

# **CORRECTIVE MEASURES STUDY (CMS)**

## **FOR THE TIN MILL CANAL**

TRADEPOINT ATLANTIC  
SPARROWS POINT, MARYLAND

Prepared For:



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ARM Project No. 170208M

Revision 0 – June 16, 2017

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## 1.0 INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared this Corrective Measures Study (CMS) Report for a portion of the Tradepoint Atlantic property that has been designated as Parcel B16, the Tin Mill Canal (TMC). The purpose of this CMS is to develop and evaluate corrective action alternatives and to recommend the corrective measures to be taken for the TMC. The development and evaluation of corrective measure alternatives in this CMS Report are based on the findings and recommendations of the “Sediment Characterization Report for the Tin Mill Canal – Revision 1” dated June 14, 2017 (i.e., the SCR), information presented in the “Maintenance Cleanup Plan for the Tin Mill Canal – Revision 0” dated May 5, 2017, and related discussions with the United States Environmental Protection Agency (USEPA) and the Maryland Department of the Environment (MDE).

Groundwater at the Site was investigated in accordance with the Area B Groundwater Investigation Work Plan (Revision 3) dated October 6, 2015 and the Finishing Mills Groundwater Investigation Work Plan (Revision 1) dated July 7, 2016. The groundwater impacts at the Site are discussed within the Area B Groundwater Phase II Investigation Report – Revision 0 dated September 30, 2016 and the Finishing Mills Groundwater Phase II Investigation Report – Revision 0 dated November 30, 2016. Groundwater impacts in the vicinity of the TMC and appropriate corrective measures are being addressed as part of a site-wide groundwater study, and are not a part of this CMS.

### 1.1. SITE DESCRIPTION

The TMC is a constructed swale that currently serves as a conveyance for stormwater runoff from an approximately 800-acre drainage area of the Sparrows Point site. Waters collected in the TMC are routed to the Humphrey’s Creek Waste Water Treatment Plant (HCWWTP) for treatment prior to discharge via the NPDES permitted Outfall 014. The average volume of water flowing through the canal to the HCWWTP during dry weather is approximately 3,000 gallons per minute (gpm), but can increase to over 50,000 gpm during storm events. The TMC is located in the central portion of the Sparrows Point property, south of Interstate 695 and Highway Route 158. An aerial photo that shows the location of the canal is provided as Figure 1. All adjacent property to the TMC is owned by Tradepoint Atlantic.

The TMC is approximately 7,500 feet in length, 30 to 50 feet wide and 15 feet below grade (see Figure 2). The canal was constructed from slag and serves to collect numerous point discharges (outfalls) from the site storm sewer system. The eastern portion of the TMC began operating in the early 1950s. The western (remaining) portions of the canal and HCWWTP were completed and began operating in approximately 1969. The TMC historically also conveyed process wastewater discharged from numerous manufacturing facilities associated with former

steelmaking and steel finishing operations at the Sparrows Point site. Over the years, suspended solids and oils in the wastewaters from the steel manufacturing facilities have settled to the bottom of the TMC. This settled material contains polychlorinated biphenyls (PCBs), oil/grease, and other constituents associated with the steel finishing operations. Although process wastewater is no longer generated, the TMC still receives and controls stormwater runoff, as well as some groundwater discharge, from the Site. The HCWWTP remains operational to treat water collected in the canal prior to discharge.

## **1.2. REGULATORY SETTING**

Environmental actions for the TMC, and for the site in general, are being implemented pursuant to the following:

- Multi-Media Consent Decree (Decree) between Bethlehem Steel Corporation, the United States Environmental Protection Agency, and the Maryland Department of the Environment (effective October 8, 1997); this Decree has been modified in accordance with a stipulated order entered into by Sparrows Point LLC and the respective agencies effective July 28, 2014;
- Administrative Consent Order (ACO) between Sparrows Point Terminal, LLC and the Maryland Department of the Environment (effective September 12, 2014); and,
- Settlement Agreement and Covenant Not to Sue (SA) between Sparrows Point Terminal, LLC and the United States Environmental Protection Agency (effective November 25, 2014).

The original Consent Decree for the Sparrows Point facility dealt with many issues associated with ongoing iron-making, steel-making, coking, byproduct, plating, and finishing operations. To the extent that these operations are no longer conducted, and the associated facilities no longer exist, many specific requirements of the Decree are no longer applicable and have been removed in accordance with the stipulated order implementing modifications to the Decree. The TMC is part of the acreage that remains subject to the requirements of the Decree as documented in correspondence received from EPA on September 12, 2014.

This Corrective Measures Study Report has been completed at the direction of the USEPA to develop and evaluate corrective action alternatives and to provide recommendations for corrective measure implementation. USEPA approval of the CMS Report is required prior to the implementation of the corrective measures for the TMC.

## **2.0 IDENTIFICATION AND DEVELOPMENT OF CORRECTIVE MEASURE ALTERNATIVES**

Consistent with USEPA Guidance for the completion of Corrective Measure Studies, this section presents a summary of the background and basis for the identification and development of potentially applicable corrective measure alternatives for the TMC, followed by a description and initial screening of the identified alternatives.

### **2.1. DESCRIPTION OF CURRENT SITUATION**

This section supplements the current site information outlined in Section 1 of this report. As noted in Section 1 of this report, and based on the significant sampling and testing conducted, the primary constituents of concern in the canal sediments consist of oil & grease and PCBs. The extent and concentration of these constituents in the canal sediments, as well as the nature of the canal sediments themselves, are important to the identification and development of potentially applicable corrective measure alternatives, and are discussed in the following subsections.

#### **2.1.1. Chemical Characteristics**

During former steelmaking operations, oils within contact wastewaters were managed through a series of baffles and oil skimmers installed at specific locations along the canal. As a result, oil & grease was observed in the sediments through much of the canal. The oil-control structures are no longer in operation; however, the mobilization of oil & grease from the sediments in stormwater is a potential concern.

Aroclors 1242, 1248, 1254, 1260, and total PCBs were identified in sediment samples collected from the TMC, with several samples having total PCB concentrations of greater than 50 mg/kg. The extent of the TMC where total PCBs were detected at concentrations above 50 mg/kg has been laterally delineated as generally shown on Sheet 1 of the attached Drawings. However, because samples with PCB concentrations over 50 mg/kg were from deep sampling depth intervals, further vertical delineation is required and is planned to be conducted as required by the USEPA.

#### **2.1.2. Physical Characteristics**

As presented in the SCR, the canal sediments were typically described as dark black fine silt; oily/greasy; and sludge-like. The moisture content of selected samples ranged from 28 to 41.4%, and dry densities ranged from as high as 109 pounds per cubic foot (pcf) for material described as dryish to 76.8 pcf for more typical material. Based on the observed presence of free-draining liquids in the sediments, any excavated sediments would need to be dewatered, possibly with the

use of drying agents, to remove free liquids prior to on-site landfilling or off-site transportation and disposal.

### 2.1.3. Waste Characterization

Waste characterization activities were previously completed to support the identification and evaluation of corrective measure alternatives for the sediments, including any excavated sediments and any sediments left in place. To supplement earlier waste characterization assessments, and as detailed in the SCR, Toxicity Characterization Leaching Procedure (TCLP) testing of discrete and composite sediment samples recovered from numerous transects along the canal was completed for regulated volatile, semi-volatile and metal constituents. Based on that sampling, no exceedances of the TCLP regulatory limits for hazardous waste were identified. Furthermore, none of the maximum detected concentrations or maximum method detection limits (MDLs) for all hazardous constituents (except for PCBs) exceeded their respective health-based levels below which contaminated environmental media would be considered to no longer contain hazardous waste (“contained-in” criteria i.e., Adjusted RSLs). Therefore, with the exception of sediment with concentrations of PCBs greater than 50 mg/kg, the contaminated environmental media within the canal is considered to be “contained out”, and will not require management as a hazardous waste. Sediments or contaminated media containing total PCB concentrations greater than 50 mg/kg are subject to disposal requirements under TSCA.

## 2.2. ESTABLISHMENT OF MEDIA CLEAN-UP OBJECTIVES

This section presents the establishment of cleanup objectives for the TMC sediments and stormwater discharges. As noted earlier, groundwater discharges to the TMC are being addressed in a separate comprehensive site-wide groundwater study, and cleanup objectives for groundwater are not a subject of this CMS. To the extent applicable, media cleanup objectives for the TMC sediments and surface water have been developed in this CMS based on the existing site conditions, USEPA guidance, public health criteria, State cleanup criteria, and the results of a Screening Level Risk Analysis (SLRA) as presented in the SCR.

In general, the cleanup objectives for the TMC are to restore the flow capacity of the canal, and to achieve a condition that is protective of both human health and the environment. These objectives are further discussed as follows:

- Some of the sediments were found to have total PCB concentrations greater than the TSCA threshold of 50 mg/kg. Based on the applicable regulations and discussions with the USEPA, sediments with total PCB concentrations greater than 50 mg/kg are required to be removed from the site as part of the corrective measure activities.

- As a result of historic site activities and surface water runoff, sediments have accumulated within the canal over time and have reached an average depth of approximately 2 feet above the original canal bottom. These sediment deposits reduce the flow capacity of the canal, restrict or block the flow of water from outfalls that discharge into the canal, and increase the potential for sediment erosion and migration. As a result of these conditions, restoration of the canal bottom and flow capacity is one of the clean-up objectives for the TMC.
- Based on the results of the SLRA, the potential for future on-site workers to be exposed to the canal sediments, following removal of all sediments with total PCB concentrations greater than 50 mg/kg, as identified as a potential concern. In particular, the SLRA indicated that the cumulative cancer risk for such future workers could be as high as 3E-5, which is above the regulatory benchmark for no further action of 1E-5. The SLRA also indicated that the acceptable cumulative non-cancer Hazard Index (HI) of 1 was not exceeded for any organ system evaluated for the same potential future worker exposure scenario. Therefore, after removal of sediment with total PCB concentrations greater than 50 mg/kg, in-place capping of residual sediments would generally be acceptable because the cumulative cancer risk for exposure to sediments was calculated to be less than 1E-4.

Based on the factors discussed above, the media cleanup objectives for the TMC sediments are summarized as follows for this CMS:

1. remove sediments with total PCB concentrations greater than 50 mg/kg;
2. remove sediments as necessary to restore the flow capacity of the canal; and
3. reduce future direct contact exposure risks to within acceptable levels (i.e., cumulative cancer risk of no greater than 1E-5 for future site workers).

## **2.3. IDENTIFICATION OF CORRECTIVE MEASURE ALTERNATIVES**

### **2.3.1. General**

This section presents the identification of corrective measure alternatives to be evaluated in this CMS Report, followed by a screening of the alternatives against the RCRA threshold criteria (i.e., protection of human health and the environment; attainment of media cleanup objectives; and controlling the sources). The corrective measure alternatives were developed based on the media clean-up objectives, communications with the USEPA and the MDE, and professional experience with the identification of corrective measure alternatives, and consist of the following:



1. No Action Alternative (Alternative 1): This alternative does not include the implementation of any corrective measures, and essentially represents leaving the canal in its existing condition. This alternative does not address the media cleanup objectives, but is presented as a baseline condition for comparison purposes.
2. Sediment Removal and Capping (Alternative 2): This alternative has been developed to meet the media cleanup objectives, and generally involves the following major activities: removal of sediments with total PCB concentrations of greater than 50 mg/kg; removal of at least 2 feet of sediments along the full length of the canal to restore flow capacity and allow for placement of a cap over residual sediments; capping of residual sediments with a 2-foot cap to prevent direct contact exposure risks; and institutional controls to restrict future disturbance of the cap.

### 2.3.2. Detailed Description of Alternative 2 (Sediment Removal and Capping)

To provide a basis for the subsequent evaluation and comparison of alternatives, this section presents a detailed description of the Sediment Removal and Capping Alternative (i.e., Alternative 2). The major components of this alternative are as follows (additional details of this alternative are depicted on the attached Drawings [Sheets 1 and 2], and further discussed in the “Maintenance Cleanup Plan for the Tin Mill Canal” [ARM, 2017]):

- Sediments impacted by elevated PCBs (>50 mg/kg) in the northern portion of the TMC will be excavated. Lateral delineation has been completed, but the depth of sediments containing total PCB concentrations greater than 50 mg/kg will be further delineated during implementation of the corrective measures. Material exceeding the threshold of 50 mg/kg total PCBs will be excavated, dried as necessary to eliminate free-draining liquids, and disposed of at a TSCA-permitted off-site landfill. Excavated sediments with concentrations of PCBs less than 50 mg/kg meet the “contained out” criteria to be considered non-hazardous and will be disposed at the on-site Greys Landfill, following drying as necessary to eliminate free-draining liquids. The volume of PCB-impacted sediments to be removed has been estimated as approximately 4,500 cubic yards (cy).
- Supplemental excavation of sediments will be conducted along the length of the canal as needed to restore the flow capacity of the canal and to facilitate placement of an engineered barrier for protection of the current and future site worker. Based on the presence of elevated concentrations of oil & grease in these sediments, sediments observed to have mobile, separate-phase petroleum product will also be removed. Following drying as necessary to eliminate free-draining liquids, these materials will be transported to the on-site Greys Landfill for disposal. Based on an estimated average

excavation thickness of approximately 4 feet along the canal, the volume of sediments to be removed as part of this task has been estimated as approximately 31,000 cy.

- Prior to beginning earthwork, existing vegetation (e.g., tall grasses and shrubs) within the limits of disturbance will be removed and segregated from the sediments to be excavated. Existing abandoned utilities, oil-removal stations, fencing, canal crossing manways, inactive outfalls, and other features along the canal will be removed during the course of the work as necessary to provide for equipment operation and support the excavation of sediments along the entire canal. A series of staging areas will be constructed along the canal to provide for equipment access, material dewatering and staging. The excavation work will be conducted in sections beginning at the upslope portion of the canal and move progressively downstream. Surface water will be managed with coffer dams and water will be pumped around the active excavation section. Groundwater will be removed from the active area with dewatering pumps as necessary to facilitate the excavation of sediments. Excavated sediments will be moved to lined dewatering pads for drying (i.e., gravity drainage, enhanced evaporation, and/or addition of drying agents). Fluid drained from the sediments will generally be discharged back into the canal for subsequent treatment at the HCWWTP, although fluid drained from the sediments with total PCB concentrations greater than 50 mg/kg will be collected into sumps and treated before discharge.
- Following sediment excavation, a 2-foot-thick cap will be installed across the bottom of the canal to prevent future direct contact exposures, and to provide a non-erosive channel lining. The cap would be constructed of appropriately sized rip rap (possibly to include the use of recycled crushed slag and concrete from on-site sources), underlain by a geotextile filter fabric.
- Institutional controls will be established as necessary to provide for the long-term protection of future site workers. These controls will be recorded with the deed(s) for this portion of the property, and will include provisions for periodic inspections and maintenance of the engineered cap, as well as proper oversight and management of any future intrusive construction activities that would disturb sediments below the cap. These institutional controls will include a requirement for written notice to the MDE of any future intrusive activities, along with appropriate measures for worker health and safety, material management, and cap restoration.

### 2.3.3. Initial Screening of Alternatives

Per applicable CMS guidance, this section presents a brief screening of the identified corrective measure alternatives against the RCRA threshold criteria (i.e., protection of human health and

the environment; attainment of media cleanup objectives; and controlling the sources). The screening is summarized as follows:

- Protection of Human Health and the Environment: Alternative 1 (No Action) does not provide adequate protection of human health and the environment because of the presence of total PCBs at concentrations greater than the TSCA threshold of 50 mg/kg, and because potential direct contact exposure risks to on-site workers are greater than 1E-5, based on cumulative cancer risks. Alternative 2 (Sediment Removal and Capping) would provide for the protection of human health and the environment by removing sediments with total PCB concentrations greater than 50 mg/kg, and by preventing direct contact exposures through the placement of a cap and institutional controls.
- Attainment of Media Cleanup Objectives: Alternative 1 (No Action) would not meet any of the established media cleanup objectives, while Alternative 2 (Sediment Removal and Capping) would address all three of the established media cleanup objectives.
- Controlling the Sources: Historic sources of contamination to the canal have generally been eliminated already through the decommissioning and removal of the previous steel production operations at the site. Alternative 1 (No Action) would not provide any additional control of contaminant sources, although Alternative 2 (Sediment Removal and Capping) would reduce the potential for migration of PCBs, oils, and greases to the surrounding environment.

Based on this initial screening, Alternative 1 (No Action) does not meet the threshold screening criteria, but Alternative 2 (Sediment Removal and Capping) does meet the threshold criteria and will be retained for detailed evaluation in the following section of this report. Even though the No Action Alternative does not meet the threshold criteria, it has also been retained for detailed evaluation in the following section of this report to provide a baseline condition for comparison purposes.

### **3.0 EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVES**

#### **3.1. GENERAL**

This section presents a detailed evaluation of the corrective measure alternatives that were identified and developed in the previous section (i.e., Alternative 1 - No Action, and Alternative 2 - Sediment Removal and Capping). Pursuant to applicable CMS guidance, the evaluation has been conducted with respect to the following evaluation/balancing criteria: long-term effectiveness; implementability; short-term effectiveness; toxicity, mobility and volume reduction; community acceptance; state acceptance; and cost.

#### **3.2. LONG-TERM EFFECTIVENESS**

This criterion refers to the expected effectiveness, reliability and risk of failure of the alternatives, including the effectiveness under analogous site conditions, the potential impact resulting from a failure of the alternative, and the projected useful life of the alternative.

- Alternative 1 – No Action: This alternative is not effective in the long-term because of the continued potential for migration of contaminants, the continued surface water flow rate restrictions, and potential direct contact exposure risks that exceed threshold goals.
- Alternative 2 – Sediment Removal and Capping: This alternative provides long-term effectiveness through the removal and secure disposal of contaminated sediments, the placement of an erosion-resistant and stable cap, and the implementation of long-term inspection and maintenance requirements (institutional controls).

#### **3.3. REDUCTION IN TOXICITY, MOBILITY, OR VOLUME OF WASTES**

This criterion generally refers to how much the corrective measures alternatives will reduce the waste toxicity, mobility and/or volume, primarily through treatment.

- Alternative 1 – No Action: This alternative does not provide any reduction in the toxicity, mobility or volume of the contaminated sediments along the canal.
- Alternative 2 – Sediment Removal and Capping: This alternative provides reduction in contaminant toxicity, mobility and volume through the treatment of fluids removed from the PCB-contaminated areas. The mobility and volume of contaminated sediments along the canal will be significantly reduced through the excavation and secure containment of sediments, and the placement of a non-erosive cap above the residual sediments.

### 3.4. SHORT-TERM EFFECTIVENESS

This criterion generally refers to potential short-term risks to on-site workers and the community in association with implementation of the corrective measure alternatives, such as might be associated with the excavation, handling, treatment, containment, and transportation of contaminated materials.

- Alternative 1 – No Action: Because this alternative does not involve any actions, it does not present any increased short-term exposure risks, or any short-term benefits.
- Alternative 2 – Sediment Removal and Capping: This alternative presents a slightly increased risk of short-term direct contact exposures to the contaminated sediments and fluids in association with their excavation, drying, loading and transportation, but these risks can be controlled through the implementation of conventional best management practices for waste handling, dust control, and worker health and safety. The benefits of this alternative will be realized immediately following alternative implementation.

### 3.5. IMPLEMENTABILITY

This criterion refers to the relative ease of alternative implementation (construction), including duration, administrative and technical feasibility, and availability of the required services and materials.

- Alternative 1 – No Action: Implementation of this alternative is not considered to be feasible because it does not address applicable requirements for PCB removal, risk reduction, and restoration of flow capacity in the canal.
- Alternative 2 – Sediment Removal and Capping: This alternative is readily implementable because a detailed evaluation indicates that it can be completed within a reasonable timeframe, the alternative can be conducted in a manner consistent with applicable permit requirements and regulations, the required technologies are feasible and well proven, and the required services and materials are readily available.

### 3.6. COMMUNITY ACCEPTANCE

This criterion refers to the known or anticipated community acceptance associated with the corrective measure alternatives. This criterion will be further evaluated through the 30-day public comment period that will be provided following remedy selection and issuance of a Statement of Basis by the USEPA.

- Alternative 1 – No Action: It is anticipated that this alternative will not be favorable to the community because it does not provide an appropriate level of long-term protection of human health and the environment.
- Alternative 2 – Sediment Removal and Capping: This alternative is expected to receive a higher level of community acceptance because it reduces risks and increases short- and long-term protection of human health and the environment.

### 3.7. STATE ACCEPTANCE

This criterion refers to how the corrective measure alternatives will comply with applicable State regulations (e.g., permit requirements).

- Alternative 1 – No Action: While this alternative does not require any new permits, it is not expected to be acceptable to the State because it does not adequately address regulations associated with PCB removal and control of exposure risks.
- Alternative 2 – Sediment Removal and Capping: This alternative can be implemented in a manner consistent with applicable State permitting requirements, and is expected to be acceptable to the State because it addresses applicable requirements of the MDE Voluntary Cleanup Program (VCP).

### 3.8. COST

This criterion addresses the anticipated short- and long-term costs associated with implementation of the corrective measure alternatives.

- Alternative 1 – No Action: This alternative does not involve any new costs.
- Alternative 2 – Sediment Removal and Capping: Implementation of this alternative is expected to cost several hundreds of thousands of dollars for sediment excavation, handling, transportation, disposal, and capping, although long-term inspection and maintenance costs are expected to be relatively low as the cap can generally function on its own without any active management. This alternative is considered to be the most cost-effective approach for addressing the identified media cleanup objectives.

## 4.0 JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURES ALTERNATIVE

Based on the detailed evaluation of corrective measure alternatives as presented in the following section, **Alternative 2 – Sediment Removal and Capping, is recommended for the TMC.** This alternative clearly satisfies the evaluation criteria better than the No Action Alternative, and is an appropriate and favorable corrective measure alternative for the TMC sediments. Supporting rationale for selection of Alternative 2 – Sediment Removal and Capping is summarized below:

- it satisfies the threshold screening criteria;
- it best satisfies the alternative evaluation criteria;
- it meets the media cleanup goals;
- it can be readily implemented with proven technologies;
- it improves the site conditions and drainage;
- it reduces potential contaminant migration and loading to the on-site treatment plant;
- it is durable and provides for long-term protection of human health and the environment; and
- it can be conducted in accordance with applicable State regulations.

## 5.0 REFERENCES

ARM Group, Inc. (2017). *Sediment Characterization Report for the Tin Mill Canal: Sparrows Point Terminal Site*. Revision 1. June 14, 2017.

ARM Group, Inc. (2017). *Maintenance Cleanup Plan for the Tin Mill Canal: Sparrows Point Terminal Site*. Revision 0. May 5, 2017.



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## **FIGURES**


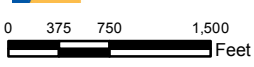
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Image courtesy of USGS Earthstar Geographics SIO © 2016 Microsoft Corporation


  
**ARM Group Inc.**  
 Earth Resource Engineers  
 and Consultants  


- Site Boundary
- Private Property
- Area A Boundaries
- Area B Boundaries

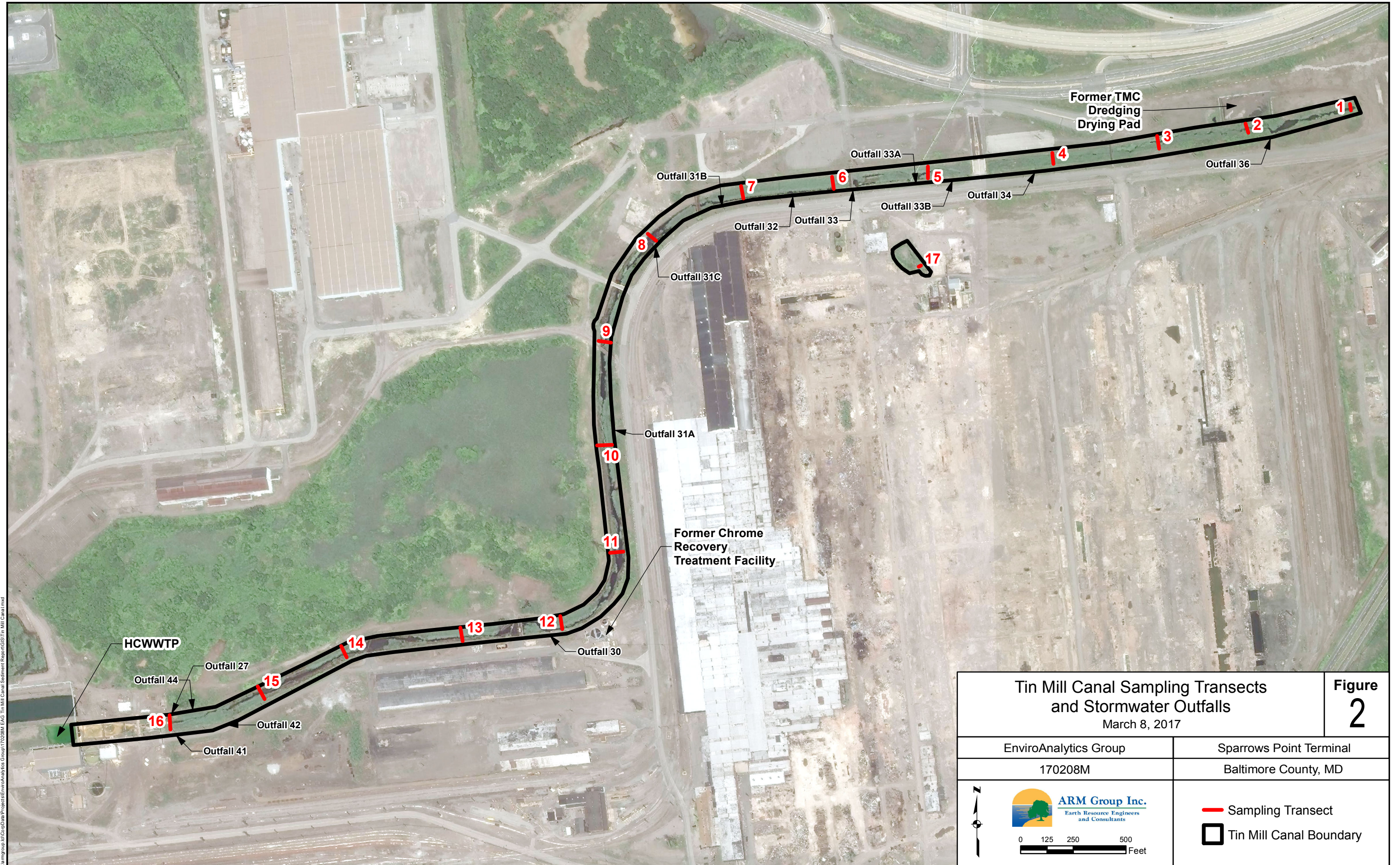
**Tradepoint Atlantic**  
**Area A and Area B Parcels**  
 August 1, 2016

EnviroAnalytics Group  
 Area A: Project 150298M  
 Area B: Project 150300M

Tradepoint Atlantic  
 Baltimore County, MD

**Figure**  
1






Tin Mill Canal Sampling Transects  
and Stormwater Outfalls

March 8, 2017

Figure  
2

EnviroAnalytics Group	Sparrows Point Terminal
170208M	Baltimore County, MD
 ARM Group Inc. Earth Resource Engineers and Consultants	<ul style="list-style-type: none"> <li><span style="color: red;">—</span> Sampling Transect</li> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px; vertical-align: middle;"></span> Tin Mill Canal Boundary</li> </ul>



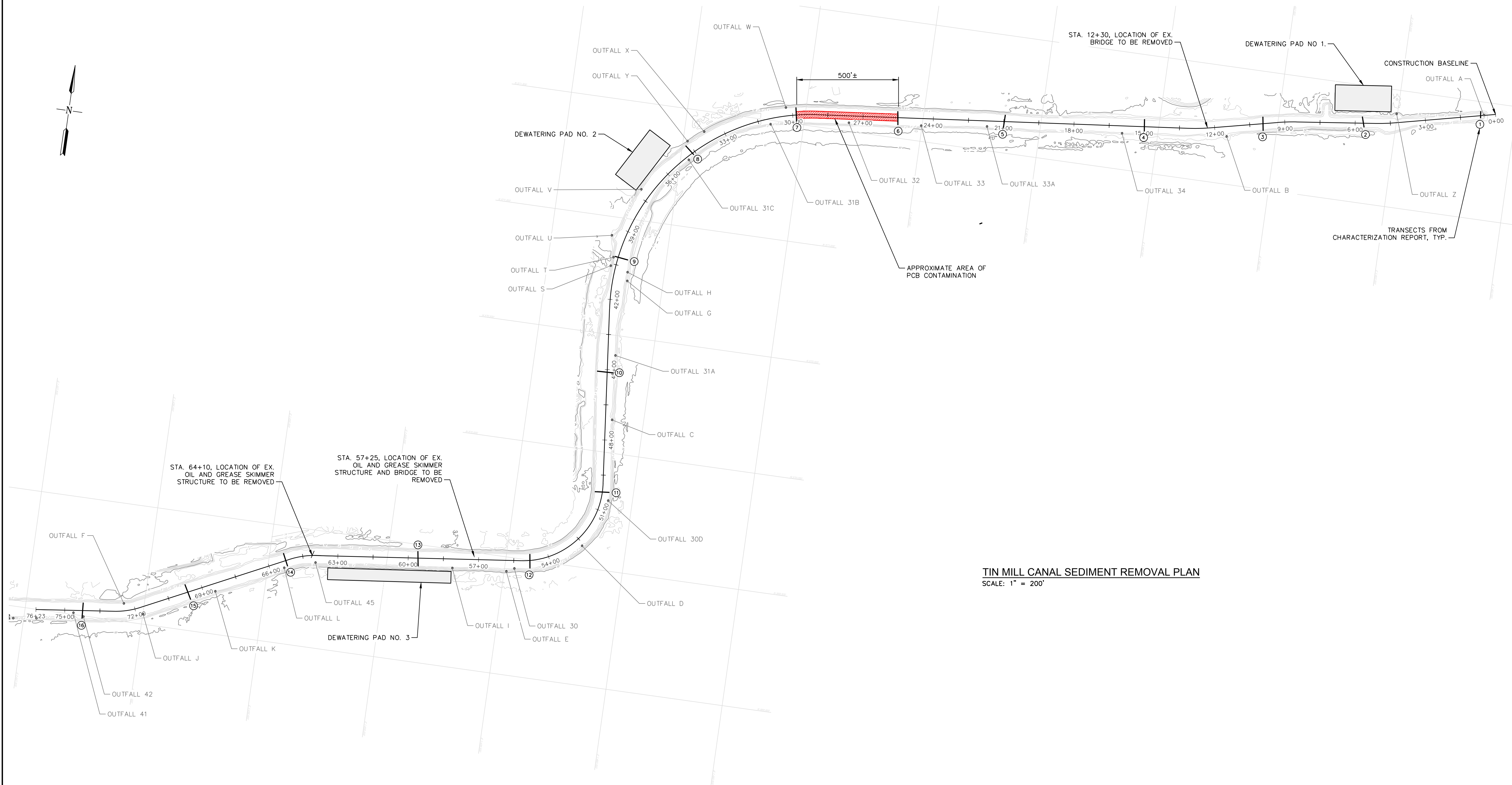
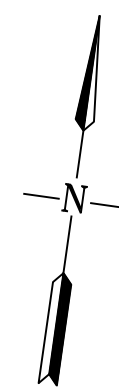
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# DRAWINGS

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**TIN MILL CANAL SEDIMENT REMOVAL PLAN**  
SCALE: 1" = 200'

**GENERAL NOTES:**

1. TOPOGRAPHIC MAPPING IS FROM AERIAL SURVEY CONDUCTED BY CME ENGINEERING OF SOMERSET, PENNSYLVANIA ON MARCH 30, 2017.
2. DEWATERING PAD NO. 1 IS EXISTING. CONTRACTOR SHALL VERIFY THE INTEGRITY OF THE PAVED SURFACE PRIOR TO STAGING EXCAVATED MATERIAL. CONCERNS ABOUT THE SUITABILITY OF THE PAVED SURFACE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
3. DIMENSIONS OF DEWATERING PADS NOS. 2 AND 3 ARE APPROXIMATE AND MAY BE FIELD-ADJUSTED TO MEET SITE OR OPERATIONAL REQUIREMENTS.
4. WINDROW SPACING IS ASSUMED, AND SHALL BE ADJUSTED BY THE CONTRACTOR AS NEEDED TO SUIT ACTUAL EQUIPMENT USED AND THE CONDITION OF EXCAVATED MATERIAL.
5. WINDROWS SHALL BE TURNED DAILY, OR MORE FREQUENTLY. ESTIMATED TIME FOR DRYING IS TWO (2) WEEKS, DEPENDING ON WEATHER CONDITIONS.
6. CONFIRM THE REMOVAL OF STRUCTURES WITH THE OWNER, PRIOR TO DEMOLITION.

**SUGGESTED SEQUENCE OF OPERATIONS:**

1. SET UP BYPASS PUMPING SYSTEM. BASE FLOW IS ESTIMATED TO BE 3000 GALLONS PER MINUTE.
2. ESTABLISH DEWATERING ZONES IN APPROXIMATE 300 LINEAR FOOT SECTIONS, STARTING AT THE UPSTREAM END OF THE TIN MILL CANAL. INSTALL COFFER DAMS AT THE UPSTREAM AND DOWNSTREAM ENDS OF THE SECTION.
3. INSTALL A SMALL PUMP IN THE SECTION BEING EXCAVATED, TO ASSIST WITH DEWATERING AND TO CONTROL BASE FLOW.
4. SEQUENCE THE FLUSHING OF STORMWATER PIPING SUCH THAT SEDIMENT OR DEBRIS IS NOT DEPOSITED IN SECTIONS OF THE TIN MILL CANAL THAT HAVE ALREADY BEEN EXCAVATED AND RESTORED TO GRADE.
5. EXCAVATE SEDIMENT FROM THE DEWATERED SECTIONS TO A DEPTH OF AT LEAST 2- FEET BELOW THE ORIGINAL CANAL GRADE. INSTALL THE COFFER DAM IN ACCORDANCE WITH THE TYPICAL DETAIL.

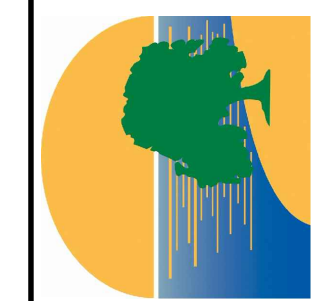
**DRAFT  
NOT FOR CONSTRUCTION**

**PROFESSIONAL CERTIFICATION:**

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State Of Maryland.

License No. \_\_\_\_\_

Expiration Date \_\_\_\_\_



No.	Revision	Date	By

DESIGNED	JBM	1" = 200'
CHECKED	TNP	DATE 05/02/2017
DRAWN	JBM	PROJECT NO. 170208M

**SEDIMENT REMOVAL PLAN**  
SPARROWS POINT  
BALTIMORE COUNTY, MARYLAND

**TIN MILL CANAL MAINTENANCE**

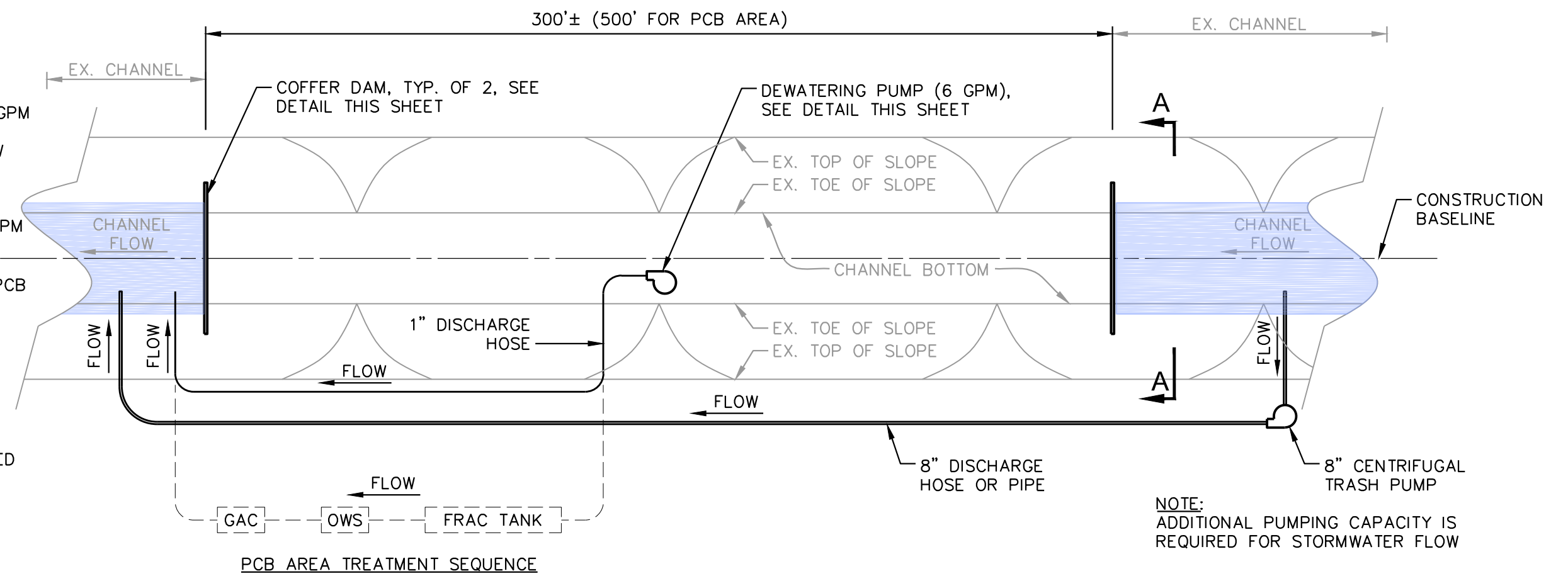
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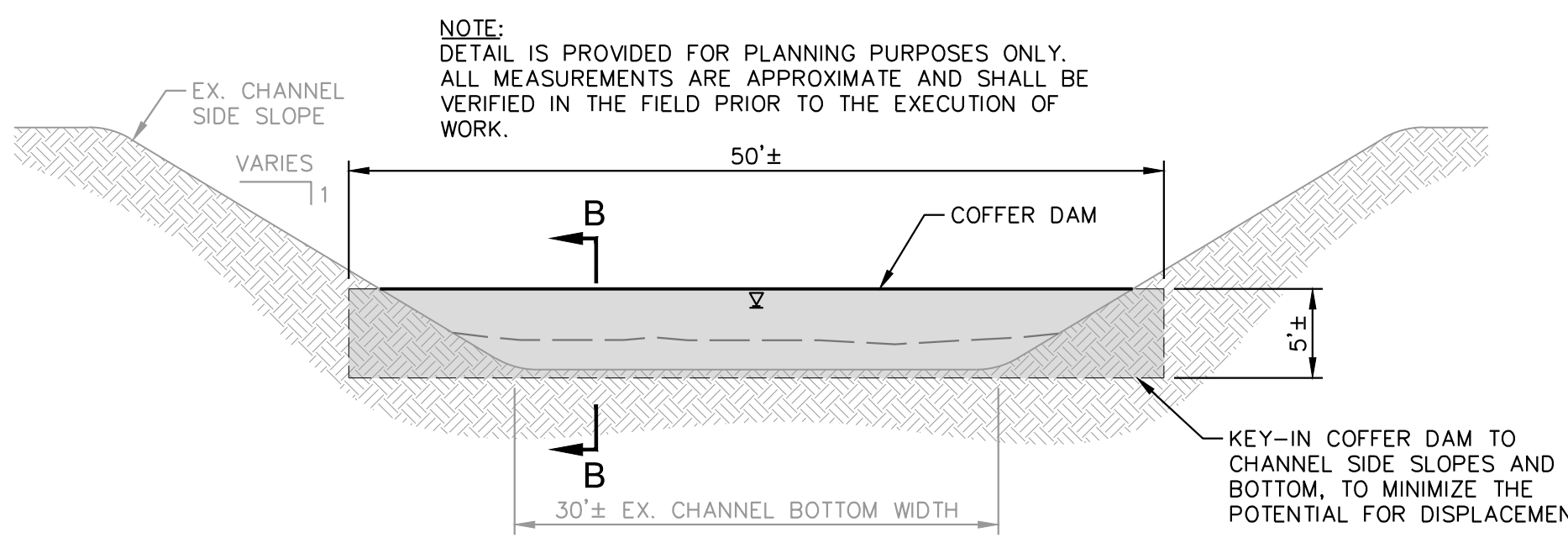


**NOTES:**

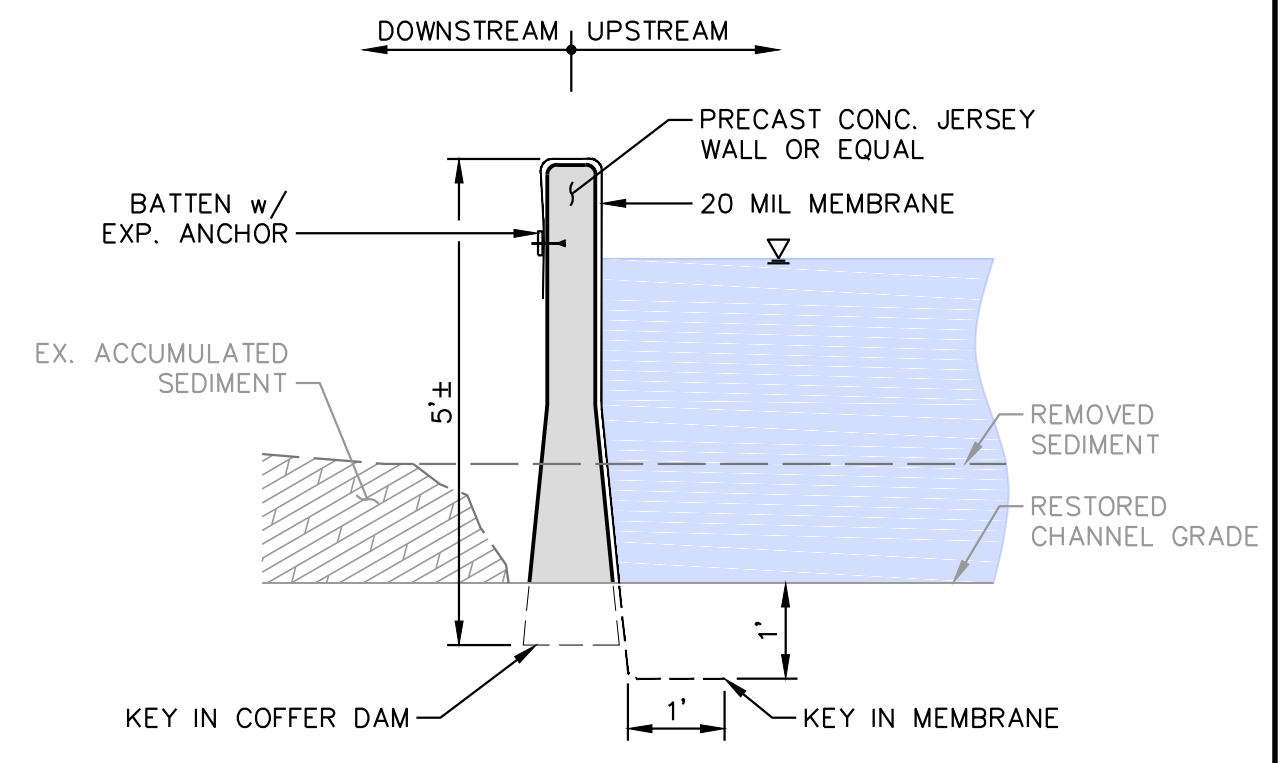
1. APPROXIMATE EXISTING BASE CHANNEL FLOW RATE = 3,000 GPM
2. APPROXIMATE DEWATERING FLOW RATE = 8,600 GPD
4. APPROXIMATE CHANNEL STORMWATER FLOW IS 62,800 GPM (1-YEAR STORM)
5. DEWATERING DISCHARGE FROM PCB CONTAMINATED AREA SHALL BE PUMPED TO A FRAC TANK, AND PROCESSED THROUGH AN OIL/WATER SEPARATOR (OWS) AND GRANULAR ACTIVATED CARBON (GAC) FILTER.
6. ALL PUMPING SHALL BE CONDUCTED THROUGH A FILTERED INTAKE, TO MINIMIZE SEDIMENT TRANSPORT.



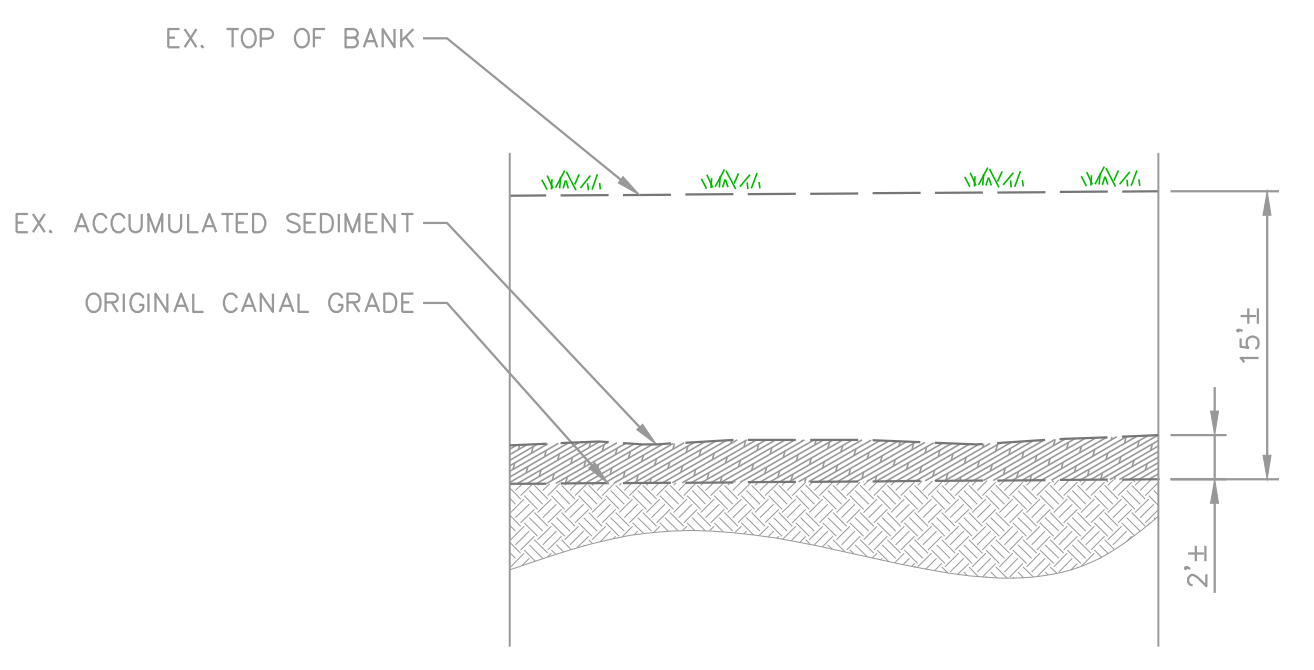
**PLAN: TYPICAL CHANNEL BYPASS PUMPING**  
SCALE: 1" = 40'



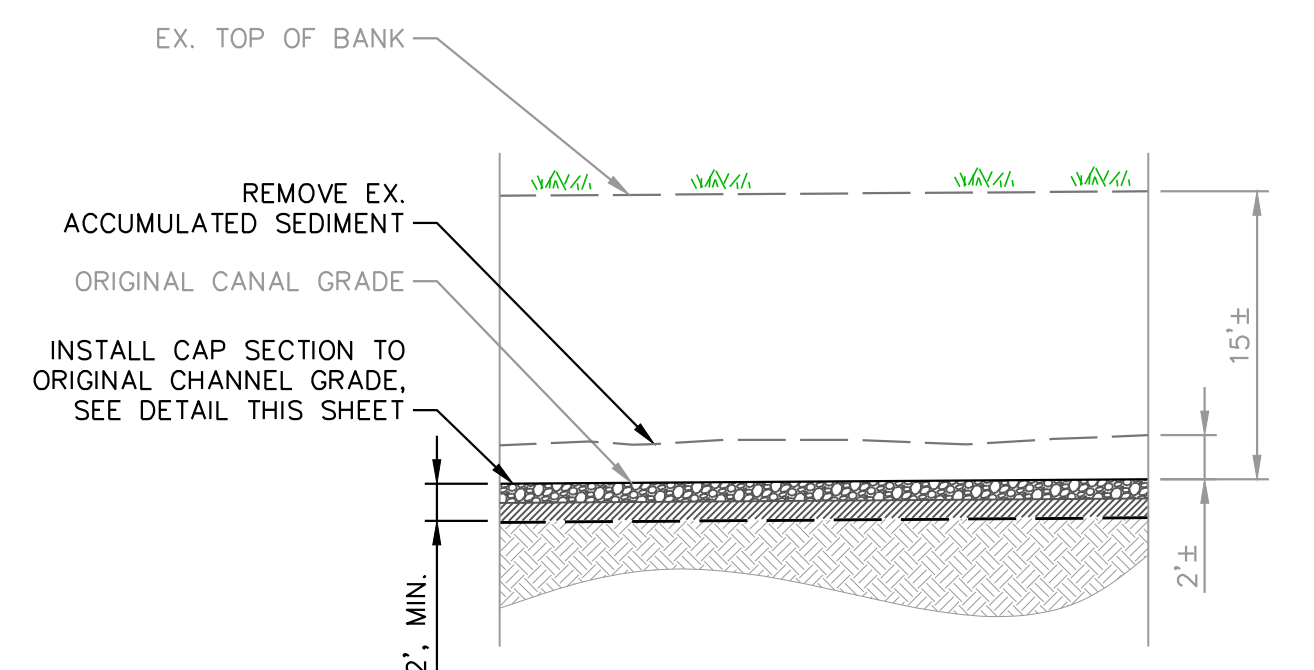
**SECTION A-A**  
SCALE: 1" = 10'



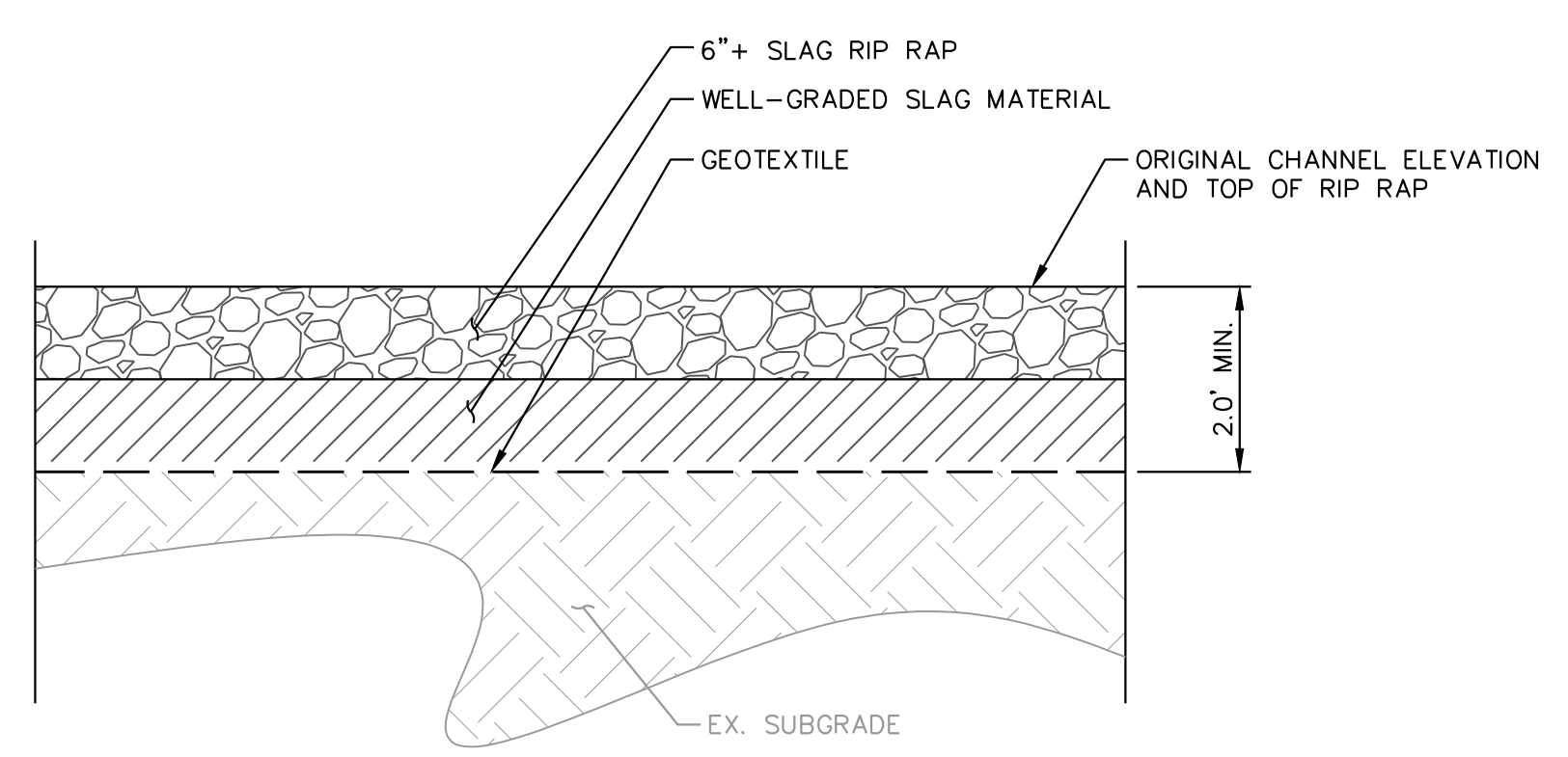
**SECTION B-B**  
SCALE: 1" = 2'



**PROFILE: TYPICAL EX. CHANNEL**  
SCALE: 1" = 10'



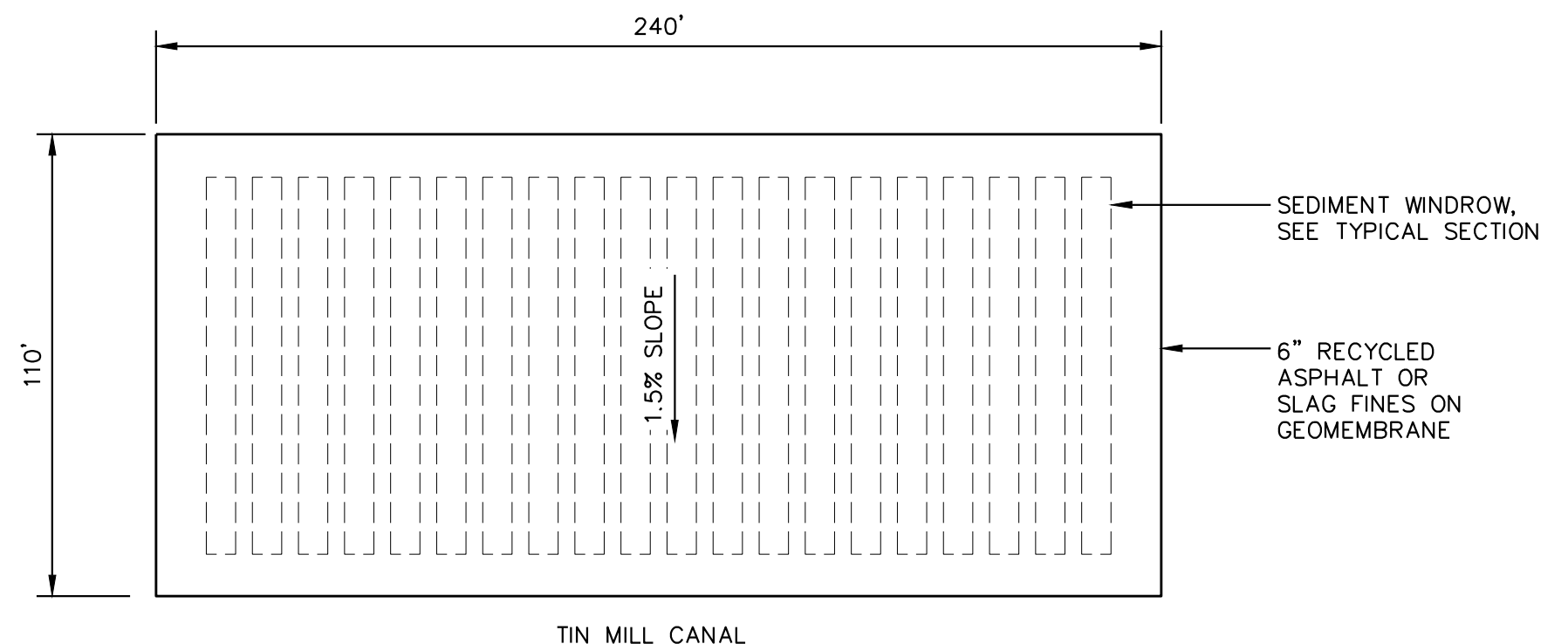
**PROFILE: TYPICAL CHANNEL CAP**  
SCALE: 1" = 10'



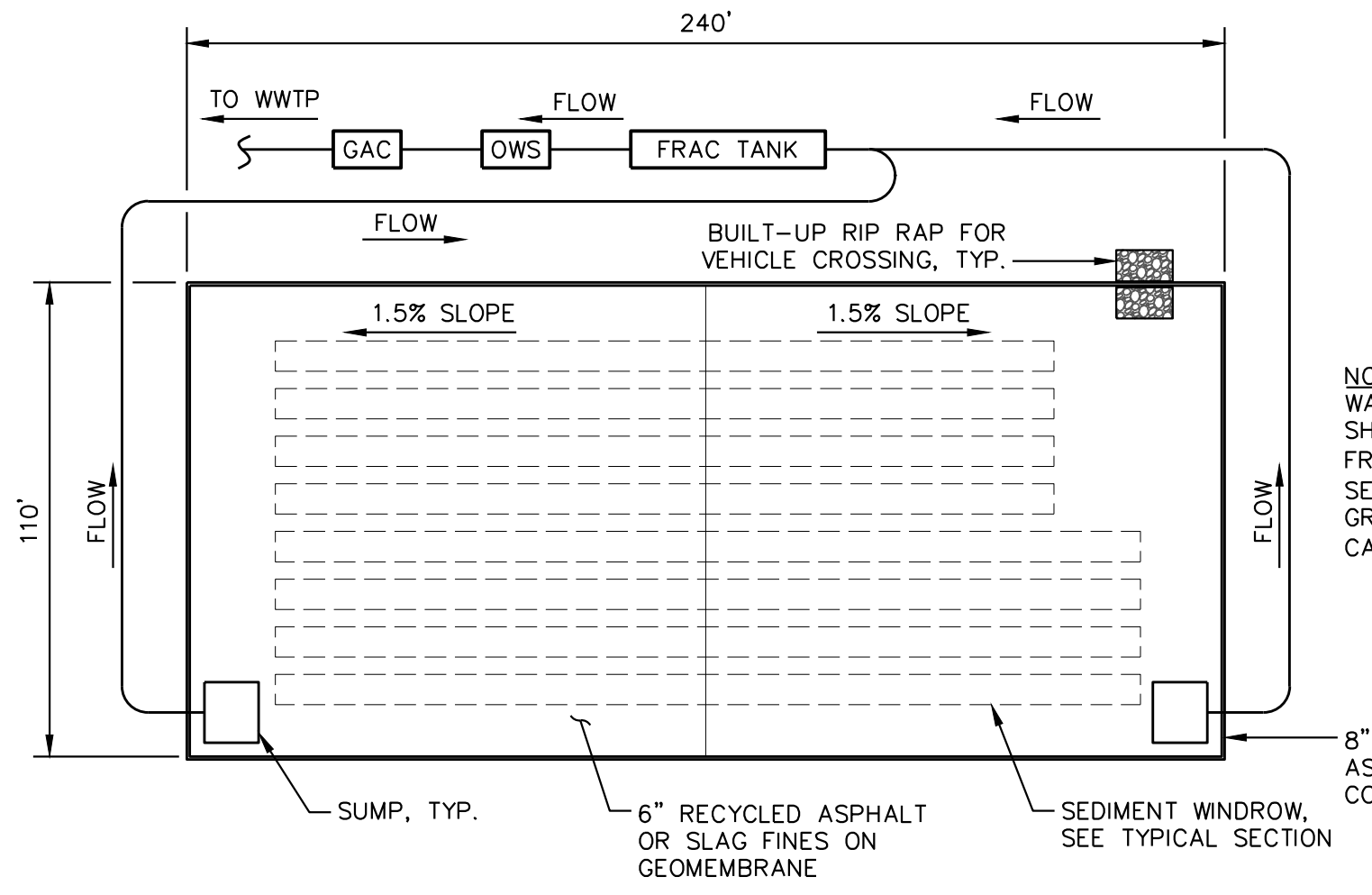
**DETAIL: TYPICAL CHANNEL CAP**  
SCALE: 1" = 2'

**GENERAL NOTES:**

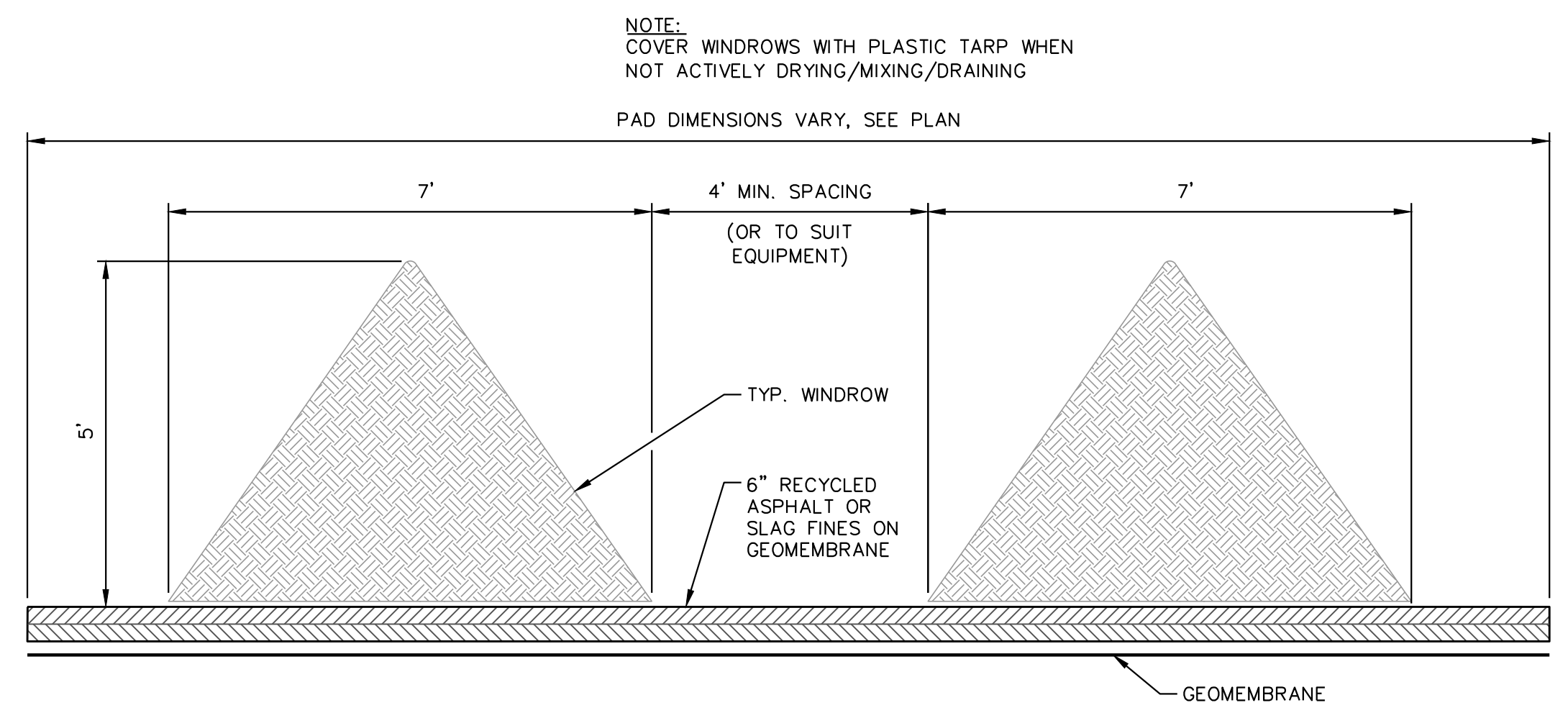
1. ALL DETAILS AND METHODS PRESENTED ARE SUGGESTED, AND NOTHING SHALL BE CONSTRUED AS TO RESTRICT THE CONTRACTOR'S PREFERRED MEANS AND METHODS, ALL DEVIATIONS SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW AND APPROVAL.
2. ALL DIMENSIONS ARE APPROXIMATE AND SHALL BE ADJUSTED BY THE CONTRACTOR TO SUIT ACTUAL CONDITIONS AND EQUIPMENT.



**PLAN: TYPICAL SEDIMENT DEWATERING PAD**  
SCALE: 1" = 40'



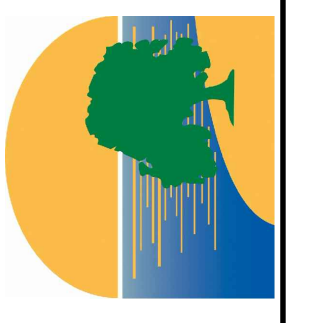
**PLAN: PCB-CONTAMINATED SEDIMENT DEWATERING PAD**  
SCALE: 1" = 40'



**SECTION: TYPICAL DEWATERING PAD**  
SCALE: 1" = 2'

**DRAFT NOT FOR CONSTRUCTION**

**PROFESSIONAL CERTIFICATION:**  
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland.  
License No. \_\_\_\_\_  
Expiration Date \_\_\_\_\_



By	
Date	
Revision	
No.	

Scale	1" = 200'
Date	05/02/2017
Project No.	170208M
Sheet No.	2

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