Exhibit N
Marine Vessel Traffic Patterns

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EXHIBIT N
MARINE VESSEL TRAFFIC PATTERNS

1.0 INTRODUCTION

Atlantic Sea Island Group LLC (ASIG or the Applicant) proposes to construct, own, and operate a liquefied natural gas (LNG) receiving, storage, and regasification facility as a deepwater port that will be capable of delivering up to 2 billion standard cubic feet (bscf) of natural gas per day to the New York metropolitan region. The deepwater port, Safe Harbor Energy, (Safe Harbor Energy or the Project) consists of three components: an island to be constructed in Federal Waters on the Outer Continental Shelf (OCS), approximately 13.5 miles south of the City of Long Beach, New York, on Long Island and 23 miles southeast of the New York Harbor entrance (Island); an LNG receiving, storage, and regasification facility (Terminal); and subsea pipeline (Pipeline) that will transport the natural gas to a connection with Transco's Morgan, New Jersey to Long Beach, New York existing offshore natural gas pipeline (Transco Pipeline).

This purpose of this report is to provide a qualitative practical assessment of the suitability of the location of the LNG Terminal, assessment of the marine risks and the integration of LNG trade with the commercial vessel, utility vessel, and leisure craft traffic in the area. The work reported herein, is a desktop assessment of the location, layout, marine operations, and marine risk of the Island in the approaches to New York. The scope of analysis includes:

- review of the location and proposed Island and pipeline layout;
- review of public domain wind, wave, and weather data;
- assessment of the site using SIGTTO LNG site selection criteria;
- review of public domain vessel traffic data or similar data provided by the Project; and
- review of the implications of ship traffic routes in the area and integration of trade with the LNG import Terminal and Pipeline.

This early work was supplemented by a more detailed review of the commercial ship traffic based on proprietary ship traffic data, to include:

- procurement of commercial ship traffic data;
- analysis of the nature of flow of commercial traffic in the area;
- report on the routes, density, and proximity of traffic to Safe Harbor Energy; and
- evaluation of marine risk based on the analysis of commercial ship traffic flow.

2.0 Safe Harbor Island/Terminal

The Island is to be constructed approximately 13.5 miles south of the city of Long Beach, New York on Long Island and 23 miles southeast of New York Harbor entrance at a position of 40º 23' 19"N and 73º 36' 35"W. This site is offshore at an area near Cholera Bank and is shown in Figure N-1.

The Island will be constructed in water depth of approximately 60 to 70 feet (18 to 21 meters) and made from natural sand, gravel, and rock materials. This will then be surrounded by armoured breakwaters consisting of prefabricated caissons, prefabricated armor units, and rock capable of withstanding major (200-year) storms.

The Terminal will be designed to handle all of the current fleet from 70,000 to 149,000 m^3, as well as the larger sizes to be in service in the future. Based on the newest LNG carrier designs, ships serving the Terminal will have a capacity of 270,000 m^3 (net) or greater. . Currently, ship maximum draft (full cargo) is approximately 39.4 feet (12.0 meters). However, planned LNG carriers in the 270,000 m^3 range will have an under-keel clearance of up to 40.4 feet (12.3 meters). Minimum water depth predicted at the Terminal is 60 feet (18.3 meters) MLLW, providing an under-keel clearance of 19.7 feet (6.0 meters). The siting of the Island has been selected to minimize impact on shipping and provides for the safe maneuvering of LNG carriers approaching or departing the berth.

The Island is located away from existing or historical disposal areas; the closest dump sites are both discontinued, are 3.5 miles south and 3.5 miles west of the Island. Safe Harbor is outside any published military training areas and there are no active areas marked on the NOAA charts or advised by USCG.

Safe Harbor Energy estimates 75 to 291 offloadings per year for the 1.15 bscfd sendout and 125 to 484 offloadings per year for the 2.0 bscfd sendout, depending on the carrier size, assuming all at 70,000m^3 vessels for the high end of the range and 270,000m^3 vessels at the low end. The Project will be designed to offload one LNG carrier at a time, but can have two LNG carriers berthed at the same time. Each LNG carrier will approach the offloading platform with the assistance of two to three tugboats under normal sea conditions.

The LNG will be transported to the Terminal by ship and pumped ashore into storage tanks. The Terminal will then convert the LNG to natural gas, which is sent ashore via a subsea pipeline. The general layout of the Island is shown in Figure N-2 and the longitudinal alignment of the Island is consistent with the direction of flow of traffic in the Traffic Separation Scheme routes 2 and 3.

3.0 Environmental Conditions

3.1 WEATHER DATA

The weather data used is drawn from Volume Three, Part One, Exhibit O - MetOcean Study; NOAA Coast Pilot 2 2007 Atlantic Coast Cape Cod, Massachusetts to Sandy Hook, New Jersey; BA Sailing Directions NP 68; and corroborating UK Meteorological Office sources.

3.2 WIND

The wind experienced in the area is predominantly from the westerly directions over the year and is northwesterly in January as a typical winter month and southwesterly in July as a typical summer month. The annual joint probability distribution of wind direction and speed based on WIS 123 data from Volume Three, Part One, Exhibit O – MetOcean study is shown in Figure N-3 and comparative figures for wind speed non-exceedance based on UKMO data is shown in Figure N-4.

Hurricane alert season lasts from June to November, and can affect the area. In an average season there are about ten tropical depressions; five of them reach hurricane strength and about two affect the United States. The year 2005 was a high hurricane year when there were 28 named tropical storms, 15 of which became hurricanes and 6 struck the United States. Generally, the hurricanes that affect the New York area lose much of their strength on their passage north, but they may occasionally retain their original intensity.

3.3 WAVE

Wave conditions in the site area have been analyzed and the wave joint probability chart of wave height and direction based on WIS 123 data from Volume Three, Part One, Exhibit O – MetOcean is shown in Figures N-5 and N-6. The occurrence of 2 meters (Hmo, about the significant wave height) and greater is shown by month in Figure N-6. The data are based on WIS 123 shown in Exhibit O and the larger waves can be experienced form any direction but will typically arrive from the southeasterly quadrant. The Hmo wave height non-exceedance diagram is shown in Figure N-7 and based on percentage occurrence of waves at WIS 123 from 1980 through 1999.

3.4 CURRENTS

The sea currents typically set in a southwesterly direction and are generally neither strong nor constant; they are mainly the result of strong or persistent winds and the southwest extension of the Labrador Current, which rounds Newfoundland and sets parallel to the coasts of northeast United States. The mean rate of the current is between 0.5 and 0.75 knots, with less than 15 percent of observations reporting 1 knot and only a very few individual observations exceeding 2 knots.

After prolonged periods of strong winds from a constant direction, a wind-drift current may be generated, the rate of which varies according to the wind speed and direction. Current rates of 2 knots or over are possible on the relatively infrequent occasions when a hurricane or extra-tropical storm affects the area, and particularly when such a storm nears the coast.

3.5 TIDES

The tidal ranges for the reference point of Sandy Hook 18 nautical miles west of the site are relatively small, being approximately 5 feet for spring tides and 3 feet for neap tides. The highest observed water level was 10 feet above mean lower low water (MLLW) (December 1960) and the lowest was almost 5 feet below MLLW (February 1976). There is a tidal current effect in the area of Ambrose Light where vessels embark and disembark the New York pilots, but wind-driven currents dominate the overall current pattern in the area.

3.6 VISIBILITY

Fog may be encountered on about eight percent of the days in a year, though it does not necessarily mean that the fog persisted for the entire 24-hour period. There is limited public domain data on the frequency or duration of fog events. The data shown in Table N-1 are for Sandy Hook, located 8 nautical miles west of Ambrose Light and 18 nautical miles from the Safe Harbor site, has been compiled from 30 years of observations and shows an average of 30 days with fog per year.

3.7 ICE

The area around New York approaches lies outside the main sea and iceberg regions of the northwest Atlantic Ocean. The extreme limits of sea ice occur in late winter and spring and extend south off Newfoundland and also southwest off Nova Scotia, and have not been known to extend south of 42º N or west of 67º W. (Site position is approximately 40º N 73º W.)

Except in very isolated cases, icebergs are not encountered west of 67º W and the site position is approximately 73º W. However, at extremely rare intervals, icebergs or their remnants have been reported in the outer extremities of the area.

3.8 OPERATING LIMITS

The operating criteria for maximum wind speed, wave height, and current will be established for the Terminal. These limits will match the LNG carrier size, the maneuvering constraints, and available tug power.

3.9 WEATHER FORECASTING

Safe Harbor Energy, the LNG carriers, and other ship traffic in the area will be able to obtain weather forecasts from the National Weather Service, which provides marine forecasts and warnings for the U.S. coastal waters. These scheduled forecasts are issued four times daily and typically contain information on wind speed and direction, wave heights, visibility, weather, and a general synopsis of weather patterns affecting the region. Supplementary forecasts are issued concerning gale and storm warnings. The principal means of disseminating the marine weather services is NOAA Weather Radio and Radio Facsimile.

4.0 Ship Traffic Flow

4.1 SHIP TRAFFIC TO NEW YORK

New York Harbor is a major port on the east coast of United States, handling a diverse range of ship types, which include container carriers, tankers, bulk carriers, cruise, and general cargo vessels. These ships arrive and depart to the majority of the ports of the world, and to assist the safe movement of these ships a Traffic Separation Scheme (TSS) is in operation in the outer approaches to New York. Navigation in the area is governed by the International Regulations for the Prevention of Collisions at Sea (1972). In addition to setting out the action of vessels for collision avoidance in confined and open waters, the regulations also specifically address vessel actions in TSS.

Traffic Separation Schemes are intended to make navigation in congested waters safer for shipping, by designating one way routes for ship transit and thus reducing the probability of head-on collisions. A TSS consists of two one-way traffic routes with a separation zone between to maintain a safe distance between the routes. The areas outside the TSS and the space between adjacent TSS are open waters where shipping can transit in any direction.

TSSs are internationally recognized by the International Maritime Organization (IMO) and inbound and outbound ships should follow the TSS as a matter of navigational prudence. However, vessels are not constrained to use the TSS and may navigate in the adjacent coastal or open waters. Vessels of less than 20 meters (which would include the majority of leisure craft) and fishing boats are required not to impede the passage of any vessel following a traffic lane.

Any shipping that is required to join or leave a traffic route is required to do so at as small an angle to the general direction of traffic flow as practicable. This will apply to the LNG carriers when they approach and depart from the Terminal. Vessels crossing the TSS should do so at a right angle or as nearly at a right angle as practicable.

4.2 THE APPROACHES TO NEW YORK

The TSS in the approaches to New York consists of three individual schemes, each with two routes, which converge at a precautionary area off Ambrose Light. These routes approach/depart from east/west (to and from the U.S. east coast, Canadian east coast, and Europe), southeast/northwest (to and from Africa and South America), and south/north (to and from Southern United States, Caribbean, and Panama Canal for the Pacific and Far Eastern Ports). These six routes are shown in Figure N-1 and Safe Harbor is located between two of these routes shown as route 2 and route 3 on Figure N-1. Note that the traffic routes narrow as they lead from the open sea to the precautionary area off Ambrose Light. As vessels proceed inbound or outbound in the routes the vessels will bunch together as the routes narrow, and spread apart as the routes widen.

The approximate position of the Safe Harbor site is shown in Figure N-8 between east outbound Ambrose to Nantucket route (route 2) and the inbound Hudson Canyon to Ambrose route (route 3). Safe Harbor is about 0.5 nm south of the southern edge of route 2 and 1.4 nm north of the northern edge of route 3. This position is outside of the traffic routes and in an area where shipping is permitted to make passage in any direction, provided that it does not interfere with traffic in the TSS.

Inbound traffic to New York will follow route 3 to the semi-circular precautionary area and then proceed to the pilot boarding area to the west of Ambrose Light. Vessels departing from New York will disembark the pilot near Ambrose Light and then proceed through the precautionary area to the start of the route 2 and then depart the area. The New York pilot boarding position and the precautionary area in relation to the Project site are shown on Figure N-9.

The New York pilot boarding position is approximately 10 miles west of Safe Harbor and is located within the magenta triangle area to the west of Ambrose Light shown in Figure N-9. Pilotage is compulsory for all foreign vessels entering or leaving New York and will be compulsory for LNG carriers calling at Safe Harbor.

There is an anchorage at the New York approaches within the precautionary area in a position approximately 1 to 2 miles northeast from Ambrose Light. The limits of this anchorage are not officially designated or marked on the chart, but is a recommended area with a depth of water of between 80 and 90 feet and noted as a sand seabed, which should make for satisfactory anchor-holding ground for vessels required to anchor while awaiting entrance to New York. The seabed has numerous subsea cables, and vessels waiting off Ambrose Light need to select an anchor position clear of any obstructions.

When approaching and departing the New York pilot station, ships are monitored by the USCG Vessel Traffic Service (VTS) with radar coverage extending at least out to the pilot boarding area to the west of Ambrose Light. The VTS area does not cover the Safe Harbor site and the extent of VTS radar coverage is not public domain information.

The VTS is operated to coordinate vessel movements through the collection, verification organization, and dissemination of information. This information may be gathered by radar, Automatic Identification System (AIS), and VHF radio. The information gathered is then used to assist vessels on their passage, by routine and designated broadcasts using VHF voice radio and NAVTEX navigation warning system.

The VHF voice broadcasts may be directed towards an individual ship, or may be a general call to all ships. The NAVTEX system is a general call to all ships and is received onboard by a passive electronic receiver and is the information is displayed in printed format. The general calls by the two systems cover various subjects, which may include weather forecasts, gale warnings, Notices to Mariners, and navigation warnings.

During construction of the Safe Harbor, regular contact with the USCG will be maintained to enable shipping in the area to receive warning of the construction/utility/towage operations that are in progress or planned. During the operation of Safe Harbor, the VTS will be advised of the LNG carrier estimated arrival times and ship handling operations.

4.3 SHIP TRAFFIC ANALYSIS

The ships arriving and departing from New York will be using one of the six numbered traffic lanes identified in Figure N-1. Data on ship traffic numbers in the area was sought from the U.S. Department of Transportation Maritime Administration, who advise 4,902 port calls, or 9,804 ship movements, of vessels greater than 10,000 tons deadweight; their source is reported as Lloyds Marine Intelligence Unit (LMIU). New York pilots advise that the approximate annual number of ship movements is about 11,000 to 12,000 per year.

The data used for the ship traffic flow analysis was obtained from LMIU for the period November 2005 through October 2006 and covers ships inbound to and outbound from New York. These data were selected because they includes not only the number of vessels but also the previous port and next port and this allows analysis of vessel routes. The data also contain information on the vessels themselves such as vessel type, length, summer deadweight, and summer draft, and these parameters allow analysis of vessel distributions on the routes. The data do not include leisure craft, fishing boats, naval, or USCG vessels.

The LMIU data showed 11,690 in total number New York inbound and outbound movements for this period; these were allocated to the six lanes to give movements on each route as shown in Table N-2. The movement numbers have not been inflated for future trade. The route used by each of the vessels was derived from the previous and next ports for each ship and knowledge of courses used in deep sea and coastal navigation.

Routes 2 and 3 that pass respectively north and south of Safe Harbor are highlighted in Table N-2 and show the traffic numbers on the two routes adjacent to Safe Harbor. Route 2 had 1,754 ship movements outbound and 15 percent of the total movements in the area. Route 3 was much less travelled and had 378 ship movements and 3 percent of the total movements in the area. Of the other, more distant, routes the north/south routes 5 and 6 have the densest traffic with a combined total of 58 percent.

Each individual route has been analyzed by ship type, summer deadweight tonnage, length, summer draft, and movement date, and shown in graphs by percentage and number. Analysis of the route 2 and route 3 is shown in Figures N-10 through N-17 and Tables N-4 through N-14, with summary data on all routes shown in Appendix N-1. Summer deadweight and summer draft are standard factors that define vessel size and are available in proprietary ship traffic data. On any individual transit the actual values will be different and typically less than the summer deadweight and summer draft; use of the summer data provides a conservative approach.

4.4 SHIP TRAFFIC ON ROUTES 2 AND 3

The distribution of vessel transits by ship type on routes2 and 3 is shown in Figure N-10; both routes have a mix of different ship types, with about half the vessels on route 2 and a fifth of vessels on route 3 being tankers carrying hydrocarbon products or in ballast, and the balance of the vessels carrying dry cargoes (see Table N-3 and Table N-4). The most common vessel subtype on both routes is a container carrier. Cruise liners anticipated to carry high numbers of passengers transit on both routes.

The higher number of movements on route 2 (outbound, heading easterly) reflects the higher volumes of international trade between New York and the U.S. east coast, Canada, Europe, the Mediterranean, and the Suez Canal, and the lower number of movements on route 3 (inbound, heading north westerly) to southern Africa and the Indian Ocean.

Vessels up to 60,000 tons deadweight are the most frequent on both routes 2 and 3, and route 2 has generally vessels of greater deadweight in transit as shown in Figure N-11. For route 2 the most frequent ship by summer deadweight tonnage is between 30,000 and 40,000 tons at 491 movements (28 percent), and for route 3 is up to 10,000 tons at 122 movements (32 percent). The vessels on both route 2 and route 3 are similar in length as shown in Figure N-12, while vessels on route 2 typically have a deeper summer draft than those on route 3 as shown in Figure N-13.

All vessels will have crew on board ranging from 6 to 10 persons on tugs and 20 to 30 persons on commercial vessels. Passenger vessels may have several hundred crew on board and a large number of passengers. The passenger vessels transiting route 2 are typically larger and have typically 2,500 to 3,500 passenger bedspaces; the passenger vessels transiting route 3 have typically 1,500 through 2,000 passenger bedspaces though larger vessels with up to 4,000 passenger bedspaces, as shown in Figure N-14.

The distribution of vessel size characteristics by vessel type for route 2 and route 3 is shown in Table N-5, N-6, N-7, N-8, N-9, N-10, and passenger bedspaces are shown in Table N-11.

4.5 FREQUENCY OF TRANSIT

The number of transits each month have been analyzed and shown in Figure N-15. Although there is no strong seasonality from month to month, for both routes the busiest month is August with 196 movements on route 2 and 48 movements on route 3. The least busy month was November for route 2 with 103 movements and December and January for route 3 each with 19 movements.

The number of transits for each route on a daily basis has been analyzed and is shown as Figure N-16. The most frequent number of daily transits on route 2 is between three and six ships per day, with fewer transits per day on route 3 at between zero and one per day. The average daily transits for route 2 is five and for route 3 is one, which gives one vessel every 4 hours on route 2 and one vessel every 24 hours on route 3. The least number of transits on any day is zero for both routes and the busiest day on route 2 had 13 transits, while the busiest day on route 3 had four transits as shown in Table N-12.

In theory there could be 75 to 291 offloadings per year for the 1.2 bscfd sendout and 125 to 484 offloadings per year for the 2.0 bscfd sendout, as discussed in Section 2 above and depending on the LNG carrier size. The lower band of 75 LNG carriers per year represents one vessel arriving and one departing every 4.8 days and would be an increase of some 20 percent in ship traffic on route 3 and a 4.2 percent increase of ship traffic for outbound route 3. The upper band of 484 LNG carriers per year represents one vessel arriving and one departing every 0.75 days (every 18 hours) and would more than double (128 percent) the ship traffic on inbound route 3 and add 28 percent to outbound route 2.

While the percentage increase may appear large, it is appropriate to consider the numbers of vessel movements. The upper band 484 LNG carrier throughput adds about 1.3 vessels per day and for route 3 inbound brings the busiest day to 5.3 movements per day; this should be easily accommodated in the water space. The 1.3 LNG carrier increment per day brings route 2 outbound busiest day to 14.3 movements or one movement every 1.6 hours; again, this should be easily accommodated in the water space.

Assuming a common current LNG carrier size of 138,000 m^3, this would equate to 147 ships and 245 ships for the 1.2 and 2.0 bscfd sendout rates, respectively. At these arrival rates, an LNG carrier would arrive at Safe Harbor Energy every 2.4 days (1.2 bscfd) and 1.5 days on average. There will be two discharge berths and the careful planning of LNG carrier arrivals will avoid two vessels arriving at the same time and enable ASIG to meet their intention to discharge only one vessel at a time.

Route 2 is the busier lane, and the amount of traffic generated by LNG carrier trade will add one more movement on average every 1 to 3 days. Given the density of the ship traffic and inter-vessel time on the day of arrival or departure of a LNG carrier, there should be sufficient sea room for the safe navigation of both the commercial traffic and the LNG carriers within the 1.5-mile-wide (at narrowest) TSS traffic routes. With a low traffic density, this should minimize any vessel conflict; even if the commercial ship traffic densities were to double, there should still be sufficient sea room to accommodate the LNG carriers.

The approximate size of a typical 138,000 m^3 capacity LNG carrier is some 79,250 tons deadweight, 289 meters in length and 11.3 meters draft. This can be compared with the size data of commercial vessels given in Tables N-5 though N-10. The distribution of length of vessels transiting route 2 and route 3 is compared with the length of vessels in the LNG carrier fleet in Figure N-17. LNG carriers at up to 300 meters and 350 meters in length are of similar size to commercial vessels that presently transit both routes, and route 2 in particular.

4.6 COLLISION HISTORY

Data on worldwide collision for the 5-year period 2001 through 2006 show five collisions in the general area of Safe Harbor Energy. The same data also show one allision plus there were two further incidents of striking the Ambrose Light in 1996 and 2001. The locations of relevant collisions are shown in Figure N-18 and details of the collisions are shown in Tables N-13 and N-14. Four of the incidents were in New York Harbor itself and are not considered further here.

The remaining four incidents, two collisions and two allisions, are discussed below:

- Case 4: collision between a bulk carrier and a fishing vessel about 45 nautical miles east of Safe Harbor Energy and in the outbound safety fairway of the Nantucket to Ambrose route.
- Case 5: collision between a tug and a fishing vessel in the open navigation waters of the inshore zone west of the outbound TSS route 6.
- Case 6: allision by an oil tanker striking the Ambrose Light Tower.
- Case 7: allision by a freighter striking the (recently repaired) Ambrose Light Tower.

The records show no collisions between two large ships navigating in the TSS, and indicate the benefits of separating those traffic flows. Both collisions involved fishing vessels. Both allisions involved a large vessel striking a fixed and well-lighted navigation mark within the precautionary area.

5.0 Other Shipping

5.1 LEISURE CRAFT

Numerous inlets along Long Island, New York and New Jersey provide leisure craft access to the open sea. This recreational boating is mainly a summer seasonal activity from mid April to late October and includes scuba diving, whale watching, and sailing. The marinas are situated within the Lower New York, Raritan Bay, Great South Bay and inlets along the New Jersey coast, with boats potentially traveling as far out as the proposed Safe Harbor Energy site.

Leisure craft can be expected to be encountered both in and out of the traffic lanes and at times may be found in large numbers; it is possible that the LNG carriers may encounter these craft on their inward or outward passages in the TSS. Vessels of less than 20 meters and sailing vessels are required not to impede the passage of vessels following the TSS.

After construction of the Project site, it is anticipated that the USCG will establish a 1,640-foot (500-meter) exclusion safety zone in the area, which would apply to all vessels and should exclude any of these small craft from impeding the LNG carrier when maneuvering for its final approach to the Terminal.

It is anticipated that all traffic in and around the Safety Zone, and to the extent of the radar range, will be under radar surveillance and be monitored by properly trained Terminal personnel and enforced by USCG.

5.2 FISHING ACTIVITY

The majority of the recreational fishing is conducted within about 3 miles off the coast and distant from Safe Harbor Energy. However, charter fishing boats may travel up to 100 miles offshore depending on the target species. Charter boat businesses are located along Long Island Sound, including Rockaway Inlet, Jones Inlet, and Fire Island Inlet as well as off the coast of northern New Jersey. The recreational fishing comprises primarily private/rental boats and party/charter boats and is an important industry for the surrounding area. The fishing in the area consists of primarily hook and line, recreational, and commercial fishing using a variety of gear to harvest different species.

Safe Harbor Energy site is located at Cholera Bank and this is reportedly known for good in-season bottom fishing for blackfish, sea bass, ling, and bluefish. The fishing season for recreational boats is from the end of April to the end of October, with June, July, and August being the busiest months. Most of this fishing takes place at weekends and during daylight hours, with any night trips usually completed by midnight. Fishing charter boat companies contacted regarding fishing at Cholera Bank reported that they generally visit Cholera Bank infrequently.

Commercial fishing in the offshore New York Bight is conducted by a fleet of boats operating out of the surrounding ports and the number of boats varies depending on season, species targeted, and species distribution.

Cholera Bank is located out of the TSS, and because it is an area of open water, vessels may make passage in any direction. Vessels engaged in fishing are required not to impede the passage of any vessel using a traffic lane. Encounters between LNG carriers and fishing boats are likely, as with the recreational craft.

5.3 COASTAL SHIPPING

The coastal shipping trade mainly consists of larger vessels that use the appropriate route within the adjacent TSS, with the smaller inter-port trade consisting of tugs and barges that use the inshore routes between the TSS and the coast.

6.0 Marine Operation of Safe Harbor Energy

6.1 PRIOR NOTIFICATION OF ETA OF LNG CARRIER

Prior to arrival at Safe Harbor Energy, the LNG carrier will be required to give 96 hours advance Notice of Arrival to the USCG National Vessel Movement Centre (NVMC) with a copy to Atlantic Sea Island Group LLC (ASIG). ASIG should also be advised of cargo quantity to be discharged, tank vapor pressures, and drafts. Notification of arrival will also be required at 72, 48, 24, 12 and 5 hours before anticipated arrival for tracking purposes.

It is typically prudent for LNG terminals to schedule LNG carrier arrivals and departures for daylight hours for the first 6 months or so of trading to allow pilots, tugmasters, and the masters of regular trading LNG carriers to become familiar with the local navigation and berthing procedures. Provided the operations are proven to be safe and practical it is then common to commence 24-hour marine operations. Given the open water conditions and generally light traffic conditions of the Safe Harbor area there should be no impediment to 24-hour operations subject to local weather conditions and operating criteria.

6.2 PILOT BOARDING AND PRE-ARRIVAL CHECKS

The LNG carrier will approach Safe Harbor from sea via route 3 and will make passage at the northern edge of the traffic route as shown in Figure N-19. The LNG carrier will approach from seaward to route 3 at about position "A" on the figure. While vessels should, so far as practicable, keep clear of the traffic separation line, the LNG carrier will stay at the northern side of the route to about position "AP," about 5 nautical miles or even further to the east of the Terminal (see Volume Four, Part 1, Exhibit U – Draft Operations Manual, Section 4.1).[1] At the pilot boarding point the LNG carrier will exit the TSS and maneuver to board the pilot. Staying at the northern side prevents the LNG carrier from hampering the passage of another vessel using the TSS, but naturally it will have to be aware of the passage of any traffic using the open water to the north of route 3.

Once the pilot is on board the vessel will rejoin the TSS, and again staying at the northern side of the route will transit to the area northwest of the Island. If a longer time were to be required after boarding the pilot, for vessel inspection procedures, etc., the LNG carrier could approach from seaward at about position "B" on the figure, and board the pilot and authorities eastward and clear of the TSS in an area open for navigation in any direction at about position "BP." The vessel would then rejoin the TSS and stay on the northern side of

[1] The point at which the pilot boards the vessel will be determined in consultation with the Pilots organization and/or through the Risk Assessment required by the USCG.

the route until leaving at a shallow angle to proceed northwest of Safe Harbor Energy. Navigation in the area is assisted by the ODAS buoy to the northeast of the TSS and the HA buoy to the southwest, as well as the navigation light on Safe Harbor Energy and the vessel's other terrestrial, radar, and electronic navigation systems.

The LNG carrier will be on maneuvering speeds during transit of the TSS and will further reduced speed and make a lee to allow the pilot boat to come alongside to transfer the pilot and other personnel onboard. The LNG carrier will leave route 3 and enter the open water to the north of the TSS to make a lee and board the pilot and USCG inspectors. This lee operation may require the vessel to adjust its heading and, in extreme cases of a strong wind and high waves, this may be an alteration of up to 90 degrees. The LNG carrier should be well clear of the TSS and other traffic before conducting this maneuver.

It is a USCG requirement to board, inspect, and check documents for LNG carriers prior to allowing entry into the port. This may be arranged while the vessel is proceeding towards the Island or the vessel may be required to anchor.

After boarding, the pilot will conduct a pilot/Master exchange of navigational information, passage, and berthing intentions prior to commencing the inward passage or making an approach to the harbor entrance. An important part of the information exchange is a detailed passage plan, which should be completed and understood before commencing the berthing operation, and will include the planned route, speed, tug information, and reaction to contingencies. The Master and pilot will make sufficient time for this exchange to take place. The pilot will use his local knowledge to advise and assist the ship's Master in the approach, tug connection, and berthing.

As the carrier approaches Safe Harbor Energy, at a position approximately 1.5 to 2 nautical miles south of the Island, it will leave the traffic route as shown in Figure N-20, tugs will be connected, and the vessel will proceed to a position northwest of the entrance to Safe Harbor where it will be stopped in the water and swung stern to the harbor entrance in the area shown as position "C" in the figure. When leaving the traffic route, it will be required to leave at as smaller angle to the general direction of traffic flow as practicable, and in the area between the TSS routes 2 and 3 it will be in open water where vessels may navigate in any direction.

6.3 TUGS AND BERTHING

The LNG carriers may be escorted from the pilot boarding area by a free-running escort tug; it is unlikely that a tethered escort tug would be required. The LNG carriers will be assisted by tugs for turning off Safe Harbor Energy, entry, and berthing, and these assist tugs will rendezvous with the LNG carrier about 2 or 3 nautical miles from the harbor, depending on weather and traffic conditions. The number of tugs required will typically be tested by maneuvering simulation testing normal and contingency operations. The two or more tugs will be positioned on the bow, quarter, and stern of the ship. The available tug power will be sufficient to overcome the maximum wind force generated on the largest ship using the Terminal, under the maximum wind speed permitted for harbor maneuvers, and assuming the LNG carriers engines are out of action.

With the tugs secured and at a position off the end of the breakwaters, the vessel will be stopped in the water and swung to port to a northwesterly heading, presenting the stern to the Safe Harbor Energy entrance. Once the vessel is steadied on the appropriate heading, it will be backed stern first towards the harbor entrance with tug assistance. As the vessel enters the harbor basin, it will be stopped in the water and then pushed alongside one of the two LNG berths by the tugs.

6.4 MOORING ARRANGEMENTS

There will be two LNG berths in the harbor, one on the north side and the other on the south. Additionally there will be a tug and crew boat berth at the eastern end of the harbor. When mooring LNG carriers

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alongside, normally a minimum of two mooring line handling boats are used. The typical arrangement for a large LNG carrier at South Harbor is shown in Figure N-21.

The LNG carriers will enter Safe Harbor Energy stern first and berth alongside bow outwards. This is a typical marine precaution to allow the vessels to depart the port expeditiously in an emergency situation.

6.5 DEPARTURE

When the LNG carrier is due to depart, the pilot will board the vessel at the berth and the pilot/Master exchange and passage plan will be completed prior to the ship starting to leave and in a similar manner to that undertaken on arrival. The ballasted ship will then let go the mooring lines and be maneuvered from the berth with the tug assistance to a position to the northwest of the Island.

Once clear of the Island, the tugs will turn the vessel onto an easterly heading in about position “C” shown in Figure N-20 in preparation for the intended outbound route to Nantucket. The LNG carrier will approach route 2, Ambrose to Nantucket via “D”, and when clear of the TSS and at reduced speed will let go of the tugs and disembark the pilot in a position about 1 to 3 nautical miles east of Safe Harbor Energy and south and clear of the route 2 TSS as shown by position “EP” in the figure, and again in an area of open water where vessels may navigate in any direction. The actual position for releasing tugs and disembarking the pilot will be decided on a case-by-case basis according to the weather and ship traffic conditions.

The departing LNG carrier will then enter route 2 at as small an angle to the general direction of traffic flow as practicable and adjust its course and speed to avoid impeding the passage of other outbound ship traffic in the area. The LNG carrier will tend to use the southern side of route 2 and will navigate clear of the separation line as much as practicable.

6.6 ANCHORAGES

The LNG carriers will typically not anchor off the Island, preferring to adjust speed while out at sea, slow down, and time arrival to avoid anchoring. Should an anchorage be required for USCG inspection or waiting or contingency anchorage, the LNG carriers can anchor easterly of the Island clear of route 2 and route 3 and clear of the Island by at least 2 miles. The water depths in the area and sand and gravel nature of the seabed mean that, if required, the LNG carrier can anchor at any location between route 2 and route 3 provided it is clear of the TSS and clear of the subsea cables and typically in 100 feet or water or less to allow expeditious recovery of the anchor. The location of any contingency anchorage will be selected bearing in mind the prevailing weather conditions.

6.7 SERVICE TRAFFIC

Safe Harbor Energy will be served by crew boats and supply vessels bringing staff, supplies, and spares. The routine schedule for these vessels is to be developed as the Project progresses and is conservatively assumed here to be one vessel transit each day. The service vessels from New York will transit outwards via the buoyed navigation channel to the precautionary area west of Ambrose Light, and then cross the precautionary area and approach Safe Harbor Energy via the open water between the TSS of route 2 and route 3.

The crew boats and supply vessels will be of sufficient power and speed to minimize transit times and be highly maneuverable. The service vessels will not hamper the transit of vessels using the TSS, and at one outward and one inward transit a day will not materially add to the volume of traffic in the area.

The tugs required to support the LNG carrier movements may be dedicated to Safe Harbor or may be called to the Island to support berthing and unberthing operations and standby during residence alongside. If the tugs are dedicated to Safe Harbor Energy they will depart the Island to meet, escort, and assist the LNG carriers on arrival and assist and escort as required on departure. The tug range of operations will be limited to the close area of the Island plus typically one tug acting as escort to the LNG carrier if required. The tugs will be of sufficient power and highly maneuverable and the tug masters and crews will be familiar with the waters around Safe Harbor Energy.

The tugs may alternatively be called from New York to assist the LNG carriers at Safe Harbor Energy. The range of operations of these tugs will be similar to that of the dedicated tugs, plus they will be required to transit from the Ambrose Channel, through the precautionary area, and to Safe Harbor using either route 2 approaching the Island or the open water between route 2 and route 3, or route 3 departing the Island. Again, these tugs will be of sufficient power and highly maneuverable and the tug masters and crews will be familiar with the waters around Safe Harbor Energy. The use of tugs called in from New York will add two or three transits across the precautionary area on passage to the Island and two or three transits on the return journey, potentially four to six tug movements each day an LNG carrier arrives or departs the Island.

7.0 Pipeline

The proposed Pipeline from the Terminal extends in a northerly direction for approximately 12.8 miles to a connection with the existing Transco Pipeline offshore Long Island as shown in Figure N-22. Figure N-22 shows data from the Sandy Hook Pilots anchored vessels log for March to May 2004 and shows the anchorage locations of vessels in relation to Ambrose Light, TSS, and the proposed and alternative pipeline routes.

The proposed pipeline route has the advantage of avoiding the Danger Area and increasing the distance from the main anchorage area. Based on the historical anchoring data, the increase in distance greatly reduces the likelihood of vessels anchoring on or near to the pipeline and of vessels anchoring farther away from Ambrose Light and closer to the Pipeline if the anchorage is busy, and of ships dragging anchor towards the Pipeline in strong south westerly winds. An anchoring exclusion area along the length of the Pipeline would require that vessels maintain a minimum distance off before anchoring.

The alternative Pipeline route will cross the entrance of the Route 2 Ambrose to Nantucket traffic route, pass within 2.5 nautical miles west of the entrance to Route 1 Nantucket to Ambrose, and then through the precautionary area 2.5 nautical miles northeast of Ambrose Light. The water depth along this Pipeline route is between 61 to 73 feet, reducing to 40 feet at the connection to the Transco Pipeline. The Pipeline will be buried to a minimum of 4 feet along the entire route.

Once the Pipeline has been laid, there should be no interference to it from surface navigation, however, the proposed route passes through the recommended offshore anchorage for New York Harbor as shown in Figure N-22. This anchorage does not have any designated limits, nor is it specifically marked on the nautical chart, and vessels anchoring in this area are not required to use a pilot, though a pilot may be used if requested by the Master. During the recorded 3-month period, 154 vessels anchored in the area and this implies about 600 vessels per year using the anchorage. The distribution of anchoring locations is approximately half to the northeast and half to the southwest of the alternative Pipeline route, as Masters select their choice of anchor position.

The seabed for the alternative Pipeline route passes through about 6 nautical miles of a charted Danger Area where existing submarine cables are laid. That area of the Pipeline route is open to surface navigation, and mariners are cautioned that because of residual danger from mines on the bottom vessels should not anchor, dredge, trawl, lay cables, or conduct any similar type of operation. This caution will act as a protection to the subsea Pipeline as it should minimize vessel anchoring and trawling operations. This area is shown in Figure N-22.

8.0 Assessment of Marine Risk

8.1 LOCATION

The selection criteria used by Safe Harbor Energy for the Island location were based on safe distance from shore and safe margins for ship traffic transits. The Island is 13.5 miles distant from the city of Long Beach. The Island is in an area of water open to navigation and distant respectively 0.5 nautical mile and 1.4 nautical miles from route 2 and route 3 of the adjacent TSS. The water depth is some 60 to 70 feet and will provide sufficient under keel clearance for the proposed LNG carriers.

The site location meets the principal recommendations of the Society of International Gas Tanker and Terminal Operators (SIGTTO) in that the approaches to the Island are open water and not constrained by physical navigable channels. The LNG carriers will be able to be turned off the Island in wide areas of water not constrained by obstructions to navigation. The entrance to the Island berths will be specifically designed and the LNG carriers will be maneuvered through the entrance and to the berths under tug power.

8.2 NAVIGATION

The LNG carriers will be navigated under the requirements of the International Regulations for the Prevention of Collisions at Sea (1972) and will use the open waters and the TSS as appropriate, in common with the existing vessel traffic. The LNG carriers will approach and depart Safe Harbor in open water and via the adjacent TSS. The LNG carriers will be aware of the implications of joining and leaving the TSS at as shallow an angle as practical, leaving the TSS to make maneuvers such as forming a lee for boarding and disembarking the pilot, and the open water navigation areas between the TSS. The vessel speeds will be varied to provide for safe navigation and avoid impeding the progress of other traffic navigating in the area.

8.3 VESSEL TRAFFIC SERVICE

The LNG carriers will be routed to Safe Harbor Energy on a pre-planned schedule that may be developed some months in advance. The LNG carriers will provide routinely updated estimated times of arrival from 96 hours before arrival. The movement of the LNG carriers will be controlled by the Island VTS and the information on the arrival and departure operations of the LNG carriers will be provided to the USCG VTS for both information and wider promulgation.

8.4 SHIP HANDLING

The LNG carriers will approach and depart Safe Harbor Energy under command of the ships Master and using the services of a local pilot for approach, berthing maneuver, and departure. The number of tugs and power of the tugs proposed will be tested by simulation and will be sufficient to handle the LNG carriers in the operational and contingency extremes of wind and wave when the LNG carrier engine is not used and with a safe margin.

The operating criteria and limits for maximum wind speed, wave height, and current will be established for the Terminal and the port approach and departure operations. The criteria will be harmonized with the tug power requirements.

8.5 INTEGRATION WITH COMMERCIAL TRAFFIC FLOW

The LNG carriers will approach Safe Harbor via route 3 and depart via route 2. The LNG carriers will be about the size of the largest vessels that presently transit those routes. The inbound route 3 has limited commercial traffic with about one vessel transit on the average day and four vessel transits on the busiest day. In the high-end case of 484 LNG carrier arrivals per year, the addition of an average 1.3 LNG carriers every day brings the route 3 average day to 2.3 movements and busiest day to 5.3 inbound movements. There is sufficient water space that this number of movements should not hamper the passage of the existing commercial traffic.

The outbound route 2 is busier, with 5 vessels on an average day and 13 vessels on the busiest day. Again, at the high-end case of 484 LNG carrier departures per year, the introduction of an average 1.3 departing LNG carriers every day brings the route 3 average day to 6.3 movements and busiest day to 14.3 outbound movements. There is sufficient water space that this number of movements should not hamper the passage of the existing commercial traffic.

8.6 RECREATIONAL AND FISHING TRAFFIC

The LNG carriers may meet recreational and fishing traffic in the area. Small vessels and vessels engaged in fishing are required not to impede the passage of large vessels using the TSS, and the conduct of navigation is governed by the established International Regulations for the Prevention of Collision at Sea (1972). Safe Harbor Energy will have a 500-meter safety zone established and monitored by radar, and this will assist in preventing small vessels from impeding the approach of the LNG carriers to the harbor entrance and berths.

8.7 PIPELINE

The Pipeline should not impede the progress of surface navigation.

8.8 SERVICE VESSELS

The service vessels such as crew boats and vessels bringing supplies and spares are conservatively estimated as one arriving and one departing transit per day. If the tugs are dedicated to the Island they will typically work close to the Island and one may escort the LNG carrier in the TSS. If the tugs are called in for each towage act then there will be four or six transits from New York to Safe Harbor. The vessels will all be sufficiently powered and highly maneuverable and, by the nature of their work, familiar with the waters around the Island. These vessels may use the TSS but are more likely to navigate via the open water between TSS and through the precautionary area centered on Ambrose Light.

8.9 MARINE RISK

The proposed Safe Harbor Energy location is in open water and meets both Safe Harbor Energy and SIGTTO criteria. The navigation of vessels in the area and in the TSS is governed by established international regulations. The number of LNG carriers arriving and departing transits can be safely accommodated in the existing commercial traffic flow and the available water space both in the open water and the TSS. The marine operations for approach, turning, berthing, and departure of the LNG carriers at Safe Harbor Energy can be undertaken using the common practices of seamen and will be supported by appropriate tug numbers and power. The assessment of marine risk of LNG carrier transit, berthing, and departure for Safe Harbor Energy shows the LNG carrier operations and integration with existing ship traffic can be managed at as low as reasonably practicable (ALARP) risk levels.

Tables

Table N-1. Number of Days with a Fog Event

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number of days with fog	4	4	3	2	2	3	2	2	1	2	2	3

Table N-2. Ship Movements by Route (LMIU November 2005 through October 2006)

Traffic Direction	Route	Number of Ships	Percentage of all Ships
West bound	Route 1 (inbound)	2548	22
East bound	Route 2 (outbound)	1754	15
Northwest bound	Route 3 (inbound)	378	3
Southeast bound	Route 4 (outbound)	252	2
North bound	Route 5 (inbound)	2919	25
South bound	Route 6 (outbound)	3839	33
Total		11690	100

Table N-3. Ship Traffic Movements on Route 2 and Route 3 by Vessel Type

Vessel Type	Number of Vessel Movements	
	Route 2	Route 3
Crude oil tanker	206	3
Product tanker	267	27
Chemical tanker	325	40
Combined OBO	29	2
LPG carrier	2	0
Container carrier	478	163
Bulker	178	3
General Cargo	94	15
Ro Ro, Car Carrier	88	51
Cruise	73	73
Tug, Cable vessels	14	1
Total	**1754**	**378**

Table N-4. Distribution of Hydrocarbon and Dry Cargo Vessels

Vessel Type	Vessel Movements	
	Route 2	Route 3
Hydrocarbons	829 (47 percent)	72 (19 percent)
Dry Cargo	928 (53 percent)	306 (81 percent)

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Table N-5. Distribution of Vessels by Type and Summer Deadweight, Route 2

Distribution of Summer Deadweight by Vessel Type, Route 2

DWT (tonnes)	Crude Oil Tanker	Product and Non-Specified Tanker	Chemical Tanker	Combined Oil and Bulk Carrier	LPG Carrier	Container Vessels	Bulker	General Cargo	RO/RO and Vehicle Carrier	Passenger Vessels (Cruise)	Other Vessels	Total
10000	0	4	4	0	0	0	1	21	2	29	3	**64**
20000	0	2	26	0	2	2	39	65	15	44	5	**200**
30000	0	3	15	0	0	4	12	1	6	0	1	**42**
40000	0	41	81	0	0	47	44	5	2	0	0	**220**
50000	8	148	168	1	0	47	72	2	45	0	0	**491**
60000	0	10	10	0	0	157	6	0	18	0	0	**201**
70000	16	17	0	4	0	218	3	0	0	0	0	**258**
80000	19	31	0	12	0	0	1	0	0	0	0	**63**
90000	4	2	20	6	0	3	0	0	0	0	0	**35**
100000	98	2	0	1	0	0	0	0	0	0	0	**101**
110000	18	7	1	5	0	0	0	0	0	0	0	**31**
120000	30	0	0	0	0	0	0	0	0	0	0	**30**
130000	2	0	0	0	0	0	0	0	0	0	0	**2**
140000	0	0	0	0	0	0	0	0	0	0	0	**0**
150000	4	0	0	0	0	0	0	0	0	0	0	**4**
160000	7	0	0	0	0	0	0	0	0	0	0	**7**
Total	**206**	**267**	**325**	**29**	**2**	**478**	**178**	**94**	**88**	**73**	**9**	**1749**

Table N-6. Distribution of Vessels by Type and Summer Deadweight, Route 3

Distribution of Summer Deadweight by Vessel Type, Route 3

DWT (tonnes)	Crude Oil Tanker	Product and Non-Specified Tanker	Chemical Tanker	Combined Oil and Bulk Carrier	LPG Carrier	Container Vessels	Bulker	General Cargo	RO/RO and Vehicle Carrier	Passenger Vessels (Cruise)	Other Vessels	Total
10000	0	2	0	0		0	0	10	51	59	0	**122**
20000	0	14	9	0		9	0	5	0	14	1	**52**
30000	0	0	9	0		19	1	0	0	0	0	**29**
40000	0	1	11	0		76	1	0	0	0	0	**89**
50000	0	6	11	0		17	1	0	0	0	0	**35**
60000	0	1	0	1		42	0	0	0	0	0	**44**
70000	0	2	0	0		0	0	0	0	0	0	**2**
80000	1	1	0	0		0	0	0	0	0	0	**2**
90000	0	0	0	1		0	0	0	0	0	0	**1**
100000	1	0	0	0		0	0	0	0	0	0	**1**
110000	0	0	0	0		0	0	0	0	0	0	**0**
120000	0	0	0	0		0	0	0	0	0	0	**0**
130000	0	0	0	0		0	0	0	0	0	0	**0**
140000	0	0	0	0		0	0	0	0	0	0	**0**
150000	1	0	0	0		0	0	0	0	0	0	**1**
160000	0	0	0	0		0	0	0	0	0	0	**0**
Total	**3**	**27**	**40**	**2**	**0**	**163**	**3**	**15**	**51**	**73**	**1**	**378**

Table N-7. Distribution of Vessels by Type and Length, Route 2

Distribution of Length by Vessel Type, Route 2

Length (m)	Crude Oil Tanker	Product and Non-Specified Tanker	Chemical Tanker	Combined Oil and Bulk Carrier	LPG Carrier	Container Vessels	Bulker	General Cargo	RO/RO and Vehicle Carrier	Passenger Vessels (Cruise)	Other Vessels	Total
50	0	0	0	0	0	0	0	0	0	0	1	**1**
100	0	0	0	0	0	0	0	3	0	0	2	**5**
150	0	5	26	0	0	0	8	20	2	0	3	**64**
200	8	197	277	1	2	22	158	69	19	4	5	**762**
250	75	65	21	28	0	64	12	2	19	8	1	**295**
300	123	0	0	0	0	392	0	0	48	45	0	**608**
350	0	0	0	0	0	0	0	0	0	16	0	**16**
400	0	0	0	0	0	0	0	0	0	0	0	**0**
450	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**206**	**267**	**324**	**29**	**2**	**478**	**178**	**94**	**88**	**73**	**12**	**1751**

Table N-8. Distribution of Vessels by Type and Length, Route 3

Distribution of Length by Vessel Type, Route 3

Length (m)	Crude Oil Tanker	Product and Non-Specified Tanker	Chemical Tanker	Combined Oil and Bulk Carrier	LPG Carrier	Container Vessels	Bulker	General Cargo	RO/RO and Vehicle Carrier	Passenger Vessels (Cruise)	Other Vessels	**Total**
50	0	0	0	0		0	0	0	0	0	0	**0**
100	0	0	0	0		0	0	2	0	0	0	**2**
150	0	5	7	0		2	0	10	51	0	1	**76**
200	0	19	33	0		58	3	3	0	18	0	**134**
250	2	3	0	2		69	0	0	0	25	0	**101**
300	1	0	0	0		34	0	0	0	17	0	**52**
350	0	0	0	0		0	0	0	0	13	0	**13**
400	0	0	0	0		0	0	0	0	0	0	**0**
450	0	0	0	0		0	0	0	0	0	0	**0**
Total	**3**	**27**	**40**	**2**	**0**	**163**	**3**	**15**	**51**	**73**	**1**	**378**

Table N-9. Distribution of Vessels by Type and Summer Draft, Route 2

Distribution of Summer Draft by Vessel Type, Route 2

Draft (m)	Crude Oil Tanker	Product and Non-Specified Tanker	Chemical Tanker	Combined Oil and Bulk Carrier	LPG Carrier	Container Vessels	Bulker	General Cargo	RO/RO and Vehicle Carrier	Passenger Vessels (Cruise)	Other Vessels	**Total**
0	0	0	0	0	0	0	0	0	0	0	0	**0**
1	0	0	0	0	0	0	0	0	0	0	0	**0**
2	0	0	0	0	0	0	0	0	0	0	0	**0**
3	0	0	0	0	0	0	0	0	0	0	0	**0**
4	0	0	0	0	0	0	0	0	0	0	0	**0**
5	0	0	0	0	0	0	0	0	0	0	2	**2**
6	0	0	0	0	0	0	0	1	0	0	2	**3**
7	0	0	1	0	0	0	1	8	2	1	1	**14**
8	0	0	4	0	0	0	2	8	1	10	2	**27**
9	0	5	12	0	0	0	4	7	4	46	0	**78**
10	0	2	24	0	2	5	47	62	7	1	3	**153**
11	0	32	73	0	0	10	36	3	10	15	0	**179**
12	0	57	66	0	0	88	54	5	64	0	1	**335**
13	109	130	117	1	0	142	32	0	0	0	0	**531**
14	45	18	7	4	0	223	2	0	0	0	0	**299**
15	41	12	2	23	0	9	0	0	0	0	0	**87**
16	1	11	0	1	0	0	0	0	0	0	0	**13**
17	9	0	19	0	0	0	0	0	0	0	0	**28**
18	1	0	0	0	0	0	0	0	0	0	0	**1**
19	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**206**	**267**	**325**	**29**	**2**	**477**	**178**	**94**	**88**	**73**	**11**	**1750**

Table N-10. Distribution of Vessels by Type and Summer Draft, Route 3

Distribution of Summer Draft by Vessel Type, Route 3

Draft (m)	Crude Oil Tanker	Product and Non-Specified Tanker	Chemical Tanker	Combined Oil and Bulk Carrier	LPG Carrier	Container Vessels	Bulker	General Cargo	RO/RO and Vehicle Carrier	Passenger Vessels (Cruise)	Other Vessels	**Total**
0	0	0	0	0		0	0	0	0	0	0	**0**
1	0	0	0	0		0	0	0	0	0	0	**0**
2	0	0	0	0		0	0	0	0	0	0	**0**
3	0	0	0	0		0	0	0	0	0	0	**0**
4	0	0	0	0		0	0	0	0	0	0	**0**
5	0	0	0	0		0	0	0	0	0	0	**0**
6	0	0	0	0		0	0	2	0	0	0	**2**
7	0	0	0	0		0	0	0	51	0	0	**51**
8	0	2	0	0		1	0	7	0	46	0	**56**
9	0	1	3	0		7	0	3	0	27	0	**41**
10	0	11	6	0		22	1	1	0	0	1	**42**
11	0	2	13	0		8	1	2	0	0	0	**26**
12	0	4	10	0		76	1	0	0	0	0	**91**
13	1	5	8	1		49	0	0	0	0	0	**64**
14	0	2	0	0		0	0	0	0	0	0	**2**
15	1	0	0	1		0	0	0	0	0	0	**2**
16	0	0	0	0		0	0	0	0	0	0	**0**
17	0	0	0	0		0	0	0	0	0	0	**0**
18	1	0	0	0		0	0	0	0	0	0	**1**
19	0	0	0	0		0	0	0	0	0	0	**0**
Total	**3**	**27**	**40**	**2**	**0**	**163**	**3**	**15**	**51**	**73**	**1**	**378**

Table N-11. Distribution of Passenger Beds on Route 2 and Route 3

Number of passenger bedspaces	Route 2	Route 3
1000	8	0
1500	0	18
2000	6	36
2500	13	2
3000	16	1
3500	28	0
4000	1	16
4500	1	0
5000	0	0

Table N-12. Distribution of Ship Movements per Day

	Route 2	Route 3
Least day	0	0
Average day	5	1
Busiest day	13	4

Table N-13. Summary Information on Collisions and Allisions (LMIU 2001-2006)

Incident	Name at time	Vessel type	Gross	Dwt	Date	Lat	deg	min	Lon	deg	min
Collision											
1	London Senator	Container Carrier	34454	45625	11/10/2002	N	40	42	W	74	1
1	Maersk Mendoza	Container Carrier	25630	33694	11/10/2002	N	40	42	W	74	1
2	Yellow Sea	Container Carrier	37549	44765	15/02/2004	N	40	42	W	74	1
2	Sibonata	combined bulk and oil carrier	45593	83155	15/02/2004	N	40	42	W	74	1
2	Pinar Kaptanoglu	bulker	20969	35072	15/02/2004	N	40	42	W	74	1
3	Dean Reinauer	tug	139		25/10/2006	N	40	42	W	74	1
3	Zeus	anchor handling salvage tug	98		25/10/2006	N	40	42	W	74	1
3	ATC 350	barge	5320		25/10/2006						
4	Debbie Ann	fishing (general)	115		13/07/2003						
4	Georgia S.	bulker	20053	30187	13/07/2003						
5	Alex Mac	fishing (general)	71		29/06/2006	N	40	6	W	73	53
5	Franklin Reinauer	tug	197		29/06/2006	N	40	6	W	73	53
Allision											
6	Aegeo	Oil Tanker	36621		??/10/1996	N	40	27	W	73	48
7	Kouros V	Freighter	15272		??/01/2001	N	40	27	W	73	48
8	Carnival Legend	passenger (cruise)	85942		22/06/2005	N	40	42	W	74	1

BW038833

Table N-14. Summary comment on Collisions and Allisions (LMIU 2001-2006)

Incident	Summary of incident
Collision	
1	In collision with c.c. Maersk Mendoza at Newark, NJ, 11 Oct 2002. Damage, if any, minor. Sailed 12 Oct.
1	In collision with container vessel London Senator at Newark, NJ, 11 Oct 2002. Damage, if any, minor. Sailed same day.
2	In collision with bulk Pinar Kaptanoglu, then in further collision with bulk/oil Sibonata, in Kill Van Kull, vicinity of Constable Hook Point, NJ, 15 Feb 2004.
2	In collision with c.c. Yellow Sea in Kill Van Kull, near Constable Hook Point, NJ, 15 Feb 2004. Moored at Bayonne, NJ. Still at anchor 18 Feb. Sd New York 14 Mar.
2	In collision with c.c. Yellow Sea in Kill Van Kull, vicinity of Constable Hook Point, NJ, 15 Feb 2004. Anchored in Gravesend Anchorage near Coney Island, NY.
3	In collision with barge ATC 350, being pulled by tug Zeus, in New York 25 Oct 2006. In port pending investigation.
3	While towing barge ACT 350, barge was in collision with tug Dean Reinauer in New York 25 Oct 2006. Held in port pending investigation.
3	While in tow of tug Zeus, was in collision with tug Dean Reinauer, in New York 25 Oct 2006. Holed abiove waterline. Held in port pending investigation.
4	In collision with bulk Georgia S. in the Nantucket shipping lane, south of Block Island 13 Jul 2003. Sustained crushed-in bow. Returned to Galilee.
4	In collision with fishing Debbie Ann in the Nantucket shipping lane, south of Block Island 13 Jul 2003. Sustained slight to no damage and proceeded to Halifax.
5	In collision with tug Franklin Reinauer off New Jersey, in 40 06.9 N 73 53.3 W, 29 Jun 2006. Sank. 2 crew rescued, 2 killed. No plans to salvage.
5	In collision with fishing Alex Mac off New Jersey, in 40 06.9 N 73 53.3 W, 29 Jun 2006. Continued voyage for New York.
Allision	
6	Struck Ambrose Light
7	Struck Ambrose Light
8	Struck a pier on arrival at New York 22 Jun 2005. Sustained a 15-foot gouge in the side. Sailed same day.

BW038834

Figures

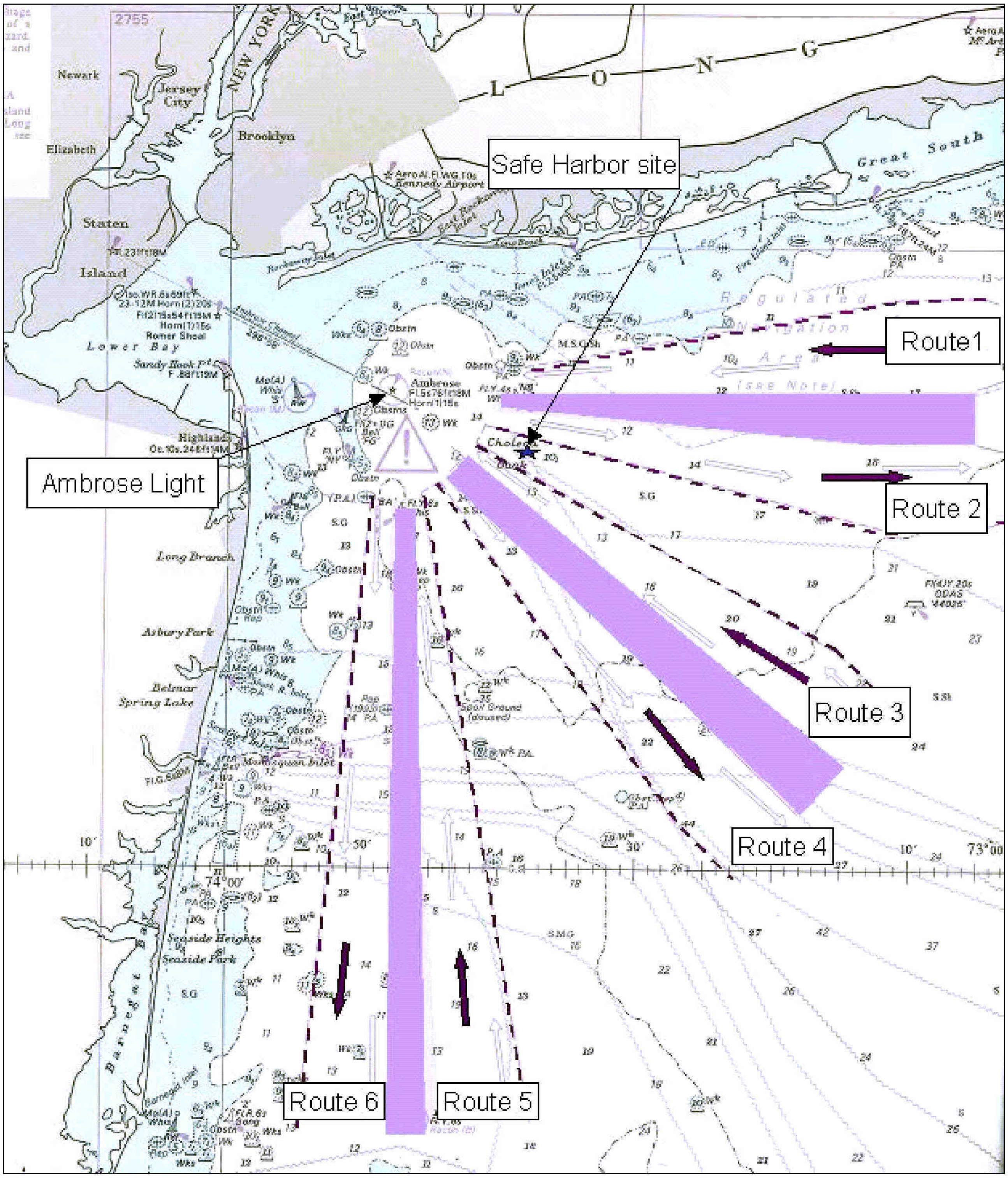


Figure N-1. **Location of Safe Harbor**

BW038836

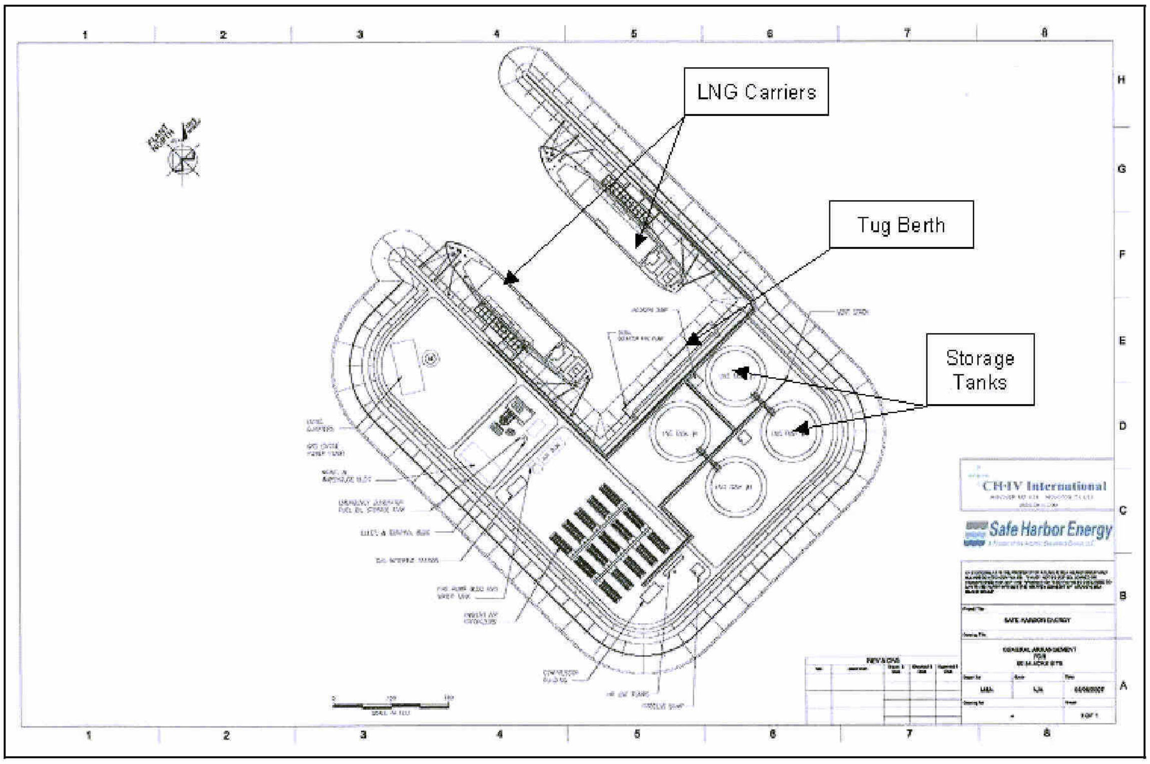


Figure N-2. Layout of Safe Harbor Island

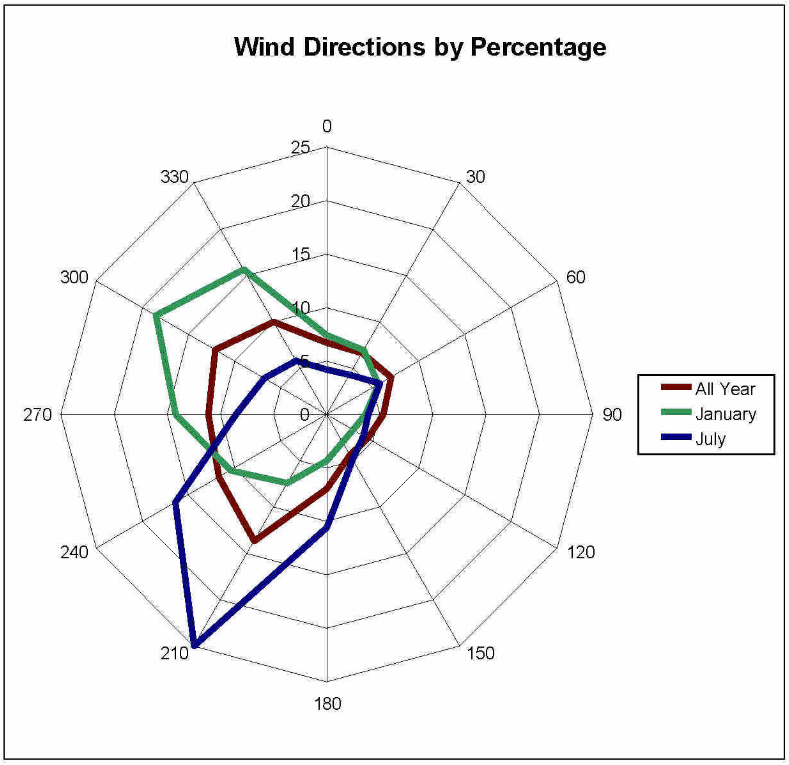


Figure N-3. Wind Directions

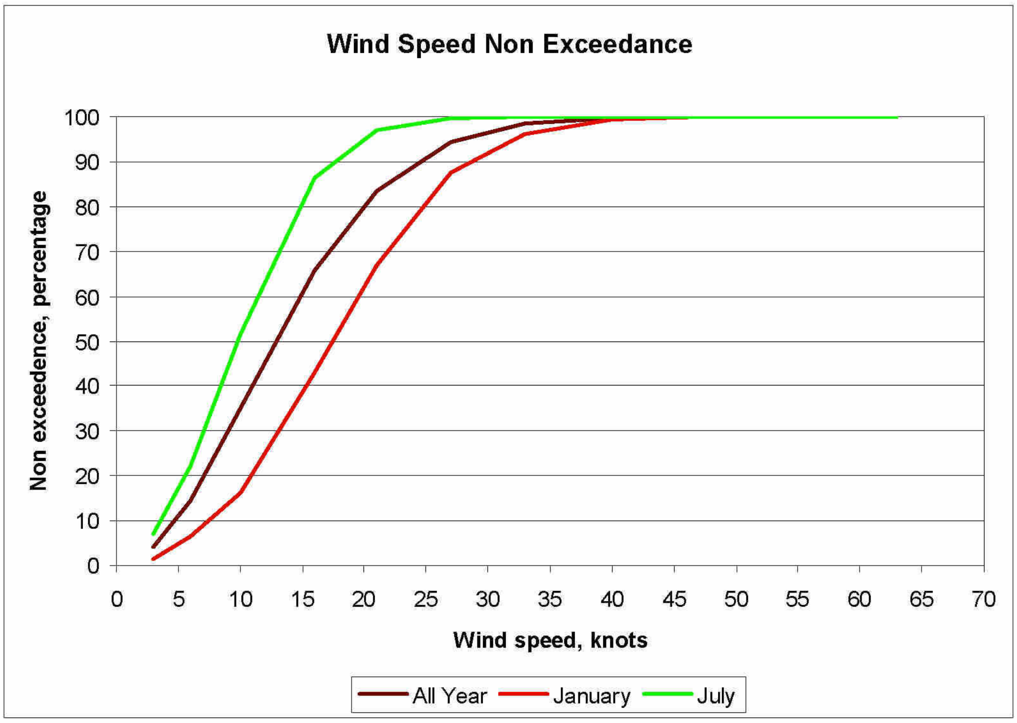


Figure N-4. Wind Speed Non-exceedance

Figure N-5. Wave Directionality

BW038838

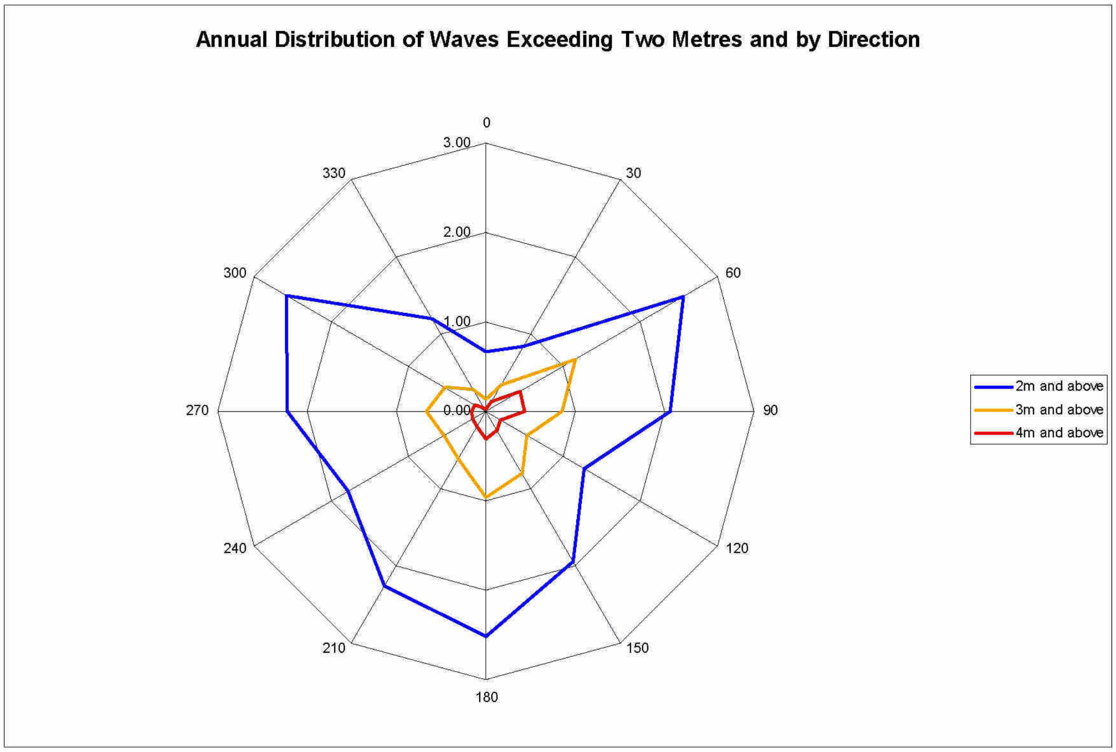


Figure N-6. Distribution of Higher Waves by Direction

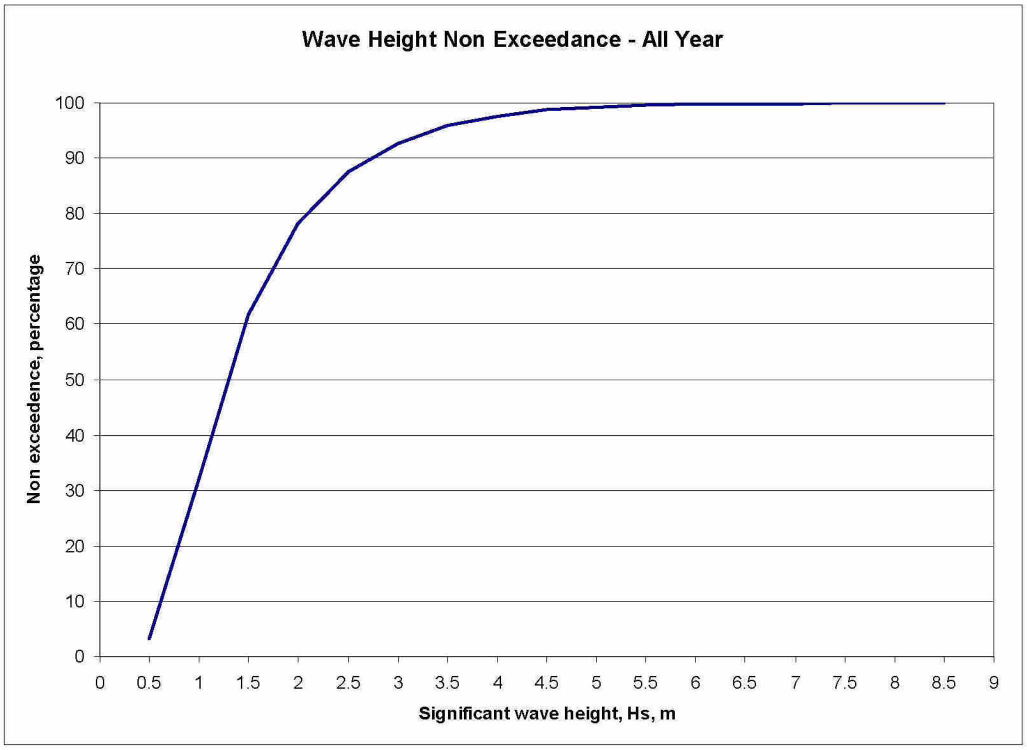


Figure N-7. Significant Wave Height Non-exceedance Curve

BW038839

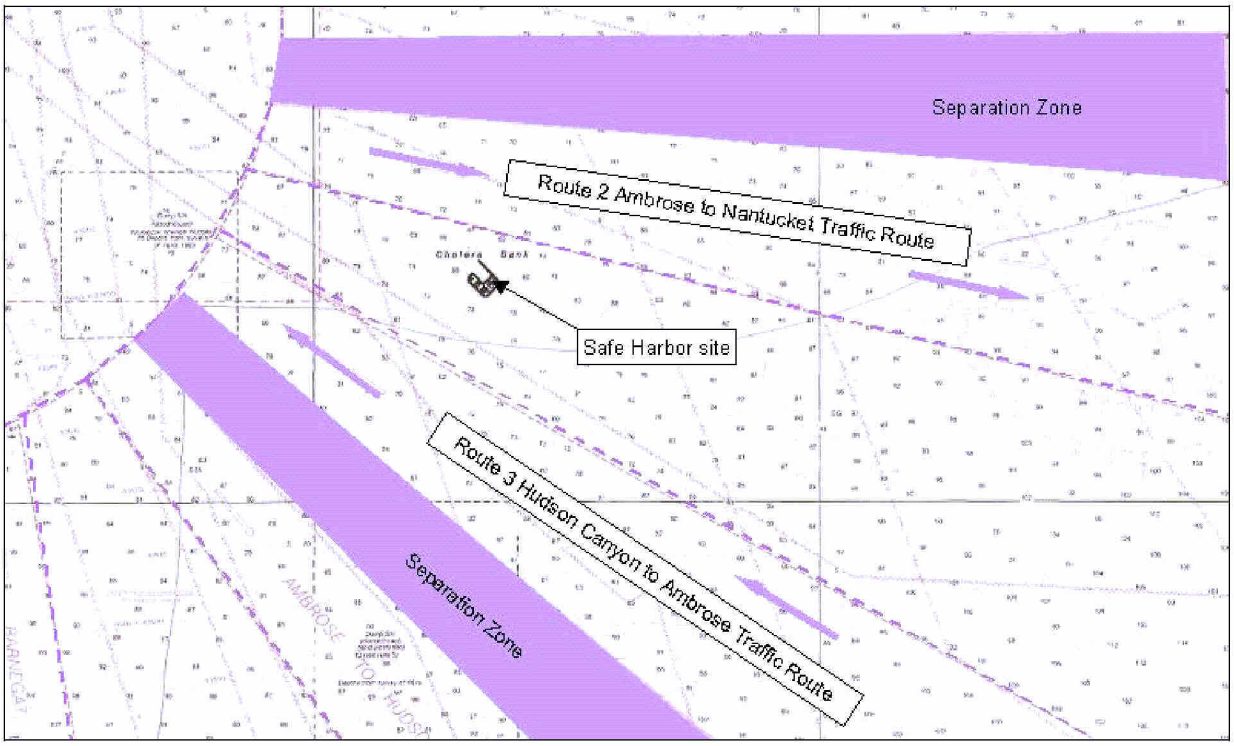


Figure N-8. General Location of Safe Harbor between Route 2 and Route 3

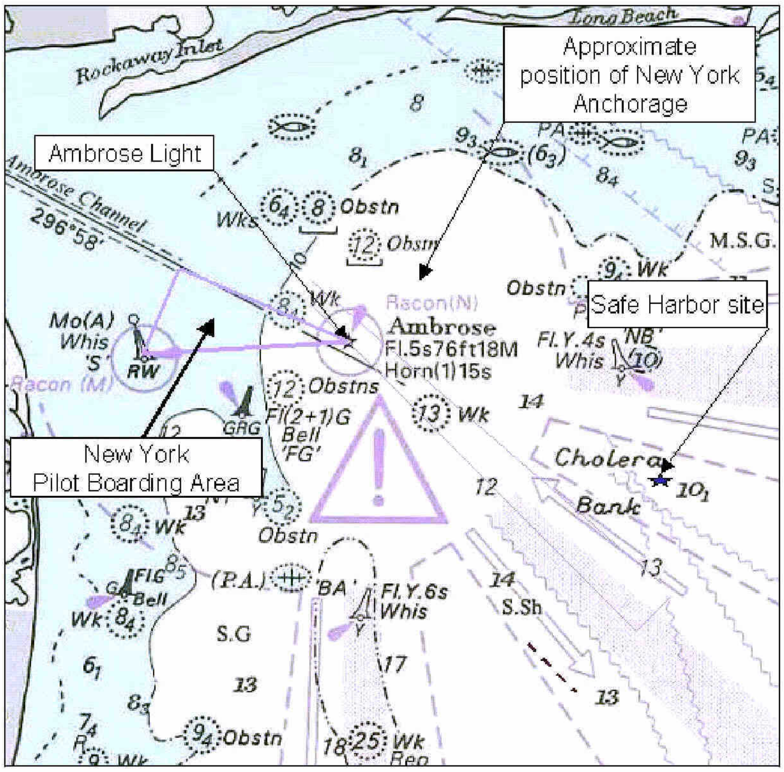


Figure N-9. Locations of Safe Harbor, Ambrose, and New York Pilot Boarding Area

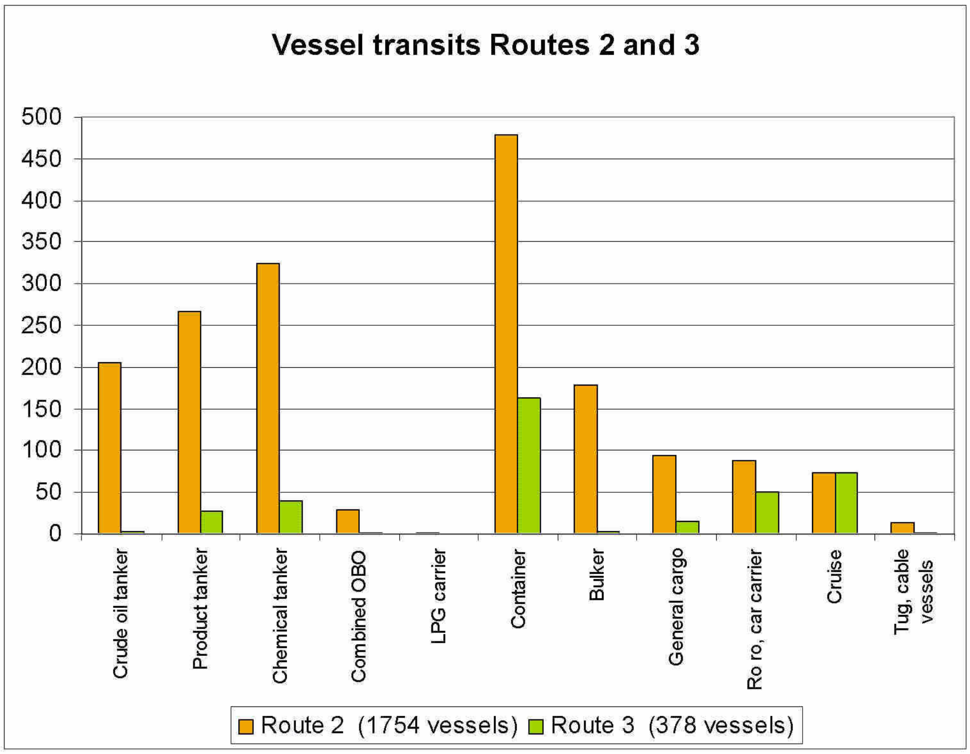


Figure N-10. Number of Vessel Transits on Route 2 (orange) and Route 3 (green)

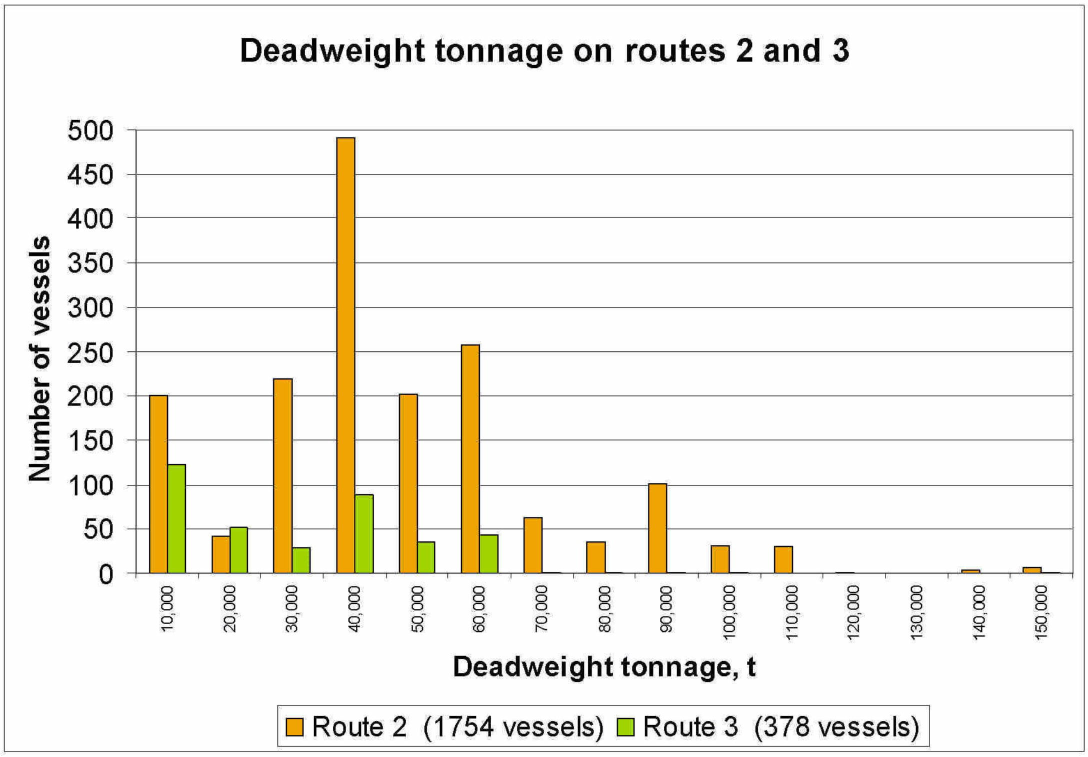


Figure N-11. Distribution of Deadweight Tonnage on Route 2 and Route 3

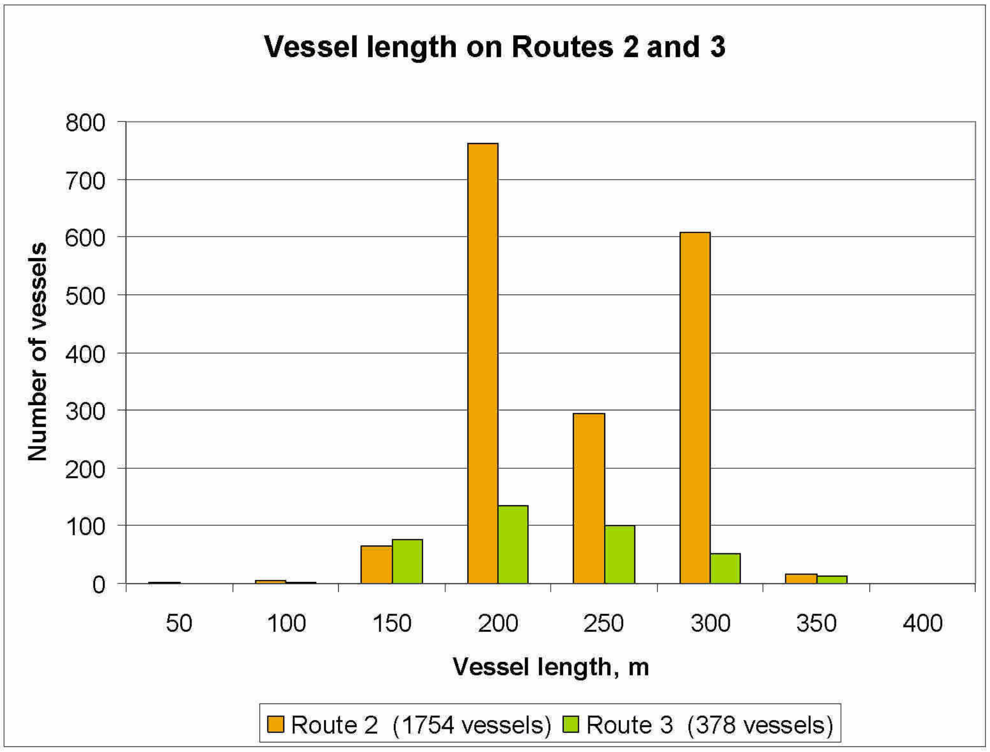


Figure N-12. Distribution of Vessels on Route 2 and Route 3 by Length

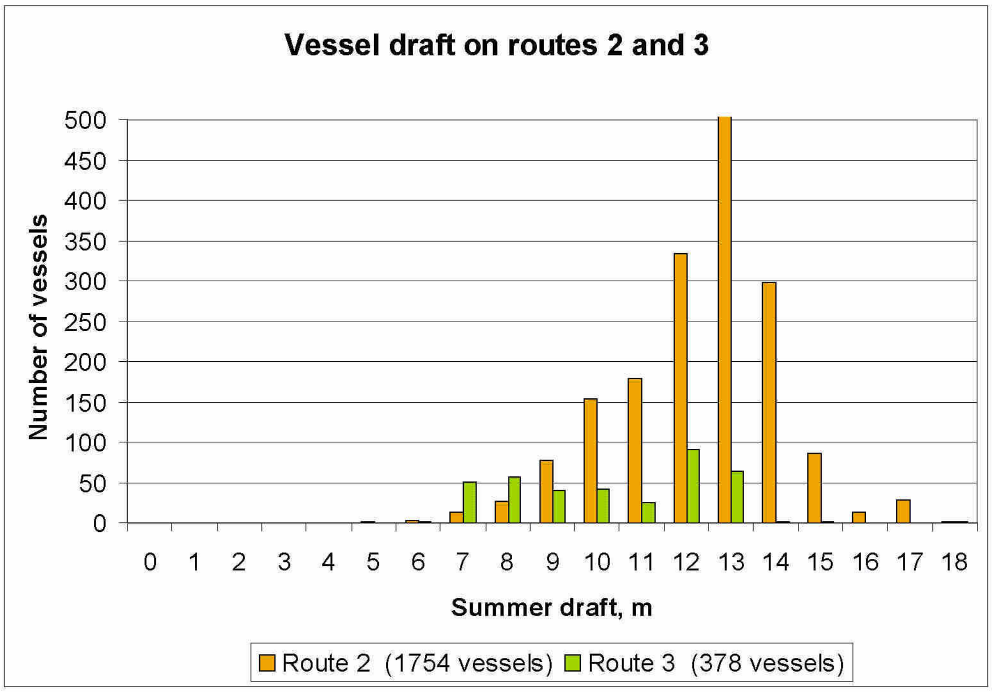


Figure N-13. Distribution of Vessels on Route 2 and Route 3 by Summer Draft

BW038842

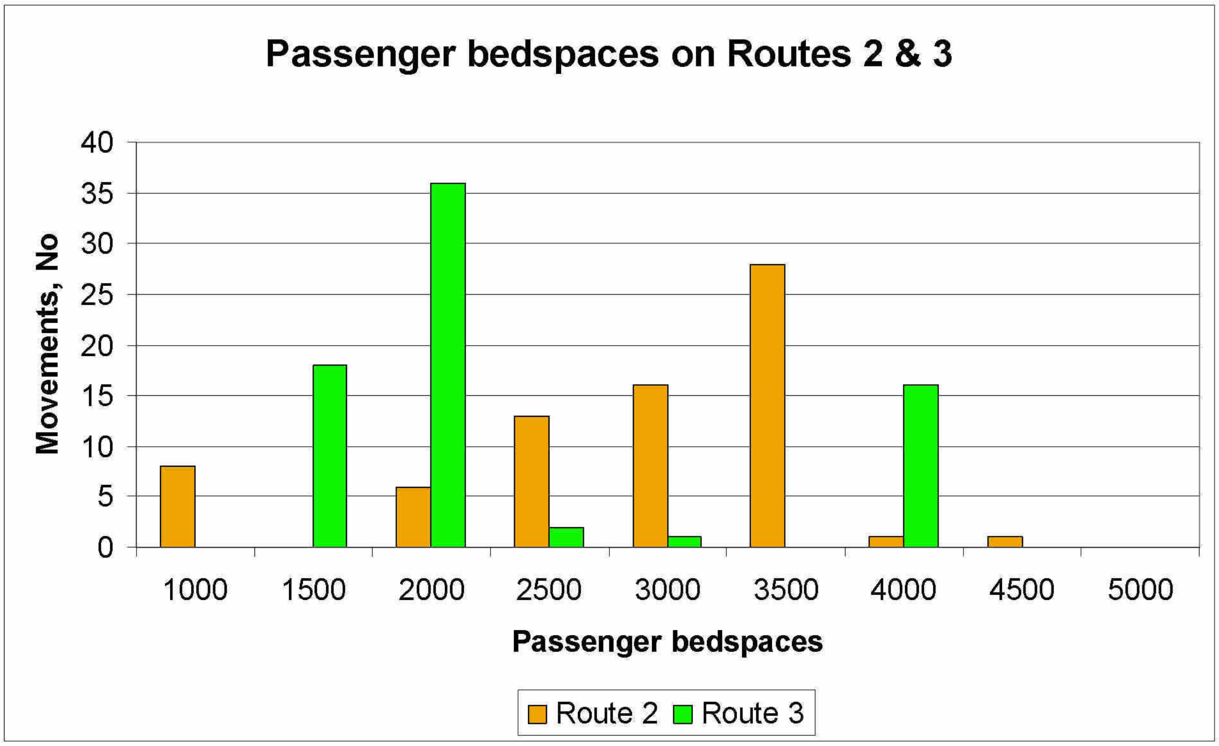


Figure N-14. Distribution of Passenger Bedspaces on Transits of Route 2 and Route 3

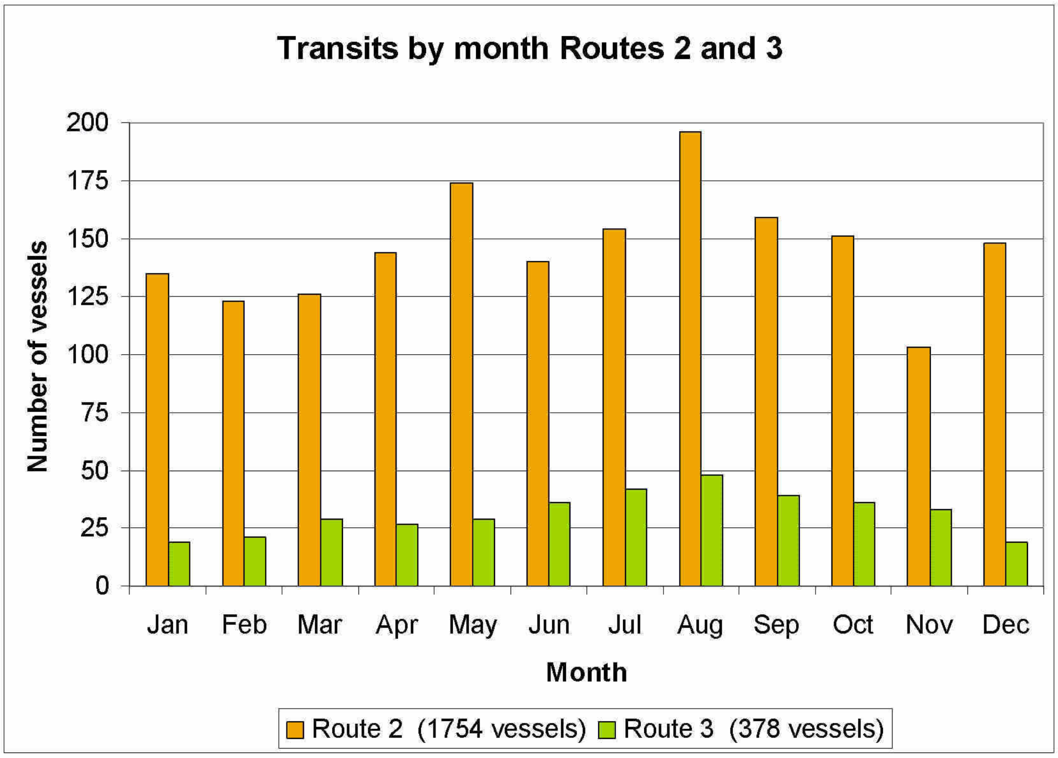


Figure N-15. Distribution of Ship Movements by Month on Route 2 and Route 3

BW038843

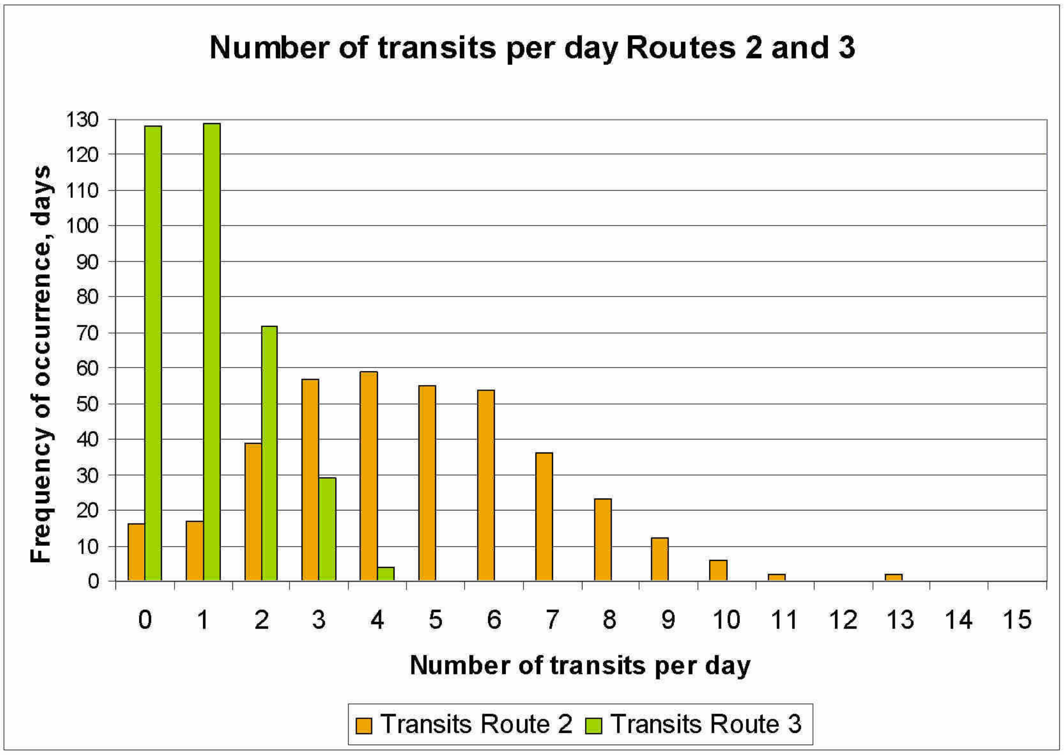


Figure N-16. Distribution of Number of Transits per Day on Route 2 and Route 3

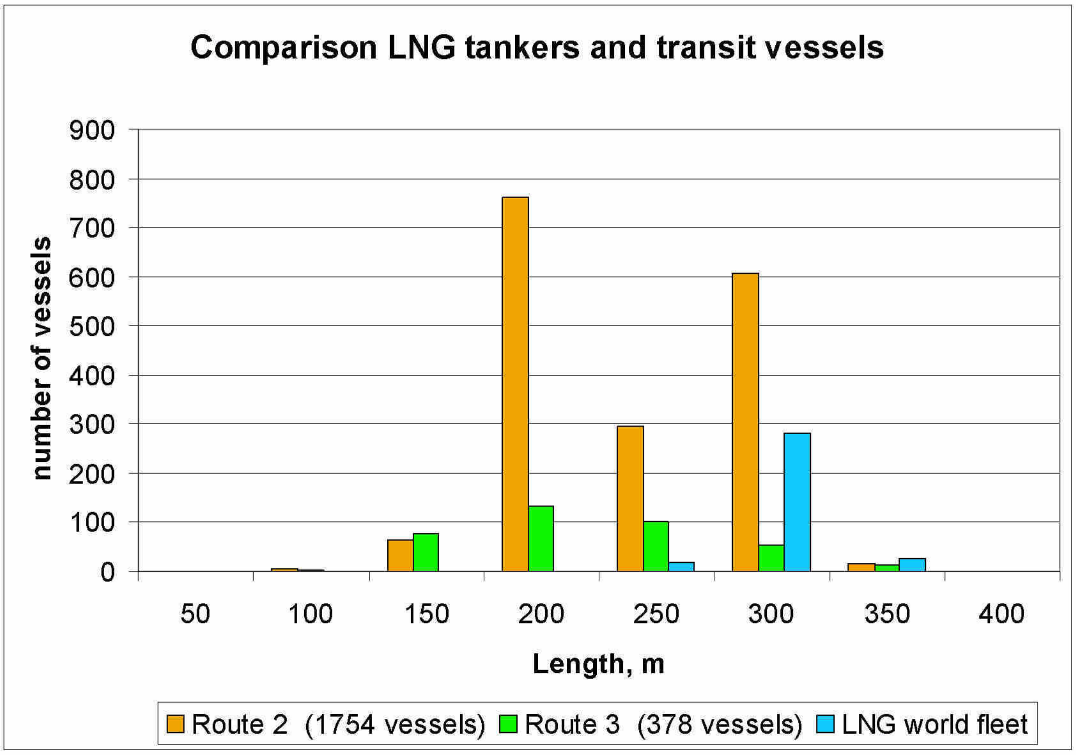


Figure N-17. Comparative Distribution of Vessel and LNG Carrier Size by Length

BW038844

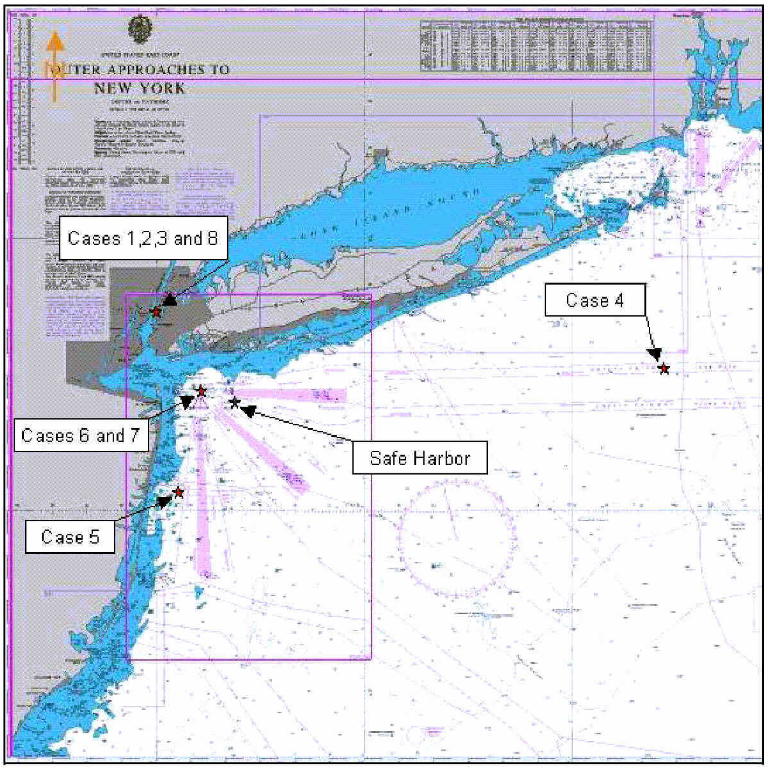


Figure N-18. Location of Collisions

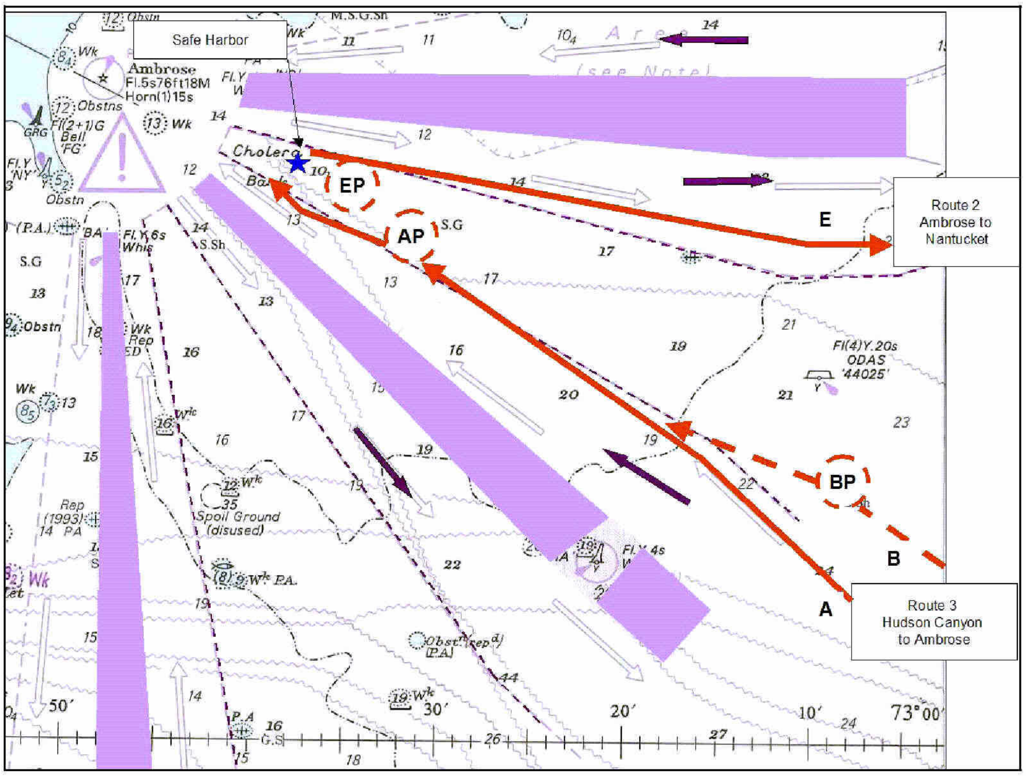


Figure N-19. LNG Carrier Arrival via Route 2 and Departure via Route 3

BW038845

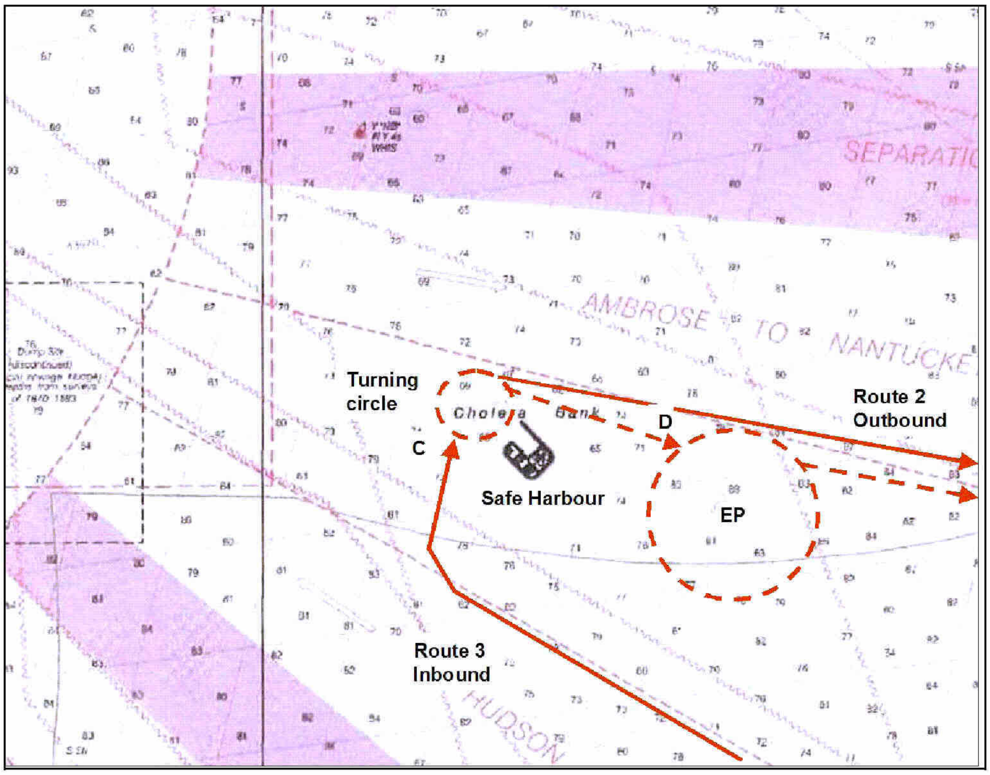


Figure N-20. LNG Carrier Operations off Safe Harbor

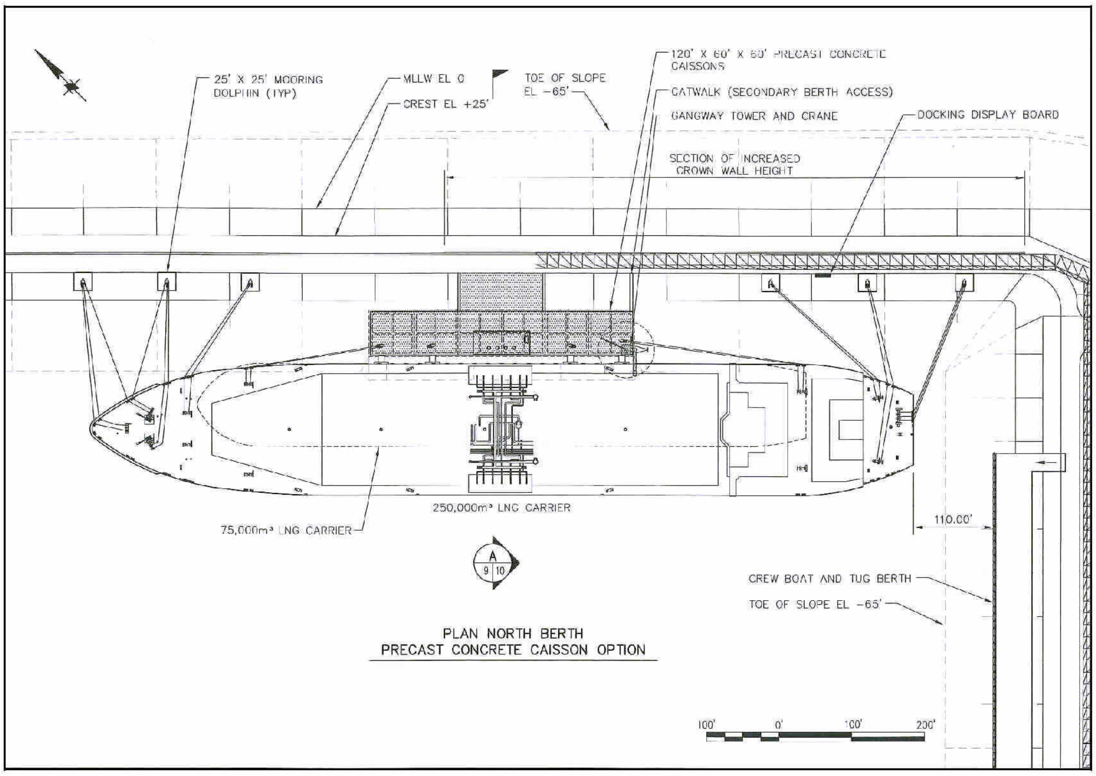


Figure N-21. Typical LNG Carrier Mooring Arrangement

BW038846

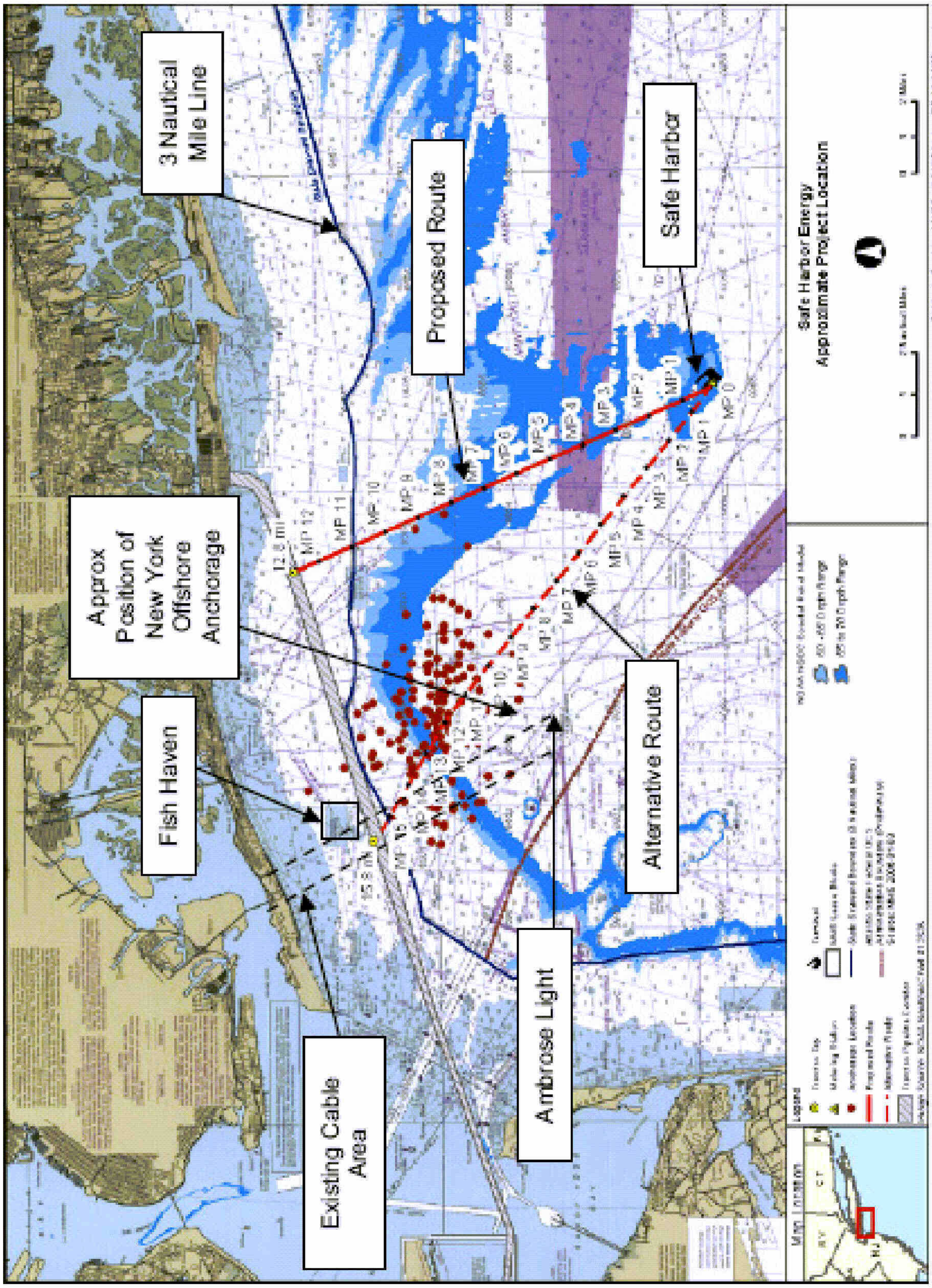


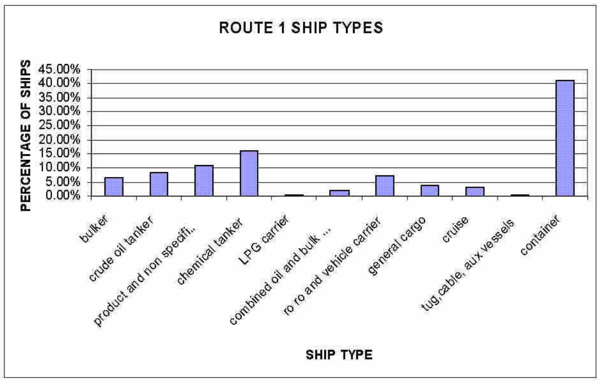
Figure N-22. General Arrangement of the Pipeline Route

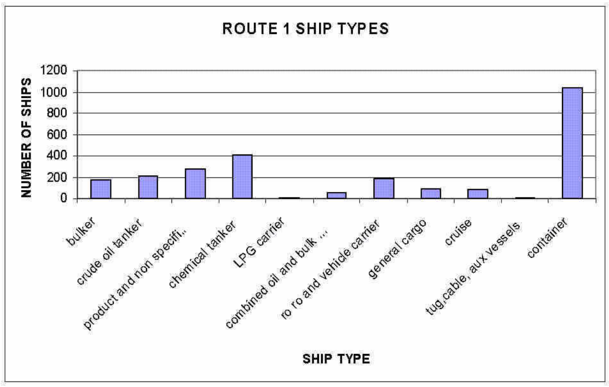
BW038847

Appendix N-1 – Traffic Data for Routes 1 through 6

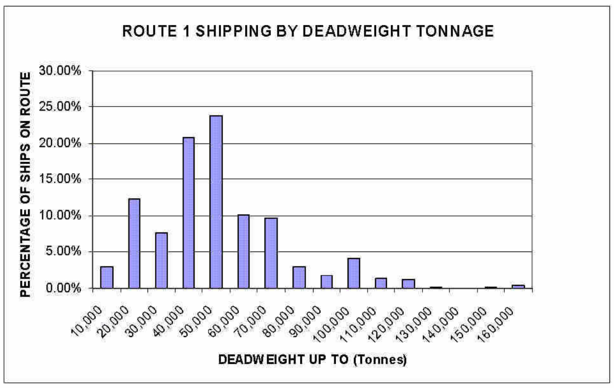
ROUTE 1 – INBOUND NANTUCKET TO AMBROSE LIGHT

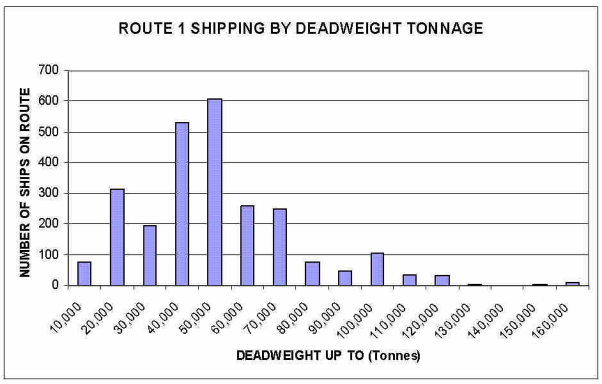
Route 1 Total Vessels by Type





Route 1 Total Vessels by Tonnage





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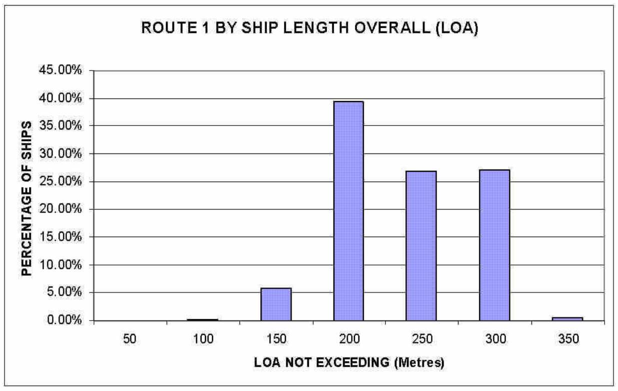
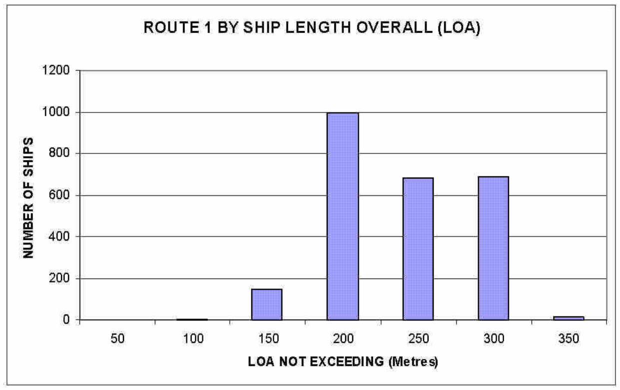
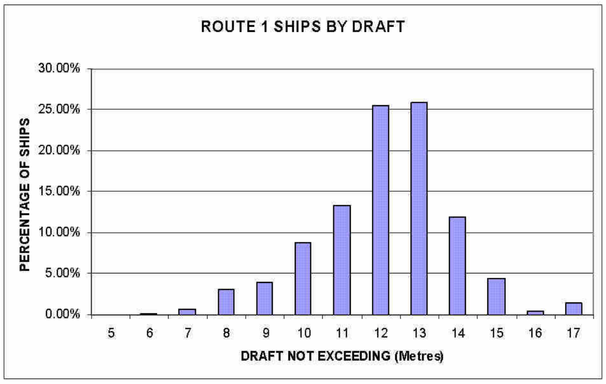
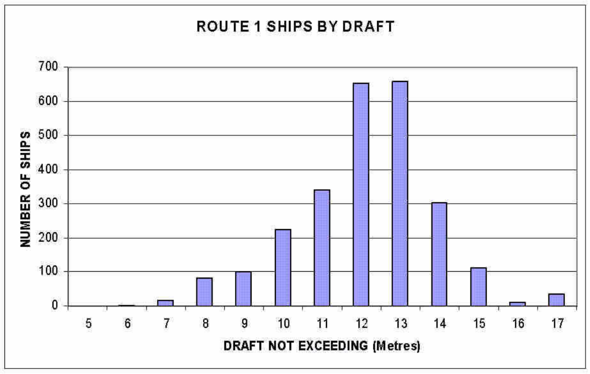
Route 1 Total Vessels by Length



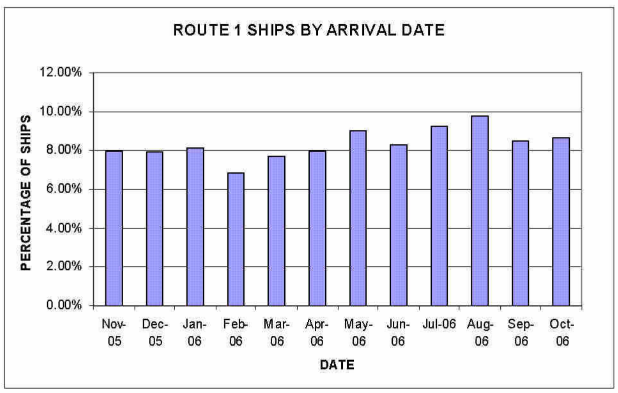


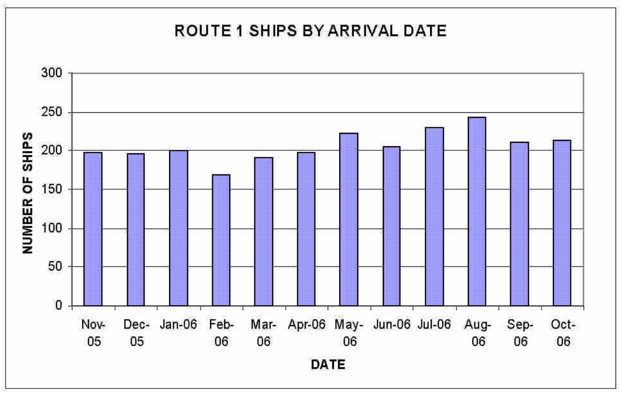
Route 1 Total Vessels by Draft





Route 1 Total Vessels by Date

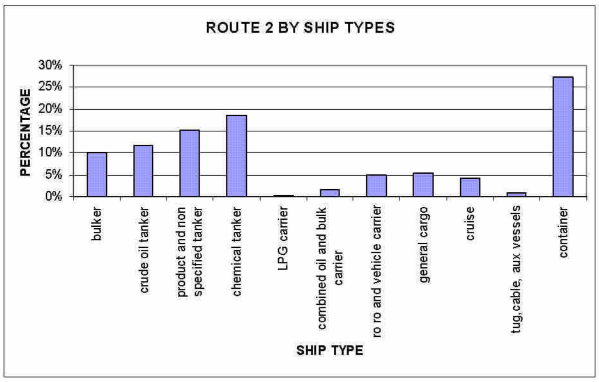


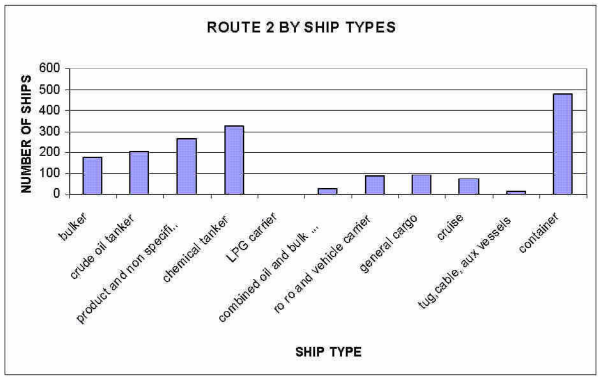


BW038849

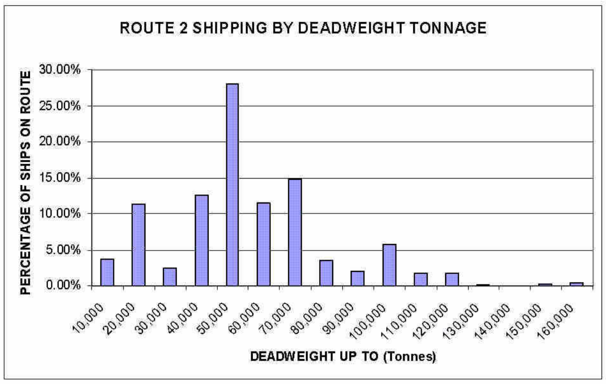
ROUTE 2 – OUTBOUND AMBROSE LIGHT TO NANTUCKET

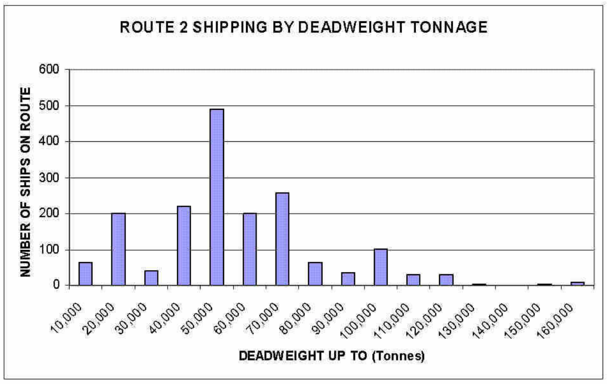
Route 2 Total Vessels by Type



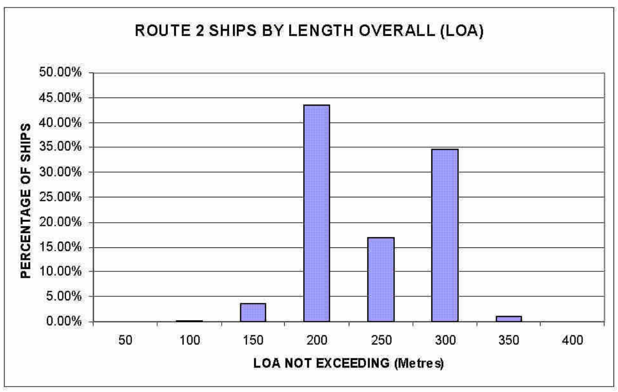


Route 2 Total Vessels by Tonnage





Route 2 Total Vessels by Length



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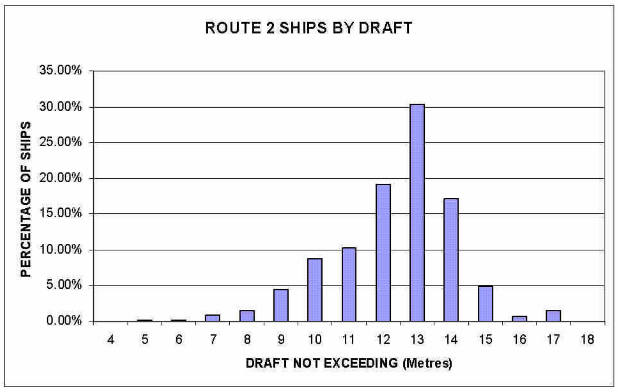
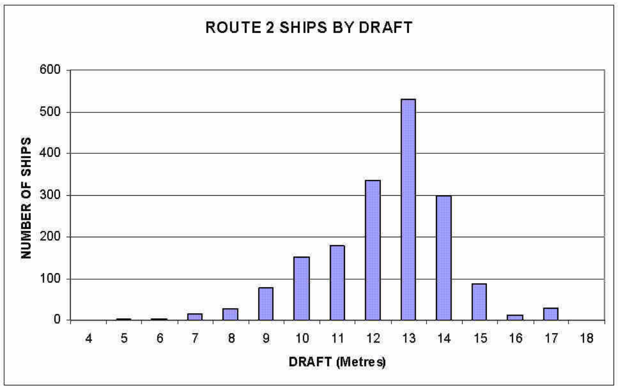
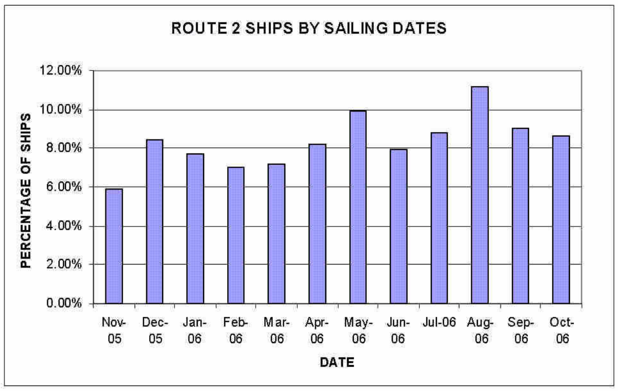
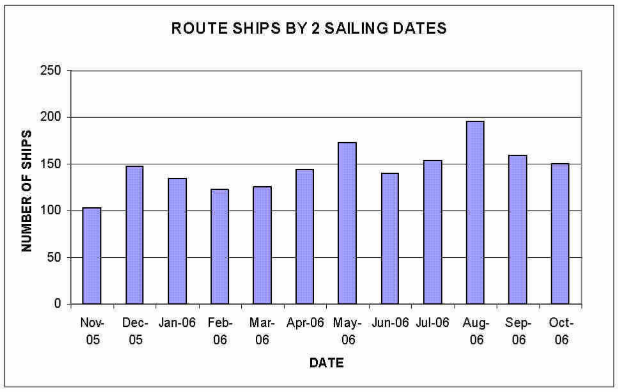
Route 2 Total Vessels by Draft





Route 2 Total Vessels by Date

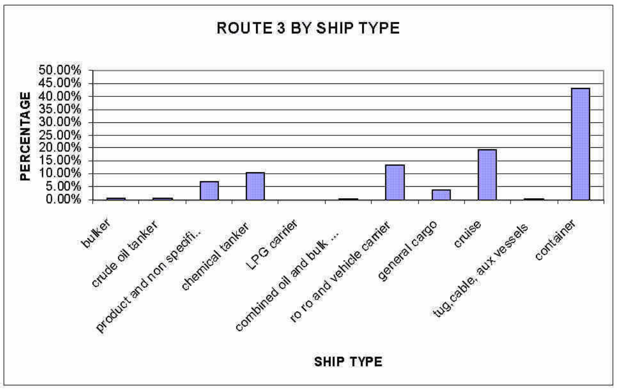


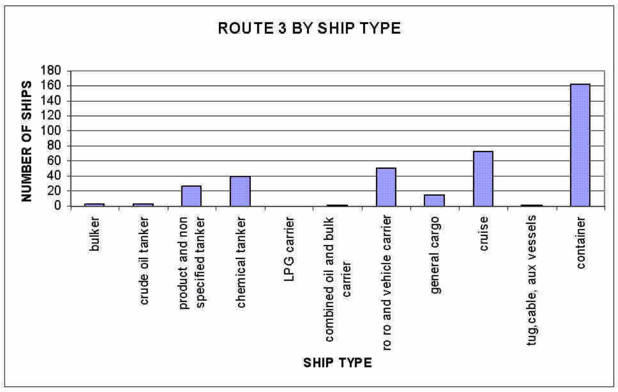


BW038851

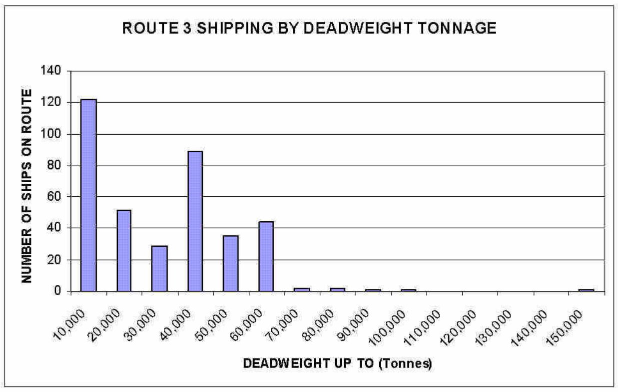
ROUTE 3 – INBOUND HUDSON CANYON TO AMBROSE LIGHT

Route 3 Total Vessels by Type

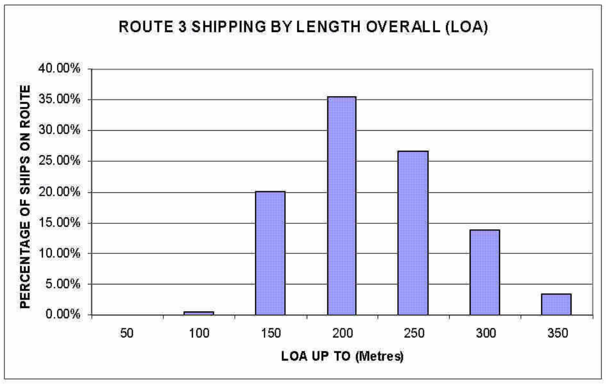


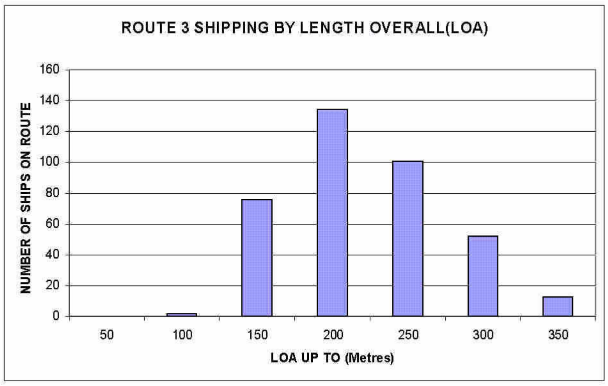


Route 3 Total Vessels by Tonnage



Route 3 Total Vessels by Length





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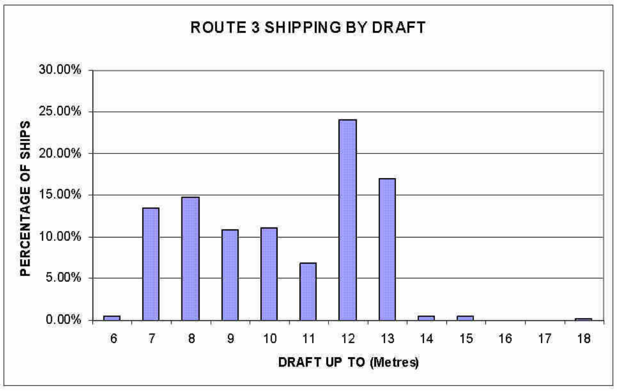
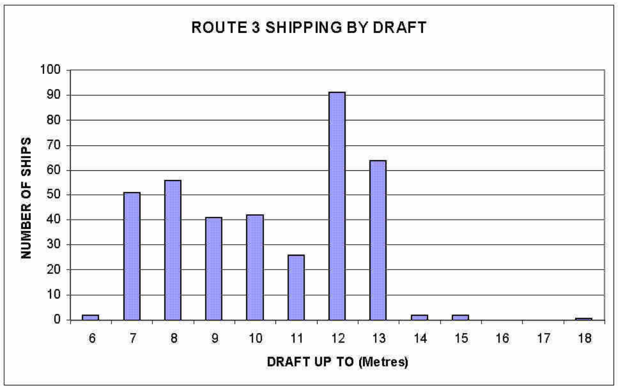
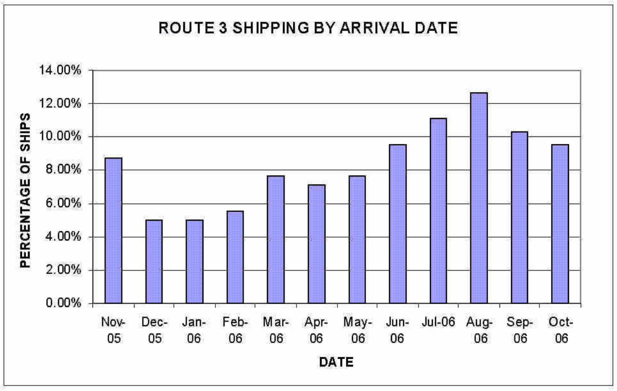
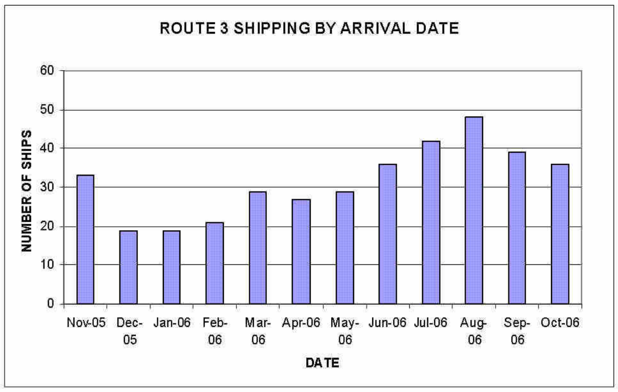
Route 3 Total Vessels by Draft





Route 3 Total Vessels by Date

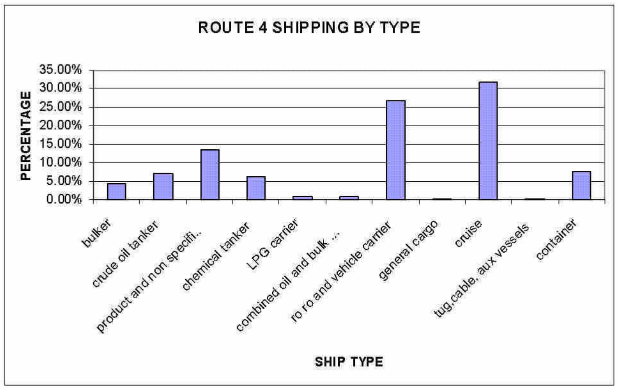




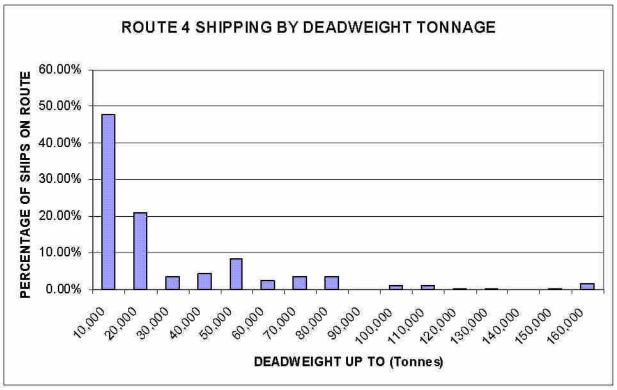
BW038853

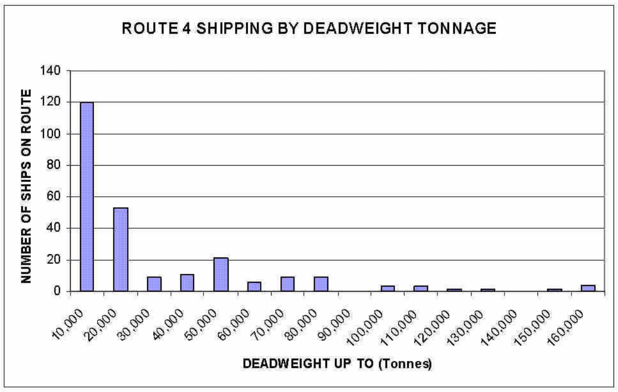
ROUTE 4 – OUTBOUND AMBROSE LIGHT TO HUDSON CANYON

Route 4 Total Vessels by Type

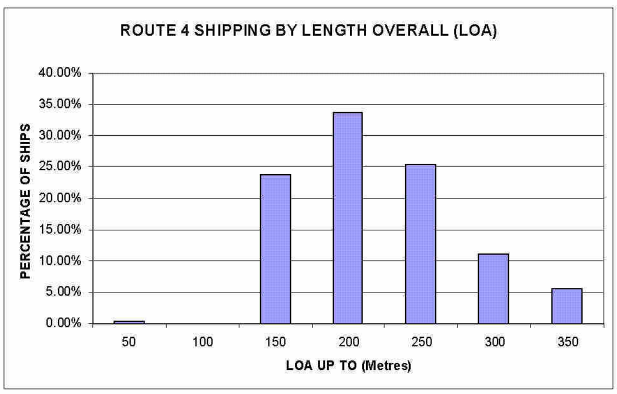


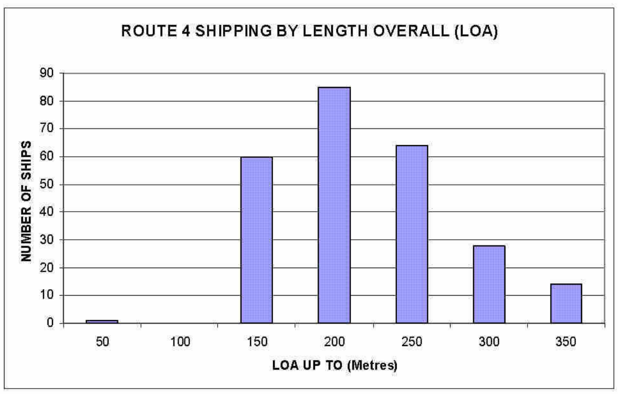
Route 4 Total Vessels by Tonnage





Route 4 Total Vessels by Length





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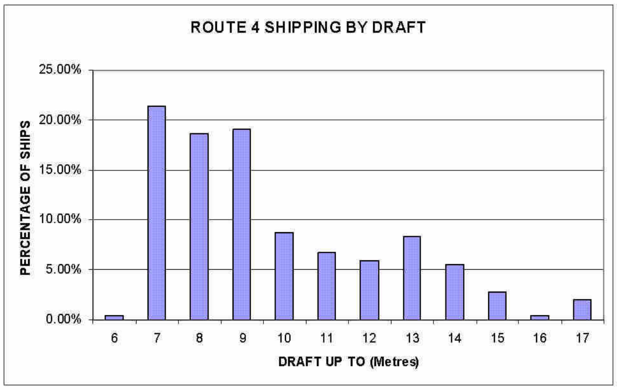
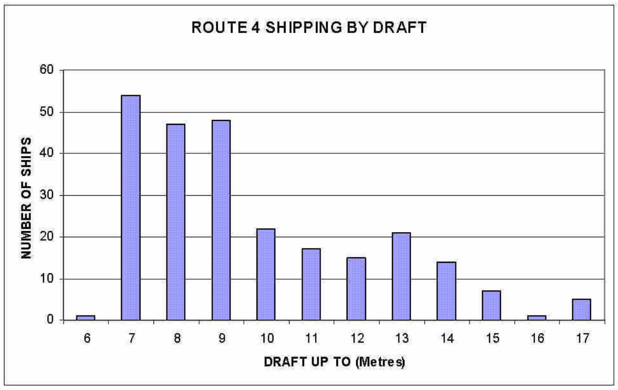
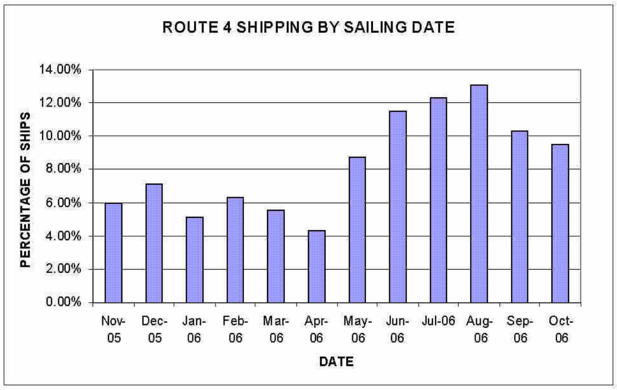
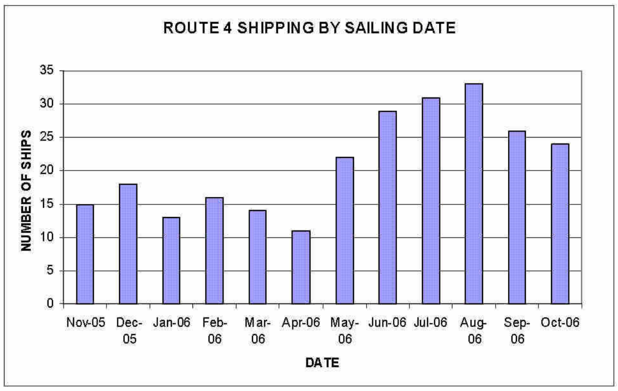




Route 4 Total Vessels by Date

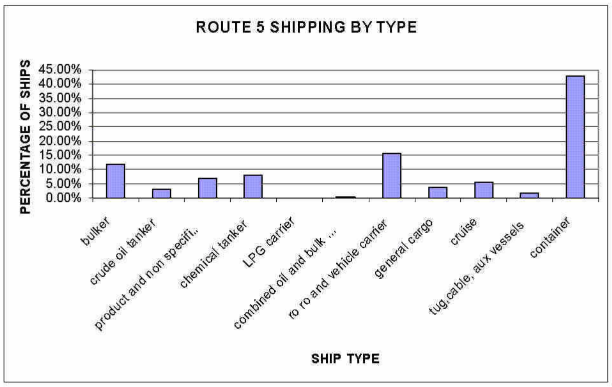


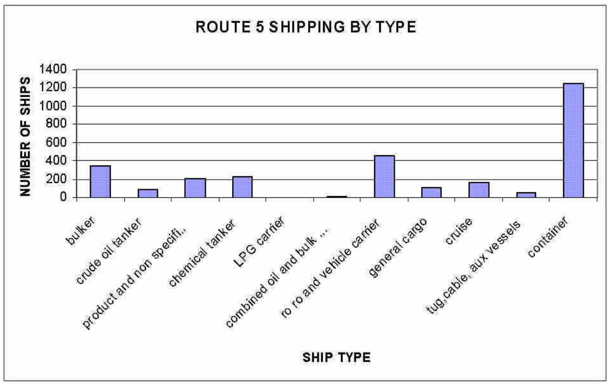


BW038855

ROUTE 5 – INBOUND BARNEGAT TO AMBROSE LIGHT

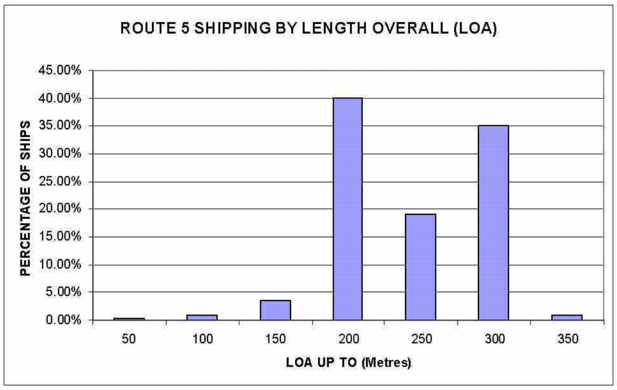
Route 5 Total Vessels by Type

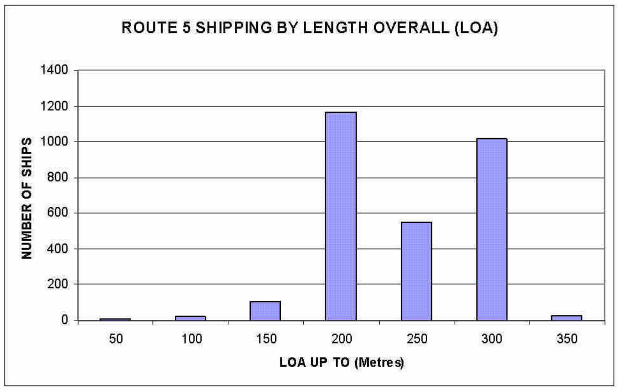




Route 5 Total Vessels by Tonnage

Route 5 Total Vessels by Length





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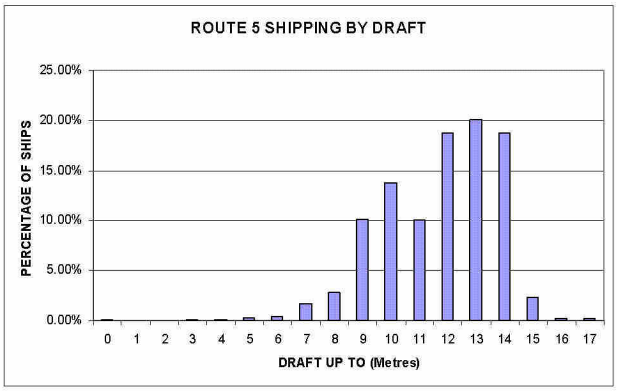
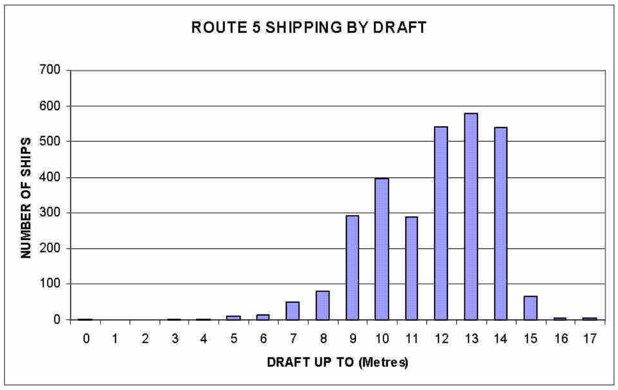
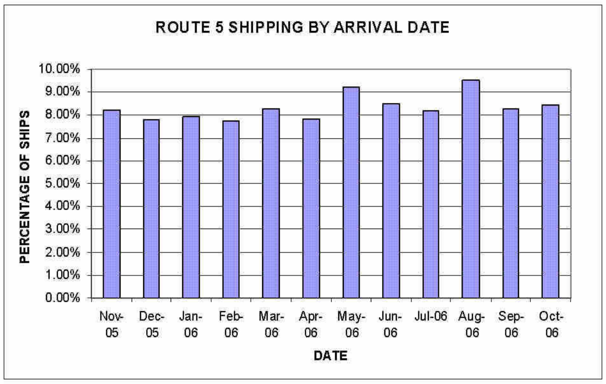
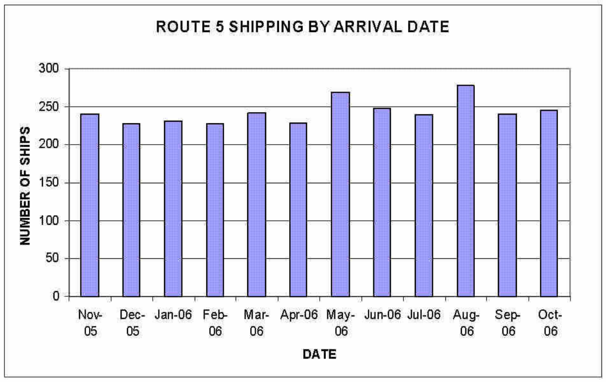
Route 5 Total Vessels by Draft





Route 5 Total Vessels by Date





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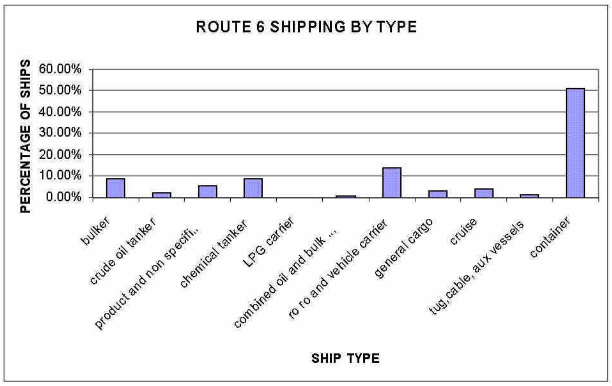
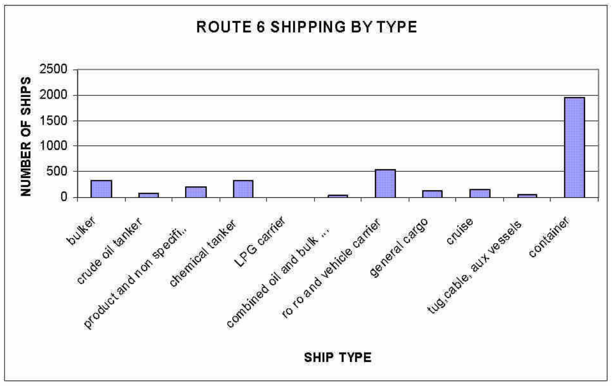
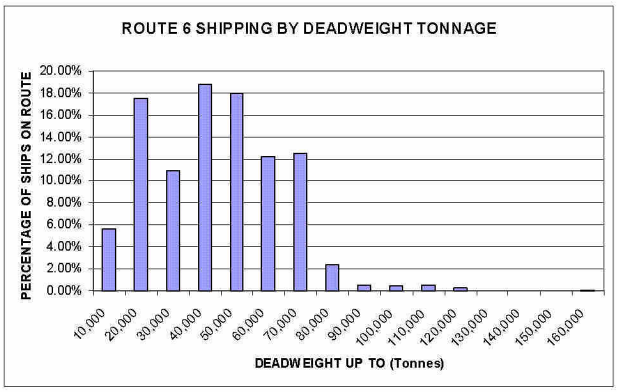
ROUTE 6 - OUTBOUND AMBROSE LIGHT TO BARNEGAT

Route 6 Total Vessels by Type

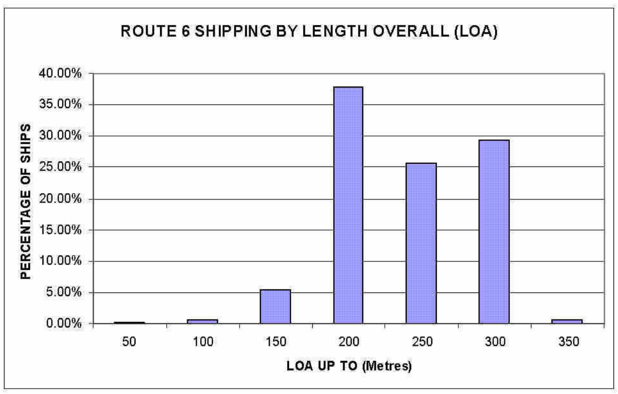


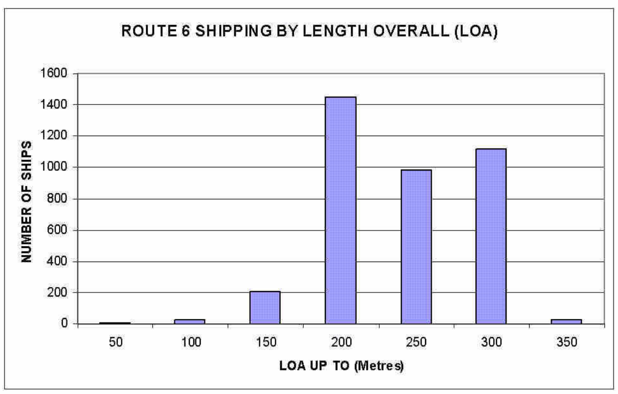


Route 6 Total Vessels by Tonnage



Route 6 Total Vessels by Length





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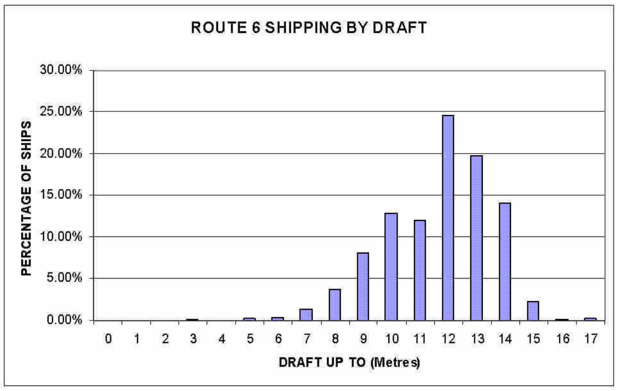
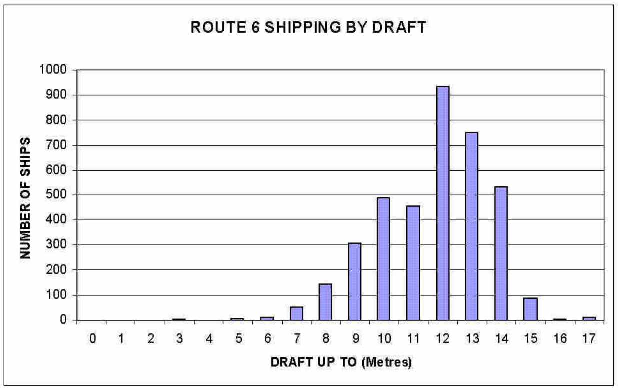
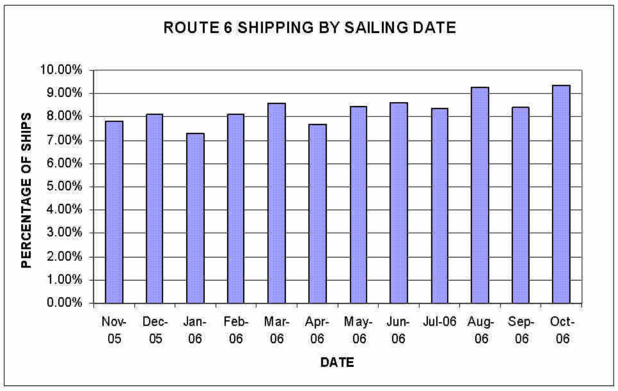
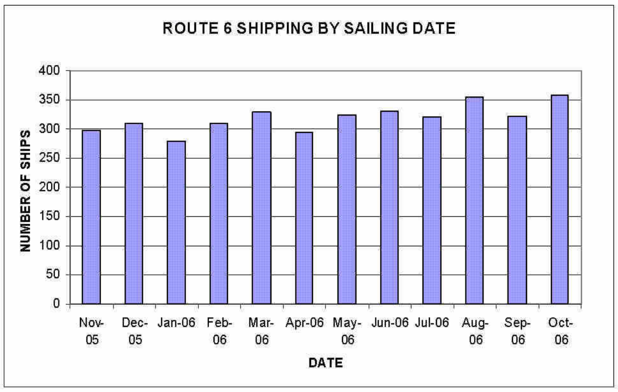
Route 6 Total Vessels by Draft





Route 6 Total Vessels by Date





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