LIFE-SAVING ACTIONS POLICY

MARINE WORK POLICY

Document #	KIEWITSAFETY- SFT-MW-POL-0001_A

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Revision Summary Change		
Rev	**Revision Date**	**Change Description**
A	10.02.2024	11.3 Crew and Survey Vessels added reflecting minimum requirements
B	08.06.2024	Updated 16.0 training
01		

NOTE: *Revision history will be an alpha revision Rev. A, B, etc., until "Issued for Use". At that point it will be issued with a two-digit numeric revision Rev. 01, 02, etc.*

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1.0 PURPOSE

The Company always strives to perform its work in the safest manner. Working in or near water can pose serious risks. This policy ensures that proper protective actions are implemented for employees who perform work in or near water or other liquid where the danger of drowning, fall, or crush exists. To avoid the risk of death or severe injury, employees are required to follow the policies and procedures outlined in this Marine Work Policy. All projects shall follow these policies and procedures, at a minimum. This policy applies to both routine and emergency procedures related to marine work.

2.0 SCOPE

This policy applies to all employees of Kiewit Corporation, or subsidiary companies, as well as other personnel working on a Kiewit-led project. The policy applies to any work performed in, on, above, or near water or other liquid and/or where the danger of drowning exists.

3.0 REGULATIONS

All employees shall comply with applicable provisions outlined in federal, state, local, or provincial regulations.

Each project should verify that this policy complies with any additional regulations applicable to the project.

Other regulatory agencies include but are not limited to:

4.0 LSA TOOLKIT

LSA TOOLKIT MATERIAL		
Policy(s)	Marine Work	
Standard Operating Procedures (SOPs)	Confined/Enclosed Space Marine	Dredge and Stone Placement
	Pile Driving and Cofferdam	Rescue
	Diving Operations	Heavy Lift / Salvage SOP
	Fall Protection Over Water	Spoils Barge Access
	Concrete Pump Trucks on Barges	Fueling on the Water
	Spud Maintenance & Hoisting Operation	MEWP Operation on a Barge
	Pile Driving or Duty Cycle Crane Work	Crane Operations on a Barge

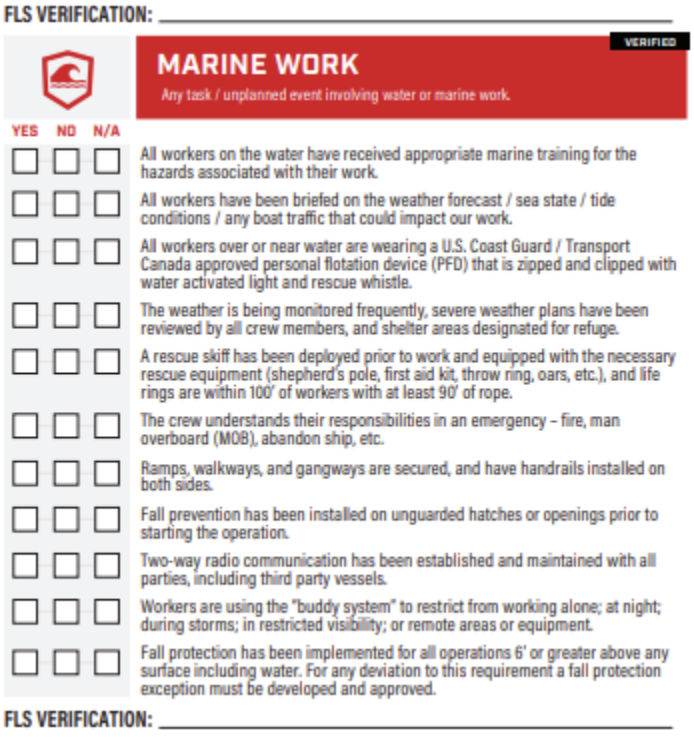
LSA TOOLKIT MATERIAL		
	Hot work on Barges	
LSA Safeguards	See LSA Safeguard Section below	
Forms	Rescue Plan Checklist	Communication Channel Page
	Hurricane Check List	
Training	Marine Work Orientation Slides	Marine Work Training
	Rescue Training (Man Overboard - MOB)	Designated Boat/Skiff Operator
	Line Handling Training	

SUPPORTING MATERIALS				
Visual Guide	Past Incidents & Lessons Learned	JHAs & Work Plan Examples	Best Practices	Videos

5.0 LSA SAFEGUARDS

Ensure proper identification and planning for LSA Risks, all operations with LSA Risk(s) identified and/or changes to LSA Risks, a FLS (Front Line Supervisor) must verify and sign-off that all safeguards are in place before work can begin. It is also recommended that FLS review those same Start Cards again throughout the day to verify safeguards are still in place and account for any change in condition.

For more detailed information reference LSA Guidelines.



FLS VERIFICATION: _____

MARINE WORK

VERIFIED

Any task / unplanned event involving water or marine work.

YES	NO	N/A	
☐	☐	☐	All workers on the water have received appropriate marine training for the hazards associated with their work.
☐	☐	☐	All workers have been briefed on the weather forecast / sea state / tide conditions / any boat traffic that could impact our work.
☐	☐	☐	All workers over or near water are wearing a U.S. Coast Guard / Transport Canada approved personal flotation device (PFD) that is zipped and clipped with water activated light and rescue whistle.
☐	☐	☐	The weather is being monitored frequently, severe weather plans have been reviewed by all crew members, and shelter areas designated for refuge.
☐	☐	☐	A rescue skiff has been deployed prior to work and equipped with the necessary rescue equipment (shepherd's pole, first aid kit, throw ring, oars, etc.), and life rings are within 100' of workers with at least 90' of rope.
☐	☐	☐	The crew understands their responsibilities in an emergency – fire, man overboard (MOB), abandon ship, etc.
☐	☐	☐	Ramps, walkways, and gangways are secured, and have handrails installed on both sides.
☐	☐	☐	Fall prevention has been installed on unguarded hatches or openings prior to starting the operation.
☐	☐	☐	Two-way radio communication has been established and maintained with all parties, including third party vessels.
☐	☐	☐	Workers are using the "buddy system" to restrict from working alone; at night; during storms; in restricted visibility; or remote areas or equipment.
☐	☐	☐	Fall protection has been implemented for all operations 6' or greater above any surface including water. For any deviation to this requirement a fall protection exception must be developed and approved.

FLS VERIFICATION: _____

6.0 DEFINITIONS / ACRONYMS

TERM / ACRONYM	DEFINITION
Air Draft	The distance from the surface of the water to the highest point on a vessel or cargo.
All-Round Light	A light showing an unbroken light over an arc of the horizon of 360 degrees of a vessel.
Anemometer	An instrument to measure wind speed. (Must have for all Kiewit and subcontractor crane barges)
Anchor Buoy	A buoy secured by a line to an anchor to indicate the position of the anchor on bottom. A large steel buoy to hold the retrieval rigging for lifting or moving anchors.
Anchor Chain	The chain used on smaller anchors to hold the anchor arm down and keep it secured in the sea floor. The chain connecting the boat or vessel to the anchor
Anchor Scope	The ratio of the length of an anchor rode from the bit to the anchor shackle and the depth of the water under the bow of the boat measured from deck height.
ATON (Aid to Navigation)	A navigational aid (NAVAID), also known as aid to navigation (ATON), is any sort of signal, markers or guidance equipment which aids the traveler in navigation, usually nautical or aviation travel. Common types of such aids include lighthouses, buoys, fog signals, and day beacons.
Ballast	Counterweight added to a ship or a barge to stabilize it. Barges are compartmentalized to add water in sections to add weight where it is needed to stabilize or correct the list and trim the vessel.
Bilge	The lowermost compartment of a ship or boat.
Bilge Pump	A pump in the bilge to remove any unwanted water from the vessel to prevent sinking or improve stability.
Bitt/Timber head	A pair of posts on the deck of a ship for fastening mooring lines or cables.
Boat Hook/Shepard's Hook/Pike Pole	Long pole with a hook and a spike at one end, used for fending off or pulling a boat.
Bow	The forwardmost part of a ship, vessel, or barge.
Button (Roller Button Chock)	Button Chocks are low profile chocks designed primarily to hold or secure the eye of a line or wire when making up a tow.
Cleat	An object having one or two projecting horns to which ropes may be secured.
Coaming	Any vertical surface designed to deflect or prevent entry of water. It usually consists of a raised section of deck plating around an opening, such as a cargo hatch.

TERM / ACRONYM	DEFINITION
Draft	The distance from the surface of the water to the lower most point on a vessel. How deep the vessel is in the water.
Day Shapes	Signals convey the status of a vessel on navigable waters during daylight hours.
Gangway/Gang Plank	Any ramp-like or stair-like means of access provided to enable personnel to board or leave a vessel, including accommodation ladders, gangplanks, and brows.
Flashing Light	A light flashing at regular intervals with a frequency of 120 flashes or more per minute.
Free Board	The distance from the surface of the water to the top of the hull.
Jacob's Ladder	Rope ladder with wooden rungs, especially for access to a ship up the side.
Jason's Cradle	A maritime rescue device. The device is similar to a scramble net made of cloth webbing. It can be suspended over a rail, but it has stiffener batts which make it easier to climb. It can take the form of a hammock or stretcher for the rescue of weakened or injured people when the "top" and "bottom" of the net are lowered to the water level so they can simply roll into it.
List	A vessel's angle of lean or tilt to port or starboard, in the direction called roll.
Longshoring	The loading, unloading, moving, or handling of cargo, ship's stores, gear, or any other materials, into, in, on, or out of any vessel.
Masthead Light	A white light placed over the fore and aft centerline of the vessel showing an unbroken light over a the horizon of 225 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaf beam on either side of the vessel, except that on a vessel of less than 12 meters in length the mas light shall be placed as nearly as practicable to the fore and aft centerline of the vessel.
Moor/Mooring	To attach a boat to a mooring buoy or post. To secure a vessel with a cable or anchor.
Nautical Mile	A unit of length corresponding approximately to one minute of arc of latitude along any meridian arc. By international agreement, it is equivalent to exactly 1,852 meters (6,076 ft).
Notice to Mariners	Notice to Mariners only contain information which is vitally important to safety at sea. Mariners are obliged to keep their products up-to-date with Notice to Mariners until a new edition is issued.
Port	The left side of a ship or vessel. Towards the left-hand side of the ship facing forward. Denoted with a red light at night.
Rake	Inclined end of a barge typically used as the bow or stern. Rake wall or breakwater is a wall on the bow of a barge that diverts wave action off the deck of the barge.
Sidelights	Green light on the starboard side and a red light on the port side
Special Flashing Light	A yellow light flashing at regular intervals with a frequency of 50 to 70 flashes per minute, placed as far forward and as nearly as practicable on the fore and aft centerline of the tow and showing an unbroken light over an arc of the horizon of not less than 180 degrees nor more than 225

TERM / ACRONYM	DEFINITION
	degrees and so fixed as to show the light from right ahead to abeam and no more than 22.5 degrees abaft the beam on either side of the vessel.
Spud	A large steel shaft that runs through the deck of the barge for mooring.
Spud Well	The portal which the spud runs through the deck of the barge.
Spud Winch	A winch on a spud barge that raises and lowers the spuds.
Starboard	The right side of a ship or vessel. Towards the right-hand side of the ship facing forward. Denoted with a green light at night.
Stern	The rear part of a ship.
Sternlight	White light placed as nearly as practicable at the stern.
Stokes Basket	A stretcher or basket designed to be used where there are obstacles to movement or other hazards: for example, in confined spaces, on slopes, in wooded terrain. Typically, it is shaped to accommodate an adult in a face up position and it is used in search and rescue operations.
Tide Gauge	A tide gauge is a device for measuring the change in sea level relative to a vertical datum.
Towing Light	Yellow light having the same characteristics as the “stern light”.
Vessel Trim	A vessel’s inclination in the longitudinal or fore & aft direction.

*For commonly used safety terms go to: Glossary

7.0 ROLES AND RESPONSIBILITIES

POSITION	ROLE AND RESPONSIBILITY
Project Sponsor	Responsible for: • Implementation of this policy • Identifying Authorized Trainers for designated operators • TSCD Matrix accurately reflects risk of marine operations • Verify the size and type of marine gear is adequate for the operations such as cranes, skiff, barges, etc.
District Safety Managers (DSM)	Responsible for implementation of the policy and procedures to include: • Assist projects with identifying competent personnel within the district • Train competent personnel on policy and procedures • Review and audit project marine work and activities. • Assist project with all marine work-related issues and concerns.
Project Management	• Ensure employees performing marine work activities have been properly trained in the safe use of the marine equipment, rescue equipment, and vessel safety requirements of this procedure. • Submit and communicate all necessary Coast Guard, FAA, and other marine notifications.

POSITION	ROLE AND RESPONSIBILITY
	• Create, communicate, and drill the marine work SOP's. • Prepare barge mooring plan to include identification of areas with coral or other Endangered Species Act (ESA) bottom features that must be avoided by anchors, mooring chains and lines, and spuds (Very Important in Hawaii,Guam, Florida, etc.).
Frontline Supervisor (FLS)	• Ensure all prevention methods and all safeguards are in place prior to starting any operations. • Ensure employees have the proper PPE and clothing for marine activities being performed. • Ensure all employees have an understanding and are familiar with the marine work LSA toolkit. • Monitor all marine work being performed to ensure that all Operations Start Card documents are comprehensive and address hazards thoroughly. • Monitor water and weather to ensure work plans are feasible and daily tasks do not create unnecessary hazards. • Take appropriate actions to safeguard personnel and equipment from forecast and actual adverse weather conditions.
Crane Operators	• Operators will go through the Corporate Designated Operator Training Program. • The operator performing marine work shall be responsible for safely handling their equipment and performing all inspection checklists required prior to starting the operation. • Will not allow employees to rig and signal if they have not been through the Qualified Rigger and Signal Training. (Add link to this) • Corporate Crane Manual - (Reference Section 29, Cranes on Barges)
Authorized Trainer	• Employee designated by the District Safety Manager (DSM) and/or Project Eq Manager, Regional Eq Manager or Marine Group Eq Manager to provide training. • Authorized trainer should be General Superintendent and above. • Train personnel on policy and procedures.
Boat Operators	• Boat operators must go through Designated Operator Training and be deemed competent operators by the Authorized Trainer. • The operator performing marine work shall be responsible for the safe handling their equipment and performing all inspection checklists prior to starting the operation. • The operator shall be responsible for adherence to all marine safety standards of the area of work. • Boat operators should use the buddy system and be accompanied when operating a boat. Single operators may use the line-of-sight method during daylight hours only. • Boat operators must comply with state regulations required to operate a boat, as some states require a boat safety course be completed/passed based on date of birth.
Craft Employees	• Continuously verify the safeguards are in place throughout the day and practice Stop Work Authority. • The individual performing marine work shall be responsible for handling their equipment in a safe manner.

POSITION	ROLE AND RESPONSIBILITY
	• The employee is responsible for wearing all the proper PPE and clothing. • The employee shall be responsible for adherence to all marine safety standards. • Keep boats, barges, and work areas clean and organized.

8.0 HAZARDS

Prior to working in, on, or near water employees must know and understand the hazards to be prepared for the work. Hazards associated with water include, but not limited to:

- Temperatures
- Tides, Current & Waves
- Weather
- Fall Hazards
- Confined Space

All the hazards listed above can affect others and create more significant events. Ex: Wind may make high waves higher or flatten them out. It is important to understand these dynamics before performing marine work.

8.1 TEMPERATURE

Water temperatures can have different effects on the body depending on the ambient temperatures and water temperature. Temperatures can result in shock or hypothermia. Any person with a risk of hypothermia should be treated by a medical expert.

Symptoms of Hypothermia		
BODY TEMPERATURE	**STAGE**	**COMMON SYMPTOMS**
98.6° F	Normal body temperature	
90-95°	Mild hypothermia	Shivering, goose bumps, bluish skin, confusion, trouble speaking, memory loss.
82-90°	Moderate Hypothermia	Shivering stops, feeling very sleepy, hallucinations
Less than 82°	Severe Hypothermia	Stiffness, passing out, coma, breathing may stop, heart may stop

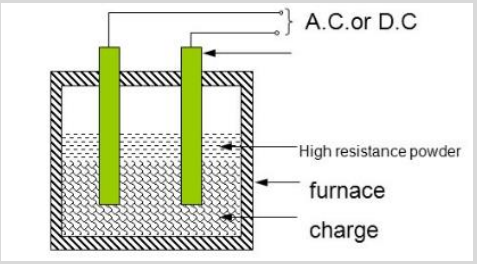
Expected Time of Survival in Water		
WATER TEMPERATURE	**EXHAUSTION OR UNCONSCIOUSNESS**	**EXPECTED TIME OF SURVIVAL**
32 F (<0C)	Under 15 Minutes	Under 15 - 45 Minutes

32.5 – 40 F (0-4 C)	15 - 30 Minutes	30 - 90 Minutes
40- 50 F (4-10 C)	30 - 60 Minutes	1 - 3 Hours
50 - 60 F (10-16 C)	1 -2 Hours	1 - 6 Hours
60 - 70 F (16-21 C)	2 - 7 Hours	2 - 40 Hours
70 - 80 F (21-27 C)	3 - 12 Hours	3 Hours - Indefinitely
OVER 80 F (21C)	Indefinitely	Indefinitely

8.1.1 PREVENTION

- Ensure equipment such as heaters are available to warm employees and dry PPE and clothing when the risk of hypothermia exists. Special precautions shall be taken so that the heater does not start a fire or change the breathable atmosphere.
    - The two most used type of heaters are Forced Air Warming (FAW) and Resistive Heating (RH).
    - An additional option would be a warm blanket device.

Ensure water temperature readings are obtained intermittently to understand conditions.

Heater Equipment Recommendations		
Type	**Model / Example**	**Reference Image**
Forced Air Warming (FAW) • Air is sucked in from the surroundings and warmed using electric coils. The blower circulates the warm air through a blanket that warms the patient through convection.	DeWALT® Portable Forced Air Electric Heater W/ Adjustable Thermostat, 120V, 1 Phase, 1650 Watt	
Resistive Heating (RH) • Conductive polymer fiber sheet that produces heat and warms the patient through conduction.	Electric resistance heat can be supplied by centralized forced-air electric furnaces or by heaters in each room. Room heaters can consist of electric baseboard heaters, electric wall heaters, electric radiant heat, or electric space heaters.	

8.2 WATER HAZARDS

8.2.1 SHALLOW WATER

When working in shallow water, know water depths to mudline or underwater obstructions below floating gear. Soundings need to be taken on a regular basis.

8.2.2 UNDERWATER HAZARDS

When working in any body of water, below the surface hazards may exist and may not be seen due to poor water clarity. Fallen trees, plants such as grasses, large rocks or rip rap, old broken pilings, outfalls, cable and pipeline crossings, and many other items can often be found at the bottom of water bodies. These obstructions can present risks to equipment and employees. Review navigational charts for potential underwater obstructions within the work zone such as utilities, pipelines, etc. Also, check shorelines for signage that may demarcate utility locations. Demarcate utility and outfall locations using spar or Norwegian Buoys to signify the underwater hazards. Additionally, there can be unexpected shallow areas caused by sandbars, trees, and rocks that can be hazardous to employees that maybe working in the water along shorelines.

8.2.3 TIDES/CURRENTS/WAVES

The rise and fall of tides will cause water levels to fluctuate in excess of 30 feet depending on geographical location and can generate strong currents depending on the region where the work is being performed. Tide times and heights vary throughout the month and must be reviewed daily for specific operations that are tide dependent. Floating gear must be managed near permanent structures to minimize risks of being caught under fixed structures such as pile caps, bridge and trestle structures, piers, wharfs, and docks.

With the rising and falling tides, heavy currents flowing in or out of the waterways can also present hazards and risks to employees and equipment. Falling into water where currents are heavy can lead to being swept downstream or under barges increasing the risk of drowning. Projects must have a “Man Overboard (MOB) Rescue Plan” prior to performing work which shall outline the process and procedure to rescue an employee should they enter the water (See Emergency Rescue Section for further details on MOB)

Knowing the types of potential sea state and unique marine weather conditions that could be present and how to deal with them is critical for working safely on any body of water. Waves can be dangerous obstacles that can swamp or capsize a boat. Waves can also create significant crush points between skiffs and barges, between spud piles and spud wells, etc.

The following are suggestions to be used to help determine tidal, current, and general weather conditions:

- Tide tables
- US Harbors
- Windy App
- NOAA

- Tides Near Me
- Tide Alert (NOAA)\
- StormGeo

8.2.4 HAZARDS/PREVENTIONS

DESCRIPTIONS	HAZARDS	PREVENTIONS
TIDES, CURRENTS AND WIND	Sweep people / vessels away	FLS are to monitor conditions and forecast changes, current and tidal direction, and surroundings prior to and during work. All personnel are responsible for notifying management if conditions change. Perform emergency drills.
	Difficulty controlling vessels, boats, skiffs	Have the tide schedule posted in the work area, know water current direction when operating skiffs, designated/experienced skiff operators only.
	Work barges and skiffs can get trapped under formwork and existing structures as tides rise	Know and understand the tides being worked in, do not leave barges and vessels unattended where they could potentially become caught under structures, when leaving vessels overnight or weekends ensure there is a minimum of 15' between vessels and structures. Ensure the vessel is moored so that it cannot shift under a structure if weather or currents shift.
	Inclement weather, heavy surf/waves, winds	Checking the forecast and understanding the tide tables and surf reports. Boom down cranes if needed, tie down portable toilets, secure materials and plywood Plan ahead and move barges from weather exposed areas if extreme weather is anticipated – once a storm begins it may not be possible to safely make moves.
	Heavy currents/waves can create pinch points/break lines	Every cleat should get a line in poor weather conditions, keep hands out of crush zones between skiffs and barges, cleats and mooring lines, spuds and spud wells, etc.
	Vessel/barge housekeeping and access to embark/disembark	Practicing good housekeeping, clear and open lanes of access, and keeping lines coiled, organized and out of the way.
	Falls to water from vessels/barges and skiffs	Handrails on gangways and walkways, or other barriers on floating vessels; when able to do so, ensure to position barges so that employees will be swept away from the barge where the potential to fall into the water exists; the best method for protecting employees from being

DESCRIPTIONS	HAZARDS	PREVENTIONS
		swept away in the current is not allowing them to fall into the water.
	Crane work between fixed object and floating crane	Crane operators and crews must understand that the load, load dynamics and all equipment aboard the crane, can be greatly affected by wave action and tidal fluctuation. Specific lift plans and controls must be in established and implemented for each operation. Crane operators may need to hoist a load up or down to account for tidal fluctuations during operations that require long load holding like weld or bolt fit up or demolishing a fixed structure.
WAKES / WAVES / SWELLS	Man overboard	Employees will stay seated inside the vessel during movement unless it is specifically designed for standing while traveling; Exception: When the operator needs to stand to safely navigate.
	Crushing hazards between vessels / Barges	Never hop barge or climb tires to get from barge to barge, set up proper access, ensure vessels/barges have adequate tires/bumpers on sides of vessels/barges.
	Capsizing / Sinking / Taking on water	Keep skiffs/boats protected from swells when they are tied up and not in use; Always point bow into waves and swells to keep from swamping skiffs/boats. Park boats for extended times in protected areas or remove from water if possible. Make sure bilge pumps work if applicable.
	Moving and hard to control loads when crane is in use	Use taglines for all loads, during high swell we must increase the safe distance from the load.; Never place any body part in the fall zone or crush point of a suspended load.
	Crushing hazard due to uncontrolled crane loads	Crushing hazard between any stationary structure against anything on a barge that is not stationary is a potential crush point.
	Dynamic loading	Crane operators must understand stability, drift, side load derating charts/ limitations, and center of gravity.
UNDERWATER HAZARDS	Expose underwater hazards – submerged objects that did not present a problem at high tide may become obstructions at low tide.	Know what's below, perform underwater survey, if necessary, take soundings when in shallow waters, know your vessels draft.

DESCRIPTIONS	HAZARDS	PREVENTIONS
	Equipment damage	Take soundings to confirm water depth and confirm against draft of vessels/barges.
	Being thrown from skiff/boat	Operate skiffs/boats slowly when in new area if potentially shallow or underwater objects.; When traveling and higher speeds ensure passengers are sitting down. A bailey rail should be used as a person's stability holding point inside a skiff.
	Utilities / Outfalls	Mark under water hazards and make sure your markings remain visible during all potential water levels; Review local NOAA or Navigation Charts.
	Equipment damage	Take soundings to confirm water depth and confirm against draft of vessels/barges
Vessel Ruptures	Unexpected Freeboard Changes	Unexplained/Unexpected changes in vessel trim should be investigated immediately. Contact the Marine Equipment Department immediately for any concerns in Vessel Freeboard Changes. Only use shipyard competent people to open vessel hatches, as hatches could accelerate the flooding of a holed vessel and uncontrolled opening of hatches on tanks under internal pressure could result in hatches opening violently.

8.2.5 MOORING LINES AND TYING UP BARGES

Considerations must be made to the size, number, condition of the lines, type of lines (e.g., polypropylene, nylon, etc.) and mooring points / proper line size in relation to barge weight. In inclement weather (especially in winters) every cleat must get a line to prevent barges from breaking free.

When using anchorages, proper scope/length of anchorages must be taken into account. Pennant lines must be of adequate length to account for depth of water, designated for the expected currents, and type of anchor being used. Keep marine vessels positioned, if possible, parallel with the current and not cross current, especially where currents run fast. Anchors should have a minimum 4 to 1 ration of length to depth.

8.2.6 EMERGENCY DRILLS

Man overboard drills, abandon ship and fire drills shall occur monthly, at a minimum. Rescue Training shall be done at the beginning of the job, annually or when there is a significant change to the plan.

This includes drills required by USCG and/or local jurisdiction, marine police, and rescue.

8.3 WEATHER

8.3.1 HURRICANES

TYPE	WIND SPEED	POTENTIAL STORM SURGE
Tropical Storm	39-73 mph	--
Category 1	74-95 mph	5 Feet
Category 2	96-110 mph	7 Feet
Category 3	111-130 mph	10 Feet
Category 4	131-155 mph	13 Feet
Category 5	156+ mph	15 Feet

WEATHER	HAZARDS	PREVENTION
MAJOR STORMS & HURRICANES	• Catastrophic Loss	Projects shall develop a job specific hurricane plan (link) before hurricane season. This plan shall include at a minimum: • Follow your Major Storm or Hurricane Plan and its Milestones. • Procure all supplies needed to execute the hurricane plan (link for example). • Assign specific tasks within the hurricane plan for execution. • Ensure that all employees have a weather app with notifications on (assign one). • Secure equipment, offices, and barges in scenarios where it cannot be removed from the project site. • Identify safe harbors for demobilizing project equipment in advance of adverse weather.
WATERSPOUTS	• Flying debris • Loss of built work	• Monitor weather frequently when chances of tornado producing storms are possible. • Maintain clean job sites and barges/Secure material and equipment. • Secure connex boxes, barges and mobile offices. • A shelter area(s) shall be identified that is large enough to accommodate project personnel.
LIGHTNING	Marine work presents unique challenges to lightning safety. • Electrocution • Burns • Internal injuries	• Identify at least one person to monitor and track weather on daily operations. ○ Weather Bug ○ Lightning tracker ○ Strom Pro 2

WEATHER	HAZARDS	PREVENTION

		• Develop a project plan to quickly notify all people working outside when lightning is within striking distance.
		• Notify all project personnel lightning is approaching and within 11-to-20-mile radius from the project.
		• All employees shall seek shelter and stop work within 6 miles. Some clients may require 10 miles.
		• Seek safety in a building, a grounded connex, fully enclosed equipment, or a vehicle.
		• When lightning strikes are in range of 6-10 miles out:
		  ○ A person will be assigned to monitor the storm activity and communicate regularly.
		  ○ ALL crane activities and MEWP work must STOP.
		• When lightning strikes are in range are less than 6 miles:
		  ○ All project operations must stop, and employees will go to designated shelter areas.
		  ○ Work may only resume after 30 min. of the last lightning strike within the 6 miles radius.

WINDS	• Crane collapse or tipping
	• Flying debris
	• Creation of large swells (see swell hazards)
	• Personnel blown off their feet
		• Manufacturer limitations for wind exposure to equipment must be followed and available to the operator.
		  ○ An anemometer may be required for the barge to allow accurate readings and monitoring.
		  • NOTE: Cranes are supplied with one.
		• All materials and tools not in use will be secured or lashed down to prevent unwanted movement caused by wind exposure.
		• Wind and wave forecasts will be monitored at least daily to plan potential hazards during the workday. This forecast will be communicated with personnel on site.
		• If wind or wave advisories exceed safe working thresholds for equipment and personnel, work will be modified or cancelled. No personnel will be exposed to unsafe working conditions related to weather.
		• Hoisting loads with crane:
		  ○ Use taglines for all loads.
		  ○ During high winds we must increase the safe distance from the load. Never place

WEATHER	HAZARDS	PREVENTION
		any body part in the fall zone or crush point of a suspended load. ○ The operator and riggers must communicate the conditions of the wind regularly and account for load dynamics related to wind. • To be identified in the standard on the spot lift plan. ○ Crushing hazard between vessels and stationary structures will likely be fatal. • Crane operators must understand the following: ○ Stability ○ Side load ○ Load drift ○ Derating charts / limitations ○ Center of gravity

8.4 FALL PROTECTION

8.4.1 FALL PROTECTION REQUIREMENTS:

Employees must be protected from falls 6 feet or greater. Fall protection planning, gear, and methods must be in compliance with the Working at Heights Toolkit.

8.4.2 FALL PROTECTION EXCEPTIONS FOR LIMITED MARINE OPERATIONS:

In some limited vessel navigation and mooring operations ("Marine Operations"), conventional fall protection measures may be infeasible and/or create a greater hazard. For any such Marine Operations, a Marine Operations Fall Protection Exception Permit must be obtained. Below are the minimum requirements for using an exception during vessel navigation and mooring operations:

- **Infeasibility or Greater Hazard.** The Marine Operations Fall Protection Exception Permit will only be granted as a reasonable last resort to protect employees if:

(1) Infeasibility of Compliance: Compliance with conventional fall protection requirements is functionally impossible or would prevent workers from completing required work, ***and*** there are no feasible alternative means of providing equivalent protection for workers;

OR

(2) Greater Hazard: Compliance with conventional fall protection requirements would result in greater hazards to employees than

noncompliance, ***and*** there are no alternative means of employee protection that would be as effective.

- **Fall Height and Water Depth**. A Marine Operation Exception Permit can only be obtained for any potential unobstructed fall less than 15 feet to water. For any potential falls to water from a height of more than 6 feet and less than 10 feet, the water must be at least as deep as the height of the fall (1:1 ratio). For example, if the potential fall is 7 feet, the water must be at least 7 feet deep. For any potential falls between 10 feet and 15 feet, the water must be at least 10 feet deep.
- **Unobstructed Fall**. Any potential fall must be unobstructed, meaning that no objects, items, or surfaces are present between where the potential fall could occur and the water. A Marine Operations Fall Protection Exception Permit does not apply when the fall to water is obstructed by any object, including but not limited to crane mat floats, skiffs, flexifloat, bullrail, etc.
- **Fall from Vessel.** If the potential unobstructed fall to water is from a vessel, a Marine Operations Fall Protection Exception Permit must be obtained specific to each vessel and project.
- **Fall from Structure or Surface Other Than Vessel**. If the potential unobstructed fall to water is from a structure or any surface other than a vessel, a Marine Operations Fall Protection Exception Permit must be obtained for each operation.
  - **Approval.** Each Marine Operations Fall Protection Exception Permit shall be approved by the Area Manager or Sponsor with notification to the District Manager and District Safety Manager before any operations begin where conventional fall protection measures are not used.
  - **Notice.** All employees performing operations in the applicable area must be provided a written copy of and sign the Marine Operations Fall Protection Exception Permit. A copy of the Permit must be clearly posted in the area to which the Permit applies.
  - **Hazardous Area Markings.** Rope barriers or highly visible painted markings on the walking surface shall identify the areas applicable to the Marine Operations Fall Protection Exception Permit. Only those employees who have signed the Permit and obtained training shall be permitted to access the area to which the Permit applies.
  - **Training.** Any employees in the area to which the Permit applies shall be trained to identify any specific hazards or any obstructions that may invalidate the Permit.

8.5 CONFINED SPACE / ENCLOSED SPACES

The confined or enclosed spaces on a barge may have an atmosphere that is unsafe, causing injury or death. Hazards associated while working in a confined space or enclosed barge spaces are:

- Oxygen deficiency
- Explosive / flammable atmospheres
- Toxic compounds
- Engulfment from any holes or gashes on the exterior
- Configuration

Prior to working in any confined space, refer to the Confined Space Toolkit / Confined Space / Enclosed Space Barge SOP.

Link the Confined Space / Enclosed Space Barge SOP.

9.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

9.1 PERSONAL FLOTATION DEVICES (PFD)

Employees who are working over or near the water with the risk of drowning (i.e., when continuous fall protection is used (without exception eliminating the risk of drowning) must wear an approved Type I or III personal flotation device (PFD). With Sponsor approval, Type V PFDs may be used. PFDs must be worn properly with all manufactured fasteners secured (zipped and clipped) at all times. Before and after each use, each employee using the PFD must inspect the PFD in accordance with manufacturer requirements and inspect for defects, damage, or other issues that could affect its strength or buoyancy. If a Type V PFD is being used, the employee muse check the inflator on a Type V inflatable PFD before each use, inspect the exterior of the life jacket for any visible tears, rips, or other signs of weakness or damage, and inspect the CO2 cylinder for any puncture, dust, or rust. Any damaged or defective PFDs must be immediately reported to FLS and taken out of use.

PFDs will be equipped with wet water whistles and a water activated flashing beacon. As of March 31st, 2024, all PFD's will be of an international orange (or orange /red) or yellow-green color with reflective stripes. When in danger, the employee is expected to blow the whistle, which will activate the Water Rescue Emergency Plan.

PFDs are not flame retardant, operational specific protections must be put in place to protect the person from the risk of hot work and drowning if both hazards exist.

TYPE	DESCRIPTION	USE	EXAMPLE
TYPE I: OFFSHORE LIFE JACKETS	These vests are designed for rough or remote waters where rescue may take some time. They provide the most buoyancy, are excellent for flotation and will turn most unconscious persons face up in the water	Working in or over water	
TYPE III: FLOTATION AIDS	These life jackets (vests) are great for calm waters where a rescue if needed would be quick. These are not recommended for rough waters since they will not turn most unconscious people face up.	Working in or over water	
TYPE V: SPECIAL-USE DEVICES	Only allowed by Sponsor approval.		
MARINE WHISTLE	Plastic whistle, typically “pea-less” and designed to work when wet.	Attached to all PFDs when in use	

TYPE	DESCRIPTION	USE	EXAMPLE
PFD RESCUE LIGHT	Device containing a light and activation pole that are turned on when water comes in contact with them. Begins flashing when employee is in the water for easier visibility.	Attached to all PFDs when in use	
WINDOW PUNCH / SEATBELT CUTTER	These devices shall be in equipment working on or near the water.	Attached in reachable location for the operator.	

10.0 ACCESS

Access to vessels shall be limited to authorized personnel and/or escorted visitors only.

Working in, on, or near water can compound hazards related to accessing the work. Factors such as wind, tides, waves, currents, vessel maneuvering, and other factors may make it more hazardous than other types of access. For this reason, projects which are categorized as Marine work by this policy must adhere to certain basic principles of access related to water. Access to Marine Equipment Minimum Requirements are as follows:

- Vessel to vessel transfers without designated walkways shall be limited to planned boarding and disembarking locations, for example crew boat loading/unloading areas.
- Maintain designated walkways with handrail between derricks, barges, and permanent structures during active construction and dredging operations.
- Walkways and access may become obstructed from mud, sand, or rock from dredging or placement operations. If walkway access becomes obstructed or compromised, the operation shall stop until it is rectified.
- Access shall be checked at the beginning and end of each shift, and after barge moves. Gangways may need to be removed over night or between shifts to avoid damage off shift.
- Projection and tripping hazards shall be removed, identified with warning signs, or distinctly marked with safety yellow. Removal of these hazards is preferred.

- Non-slip surfaces shall be provided on access/egress decks, stair treads, ship ladders, platforms, catwalks, and walkways.
- Snow, ice, and excess water shall be reasonably cleared of barges before going to work. Winter removal supplies shall be readily available for removal of snow and ice.
- Keep designated walkways away from spud and anchor winch cables when possible. If not possible, create designated walkways over cables.
- Counterweights 7 ft or less from the deck must maintain swing radius protection or restrict access around cranes mark swing radius of crane. Designated walkways shall avoid this area.
- Cover holes in crane mats to prevent trip hazards.
- If cargo or material are stored on deck of barges, scows, floats, etc., the outboard edge shall not be used as a passageway unless a minimum of 2 ft of clearance is maintained.
- Verify access between tidal changes (land and water).
- Do not walk over or under spud or anchor wires when spuds or anchors are in use. Access plan must be in place and address the use of “up and overs”.
- Do not jump from barge to barge, barge to skiff, etc.

There is no standard barge, ship, or boat access. Ladders, stairs, gangways, and other access methods must be flexible to accommodate different work scenarios. Items to consider when determining the best method for access.

- Length of ships, barges, and boats
- Constant motion from the water / ability to move with vessel
- Varying heights of ships and barges
- Ability to secure access
- Load rating / capacity

10.1 LADDERS

Extension, step, and job-built ladder access should be avoided as a permanent access.

- One person on ladder at a time.
- Other than vertical boarding ladders permanently mounted to the side of the barge, ladder access should be avoided.
- When the shore does not slope at a 1:1 ratio or shallower, a ladder will be placed- to allow workers to exit the water. The ladder must be clearly visible, secured, and extend at least 3 ft above upper access and 3 feet below the water line.

10.2 STAIRS

- If stairs are to be used for access, they will follow applicable regulations for stair use.
- Stairs will be secured to prevent tipping and should be able to safely accommodate swells, current, or tides creating movement between decks and land points.
- Steps should have a non skid surface in addition to following OSHA requirements for construction of the steps.

- **GANGWAYS**
- Gangways and ramps shall be secured on the higher elevation end of the gangway, so the lower end is capable of floating with the tides and movement of the barges. They shall be supported in such a manner to carry them and their normal load during use. They shall be placed at an angle no greater than that recommended by the manufacturer. Finally, they shall be provided with a standard handrail (toe boards are optional depending on their usefulness and the hazard involved).
- All gangplanks and walkways shall be equipped with guardrails constructed with a top rail at 42” (+/- 3”) and a midrail at 21” (+/- 3”). Toe boards shall be placed where they pass above personnel and/or the traveling public.
- Gangways shall be of acceptable length to not cause a steep angle to transverse.
- Gangways shall be illuminated sufficiently over the full-length during operations other than daylight hours.
- Gangways and ramps must be equipped with handrail and a nonskid walking surface.

10.3 LIGHTING

All cranes and derricks shall have boom lights. Light towers will be used as necessary to provide additional lighting of the barge deck and the work area as needed. Provide adequate lighting at all access locations.

All cranes, derricks and barges must be equipped with proper navigation lights and corresponding day shapes. Barges (or outside corners of rafted barges) will have lights on all four corners and any additional navigation lights required by the Coast Guard. Anchor buoys must be lighted with steady white lights at night. Color and flashing light types vary by location and waterway, be sure to verify with Local USCG requirements and officials of actual requirements All lights shall be checked for proper operation daily.

11.0 EQUIPMENT

11.1 DESIGNATED BOAT OPERATOR

Safe operations of small boats, work boats and skiffs are the responsibility of the Approved Authorized Trainer. Part of this responsibility is restricting the operation of this equipment to designated operators (See training document). All vessels that are compliant with USCG sailing regulations for credentialed mariners are addressed by specific policies and procedures that are not part of this section.

The Designated Boat Operator Shall have the Following Responsibilities:

- Perform visual inspections of the boat each day prior to use.
- Ensure the boat is clean, work wise and to notify their supervisor of any mechanical needs that require attention.

- Ensure that the maximum capacity for workers in the boat is not exceeded.
- Ensure that all personnel follow instructions.
- No personnel shall exit the boat until given permission from the designated operator and must exit at designated offloading area.

Only Designated Boat Operators, trainees under direct supervision of a designated operator, or qualified maintenance personnel are allowed to operate a boat or skiff. Confirm with your local jurisdiction for applicable boat licenses and requirements.

The names of all designated operators will be maintained and posted on the project. Each project will be required to establish a method of identifying designated operators such as placards, wallet cards or hard hat stickers.

Prior to being designated as an operator, an individual must demonstrate the following competencies to the qualified trainer:

1. Performance of a pre-operation inspection
2. Knowledge of the basic rules for passengers
3. Man overboard procedure
4. Starting the motor and setting the trim
5. Have an understanding of tides and current
6. Knowledge of the basic right of way rules
7. Use of marine radio
8. Understanding how a small boat can get in trouble and its avoidance
9. Tying the boat up and anchoring
10. Fuel the boat and spill control
11. Locking up the boat
12. Craft operator card
13. Use of any required navigation radar

11.2 SKIFFS

Only Designated Boat Operators will run marine watercraft. Below are the minimum requirements for the two types of skiffs: work skiff and safety skiff. If the work skiff is also used as the safety skiff, it must have all the gear outlined in the safety skiff section.

WORK SKIFF	SAFETY SKIFF

• Paddle with T-Top
• 1 – 10lb ABC rated fire extinguisher.
• Skiff Capacity stenciled (or welded) on the side of the skiff.
• Boat Hook or Pike Pole.
	• All items listed under work skiff.
	• 30'' Life Ring with 90 feet of Throw Rope
	• Anchor with line.
	• Working Outboard w/ Fuel
	• Picking attachments on the skiff with bridle (do not use Molly's for picking skiffs)
	• Waterproof Emergency Box containing:
	  ○ First-Aid Kit
	  ○ Flares
	  ○ Air Horn

11.2.1 WORK SKIFF

- Except for entry and exit, passengers and employees shall remain seated in the skiff and transfer on or off will only proceed after the boat operator or captain gives the signal that it is safe.
- Transfer of employees from skiffs to barges performed at the rake end of the vessel shall be avoided. These transfers must have special access and planning.
- Boat Operators should use the buddy system and be accompanied when operating a boat. ingle operators in a skiff can ONLY occur during daylight hours using the line-of-sight method may be used during day light hours.
- Decks, bows, gunnels, and any other surface needed for transfer shall have traction material or other non-skid surface.
- If there are dynamic factors to barge access from skiff such as waves or current, steps shall be taken to prevent crushing and pinch point hazards between the skiff and receiving vessel such as ladder well, fender, or other barrier between vessels.
- If transfer from skiff to barge, bulkhead, or dock has a gap or vertical distance of greater than 18 inches an access ladder will be provided.
- Access between a skiff and a barge or "Nosing In" will only be performed if the necessary access points are present between the skiff deck and barge deck to maintain the 18" rule and shall be avoided if possible if swells or waves are present on the water.

11.3 CREW / SURVEY VESSELS THAT HAVE THE CARRYING CAPACITY OF 6 OR MORE PASSENGERS AND TENDERS / TUGS LESS THAN 26' OR 5 GROSS TON

Much like the crane operator authorized program Kiewit Companies will implements the following requirements for ALL persons operating Small Boats as defined above. This program is intended to validate an employee's credentials and instill our basic expectations and safety requirements.

11.3.1 MINIMUM REQUIREMENTS FOR ALL SMALL BOAT OPERATIONS

- If a Small Boat is on a project, the project shall have a Small Boat Manager. The Manager will have hands on experience dealing with marine vessel operations. The individual selected will be approved by the Project Sponsor and appropriate Marine Equipment Operations Manager.
- A start card will be filled daily specific to ALL Small Boat Operations. The start cards development will include the Small Boat Manager and be signed by him/her prior to any work being performed.
- If the start card includes any plan for a move that solely involves the Small Boat with no other support (does not apply to skiffs support), a Voyage Plan will be developed and reviewed by the Small Boat Manager.
- A licensed Captain with minimum one deck hand, with the qualifications per the responsibility matrix below, will be the individuals operating the boat at any time of its use. These individuals will be approved by the Small Boat Manager and appropriate Marine Equipment Operations Manager prior to any operations on the project. No operations will be started using the any Small Boat without both employees on board.
- Minimum 8 hours of field training & testing as well as a minimum 4-hour classroom session will be performed for any employes planning to be a captain. The intent of this training is to ensure the captain is familiar with the Vessel Operation Manual, Kiewit Company Safety Policies and Procedures, along with the working limitations of the vessel. A portion of the field training and testing must be dedicated to “failure training”, such as the loss of an engine, steering, rope lines in wheel, etc.…
- Trainings and testing will be administered by an authorized trainer. A list of these trainers can be found through your Marine Services Group. Captains and Deckhands will be approved in writing by Authorized delegates from your Marine Services Group. All training and authorizations will be held in Talent Navigator.
- A PFD will be worn at all times by all individuals on the vessel when the vessel is operational or underway. If the vessel is not operational, PFD’s may be removed when performing maintenance in areas such as the engine room, when there is zero exposure to a drowning risk.
- The vessel will have all USCG required items (Life Ring, lights, etc.…) prior to its use on the project. These items will be inspected for their working order at the start of every shift by using the DVI APP.

11.3.2 RESPONSIBILITY MATRIX

Title	US Minimum Requirements	Canadian Minimum Requirements	Notes
Small Boat Manager	• Minimum 10 Years working hands on with Tug, Tow and Tender Operations.	• Minimum 10 Years working hands on with Tug, Tow and Tender Operations.	Individual shall be approved by the Project Sponsor and appropriate Marine Equipment Operations Manager.
Captain	• 25 Masters License • Radar and Training in Electronic Chart Systems (ECS) • Marine Radio License • Person In Charge (PIC) Marine Vessel Fueling • Pass the written and practical evaluations held in Talent Navigator	• 60 Ton Red Seal Captain Certificate or equivalent • Radar • ROC-M (One day safety course for vessels in Canadian Waters) •Trained in WHMIS • Pass the written and practical evaluations held in Talent Navigator	•Will be on boat whenever it is in use. •Will review and approve any tug move prior to the move being performed. •Authorized by Authorized Operator
Deck Hands	• Individual with common sense and situational awareness. • Adult First Aid and CPR/AED Training • Marine Radio License • Person In Charge (PIC) Marine Vessel Fueling • Pass the written and practical evaluations held in Talent Navigator	• Individual with common sense and situational awareness. • Adult First Aid and CPR/AED Training • Marine Radio License • Person In Charge (PIC) Marine Vessel Fueling • Pass the written and practical evaluations held in Talent Navigator	•May be utilized withing the crew on a barge as an extra deck hand but dedicated to boat when in use) •Authorized by Authorized Operator

11.3.3 AUTHORIZED EXAMINERS INFORMATION

All Authorized Examiners (AE's) signing off completion of operator's manual, field assessments for boat captains must be approved by a Kiewit Company Authorized Trainer. Assessments conducted by individuals who are not approved AE's will not be accepted.

Kiewit Companies have a great deal of trust in the professional competence, judgement and behavior of Authorized Trainers and Examiners. In performing your function as an AE, you must complete the assessments in Talent Navigator (TN) and personally witness the demonstration of skill or ability by the person being assessed and have found that individual, in your professional judgement, to be competent under the criteria contained herein.

Kiewit Companies greatly appreciate the efforts of the AE. Their role is critical to maintaining high professional standards among our Marine Fleet. AE's who sign off for any item in the assessments must provide information in the comments section concerning the Authorized Operators (OE) qualifications.

Prior to conducting an assessment, the AE must be thoroughly familiar with the vessel and fully understand the vessel characteristics, equipment, manning requirements, company policies and procedures etc. The AE must be able to use his or her professional judgement in adapting this guidance to fit the circumstances of the assessment. For example, project specific requirements or needs, vessel only used as an assist, vessel is operating with low air draft, vessel is operating in shallow water, vessel operating in navigable waterways, inclement weather etc. The AE must also be familiar with the USCG International Rules of the Road.

In conducting the assessment, the AE must clearly communicate to the AO/Trainee the purpose of the task being assessed and actions that must be taken to successfully demonstrate competency. The AE must remind the AO/Trainee that throughout the assessment process, the AO/Trainee is expected to act with consideration for the safety of the crew, the vessel, its cargo, and the environment and that he or she should not take any action or neglect any responsibilities that would cause personal injury, equipment damage or pollution. The AE must advise the AO/Trainee that if a collision, injury, or pollution incident occurs during the course of the assessment, the AE will not consider the AO/Trainee to have demonstrated a competent task.

11.4 TUGS

Towing vessels are regulated by CFR 46 – Subchapter M. Predominantly towing vessels use a Towing Safety Management System (TSMS). This document should be approved by a Third Party Organization (TPO) which is certified as a TPO by the Coast Guard. This document should be maintained on each vessel and reviewed regularly.

11.5 BARGES

The selection of a barge suitable for operation requires the consideration of these areas, reference the TSCD risk level matrix.

- Critical Design Considerations
- Engineer barge design, winches, stability, walk-on plan & loading sequence review.
- Anchors, winches, spuds, etc., need to be part of the design, may require structural modifications to the barge.
- Land cranes must use reduced machine list charts.
  Thoroughly inspect barges before leasing/buying (corrosion).
- Only potable water should be used in ballast tanks, and tanks should be pressed full wherever possible to avoid “sloshing” affect.

TEMPORARY STRUCTURES AND CONSTRUCTION DEVICES MANUAL

TABLE 3.4: MARINE[1,2,3]

RISK LEVEL	ATTRIBUTES	DESIGNER	DESIGN REVIEWER	INSPECTOR(S)
Low	• Barge is outfitted for mobile crane equipment/loads and previous engineering package validates the barge's stability and structural adequacy for the serial number specific crane and configuration. • Dynamic operation limits have been verified and a plan exists to prevent reaching these limits. • Mooring/berthing structures are rated for intended loads.	Consultant **OR** KIE **OR** District PE	Original Consultant (for Cranes on Barges) – Not required for Mooring/Berthing Structures	Normal sign-off required for crane equipment usage[2]
Moderate	• Barge requires structural analysis to verify adequacy for intended loads. • The placement, walking, or driving of equipment/loads onto the barge requires additional analysis and engineering. • Roll-on / Roll-off operations to include mooring, ballasting, and ramp design[4]. • Float-in / Float-out operations with custom dunnage/grillage. • Custom lashing / sea-fastening design (outside of manufacturer's specification). • Passive ballasting of barge is required to offset planned deck loads (including cranes and lifted loads). • Mooring/berthing require additional analysis and engineering. • Barge operations are limited to protected/sheltered waterways with minimal tidal/wave effects.	KIE	Not required	Project Equipment Superintendent **OR** Experienced District Personnel[2] **AND** Designer **OR** Designer Delegate
		District PE A **OR** Consultant A	District PE B **OR** KIE **OR** Consultant B	
High	• Interlocking modular barges (Flexifloat or similar) requiring specialized shapes to match site constraints. • Active ballasting of barges required to balance crane loads. • Float-in / Float-out operations with elevated falsework. • Barge structural modifications or specialty grillage. • Dynamic load analysis required for offshore vessel use or impacts from tidal/wave effects.	KIE	Consultant	Project Equipment Superintendent **AND** Designer
		Consultant A	KIE **OR** Consultant B	

Footnotes

1. *Barge crane operations must comply with the Corporate Crane Procedures Manual (CCPM), Section 29, Crane and Barges.*
2. *Inspections for mobile land-based cranes on barges to include Project Manager, Regional Equipment Manager, Regional Crane Manager, and Marine Equipment Manager as required per CCPM.*
3. *Additional guidance for barge operational limits and structural analysis can be obtained from Det Norske Vertias (DNV) and/ or the American Bureau of Shipping (ABS).*
4. *For heavy hall operations refer to Table 3.14 Heavy Haul.*

11.6 CRANES & EXCAVATORS

When cranes and/or excavators are operating on a barge or in a marine application, a barge stability analysis, structural adequacy, deck loading, and lashing plan must be completed. Factors such as water depth, tide changes, and water flow will present higher risk than normal

land crane operations. Ensure that the design firm analyzing the equipment and the stability analysis also provides direction on lashing or physical barriers to prevent equipment movement off barges during operation.

HAZARD	PREVENTION
• Weather conditions (i.e., wind and rain) • Structure of the barge failing due to over loading • Tipping over while being moved to the barge. • Travelling over the edge of the barge	• Stability Analysis • Ensure the barge can support the weight of the equipment and loads. • Ensure the barge can maintain its stability with the maximum safe inclination for all working positions of the MEWP. • Securing or bull rail on barge • Crane mats • Delineate the safe zone identified on stability analysis • Designated operator training • Special Barge Mount Crane (BMC) training • Understand barge and crane list and trim • Understand crush points • Use a spotter, where necessary • Communication method between the spotter and the operator

When working with a crane on a barge, r*eference the Corporate Crane Manual, "Cranes on Barges" Section* 29.

11.7 MEWP

For all MEWP operations on a Barges reference SOP And the Corporate TSCD Manual.

11.8 SPUDS

Spuds present a unique set of crush hazards to personnel, including but not limited to (Between spud pin or dog and spud, spud well, deck, spud wire and sheaves). All crew members working near spuds are required to list and discuss specific crush point hazards on the Operations Start Card.

- Spuds shall be of sufficient length and width to secure the barge in the depth of any intended work area.
- Collars should be used on all spuds to ensure safe handling.
- Inspection – *Follow Spud Maintenance and Hoisting SOP*

- The spud cable under the deck will need to be inspected more frequently based on the type of work.
    - Example: During a dredging operation, the spuds may be raised and lowered more often for frequent barge moves.
    - It is recommended that the spuds be pinned and the cables disconnected at minimum once a month for a complete inspection when dredging operations are occurring during both day and night shifts.
- Rigging and winch cables used to lift spuds shall be of sufficient capacity to lift the spuds and the water that will potentially fill them during use.
    - Preferred practice of capped spuds.
- While traveling long distances, lay the spuds down (i.e., ocean tow, mobilization/demobilization to project, etc.). Should spuds remain in the wells for short transit, the detailed Derrick / spud barge operational manual shall be followed for correction safe stowage of the vessel.
- Ensure that crane has the capacity to lift the spud.
- Crush and pinch points in spud wells, winches, spud cables, and pulley shall be labeled clearly. If feasible all crush and pinch points shall be guarded with a physical barrier capable of preventing accidental entanglement or line of fire hazards.
- Spud cables and winches shall be guarded to prevent employees from getting crushed or hit by broken or slapping cables.
- Access over or around spud wires shall be protected. Employees shall only cross spud wires at the turn backs or over established protected access points.
- Spud pins shall be stowed such that they do not become a trip hazard.

11.9 WINCH AND CABLE SYSTEM

- All operations must be in 100% compliance with the “Winch Operations Instructions Policy” and Energy Isolation / LOTO Toolkit. Attach Links here

11.10 MOORING

- All mooring lines and cables shall be inspected for working condition before use. All mooring lines and cables that are damaged or worn to a degree that affects their capacity or safe use shall be removed from service.
- Cables and mooring lines shall be of sufficient size and strength capacity to hold barges, skiffs, or other floating vessels operated for the scope of work they are participating in.
- A minimum requirement of 4 mooring lines is required for all operations.
    - In dynamic conditions such as current, waves, and tides we must secure barges, example as securing them to piling or cleats.
- Cables on roller drums or pulley systems shall be set at the proper angle, height, and position to prevent the cable from slipping off. They shall be labeled as pinch points and guarded if feasible.
- Handling more than one mooring line at a time is prohibited.

- All crew members shall have handheld radios for good communication. This helps in both the movement and mooring of barges.
- Mooring lines shall not have any knots under any circumstance.

11.11 OTHER EQUIPMENT

Reference Marine Services - Home (kiewit.com) or additional marine equipment information.

12.0 DIVING

Majority of diving operations will be subcontracted, but Kiewit will work side by side with the diving subcontractor in all aspects of the safety program. For all Diving operations reference SOP.

13.0 NIGHT OPERATIONS

Night operations while working in or around or adjacent to water present a unique set of hazards to personnel.

- All crews working on night operations near or on the water are required to always have a partner/companion as a “buddy system”.
- All PFD’s will be outfitted with water activated strobe lights and whistles for visual and audible location identification of an overboard employee.
- The Superintendent will ensure that the night operations work plan and Hazard Analysis addresses the safety issues of working at night.
- The Plan and Hazard Analysis will address, but not be limited to, the following items:
    - Reflectivity
    - Illumination
    - Communications
    - Emergency procedures

13.1 LIGHTS & SIGNAGE

All Coast Guard light and signage regulations shall be followed in navigable waters as defined in said regulations.

Barge lights, solid white lights located on the barge corners at night to identify barge corners when not moving. Barge Lights must follow USCG Minimum Requirements.

All derricks and cranes shall have boom lights. Light towers will be used as necessary to provide additional lighting of the barge deck and the work area as needed. Provide adequate lighting at all access locations.

All derricks, cranes and barges must be equipped with proper navigation lights and corresponding day shapes, as barges with spuds or anchors are restricted in their ability to maneuver. Refer ECFR Chapter I – Subpart C – Lighting and Shapes for further guidance.

14.0 PUBLIC SAFETY

All derricks, cranes and barges must be equipped with proper navigation lights and corresponding day shapes, as barges with spuds or anchors are restricted in their ability to maneuver.

Keep proper navigation lights in place on buoys, barges and bridge structures and maintain proper notice to mariners. Be aware of private vessels transiting the area. Be prepared to call vessels via VHF radio and give them five blasts on the air horn if they are entering the work zone. Posting signs is a good way to warn the public of submerged anchor wires or other hazards and give warnings to give clearance of 150 meters (500 feet).

Air space restrictions must be verified by reviewing the FAA for boom height restrictions at the work area and travel to and from port or assembly area. Aviation lights and flags shall be provided at the boomtip, A-Frame/Mast, and other areas of cranes as required by FAA and other applicable authorities.

15.0 EMERGENCY & RESCUE

- All personnel will be trained for emergencies such as Man-Overboard (MOB) / Man In Water (MIW), fire, injured/ill personnel extraction, abandon ship, sinking, or any other potential emergency related to marine work.
- Man overboard drills or reviews shall occur monthly, at a minimum. Rescue Training shall be done at the beginning of the job, annually or when there is a significant change to the plan.
- Muster points shall be designated and marked.
- A station bill and over the water maps for extraction routes will be created and posted in conspicuous places on barges. Each crew member shall be given a written description of and shall become familiar with his/her emergency duties and shall become familiar with the vessel's emergency signals.
- Local rescue shall be made aware of scope of work and location to ensure timely responses to emergencies. When practical they shall be asked to tour the operation on location.
- Man/stokes baskets shall be available on all spud/anchor barges and shall be equipped with flotation device. No personnel shall ever be strapped to a man basket not equipped with flotation device while on the water.
- At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water. Personnel trained in launching and operating the skiff shall be readily available during working hours. Lifesaving personnel shall perform a lifesaving drill, including the launching and recovery of the skiff before the initiation of work at the site and periodically thereafter as specified by the project. Skiffs shall be kept afloat or ready for instant launching.
- Life rings and ring buoys shall be USCG-approved; shall have at least 90' of 3/8'' attached solid braid polypropylene rope or equivalent. Throw bags may also be used in addition to life rings or buoys. These throwable devices and lifelines shall be inspected at a minimum every 6 months and shall be stored in a manner as to allow immediate deployment and will be protected from degradation from weather and sunlight. Life Rings shall be readily available and be provided on docks, wharfs, trestles, safety skiffs, and motorized vessels. Life Rings shall be at intervals of not more than 200', or within 100' from an employee.

- Self-rescue such as Jacob's ladders and Jason's Cradles shall be on vessels and stored properly.
- Rescue equipment is required onshore and on barges. Each system shall be complete and independent.

16.0 TRAINING

ROLE	TRAINING DESCRIPTION	FREQUENCY	INSTRUCTOR	LINK
Marine Work Orientation Slides	Will be trained in the following: • Definition of a Marine work • Safeguards • Identification & Training Requirements	New Hire / Orientation	Project Staff (FLS, Safety)	CLICK HERE
Designated Boat Operators	In addition to the new hire awareness, training will include: • Familiarization • Responsibilities • Visual Inspections • Requirements etc. These will be created once the training is developed:	Prior to initial operation of any boat/skiff.	Competent Person(s)	CLICK HERE
First-Aid / CPR / AED	Accredited Training Program	Current (2 yr. exp.)	Qualified Person(s)	CLICK HERE
Marine Work Training	One-hour, in-depth marine work safety presentation.	Prior to assigned marine work duties on project	Competent Person(s)	CLICK HERE
Vessel Specific Familiarization	Familiarization is for all vessel personnel that will be assigned shipboard duties and visitors. • Familiarization • Responsibilities • Visual Inspections • Emergency Procedures	Prior to assuming duties	The Master or designee	CLICK HERE
Emergency Drill: Man Overboard	The procedure to be followed in the event of a Man Overboard event and the precautions to be taken while working around water.	Prior to assuming duties/monthly	Competent person or designee	CLICK HERE
Emergency Drill: Fire	Procedures and guidelines to protect property and vessels from fire hazards.	Prior to assuming duties/monthly	Competent person or designee	CLICK HERE

ROLE	TRAINING DESCRIPTION	FREQUENCY	INSTRUCTOR	LINK
Emergency Drill: Abandon Ship	The procedure to be followed in the event of an abandon ship.	Prior to assuming duties/monthly	Competent person or designee	CLICK HERE

Retraining is required for the following:

- Whenever there is a change in marine operations that presents a hazard which an employee has not previously been trained; and
- Whenever there is any evidence of a deviation from marine procedures or there are inadequacies in the employee's knowledge or use of these procedures.

Emergency Drill and Exercise Schedule

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EMERGENCY DRILLS												
FIRE	X	X	X	X	X	X	X	X	X	X	X	X
FIRE WATCH						X						
ABANDON SHIP[1]	X	X	X	X	X	X	X	X	X	X	X	X
RESCUE BOAT[2]	X	X	X	X	X	X	X	X	X	X	X	X
CONFINED SPACE	X		X		X		X		X		X	
EMERGENCY STEERING LOSS STEERING[6]	X			X			X			X		
LINE THROWING		X			X			X			X	
MAN OVERBOARD[5]	X	X	X	X	X	X	X	X	X	X	X	X
OIL SPILL[3]		X		X		X		X		X		X
SECURITY			X			X			X			X
HELICOPTER EVACUATION[7]		X						X				
DP SYSTEM FAILURE		X			X			X			X	
EMERGENCY EXERCISES												
LOSS PROPULSION						X						X
COLLISION/ALLISION[4]			X						X			
GROUNDING[4]				X						X		
SERIOUS INJURY	X						X					
COMMUNICATIONS[8]					X						X	

[1]See 46 CFR 199.180 for details on required intervals of launching of lifeboat and maneuvering in the water, donning immersion suits during drill, and onboard training in the use of davit launched life rafts.

[2]See 46 CFR 199.180 for details on required intervals of launching rescue boat and maneuvering in the water.

[3]Alternate between QI modification and emergency procedures exercise, ref. 33 CFR 155.1060.

[4]Incorporate Flooding and Structural Failure into these exercises.

[5]Incorporate Missing Man Scenario twice each year.

[6]See 33 CFR 164.25 for details required for these drills. Emergency Steering and Loss of Steering Drills may be performed concurrently.
[7]May be held in conjunction with Abandon Ship drill or Serious Injury exercise.
[8]Communications Exercise is a communications exercise to test all comm devices.

17.0 FORMS

- Rescue Checklist
- Hurricane Plan

18.0 REFERENCES

- Kiewit Marine Equipment Policy
- Marine Services - Home (kiewit.com)
- Corporate Crane Manual Section 29 - Cranes on Barge
- Corporate Crane Manual Section 30 - Pile Driving
- MEWP Safe Use Plan
- TSCD Manual
- Proper line use and knots for typical applications (need to add link)