

A Dock Information System for the Great Lakes: Part 2

Inside the implementation and testing of a new DIS providing comprehensive information on all docks on the Great Lakes

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Part 1 of this article, written by Samir Dhar and Dr. Peter Lindquist, was previously published in Edition 48 of *Port Technology International*.

Introduction

This paper documents the second phase of a wider data collection effort undertaken by the University of Toledo and the U.S. Army Corps of Engineers (USACE or Corps) for a web-based system used to collect, organize, and transfer data pertaining to piers, wharves, docks and terminals (i.e. dock facilities) in support of maritime transportation.

This system was developed in response to a recent initiative undertaken by the Corps to update the methodology used to assemble and maintain timely and accurate data for the nation's dock facilities. This updated approach will replace previous methods from the Corps' Port Series Reports to a more dynamic and continuous updating process in the Corps' new *Master Docks Plus* (MDP) database. The design, development, and testing phase of this project has been described previously in Edition 48 of *Port Technology International*.

Much of the effort in the first phase of the project was devoted to the design, development and implementation of the web-based data collection system. The second phase of the project reported here concentrated on a pilot study to test the direct web entry approach, where individual dock and terminal operators were given the opportunity to enter the data directly into the registry themselves, without any intermediaries and with limited need for site visits by Corps personnel or the project team. This study was carried out at the Port of Toledo, Ohio – the area formerly known as Port Series 44.

Pilot study process

The test phase of this project was devoted to empirically evaluating the functionality of the web application and testing its effectiveness in gathering data. A high priority was placed on the users' perspective in order to provide a versatile web application system that was user-centered for dock owner/operators, yet sufficiently robust for Corps personnel as a data collection and verification instrument. The subsequent testing through the Port of Toledo provided valuable feedback to the project team; the system's functions and user interface for the web application were monitored closely and modified as needed throughout this process.

The proximity to the Port of Toledo provided an excellent opportunity for testing the new web application's effectiveness. The project team was able to meet several times with officials from the Toledo/Lucas County Port Authority to assist in contacting dock owner/operators. According to the Corps' Port Series #44 book details, 35 docks were listed for the port. The

dock facility information from Port Series #44 was input into the system. This initial version of the database was then updated by dock owner/operators through a series of letters, phone calls, and site visits from the project team.

Table 1 provides an overview of the Port of Toledo docks, as verified with the Toledo/Lucas County Port Authority, and the effort necessary to generate an organization response to collect data via the DIS. In addition to the preliminary database, some docks were added and some were removed since this was last reported in the Port Series #44 book in 2000. The bottom six docks listed in Table 1 have been identified as inactive.

After some initial consultations with the Corps regarding dock identification protocols, the process essentially began with a mailing campaign to dock/terminal owner/operators in June 2009, after the system was updated with new login information. As a follow-up, dock owner/operators were contacted by phone after the letters were mailed and were allowed time for receipt. Appointments were set up at this time for users requesting additional instructions. Subsequently, emails were sent to individuals that could not be reached by phone or in addition to leaving phone messages.

Several site visits were made in cases where the information of the dock owner/operator or the operations of the dock were not clear. It is important to note here that no effort was put forth by members of the project team to measure buildings, equipment, or otherwise assess facility characteristics during a site visit. These visits were strictly to instruct terminal operators on the use of the system. Six of the docks were not updated through the DIS due to lack of response from owner/operators. Six docks were also found that were no longer in operation, and two new docks were identified as not originally in the Corps' list. Information pertaining to the new docks was passed on to the Corps in order for new GUIDs to be issued for entry into the DIS.

The remaining terminal operators were contacted via phone or email (and sometimes both) as a follow-up to the letters. Six additional companies set up site visits during the summer. Two docks were updated through the system via telephone interview. Two respondents indicated that they would update through the site at a later time and did in fact go in and update their dock facilities' data. In all, 21 of 27 docks identified as 'active' were updated in the DIS through this effort. In one instance, a site visit took place with a dock operator while technical difficulties were present; the operator cooperated with a paper survey to update the information. A member of the project team then updated the database for the operator. In this one case the problem was resolved in a timely manner later the same day and was not an issue with any other respondents. As the project team worked with more users over the course of the summer, it was decided that a complete users' guide with detailed instructions should be made available for download on the website.

NAV_UNIT_GUID	GUID	DOCK_NAME	MAIL	PHONE	SITE VISIT	COMMENTS
33809	0V8D	St. Mary's Cement	2	1	10mins, 5mins	
32482	0UJC	Sunoco, Inc Refining & Supply Hocking Valley Dock Pier Slip.	2	1		
33803	0V87	Toledo Harbor Warehousing Corp Wharf	2	1		
33805	0V89	The Andersons Toledo Edwin Drive Elevator Dock	2	1	20mins	
33802	0V86	ARMS/Hansen Mueller Co.	2	2		
33808	0Q34	Grain Terminal - Kraft Foods	2	1		
33804	0Q30	Lafarge Cement Toledo Terminal Wharf	2	1		
32408	0U16	Heidtman Steel	4	3	1	Materials dropped off at facility
33812	0V8G	Midwest Terminals of Toledo International - General Cargo Terminal	7	3		
32237	0TW5	CSX Toledo Presque Isle Coal Docks, Slip No. 2	6	5	15mins	Only CSX dock updated
38407	027M	Arc Terminals Holdings Ilc Wharf	2	4		
33798	0V82	US Coast Guard Toledo Station Wharf	2	1		
32442	0U26	Toledo Shiprepair Co., Shipyard Slip. - Ironhead	2	1	5, 3, & 30mins	
32504	0U40	Toledo Shipyard - Ironhead	*	*	*	*Shares effort with 0U26
32474	0U34	Kuhlman Corp., Upper Dock	2	1	30mins	
32475	0U35	Kuhlman Corp., Yard No. 1 Dock	*	*	*	*Shares effort with 0U34
33811	0V8F	BP Oil Co toledo Refinery Marine Dock	2	1	40mins	
33807	0V8B	Seneca Petroleum Co. Edison Acme Station Slip	2	2	30mins	
33806	0V8A	ADM Grain	2	1	25mins	
39583	1087	Midwest Terminals - Ironville Terminal (Incl. Shelly Co. & Amcane)	2	2	45mins	Site visit was with Shelly Co.
39604	2IH4	Geo. Gradel Co.	4	1		
33801	0V85	Wohlebe - Socie Slip	4	2	1	Materials dropped off at facility
33800	0V84	H. Hansen Industries Slip	5	5	1, 1	Materials dropped off at facility 2X's
32233	0TW1	CSX Toledo Lakefront Ore Docks, TORCO Slip No. 1	6	*	*	*Shares effort with 0TW5
32458	0U2N	CSX Toledo Presque Isle Coal Docks, Slip No. 3 (Presque Isle Frog Pond Slip)	6	*	*	*Shares effort with 0TW5
32236	0TW4	CSX Toledo Presque Isle Coal Docks, Slip No. 1	6	*	*	*Shares effort with 0TW5
32235	0TW3	CSX Toledo Lakefront Ore Docks, Slip No. 3 (Lakefront Frog Pond Slip)	6	*	*	*Shares effort with 0TW5
37875	0YRZ	Toledo City Salt Dock	2	1		Docks inactive per Port Authority
33861	0V9X	Toledo Edison Bayshore Station Wharf	2			Docks inactive per Port Authority
37384	0YBJ	City of Toledo Naval Armory	2			Docks inactive per Port Authority
37876	0YS0	Harbor Light Cruise Lines	2			Docks inactive per Port Authority
32481	0U3B	Sunoco MidAmerica Marketing and Refining Co., Downstream Hocking Valley	2			Docks inactive per Port Authority
32234	0TW2	CSX Toledo Lakefront Ore Docks, Slip No. 2	2	1		Docks inactive per Port Authority

NOTES:

1) Additional phone calls to ARC, Seneca, and ARMS/Hansen Mueller were due to firewall difficulties on the UT server.

DOCKS UPDATED THROUGH NEW SYSTEM

NEW DOCKS IDENTIFIED

NOT UPDATED AS OF 11/30/09 - OWNERS/OPERATORS WILL NOT RESPOND AFTER CONSIDERABLE EFFORT

INACTIVE DOCKS

Table 1. Effort measures expended for data collection of each facility.

Results and discussion

During the testing phase, 33 total dock facilities were surveyed at the Port of Toledo. Organizations for 21 facilities responded to data collection efforts with low to medium initial effort. Organizations owning 12 dock facilities did not respond to survey efforts. Of the 12 that did not respond, six dock facilities have been identified through further investigative work to be inactive docks. This determination was verified through the

Toledo Port Authority. The remaining six facilities are known to be active, and there are only three owners for these docks. Thus, a large portion of organizations responded favorably to the new data collection methods.

A complete summary of diagnostic results is listed in Table 2 below. This table represents the frequency of observations per collection method (i.e. web, GIS, phone, site visit) for each attribute level of importance collected.

Level of Importance	Collection Methods						Total
	W	G	P	S	B	NR	Observations
Critical Attributes	295	66	48	201	149	396	1155
High Importance	110	0	16	73	74	156	429
Important	210	0	32	163	225	360	990
Total Response per Method	615	66	96	437	448	912	2574
W - Organization entered data directly into the web							
G - Obtained through GIS methods, on part of the project team							
P - Obtained from phone interview, project team member entered data into web							
S - Site visit was required by project team member							
B - Data field was left blank by respondent							
NR - No response was issued for any part of the survey							

Table 2. Summary results by attribute level of importance.

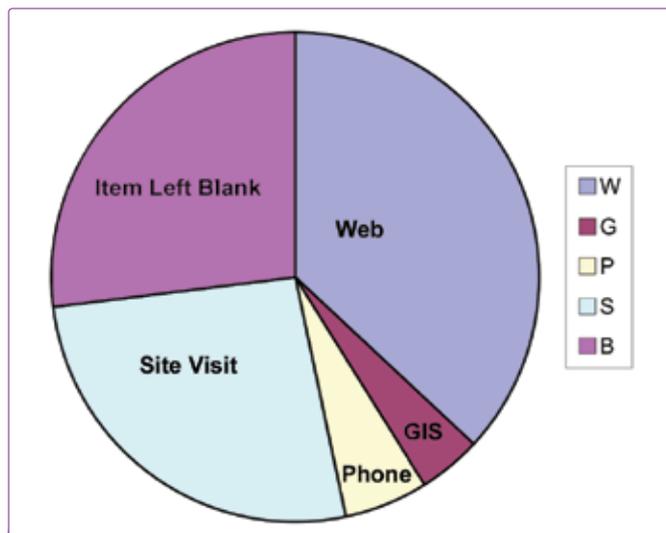


Figure 1. Data collection methods per respondent.

Efforts for data collection using the new methods are less labor intensive than previous methods. Nine facilities were updated through the new system with phone call prompts after receiving the initial letter from the research team. Organizations for seven of the nine facilities were able to update dock data through the new web system with no further action required of the project team. Two of the organizations completed telephone surveys with a member of the research team, and in turn, the research team member updated the web page data for the organization. Eight organizations set up meetings with a member of the project team at their site in order to clarify information regarding data elements and field definitions. These meetings provided valuable feedback from users directly to the project team. A typical site visit for this purpose lasted approximately 30 minutes or less. As discussed earlier in this paper, several enhancements were incorporated into the system as a direct result of these site visits.

Figure 1 is a summary pie chart depicting the methods in which data attributes were collected from respondents. The largest portion of data collected was through the web-based system. The next largest section is for attributes left blank. It is important to note here that only five of the 35 critical attributes had a sizable number of blank entries; between 15 and 20 of the respondents left the fields blank. These five attributes are: waterway mile, middle initial, department, room number and PO Box. Four of the five attributes most likely did not apply to the organization responding. The latitude and longitude elements were obtained strictly through GIS methods for all facilities.

The greatest effort expended in this endeavor was in soliciting participation from dock owners and operators. Several site visits were made in attempt to engage the organizations into initial participation. Face-to-face interaction was important for these organizations during the start-up of this new system. However, it is assumed that subsequent visits on the part of the Corps to many of these owner/operators may not be necessary once they have gained familiarity with the system – it could be possible for these organizations to make updates on their own in the future with minimal prompting from the Corps.

In order for this initiative to be successful as a long-term endeavor, it is essential for the Corps to convey the benefits for organizations to participate; otherwise the Corps would need to repeatedly contact those organizations that do not initially choose to participate. One key benefit to an organization is the use of this system as a comprehensive marketing tool for shipping in the Great Lakes. As such, the system will provide a listing of all ports and docks with contact information and material handling capabilities. This system has the potential to be the worldwide

'yellow book' pages for Great Lakes shipping. The platform for this system can be applied to the entire Great Lakes region as it is and to the coastal and inland waterways with minor adjustments. It is the recommendation of the project team that the system be launched in the Great Lakes region with a widespread marketing campaign. The first order of soliciting participation from dock owners and operators is making sure they know the system is available. It is likely that additional phone calls and/or letters will be required to prompt participants and boost response rates, while owners/operators are learning the value of using this system.

In addition, the advantage of this system to the Corps is that it reduces the amount of data needed to be physically collected. It also defines more precisely those data that will need to be physically collected on a site visit by trained Corps personnel. This automated data collection will therefore reduce the necessity of a trained civil engineer from the Corps to visit every facility to physically collect data. It will also reduce the volume of data to collect in those instances when a site visit to a facility is warranted. As discussed earlier, this is a time consuming effort on part of the Corps; few engineers have either the training or experience to perform the task. Secondly, the project team can recommend facilities that require a site visit from a trained engineer based on the data collected from the new methods process.

Evaluation of the accuracy of these new methods will also require additional study, as it is beyond the expertise of the project team to evaluate the accuracy of the new methods vs. existing methods. It is the recommendation of the project team that a random sample of docks be selected from the Port of Toledo and a trained civil engineer from the Corps should evaluate the accuracy of the new methods within that sample.

Overall, dock owner/operators reacted positively to the appearance and functionality of the web interface. In cases where features within the system proved to be problematic for users, they were promptly modified. For instance, one dock manager suggested an option to change the login password given that the generated password was difficult to remember. This feature was then modified within the system giving users an option to change their password. In another case, the system was modified as a result of user feedback concerning the data entry 'save' function; the entire data entry and save process was revamped with a step-by-step update procedure providing users with the option to toggle back and forth between each step followed by a final 'save' prompt for all edits before exiting the system.

Additional feedback was solicited by the project team from initial users of the system. This resulted with a request for additional search features in the web application that could filter docks by 'State' and/or 'City' in addition to the existing 'Facility Type,' 'Service Type,' or 'Commodity' categories. This additional capability can provide dock owner/operators and ports with the benefit of using the system as a marketing tool for their respective facilities, which in turn contributed to a higher level of participation in the DIS project by providing an incentive for entering data into the system. Additional features such as these are thereby envisioned to assist owner/operators in promoting their dock facilities and capabilities within the global market and consequently, attract prospective clients.

In addition to feedback from dock owner/operators, this phase also provided the project team with information regarding the utility of the web portal approach in collecting and managing data acquired directly from dock owner/operators. The discussion that follows will include details regarding the following:

- Number of facilities surveyed without calls or site visits
- Number of facilities surveyed with only calls
- Number of facilities requiring only a site visit
- Number of facilities requiring a call and site visit

- Amount of time, in hours, spent at site visits
- Data elements obtained without a call or site visit
- Data elements requiring a call but no site visit, and
- Data elements requiring a call and site visit.

Finally, this phase also provided the project team with a fundamental true-count evaluation of the acknowledgement and verification process for the Corps. The team carefully monitored the email alert notifications sent to the Corps, the Corps' acknowledgement of the changes made by dock owner/operators and the verification process to update those changes. Moreover, detailed SQL queries embedded within the data after dock information was updated were also closely monitored. Minor changes that were incorporated in the SQL query were made available to the Corps to update their *Master Docks Plus* database.

Conclusion & recommendations

This system was developed over the course of two years and was initially tested at the Port of Toledo over the spring and summer of 2009. As the system was tested through data entry by dock owners and operators, it was refined and improved in response to user comments and observations made by members of the project team. Twenty-one of 27 active docks (approximately 78 percent) at the Port of Toledo were updated through the web-based data entry system described in this report. In general, respondents received the system favorably, and most of the operators were able to update their data directly through the secure web access.

The web-based system was demonstrated to be an effective and efficient data collection method for this purpose. Users responded favorably to the flexibility offered by the system to input the data at their convenience. In addition, users found the system to be user-friendly with minimal difficulty in accessing the site to input their data. Feedback from dock operators was recorded by the project team and where appropriate, was incorporated to refine the system. During site visits, the project team learned from conversations with some dock operators that the database could be useful in promoting their businesses. In other cases, some dock owner/operators were concerned about revealing commodity tonnages to competitors through the system. As a result, most dock operators did not divulge the commodity tonnage information while they were filling out their information. In response, the system was refined to allow users to 'hide' this information from public view, thus allowing the data to be supplied without compromising free enterprise.

Finally, it is the conclusion of the project team that this DIS system has proven to be an effective tool in the Corps' goal of developing a robust, efficient, continuous data collection system for the nation's docks, piers, wharves and terminals. It is also

the belief of the project team that the Corps can market this system prototype over a broad range of applications including coastal ports and the inland waterway system. The data collection system and associated *Master Docks Plus* database also show considerable promise for furnishing data to ports and dock operators in marketing their facilities in global promotional initiatives for ports and shipping. The project team has also focused on future enhancements to applications and functionality, such as the addition of aerial photographs for each dock and more robust search criteria; these features would further augment this system as a marketing tool for dock owner/operators to promote their facilities.

Overall, the DIS system has produced excellent results in fulfilling its intended purpose to provide the Corps with a secure, efficient, continuous and dynamic data acquisition resource.

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The **U.S. Army Corps of Engineers** (USACE) has approximately 34,000 dedicated civilians and soldiers delivering engineering services to customers in more

than 90 countries worldwide. With environmental sustainability as a guiding principle, its disciplined Corps team works to strengthen the USA's security by building and maintaining the country's infrastructure and providing military facilities where its service members train, work and live.

ENQUIRIES

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