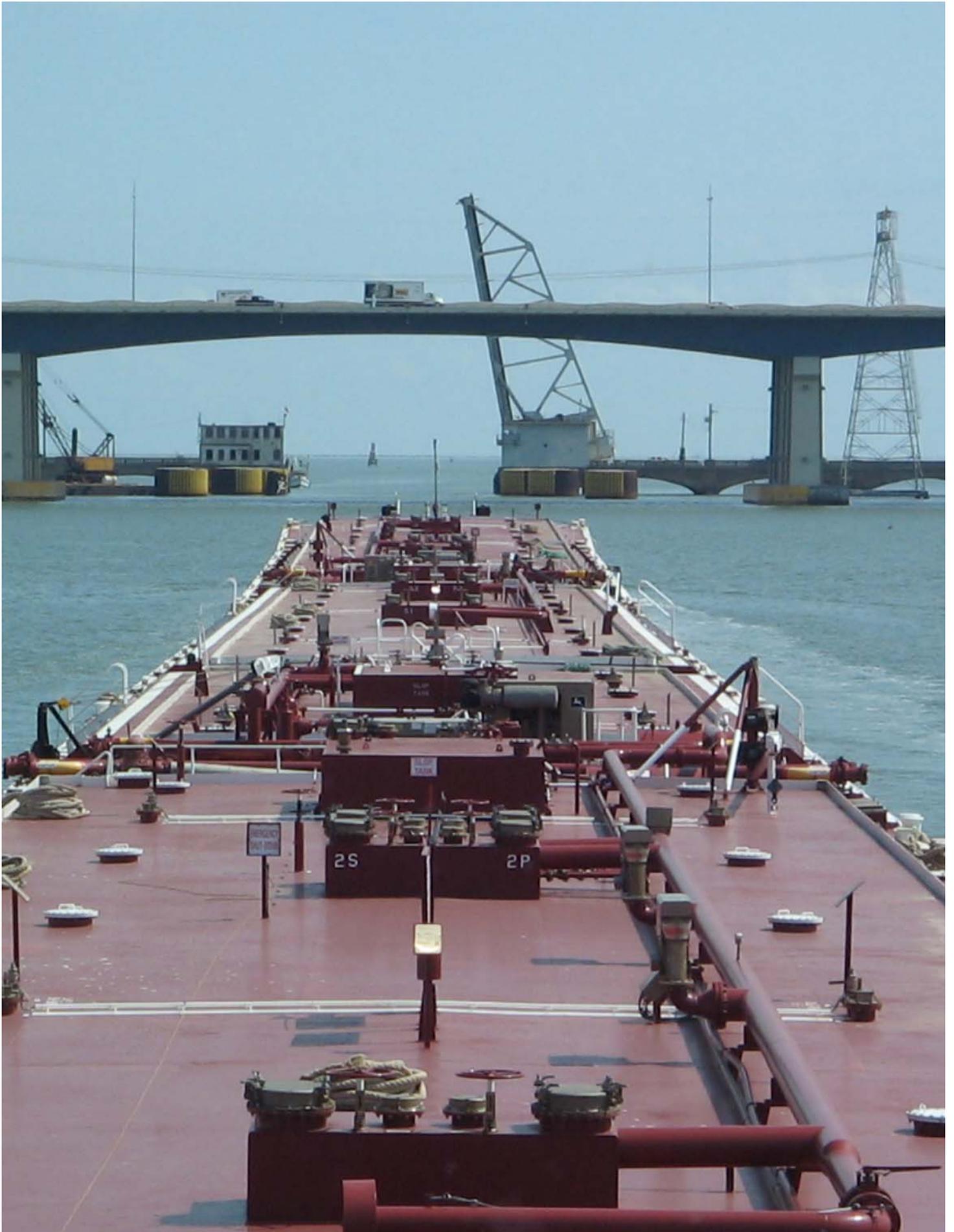


Navigating the Houston Ship Channel

a reference for commercial users



A publication of the
Houston-Galveston Navigation Safety Advisory Committee



Welcome to the Houston Ship Channel

one of the busiest and most challenging waterways in the world

The Houston Ship Channel hosts more than 60 ships and 340 barge movements each day. Statistics from Vessel Traffic Service indicate annual increases of nearly 10% since 2004; and as the Panama Canal nears completion, we may see additional increases in vessel size and traffic. The deepening and widening of the Houston Ship Channel brought larger ships to the waterway. With a project depth of 45 feet and width of 530 feet, the channel can accommodate the "Suezmax" tanker, which carries up to 40% more cargo than any ship permitted within the channel's previous dimensions. Similar expansions are ongoing for the Texas City and Galveston channels.

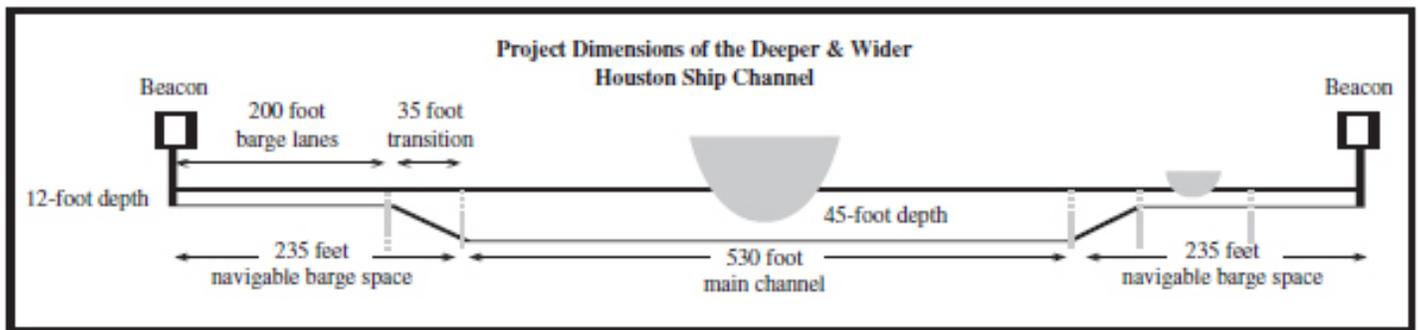
The deepening and widening of the Houston Ship Channel incorporated barge lanes on either side of the deep channel and permits the safe movement of larger volumes of mixed use traffic and expanded opportunities for our ports and all who use their facilities. To capitalize on these improvements, however, we must maintain a safe navigation environment. This means adjusting our operations and procedures to accommodate heavy traffic and large vessels in the channel. With some simple considerations, and continued cooperation among vessel operators, we can ensure a deeper, wider, and *safer* waterway.



Our Houston Ship Channel

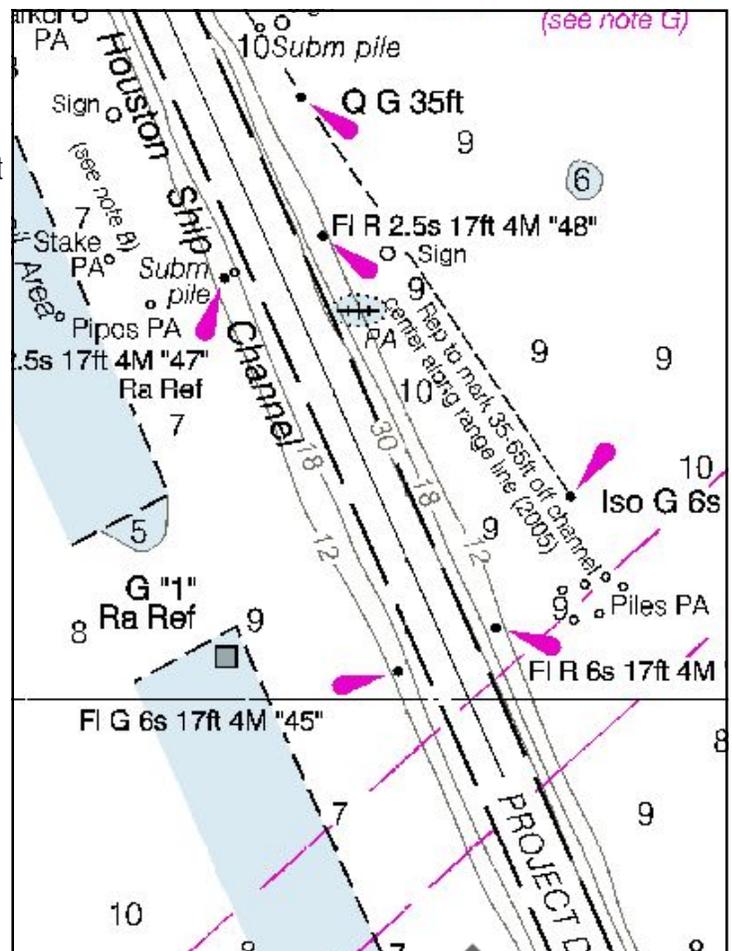
The Houston Ship Channel consists of a main channel with a project depth of 45 feet, width of 530 feet, and barge lanes on either side between the Gulf Intracoastal Waterway and Morgan's Point. A cross section of the improved channel shows:

- A main channel dredged to a project depth of 45 feet and width of 530 feet;
- 35-foot wide transition slopes on either side of the main channel, measuring 45 feet deep at their innermost point, and 12 feet deep at their outermost point;
- 200-foot wide barge lanes outside the transition slopes, measuring 12 feet deep; and,
- Width of the entire channel along this reach as 1000 feet.



Navigable space within the barge lanes includes the 35-foot transition slope, for a total navigable width of 235 feet on either side of the main channel. The outer edges of the barge lanes are marked with gated beacons in good water, but inner edges are left unmarked.

Tow operators are encouraged to use the lanes as a safe navigation space, leaving the main channel free for faster-moving vessels and deep-draft ships. Operators should be aware, however, of hydraulic effects caused by the new channel configuration. Currents in the barge lanes may run slightly faster due to their shallower depth, and forces exerted by larger displacement ships will be amplified. See the sections on Deepdraft/Tow Interactions and Mooring Issues for additional details on the impact of hydraulic effects.





Every vessel type transiting the Houston Ship Channel has its own unique navigational challenges and limitations. In order to maintain a safe environment, it is important to understand the differences between vessel types, and how their operation impacts others on the waterway.

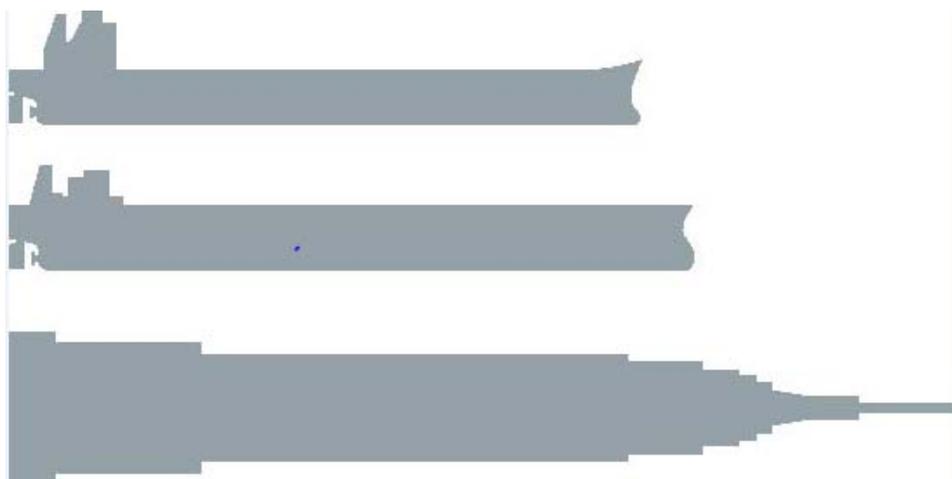
Can you see off that ship?

A ship's configuration and cargo affect the vessel operator's line of sight from the ship's bridge. The blind spot ahead of the bow can be a few hundred feet – or thousands of feet in the case of deep draft container ships. Cranes, containers and cargo canopies can create additional blind spots. Towboat and other vessel operators should exercise extreme caution when attempting to overtake a ship, taking care to avoid blind spots and to communicate intentions when necessary.



How much does that ship hold, and why should I care?

With the deepening and widening project complete, the Houston Ship Channel can accommodate the massive Suezmax tanker. On average, the Suezmax is 70 feet longer and 20 feet wider than the Aframax – the largest vessel permissible in the Channel prior to the deepening and widening project. It is also capable of carrying up to 40% more cargo. The larger size and cargo capacity of the Suezmax tanker means more weight and greater water displacement in the Channel. This leads to amplification of hydraulic forces exerted on other vessels in the vicinity.



Aframax

Length: 830 ft
Beam: 145 ft
Draft: 38 ft

Suezmax

Length: 899 ft
Beam: 164 ft
Draft: 45 ft

Empire State Building

Height: 1250 ft

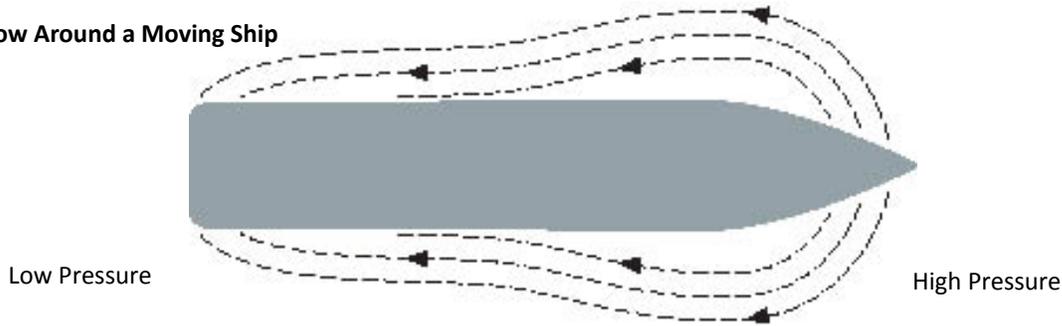
Compensating for hydrodynamics



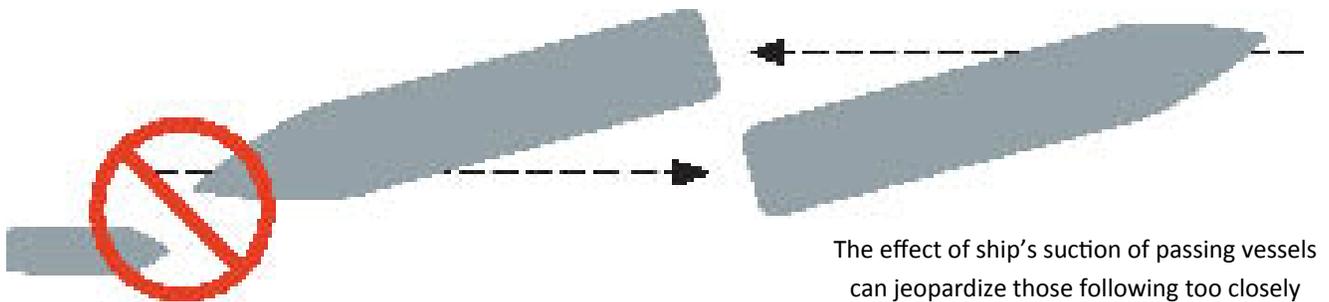
A moving ship pushes water away from its hull in all directions. As the ship moves forward, water will flow around and under the vessel to fill space in its wake.

Areas of high pressure exist on both sides of the moving ship's bow as water is displaced. As it flows along the sides of the ship, water speed increases until it reaches an area of low pressure near the stern. This is where "ship's suction" occurs. Ship's suction is a hydraulic effect that draws neighboring vessels toward the stern as the ship passes, or pulls the stern near the bank of the channel when transiting close to shore.

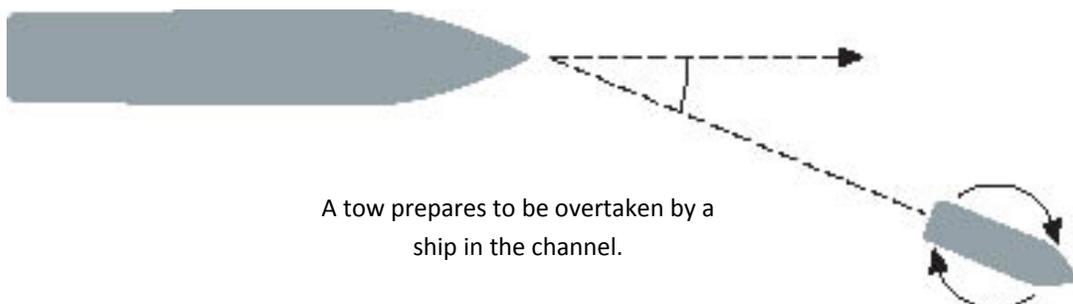
Water Flow Around a Moving Ship



When two ships meet in the Channel, this effect can turn each of them off-course in a counter-clockwise direction (assuming opposing vessels are both on their respective right sides of the Channel). This poses potential danger to vessels following either ship. To avoid this hazard, vessels should maintain following distances large enough to permit meeting ships to correct their course.



In similar fashion, a ship exerts suction on vessels it overtakes in the Channel. To mitigate the effect, tow operators are encouraged to position their vessels at an angle to the ship's path (with the stern pointing toward the ship and the bow pointing away from the ship).. Hydraulic effects on moored vessels are also amplified by the presence of larger ships in the Houston Ship Channel. Please see the section on Mooring Issues for tips on mitigating these effects.



Working Around Harbor Tugs



Vessel berths along the Houston Ship Channel are numerous and varied – and you can expect to encounter vessels berthing and unberthing at all times of the day and night. Assisting those vessels will be harbor tugs. Harbor tugs are powerful and maneuverable vessels that range in horsepower from 1700 to 6300 Hp Z-drive tugs. Tug designs may vary from single screw conventional tugs to advanced twin screw azimuth stern drive (Z-drives), these design differences account for varied performance in both power and maneuvering capability. When assisting ships, harbor tugs may or may not be made up to the vessel with a line, but regardless it is imperative you recognize the tug is assisting a vessel and provide a wide berth for the operation – one minute the tug can be working against the vessel and the next be stretched out on their lines. Additionally, tugs may be maneuvering around the vessel while they assist with the berthing/unberthing; they may suddenly move into sight as they move from the one side of the vessel to the other very rapidly. Tugs also produce vessel very powerful propeller wash that may affect tows passing in close proximity. Harbor tugs have much deeper drafts than towboats and will usually be restricted to the deeper areas of the channel. While assisting ships, the actions of the tugs are at the direction of a State Pilot or the Ship's Master. It is common practice that the Pilot will make a broadcast on channel 13 before they shift to a working channel to direct the operation of the tugs. You should maintain a VHF radio listening watch (see section later in this publication), so the pilot assisting the vessel can communicate with you regarding the movement(s) of the vessel and/or tugs.





With deepening and widening of the Houston Ship Channel complete, ships larger than ever before transit the channel. These ships – some with as much as 40% more cargo capacity than the largest ships permissible within previous channel dimensions – can exert much stronger forces on moored vessels.



As a passing ship approaches, the water surge ahead of it will cause a water flow at the pier in the direction of the passing ship. As the ship passes, water flow at the berth will shift direction, drawing the moored vessel in the opposite direction. A third force comes into play as the stern of the vessel passes. This force follows the passing vessel and is diametrically opposed to the previous force. In a short period, the moored vessel will be pushed in different directions three times.

Because these forces are amplified by the transit of larger ships, it is particularly important to pay attention to proper dockside moorings. Mariners should tend their lines carefully and make sure loads are equally distributed. Lines should be tensioned such that no movement is allowed at the dock. If slack lines permit movement of even a few feet, the moored vessel will be subjected to a substantial amount of energy that will surge loads and part overloaded mooring lines.

The Houston Galveston Navigation Safety Advisory Committee includes a sub-committee whose purpose is to address issues related to mooring safety along the Houston Ship Channel. This group is working with the U.S. Coast Guard to reduce incidents of parted mooring lines and damaged moorings. They are accomplishing this goal by educating mariners and dockhands on the importance of proper mooring leads, adequate mooring lines and optimal use of cleats and bitts.

The subcommittee is also working on a comprehensive survey of mooring facilities throughout the Houston, Galveston and Texas City Port complexes, to assess the configuration and condition of docks, wharves and piers, as well as practices in place at those facilities. Subcommittee members offer courtesy reviews of any new waterfront construction involving moorings, providing facility owners a better understanding of the mooring needs of both shallow and deep draft vessels.

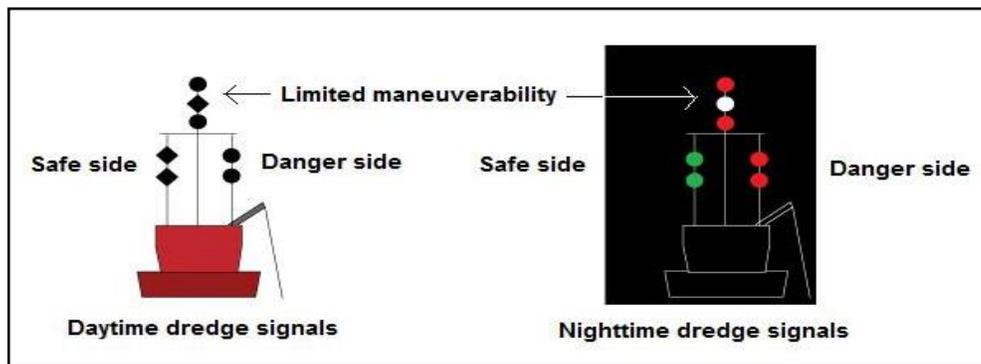
Dredge Operations



You can find a dredge working within the port complex at almost any time. It is important to be aware of dredge operations and understand their signals in order to avoid an accident.

During the day, dredges will display a ball-diamond-ball in a vertical line, usually on the centerline near the forward portion of the dredge. This signals that you are approaching a vessel with limited maneuverability. The "safe side" will be marked with two diamonds. Avoid the "danger side" marked with two black balls. It is the side on which the dredge pipe is connected.

At night, the ball-diamond-ball pattern will instead be represented with a red-white-red pattern. The two diamonds of the safe side will show two green lights, and the two black balls of the danger side will show two red lights. Do not confuse these with navigation lights, and never pass a dredge until you confirm passing instructions with the dredge master on VHF-FM Channel 13.



Dredge operations involve a considerable number of support vessels that are necessary to move the dredge, relocate anchors and anchor balls, place dredging pipe and connecting flanges, and ferry personnel and supplies. These boats are on the move 24 hours a day. Maintain a close lookout, and be prepared for sudden maneuvers by support vessels.



Areas Requiring Special Attention



There are several locations within the vicinity of the Houston Ship Channel that warrant the special attention of mariners.

Area Intersection of the Gulf Intracoastal Waterway and the Houston Ship Channel.

Challenges Traffic congestion, current, wind and weather, vessel size and speed variation, radio congestion, mariner inexperience.

Area Lynchburg Ferry/San Jacinto River

Challenges Traffic congestion, line of sight, current, ferry crossing, background lights intersecting waterway, sharp bend, communication issues.

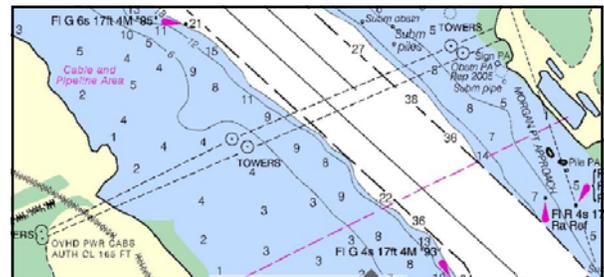


Area Dredge Locations (various)

Challenges Channel restrictions, closures, communication issues, one-way traffic, location of equipment.

Area Manchester

Challenges Narrow passage, limited line of sight, congestion.



Area Morgan's Point Highlines

Challenges Barbours Cut and Cedar Bayou intersections, high traffic area subject to congestion.

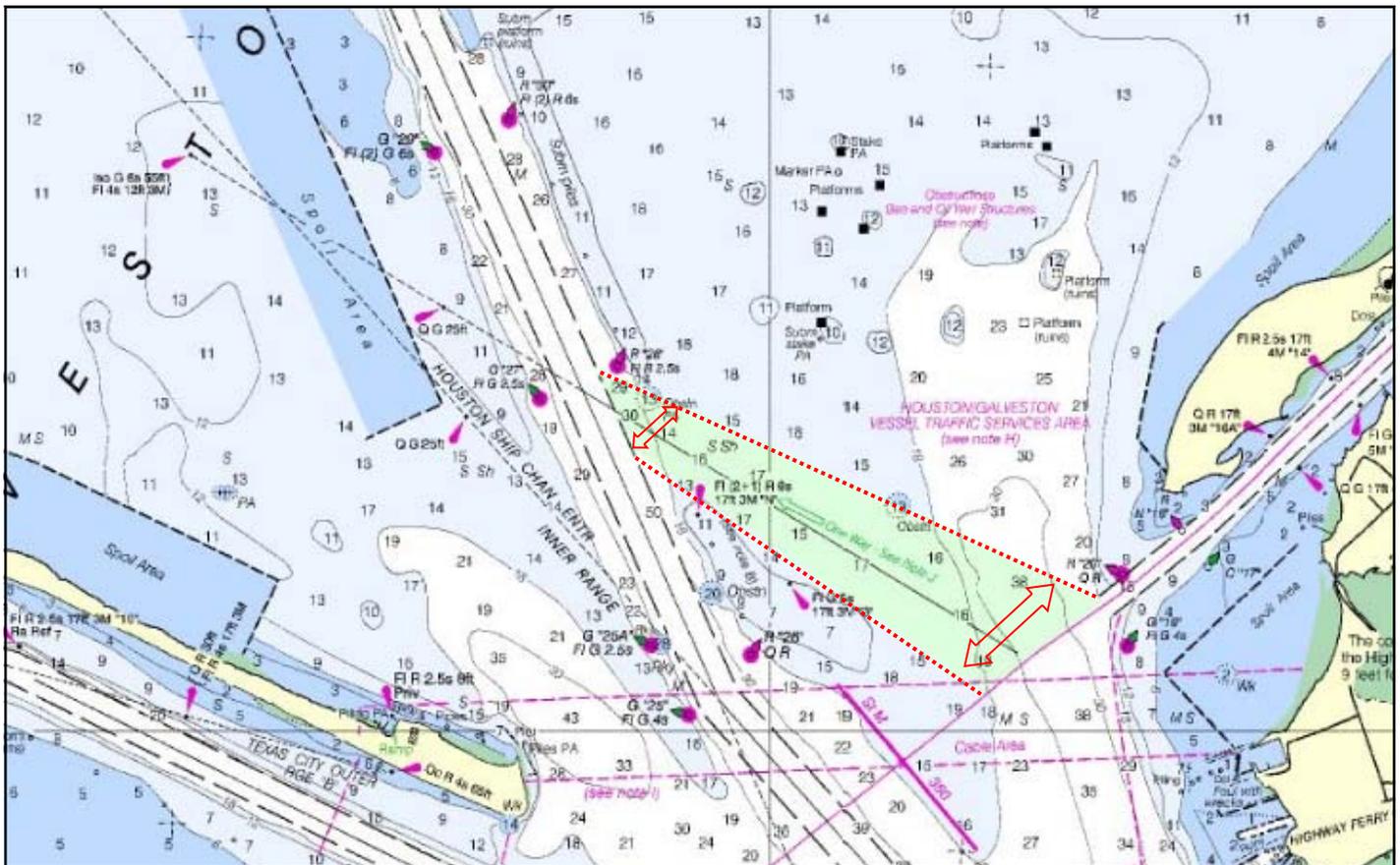


Bolivar Roads Alternate Inbound Route

The Bolivar Roads intersection with the Houston Ship Channel has always been a busy one, but with additional traffic and larger vessels transiting, it is expected to become even more challenging.

At the same time that barge lanes were added, we implemented an alternate route that allows mariners to avoid the Bolivar Roads/Houston Ship Channel intersection. Known as the Bolivar Roads Alternate Inbound Route, or BRAIR, the passage acts much like a freeway on-ramp. Westbound traffic exiting Bolivar Roads may enter the Ship Channel via the BRAIR and continue inbound, rather than navigating the difficult 105-degree turn at the intersection.

The BRAIR is intended to serve inbound traffic only. It features an inbound range on the extended centerline of the route's northern end. Some towing vessel operators are unaccustomed to using ranges, but those who do find them most helpful. Vessels departing the GIWW at Bolivar buoys 19 and 20 inbound for Houston will pick up a rear range (ISO G 6S) and a front range (Q G) on a heading of 300 true which will keep them in naturally deep water until they merge into the Houston Ship Channel at buoys 27 and 28.



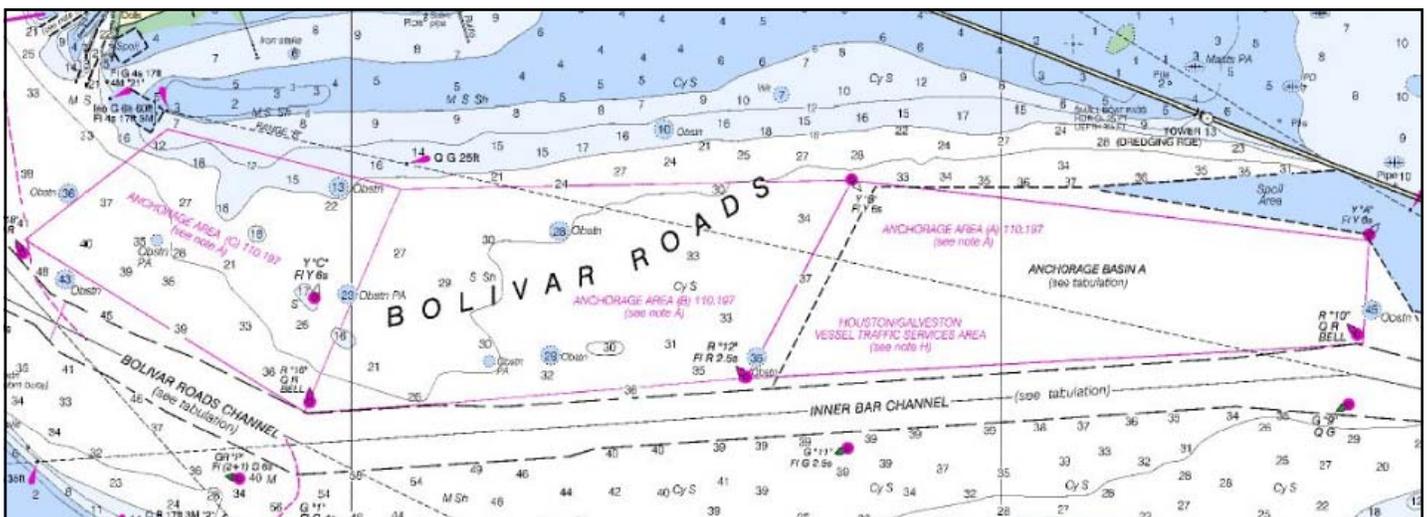
Anchorage Areas at Bolivar Roads

Anchorage areas at Bolivar Roads are intended for temporary use by vessels of all types. Most vessels use the Bolivar Roads Anchorages while waiting for dock space to clear, for bad weather to pass, for bunkering and/or provisioning, or for completion of any required inspections.

Mariners should note specific restrictions applicable to Anchorage Areas A and C as set forth at 33 CFR 110.197:

- Unless otherwise authorized by the Captain of the Port of Galveston, vessels shall not anchor in Anchorage Area A or C for more than 48 hours.
- No vessel with a draft of less than 22 feet may occupy Anchorage Area A without prior approval from the Captain of the Port.
- No vessel with a draft of less than 16 feet may occupy Anchorage Area C without prior approval from the Captain of the Port.
- Anchors shall not be placed in the navigation channel, and no portion of the hull or rigging of any anchored vessel shall extend outside the anchorage areas.

Vessel Traffic Service (VTS) Houston/Galveston oversees the management of vessels within Bolivar Roads Anchorages.





The Bolivar Roads area is generally a safe place for ships to anchor. Passing traffic and adverse weather conditions that pose little danger to a ship, however, can find the brownwater vessel – either preparing for or conducting bunkering operations – in a hazardous situation. Every vessel passing the anchorage should respect the hazards of the bunkering operation when it is being conducted.

The master of the towing vessel is responsible for the conduct and safety of the vessel prior to, during, and at the conclusion of bunkering operations. Tow safety can be ensured by taking precautions and following operating procedures. [Compete text is available at www.uscg.mil/vtshouston (click Bolivar Roads Anchorage Bunkering Safety Guidelines).]

Bunkering Safety Guidelines

1. It is incumbent upon the master to check weather conditions – existing and forecasted – before departing for the bunkering operation. There should be adequate familiarity with the receiving vessel to ensure appropriate lines and fenders are prepared prior to departure.
2. To ensure safety of the crew, to protect the vessel and bunkering operation, and to prevent spills, the master should conduct a “pre-critical task conference” with the crew. At minimum, the master and crew should discuss:
 - Weather, tide, and current
 - Duration of the operation
 - Lookout procedures
 - Communications with the receiving ship
 - Definition of crewman responsibilities
 - Identification of situations that would require shutting down the transfer
 - The mooring plan, as well as potential placement of lines and fenders
3. When possible, Masters should plan to moor on the side of the vessel least affected by the wake effects of passing vessels. While alongside, both the master and crew should continuously monitor conditions – including passing traffic, shifting tides or winds, and changing weather. As conditions change, the master and crew should not hesitate to shift sides or stop the operation if it becomes hazardous.
4. Prior to departing, the crew should ensure that all hoses, valves, and any equipment used in bunkering are secured and properly stowed. Following appropriate notifications, the towing vessel may depart for its next job.

Advance Notice Required

In accordance with 33 CFR 156.118, vessel operators must provide a 4-hour notice of anticipated bunkering operations to the Captain of the Port. This notice is required for all bunkering operations within the Bolivar Roads Anchorage, as defined by 33 CFR 110.197. Operators may make this notification to Houston Traffic via telephone (preferred) at 713.671.5103 or VHF FM Channel 05A (alternate).



VTS Houston/Galveston acts as a communications hub to provide accurate, relevant, and timely information to mariners, port authorities, facility operators, and local, state, and federal agencies. Its primary purpose is to prevent groundings, allisions, and collisions by sharing information and implementing appropriate traffic management measures.

Calling the Vessel Traffic Center (VTC)

VTS Houston/Galveston's call sign is "Houston Traffic." The VTS requires all captains and pilots to use the vessel's official name when calling the VTC. Houston, Galveston, and Texas City Pilots may use their individual identification number in addition to the vessel's name. All communications must be in English.

Radio Frequencies

VHF-FM Channel 05A All vessels must first contact Houston Traffic on this frequency before switching to a working frequency.

VHF-FM Channel 11/12 Working frequencies for the Houston/Galveston VTS area include VHF-FM Channels 11 and 12. Use Channel 11 at ExxonMobil Baytown and all points above. Use Channel 12 at all points below.

VTS Users not maintaining a listening watch on the appropriate VTS frequency (VHF-FM Channel 11 or 12) are required to monitor VHF-FM Channel 16, and bridge-to-bridge frequency VHF-FM Channel 13.

Other VHF-FM Channels used along the HSC

| Channel | Use |
|---------|---|
| 09 | Kirby Fleeting Area – Old River |
| 10 | Channel Shipyard – San Jacinto River tow traffic |
| 14 | Port Operations and Houston Pilots Ship-to-Tug; Pilot Boats |
| 19 | ExxonMobil Docks – Baytown |
| 21A | USCG Sector Houston-Galveston working |
| 22A | Government/non-Government liaison |
| 73 | Galveston-Texas City Pilots working |
| 74 | Houston Pilots working |
| 77 | Galveston-Texas City Pilots Ship-to-Tug |
| 81 | USCG working |
| 83 | USCG working |



Anyone proposing to conduct maritime operations that may interrupt or impede navigation on a ship channel within the Captain of the Port Houston-Galveston area of responsibility must submit a channel obstruction application to the Coast Guard at www.uscg.mil/vtshouston in advance of the requested closure.

Processing differs between requests inside the VTSA of VTS Houston/Galveston and those for all other COTP channels/waterways, but there are two categories of channel obstruction. Applicants should review these categories carefully prior to submitting an application.

Category I Obstructions

Include those operations impacting (or potentially impacting) navigation which cannot be completely mitigated by unilateral traffic management measures imposed by the Coast Guard. Complete or near-complete channel closure, or significant restrictions of meeting or overtaking situations, for dredging pipeline constriction, power line placement, dead ship movements, or large off-shore rig movements are examples of Category I obstructions. The COTP requires four days (five days if the period covers a weekend) advance notice for consideration of a Category I obstruction.

Category II Obstructions

Include operations not completely limited to the boundaries of the channel, and with marginal effect on vessel navigation. Heavy-lift operations, roll-on/roll-off evolutions, and most off-shore rig movements are examples. Category II obstructions are typically short duration, short notice undertakings, and must be moveable or terminable within one hour of notification from the VTS or Captain of the Port. The COTP requires twenty-four hours advance notice for consideration of a Category II obstruction.

Channel Reopening Process



Given the large number of vessels simultaneously awaiting arrival or departure following a major closure of the port complex, standard procedures are in place to ensure the orderly flow of traffic and the maintenance of a safe operating environment. A major closure is typically defined as one lasting 12 hours or more, and may be attributable to weather, destruction of major navigation aids, channel blockage, or other factors.

1. At the onset of any long duration channel closure, a VTS representative will communicate with the members of the Port Coordination Team (PCT) to establish the timing of a series of conference calls.
2. During the closure, and until traffic has been restored to pre-closure norms, PCT industry and agency representatives will conduct a series of conference calls to establish channel conditions and movement priorities.
3. VTS Houston/Galveston will manage the resumption of traffic by “operationalizing” the priorities established by the PCT and by implementing such VTS Directives and Measures as may be required.
4. The VTS may direct dredges to cease and/or move dredging operations or any other obstructions from the Channel until vessel traffic returns to normal levels.
5. The VTS may require vessels to monitor VHF-FM Channel 11 or 12 until vessel traffic returns to normal levels, reducing the need to repeat advisories, and freeing airwaves for vessels with urgent information to report.





The Houston Ship Channel and Gulf Intracoastal Waterway (within the Houston Vessel Traffic Service Area) hold claim to the highest rate of Aids to Navigation (ATON) discrepancies of any U.S. Coast Guard district. More than \$2 million is spent each year to repair or replace aids in these areas. When aids are damaged or missing, navigation safety is jeopardized.

It is a mariner's legal obligation to report any incident involving damage to or destruction of an ATON. Failure to report not only puts all other mariners in harm's way, but also comes with severe penalties including fines and/or imprisonment, along with revocation and/or loss of license. By reporting an incident immediately, the Coast Guard's limited resources may be put to most efficient use, and risk to other mariners can be removed as quickly as possible.

Because ATON damage and destruction are not self-reported in the majority of cases, those aids most vulnerable to damage are now fitted with an ATON monitoring system providing automatic electronic notification of an allision. This enables the Coast Guard not only to respond promptly with repair or replacement, but also to identify the offending vessel.

Report ATON damage to Houston Traffic, Port Arthur Traffic, or the Sector Houston-Galveston Command Center via the phone numbers or frequencies below. The watch stander taking your report will collect information as described at Appendix D of the VTS Houston/Galveston User's manual.

| | | |
|---|--------------|--------------------------|
| Sector Houston-Galveston Command Center | 713.678.9057 | VHF Channel 16 |
| VTS Houston/Galveston | 713.671.5103 | VHF Channels 05A, 11, 12 |
| VTS Port Arthur | 409.713.5070 | VHF Channels 01A, 65A |

American Waterways Operators

www.americanwaterways.com

Bolivar Roads Anchorage Bunkering Safety Guidelines

www.uscg.mil/vtshouston

Galveston-Texas City Pilots

www.galvestonpilots.com

Gulf Intracoastal Canal Association

www.gicaonline.com

Houston Pilots

www.houston-pilots.com

Physical Oceanographic Real-Time System (P.O.R.T.S.) Houston/Galveston

www.co-ops.nos.noaa.gov/hgports/hgports.html

Port of Galveston

www.portofgalveston.com

Port of Houston Authority

www.portofhouston.com

Port of Texas City and Texas City Terminal Railway Company

www.tctrr.com

U.S. Army Corps of Engineers, Galveston District

www.swg.usace.army.mil

U.S. Coast Guard

www.uscg.mil

Vessel Traffic Service Houston/Galveston

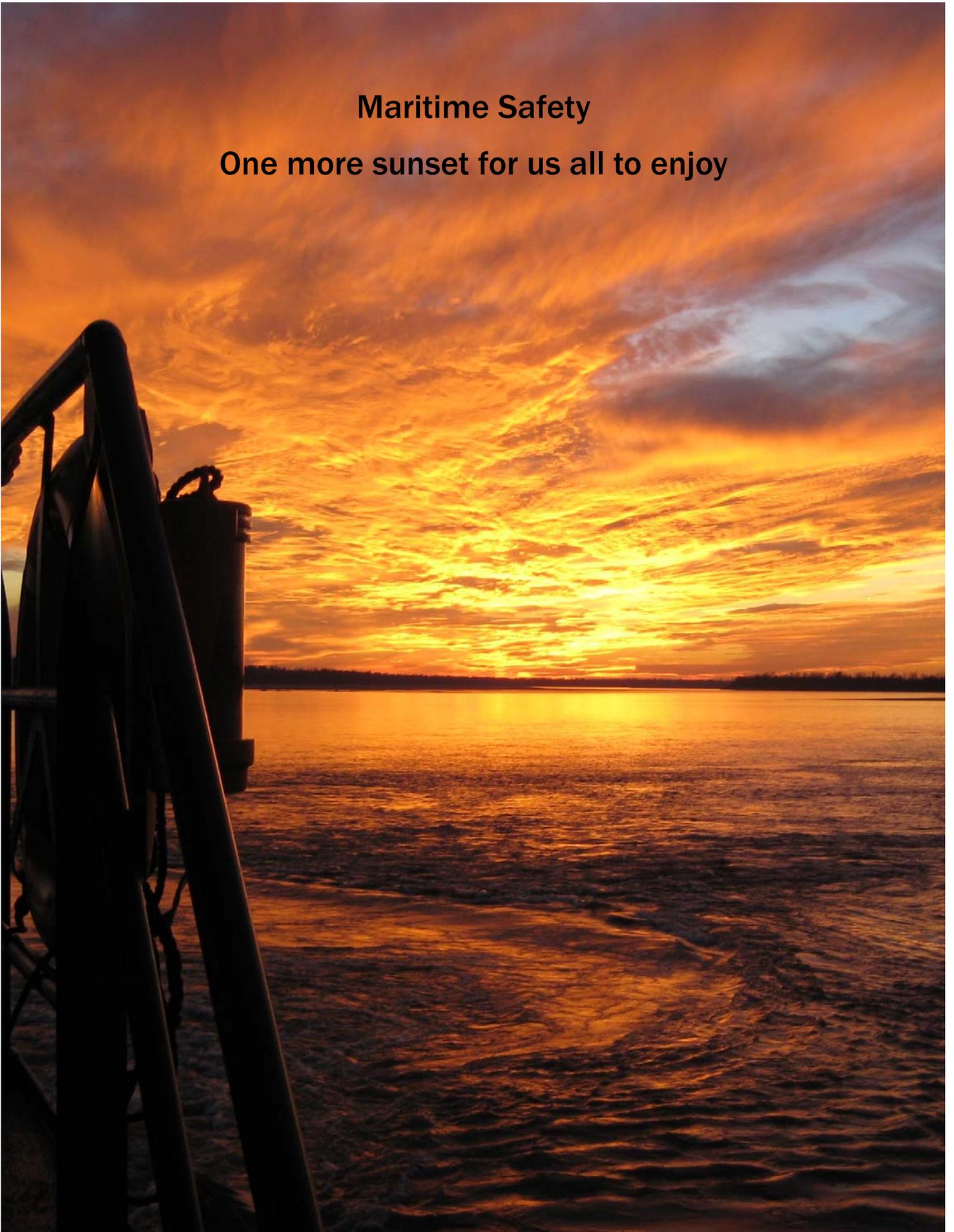
www.uscg.mil/vtshouston

Wheelhouse Report

www.wheelhoureport.org

Maritime Safety

One more sunset for us all to enjoy



This publication is presented by the Houston–Galveston Navigation Safety Advisory Committee, with the support of its generous sponsors. Pictures used are courtesy of Bay Houston Towing, Higman Marine, Kirby Inland Marine, Port of Houston, Philip Kropf, Steve Nerheim, and the USCG.



SeaRiver



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