

South Carolina State **PORTS AUTHORITY**

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1010 Duke St.
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To whom it may concern:

The attached application is for a system developed by and for the South Carolina State Ports Authority Berthing and Scheduling Department. The purpose of the system, called the Automated Vessel Scheduling Application (AVSA), is to streamline data accumulation processes within the Harbor Master's office. The system has been in effect since May 2002 and development will begin shortly on Phase II automation.

Sincerely,

Handwritten signature of Pamela A. Everitt in cursive script, including the initials 'PSE' at the end.

Pamela A. Everitt

PORTCHARLESTON



Automated Vessel Scheduling Application (AVSA)

South Carolina State Ports Authority – Port of Charleston

Pam Everitt, Director of Information Technology

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Port Description

The Mission of the South Carolina State Ports Authority (SPA) is to contribute to the economic development of South Carolina by fostering and stimulating waterborne commerce and shipment of freight. In pursuit of this mission, the Authority seeks to develop and operate efficient marine terminals and attract high-quality steamship services.

The SPA owns and operates three port facilities: The Port of Charleston (POC), the Port of Georgetown and the Port of Port Royal. The POC is comprised of four terminals: North Charleston, Wando Welch, Columbus Street and Union Pier. North Charleston and Columbus Street are container and breakbulk terminals, Wando Welch is a dedicated container terminal and Union Pier is a dedicated ro-ro/breakbulk terminal. These facilities are owner operated terminals, meaning the SPA owns the terminals and operates them with its own staff. SPA staff works in all container cranes, runs the container yard equipment, and operate the gates on all terminals. The only exceptions are the licensed operators at the port, who lease terminal space and operate their own yards and gates. SPA staff operates the dockside container cranes and the yard equipment for licensed operators as well.

The SPA also has a long-term lease on a breakbulk terminal at the former Charleston Naval Base. Operation of this facility is sub-leased under a license agreement to Charleston International Ports.

Introduction – Paper Highlights

The AVSA System replaces the SPA's Harbor Services manual berthing board system, automating vessel planning and scheduling. This new system links electronically collected data from the SPA proprietary ORION system to the new AVSA application. Since May 2002, when this application came on-line, near real-time data is now available internally through our company Intranet. This has eliminated many telephone calls to the Harbor Master's office, reduced redundancy in the planning process, and enabled management to do "what if" scenarios relevant to steamship lines relocating from terminal to terminal. This new system eliminates the effort to correct keying errors which, in the past, were passed on to our financial systems from the manual process.

ORION is the SPA's mainframe computer system at the POC, providing electronic documentation clearing and processing and hosts many EDI services. Specifically, it provides access to U.S. Customs' Automated Commercial System (ACS), Automated Manifest System (AMS) and Automated Broker Interface (ABI).



Goals and Objectives

- To create an in-house system which streamlines data accumulation processes within the Harbor Master's office.
- To provide near real-time vessel arrival and departure data capture.
- To maintain an historic activity database that enables “what-if” scenarios that models potential berth conflicts occurring when steamship line tenants relocate from one terminal to another.
- To make data available to both internal users through the company Intranet and external port users such as steamship lines, agents, harbor pilots, and tug companies via the company Web Page.

Business Problem

- The manual berthing board process required physical daily placement by the Harbor Master of magnets representing each vessel to a magnetic board.
- For any vessel not already in the ORION system, a vessel magnet had to be created
- If a vessel was not currently on the board, it had to be hunted for in a pile of magnets at the base of the boards (**Exhibit A-1**)
- The original berthing board process predominately served single purpose; vessel to berth planning and manual placement of magnets representing vessels to berth.
- The manual berthing board process was paper driven, requiring physical movement of vessel data sheets between terminals and then back to a central office.
- Dock wardens at each terminal had to maintain a hand-written log book of after-hours vessel activity, which in turn had to be delivered via courier to the Harbor Master's office first thing the following morning. This equates to at least an eight hour delay.
- Excessive volume of both internal and external phone calls for vessel inquiries
- The information in the ORION system was behind real time by 8-12 hours.

- The information on the Berthing Board was not available to anyone other than those physically present in the Harbor Master's office.
- Manual process for determining physical placement of actual vessels at berth based on a calculation of the vessel length overall relative to the overall length of the terminal berth.
- Inability to analyze mainframe data because of lack of ODBC connection to analytical software

Discussion:

A. Background

Previous Scheduling Process

Approximately 12 years ago, the Harbor Services department at the SPA created a manual berthing board system for visually displaying current vessel wharf positions at our four marine terminals. A series of "Berthing Boards" were developed for each terminal, with a magnet representing each vessel calling our port. The boards were mounted on the wall at the Harbor Master's office with vessel magnets showing the vessels due in port and the vessels that were currently in port. Below was the previous process used:

1. Harbor Master moves all magnets on berthing board to correct date

Automated - this process is handled by Visio AVSA application

2. Receives hand-written log book from terminals noting which vessels were worked after hours.

Automated - Dock Wardens at each terminal are currently being trained to input that information directly into ORION from the Dock Wardens offices. This significantly reduces the paper trail, and helps to eliminate input errors by the Harbor Master.

3. Harbor Master receives calls and faxes from Steamship Line Agents with vessel name and estimated time of its arrival

4. Harbor Master looks up vessel name in ORION to get the length overall (LOA) of vessel and its in-house vessel code

5. Looks at berthing board to determine which berth is empty at the appropriate terminal. If other vessels are docked, or another is expected to be docked, must determine which footmark to assign the vessel to at berth. This is done based on the LOA and the physical length in feet of the terminal berth

Automated - Instead, inputs information directly into ORION. Runs the Visio Application

(Exhibit G). Once vessels are distributed to the page based on the estimated arrival time/date and actual arrival time/date, clicks on vessels objects (which are to scale) and moves them around screen to determine actual physical vessel placement at berth.

6. Calls agent back with above information

Phase II Automation - Once this project moves to its second phase, the AVSA Berthing Board information will be available on our company Web Site with the most up-to-date information.

7. Agent contacts harbor pilot with final orders, and anyone else needing notification, such as line handlers, tug companies, etc.

Technical Description of Application

The AVSA was created using Microsoft Visio 2002 and Microsoft Access 2000 with an interface to the SPA's ORION Vessel Activity, Vessel Work and Vessel Description tables. These tables contain current information on all vessels entering and leaving POC terminals, including actual arrival date and time, estimated arrival date and time, assigned berth, assigned foot mark, estimated departure date and time, vessel work date and time, Lloyds' Code, detailed vessel information, vessel's length overall (LOA), and docking instructions. The AVSA is linked directly to this information, which is maintained primarily by the Harbor Master. Within the next few weeks, Dock Wardens at each of the four terminals will be trained to input the information into ORION as soon as the vessel is docked, thus eliminating a paper trail to the Harbor Master's office. Previously, the Harbor Master was the only one qualified to input this data, thus contributing to the significant lack of real-time data availability.

The AVSA application consists of one Visio 2002 file which is separated into four pages, each page representing one of the SPA's POC terminals; North Charleston, Columbus Street, Wando Welch and Union Pier. To start, the user of the application runs a "Database Monitor" which connects to an Access database that in turn connects via ODBC to ORION. The "Database Monitor" distributes

shapes (vessels) onto the screen for each individual terminal based on the estimated arrival date, actual arrival date, the estimated berth and the actual footmarks (**Exhibit G**). The vessels were all one size on the old Berthing Board system (**Exhibit A-3**). The new AVSA system sizes the vessels to scale based on each vessel's LOA, for each terminal.

B. Objectives and Methodology

- Various meetings were held with Vice President of Operations, the General Manager of Berthing and Scheduling, and the Berthing Manager (Harbor Master)
- Photographs were taken of the manual berthing boards at the Harbor Master's office (**Exhibit A**)
- Spent approximately 40 hours sitting with Harbor Master to observe and record processes she used
- Software was purchased and installed to link via Access 2000 ODBC to ORION mainframe, where vessel data is located
- Researched various types of software to determine which one would be the best to develop this type of application. Visio 2002 was chosen because of its excellent database integration and "Smart Shape" capabilities
- Created prototype of automated Berthing Boards in Visio 2002. Application was named "Automated Vessel Scheduling Application" (AVSA)
- Used Access 2000 to analyze ORION data and create queries to calculate pertinent information for each terminal (**Exhibit C**)
- Linked Visio Application to Access 2000 database and tested with live ORION data
- Equipment and hardware was chosen, ordered, and installed
- Four Plasma TV screens were mounted on the wall at Harbor Master's office in place of magnetic Berthing Boards, which were moved out of the way but still used
- Harbor Master was trained to use AVSA (**Exhibit G**)

- AVSA and manual Berthing Boards mirrored each other for approximately three weeks during the testing phase
- Manual Berthing Boards were packed up and are no longer being used

C. Hardware/Software Used

Software: Microsoft Visio 2002, Microsoft Access 2000, and CA-DATACOM ODBC software

Hardware:

Sony 42" Plasma Monitor	42" flat panel with 1024 x 1024 res
Sony Flat Wall Mount	Wall mounting kit
Matrox Quad Video Card	Quad Video card
Extron Video Shift	Shifts picture to prevent burn in
Extron Distribution Amp	Amplifies signal for long cable runs
Gateway PC	1000mhz with 256 RAM
15 Pin VGA Cables	Assorted video cables
Extron SY Cable	VGA/XGA 50' Cable
Extron SY Cable	VGA/XGA 6' Cable

D. Project Cost

The approximate final hardware cost was \$35,000 and the cost of software was approximately \$600.00

E. Performance Measures

- Elimination of courier service between terminals twice daily
- Almost real time vessel arrival and departure information available on-line via the company Intranet
- Improved ability to model vessel impacts and conflicts when needed to contemplate relocating steamship line tenants from one terminal to another. This previously was a very tedious and time-consuming process

F. How The Project Fulfills The Award Criteria

The AVSA system is a new innovation in technology because it links a mainframe database to a PC-based application. The AVSA has enhanced data flow by eliminating manual processes, re-keying errors, and reduced time and effort involved in the vessel scheduling processes. AVSA has served to improve productivity within the Harbor Master's office by reducing the intensive effort occurring

under the manual process. This system also provides the Crane Maintenance department with a near real time schedule of vessel activity, required for scheduling down-time crane maintenance. In Phase II Automation, agents and others in the port industry community will have near real-time access to information they require in scheduling their respective workloads.

Conclusion

As the "Port Operations and Management Systems" category defines, the AVSA system developed and installed by the SPA, and currently utilized, has proven itself to be an award-winning application due to its reduction in errors, increases in productivity, provision of near real-time data and management analytical processes. Should you require additional information please contact me, English Anne P. Struth, at 843-577-8184 or via email estruth@scspa.com.

Appendix

Exhibit A-1

Original Berthing Boards at Harbor Services office at the POC.

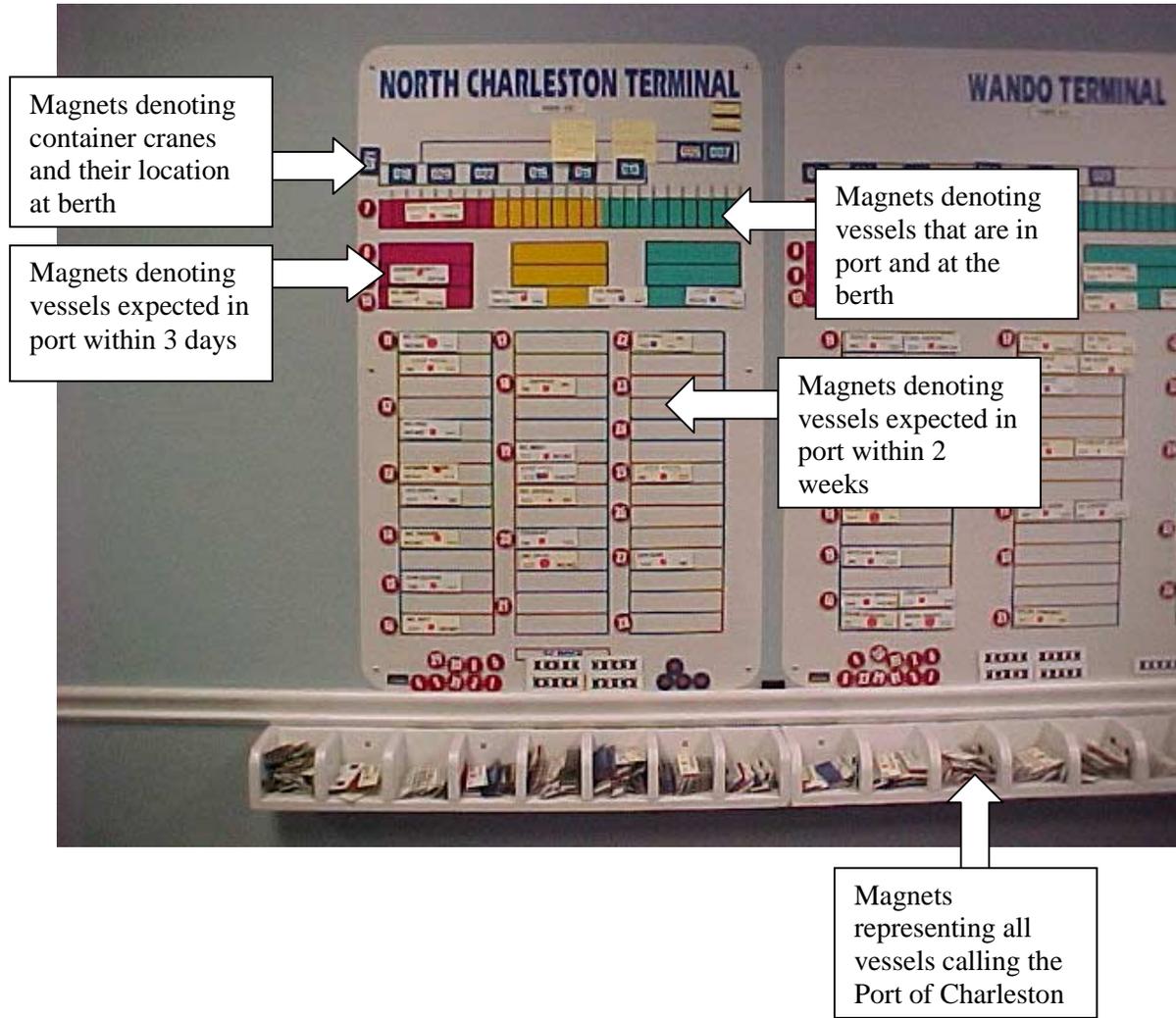


Exhibit A-2

Another view of the original Berthing Boards

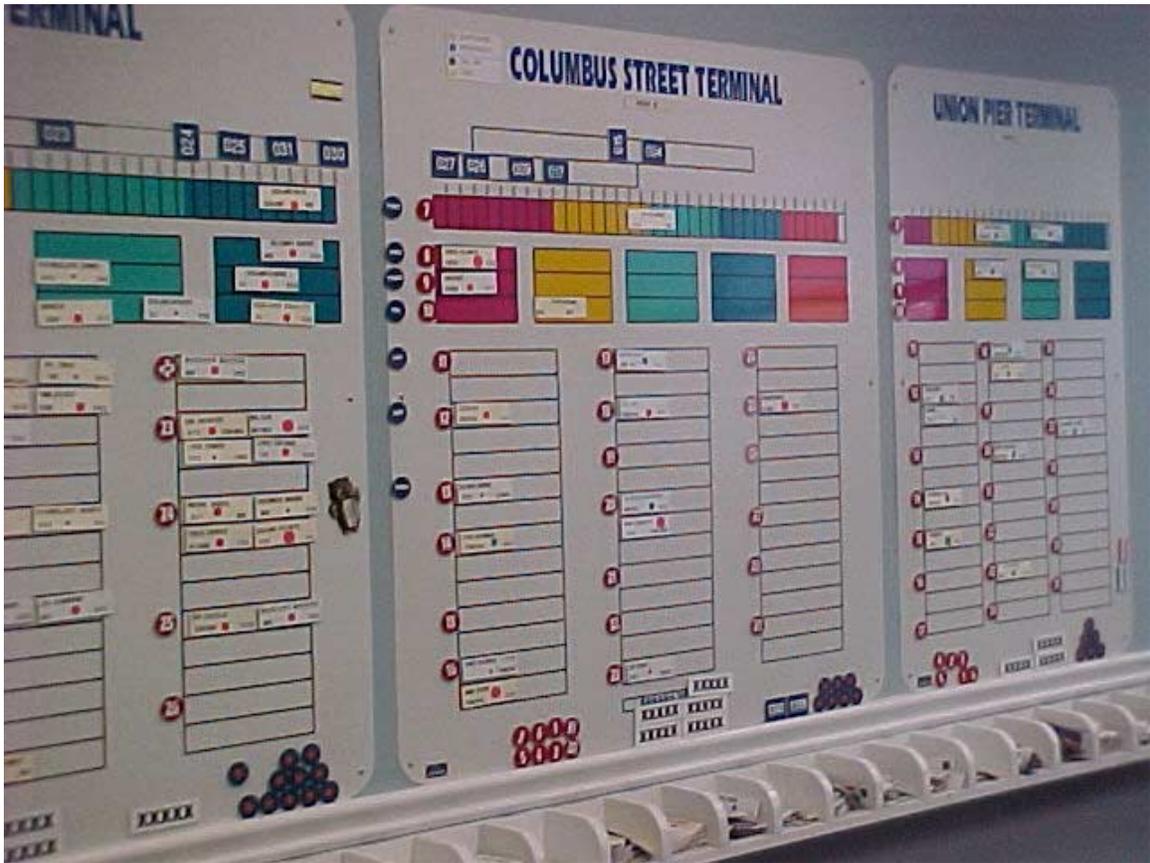


Exhibit A-3

Close-up photograph of Berthing Board.



Magnet denoting day of the week

Magnet denoting vessel due in port and it's length overall (LOA)

Exhibit B

Automated Vessel Scheduling Application Data Flow Diagram

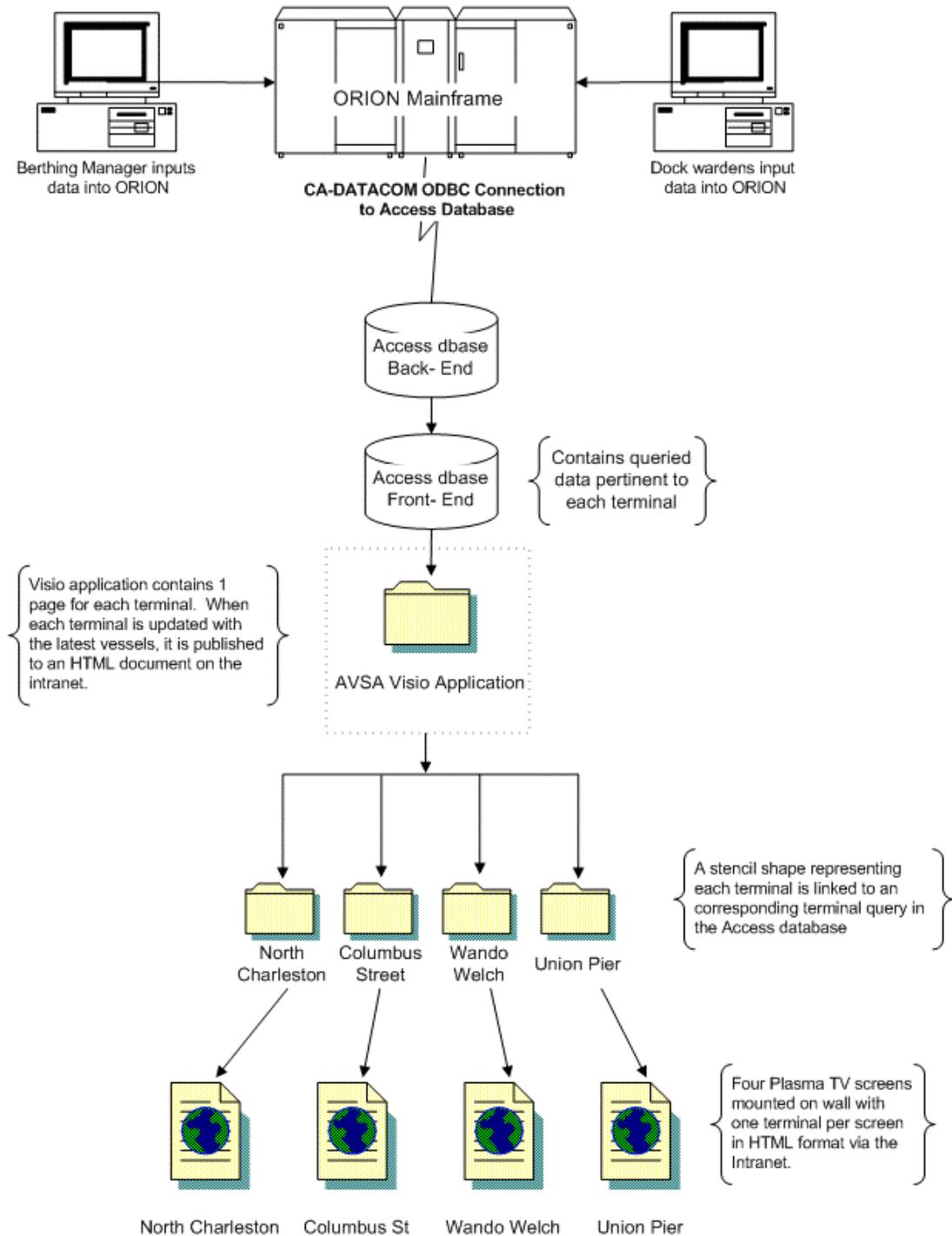


Exhibit C

Screen shot of AVSA Access 2000 database front-end

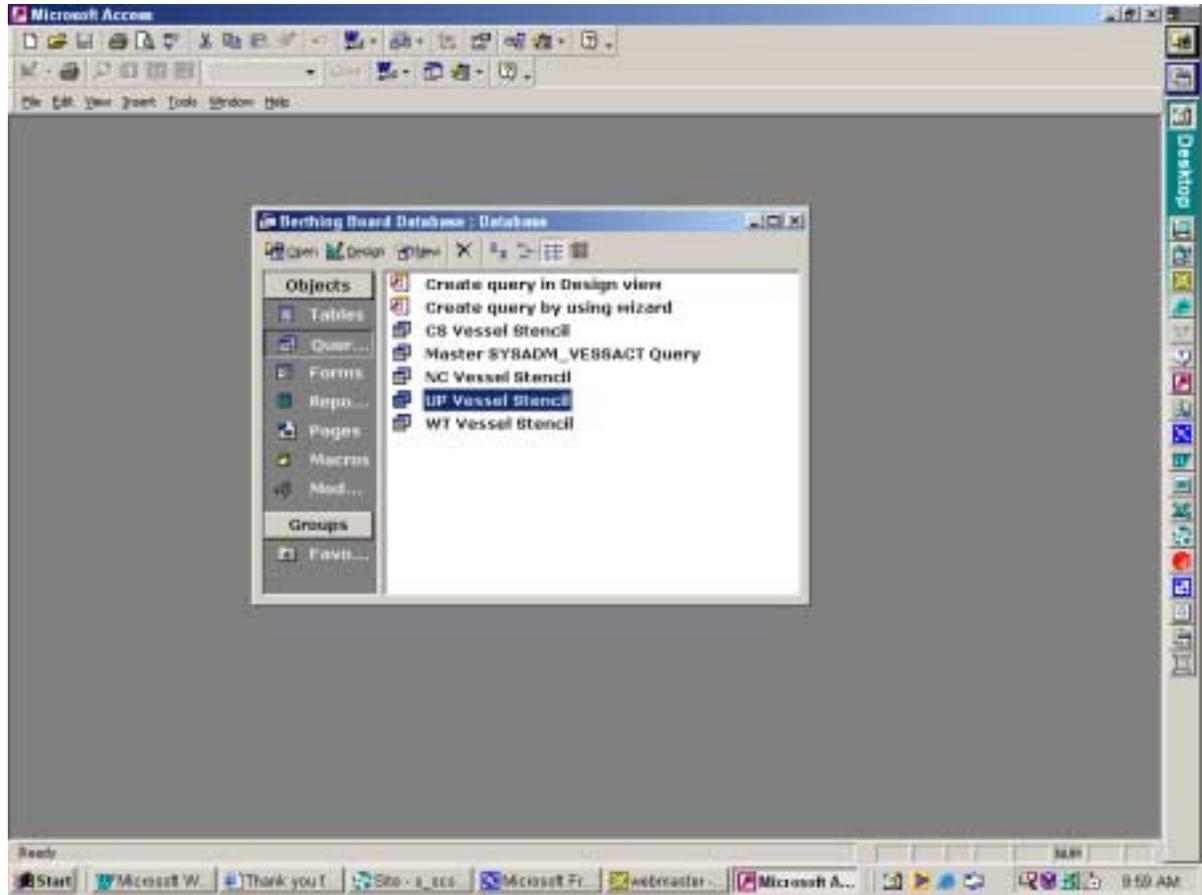


Exhibit D

Screen shot of Visio Application

The screenshot displays a Visio application window with a 'WWT Vessel Report' table and a 'Berthing Board Utilities' dialog box. The report table is as follows:

ETA	Vessel Name	Carrier Name	Agency Code	LOA	Estimated Berth/Four Mark	ETA	Arrival Date	Arrival Time	ZOD	ERS
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01
01/01/01	WORLD EXPRESS	WORLD EXPRESS	01/01/01	100	100	100	01/01/01	10:00	01/01/01	01/01/01

The 'Berthing Board Utilities' dialog box contains the following text:

Click Here Update Berthing Board-Click once to update all terminals

Click Here Update Report and Export to Intranet-Click to update each terminal individually

User form to run application: update berthing boards, export most current information to Intranet and update Vessel Report at bottom of page

Another Screen shot of Visio Application

The screenshot shows the Microsoft Visio application interface. The main drawing area displays a terminal layout with various colored blocks representing different sections. A 'Database Drawing Monitor' dialog box is open in the bottom right corner, listing drawing pages and their associated database queries. Two callout boxes provide additional context:

- A callout box on the left points to a green sidebar area, stating: "Shapes linked to Access 2002 queries for relevant terminal".
- A callout box on the right points to the 'Database Drawing Monitor' dialog, stating: "Database Monitor" which updates vessel shapes with the most current information".

The 'Database Drawing Monitor' dialog box contains the following information:

Database Drawing Page	Database Query
U3_scpabodge(Berthg)Capr (1) of POC Berthing Board-00.vi	U3_scpabodge(Berthg)Capr (1) of POC Berthing Board-00.vi
U5_scpabodge(Berthg)Capr (1) of POC Berthing Board-00.vi	U5_scpabodge(Berthg)Capr (1) of POC Berthing Board-00.vi
U1_scpabodge(Berthg)Capr (1) of POC Berthing Board-00.vi	U1_scpabodge(Berthg)Capr (1) of POC Berthing Board-00.vi

At the bottom of the Visio window, a table titled 'WWT V' is visible, showing vessel information:

EDA	Vessel Name	Carrier Name	Agency Code
000001	MSU 0207	MAERSK LINE	000001
000002	YARA EXPRESS	YARA	000002
000003	MAERSK MADRID	MAERSK LINE	000003
000004	MAERSK MADRID	MAERSK LINE	000004
000005	MAERSK MADRID	MAERSK LINE	000005
000006	MAERSK MADRID	MAERSK LINE	000006
000007	MAERSK MADRID	MAERSK LINE	000007
000008	MAERSK MADRID	MAERSK LINE	000008
000009	MAERSK MADRID	MAERSK LINE	000009
000010	MAERSK MADRID	MAERSK LINE	000010

Exhibit E

Screen shot of the Wando Welch Terminal Intranet page on display at the Berthing office.

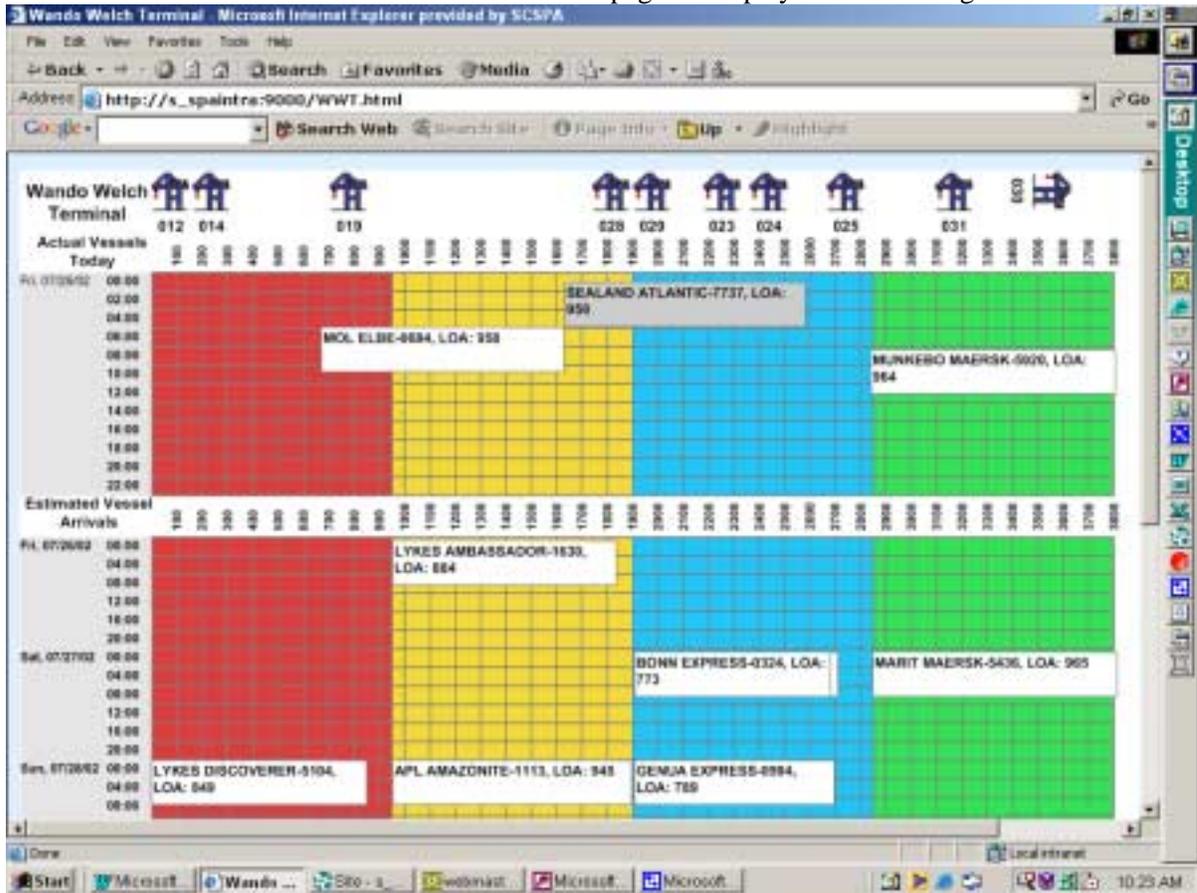


Exhibit F-1

Berthing Office Today

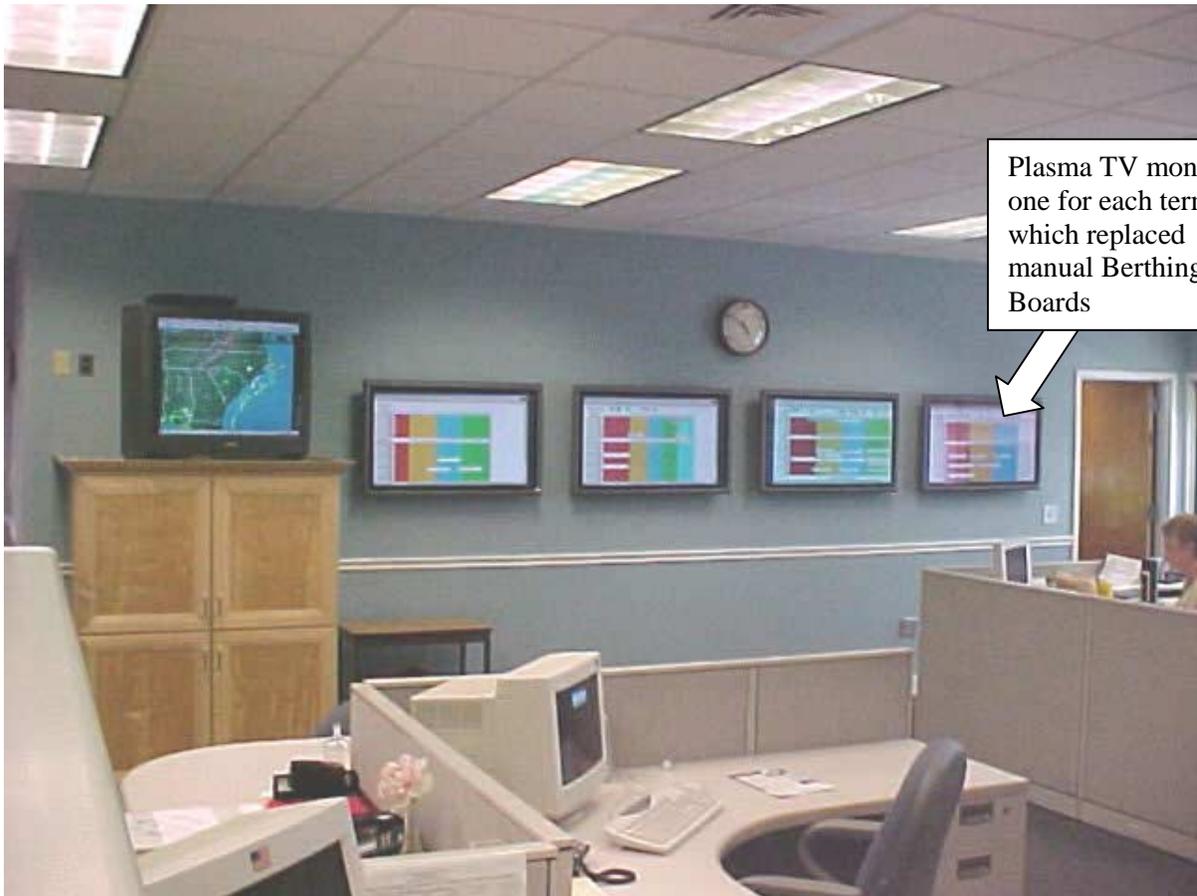


Exhibit F-2

Another photograph of Berthing Office

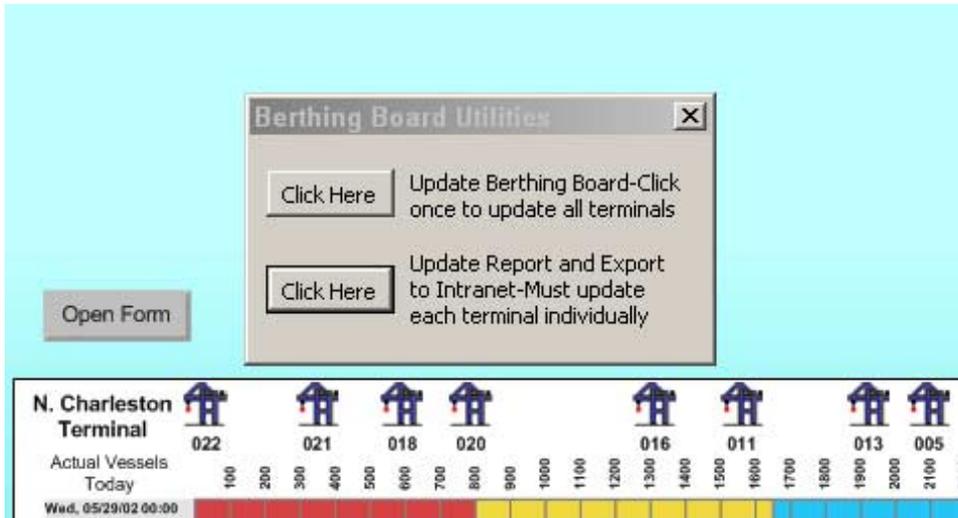


Exhibit G

Instructions for Using Automated Vessel Scheduling Application

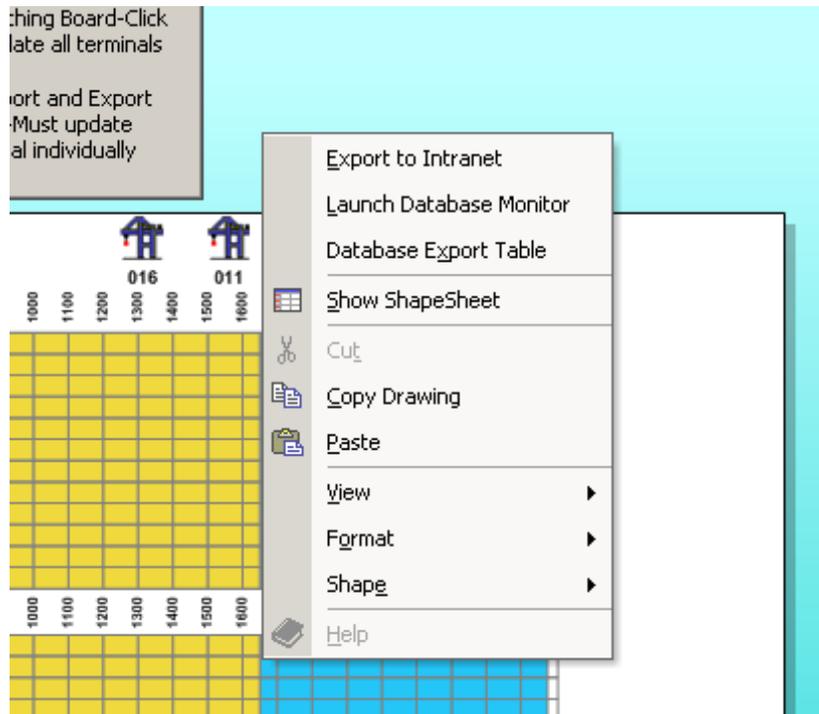
Instructions for Use by Harbor Master:

1. Open Visio document called "POC Berthing Board-10.vsd" from shortcut on desktop. A form called "Berthing Board Utilities" will pop up upon opening file.



2. Click the top button to launch the "Database Monitor" (Update Berthing Board) and connect to ORION. Click OK when a dialog box for "Datacom" opens. This will automatically distribute the vessels simultaneously for **ALL FOUR TERMINALS** onto the berthing board. You only need to click the button once.

3. If any additional changes are made to ORION throughout the day, you may click the right mouse button and choose "Launch Database Monitor" to update the vessels for only that page/terminal.



4. When the Database Monitor has finished updating the vessels, click "Close" and then click "OK."
5. When you are finished determining footmarks for the vessels, you must **publish EACH SEPARATE PAGE** to the Intranet. Clicking the second button on the "Berthing Board Utilities" form does this.

6. If you wish to change the **estimated date of arrival (EDA)** and manually move the vessel to the new date for planning purposes, double-click the vessel and edit the EDA field for that vessel.
- Remember: this does not change information in ORION.

The screenshot shows a 'Custom Properties' dialog box for a vessel. The 'EDA' field is circled in red. The dialog box contains the following fields and values:

Field	Value
Unique:	305079979477 NC
Arrival_Date:	Unknown
Arrival_Time:	00:00
EDA:	05/30/02
ETA:	00:00
Estimated_Berth:	2
EDD:	05/30/02
ETD:	00:00
Foot_Mark:	
Terminal:	NC
Vessel_Code:	3050
LOA:	589
Carrier_Name:	CMA-CGM AMERICA
Vessel_Name:	INDAMEX IMPALA
Lloyds Code:	9080405

At the bottom of the dialog box, there is a 'Prompt' field with the text: 'Custom property generated from database field Unique.' Below the dialog box, there are buttons for 'Define...', 'OK', and 'Cancel'. The background shows a calendar and a grid.

Important Information:

The placement of the shapes on the berthing board is data-driven. In order for changes to take place on the berthing board, the information must be changed in ORION.

Therefore,

- Do not edit any of the vessel shapes distributed on the berthing board, except for reasons detailed in #6.
- Do not delete any of the vessels - vessels will disappear from the berthing board based on the actual date of departure entered into ORION.
- If you accidentally close the form, each page has a button above the crane icons which, when double-clicked, will open the form.
- The cranes may be moved left and right, but not up and down.
- You must click the second button on the "Berthing Board Utilities" form to update the data in the Vessel Report at the bottom of each terminal. This must be done each time the database monitor is run. It does not update automatically.
- A custom toolbar is at the top of the application. From this toolbar you may "Save as Web Page" and rotate non-operational cranes.

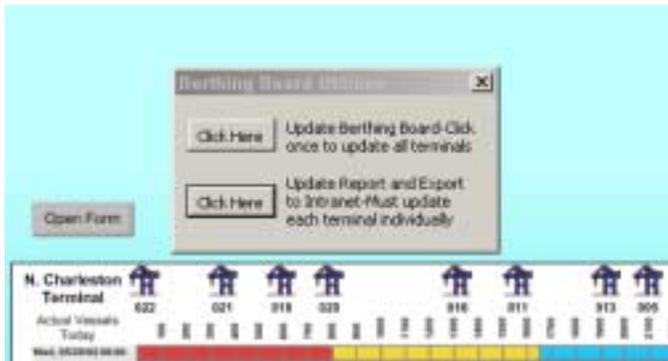
"What If" Questions:

What should I do if I delete one of the vessels from the screen?

First, use your undo command. If that does not work, re-launch the database monitor for that particular page. (Click right mouse button and choose "Launch Database Monitor."

What if I close the form?

Buttons on the top of each terminal page say "Open Form." Double-click that button and the form will open again.



What if I do not see a vessel at one of the terminals on the screen and I know that I entered it into ORION?

If you notice that a vessel is not showing up on the berthing board, but you know you updated the information in ORION, click the second button on the form and update the report. If you see the vessel in question on that report, you know that the vessel is hidden under another vessel on the page.

Assigning another estimated berth and a footmark in ORION will rectify that problem.

How do I send a copy of the terminals via e-mail?

To send a copy by e-mail, click "Save as Web Page," "Publish," "Replace Existing," and then OK. It will open up in your browser. Click File/Send/Page by E-mail.

What if I want to show that a crane is down?

Click on the crane that is down, and click the "Rotate Right" button on the Berthing Board toolbar at the top.