# National Transportation Safety Board

## Marine Accident Brief

### Allision of Cruise Ship *Celebrity Infinity* with Dock

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| **Accident no.** | DCA16FM042 |
| **Vessel name** | *Celebrity Infinity* |
| **Accident type** | Allision |
| **Location** | Berth 3, Ketchikan, Alaska, 55° 20.5' N, 131° 39.04' W |
| **Date** | June 3, 2016 |
| **Time** | 1356 Alaska daylight time (coordinated universal time – 8 hours) |
| **Injuries** | None |
| **Property damage** | $1.15 million est. |
| **Environmental damage** | None |
| **Weather** | Rain, visibility 7 miles, south-southeast winds at 38–45 knots, choppy seas, air temperature 55°F, water temperature 52°F |
| **Waterway information** | Berth 3 is located in the east channel of the Tongass Narrows on the southwest side of Revillagigedo Island. The narrows is about 3.3 miles long and 0.44 mile wide and runs northwest to southeast. |

About 1400 on June 3, 2016, the Malta-flag cruise ship *Celebrity Infinity* allided with berth 3 in Ketchikan, Alaska. No one was injured and no pollution occurred. The vessel sustained a 9-inch-diameter hole on the forward port side, about 12 feet above the waterline. The berth suffered extensive damage to the catwalks and pilings. The cost of repairs was about $1.15 million.


**Postaccident photo of *Celebrity Infinity* docked at damaged berth 3, Ketchikan, Alaska. (Photo by Coast Guard)**


**Gulf of Alaska with Ketchikan at red marker near center of picture. (Photo by Google Earth)**

## Background

*Celebrity Infinity*, an 863-foot-long, 90,940-gross-ton cruise ship, was propelled by two fixed-pitch propellers, each housed in an electric-motored azimuthing thruster called a "pod." Each pod was rated at 26,150 hp and its thrust could, with certain limitations, be directed through 360 degrees. The pods were located side by side near the stern of the vessel. The *Celebrity Infinity* also had three controllable-pitch tunnel bow thrusters with a combined output of 9,588 hp. The vessel was operated by Celebrity Cruises, Inc.

Like most modern cruise ships, the vessel's bridge equipment was quite extensive. The Navigation Automation Control System (NACOS) suite included five radars and numerous work stations where bridge personnel could navigate and direct the movement of, or "conn," the vessel.[1] Conning stations for the vessel included consoles at the center of the bridge and one on each fully enclosed bridge wing. Pods and bow thrusters could be controlled from all three stations.

The *Celebrity Infinity* also had two bow anchors of about 12.7 long tons each. The anchors, once their securing gear had been removed, could be released from the bridge using an electric switch that released a brake to the windlass. The port anchor was connected to the ship with 12 shots of chain; the starboard anchor had 13.[2]

Senior bridge and engineering personnel told investigators there were no problems with the nautical, bridge, or propulsion equipment at the time of the accident, and the bridge logbook

[1] NACOS is a trademark of SAM Electronics, an L3 communications company.
[2] A *shot* is a linear measurement of 90 feet.

indicated all regulatory and company required equipment was "tested and found in good working order."


**City of Ketchikan, Alaska. (Photo by Google Earth)**

During the accident voyage, the *Celebrity Infinity* carried a crew of 961, which included 28 members of the deck department and a master. At the time of the accident, 2,160 passengers were on board. According to records reviewed, six officers and crew were on the bridge at the time of the accident. In addition to the crew, the *Celebrity Infinity* carried two compulsory Alaska marine pilots who guided the navigation of the vessel in Alaska waters. The pilots joined the vessel when the *Celebrity Infinity* first entered Alaska waters on the northbound leg of its one-week voyage and remained aboard until just before the vessel left Alaska waters on the southbound leg of the transit. The pilots alternated work shifts for the several days they remained aboard. This allowed them to obtain required rest between work periods.

According to the vice president of a local tugboat company, all the cruise lines calling in Ketchikan, except Celebrity Cruises and Royal Caribbean Cruises, had a verbal agreement with the tugboat company whereby a tugboat would be made available to assist in docking within one hour of the company being notified. For non-parties to the agreement, the tugboat would typically be ordered via the agent and its arrival time to assist was dependent on many different factors. For the date in question, the vice president said one of the company's tugboats assisted other cruise ships with docking and undocking, but that the company was not asked to assist the *Celebrity Infinity*. He was not sure how long it would have taken to assist the *Celebrity Infinity* due to the aforementioned commitments with the other vessels whose companies were parties to the agreement.

The vessel navigation officer told investigators that the *Celebrity Infinity* received weather information from two contracted services: Bon Voyage Systems (BVS) and Weather Routing Inc. (WRI). He also said the crew could obtain weather information from the onboard NAVTEX printer and by VHF radio, but he was uncertain if the *Celebrity Infinity* received weather information from

either of these sources on the day of the accident. According to the staff captain, bridge personnel looked at WRI and weather reports from the National Oceanic and Atmospheric Administration (NOAA) on the accident date. Investigators were given a National Weather Service (NWS) weather report for the Ketchikan area updated on June 2 at 0500, about 33 hours before the accident occurred.[3] *Coast Pilot 8* states that "winds are prevalent from the southeast and gales are infrequent" in the port of Ketchikan.[4]

According to the master, Celebrity Cruises' company safety management system stated the master or staff captain must perform dockings, and the master confirmed to investigators that a pilot had never docked the vessel while he served as master. The staff captain was scheduled to dock the ship on arrival in Ketchikan, and the master told investigators that he was very comfortable with that assignment based on the staff captain's extensive docking experience. According to the staff captain, he had docked or undocked the *Celebrity Infinity* and other vessels of its class hundreds of times during his time with Celebrity Cruises. Both the master and the staff captain believed the vessel could be safely docked in 30–35-knot beam winds.

## Accident Events

The *Celebrity Infinity* left Vancouver, Canada, on Sunday, May 29, 2016, and headed northbound. The vessel's one-week roundtrip itinerary included a June 3 port call at Ketchikan on the southbound part of the voyage. The vessel left the port of Juneau, Alaska, on June 2, the evening before the accident.

On the accident voyage, *Celebrity Infinity* received weather forecasts for the docking area from the NWS and from WRI. The NOAA marine forecast issued at 1943 local time on June 2 included a gale warning with 35-knot southerly winds for the Ketchikan area through June 3. The NOAA/NWS Ketchikan weather forecast issued at 1042 on June 3 predicted southeast winds of 30 mph with gusts to about 45 mph. The 0714 WRI forecast for the Ketchikan area predicted gale-force to strong gale-force winds from the south-southeast of between 40 and 45 knots with brief gusts to 50 knots.

The master stated that, about 0900 on the morning of the accident, he spoke to the company fleet captain about the expected strong winds in Ketchikan and that the fleet captain told him it was the master's decision whether to dock or not. The master also told investigators the use of tugboats was not discussed during their conversation. The master further stated that he had never heard of tugboats being available in the port of Ketchikan.

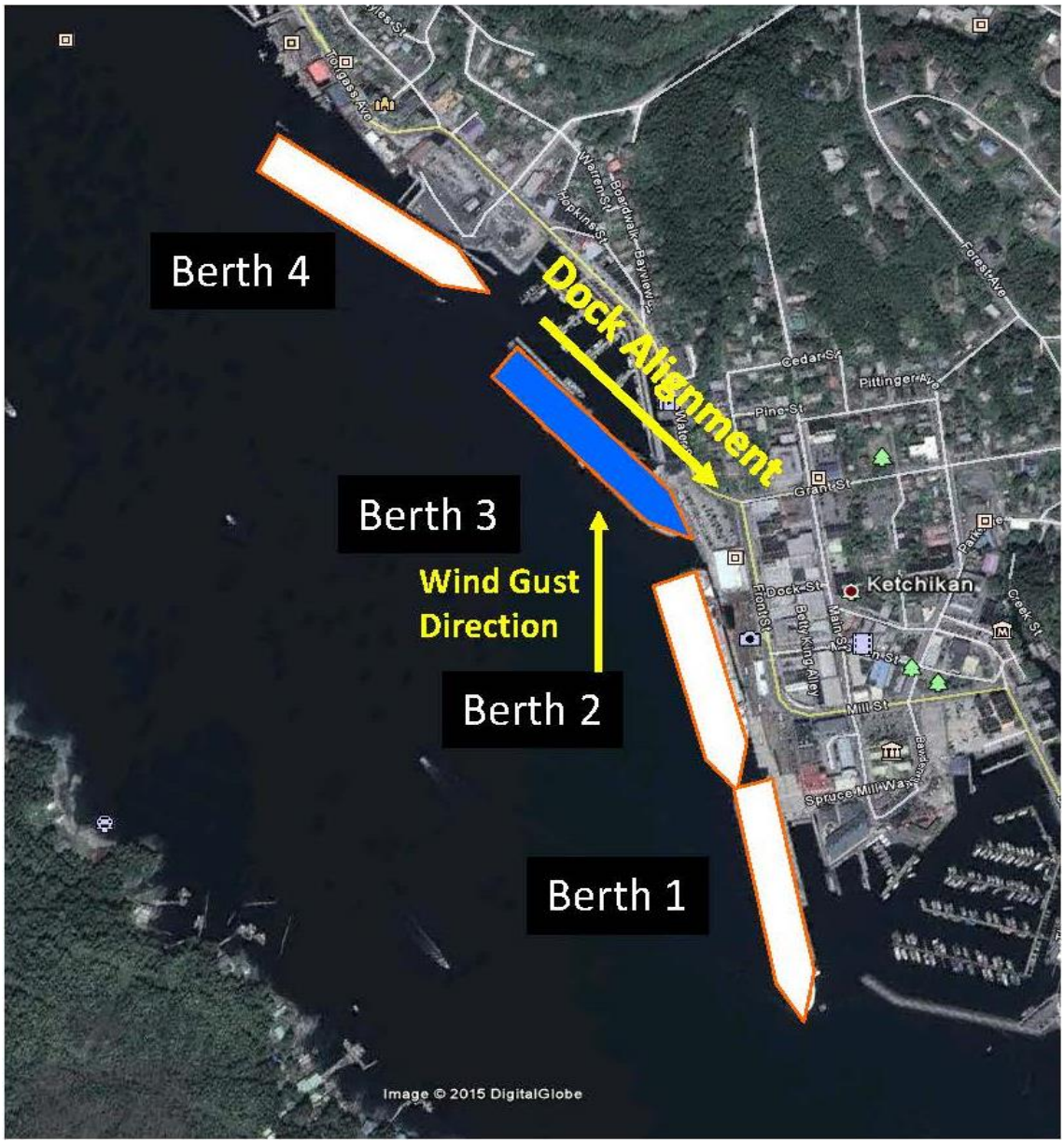
According to the ship's deck logbook, on the morning of June 3, the pilots exchanged watch at 1020. Per the oncoming pilot, the exchange of information was routine with no unusual weather or navigation issues for the upcoming transit to berth 3 in Ketchikan.

The bridge watch changed at 1200. According to the off-going watch officer's log entry, the *Celebrity Infinity* was in gale-force winds with very rough sea conditions. The pilot stated that as the ship continued south, the winds abated. At 1234, automatic identification system (AIS) data

[3] The NWS is part of NOAA.

[4] The *United States Coast Pilot*, produced by NOAA, consists of a series of nautical books that cover a variety of information important to navigators of coastal and intracoastal waters and the Great Lakes. Issued in nine volumes, the *Coast Pilot* contains supplemental information that is difficult to portray on a nautical chart. (Source: https://www.nauticalcharts.noaa.gov/publications/coast-pilot/index.html, accessed November 15, 2017)

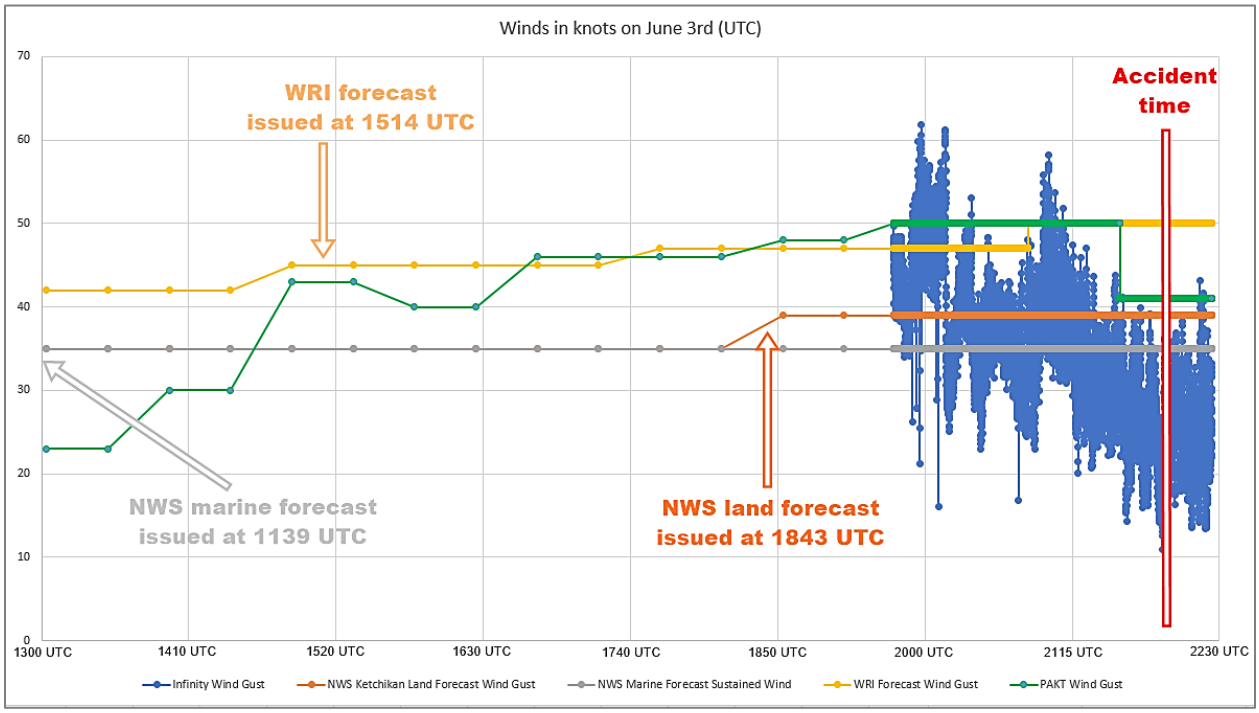
showed the *Celebrity Infinity* off Guard Island, the north entrance to Tongass Narrows. According to a pre-arrival brief (PowerPoint presentation) given to investigators, the ship's estimated arrival time at berth 3 was 1345. The brief also noted expected winds at docking of 15–18 knots from the southeast and the pier heading was 103 degrees true. Berth 3 was located between berths 2 and 4; other cruise ships were docked at berths 2 and 4 on the accident date.




**Ketchikan harbor with overlaid approximate positions of cruise ships at cruise vessel berths. The blue ship shows the approximate position of *Celebrity Infinity* at berth 3. (Background by DigitalGlobe)**

At 1302, the pilot on the *Celebrity Infinity* radioed the pilot on a vessel that was leaving berth 3 and learned the wind was a steady 25 knots with gusts to 35 knots. According to the *Celebrity Infinity*'s logbook, a company-required pre-arrival brief was conducted by the bridge team at 1326. The master told investigators that all the deck officers and sailors who participated in the docking attended this meeting. He also stated that pilots normally participated in the brief but that the assigned pilot did not participate this time because the *Celebrity Infinity* was in restricted waters and the pilot had to concentrate on conning the vessel.

The pilot told investigators that he was not part of the pre-arrival brief but that he did talk to the master about the expected winds at docking. He said the master assured him they could dock within the parameters being reported to them. The pilot stated the master told him they would come in a bit faster and wider than normal due to the wind. The pilot also stated he told the master that tugboats were available but the master said that "unless the winds were very strong, 30–40 [knots], they would have no problem holding the ship" and that he (the master) had docked the vessel in wind gusts up to 50 knots.




**Graphic of the wind conditions leading up to the accident.**

When the vessel was about 4 tenths of a mile from the dock, the conn changed from the pilot to the staff captain. This change was not heard on the vessel's voyage data recorder (VDR).[5] According to the master and pilot, the port-side-to docking maneuver went according to plan as the vessel approached berth 3. The master stated he noticed the ship "drifting a lot" and that he then advised the forward mooring station to drop the starboard anchor; he said that the wind suddenly increased from 23 to 40 knots. Parametric data downloaded from the vessel's VDR showed a maximum one-second wind speed of 43.8 knots and wind direction of 151.7 degrees true at 13:42:35 and a maximum one-second wind speed of 38.8 knots from 157.1 degrees true at 13:53:01, about the time the anchor was let go. The pilot said there was no current and that he saw nothing that would have caused the ship to do what it did. Investigators noted from a closed-circuit television (CCTV) recording that, after the starboard anchor was dropped, the stern approached the dock more rapidly.

## Analysis

Investigators compared wind readings from the *Celebrity Infinity*'s two anemometers to readings obtained from the official airport anemometers located at nearby Ketchikan airport, when

[5] The VDR is a device that records numerous data such as vessel speed, heading, pods position, thruster direction and speed, and wind speed. It also captures sound via microphones situated on the bridge of the ship.

the vessel passed the airport about half an hour before the accident, and found them to closely match. Investigators also compared official wind readings to forecast readings and found the comparisons favorable.

The master said he discussed the docking evolution with the pilot, and the staff captain said he discussed the expected wind for docking with the master; however, it is unclear if the three of them discussed the docking evolution together, as nothing was heard on the VDR. The master told investigators that the weather conditions were discussed at the pre-arrival brief; however, investigators reviewed the VDR and CCTV and noted that the master and the pilot did not participate in the brief. The CCTV showed the master and the pilot standing away from the area where the pre-arrival brief was held, looking forward, and conning the vessel. Further, the VDR did not record the four people who did attend the pre-arrival brief—staff captain, first officer, safety officer, and third officer—discussing the weather conditions. Investigators were left with the impression that a clear mental model of the docking evolution was not shared by the entire bridge team.

The staff captain said the latest NOAA weather forecast was discussed at the pre-arrival brief. This was not recorded by the VDR, but according to the pre-arrival PowerPoint brief used at the morning meeting of the accident day, the expected wind for the docking was from the southeast at 15–18 mph. This was clearly at odds with forecasts reviewed by investigators, and it is unclear why the bridge team did not use the most recently available weather information. The brief also noted that tugboats were available in Ketchikan.

Investigators viewed the CCTV recordings from cameras located at the port bridge wing conning station, a deck camera looking forward from the stern, and a deck camera looking aft from the bow. Investigators also listened to the VDR recording of the vessel approaching the berth. At 1346, the wind gusted to 40 knots and, at 1349, control of the vessel's pods and thrusters was shifted to the port bridge wing with the master, pilot, and staff captain manning the port conning station seconds later.[6] The port bridge wing camera showed all three men looking toward the port side of the vessel and forward as the vessel neared the dock. Between 1352 and 1353, the staff captain looked toward the stern three times but did not appear to say anything on the CCTV footage, nor did the VDR record him saying anything at that time.

The master told investigators he ordered the starboard anchor to be dropped when the vessel was about 450 meters from the dock because he felt that the bow of the vessel was rapidly approaching the dock and the bow thrusters were unable to slow the motion of the bow. According to the VDR and CCTV recordings, the anchor was dropped at 1353. Both the master and the staff captain told investigators that the master took over the conn at this point; however, the ship's logbook does not reflect a change of conn from the staff captain to the master and nothing was heard on the VDR to indicate the master had the conn. Further, CCTV footage showed the master, pilot, and staff captain operating the bow thrusters and the master and the staff captain operating the pods after the anchor had been dropped.

[6] The *Celebrity Infinity* VDR recorded a 40-knot wind gust. At the Ketchikan airport, an anemometer recorded a rooftop wind speed (a measurement taken from a height close to the same height as the *Celebrity Infinity*'s anemometer) of 50 knots shortly after the *Celebrity Infinity* docked, and it is likely that the vessel also experienced wind gusts of 50 knots at the time of the docking.


***Celebrity Infinity*'s port bridge wing conning console (the handle to the port pod controller is missing in this photo).**

The pilot told investigators that dropping the starboard anchor slowed the motion of the bow toward the pier. The master said that he then ordered chain to be paid out so the vessel could move forward and toward the dock, but the VDR recording captured the master's order as "hold the anchor." According to the pilot, the thrusters and anchor were able to control the bow but "whatever maneuvers they made with the pods weren't sufficient to hold the ship and it made a hard landing on the dolphins back there." At 1355, with the after part of the vessel pivoting toward berth 3, the VDR recorded someone shouting, "the stern, the stern!" and, at 1356, the vessel allided with the berth. The force of the allision opened a 9-inch-diameter hole in the vessel's port side between frames 231 and 233, about 12 feet above the waterline. It also caused the deflection of vessel structural members. The berth suffered extensive damage to its catwalks and structural members. Damage to the berth and vessel was estimated at $1,153,738.

## Probable Cause

The National Transportation Safety Board determines that the probable cause of the *Celebrity Infinity*'s allision with the dock was the master's failure to plan, monitor, and execute a safe docking evolution.

## Vessel Particulars

| Vessel | *Celebrity Infinity* |
|---|---|
| **Owner/operator** | Celebrity Inc./Celebrity Cruises, Inc. |
| **Port of registry** | Valletta, Malta |
| **Flag** | Malta |
| **Type** | Cruise ship |
| **Year built** | 2001 |
| **Official number (US)** | N/A |
| **IMO number** | 9189421 |
| **Classification society** | Lloyd's Register Group, Ltd. |
| **Construction** | Steel |
| **Length** | 863.3 ft (263.2 m) |
| **Draft** | 27.3 ft (8.3 m) |
| **Beam/width** | 105.7 ft (32.2 m) |
| **Gross/net tonnage** | 90,940 gross tons/55,452 net tons |
| **Engine power; manufacturer** | 2 x 33,525 hp (25,000 kW) General Electric gas turbines and 1 x 15,080 hp (11,600 kW) Wartsila diesel generator powering 2 Mermaid azipods; 3 x 3,196 hp (2,350 kW) bow thrusters |
| **Persons on board** | 3,131 persons |

**NTSB investigators worked closely with our counterparts from Coast Guard Marine Safety Detachment Ketchikan throughout this investigation.**

For more details about this accident, visit www.ntsb.gov and search for NTSB accident ID DCA16FM042.

**Issued: November 14, 2017**