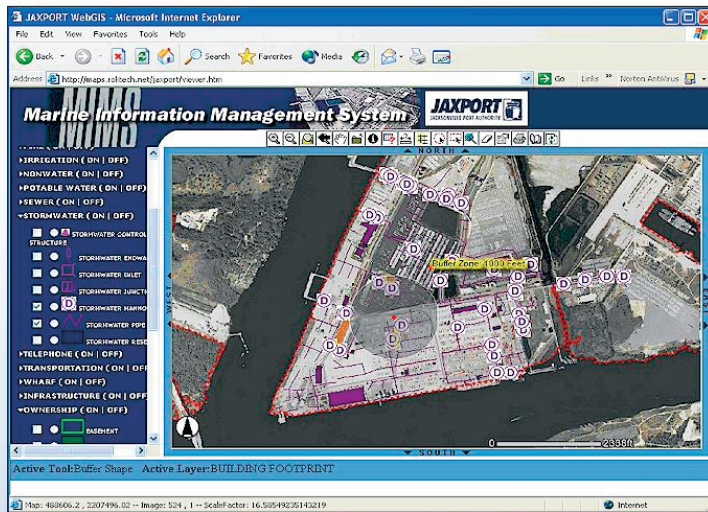
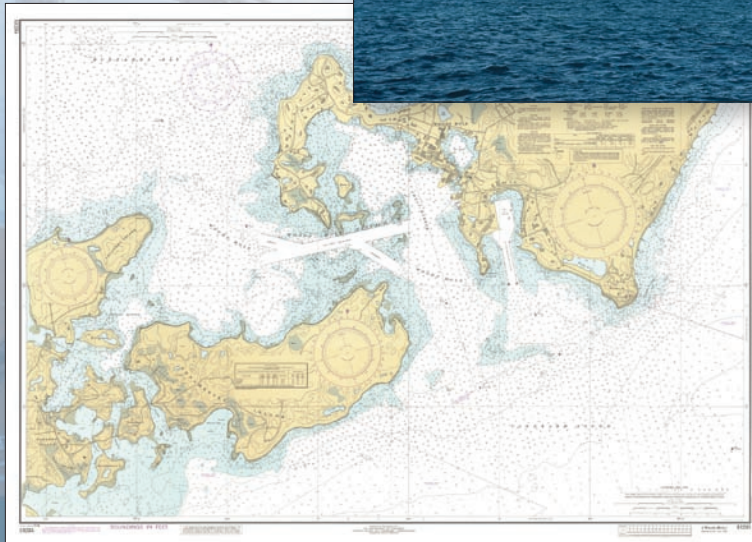
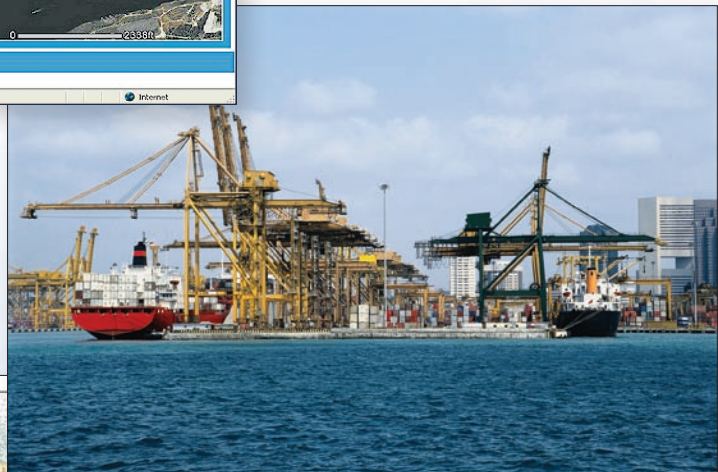


GIS Solutions for Ports and Maritime Transport



ESRI® GIS for

- Environmental Management
- Facility Management
- Intermodal Management
- Operations
- Security



GIS Solutions for Ports and Maritime Transport

ESRI® GIS Solutions Drive Business Results

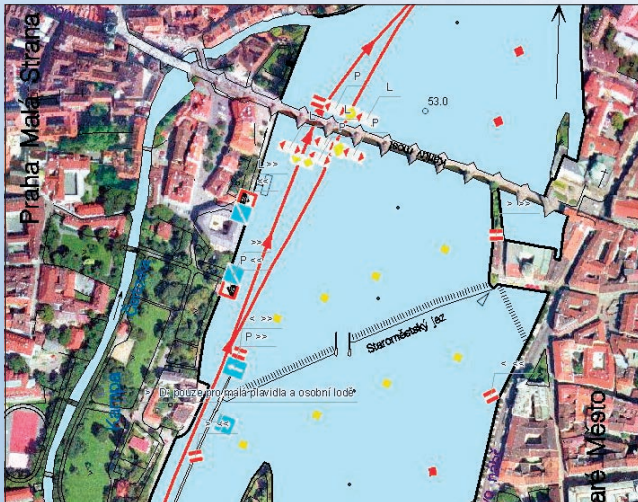
Port operators today face increased demands for operational efficiency, effective facility management, comprehensive security, and sensitive environmental management. These diverse challenges require access to detailed, up-to-date information and careful analysis to produce optimal results. Geographic information system (GIS) technology from ESRI provides management solutions that incorporate the location of your assets to give you a decisive competitive advantage.

Use ESRI's ArcGIS® family of software products to

- Integrate information from all aspects of port operations.
- Track and analyze assets over space and time.
- Provide insight through visualization (mapping) of information and relationships.
- Support information sharing throughout your organization.

ESRI® GIS gives you the ability to integrate disparate information sources into a common operational picture of all port facilities, with greater power to control your operations and positively impact your bottom line.

Discover the power of using location to connect and analyze your existing business processes so you can see—and control—the big picture.



A Web-based GIS system enables viewing and distribution of customized waterway shipping maps for the Shipping Authority of the Czech Republic. Image courtesy of VARS BRNO Company and the Czech Shipping Authority.



GIS helps ports track their facilities including the location of hazardous materials.

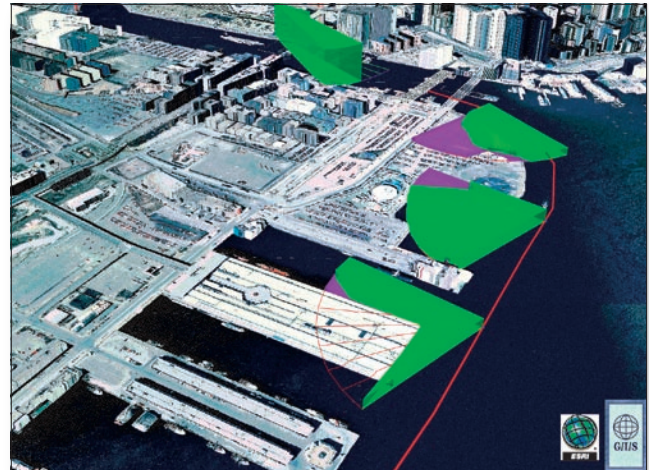
GIS improves port and maritime efficiency in

- Infrastructure and Expansion Planning
- Port Design
- Environmental Management
 - Storm Water Management
 - Environmental Compliance
- Facility and Utility Management
 - Asset and Inventory Management
 - Maintenance/Work Order Management
 - Utility Operations and Control
- Property and Lease Management
- Security Operations
- Emergency Response and Management
 - Spill Response and Management
 - Incident Tracking
- Port Operations
 - Real-Time Vehicle and Asset Location
 - Vessel Routing and Tracking
 - Berth Occupancy and Assignment
 - Cargo and Berth Time Calculations
 - Dangerous Cargo Display
- Intermodal Management
- Meteorological Monitoring
- Water Depth Assessment and Visualization
- Nautical Charting
- Public Information
 - Shipping Channels Location
 - Restricted Area Awareness

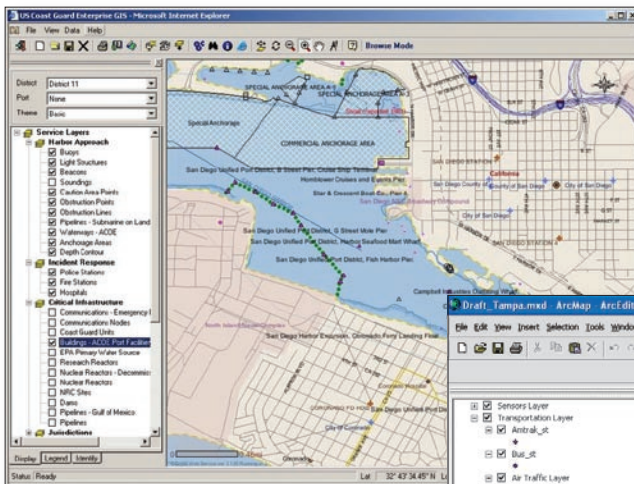
Improve Port Security with GIS

Port security requirements increased considerably after September 11, 2001, and your comprehensive port protection requires cooperation and close coordination among different agencies. Use GIS technology to enable a shared common operational picture of port and supporting facilities, which promotes inter-agency communication and coordination of action.

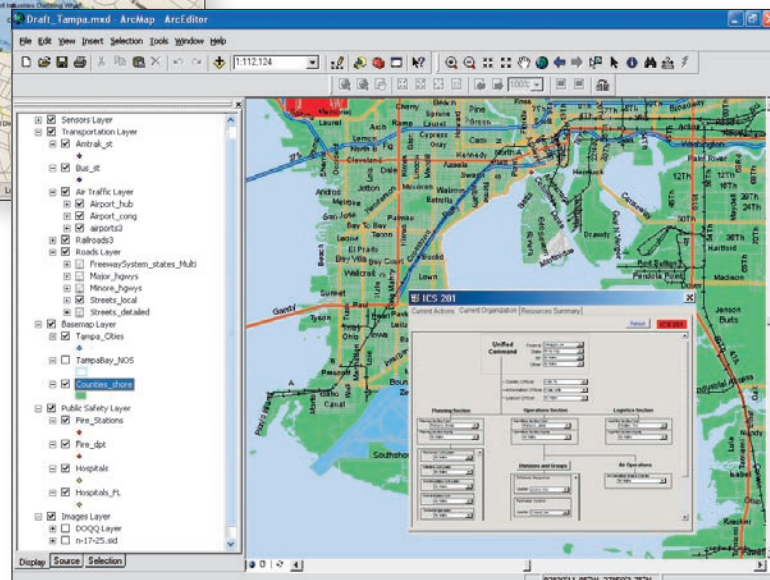
GIS integrates multiple sources of information, displays results on a map or satellite image, and delivers the resulting situational awareness on a secure network. You can combine real-time tracking of vessels and port-based vehicles with sources such as live CCTV cameras to deliver a real-time security view of your port facilities. These capabilities make GIS an essential technology for managing a port's security framework.



A 3D "viewshed" created with ESRI GIS technology helps port security managers visualize security camera coverage and plan the most efficient camera placement for security monitoring. Application image courtesy of Geographic Information Services Inc.



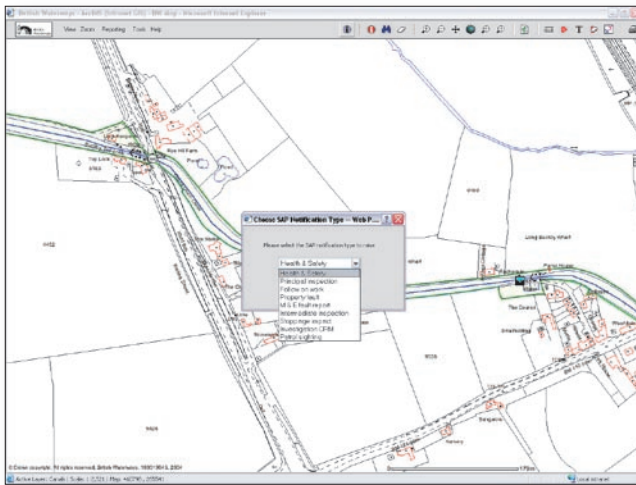
A common operational picture of the Port of San Diego uses Web-based GIS technology to map all critical facilities for incident response. Image courtesy of the U.S. Coast Guard's Enterprise GIS.



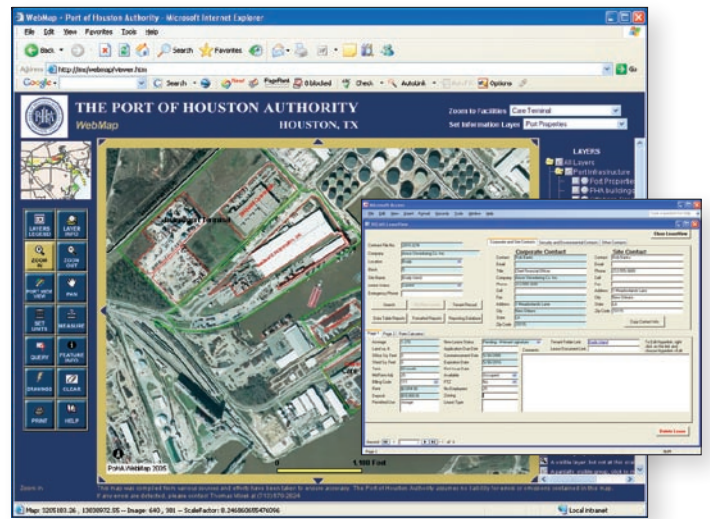
Applications built using ESRI ArcGIS provide information that assists emergency planners and responders such as this display of Tampa Bay, Florida, which includes the incident response command structure. This incident command system (ICS) was developed by Applied Science Associates for the U.S. Coast Guard.

Increase Facility Management Efficiency with GIS

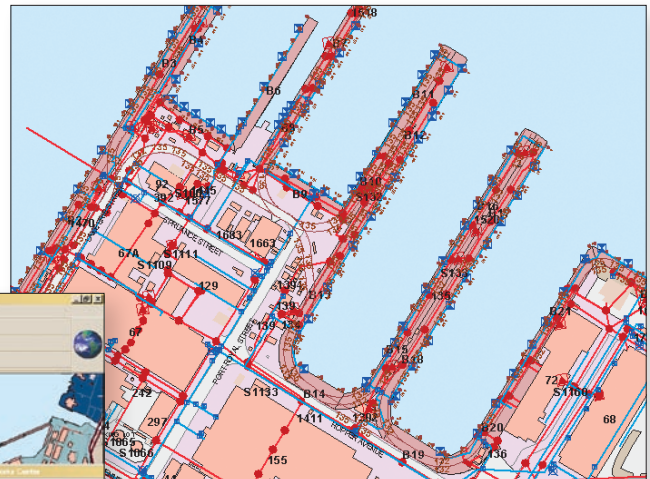
Use GIS to streamline coordination and management of a large collection of different facilities and achieve optimum efficiency. A GIS-based information system provides a powerful foundation for better port facility management by generating integrated information that helps you make better allocation decisions about limited port resources. You can achieve significant cost savings and ensure maximum operational efficiencies when you integrate your facility management solution with an ESRI GIS-based maintenance management solution.



ESRI GIS integrated with an enterprise resource planning solution from SAP improves British Waterways' management of a 2,000-mile water network and its associated infrastructure. Waterways managers gain a powerful online tool for visualizing and managing their asset information.



The Port of Houston uses a Web-based real estate lease management application to map all the port's property leases and attaches a Microsoft Access database of relevant leasehold information. Port employees view the GIS application over the corporate intranet.



Created by the Department of the Navy's Pacific Fleet, this application uses ArcGIS to map utilities and other infrastructure (above) and integrate facility photos, links to the facility information database, and maintenance records in Maximo, IBM's asset management solution (left).



Model and Visualize Port Operations with GIS

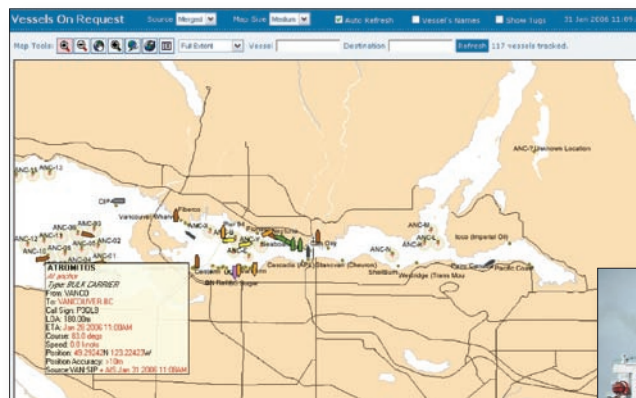
Managing your port's daily operations requires careful coordination of multiple activities within the port. A location-based information management solution helps you achieve greater efficiencies with tools for modeling, analysis, and visualization. Improve coordination of activities including ship traffic control, berth scheduling, ground-based utility provisioning, and container off-loading and tracking.



ESRI technology enables mapping and display of vessel locations for traffic control and safety management, as shown in this Municipal Port Authority of Rotterdam application.



Working in partnership with the U.S. National Oceanic and Atmospheric Administration Coastal Services Center, EarthData Solutions developed a prototype decision support tool for improved port operations. Based on ESRI technology and EarthData's SIMmetry architecture, the prototype offers 2D GIS fully synchronized with 3D thematic mapping, query, analysis capabilities, and analytical modeling. Context-driven queries and data views support specific groups such as environmental, property, and port operations managers and security, marine, and emergency response personnel.



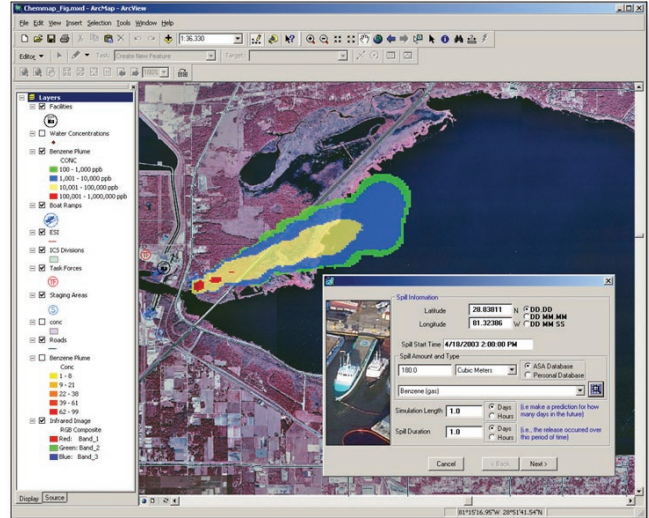
The Vancouver Port Authority uses ESRI technology to coordinate vessel automatic identification system (AIS) data for dynamic berth assignment. The port's application (Portview) color codes vessels by cargo type and records their location at each berth. A mouse click on the berth section retrieves information on vessel name, type, estimated time of arrival, position, registration, ownership, and more. Port operators use this information to calculate tariffs and generate billing invoices and various reports. Web-based GIS technology makes it possible for shippers to apply for parking and hazardous materials permits over the Internet.

Coordinate Environmental Compliance with GIS

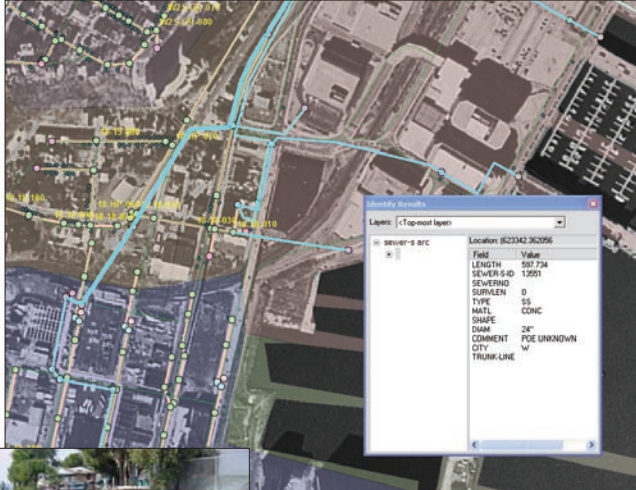
Location-based information management and visualization capabilities give you useful tools for environmental management including tools for meeting monitoring and compliance requirements for

- Storm water and other potential contaminants
- Dredging operations
- Wetlands restoration

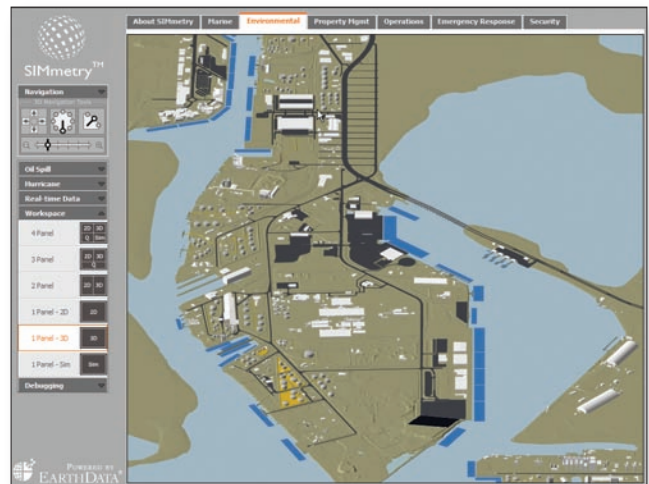
Use ArcGIS technology to create a comprehensive view of hazardous materials location and storage and analyze the potential impact of chemical, oil, or gas spills in the marine environment. You can create 3D views of aboveground port facilities or underwater features. Use bathymetric data to model channel depth for dredging operations and map underwater obstructions for safer navigation.



A modeling application uses weather and other data to help understand the potential plume footprint from an industrial facility in the event of a major chemical release. The Department of Health and Human Services, Bureau of Air Quality Control, Houston, Texas, uses existing enterprise GIS data to run this AIRMAP extension built by Applied Science Associates using ESRI ArcGIS technology.



GIS stores locations of impervious surfaces, potential contaminant sources, storm water collection systems, and treatment facilities to help managers monitor flows and plan improvements. Image courtesy of CH2M HILL.



The Tampa Port Authority uses GIS technology for environmental compliance to identify best management practices and better manage a network of drainage ditches, retention ponds, and wetlands that help improve water quality and coastal habitats.

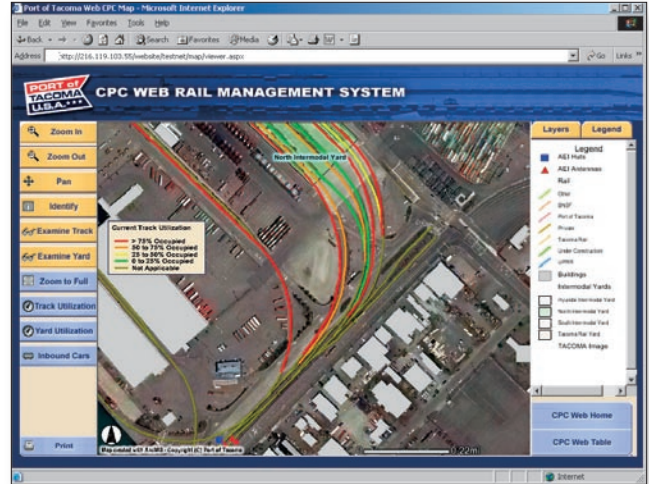
Power Port Throughput with GIS

The dynamic nature of intermodal cargo transfer too often leads to cargo traffic bottlenecks, increased waiting time, and lost efficiency. This can lead to higher costs, late deliveries, destruction of perishables, or even shipment cancellations.

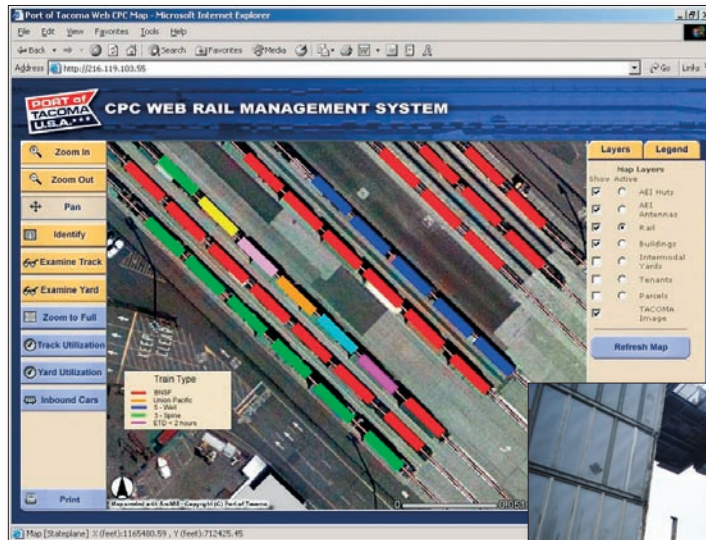
Use ArcGIS technology to centralize your data and, in the process, give you and your personnel access to accurate and timely information. An essential feature in any decision support system, access to up-to-date information helps you effectively manage coordination of ship-to-rail or ship-to-truck transfers and shipments.

GIS integrated with real-time container and vehicle tracking makes it possible to schedule just-in-time arrivals for deliveries and increase port throughput. Increase security and efficiency with location tracking of containers and other port assets.

GIS supports the development of "executive dashboards" that display many types of information on a single screen. Facility and operations managers can view real-time video, maps, analytical graphs, aerial photographs, and detailed data in one place to enhance understanding of complex operations.



The Port of Tacoma Intranet Rail Management System integrates near real-time displays of rail car and container information received from Automatic Equipment Identification tags and sensors. The port uses this information for yard management and rail consist management. Images courtesy of Integral GIS and the Port of Tacoma.



Microsoft Excel - Microsoft Internet Explorer

Tacoma Westbound Plan
As of 01/13/2003 08:27

Train I.D.	Date	Time	Feet	Units	Feet	Summary				Date	Time		
						NEM	BLAIR	PCI	Total				
BLVDING109	01/09/2003	17:44	251	5	0	0	0	0	251	5	01/09/2003	17:44	
Subtotal	01/09/2003		251	5	0	0	0	0	251	5	01/09/2003	17:07	
HLWPA5107	01/10/2003	16:07	0	0	0	0	0	0	0	0	01/10/2003	16:07	
Subtotal	01/10/2003		0	0	0	0	0	0	0	0	01/10/2003	14:56	
SBRTAC310	01/11/2003	14:56	480	23	5,614	0	0	0	6,094	238	01/11/2003	06:53	
HLWET06110	01/11/2003	05:53	0	0	0	1,102	0	0	5,892	216	01/11/2003	05:53	
Subtotal	01/11/2003		480	23	5,614	1,102	0	0	840	32	01/12/2003	12:31	
BLWPA5109	01/12/2003	12:31	0	0	0	14	2,372	0	0	4,901	327	01/12/2003	12:31
BLWPA5110	01/12/2003	08:48	0	0	0	0	0	0	0	0	01/12/2003	08:48	
BLWPA5111	01/12/2003	07:09	565	27	5,339	29	3,992	0	3,992	327	01/12/2003	07:09	
BLWPA5112	01/12/2003	06:53	566	28	5,222	356	0	0	6,788	284	01/12/2003	06:53	
BLWPA5113	01/12/2003	05:07	154	12	2,862	76	591	0	3,508	228	01/12/2003	05:07	
BLWPA5114	01/12/2003	01:17	1,241	12	0	0	0	0	1,241	22	01/12/2003	01:17	
Subtotal	01/12/2003		3,513	108	11,885	316	3,023	151	0	22,420	980	01/12/2003	12:31
BLWPA5115	01/13/2003	12:04	1,140	21	472	18	116	0	2,181	62	01/13/2003	12:04	
BLWPA5116	01/13/2003	12:07	0	0	469	11	0	0	469	13	01/13/2003	12:07	
BLWPA5117	01/13/2003	04:59	0	0	0	0	0	0	0	0	01/13/2003	04:59	
BLWPA5118	01/13/2003	02:51	72	2	3,896	43	3,447	32	0	9,028	97	01/13/2003	02:51
BLWPA5119	01/13/2003	01:54	3,649	36	5,120	139	76	1	4,241	136	01/13/2003	01:54	
BLWPA5120	01/13/2003	00:06	1,100	12	873	21	3,382	114	0	8,895	208	01/13/2003	00:06
Subtotal	01/13/2003		6,792	107	11,366	310	5,290	221	0	16,614	515	01/13/2003	12:04
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BLWPA5122	01/14/2003	01:49	0	0	912	28	1,027	17	0	2,478	44	01/14/2003	01:49
Subtotal	01/14/2003		364	10	1,394	41	1,098	34	0	2,946	60	01/14/2003	12:03
BLWPA5123	01/15/2003	12:29	592	5	1,015	22	866	21	0	1,981	32	01/15/2003	12:29
BLWPA5124	01/15/2003	10:17	2,762	48	3,115	34	2,112	66	0	8,920	170	01/15/2003	10:17
BLWPA5125	01/15/2003	07:28	0	0	707	20	458	18	0	1,203	26	01/15/2003	07:28
Subtotal	01/15/2003		3,954	14	5,290	81	3,295	102	0	10,679	208	01/15/2003	12:03
BLWPA5126	01/16/2003	02:21	329	18	393	21	0	0	528	32	01/16/2003	02:21	
BLWPA5127	01/16/2003	07:01	0	0	882	16	472	28	0	1,304	25	01/16/2003	07:01
Subtotal	01/16/2003		329	18	792	37	472	28	0	1,632	45	01/16/2003	12:03
BLWPA5128	01/17/2003	07:17	1,295	18	203	10	0	0	1,528	46	01/17/2003	07:17	
Subtotal	01/17/2003		1,295	18	363	10	0	0	1,528	46	01/17/2003	07:17	
Grand Total			14,527	304	16,981	801	13,791	801	0	60,242	1,907		





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E-mail: info@esri.com

For more than 35 years, ESRI has been helping people make better decisions through management and analysis of geographic information. A full-service GIS company, ESRI offers a framework for implementing GIS technology and business logic in any organization from personal GIS on the desktop to enterprise-wide GIS servers (including the Web) and mobile devices. ESRI GIS solutions are flexible and can be customized to meet the needs of our users.

For More Information

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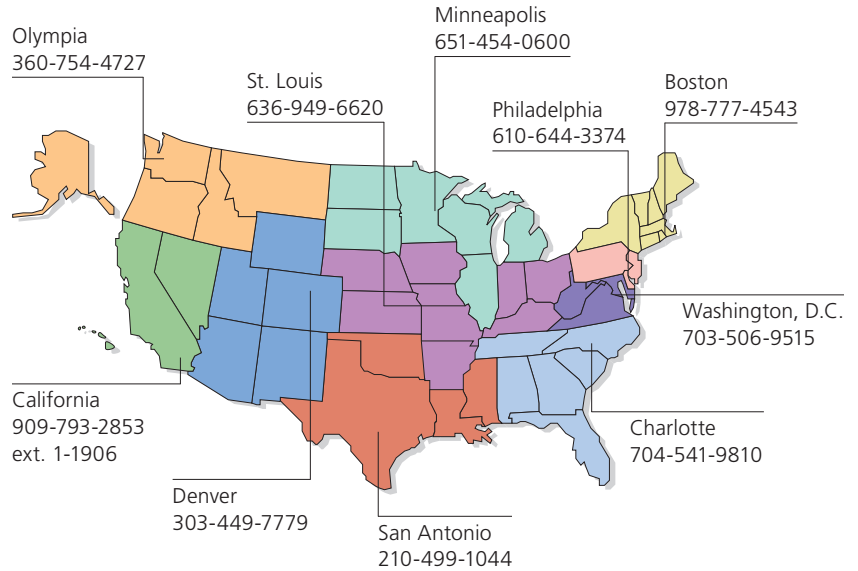
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