



**US Army Corps
of Engineers** ®
Detroit District

HARBOR INFRASTRUCTURE INVENTORIES Chicago Harbor, Illinois



Harbor Location: Chicago Harbor is located on the southwest shore of Lake Michigan in the heart of downtown Chicago, Cook County, Illinois.

Authority: The Rivers and Harbors Acts of 1870, 1880, 1912, 1919 and 1962

Project Description: Originally authorized by the Rivers and Harbors Act of 1870, the Federal interest in maintaining this harbor is to provide for navigation. Chicago Harbor is one of several entities that make up the Port of Chicago. This harbor originally served commercial navigation, but most heavy industry is now served by Calumet Harbor. The Chicago Harbor now primarily supports recreation, and commerce related to the tourism industry. The harbor is one of the most heavily used in the country, as evidenced by the 40,000 boats that pass through the Chicago Lock annually. The lock is located at the interface of Lake Michigan and the Chicago River. Longest fetch and direction: 280 miles, north-northeasterly. Maximum Recorded Wave Height: 20.3ft (1965). Typical Storm Wave (2-yr offshore wave): 16.4ft.

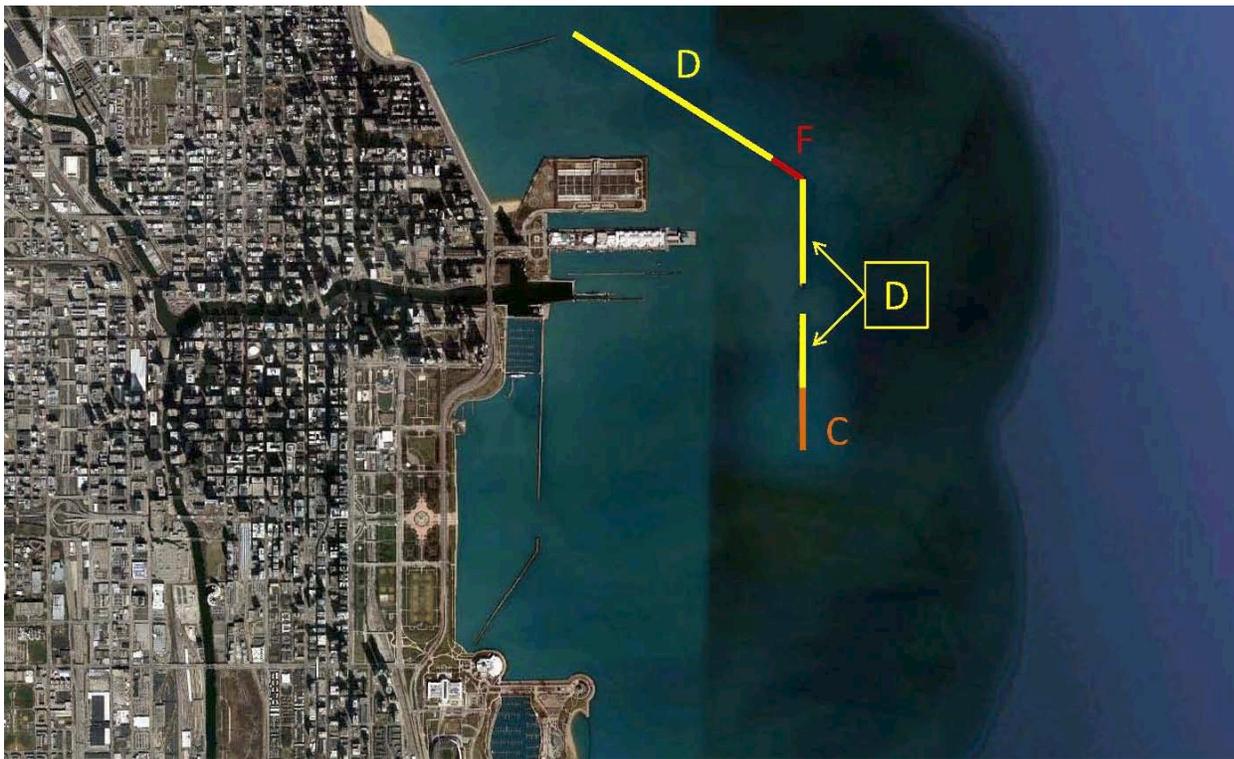
Traffic: 24,654,200 tons (5-Year average, 2004-2008, Port of Chicago)

Transportation Importance: Commodities handled are general cargo, petroleum, newsprint, salt, and cement. Bulk commodities that pass through Port of Chicago generate \$820M annually in direct revenue, support 4,707 jobs, and generate \$216M per year in personal income.

Congressional Interest:

- Representative Danny K. Davis, D-IL-7
- Senator Richard Durbin, D-IL
- Senator Mark Kirk, R-IL

Current Condition Assessment: **D** (portion of exterior BW = F)



Date of Site Visit: 27 August 2010

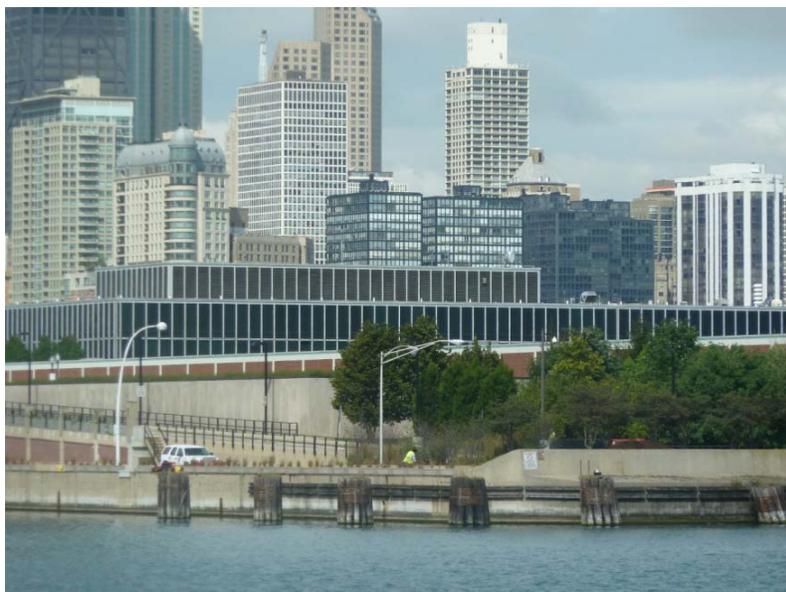
Summary of Impact: Prevailing waves typically come from a northeasterly and a southeasterly direction. The immediate impact of a breach and/or overtopping of the breakwaters would occur at North Lake Shore Drive, Monroe and DuSable Harbors, charter boat services at Navy Pier and operations at the Chicago Harbor Lock. Significant wave activity has the potential to flood North Lake Shore Drive, an expressway which serves over 110,000 vehicles per day. A 3,000 foot section of the roadway runs along the lake very close to the shoreline between Oak Street and the Jardine Water Treatment Plant. This stretch of Lake Shore Drive has been previously flooded during large storm events, disrupting and preventing normal traffic flow on this highly traveled roadway. Significant wave activity within the harbor will also damage any recreational boats and yachts moored in DuSable and Monroe Harbors, and commercial tour boats at Navy Pier. Additionally, any breach in the breakwater could potentially damage the Chicago Harbor Lock sector gates which would halt all boating traffic between Lake Michigan and the Chicago River. The Chicago Marine Safety Station operates from the riverside of the Chicago Harbor Lock. Any damage to the Chicago Harbor Lock sector gates would significantly impact Coast Guard, Illinois Conservation and Chicago Police operations to protect the lives of the maritime community in the Chicago area. The shore structures with the greatest exposure are North Lake Shore Drive, Monroe and DuSable Harbors, Chicago's Navy Pier and the Chicago Harbor Locks. Other shore structures subject to inundation are the James W. Jardine Water Purification Plant, the Chicago Marine Safety Station, Ohio Street Beach, the Adler Planetarium & Astronomy Museum, the John G. Shedd Aquarium, and the Field Museum of Natural History.

A significant problem within Chicago Harbor is that wave action during windstorms is extremely heavy, even though the harbor is protected with an outer set of breakwaters, and inner breakwaters for the recreational boat harbors. There are a combination of several conditions that contribute to the problem. First, the designed elevation of the breakwaters (+8-foot LWD) is not high enough to prevent significant wave action during severe windstorms. Significant amounts of wave energy are able to overtop the breakwaters. This wave energy can be destructive to navigation and onshore facilities, by causing physical damages and by preventing expected uses of the protected harbor area. Second, the breakwaters are very old, anywhere from 60 to 100 years plus, and were constructed with timber crib cross-sections. These are failing in many reaches, and are expected to deteriorate even further over time. Lastly, the loss of fill material within the timber cribs due to structural degradation allows the transmission of wave energy through the structure which could cause severe damage to the sub-structure of the breakwaters.

Examples of Protected Infrastructure:



1. James W. Jardine Water Purification Plant: Also known as the Central District Filtration Plant, the James W. Jardine Water Purification Plant was the world's largest water filtration plant at the time of its completion. Constructed in 1964 by Alvard, Burdick & Howson, Jardine Water Purification Plant processes nearly a billion gallons of water each day for the City of Chicago as well as more than a hundred suburban communities serving over five million people.



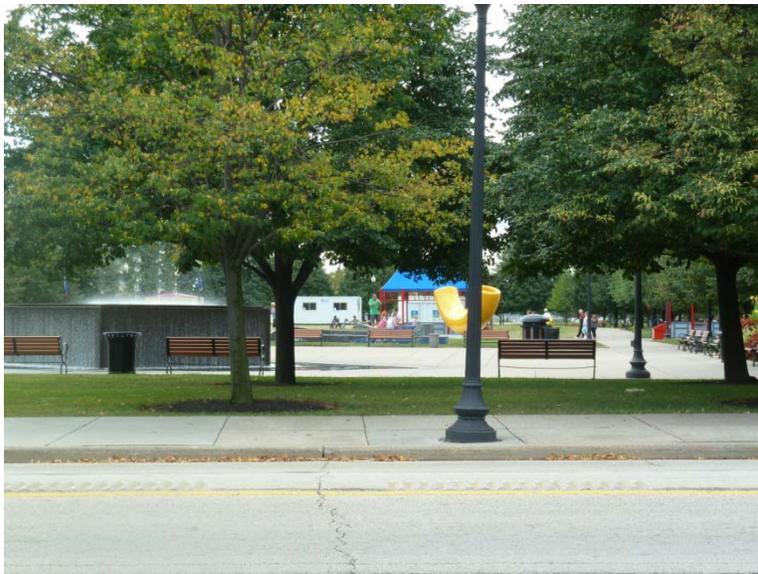
2. Chicago Harbor Lock Control House: The Chicago Harbor Lock was constructed by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) between 1936 and 1938. The Chicago Lock was part of the historic engineering project that reversed the flow of the Chicago River. This action prevented polluted river water from flowing into Lake Michigan, thereby contaminating Chicago's water supply. The U.S. Army Corps of Engineers – Chicago District began operating the lock in 1984. The Chicago Lock is one of the most heavily used locks operated by the Corps of Engineers. The lock is part of a complex of controlling works that separate Lake Michigan from the Chicago River. Commodities moved through the lock are petroleum and other chemical products moving by deep draft lake barges that take advantage of the lock's deep sills and the existing depths of the upper reaches of the Chicago Sanitary and Ship Canal. In addition to serving navigation, the gates must be fully functional at all times because they serve the flood damage prevention mission. During extreme rainfall events, storm run-off enters the Chicago River and can increase its height above lake water levels. To prevent flood damage, MWRDGC will release water from the river into the lake. Initially, Chicago River water is released through sluice gates near the Chicago Lock. If the sluice gates cannot provide enough relief, MWRDGC will request that USACE open the Lock gates to allow a backflow of water through the lock. Chicago River flooding in downtown Chicago could lead to enormous damages to building basements, transportation systems and electrical vaults, as evidence by the 1922 Chicago Tunnel Flood, which totaled approximately \$1 B dollars in damages. The lock is 600 feet long, 80 feet wide, and 22.4 feet (low pool) deep, with a lift of 2 to 4 feet and sector type gates.



3. Chicago Marine Safety Station: Formerly the Old Chicago Coast Guard Station, the Chicago Marine Safety Station was built in 1936. The station is used by the U.S. Coast Guard, the Chicago Police Marine Unit, and the Illinois Department of Natural Resources.



4. Gateway Park and Fountain: Navy Pier Park and Fountain is a large front lawn showcasing numerous larger-than-life public art sculptures and an interactive animated fountain created by Water Entertainment Technologies Design.



5. Milton Lee Olive Park: A 6 acre park, dedicated to Private First Class Milton Lee Olive III by President Lyndon B. Johnson in June 1966 for heroism in the Vietnam War.



6. Lake Point Towers: Lake Point Tower is a 70-story residential skyscraper which houses approximately 752 individual residences. This high-rise was designed by Schipporeit-Heinrich Associates and was completed in 1968. This building has received numerous awards for its design by the American Institute of Architects. The 700-car parking garage is topped by a private park featuring trees, a playground and a duck pond.



7. DuSable Harbor: DuSable Harbor is a city owned marina consisting of 420 seasonal and transient boat slips. Rates vary from \$3,390 to \$8,400+ a season depending on the size of the vessel. The marina consists of floating docks and the water to land interface consists of sheet piles.



8. Columbia Yacht Club Clubship: A former Canadian icebreaker from Nova Scotia; the 372 foot long Abegweit has served as the Columbia Yacht Club Clubship since 1983.



9. Monroe Harbor: Monroe Harbor is a city owned marina consisting of 1,000 seasonal and transient mooring cans. Rates vary from \$975 to \$4,160 per season depending on the size of the vessel. Monroe Harbor is also home to the Chicago Yacht Club and the Columbia Yacht Club. Monroe Harbor has a tender service, which provides delivery and pickup to boats in the harbor. The water to land interface consists of sheet piles.



10. Ohio Street Beach: Ohio Street Beach is a small beach in Olive Park located just north of Ohio Street and east of Lake Shore Drive. The beach faces north, rather than the usual east because it formed on its own in a bay created by the Jardine Water Purification Plant which juts out into the lake. The beach has approximately 500,000 annual visitors.



11. 990 North Lake Shore Drive: 990 North Lake Shore Drive is a 34-story residential skyscraper which houses 145 units and was designed by Barancik Conte and Associates in 1973.



12. 900-910 North Lake Shore Drive: 900-910 North Lake Shore Drive is a 28-story residential skyscraper which houses 524 units and was designed by Ludwig Miles van der Rohe in 1956.



13. 860-880 North Lake Shore Drive: 860-880 North Lake Shore Drive is a 26-story residential skyscraper which houses 248 units and was designed by Ludwig Miles van der Rohe in 1951.



14. 840 North Lake Shore Drive: 840 North Lake Shore Drive is a 27-story residential skyscraper with 73 units that was completed in 2004.



15. North Lake Shore Drive: Lake Shore Drive is a 15.83 mile, mostly freeway-standard expressway running parallel with and alongside the shoreline of Lake Michigan through Chicago, Illinois. Lake Shore Drive has a traffic count of approximately 110,000 vehicles per day.



16. Lake Shore Park: A 4.25 acre park featuring baseball fields, a fitness center and gym, meeting rooms and assembly halls, paths and tennis courts.



17. Northwestern University - School of Law (Arthur Rubloff Building): The 13-story Arthur Rubloff Building was completed in 1984 for an estimated \$37M. The facility was designed by Holabird & Root as part of the Northwestern University – School of Law.



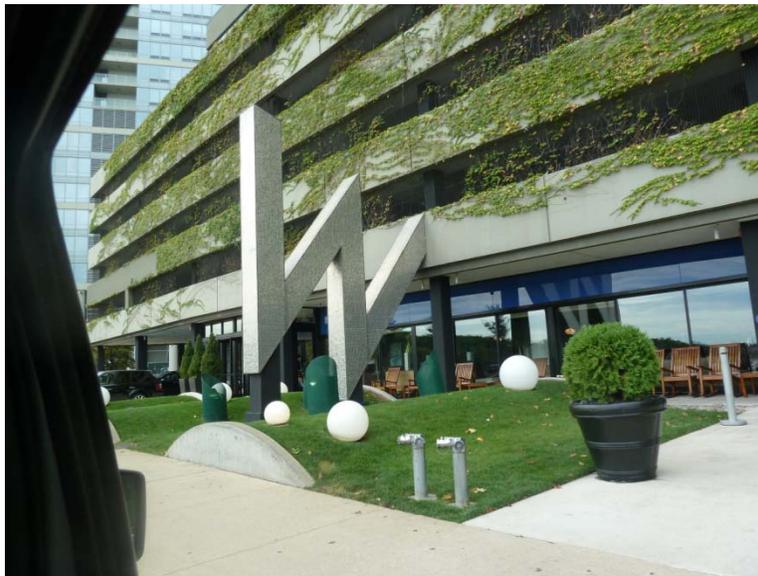
18. Northwestern University - Abbott Hall: The 20-story Abbott Hall was completed in 1940 for an estimated \$1.75M. The building serves as an administration building for Northwestern University's Downtown Campus.



19. 680 North Lake Shore Drive: Formerly the American Furniture Mart, 680 North Lake Shore Drive was constructed in 1926 and was designed by Nimmons & Company. The 29-story building is now a mixed use office complex.



20. The W Hotel Chicago – Lakeshore: The 33-story W Hotel Chicago – Lakeshore was completed in 1964. The hotel has 550 guest rooms that range in price from \$264.00 to \$380.00 per night.



21. 600 North Lake Shore Drive: 600 North Lake Shore Drive was completed in 2008 and was designed by Pappageorge/Haymes Ltd. The building consists of two towers; Tower 1 is 40-stories and has 154 condominium units and Tower 2 is 46-stories and has 246 condominium units. Units range in price from half a million to well over a million dollars.



22. 540 North Lake Shore Drive: 540 North Lake Shore Drive was completed in 1920 and is a 6-story residential building which houses 150 condominium units.



23. 530 North Lake Shore Drive: 530 North Lake Shore Drive was completed in 2004 and was designed by Pappageorge/Haymes Ltd. The 30-story building houses 196 condominium units. Units range in price from a quarter of a million to well over a million dollars.



24. North Pier Apartment Tower: North Pier Apartment Tower was completed in 1990 and was designed by Dubin Black and Moutoussamy. The 61-story building was originally designed as an apartment building but in 2005 the building was officially renamed 474 North Lake Shore Drive when the building was converted to 505 condominiums.



25. The Parkshore: The Parkshore was completed in 1991 and was designed by Barancik Conte and Associates. The 56-story building houses 483 condominium units.



26. Harbor Point: Harbor Point was completed in 1975 and was designed by Solomon, Cordwell, and Buenz & Associates. The 54-story building houses 742 condominium units and is also home to 22 commercial businesses.



27. Chicago Yacht Club: The Chicago Yacht Club was founded in 1875 to encourage and promote the sport of yachting. In 1955 construction began on the current Monroe Harbor Station. The club hosts numerous races annually and is a leader in teaching children and adults to sail for over 84 years.



28. The Chandler: The Chandler was completed in 2006 and was designed by DeStefano & Partners. The 35-story residential condominium houses 304 units.



29. East Water Place Townhomes: East Water Place is a community of 56 townhomes. The complex was constructed in two phases between 1997 and 1998.



30. River View Condominiums: River View Condominiums consists of two towers. The 27-story River View I has 690 units and was constructed in 2000; the 32-story River View II has 816 units and was constructed in 2004. Both towers were designed by DeStefano & Partners.



31. The Regatta: The Regatta was designed by DeStefano & Partners and constructed in 2006. The 45-story residential condominium building has 320 units and was completed for approximately \$140M.



32. Cityfront Place: Cityfront Place was constructed in 1991 and was designed by Gelick Foran & Associates. The 40-story apartment building houses approximately 500 units. Apartment rent prices range from \$1,200 to \$2,400 per month.



33. Sheraton Chicago Hotel & Towers: The 31-story Sheraton Chicago Hotel and Tower was completed in 1992 and designed by Solomon, Cordwell, and Buenz & Associates. The hotel has 1,249 guest rooms that range in price from \$230 to \$318 per night.



34. Swissotel Chicago: The 45-story Swissotel Chicago was completed in 1988 for approximately \$125M. The hotel, designed by Harry Weese and Associates, has 668 guest rooms that range in price from \$230 to \$510 per night.



35. 303 East Wacker: 303 East Wacker was completed in 1979 and was designed by Fujikawa Johnson & Associates. The 28-story building primarily serves as an office building.



36. Adler Planetarium & Astronomy Museum: The Adler Planetarium & Astronomy Museum was completed in 1930 and was designed by Ernest A. Grunsfeld, Jr. The Adler Planetarium is home to over 2,000 instruments and models from the 12th through the 20th centuries. The building was added to the National Register of Historic Places and was designated a National Historic Landmark in 1987. It draws approximately one million visitors annually.



37. John G. Shedd Aquarium: The John G. Shedd Aquarium was completed in 1931 and was designed by Graham, Anderson, and Probst & White. The aquarium houses more 1,500 species including fish, marine mammals, birds, snakes, amphibians, and insects. In 1991, with the addition of the Oceanarium, the Shedd became the largest indoor marine mammal facility in the world. The building was added to the National Register of Historic Places and was designated a National Historic Landmark in 1987. The John G. Shedd Aquarium draws approximately two million visitors annually.



Potential Impact Area: The following graphic displays property parcels that could be impacted within various zones defined by different setbacks from the shoreline behind existing Federal coastal structures. Values are based on real property tax assessments from these parcels, and don't reflect any detailed coastal zone damage assessments. Figures simply reflect property values at various setbacks.

