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China's Mobile Piers for Cross-Strait Operations Showcase PLA's Innovation and Capability

China's Shuiqiao mobile pier system is one of Beijing's most significant and innovative developments in amphibious warfare and cross-Strait readiness, challenging Taiwanese defenses and U.S. Army operations in a potential invasion scenario. The Chinese People's Liberation Army (PLA) Navy leads the development of the Shuiqiao-class system with the best-known examples assigned to the PLA Eastern Fleet in ships known as Dong Gong 403, Dong Gong 402, and Dong Gong 401 (*Dong* meaning 'east,' and *Gong* meaning 'engineering'). These ships provide the PLA Navy with a modular, relocatable pier system that can be rapidly assembled in contested waters. First observed in January 2025, these specialized vessels—notable for their unique bridging design—have quickly emerged as a focal point of military analysis regarding China's preparations for potential cross-Strait operations.[1]

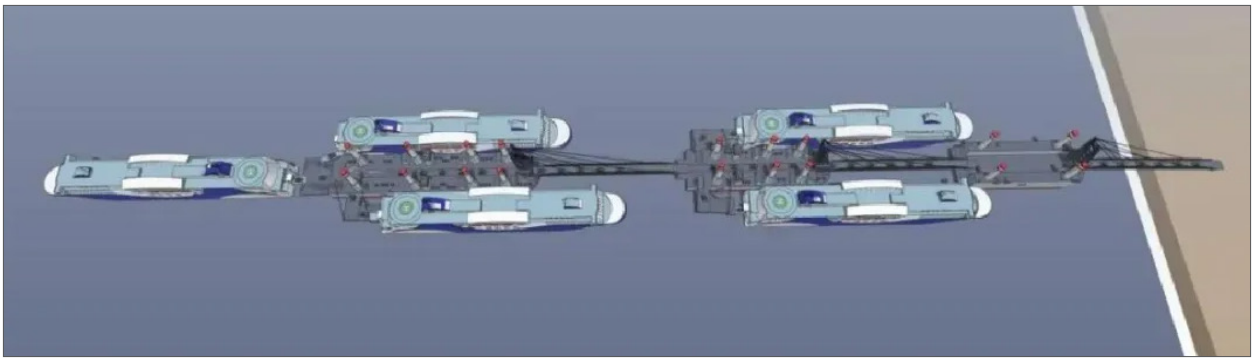


Figure 1: Connected Dong Gong Vessels With RO/RO Ferries (Source: Via X but original source Chinese social media)[2]

SHUIQIAO MOBILE PIER SYSTEM PROVIDES PLA NAVY ENHANCED CAPABILITY

When connected, the Dong Gong ships form an 820-meter pier, with each vessel contributing distinct structural and throughput functions. The Dong Gong 403 is particularly critical due to its shallower draft and four jack-up legs that allow it to approach the shore much closer than the other two vessels. Additionally, patents and other reporting suggest that the 403 possesses a unique capability to flood its aft ballast tanks to raise the bow of the ship and effectively beach itself in even shallower water if necessary.[3] The Dong Gong 402 features six jack-up legs and roll-on/roll-off (RO/RO) vessel docking points on both its port and starboard sides, while the Dong Gong 401 has eight jack-up legs and three RO/RO points, one on each side and one on the stern. Collectively, the vessels' robust jack-up system can extend down to the sea floor and elevate the ships above the water surface, providing a stable, pier-like structure that is better protected from challenging wave action and currents than conventional beached landing craft.[4]

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Nomenclature	Vessel Length x Width	Draft	Jack-Up Legs	Max Leg Extension	Bow Ramp Length x Width	RO/RO Docking Point
Dong Gong 403	110 x 38 m	2 m	4 at 32 m	18-20 m	130 x 6 m	0
Dong Gong 402	135 x 36 m	4 m	6 at 50 m	30-32 m	125 x 6 m	2
Dong Gong 401	185 x 36 m	4 m	8 at 55 m	30-32 m	127 x 6 m	3

Figure 2: Dong Gong Series Vessels' Dimensions and Capabilities (Source: T2COM G-2)

The Shuiqiao-class vessels provide practical and adaptable support to an amphibious assault, particularly on an island like Taiwan, which has limited coastline suitable for traditional landing craft. The Eastern Theater Command's fleet of Dong Gong ships (Dong Gong 403, 402, and 401) consist of three unique vessels that connect to form an 820-meter relocatable pier. In conjunction with RO/RO ships, these vessels can deliver equipment, nonamphibious vehicles (e.g., tanks, infantry fighting vehicles, artillery, etc.), and personnel to previously inaccessible landing areas. With a total of five RO/RO docks, the system has the capability to support the transfer of hundreds of vehicles per hour from ship to shore.[5]

The rapid production and deployment of the Shuiqiao capability materially enhances the PLA's capacity for comprehensive island landing and seizure campaigns by 2027 when President Xi Jinping expects the PLA to be ready to seize Taiwan. These mobile pier systems enable ship-to-shore delivery of nonamphibious medium and heavy combat vehicles directly onto austere or unimproved shores, effectively expanding China's options for amphibious assaults without relying on established ports. At least two sets, each consisting of three variants, have been observed in operation; one set was observed in operation in early 2025, and the second set in January 2026.[6] China can reportedly produce and deploy additional sets within four to six months. This rapid production underscores Beijing's ability to scale amphibious support to infrastructure quickly, a feature that aligns with PLA modernization benchmarks and means China could amass a substantial fleet by Xi's 2027 deadline.[7] Although 2027 is not an absolute deadline for invasion, it is the centennial of the founding of the PLA, and it is a year in which President Xi has ordered the PLA to be prepared to "conduct an invasion of Taiwan to complete Beijing's long-standing ambition of reunification."[8]

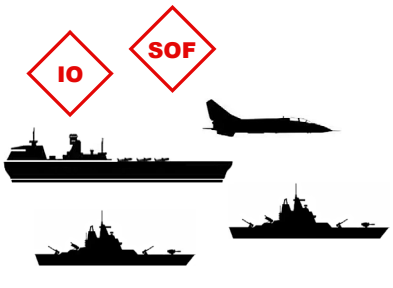


Figure 3: Dong Gong 401 Extending Its Pier Bridge to the Dong Gong 402 (Source: Image via Naval News, originally Chinese social media)[9]

China's accelerated production of dual-use RO/RO vessels increases the threat these vessels pose by enabling high-volume, rapid reinforcement of Shuiqiao pier operations such as those supported by the Eastern Theater Command's Dong Gong ships. China's largest RO/RO vessel is the *Anji Ansheng*, which holds the world record for vehicle transportation capacity at 9,500 civilian vehicles.[10] In a military support role, the *Anji Ansheng* could likely transport around 500 army vehicles, equivalent to approximately three or four fully equipped heavy combined-arms battalions. This capacity is a direct outcome of China's broader civil-military fusion strategy, which integrates national economic and military development to achieve national security objectives and fill critical military gaps. The PLA's close collaboration with shipbuilders ensures that commercial RO/ROs incorporate military-specific features, such as helipads, medical equipment, improved command and communications equipment, and greater freight deck ventilation, making them more suitable for sustained amphibious support.[11]

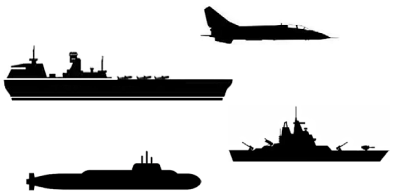
STRATEGIC AND OPERATIONAL DEPLOYMENT

Prior to deploying the Dong Gong series vessels in combat, the PLA would conduct extensive shaping operations crucial for gaining information dominance necessary for a successful amphibious invasion. PLA doctrine emphasizes information dominance as the prerequisite to gaining dominance in multiple domains and ultimately for seizing the initiative and victory in the entire Taiwan invasion campaign.[12] Indications and warnings of such an operation would likely include extensive psychological operations, disinformation, and propaganda, alongside information 'soft strikes' targeting critical infrastructure. These strikes would involve cyberattacks and electronic jamming of information systems, command and control centers, communication nodes, radar stations, and electrical power infrastructure. China would also likely target U.S. satellites that provide intelligence, communications, and navigation support. These include satellites supporting weapons targeting and secure communications between ships, aircraft, and ground forces.[13] Beijing could employ maritime quarantine and blockade measures intended either to coerce concessions from Taipei and Washington or to set conditions for a subsequent assault.[14] The notional timeline depicted below represents ideal conditions in the PLA's favor and includes analysis resulting from various wargames showcasing a hypothetical island seizure by the PLA, various PLA exercises around the island, and Chinese doctrine.[15] Some analysts have noted that China will seek to take Taiwan by force, if necessary, perhaps no later than 2030.[16]



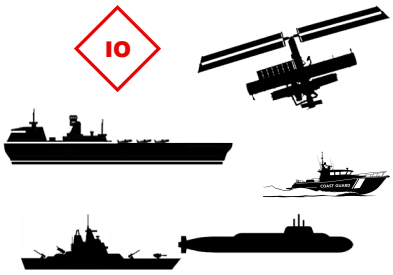
ABOUT 6 MONTHS TO 3 MONTHS OUT

- Gradual fuel, ammo, and missile stockpiling in Eastern Theater Command depots
- Special operations forces (SOF) and other enablers reconnoiter Taiwanese key targets
- Disinformation campaigns/expanded propaganda on Taiwan's mismanagement, illegitimacy, and corruption in Taipei
- Cyber probing of utilities, telecommunications, and finance (Taiwanese and U.S.)



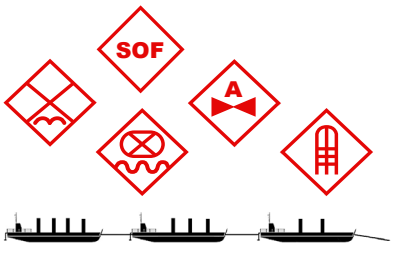
ABOUT 3 MONTHS TO 1 MONTH OUT

- Larger, more frequent joint exercises near Taiwan; more air defense identification zone incursions as 'new normal'
- Announced "joint blockade"/"joint firepower strike" exercise series with large live-fire exclusion zones that begin to affect commercial routes and air corridors



ABOUT 1 MONTH TO 1 WEEK OUT

- Intensified soft and hard IO attacks on civilian power grids, communications, and financial hubs
- Deception operations to mislead public about timing and location of invasion
- China, via its Coast Guard, initiates quarantine
- Threats of military action
- China targets U.S. satellites
- Naval drills turn into blockade (affecting commerce and military resupply)



FINAL WEEK TO SEIZURE

- SOF sabotage key infrastructure and military bases
- Suppression of air defenses, long-range missile, and rocket systems (PLA Navy, PLA Rocket Force)
- Amphibious combined-arms brigade landings
- Airborne and air assault forces seize key infrastructure
- Dong Gong (multiple sets) land along Taiwan's northern coast to facilitate seizure of Taipei

Figure 4: Possible Timeline Leading to Employment of Dong Gong Vessels (Source: T2COM G-2)

The intended deployment of Dong Gong ships from the Eastern Theater Command in the second or third wave of a Taiwan invasion highlights their strategic role in consolidating a beachhead after initial gains in air and sea superiority. Once initial beachheads are secured, the Dong Gong 403, 402, and 401 would approach the shore, with the Dong Gong 403 coming within approximately 130 meters of the coastline. The three vessels would then align, lower their jack-up legs to raise the vessels above the surface, and flood their ballast tanks to make the ships heavier to firmly press into the seabed. Once secured and elevated above wave action, their bridges would extend to connect the vessels together. Commercial satellite imagery from the construction phase reveals large circular depressions on each vessel, suggesting a turret-type system designed for vertical and horizontal bow ramp adjustment.[17] This advanced feature would allow the vessels to precisely align and extend their ramps even after their jack-up legs are lowered, ensuring a successful connection to the shore.[18]



Figure 5: This imagery shows the Dong Gong 403, 402, 401 under construction in January 2025 at the China State Shipbuilding Corporation shipyard in Guangzhou Province. The yellow arrows indicate possible adjustable turrets. (Source: T2COM G-2 based on U.S. Geographical Survey information)[19]

SHUIQIAO LIMITATIONS AND VULNERABILITIES

Despite impressive throughput and flexibility, the Shuiqiao system, as fielded in the Eastern Theater Command's Dong Gong ships, has several limitations and vulnerabilities that can be exploited. Beyond the high likelihood the PLA would need to establish multidomain dominance prior to employing the vessels, there are additional limitations involving an amphibious landing on Taiwan. The Dong Gong vessels are large, highly visible, and difficult to maneuver at speed because their flat bottoms and shallow drafts make them more susceptible to wind, currents, and waves than vessels with deeper, V-shaped hulls, making them vulnerable to surveillance and targeting.[20] If the PLA launched the vessels without establishing localized land, sea, and air superiority, it would be vulnerable to attacks from surface and subsurface mines and drones, as well as direct and indirect fires.[21] Moreover, if one vessel, particularly the shallow-draft lead vessel analogous to Dong Gong 403, were damaged or destroyed, the remaining vessels would be nonoperational, as the Dong Gong 402 and Dong Gong 401 would be unable to approach the beach with their 4-meter drafts.[22]

The Dong Gong series vessels have the potential to create massing and congestion at landing sites, making PLA ground forces vulnerable during and immediately after disembarkation in restricted terrain. With RO/RO capabilities, the vessels could receive one or two heavy combined arms battalions (approximately 175-350 vehicles) from each RO/RO ferry (up to 500 vehicles if a ship like the *Anji Ansheng* were used). Since the 3-vessel system has 5 total docking stations, they could simultaneously receive up to 10 battalions' worth of vehicles, corresponding personnel, and equipment. However, units must debark in a single column via Dong Gong 403's bow ramp and transit the 820-meter pier at a maximum speed of 8 km/hour, taking each battalion around 30 minutes in ideal conditions to transit the length of the 820-meter pier.[23] Once ashore, vehicles and personnel will need to quickly move inland to defensive positions or assembly areas.[24] The PLA must secure lines of communication before offloading to move units rapidly toward their objectives.[25]



Figure 6: The Dong Gong vessels open opportunities for the PLA to exploit areas beyond the established ports and landing beaches, such as on Taiwan. (Source: T2COM G-2)

Taiwan's geography and complex infrastructure would magnify both opportunities Shuiqiao creates for the PLA and the risks forces would face once ashore. Analysts assess that Taiwan has only 14 beaches that could enable amphibious operations, but the Dong Gong-type vessels would allow the PLA to exploit previously inaccessible areas along Taiwan's vast coastline. After initial landings, however, Taiwan's mountainous terrain, chokepoints, tunnels, bridges, and rivers would constrain movement and funnel the PLA into predictable corridors and engagement areas, enabling intersecting fields of fire and preregistered targets from Taiwanese defenders. Commercial satellite imagery indicates that the PLA has used China's Nantian Island in Zhejiang Province as a test area for the Dong Gong vessels, as this area resembles sections of the northeast portion of Taiwan. China's use of Nantian Island may be a deliberate effort to simulate areas such as Yilan County or New Taipei City in Taiwan, where rugged, less defended beaches could provide the PLA an option to establish logistics-over-the-shore (LOTS) operations and move personnel, vehicles, and supplies quickly to the capital.[26]

Weather would further complicate any Shuiqiao-enabled invasion, narrowing realistic windows for large-scale amphibious operations. Historical patterns suggest April and October provide the best, albeit still imperfect 4- to 6-week windows for a cross-Strait campaign, with April generally preferred for its minimal typhoon activity, moderate sea states, and stable wind patterns despite problematic fog that can hinder navigation and air support.[27] October is a less attractive option, as lingering typhoon risk and transitional weather increase uncertainty in sea state, visibility, and wind, compounding operational planning challenges.[28] Across the rest of the year, the combination of typhoons, monsoons, strong currents, and higher sea states creates natural barriers that stress large formations at sea; while the Dong Gong's jack-up legs offer some relief from weather and sea conditions, RO/ROs attempting to offload vehicles and equipment to the Dong Gongs will still be affected by the ocean and weather.

IMPLICATIONS FOR THE U.S. ARMY

The Shuiqiao system offers operational capabilities that differ markedly from the U.S. causeway systems such as the Army's Modular Causeway System (MCS) and the Navy's Elevated Causeway System-Modular (ELCAS-M).[29] Understanding these differences enables U.S. and allied planners to anticipate how the PLA might employ equivalent LOTS systems in contested environments. Taken together, these distinctions highlight that the Shuiqiao capability is a purpose-built system for rapid, autonomous deployment in more varied and contested coastal conditions than those for which current U.S. causeway systems are optimized, potentially offering the PLA an operational advantage in time-sensitive amphibious assault scenarios.

Feature	Shuiqiao	MCS	ELCAS-M
Deployment	Self-propelled landing platforms with modular Bailey bridge extensions that can rapidly assemble into a relocatable pier[30]	Non-self-propelled floating causeway modules that must be towed and assembled; deployment time ranges from hours to days depending on length and crew proficiency	Pile-supported modular pier that requires extensive installation by specialized units and support craft; full buildout typically takes about 7 days
Structural concept	Jack-up ships with modular bridge extensions (analogous to Bailey bridging) that form an about 820-meter pier	Floating causeway sections configured as ferries, piers, or RO/RO discharge facilities	Fixed, pile-supported pier with modular deck sections extending from shore
Beachhead flexibility	Bow ramps capable of vertical and horizontal adjustment, allowing the lead vessel to reach over seawalls, obstacles, and damaged infrastructure and access more challenging landing sites	Designed for use on relatively favorable beaches and gradients; ramp geometry is less suited to complex obstacles	Intended for prepared or semiprepared beach areas; access is optimized for benign or moderately challenging shore conditions, not heavily obstructed seawalls or rubble
Seastate resilience	Jackup legs raise hulls above the water surface once emplaced, improving stability and reducing exposure to waves and currents while still providing a continuous vehicle/pedestrian surface[31]	Entirely floating; performance and safety are more sensitive to sea state, wind, and current during both emplacement and operations[32]	Once installed on piles, the pier is largely insulated from day-to-day wave action, tides, and routine water-level changes, but installation and ship-to-shore transfer still depend on acceptable sea state and weather[33]
Autonomy of operation	Each Dong Gong ship carries its own propulsion, jacking, and bridging systems, allowing relatively autonomous deployment and pier assembly	Requires tugs, landing craft, and support vessels to transport, position, and reconfigure modules	Requires dedicated engineering units, heavy equipment, and support vessels for transport, pile driving, and assembly

Figure 7: Key Differences Between the Shuiqiao and Corresponding U.S. Systems. (Source: T2COM G-2)

As additional Shuiqiao ships enter service, the PLA gains more options for sequencing and scaling landings through 2027 and beyond, widening both the geographic and temporal windows for potential operations against Taiwan. This may force Taiwan, and the U.S. Army as its treaty ally, to consider additional and different approaches to defending the island against a PLA invasion.

- The use of Dong Gong vessels potentially increases the number of LOTS operational areas on Taiwan, thus inherently increasing the number of areas Taiwanese forces would need to defend. To maintain control of the littoral areas and deny access to the PLA Navy, Taiwan (with possible assistance from partners and allies) would need to secure these areas with mines and decoys (intermixing both) in potentially large swaths of areas. Taiwanese forces can ensure coverage in the Strait by identifying points where mines in depth can be deployed and using uncrewed underwater and surface systems to fill in the gaps.
- Dong Gong vessels' throughput compresses defenders' timelines and demands highly prioritized, dynamic targeting. With up to five RO/RO ferries berthed simultaneously (three on Dong Gong 401 and two on 402), the PLA could plausibly offload roughly one battalion per hour, and quickly establish itself on the island to prepare for follow-on operations.[34] Defending forces must therefore anticipate a potentially large number of landing sites; track movements of the ships during their voyage from mainland China toward their targeted areas; and develop a prioritized target list of key vehicles, systems, and other platforms. Destroying or neutralizing a vast number of vehicles and personnel disembarking these vessels will be difficult, so defenders must have a flexible plan to prioritize key targets, such as the Dong Gong 403, which is the lead vessel. Additionally, plans should include the ability to defend landing sites and lines of communication, including destroying local infrastructure (e.g., bridges, roads, etc.).
- The PLA's use of the Dong Gong vessels potentially expands the strategic options for an invasion by enabling landings in areas outside the Taiwan Strait. The Dong Gong vessels allow the PLA to bypass the adverse weather and sea state hazards of the Taiwan Strait by targeting Taiwan's north and northeastern coast. This approach offers distinct advantages: it exploits less heavily defended beaches, provides direct access to Taipei via the Yilan Valley corridor, and reduces dependence on the narrow seasonal weather windows (April and October) that dominate Strait-crossing scenarios. This course of action is entirely plausible, as evidenced by the PLA's documented exercises on China's Nantian Island, which simulate landings in terrain and geographic configurations comparable to Taiwan's northeastern coastline. Consequently, Taiwan must fortify these traditionally lower-priority coastal areas with robust defenses, further dispersing limited defensive resources across an expanded perimeter.

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