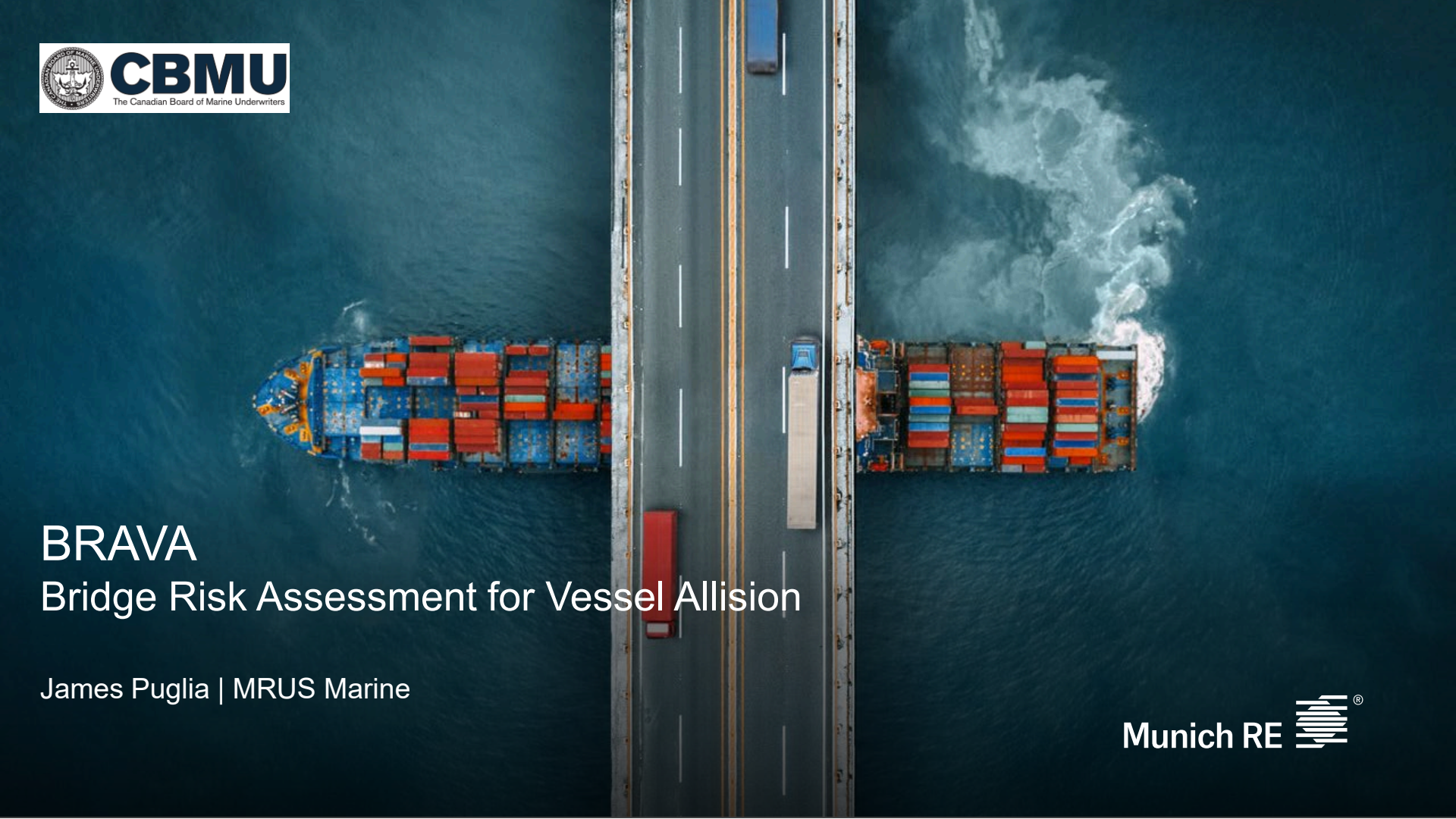
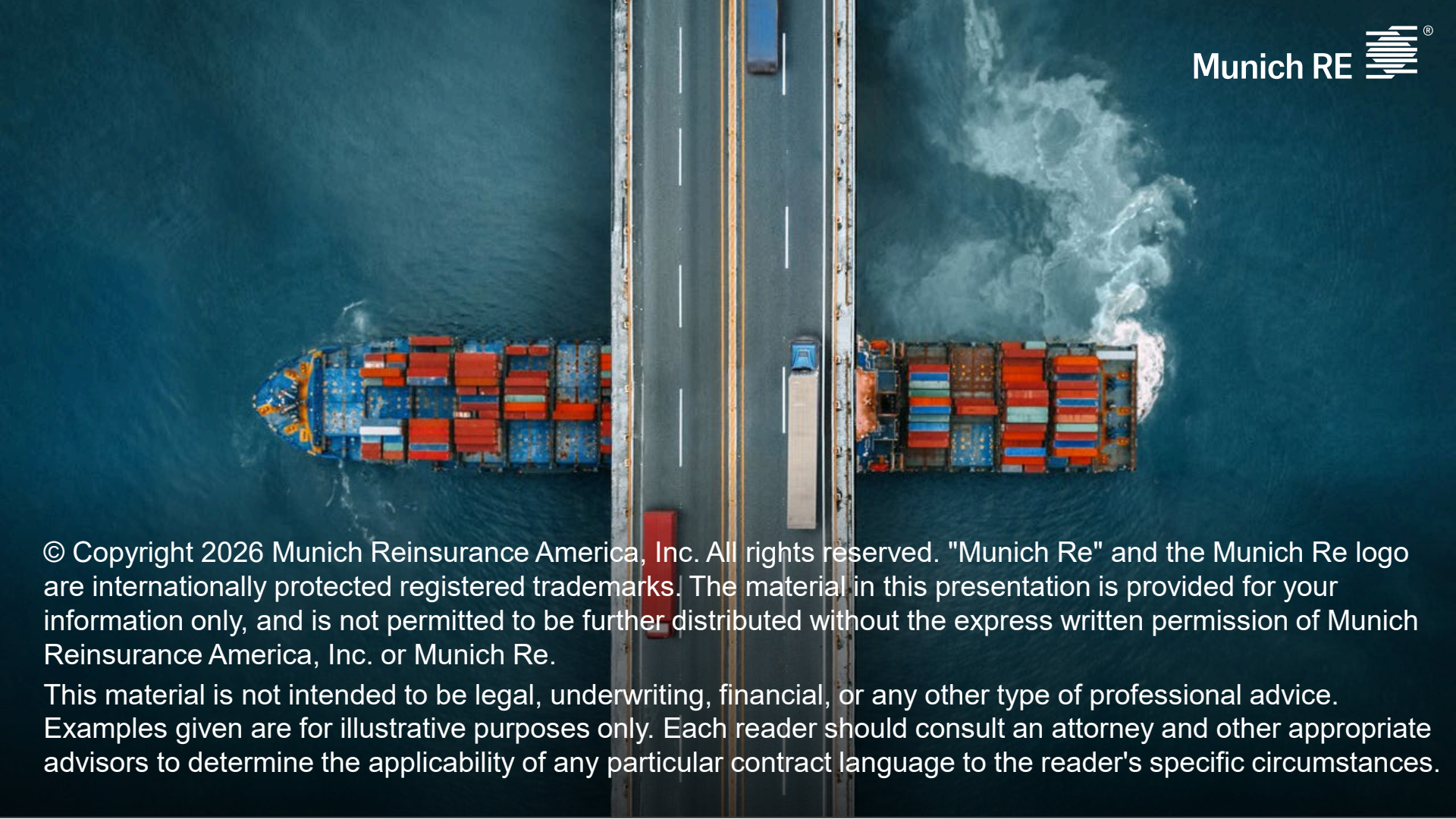


CBMU
The Canadian Board of Marine Underwriters

BRAVA
Bridge Risk Assessment for Vessel Allision

James Puglia | MRUS Marine

Munich RE



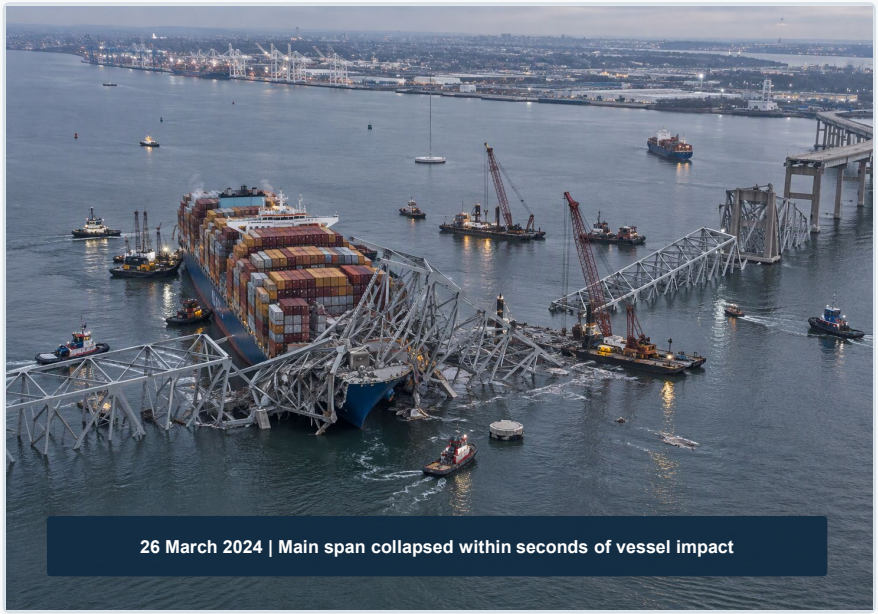
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Baltimore Bridge Collapse | Effects of a Single Allision

The M/V Dali casualty disrupted lives, infrastructure, trade and the global marine insurance market

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26 March 2024 | Main span collapsed within seconds of vessel impact

01 Human impact

Six road workers died; one person survived. Search, recovery and family claims became immediate priorities.

02 Infrastructure loss

A critical interstate crossing was destroyed, cutting a major route around Baltimore and triggering a multiyear replacement project.

03 Port disruption

The federal navigation channel closed during salvage. Vessel calls, cargo flows and terminal operations were disrupted until the channel reopened.

04 Supply-chain effects

Freight was rerouted to other ports and road corridors. Autos, containers and bulk cargo faced delay and added logistics costs.

05 Economic effects

Commuters and trucks faced longer routes; toll revenue was lost; local businesses and transport providers absorbed interruption costs.

06 Insurance & legal effects

P&I, bridge property, hull, cargo, general average, liability and reinsurance claims converged amid limitation and subrogation proceedings.

CASCADE EFFECT

Equipment failure → Vessel allision → Bridge collapse → Port closure → Supply-chain disruption → Global insurance loss

Takeaway: bridge-allision exposure extends far beyond physical damage to the bridge and vessel.

Baltimore Bridge Collapse | Insurance Implications

A single marine casualty crossing multiple insurance classes and the global reinsurance market

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~$2.8B
ESTIMATED INSURED LOSS

~93%
OF THE $3B IG XOL TOWER

$350M
BRIDGE PROPERTY POLICY LIMIT PAID

P&I liability

Bridge damage, wreck removal, pollution, fatalities and government claims. Britannia P&I sits within the International Group pooling and reinsurance structure.

Property & subrogation

ACE American / Chubb paid Maryland the $350M bridge policy limit. Recovery rights then shifted toward vessel interests and their insurers.

Hull & machinery

Physical damage to Dali, salvage, loss-of-hire and machinery causation issues sit alongside the much larger third-party liability loss.

Cargo / GA

Cargo delay, damage, salvage and general-average issues affected thousands of containers and multiple cargo interests.

Business interruption

Port closure, toll-revenue loss and supply-chain disruption created major economic loss, although pure economic claims face maritime-law hurdles.

Casualty & liability

Six worker fatalities, survivor claims, contractor exposures and potential employer-liability or workers' compensation responses.

WHY THIS MATTERS TO INSURERS & REINSURERS

One casualty activated multiple policies, legal regimes and recovery paths.

Reinsurance concentration

The loss is concentrated in the upper International Group layers and retrocession market.

Reserve development

The estimate developed materially as bridge, liability and consequential-loss components crystallized.

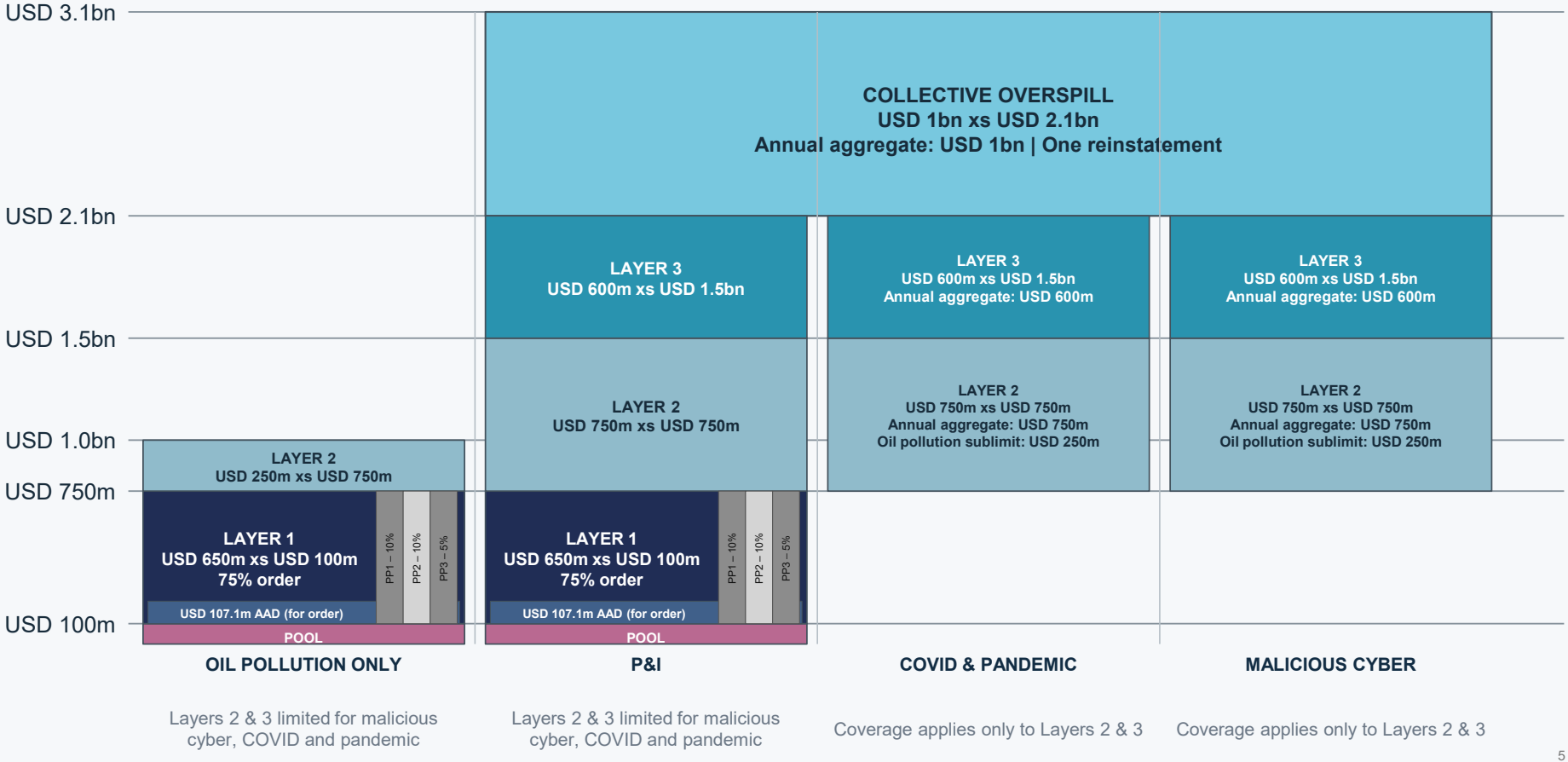
Underwriting response

Greater focus on aging fleet, bridge vulnerability, aggregation and adequacy of P&I catastrophe protection.

Sources: Market disclosures; International Group P&I structure; Maryland / ACE settlement reporting. Figures shown are market estimates as of 2026.

International Group General Excess of Loss Program

Simplified structure | Limits shown in USD | Not to scale within individual sublayers



Aging Infrastructure on Both Sides of the Allision

BRAVA must consider not only older bridges, but also an aging vessel fleet operating around them

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BRIDGES

47 years

AVERAGE AGE OF U.S. BRIDGES

623,218
total bridges

36%
need major repair or replacement

BRIDGE EXPOSURE

Aging structural components and legacy pier-protection assumptions.

Aging does not equal unsafe, but it increases the importance of inspection, maintenance and vulnerability assessment.

SHARED WATERWAY EXPOSURE

THE WORLD FLEET IS AGING

22.4 years
Average age of world fleet
IUMI / Clarksons, August 2026

~20%
Global capacity 20+ years old
Clarksons, October 2026

+90%
Growth in 20+ year tonnage
Five-year change | Clarksons

SHARE OF FLEET CAPACITY 20+ YEARS OLD



Machinery reliability
Wear, obsolescence and maintenance quality can increase blackout or propulsion-loss potential.

Recovery capability
Older system architecture may affect redundancy, restart time and steering recovery after a blackout.

Bridge interaction
Aging ships are also larger than historical fleets, increasing energy and consequences if control is lost.

Fleet age alone is not a proxy for seaworthiness; class, maintenance, flag, operator and machinery condition remain decisive.

Sources: ASCE 2025; ARTBA 2024; IUMI / Clarksons World Fleet Statistics, August 2026; Clarksons Research, October 2026.

BRAVA LENS

Older bridges and older vessels share the same constrained waterways.

The risk sits at the intersection of bridge vulnerability, vessel reliability and effective intervention.

Francis Scott Key Bridge | Was Protection in Place?

Protection existed, but it did not prevent the M/V Dali from reaching the bridge pier

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YES, PROTECTION WAS PRESENT

But the dolphin arrangement did not intercept the casualty path.

01

Geometry matters

The dolphins were positioned away from the critical pier and did not form a continuous barrier across the Dali's approach.

02

Legacy design vs. modern ships

The bridge opened in 1977. The 984-foot Dali illustrates how vessel scale and traffic have outgrown assumptions embedded in older infrastructure.

03

Inventory status is not adequacy

"In place and functioning" describes condition. It does not confirm that the protection is correctly located, sufficiently strong or adequate for today's exposure.

PROTECTION GAP

28 ft dolphin diameter vs. **80 ft** current standard cited

BRAVA TAKEAWAY

Protection should be assessed against the credible vessel trajectory, impact energy and current fleet, not solely by whether a device exists.

Image source as shown in original slide: Claims Journal.

The Marine Insurance Perspective

What the Baltimore Key Bridge collapse changed, and what it did not

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THE RISK DID NOT CHANGE OVERNIGHT

What changed was the market's perception and awareness of risk.

01 RISK PERCEPTION

Black swan or grey rhino?

The casualty was extraordinary in consequence, but the underlying exposure was visible: larger ships, aging bridges and uneven pier protection.

02 LOSS SEVERITY

A marine market record

Bridge property, P&I liability, wreck removal, fatalities, cargo, port interruption and reinsurance accumulated in one casualty.

03 UNDERWRITING RESPONSE

Exposure knowledge drives risk evaluation

Better underwriting starts with vessel traffic, bridge vulnerability and protection, impact scenarios and insurance aggregation.

BRAVA VIEW **GREY RHINO** — **High-impact threat that was visible, but insufficiently evaluated or adapted for.**

PRACTICAL QUESTION **Where can a modern vessel reach a critical bridge component, and who ultimately carries the loss?**

Bridge allision is a risk we cannot entirely avoid, but one we can evaluate more deliberately.

About the BRAVA Analysis

Combining national infrastructure data, vessel traffic and casualty experience into an interactive bridge-risk assessment

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01 SOURCE

Main data sources

1. **National Bridge Inventory**
   Structural and inventory data on U.S. bridges
2. **Johns Hopkins study**
   Large-ship traffic beneath bridges in major U.S. ports
3. **U.S. Coast Guard**
   Marine casualty records, April 2002– March 2025
4. **National Transportation Safety Board**
   Key Bridge investigation findings and casualty context

02 ASSESS

Bridge pier assessment

25
U.S. BRIDGES

>275 meter
MEGA-SHIP THRESHOLD

Methodology

Validated by in-house engineers and applied to the 25 U.S. bridges with the highest mega-ship traffic.

03 INTERACT

Interactive dashboard



BRAVA **Bridge Risk Assessment for Vessel Allision**

Allows users to explore bridge characteristics, vessel traffic and modeled vulnerability interactively.

ANALYTICAL FLOW

National data → Engineering assessment → Comparable bridge ranking → Interactive underwriting insight

PIER PROTECTION ASSESSMENT

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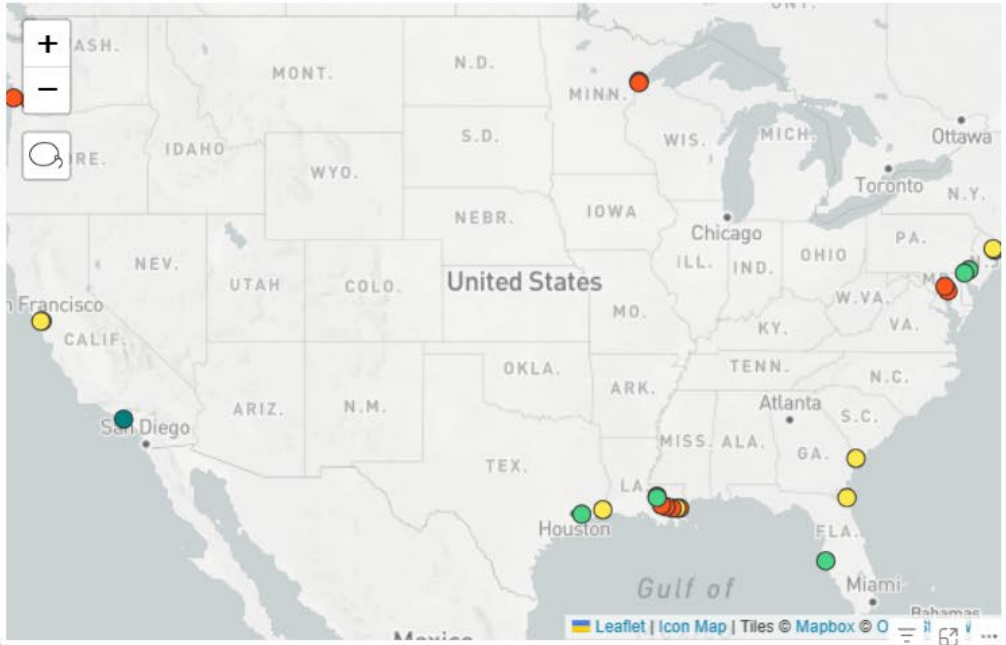
Ship Traffic Totals (Jan 2018-Dec 2023 Cumulative)

Top 25 U.S. Bridges by Mega Ship Traffic Volume | Source: Johns Hopkins RAPID Study

Ship Lengths (meters): 275+



Pier Protection Ratings



Piers not at risk Adequate Potentially inadequate Likely inadequate

Rating

- [ ] Piers not at risk
- [ ] Adequate
- [ ] Potentially inadequate
- [ ] Likely inadequate

View Bridge Profile

Pier protection rating reflects protection against horizontal ship allisions, and does not reflect other risks to the bridge, such as vertical clearance. Please see "Data Sources" page for details on methodology.

Findings of Pier Assessment

Top 10 bridges by traffic ranking

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**Cumulative ship traffic totals over the 6-year period, 2018-2023; limited to ships over 275 meters.*

BRIDGE	SHIP TRAFFIC*	PIER PROTECTION
1. VERRAZZANO NARROWS (NY)	15,548	Adequate
2. TALMADGE MEMORIAL (GA)	11,432	Potentially inadequate
3. GOLDEN GATE (CA)	9,021	Potentially inadequate
4. SAN FRANCISCO OAKLAND BAY (CA)	8,325	Potentially inadequate
5. CHESAPEAKE BAY (MD)	5,001	Likely inadequate
6. **FRANCIS SCOTT KEY (MD)**	**4,923**	**Likely inadequate**
7. BAYONNE (NY-NJ)	4,251	Potentially inadequate
8. CRESCENT CITY CONNECTION (LA)	2,988	Likely inadequate
9. VINCENT THOMAS (CA)	2,285	Adequate
10. DULUTH LIFT (MN)	1,927	Piers not at risk

Source: Shields, M. (2024). JHU-Key-Bridge-Data. GitHub. https://github.com/SURGroup/JHU-Key-Bridge-Data

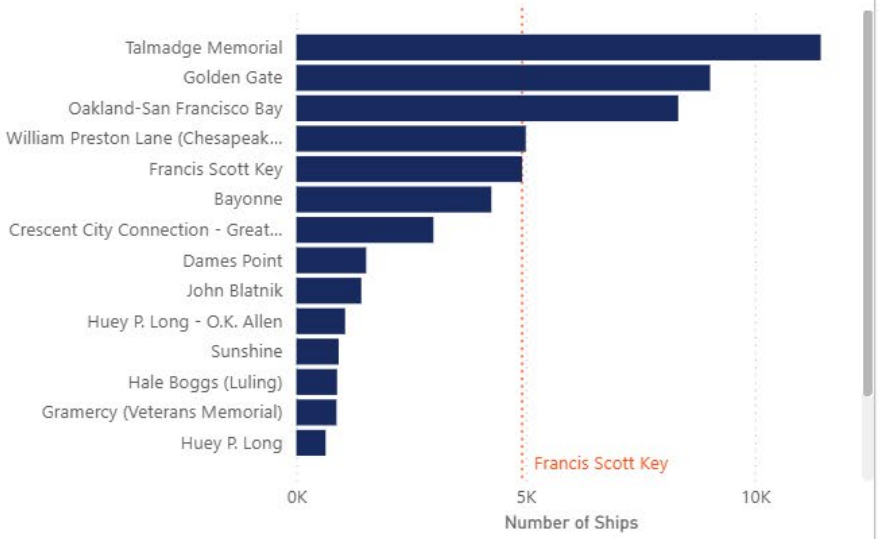
PIER PROTECTION ASSESSMENT

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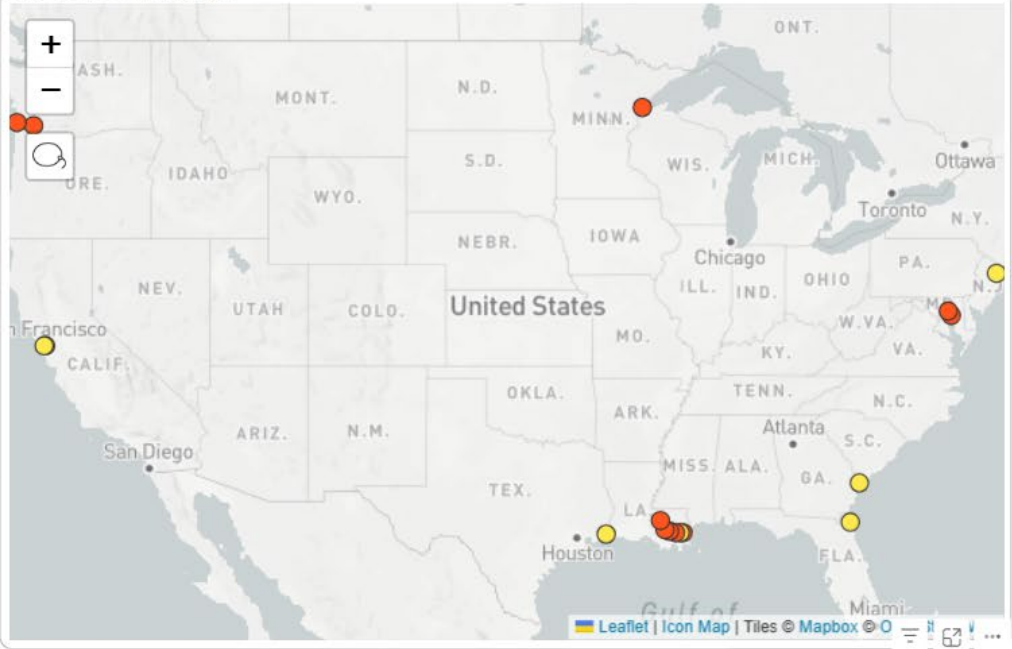
Ship Traffic Totals (Jan 2018-Dec 2023 Cumulative)

Top 25 U.S. Bridges by Mega Ship Traffic Volume | Source: Johns Hopkins RAPID Study

Ship Lengths (meters): 275+



Pier Protection Ratings



Potentially inadequate Likely inadequate

View Bridge Profile

Rating

- ☐ Piers not at risk
- ☐ Adequate
- ■ Potentially inadequate
- ■ Likely inadequate

Pier protection rating reflects protection against horizontal ship allisions, and does not reflect other risks to the bridge, such as vertical clearance. Please see "Data Sources" page for details on methodology.

Findings of Pier Assessment

Rating: Potentially inadequate

Munich RE

Cumulative ship traffic totals over the 6-year period, 2018-2023; limited to ships over 275 meters.

BRIDGE	SHIP TRAFFIC*	PIER PROTECTION
2. TALMADGE MEMORIAL (GA)	11,432	Potentially inadequate
3. GOLDEN GATE (CA)	9,021	Potentially inadequate
4. SAN FRANCISCO OAKLAND BAY (CA)	8,325	Potentially inadequate
7. BAYONNE (NY-NJ)	4,251	Potentially inadequate
12. DAMES POINT (FL)	1.522	Potentially inadequate
17. HUEY P. LONG (LA)	638	Potentially inadequate
24. GULFGATE (TX)	592	Potentially inadequate

Source: Shields, M. (2024). JHU-Key-Bridge-Data. GitHub. https://github.com/SURGroup/JHU-Key-Bridge-Data

Findings of Pier Assessment

Rating: Likely inadequate

Munich RE

**Cumulative ship traffic totals over the 6-year period, 2018-2023; limited to ships over 275 meters.*

BRIDGE	SHIP TRAFFIC*	PIER PROTECTION
5. CHESAPEAKE BAY (MD)	5,001	Likely inadequate
6. FRANCIS SCOTT KEY (MD)	4,923	Likely inadequate
8. CRESCENT CITY CONNECTION (LA)	2,988	Likely inadequate
13. JOHN A BLATNIK (MN-WI)	1,416	Likely inadequate
17. HUEY P LONG OK ALLEN (LA)	1,062	Likely inadequate
18. SUNSHINE (LA)	923	Likely inadequate
19. HALE BOGGS MEMORIAL (LA)	887	Likely inadequate
20. GRAMERCY (LA)	875	Likely inadequate
24. ASTORIA MEGIER (OR)	376	Likely inadequate
25. LEWIS AND CLARK (OR)	362	Likely inadequate

Source: Shields, M. (2024). JHU-Key-Bridge-Data. GitHub. https://github.com/SURGroup/JHU-Key-Bridge-Data

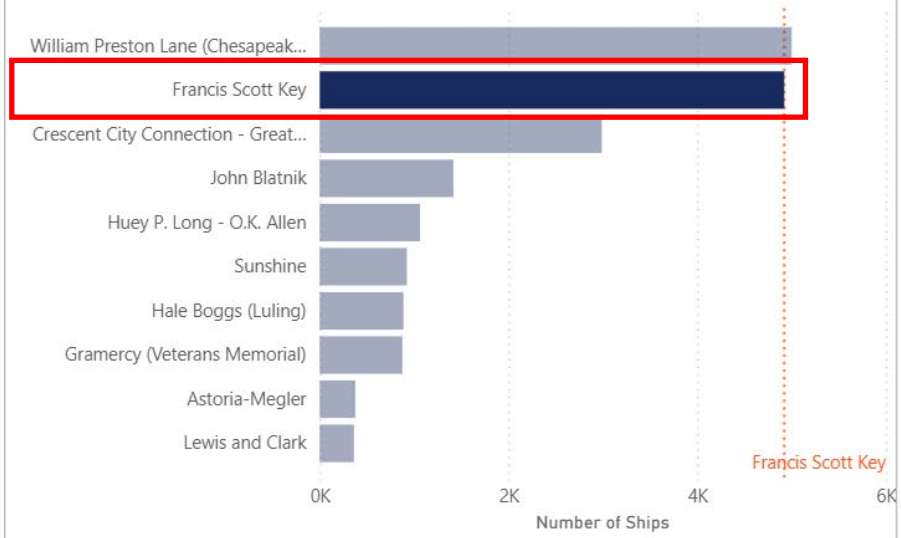
PIER PROTECTION ASSESSMENT

Munich RE

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Top 25 U.S. Bridges by Mega Ship Traffic Volume | Source: Johns Hopkins RAPID Study

Ship Lengths (meters): 275+



Pier Protection Ratings



View Bridge Profile

Likely inadequate

Rating

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Francis Scott Key

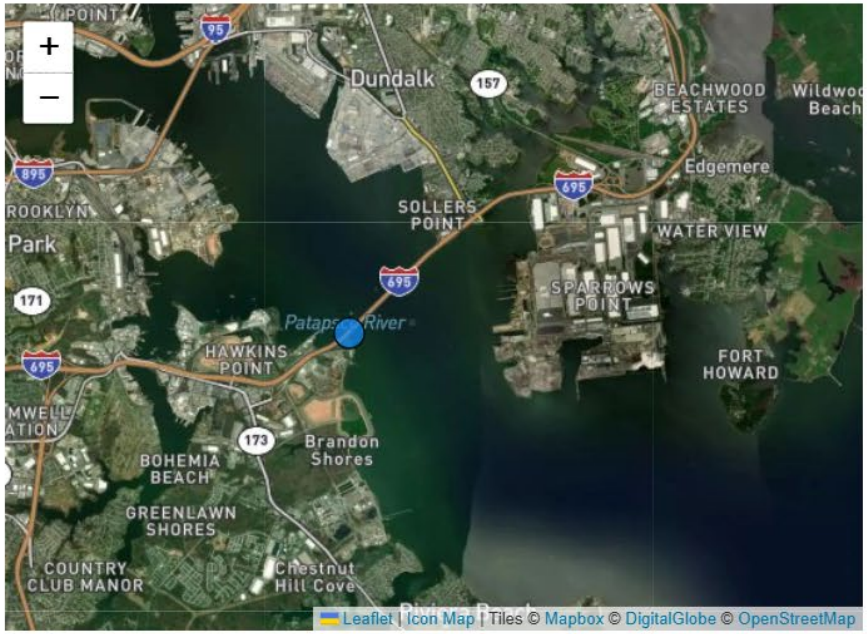
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Risks
Source: National Bridge Inventory (2024)

Year Built	1976
Year Reconstructed	N/A
Bridge Condition	Fair
Horizontal Clearance (m)	335
Vertical Clearance (m)	56

Pier Protection

Pier Assessment	Likely inadequate
Protection Type	Dolphins (28 ft diameter)



Impacts
Source: National Bridge Inventory (2024)

STRAHNET Classification	Critical/Essential
Fracture Critical	Yes
Avg. Daily Vehicle Traffic (Year)	30,767 (2019)

Bridge Information

State	Maryland
Owner	Maryland Transportation Authority
Port	Baltimore, MD

Risk Mitigation

Vulnerability Assessment Recommended by NTSB	n/a
Air Gap Sensor (NOAA 2024)	Yes
Vessel Traffic Service	No
Recent/Upcoming Projects	Expected to open fall 2028

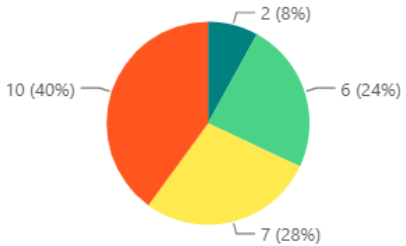
U.S. Coast Guard Marine Casualty Events (2002-2025)

Year	Damage to Bridge ($)	Vessel Category	Vessel Length (m)	Activity ID
2006	0	Ship	177	2630298

BRIDGE SUMMARY

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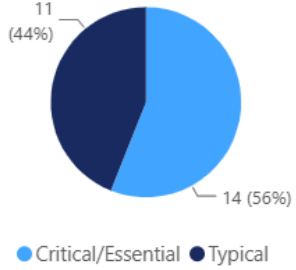
Pier Protection Assessment



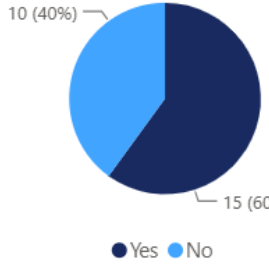
1966
Average Year Built

87
Count of Incidents

STRAHNET Classification



Vessel Traffic Service



Bridge	State	Port	2022 Port Tonnage (short tons)	Port Rank by Tonnage	Pier Assessment	Year Built	Bridge Condition	Pier protection type	Number of incidents USCG 2002-2025	Damage to Bridge ($): USCG 2002-2025	STRAHNET Classification	Fracture Critical
Huey P. Long - O.K. Allen	Louisiana	Port of Greater Baton Rouge, LA	73,371,577	8	Likely inadequate	1939	Poor	None apparent	14	240,000	Typical	Yes
Bayonne	New York - New Jersey	New York, NY & NJ	141,290,423	4	Potentially inadequate	1931	Good	Not required	11	55,700	Typical	Yes
Sunshine	Louisiana	South Louisiana, LA, Port of	226,188,142	2	Likely inadequate	1963	Fair	Timber fenders	6	12,778,288	Typical	Yes
Huey P. Long	Louisiana	New Orleans, LA	83,254,102	6	Potentially inadequate	1936	Fair	Fenders	6	29,447	Typical	Yes
Crescent City Connection - Greater New Orleans	Louisiana	New Orleans, LA	83,254,102	6	Likely inadequate	1957	Fair	Fenders	4	444,500	Typical	Yes

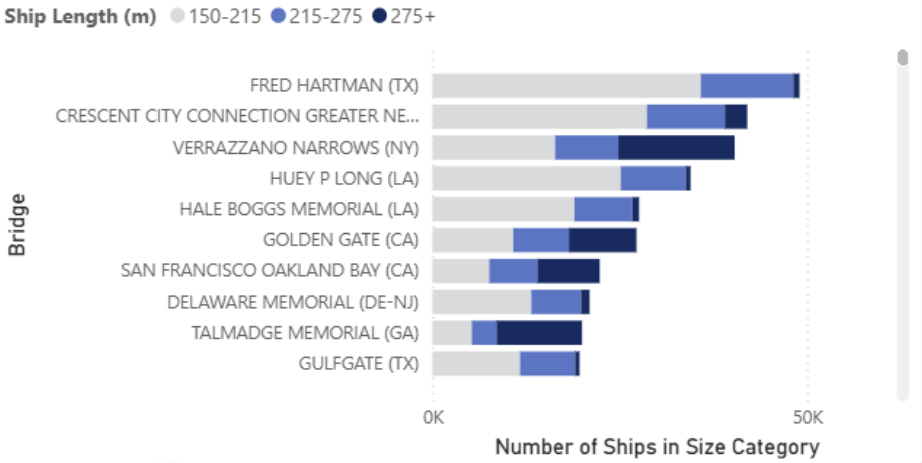
SHIP TRAFFIC TRENDS: 2018-2023

Source: Johns Hopkins RAPID Study

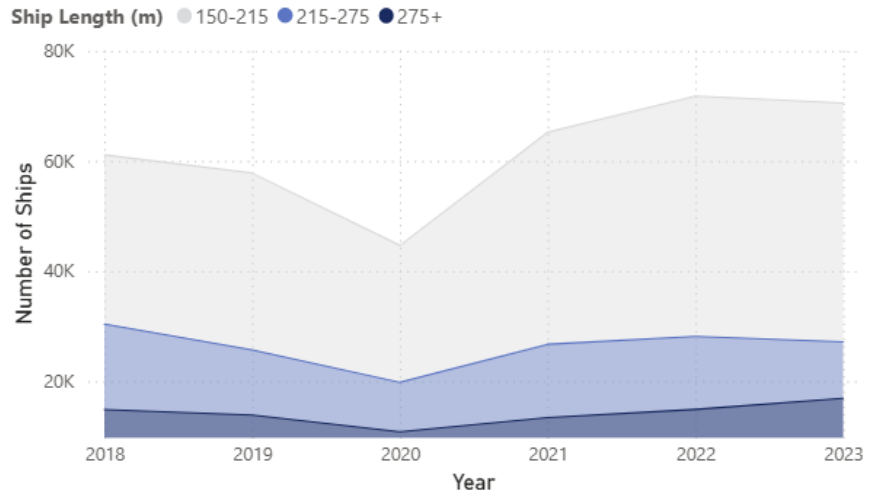
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Ship Traffic Totals (Jan 2018-Dec 2023 Cumulative)

All RAPID Study Bridges



Number of Ships by Year and Ship Size



Ship Length (m)

- [ ] 150-215
- [ ] 215-275
- [ ] 275+

Pier Assessment

- [ ] Piers not at risk
- [ ] Adequate
- [ ] Potentially inadequate
- [ ] Likely inadequate
- [ ] Not Assessed

Percentage Change 2018-2023	Absolute Change 2018-2023
7.7%	8,229

SHIP TRAFFIC TRENDS: 2018-2023

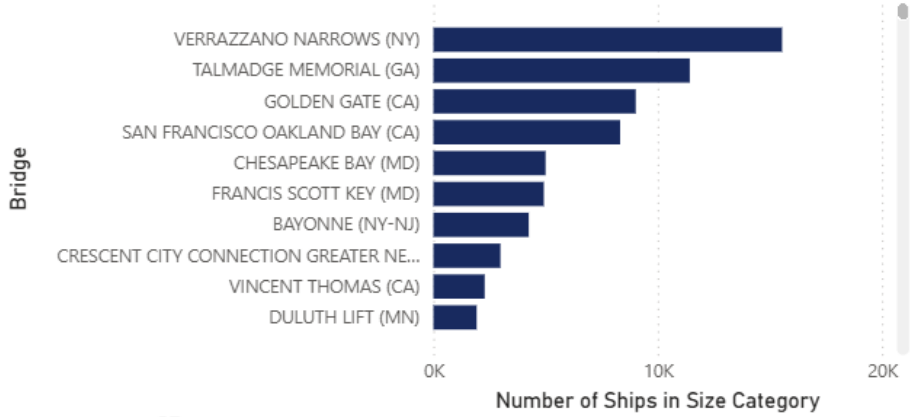
Source: Johns Hopkins RAPID Study

Munich RE

Ship Traffic Totals (Jan 2018-Dec 2023 Cumulative)

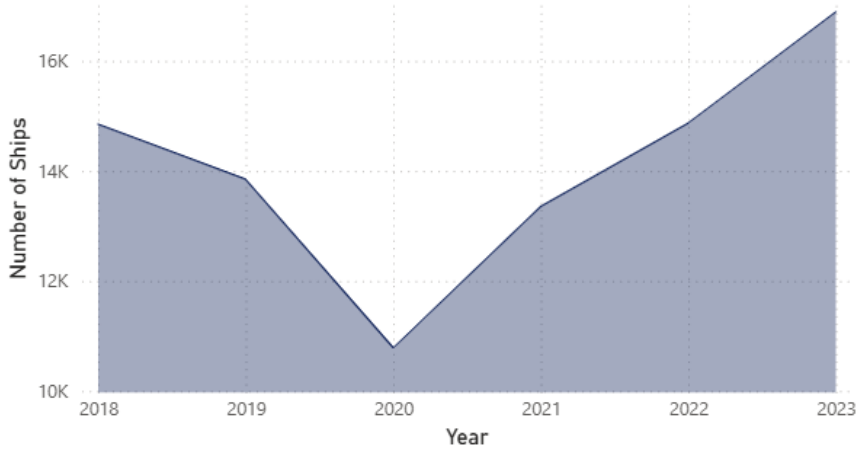
All RAPID Study Bridges

Ship Length (m) ● 275+



Number of Ships by Year and Ship Size

Ship Length (m) ● 275+



Ship Length (m)

- ☐ 150-215
- ☐ 215-275
- ■ 275+

Pier Assessment

- ☐ Piers not at risk
- ☐ Adequate
- ☐ Potentially inadequate
- ☐ Likely inadequate
- ☐ Not Assessed

Percentage Change 2018-2023	Absolute Change 2018-2023
13.7%	2,037

SHIP TRAFFIC TRENDS: 2018-2023

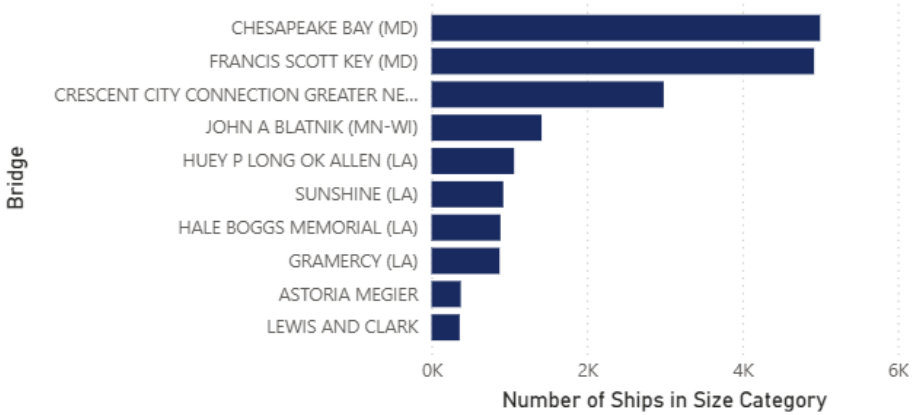
Source: Johns Hopkins RAPID Study

Munich RE

Ship Traffic Totals (Jan 2018-Dec 2023 Cumulative)

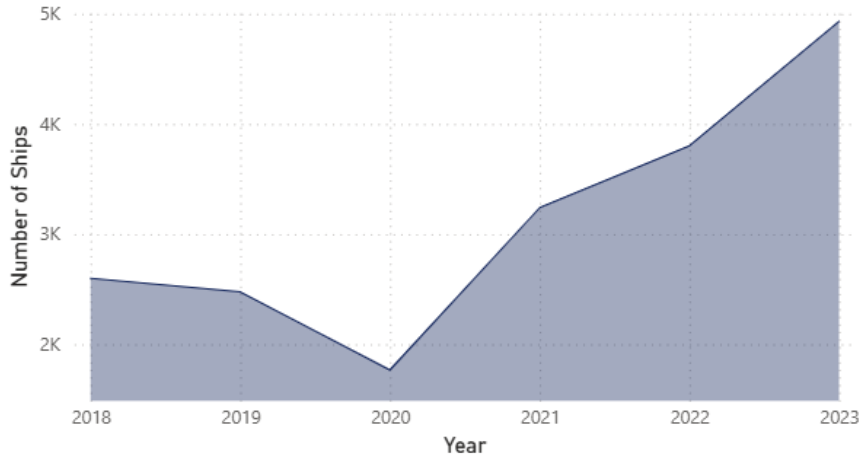
All RAPID Study Bridges

Ship Length (m) ● 275+



Number of Ships by Year and Ship Size

Ship Length (m) ● 275+



Ship Length (m)

- ☐ 150-215
- ☐ 215-275
- ■ 275+

Pier Assessment

- ☐ Piers not at risk
- ☐ Adequate
- ☐ Potentially inadequate
- ■ Likely inadequate
- ☐ Not Assessed

Percentage Change 2018-2023	Absolute Change 2018-2023
89.8%	2,333

VESSEL-BRIDGE INCIDENTS 2001-2025

Source: U.S. Coast Guard (USCG)

- Includes serious and non-serious incidents; vertical and horizontal allisions; near-misses
- Latitudes and longitudes may be inaccurate
- For more details on each incident, search by "Activity ID" on the USCG investigation reports webpage: https://cgmix.uscg.mil/IIR/IIRSearch.aspx

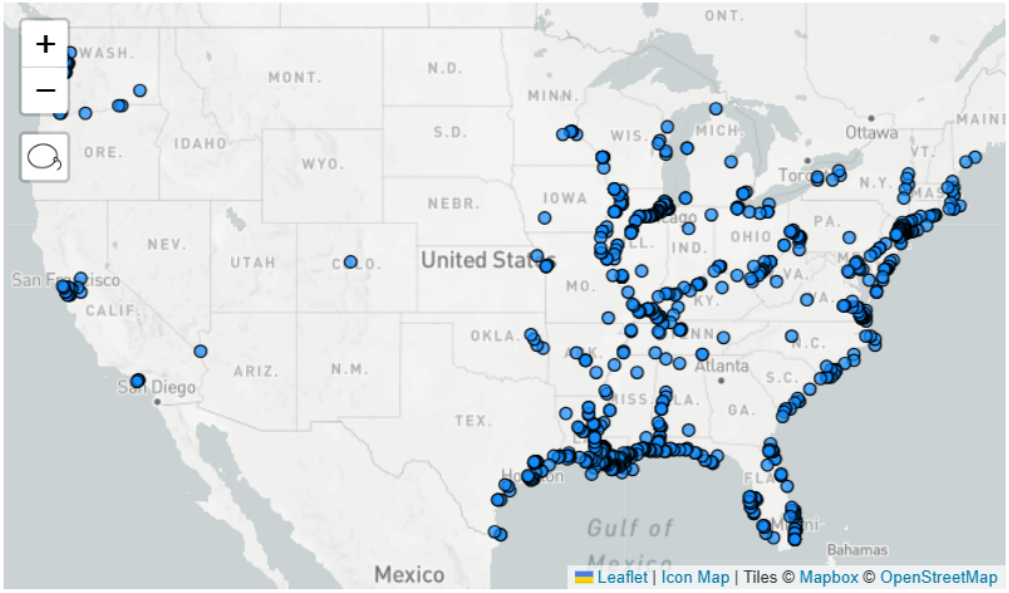
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2707	318M	832
Count of Incidents	Total Damages ($) of Selection	Distinct Count of Bridges

Incidents 2002-2025

Bridge	Year	Activity ID	Vessel Category	Vessel Length (m)	Gross Tonnage	Total Damage ($)	Cargo Dama
INTERSTATE 40 HIGHWAY BRIDGE	2002	1635967	Barge	91		61,527,176	
JEFFERSON AVENUE BRIDGE	2013	4589867	Ship	204		50,005,000	
I-10 - BATON ROUGE, LA	2007	2870153	Ship	243	53,829	10,773,000	
COCHRAN-AFRICATOWN BRIDGE	2005	2512044	Other			8,103,000	
SAKONNET RIVER BRIDGE	2005	2427900	Towing	16		7,293,300	
LA HIGHWAY 70 - CONVENT, LA	2018		Other	58		6,726,936	
SAN FRANCISCO 13.0	2008	3128466	Barge	94	4,721	6,300,000	
JACKSON RR BRIDGE	2019		Towing	38		4,865,000	

Incident Locations



Damage

- [ ] $0-$99,999
- [ ] $100,000-$999,999
- [ ] $1,000,000+

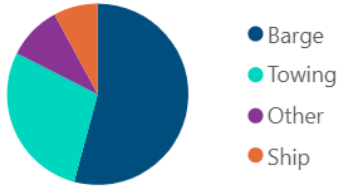
Vessel Category

- [ ] Barge
- [ ] Other
- [ ] Ship
- [ ] Towing

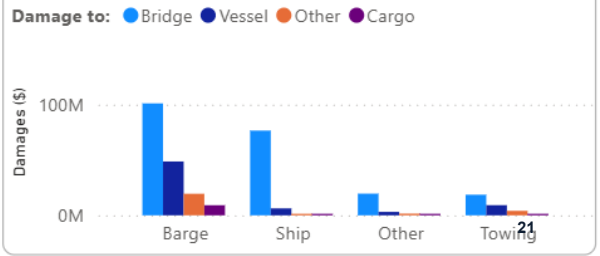
Vessel Length (m)

2 — 364

Number of Incidents by Vessel Type



Damages by Vessel Type



Source: U.S. Coast Guard

US Bridge Allision Accidents

Baltimore was catastrophic, but the underlying loss mechanism was not unprecedented

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1974

Lake Pontchartrain

Louisiana

3 fatalities

Barge tow struck span; 252 ft collapsed



1977

Benjamin Harrison

Virginia

Span damage

Ship impact to movable bridge



1980

Sunshine Skyway

Florida

35 fatalities

Bulk carrier struck pier in severe weather



1993

Seebar Bridge

Louisiana

Bridge collapse

Tow struck bridge structure



1993

Big Bayou Canot

Alabama

47 fatalities

Barge displaced rail bridge; Amtrak derailed



2001

Queen Isabella

Texas

8 fatalities

Tow struck unprotected pier outside channel



2002

I-40 Bridge

Oklahoma

14 fatalities

Tow struck pier 201 ft outside channel

2012

Eggner's Ferry

Kentucky

No injuries

Vessel entered span with insufficient clearance

RECURRING PATTERN

Weather • navigation error • loss of control • off-channel impact • inadequate pier protection • delayed motorist warning

Recent Bridge Allision | Tacony–Palmyra Bridge

A 180-metre bulk carrier struck the raised drawbridge on the Delaware River on 12 November 2026

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12 NOVEMBER 2026

Tacony–Palmyra Bridge

Palmyra, New Jersey ↔ Philadelphia, Pennsylvania

M/V Strategic Alliance

180 m | Singapore flag | built 2013

No injuries reported

WHAT HAPPENED

The bulk carrier struck the bridge while the movable span was raised for marine traffic at about 1:15 p.m.

IMMEDIATE EFFECT

The span was temporarily unable to close, disrupting Route 73 traffic and causing major backups.

BRIDGE CONTEXT

Opened in 1929; 3,659 ft long; up to 76,200 vehicles per day; rated “fair” in the 2026 federal inventory.

Sources: U.S. Coast Guard reporting; Associated Press; gCaptain. Visual CBS News

BRAVA TAKEAWAY

Even a non-catastrophic strike can disable movable infrastructure and immediately disrupt a high-volume transport corridor.

Cause, contact point and final damage assessment remained under investigation when this slide was prepared.

Canadian Bridge Allision Accidents

Three allisions at two critical transport crossings demonstrate the consequences of navigation constraints and operator error



1930 **Second Narrows Bridge**

Vancouver, British Columbia

SS Pacific Gatherer / log barge

No fatalities

Rising tide lifted the 300-ft centre span after a barge became wedged beneath it.



1979 **Second Narrows Bridge**

Vancouver, British Columbia

Japan Erica

C$6.5M repair cost

Heavy-fog strike knocked a north approach span into the inlet.



2001 **Bridge 11 | Welland Canal**

Allanburg, Ontario

MS Windoc

Constructive total loss

Lift span descended before clearance, destroying the wheelhouse and igniting a major fire.

RECURRING PATTERN

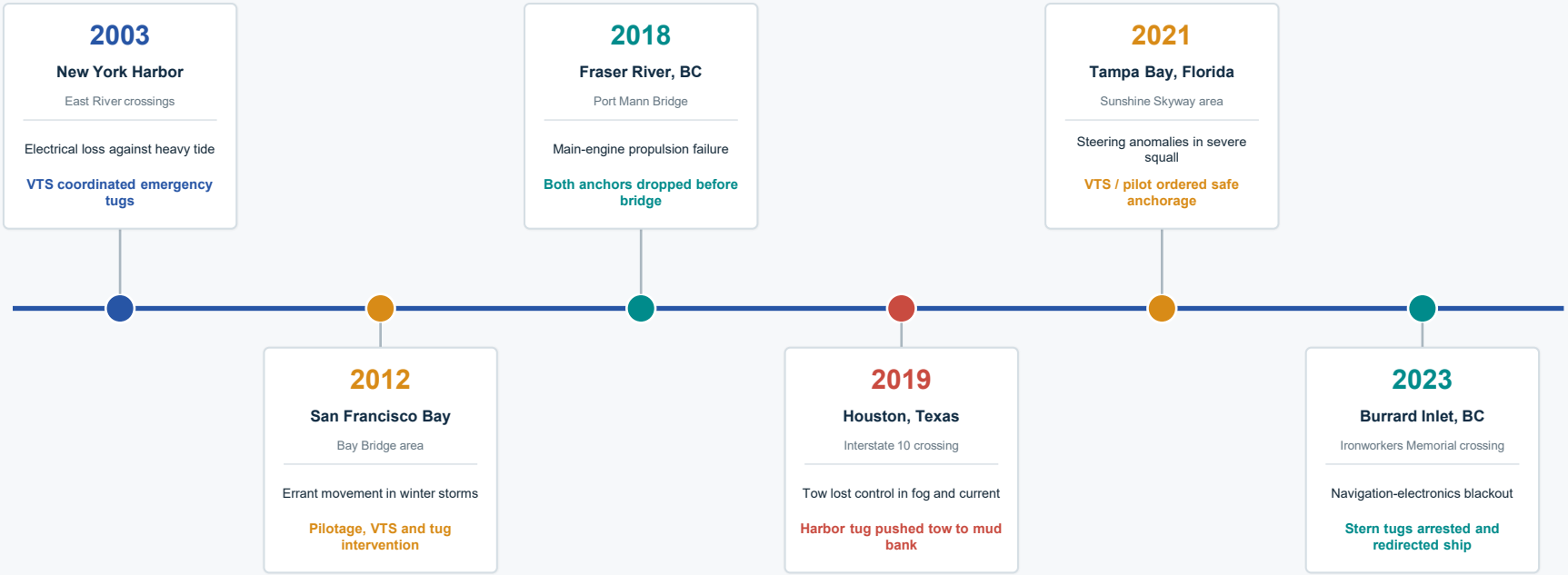
Narrow openings • tidal currents • restricted visibility • movable-span operation • prolonged transport disruption

No fatalities, but the events caused a four-year bridge closure, a C$6.5M repair, loss of rail access, a vessel CTL and a two-day canal shutdown.

Notable US & Canadian Bridge Allision Near Misses

Close calls show how layered controls can interrupt the casualty sequence before vessel contact

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Historical research compilation supplied by presenter. Primary-source confirmation is recommended before external publication.

CASUALTY INTERRUPTERS

1. **VTS + radar** — Early detection
2. **Emergency anchors** — Arrest momentum
3. **Tug assistance** — Control trajectory

Near misses are leading indicators: successful intervention does not eliminate the underlying bridge exposure.

Key Marine Indicators

All regions, several ports selected

Container | Cargo | Vessel Transit time

Transports Canada | Transport Canada

Cargo

Cargo Handled, 2025

2.4%

Vs Prev. Year

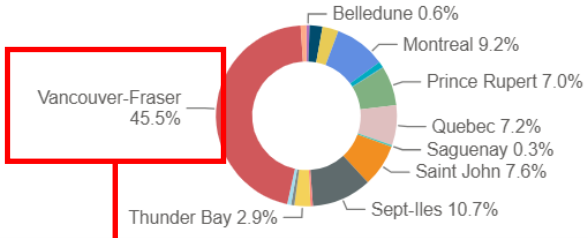
374.3

Millions of Tonnes

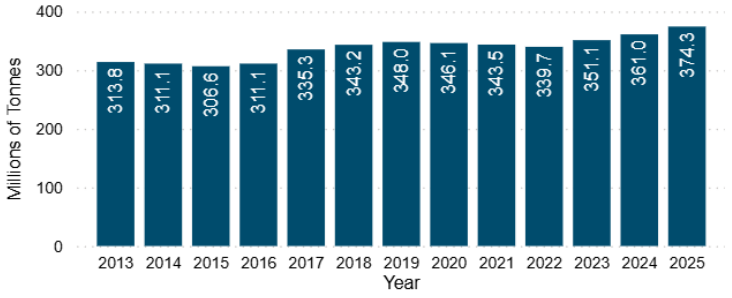
Cargo Handled by Region, 2025

Region	Millions of Tonnes	Total %
Atlantic	40.7	10.9%
Central	132.5	35.4%
Pacific	201.1	53.7%
Total	**374.3**	**100.0%**

Percentage of Cargo Handled by Port, 2025



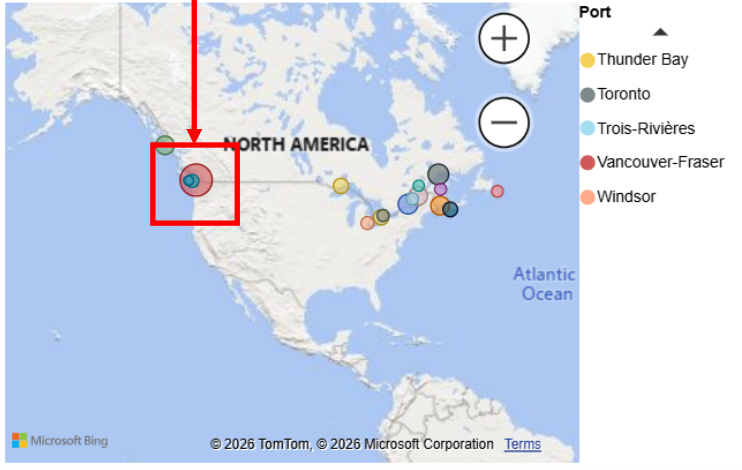
Cargo Tonnage Handled, Millions of Tonnes (2013-2025)



YoY% Change

Port	2018	2019	2020	2021	2022	2023	2024	2025	2026
Belledune	19.8%	-11.0%	-20.2%	5.8%	3.2%	5.3%	4.2%	3.2%	-100.0%
Halifax	1.0%	-4.1%	-4.0%	5.8%	11.3%	1.3%	-2.8%	-10.5%	-100.0%
Hamilton-	18.4%	-12.9%	2.5%	4.8%	-8.8%	8.9%	0.4%	-4.6%	-100.0%

Map of Cargo Handled at Port, 2025



Link: Marine and Port Dashboard

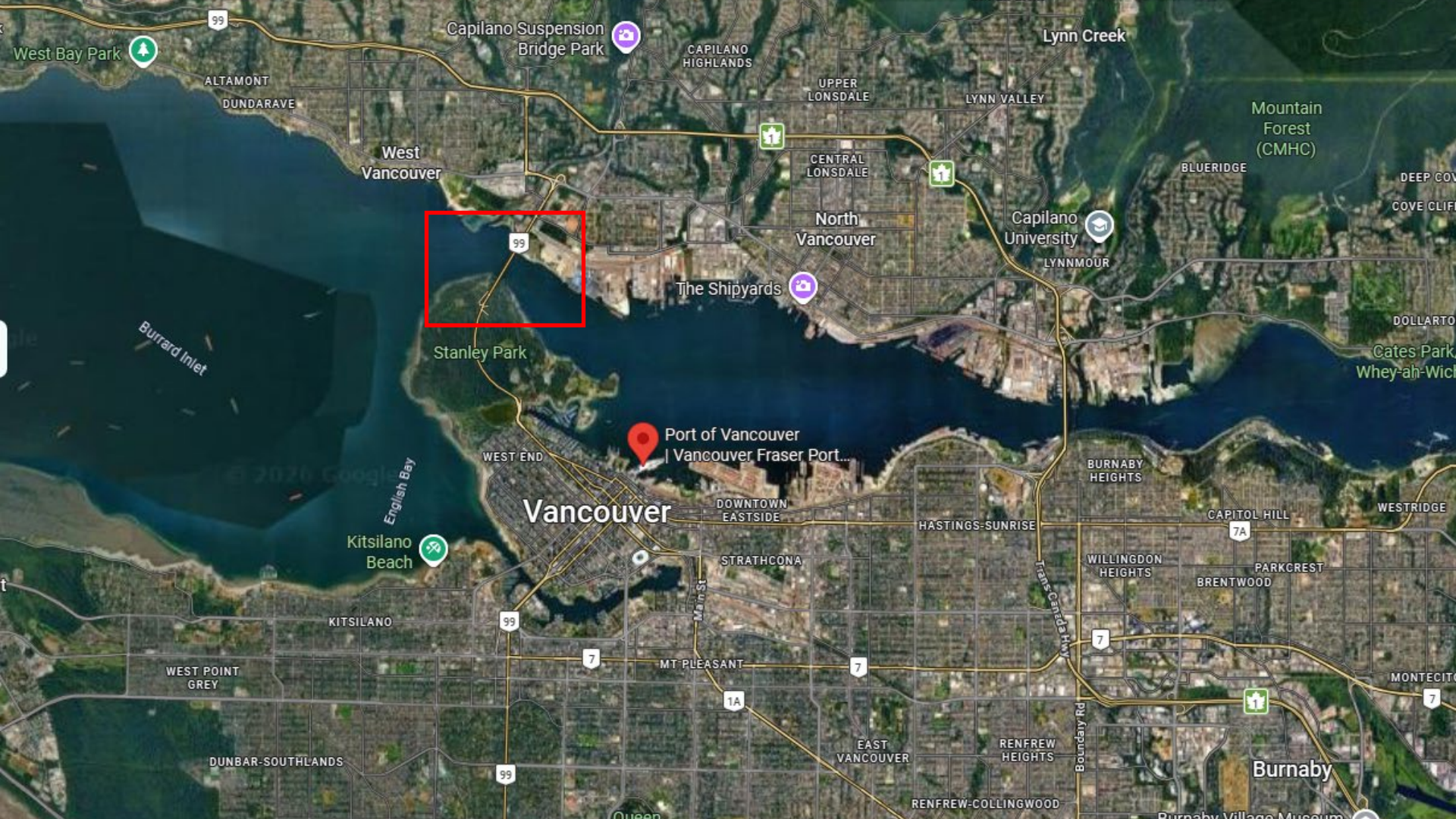
Filters

Select Year

2025

Region, Port

- Select all
- Atlantic
  - Belledune
  - Halifax
  - Saint John
  - St. John's
- Central
- Pacific


West Bay Park
Capilano Suspension Bridge Park
CAPILANO HIGHLANDS
Lynn Creek
ALTAMONT
DUNDARAVE
UPPER LONSDALE
LYNN VALLEY
Mountain Forest (CMHC)
West Vancouver
CENTRAL LONSDALE
BLUERIDGE
North Vancouver
Capilano University
LYNNMOUR
The Shipyards
Burrard Inlet
Stanley Park
Cates Park Whey-ah-Wich
Port of Vancouver | Vancouver Fraser Port...
WEST END
BURNABY HEIGHTS
English Bay
Vancouver
DOWNTOWN EASTSIDE
HASTINGS-SUNRISE
CAPITOL HILL
WESTRIDGE
Kitsilano Beach
STRATHCONA
WILLINGDON HEIGHTS
PARKCREST
BRENTWOOD
KITSILANO
MT PLEASANT
WEST POINT GREY
EAST VANCOUVER
RENFREW HEIGHTS
DUNBAR-SOUTHLANDS
Burnaby
RENFREW-COLLINGWOOD

Lions Gate Bridge

First Narrows | Vancouver, British Columbia

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BRIDGE FACTS

Opened	Type
1938	**Suspension**
Total length	**Main span**
846 m	**472 m**
Vertical clearance	**Roadway**
61 m at centre	**3 lanes**

South Tower stands in the water; North Tower is set back at the shoreline.

PIER PROTECTION

SOUTH TOWER
Concrete protection collar (1988)

NORTH TOWER
Rock berm (1988)

RISK MITIGATION

- VFPA Traffic Control Zone
- Compulsory pilotage / tug controls
- Preferred concept: expanded rock-fill berm
- Ground the vessel before tower contact



Commercial gateway to Vancouver Harbour

KEY VULNERABILITY

>80% of modeled risk: outbound vessels

Flared bows of container, general cargo and cruise ships could reach the South Tower steel legs above the stronger concrete pedestal.

UNDERWRITING TAKEAWAY

High consequence exposure despite a favorable bridge-allision loss record. Risk is driven by vessel geometry, outbound navigation, channel conditions and whether physical protection prevents tower contact.

Sources: BC Ministry of Transportation and Infrastructure traffic data; Vancouver Fraser Port Authority information; Lions Gate Bridge vessel-collision engineering report.

ROAD TRAFFIC

2025 average daily traffic

~56,600 vehicles / day

≈20.7M vehicle crossings / year

MARINE TRAFFIC

2025 commercial traffic

>5,000 transits / year

Excludes tugs, small barges, booms, small craft and recreational vessels.

LOSS HISTORY

NO RECORDED COMMERCIAL VESSEL ALLISION

Historical marine incidents have occurred in the First Narrows area, including vessel groundings and vessel-to-vessel collisions, but no known commercial vessel strike on the bridge.

Key Takeaways | From Baltimore to BRAVA

Bridge-allision risk is visible, evolving and manageable when exposure is evaluated systematically

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THE RISK DID NOT APPEAR OVERNIGHT

Baltimore exposed a long-developing mismatch between modern vessel exposure and legacy bridge protection.

01

Treat allision as a systemic accumulation

One loss can combine fatalities, bridge property, vessel damage, wreck removal, cargo, port closure and global P&I reinsurance.

02

Exposure evolves faster than infrastructure

Larger and older vessels are using waterways beneath bridges whose geometry and protection may reflect a much smaller historic fleet.

03

Protection presence is not protection adequacy

Dolphins, fenders or berms must intercept credible vessel paths and withstand current mass, speed, angle and impact energy.

04

Operational controls are critical layers

Pilotage, VTS, radar, tug assistance, emergency anchoring and rapid road closure can interrupt the casualty sequence.

05

Historical loss experience can create false comfort

No prior catastrophic strike does not eliminate modeled vulnerability. Near misses and smaller incidents are leading indicators.

06

BRAVA turns data into insights

Combine vessel traffic, bridge configuration, casualty history and engineering judgment to identify, compare and prioritize exposed crossings.

The Canadian relevance

Concentrated port gateways such as Vancouver demonstrate that the same questions apply beyond the U.S.

Image: MAGNIFIER / Getty Images

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Thank you for your attention!

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