

Marine Contractor's Licensing Manual

June 2026
Version 2.0



Preface

In 2009 the Maryland Department of the Environment, the Maryland Marine Contractors Association, and others approached the Maryland Legislature about the possible need for legislation to better ensure that marine contractors are knowledgeable and proficient in the trade of marine construction and familiar with Maryland environmental permitting, licensing and contracting requirements. In 2010 the Maryland Legislature enacted legislation (Environment Article Title 17 Chapter 286) to establish the Maryland Marine Contractors Licensing Board (the Board) and to require that all contractors performing marine activities in Maryland's tidal waters obtain a Maryland Marine Contractors License. The legislation requires that in order to be licensed, a contractor must have certain marine trade experience, pass an examination administered by the Board, and fulfill continuing education requirements. The Board is the State licensing agency and as such is responsible for the review of applications for licenses, for issuing, denying and revoking licenses and for administering tests and providing continuing education for licensed marine contractors. This manual was developed as a resource for use by marine contractors as they prepare to take the Marine Contractors Licensing Exam.

Notice

The purpose of this manual is to provide an introduction to, and basic understanding of, many of the general concepts and regulations governing marine construction in the State of Maryland. This manual is also intended to assist readers in preparing for Maryland's Marine Contractor Licensing Program exam. Its content is not exhaustive. References containing additional detail are provided where appropriate.

The Maryland Marine Contractor Licensing Board has attempted to accurately represent state and federal regulatory requirements in this Manual. Many of the regulatory requirements contained in the manual sections are verbatim; however, some regulations have been summarized for brevity. Accordingly, contractors are advised to consult the actual regulations as the authoritative source of legal requirements. Where regulatory requirements are referenced in the manual, regulatory website citations have been included to allow contractors to access the most current and complete version of the actual regulations.

This manual is not intended as a design guide. Design content is general in nature. Language on dimensions and sizing is provided for the purpose of illustrating concepts and is not intended to be followed as specifications applicable to any individual, or all project(s).

Professional judgment should always be exercised in concert with use of the manual. With regard to design criteria in particular, the marine contractor should consult a licensed professional engineer when clarifications or additional directions are needed. Individual permit

requirements and contract special conditions should be interpreted to override manual content where conflicts exist.

The manual is accurate to the time of publishing. Revisions and updates to the manual will be provided at the discretion of the Marine Contractors Licensing Board, as budget allows. However, changes in regulation in between the time of manual publishing and revision do not relieve the contractor of his duty to adhere to current Tidal Wetland Regulations, COMAR 26.24, and COMAR 26.30, Marine Contractor Licensing Board regulations, which can be obtained via the internet on the COMAR webpage:

<https://mde.maryland.gov/programs/permits/pages/comaronline.aspx>

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List of Acronyms and Abbreviations

ASME	American Society of Mechanical Engineers
BPW	Maryland Board of Public Works
CAC	Critical Area Commission
CDC	US Center for Disease Control
CGL	Commercial General Liability insurance
COMAR	Code of Maryland Regulations
The Act	Chesapeake Bay Critical Area Protection Act
DNR	Department of Natural Resources
DOD	Department of Defense
ESC	Erosion and Sediment Control
GPS	Global Positioning System
IDA	Intensely Developed Area
LDA	Limited Development Area
MCLB	Maryland Marine Contractors Licensing Board
MD DNR	Maryland Department of Natural Resources
MDE	Maryland Department of the Environment
MHIC	Maryland Home Improvement Commission
Miss Utility	Maryland's on-call system for Utility Information
MOSH	Maryland Occupational Safety and Health
MVA	Motor Vehicle Administration
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Act
RCA	Resource Conservation Area
ROPS	Roll-Over Protective Structure
SAV	Submerged Aquatic Vegetation
SDS	Safety Data Sheets
UMD	University of Maryland
USACE	US Army Corps of Engineers
USCG	US Coast Guard
UXO	Unexploded ordinance

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1. INTRODUCTION

As the nation's largest estuarine system, the Chesapeake Bay is home to approximately 3,600 species of flora and fauna, including approximately 2,700 species of plants, 15 species of submerged aquatic vegetation, 30 species of waterfowl, 350 species of finfish and 175 species of shellfish - including the iconic Eastern oyster and blue crab. The Bay's wetlands, beaches, islands and other habitats host approximately one million visiting migratory waterfowl each winter and provide spawning and nursery grounds critical to the continuance of migratory fish species as well.

The Chesapeake Bay and the Atlantic Coastal Bays and their tributaries have an abundance of fish and wildlife that support commercial fisheries and also provide wonderful opportunities for recreational activities. These include fishing, swimming, sailing, boating, kayaking, hiking, birding and wildlife viewing. The Bay's impact on Maryland's economy from these commercial and recreational activities is considerable. For example, in 2024, the combined dockside value of Maryland's key commercial fisheries (blue crabs, oysters and striped bass) was estimated at \$67.48 million, with an additional \$3.74 million value from harvest of razor clams and invasive wild blue catfish. The National Marine Manufacturers Association estimates that in 2023 recreational boating had a \$4.2 billion impact on Maryland's economy. The continuance of commercial and recreational activities in the Chesapeake and Atlantic Coastal Bays is tied to the stewardship of Maryland's tidal wetlands and adjacent lands, mainly the preservation of the quality of:



Thomas Point Shoal Light, Chesapeake Bay

- The fifty billion gallons of freshwater delivered to the Bay daily from its six-state, 64,000 square mile watershed – and, in particular, that volume delivered to the Atlantic Coastal Bays, which have shallow waters and receive less flushing; and
- The habitats that provide opportunities for hunting and foraging, refuge from predators, spawning or nesting, and nursery areas for fish and wildlife.

Over 18.5 million people currently call the Chesapeake Bay watershed home; an additional 1.5 million are expected to move to the area by 2040. To enjoy its waters to the fullest, inhabitants have built piers, docks, and marinas on Maryland's waterways. In 2024, Maryland identified 520 Public Water Access Sites including 251 boat ramps designed for motorized vessels and 252 soft access sites for nonmotorized vessels. In 2025, approximately five hundred marinas and thousands of in-water boat slips were identified in Maryland. That same year, the state recognized 169,403 pleasure boats and 2,792 commercial boats registered to Maryland.

Population growth and development in the Chesapeake Bay watershed, especially near its shores, brings with it many stressors on the environment and the fragile ecosystems of the Chesapeake and Atlantic Coastal Bays. In addition to providing habitat for birds, insects, amphibians, crustaceans, and fish - wetlands and forested buffers along waterways, when properly preserved, can function to absorb 80 to 90 percent of sediment and nutrients. These sediments and nutrients are the Bay's largest pollutants. They are carried by groundwater and surface water and would otherwise enter the Bay directly. Submerged aquatic vegetation in wetlands creates dissolved oxygen necessary to support aquatic life, some of which (e.g., oysters) serve to further filter pollutants from the estuary. Forest root mass serves to anchor stream banks, break up soil to facilitate rainwater infiltration, buffer wetlands and recharge aquifers. Although the Chesapeake Bay watershed is comprised predominantly of forest cover, estimates indicate that between 1999 and 2019 approximately 4.6% of forest cover in the watershed has been lost.

The Chesapeake Bay, Atlantic Coastal Bays, and their tidal tributaries include 6,659 miles of shoreline. A significant percentage of the shoreline is eroding and has been eroding for thousands of years. Shoreline erosion is a natural process in the Chesapeake Bay area. Shorelines are continually eroded by the movement of water due to natural forces such as stormwater runoff and wind driven waves as well as human activities, such as high-speed



Living Shoreline

boating. Maryland tidal wetlands law allows coastal- or Bay-front property owners to protect their property from the forces of shore erosion by various methods such as living shorelines, bulkheads, or stone revetments.

Among many other activities, marine contractors build docks, piers, revetments, and bulkheads,

boatlifts, and perform dredging to maintain navigation channels. These activities have spawned a marine contracting industry that is unique and specific to Maryland and comes with a

responsibility to protect the quality of the environment that supports them. Working along Maryland's 12,000 miles of shoreline and in its 240,000 acres of tidal wetlands, marine contractors have, geographically speaking, the final opportunity to mitigate the impacts of development on Maryland's tidal wetlands and adjacent lands.

As development pressures increase along the coastal waterways and more contractors enter the marine field, Maryland legislature determined that it is important to ensure that contractors performing work on Maryland waterways are knowledgeable and proficient in the trade of marine construction and are familiar with associated environmental protection and contracting requirements. As such, the Maryland Marine Contractors Licensing Board (Board) was established by the Maryland General Assembly in 2010. **The corresponding legislation (Environment Article Title 17) requires that all contractors performing marine activities in Maryland obtain a Maryland Marine Contractor's License. To obtain this license, a contractor must have two years of marine trade experience, pass an examination administered by the Board, and maintain minimum insurance requirements. License renewal includes fulfilling continuing education requirements.**

2. BACKGROUND

2.1 GOVERNING LEGISLATION AND REGULATIONS

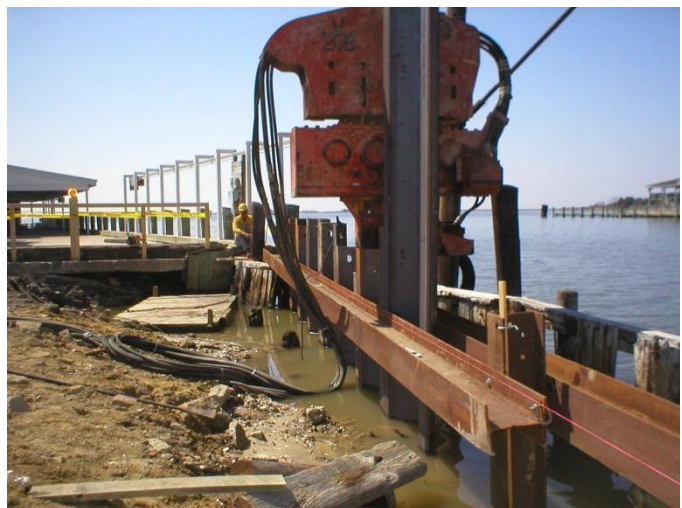
The Marine Contractors Licensing Board (MCLB) was established by Chapter 286 of the 2010 Laws of Maryland. The MCLB consists of seven individuals, appointed by the Governor, each serving three-year terms. These members consist of three marine contractors, two at-large representatives, one representative from the Maryland Department of the Environment, and one representative from the Maryland Department of Natural Resources. The MCLB is responsible for licensing and regulating individuals and entities that provide marine contractor services in the State.

The MCLB is required to carry out the marine contractor licensing provisions of Title 17 of the Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) Title 26 Subtitle 30 Marine Contractors Licensing Board including:

- Accepting and evaluating applications for a marine contractor's license;
- Approving the substance and form of a continuing education course;
- Granting, renewing, denying, suspending or revoking a marine contractor's license;
- Setting reasonable fees for the issuance and renewal of licenses;
- Collecting and accounting for specified fees; and
- Keeping a current record of all licensed marine contractors.

See Appendix A: *Environmental Article, Title 17, Annotated Code of Maryland* for more information.

In addition to those mandatory duties, the MCLB is also authorized to update regulations by the Secretary of the Environment to carry out the marine contractor licensing program. This included establishing license categories that specify the marine contractor services that each license authorizes a licensee to perform (Title 17-305). The MCLB is also authorized to make inquiries and conduct investigations of applicants for a marine contractor's license.



Bulkhead Construction

New regulations, COMAR 26.30 Marine Contractors Licensing Board, became effective March 18, 2024. The most significant change in these new regulations was the introduction of four license Categories. These Categories create separate licenses that authorize more specific types of marine contractor services based on an applicant's particular marine contractor experience. These four Categories replaced the previous single license that authorized all marine contractor services.

Each category authorizes specific types of **marine contractor services** according to an applicant or licensee's experience. These categories are: Category 1 Heavy Marine Construction, (also authorizes Cats. 2, 3, & 4), Category 2 Residential and Commercial Marine Construction (also authorizes Cats. 3 & 4), Category 3 Limited Marine Construction, and Category 4 Incidental Marine Contractor Services.

2.2.1 APPLICABILITY

As defined in the law and regulations, **marine contractor services** are “**construction, demolition, installation, alteration, repair, or salvage activities located in, on, or under State or private tidal wetlands, including:**

- **Dredging and filling;**
- **The construction, demolition, installation, alteration, repair, or salvage of structures, including boathouses, boat or other personal watercraft lifts or ramps, slips, docks, floating platforms, moorings, piers, pier access structures, pilings, wetland observation platforms, wetland walkways, and wharfs; and**
- **The construction, demolition, installation, alteration, repair, or salvage of stabilization and erosion control measures, including revetments, breakwaters, bulkheads, groins, jetties, stone sills, marsh establishments (non-structural shoreline stabilization measures), and beach nourishment or other similar projects.”**



Shoreline Erosion

The Board provides the following general guidance on the application of the law.

Marine contractor services are defined by the type of service to be performed, regardless of the size of the project. The law applies to activities completed on both state and private tidal wetlands.

Services that involve a physical disturbance in a tidal wetland, such as construction, major renovations, and the creation, restoration and enhancement of wetland sites with plantings, are considered marine contractor services, and require the contractor to hold a marine contractor's license. **All services that require a tidal wetlands permit or license, as defined in Title 17, are considered marine contractor services.**

Services that do not involve physical disturbance, such as wetland delineation services, do not require a marine contractor's license. Control of invasive species via the application of herbicides and/or controlled burn procedures do not require a marine contractor's license, unless removal of root mass is also involved. Desktop services, such as project planning, design and permitting support services, are exempted from the marine contractor licensing requirements. Contractors should contact the Board if they are uncertain as to whether the services they provide require a marine contractor's license.

It is critical to note that the licensing of a marine contractor DOES NOT exempt the licensee's projects from complying with the permitting requirements of Maryland Department of the Environment's (MDE) Wetlands and Waterways Protection Program and other laws and regulations as they pertain to their work, such as County Building permits. Adherence to other criteria, such as a Professional Engineer's review of the plans, may be appropriate in conjunction with rendering such services. Marine contractors may also consult the Maryland Home Improvement Commission (MHIC) if in doubt about the need for continuance of a MHIC License to perform their services, but note that a MHIC License does not authorize a contractor to perform marine contractor services as defined in the law and regulations.

2.2.2 EXCEPTIONS

Exceptions/Exemptions: Title 17 and COMAR 26.30.01.02B state the following four exceptions to the Marine Contractors Licensing requirements (Environment Article Title 17-301 (c), (d), and (e)(3)(i):

- (1) An individual who is employed by an agency of the federal government or the State may perform marine contractor services while in the performance of the duties of their employment without having to obtain a license from the Board.
- (2) A residential or commercial property owner may perform marine contractor services on the property owner's own property without having to obtain a license from the Board.
- (3) An individual who performs marine contractor services while in the performance of the duties of their employment on behalf of a county or municipality in the State is not required to pay a fee for the issuance or renewal of a license or a test administered by the Board.

(4) An individual who performs marine contractor services while in the performance of the duties of their employment on behalf of a county or municipality in the State may do so without having to obtain a license from the Board if the individual is performing marine contractor services that:

- (a) Would present a de minimis risk to human health or the environment;
- (b) Do not require a federal or State permit; and
- (c) If the marine contract services involve an existing structure, except a shore erosion control structure, and do not increase the footprint of the structure.

2.2.3 REQUIREMENTS for MARINE CONTRACTING LICENSURE

2.2.3.1 Application and Fee

Title 17 and COMAR 26.30.02 dictates that marine contractors must apply to the Board for licensure. To become licensed, the marine contractor must demonstrate at least two years of full-time experience as a marine contractor or the equivalent relevant experience acceptable to the Board. In addition, a contractor in their application must present their federal identification number or Social Security number, as applicable, and proof of minimum aggregate of \$300,000.00 in commercial liability insurance and the appropriate Workers' Compensation insurance, unless exempted by law.

There are two types of license applications, ‘Individual’ and ‘Entity.’ An Individual application should be submitted by any individual contractor who is self-employed or may wish to become self-employed. An Individual license only authorizes the license holder to perform marine contractor services in the State. An Entity or business application should be completed by any contracting entity which has more than one employee. Each entity must designate a *Representative* to submit in its license application. It is this *Representative* that must meet the minimum work requirements, and if approved to take the license examination - pass it. An Entity license authorizes all members of the licensed entity to perform marine contractor services in the State.

An Individual applicant must include their own name and current address on the application provided to the Board. An applicant applying on behalf of an entity should also include their own name and current address, as well as the names and addresses of the owner(s) of the entity, if different than the applicant, and proof of affiliation with the entity for which they are applying. Both individuals and representative agents must include the addresses of the principal place of business and the branch offices, and any trade or other names to which the business may be referred while performing services under the license on the application. Trade names must be

discreet and not so similar to those of another agent that the public could be confused. The law provides the Board with the discretion to request additional information from the applicant, as it determines appropriate. Applicants must sign the application under oath.

A fee is collected if the Board approves that the applicant meets the minimum work experience requirements and passes a licensing exam. These fees support administration of the marine contractors licensing program.

2.2.3.2 Exam

Applicants are required to successfully complete the marine contractors licensing exam, with a passing score of 70% or higher. The exam is designed to test the applicant's knowledge of the broad range of services that may be required of a marine contractor and associated regulations and business practices. Note: the applicant is given the opportunity to take this exam only after the Board approves the applicant as meeting minimum work experience requirements.

2.2.3.3 License Categories

On March 18, 2024, new marine contractor regulations became effective that established four license categories. These four categories replaced the previous single license that authorized all marine contractor services.

The four categories are as follows:

- **Category 1:** Heavy Marine Construction (also authorizes Cats. 2, 3, & 4)
- **Category 2:** Residential and Commercial Marine Construction (also authorized Cats. 3 & 4)
- **Category 3:** Limited Marine Construction (authorizes specific activities within Category 2 such as Boat lifts)
- **Category 4:** Incidental Marine Contractor Services (authorizes specific marine contractor activities such as directional drilling)

The applicant for licensure on their application must select the **single** license Category that they qualify for. This selection is subject to the Board's review of the work examples submitted and determination that these marine services support their Category selection.

See Appendix B: *Code of Maryland Regulations Title 26 Subtitle 30 Chapter 01.05* for a full description of these categories as stated in License Categories.

2.2.3.4 Expiration, Renewal and Post-Licensing Requirements

Upon passing the examination, submitting required fees and documentation that the required insurance has been obtained, -the applicant will be issued a marine contractor's license. This license will be valid for a period of two (2) years. **The license number indicated on the license must be included in all advertising related to the provision of marine contractor services and prominently displayed on all large equipment used in the course of providing the services. Equipment should be marked with at least three (3) inch block letters and numbers as follows: MCLB 000 (licensee's specific number).**

Marine contractors are required to complete a minimum of 12 hours of continuing education as approved by the MCLB every two (2) years. Coursework must be provided by a qualified instructor or a Board-approved educational institution. However, the licensee is responsible for the continuing education costs.

Licenses may be renewed by the Board for a two (2)-year license renewal, prior to expiration, if the licensee is in good standing and has provided:

- All fees due, including the renewal fee, established by the Board;
- Evidence of the completion of the continuing education required;
- Evidence of continued compliance with insurance requirements;
- Evidence of the resolution of any license violations, suspensions, denials, revocations, or other Board actions.

The Board shall provide the renewal application package to the licensee at least two (2) months prior to license expiration via US mail or electronically. The application package shall include the date of license expiration, the amount of the renewal fee due and the date the completed application package must be received by the Board in order to avoid license expiration. To facilitate receipt of a renewal application and other correspondence from the Board, including a notice of disciplinary action, as referenced in the subsequent section, the licensee is required by law to notify the Board within five (5) days of a physical address or telephone number change for the individual licensee or licensed entity, and to provide contact information for the addition of any branch office associated with the licensed entity within five (5) days of the addition. In addition, a licensed Entity must keep current the identity of the person designated as the Representative member. **If there is to be a change of the Representative, the licensed marine contractor must submit within five business days after the change, a written request to the Board to designate a new Representative member.** This new applicant for Representative must submit an application, for review and approval, before the company is authorized to continue performing marine construction.

2.2.3.5 Violations and Enforcement

An individual or entity that violates Title 17 of COMAR 26.30 may be guilty of a misdemeanor, and **upon conviction, the violator would be subject to a fine not to exceed \$10,000, up to one (1) year imprisonment, or both.** Each day of violation is considered a separate, punishable offense. A civil action may also be brought against a person or entity in non-compliance and could result in penalties of up to \$10,000 per violation.

Licensed marine contractors failing to comply with the licensing requirements or determined to be in violation of a Maryland regulation in their practice may have their license suspended. The Board may also choose to revoke the marine contractor's license based upon the severity (e.g., gross misconduct) of the offense. Should an individual or entity's license be revoked, a marine contractor would be required to repeat the application process and obtain a new license in order to continue providing marine contractor services.

Grounds for license suspension, revocation, or the Board's denial to issue or renew a marine contractor's license include but are not limited to:

- Fraudulent or deceptive practices related to obtaining or using a Marine Contractor license, including:
 - Conducting, attempting to conduct, or offering to conduct marine contractors' services without holding a license;
 - Misrepresentation to the public (by title, description of services, methods, procedures or otherwise) that an unlicensed individual or entity is authorized to perform marine contractor services in Maryland.
- Acts of gross negligence, incompetence, or misconduct in work performance;
- Failure to comply with the terms of a tidal wetlands license or a private wetlands permit;
- Failure to comply with codes, ordinances, permits, licenses and/or conditional approvals or legal requirements relative to the Chesapeake and Atlantic Coastal Bays Critical Area program.
- Doing marine contractor services not authorized by a license holder's Board-approved License Category.

Acts and omissions of a licensee's principal, agent or employee may be construed as acts and omissions of both the licensee and offending party.

Before the Board takes any disciplinary action, the Board shall refer a proposed decision to the MDE Secretary or their designee for final approval. Once a final decision has been made by the

Secretary or their designee, the Board shall give the applicant or licensed marine contractor against whom the action is contemplated notice, and the opportunity for a contested case hearing.

3. REGULATORY AND COMPLIANCE

3.1 TIDAL WETLANDS

For the purposes of resource management, the State of Maryland defines “Tidal Wetlands” as: "all State and private tidal wetlands, marshes, submerged aquatic vegetation, lands, and open water within the Chesapeake Bay and its tidal tributaries, the Coastal Bays and their tidal tributaries, and the Atlantic Ocean to a distance of 3 miles off shore of the low water mark.” COMAR Title 26.24.01.02(57)

The State holds State tidal wetlands in trust for the benefit of the people of Maryland. It is the goal of the State of Maryland to protect and preserve tidal wetlands for the environmental benefits they provide and to strive for an increase in tidal wetland acreage, while providing reasonable use to citizens. Impacts to wetlands are to be avoided wherever possible and minimized where complete avoidance is not possible.

3.1.1 ACT AND AUTHORITY

Environmental Article Title 16 provides authority to the Maryland Board of Public Works (BPW) and/or MDE to permit the dredging and filling of open water and vegetated wetlands, construction of piers, bulkheads and revetments, and marsh establishment in Maryland’s tidal wetlands, in coordination with the US Army Corps of Engineers (USACE) and other state and federal agencies (See Appendix C: *Environmental Article, Title 16, Annotated Code of Maryland*). MDE functions as the primary coordinating agency for tidal wetlands permits and licenses and performs initial review of all applications. However, projects with considerable impacts may require final BPW approval.

3.1.2 GENERAL PRINCIPALS

In order to obtain approval to work in tidal wetlands, an applicant for a tidal wetlands permit or license must demonstrate that: the project is in the public interest and best suited to the proposed location, and; potential impacts to tidal wetlands from the project have been avoided or minimized, and remaining impacts are necessary, unavoidable and need to be offset by an approved mitigation plan.

3.1.3 PERMITS AND LICENSE

Authorization to proceed with regulated activities in tidal wetlands is granted by issuance of a permit (private tidal wetlands) or tidal wetlands license (state wetlands) via the approval of a Joint Federal/State Application for the Alteration of Any Tidal Wetland in

Maryland, otherwise referred to as a “Joint Permit” application. Activities authorized by Section 404 of the Federal Clean Water Act also require a Water Quality Certification from MDE that assures the protection of receiving waters from project-related discharges. The requirements for issuance of a Water Quality Certification are incorporated into the process to obtain a permit or tidal wetlands license from MDE via the Joint Permit application process. See Appendix D: *Instruction Booklet for the Abbreviated Joint Federal/State Application for the Alteration of Any Tidal Wetland in Maryland* for more information.



Tidal Wetland in Calvert County, Maryland

3.1.4 APPLICATION PREPARATION AND SUBMITTAL PROCESS

To ensure MDE’s thorough understanding of the project and complete assessment of requirements, applicants are encouraged to initiate the application process by requesting a pre-application project review and/or meeting. As part of the pre-application process, MDE may perform a site visit for which purpose applicants are required to provide MDE with reasonable access to the site. The request for a pre-application project review can be submitted electronically via the MDE website.

The Joint Permit requires the applicant to provide information including but not limited to: contact information for the applicant or his assigned agent; the project location, including maps and directions; a complete description of the project, including detailed plans with construction methodology and schedule; the type and size of tidal wetlands within the project limits; a description of how impacts to resources from the project will be avoided or minimized; temporary stabilization measures, and; mitigation and dredged material management plans, where appropriate. MDE may require the inclusion of a bathymetric survey. All survey and topographic information included in plans is to be referenced to a datum of 0.0 feet Mean Low Water.

Dredged material management plans must include the maximum volume of material to be dredged, methodologies to be used, and guarantee of material acceptance from the operator of the placement site. MDE may also require that a licensed, professional engineer certify that the design plans for shoreline erosion control structures and dredged material placement sites meet all requirements.

The application can be submitted to MDE's online application portal or the original permit application and seven (7) copies can be submitted by mail to MDE's Water and Science Administration via the Regulatory Services Coordination Office.

The application and full instructions can be obtained online at MDE's Wetlands and Waterways Protection Program website:

https://mde.maryland.gov/programs/water/WetlandsandWaterways/PermitsandApplications/Pages/tidal_permits.aspx

3.1.5 REGULATORY REVIEW PROCESS

MDE will conduct the formal application review in cooperation with appropriate state, Federal and local agencies. However, **the applicant retains the responsibility to obtain any necessary local approvals for the project.**

Within 45 days of receipt of the application package, MDE will notify the applicant that it either accepts the package as complete or requires additional information on which to base its decision. In the latter instance, MDE will provide a deadline by which the supplemental information must be submitted before the application is automatically denied. In determining the deadline, MDE will give consideration to necessary timeframes for the creation or gathering of scientific data that is not readily attainable.

The nineteen evaluation criteria required to be considered by MDE in review of a license or permit application are listed in Title 26 Subtitle 24 of COMAR. For example, when reviewing a permit application for the construction of a pier, MDE would:

- Review the location for water depths, existing marsh vegetation, Critical Areas, cultural and historic resources, and the presence of natural oyster bars, submerged aquatic vegetation (SAV), waterfowl staging areas, essential fish habitat, and other aquatic resources;
- Consider provisions for reasonable access to tidal wetlands, determine that navigational safety is not adversely affected, and ingress to and egress from adjoining properties will not be blocked;
- Review any established local ordinance for set-back and total length.

MDE's review time is generally estimated at 90 days for a typical project, and 240 days for a project which requires significant coordination with other agencies.

3.1.6 PUBLIC NOTICE REQUIREMENTS

MDE will advise on whether or not a public notice process is required in conjunction with the application review. Required public notice may be limited to informing the adjacent property owners of the project details; or a public informational hearing may be required if requested by interested parties. In the latter instance, MDE will advertise the hearing on behalf of the applicant. However, the applicant will be responsible for the advertising costs.

The following categories of projects have a standing requirement for public notice per COMAR 26.24.01.04:

- **Replacement bulkheads greater than 18 inches channelward of the existing bulkhead or greater than 10 feet channelward of the existing bulkhead when a stone toe protection is included;**
- **Stone revetments longer than 500 feet or greater than 10 feet channelward or more of the mean high water line;**
- **Living shoreline and marsh creation projects longer than 500 feet or greater than 35 feet channelward of the mean high water line;**
- **New stormwater discharge within the critical area extending greater than 10 feet channelward of the mean high water line;**
- **Maintenance dredging projects that are of a surface area greater than 1,500 square feet or involve the removal of greater than 100 cubic yards of material;**
- **New dredging projects**
- **Boat ramps greater than 12 feet wide or extending greater than 30 feet channelward of the mean high water line;**
- **Construction of jetties, and groins extending greater than 25 feet channelward of the mean high water line;**
- **Marina creation and expansion projects.**

See Appendix B: *Code of Maryland Regulations (COMAR) Title 26 Subtitle 24* and Appendix F: *Code of Maryland Regulations (COMAR) Title 23* for more information.

3.1.7 CONDITIONAL APPROVALS AND SUPPLEMENTAL REQUIREMENTS

Marine contractors are advised to read the tidal wetlands license or permit issued thoroughly, because the license or permit may include enforceable supplemental requirements or special conditions. **Permit conditions may include but are not limited to: advanced notification to MDE of the project start; time of year activity or equipment type restrictions for the protection of finfish, shellfish, and/or SAV; limitations on the use of construction equipment and temporary barriers to prevent impacts to navigation; limiting the construction of**

structures over shoreline erosion control measures without specific approval from the BPW, or; mitigation requirements or other conditions unique to the project.

The USACE Self-Certification Statement of Compliance form included with most tidal wetlands license or permits must be completed and filed at project completion to assert that construction and mitigation was completed in accordance with approved plans.

3.1.8 APPLICATION FEES

MDE requires an application fee be submitted with the Joint Permit application. A complete schedule of MDE application fees is available online at:

<https://mde.maryland.gov/programs/water/WetlandsandWaterways/Pages/Fee-Schedule.aspx>

3.1.9 TIDAL WETLANDS LICENSES AND PERMITS MODIFICATIONS AND TIME FOR CONSTRUCTION

All modifications to a tidal wetland license or permit require the approval of all applicable regulatory agencies. Additional fees may be required. **Tidal wetland license and permits are generally valid for a period of three (3) years.** The Department or BPW may extend the construction period for an active tidal wetlands license on a qualifying project once, for a period of up to an additional three (3) years, after which time a new permit application must be submitted for review. Substantiating evidence and explanation must be provided to support the extension request.

3.2 MITIGATION

It is the State's goal to preserve tidal wetlands, prevent their loss and despoliation, and strive for a net resource gain in tidal wetlands acreage and function, an applicant for a license or permit is to design a project to first avoid, and then minimize, the loss of tidal wetlands. If an applicant demonstrates that alteration of tidal wetlands cannot be avoided to accomplish the project, MDE will either recommend mitigation as a condition of a State tidal wetlands license or require mitigation as a condition of a private tidal wetlands permit. Mitigation may be required as a result of various proposed activities. The *Tidal Mitigation Trigger Flowchart* should be used for guidance and planning. For more information, see Appendix G: *Tidal Mitigation Trigger Flowchart*. Final agency decisions on a tidal wetlands application are made at the conclusion of the project application review process.

3.2.1 USES AND PLAN DEVELOPMENT

Mitigation is designed to replace the values and functions of impacted wetlands and is required in conjunction with issuance of a wetlands license or permit if avoidance of impacts to tidal wetlands cannot be demonstrated by the applicant.

With regard to siting, mitigation projects must be connected to existing tidal wetlands or waterways. In approving mitigation plans, MDE gives preference to projects co-located with the construction project to be permitted. “If locating the mitigation on-site is not possible then off-site mitigation should be placed in the same watershed, unless alternate siting is approved by MDE.” Preference is given in the following types of mitigation (in decreasing order). The *Mitigation Ratio Calculation* document should be referenced for guidance and planning:



Marsh Planting

- 1) Restoration
- 2) In-kind creation, at ratios (acres replaced: acres lost) of:
 - 1:1 for open water tidal wetlands
 - 2:1 for emergent tidal wetlands, scrub-shrub tidal wetlands and forested wetlands
 - 3:1 for tidal wetlands habitat for rare, threatened, or endangered species, species of State concern, submerged aquatic vegetation, and natural oyster bars
- 3) Out-of-kind creation, at the ratios of:
 - 2:1 for open water tidal wetlands
 - 4:1 for emergent tidal wetlands, scrub-shrub tidal wetlands and forested wetlands
 - 6:1 for tidal wetlands habitat for rare, threatened, or endangered species, species of State concern, submerged aquatic vegetation, and natural oyster bars
- 4) Enhancement of existing tidal wetlands providing additional protection or improving wetland function, or; preservation of existing tidal wetlands
- 5) Monetary compensation to the Tidal Wetlands Compensation Fund

Payments to the Tidal Wetlands Compensation Fund may be considered mitigation ONLY upon MDE’s determination that alternatives 1-4 above are infeasible. MDE also gives consideration to consistency and compatibility of the proposed mitigation plan with natural resource and watershed management plans when reviewing a monitoring plan.

Applicants are required to submit a detailed mitigation plan. At a minimum, the plan must contain the information outlined below. Appendix H: *Guidance for Tidal Wetlands Mitigation Plans* should also be consulted during the development of any mitigation project.

- A plan view drawing (scaled no less than 1 inch equals 50 feet), with delineation of all existing site and adjacent tidal and nontidal wetlands, SAV, and shellfish resources;
- Existing and proposed elevations of site ground contours, referenced to MLW feet;
- Cross-section views if elevation changes are required to provide adequate substrate to support plant species;
- The location and description of all existing and proposed tidal wetlands plants by species;
- Photographs of the affected tidal wetlands, including the types of vegetation;
- The proposed method of construction, including temporary or permanent access roads;
- Location, type, and characteristics of all borrow or fill materials and method of site grading;
- Construction schedule;
- Method of final site stabilization;
- A description of how the proposed mitigation project will replace the functions of lost tidal wetlands; and
- A monitoring plan.

Upon approval, mitigation activities must start before or at the time of initiation of the primary construction project requiring the mitigation, unless otherwise directed by MDE. Approval of the mitigation plan is contingent on the submission of all requested documents. The plan's potential for long-term success is taken into account during the approval process. Specific and measurable ecologically based performance standards must be met in accordance with designated criteria for each resource and are to be monitored on a yearly basis over a minimum five (5) year assessment period after creation.



Wetland Planting

The permittee or licensee must submit annual monitoring reports to MDE demonstrating progress towards successful project performance during the course of the assessment period, unless MDE confirms in writing that the monitoring requirements have been met earlier.

The first monitoring report must include an "as-built" site design plan. This and all subsequent reports should include photographs, the source of planting stock (as appropriate), and descriptions of completed 'as-built' drawings or requested plan modifications, as applicable. MDE reserves the right to inspect the mitigation project at any time, and in the event that successful performance is not demonstrated within five (5) years according to the performance criteria, the mitigation period may be extended by three (3) years.

3.2.2 MITIGATION AND BONDING

MDE may require a surety bond in conjunction with mitigation activities performed in private tidal wetlands (COMAR 26.24.05.02)

3.2.3 MITIGATION EXEMPTIONS

Living shoreline projects are typically considered self-mitigating. If the primary project is determined by the Department to be significantly beneficial to the environment, it may be exempted from mitigation requirements or qualify for a **reduction** in required mitigation credits (COMAR 26.24.04.01).

3.2.4 WETLAND LICENSE AND PERMIT EXEMPTIONS AND EXCEPTIONS

If the existing structure is functional, meaning the structure is performing at least 85 percent of the action that it was originally designed to perform, it is exempt from the permit process if there is no increase in the original length, width, height, or channelward encroachment of the structure. If these criteria are met, then the routine maintenance, repair, or replacement of a highway structure, pier, boathouse, structure on a pier, bulkhead, revetment, tidal impoundment dike, water control structure, above ground transmission facility, agricultural drainage ditch, or previously-authorized highway drainage ditches are exempt from the permit process. Note: Tidal Wetlands Authorization is for the site, whereas a Marine Contractor License is for the contractor.

3.2.5 VIOLATIONS AND ENFORCEMENT

Marine Contractors should contact MDE's Wetlands and Waterways Protection Program staff when planning to perform construction in Maryland's tidal wetlands, if permit or tidal wetlands licensing requirements are unclear, or if a plan modification is requested. MDE's Compliance Program performs inspections to ascertain that permitting requirements are being met. Compliance Program inspectors give particular attention to construction or filling activity

without a permit or MDE authorization, or in excess of permitted limits. Marine Contractors should contact the Compliance Program to inform them of the intended start of construction.

In the event that it is discovered that a project owner has initiated work in tidal wetlands without a tidal wetlands authorization or has violated governing regulation or any condition of the license or permit, or any administrative order, a formal complaint may be filed. MDE can issue an administrative order to immediately **stop all work, stabilize the site, and restore the damaged tidal wetlands** within a defined timeframe.

Ultimately, a tidal wetland license or permit may be revoked for cause. Reasons for the revocation of a license or permit include but are not limited to:

- **Misrepresentation in the license or permit application process or failure to disclose a relevant or material fact;**
- **A substantial deviation from the plans, specifications, or requirements of the license or permit;**
- **Refusal of the permittee or licensee to allow MDE site entry for the purpose of inspections;**
- **New information, changes in site conditions, or amended regulatory requirements necessitating revocation;**
- **Failure to post or maintain financial assurances (e.g., surety bonds) related to mitigation; or**
- **A history of non-compliance.**

The Compliance Program follows up on significant or repeat violations with enforcement action that may include referral to the Office of the Attorney General or the Environmental Crimes Unit of the Attorney General.

3.3 THE CRITICAL AREA OF THE CHESAPEAKE AND ATLANTIC COASTAL BAYS

This section summarizes the Critical Area requirements most relevant to marine contractors, with emphasis on shoreline work, water-dependent facilities, Critical Area Buffer requirements, and permitting coordination. It is intended as a practical reference, not a comprehensive guide. Contractors are responsible for complying with local Critical Area programs, State regulations (COMAR 27.01), and all applicable State and federal permits.

3.3.1 PURPOSE AND AUTHORITY

The Chesapeake Bay Critical Area Protection Act (1984), expanded to include the Atlantic Coastal Bays in 2002, establishes minimum statewide standards and associated performance

criteria to counteract the effects of stressors to the Bay's health. **The goals of the Critical Area Law are as follows:**

- **Minimize adverse impacts on water quality from point sources and runoff;**
- **Conserve fish, wildlife and plant habitat;**
- **Establish land use policies that accommodate growth while addressing its potential impacts;**
- **Reduce vulnerability to the impacts of climate change and incorporate measures to improve the climate resiliency of the Chesapeake and Atlantic Coastal Bays and its tributaries; and**
- **Ensure an equitable distribution of the burdens and benefits of development, mitigation, restoration, conservation, and adaptation to climate change within the Critical Area**

3.3.2 CRITICAL AREA IMPLEMENTATION

Critical Area requirements are administered locally through county and municipal codes approved by the Critical Area Commission (CAC). While the standards are statewide, permit procedures, mitigation ratios, and exemptions may vary by jurisdiction.

Key takeaway for contractors: Always verify site-specific requirements with the local jurisdiction early in project planning. Local programs are periodically updated, and statewide regulations may also change.



Tidal Wetlands Poplar Island

3.3.3 THE CRITICAL AND GENERAL PRINCIPALS—WHAT CONTRACTORS NEED TO KNOW

In addition to the general criteria explained above, there are several provisions of the Critical Area Law and regulations that are specific to the work of marine contractors in the Critical Area. These include specific provisions for water-dependent facilities, structures on piers, and requirements for shore erosion control activities and construction of private piers, as further detailed below.

3.3.4 CRITICAL AREA LAND DEVELOPMENT LIMITATIONS AND CRITERIA (COMAR 27.01.02) – HIGH LEVEL OVERVIEW

Each waterfront property is mapped as one of three Critical Area designations. These designations may affect where and to what extent development and redevelopment activities may occur and how impacts are mitigated.

Intensely Developed Area (IDA)

Highly developed shoreline areas (e.g., ports, urban waterfronts). Focus is on stormwater treatment and retrofits to achieve a 10% phosphorus reduction. Many commercial marine facilities are in an IDA.

Limited Development Area (LDA)

Low- to moderate-density residential and mixed-use areas. Greater emphasis on habitat retention, lot coverage, and forest clearing limits apply.

Resource Conservation Area (RCA)

Predominantly rural and undeveloped areas mainly comprised of forest, wetlands, and agricultural fields. New commercial and industrial facilities are generally prohibited; residential density is limited.

Modified Buffer Areas (MBAs)

MBAs are previously developed shoreline areas that no longer function as a natural Buffer. Standard Buffer requirements generally do not apply, and local jurisdiction standards govern development and mitigation, except for shoreline stabilization projects.

Key takeaway for contractors: The land use designation influences whether marinas, community piers, dredging support areas, and accessory structures are allowed.

3.3.5 HABITAT PROTECTION AREAS (HPAs) (COMAR 27.01.09) — PRACTICAL IMPLICATIONS

Certain sensitive resources receive additional protection within the Critical Area:

The Buffer

Within the 1,000-foot Critical Area boundary, the Critical Area Law also designates at a minimum the first 100 feet – the Critical Area Buffer – as especially sensitive to impacts. When properly conserved, this Critical Area Buffer serves as a transition zone between the Bays and neighboring developed areas. In addition to providing rich habitat for living organisms, when aptly vegetated, the transition zone or “Buffer” serves to slow the velocity of stormwater runoff to the Bays, thereby promoting infiltration, reducing the volume of stormwater received, and reducing erosion. The Buffer occurs within all Critical Area land designations. See Section 3.3.6 below for a more detailed review of the Buffer standards and mitigation requirements.

Rare, Threatened, Endangered, and Special Concern Species

State and federally protected species – fish, wildlife, and plants – are identified as Habitat Protection Areas throughout the Critical Area. If such species are present on a site, resource agencies, including the Department of Natural Resources and the U.S. Fish and Wildlife Service, work with the applicant to ensure protection of the species of concern. In addition to species protected under Federal law, Critical Area regulations require increased consideration for State Species of Special Concern. Typically, habitats of these species are identified during the permit review process, and may result in seasonal restrictions, avoidance areas, or design modifications.

Plant and Wildlife Habitat

The Critical Area regulations also designate other unique areas as Habitat Protection Areas. These include large contiguous forests that provide habitat for forest interior dwelling birds, colonial waterbird nesting sites (e.g., a great blue heron rookery), historic waterfowl staging and concentration areas, natural heritage areas, and other areas as may be designated by a local jurisdiction.

Anadromous Fish Spawning Streams

Anadromous fish are those species that migrate from their primary ocean habitat to freshwater areas for the purpose of spawning. Channel alteration, armoring, or structures that impede fish passage are generally prohibited. Time-of-year restrictions may apply.

3.3.6 CRITICAL AREA BUFFER: DEVELOPMENT STANDARDS AND MITIGATION REQUIREMENTS

Disturbances in the Critical Area Buffer, including the removal of vegetation is generally prohibited unless allowed for certain project types (i.e., water-dependent facilities and activities, riparian access for a shoreline erosion control process, or through a granted variance) under a locally approved Buffer Management Plan. Maintaining existing lawn, planting trees and shrubs, and gardening are generally permitted in the Critical Area Buffer without a Buffer Management Plan so long as the use of heavy equipment or installation of structures is not involved.



Terrapin Hatchling

The total mitigation required in a Buffer Management Plan is calculated as the sum of the mitigation necessary for the area of the disturbance based on the activity type, as generally outlined in the table below, plus additional mitigation is required at a 1:1 ratio for the square footage of tree canopy coverage removed.

Activity	Mitigation Ratio	
	Permanent Disturbance	Temporary Disturbance
Septic on a lot created before local program approval, if located in existing grass, or if clearing is not required	Not applicable	0
Septic system in a forest or developed woodland on a lot created before local program approval, if clearing is required	1:1	Not applicable
Shore erosion control	1:1	1:1
Riparian water access	2:1	1:1
Development or redevelopment of a water-dependent facility	2:1	1:1
Variance	3:1	1:1
Violation	4:1	Not applicable

Mitigation for Buffer impacts is to be prioritized to be located back within the Buffer on the affected project site and comprised of native vegetation.

Key takeaway for contractors: Most types of Buffer disturbance require an approved Buffer Management Plan prior to construction.

3.3.7 SHORE EROSION CONTROL (COMAR 27.01.04)

In addition to establishing appropriate land uses in the Critical Area, the Critical Area regulations support the protection of rapidly eroding shorelines to prevent unnecessary inputs of sediment, and the nutrients and contaminants it may carry into State waters. The Critical Area Law is consistent with the Living Shoreline Protection Act in that it requires nonstructural shoreline stabilization measures to protect a person's property against erosion, except in areas where the person can demonstrate to the satisfaction of MDE that these measures are not feasible. **The Critical Area Act recognizes the authority of MDE to designate on a map, areas where structural shoreline erosion control is appropriate.** Similarly, if an area is not mapped but an applicant can demonstrate unfavorable site conditions for a living shoreline, MDE may issue a waiver to permit structural shoreline erosion control.

Critical Area requirements for shore erosion control projects apply to all shoreline stabilization activities within the Critical Area, including living shorelines, revetments, bulkheads, breakwaters, and offshore structures. Because these projects almost always involve work at the land–water interface, early and coordinated permitting is essential.

3.3.7.1 Critical Area Submittal and Review Process

Applicants for shore erosion control projects must submit a draft Buffer Management Plan (BMP) and a signed Buffer Notification Form to MDE at the time of application for a tidal wetlands license. These documents are transmitted by MDE, along with the full Joint Permit Application (JPA) package, to the CAC for concurrent review.

Key requirements:

- **The local jurisdiction must approve the Buffer Management Plan prior to any landward site disturbance.**
- **MDE will not issue a tidal wetlands license unless the required Critical Area documentation has been submitted.**
- **Buffer impacts are reviewed collectively by CAC and the local jurisdiction to identify and resolve issues early in the process and avoid permitting delays.**



Bald Eagles, Poplar Island

3.3.7.2 Buffer Management Plan Applicability and Complexity

The type and complexity of a Buffer Management Plan depend on the shore erosion control method, existing Buffer conditions, and the extent of landward disturbance. Projects that involve **any disturbance within the Buffer** - including clearing, grading, access paths, equipment staging, or material stockpiling - require an approved Buffer Management Plan. **Under no circumstances may a Simplified Buffer Management Plan be used for a shore erosion control project.**

Each plan must clearly identify:

- Limits of disturbance
- Access routes and construction entrances
- Stockpile and staging areas
- Vegetation removal (including tree canopy impacts)
- Proposed mitigation measures

Mitigation is generally calculated based on:

- Area of Buffer disturbance (typically 1:1), and
- Total square footage of tree canopy removed (1:1)

Mitigation typically consists of planting native, site-appropriate species within or adjacent to the disturbed area. Depending on site conditions and project design, mitigation requirements may be adjusted through the use of the **Commission-developed Shore Erosion Control BMP forms** described below.

Incorporating **climate-resilient mitigation** is strongly encouraged.

Examples include:

- Linear filter strips comprised of native warm-season grasses, shrubs, and herbaceous species planted landward of bulkheads or revetments
- Transitional habitat plantings landward of living shorelines using shrubs, warm-season grasses, and herbaceous species

Projects that involve **only in-water work** (e.g., offshore breakwaters or stone placement waterward of an existing bulkhead) must still submit a Buffer Management Plan confirming that no Buffer disturbance will occur.

3.3.7.3 Commission Shore Erosion Control Buffer Management Plan Forms

To streamline review and improve consistency, the Critical Area Commission has developed project-specific Buffer Management Plan forms for common shoreline stabilization activities. These forms are available on the Commission's website:

<https://dnr.maryland.gov/criticalarea/Pages/default.aspx>

When properly completed, these forms are accepted to meet the Critical Area requirements for the JPA process and are also generally accepted by local jurisdictions to satisfy Buffer Management Plan requirements. **Local permit approval is still required prior to construction.**

Project Type	Applicable Form	Key Applicability Criteria	Mitigation Notes
Living Shoreline (Type I)	Type I Living Shoreline BMP	Existing Buffer is lawn or lawn with scattered trees and disturbance extends < 15 ft landward of mean high water	Reduced mitigation requirements; increased flexibility compared to COMAR 27.01.09
Living Shoreline (Type II)	Type II Living Shoreline BMP	Buffer is densely vegetated/forested or disturbance extends ≥ 15 ft landward of mean high water	Greater mitigation flexibility than standard regulations
Revetment	Revetment BMP	Used for stone revetments; form selection depends on Buffer condition and disturbance width	<u>Type I:</u> lawn or lightly vegetated Buffer with < 10 ft disturbance; <u>Type II:</u> forested or ≥ 10 ft disturbance
Bulkhead Replacement	Bulkhead Replacement BMP	Replacement of an existing bulkhead with minimal land disturbance	Mitigation required for tree and shrub removal
Offshore Work Only	Offshore Work BMP	No clearing, grading, disturbance, or stockpiling on land	Confirms zero Buffer impact (e.g., breakwaters, stone placement waterward of bulkhead)

3.3.7.4 Local Coordination and Permitting

While the Commission's forms are designed to facilitate coordinated review, **each local jurisdiction maintains its own shoreline permitting process**. Marine contractors are responsible for ensuring that:

- Local shoreline and building permits are obtained
- The approved Buffer Management Plan is incorporated into construction plans
- Approved limits of disturbance are strictly adhered to in the field

Requiring the Buffer Management Plan at the time of MDE application allows all reviewing agencies to evaluate Buffer impacts upfront, significantly reducing the risk of last-minute design changes, mitigation revisions, or construction delays.

Key takeaway for contractors: Early coordination with the local Critical Area administrator is strongly recommended for all shore erosion control projects.

3.3.8 WATER-DEPENDENT FACILITIES — MARINE CONTRACTOR-FOCUSED SUMMARY (COMAR 27.01.03)

Water-dependent facilities mean a structure or activity that, by reason of its intrinsic nature or operation or because of its association with an industrial, maritime, recreational, educational, aquaculture, or fishery activity, is dependent on the water and requires location at or near the shoreline or in the Buffer (e.g., a boat ramp, port, marina, etc.). Water-dependent facilities must meet the following general criteria to be located within the 100-foot Buffer:

- **The facility must meet a recognized private right or public need. (*Note: individual, private piers are not regulated under the Critical Area's regulations for water-dependent facilities.*)**
- **Adverse impacts to water quality and fish and wildlife habitat must be minimized.**
- **Non-water dependent components of the project (e.g., restrooms, restaurants, concession stands) must be located outside the Buffer.**
- **Additional requirements designated by the locality must be met.**

3.3.8.1 Dredging

Dredging must be conducted in a manner that causes the least disturbance to water quality and habitats. Dredged material cannot be placed in the Buffer unless it is part of a shore erosion control measure, beach nourishment, or island restoration project, or unless it will be placed in a

previously approved channel maintenance disposal area (i.e., approvals for the site occurred prior to June 11, 1988). Dredging and dredged material placement activities require permits from the MDE and USACE, as discussed in Section 6.1.6, and may carry additional restrictions, depending on the project specifications.

3.3.8.2 Use-Specific Restrictions (For Inclusive List See COMAR 27.01.03)

Industrial/Port Facilities: Limited to IDAs with mapped Buffer exemption areas.

Marinas:

- Must meet State sanitary requirements and include considerations for minimizing discharge of bottom wash waters into tidal wetlands.
- New marinas can be located in an RCA only if they are publicly owned, provide public access, and meet all the requirements of COMAR 27.01.08: Public Beaches and Other Public Water-Oriented Recreation or Education Areas or Activities.
- Existing facilities – if already located within the RCA – can expand only by demonstrating no adverse effects to water quality or an overall net improvement to water quality at or leaving the site.

Community Piers:

- Cannot involve the sale of goods or services, including food and fuel.
- Must provide adequate sanitary facilities.
- Must be community-owned and established and operated for the benefit of the residents of a platted and recorded riparian subdivision.
- Must be designed with a single point of access through the Buffer and designed to minimize Buffer disturbance.
- Are not permitted if individual piers are part of the project.
- Must have their slips limited in number by the length of the shoreline and the number of platted lots or dwellings in the Critical Area, as denoted in the Critical Area Law.

Fisheries Activities:

- Commercial fisheries facilities, including off-loading docks and landside structures associated with aquaculture operations, may also be located within the Buffer in any Critical Area designation. **The CAC has recommended that localities identify and protect areas with high aquaculture success potential.**

3.3.8.3 Nonwater-Dependent Projects – Structures on Piers (COMAR 27.01.13)

In 2012, Natural Resources Article §8-1808.4 was amended to allow limited construction of nonwater-dependent structures and uses on piers. A non-water-dependent project includes dwellings, restaurants, shops, offices, small-scale renewable energy systems, or any other commercial building or use on a pier. Except for a small-scale renewable energy system, non-water-dependent projects are only authorized if located within the Intensely Developed Area of the Critical Area and if the use is accessory to a primary commercial use. Further, the structure or use is limited to a maximum size of 1,000 square feet in size and 18 feet in height. Small-scale renewable energy projects include solar panels, wind turbines, and geothermal heat pumps, and their related equipment, and are not restricted to a specific Critical Area designation or to a specific use. However, design criteria apply and are determined by the type of small-scale renewable energy system proposed.

In order for a permit to be issued for a non-water-dependent structure on a pier, the local jurisdiction where the pier is located must first amend its Critical Area Program. A program amendment requires the County or Town to adopt the provisions as laid out in the law and submit the provisions to the Critical Area Commission for final approval.

3.4 SHORE EROSION CONTROL

Critical Area requirements for shore erosion control projects require applicants to provide a draft Buffer Management Plan and a signed Buffer Notification Form to MDE at the time of application for a tidal wetlands license. These documents, along with the full MDE application packet, are forwarded to the Critical Area Commission and the local jurisdiction for review. Ultimately, the Buffer Management Plan must be approved by the local jurisdiction prior to any site disturbance. A license will not be issued if MDE has not received the required documents.

The complexity of the Buffer Management Plan varies depending on the type of project (e.g., breakwater, bulkhead replacement, living shoreline). Projects which involve disturbance in the Buffer – clearing, grading, stockpiling – will require a major or minor Buffer Management Plan that clearly shows the limits of disturbance, means of access, stockpile areas, vegetation removed and the proposed mitigation for these impacts. Mitigation is generally based on the limits of disturbance on a square footage basis at a 1:1 ratio, as well as the area of tree canopy removed (if any). Mitigation is the planting of native species – typically throughout the area disturbed. However, mitigation requirements may vary depending on existing site conditions and proposed disturbance when the Shore Erosion Control Buffer Management forms listed below are utilized. Additionally, Buffer mitigation for shore erosion control impacts should incorporate native site-conducive species thoughtfully located to enhance climate resiliency such as planting a

linear filter strip landward of a revetment or bulkhead, or a transitional habitat landward of a living shoreline comprised of shrubs, warm-season grasses, and herbaceous species.

The Commission has developed specific Shore Erosion Control Buffer Management Plan forms that are located on the Commission's [website](#). These forms allow for a streamlined review with the goal of satisfying both the Joint Permit Application and the local Buffer Management Plan requirements for the types of shore erosion control projects as listed below.

Living Shoreline Projects:

For a shore erosion control project involving a living shoreline where the existing Buffer is lawn or lawn interspersed with trees, and the proposed Buffer disturbance extends less than 15 feet landward of mean high water, the Type I Living Shoreline Buffer Management Plan should be used. This form provides reduced Buffer mitigation requirements while increasing mitigation flexibility compared to the requirements of COMAR 27.01.09.

For a shore erosion control project involving a living shoreline where the existing Buffer is densely vegetated/forested, or the proposed Buffer disturbance extends more than 15 feet landward of mean high water, the Type II Living Shoreline Buffer Management Plan should be used. This form provides an increase in mitigation flexibility when compared to the requirements of COMAR 27.01.09.

Revetment Shoreline Projects:

For shore erosion control projects involving a revetment, the Revetment Buffer Management Plan form should be used. The existing conditions and the proposed Buffer disturbance will determine how the form is completed and the type and amount of mitigation that is required. If the existing conditions within the Buffer are lawn or lawn interspersed with trees *and* the Buffer disturbance extends less than 10 feet in width, Type I section should be completed. If the Buffer is heavily vegetated *or* forested or the impacts extend more than 10-feet in width, Type 2 section should be completed.

Bulkhead Replacement Buffer Management Plan:

This form should be completed when a project only involves the replacement of an existing bulkhead. To be eligible to use the Bulkhead Replacement form, any clearing, grading, disturbance, or stockpiling on land associated with the bulkhead replacement must be minimal. Mitigation is required for the removal of trees and shrubs.

Offshore Work Only:

To use the Offshore Work form, the project *cannot* involve ANY clearing, grading, disturbance, or stockpiling on land. Such examples include breakwaters or placement of stone in front of an existing bulkhead.

While the above forms are accepted for the JPA process and also largely accepted to fulfill the Buffer provisions for the local jurisdiction requirements, coordination with the local government is still required to secure local permit approval prior to the start of construction. MDE requires the Buffer Management Plan to be submitted with the application. This provides the opportunity for all interested agencies (MDE, the Critical Area Commission, and the local jurisdiction) to review potential Buffer impacts from the outset and alleviate any last-minute permitting surprises.

3.4.1 LIVING SHORELINE PREFERENCE (MDE REVIEW CRITERIA)

Regulations to implement the State of Maryland's Living Shorelines Protection Act of 2008, instituted in February 2013, stipulate that MDE may not authorize an erosion control project if:

- There is no evidence of erosion, and the applicant is unable to document a claim of erosion;
- Existing State or private tidal wetlands are effectively preventing erosion, or;
- The proposed project may adversely affect:
 - An adjacent property;
 - Navigation, and the applicant has not adequately offset these impacts;
 - Threatened or endangered species, species in need of conservation, or significant historic or archaeological resources, or;
 - Natural oyster bars or private oyster leases.

The Living Shorelines Act mandates that a shore erosion control project consists of non-structural shoreline stabilization measures (e.g., living shoreline) unless:

- **The project shoreline is mapped by MDE as appropriate for structural shoreline stabilization measures *OR***
- **A waiver is requested from, and issued by, MDE.**



Living Shoreline

Living Shoreline Waiver Requests – An applicant requesting a waiver from the requirement for a non-structural measure (i.e., living shoreline) must first establish that neither “No Action”, nor relocation of structures threatened by erosion, is feasible. Once that has been established, the applicant is then required to submit the associated form to MDE prior to the submittal of the tidal wetlands permit or license application. MDE will only grant the waiver if the applicant demonstrates to MDE’s satisfaction that structural shoreline stabilization is necessary to protect and maintain the shoreline: The Maryland Shoreline Stabilization Mapper (MSSM) is a tool that can be useful for determining areas where living shorelines are a suitable treatment option for sediment control.

For access to the Maryland Shoreline Stabilization Mapper, see:

<https://mde.maryland.gov/programs/water/wetlandsandwaterways/documentsandinformation/pages/wetlandtidalshoremappings.aspx>

3.4.2. MDE TIDAL WETLAND APPLICATION REQUIREMENTS

An applicant requesting MDE’s approval to construct a shoreline stabilization measure must provide MDE with proof of delivery of the plans and Critical Area Buffer Notification form to the Critical Area Commission and local jurisdiction. The applicant should also include the following in the request to MDE:

- **Photographs of the project site, the adjoining shoreline, and existing structures;**
- **The proposed Buffer Management Plan and;**
- **The waiver for use of non-structural shoreline stabilization measures, if applicable.**

MDE may also request that the applicant provide a Design Report. If requested, this report should include:

- A foundation investigation;
- A structural analysis;
- The structural properties of the construction materials to be used;
- Estimated economic, environmental, and other benefits from the project;
- The design life expectancy of the project;
 - Construction sequence;
 - A description of the method of construction that includes:
 - Estimated beginning and completion dates;

- The equipment to be used;
 - The proposed access to the site;
 - The foundation excavations;
 - The means for diverting water away from the project during construction, and;
 - The means for controlling the dewatering discharges.
- Specific references and benchmarks used by the designer;
 - Estimated impact, if any, of the project on adjacent properties;
 - Estimated impact, if any, of the project on public access to the shore;
 - Written specifications for the quality of the materials and methods of construction to ensure that design criteria will be met or exceeded;
 - A description of how the reclamation of lost uplands meet the requirements of COMAR 26.24.03.06C, if applicable, and;
 - A description of measures to be taken to avoid and minimize impacts to plant, fish, and wildlife habitat before, during, and after construction.

MDE may also request an alternative analysis, including:

- The justification for rejecting the options required to be considered under COMAR 26.24.04.01B;
- The justification for the selected shoreline stabilization measure, and;
- For a structural shoreline stabilization measure, proof of consideration of each alternative, including an analysis of habitat impact for each.

Additional relevant information must be provided to MDE upon request.

3.4.3 APPLICATION REVIEW PROCESS

As demonstrated by the Living Shorelines Act, the State of Maryland's position on shoreline protection measures is that, while their construction is often necessary to protect waterfront property, "it is in the best interest of waterfront property owners and the health of the Chesapeake Bay to select the most environmentally sensitive methods of combating shore erosion".

COMAR Subtitle 26, Title 24; Chapter 04 establishes five (5) evaluation criteria for MDE's use in determining and mapping areas appropriate for structural shoreline stabilization measures.

In its guidance document, Shore Erosion Control Guidelines for Waterfront Property Owners, MDE establishes a preferred hierarchy for the selection of the appropriate shoreline protection mechanism, based on environmental sensitivity:

1. Beach nourishment;
2. Breakwater;
3. Groin, jetty, or a similar structure;
4. Revetment; and
5. Bulkhead.

3.4.4 CONSTRUCTION OF PRIVATE PIERS

By virtue of attaching to the land, construction of private piers involves some type of Critical Area disturbance. While not required as part of the MDE permitting process, a Buffer Management Plan is required by the Critical Area regulations and local jurisdictions. Riparian access through the Buffer is permissible but impacts should be minimized. Mitigation for riparian access is required at a 2:1 ratio based on the area disturbed plus the area of tree canopy removed. **If permanent access to a pier is three (3) feet wide or less, a simplified Buffer Management Plan can be accepted by the local jurisdiction.**

3.4.5 VIOLATIONS

The following activities are considered violations of the Critical Area Act if conducted without prior approval (permit, authorized variance, or Buffer Management Plan):

- Clearing, removing, cutting, burning or brush-hogging vegetation and/or trees in the Buffer;
- Clearing or cutting of trees anywhere in the Critical Area that exceeds approved limits;
- Building or grading within the Critical Area;
- Construction or placement of ancillary structures in the Buffer;
- Grading, filling, dumping, stockpiling of construction materials and other disturbances to the Buffer;
- Filling of tidal and nontidal wetlands;
- Construction of piers and pier structures (e.g., boathouses);
- Construction of shoreline erosion control measures, and;
- Clearing or destruction of marsh vegetation.

3.4.6 ENFORCEMENT OF THE CRITICAL AREA ACT

Enforcement actions can be brought against contractors, as well as property owners and/or any entity that can be established as having authorized or participated in the activity that constitutes the violation.

Upon discovery of a violation, local jurisdictions may stop project work and impose penalties for violations of the Critical Area Act. **Penalties may include imprisonment of up to 90 days and/or a fine of up to \$10,000 per Critical Area violation with each violation of a provision of the Act (including disregard of a permit or plan requirement) constituting a separate violation and each day of non-compliance constituting a separate, actionable offense.**

In addition to imposing penalties, the Critical Area Law authorizes localities to order the restoration of property and structures to their original/preconstruction condition AND requires them to impose mitigation to correct for lost resource function. **The mitigation planting ratio for Critical Area violations is 4:1.** Development of a Buffer Management Plan demonstrating how the Buffer will be restored with native vegetation and maintained as riparian habitat may also be required.

Localities are required to report Critical Area violations. The Chair of the CAC can also initiate a court action against a violator. Citizen reporting of violations is encouraged. Self-reporting is recommended when an unintentional violation is realized as the locality may focus efforts on working with the violator to expedite compliance.

3.5 SEDIMENT AND EROSION CONTROL AND STORMWATER MANAGEMENT

As indicated by the MDE, erosion on construction sites as a result of poor stormwater management can be a significant source of sediment deposition in storm sewers, drainage ditches, channels, culverts, and, ultimately, streams and waters of the Chesapeake Bay to which they connect. Impacts include increased stream scour and obstruction of stream channels resulting from increased discharges; filling-in of navigable channels, necessitating dredging; increased maintenance costs for conveyance systems and stormwater management facilities; and the loss of storage capacity in reservoirs due to sedimentation.

When too much sediment washes into the Chesapeake Bay and its tributaries, the resulting decrease in water quality causes significant and often long-lasting ecological damage. The negative effects are widespread: sediment reduces the number and variety of benthic species (clams and worms), which are the main food source for many fish. Submerged aquatic vegetation (SAV) and wetlands are killed either by **direct burial** or indirectly by increased **water turbidity** (cloudiness), which blocks the sunlight needed for growth. This poor water quality also reduces

the dissolved oxygen necessary to support healthy aquatic life and SAV populations. Ultimately, this comprehensive damage reduces the food and habitat available for migratory waterfowl.

The aesthetics and recreational value of streams, lakes, and reservoirs are also reduced by the aforementioned processes. In addition, dredging that may be necessary to maintain channel navigability can cause further ecological impact, when not properly conducted.

In addition to a responsibility, Marine Contractors have an opportunity, due to the geographic proximity of their projects to its waters, to lessen the impact of construction-related erosion and sedimentation on the Bay.

3.5.1 ACT AND AUTHORITY

Maryland's General Assembly passed the Sediment Control Law in 1970 in recognition of the impacts of erosion and increased sediment loads in stormwater runoff on the Chesapeake Bay and its tributaries. Among other considerations, the law mandates that **a plan to implement practices for the control of erosion and sedimentation (Erosion and Sediment Control (ESC) plan) must be developed and approved for any earthen disturbance equal to or greater than 5,000 square feet or 100 cubic yards of earth. The law also requires that localities develop ordinances requiring developers to obtain an approved erosion and sediment control plan prior to issuance of a grading permit.**

In addition, stormwater discharge permits are required for construction activity with a land disturbance of one (1) acre or larger in accordance with the establishment of the federal National Pollution Discharge Elimination System (NPDES) program. The process and requirements of the MDE issued permit (CP) can be found at:

https://mde.maryland.gov/programs/water/wwp/Pages/gp_construction.aspx

3.5.2 APPLICABILITY

Contractors should always follow appropriate "Best Management Practices" regarding erosion and sediment controls needed on any construction site regardless of project size. The possibility of erosion created from stormwater runoff during the construction or use of access roads, trails and stockpile areas should always be considered even if the site is below the threshold for requiring an approved



Chesapeake Bay Blue Crab

ESC plan. If an approved ESC plan is required for the site, then the plan must be followed.

3.5.3 IMPLEMENTATION

Maryland statute defines the local soil conservation district as the approval authority for erosion and sediment control plan approval. Performing construction inspections and ensuring compliance with the requirements in the approved plan is the responsibility of MDE and in MDE delegated jurisdictions, the county or municipality. All responsible personnel involved in the construction of the project are required to be certified under an MDE approved certification program. Training and the application to receive the Responsible Personnel Certification is now available online at: <http://mderpcc.mde.state.md.us/Account/login.aspx>

In addition, self-inspections of controls are required weekly and within 24 hours of a storm event for projects over an acre that are subject to the CP permit requirements. Personnel performing self-inspection of installed sediment and erosion control plan components are required to obtain a Responsible Personnel Certification from MDE.

3.5.4 GENERAL PRINCIPLES AND ESC PLAN DEVELOPMENT

MDE's 2011 *Standards and Specifications for Soil Erosion and Sediment Control* (2011 Manual) outlines the **minimum** standards to be included in ESC plans for construction projects. The general principles guiding the development of an appropriate ESC plan are to:

- Plan the development to fit the site, including following natural contours where possible to limit cutting, grading and filling;
- Protect and avoid natural resources (e.g., wetlands, floodplains, stream buffers);
- Protect and avoid steep slopes and highly erodible soils:
 - Steep slopes are defined as 20% or greater;
 - Highly erodible soils are defined as having: 15% or greater slope, or >5% slope with $K > 0.35$ soils.
- Minimize the area and time of disturbance:
 - Areas to be graded should be divided into units (recommend twenty acres or less);
 - Work on the next unit should not proceed until 50% or more of the preceding unit has been adequately stabilized.
- Stabilize exposed soils as soon as practicable. Unless the approved ESC plan indicates more immediate action is required, and with the exception of active grading areas:
 - All perimeter controls (e.g., earth berms, sediment traps) and slopes greater than 3:1 must be stabilized within three (3) calendar days;
 - All other disturbed areas must be stabilized within seven (7) calendar days.

- Control and/or manage on-site and off-site runoff;
- Protect perimeter areas and retain sediment on-site, and;
- Make provisions for inspecting and maintaining sediment controls.

According to the 2011 Manual, ESC plans are to be developed in three stages:

- **Concept:** The applicant performs a site visit and gathers and reviews available data on site characteristics, including:
 - Topography (at a contour level suitable to identify drainage areas), flow patterns, slopes of 15% or greater, highly erodible soils, and sensitive natural areas (e.g., wetlands, lakes, streams, seeps, critical areas, Tier II (degraded) waters), for avoidance;
 - Vegetation;
 - Drainage, and;
 - Soil type.
- **Site Development Plan:** The applicant:
 - Establishes the footprint of the proposed project;
 - Identifies the impacts of the proposed construction;
 - Describes how environmental site design will be incorporated into the plan, and;
 - Prepares detailed designs, supporting calculations, and grading plans – including an overlay of ESC practices - for review and approval.
- **Final Plan:** Following the approving authority's acceptance of the Site Development Plan, the applicant updates the plan to include:
 - The limit of disturbance (LOD);
 - Location of each sediment control practice, depicted with standard symbols, inclusive of the device footprint;
 - Existing and proposed contours, at an appropriate scale, including those for sediment traps and sediment basins;
 - Construction notes, details, and representative cross-sections, as appropriate;
 - Drainage areas for sediment control practices, sized based on drainage area, and any related design, and;
 - Construction sequence, including initial, interim, and final phase sediment control practices, as appropriate, in enough detail to demonstrate the construction, maintenance, and removal of controls.

A matrix depicting the appropriate use of ESC practices is included in the 2011 Manual along with detailed guidance on standards and specifications for the design, construction and maintenance of practices, with accompanying drawings.

For more information on ESC practices, see:

https://mde.maryland.gov/programs/water/stormwatermanagementprogram/pages/esc_standards.aspx

3.5.5 PLAN MODIFICATIONS AND REPORTING REQUIREMENTS

Following ESC plan approval, MDE or the delegated county or municipality must be notified of project progress at the pre-construction meeting, after installation of sediment controls for each phase of construction, and after permanent stabilization - but prior to removal of sediment and erosion controls. Self-inspection reports should be housed at the site for MDE's reference upon inspection.

Any major modification of the approved ESC plan requires pre-approval by the authority that approved the original plan. Modification requests must be accompanied by a written explanation supporting the need for the change(s) and corresponding revised plan sheets. An approved plan modification provided by the local approval authority (SCD) must be obtained prior to implementing the changes. Minor modifications may be made in the field with approval from the inspector and must be documented in the field inspection report.

3.5.6 VIOLATIONS AND ENFORCEMENT

MDE's Compliance Program and delegated counties and municipalities are responsible for enforcement of the approved erosion and sediment control plan. Violations of the governing law are enforceable with civil and/or criminal penalties and may result in the suspension or revocation of the erosion and sediment control plan and grading permit if:

- Terms or conditions of the approved ESC plan were violated;
- Violation notice(s) or stop work order(s) were ignored;
- Site characteristics upon which plan approval was based were changed without approval;
- Construction standards required by the approved plan were disregarded.

4. ENVIRONMENTAL PROTECTION AND SAFETY

4.1 GENERAL WORKER SAFETY REQUIREMENTS

In the course of their work, marine contractors may encounter dangers related to vessel navigation and barge towing, and operation of equipment, such as clearing and grading

equipment and cranes. Hazards include, but are not limited to, potential accidents, injury and death resulting from: equipment and vessel collisions; falling overboard/drowning; slip, trip and fall hazards; falling objects and other strike hazards; sliding of equipment and vehicles on earthen slopes; and exposure to chemicals.

The Occupational Safety and Health Act (OSHA) requires employers and workers to comply with safety and health standards and regulations promulgated by OSHA or by an OSHA-approved state plan. The US Coast Guard (USCG) and US Navy provide additional Federal standards on vessel navigation and the use of on-board safety equipment. Regulations and standards are often specific to the nature of the operation and equipment in use. Therefore, subject matter provided in this section is intended to provide a cursory overview of potential requirements and is not exhaustive. Marine contractors should refer to regulating agencies for comprehensive requirements. General safety considerations include, but are not limited to, the following:

- Equipment, tools and ladders should always be outfitted with appropriate safety features and used according to the manufacturer's specifications and intended use.
- Vessel and equipment operators should be trained in equipment use, maintenance and safety features. Vessel operators should also be versed in proper navigation and mooring procedures.
- Equipment operators should have a clear path of sight in the work area and be cognizant of clearances and overhead electric lines.
- Work should be conducted in appropriate lighting.
- Walkways should be kept free of obstructions and dry, whenever possible.
- Overhead loads should be properly secured.
- Employees should refrain from walking under loads or moving parts of heavy equipment.
- Personal protective equipment (e.g., life jackets, reflective vests, safety-toed work boots, protective eyewear) should be utilized, where appropriate.
- Tools and equipment should be locked out/tagged out when in need of repair.
- Appropriate measures (e.g., construction fencing, cones, barricades, tipped buckets on loaders) should be taken to prevent the public from encountering stored equipment, stockpiles, pits and unsecured slopes. Traffic markers and guides should be used to prevent the public from encountering working equipment and equipment traffic.
- Site Health and Safety Plans should be administered on large or complicated projects with multiple safety concerns.
- Safety Data Sheets must be readily available to workers working with hazardous chemicals.

4.1.1 FIRST AID

Workplaces vary widely in their degree of hazards, location, size, amount of staff training and availability of professional medical services. With the exception of the Logging Operations standard 29 CFR 1910.266, OSHA standards do not require specific first-aid-kit contents. However, since some employers may find it useful to refer to a list of basic first-aid supplies, OSHA provides recommended minimum requirements for workplace first aid kits and supplies. First-aid kits in compliance with this standard will provide a basic range of products to deal with most types of injuries encountered in the workplace and may be adequate for a small worksite. Employers should evaluate their own workplaces to determine whether additional supplies or kits are needed, based on the size and specific hazards of their workplaces.

The First Aid Kit is to be located so as to permit easy accessibility in the event of an emergency. The kit or location must be visibly marked, and the outside of the kit must be in good repair to adequately protect the supplies from dirt, moisture or other contaminants. All of the supplies must remain in the original packaging or container and not expired. Required supplies include:

- 1 First Aid Guide
- 1 Absorbent Compress 4" x 8 minimum
- 16 1" X 3" Sterile Adhesive Bandages, individually packaged
- 1 3/8" Adhesive Tape, 2.5 yard roll
- 10 Antiseptic Treatment Application 0.9 gram, individually packaged
- 6 Burn Treatment Applications 0.9 gram, individually packaged
- 4 3" X 3" Sterile Gauze Pads, individually packaged
- 2 Pair Medical Exam Gloves (non-Latex)
- 1 Triangular Bandage 40" X 40" X 56" min
- 6 Antibiotic Ointment Applications 0.5 gram, individually packaged

4.2 NAVIGATION AND MARINE SAFETY

The USCG and OSHA have a cooperative agreement to regulate the safety of workers working over or near water, including Marine Contractors.

4.2.1 MARINE SAFETY EQUIPMENT

OSHA standard 1926.106 mandates that:

- Employees working over or near water, where the danger of drowning exists, shall be provided with USCG-approved life jackets or buoyant work vests.
- Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall not be used.

- Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. The distance between ring buoys shall not exceed 200 feet.
- At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water.

4.2.2 NAVIGATION AND NAVIGATIONAL AIDS

The USCG publication “Navigation Rules and Regulations Handbook” (Revised August 2024) prescribes navigation protocols for both International and Inland vessels. The “Inland” portion of this document, available online at <http://www.navcen.uscg.gov/?pageName=nav>, applies to Marine Contractor vessels working in the State of Maryland. Information therein is summarized below. The summary is not all-inclusive. Marine contractors are advised to refer to the USCG document for a thorough discussion of all aspects of regulations.

Navigation buoys and beacons act individually as guides to identify conditions related to water safety, areas of restricted access, and the presence of obstructions, and also in combination as channel markers. **Such lateral markers are used to signify the “red” of the “Red, Right, Return” general operational instruction which indicates that, when returning from the seaward direction to port, red markers should be held on the right, or starboard, side of the boat.** Safe water markers are supplemental, red- and white-colored, navigation aids with unobstructed water on all sides, used to mark fairways, mid-channels, and offshore approaches. Their proper use requires orientation to a nautical chart. Boat operators are prohibited from tying up a boat to any navigational aid.

In addition to physical markers, Global Positioning System (GPS) equipment can be a valuable aid to navigation. However, the USCG recommends the use of navigational charts in conjunction with GPS in order to identify obstructions and hazards in addition to boat position.

4.2.3 OPERATIONAL CONSIDERATIONS TO AVOID COLLISION

When working on large projects in Federal navigational channels, contractors should coordinate and schedule their operations so as not to cause interference with the traffic of vessels calling on port terminals.

Regulations are in place for the majority of circumstances where vessel traffic cannot be avoided. The USCG’s rules for inland navigation stipulate that boat operators are required to take



Vessel Underway

necessary action, and in ample time, to avoid collision. Such action includes the alteration of course and/or speed, up to stopping or reversing propulsion, and should be large enough to be readily apparent to another vessel, rather than a succession of small alterations of course and/or speed. Actions should also: be taken such as to avoid approaching other vessels in close quarters and allow safe passing distance, and; continue until the other vessel is past.

To avoid collision, in summary, the USCG Navigation Rules stipulate that vessel operators must, at all times:

- **Maintain a proper look-out** by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision (Rule 5).
- **Operate at a safe speed** in consideration of traffic density, the state of visibility (including background light at night), maneuverability of the vessel, the state of wind, sea and currents, the vessel's draft in relation to available water depth, and the proximity of navigational hazards (Rule 6).
- **Continuously assess the risk of collision** (Rule 7).

Maryland's Department of Natural Resources (MD DNR) notes that many of the vessel accidents reported in Maryland are attributable to the vessel operator's failure to control wake to the extent possible. To minimize unnecessary wake, which can exacerbate shoreline erosion, as well as cause incidents involving the capsizing of a vessel, MD DNR Natural Resource Police offer the following general guidance to boat operators at:

<https://dnr.maryland.gov/nrp/pages/boatingsafety/courtesy-on-the-water.aspx>

- Slow vessel speed and allow room when overtaking a slower vessel in open water.
- Be cognizant of smaller vessels, such as canoes or kayaks, which may be less stable.
- Avoid creating an excessive wake in narrow, confined areas.
- Operate slowly at all times when in the vicinity of marinas and launch ramps.

The USCG provides additional rules and guidance related to encountering other vessels. All operators of moving vessels must give way to:

- Anchored or disabled vessels, and;
- Vessels with restricted movement, which include:
 - Vessels towing, laying cable, or picking up navigational markers;
 - Ships constrained by draft;

- Vessels engaged in commercial fishing, and;
- Sailing vessels, unless the sailing vessel is also under power and attempting to overtake.

4.2.4 RULES FOR OVERTAKING

Rule 13 of the USCG Navigation Rules handbook defines overtaking as a situation in which one vessel is approaching the other from a direction more than 22.5° abaft of her beam, or a direction from which, at night, the passing operator would be able to see only the stern light, but not the sidelights, of the vessel they are passing. The USCG mandates that any vessel overtaking another shall keep out of the way of the vessel it is overtaking. Additionally, although both vessels may be under power, the USCG mandates that a vessel that is 20 meters (65.6 feet) in length or less shall not impede the passage of a vessel that can safely navigate only within a narrow channel or fairway.

4.2.5 RULES FOR HEAD-ON ENCOUNTERS

In summary the USCG Navigation Rules handbook also mandates the following additional procedures for head-on encounters and crossing situations between two power-driven boats:

- Unless otherwise agreed upon, when two power-driven vessels are meeting on reciprocal or nearly reciprocal courses, each shall alter her course to starboard so that each shall pass on the port side of the other.
- When two power-driven vessels are crossing, the vessel which has the other on her starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.
- Where one of two vessels is to keep out of the way of the other, it shall take early and substantial action to do so; the stand-on vessel shall keep her course and speed, unless collision cannot be avoided by doing so.
- A power-driven vessel which takes action in a crossing situation to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on its port side.

The USCG recognizes the need for operators to take additional precautions to avoid collisions during times of restricted visibility and offers related rules and guidance. According to the USCG, all vessels must slow their speed to accommodate conditions, up to and including slowing the motor to an idle when the potential for an imminent collision is identified by the known proximity to another vessel, or a fog signal or radar signaling its presence. Boats with power should have engines ready for immediate maneuver to avoid collision. The following situations should be avoided for vessels using radar as a primary means of vessel avoidance:

- An alteration of course to port for a vessel forward of the beam, other than for a vessel being overtaken.
- An alteration of course toward a vessel abeam or abaft of the beam.

4.2.6 LIGHTING

Vessels should also make use of navigation lights in restricted visibility as well as while operating between the hours of sunset and sunrise. Unless specified as “flashing”, all lights should display an unbroken arc of light. The color of the light is specific to the purpose and location. Masthead lights and stern lights should display white light. Sidelights should display green light on the starboard side of the boat, and red on the port side. A vessel towing should also display yellow lights. All-round lights are typically red, yellow or green. However, the arc of light must radiate 360°. Supplemental lights whose display might be confused with those light signals denoted here should **not** be illuminated. The use of blue and flashing red lights, in particular, is restricted to law enforcement vessels.

The necessity, type and positioning of lights is dependent on the power conditions of the vessel, visibility conditions under which it is operating, and whether or not it is towing. However, when conditions necessitate the use of lights, the light displayed must meet the following minimum distance of illumination, based on boat size:

On a vessel of 50 meters (164 feet) or more in length:

- A masthead light must be visible to a distance of six (6) miles;
- A sidelight, stern light, towing light and all-round light, must all be visible to a distance of three (3) miles, and;
- A special flashing light must be visible to a distance of two (2) miles.

On a vessel of 12 meters (39.4 feet) or more, but less than 50 meters:

- A masthead light must be visible to a distance of five (5) miles (unless the vessel is less than 20 meters (65.6 feet) in length, in which case the distance is reduced to three (3) miles) and;
- A sidelight, stern light, towing light, all-round light, and special flashing light must all be visible to a distance of two (2) miles.

On a vessel of less than 12 meters (39.4 feet) in length:

- A masthead light, stern light, towing light, all-round light and special flashing light, all must be visible to a distance of two (2) miles and;
- A sidelight must be visible to a distance of one (1) mile.

A white all-round light, on a vessel being towed must be visible to a distance of three (3) miles.

Detailed guidance on the number and positioning of light fixtures on the vessel, desired distribution of the associated arc of illumination, and specifications for visibility and power conditions, can be found in the USCG navigation rules. In general, and at minimum, the USCG mandates that a conspicuous, power-driven vessel underway shall exhibit a masthead light forward, sidelights and a stern light. Boats over 50 meters (164 feet) in length must display a second masthead light higher and abaft of the first. Boats less than 12 meters (39.4 feet) can limit lighting to all-round white lights and sidelights. Additional requirements and/or alternate light displays apply for vessels that are towing, under tow, piloting, involved in fishing or associated trawling, not under command, restricted in their ability to maneuver or involved in diving, mine clearing or dredging activities, and barges.

All moored or anchored vessels must display an all-round white light when outside of a designated mooring area between sunset and sunrise. The requirement increases from one light to two for boats greater than 50 meters (164 feet) in length and is waived for vessels under seven (7) meters (23 feet), unless moored in a confined or trafficked area.

In addition to standing lights, flashes of light and bursts of sounds can be used to make a vessel operator aware of an approaching vessel, or to indicate distress, if a radio telephone is not employable. Vessels over 12 meters (39.4 feet) in length are required to be equipped with a bell and whistle for these purposes, although bell use is restricted to anchored vessels. A blast of a whistle is identified as “short” if of a duration of 1 second, and “prolonged” if of a duration of four (4) to six (6) seconds.

When two vessels under power approach, one is to indicate to the other of the intent to pass and intended side of passage by short blasts: one short blast indicates intent to pass on the port side; two blasts indicate intent to pass on the starboard. The blasts are returned if the receiving boat agrees.

Five short blasts indicate a request to repeat the signal. One prolonged blast is used: to signal that a power-driven vessel is leaving a dock or berth, and; in anticipation of rounding a bend where an approaching vessel may be obscured. An approaching vessel should return the signal in the latter instance. Signals are to be repeated at intervals of two (2) minutes or less in conditions of restricted visibility.

In addition to radio transmissions of “May Day” and the use of pyrotechnic devices, dye markers and other signals, a high intensity white light, flashing at regular intervals of 50 to 70 times per minute, can be used to signal distress, as can any sound or light signal that does not have another meaning under USCG rules.

4.2.7 SECURING VESSELS

A mooring buoy can be used as a device to secure a boat when docking is not an option, and the security of a boat's anchor is in question. Mooring buoys are secured by being drilled into the waterway bed or by being attached to a heavy mushroom or similar weighted anchor.

A MD DNR permit is required for placement of three (3) or more mooring buoys. An individual regulatory (state or Federal) permit is not necessary for the use of a single mooring buoy. However, MD DNR does place restrictions on the appearance, and placement locations and methods for individual mooring buoys. The buoys are to be white with a horizontal blue band around the circumference, centered midway between the top of the buoy and the water line. If lighted, under normal placement conditions, the mooring buoy is to display a slow-flashing white light. The flash frequency should be increased in areas where the buoy may be an obstruction to vessels operating in darkness hours. Information about MD DNR's mooring buoy permit can be found here: <https://dnr.maryland.gov/boating/pages/srmbuoys.aspx>

MDE authorization is needed for the placement of more than one mooring buoy. **Mooring buoys may not be placed in:**

- **Public shellfish beds;**
- **Private shellfish beds, without permission of the leaseholder for the affected bottom;**
- **Cable crossing areas;**
- **Designated beach and swim areas in the Severn River;**
- **Controlled ski areas in the Severn and South Rivers;**
- **A position that would allow the arc of swing to extend into a channel;**
- **A manner that interferes with the operation of a bridge access.**

Additional restrictions apply in Kent County, the City of Annapolis and the towns of Oxford and St. Michael's. For more information on boating regulations in Maryland see: <https://dnr.maryland.gov/boating/Pages/regulations/home.aspx>

4.2.8 ENFORCEMENT

Title 14, Section 89, of the US Code authorizes the USCG to board vessels to make inquiries, examinations, inspections, searches, seizures, and arrests. **Therefore, when hailed by a USCG vessel, the operator of a vessel underway must heave to or maneuver as directed and allow USCG personnel to board.** The USCG may impose a civil penalty for failure to comply with equipment requirements, Navigation Rules, or other federal regulations, or to report a boating accident. A civil and/or criminal penalty may be imposed for grossly negligent operation. In the latter instance, the operator may be fined up to \$5,000, imprisoned for one year, or both.

In addition, a USCG officer who observes unsafe operating conditions, as defined by law or regulation, has the discretion to direct the operator to return to port. Failure to comply with such direction could result in an additional criminal infraction, punishable with a fine of up to \$1,000, up to one (1) year imprisonment, or both. Citable unsafe operating conditions include:

- Insufficient life-saving devices.
- Insufficient fire extinguishers.
- An overloaded vessel.
- Improper display of navigation lights.
- Improper ventilation of fuel tanks and engine spaces.
- Fuel leak or accumulation of fuel in the bilges.
- Inadequate backfire flame control.
- A manifestly unsafe voyage.

The operator of a vessel is also obligated by law to provide assistance that can be safely provided to any individual in danger at sea and is subject to a fine and/or imprisonment for failure to comply.

4.2.9 VESSEL POLLUTION CONTROL

Regulations issued under the Federal Water Pollution Control Act require all vessels with propulsion machinery to have the capacity to catch and retain oily mixtures on board and be equipped with a fixed or portable means to discharge these oily mixtures to a reception facility. **No person may intentionally drain oil or oily waste from any source into the bilge of any vessel. Operators must immediately notify the USCG National Response Center at (800) 424-8802 if their vessel discharges oil or hazardous substances in the water.**

4.2.10 BARGE DECKS

OSHA Publication 3358-01N 2009 provides guidance on safety aboard barge decks. Many of these provisions apply to safety aboard any boat. Examples include:

4.2.10.1 Minimizing Hazards on Deck

- Keep all walking and working surfaces clean, dry, and unobstructed.
- Keep all areas free of debris.
- Clean up and/or report any spills immediately.
- Stack materials in a stable manner.
- Secure gear and equipment that is not in use.

- Keep stairs, doorways, walkways, and gangways free of equipment and stowed materials.
- Secure ramps during loading and offloading operations.
- Repair leaks from hoses, pipelines, and valves immediately.
- Use a non-skid protective deck compound and do not paint over the non-skid compound with standard paint.
- Have de-icing procedures in place when necessary.
- Paint the perimeter and tripping hazards in a contrasting color.

4.2.10.2 Ladder Safety

- Always maintain three-points of contact on a ladder—two hands and a foot, or two feet and a hand—so that only one limb is in motion at any one time.
- Avoid overextending the body when performing tasks such as checking sounders, checking lights, and wiring rigging, as this can lead to falls from ladders.
- Fully enclosed slip-resistant footwear should always be worn when using ladders.
- An adequate guard rail should be installed, or employees should wear Personal Fall Arrest Systems when work is being performed above a solid surface (e.g., to prevent falls from the barge to the dock).
- Use gangplanks with guardrails to prevent falls on the dock or pilings.
- All deck holes, openings, and hatches should be covered or guarded.
- Pigeonholes should not be used to access barge walking or working surfaces.
- Portable ladders should be:
 - Used only for their designed purpose (i.e., step ladders should not be used as portable rung ladders).
 - Positioned so that for every four (4) feet in height, the ladder extends out from the vertical surface at the base approximately one (1) foot.
 - Long enough for the job—if used for access to an upper landing surface the side rails must extend at least three (3) feet above that surface.
 - Fitted with proper footing to keep the ladder from slipping or sliding.
 - Tied to a secure object. Remember that the vessel(s) that the ladder is secured to can move. Use the buddy system, if possible, so that one person can hold the ladder to stop it from moving.
- Additional OSHA instructions on the use of portable ladders include:
 - Never use portable metal ladders near energized electrical equipment (such as conductors or electric arc welding machines).
 - Keep your body near the middle of the step and always face the ladder while climbing.

- Do not move, shift, or extend ladders while in use. Move the ladder instead of stretching or leaning to the side to reach your work.
- Use hand lines or a tool bag/belt to keep hands free when using a ladder.

Most ladder safety requirements included in the OSHA standard for deck barges apply to any situation in which a ladder may be used.

4.2.11 CRANES AND RIGGING

Marine contractors may use cranes, which pose significant risk of both bodily injury and death when improperly used, in the course of their work. Riggers preparing loads or conducting lifting operations may be exposed to physical hazards including slip and fall, strike and crush, and electric shock hazards. For example, when rigging or operating a crane:

- Workers may fall when working on uneven or slippery surfaces, using a ladder improperly, or working in areas with unprotected sides, bulkhead openings and deck holes greater than five (5) feet.
- Strike and crush hazards are presented when loads are not safely rigged prior to hoist and/or tag lines are improperly used, allowing the load to wing out of control.
- Electrical hazards are presented when hoisting and hauling of equipment is conducted near energized lines, electric cables are frayed, or tools and equipment are not properly grounded.

Riggers must be qualified to perform work and trained to be familiar with correct rigging techniques and to recognize hazards and unsafe conditions. Attention should be paid to the surface conditions upon which the crane is operating; the adequacy of welds on eye pads; the weight load in relation to the rated capacity of the crane and rigging gear, and; necessary precautions to prevent damage to lifting gear, equipment, and vessel components. Equipment must be checked regularly and removed from service when found to be defective. Alternate fall protection devices should be installed to ensure worker safety when devices such as guardrails on deck edges, deck openings or stair railings are temporarily removed to allow the movement of a load. Spotters and signalmen should be utilized during a lift. Tag lines must be provided on loads likely to swing but should not be utilized near power lines. Additional information on proper equipment usage, recommended communications to employees, and references to detailed standards are provided by OSHA at:

https://www.osha.gov/dts/maritime/sltc/ships/rigging/rigging_process.html

Supplemental Maryland regulations related to safe rigging and operation of cranes with manufacturer-rated hoisting/lifting capacity of 2,000 pounds or more are detailed in the Code of

Maryland Regulations (COMAR) 09.12.26 and include specific testing requirements for accredited and audited employer certification programs.

COMAR requires that employers who offer “safety sensitive” positions - including crane operators, crane operator trainees, signal persons, and riggers - administer a drug- and alcohol-free workplace and substance abuse policy that prohibits the use, possession, or manufacture of any unlawful drug or use of alcohol while at work. Controlled substances are classified as drugs under regulation unless the employee is using the controlled substance under the direction of a licensed physician who advises that his ability to safely perform the duties will not be adversely affected, and notifies his supervisor, and provides official, written medical documentation. The employer must consent to the employee’s use of the controlled substance on the job. The drug- and alcohol-free workplace policy must adhere to procedural and timing requirements for testing. Employee testing must be completed:

- At the commencement of employment;
- At the discretion of the employer given reasonable suspicion of drug or alcohol abuse by the employee;
- Randomly, and;
- No later than 24 hours after an incident involving a fatality, bodily injury, or greater than \$5,000 in property damage for which crane operations were a direct or indirect cause, unless the medical condition of the employee prevents such a test from being administered.

Every 2 years, an employer shall ensure that the crane operator provides the employer with the medical documentation, as specified in COMAR. Moreover, specific training and qualification requirements pertaining to crane operator trainees (COMAR 09.12.26.07) and rigging and riggers (COMAR 09.12.26.08) must also be provided. Training records must be maintained by the employer for at least three (3) years.

4.2.12 PILE DRIVING

OSHA document 1926.603(a) provides guidance specific to pile driving in marine construction operations, which can also provide significant risk of bodily injury or death, from strike and crush, in particular, when improperly performed. The OSHA standard outlines the minimum equipment standards and operational protections to be employed during pile driving. Requirements include:

- Boilers and piping systems which are a part of, or used with, pile driving equipment shall meet the applicable requirements of the American Society of Mechanical Engineers (ASME), Power Boilers (section I).

- All pressure vessels which are a part of, or used with, pile driving equipment shall meet the applicable requirements of the ASME, Pressure Vessels (section VIII).
- Overhead protection, which will not obscure the vision of the operator, and which meets OSHA requirements, shall be provided. Protection shall be the equivalent of 2-inch planking or other solid material of equivalent strength.
- Stop blocks shall be provided for the leads to prevent the hammer from being raised against the head block.
- A blocking device, capable of safely supporting the weight of the hammer, shall be provided for placement in the leads under the hammer at all times while employees are working under the hammer.
- Guards shall be provided across the top of the head block to prevent the cable from jumping out of the sheaves.
- When the leads must be inclined in the driving of batter piles, provisions shall be made to stabilize the leads.
- Fixed leads shall be provided with ladder, and adequate rings, or similar attachment points, so that the loft worker may engage his safety belt lanyard to the leads. If the leads are provided with loft platforms(s), such platform(s) shall be protected by standard guardrails.
- Steam hoses leading to a steam hammer or jet pipe shall be securely attached to the hammer with an adequate length of at least 1/4-inch diameter chain or cable to prevent whipping in the event the joint at the hammer is broken. Air hammer hoses shall be provided with the same protection as required for steam lines.
- Safety chains, or equivalent means, shall be provided for each hose connection to prevent the line from thrashing around in case the coupling becomes disconnected.
- Steam line controls shall consist of two shutoff valves, one of which shall be a quick-acting lever type within easy reach of the hammer operator.
- Guys, outriggers, thrustouts, or counterbalances shall be provided as necessary to maintain stability of pile driver rigs.
- Barges or floats supporting pile driving operations shall meet the applicable requirements of OSHA standard 1926.605.

4.2.13 SITE CLEARING AND GRADING

Marine contractors engaged in site clearing activities (e.g., removal of vegetative cover, grading) on the landward portion of a project are exposed to risk of physical injury from accidents involving clearing equipment, as well as contact with poisonous plants and animals. **Workers should be trained in the proper use of clearing and grading equipment. They should also be instructed to recognize toxic and irritant plants and their proper removal, as well as in preventative and first aid procedures for an unanticipated encounter.**

4.2.13.1 Earth-Moving Equipment Safety

OSHA standard 1926.602(a) provides safety guidance on the outfitting and use of earth-moving equipment, defined as scrapers, loaders, crawler or wheel tractors, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment. Requirements include:

- Seat belts meeting the requirements of the Society of Automotive Engineers shall be provided on all equipment according to the document “J386-1969, Seat Belts for Construction Equipment”. Exceptions include tractors, which carry unique seat belt requirements, equipment designed only for stand-up operation, and equipment which does not have roll-over protective structure (ROPS) or adequate canopy protection.
- Access roadways and grades shall be constructed and maintained in a manner to accommodate the safe movement of construction equipment and vehicles.
- Emergency access ramps and berms shall be constructed to restrain and control runaway vehicles.
- Equipment shall have a braking system capable of stopping and holding the equipment fully loaded, as specified in the Society of Automotive Engineers SAE-J237, “Loader Dozer-1971”, -J236, “Graders-1971”, and -J319b, “Scrapers-1971”. (Additional performance criteria is applied to self-propelled, rubber-tired off-highway equipment manufactured after January 1, 1972).
- Pneumatic-tired earth-moving haulage equipment (trucks, scrapers, tractors, and trailing units) whose maximum speed exceeds 15 miles per hour, shall be equipped with fenders on all wheels to meet the requirements of the Society of Automotive Engineers SAE J321a-1970, “Fenders for Pneumatic-Tired Earthmoving Haulage Equipment”, unless the employer demonstrates no hazard to personnel from flying material under OSHA 1926.2.
- All bidirectional machines (e.g., rollers, compacters, front-end loaders, bulldozers, and similar equipment), shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be maintained and operated as needed when the machine is moving in either direction.
- Earthmoving or compacting equipment with an obstructed view to the rear shall not be used in reverse gear unless the equipment is operating with a reverse signal alarm distinguishable from the surrounding noise level or a signaler is employed.



Site Clearing

- Scissor points on all front-end loaders shall be guarded.
- Lift trucks, stackers, etc., shall have the rated capacity clearly posted on the vehicle and visible to the operator. When auxiliary removable counterweights are provided by the manufacturer, corresponding alternate rated capacities also shall be clearly shown on the vehicle and not exceeded.
- No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval. Any modification affecting the capacity or safe operation of equipment shall not reduce the original safety factor of the equipment. Changes shall be documented on instruction plates, tags, or decals.
- If a load is lifted by two or more trucks working in unison, the proportion of the total load carried by any one truck shall not exceed its capacity.
- Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism is of a type that prevents road reactions from causing the steering hand wheel to spin. The steering knob shall be mounted within the periphery of the wheel.
- All high lift rider industrial trucks shall be equipped with overhead guards which meet the configuration and structural requirements as defined in paragraph 421 of American National Standards Institute B56.1-1969, "Safety Standards for Powered Industrial Trucks".
- All industrial trucks in use shall meet the applicable requirements of design, construction, stability, inspection, testing, maintenance, and operation, as defined in American National Standards Institute B56.1-1969, "Safety Standards for Powered Industrial Trucks". Provisions include that:
 - Only certified employees are permitted to operate powered industrial trucks.
 - The operator's certification must be specific to the equipment to be operated.
- Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.
- Whenever a truck is equipped with vertical only, or vertical and horizontal controls able to lift or elevate personnel with a lifting carriage or forks:
 - A safety platform firmly secured to the lifting carriage and/or forks shall be used.
 - Personnel on the platform shall be provided with a means to shut off power to the truck.
 - Protection from falling objects shall be provided as necessary, based on the operating conditions.

OSHA standard 1926.604(a) provides additional, specific, safety provisions for clearing equipment:

- All equipment used in site clearing operations shall be equipped with rollover guards meeting OSHA requirements. In addition, rider-operated equipment shall be equipped with an overhead and rear canopy guard meeting the following requirements:
 - The overhead covering on this canopy structure shall be of not less than 1/8-inch steel plate or 1/4-inch woven wire mesh with openings no greater than 1 inch, or equivalent.
 - The opening in the rear of the canopy structure shall be covered with no less than 1/4-inch woven wire mesh with openings no greater than 1 inch.

4.2.13.2 Poisonous Plant Encounters

OSHA Standard 1926.604(a) also provides that employees engaged in site clearing shall be protected from hazards of irritant and toxic plants and suitably instructed in the treatment and administration of first aid:

<https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.604>

The University of Maryland (UMD) Cooperative Extension Program has compiled a summary list of *100 Poisonous Plants of Maryland* with descriptions and artist renderings to aid in identification:

https://extension.umd.edu/sites/extension.umd.edu/files/2021-03/EB314_PoisonousPlantsMD.pdf

The US Center for Disease Control (CDC) provides additional guidance on the prevention of worker exposure to the most commonly encountered poisonous plants on job sites: poison ivy, oak and sumac. Photographs of these plants, and first aid procedures to be employed where prevention methods fail can be found at:

<https://www.cdc.gov/niosh/docs/2010-118/pdfs/2010-118.pdf?id=10.26616/NIOSH PUB2010118>

Workers should be especially cautious of encountering burning plants as the particulates of the sap oil containing the allergen can be inhaled in the smoke.

4.3 OFF-HIGHWAY VEHICLES

OSHA standard 1926.601 provides safety rules for motor vehicles not governed by the site clearing equipment standard (1926.602). Requirements include:

- All vehicles shall have and maintain a service brake system, emergency brake system, and a parking brake system in operable condition. The systems may use common components.
- Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two headlights and two taillights in operable condition.
- All vehicles shall have brake lights in operable condition regardless of light conditions.
- All vehicles shall be equipped with an adequate and operable audible warning device at the operator's station.
- No employee shall use any motor vehicle equipment having an obstructed view to the rear unless:
 - The vehicle has a reverse signal alarm audible above the surrounding noise level or:
 - The vehicle is backed up only when an observer signals that it is safe to do so.
- All vehicles with cabs shall be equipped with windshields and powered wipers. Cracked and broken glass shall be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields shall be equipped with operable defogging or defrosting devices.
- All haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- Tools and materials shall be secured to prevent movement when transported in the same compartment with employees.
- Vehicles used to transport employees shall have seats firmly secured and adequate for the number of employees to be carried.
- Seat belts and anchorages meeting the requirements of 49 CFR Part 571 (Department of Transportation, Federal Motor Vehicle Safety Standards) shall be installed in all motor vehicles.
- Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.
- Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device, which will prevent accidental starting or tripping of the mechanism.
- Trip handles for tailgates of dump trucks shall be so arranged that, in dumping, the operator will be in the clear.

- All rubber-tired motor vehicle equipment shall be equipped with fenders. Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.
- All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.

4.4 HEAVY EQUIPMENT USE, STORAGE AND SERVICING

Additional consideration for the use, storage and servicing of equipment used in marine construction activities is provided by OSHA Standard 1926.600, including those for working near energized power lines. Requirements include:

- All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas where work is in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of the equipment.
- A safety tire rack, cage, or equivalent protection shall be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.
- Heavy machinery, equipment, or parts thereof, which are suspended or held aloft by use of slings, hoists, or jacks shall be substantially blocked or cribbed to prevent falling or shifting before employees are permitted to work under or between them. Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment, shall be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the motors stopped and brakes set, unless work being performed requires otherwise.
- Whenever the equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.
- The use, care and charging of all batteries shall conform to OSHA requirements.
- All cab glass shall be safety glass, or equivalent, that introduces no visible distortion affecting the safe operation of any machine covered by this subpart.
- All equipment shall comply with the following requirements when working or being moved in the vicinity of power lines or energized transmitters, except where electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines:
 - For lines rated 50 kV or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet;
 - For lines rated over 50 kV, minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or twice the length of the line insulator, but never less than 10 feet;
 - In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV;

- A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means;
- Cage-type boom guards, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not alter other specified requirements;
- Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded;
- Prior to work near transmitter towers where an electrical charge can be induced in the equipment or materials being handled, the transmitter shall be de-energized or tests shall be made to determine if electrical charge is induced on the crane.
- The following precautions shall be taken when necessary to dissipate induced voltages:
 - The equipment shall be provided with an electrical ground directly to the upper rotating structure supporting the boom.
 - Ground jumper cables shall be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters.
 - Crews shall be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load.
 - Combustible and flammable materials shall be removed from the immediate area prior to operations.

4.5 AVOIDANCE OF UNDERGROUND AND SUBMERGED UTILITIES AND STRUCTURES

In addition to hazards associated with the use of chemicals and equipment, marine construction work, if improperly planned, could result in damage to existing structures and utilities, resulting in the potential for increased safety risk to both workers and the general public. Detailed site plans with an accurate and appropriate scale should be referenced during work activities and should depict any known obstructions in the work area.

Legislation passed in May 2001 requires that all “owner-members” of underground facilities in the state of Maryland provide a positive response to excavators via the electronic Ticket Check®

system. The automated response to the information request will identify the presence of pipes, sewers, conduits, cables, valves, lines, wires, manholes, attachments, and those portions of poles below ground, but will not include stormwater drains. **It is important to note that, while contacting Miss Utility using the one call system will provide valuable information, such action does not relieve the contractor from liability for damages incurred if underground or submerged structures or utilities are nevertheless encountered.**

At minimum, the site manager must contact Miss Utility at least three (3) business days and no more than 12 business days before planning to begin excavation work. The project designer may also initiate a one-time ticket in the planning stage.

Any clearance ticket issued is valid for a period of 12 days, unless otherwise specified in the clearance ticket, after which time the site manager must place another request if the work is not completed. Additional coordination is necessary if the work area is expanded. Once established by the owner, the contractor is responsible for maintaining any utility markers through the completion of the work. Markers are accurate only to within five (5) feet of the actual location of the structure to be avoided. Contractors should use hand tools to locate structures marked within 18 inches of the work area and cannot use mechanized equipment within 18 inches of the outermost limit of the structure unearthed. Additional instruction and requirements can be obtained online at: <http://www.missutility.net/excavators/>

4.5.1 UNEXPLODED ORDNANCE AND MUNITIONS

Due to the extensive history of military battles in the region, and the proximity to several military training grounds, the potential to encounter unexploded ordinance (UXO) when working in and around the Chesapeake Bay is also a consideration for some projects: those that involve dredging, in particular. The contractor should determine if coordination with the local district of USACE and/or US Department of Defense (DOD) is advisable to identify the presence or likely presence of UXO and munitions and initiate the contact if in doubt. An avoidance and response plan detailing UXO inspection, identification, handling and disposal responsibilities, and procedures should be developed, and qualified inspection personnel assigned, in the instance that encountering UXO in the project area is a recognized concern.

Any unanticipated encounter of suspected UXO during work activities should be treated as an emergency and reported to authorities via 911, if landside, or the USCG on Channel 16, if on water. A description of the munition should be provided at the time of report. Contractors should not attempt to either handle or dispose of munitions or similar materials, unless activities are specifically directed and supervised by a certified munitions expert or authorized agency. Mechanized equipment should be immediately turned off to avoid vibration, if possible to do so without endangering the operator. The work area should be vacated pending further instruction

from authorities. The U.S. Army Technical Center for Explosive Safety has prepared the document *Munitions at Sea – A Guide for Commercial Maritime Industries*, which provides depictions to aid in recognizing a munition, as well as guidance specific to those that may contain chemical agents, and instructions on the proper response method if munitions are accidentally brought aboard.

4.6 STORAGE OF HAZARDOUS CHEMICALS

Employers are required by the Federal Hazard Communications Standard (29 CFR 1910.1200) to inform their employees of any hazardous chemicals that may be encountered in their work environment, as well as handling and storage precautions, and incident response measures for accidental releases of, or exposures to, such chemicals. OSHA mandates that, at minimum, employers provide this information by maintaining a complete Chemical Information List of all hazardous substances on-site and readily accessible Safety Data Sheets (SDS). The SDSs may be housed in a binder at the work site, or stored electronically, so long as employees have immediate access to the information and a back-up system (for electronic storage) is in place. Hazardous chemicals must be labeled and stored properly, and in compliance with the Globally Harmonized Labeling System. SDSs and labels must be completed by the employer within 15 days of the time the substance is brought on-site and updated following the identification of new and significant information relevant to their content.

In addition to making SDSs readily available, OSHA also mandates that employers provide training to workers on the hazardous chemicals they may be exposed to during work. At a minimum, training must be conducted at the time of initial assignment to the work area, and whenever a new hazard is introduced. The topics of training to be covered must, at a minimum, include:

- Detection (e.g., visual appearance, odor, monitoring devices);
- Effects of exposure;
- Protection measures (e.g., work practices, emergency procedures, personal protective equipment), and;
- A detailed overview of the employer's written hazard communication program, including an explanation of the manufacturer's labels on containers and SDS.

4.7 SITE HEALTH AND SAFETY PLANS

For larger projects involving many chemical and/or physical hazards, creation of a site-specific health and safety plan is an appropriate component of safety training. In addition to SDSs, the plan should contain: detailed and well-organized information on job hazards, including those associated with the use of equipment; procedural requirements and appropriate protective gear and use for preventing chemical exposures, incidents and

accidents; reporting procedures, should an incident or accident occur, and; directions to the nearest medical facility from the work site, for use in case of emergency. All parties working on a job site necessitating a site health and safety plan are required to understand and sign the plan in acknowledgment of its content, when it is administered and when its content is significantly revised or supplemented. An on-site worker or manager should be designated to maintain the plan and obtain signatures from employees and contractors.

Daily site safety meetings may also be appropriate on larger or more complex job sites. Such meetings should be held at the beginning of the workday and used to provide an overview of the tasks ahead and associated safety concerns and precautions, and to review any recent incidents and accidents and inform workers of appropriate steps to prevent recurrence.

4.8 OTHER SAFETY CONSIDERATIONS AND REFERENCE DOCUMENTS

Many additional safety requirements found in OSHA's Hazards Communication Standard and other standards and regulations are applicable to marine construction work, depending on the specialty of the service (e.g., welding, cutting) to be provided, the materials used to provide those services (e.g., spray finishes, flammable liquids), and even the vessels which are utilized to perform them. Contractors seeking additional guidance on, or clarification of, job safety requirements can contact OSHA's On-site Consultation Program for a free and confidential audit. Compliance violations identified during the audit are not subject to enforcement if corrected: www.osha.gov/dcsp/smallbusiness

The USACE has instituted additional safety requirements for jobs performed under their contracts. Those affected should reference the USACE Safety and Health Requirements Manual, and consult with the local district of the USACE, as appropriate. The Safety and Health Requirements Manual can be obtained from the awarding district's contracting or safety and health office. A request can also be submitted online to the USACE's Publications Depot: <https://www.usace.army.mil/Missions/Safety-and-Occupational-Health/Safety-and-Health-Requirements-Manual/>

5. SHORELINE PROTECTION

5.1 BACKGROUND

Erosion and deposition of sediment are natural, but complex processes that create and change shorelines. In the Chesapeake Bay and Atlantic coastal bays and their tributaries, shoreline erosion is primarily caused by wind-driven waves and, to a lesser extent, wakes from boats and surface water runoff. The size and impact of the wave is a function of the wind velocity, duration, fetch – or the expanse of water over which it travels – and water depth. Water depth is influenced by conditions such as tides, storms, droughts, sea level rise, and seasonal fluctuations in freshwater and sediment inputs from precipitation and surface water runoff. The rate of surface water runoff is also determined by variables such as the water velocity, height and slope of the bank, and presence of vegetation. Vegetation is important because it can decrease the runoff speed and capture loose sediment.

In addition to the erosion of sediment from processes described above, sediment deposition along shorelines can be caused by failing banks from a combination of littoral processes (e.g., undercutting from waves), landside practices (e.g., building too close to the shoreline), and hydrogeological processes (e.g., groundwater carrying sediment through fractures). These processes work in combination to weaken the bank and deposit sediment in tidal waters.

Ultimately, erosion and sedimentation can lead to the loss of waterfront property, the creation of land in places that lower its value to users (e.g., shoaling in channels or near docks and marinas), and/or results in the loss of open water or wetland habitat. In addition, sediment reintroduced to the water column from erosion can result in negative impacts to water quality. The installation of shoreline protection measures to slow the processes of erosion and sedimentation is therefore often necessary.

Because sediments are continuously re-distributed in a natural system, artificially restricting the movement of sediment to protect one shoreline or structure can have the opposite effect on another, starving the area of sediments. **Therefore, the equilibrium of the system, and the ability of the project site to lose and accept appropriate amounts of sediment, should be a primary consideration in the selection of shoreline protection measures. The use of more hardened measures, such as the construction of revetments and**



Marsh Sill

bulkheads, which capture or prevent the movement of sediment entirely, should be reserved to coastal areas with exceptionally high wave action, or shipping ports with deep water berths where non-structural measures are determined to be inadequate.

The requirements for a permit or license to alter wetlands, and Critical Areas approval, as discussed in Sections 3.1 and 3.2, include the construction of shoreline protection measures. In addition, the Living Shorelines Act of 2008 mandates that, prior to designing a shoreline erosion control project, the project owner must first consider the necessity of the proposal by determining the feasibility of “No Action” or the relocation of structures threatened by erosion. Upon determining that “No Action” or structure relocation is not feasible, the project owner must then consider non-structural measures such as wetland creation, before use of a structural erosion control project can be considered by the MDE.

MDE’s Shore Erosion Control Guidelines for Waterfront Property Owners describes processes affecting erosion and sedimentation rates. This may aid in providing an understanding of the basis for state regulations for both the Marine Contractor and/or the private property owner: <https://dnr.maryland.gov/ccs/Publication/Shoreerostext.pdf>

5.2 DESIGN AND INSTALLATION OF SHORELINE EROSION CONTROL PROJECTS

The requirements of the Marine Contractors licensing program, as discussed in Title 17 Subtitle 3 of the Environment Article and COMAR 26.30, dictate that Marine Contractors applying for a license or permit come prepared with the appropriate construction knowledge and experience. In addition, Professional Engineers are responsible for designing plans and developing specifications for mid-sized and large marine construction projects. However, regardless of the project size, it is important for the Marine Contractor to understand the appropriate use and intended function of the proposed structure. In addition, knowledge of proper installation procedures for the structure’s components will help ensure the project’s integrity and longevity and protect both the environment and the customer’s investment.

The following table adapted from COMAR 26.24 summarizes the various types of structures that marine contractors may install in Maryland for shoreline protection and their primary function. These structures are discussed in general order of **regulatory preference, from non-structural to structural**. Note that some non-structural projects (e.g., a wetland establishment or living shoreline) often have a structural component in order to



Shoreline Erosion

increase the level of protection provided. These structural components (e.g., sill) are integrated into a “non-structural” project.

NON-STRUCTURAL EROSION CONTROL PROJECTS		
Erosion Control Method	Function	Purpose
Wetlands/Marsh Establishment (Living Shoreline)	Natural elements that preserve natural shoreline, minimize erosion and establish aquatic habitat.	Use of natural elements to dissipate wave energy and provide additional flood capacity.
STRUCTURAL EROSION CONTROL PROJECTS		
Beach Nourishment	Prevents storm damage and protects against flooding by placing or pumping sand from elsewhere onto an eroding shoreline.	Artificial infill of beach material is eroded by waves and currents in lieu of natural supply.
Breakwater	Shelters harbor basins and mooring areas against short-period waves; prevents shoreline erosion.	Reduction of wave heights by reflection and attenuation.
Groin	Designed to trap sand and reduce erosion and typically placed perpendicular to the shoreline.	Reduction of longshore transport of sediment.
Jetty	Stabilizes navigation channels at rivers and mouths of tidal inlets and marina basins.	Confine streams and tidal flow; protect against stormwater and crosscurrents.
Revetment	Protects the shoreline against erosion.	Reinforcement of some part of the shoreline profile using stone, concrete or other similar material.
Bulkhead	Retains soil and prevents sliding of the land behind.	Reinforcement of the soil bank comprised of a vertical retaining wall composed of wood, stone, concrete, plastic, steel or similar materials.

Unless otherwise specified, the information below, which summarizes the construction, appropriate use, and function of coastal structures to prevent shoreline erosion and sedimentation (as listed in the preceding table) is extracted from the USACE's Shore Protection manual. Depictions of common failure modes from the manual are also provided in the excerpted text. Design requirements of floating structures and the benefits of scour protection are also discussed.

5.2.1 NON-STRUCTURAL METHODS OF SHORELINE PROTECTION

5.2.1.1 Living Shorelines

A living shoreline is a shoreline stabilization measure that uses natural materials such as plants and sand, rock, oyster shell, or other natural materials to protect the shoreline and to create, maintain, or enhance habitat. Living shorelines benefit from the construction of nearshore sills.



Living Shoreline

In low wave-energy environments, natural, wide, fringe marshes can provide sufficient erosion protection for upland areas.

However, for many reasons, the fringe marsh itself may erode and require protection, enhancement, and/or to be re-established. **Sills are typically low, small, continuous rock structures placed at mean low water with some sand fill in the lee to provide a substrate for marsh growth (Figure 1a; Hardaway and Byrne, 1999).** Figure 1c displays a curved, stone sill connecting headland breakwaters with sand fill and marsh plantings on the Choptank River, Chesapeake Bay (from Hardaway and Byrne 1999). After several years, a successful sill retains its structure while promoting marsh vegetation growth on its landward side (Figure 1b).

Sills can thus be used in higher wave energy regimes to establish intertidal marsh grasses that aid in shoreline protection. Periodic marsh replanting and maintenance may be required under higher wave energy conditions. Advantages and disadvantages of a wide variety of erosion mitigation structures and materials to protect wetlands can be found in the Wetlands Engineering Handbook (Olin et al., 2000):

<https://www.csu.edu/cerc/researchreports/documents/WetlandsEngineeringHandbookUSACE2000.pdf>

The word “sill” has evolved to take on two separate identities in coastal engineering. Both meanings imply wave attenuation in the lee of the structure. A submerged, continuous, nearshore dike constructed to hold sand moving offshore from a nourished beach is one definition. The resulting beach is often referred to as a perched beach. Alternatively, free-standing, low profile, continuous shoreline structures constructed to establish a marsh fringe in the lee of the structure are also considered to be sills.

Tidal creeks with fetch exposures less than 0.5 nautical miles and low wave-energy environments can naturally sustain a sufficiently wide marsh fringe. Also, they generally have little or no problem with upland bank erosion because the established marsh fringe absorbs most of the wave energy before it can impact the upland area (Hardaway and Byrne, 1999). On the Chesapeake Bay, Hardaway and Anderson (1980) found that low, upland banks erode almost twice as fast as marsh shorelines with similar fetch exposures and nearshore depths.

Wetland vegetation acts as a shock absorber for its shoreline. Studies, both in the field and in labs, have proven that these plants can reduce the size of incoming waves by 50%. They also take the power out of the waves—scattering the energy so that one big wave becomes a bunch of small, harmless splashes. This helps protect the land behind the plants from erosion.

5.2.1.2 Sills

A submerged sill is a special version of a reef breakwater built nearshore and used to retard offshore sand movements by introducing a structural barrier at one point on the beach profile. However, the sill may also interrupt the onshore sand movement. The sill introduces a discontinuity into the beach profile so that the beach behind it becomes a perched beach at higher elevation and thus wider than adjacent beaches. Submerged sills are also used to retain beach material artificially placed on the beach profile behind the sill. Submerged sills are usually built as rock-armored, rubble-mound structures or by commercially available prefabricated units. Submerged sills represent a non-visible hazard to swimmers and boats.



Figure 1a - Stone sill with marsh planting.

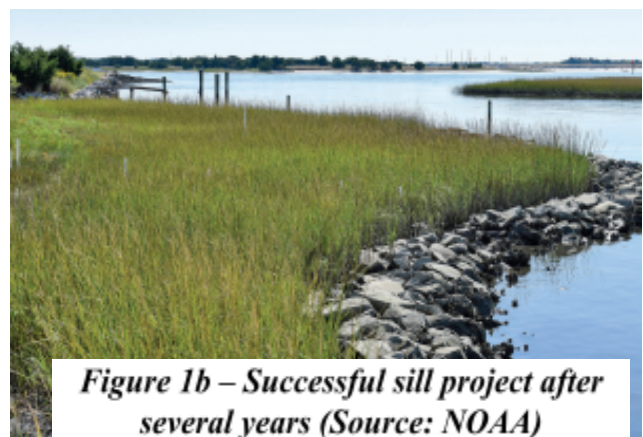
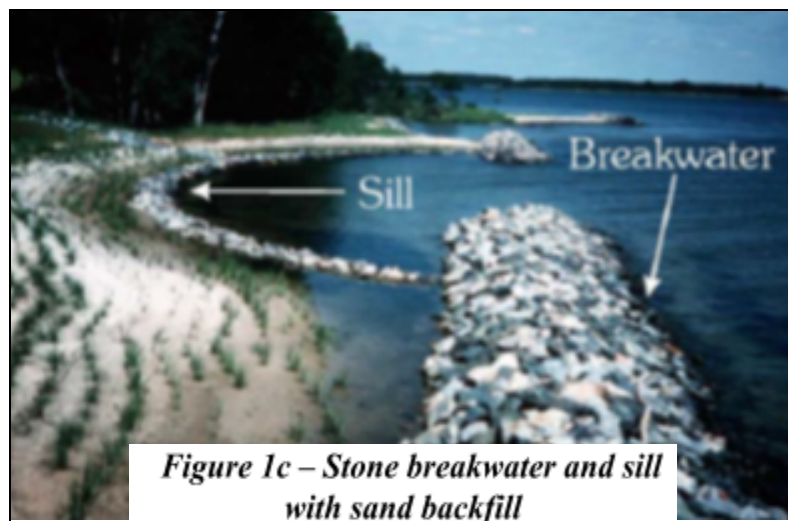


Figure 1b – Successful sill project after several years (Source: NOAA)



5.2.2 STRUCTURAL METHODS OF SHORELINE PROTECTION

5.2.2.1 Revetments

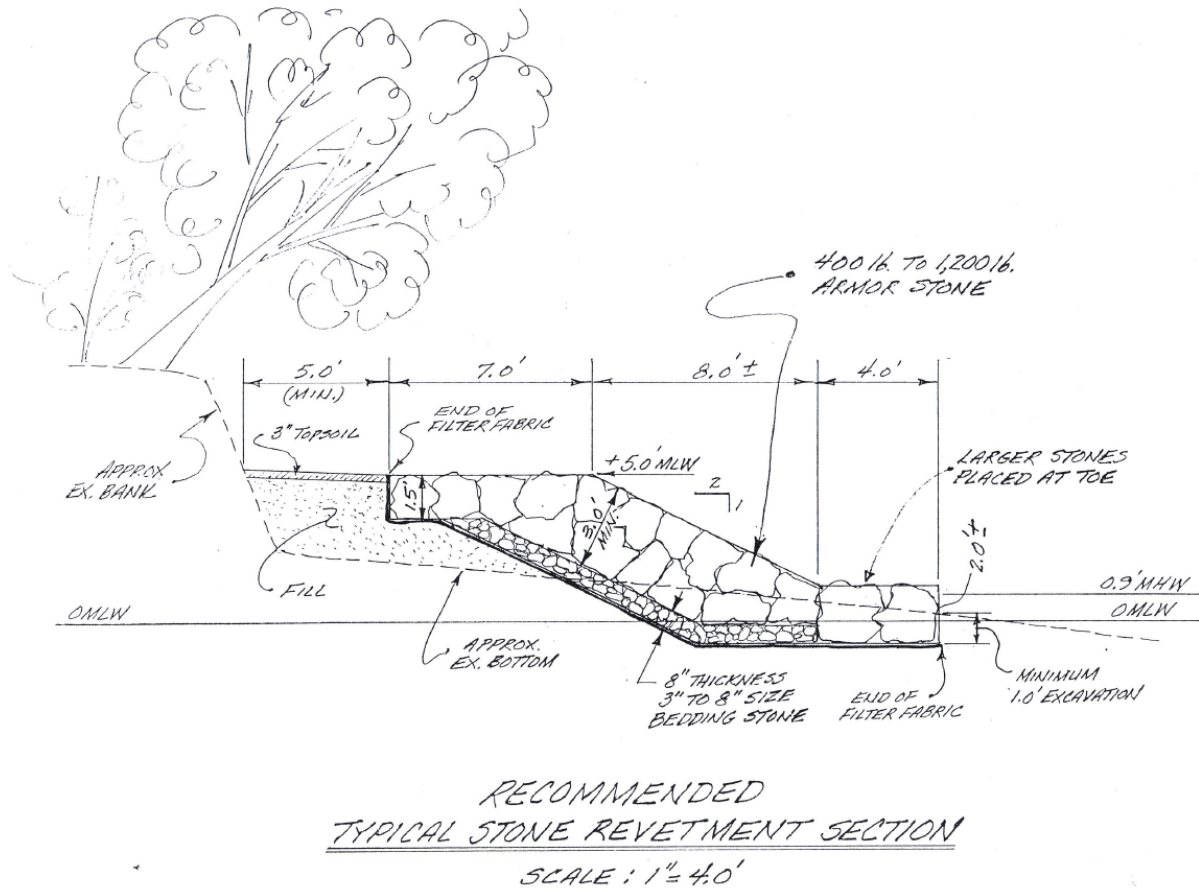
Revetments are a cover or facing of erosion-resistant material placed directly on an existing slope, embankment or dike to protect the area from waves and strong currents. Three major features are a stable armor layer, a filter cloth or underlayer, and toe protection. The filter and underlayer support the armor yet allow for passage of water through the structure. Toe protection prevents undercutting and provides support for all the layer materials previously mentioned. If the toe fails, the entire revetment can fail.

Figure 2 on the next page summarizes a wide range of designs and materials employed for a revetment. Armoring may be either flexible (normal) or rigid. Riprap and quarry stone designs can tolerate some movement and shifting or settling of their underlying foundation yet remain functional. Rigid, concrete or asphalt slabs-on-grade are generally unable to accommodate any settling.



Revetment Construction

Figure 2: Stone Revetment



Typical failure modes for revetments include:

- Armor layer damage and interior exposure;
- Overtopping and loss of foundation material;
- Toe failure and unraveling;
- Excess groundwater pressure and piping failure through the armor layer;
- Rotational sliding along the slip-circle surface;
- Flanking of the end sections.

5.2.2.2 Groins

Groins are built to stabilize a stretch of natural or artificially nourished beach against erosion primarily due to a net longshore loss of beach material. Groins function only when longshore transport occurs. Groins are narrow structures, usually straight and perpendicular to the pre-project shoreline. The effect of a single groin is accretion of beach material on the updrift side and erosion on the downdrift side; both effects extend some distance from the structure. Consequently, a groin system (series of groins) results in a

saw-tooth-shaped shoreline within the groin field and a differential in beach level on either side of the groins.

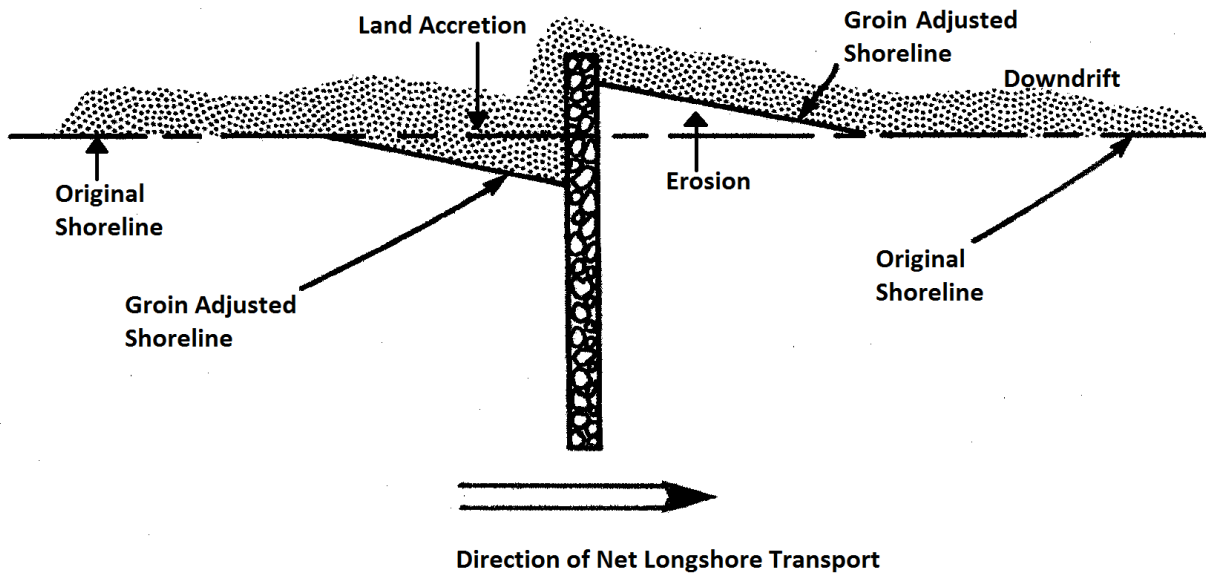


Figure 3: Map view of a single groin.

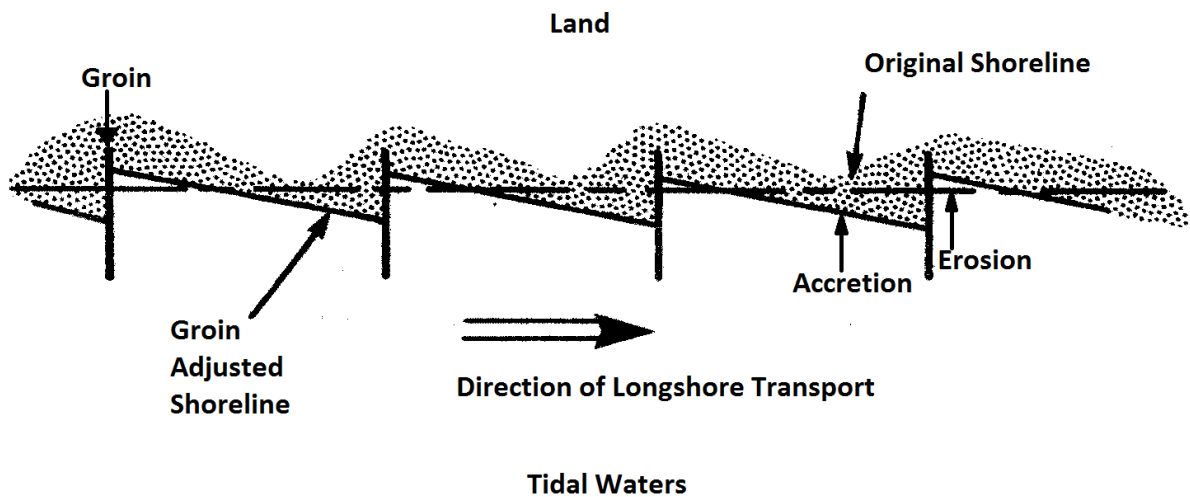


Figure 4: Groin field showing the general shoreline adjustment for direction of net longshore transport

Groins create complex current and wave patterns. However, a well-designed groin system can arrest or slow down the rate of longshore transport and, by accumulating material in the groin bays, provide some protection of the coastline against erosion. Groins are also used to hold artificially nourished beach material, and to prevent sedimentation or accretion in a downdrift area (e.g., at an inlet) by acting as a barrier to longshore transport. The orientation, length, height, permeability, and spacing of the groins determine, under given natural conditions, the actual change in the shoreline and the beach level. Because of the potential for erosion of the beach downdrift of the last groin in the field, a transition section of progressively shorter groins may be provided to prevent the formation of a severely eroded area. Even so, it might be necessary to protect some part of the downdrift beach with a seawall, or to nourish a portion of the eroded area with beach material from an alternative source.

Groins are occasionally constructed non-perpendicular to the shoreline. They can be curved, have fishtails, or have a shore-parallel T-head at their seaward end. Shore-parallel spurs are provided to shelter a stretch of beach or to reduce the possibility of offshore sand transport by rip currents. However, such refinements, compared to the simple shape of straight perpendicular groins, are generally not deemed effective in improving the performance of the groins. In most cases, groins are sheet-pile (Figures 5a-c) or rubble-mound constructions (Figure 6). The latter is preferably used at exposed sites because of a rubble-mound structure's ability to withstand severe wave loads and to decrease wave reflection. In addition, the risk of scouring and formation of strong rip currents along rubble groins is reduced.

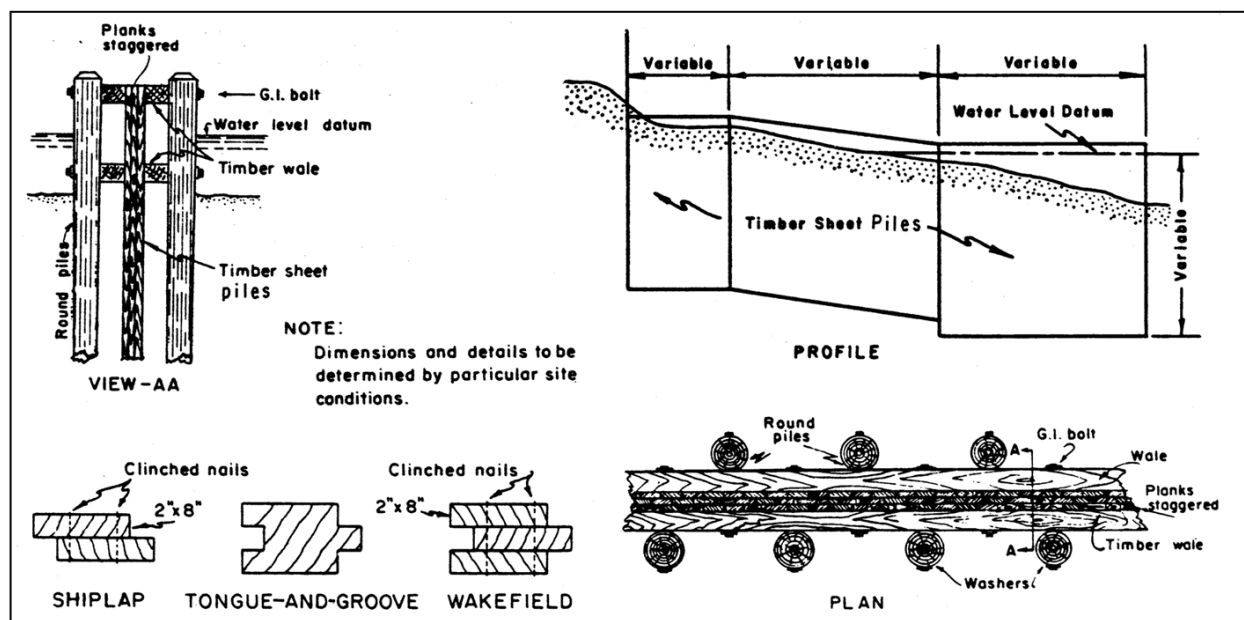


Figure 5a: Timber plank sheet-pile groin construction and materials.

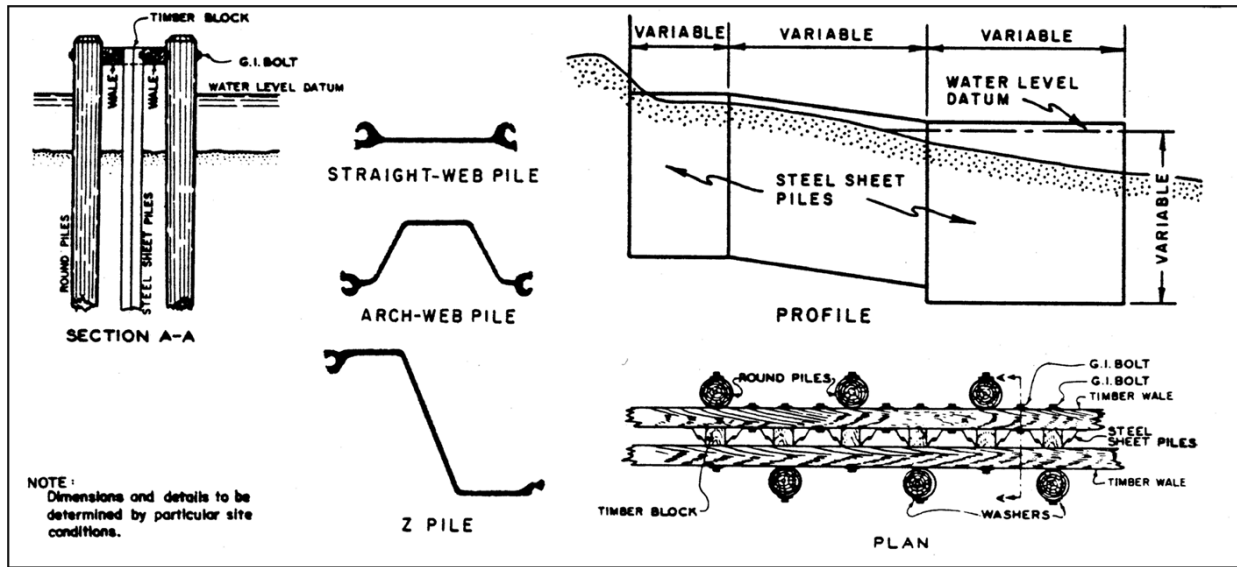


Figure 5b: Timber crib sheet-pile groin construction and materials.

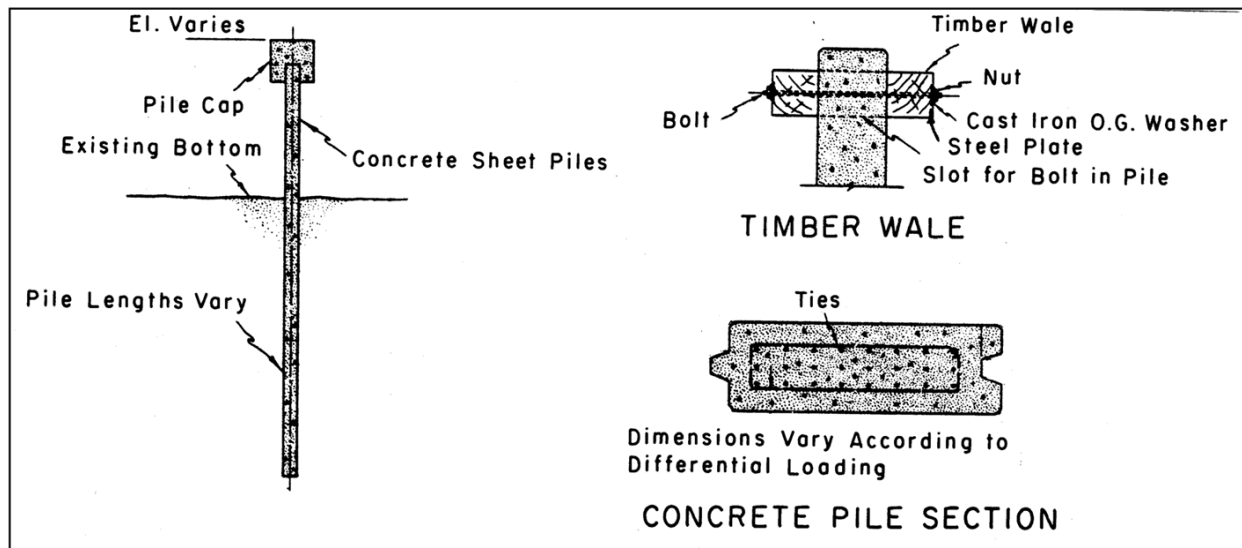


Figure 5c: Pre-stressed concrete sheet-pile groin construction and materials.

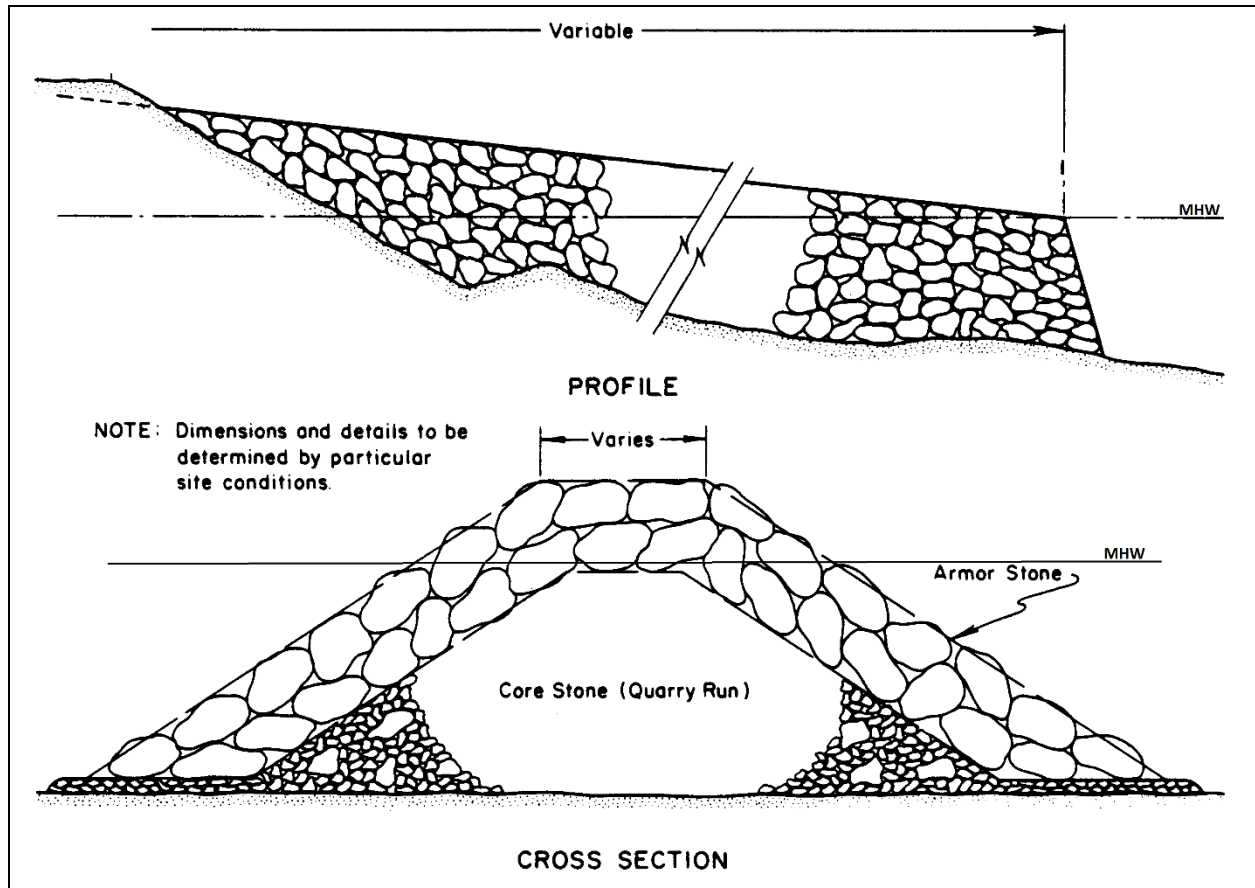


Figure 6: Rubble mound groin construction and materials.

Groins in most cases are constructed as sloping-front structures or as piled vertical face structures. The landward end of the groins must extend to a point above the high-water line in order to stay beyond the normal zone of beach movement and thereby avoid outflanking by back scour. The groins must, for the same reason, reach seawalls when present, or connect into stable back beach features. The position of the seaward end is determined such that the groin retains some proportion of the longshore transport during more severe wave conditions.

Some cross-groin transport is beneficial for obtaining a well-distributed retaining effect along the coast. For the same reason **permeable groins**, which allow sediment to be transported through the structure, may be advantageous. Examples of permeable groins include rubble-mound structures built of rock and concrete armor units without fine material cores, and structures made of piles with some spacing. Most sheet-pile structures are impermeable. Low-ridged or crested and permeable groins have the benefit of reduced wave reflection and less rip current formation compared with high-ridged or crested and impermeable groins.

Timber groins are used for smaller and less exposed applications, whereas rubble mound groins are used for all conditions. On very exposed coastlines the armor is often concrete armor units. The timber planking groin is weaker and much more vulnerable to scour failure than the timber pile groin.

5.2.2.3 Breakwaters

Detached Breakwaters:

Detached breakwaters are nearshore structures that are not connected to the shoreline. Their principal function is to reduce erosion by reducing wave energy reaching the shoreline. They are built parallel to the shore just seaward of the shoreline in shallow water depths. Multiple detached breakwaters spaced along the shoreline can provide protection to substantial shoreline frontages. The gaps between the breakwaters are, in most cases, of the same order of magnitude as the length of one individual structure.

Each breakwater reflects and dissipates some of the incoming wave energy, thus reducing wave heights on the lee of the structure and reducing shore erosion. Sediment transported along the beach moves into the sheltered area behind the breakwater where it is deposited in the lower wave energy region. The nearshore wave pattern, which is strongly influenced by diffraction at the heads of the structures, may cause a series of pocket beaches along the coastline. Once formed, the pockets will cause wave refraction, which helps to stabilize the pocket-shaped coastline.

Like groins, a series of detached breakwaters can be used to control the distribution of beach material along a coastline. Immediately downdrift of the last breakwater in the series there is an increased risk of shoreline erosion. Consequently, it might be necessary to introduce a transition section where the breakwaters are gradually made smaller and placed closer to the shoreline. In addition, seawall protection of the downdrift stretch of beach might be necessary.

Properly designed detached breakwaters are highly effective in reducing erosion and in building up beaches by taking advantage of natural littoral drift. Moreover, they are effective in holding artificially nourished beach material. However, optimizing detached breakwater designs is difficult when large water level variations are present, as is the case on coastlines with a large tidal range. Detached breakwaters are almost always built as rubble-mound structures (Figure 7). Whether or not the detached breakwaters become attached to shore (i.e., tombolo) is a function of placement distance offshore. Tombolos are more likely to form when breakwaters are constructed within the surf zone.

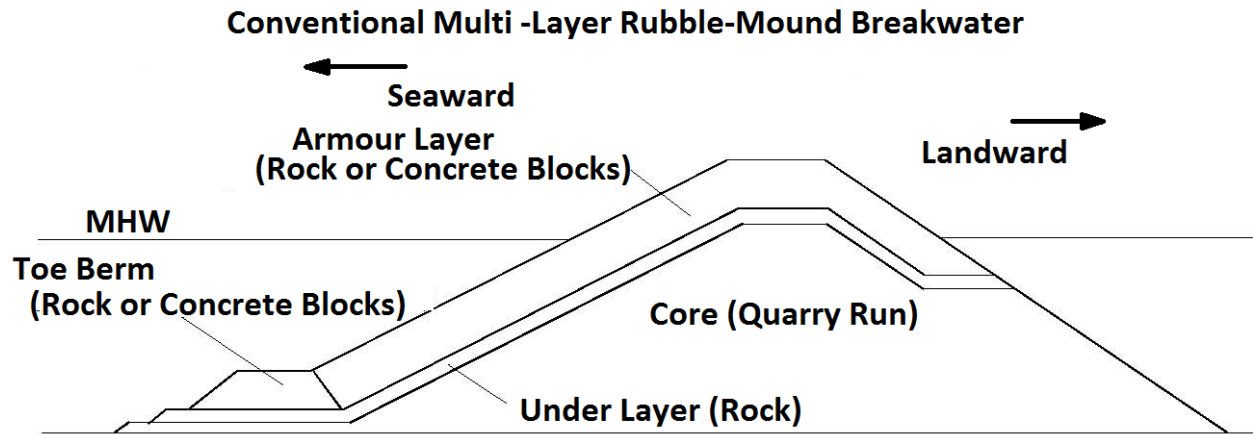


Figure 7: Conventional Multi-Layer Rubble-Mound Breakwater.

Piled Breakwaters:

Piled breakwaters consist of an inclined or vertical curtain wall-mounted on pile work. This type of breakwater is applicable in less severe wave climates on sites with weak and soft subsoils.

Floating breakwaters:

Floating breakwaters are used in protected regions that experience mild wave climates with very short-period waves. For example, box-shaped reinforced concrete pontoons are used to protect marinas in sheltered areas. Floating docks affixed to piles are also used in marinas.

5.2.2.4 Jetties

Jetties are used for stabilization of navigation channels at river mouths and tidal inlets. Jetties are shore-connected structures generally built on one or both sides of the navigation channel that extend perpendicularly from the shoreline into the water. **By confining the stream or tidal flow, it is possible to reduce channel shoaling and decrease dredging requirements. Moreover, on coastlines with longshore currents and littoral drift, another function of the jetties is to arrest the crosscurrent and direct it across the entrance in deeper water where it poses less of a hazard to navigation.** When extended offshore of the breaker zone, jetties improve the maneuverability of ships by providing shelter against storm waves. Jetties are constructed similar to breakwaters; in most cases, jetties are designed as rubble-mound structures except that the outer part must be armored on both sides.

5.2.2.5 Beach Nourishment

Beach nourishment is a structural solution used for habitat



Bulkhead with Jetty in Background

enhancement. Material of preferably the same, or larger grain size and density as the natural beach material is placed on the eroded part of the beach to compensate for the lack of natural supply of beach material. The beach fill might protect not only the beach where it is placed, but also downdrift stretches by providing an updrift point source of sand.

Groins and detached breakwaters combined with beach fills mitigate downdrift impacts and/or increase the fill life of the re-nourished beach. Together, their life-cycle costs and environmental impact may be less than if selectively implemented. Construction of beach stabilization structures without fill is likely to damage adjacent beaches.

Any coastal structure resting on, driven into, or otherwise founded on soil or sand is susceptible to scour and possible toe failure when exposed to waves and currents. Generally, scour potential around impermeable structures is enhanced in regions of flow concentration due to directed currents and/or high wave reflection. In comparison, scour potential is decreased around sloping, permeable structures.

5.2.2.6 Bulkheads

Bulkheads are vertical retaining walls constructed with either cantilevered or anchored sheet piles used to hold or prevent soil from sliding seaward (Figure 8). Their main purpose is to reduce land erosion and loss to the sea - not to mitigate coastal flooding and wave damage. For eroding bluffs and cliffs, bulkheads increase stability by protecting the toe from undercutting.

Cantilever bulkheads derive their support from ground penetration; therefore, the effective embedment length must be sufficient to prevent overturning. Toe scour results in a loss of embedment length and could threaten the stability of such structures. Anchored bulkheads are similar to cantilevered bulkheads except they gain additional support from anchors embedded on the landward side, or from structural piles placed at a batter on the seaward side. For anchored bulkheads, corrosion protection at the connectors is particularly important to prevent failures. Generally, replacement bulkheads may only be constructed to replace an existing failing bulkhead.

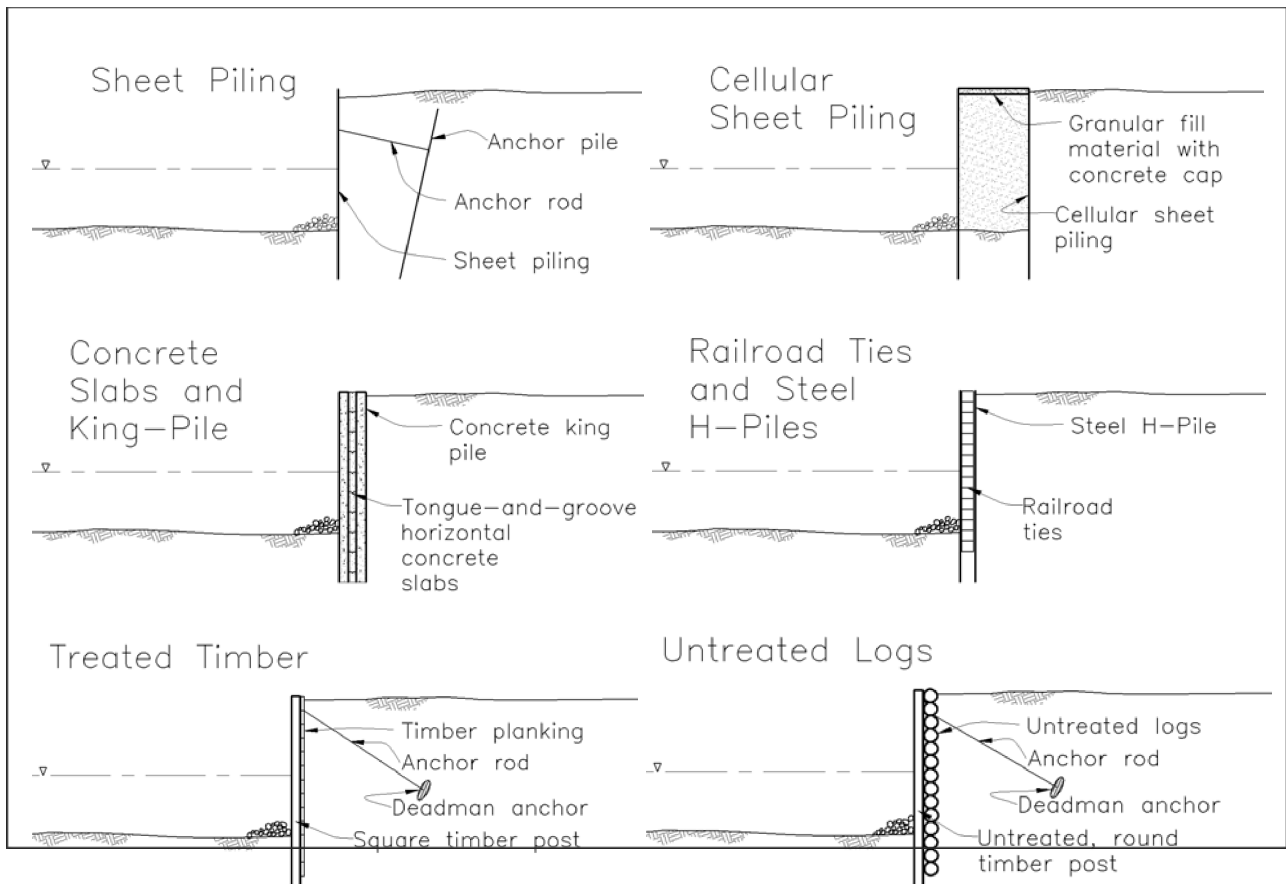


Figure 8: Typical bulkhead types, their construction design, and materials used.

The primary purpose of bulkheads is to hold land or fill in place and prevent shore side losses. A secondary purpose is to protect the land from wave attack. The strength of a bulkhead to protect against wave attack is provided almost solely by the fill, and if this material is lost, the bulkhead has no practical mechanism to adequately protect against waves (Figure 9). **Therefore, two critical elements of a good bulkhead design that prevent or limit loss of backfill are: return walls at the alongshore ends of the structure to prevent high water from washing material away from behind the structure; and geotextiles to allow water, but not fines, to flow through the structure.** Drainage of water through, behind, or laterally away from the structure is important to relieve pore pressure from excessive rainfall or overtopping. Drainage can be provided by drilling weep holes in the structure's face to allow water to seep out.

Steel and timber sheet piling are the most commonly used bulkhead material. **Steel sheet piles are individual sheets that can be interlocked and driven into hard, dense soils.** The interlocking nature of individual steel sheet piles helps to limit erosion losses of backfill through the bulkhead. However, good design practice also includes installation of a geotextile or gravel filter between the bulkhead and the backfill to further prevent sediment losses. Filters are

particularly important for timber bulkheads because they lack an interlocking mechanism. However, overlapping timber sheets in a two-to-three-layer technique can often limit the pathways for sediment to travel. An often-encountered difficulty in installing geotextiles is depth of placement. For sheet piles that are driven, placing the geotextiles the full depth of the structure is practically impossible through the structure below the depth of the filter cloth. The loss of the backfill at a timber bulkhead from water (e.g., rain and/or wave overtopping) seeping and carrying sand through the bulkhead below the depth of the filter or below the depth of the timber piles is a common damage mechanism (Figure 9).

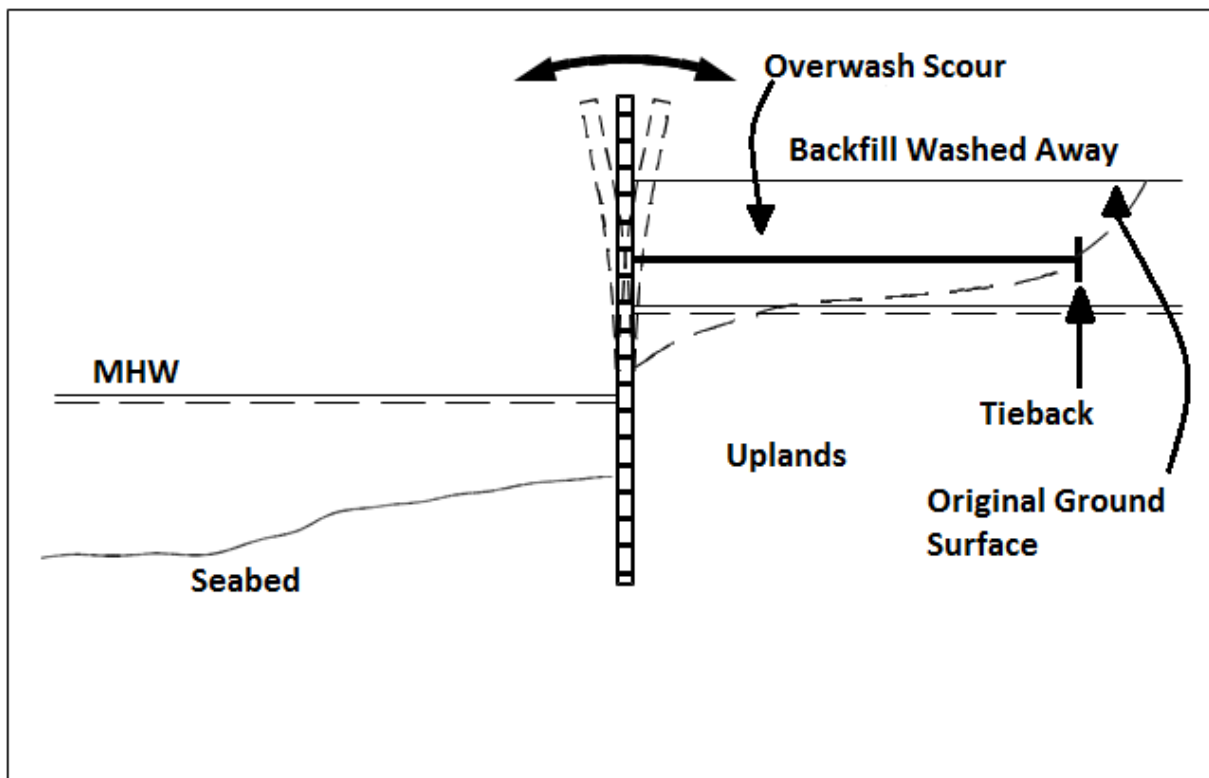


Figure 9: Typical Bulkhead and Shoreline Failures.

5.2.2.7 Scour Protection

Scour protection on the seabed is primarily meant to prevent coastal structures with foundations from becoming unstable due to scouring or erosion of the underlying seabed or beach sediment. Both granular material and clay can be eroded by the action of waves and currents. Scour potential is especially enhanced by a combination of waves and currents. In most cases, scour protection consists of appropriate size stone on geotextile filter. Scour protection is commonly used at the toe of seawalls and dikes, and in some instances is needed around piles and pillars, at the toe of vertical-front breakwaters, and at groin heads. Scour protection might also be needed along structures (e.g., breakwaters extending from the shoreline) that concentrate or increase current strength. Highly reflective structures, such as impermeable

vertical walls, are much more susceptible to near-structure scour than sloping rubble-mound structures.

5.2.3 DEPICTIONS OF FAILURE MODES OF TYPICAL STRUCTURE TYPES

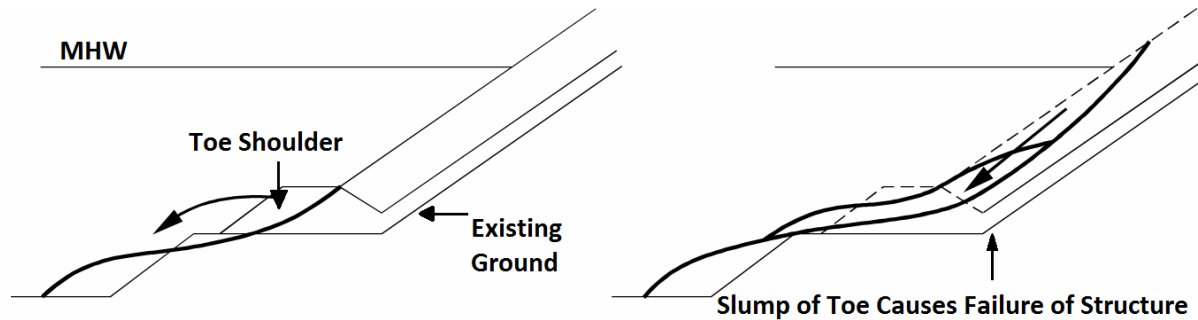


Figure 10: Failure of main armor due to erosion of toe berm stone.

- Erosion starts at the “shoulder” of the toe and progresses towards the foot of the main armor. The toe functions as support for the main armor, as long as the toe erosion does not cause undermining of the armor.
- Undermining of the armor layer causes sliding of armor units, which eventually only armor the remaining part of the toe.

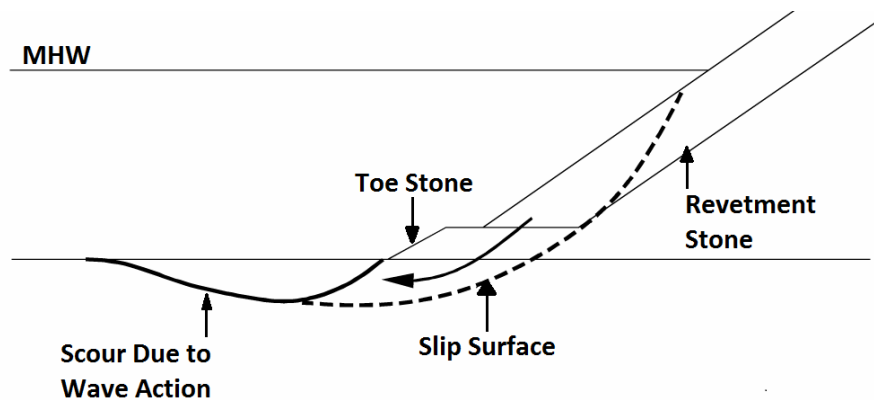


Figure 11: Sliding of main armor due to seabed scour causing revetment failure.

- A scour hole may form close to the foot of the structure due to wave and current action, which may reduce the stabilizing effect of the toe. The toe functions to support the main armor; as long as toe erosion does not cause undermining of the armor, the structure will remain stable.
- Reduced stabilizing forces causes slip failure which results in sliding of the armor.

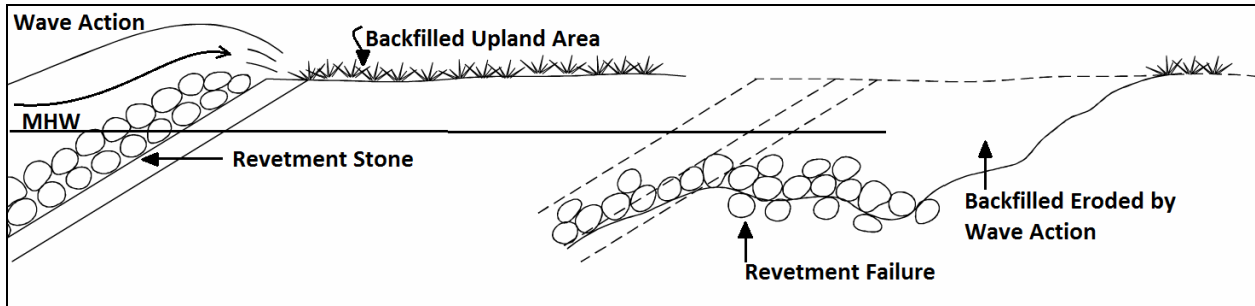


Figure 12: Back scour failure due to overtopping of revetment.

- Excessive overtopping of a seawall may cause erosion of uplands backfill.
- Subsequent collapse of the top of seawall structure may follow.

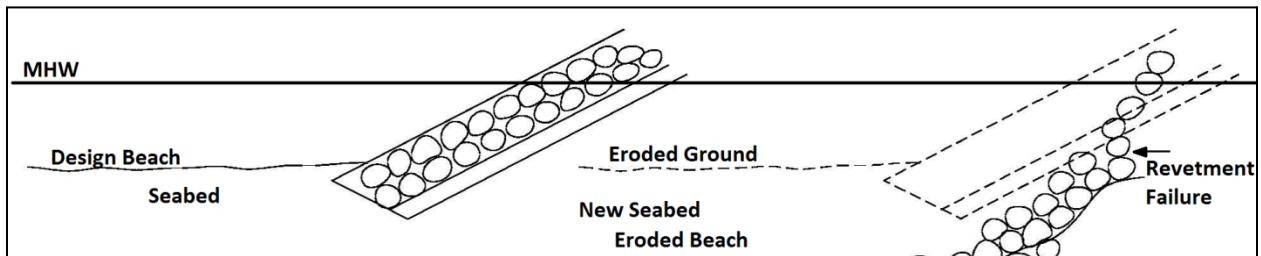


Figure 13: Toe erosion failure of rubble slope revetment.

- Lowering of beach level below design level in front of the revetment.
- Subsequent undermining and sinking of the stone revetment material into the beach.

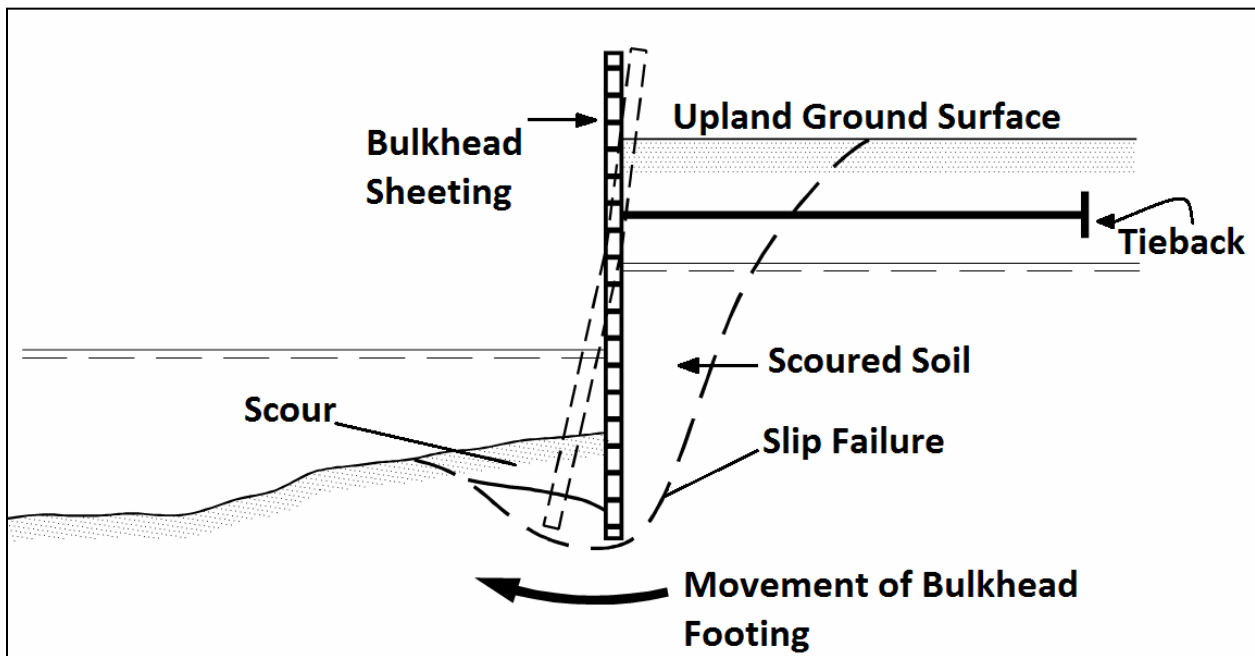


Figure 14: Toe scour undercut and rotation of sheet wall

- Toe scour and undercutting reduces/eliminates the passive pressure from the soil.
- When the active soil pressure and the pressure from the groundwater exceed the passive pressure, rotation of the wall may occur.

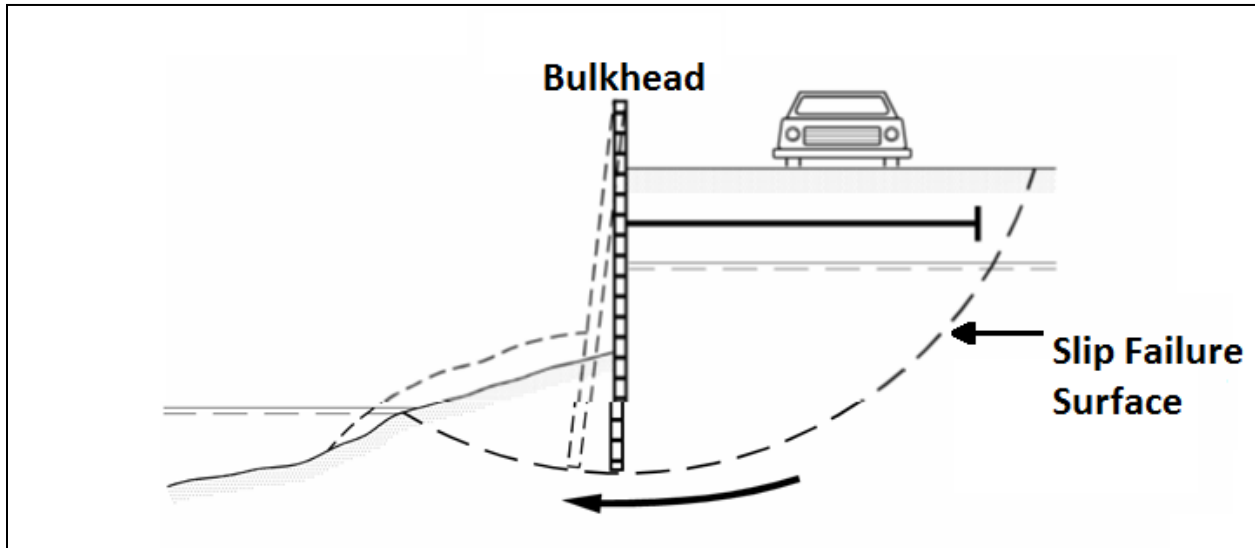


Figure 15: Rotational slip failure.

- Rotational slip failure occurs when the driving movements from the weight of the soil and the surface loads exceed the restoring moment given by the soil strength.

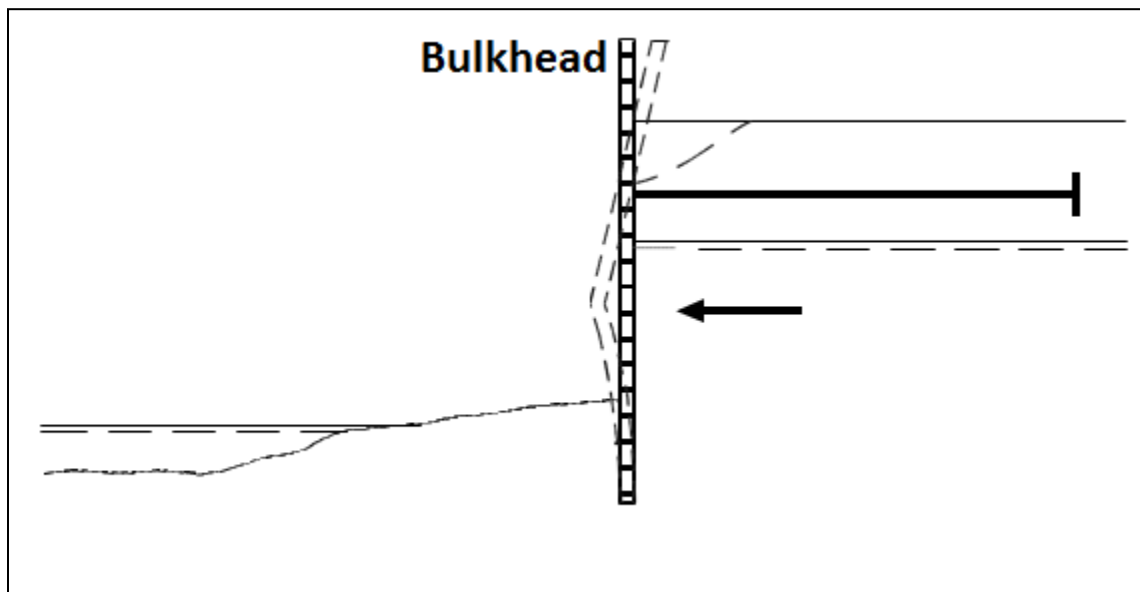


Figure 16: Yielding in sheet wall.

- Failure may occur as a result of yielding in the sheet wall due to stress exceeding the strength.

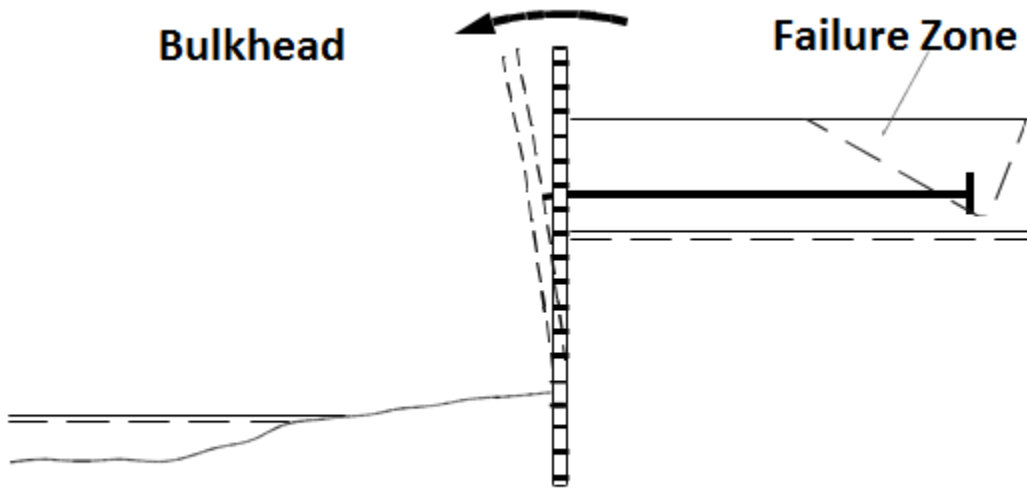


Figure 17: Anchor pullout and seaward tilt of sheet wall.

- Excess loads from active soil pressure and a high groundwater table or the use of wall anchor slabs that are undersized might lead to anchor pullout and subsequent collapse of the sheet wall.

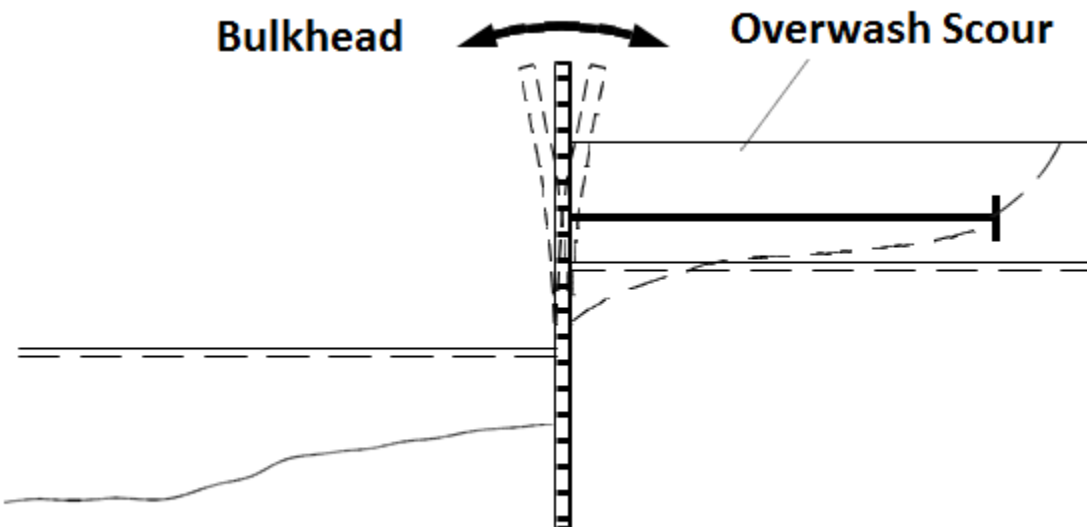


Figure 18: Overwash scour and failure of sheet wall.

6. MARINE CONSTRUCTION

6.1 GENERAL DESIGN GUIDELINES AND REGULATORY REQUIREMENTS

The following information is to be considered general guidelines only.

6.1.1 FLOATING STRUCTURES

The mooring/anchoring system of a floating structure is critical to a successful design.

Mooring systems fail when the mooring lines break or separate from the connection points, or when the anchoring method does not resist the mooring loads. Dead weight anchors rely primarily on anchor mass with additional help from frictional resistance between the anchor and soil. Penetration anchors rely on soil shear strength to resist pullout under load conditions. Extreme loads may cause anchors to drag or pullout, but the floating structure may survive intact at a displaced location. Failure occurs if the structure displacement results in the floating structure breaking up, suffering impact damage, or becoming irretrievable. Similar damage can occur to pile-supported floating structures when the piles fail, or the floating structure breaks free of the pilings.

Many floating structures have compartments of entrapped air that provide necessary buoyancy. If these compartments flood, the structure may sink. Flooding can occur because of impact damage, construction material failure, excessive structure tilting, or wave overtopping. Material used to fabricate individual floating sections must be able to withstand wave slamming forces, vessel impacts, marine corrosion, and concentrated loading at connection points and mooring points. Floating sections fabricated with concrete must be able to withstand deterioration. Damage to the floating section construction material may lead to flooding of the unit, displacement of the section from its moored location, or rendering the section unsafe for traffic.

Many floating structures consist of several units joined with flexible connections. These connectors must be able to resist transmitted force and moment loads induced by environmental loading and differential movements between floating sections. Failure of the connectors results in a substantial decrease in the structure's functionality.

Floating structures used in coastal engineering applications have four different failure modes associated with structural design:

- Failure of floating sections;
- Failure of floating section connectors;
- Failure of anchor system or pile supports;
- Flooding and sinking.

Finally, floating structures may fail because they do not perform at the expected level. For example, a floating breakwater that does not reduce wave heights sufficiently and a floating boat slip with excessive motion would both be considered failures.

6.1.2 PILE STRUCTURES

The most common pile structures in coastal engineering are bridge piers extending from the shore into the water where they are exposed to loads from waves, currents, and in cold regions, ice. The purpose of pile structures might be to provide open coast moorings for vessels, in which case the deck and the piles must carry loads from traffic, cranes, goods, and pipeline installations. Piers are also used for recreational purposes by providing space for fishing, outlook platforms, restaurants, shops, etc. The supporting pile structure might consist of slender wood, steel, or reinforced concrete piles driven into the seabed, or of large diameter piles or pillars placed directly on the seabed or on pile work, depending on the bearing capacity and settlement characteristics of the seabed. Large diameter piles would commonly be constructed of concrete or be steel pipes filled with mass concrete. Pillars would most commonly be constructed as concrete caissons, concrete blockwork, or backfilled steel sheet piling.

6.1.3 PIERS AND BULKHEADS

6.1.3.1 Regulatory Requirements for Private Piers in Maryland

Maryland Tidal Wetlands Regulations (COMAR 26.24.04.02) specify the required criteria for building private, noncommercial fixed or floating piers, watercraft hoists or lifts, mooring piles, platforms, and osprey nesting poles. These regulations were put in place to allow private riparian (tidal waterfront) property owners to access tidal wetlands for water-dependent activities such as boating, water skiing, fishing, crabbing and other such activities. The regulations provide private riparian property owners rights to and reasonable access to State owned waters.

It is important to note that the regulations for private piers do not prescribe the method of constructing piers or other structures and do not specify the types of materials to be used in construction. Rather, the regulatory criteria for piers are aimed at minimizing the impacts to tidal wetlands, water quality, wildlife, and fish, while at the same time allowing for navigation and use by neighboring property owners.

It is up to the property owner and the marine contractor to build a structure that is



Private Pier

sturdy, safe and accessible. Generally, county building codes also enforce construction methods and materials for private and marina piers and other structures in tidal wetlands.

The Maryland Department of the Environment is charged with issuance of tidal wetland permits and licenses for the construction of piers and related structures. MDE, in its review of applications to construct piers and related structures, must consider the structure's effect on shallow water habitat of various plants and animals such as submerged aquatic vegetation (underwater grasses), shellfish, or vegetated emergent tidal wetlands.

It is critical for the marine contractor to have a thorough understanding of the regulatory requirements when designing a pier or other structures for a potential client. If a marine contractor knows and understands what is allowed to be authorized by MDE and the local jurisdiction prior to meeting with clients, it will save time and money overall for both the contractor and the customer.

The following list includes some of the criteria MDE currently uses to evaluate applications for a license or permit to construct a private non-commercial pier. Please contact MDE and/or review the pier regulations for the most up-to-date regulatory requirements. Maryland's regulations are accessible at: <https://dsd.maryland.gov/pages/COMARHome.aspx>

MDE review criteria for private non-commercial piers:

- **The main section of the pier may not be wider than 6 feet.**
- **A pier must meet the minimum property line setbacks established by the local jurisdiction where the pier is proposed. If there is no local setback established, then MDE will require a setback of at least 10 feet from the extended property lines.**
- **The pier may not impede navigation or block ingress or egress of neighboring properties.**
- **The pier may not obstruct the flow of the tide.**
- **A pier may not extend within 100 feet of a ski course approved by MDE.**
- **A pier may not extend more than 25% across a waterway.**
- **A pier may include a maximum of six mooring piles.**
- **A pier may include a maximum of six slips, of which no more than four may be used for boat slips or lifts. The remaining two slips may be used for personal watercraft slips or hoists.**
- **A pier constructed over vegetated tidal wetlands must be no more than three feet wide and a minimum of three feet above the substrate (ground level); and once over open water, the pier may be up to 6 feet wide.**

- The total area of fixed or floating platforms includes the area of the main pier to which the platform is attached.
- A maximum of two three-foot wide finger piers may be connected to the main pier.
- Existing grandfathered boathouses may be maintained, no new private boathouses may be constructed in or over State or private wetlands.

6.1.3.2 Example of Typical Requirements Timber Bulkhead and Pier Construction

For the construction of bulkheads and piers, the contractor shall furnish all labor, materials and equipment necessary. The following is an example of typical specifications and materials used for a timber bulkhead project in Maryland:

- **General Quality:** Piles shall meet the requirements of the ASTM D25 “Standard Specifications for Round Timber Piles”, except as modified by the Drawings and Specifications. Piles shall be cut from sound, live trees and be free from decay and insect attack. Piles shall be cut above the ground swell and have a gradual taper from the butt to the tip or from three feet below the butt to the tip.
- Piles shall be free from defects such as holes, scars, checks, shakes, splits, twists of grain, compression wood and knots as required by ASTM Specification D25.
- **Sizes:** Length of piles, minimum butt and tip diameter, minimum butt and tip circumference, and pile taper shall be as specified in the Drawings.
- **Sapwood:** Piles shall have a minimum sapwood thickness of three inches. The sapwood shall be measured continuously along the radius at the mid-point of the length and at the butt of the pile.
- **Straightness:** Front wall piles (vertical and batter, if applicable) shall be within a straightness requirement where a line drawn from the center of the tip to the center of the butt does not fall outside the center of the pile at any point by more than 1 1/4 % of the length of the pile or shall lie entirely within the body of the pile, whichever is less. For anchor piles (if applicable), a line drawn from the center of the tip to the center of the butt shall lie entirely within the body of the pile.
- **Peeling and Cutting:** Prior to treatment, piles shall be clean peeled of all outer bark and at least a minimum of 80% of the inner bark. The butts and tips of piles shall be sawed square with the axis of the pile. The allowable tolerance shall be 10% square.



Timber Bulkhead

- All timbers, dimension lumber, and boards shall be graded and carry an identifiable grade mark in accordance with the Grading Rules of the Southern Pine Inspection Bureau. All timber shall be Southern Yellow Pine and be free from all defects which will impair its strength and/or durability.

The in-place length of lumber shall be as shown on the drawings. All lumber shall comply with the following specifications:

Timber Bulkhead:

- **Wales and Butt Blocks:** Grade No. 1 minimum, (MC greater than or equal to 19%), Fb = 1,500 psi minimum before treatment, and surfaced on four sides (S4S).
- **Sheeting and Corner Boards:** Grade No. 1 minimum, (MC greater than or equal to 19%), Fb = 1,400 psi minimum before treatment, tongued and grooved (T&G), and surfaced on one or two sides (S1S or S2S).
- **Capboards, Liner and Bumper Boards:** Grade No. 1 minimum, (MC greater than or equal to 19%), Fb = 1,200 psi minimum before treatment, and surfaced on four sides (S4S).

Timber Pier, Boardwalk & Loading Platform:

- **Split Pile Caps/Cantilever Beams:** Grade Select Structural, (MC greater than or equal to 19%), and surfaced on two narrow sides only (S2S).
- **Stringers:** Grade No 1. minimum, (MC greater than or equal to 19%) before treatment, and surfaced on two narrow sides only (S2S).
- **Decking:** Grade No 1. minimum, (MC greater than or equal to 19%) before treatment, and surfaced on two narrow sides only (S2S).

All hardware to be used for the construction of the timber bulkhead shall be manufactured from good, commercial quality material and shall meet the minimum, requirements of the following specifications:

- Bolts shall be hot forged with hexagonal heads and meet ASTM specification A-307 for Grade A steel.
- Nuts shall be hexagonal heads and meet ASTM specification A-307 for Grade A steel.
- NYDD Washers and Standard Cut Washers shall be fabricated from a commercial grade steel and shall conform to ASTM Specification Designation F844-83 with the exception that galvanizing shall be as outlined in these specifications.
- Nails, spikes, tie-rods, bolts and similar fastenings shall be furnished and placed as required. Where information is not given on drawings, the type and size of the fastenings shall be such as to draw the members into place and securely hold them in position.

- Spikes and nails and other parts coming under the heading of “Hardware” shall be composed of carbon steel and shall meet the requirements of Federal Specifications FF-N-105.
- All of the above hardware shall be hot-dipped galvanized in accordance with ASTM designation A-153. The zinc coating shall be Class A and a minimum of 2.0 ounces of zinc per square foot of hardware surface.
- Threads on all tie rods and threaded fasteners shall be of the rolled or cut type. All threads shall be cut prior to galvanization.

Weather Guards:

- Durable weather resistant pile caps shall be used on all vertical wall piles. They shall be molded from 3/16-inch thick, ultraviolet resistant, low-density polyethylene or an approved equivalent. Cap sizes shall be selected to fit properly without subjecting the piles to excessive trimming.
- In order to ensure minimal trimming of pile tops for proper caps fit, the Contractor shall measure each pile top after cut-off and prior to ordering respective pile caps. The method of measuring pile tops shall consist of taking the average of the minimum and maximum diameter per pile and ordering the individual caps to the least half or whole inch increment. The pile tops shall be square cut and the end grain coated with asphalt roofing cement, as outlined in these specifications. Drill 5/32-inch pilot holes no more than 2 inches on centers around the circumference of the cap skirt. The caps shall be then fastened in place with 10 gauge, 1 ¼ inch copper roofing nails.
- Top of anchor piles, unexposed pier piles, ends of wale splices and top ends of sheeting shall be treated with two (2) coats of asphalt roofing cement to a minimum thickness of 1/8 inch, or approved equal.

Miscellaneous Materials:

- **Water-borne preservative solution of CCA-Type C for the treatment of field cuts, trimmed areas and holes, shall meet the requirements of AWWA M4-91, “Standard for the Care of Preservative Treated Wood Products”.**

For Example Only

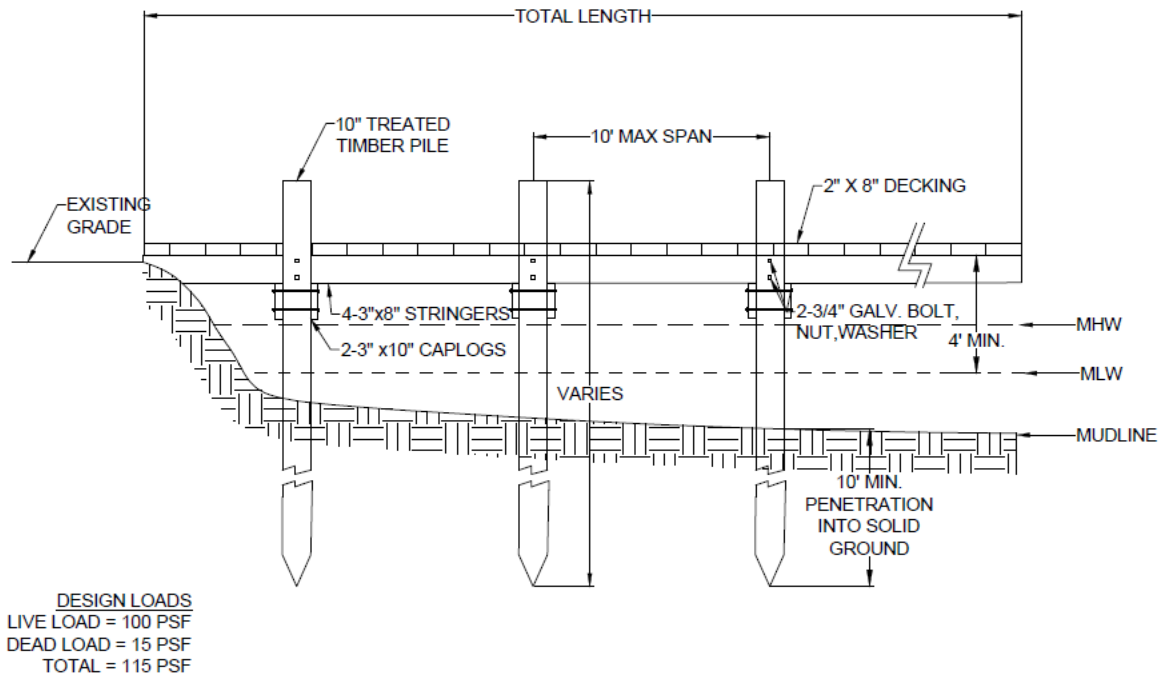


Figure 1: Typical Pier Elevation.

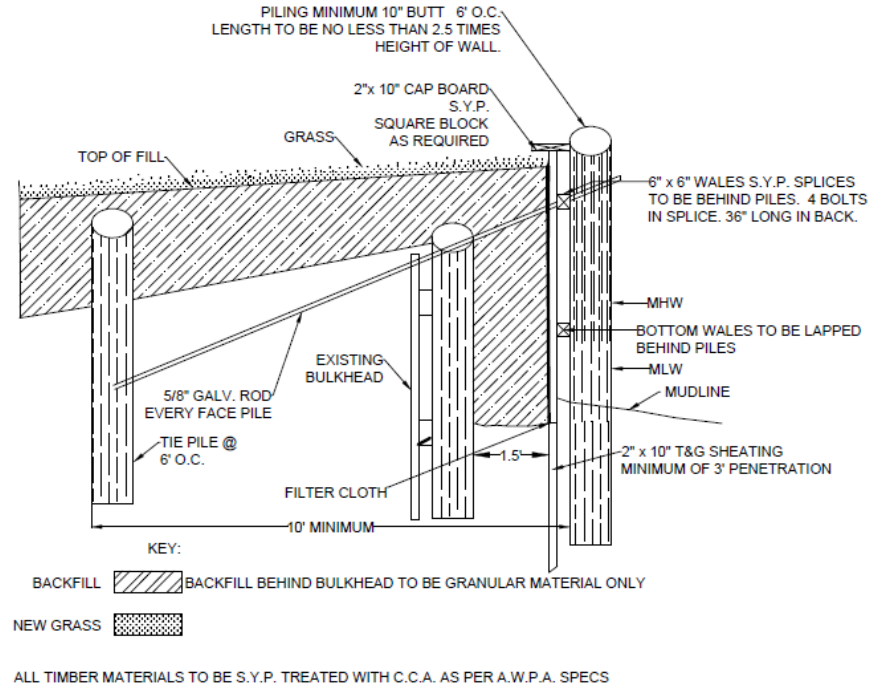


Figure 2: Typical Replacement Bulkhead Cross Section 3' to 5' High.

6.1.4 BOAT LIFT CONSTRUCTION

Boatlifts are manufactured in many different capacities and configurations, from manually operated models to lift small canoes and kayaks to large capacity models designed to lift heavy commercial or recreational vessels.

No matter what model lift, the marine contractor needs to be thoroughly familiar with the manufacturer's recommendations for installation. The contractor would need to know specifications for pile size and minimum pile penetration, proper installation techniques, and customer operating instructions including safety instructions and support.

A licensed electrician is needed to install proper wiring and electrical safety equipment for each lift. The contractor must ensure that all safety decals are installed and legible prior to customer operation of the lift. *However, if electrical work is done below the waterline, then the contractor must also be a licensed marine contractor.*

6.1.5 MARINA CONSTRUCTION

The State's Tidal Wetland Regulations (COMAR 26.24.04.03) contain guidelines for the siting and development of new and expanding marinas. As with other activities requiring permits within state tidal wetlands, a project must first avoid and then minimize the loss of tidal wetlands. **One requirement includes strong flushing characteristics of the receiving water body.** Tidal flushing is nature's cleaning cycle. When the tide rises, it pushes fresh, clean water in. This mixes with the water already there, and when the tide falls, it carries the old or stagnant water back out. **Other requirements include minimum natural depths of 4.5 feet at mean low water; and no adverse impacts to submerged aquatic vegetation, productive macro-invertebrate communities, shellfish beds, fish spawning or nursery areas, rare, threatened or endangered species, species in need of conservation, or historic waterfowl staging areas.**

In general, expansion of existing facilities is preferred over the development of new marina sites. Detailed information must be submitted along with the tidal wetlands license or permit application for new or expanding marinas, including the following:

- **An alternatives analysis outlining the potential impacts on water quality, tidal wetland values, and aquatic habitat;**
- **A description of the marina facility;**
- **Techniques to minimize the adverse environmental impacts of the facility;**
- **A description of existing site characteristics such as water quality;**
- **Location of boat repair and maintenance activities;**
- **A flushing study for any basins dredged into uplands, and;**

- A description and plan for managing storm water runoff. Also, the permit must address boat pump-out facilities, vessel mooring facilities and conform to any existing local marina management plans. Additional information may be required depending on the scope and size of the proposed project.

6.1.5.1 General Discharge Permit for Discharges from Marinas including Boat Yards and Yacht Basins

A discharge permit may be required for facilities that rent boat slips, store boats, and perform a range of other boating services including cleaning and incidental repair.

These types of facilities include:

- Marinas
- Boat yards that provide storage and incidental repair
- Boat clubs with marinas
- Sailing clubs with marinas
- Yacht clubs with marinas

Any facility fitting the above category which provides or allows boat maintenance (including boat rehabilitation, mechanical repairs, painting, fueling, and lubrication), or equipment cleaning operations (i.e. pressure washing of boat bottoms) requires this discharge permit. This discharge permit is not required for the washing of docks or the retail sale of fuel if there are no other boat maintenance or equipment cleaning operations.

This permit is site-specific and it is up to property owner's discretion whether they or the persons (i.e. contractors) performing the boat maintenance apply for coverage under this permit.

For a complete list of requirements with regards to the construction of a new marina or marina expansion refer to COMAR 26.24.04.03.



Marina

6.1.6 DREDGING

6.1.6.1 Application Preparation and Submittal

The following information is taken directly from the Dredging Master Plan developed by the Navigation and Dredging Advisory Group and last edited in 2010 by Cornelia Pasche Wikar. In addition to the requirements of COMAR 26.24.02.02, an applicant proposing to maintenance dredge, or to dredge to maintain existing use in State or private tidal wetlands, shall submit the following information at the time of application (COMAR 26.24.03.01):

- A plan depicting the dimensions, including the existing and proposed depths and location of the main channel and all the spur channels proposed to be dredged;
- Quantity of material to be dredged;
- Documentation detailing when the site was last dredged and the dimensions of the channel, if applicable;
- Evidence of historical boat use since January 1, 1972;
- Texture characterization of material to be dredged, and;
- Dredge material placement information in accordance with Regulation .03 or .05.

Except for emergency dredging projects as determined by the Department, a map depicting the following items must also be provided:

- **Current submerged aquatic vegetation populations within the area to be dredged, and a 500-yard buffer, if applicable;**
- **Date of the submerged aquatic vegetation survey;**
- **Method of sampling, and;**
- **Justification for classifying the proposed maintenance dredging as an emergency.**

The Department may recommend that a wetland license contain a condition to allow for periodic maintenance dredging of quantities less than 500 cubic yards.

6.1.6.2 Design Requirements

COMAR 26.24.03.02 requires that:

- Dredging of channels, canals, and boat basins shall be designed to provide:
 - Adequate flushing and elimination of stagnant water pockets, and;
 - A demonstrated public benefit.
- Navigational access projects shall, when possible, be designed to use piers to reach deep waters rather than to use dredging.

- Navigational access channels to serve individual or small groups of riparian landowners shall be designed to prevent unnecessary channels. A central access channel with short spur channels shall be considered over separate access channels for each landowner.
- **Navigational access channels shall be designed to minimize alteration of State or private tidal wetlands.** The channel shall provide a minimum width, length, and depth consistent with historic boating use or access. The channel alignment shall make maximum use of natural or existing channels and bottom contours.
- **The alignment of the channel shall first avoid and then minimize impacts to shellfish beds, submerged aquatic vegetation, and vegetated tidal wetlands.** When feasible, the alignment shall be located the maximum distance feasible from shellfish beds, submerged aquatic vegetation, and other vegetated tidal wetlands.
- New channels through uplands, canals, or basins connecting to State waters for navigational access shall be considered only when the:
 - Applicant is a riparian landowner who demonstrates a need for access to State waters;
 - Proposed channel represents the smallest dimensions necessary to connect a basin created from upland, or is a public boat ramp to navigable waters if all other requirements of this subtitle are met, and;
 - Proposal is the best alternative means of providing reasonable access to navigable waters or no other alternative location exists that would cause less destruction or alteration of tidal wetlands.
- New channels shall be designed to comply with Maryland water quality standards and to avoid pockets of stagnant water having inadequate tidal flushing. The channel design shall include provisions for adequate water circulation.
- Upland excavation that would open to State waters shall be performed in the dry and the banks shall be stabilized through wetland creation or the placement of stone before a connection to tidal wetlands is made.
- Provisions shall be included in the design for protection of the channel or canal banks against erosion by waves and boat wakes.
- Dredging to obtain material for beach nourishment may be approved if an environmental analysis determines there will be no adverse impacts to the environment, and the requirements of Regulation .06 of chapter 26.24.03.02 are fulfilled.
- Dredging for sand, gravel, or fill material **may be approved when an environmental analysis determines that there will be no adverse impact on the environment, and no alternative fill material is available.**

For a complete list of all regulations as they relate to dredging activities, refer to COMAR 26.24.03.

6.1.6.3 Innovative Reuse and Beneficial Use of Dredged Material

On an annual basis, approximately five million cubic yards of sediments are dredged in Maryland's portion of the Chesapeake Bay. These operations are vital for keeping Baltimore's Harbor navigation channels open. Finding environmentally responsible solutions for managing this material is a priority for the State of Maryland. MDE published a guidance document, with public involvement, to facilitate dredged material reuse in a manner protective of public health and the environment:

https://mde.maryland.gov/programs/marylander/Documents/Dredging/FINAL_IBR_GUIDANCE_12.05.2019_MDE.pdf

7. CONTRACT ADMINISTRATION, WAGES, INSURANCE AND REGISTRATIONS

7.1 CONTRACT ADMINISTRATION

Maryland's Marine Contracting program is similar to the Maryland Home Improvement Commission's (MHIC) mandates regarding contract requirements and processes. Once the client and/or property owner has authorized construction to be performed, it is advisable to enter into a contract between the parties to confirm an understanding of the scope of work to be completed, limitations, and payment schedule. **Binding marine service contracts:**

- **Must be in writing and legible;**
- **Must contain the name, address, and license number of the contractor, and salesperson;**
- **Must contain a description of the services to be performed, materials to be used and the dates of service;**
- **Must clearly state the agreed-upon price of the service to be provided;**
- **Must describe each document incorporated, and;**
- **Must be signed by each party to the agreement.**

A signed copy of the agreement must be provided to the purchaser prior to the start of work.

Pursuant to § 8-617 of the Business Regulation Article, Annotated Code of Maryland, a marine contractor may not demand or receive any payment before a contract is signed. Furthermore, a marine contractor may not receive a deposit of more than 1/3 of the contract price prior to the execution of the contract. The remainder of the payment terms is subject to negotiation between the marine contractor and the purchaser.

Marine service contracts may be subject to the terms of Maryland's Door-to-Door Sales Act, which offers the purchaser an opportunity to cancel the agreement without penalty or obligation within five (5) business days following contract signing. Additionally, if the buyer of marine contractor services is at least 65 years old, they may cancel the agreement within seven (7) business days. Applicability is determined by how and where the sale was solicited. Contractors with contracts subject to the Act are to append a prepared Notice of Cancellation. This Notice must comply with § 14-302(1)(ii) of the Commercial Law Article, Annotated Code of Maryland, for the purchaser's use to assure receipt of notification of the dissolution of contracts in a formalized and consistent manner. The notice is to contain a description of the purchaser's rights and the process for contract termination. If the notice is not appended to the contract, the purchaser may notify the contractor of the contract dissolution by a method of their

own choosing. Any deposit provided by the purchaser under a legally dissolved contract must be returned to the purchaser by the contractor within 10 days of notification of contract dissolution.

In instances where a lien is a potential penalty for non-payment, the following language must also be included in the contract:

"This contract creates a mortgage or lien against your property to secure payment and may cause a loss of your property if you fail to pay the amount agreed upon. You have the right to consult an attorney. You have the right to rescind this contract within 3 business days after the date you sign it by notifying the contractor in writing that you are rescinding the contract."

7.2 WAGES

7.2.1 MARYLAND'S MINIMUM WAGE

As noted in Title 3, Subtitle 4, of the Labor and Employment Article, Annotated Code of Maryland, **most employees must be paid the Maryland State Minimum Wage Rate.** Notable exceptions to the field of Marine Contracting include, but are not limited to, executives, administrative and professional employees, and outside salesmen. **Furthermore, employers in some counties may be required to pay their employees at higher minimum wage rates than the state minimum.**

For more details see: <https://www.dllr.state.md.us/labor/wages/>

7.2.2 OVERTIME

Section 3-415 of the Labor and Employment Article, Annotated Code of Maryland, mandates that an employee subject to the Minimum Wage Act of Maryland shall be paid overtime compensation, at the rate of 1.5 times the regular hourly rate which the employee is paid, for each hour worked in excess of 40 hours per work week. "All hours worked by an employee for the same employer are included" in the total hours worked, even if the employee performs "work in two or more unrelated jobs" for the employer. If the total work week hours do not exceed forty, "an employee is not entitled to overtime compensation for hours worked in excess of 8 on any day, including Saturday, Sunday, and holidays."

Employers are required by law to retain pay records for a minimum of three (3) years and to post wage information, including but not limited to, rates and how to file a formal complaint, in a conspicuous area of the workplace for the benefit of employees. Posters and additional information can be obtained online at:

<http://www.dllr.state.md.us/labor/wages/wagehrfacts.shtml>

7.3 INSURANCE AND BONDING

7.3.1 WORKERS' COMPENSATION INSURANCE

Employers, with very few exceptions, in the State of Maryland are required by law to obtain workers' compensation insurance from an authorized insurance company licensed to write workers' compensation insurance. As an alternative, the employer can become self-insured with prior approval of the Workers' Compensation Commission. The full cost of workers' compensation insurance must be borne by the employer and may not be passed on to the employee. Employers that fail to secure workers' compensation insurance or deduct any portion of the premiums from the wages of eligible employees shall be guilty of a misdemeanor, and subject to a fine of not less than \$500 or more than \$10,000, imprisonment for up to one year, or both.

According to the Maryland Workers' Compensation Commission in the State of Maryland, workers' compensation insurance is designed to provide assistance to employees that acquire an occupational illness or suffer an "accidental personal injury arising out of and in the course of employment."

The condition of "arising out of and in the course of employment" refers to the following criteria:

- The job requirements and conditions under which the work is required to be performed by the employer provides the exposure to risk or danger that causes the worker's injury.
- The injury occurs when an employee is performing their job duties, or functions related to them, while at "the employer's place of business or another work location designated by the employer."

If an employee sustains a disability (resulting from an accident) for a period of more than three (3) days, the employer must report the accident to the Workers' Compensation Commission on a "First Report of Injury" form within 10 days after oral or written notice of the accident. The employer must also submit copies of the "First Report of Injury" to his insurance carrier and to the Department of Labor, Licensing & Regulation, Division of Labor and Industry MOSH Research and Statistics.

General questions on reporting compliance and requirements **can be directed to the** Workers' Compensation Commission Insurance, Compliance, & Reporting Division by phone at 410-864-5293 or by email at wccinsur@wcc.state.md.us.

Detailed information on procedures and claim eligibility can be obtained online at: http://www.wcc.state.md.us/Gen_Info/WCC_Benefits.html

Reporting forms, and addresses for submittal, can be obtained online at: <http://www.wcc.state.md.us/>

7.3.2 LIABILITY, PROPERTY AND OTHER INSURANCE

Commercial General Liability (CGL) insurance is designed to protect the insured “business against the economic loss and expense associated with claims of bodily injury, property damage, and injury to one’s reputation caused by slander and libel, and also the harm caused by false or misleading advertising.” Supporting documents for this can be found via the Maryland Insurance Administration, *A Business Owners Guide to Commercial Insurance*, at: <https://insurance.maryland.gov/Consumer/pages/businessesandprofessionals.aspx>

As indicated in Title 17 of the Environment Article, Annotated Code of Maryland, a minimum of \$300,000.00 in liability insurance must be carried by a licensed marine contractor. The appropriate extent of coverage is dependent upon the policy and endorsements selected and, potential causative agents (e.g., fire, flood, vandalism) of the loss or damage. The maximum dollar value of covered losses should be stated in the purchased policy. The policy holder is responsible for the balance beyond this maximum on any legitimized claim, which could be offset by the purchase of a supplemental “Umbrella” policy.

Most CGL insurance policies provide coverage for compensatory damages, or those incurred by the claimant as a result of the injury (e.g., current and forecasted medical expenses and lost wages) and general damages, or non-monetary losses suffered by the injured party, such as “pain and suffering” or “mental anguish.” Punitive damages, or penalties awarded as a sanction against the action, are typically not covered by CGL insurance.

Liability insurance premiums are determined based on the business’s sales and payroll estimates, and general estimation of risk based on the business type, probability of claims, and other data. Records may be audited at policy expiration to determine whether or not an additional premium is due to the insurer or whether a refund is due to the insured based on the variance between the forecasted and actual sales and payroll.

Tips for reducing risk exposure toward lowering the GCL premium are included in the Maryland Insurance Administration’s Business Owner’s Guide to Commercial Insurance, available online at: <http://insurance.maryland.gov/Consumer/Documents/publications/commercialinsurance.pdf>

The guide also offers information on other insurance coverage which contractors may find beneficial, including property, flood and earthquake, business interruption, and group policies for employee health and life insurance.

7.4 REGISTRATIONS

7.4.1 VESSEL REGISTRATION

The Maryland State Boat Act mandates that, within 30 days of purchase or entrance into Maryland Waters, all vessels used principally in Maryland waters and having any kind of primary mechanical propulsion (motor):

- **Must be registered in title with the State and display a documented use decal. Nominal fees apply.**
- **Are subject to a vessel excise tax of 5% of the purchase price or fair market value, with a minimum tax of \$5 and maximum tax of \$15,000.**

7.4.2 EXEMPTIONS

Vessels 16 feet in length or less and/or propelled by a motor of 7.5 horsepower or less are exempted from the registration fee but must display a “2-year” registration decal, valid for the calendar year issued through December 31 of the following year. United States Coast Guard documented vessels are exempted from the registration process, but NOT the vessel excise tax and must purchase a documented decal.

Boat trailers are exempted from the Maryland Department of Natural Resources (DNR)’s registration procedures but are to be registered with the Maryland Motor Vehicle Administration (MVA).

7.4.3 ENFORCEMENT

Penalties and interest will apply if the excise tax is not paid within the 30-day window. The taxable amount may be challenged if the vessel is in disrepair or not operational at the time of purchase, as documented on a certified bill of sale. However, the 30-day registration requirement should be adhered to, or the purchaser will be responsible for the higher vessel excise tax that would be assigned once the work is completed. *See §§ 8-716.1 & 8-716.2 of the Natural Resources Article, Annotated Code of Maryland, for more information.*

7.4.4 VESSEL SALE AND DECOMMISSIONING

“Vessel owners must notify the Department within 15 days if a vessel is sold or destroyed. Notification should include date and circumstances (purchaser name and address, amount of sale) and be forwarded to a DNR Service Center either in person, by fax, or by mail. Registration decals should be removed from the vessel if you will be requesting a refund of the

second year's registration fee (\$ 35)" *MD DNR Boating Services*. More information can be found at: <https://dnr.maryland.gov/boating/Pages/default.aspx>

7.4.5 ADDITIONAL INFORMATION

Forms, purchase-specific documentation requirements, and other details on the registration process, including procedures for registering abandoned and self-constructed boats, requirements specific to in-family vessel transfers, excise tax offsets allowable for marine vessel trades conducted through a licensed boat dealer, and reciprocity tax credit for vessels previously registered through the calendar year in another state, are available from MD DNR online at: <https://dnr.maryland.gov/boating/pages/registration.aspx>

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Appendix A:
Environmental Article, Title 17, Annotated Code of Maryland

Appendix B:
Code of Maryland Regulations (COMAR) Title 26 Subtitle 30

Appendix C:
Environmental Article, Title 16, Annotated Code of Maryland

Appendix D:
Instruction Booklet for the Abbreviated Joint Federal/State
Application for the Alteration of any Tidal Wetland and/or Tidal
Waters in Maryland

Appendix E:
Code of Maryland Regulations (COMAR) Title 26 Subtitle 24

Appendix F:
Code of Maryland Regulations (COMAR) Title 23

Appendix G:
Tidal Mitigation Trigger Flowchart

Appendix H:
Guidance for Tidal Wetlands Mitigation Plans