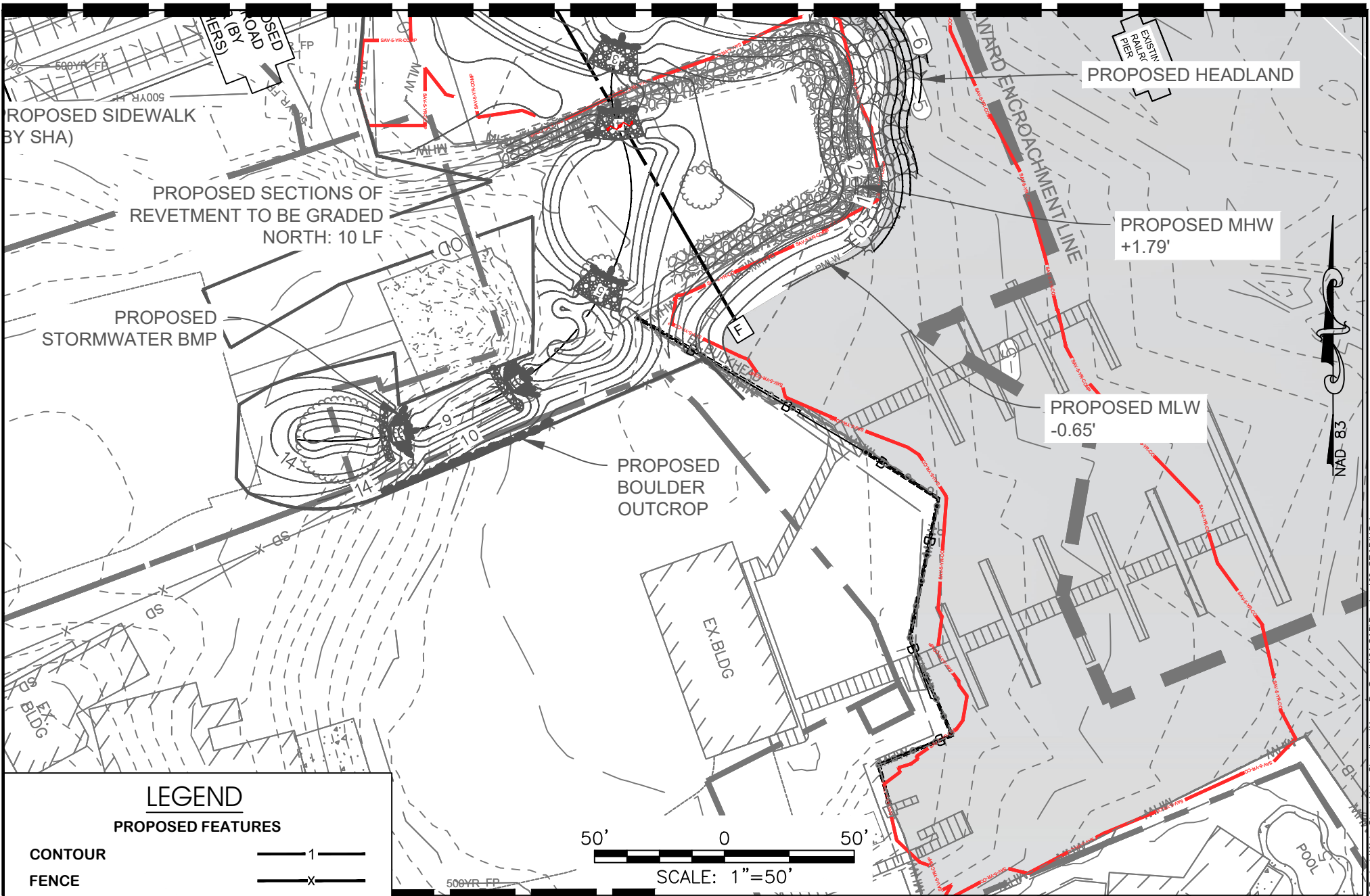
December 16, 2021

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| Approved By       | D.W.           |
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**PROPOSED CONDITIONS**

**WATER STREET  
 LIVING SHORELINE**  
 HAVRE DE GRACE  
 TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
 653, 652, 473, 472, 470, & 463  
 6TH ELECTION DISTRICT, HARFORD COUNTY

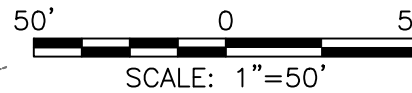




### LEGEND

#### PROPOSED FEATURES

- CONTOUR  1
- FENCE  X
- MEAN HIGH WATER  PMHW
- MEAN LOW WATER  PMLW
- SUBMERGED COBBLE TOE
- BOULDERS
- COBBLE WEIR



SEE SHEET 12

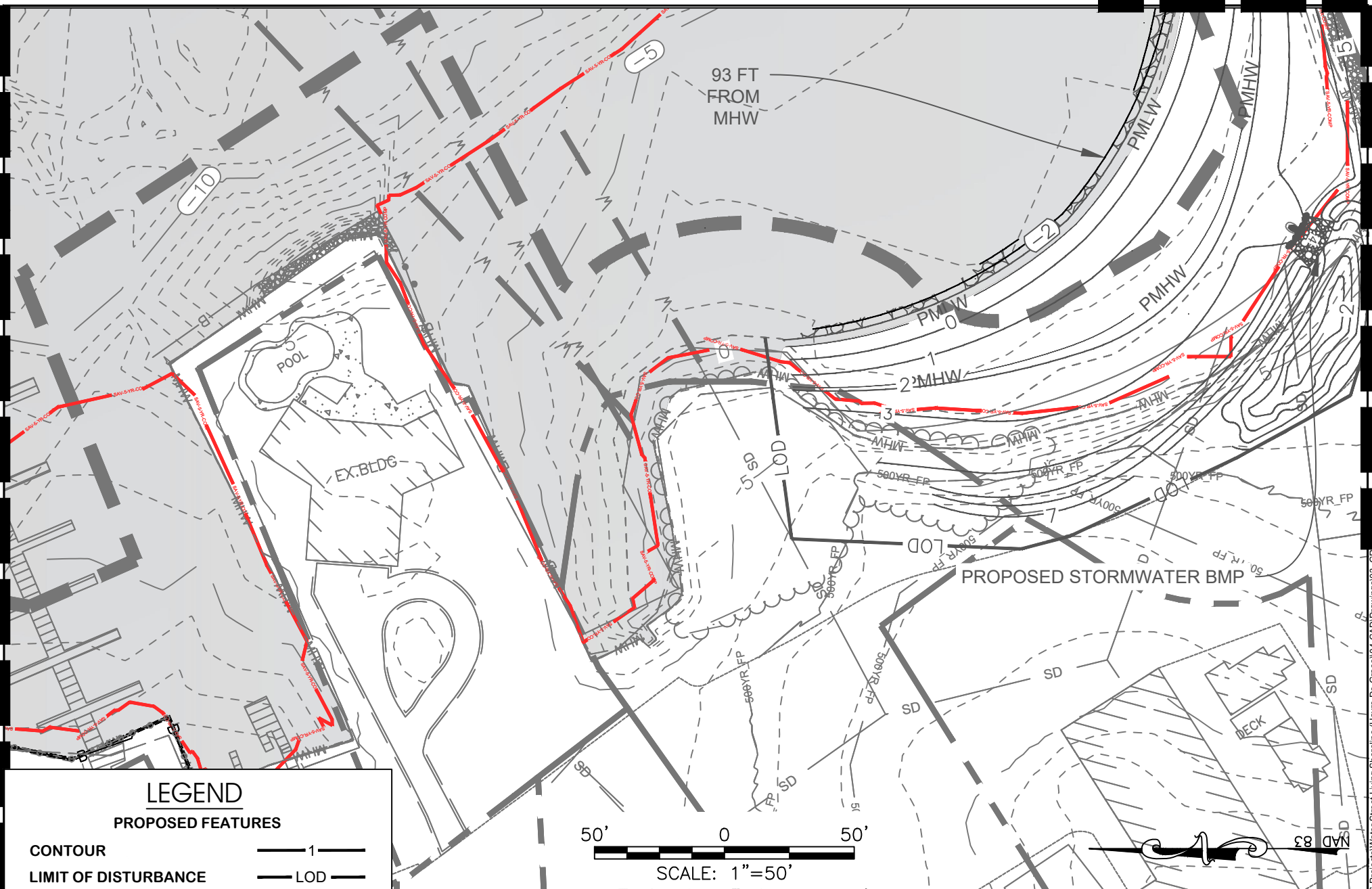
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| Approved By       | D.W.           |
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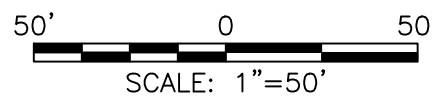
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| <b>PROPOSED CONDITIONS</b>  |
| <b>WATER STREET<br/>LIVING SHORELINE</b>  |
| HAVRE DE GRACE<br>TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br>653, 652, 473, 472, 470, & 463<br>6TH ELECTION DISTRICT, HARFORD COUNTY |



**LEGEND**

**PROPOSED FEATURES**

- CONTOUR ——— 1 ———
- LIMIT OF DISTURBANCE ——— LOD ———
- MEAN HIGH WATER ——— MHW ———
- MEAN LOW WATER ——— PMLW ———
- SUBMERGED COBBLE TOE 
- BOULDERS 
- COARSE WOODY DEBRIS 



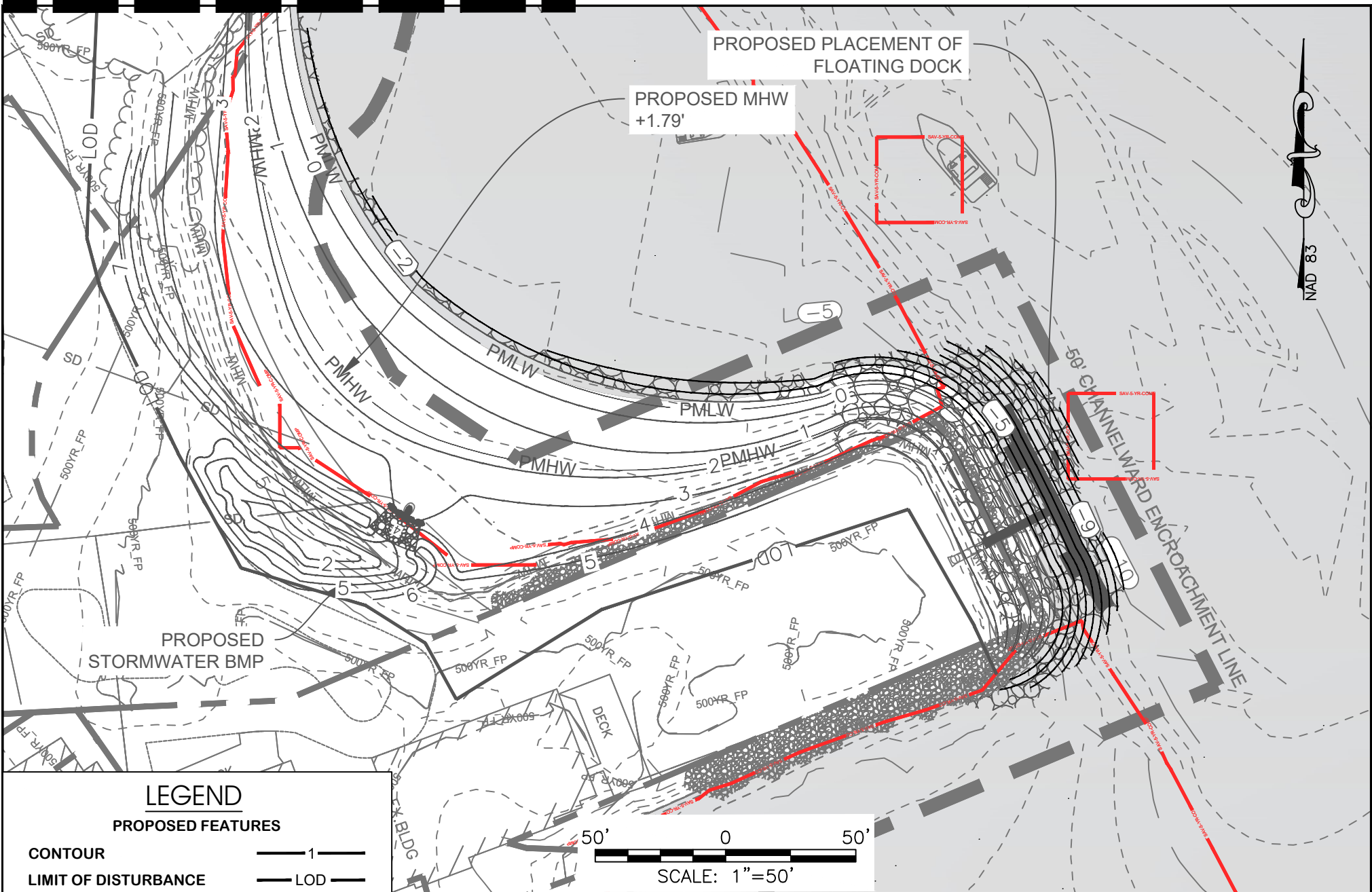
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| Approved By       | D.W.           |
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**PROPOSED CONDITIONS**  
**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
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6TH ELECTION DISTRICT, HARFORD COUNTY

December 16, 2021



PROPOSED PLACEMENT OF  
FLOATING DOCK

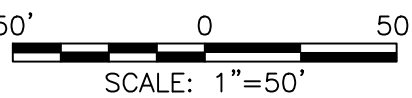
PROPOSED MHW  
+1.79'

NAD 83

**LEGEND**

**PROPOSED FEATURES**

- CONTOUR 1
- LIMIT OF DISTURBANCE LOD
- MEAN HIGH WATER PMHW
- MEAN LOW WATER PMLW
- SUBMERGED COBBLE TOE
- BOULDERS
- COARSE WOODY DEBRIS



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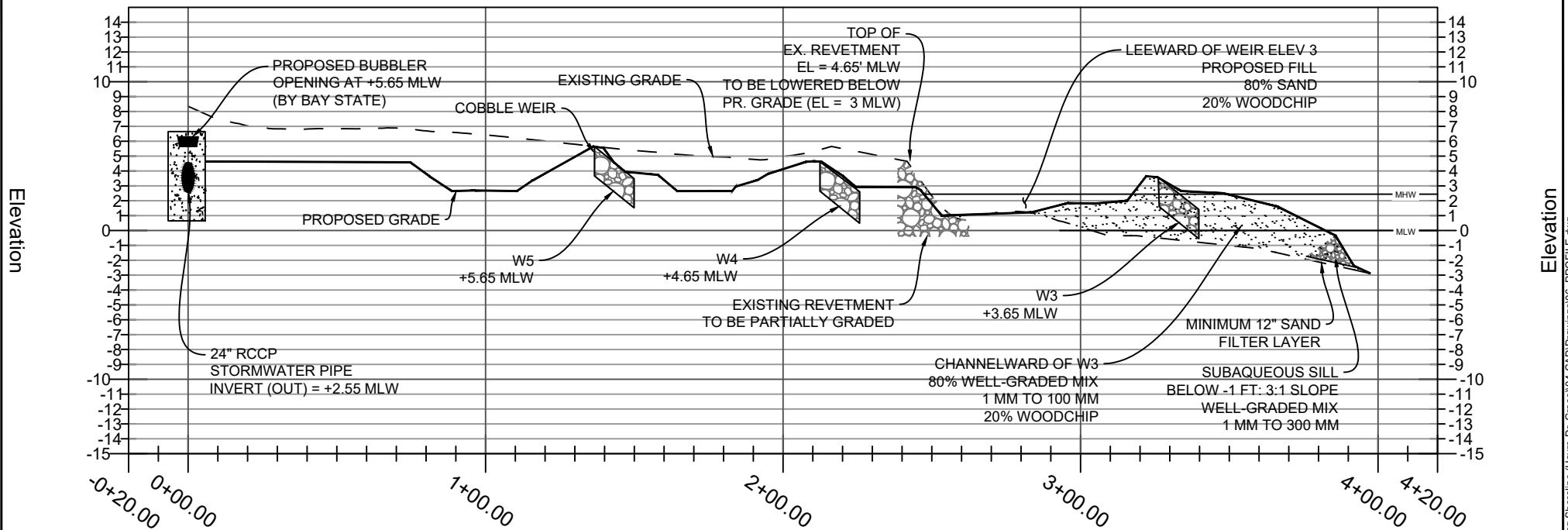
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| Approved By       | D.W.           |
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**PROPOSED CONDITIONS**

**WATER STREET  
LIVING SHORELINE**

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653, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY

### A: PROPOSED STORMWATER BMP PROFILE



HORIZ SCALE: 1" = 50'  
 VERT SCALE: 1" = 10'

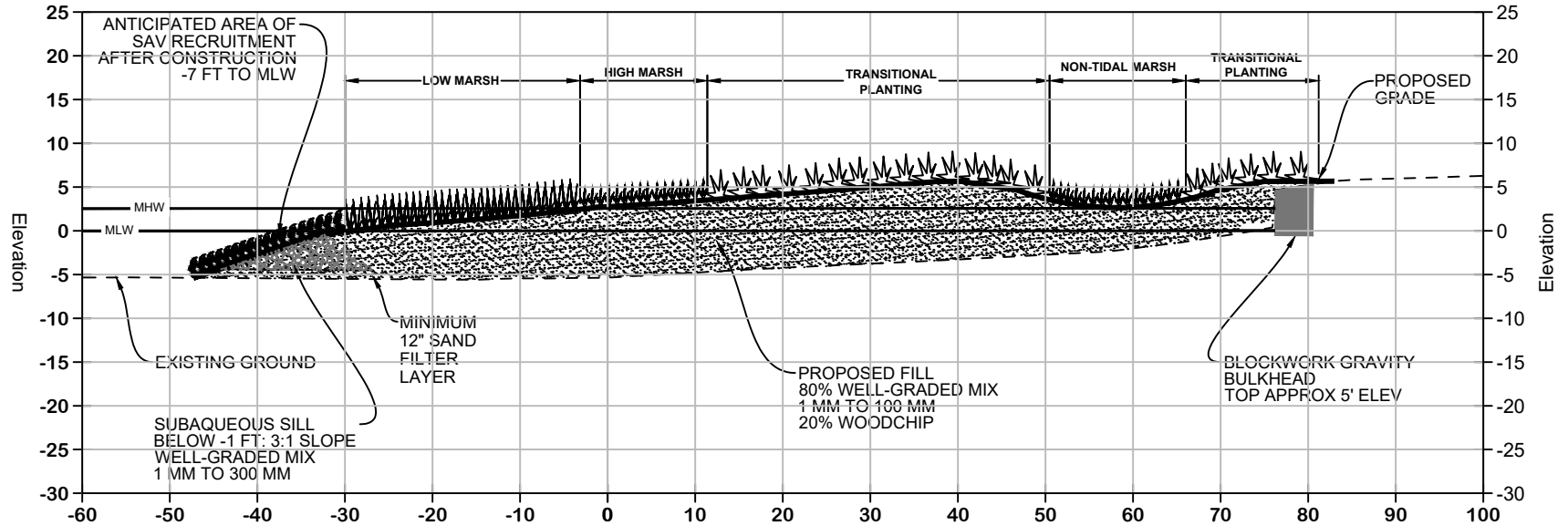
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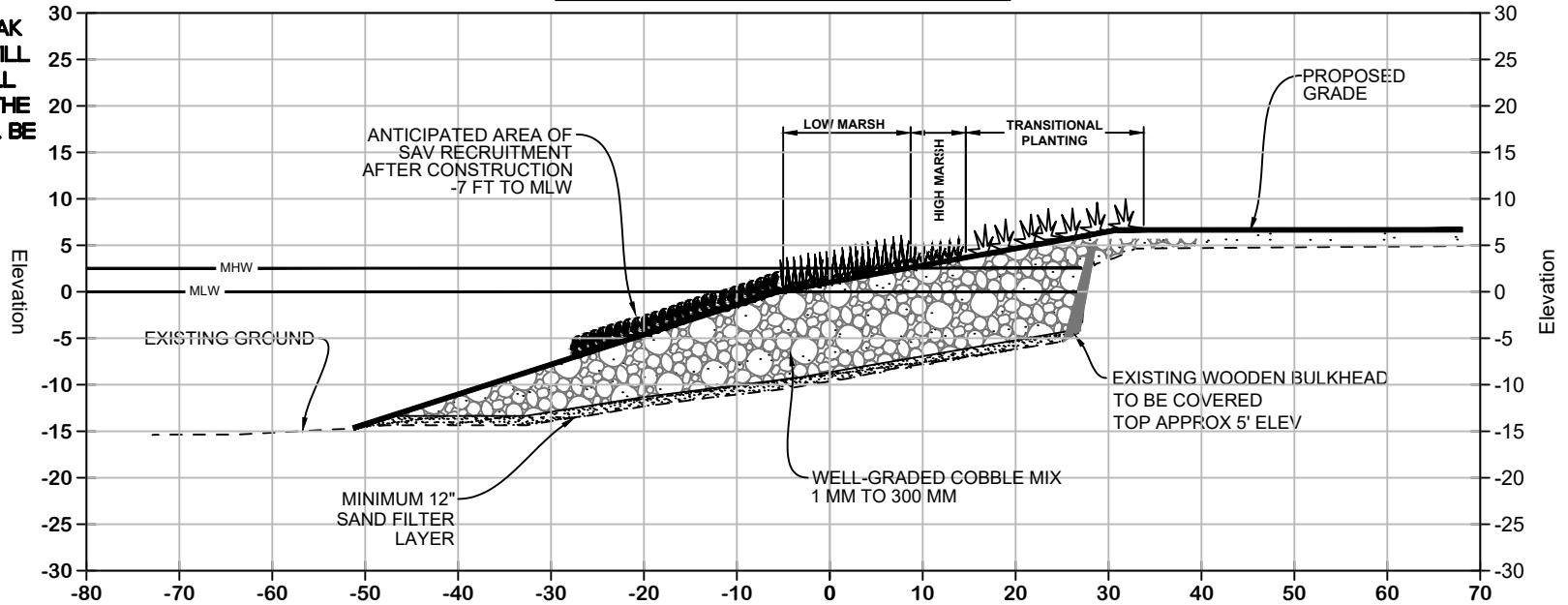
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| December 16, 2021   |                |
| Scale   | AS SHOWN       |
| Drawn By  | J.H./J.K./K.B. |
| Approved By   | D.W.           |
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| <b>PROFILES</b>   |                |
| <b>WATER STREET<br/>LIVING SHORELINE</b>  |                |
| HAVRE DE GRACE<br>TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br>653, 652, 473, 472, 470, & 463<br>6TH ELECTION DISTRICT, HARFORD COUNTY |                |

**B: PROPOSED BAY MARSH ZONE AND SOFT KAYAK LAUNCH PROFILE**



**C: PROPOSED HEADLAND PROFILE**

**NOTE: THE SOFT KAYAK LAUNCH FOOTPRINT WILL NOT BE PLANTED. ALL OTHER AREAS WITHIN THE BAY MARSH ZONE WILL BE PLANTED**



HORIZ SCALE: 1" = 20'  
VERT SCALE: 1" = 20'

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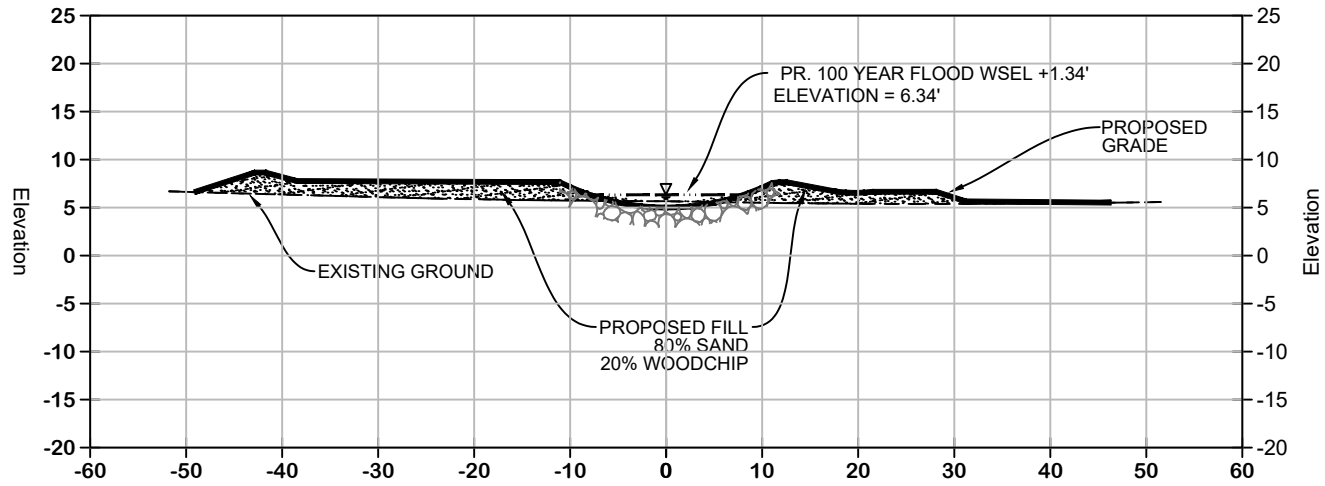
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|-------------------|----------------|
| December 16, 2021 |                |
| Scale             | AS SHOWN       |
| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 15 Of 25       |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

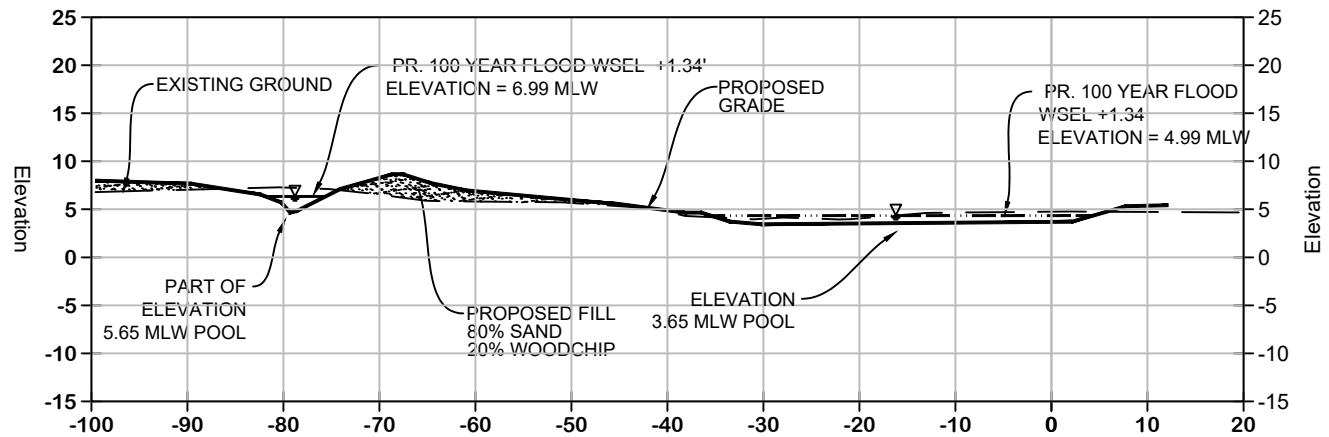
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| <b>PROFILES</b>  |  |
| <b>WATER STREET<br/>LIVING SHORELINE</b>                                     |  |
| HAVRE DE GRACE   |  |
| TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br>653, 652, 473, 472, 470, & 463 |  |
| 6TH ELECTION DISTRICT, HARFORD COUNTY  |  |

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### SECTION D - WEIR 5 CROSS-SECTION

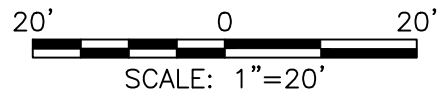


### SECTION E - POOL 3 CROSS-SECTION



HORIZ. SCALE: 1" : 20'  
VERT. SCALE: 1" : 20'

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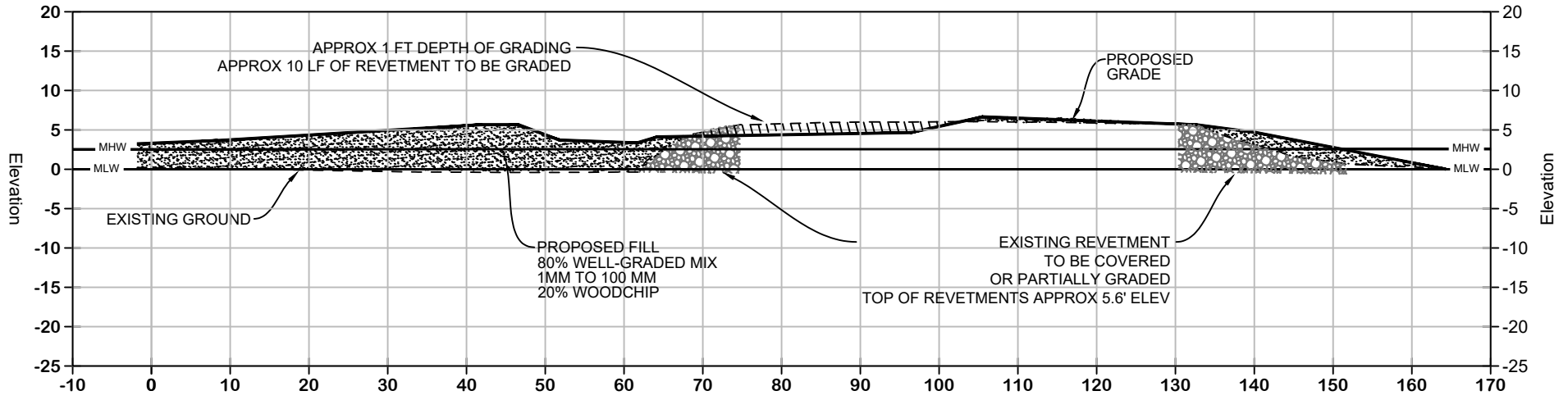
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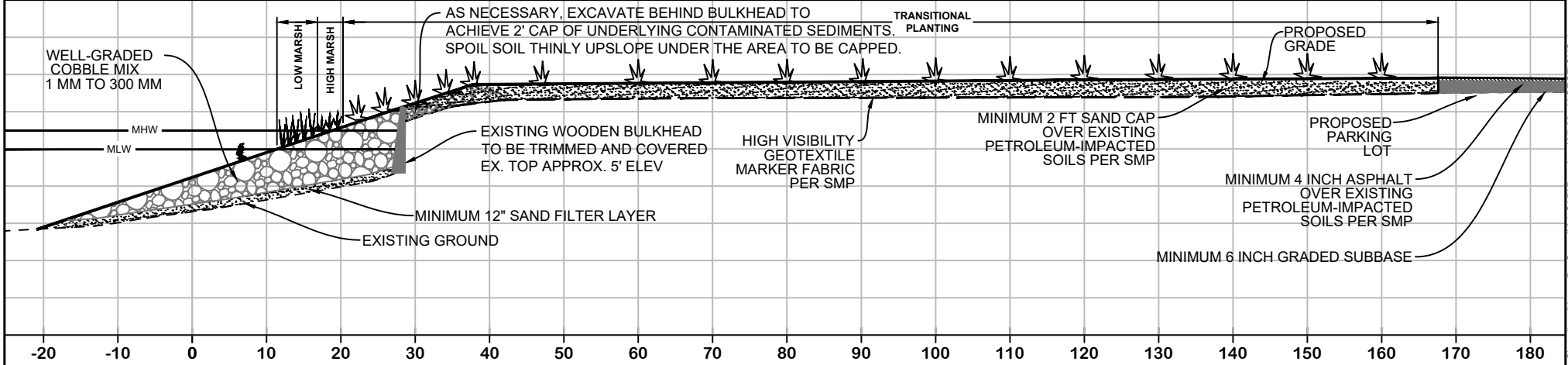
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| December 16, 2021   |                |
| Scale   | AS SHOWN       |
| Drawn By  | J.H./J.K./K.B. |
| Approved By   | D.W.           |
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| USACE Project No.   | NAB-2020-60853 |
| MDE Permit No.  | 20-WL-0558     |
| <b>CROSS-SECTIONS</b>   |                |
| <b>WATER STREET<br/>LIVING SHORELINE</b>  |                |
| HAVRE DE GRACE<br>TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br>653, 652, 473, 472, 470, & 463<br>6TH ELECTION DISTRICT, HARFORD COUNTY |                |

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## SECTION F - DAVID R CRAIG PARK REVETMENT DISTURBANCE



## SECTION G - PETROLEUM-IMPACTED SOIL MANAGEMENT PLAN

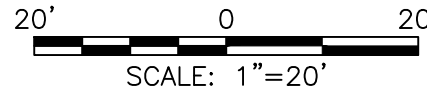


**NOTE:**

Excavated material will be capped onsite on Parcels 470 and 472. Capping will include removal of organic materials (trees, brush, heavy grasses/weeds), placement of a geotextile marker fabric above the excavated material or ground surface, followed by a minimum of two feet of non-impacted fill material. Non-impacted fill material may be stone, sand, gravel, or soil, as discussed in Section 4.6 of the soil management plan. The cap thickness may be increased as needed for the purposes of achieving appropriate site grades.

As an alternative, the parcels may be capped, in whole or in part, with asphalt pavement. A minimum of four inches of asphalt will be required to cap the site.

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HORIZ. SCALE: 1" : 20'  
VERT. SCALE: 1" : 20'

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| Approved By       | D.W.           |
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**CROSS-SECTIONS**

**WATER STREET  
LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
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6TH ELECTION DISTRICT, HARFORD COUNTY

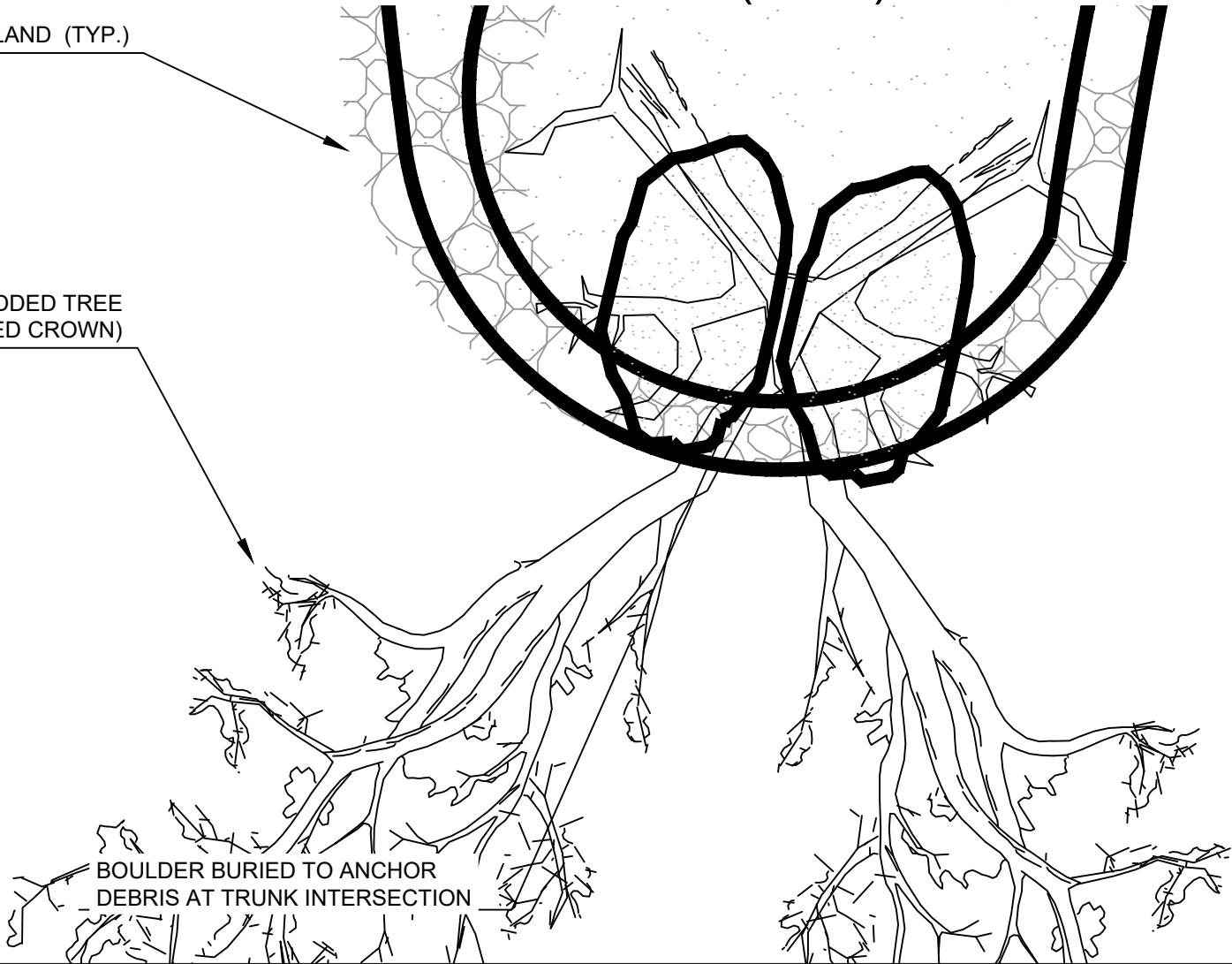
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# WOODY MATERIAL ANCHORING (TYP.) - PLAN VIEW

HEADLAND (TYP.)

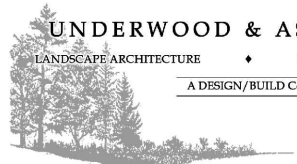
EMBEDDED TREE  
(EXPOSED CROWN)

BOULDER BURIED TO ANCHOR  
DEBRIS AT TRUNK INTERSECTION



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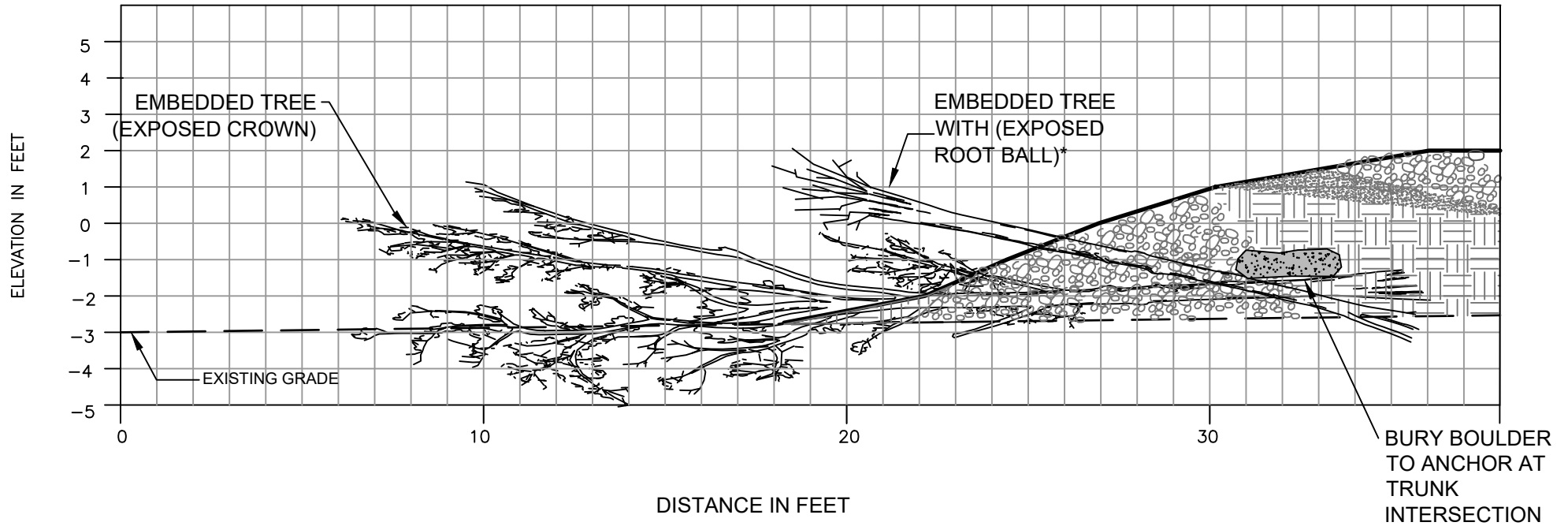
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| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
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## PROJECT DETAILS

**WATER STREET  
LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
653, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY



# WOODY MATERIAL ANCHORING (TYP.) - PROFILE VIEW



\*NOTE: THE EMBEDDED TREE WITH EXPOSED ROOT BALL IS SET AT THE EXISTING GRADE. THIS DETAIL SHOWS THE ROOT BALL SLIGHTLY ELEVATED IN ORDER TO DISPLAY BOTH TREES. SEE PLAN VIEW FOR ALIGNMENT.

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|   |                |
|---|----------------|
| December 16, 2021   |                |
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| Approved By   | D.W.           |
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| USACE Project No.   | NAB-2020-60853 |
| MDE Permit No.  | 20-WL-0558     |
| <b>PROJECT DETAILS</b>  |                |
| <b>WATER STREET<br/>LIVING SHORELINE</b>  |                |
| HAVRE DE GRACE<br>TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br>653, 652, 473, 472, 470, & 463<br>6TH ELECTION DISTRICT, HARFORD COUNTY |                |

| Project Impacts to State Tidal Wetlands & Proposed Marsh Using a 5-Year Composite of SAV Bed Footprints |               |               |  |
|---|---------------|---------------|--|
| Feature   | Impacted (sf) | Proposed (sf) | Delineation Criteria   |
| High Marsh  | 0             | 31,074        | Proposed MHW (PMHW) to elevation 3 ft  |
| Low Marsh   | 0             | 17,247        | Proposed MLW (PMLW) to PMHW  |
| Unvegetated Shallow Habitat   | 13,801        | 0             | Unvegetated open-water areas above 3 ft of depth   |
| Vegetated Shallow Habitat   | 47,000        | 0             | Vegetated open-water areas above 3 ft of depth   |
| Unvegetated "Open Water" Habitat  | 20,456        | 0             | Unvegetated open-water areas below 3 ft of depth   |
| Vegetated "Deeper" Habitat  | 37,836        | 0             | Vegetated open-water areas below 3 ft of depth   |
| Post-Construction Natural Recruitment Area  | -             | 21,107        | Areas between PMLW and -7 ft elevation on the proposed living shoreline.<br>Based on SAV observations made on-site (Jones, 2020) |
| Total Vegetated Tidal Wetlands  | 84,836        | 69,428        |  |
| Remaining Unimpacted Existing Wetlands  |               | 197,616       |  |
| Total Post-Construction Wetland Area  |               | 267,044       |  |

**NOTE**

**NO BULKHEAD OR REVETMENT ADJACENT TO CONTAMINATED SOILS SHALL BE REMOVED, ONLY COVERED, WITH FILL PLACED CHANNELWARD. THE ONLY EXCEPTION IS THE BULKHEAD TO BE REMOVED AND REPLACED IN CONSTRUCTION OF THE BOAT RAMP.**

| Project Impacts to State Tidal Wetlands by Project Element |                                  |                                |                                   |                                 |                           |
|--|----------------------------------|--------------------------------|-----------------------------------|---------------------------------|---------------------------|
| Project Element  | Unvegetated Shallow Habitat (sf) | Vegetated Shallow Habitat (sf) | Unvegetated "Deeper" Habitat (sf) | Vegetated "Deeper" Habitat (sf) | Percent of Project Impact |
| Living Shoreline   | 8,496                            | 40,145                         | 19,602                            | 36,009                          | 87.5%                     |
| Stormwater Outfall Reconnection                            | 4,410                            | 6,356                          | 0                                 | 0                               | 9.0%                      |
| Boat Ramp  | 738                              | 37                             | 854                               | 877                             | 2.1%                      |
| Soft Kayak Launch  | 156                              | 463                            | 0                                 | 950                             | 1.3%                      |
| <b>Totals</b>  | <b>13,801</b>                    | <b>47,000</b>                  | <b>20,456</b>                     | <b>37,836</b>                   | <b>100%</b>               |

| Proposed Impacts to Existing Shoreline Structures in Linear Feet |         |         |          |
|--|---------|---------|----------|
| Feature  | Removed | Covered | Proposed |
| Bulkhead   | 147     | 1,389   | 244      |
| Revetment  | 50      | 896     | 0        |
| Totals   | 197     | 2,285   | 244      |


| Maximum Channelward Extent By Project Element |                    |
|---|--------------------|
| Element                                       | Max Extent in Feet |
| Living Shoreline                              | 103                |
| Boat Ramp                                     | 7                  |
| Soft Kayak Launch                             | 51                 |

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202060853  
12/21/2021  
Sheet 20 of 25

**NOTE**

**BAY STATE LAND SERVICES IS DESIGNING THE PARKING LOT AND BOAT RAMP. THEIR AREA OF RESPONSIBILITY HAS BEEN CLEARLY DEMARCATED IN THE PROPOSED CONDITIONS SHEETS. OUR TWO FIRMS WORKED CLOSELY TOGETHER TO ENSURE OUR RESPECTIVE PROJECTS WERE IN UNION WITH EACH OTHER.**

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December 16, 2021

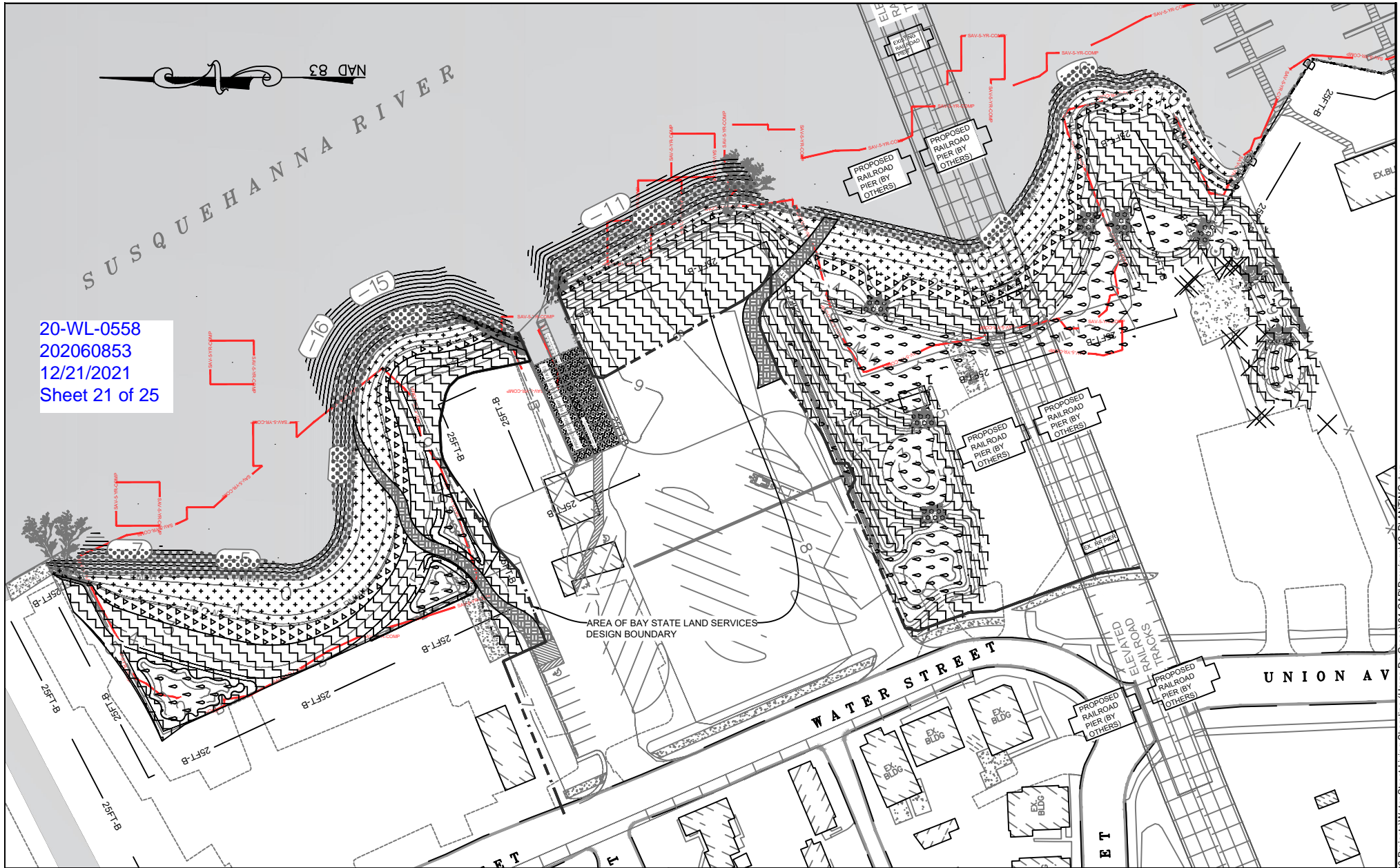
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|-------------------|----------------|---|
| Scale             | AS SHOWN       | <b>PROJECT DATA TABLES</b><br><br><b>WATER STREET LIVING SHORELINE</b><br>HAVRE DE GRACE<br>TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br>653, 652, 473, 472, 470, & 463<br>6TH ELECTION DISTRICT, HARFORD COUNTY |
| Drawn By          | J.H./J.K./K.B. |   |
| Approved By       | D.W.           |   |
| Sheet No.         | 20 Of 25       |   |
| USACE Project No. | NAB-2020-60853 |   |
| MDE Permit No.    | 20-WL-0558     |   |

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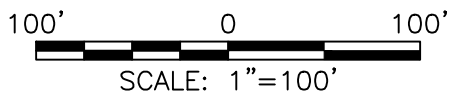


SUSQUEHANNA RIVER

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POST-CONSTRUCTION SAV RECRUITMENT AREA  21,703 SF



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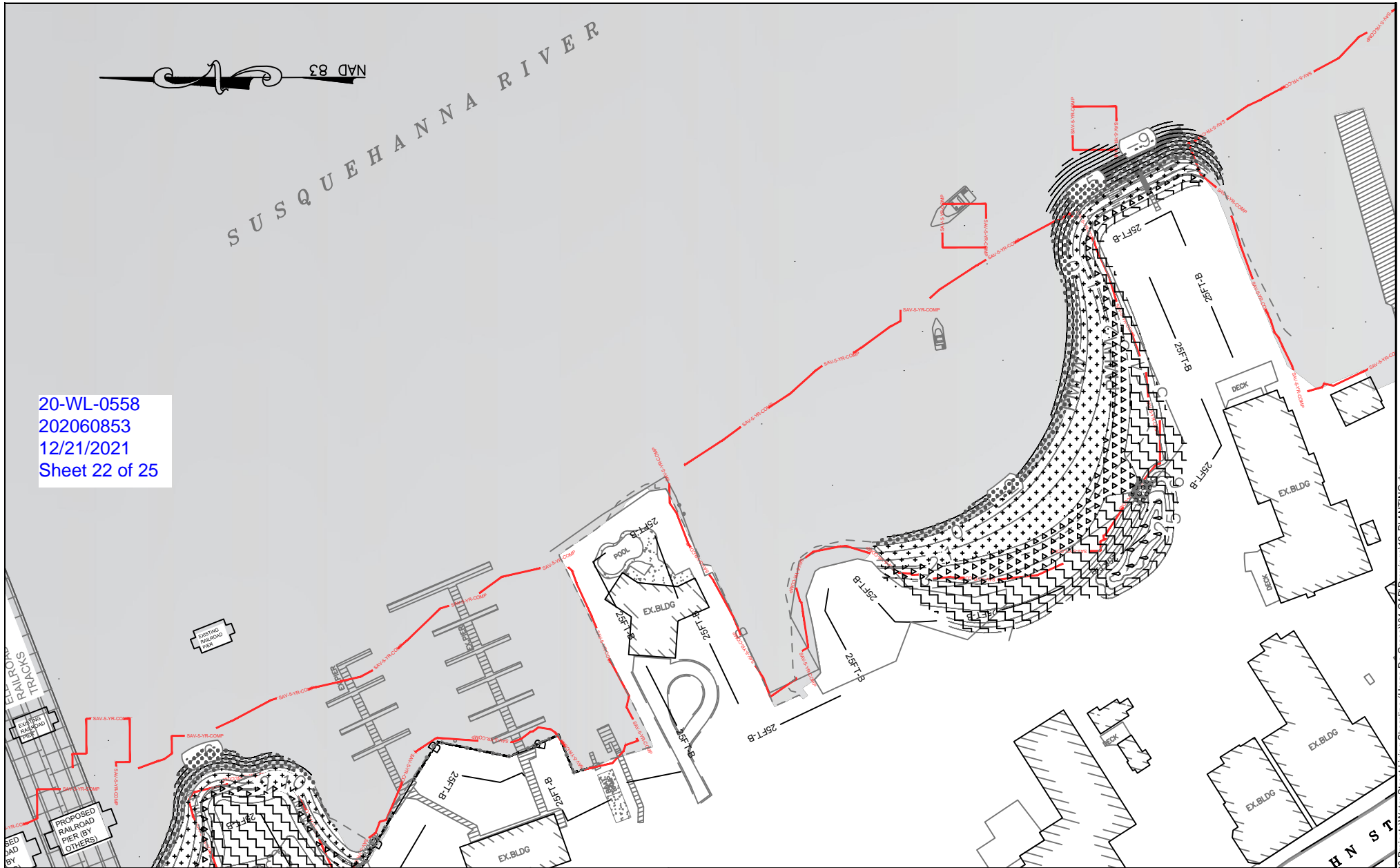
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|-------------------|----------------|---|
| Scale             | AS SHOWN       | <p><b>PLANTING PLAN</b></p> <p><b>WATER STREET LIVING SHORELINE</b></p> <p>HAVRE DE GRACE<br/>TAX MAP 0601, PARCELS 1787, 744, 715, 714,<br/>653, 652, 473, 472, 470, &amp; 463<br/>6TH ELECTION DISTRICT, HARFORD COUNTY</p> |
| Drawn By          | J.H./J.K./K.B. |   |
| Approved By       | D.W.           |   |
| Sheet No.         | 21 Of 25       |   |
| USACE Project No. | NAB-2020-60853 |   |
| MDE Permit No.    | 20-WL-0558     | December 16, 2021   |

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SUSQUEHANNA RIVER

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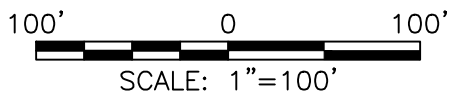


December 16, 2021

POST-CONSTRUCTION SAV RECRUITMENT AREA



21,703 SF



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|                   |                |
|-------------------|----------------|
| Scale             | AS SHOWN       |
| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 22 Of 25       |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

**PLANTING PLAN**  
**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
653, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY


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Havre De Grace - Water Street Living Shoreline Phase 1 - Planting Schedule and Mitigation Calculations

| Planting Zone  | Symbol   | Total Area (SF) | Common Name                                  | Scientific Name                                     | Type       | Size                                       | Distribution             | Avg Spacing (ft)        | Quantity | Credit Area (SF per plant)                   | Total Credit Area (SF) | Description   |
|----------------|--|-----------------|--|---|------------|--|--------------------------|-------------------------|----------|--|------------------------|---|
| Low marsh      | + + +<br>+ + +<br>+ + +  | 31,074          | Arrow arum                                   | <i>Peltandra virginica</i>                          | Herbaceous | Gal  | Random                   | 2                       | 1,942    | 0  | 0                      | Between proposed MLW and proposed MHW.                          |
|                |  |                 | Pickereelweed                                | <i>Pontederia cordata</i>                           | Herbaceous | Gal  | Random                   | 2                       | 1,942    | 0  | 0                      |   |
|                |  |                 | Soft stem bulrush                            | <i>Scirpus tabernaemontani</i>                      | Herbaceous | Gal  | Random                   | 2                       | 1,942    | 0  | 0                      |   |
|                |  |                 | Three-square                                 | <i>Scirpus pungens</i>                              | Herbaceous | Gal  | Random                   | 2                       | 1,942    | 0  | 0                      |   |
| High marsh     | ▽ ▽ ▽ ▽<br>▽ ▽ ▽ ▽<br>▽ ▽ ▽ ▽<br>▽ ▽ ▽ ▽<br>▽ ▽ ▽ ▽  | 17,247          | Switchgrass                                  | <i>Panicum virgatum</i>                             | Herbaceous | Gal  | Random                   | 2                       | 616      | 0  | 0                      | Aboveproposed MHW to elevation 3 ft.                            |
|                |  |                 | Soft rush                                    | <i>Juncus effusus</i>                               | Herbaceous | Gal  | Random                   | 2                       | 616      | 0  | 0                      |   |
|                |  |                 | Marsh hibiscus                               | <i>Hibiscus moscheutos</i>                          | Herbaceous | Gal  | Random                   | 2                       | 616      | 0  | 0                      |   |
|                |  |                 | Blueflag Iris                                | <i>Iris versicolor</i>                              | Herbaceous | Gal  | Random                   | 2                       | 616      | 0  | 0                      |   |
|                |  |                 | Goldenrod                                    | <i>Solidago sempervirens</i>                        | Herbaceous | Gal  | Random                   | 2                       | 616      | 0  | 0                      |   |
|                |  |                 | Buttonbush                                   | <i>Cephalanthus occidentalis</i>                    | Shrub      | Gal  | Random                   | 10                      | 25       | 0  | 0                      |   |
|                |  |                 | Cardinal flower                              | <i>Lobelia cardinalis</i>                           | Herbaceous | Gal  | Random                   | 2                       | 616      | 0  | 0                      |   |
|                |  |                 | Blueflag Iris                                | <i>Iris versicolor</i>                              | Herbaceous | Gal  | Random                   | 5                       | 54       | 2  | 110                    |   |
| Dry Pools      | ⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿ | 24,435          | Cardinal Flower                              | <i>Lobelia cardinalis</i>                           | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    | Within intermittently flooded areas.                            |
|                |  |                 | Cinnamon Fern                                | <i>Osmunda cinnamomea</i>                           | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | Dense Blazing Star                           | <i>Liatris spicata</i>                              | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | Little Bluestem                              | <i>Schizachyrium scoparium</i>                      | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | Path Rush                                    | <i>Juncus tenuis</i>                                | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | Royal Fern                                   | <i>Osmunda regalis</i>                              | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | New England Aster                            | <i>Symphotrichum novae angliae</i>                  | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | Swamp Milkweed                               | <i>Asclepias incarnata</i>                          | Herbaceous | QT   | Random                   | 5                       | 54       | 2  | 110                    |   |
|                |  |                 | American Cranberry                           | <i>Vaccinium macrocarpon</i>                        | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Black Huckleberry                            | <i>Gaylussacia baccata</i>                          | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Dwarf Huckleberry                            | <i>Gaylussacia dumosa</i>                           | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Inkberry                                     | <i>Ilex glabra</i>                                  | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Smooth Alder                                 | <i>Alnus serrulata</i>                              | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Summersweet                                  | <i>Clethra alnifolia</i>                            | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Swamp Azelea                                 | <i>Rhododendron viscosum</i>                        | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Swamp Bayberry                               | <i>Myrica heterophylla</i>                          | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Wax Myrtle                                   | <i>Myrica cerifera</i>                              | Shrub      | Gal  | Random                   | 10                      | 14       | 50   | 700                    |   |
|                |  |                 | Cobble Riffle Grade Controls                 | ⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿ | 1,326      | Bladder Sedge                              | <i>Carex intumescens</i> | Herbaceous              | Qt       | Random                                       | 2                      |   |
| Broomsedge     | <i>Andropogon virginicus</i>   | Herbaceous      |  |   |            | Qt   | Random                   | 2                       | 66       | 2  | 134                    |   |
| Bushy Bluestem | <i>Andropogon glomeratus</i>   | Herbaceous      |  |   |            | Qt   | Random                   | 2                       | 66       | 2  | 134                    |   |
| Fringed Sedge  | <i>Carex crinita</i>   | Herbaceous      |  |   |            | Qt   | Random                   | 2                       | 66       | 2  | 134                    |   |
| Tussock Sedge  | <i>Carex stricta</i>   | Herbaceous      |  |   |            | Qt   | Random                   | 2                       | 66       | 2  | 134                    |   |
| Transitional   | ⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿<br>⦿ ⦿ ⦿ ⦿  | 71,470          | American Beech                               | <i>Fagus grandiflora</i>                            | Tree       | 2-3'                                       | Random                   | 10                      | 79       | 100  | 8,000                  | Replanting areas that are outside intermittently flooded areas. |
|                |  |                 | Atlantic White Cedar                         | <i>Chamaecyparis thyoides</i>                       | Tree       | 2-3'                                       | Random                   | 5                       | 318      | 100  | 31,800                 |   |
|                |  |                 | Sweetbay Magnolia                            | <i>Magnolia virginiana</i>                          | Tree       | 2-3'                                       | Random                   | 10                      | 79       | 100  | 8,000                  |   |
|                |  |                 | Broomsedge                                   | <i>Andropogon glomeratus</i>                        | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | New england aster                            | <i>Dryopteris arguta</i>                            | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Summersweet                                  | <i>Clethra alnifolia</i>                            | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Dense Blazing Star                           | <i>Liatris spicata</i>                              | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Cardinal Flower                              | <i>Lobelia cardinalis</i>                           | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Wax Myrtle                                   | <i>Morella cerifera</i>                             | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Path Rush                                    | <i>Juncus tenuis</i>                                | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Switchgrass                                  | <i>Panicum virgatum</i>                             | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | Milkweed                                     | <i>Asclepias incarnata</i>                          | Herbaceous | Qt   | Random                   | 5                       | 318      | 2  | 636                    |   |
|                |  |                 | <b>Critical Area Mitigation Calculations</b> |   |            | <b>Total Area of Disturbed Canopy (SF)</b> |                          | <b>Mitigation Ratio</b> |          | <b>Total Mitigation Credit Required (SF)</b> |                        |   |
|                |  |                 | 20,914                                       |   | 2:1        |  | 41,828                   |                         |          | 67,784                                       |                        | 162%  |

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202060853  
12/21/2021  
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|-------------------|----------------|
| December 16, 2021 |                |
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| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 23 Of 25       |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

**PLANTING DETAILS**

**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
653, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY

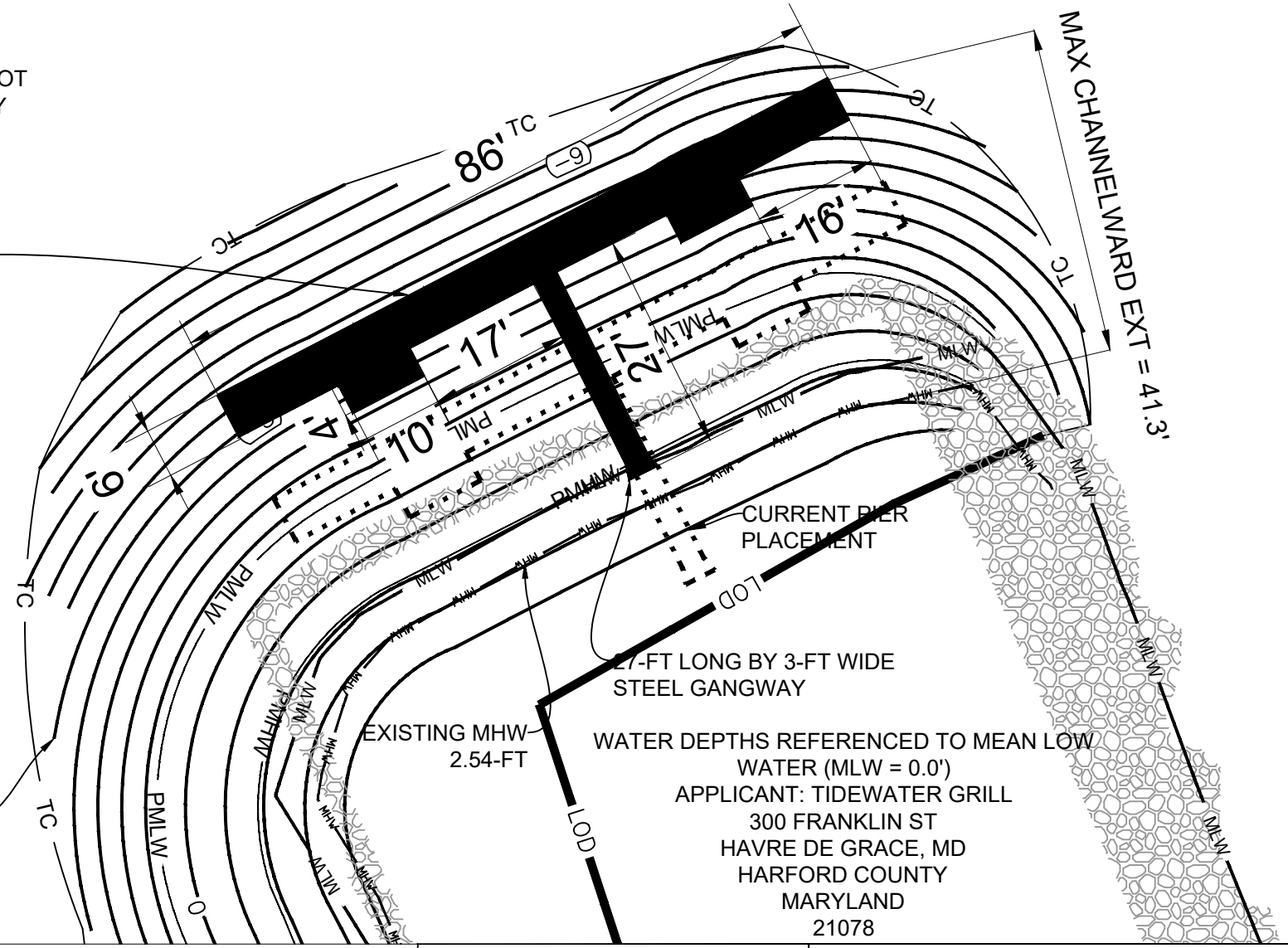
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# SUSQUEHANNA RIVER

THE PIER SITS OUT ON A PENINSULA, AND DOES NOT HAVE NEARBY PROPERTY LINES TO REFERENCE

PROPOSED FLOATING PIER RELOCATION

PROPOSED GRADE LINES



CURRENT PIER PLACEMENT

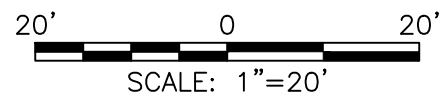
27-FT LONG BY 3-FT WIDE STEEL GANGWAY

WATER DEPTHS REFERENCED TO MEAN LOW WATER (MLW = 0.0')

APPLICANT: TIDEWATER GRILL  
300 FRANKLIN ST  
HAVRE DE GRACE, MD  
HARFORD COUNTY  
MARYLAND  
21078

December 16, 2021

20-WL-0558  
202060853  
12/21/2021  
Sheet 24 of 25



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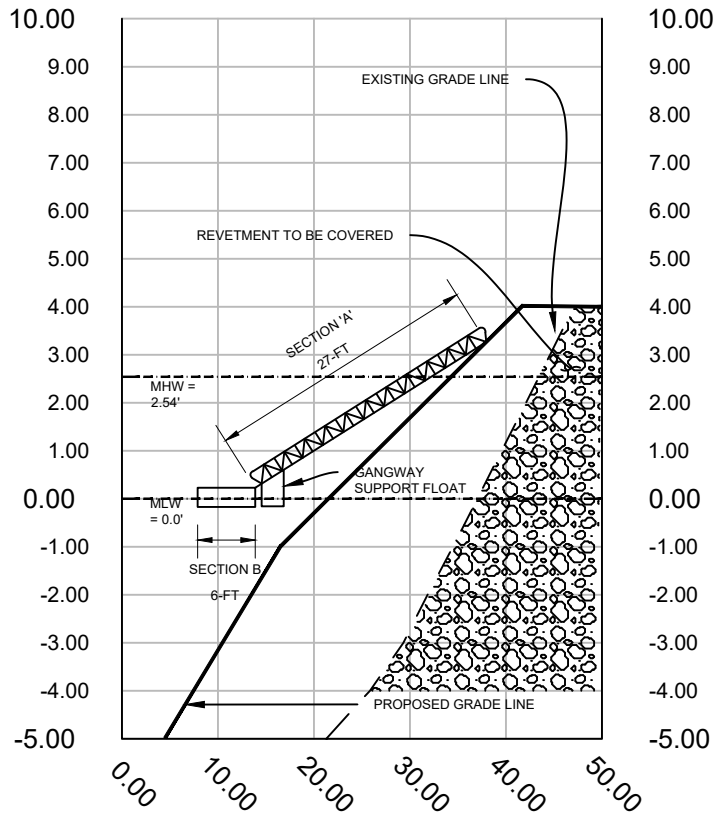
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| Approved By       | D.W.           |
| Sheet No.         | 24 Of 25       |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

**FLOATING PIER PLANVIEW**

**WATER STREET LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1767, 744, 715, 714,  
653, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY

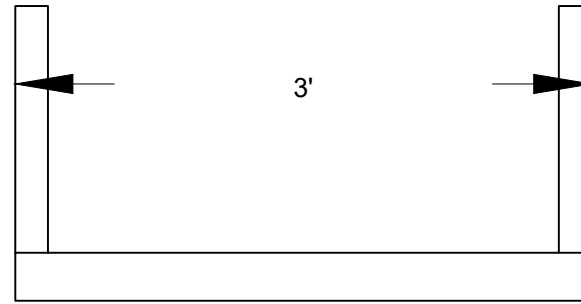
**FLOATING PIER  
CROSS-SECTION**



VERT SCALE: 1" = 20'  
HORIZ SCALE: 1" = 4'

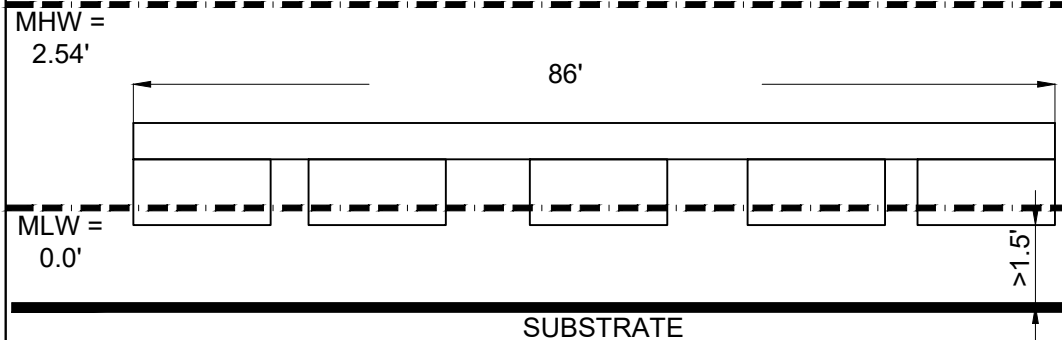
**SECTION 'A'  
FLOATING GANGWAY**

MAX DECKING WIDTH = 3.0'  
MINIMUM HEIGHT ABOVE  
MARSH SUBSTRATE = 0.5'



**SECTION 'B'  
FLOATING PIER**

PLATFORM DIMENSIONS = 6'  
WIDE BY 86' LONG  
MINIMUM HEIGHT ABOVE  
SUBSTRATE = 1.5'



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202060853  
12/21/2021  
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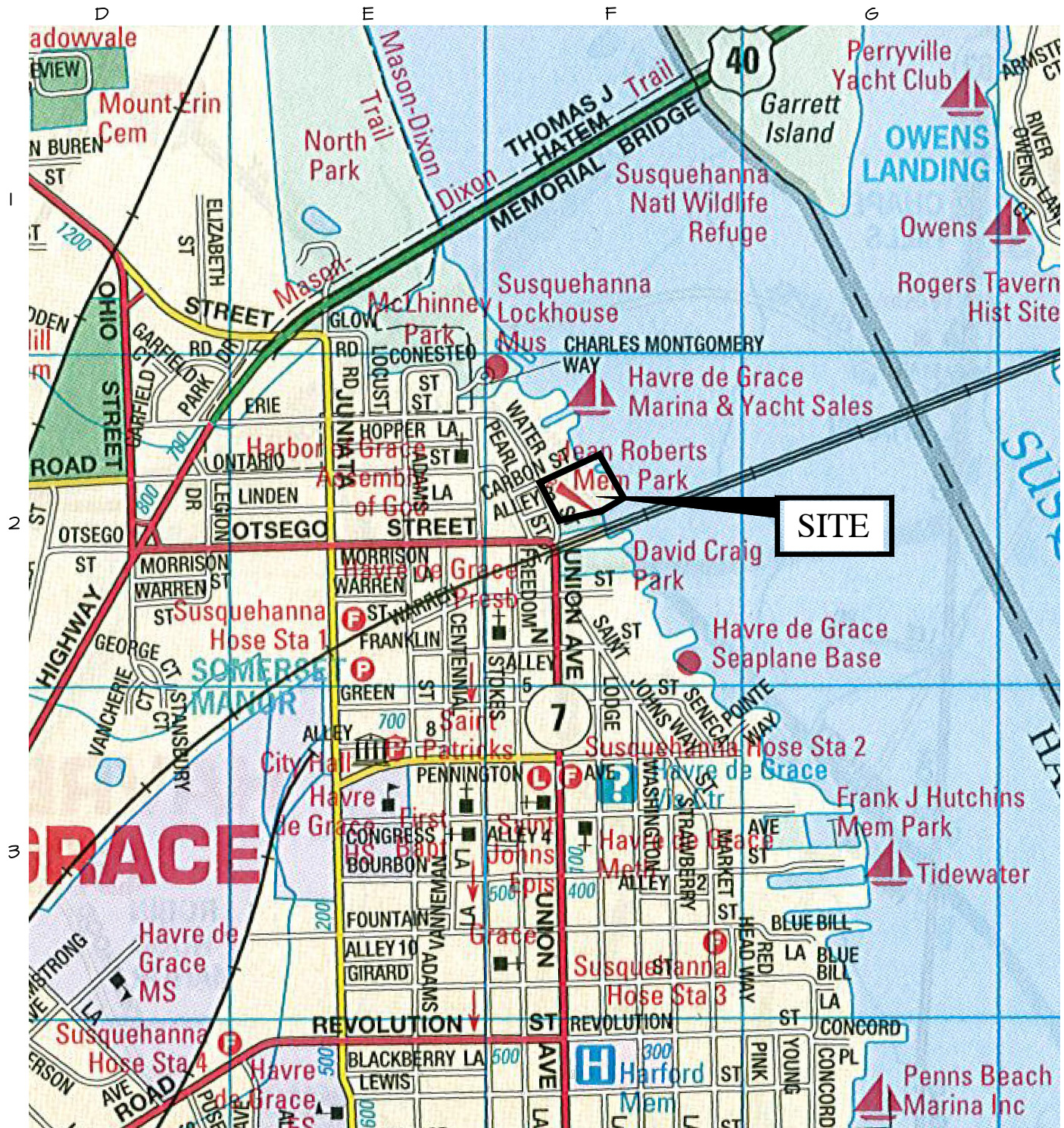
December 16, 2021

|                   |                |
|-------------------|----------------|
| Scale             | AS SHOWN       |
| Drawn By          | J.H./J.K./K.B. |
| Approved By       | D.W.           |
| Sheet No.         | 25 Of 25       |
| USACE Project No. | NAB-2020-60853 |
| MDE Permit No.    | 20-WL-0558     |

**FLOATING PIER DETAIL**

**WATER STREET  
LIVING SHORELINE**  
HAVRE DE GRACE  
TAX MAP 0601, PARCELS 1787, 744, 715, 714,  
853, 652, 473, 472, 470, & 463  
6TH ELECTION DISTRICT, HARFORD COUNTY

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APPLICANT: CITY OF HAVRE DE GRACE  
 DEPARTMENT OF PUBLIC WORKS  
 ATTEN: TIM WHITTIE  
 711 PENNINGTON AVE  
 HAVRE DE GRACE, MD 21078

OWNER: MAYOR AND CITY COUNCIL OF  
 HAVRE DE GRACE  
 711 PENNINGTON AVE  
 HAVRE DE GRACE, MD 21078

ADC MAP 4355.

20-WL-0531  
 202060853  
 1/7/2022  
 Sheet 1 of 20

LOCATION MAP  
**WATER STREET  
 HERITAGE PARK**

SHEET 1 OF 20 CITY OF HAVRE DE GRACE, MARYLAND  
 SCALE: 1" = 1000' DATE: 1/5/22 DRAWN BY: RAL JOB NO. 18058

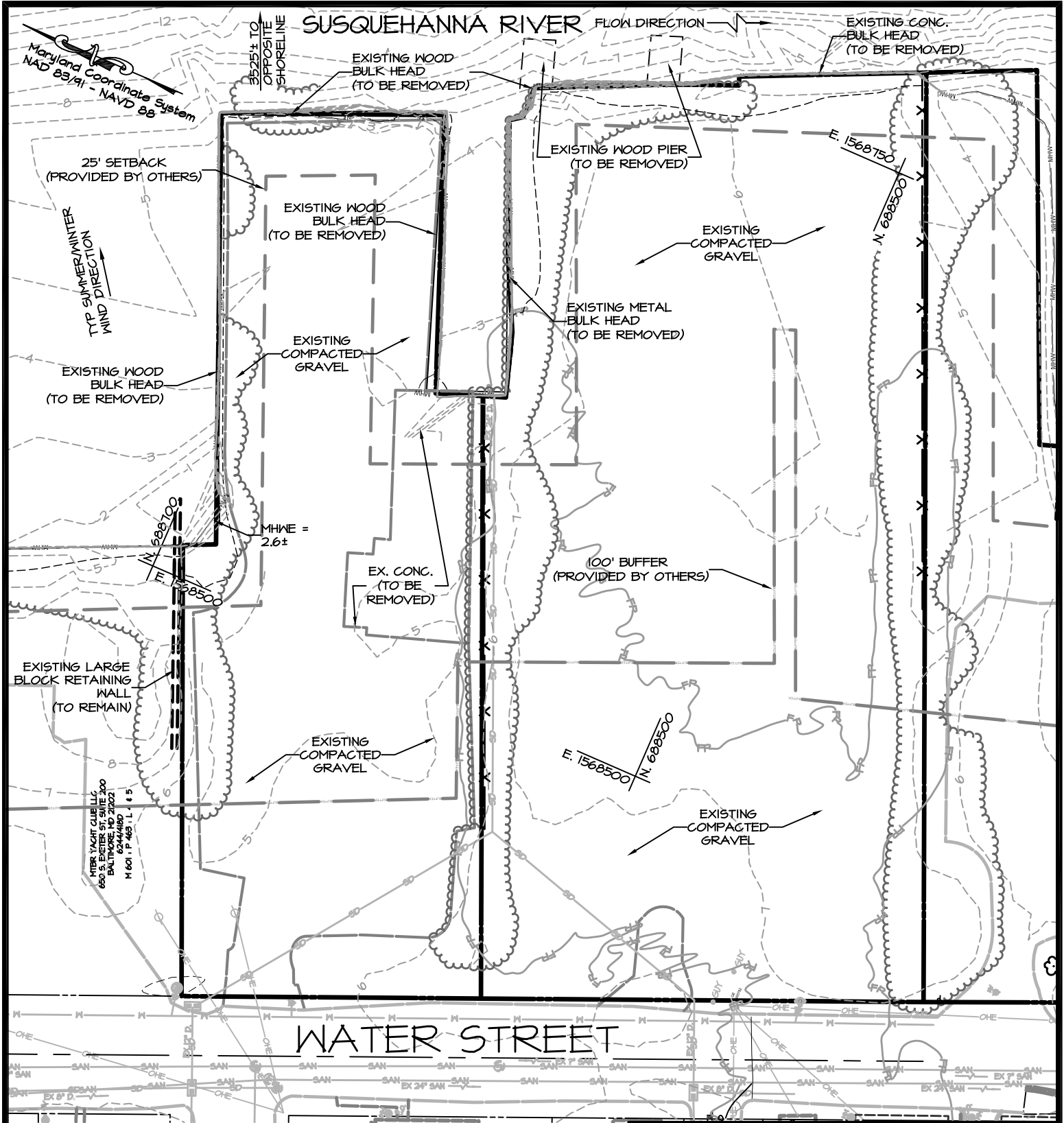
**BAY STATE LAND  
 SERVICES**

Civil & Structural Engineers  
 Land Planners & Land Surveyors  
 Environmental Engineers  
 Geo-Technical, Materials Testing and Inspections



2012 Rock Spring Road  
 Suite D  
 Forest Hill, Maryland 20150  
 Phone: 410-879-4747  
 Fax : 410-420-3949  
[www.baystatelandservices.com](http://www.baystatelandservices.com)





MEAN LOW WATER ELEV = 0.0±  
 MEAN HIGH WATER ELEV = 2.6±

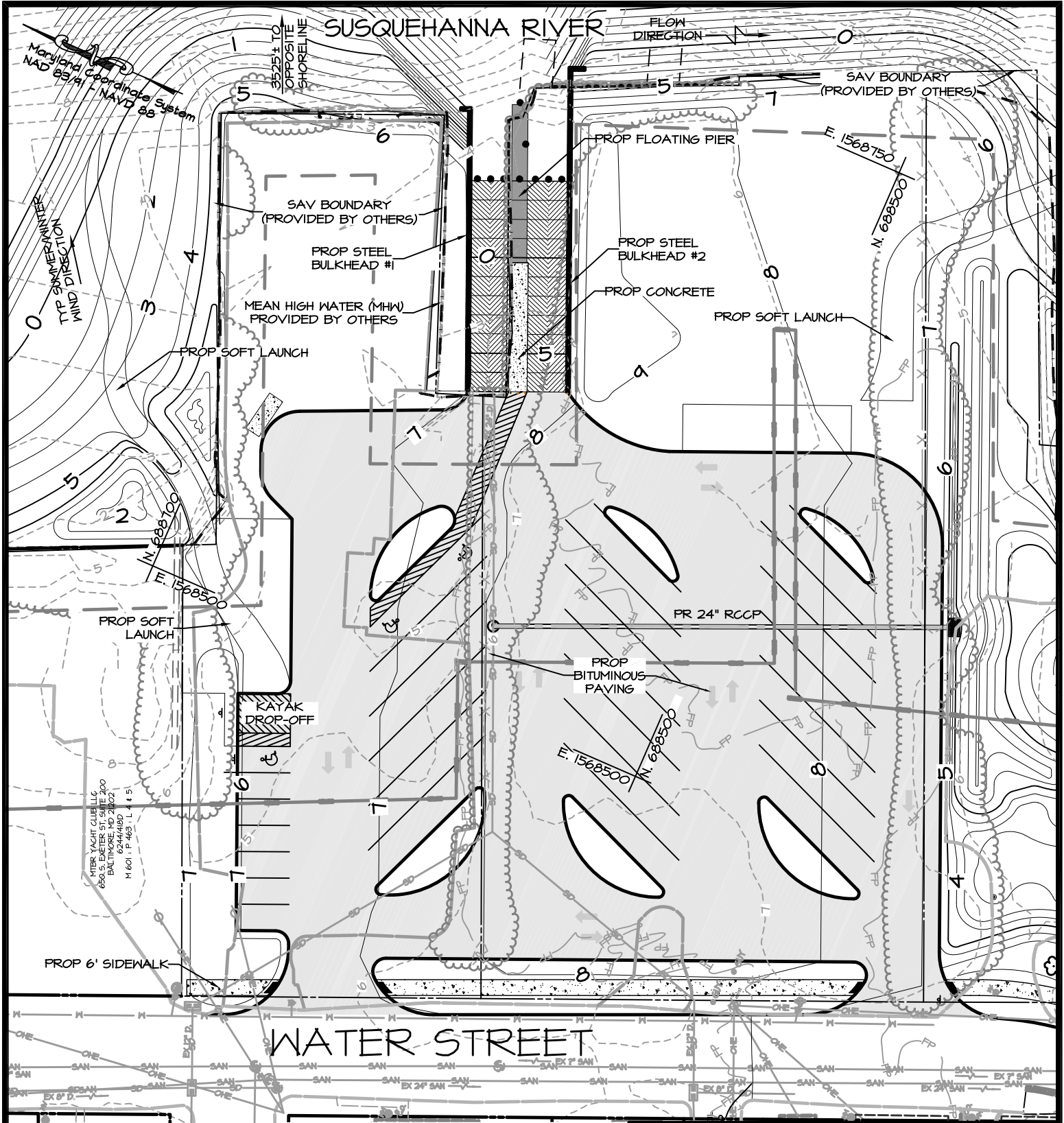
20-WL-0531  
 202060853  
 1/7/2022  
 Sheet 2 of 20

EXISTING CONDITIONS PLAN  
**WATER STREET  
 HERITAGE PARK**

**BAY STATE LAND  
 SERVICES**  
 Civil & Structural Engineers  
 Land Planners & Land Surveyors  
 Environmental Engineers  
 Geo-Technical, Materials Testing and Inspections



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MEAN LOW WATER ELEV = 0.0±  
 MEAN HIGH WATER ELEV = 2.6±

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 202060853  
 1/7/2022  
 Sheet 3 of 20

PROPOSED CONDITIONS PLAN  
**WATER STREET  
 HERITAGE PARK**

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# SUSQUEHANNA RIVER

**BULKHEAD #1 IMPACTS**  
 Shallow Water Open Impact  
 285 Sq.Ft. - 0.00654 Ac.

Shallow Water SAV Impact  
 0 Sq.Ft. - 0.00000 Ac.

Deep Water Open Impact  
 385 Sq.Ft. - 0.00883 Ac.

Deep Water SAV Impact  
 420 Sq.Ft. - 0.00964 Ac.

FILL VOLUME  
 595 Cu.Yd. - 16,065 Cu.Ft.

CUT VOLUME  
 0 Cu.Yd. - 0 Cu.Ft.

**BOAT RAMP IMPACTS**  
 Shallow Water Open Impact  
 417 Sq.Ft. - 0.00957 Ac.

Shallow Water SAV Impact  
 13 Sq.Ft. - 0.000298 Ac.

Deep Water Open Impact  
 469 Sq.Ft. - 0.01076 Ac.

Deep Water SAV Impact  
 313 Sq.Ft. - 0.00719 Ac.

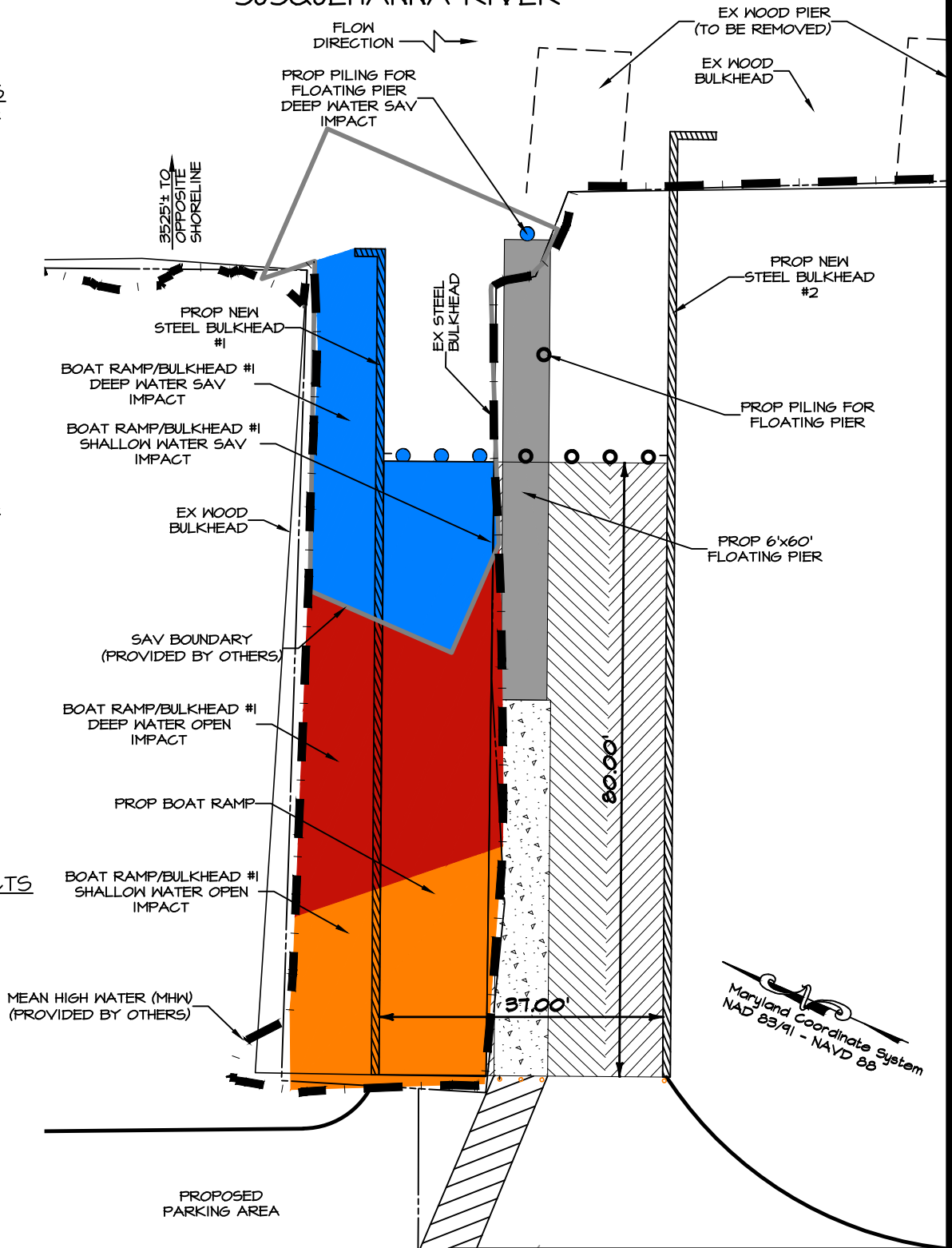
FILL VOLUME  
 600 Cu.Yd. - 16,200 Cu.Ft.

CUT VOLUME  
 926 Cu.Yd. - 25,000 Cu.Ft.

**FLOATING PIER IMPACTS**  
 Deep Water SAV Impact  
 5 Sq.Ft. - 0.000 Ac.

FILL VOLUME  
 0 Cu.Yd. - 0 Cu.Ft.

CUT VOLUME  
 0.00 Cu.Yd. - 0.00 Cu.Ft.



Maryland Coordinate System  
 NAD 83/91 - NAVD 88

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 Sheet 4 of 20

MEAN LOW WATER ELEV = 0.0±  
 MEAN HIGH WATER ELEV = 2.6±

BOAT RAMP AND BULK HEAD PLAN

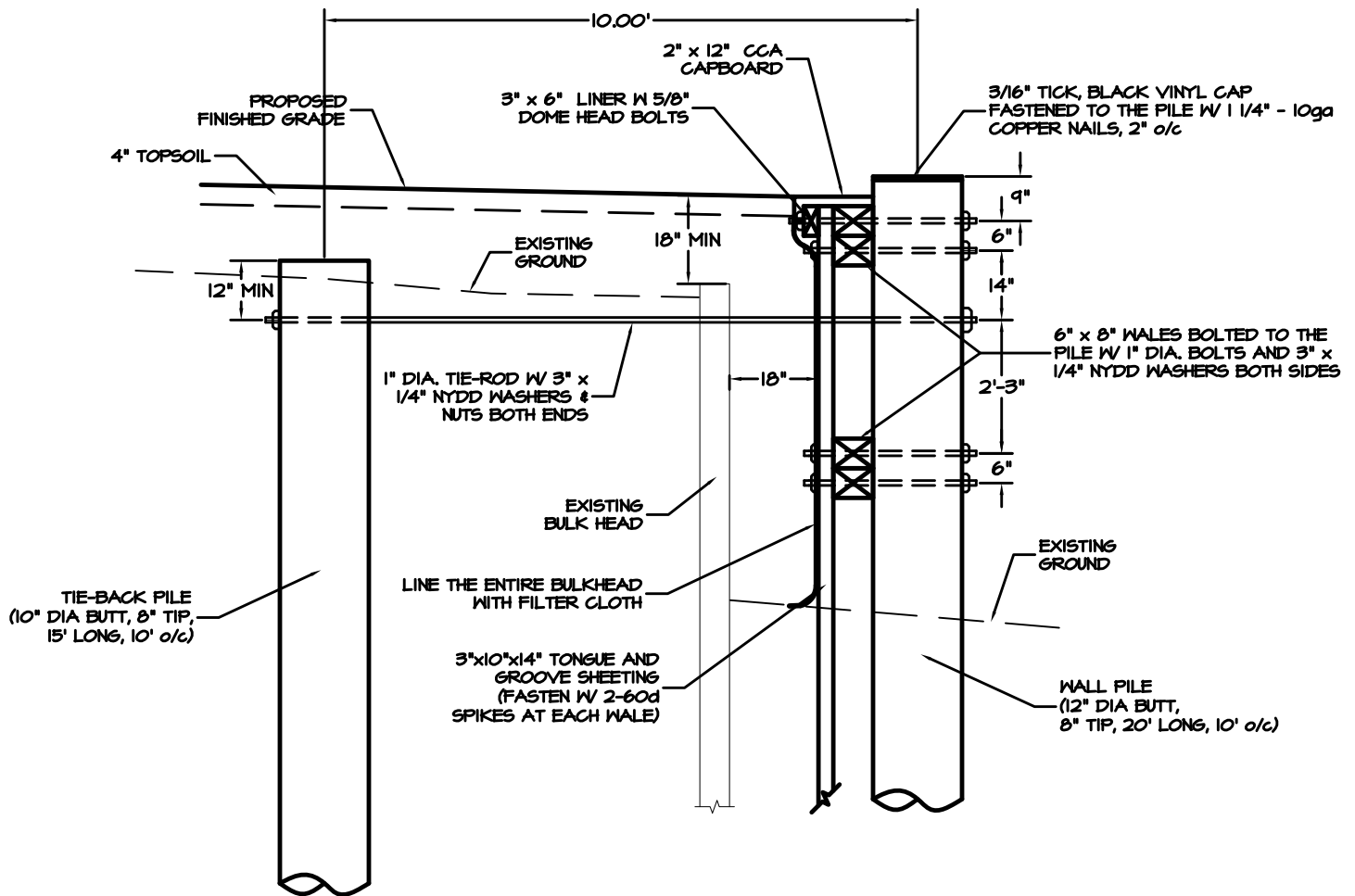
## WATER STREET HERITAGE PARK

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**TYPICAL BULKHEAD SECTION**  
NOT TO SCALE

- NOTES:
- EXISTING BULK HEAD TO BE REMOVED TO AT LEAST 18" BELOW PROPOSED GRADE.
  - ALL HARDWARE SHALL BE HOT DIPPED GALVANIZED.
  - ALL TIMBER MATERIAL SHALL BE TREATED WITH 2.5lbs/cu.ft. CCA.

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BULKHEAD REPLACEMENT DETAIL

# WATER STREET HERITAGE PARK

SHEET 5 OF 20

CITY OF HAVRE DE GRACE, MARYLAND

SCALE: AS SHOWN

DATE: 1/5/22

DRAWN BY: BWN

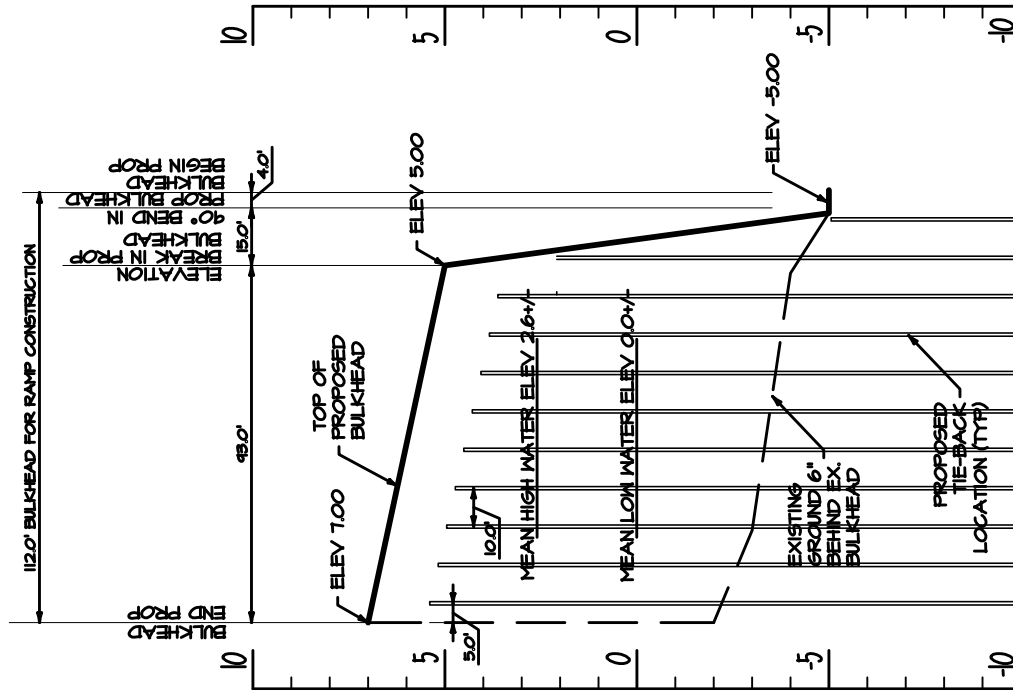
JOB NO. 18058

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**BULKHEAD #1 PROFILE**

SCALE: HORIZ: 1"=50'

VERT: 1"=5'

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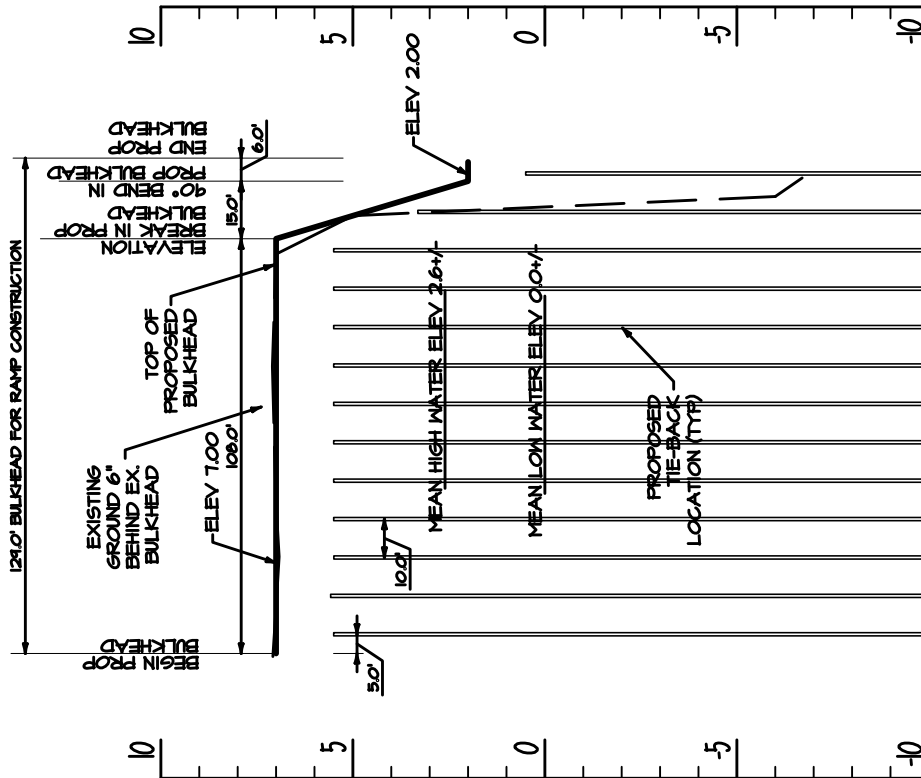
BULKHEAD #1 PROFILE  
**WATER STREET  
 HERITAGE PARK**

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**BULKHEAD #2 PROFILE**

SCALE: HORIZ: 1"=50'

VERT: 1"=5'

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 202060853  
 1/7/2022  
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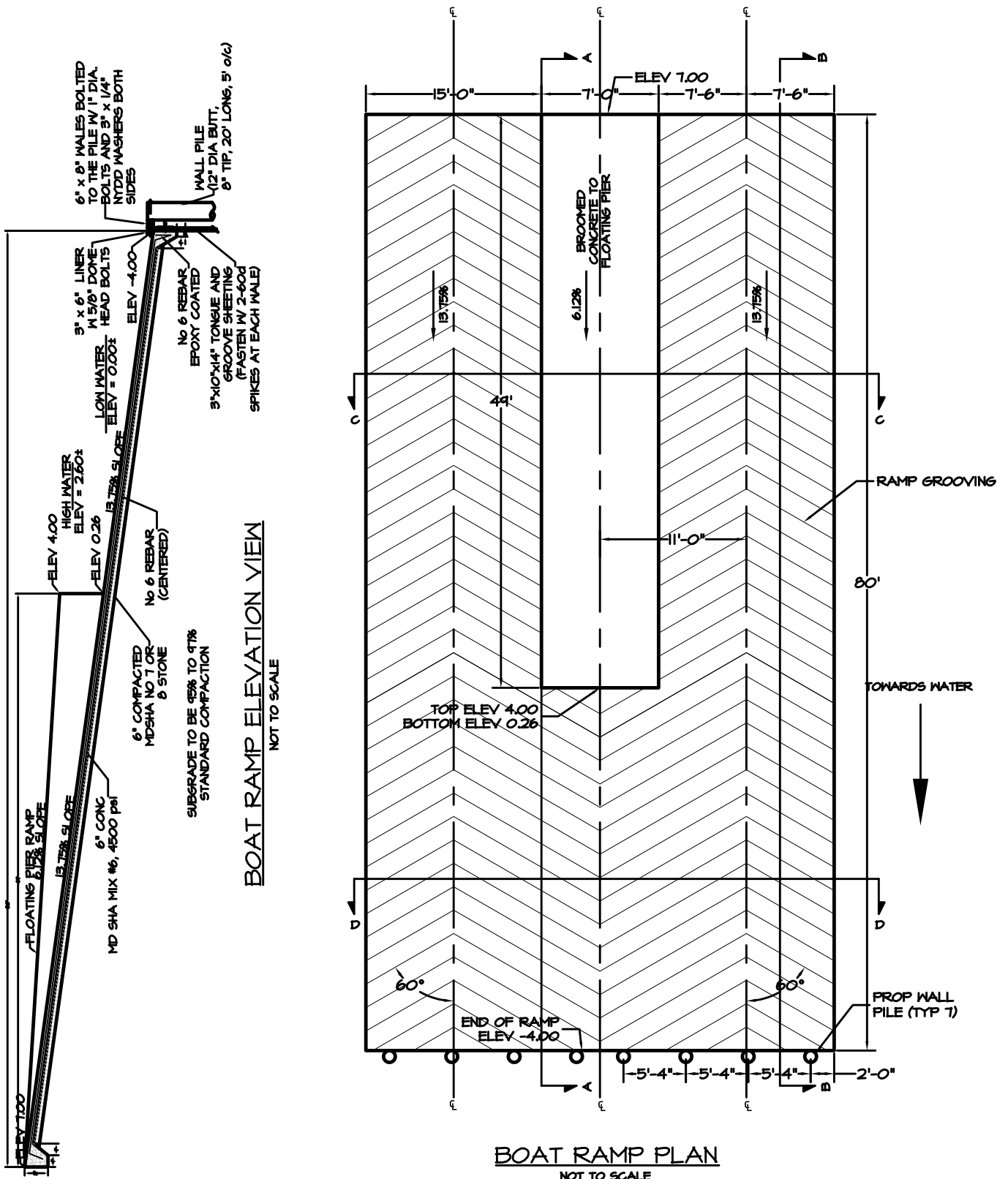
BULKHEAD #2 PROFILE  
**WATER STREET  
 HERITAGE PARK**

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BOAT RAMP DETAILS

**WATER STREET  
HERITAGE PARK**

DATE: 7-28-2021

SHEET 8 OF 20

CITY OF HAVRE DE GRACE, MARYLAND

SCALE: AS SHOWN

DATE: 1/5/22

DRAWN BY: B/W

JOB NO. 18058

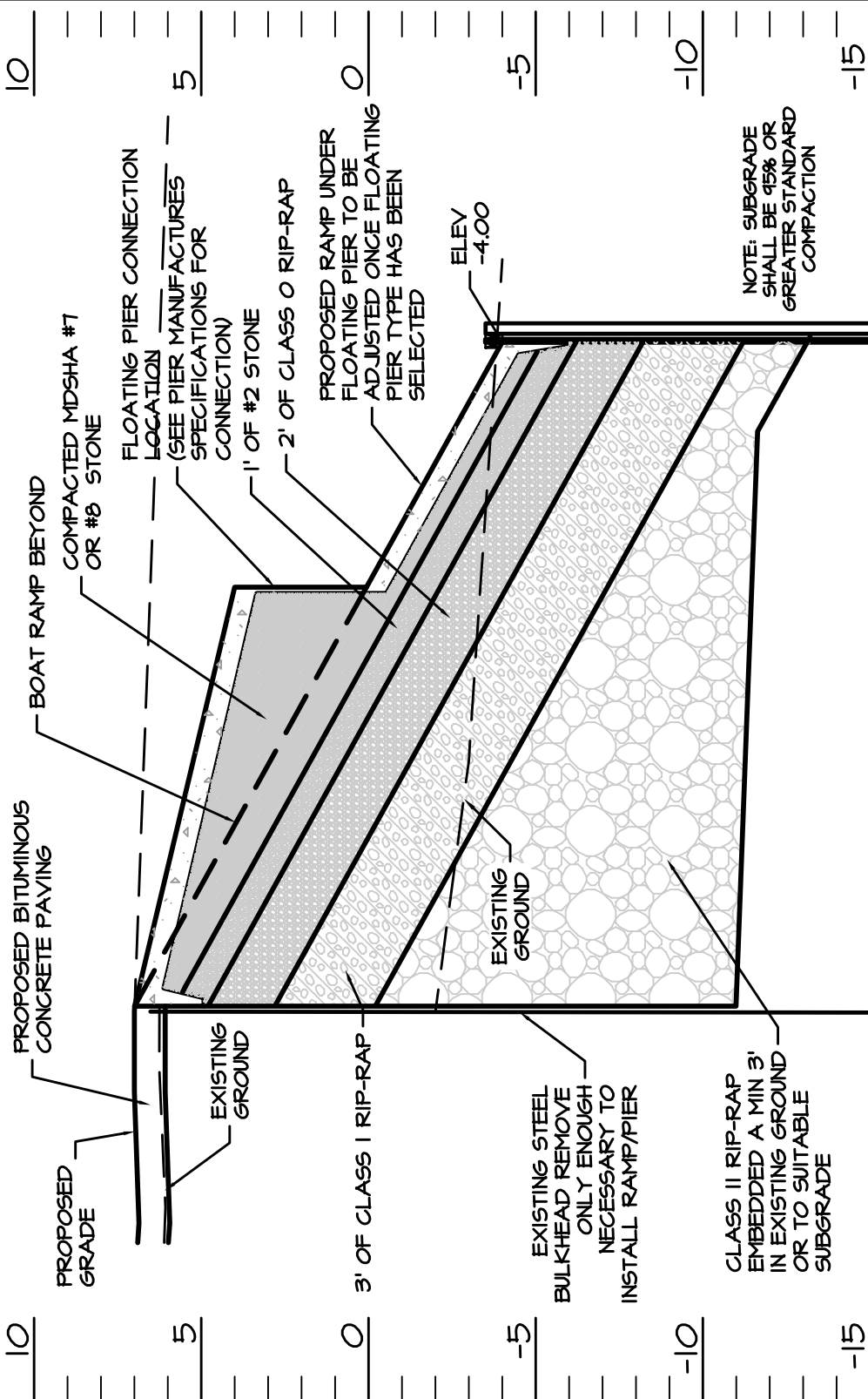
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BOAT RAMP SECTION A-A  
NOT TO SCALE

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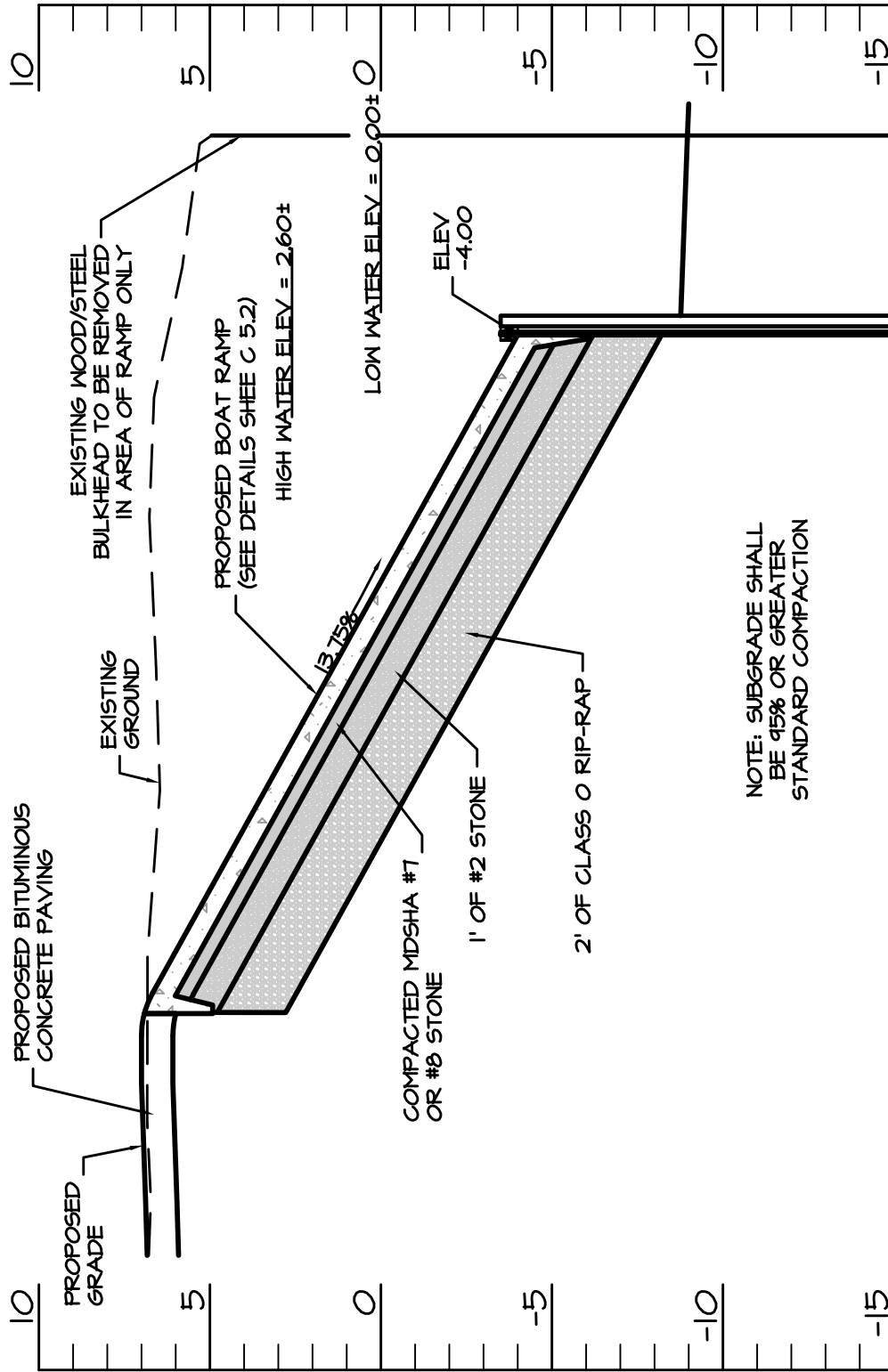
BOAT RAMP SECTION A-A  
**WATER STREET  
HERITAGE PARK**

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NOTE: SUBGRADE SHALL BE 95% OR GREATER STANDARD COMPACTION

BOAT RAMP SECTION B-B  
NOT TO SCALE

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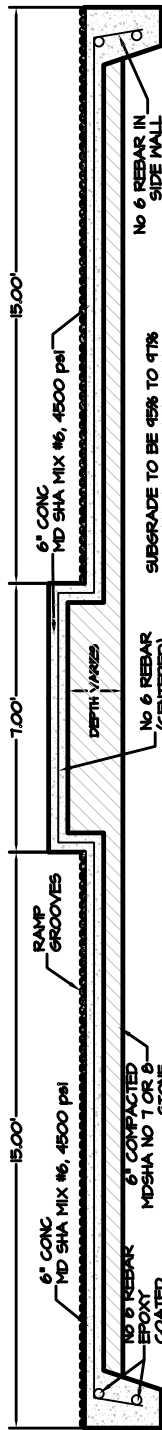
BOAT RAMP SECTION B-B  
WATER STREET  
HERITAGE PARK

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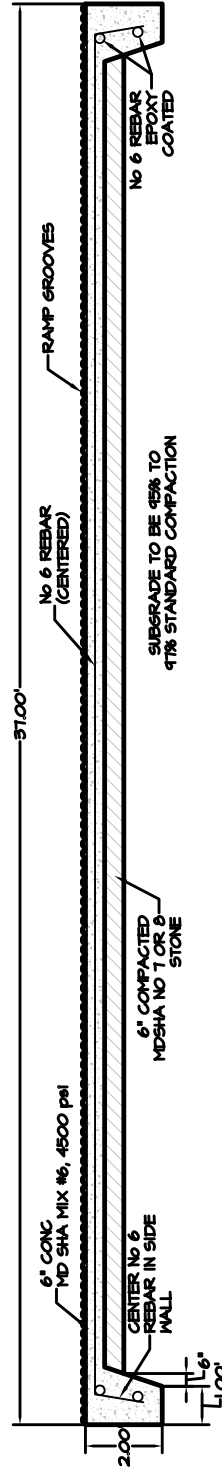


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BOAT RAMP SECTION C-C

NOT TO SCALE



BOAT RAMP SECTION D-D

NOT TO SCALE

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BOAT RAMPS SECTIONS C-C & D-D

WATER STREET  
HERITAGE PARK

SHEET 11 OF 20 CITY OF HAVRE DE GRACE, MARYLAND

SCALE: AS SHOWN DATE: 1/5/22 DRAWN BY: B/W JOB NO. 18058

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# SEQUENCE OF CONSTRUCTION

- 2Days 1. Notify City of Havre De Grace, Construction and Program Management @ (410) 939-1800 and Maryland Department of the Environment (410)-537-3510 at least forty-eight (48) hours prior to beginning construction.
- 1Day 2. Clear and grub for Stabilized Construction Entrances w/ Mountable Berm.
- 1 Day 3. Install Stabilized Construction Entrance w/ Mountable Berm.
- 2 Days 4. Clear and Grub for perimeter sediment controls. (Silt Fence)
- 2 Days 5. Install Silt Fence.
- 4 Weeks 6. Install new sheet pile bulkhead and tie backs. Note silt fence shall be removed and replaced daily as installation commences.
- 1 Week 7. Install Temporary Bulkhead for construction of Boat Ramp. Dewater area via Filter Bag.
- 3 Weeks 8. Muck out area of Boat Ramp and install Ramp per details on the Site Plans. Stockpile removed material onsite to dry out and be used as fill.
- 4 Weeks 9. Commence grading operations with approval from City of Havre De Grace or MDE Sediment Control Inspector. Stockpile topsoil at location shown hereon. Install soft launch ramp and stone sill as shown on the Site Plans.

Excavated material will be capped onsite on Parcels 470 and 472. Capping will include removal of organic materials (trees, brush, heavy grasses/weeds), placement of a geotextile marker fabric above the excavated material or ground surface, followed by a minimum of two feet of non-impacted fill material. Non-impacted fill material may be soil, gravel, crusher run or crushed concrete, must be verified as clean before it is brought to the site. Materials brought from a quarry or mine may be verified by a letter from the source. A copy of the letter must be provided by the contractor for submission to the MDE LRP for approval prior to bringing the material onsite. If documentation cannot be obtained from the provider, or the material being proposed for import is soil, the material must be sampled and the analytical results must be submitted to MDE for review to confirm the material meets MDE requirements. The cap thickness may be increased as needed for the purposes of achieving appropriate site grades. As an alternative, the parcels may be capped, in whole or in part, with asphalt pavement. A minimum of four inches of asphalt will be required to cap the site.

- 1 Week 10. Install storm drains and Submerged Gravel Wetlands outfall.
- 3 Days 11. Install base paving and concrete sidewalks.
- 1 Week 12. Fine grade pervious areas of site and permanently stabilize.
- 1 Weeks 13. Once pervious areas have 90% or greater vegetative cover, base paving is in place and with approval from the City of Havre De Grace or MDE Sediment control inspector begin installation of the Regenerative Stormwater Conveyance System per stormwater management plans. Contact the Engineer preparing the as-built at least 48 hour prior to construction of the Regenerative Stormwater Conveyance System for required inspections, pictures and documentation. Install landscaping once brought to final grade.
- 2 Weeks 14. Install any remaining Landscaping.
- 1 Week 15. Install final paving followed by parking striping and signage.
- 2 Days 16. Remove any remaining sediment control measures and permanently stabilize any additional areas disturbed.

ESTIMATED START DATE: JANUARY 1, 2022  
ESTIMATED COMPLETION DATE: MARCH 31, 2022

## SEQUENCE OF CONSTRUCTION

# WATER STREET HERITAGE PARK

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SHEET 12 OF 20 CITY OF HAVRE DE GRACE, MARYLAND

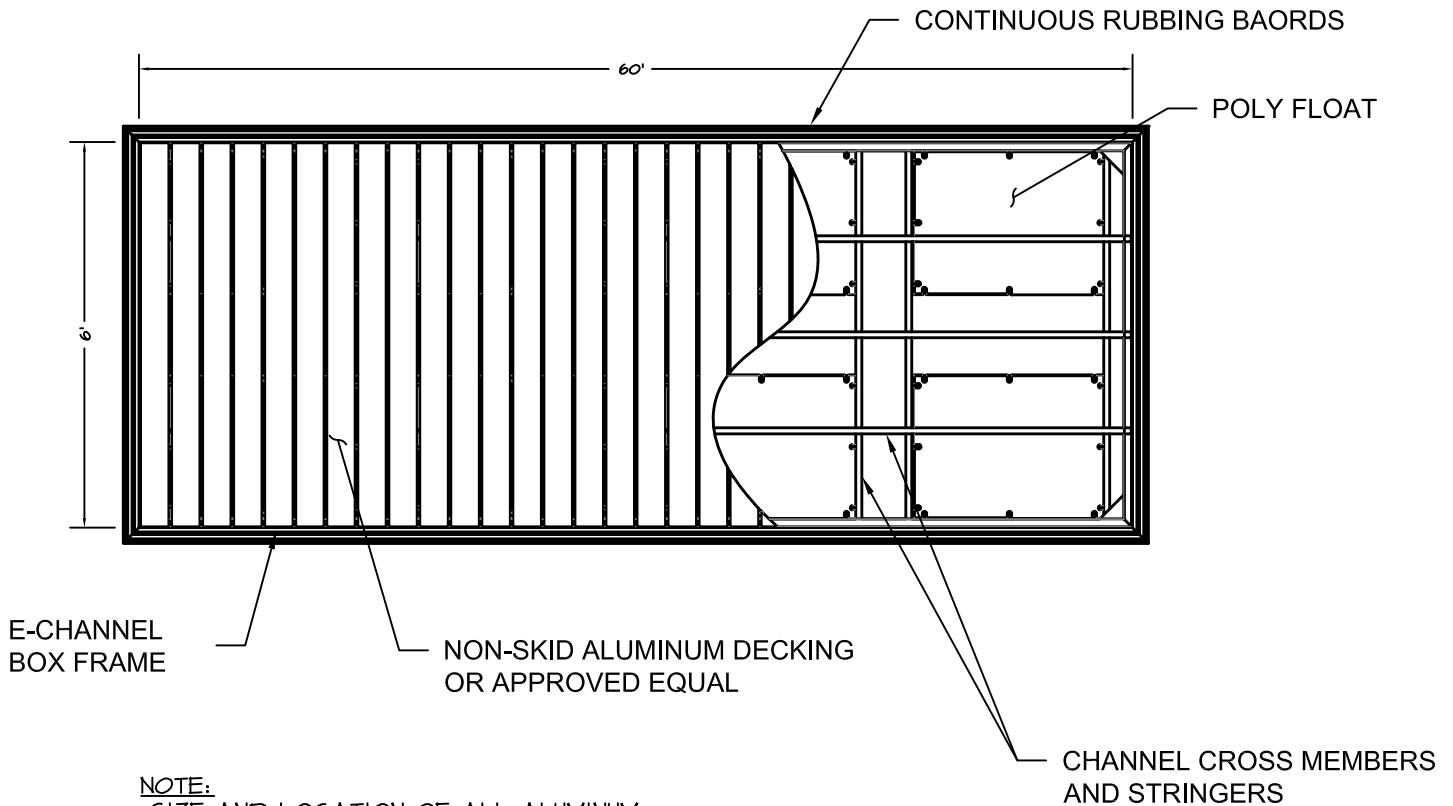
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FLOATING PIER PLAN VIEW  
 NOT TO SCALE

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 202060853  
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 Sheet 13 of 20

FLOATING PIER DETAIL SHEET #1

**WATER STREET  
 HERITAGE PARK**

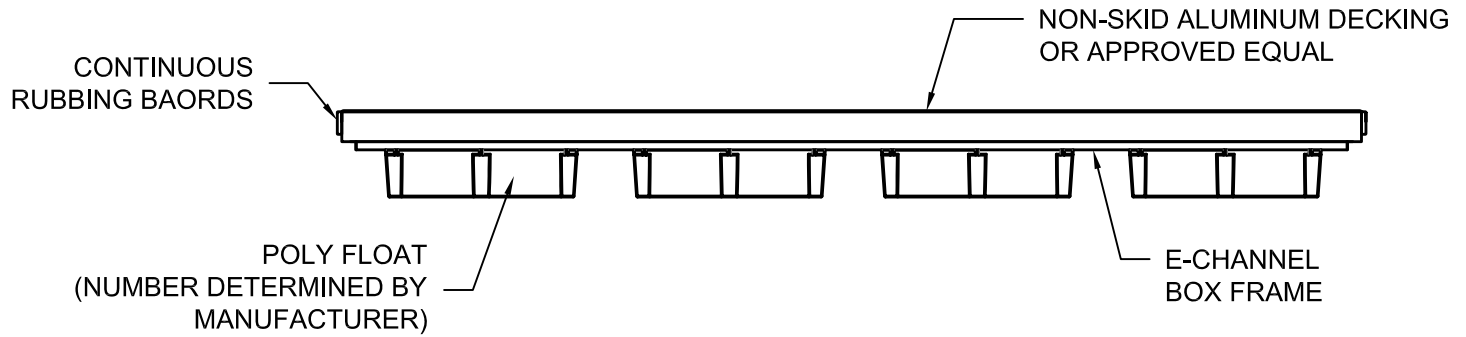
SHEET 13 OF 20 CITY OF HAVRE DE GRACE, MARYLAND  
 SCALE: AS SHOWN DATE: 1/5/22 DRAWN BY: BWN JOB NO. 18058

**BAY STATE LAND  
 SERVICES**

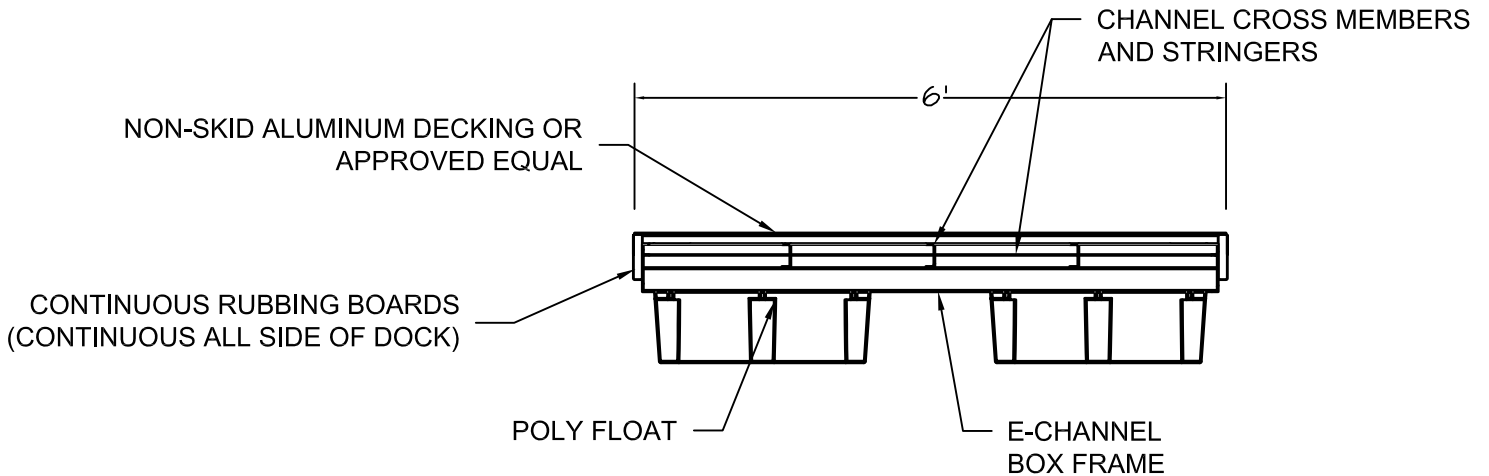
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FLOATING PIER ELEVATION  
NOT TO SCALE



FLOATING PIER SECTION  
NOT TO SCALE

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FLOATING PIER DETAIL SHEET #2

# WATER STREET HERITAGE PARK

SHEET 14 OF 20 CITY OF HAVRE DE GRACE, MARYLAND  
SCALE: AS SHOWN DATE: 1/5/22 DRAWN BY: BWN JOB NO. 18058

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## FLOATING PIER NOTES

1. ALL MATERIALS SHALL BE AS MANUFACTURED BY A REPUTABLE PIER MANUFACTURER AS APPROVED BY THE CITY OF HAVRE DE GRACE OR DESIGN ENGINEER.
2. THE DECK AND FRAME STRUCTURAL COMPONENTS OF THE FLOATING DOCKS SHALL BE DESIGNED WITH MINIMUM SAFETY FACTORS ON WORKING STRESS WHICH CONFORM TO THOSE SET FORTH IN THE LATEST ISSUE OF THE ALUMINUM ASSOCIATION "SPECIFICATIONS FOR ALUMINUM STRUCTURES" FOR BUILDINGS AND SIMILAR TYPE STRUCTURES.
3. THE MANUFACTURER/SUPPLIER SHALL HAVE A MINIMUM OF 5 YEARS CONTINUOUS EXPERIENCE IN COMMERCIAL DOCK FABRICATION.
4. ALUMINUM EXTRUSIONS FOR DOCK STRUCTURES SHALL BE ALUMINUM ALLOY 6061-T6 "E" CHANNELS EXTRUDED IN ACCORDANCE WITH THE REQUIREMENTS OF APPLICABLE SECTIONS OF FEDERAL SPECIFICATIONS QQ-A-200. MISCELLANEOUS ALUMINUM MAY BE 6063-T5 OR 5052-H32.
5. ALUMINUM DECKING SHALL BE SYMMETRICALLY EXTRUDED SLATS WITH INTEGRATED RIBS AND MECHANICAL KNURLING TO PROVIDE A NON SKID SURFACE. DECKING TO BE ALUMINUM ALLOY 6061-T6.
6. ALL FLOATING DOCKS SHALL BE DESIGNED FOR A MINIMUM FREEBOARD OF 8 INCHES UNDER FULL DEAD PLUS LIVE LOAD, AND 10 INCHES UNDER A DEADLOAD PLUS CONCENTRATED LOAD OF 400 POUNDS APPLIED AT ANY LOCATION ON THE DOCK WALKING SURFACE. ADDITIONAL FLOTATION SHALL BE ADDED TO SUPPORT THE GANGWAY DEAD LOADS WITHOUT CREATING UNDUE DISTORTION IN THE DOCK. POLY FLOATS SHALL BE DESIGNED FOR A MINIMUM OF 20 PSF LIVE LOAD PROVIDING A MINIMUM OF 16 INCHES UNLOADED FREEBOARD.
7. HINGED OR BOLTED FLOATING DOCK MODULE CONNECTORS SHALL BE ABLE TO WITHSTAND A LOAD OF 3000 POUNDS APPLIED TO THE FULL CONNECTOR.
8. ALL WELDS SHALL BE MADE IN A CLEAN AND NEAT MANNER TO RESULT IN A HIGH QUALITY WELD. FABRICATOR IS RESPONSIBLE FOR REMOVING ALL BURS AND SHARP EDGES FROM ALUMINUM MEMBERS OR WELDS THAT MAY POSE A HAZARD TO USERS.
9. CONTRACTOR IS REQUIRED TO SUBMIT SHOP DRAWINGS AND ENGINEERING CALCULATIONS FOR ALL GANGWAY, FIXED PIERS, AND FLOATING DOCKS FROM THE MANUFACTURER APPROVED BY THE ENGINEER. THE MANUFACTURERS SHOP DRAWINGS AND CALCULATIONS SHALL BE SIGNED AND STAMPED BY A MARYLAND REGISTERED PROFESSIONAL ENGINEER.
10. CONTRACTOR SHALL PROPERLY INSULATE ANY POTENTIALLY CORROSIVE OR DISSIMILAR METALS BY USE OF NEOPRENE, NYLON, OR A OTHER MATERIAL AS APPROVED BY THE ENGINEER.
11. ALL HARDWARE FOR CONNECTING THE RUBBING BOARDS SHALL BE COUNTERSUNK.
12. LAND SIDE GANGWAY ATTACHMENT IS A FIXED LOCATION AND ANY FIELD ADJUSTMENTS SHALL BE MADE TO FLOATING DOCK.
13. CONTRACTOR SHALL SLIGHTLY FIELD-ADJUST THE LOCATION OF THE FLOATING DOCK TO ENSURE THAT THE REQUIRED CLEARANCES ARE MAINTAINED.
14. GANGWAY SHALL NOT BE ALLOWED TO HAVE INTERFERENCE DURING ANY STAGE OF THE TIDE.
15. PRIOR TO PERFORMING ANY FIELD ADJUSTMENTS, CONTRACTOR SHALL NOTIFY THE CITY OF HAVRE DE GRACE AND DESIGN ENGINEER.
16. PEAR ANCHOR PILE LOCATION AND ATTACHMENT TYPE SHALL BE DETERMINED ONCE A PIER MANUFACTURE AND PIER TYPE HAVE BEEN SELECTED.

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FLOATING PIER DETAIL SHEET #3

# WATER STREET HERITAGE PARK

SHEET 15 OF 20 CITY OF HAVRE DE GRACE, MARYLAND

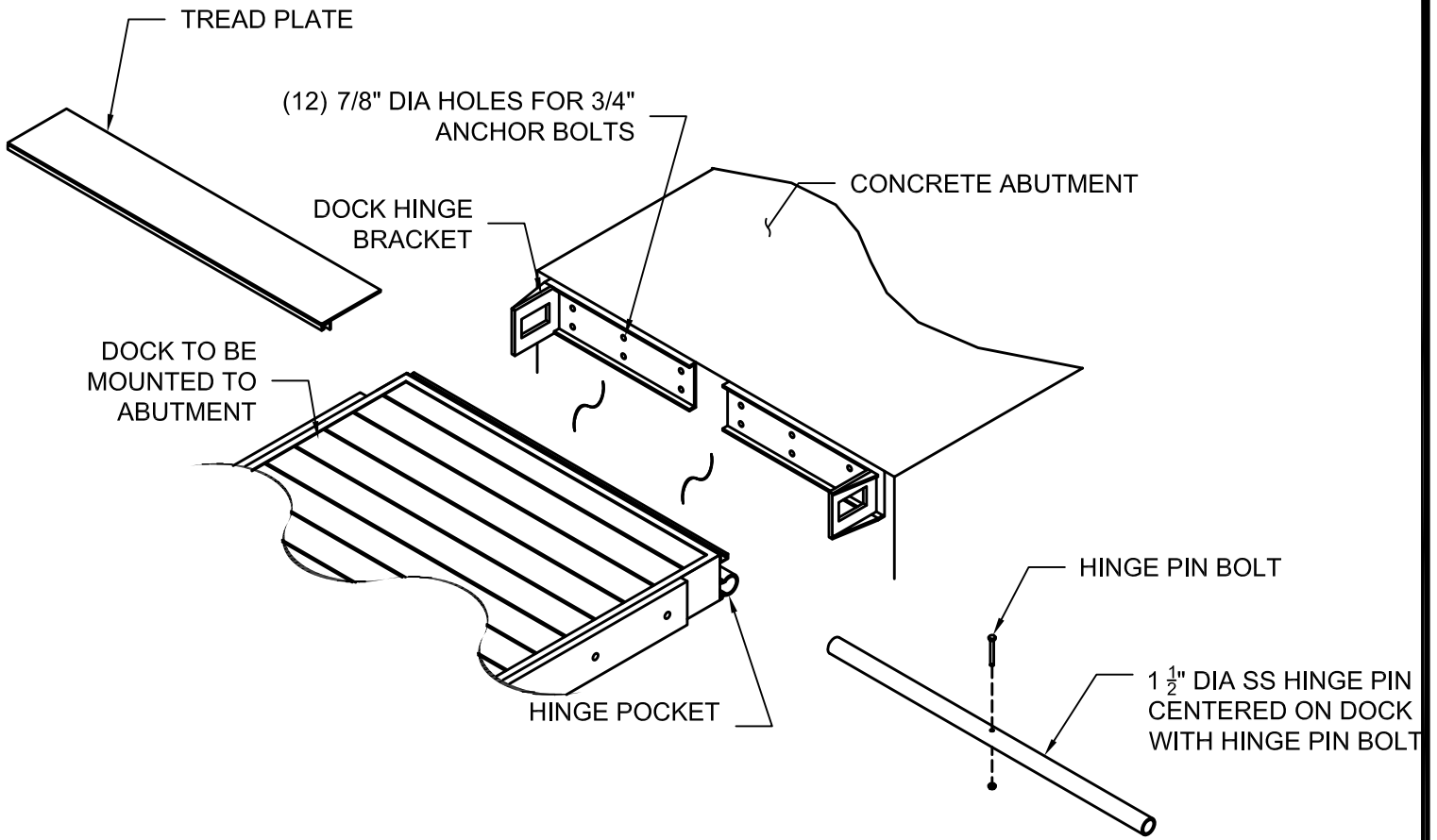
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## BAY STATE LAND SERVICES

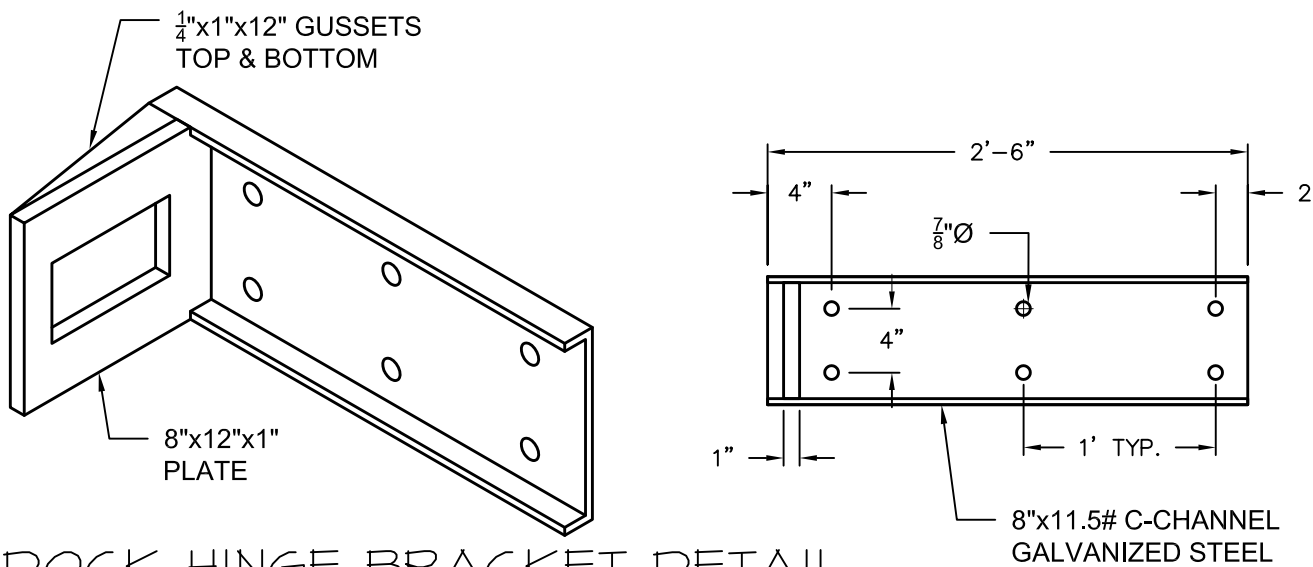
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NARRAGANSETT HINGE DETAILS AND ASSEMBLY  
NOT TO SCALE



DOCK HINGE BRACKET DETAIL  
NOT TO SCALE

FLOATING PIER DETAIL SHEET #4

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202060853  
1/7/2022  
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**WATER STREET  
HERITAGE PARK**

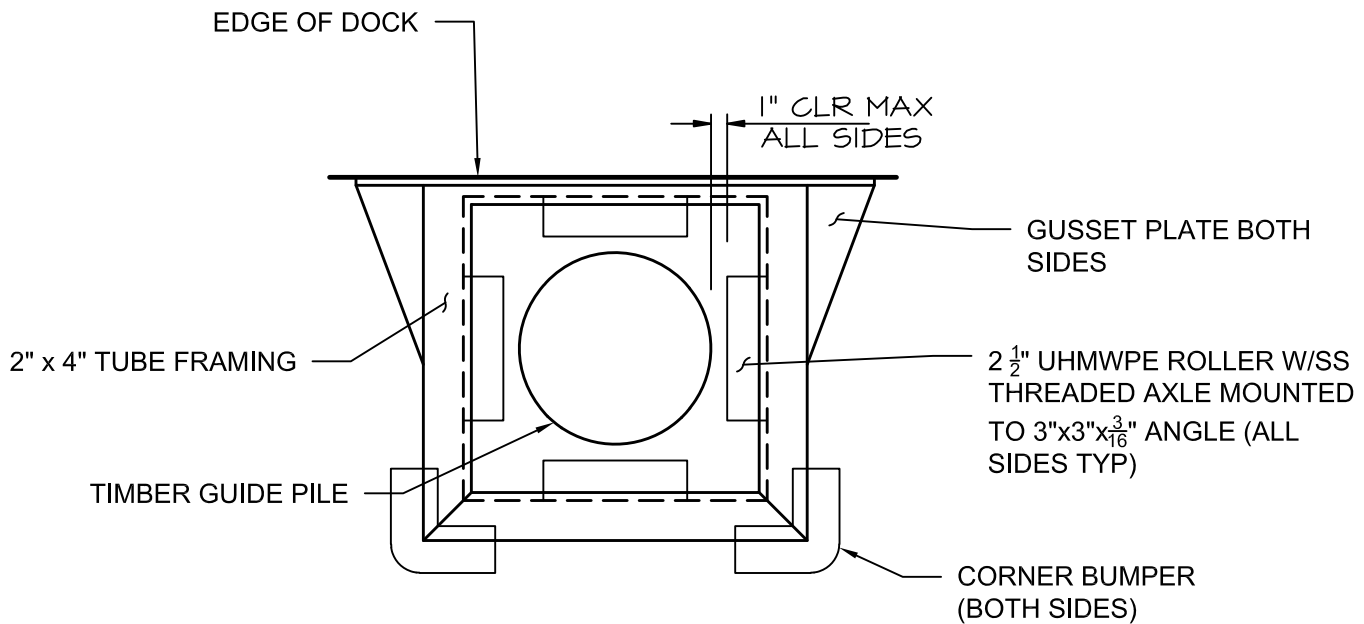
SHEET 16 OF 20 CITY OF HAVRE DE GRACE, MARYLAND  
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SERVICES**

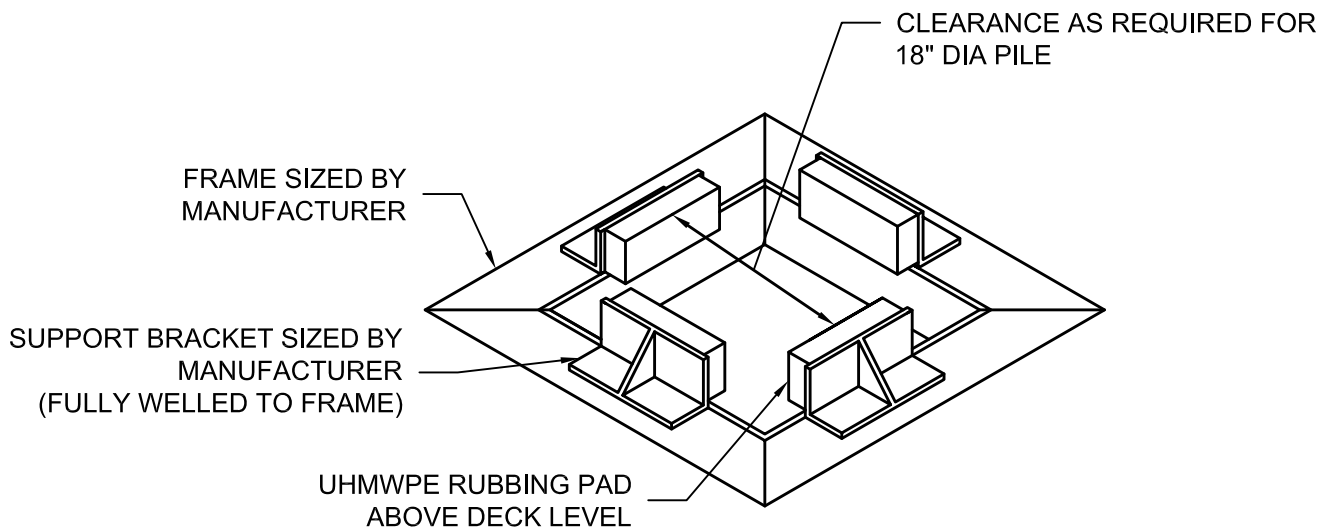
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EXTERNAL PILE GUIDE DETAIL  
NOT TO SCALE



INTERNAL PILE GUIDE DETAIL  
NOT TO SCALE

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FLOATING PIER DETAIL SHEET #5

# WATER STREET HERITAGE PARK

SHEET 17 OF 20 CITY OF HAVRE DE GRACE, MARYLAND  
SCALE: AS SHOWN DATE: 1/5/22 DRAWN BY: BWN JOB NO. 18058

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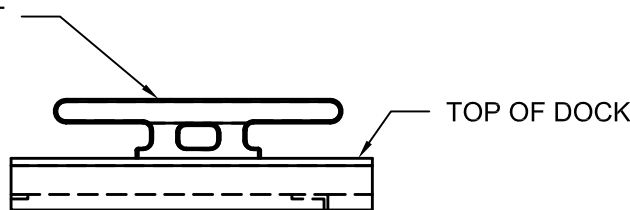
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PILE GUIDE NOTES:

1. PILE GUIDE SHALL BE SIZED FOR HEAVY DUTY SERVICE IN THE MARINE ENVIRONMENT.
2. PILE GUIDE FRAME AND SUPPORT BRACKETS SHALL BE ALUMINUM OR STAINLESS STEEL AS DETERMINED BY THE MANUFACTURER IN ORDER TO RESIST THE FORCES GENERATED BY THE FLOATING DOCK.
3. RUBBING PADS SHALL BE UHMWPE AND SHALL BE BOLTED TO THE SUPPORT BRACKET USING STAINLESS STEEL HARDWARE. ALL HARDWARE SHALL BE RECESSED OR COUNTERSUNK WITHIN THE RUBBING PAD.
4. SUPPORT BRACKETS SHALL BE WELDED TO THE PILE GUIDE FRAME MEMBERS.
5. STIFFENERS FOR THE ANGLE SUPPORT BRACKETS SHALL BE PROVIDED WHERE DEEMED NECESSARY BY THE MANUFACTURER.
6. ALL HARDWARE SHALL BE STAINLESS STEEL WITH NYLON LOCK NUTS WHERE APPLICABLE.
7. ANCHORING DEVICES FOR THE FLOATING DOCK SHALL ALLOW FREE MOVEMENT OF THE DOCK WHILE MINIMIZING DAMAGE DUE TO NORMAL DOCK MOVEMENT CAUSED BY TIDES, BOAT WAKES, WATER FLUCTUATION AND SEASONAL WINDS. GUIDES SHALL BE OF SUFFICIENT NUMBER TO RESTRAIN A UNIFORM LATERAL FORCE OF 150 POUNDS PER LINEAR FOOT APPLIED ALONG THE ENTIRE LENGTH OF THE DOCK.
8. ALL FABRICATED COMPONENTS SHALL BE OF THE SAME MATERIAL.

12" ALUMINUM CLEAT



CLEAT DETAIL  
NOT TO SCALE

CLEAT NOTES:

1. CLEATS SHALL BE CAST ALUMINUM ALLOY MEETING THE REQUIREMENT OF THE FEDERAL SPECIFICATIONS QQ-A-571F AND QQ-A-601E
2. CLEATS SHALL BE DESIGNED TO WITHSTAND A MOORING LINE LOAD OF 1500 POUNDS IN ANY DIRECTION.
3. CLEATS ON ALUMINUM DECKED DOCKS SHALL BE WELDED WITH A CONTINUOUS FILLET WELD.
4. CLEATS ON A WOODEN DECKED DOCK SHALL BE FASTEN IN SUCH A WAY AS TO WITHSTAND A MOORING LINE LOAD OF 1500 POUNDS IN ANY DIRECTION.

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FLOATING PIER DETAIL SHEET #6

**WATER STREET  
HERITAGE PARK**

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BULKHEAD #1 IMPACTS

Shallow Water Open Impact  
285 Sq.Ft. - 0.00654 Ac.

Shallow Water SAV Impact  
0 Sq.Ft. - 0.00000 Ac.

Deep Water Open Impact  
385 Sq.Ft. - 0.00883 Ac.

Deep Water SAV Impact  
420 Sq.Ft. - 0.00964 Ac.

FILL VOLUME  
595 Cu.Yd. - 16,065 Cu.Ft.

CUT VOLUME  
0 Cu.Yd. - 0 Cu.Ft.

BOAT RAMP IMPACTS

Shallow Water Open Impact  
417 Sq.Ft. - 0.00957 Ac.

Shallow Water SAV Impact  
13 Sq.Ft. - 0.000298 Ac.

Deep Water Open Impact  
469 Sq.Ft. - 0.01076 Ac.

Deep Water SAV Impact  
313 Sq.Ft. - 0.00719 Ac.

FILL VOLUME  
600 Cu.Yd. - 16,200 Cu.Ft.

CUT VOLUME  
926 Cu.Yd. - 25,000 Cu.Ft.

FLOATING PIER IMPACTS

Deep Water SAV Impact  
5 Sq.Ft. - 0.000 Ac.

FILL VOLUME  
0 Cu.Yd. - 0 Cu.Ft.

CUT VOLUME  
0.00 Cu.Yd. - 0.00 Cu.Ft.

20-WL-0531  
202060853  
1/7/2022  
Sheet 19 of 20

IMPACT TABLE  
**WATER STREET  
HERITAGE PARK**

SHEET 19 OF 20

CITY OF HAVRE DE GRACE, MARYLAND

SCALE: AS SHOWN

DATE: 1/5/22

DRAWN BY: BWN

JOB NO. 18058

**BAY STATE LAND  
SERVICES**

Civil & Structural Engineers  
Land Planners & Land Surveyors  
Environmental Engineers  
Geo-Technical, Materials Testing and Inspections

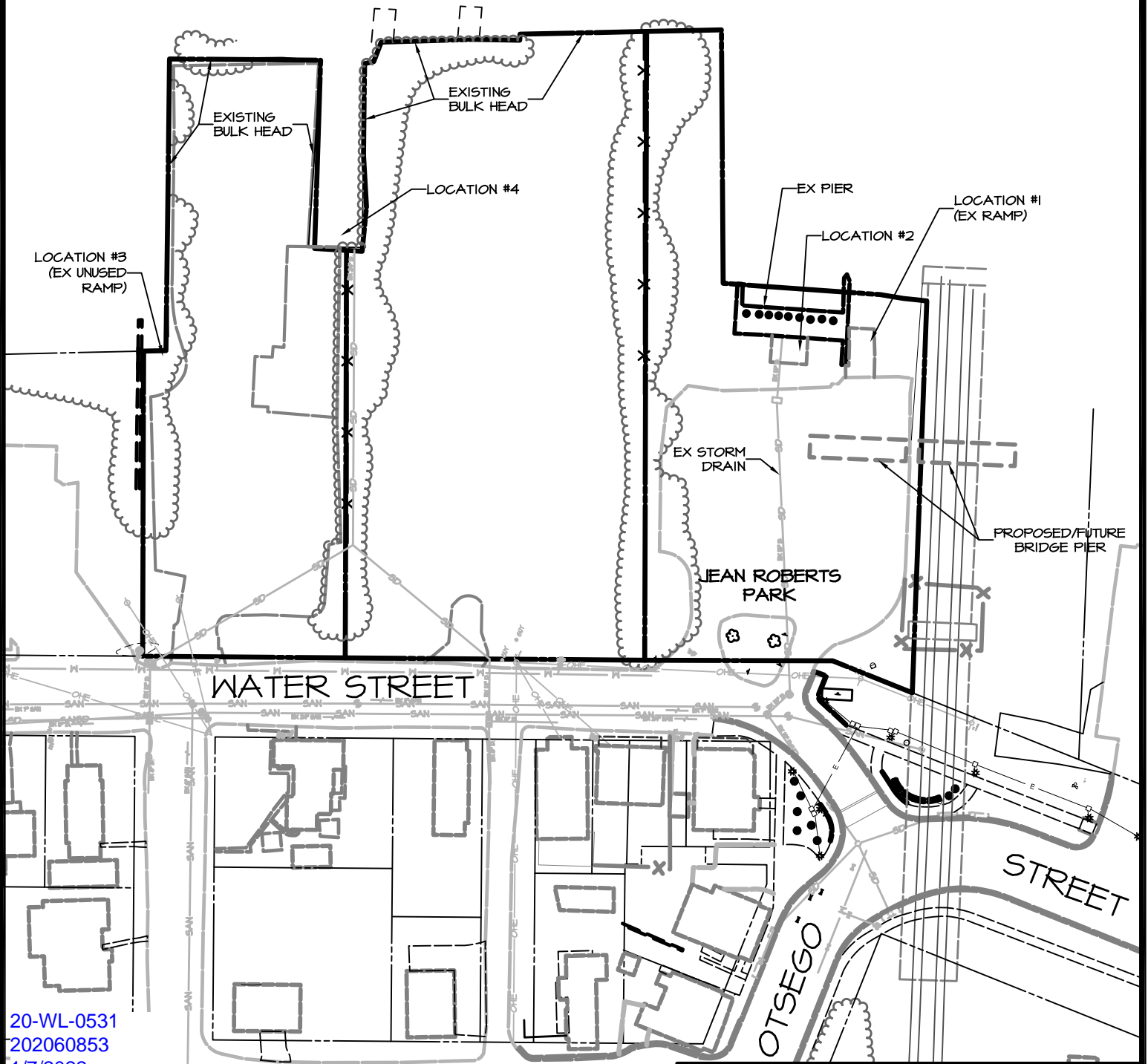


2012 Rock Spring Road  
Suite D  
Forest Hill, Maryland 20150  
Phone: 410-879-4747  
Fax : 410-420-3949  
[www.baystatelandservices.com](http://www.baystatelandservices.com)

Maryland Coordinate System  
NAD 83/91 - NAVD 88

# SUSQUEHANNA RIVER

FLOW DIRECTION →



20-WL-0531  
202060853  
1/7/2022  
Sheet 20 of 20

## ALTERNATIVES ANALYSIS WATER STREET HERITAGE PARK

### BAY STATE LAND SERVICES

Civil & Structural Engineers  
Land Planners & Land Surveyors  
Environmental Engineers  
Geo-Technical, Materials Testing and Inspections



2012 Rock Spring Road  
Suite D  
Forest Hill, Maryland 20150  
Phone: 410-879-4747  
Fax : 410-420-3949  
[www.baystatelandservices.com](http://www.baystatelandservices.com)



## SOIL MANAGEMENT PLAN

---

### **WATER STREET PROPERTIES**

**Tax Map 601: Parcels 470, 472, and 473**

**Havre de Grace, Maryland 21078**

August 24, 2021

*Revised November 23, 2021*

Prepared for:

**CITY OF HAVRE DE GRACE  
DEPARTMENT OF PUBLIC WORKS**

711 Pennington Avenue  
Havre de Grace, Maryland 21078

Attn: Mr. Tim Whittie, P.E.

---

Prepared by:

**GEO-TECHNOLOGY ASSOCIATES, INC.**

*Geotechnical and Environmental Consultants*

3445-A Box Hill Corporate Center Drive

Abingdon, Maryland 21009

(410) 515-9446

*www.gtaeng.com*

GTA Project No: 31170428x1

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**SOIL MANAGEMENT PLAN**  
**WATER STREET PROPERTIES**  
**HAVRE DE GRACE, MARYLAND 21078**  
**AUGUST 24, 2021**  
***REVISED NOVEMBER 23, 2021***

**1.0 INTRODUCTION**

At the request of the City of Havre de Grace (Client), Geo-Technology Associates, Inc. (GTA) has prepared this *Soil Management Plan* (Plan) to address soil handling, placement, and management at the above-referenced property (“subject property,” “site”). The subject property consists of three parcels totaling approximately 2.42 acres and currently contains open land and paved parking areas. The subject property is located along Water Street in the Havre de Grace area of Harford County, Maryland. The subject property is identified on Tax Map 601, as Parcels 470, 472, and 473. A *Site Location Map* and *Parcel Location Map*, depicting the subject property and parcel boundaries, are included as *Figures 1* and *2*, respectively.

This Plan was developed to (1) summarize previous environmental evaluations and reports associated with the subject property; and (2) establish soil excavation and management procedures associated with site development. Sediment and Erosion Control plans for the overall Water Street Properties re-development project are included in *Appendix A*. It should be noted that the soil excavation, removal, and/or capping activities described in this Plan are limited to Parcels 470, 472, and 473. A map depicting the areas proposed for excavation and capping is included in *Appendix A*.

GTA understands that soil excavated during redevelopment will be managed on-site. GTA has prepared this Plan to detail soil/material screening and handling, soil disposal, and documentation procedures that will be followed during the redevelopment activities.

Our conclusions regarding this site have been based on observations of existing conditions, a review of previous environmental reports, an interpretation of site history and site usage data, professional experience in the area with similar projects, and generally accepted professional environmental practice under similar circumstances. Field conditions were inferred

from the results of field screening and laboratory analysis of samples obtained at specific locations and on specific dates. The conclusions reached regarding the conditions of this site do not represent a warranty that all areas within the site are of a similar quality as may be inferred from observable site conditions, available site history, and analysis results.

This report was prepared by GTA for the sole and exclusive use of the City of Havre de Grace. Use and reproduction of this report by any other person without the expressed written permission of GTA and the City of Havre de Grace is unauthorized, and such use is at the sole risk of the user.

### **1.1 Property Description**

The site consists of approximately 2.42 acres, and currently contains a paved parking lot and open land. The site is comprised of three tax parcels (Parcels 470, 472, and 473) on Tax Map 601.

### **1.2 Topography**

The topographic information on the USGS Topographic Quadrangle Maps for the site vicinity (Havre de Grace, MD) indicate that the ground surface elevations on the site are approximately Mean Sea Level. The site slopes downward to the east, toward the Susquehanna River.

### **1.3 Soils**

According to the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) Web Soil Survey (reviewed on August 23, 2021), the site is underlain by Matapeake silt loam (MkB) and Cut and fill land (Cx).

The USDA Soil Conservation Service (SCS) *Soil Survey of Harford County Area, Maryland* (1975) describes cut and fill land as areas where the soil has been cut away by grading or land leveling, and areas that have been filled with soil and other materials.

## **1.4 Geology and Hydrogeology**

According to the Maryland Geological Survey Geologic Map of Harford County, Maryland (1968), the site vicinity is situated within the transition zone between the Atlantic Coastal Plain and the Piedmont Physiographic provinces, a boundary commonly referred to as the Fall Line or Fall Zone. The Fall Zone in this area is characterized by a relatively thin capping of Coastal Plain soils over residual soils and the rocks of the Piedmont. The Coastal Plain stratigraphy is characterized by undifferentiated and interlayered sedimentary deposits derived from eroded and transported rock formations to the north. The Piedmont is characterized by strongly folded and faulted metamorphic rocks, overlain by residual soils derived from the in-situ decomposition of the parent bedrock.

Specifically, the Site is indicated to be underlain by Alluvium. Alluvium chiefly consists of micaceous silt and clayey sand. The Talbot formation may also underlie the westernmost portion of the Site. The Talbot formation is comprised of pale to moderate gray silt, and contains abundant clay and some fine sand.

The groundwater flow direction in the site vicinity is assumed to mirror surficial topography. Accordingly, the groundwater flow direction is assumed to be generally toward the east in the immediate site vicinity.

Due to the historic uses of the Site and its location adjacent to the Susquehanna River, significant man-made fills are anticipated throughout the Site.

## **2.0 ENVIRONMENTAL HISTORY**

### **2.1 Summary of Prior Environmental Assessments**

GTA has performed a variety of environmental assessments of the site, as well as nearby parcels on Tax Map 601 (Parcels 460, 461, and 463). A summary of the prior on-site activities is included below:



*Parcel 470 – 2004 Activities*

---

In December of 2004, a Phase I Environmental Site Assessment (ESA) was prepared for Parcel 470. The parcel was occupied by Extreme Offshore Marine, Inc at that time. One 2,000-gallon unleaded gasoline AST and one 550-gallon diesel AST were noted on the southeastern portion of Parcel 470 by GTA personnel at that time. Various 30- to 55-gallon drums containing grease, used oil, virgin oil, and lubricant were also noted, as well as smaller containers of antifreeze, acetone, oxygen and argon gas cylinders, and other substances associated with boat repair and maintenance. At that time, GTA noted staining on gravel surfaces beneath used petroleum product drums on the southern property boundary of Parcel 470.

*Parcels 460, 461, 463, 470, and 472 – 2013 Activities*

---

GTA personnel performed a Phase I ESA of the above parcels, dated January 30, 2013. The Phase I ESA identified the following recognized environmental conditions (RECs):

- The former use of the site as a bulk petroleum/pesticide storage and distribution facility (Parcels 460 & 461).
- The historic placement of fill on the site.
- The former use of a portion of the site as a boat storage and maintenance facility (Parcel 470).

Based on these findings, a Phase II ESA was performed for the site on March 22, 2013. The Phase II ESA included six direct-push borings on Parcel 470 (designated GTA-1 through GTA-6) and one boring on Parcel 460 (GTA-13). Two additional borings were attempted on Parcels 460 and 461, designated GTA-14 and GTA-15, although Geoprobe refusal was encountered. Five soil samples were collected from the on-site borings, which were variously analyzed for volatile organic compounds (VOCs), organochlorine pesticides, and priority pollutant metals.

The soil sample analytical results indicated that lead was reported in soil sample GTA-5 (4'-5') on Parcel 470 at a concentration of 590 milligrams per kilogram (mg/kg), above the MDE RCS for lead of 200 mg/kg (MDE RCS at the time was 400 mg/kg). Additional analytes were variously reported in the soil samples at concentrations below their respective MDE RCS values.

Three groundwater samples were collected from Parcel 470 as part of this assessment from borings GTA-1, GTA-2, and GTA-4. The groundwater samples were analyzed for total petroleum hydrocarbons (TPH) diesel range organics (DRO), TPH gasoline range organics (GRO), and VOCs. TPH-DRO was reported at concentrations of 130 micrograms per liter (ug/l) and 120 ug/l in groundwater samples collected from borings GTA-1 and GTA-2, (designated samples GW-1 and GW-2), respectively, above the MDE GCS of 47 ug/l. TPH-DRO was not detected above the laboratory reporting limit in the groundwater sample collected from boring GTA-4. MTBE and acetone were variously reported in the groundwater samples at concentrations below their respective MDE GCS values. The remaining analytes were not detected above their respective laboratory reporting limits.

Based on these findings, the site was entered into the MDE Controlled Hazardous Substance (CHS) Program. The MDE CHS requested additional assessment of the site soils.

*Parcels 460, 461, and 470 – 2017 Activities*

---

Based on the findings of the 2013 Phase II ESA, GTA performed an additional Phase II ESA on Parcels 460, 461, and 470 on September 21, 2017. The 2017 Phase II ESA was conducted under an MDE-approved Work Plan for the site (Approval Date: September 6, 2017). The subsurface evaluation included four direct-push borings on Parcel 470 and four direct-push borings on Parcels 460 & 461. A total of 15 surface and subsurface soil samples were collected from the soil borings. Two soil samples were collected from each boring at depths of 0'-1' below ground surface (bgs) and 4'-5' bgs, respectively. Only one soil sample was collected at Boring G (Parcel 470) at an approximate depth of 4'-5' bgs. The soil samples were analyzed for TPH-DRO and TPH-GRO, polycyclic aromatic hydrocarbons (PAHs), and priority pollutant metals.

The soil sample analytical results indicated that several priority pollutant metals (antimony, total chromium, and total mercury) were variously reported above their respective MDE RCS values in three surficial soil samples collected on Parcel 470.

In addition, one PAH (benzo[a]pyrene), was detected above its respective MDE RCS value in two surficial soil samples collected on Parcel 470. Analytical results suggested that elevated PAH concentrations are localized within surficial soil (0' to 1' bgs), with the analytical results of corresponding subsurface soil samples reporting concentrations of benzo[a]pyrene as not detected above the laboratory reporting limit.

The 2017 Phase II ESA concluded, "This report should be submitted to MDE CHS for review and comment. Any recommendations regarding the findings of this Report will be based on the conclusions reached by MDE CHS, and should consider the proposed future use of the property."

*Parcel 473 – 2021 Activities*

---

At the request of the Client, GTA conducted two direct-push soil borings on Parcel 473 on August 6, 2021. A total of two soil samples were collected from approximately 4'-5' bgs and analyzed for VOCs, TPH-DRO and GRO, and priority pollutant metals.

Analytical results indicated that lead was detected at a concentration of 230 mg/kg and above the MDE RCS comparison value of 200 mg/kg in one soil sample. The remaining analytes were either reported at concentrations below their respective MDE RCS, or were not detected above the laboratory reporting limit.

Copies of the sample location map, data summary table, and laboratory analytical package from the 2021 sampling activities on Parcel 473 are included within *Appendix C*. Copies of data tables from GTA's previous studies on Parcels 470 and 472 are included within *Appendix B*.

### **3.0 REGULATORY INVOLVEMENT**

Several of the subject property parcels have previously been under MDE review/regulation. One of the subject property parcels (472) was entered into the MDE Voluntary Cleanup Program (VCP) in the late 2000's for residential redevelopment. The parcel was withdrawn from the VCP based on changing market dynamics.

Parcels 470 and 472 have been reviewed by the MDE CHS division, as part of a recreational use redevelopment. The MDE CHS review included previous sampling and analysis data and recommended capping of Parcels 470 and 472 with either non-impacted structural fill or asphalt pavement. A sample location map, data summary table, and laboratory analytical package for Parcel 473 is included in *Appendix C* of this Plan for MDE review.

### **4.0 SOIL MANAGEMENT PROCEDURES**

The shoreline along the subject parcels and adjacent parcels is being redeveloped for recreational use. The redevelopment includes improvements to the shoreline, expansion of a boat launch ramp, construction of a floating pier, stormwater management structures, paving, and capping. It is estimated that approximately 900 to 1,000 cubic yards of soil will be excavated and relocated during site work. This soil will originate from the land side of the parcels, and not from sediments in the water. Contractors performing excavation and construction work on the subject property should be notified of the presence of impacted soil on the site, as summarized in *Section 2.0*.

#### **4.1 Initial Communication**

GTA will provide a draft version of this Plan to the Client and involved contractors prior to the start of excavation activities. Upon review of the Plan by the involved parties and with concurrence from MDE, portions of this Plan may be modified. It should be noted that once approved by the MDE, this Plan may be not be revised or modified without written request and approval by the MDE Land Restoration Program (LRP). Any modifications to this Soil Management Plan (SMP) will require re-submittal to the MDE LRP for additional review and approval prior to implementation.

At the Client's request, GTA will attend a pre-construction meeting with the involved parties to review the contents of this Plan. It is expected that this pre-construction meeting will include personnel that will supervise the excavation activities. Following this pre-construction meeting, additional modifications of this Plan may be necessary.

#### **4.2 Soil Screening and Stockpiling**

Excavated soil at the site will be screened and observed for qualitative evidence of impacts (odors, visible staining or discoloration, presence of liquid petroleum hydrocarbons (LPH), and fill material containing debris). Generally, excavated soil is intended to be re-used on site. Soils stockpiled at their final placement location will be placed directly on the ground surface. Soils staged at an interim location will be stockpiled as described below.

Soil screening will include observation for evidence of LPH (oily consistency, staining, saturated conditions, odors) and the presence of debris (trash, construction debris, etc.). Soils exhibiting these conditions will be segregated for further evaluation and potential offsite disposal. Other soils will remain onsite for capping.

Soils to be stockpiled will be placed on a minimum 10-mil polyethylene sheeting with a minimum one-foot-high berm around the perimeter to impede stormwater flow to/from the soil. Straw bales or non-impacted excavated material may be used to construct the berms. The soil stockpiles will be covered on a daily basis with a minimum 6-mil polyethylene sheeting and weighted to keep the cover in place, as necessary.

#### **4.3 Capping**

Excavated material will be capped onsite on Parcels 470 and 472. Capping will include removal of organic materials (trees, brush, heavy grasses/weeds), placement of a geotextile marker fabric above the excavated material or ground surface, followed by a minimum of two feet of non-impacted fill material. Non-impacted fill material may be stone, sand, gravel, or soil, as discussed in Section 4.6, below. The cap thickness may be increased as needed for the purposes of achieving appropriate site grades.

As an alternative, the parcels may be capped, in whole or in part, with asphalt pavement. A minimum of four inches of asphalt will be required to cap the site. GTA understands that the MDE LRP requires the submission of an engineer-certified cross section demonstrating that any proposed asphalt cap is suitable for intended use prior to cap construction.

Following placement of the cap, an Environmental Covenant restricting intrusive activities on the site will be required. The Environmental Covenant will require an Operations, Inspection and Maintenance Plan (OIMP) as an Exhibit that will describe the notification requirements for intrusive activities, methods for managing excavated materials, method for repairing and replacing the cap, and annual inspection and reporting requirements for the cap. In addition, GTA understands that an Annual Summary Report will be required to be submitted to the MDE LRP documenting annual inspections of the capped area, as well as any repairs or intrusive activities that have occurred.

#### **4.4 Offsite Soil Disposal**

Offsite disposal of excavated material is not anticipated at this time. However, if soil is determined to be unsuitable for reuse, the soil will be sampled for the appropriate waste characterization parameters and transported to an appropriate disposal facility. Soil transportation and disposal will be conducted in general accordance with local, State, and Federal regulations. A disposal facility has not been selected at this time. Two facilities to be considered include:

Soil Safe, Inc.  
6700 Alexander Bell Drive, Suite 300  
Columbia, Maryland 21046

Clean Earth of Greater Washington  
6250 Dower House Road  
Upper Marlboro, Maryland 20772

Other facilities may be evaluated and selected, based on the preference of the contractor and/or developer. In general, waste characterization samples will be collected prior to transporting the soil off-site. The number of samples to be collected and the analytical parameters will be determined by the individual waste disposal facilities and volume of soil.

The MDE LRP will be notified of the intended disposal location for approval prior to the disposition of the material. Soil transportation and disposal is anticipated to be performed under non-hazardous waste manifests. Waste manifests will be prepared for each truck load of soil removed from the property. Waste disposal documentation will be maintained onsite for inclusion in a final report that will be submitted to the MDE LRP following the disposal of the material.

#### **4.5 Dust Control**

During excavation activities, nuisance dust emissions will be controlled by wetting the soil as necessary. Soil wetting will be performed by spraying or misting the soil with a water truck. Additional dust emissions in the vicinity of the on-site activities will be reduced through regular street sweeping and water truck spraying. The excavation contractor will be responsible for providing the necessary equipment for dust control. Based on the analytical data collected to date, dust monitoring activities are not proposed at this time.

#### **4.6 Imported Fill Materials**

Materials imported for use as fill on the site (soil, gravel, crusher run, crushed concrete, etc.) must be verified as clean before it is brought onto the site. Materials brought from a quarry or mine may be verified by a letter from the source. A copy of the letter must be provided by the Contractor for submission to the MDE LRP for approval prior to bringing the material onsite.

If documentation cannot be obtained from the provider, or the material being proposed for import is soil, the material must be sampled and the analytical results must be submitted to MDE for review to confirm that the material meets MDE requirements. GTA understands that the MDE LRP must approve a work plan for sampling of any clean fill material prior to the collection of samples. The number of samples and analytical parameters are determined based on the source property use, source type (in-situ or pile), soil amount, and site conditions (presence of absence of RECs).

#### **4.7 Sample Collection and Analysis**

Samples may be required for collection periodically at the site. These samples may include confirmatory samples, site characterization samples, waste characterization samples, groundwater samples, surface water samples, sludge samples, etc. Generally, samples will be collected using dedicated, disposable equipment, where possible, to prevent cross contamination. Re-usable equipment will be decontaminated between sample locations or sampling events. Samples will be collected in laboratory-provided sample containers, labeled, and placed on ice for shipment.

Sample analysis will be conducted on a standard 5-day turn-around time. The selected off-site laboratory is:

Phase Separation Science, Inc.  
6630 Baltimore National Pike  
Baltimore, Maryland 21228  
Phone: (410) 747-8770  
Fax: (410) 788-8723

#### **4.8 Asbestos Containing Materials**

Asbestos containing materials are not anticipated to be encountered during site work. If suspect materials are encountered during excavation activities, samples will be collected for analysis as needed. Further evaluation, including handling, sampling, and removal/disposal, will be performed at that time.

#### **4.9 Demolition Debris**

Sections of existing onsite structures (bulkheads, concrete slabs, etc.) are proposed for demolition. Demolition debris may include concrete, brick, block, wood, metal, stone, or other building material. If concrete, brick, and/or block is proposed for crushing and re-use, the Department will be notified and a plan for verifying the material is not impacted will be prepared and implemented. Other demolition debris will be removed from the site for disposal.

#### **4.10 Unanticipated Subsurface Conditions**

Unanticipated subsurface conditions may include, but not be limited to, the presence of underground storage tanks (USTs), buried drums, other buried waste, high groundwater

conditions, the presence of LPH, etc. If unanticipated subsurface conditions are encountered during excavation work, the MDE LRP will be notified by phone within 2 hours and by follow up email within 24 hours. GTA understands that meetings with MDE Oil Control Program (OCP) personnel will be necessary if free product is identified during excavation.

## **5.0 PLAN REVISIONS**

At any stage of the site activities, this Plan may be revised to reflect previously unidentified field conditions, personnel changes, etc. Modifications to soil handling, soil storage, placement, or documentation procedures may also be required. GTA understands that these revisions or modifications may not be made to the MDE LRP-approved SMP without written request and approval by the MDE LRP.

## **6.0 REPORTING**

GTA understands that the MDE LRP requires the submission of monthly status reports documenting site activities, as well as a final completion report. Monthly status reports will be submitted by the 15<sup>th</sup> of the following month (i.e., a report covering January 1<sup>st</sup> through January 30<sup>th</sup> is due by February 15<sup>th</sup>) via email. If no Soil Management Plan related activities have occurred, the status report may be limited to an email stating such. The final completion report must include the Operations and Maintenance Plan (including a site plan of capping types) for MDE LRP review and approval, as well as inclusion within the MDE LRP-issued Environmental Covenant.

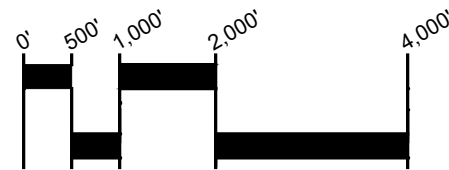
\*\*\*\*\* END OF REPORT \*\*\*\*\*



# **FIGURES**



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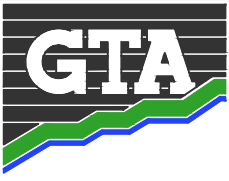


**SCALE: 1"=2,000'**

**LEGEND**



**SUBJECT PROPERTY**



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3445-A BOX HILL CORPORATE CENTER DRIVE  
 ABINGDON, MARYLAND 21009  
 410-515-9446  
 FAX: 410-515-4895  
 WWW.GTAENG.COM

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**SITE LOCATION MAP  
 WATER STREET PROPERTIES**

HARFORD COUNTY, MARYLAND

|                    |                  |                   |               |                |           |
|--------------------|------------------|-------------------|---------------|----------------|-----------|
| JOB NO. 31170428X1 | SCALE: 1"=2,000' | DATE: AUGUST 2021 | DRAWN BY: SAG | REVIEW BY: BGM | FIGURE: 1 |
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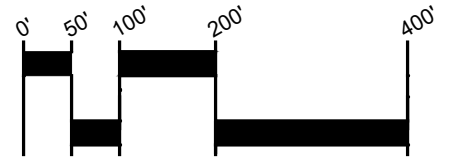
L:\Shared\Project Files\2017\31170428x1 - Water Street Properties - HdG\CAD\Plot\Water Street BLP Figs.dwg



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**LEGEND**

- — — — — SUBJECT PROPERTY
- PREVIOUS STUDY AREAS - APPROXIMATE PARCEL BOUNDARIES



**SCALE: 1"=200'**



**GEO-TECHNOLOGY ASSOCIATES, INC.**  
 GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS  
 3445-A BOX HILL CORPORATE CENTER DRIVE  
 ABINGDON, MARYLAND 21009  
 410-515-9446  
 FAX: 410-515-4895  
 WWW.GTAENG.COM

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PARCEL LOCATION MAP  
**WATER STREET PROPERTIES**





HARFORD COUNTY, MARYLAND

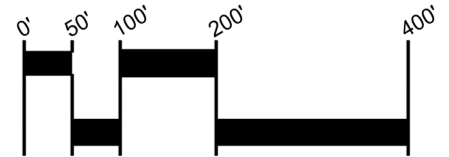
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| JOB NO. 31170428X1 | SCALE: 1"= 200' | DATE: AUGUST 2021 | DRAWN BY: SAG | REVIEW BY: BGM | FIGURE: 2 |
|--------------------|-----------------|-------------------|---------------|----------------|-----------|



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**LEGEND**

-  SUBJECT PROPERTY
-  PREVIOUS STUDY AREAS - APPROXIMATE PARCEL BOUNDARIES
-  APPROXIMATE EXCAVATION AREA
-  APPROXIMATE PROPOSED CAP LOCATION



**SCALE: 1"=200'**



**GEO-TECHNOLOGY ASSOCIATES, INC.**

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

3445-A BOX HILL CORPORATE CENTER DRIVE  
 ABINGDON, MARYLAND 21009  
 410-515-9446  
 FAX: 410-515-4895  
 WWW.GTAENG.COM

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**EXCAVATION LOCATION PLAN  
 WATER STREET PROPERTIES**

HARFORD COUNTY, MARYLAND

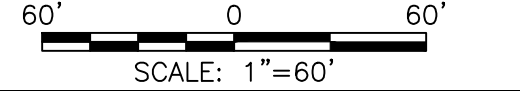
**APPENDIX A  
SEDIMENT & EROSION  
CONTROL PLAN**



**LEGEND**

|                                  |                         |
|----------------------------------|-------------------------|
| REINFORCED SILT FENCE            | —RSF—                   |
| LIMIT OF DISTURBANCE             | —LOD—                   |
| PROPOSED HAUL ROAD               | [Hatched Pattern]       |
| STABILIZED CONSTRUCTION ENTRANCE | [S.C.E. Symbol]         |
| SUPER SILT FENCE                 | —SSF—                   |
| TURBIDITY CURTAIN                | —FL-15—                 |
| STAGING AND STOCKPILE AREA       | [Cross-hatched Pattern] |

**PLAN**  
SCALE: 1"=60'



**UNDERWOOD & ASSOCIATES**  
LANDSCAPE ARCHITECTURE • ECOLOGICAL RESTORATION  
A DESIGN/BUILD Co.

1753 EBLING TRAIL • ANNAPOLIS, MD 21401  
Tel. 410-849-3211 Fax. 410-849-2136

DAVID J. WALLACE, P.E.  
PROFESSIONAL CERTIFICATION

I, DAVID J. WALLACE, CERTIFY THAT THESE DOCUMENTS WERE PREPARED BY OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.  
LICENSE NO. 11466  
EXPIRATION DATE: MAY 28, 2021.

DAVID J. WALLACE, P.E.  
701 CHESAPEAKE AVENUE  
ANNAPOLIS, MARYLAND 21403  
BUSINESS PH. 410.544.1225

Signature \_\_\_\_\_  
Date \_\_\_\_\_



Revisions

|  |  |
|--|--|
|  |  |
|--|--|

**HARFORD COUNTY, MARYLAND**

**SEDIMENT AND EROSION PLAN**

|             |                |              |             |
|-------------|----------------|--------------|-------------|
| DESIGNED BY | J.H./K.B.      | CONTRACT NO. | AS SHOWN    |
| DRAWN BY    | K.B./J.H./J.K. | SCALE        | AS SHOWN    |
| APPROVED BY | D.W.           | SHEET NO.    | 9 OF 14     |
|             |                | DATE         | APRIL, 2021 |

PLOTTED: Aug 02, 2021 - 11:28am

TAX MAP: ADC MAP:

Cadd File : \\25.61.130.194\Shared\006-Projects\Water Street Living Shoreline (Havre De Grace)\04-CADD\Drawings\07\_SEC.dwg

**APPENDIX B**  
**TABLES FROM PREVIOUS**  
**GTA STUDIES**

**Table 1 - Soil Sample Analytical Results - March 2013**  
**Water Street Properties, Harford County, Maryland**  
**GTA Project #121477**

| Analyte                                      | Units | GTA-1 (4'-5') | GTA-2 (4'-5') | GTA-3 (4'-5') | GTA-5 (4'-5') | GTA-8 (4'-5') | GTA-10 (5'-6') | GTA-11 (1'-2') | GTA-13 (4'-5') | MDE<br>RCS / NRCS |
|--|-------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|-------------------|
| <b>TCL Volatile Organic Compounds (VOCs)</b> |       |               |               |               |               |               |                |                |                |                   |
| Acetone                                      | mg/kg | 0.035         | -- --         | 0.028         | -- --         | 0.052         | -- --          | -- --          | 0.042          | 7000/92000        |
| Methylcyclohexane                            | mg/kg | -- --         | -- --         | -- --         | -- --         | -- --         | 8.2            | 5.6            | -- --          | NS                |
| Isopropylbenzene                             | mg/kg | -- --         | -- --         | -- --         | -- --         | -- --         | 1.9            | -- --          | -- --          | 780/10000         |
| Methylene Chloride                           | mg/kg | -- --         | -- --         | -- --         | -- --         | -- --         | 1.1            | 0.72           | -- --          | 85/380            |
| Remaining VOCs                               | mg/kg | -- --         | -- --         | -- --         | -- --         | -- --         | -- --          | -- --          | -- --          | varies            |
| <b>Organochlorine Pesticides</b>             |       |               |               |               |               |               |                |                |                |                   |
| 22 Compounds                                 | mg/kg | n/a           | n/a           | n/a           | n/a           | n/a           | n/a            | n/a            | -- --          | varies            |
| <b>Priority Pollutant (PP) Metals</b>        |       |               |               |               |               |               |                |                |                |                   |
| Antimony                                     | mg/kg | n/a           | -- --         | -- --         | -- --         | n/a           | n/a            | n/a            | -- --          | 3.1/41            |
| Arsenic                                      | mg/kg | n/a           | 7.1           | 5.2           | 5.2           | n/a           | n/a            | n/a            | 4              | .43/3.6/6/10-20*  |
| Beryllium                                    | mg/kg | n/a           | -- --         | -- --         | -- --         | n/a           | n/a            | n/a            | -- --          | 16/200            |
| Cadmium                                      | mg/kg | n/a           | -- --         | -- --         | -- --         | n/a           | n/a            | n/a            | -- --          | 3.9/51            |
| Chromium                                     | mg/kg | n/a           | 18            | 16            | 23            | n/a           | n/a            | n/a            | 23             | 23/310            |
| Copper                                       | mg/kg | n/a           | 14            | 36            | 18            | n/a           | n/a            | n/a            | 9              | 310/4100          |
| Lead   | mg/kg | n/a           | 14            | 10            | <b>590</b>    | n/a           | n/a            | n/a            | 3.9            | 400/1000          |
| Mercury                                      | mg/kg | n/a           | -- --         | -- --         | 0.27          | n/a           | n/a            | n/a            | -- --          | 2.3/31            |
| Nickel                                       | mg/kg | n/a           | 16            | 12            | 31            | n/a           | n/a            | n/a            | -- --          | 160/2000          |
| Selenium                                     | mg/kg | n/a           | -- --         | -- --         | -- --         | n/a           | n/a            | n/a            | -- --          | 39/510            |
| Silver                                       | mg/kg | n/a           | -- --         | -- --         | -- --         | n/a           | n/a            | n/a            | -- --          | 39/510            |
| Thallium                                     | mg/kg | n/a           | -- --         | -- --         | -- --         | n/a           | n/a            | n/a            | -- --          | .55/7.2           |
| Zinc   | mg/kg | n/a           | 41            | 30            | 130           | n/a           | n/a            | n/a            | -- --          | 2300/31000        |
| <b>Total Petroleum Hydrocarbons</b>          |       |               |               |               |               |               |                |                |                |                   |
| TPH- Diesel Range Organics                   | mg/kg | -- --         | -- --         | -- --         | -- --         | -- --         | <b>4,600</b>   | <b>860</b>     | -- --          | 230/620           |
| TPH- Gasoline Range Organics                 | mg/kg | -- --         | -- --         | -- --         | -- --         | -- --         | <b>670</b>     | -- --          | -- --          | 230/620           |

Notes:

Samples collected March 12, 2013. Sample depth presented in sample designation.

Results in milligrams per kilogram (mg/kg), or parts per million (ppm)

-- -- = Not detected at or above the laboratory's reporting limit

n/a = Not Analyzed

MDE RCS = Residential Cleanup Standard for Soil (MDE Interim Final Guidance 2.1, June 2008).

MDE NRCS = Non-Residential Cleanup Standard for Soil (MDE Interim Final Guidance 2.1, June 2008).

\*Value presented include ATC value for eastern Maryland (based on geology). Additionally, MDE will calculate a site-specific cleanup standard based on site use, other contaminants of concern, etc. This value is typically 6.0 mg/kg for residential use and between 10 and 20 mg/kg for non-residential use

Shaded and **bold** values represent exceedance of MDE NRCS, RCS, or ATC.

NS = No Standard established.



**Table 2 - Groundwater Sample Analytical Results - March 2013**  
**Water Street Properties, Harford County, Maryland**  
**GTA Project #121477**

| Analyte                                      | Units | GW-1       | GW-2       | GW-4 | GW-8       | GW-9        | MDE GCS |
|--|-------|------------|------------|------|------------|-------------|---------|
| <b><i>TCL Volatile Organic Compounds</i></b> |       |            |            |      |            |             |         |
| Acetone                                      | ug/L  | 24         | 44         | ---  | 13         | 17          | 555     |
| Cyclohexane                                  | ug/L  | ---        | ---        | ---  | ---        | 140         | NS      |
| Benzene                                      | ug/L  | ---        | ---        | ---  | ---        | 4.3         | 5       |
| Isopropylbenzene                             | ug/L  | ---        | ---        | ---  | ---        | 2.4         | 66      |
| Methyl-t-butyl ether                         | ug/L  | ---        | 13         | ---  | ---        | ---         | 20      |
| Naphthalene                                  | ug/L  | ---        | ---        | ---  | ---        | <b>2.4</b>  | 0.65    |
| Xylenes, total                               | ug/L  | ---        | ---        | ---  | ---        | 2.1         | 10000   |
| Methylcyclohexane                            | ug/L  | ---        | ---        | ---  | ---        | 120         | NS      |
| Toluene                                      | ug/L  | ---        | ---        | ---  | ---        | 3.7         | 1000    |
| Remaining VOCs                               | ug/L  | ---        | ---        | ---  | ---        | ---         | Varies  |
| <b><i>Total Petroleum Hydrocarbons</i></b>   |       |            |            |      |            |             |         |
| TPH- Diesel Range Organics                   | ug/L  | <b>130</b> | <b>120</b> | ---  | <b>120</b> | <b>980</b>  | 47      |
| TPH- Gasoline Range Organics                 | ug/L  | ---        | ---        | ---  | ---        | <b>1800</b> | 47      |

Notes:

Samples collected March 12, 2013. Sample depths gathered at approximately 8 ft bgs

Results in micrograms per kilogram (ug/kg), or parts per billion (ppb)

--- = Not detected at or above the laboratory's reporting limit

n/a = Not Analyzed

MDE GCS = Groundwater Cleanup Standard for Soil (MDE Interim Final Guidance 2.1, June 2008).

NS = No Standard established.

Shaded and bold values represent exceedance of MDE GCS

**Table 1 - Soil Sample Analytical Results**  
**Water Street Properties**  
GTA Project #31170428x1

| Analyte                                 | Regulatory Limits | A (0'-1')   | A (4'-5')  | B (0'-1') | B (4'-5') | C (0'-1')    | C (4'-5')    | D (0'-1') | D (4'-5') | E (0'-1')    | E (4'-5') | F (0'-1') | F (4'-5') | G (4'-5') | H (0'-1')    | H (4'-5') |
|---|-------------------|-------------|------------|-----------|-----------|--------------|--------------|-----------|-----------|--------------|-----------|-----------|-----------|-----------|--------------|-----------|
| <b>Total Petroleum Hydrocarbons</b>     |                   |             |            |           |           |              |              |           |           |              |           |           |           |           |              |           |
| TPH-diesel range organics               | 230               | <b>250</b>  | 47         | ---       | 45        | 20           | 160          | ---       | ---       | 110          | ---       | ---       | ---       | ---       | ---          | ---       |
| TPH-gasoline range organics             | 230               | ---         | ---        | ---       | ---       | ---          | 0.22         | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| <b>Polycyclic Aromatic Hydrocarbons</b> |                   |             |            |           |           |              |              |           |           |              |           |           |           |           |              |           |
| acenaphthene                            | 470               | 0.23        | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| acenaphthylene                          | 470               | 0.49        | ---        | ---       | ---       | ---          | 0.025        | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| anthracene                              | 2,300             | 0.93        | ---        | ---       | ---       | ---          | 0.025        | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| benzo[a]anthracene                      | 0.22              | 2.9         | ---        | ---       | ---       | 0.023        | 0.14         | ---       | ---       | 0.034        | ---       | ---       | ---       | ---       | 0.044        | ---       |
| benzo[a]pyrene                          | 0.022             | <b>2.7</b>  | ---        | ---       | ---       | <b>0.025</b> | <b>0.17</b>  | ---       | ---       | <b>0.029</b> | ---       | ---       | ---       | ---       | <b>0.041</b> | ---       |
| benzo[b]fluoranthene                    | 0.22              | <b>2.8</b>  | ---        | ---       | ---       | 0.026        | 0.14         | ---       | ---       | 0.021        | ---       | ---       | ---       | ---       | 0.037        | ---       |
| benzo[ghi]perylene                      | 230               | 1.5         | ---        | ---       | ---       | 0.022        | 0.14         | ---       | ---       | 0.029        | ---       | ---       | ---       | ---       | 0.036        | ---       |
| benzo[k]fluoranthene                    | 2.2               | <b>2.3</b>  | ---        | ---       | ---       | 0.021        | 0.14         | ---       | ---       | 0.021        | ---       | ---       | ---       | ---       | 0.037        | ---       |
| chrysene                                | 22                | 2.9         | ---        | ---       | ---       | 0.028        | 0.15         | ---       | ---       | 0.043        | ---       | ---       | ---       | ---       | 0.049        | ---       |
| dibenzo[a,h]anthracene                  | 0.022             | <b>0.79</b> | ---        | ---       | ---       | ---          | <b>0.032</b> | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| fluoranthene                            | 310               | 5.9         | 0.22       | ---       | ---       | 0.029        | 0.21         | ---       | ---       | 0.025        | ---       | ---       | ---       | ---       | 0.06         | ---       |
| fluorene                                | 310               | 0.55        | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| indeno(1,2,3,-cd)pyrene                 | 0.22              | <b>2.1</b>  | ---        | ---       | ---       | 0.024        | 0.18         | ---       | ---       | 0.027        | ---       | ---       | ---       | ---       | 0.047        | ---       |
| 2-methylnaphthalene                     | 31                | 0.035       | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | ---       | ---       | 0.066     | ---       | ---          | ---       |
| naphthalene                             | 160               | 0.034       | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | ---       | ---       | ---       | ---       | ---          | ---       |
| phenanthrene                            | 2,300             | 3           | ---        | ---       | ---       | ---          | 0.062        | ---       | ---       | ---          | ---       | ---       | ---       | ---       | 0.021        | ---       |
| pyrene                                  | 230               | 3.9         | 0.27       | ---       | ---       | 0.037        | 0.29         | ---       | ---       | 0.066        | ---       | ---       | ---       | ---       | 0.058        | ---       |
| <b>Priority Pollutant Metals</b>        |                   |             |            |           |           |              |              |           |           |              |           |           |           |           |              |           |
| antimony                                | 3.1               | 2.7         | <b>16</b>  | ---       | ---       | ---          | ---          | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | <b>3.5</b>   | n/a       |
| arsenic                                 | 10.1/19.5         | 14          | 14         | 2.7       | 2.1       | 8.1          | 4.8          | 7.5       | 11        | 1.5          | n/a       | 2.7       | n/a       | n/a       | 12           | n/a       |
| beryllium                               | 16                | ---         | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | ---          | n/a       |
| cadmium                                 | 3.9               | ---         | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | ---          | n/a       |
| total chromium                          | 23/12,000**       | <b>38</b>   | <b>36</b>  | 21        | <b>25</b> | <b>42</b>    | 15           | 19        | 15        | 17           | n/a       | <b>24</b> | n/a       | n/a       | 23           | n/a       |
| copper                                  | 310               | 100         | 170        | 9.1       | 8.2       | 29           | 20           | 15        | 17        | 38           | n/a       | 71        | n/a       | n/a       | 47           | n/a       |
| lead                                    | 400               | <b>520</b>  | <b>590</b> | 9.2       | 9.8       | 53           | 83           | 12        | 11        | 3.9          | n/a       | 44        | n/a       | n/a       | 280          | n/a       |
| total mercury                           | 0.51              | <b>0.55</b> | 0.49       | ---       | ---       | 0.077        | 0.13         | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | <b>3.2</b>   | n/a       |
| nickel                                  | 160               | 25          | 30         | 14        | 19        | 9.9          | 16           | 15        | 14        | 12           | n/a       | 73        | n/a       | n/a       | 30           | n/a       |
| selenium                                | 39                | ---         | ---        | ---       | ---       | 2.1          | ---          | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | ---          | n/a       |
| silver                                  | 39                | ---         | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | ---          | n/a       |
| thallium                                | 0.55              | ---         | ---        | ---       | ---       | ---          | ---          | ---       | ---       | ---          | n/a       | ---       | n/a       | n/a       | ---          | n/a       |
| zinc                                    | 2,300             | 790         | 790        | 32        | 47        | 64           | 110          | 80        | 65        | 26           | n/a       | 44        | n/a       | n/a       | 160          | n/a       |

Notes:

Samples collected on September 21, 2017.

Results in milligrams per kilogram (mg/kg).

--- = Not detected at or above the laboratory's reporting limit

n/a = Not Analyzed

Shaded and **bold** values represent exceedance of regulatory limits

**Regulatory Limits** = The limits depicted in this column are a combination of the following:

MDE RCS = Residential Cleanup Standard for Soil (MDE Interim Final Guidance 2.1, June 2008).

MDE ATC = Anticipated typical concentration for Eastern Maryland Province.

MDE SSRBC = Site-specific risk-based concentration, based on GTA's experience on other residential projects with the MDE Voluntary Cleanup Program (VCP).

For arsenic, a recreational (moderate frequency) risk-derived comparison value (RCV) is used to indicate remedial goals for sites intended for recreational use. Additional information is found in the report text.

**Table 1**  
**Parcel 473 - Soil Analysis Summary**

*Water Street Parcels  
Harford County, Maryland  
GTA Project No. 31211433*

| Sample Identification            | GTA-1         | GTA-2        | Comparison Values |           |
|----------------------------------|---------------|--------------|-------------------|-----------|
| Depth (feet)                     | 4-5           | 4-5          | RCS               | NRCS      |
| <b>VOCs</b>                      |               |              |                   |           |
| 2-Butanone (MEK)                 | <b>0.024</b>  | <b>0.017</b> | 2,700             | 19,000    |
| Acetone                          | <b>0.42</b>   | <b>0.34</b>  | 6,100             | 67,000    |
| Benzene                          | <b>0.0021</b> | <0.0011      | 1.2               | 5.1       |
| Remaining Compounds              | ---           | ---          | Varies            | Varies    |
| <b>TPH</b>                       |               |              |                   |           |
| TPH DRO                          | <b>220</b>    | <b>29</b>    | 230               | 620       |
| TPH GRO                          | <0.13         | <b>0.17</b>  | 230               | 620       |
| <b>Priority Pollutant Metals</b> |               |              |                   |           |
| Antimony                         | <2.8          | <2.2         | 3.1               | 47        |
| Arsenic <sup>(1)</sup>           | <b>6.7</b>    | <b>4.5</b>   | 10.1              | 19.5/26.8 |
| Beryllium                        | <b>0.58</b>   | <b>0.44</b>  | 16                | 230       |
| Cadmium                          | <b>1.1</b>    | <0.44        | 7.1               | 98        |
| Chromium <sup>(2)</sup>          | <b>27</b>     | <b>20</b>    | 12,000            | 180,000   |
| Copper                           | <b>42</b>     | <b>22</b>    | 310               | 4,700     |
| Lead <sup>(3)</sup>              | <b>230</b>    | <b>48</b>    | 200               | 550/1,050 |
| Mercury                          | <b>0.47</b>   | <b>0.10</b>  | 1.1               | 4.6       |
| Nickel                           | <b>30</b>     | <b>16</b>    | 150               | 2,200     |
| Selenium                         | <0.56         | <0.44        | 39                | 580       |
| Silver                           | <0.56         | <0.44        | 39                | 580       |
| Thallium                         | <0.56         | <0.44        | 0.078             | 1.2       |
| Zinc                             | <b>200</b>    | <b>54</b>    | 2,300             | 35,000    |

**Notes:**

Samples collected on August 6, 2021

Results in milligrams per kilogram (mg/kg), equivalent to parts per million (ppm)

<sup>(1)</sup> = The RCS/NRCS comparison values for arsenic are risk-derived values developed from standard risk assessment calculations. An approach reinforced on projects with MDE involvement and oversight.

<sup>(2)</sup> = The comparison values for total chromium are referenced as trivalent chromium RCS/NRCS.

<sup>(3)</sup> = The comparison values for lead are based on updated MDE lead soil screening concentrations, effective July 1, 2020.

--- = Not detected above laboratory reporting limit

Shaded and bold values represent exceedance of MDE RCS (and ATC, if applicable)

NA = Not applicable

NE = Maryland Department of the Environment (MDE) standard not established

RCS = MDE Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 3, October 2018)

NRCS = MDE Non-Residential Cleanup Standards for soil (MDE Interim Final Guidance Update No. 3, October 2018)

VOCs = Volatile Organic Compounds

TPH = Total Petroleum Hydrocarbons

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

