

## TR News July-August 2010: Globalization and Transportation: Changing the World

### DETAILS

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### AUTHORS

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# TR NEWS

NUMBER 269

JULY–AUGUST 2010

## GLOBALIZATION AND TRANSPORTATION: CHANGING THE WORLD

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#### Globalization and Transportation: Changing the World

*Joedy Cambridge*

Starting with an instructive inventory of information, articles in this special issue present historical, national, regional, economic, and policy perspectives on globalization, its multifaceted interactions with transportation, and its manifold impacts.

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*Mary R. Brooks*

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COVER: Port Metro Vancouver terminals on Burrard Inlet, seen from the air. The effects of globalization on transportation include shifts in trade environment, multilayered security considerations, regional development, and new perspectives on port investment. (Photo: Port Metro Vancouver)

# TR NEWS

features articles on innovative and timely research and development activities in all modes of transportation. Brief news items of interest to the transportation community are also included, along with profiles of transportation professionals, meeting announcements, summaries of new publications, and news of Transportation Research Board activities.

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Considerations for the Transportation Infrastructure**

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Globalization is shaping the freight transportation needs of the Southeast United States; the development of gateways, exporters, and foreign direct investment will lead to more traffic on the region's infrastructure and across jurisdictions, the author observes, citing examples, trends, and projections.

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U.S. port activities generate more than \$3 trillion in economic activity annually and support more than 13 million workers. The CEO of the American Association of Port Authorities outlines several federal programs and tax incentives related to ports that could assist in job creation, enhance sustainability, and provide long-term economic growth and prosperity for the nation.

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**COMING NEXT ISSUE**

Transportation asset management, including performance measures and performance management, is the focus of articles in the September–October *TR News*. Features highlight practical perspectives on programs in two states and one county, with an overview of the necessary tools; insights into change management; the benefits of asset management for local communities, including improved accountability and transparency, reduced risks, and more informed decisions; the use of visualization for management of transportation assets; choosing the right fix at the right time to increase the service life of assets; and more.



Visualization of surveyed culverts and pavement sections, in the context of the terrain; affordable computer tools can show graphically the relationships between assets, the physical world, and past and planned changes.

## INTRODUCTION

# GLOBALIZATION AND TRANSPORTATION

## *Changing the World*

**W**hat do *you* know about globalization and international transportation? During a recent Transportation Research Board (TRB) Annual Meeting, session speaker Mary L. Brooks of Dalhousie University, Nova Scotia, Canada, distributed a quiz on globalization to attendees. The results revealed that many transportation professionals knew less about the topic than would be expected. *TR News* readers now can test their knowledge with an updated version of the 21-question quiz (page 4) and then fill in the gaps with the answers and resources (page 12).

The articles in this theme issue not only provide an overview of globalization and its impact on the economy, the environment, sustainability, and security, but also include a historical look at globalization as far back as ancient Rome. Author and journalist Sarah Murray, a featured speaker at the TRB 2008 Joint Summer Conference in Baltimore, offers an historical perspective on globalization, adapted from her book, *Moveable Feasts: From Ancient Rome to the 21st Century—The Incredible Journeys of the Food We Eat* (see page 6). Thomas Wakeman of the Stevens Institute of Technology, Hoboken, New Jersey, and Michael Bomba, Alliance Transportation Group, Austin, Texas, examine the role of international freight transportation in national economic recovery and global sustainability (page 14).

The security aspects of globalization in the context of the aviation sector come under the scrutiny of Richard Bloom, Embry-Riddle Aeronautical University, Prescott, Arizona (page 21). In his article, Bruce Lambert, Institute for Trade and Transportation Studies, Mandeville, Louisiana, examines globalization from a U.S. regional perspective, focusing on the effects of globalization on transportation infrastructure needs in the U.S. Southeast (page 28). Kurt Nagle, President and CEO of the American Association of Port Authorities, offers a Point of View on the roles that seaports play in boosting the national economy with new jobs and in adopting initiatives to enhance the environment (page 35).

The goal of this special issue is to raise awareness of—and interest in—the many aspects of globalization and the impacts it has even at the local level. Reader feedback on the articles in this issue is encouraged.

—Joedy Cambridge  
*Marine and Intermodal Specialist, TRB*

EDITOR'S NOTE: Appreciation is expressed to Joedy Cambridge for her contributions in developing this issue of *TR News*.





# GLOBALIZATION AND TRANSPORTATION

## QUIZ

# What Do You Know About Globalization and International Transportation?

MARY R. BROOKS

The author is William A. Black Chair of Commerce, Dalhousie University, Halifax, Nova Scotia, Canada.

Editor's Note: Answers to the quiz appear on page 12.

### True or False? (1 point each)

1. In 2008, Germany was the largest goods exporter in the world in terms of value.
2. In 2008, the United States was the largest goods trader—importer and exporter—in terms of value.
3. In 2008, Germany was the largest trader in commercial services in terms of value.
4. Between 1955 and 2004, air freight prices fell from \$3.87 per ton-kilometer to less than \$0.30 per ton-kilometer, in 2000 U.S. dollars.
5. A global reduction in the cost of transportation was a key to the rapid growth of global trade in the past two decades.
6. Since 2000, the share of world merchandise trade held by the North American Free Trade Agreement countries has fallen from one-fifth to one-eighth.
7. Japanese own 100 percent of the vessels flagged in Japan, but Bahamians own none of the vessels flagged in the Bahamas.



PHOTO: NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

A shipment of high-tech equipment is offloaded from a Lufthansa plane at Cape Canaveral Air Station in Florida. Changes in air freight prices since the 1950s have facilitated international shipping.



PHOTO: M. LINDER © HAFEN HAMBURG MARKETING

Terminal expansion work at the Port of Hamburg's Burchardkai-Eurokai container handling facilities. Germany plays a major role in international shipping.

PHOTO: HTTP://BLOGS.PRINCETON.EDU/GREAT-MINEMISTRY



China's prominence in the global economy has held steady throughout history.

**Multiple Choice** (1 point each)

8. The two largest economies in the 19th century were (a) United States and Canada; (b) France and United Kingdom; (c) China and India.
9. The largest emerging economies in the 21st century are (a) United States and Canada; (b) Brazil and Russia; (c) China and India.
10. The top 10 countries with ability to buy—based on gross domestic product (GDP) per capita, purchasing power parity—include (a) United States, Norway, and Canada; (b) Singapore, Kuwait, and Norway; (c) United States, Qatar, and United Kingdom; (d) United States, Canada, and Luxembourg.
11. Global Insight projects that by 2050, the top four economies in the world—in order, by real GDP—will be (a) United States, China, Japan, India; (b) China, United States, India, Japan; (c) United States, China, Brazil, India; (d) China, United States, India, Russia.
12. The KOF Globalization Index measures the degree of globalization of a country. Match each of the countries in Column 1 below with its economic dimension score on the KOF Globalization Index 2010, based on 2007 data, listed in Column 2 (1 point for each correct combination; 5 points total for Question 12):
 

Belgium	56.82
Canada	69.27
China (not including Hong Kong)	78.55
United Kingdom	81.49
United States	91.94
13. The World Economic Forum's *Global Enabling Trade Report 2009* ranked the following countries as the top four in transport and communications infrastructure: (a) Germany, Netherlands, Singapore, Sweden; (b) Germany, Singapore, Hong Kong, France; (c) United States, Germany, Switzerland, Japan.
14. In the World Economic Forum's *Global Competitiveness Report 2009–2010*, which of the fol-

lowing is true? (Choose one:) (a) Japan ranked 3rd, and Germany ranked 7th; (b) Switzerland ranked 1st, and United States ranked 2nd; (c) United States ranked 1st, and Singapore ranked 4th.

15. The top three border crossings for Canada–U.S. trade by road are (a) Fort Erie, Sarnia, and Pacific Highway; (b) Windsor, Fort Erie, and Sarnia; (c) Windsor, Sarnia, and La Colle.
16. As of January 1, 2009, the world's largest ship owners—domestic and foreign flag ships, by tonnage—were (a) Americans; (b) Greeks; (c) Japanese; (d) Hong Kong Chinese.
17. The largest demand for bulk shipping, in terms of billions of ton-miles, comes from (a) crude oil; (b) iron ore; (c) coal.
18. Documentary requirements can streamline trade or make it more difficult. Which of the following four countries requires the most documents for import and export? (a) Canada; (b) India; (c) Mexico; (d) United States.
19. Which seaport is closer to Brazil? (a) Halifax, Canada; (b) Savannah, Georgia.
20. Which is closer to Norfolk, Virginia? (a) Singapore via Suez Canal; (b) Singapore via Panama Canal.
21. Which is closer to Singapore? (a) Los Angeles; (b) Lázaro Cárdenas, Mexico; (c) Vancouver, Canada.

**Your score out of 25:**

The Panama Canal, visible in the center of the image, has played a key role in world trade, linking ports in the Eastern and Western Hemispheres; the canal is undergoing major expansion.

PHOTO: NASA





## GLOBALIZATION AND TRANSPORTATION

# Liquid Gold

## *The Ancient Amphora Delivers Roman Riches*

SARAH MURRAY

The author is a longtime Financial Times contributor and lives in New York City. This essay is adapted from her book, *Moveable Feasts: From Ancient Rome to the 21st Century, the Incredible Journeys of the Food We Eat*, published by St. Martin's Press, 2007, and Picador, 2008.

Many mosaics are still visible at the Piazzale delle Corporazioni (Square of the Corporations) in the ancient Roman harbor town of Ostia. This mosaic features an amphora at its center; amphorae were vital to Roman trade.

José Remesal Rodríguez holds a piece of pottery up to the sunlight. He is standing at the top of Monte Testaccio, a small, unassuming hill on the southern fringe of the Aventine, a short ride from Rome's city center and within sight of some of Europe's greatest monuments. But the professor is not paying attention to the view. He is examining the chunk of clay in his hand.

The piece of clay is pale brown and bears a deep mark that appears to have been stamped when the clay was wet. Nothing is refined about this thick fragment of earthenware with its clumsy form and rough surface. It was clearly not part of any decorative or ceremonial object. It is a piece of a Roman transport amphora—a ceramic pot about the size of a small barrel that almost 2,000 years ago carried goods to Rome, the capital of an empire stretching from the lowlands of Scotland to the deserts of Africa, from Spain to the Persian Gulf.

"It is Baetican, of course," pronounces the professor. Baetica is today's Spanish province of Andalusia,

the southernmost region of the Iberian Peninsula. Baetica was part of Hispania, an area now occupied by Spain, Portugal, Andorra, and Gibraltar. Roman soldiers first arrived there in 218 BC and, as direct imperial rule was established, Hispania became a prized part of the empire. Baetica also was an important source of food for the empire and the starting point for the piece of pottery Remesal is holding.

The pottery fragment is from a 2nd-century transport jar that set out to Italy from a vast agricultural estate owned by a wealthy senator when Rome was at the height of its power. Produce from this fertile land was loaded into the jar, heaved on to a vessel by bonded laborers, and shipped to Rome. There, it ended up in the homes and palaces of everyone from politicians to freed slaves. Although small and dusty, this fragment of pottery is part of the endless patchwork that is the history of the Roman Empire. It tells a story of immense wealth built on trade in an essential commodity—olive oil.

### Uncovering Ancient Stories

Remesal is a bearded, bespectacled Spaniard who has spent the past couple of decades uncovering the stories hidden beneath Monte Testaccio's grassy slopes. In blue jeans and khaki safari jacket, he looks entirely at home clambering over the broken pieces of Roman amphorae scattered underfoot.

"I spend a month here each year, and every time we come, we find something different," he says. "I know this hill pretty well, but there are always surprises." Remesal talks with a deep, gravelly voice. It sounds as if, over the years, particles of dust from the pots he studies have become lodged in his throat.

The archaeological dig on Monte Testaccio is like no other. Most archaeologists spend days scrabbling about in dirt in the hope of finding something of interest, but here they have no such worries. The entire hill is made of archaeological material—beneath the thin layer of topsoil are millions of broken pots.

Each year, Remesal and his colleagues come to



PHOTO: BILL STORAGE AND LAURA MAISH

study the hill, carving a large square pit approximately 10 feet deep and recording details of what they excavate. Like the rings of a tree, each layer of pots corresponds to a moment in time. This year's pit has reached as far as the reign of Marcus Aurelius, around AD 175. As the dig progresses, Italian contract workers in hard hats stand at the bottom of the hole, chipping carefully away and filling buckets with pieces of amphora. These are hauled up to the surface and heaved over to the center of activity—a collection of large plastic tubs filled with muddy water. There, students and academics sit and gossip as they wash 2,000-year-old layers of dust from the chunks of earthenware in their hands.

The shards are thrown into bright orange, yellow, and green plastic crates—a different color for each category of fragment. Some crates contain fragments with form—handles, necks, or bases. Others store pieces on which rough scratches, stamped marks, or painted inscriptions are visible. Most of the pieces, however, are shards without recognizable shape or markings, known as “no form.” At a large table, several archaeologists are working on one of the world's more difficult jigsaw puzzles, trying—mostly in vain—to recreate entire pots by fitting together some of the larger pieces retrieved from the same excavation level.

At the end of the dig, much of what has been heaved up from below the hill's surface will be thrown back into the hole. A single one of these shards found in a field anywhere else would generate excitement among historians and archaeologists. On Monte Testaccio, however, pieces of Roman amphorae are being heaved up in bucket loads throughout the day. The volunteers wash the fragments and casually sort them into the plastic boxes.

### Standing on Spanish Soil

One of the world's ancient relics, Monte Testaccio is a vast rubbish heap. For more than two centuries, olive oil amphorae were dumped here after the contents had been unloaded and distributed to consumers. As Romans used up more and more oil, the pile of shards grew, creating a hill made up entirely of bits of pottery—bases, handles, rims, necks, and body fragments. Roman emperors came and went, battles were lost and won, and nations beaten into submission, but the mountain of pots kept rising.

Some of the amphorae were shipped from North Africa, but at least 80 percent of Monte Testaccio's unlikely treasures originated in Baetica. “We are standing on Spanish territory,” Remesal declares with a grin. He is right—the gargantuan mound is made from the clay of southern Spain, a chunk of foreign soil that ended up on Italian shores.



PHOTO: ADRIAN PINSTONE

A replica of a statue of Roman emperor Marcus Aurelius stands in Rome's Piazza Campidoglio. So far, the dig at Monte Testaccio has uncovered shipping pots that date back to Aurelius' reign, 161–180 AD.

Few notice this bizarre monument to ancient Rome's commercial might, for clustering around its base today are restaurants, bars, and nightclubs. At the back of several of the restaurants, the pot fragments are clearly visible behind glass walls. Dining and dancing may now be the order of the day, but in the 1st and 2nd centuries, the activity centered on waste disposal.

### Hill of Data

Several theories explain how the activity was organized. Some believe that empty pots were hauled up the ever-expanding hill by mules—each animal perhaps carrying four amphorae—and were broken up at the summit. Others speculate that the jars were smashed below before being taken up to their final resting place. From time to time, lime was poured on the broken shards to counter the smell of rancid oil and to prevent the spread of disease.

With each cargo vessel that arrived on the banks of the Tiber River, the hill grew bigger. By some accounts, it is approximately 165 feet high and takes 20 minutes to walk around. It may not compare with the Colosseum, the giant showcase for Roman cruelty, or the Pantheon and its mighty dome, but this man-made mound is one of the world's most important archaeological sites—a critical corner of ancient Rome, a remarkable window on the empire's economic life.



PHOTO: AD MESKENS

Amphorae from the Greek island Kos on display at the Bodrum Castle in Turkey. The ancient shipping containers made their way across the Roman Empire mostly as part of the olive oil trade.

In 1872, Heinrich Dressel, an Italian-Prussian professor, and Father Luigi Bruzza, an Italian priest, began to excavate the site. Dressel scrutinized and set down the details of more than 3,000 marks stamped onto amphorae handles. From the bodies of the pots, he recorded nearly 1,000 inscriptions by Roman insurance agents, ship captains, and customs officers.

Yet the amphorae assessed by Dressel's project represent only a fraction of the hill's historical data. More than 50 million pots ended up here, so that the teams are only scraping the surface in excavating more than 500 cubic feet of material each season.

Not all Roman amphorae were disposed of in a great pile. Elsewhere, in early examples of recycling, they were used for storage in domestic kitchens and warehouses. Smashed into pieces, they became part of the fabric of buildings. In short, the pots were extremely useful. The Roman mountain of amphorae indicates the scale of demand for olive oil in the 1st and 2nd centuries.

### Demand for Olive Oil

Rome was then the largest city in the ancient world, with a population of approximately 1 million. It was made up mainly of residences, with no industrial manufacturing or food production of its own. Romans were consumers, not producers; most of what they ate was brought in from other parts of the empire—in large quantities.

Olive oil was a main import. An extraordinarily nutritious food, olive oil was used for frying, baking, and roasting. It was a key ingredient in bread, the staple food of the empire. Each night, olive oil lamps lit domestic households, temples, baths, and palaces. At sporting events, athletes smeared themselves with oil before competing, and olive oil was the base for perfumes and cosmetics.

Each Roman citizen probably consumed 13 gallons of the liquid a year—Italians today use 4.5 gallons a year per person—and larger homes or taverns stored hundreds of gallons in a *dolium*, a huge jar dug into the ground to keep the oil cool. Monte Testaccio's amphorae fragments provide evidence of consump-



PHOTO: AD MEKENS

This display at Turkey's Bodrum Castle suggests how amphorae may have been stacked in a galley ship. The jars' curvature and pointed base allowed for compact stacking, and minimized shifting during transit.

tion on a massive scale. Some estimate that the hill's well-traveled pots collectively would have carried 1.6 billion gallons to their destinations.

### Painted Inscriptions

Monte Testaccio has more secrets to reveal. The markings on the pottery shards make the hill a giant accounts book detailing the export and import of olive oil. Instead of ledgers recording income, expenditure, and accounts receivable, the pots' stamps, scratches, and painted inscriptions tell of the estates that produced the oil, the companies that shipped it, and the customs officials in Spain and Rome who checked the goods at departure and arrival.

The painted inscriptions are the most intriguing, because they rarely have survived elsewhere, making the beauty of the ephemeral hieroglyphs, with their elaborate flourishes and curls, more entrancing. Exposure to light or moisture usually means any ink inscriptions have long since disappeared. But like a giant time capsule, Monte Testaccio has protected every shard with a layer of topsoil and grass. Painted details remain to trace each stage of a pot's passage from olive estate to the docks of the Tiber, with marks recording the month the pot left Spain or the date it arrived in Italy.

The hill reveals information about the Spanish businessmen who profited from the oil. A group of shards with the same markings found at the same level of excavation can identify the years in which the olive estates of certain families produced good harvests. Shipped across the empire, olive oil made Baetica into Hispania's wealthiest province, with architectural, political, and social structures emulating those of Rome.



PHOTO: BILL STORAGE AND LAURA MASH

A mosaic at Ostia's Piazzale delle Corporazioni shows a Roman ship and two grain measures, with the inscription "Navicul[arii] et Negotiantes Karalitani" (Shipowners and Traders of Cagliari, Sardinia).

## Ancient Shipping Containers

None of this would have been possible without the assistance of an unassuming clay jar. The shape of this simple but cleverly designed container—a cross between an egg and a torpedo—made it remarkably strong and easy to pack into a vessel's hold. The curve of the pot's side fitted snugly against the curve of the ship. The pointed base allowed the jar to fit neatly between the shoulders of the amphorae in the row below, preventing the cargo from rolling around during transit. The base also served as a third grip—supplementing the two handles—for dockworkers to grasp when unloading and decanting the liquid.

The manufacture of these transport workhorses was complicated. First, the main body of the pot was formed, leaving a small hole in the base for quicker drying. Then the neck and rim, created separately, were joined to the main body, and the hole at the bottom was closed up. The two side handles were added last.

Pot production took place on an industrial scale. Along the banks of the Guadalquivir, Spain's longest and most important river, are the remains of at least a hundred pottery workshops, some with rows of kilns that would have occupied dozens of workers in the production of shipping amphorae. Because land transport was expensive, it made sense to manufacture these heavy pots near rivers or coasts, and the Baetis—as the Guadalquivir was then known—was a vital artery in the olive trade, running from Córdoba into the Atlantic Ocean.

## Delivering the Goods

Baetica's mountainous land and the hot, dry climate provided perfect conditions for the olive tree. Baetica also had another ingredient vital for the creation of wealth—a stable market. The olive oil supply chain combined state-controlled production and free-market economics, driven by demand from Rome. Rations of olive oil from Baetica were distributed through the *annona*, an official agency that also distributed grain. The authorities also allowed private merchants to participate in the provision of the supply. In addition, Baetica was the chief source of the olive oil consumed by Roman legions stationed in outposts such as Germany and Britain.

Drawn by the empire's appetite, millions of jars of olive oil made their way from Hispania to Rome, departing from places such as Córdoba and sailing south via the Balearic Islands. Some went along the North African shore and across to Italy. Amphorae also found their way to markets in Italy, France, Britain, and even India.

Although they were great road builders, the Romans were less comfortable on water. Even when

they gained control of Mare Nostrum—their name for the Mediterranean—the Romans preferred navigation techniques and trade routes that did not take them too far from land. Yet water transport was crucial to the economy, because hauling goods by land was extremely expensive.

Roman ship hulls were simple and made of wood, using the tongue-and-groove system, with the edge of each plank slotted into that of its neighbor, instead of overlapping planks. Deck, mast, and internal ribs were then built, and the lower part of the hull was sheathed in lead to protect it from wood-boring sea worms.

## Mighty Trading Post

Conveyed in these vessels, oil from Baetica ended up at the port of Ostia, on the Tyrrhenian Sea off Italy's west coast. After a short layover in a warehouse, the cargo was loaded on to barges that could navigate the Tiber and unloaded at port installations along the river's banks in southern Rome. In addition to the olive oil, Ostia received shiploads of grain from Egypt to be ground into flour, baked into bread, and sent on barges up the Tiber into Rome.

Echoes of this mighty trading post can be found today in the remains of the Roman port, now known as Ostia Antica, a 40-minute drive southwest of Rome. Mill-bakeries with giant grindstones and ovens survive, along with paved streets and the remains of impressive public buildings, shops, warehouses, apartment blocks, theaters, and villas. Romans enjoyed themselves here at luxurious baths, as well as at brothels and bars.

The remains of Ostia may conjure up images of the lifestyle of wealthy Romans but are evidence that international commerce funded the decadence. From within small booths at the Square of the Guilds—a sort

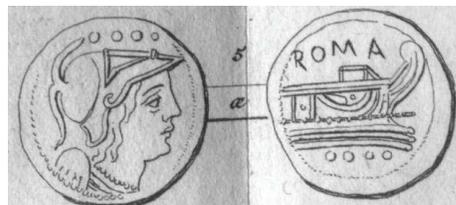


IMAGE: WIKIMEDIA COMMONS

This 18th-century sketch of a Roman coin shows the goddess Minerva on one side and the prow of a Roman galley ship on the other. Made of wood, Roman ships were built using interlocking planks, with the bottom of the hull sheathed in a protective lead coating.

The remains of the Grandi Horrea, or main warehouse, at Ostia Antica in Italy. In Roman times, the busy port was surrounded by shops, bakeries, theaters, residences, entertainment, and public buildings.



PHOTO: MARIE-LAN NGUYEN

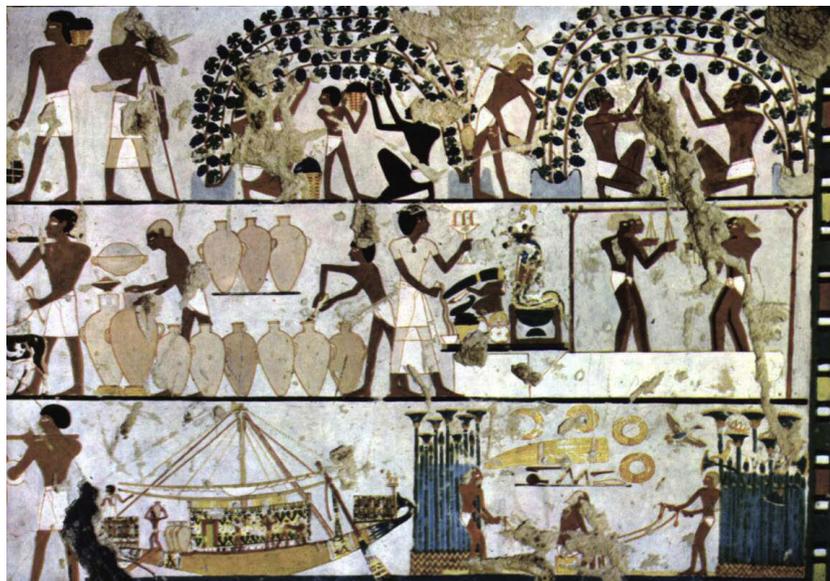


IMAGE: PUBLIC DOMAIN

The amphora also was a feature of ancient Egyptian trade. When Egypt became part of the Roman Empire, it contributed to the global food trade with its grain exports.

of trading floor—vessel owners from around the world haggled over freight rates, and merchants negotiated business deals and supply contracts. Among the guilds were the *mercatores olearii* (oil merchants). On one side of the square, a floor mosaic provides a visual reminder of their trade—a slave aboard a vessel carries a large amphora on his shoulders.

While oil merchants talked money in the Square of

the Guilds, slaves were out on the docks, their backs glistening with sweat as they unloaded pot after pot of olive oil beneath the fiery Italian sun. The pots were extremely heavy—approximately 66 pounds when empty and more than double that when full, containing about 6 gallons.

For the slaves, the amphora was a heavy burden. For the men and donkeys lugging broken shards up the slopes of Monte Testaccio, the amphora was a chore. But for the olive merchants of Baetica, it was an extraordinarily efficient ceramic vessel at the heart of an international trade that thrived many centuries before the word “globalization” was coined.

### Global Eateries

Supply and demand kept the Roman Empire together. The imposition of Roman rule was therefore good news for an area, instantly creating a lucrative international market. Moreover, the Romans—who assembled a multicultural population mix unmatched in the ancient world—had a truly global approach to eating.

Roman citizens from Germany to Egypt were accustomed to foods hauled in from all parts of the empire. Rome enjoyed grain from Egypt and Africa; wine from Spain, France, Greece, and Sicily; preserved fruits from Syria; walnuts from Persia; and rare spices

## Moveable Feasts

### *From Ancient Rome to the 21st Century, the Incredible Journeys of the Food We Eat*

SARAH MURRAY

**P**luck a cluster of green peppercorns from a vine that grows in the southern Indian state of Kerala, put one of the tiny berries in your mouth, crunch it between your teeth, and something curious happens. A small explosion of flavor travels at speed through your body, first around your head, and then through veins and arteries—or so it seems.

It is a remarkable sensation. Pain and pleasure intermingle in a heady rush of piquancy.

It is not only pepper’s flavor that has a propensity to travel, however. As a valuable commodity, this king of spices has been shipped around the world for centuries, covering tens of thousands of miles in the hands of everyone from Arab traders and Venetian merchants to European colonizers.

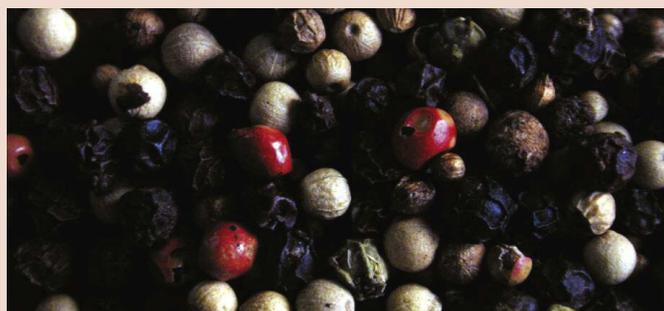
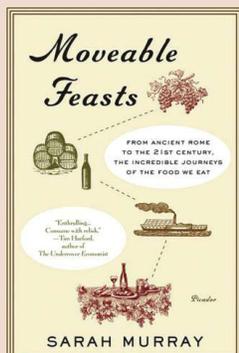


PHOTO: PUBLIC DOMAIN

Peppercorns have been transported across the globe from Kerala, India, for centuries.

Pepper is not alone in being a globetrotter. *Moveable Feasts* examines the mammoth journeys—ancient and modern—of food.\* It celebrates the inventive brilliance of all kinds

\* Published by St Martin’s Press, 2007, and by Picador, 2008. See also [www.moveablefeasts.org](http://www.moveablefeasts.org).



from China, India, Arabia, and Africa. South Indian pepper from the 1st century AD has been found in Germany—then known as Germania. Even fresh produce traveled distances to reach consumers—apples and pears were conveyed to Rome by road from Picenum, a northern district between the Apennines and the Adriatic. As noted, the preeminent source of Rome's olive oil was hundreds of miles away in Spain.

Today, olive oil travels in giant, temperature-controlled, stainless steel tankers. Although transport technology has advanced since Roman times, tastes have not. Today's diet includes a global array of ingredients, whether kiwis from New Zealand, fish processed in China, grapes from Chile, or green beans from Kenya. Is this appetite for foods that have traveled from all over the world different from that of the Romans? Perhaps not—what makes this ancient civilization so compelling is that the lifestyle of the Romans feels oddly familiar, particularly when it comes to eating.

In Ostia's ruins, one can almost smell the bread rising in the ovens at the bakery—bread made from Egyptian flour ground on one of the nearby millstones. At a tavern in one section of the city, it is easy to imagine savoring a glass of wine from a consignment from Greece, unloaded on the docks at Ostia that morning—Greek wine accompanied by a selection of

preserved fruits from Syria or a bowl of nuts from Anatolia (modern-day Turkey). Then for dinner, perhaps fish seasoned with black pepper from India and a dish of roasted vegetables baked in olive oil—a golden liquid from southern Spain conveyed to Rome in an amphora. Empty of its contents and broken into fragments, that pot now lies in a gargantuan pile of shards beneath the grassy slopes of Monte Testaccio.

### Logistical Tracking

But the resemblances extend beyond the global food supply. Transport logistics, too, links Roman trade with today's containerized global trade. Like the amphora, today's shipping container bears markings denoting details of the trade—letters and numbers on the back of each container give each box an identity, indicating its owner and the types of products it carries, linking the individual container within the shipper's fleet, and describing its dimensions, its weight when empty, and its weight when full.

For ship captains, crews, coast guards, dock supervisors, customs officers, and warehouse managers, the code is an instant guide to what is in a container, where it came from, and where it is going—not so different from the stamps, marks, and ink inscriptions on the ancient Roman amphorae shards in the giant transportation trash heap that is Monte Testaccio.

of transport containers, from the Roman amphora and the barrel to today's steel shipping container, truly "globalization's porter."

The book also explains how food transport has altered our world. Without the refrigerated steamship, for example, Central American countries might never have fallen under the pervasive influence of U.S. fruit companies and earned the dubious collective name of Banana Republics. In Buffalo, the grain elevator—the giant, mechanical scooping machine that transferred corn from ships to canal boats—turned the city into one of America's wealthiest, but it also had a profound influence on modern architecture, as a source of inspiration for Bauhaus designers.

*Moveable Feasts* therefore is about more than food or transportation, but about how the world works. For example, why does it make economic sense to ship frozen salmon to China to be filleted, then refrozen and returned to the United States? Why is the carbon footprint of food transported from the other side of the world sometimes lower than that of locally produced fruits and vegetables?

For some, the phrase "moveable feasts" may evoke religious holidays, such as Easter or Chinese New Year, which fall on different dates each year. For others, a moveable feast is a task or decision that can be adjusted to changing circum-

stances. The book *Moveable Feasts* follows a more literal interpretation—that food and drink are eminently moveable—sometimes against all odds.



Workers unloading wheat from grain elevators in Buffalo, New York, around the turn of the 20th century.

PHOTO: LIBRARY OF CONGRESS, DETROIT PUBLISHING COMPANY COLLECTION



## GLOBALIZATION AND TRANSPORTATION

### QUIZ ANSWERS AND RESOURCES

# What Do You Know About Globalization and International Transportation?

MARY R. BROOKS

1. In 2008, Germany was the largest goods exporter in the world in terms of value. **True.**
2. In 2008, the United States was the largest goods trader—importer and exporter—in terms of value. **True.**
3. In 2008, Germany was the largest trader in commercial services in terms of value. **False.** The United States was the largest.
4. Between 1955 and 2004, air freight prices fell from \$3.87 per ton-kilometer to less than \$0.30 per ton-kilometer, in 2000 U.S. dollars. **True.**
5. A global reduction in the cost of transportation was a key to the rapid growth of global trade in the past two decades. **True.**

Chapter 6 of the *World Development Report 2009* examines the role of transport costs in globalization and notes the role of declining telecommunications costs. The report is available at the World Bank website, [www.worldbank.org/wdr](http://www.worldbank.org/wdr). The air freight prices can be found on page 176.

6. Since 2000, the share of world merchandise trade held by the North American Free Trade Agreement countries has fallen from one-fifth to one-eighth. **True.**

Vancouver, Canada, is closer to Singapore than is Los Angeles or Lázaro Cárdenas, Mexico.



PHOTO: PORT METRO VANCOUVER



IMAGE: PUBLIC DOMAIN

The spice trade in Calcutta, India, is commemorated in this image from Georg Braun and Franz Hogenberg's atlas, *Civitates Orbis Terrarum*, 1572. Trade from India flourished over the centuries; in the 1800s, China and India had the world's largest economies.

7. Japanese own 100 percent of the vessels flagged in Japan, but Bahamians own none of the vessels flagged in the Bahamas. **True.**
8. The two largest economies in the 19th century were (c) China and India.
9. The largest emerging economies in the 21st century are (c) China and India.
10. The top 10 countries with ability to buy—based on gross domestic product (GDP) per capita, purchasing power parity—include (b) Singapore, Kuwait, and Norway.
11. Global Insight projects that by 2050, the top four economies in the world—in order, by real GDP—will be (d) China, United States, India, and Russia.
12. The KOF Globalization Index, measuring the degree of globalization of a country, calculated the following scores on the 2010 economic dimension of the index, based on 2007 data:

Belgium	91.94
Canada	81.49
China (not including Hong Kong)	56.82
United Kingdom	78.55
United States	69.27

The KOF Globalization Index, produced by the KOF Swiss Economic Institute, measures the economic, social, and political dimensions of globalization. The 2010 Index compares 181 countries from 1970 to 2007. The economic

dimension of the KOF Index quantifies not only actual trade and investment flows but also the extent to which countries protect themselves by imposing restrictions on trade and capital movements. More information and the 2010 report are posted at <http://globalization.kof.ethz.ch/>.

13. The World Economic Forum's *Global Enabling Trade Report 2009* ranked the following countries as the top four in transport and communications infrastructure: (a) Germany, Netherlands, Singapore, and Sweden. Others named in the question ranked as follows: Hong Kong, 5; France, 7; Switzerland, 9; United States, 10; and Japan, 15.

Produced by the World Economic Forum, the *Global Enabling Trade Report 2009* measures and analyzes institutions, policies, and services enabling trade in national economies. Table 4 of the report rates the transportation and communications infrastructure of each country as a part of the index of trade-enabling characteristics. The report is available at [www.weforum.org/en/initiatives/gcp/GlobalEnablingTradeReport/index.htm](http://www.weforum.org/en/initiatives/gcp/GlobalEnablingTradeReport/index.htm).

14. In the World Economic Forum's *Global Competitiveness Report 2009–2010*, (b) Switzerland ranked 1st, and the United States ranked 2nd.

The *Global Competitiveness Report 2009–2010* is available at [www.weforum.org/pdf/GCR09/GCR20092010fullreport.pdf](http://www.weforum.org/pdf/GCR09/GCR20092010fullreport.pdf).

15. The top three border crossings for Canada–U.S. trade by road are (b) Windsor, Fort Erie, and Sarnia.
16. As of January 1, 2009, the world's largest ship owners—domestic and foreign flag ships, by tonnage—were (c) Japanese. Until 2009, the Greeks were the largest.

The *Review of Maritime Transport 2009*, published by the United Nations Conference on Trade and Development, lists the largest ship owners and the product ton-mile data for shipping at [www.unctad.org/Templates/Page.asp?intItemID=2618&lang=1](http://www.unctad.org/Templates/Page.asp?intItemID=2618&lang=1).



PHOTO: BELUGA SHIPPING QATAR

A Beluga Shipping vessel transports machinery from Italy to Kuwait. Kuwait is among the world's top 10 countries with ability to buy.



PHOTO: GERALD L. NINO, U.S. CUSTOMS AND BORDER PROTECTION

17. The largest demand for bulk shipping, in terms of billions of ton-miles, comes from (a) crude oil.
18. Documentary requirements can streamline trade or make it more difficult. Of the four countries named, (b) India requires the most documents for import and export—9 and 8, respectively. Canada requires the completion of 3 documents for import and 4 for export; Mexico, 5 for each; and the United States, 4 for import and 5 for export.

The World Bank's Doing Business website provides detailed information on the ease or difficulty of doing business with a country. More information on documentary requirements may be found under the topic, Trading Across Borders, at the Doing Business website, [www.doingbusiness.org/ExploreTopics/TradingAcrossBorders/](http://www.doingbusiness.org/ExploreTopics/TradingAcrossBorders/).

19. (a) Halifax, Canada, is closer to Brazil than (b) Savannah, Georgia.
20. (a) Singapore is closer to Norfolk, Virginia, via the Suez Canal than (b) via the Panama Canal.
21. (c) Vancouver, Canada, is closer to Singapore than is (a) Los Angeles or (b) Lázaro Cárdenas, Mexico.

Port distances may be found at [www.port-distances.com](http://www.port-distances.com).

Other resources include the Research and Innovative Technology Administration (RITA), [www.rita.dot.gov](http://www.rita.dot.gov); RITA's Bureau of Transportation Statistics, [www.bts.com](http://www.bts.com); the World Trade Organization's *International Trade Statistics 2009*, [www.wto.org/english/res\\_e/statis\\_e/its2009\\_e/its09\\_toc\\_e.htm](http://www.wto.org/english/res_e/statis_e/its2009_e/its09_toc_e.htm); and the Central Intelligence Agency's *World Factbook*, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/rankorderguide.html>.

U.S. Customs and Border Protection officers check cars entering the United States via the Windsor Tunnel in Detroit, Michigan—one of the top three Canada–U.S. road border crossings.



## GLOBALIZATION AND TRANSPORTATION

# Maritime Freight Transportation, National Economic Recovery, and Global Sustainability

## *Coordinating a Strategic Plan*

THOMAS WAKEMAN AND MICHAEL BOMBA

Wakeman is Deputy Director, Center for Maritime Systems, Stevens Institute of Technology, Hoboken, New Jersey, and Chair of the TRB Marine Environment Committee. Bomba is Senior Associate, Alliance Transportation Group, Inc., Austin, Texas, and Secretary of the TRB Intermodal Freight Terminal Design and Operations Committee.

In planning a journey, the first focus is the destination, and the second is the route. National economic recovery and economic security are a primary destination for the United States in 2010. If the route were straight and clear, the second part of the plan would be “Drive on!”—that is, continue to let market forces dictate economic outcomes. But in a world of rapidly advancing globalism, climate change, and energy volatility, a road map is needed.

Since the 1950s, exports have increased as a portion of the U.S. gross domestic product (GDP)—the sum of all goods and services produced—from 5 percent to nearly 13 percent in 2008. In February 2010, President Barack Obama launched the National Export Initiative (NEI) to double exports in the next 5 years. In addition to service-sector products, exports will include agricultural goods, manufactured goods, and natural resources, which will require transport.

The President has noted that exports will boost the GDP, reduce the trade deficit, and stimulate job creation. The NEI aims to improve conditions that directly affect the ability of the private sector—especially of small businesses—to export and to overcome the hurdles to entering new markets. As the United States emerges from the recent global economic constriction, implementation of the NEI will aid in national economic recovery.

Shifts in the trade and transport environment—at the local, national, and international levels—pose a dynamic challenge and point to the need for a strategic freight plan. In addition, significant impacts on the system can come from two sources: first, from the lack of adequate intermodal transport capability; second, from emerging challenges to energy use and sustainability. Policies are needed to ensure that the nation’s marine transportation system (MTS) will be ready to operate in the rapidly changing environment of domestic and international goods movement.



PHOTO: U.S. DEPARTMENT OF STATE

U.S. Secretary of State Hillary Rodham Clinton reviews the new National Export Initiative at Boeing Shanghai Aviation Services in Shanghai, China, this year.



Aerial view of the Kwai Tsing Container Terminals at Hong Kong Port. The trade imbalance between the United States and China—far more goods are imported from China than are exported from the States—has grown since the 1970s.

## New Realities

The United States has taken bold steps to address the economic recession, but the steps have led to significant debt. Other factors must be considered in charting the road map:

- ◆ Global economic dominance eventually will shift from the United States and Western Europe to the Far East. Nevertheless, even after this shift, the United States will continue as the world's dominant military power.

- ◆ Middle-class incomes in the United States and Western Europe will stagnate or decline as a result of globalization and the growth in the global labor force, which has increased by 1 billion or more workers since the collapse of communism. Discretionary income and consumption also will decline, and savings will increase, from 1 percent to approximately 8 percent, as populations in the West age.

- ◆ Economies of scale and scope will increase in importance as strategies for competitive advantage and marketplace performance. These will affect infrastructure and resource systems.

- ◆ Fossil fuel dependency and the volatility of energy prices will continue to heighten concerns about transportation costs and energy security.

- ◆ Environment-related concerns such as climate change, congestion, biohazards, and the availability of nonrenewable resources could limit economic growth and competitiveness. Moreover, public con-

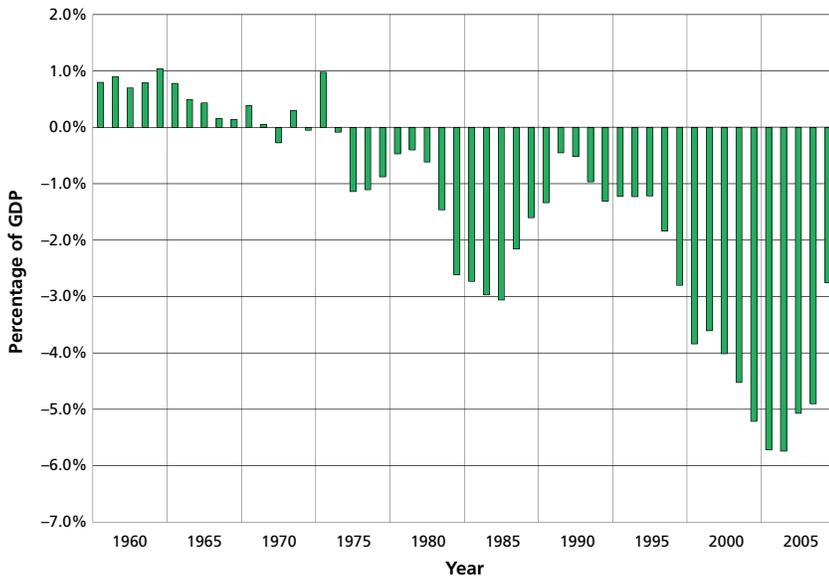
cerns about livability issues may hinder transportation system initiatives in some regions.

## International Trade

Economic security depends on the success of nations and their megaregions in the global marketplace. In early 2007, international trade contributed approximately 28.5 percent of the U.S. GDP; in 2009, the share declined to approximately 25 percent (1). The U.S. economy and the global economy both contracted between 2007 and 2009; international trade declined by 20 to 30 percent for many nations, the worst recession since the 1930s. In the next 15 years, however, international trade will contribute as much as 50 percent of the U.S. GDP.

Almost 70 percent of the U.S. GDP depends on products for personal consumption. The approximately 30 percent that remains comprises business investments (approximately 13 percent) and government spending (approximately 17 percent). In the mid-2000s, this level of personal consumption caused the U.S. foreign trade deficit to balloon. The trade deficit grew rapidly as a percentage of GDP in the mid-1990s, with the globalization of production, the expansion of international trade, and rising energy prices.

For years, the United States has had a trade imbalance (Figure 1, page 16) that has expanded because imports from China greatly exceed U.S. exports to China and to other international trading partners. This imbalance between imports and exports has

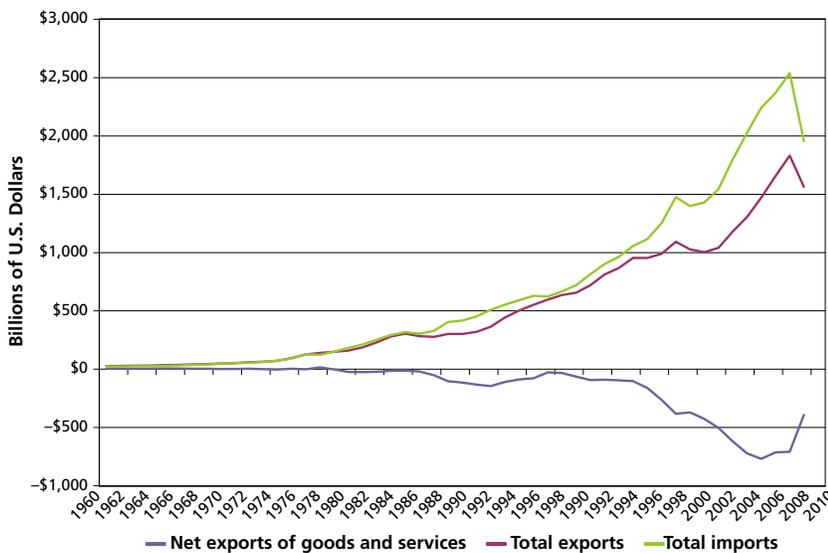


**FIGURE 1 U.S. trade balance as a percentage of GDP.**

continued since the mid-1970s (Figure 2, below) and has weakened the financial attractiveness of the United States to investors considering the purchase of public debt.

Between the third quarter of 2008 and the third quarter of 2009, the U.S. GDP dropped approximately \$310 billion, a decline of a little more than 2 percent (1), as U.S. consumers significantly cut back their purchases of imports—import volume dropped more than 25 percent. Exports from the United States fell by 2 to 4 percent or more, as the rest of the world experienced the economic shocks of 2008. Exports rebounded in 2009 as foreign demand for U.S. products expanded—the economies of several trading partners grew, and the U.S. dollar weakened. Most of these exports depend on international shipping and distribution networks for delivery to overseas customers.

**FIGURE 2 U.S. imports, exports, and net exports by year.**



### Consumer Demand

During the past 15 years, much of the global goods transport system has focused on Asian exports to U.S. and European consumer markets. The extraordinary growth in Asian production to satisfy consumer demand nearly overwhelmed the U.S. goods movement system. When the excess Pacific Coast transportation capacity was absorbed, routing economics shifted to favor all-water services to East Coast ports for East Coast customers. The primary end-consumer of manufactured goods, however, is shifting to the Far East.

In the next several decades, the emerging middle classes in China and India will be the primary consumers of global goods and services. China has a middle class of 300 million—approximately the same size as the population of the United States. According to one estimate, the GDP of emerging markets will grow from 35 percent in 2008 to 50 percent of world GDP by 2018 (2).

The spending power of China, India, and Russia is expected to triple. The higher growth rates of emerging markets will attract foreign direct investments from the West. The anticipated creation of wealth and consumption by China and India will change global transportation patterns of supply and demand. The two nations will generate unique import and export trade flows, fostering a demand for the most efficient transportation assets. China and India may create new demands for U.S. agricultural and finished goods.

With population growth and economic convergence, developing nations will increase their demand for goods. The world population is expected to reach 7 billion in late 2010 and 8 billion within 20 years. The U.S. Census Bureau estimates that the world population will exceed 9 billion before 2050. Meanwhile, Western populations will age and will increase their rates of savings to provide for retirement. In short, demand will be on the other side of the planet, where more growth opportunities will arise, including new infrastructure and other opportunities for capital investment. These regions will compete to have the most efficient transportation and distribution services.

To maintain its economic security, the United States must increase its exports of goods and services to the global marketplace. Transportation policy makers can ensure that the products of U.S. companies are globally competitive by providing adequate infrastructure capacity for the efficient movement of goods. In particular, maritime commerce is indispensable in supporting overseas transactions and therefore is a fundamental building block of national economic prosperity.

## Marine Transportation System

More than 90 percent of international trade travels by sea (3). Ocean-borne maritime trade more than tripled between 1968 and 2008 (4). Because most of the world's trade travels by ship, the port is a key component of infrastructure, linking water and land transportation. National ports serve as international gateways to world trade.

The MTS, including ports, always has been evaluated by the cost of services but now must offer flexibility and reliability to satisfy the demands of shippers in the global supply network. Ports are evaluated not only for their costs but for their connectivity. Ports that do not function seamlessly with international production networks are likely to have an adverse effect on the economic development of the hinterland or market area.

The MTS is a demand-derived service, and when demand is low, the system is vulnerable to economic and operational disruptions. The demand for international shipping has declined with the recent decrease in trade. The MTS is threatened not only by sluggish trade economics but by other types of system shocks—for example, a major natural disaster or human-caused incident could cripple the operation of the supply chain, with national economic consequences.

Although considerable work has enhanced the security of ports and of the segments of the transportation system serving freight, the resiliency of the system needs to be built up to protect its critical interdependence with other industrial sectors (5). U.S. economic security increasingly will depend on the transportation infrastructure and global connections.

## Economies of Scale and Scope

The dominant players in the recovering global trade markets will achieve economies of scale and scope. The bulk carriers started the trend with larger ships, and the container carriers in the late 20th century achieved new economies of scale (6). Because profit margins are slim, only ports and logistics systems with sufficient capacity to handle the volume of cargo on megaships will compete successfully in the global marketplace.

Economies of scope also have become important to competitiveness. So-called port poles are forming as collaborative freight networks in Asia, India, and Europe to achieve economies of scope (7). The port poles offer the size and reliability to attract cargo and can serve as regional platforms for freight logistics. The networks combine the infrastructure and business services of more than one port into an expansive platform of distribution and delivery services,



PHOTO: JAMES R. TOURTELLOTT, CBP

gaining agility, cost-effectiveness, and resilience when shocks occur. Shippers see the networks as reliable because of the redundancy of services. Future investments in transportation infrastructure will have to consider economies of scope and scale, as well as shippers' needs for connectivity and reliability.

## Infrastructure Requirements

Costs and reliability are the watchwords for global business. As goods flow across the world's oceans and through ports and connect to domestic corridors, they may face delays en route and uncertainty about delivery schedules because of infrastructure capacity constraints. Today's freight must flow seamlessly or face a time, cost, or reliability penalty.

The United States has been living on its past infrastructure construction accomplishments. If the consumption patterns of earlier in the decade had been sustained, the MTS would have been overwhelmed by traffic and would not be adequate for anticipated demands.

The American Society of Civil Engineers (ASCE) estimates that more than \$1 trillion is needed to meet the shortfall in funding for road and bridge infrastructure investments (8). Some transportation funding was allocated under the 2009 stimulus package, which is distributing \$787 billion—although less than \$52 billion is scheduled to support transportation infrastructure improvements, with \$27.5 billion for highway and bridge construction projects. According to ASCE, more than \$50 billion is needed to rebuild the U.S. inland waterway system.

Navigation and terminal infrastructure requirements have expanded as new megaships with larger containers are calling on the U.S. ports along the

Instructors at the U.S. Customs and Border Protection's Canine Enforcement Training Center stand by as a handler and a dog search a seaport container for contraband. Since the growth of maritime trade in the past 40 years, port security has become crucial to the system's health.



PHOTO: PANAMA CANAL AUTHORITY

A cruise ship passes Paraiso Hill in the Panama Canal. The first dry excavation contract of the Canal Expansion Program—the new locks are scheduled to open in 2014—took place in June 2008.

Pacific and Atlantic. The vessels require channel depths of 50 feet or more. To stay competitive, the nation must enlarge its navigation channels—and in some cases, raise bridges and increase rail tunnel clearances—to accommodate the enormous ocean-going vessels in an environmentally friendly manner. The U.S. transportation infrastructure system needs significant financial investments to ensure that businesses can maintain global competitiveness.

### Panama Canal Expansion

The Panama Canal Authority is investing \$5.3 billion to accommodate container ships with capacities of 8,000 20-foot-equivalent units and more (9). When the new locks open in 2014, a new era will begin that could change global trading patterns as the original canal did in 1914.

According to some estimates, as much as 25 percent of the West Coast cargo base could transfer to East and Gulf Coast ports as global trade picks up again. Ports are likely to have only one chance to win over the initial surge; the deepest East Coast ports with the necessary intermodal connections and warehousing capacity will capture the shift in market share.

### Sustainability

The National Environmental Policy Act, signed into law in 1970, raised tensions between the need for economic development and the need for environmental protection. Sustainable development addresses both needs simultaneously. The United Nations' Brundtland Commission coined the term in 1983 and defined it as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainable development—or sustainability—must allow for economic viability while protecting the health of individuals, communities, and the environment and embracing social responsibility and community livability. The challenge is to achieve these central tenets while the world's population increases rapidly—and as the most affluent populations consume the greatest volume of resources at an increasingly disproportionate pace. While these changes are occurring on the demand side, on the supply side many natural resources are becoming more scarce and expensive.

A scarcity of oil is the most significant economic concern. Many of the world's oil reserves are coming under the control of national governments and corporations indifferent or hostile to the United States. Other dwindling natural resources include fresh water in some regions; rare earths, used in many high-tech manufacturing processes; and potassium, essential for agriculture.

Without modifying the global consumption patterns of the most affluent nations, reducing the demands of people in developing countries becomes difficult, risking future scarcities that threaten the quality of life for this and future generations. Long-term solutions to environmental issues for global trade and transportation and for sustainability will require



PHOTO: SOUTH CAROLINA STATE PORTS AUTHORITY

A container ship crosses under the Arthur Ravenel, Jr., Bridge at the Port of Charleston, South Carolina. U.S. marine transportation infrastructure must continue to accommodate ever-larger oceangoing vessels.

efforts at the community, national, and global levels.

Ports and their associated freight transportation are heavy industrial activities that must address air, water, and land impacts and community livability under the applicable laws and regulations. From 2002 to 2007, many ports established proactive environmental policies to gain community approval to operate and expand. Most major ports experienced double-digit increases in their volume, causing problems with surrounding communities over road congestion, noxious air emissions, and safety concerns. In the San Pedro Bay area of California, for example, neighborhood groups voiced their anger to local politicians, and port projects were placed on hold.

The chief local issue is emissions, including nitrogen oxides and particulate matter from traffic congestion and the diesel combustion of port vehicles (10, 11). West Coast and East Coast ports are instituting emissions reduction programs for trucks, marine vessels, and railroad locomotives. Port authorities are working with the Environmental Protection Agency, local air boards, and tenants to curb emissions beyond the regulatory requirements, to achieve the objective of sustainable development. Despite the progress in improving air quality, port leaders must acknowledge that solving these problems will lead to other demands to address livability issues that have not received adequate attention. Examples of unresolved issues include noise, light, siting decisions, and environmental justice concerns.

Environmental compliance often is viewed as an essential but expensive maritime requirement. Poor environmental performance on the waterside or the landside, however, can have a devastating impact on the success of maritime business—as occurred, for example, with the Exxon oil spill in Alaska's Prince William Sound and with public concerns about port-associated air emissions in the Los Angeles–Long Beach Basin. Environmental concerns not only can stall port and logistics infrastructure development but also can cost millions of dollars to mitigate.

Efforts to eliminate noxious air pollutants are important. But equally important and maybe more difficult to mitigate are the air pollutants that contribute to climate change—greenhouse gases (GHGs).

## Climate Change

Global agreements addressing the emerging issue of climate change may affect the international maritime industry. Will a carbon tax or cap-and-trade policy be established worldwide? What will be the cost penalty for oceanborne cargo here or worldwide? How fast will engine room and terminal equipment technology adapt?



PHOTO: U.S. ARMY CORPS OF ENGINEERS

The United States contributes 20 percent of the world's emissions from burning fossil fuels; India contributes 4 percent. Other nations demand that the United States implement stringent emissions reduction standards before they act accordingly. The United States could apply such measures as a carbon tax, a carbon cap-and-trade program, or other mechanism. A national GHG emissions reduction protocol, however, will have to consider the business perspective and the cost implications for the United States in the global marketplace.

Yet the transportation sector generates approximately one-third of global GHG emissions. The International Maritime Organization and regulators worldwide are increasing their scrutiny of emissions from ships and cargo movement. These concerns and anticipated costs will affect the market practices of carriers and shippers. Ports and vessel owners prepared to address the issue proactively and to increase their competitiveness can reduce their liabilities and look for opportunities to profit as the new carbon markets open.

Finally, one other consequence of global climate change is the melting of ice, particularly in the polar regions, which will raise global sea levels. As sea levels rise, the infrastructure of ports in low-lying areas may be inundated during tidal fluctuations or storm surges. Sea level changes also are likely to affect roadway and rail infrastructure connecting ports to markets. Landside connectivity may be limited or severed during intense storm events. The potential for significant impacts to low-lying regions could outstrip the ability of state and local governments to pay for infrastructure mitigation or for full replacement.

As climate change concerns increase, along with international political moves to address those concerns, the pressures to reduce GHGs aggressively

A clam shell dredge digs virgin material as part of a \$700 million, multiphase Port of Anchorage, Alaska, expansion project. Environmental compliance is vital to the success of port operations and projects.

Located at the northern end of the Antarctic Peninsula, James Ross Island has experienced atmospheric warming of approximately 2°C since 1950, causing a vast retreat of its floating ice shelves, among other effects. Ice melt, a consequence of climate change, will raise global sea levels, affecting freight infrastructure.



PHOTO: JAMES ROSS, NASA

will be enormous. New laws and regulations could affect U.S. port performance and operating costs from three perspectives: U.S. emissions requirements; emissions controls for international ocean carriers; and measures to protect transportation infrastructure from sea level rise and storm surges. If dealt with reactively, these issues will have a severe effect on the cost of port and transport services.

### Systemwide Initiatives

The future of U.S. economic recovery depends on more than building on past domestic economic practices. Recovery will demand a strong export policy for U.S. goods. For the NEI to succeed, exports must enter the international marketplace at competitive prices, moving from the point of manufacture to a port along intermodal corridors that operate efficiently and effectively. The nation's rural transportation infrastructure, which brings agricultural products to ports, will require ongoing maintenance and enhancement.

For these transport capabilities to be available, however, the freight transportation sector—including the maritime sector—will have to develop a systemwide plan for transport capacity and will have to address emerging domestic and international energy and sustainability demands proactively.

National and state decision makers will need to address the inability of public funding mechanisms for transportation infrastructure to meet the needs of today's global marketplace. If these issues are resolved, the U.S. freight transportation sector will contribute positively to national economic recovery and global sustainability.

### Acknowledgments

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### References

1. *U.S. Economic Accounts*. Bureau of Economic Analysis, U.S. Department of Commerce, 2010. [www.bea.gov/](http://www.bea.gov/).
2. *Emerging Markets Take Centre Stage*. Business Monitor International, Ltd., London, 2010.
3. International Maritime Organization. *International Shipping, Carrier of the World Trade*. United Nations, New York, 2005.
4. *Shipping Facts*. International Chamber of Shipping, London, 2009. [www.marisec.org/](http://www.marisec.org/).
5. *Sustainable Critical Infrastructure Systems: A Framework for Meeting 21st Century Imperatives*. National Research Council of the National Academies, Washington, D.C., 2009. [www.nap.edu/catalog/12638.html](http://www.nap.edu/catalog/12638.html).
6. Stopford, M. *Maritime Economics*, 3rd ed. Routledge, London; New York, 2009.
7. Notteboom, T. *Economic Analysis of the European Seaport System*. Report to the European Sea Ports Organization, ITMMA; University of Antwerp, Belgium, 2009.
8. *Report Card for America's Infrastructure*. American Society of Civil Engineers, Washington, D.C., 2009. [www.infrastructurereportcard.org/](http://www.infrastructurereportcard.org/).
9. *Expansion Program*. Panama Canal Authority, Panama City, Panama, 2010. [www.pancanal.com/eng/expansion/index.html](http://www.pancanal.com/eng/expansion/index.html).
10. *San Pedro Bay Ports Clean Air Action Plan*. Port of Los Angeles and Port of Long Beach, California, 2006. [www.polb.com/environment/air/caap.asp](http://www.polb.com/environment/air/caap.asp).
11. Ross and Associates. *A Clean Air Strategy for the Port of New York and New Jersey*, Port Authority of New York and New Jersey, New York, Oct. 21, 2009. [www.panynj.gov/about/pdf/CAS-FINAL.pdf](http://www.panynj.gov/about/pdf/CAS-FINAL.pdf).

## GLOBALIZATION AND TRANSPORTATION

# Fear of Flying

## Globalization, Security, and Terrorism

RICHARD W. BLOOM

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**G**lobalization, security, and terrorism are words often invoked by experts in newspapers, on television, and in the blogosphere, tweeted via the latest versions of social networking, and even occasionally pronounced in person. As if at the mercy of Humpty Dumpty in *Through the Looking Glass*—whose words meant whatever he chose them to mean—each of these words is applied similarly and differently by the same and different people, so that confusion results. Before examining how globalization has affected, is affecting, and will affect aviation security—especially in the context of terrorism—the first step is to clear the verbal air.

### Globalization

What is globalization, and when did it begin? The word appears in dictionaries in the mid-1940s,

although some treat the word as newly coined. Most definitions point to the increasing degree by which anyone can be affected by anyone else who is somewhere else in the world. Most definitions also note the increasing interconnectivity among people. Anything and anyone may be involved—from war, politics, and sociocultural matters, to health, wealth, and the pursuit of happiness.

Different groups of scholars have identified different starting points for globalization. Some choose 1989, with the end of the Cold War and the increase of what is termed postindustrial capitalism. Others favor the 1950s, with the decolonization of the European empires in Africa and Asia; some point to 1492, with the rise of European sea exploration and trade; and yet others go back past the expansion of Islam in the 7th through 9th centuries to Alexander the Great in the late 4th century BC.

U.S. Air Force 119th Security Forces Squadron airmen detain simulated suspects—members of the 119th Student Flight unit—as part of a training exercise at the North Dakota Air National Guard facility at Hector International Airport in Fargo, North Dakota.



PHOTO: U.S. Air Force Senior Master Sgt. David H. Lipp

PHOTO: F. LEE CORRIAN



A crowd celebrates atop the Berlin Wall following the official opening of the Brandenburg Gate. The fall of the Berlin Wall in 1989 was a significant event in the history of globalization.

This brief history indicates that globalization is nothing new, is not as new as some maintain, is new only to people who do not study history, or is new only through the latest technologies interacting with the latest in human nature.

### Security

Sometimes security is considered a state of mind, signifying that someone feels safe from intentional harm; safety then becomes freedom from unintentional harm. Security may be an objective consequence—someone is safe from intentional harm—and may imply a meaning not accurate in the real world—that someone can be completely safe from intentional harm. Security may refer as well to what is done to achieve any of those goals—for example, employing behavioral recognition and verbal interrogation, explosives detection, biometrics, profiling,

data mining algorithms, and the old standby, door locks.

An immediate conclusion is that experts may be arguing about different kinds of security. Applied research about globalization's effects on the meanings, perceptions, and expectations of security is all over the board.

### Terrorism

“One man's terrorist is another man's freedom fighter” is an old canard that must be put to rest. The statement is true to the extent that one man's cannibal is another man's gourmand. The behaviors occur regardless of what they are called, but preventing these behaviors requires action.

Some experts state that terrorism involves threatening, injuring, or killing innocent people; some retort that no one is innocent. Other experts state that terrorism is violence to further political or religious beliefs. Yet apprehended and incarcerated terrorists may point to lifestyle choice, group influence and pressure, or sincere mystification. Most experts agree that the victims of terrorism are not only those who are threatened, injured, or killed, but those who are direct survivors or indirect observers—especially through mass media and telecommunications.

If terrorism is successful, these victims are more likely to think, feel, and act in the manner desired by terrorist planners. If no one finds out about terrorism, it does not work. One conclusion may be that counterterrorism should entail less screening of people and things and more prevention or censorship of the news. The main issue then becomes freedom of life versus freedom of speech without life. Global-



PHOTO: AFP/GETTY IMAGES

Convicted Lockerbie bomber Abdelbaset Ali Mohmet al-Megrahi arrives in Tripoli, Libya, August 20, 2009, after being freed from a Scottish prison.

ization is not only affecting the meanings, perceptions, and expectations of terrorism but is increasing the number and variety of means by which terrorists communicate and engage in acts of violence.

Globalization affects two goals of aviation security in response to terrorism—first, finding terrorists before they attack; and second, finding explosives and other weapons before they can be employed.

## Finding Terrorists

All methods of finding terrorists include collecting and analyzing information about people, developing a valid link between the information and the probability that a person directly or indirectly will engage in or support terrorism, and then acting to prevent or minimize terrorism in specific cases. The kinds of information collected and analyzed include voice intercepts, relayed discussions, and observations, as well as past travel behaviors, known associates, facial expressions, and choice of clothing.

The biggest problem is developing valid links between information and predicted behavior. Predictions of human behavior—for example, of violence—are extremely difficult. This should not be surprising; human social behavior is unknowable—although this explanation may not fare well after a terrorist event.

### Challenges

Challenges to linking information to predicted behavior include the following:

1. The same information may mean something different in different contexts, especially when psychological triggers are added or withheld.

2. Depending on the parameters, many people may change from terrorism-inclined to not inclined and back again, and from being inclined or not inclined in different ways.

3. Most people have less than complete awareness about their own behaviors, thoughts, feelings, motivations, and inclinations, even if they desire to be fully aware or to share this awareness during an interview or interrogation.

4. Experts often are confounded by the paradox that the most sophisticated terrorists will not look like terrorists, yet most people do not look like terrorists.

5. The greatest majority of people are extremely unlikely to engage in terrorism, except in the most extreme situations; therefore, a system for finding terrorists must be extremely accurate, or hordes of nonterrorists will be identified and treated as terrorists with noxious, self-induced security, economic, and political consequences for commercial aviation.



PHOTO: GERALD L. NINO, CBP

6. Without high accuracy in detecting a terrorist, certain nonterrorists may become terrorists because of their treatment by security authorities who wrongly identify them as terrorism-inclined.

7. Some terrorists inevitably will be treated as nonterrorists in a less-than-perfect security system, and successful terrorism will result.

Because of points 4 through 7, some experts support random screening of air passengers—or a modification of random screening—even if those pulled out for secondary screening include a 4-year-old child or a 90-year-old grandmother, who may have something dangerous planted on them.

8. A commonly accepted terrorist indicator, stress, is not all that useful. Stresses arise from many reasons not related to terrorism—such as trying to avoid missing a flight; moreover, someone about to engage in terrorism who believes it is God's will or the key to some other good may not appear stressed, but calm, tranquil, and even blissful.

9. The typical explanations for terrorism—such as ethnic, sectarian, tribal, economic, and personal grievances—may be superficial, offering few insights into the underlying psychology.

10. All experts depend on combinations of faith, intuition, logic, authority, observation, and experimentation to link information to predicted behavior, although all of these approaches have flaws.

11. A contemporary perspective holds that a person's individual identity, mind, nature, personality, and concepts of causality, space, and time may be language fictions that have practical value in describing self and reality but may not actually exist. Yet if this is the case, the foundation for the screening criteria developed by experts is tenuous.

A U.S. Customs and Border Protection canine officer checks arriving luggage. Aviation security relies on a range of detection measures, from trained dogs to X-rays.

### A New Language

In today's era of globalization, developments to improve the identification of terrorists before they strike are unclear. Depending on disparities in technological sophistication, including cybersecurity, the true purpose of a potential threat may or may not be hidden.

As more people use the latest communications technologies, human nature and the best language to describe it may be changing across groups of people and within individuals, impeding the identification of people who pose a threat and of their modus operandi. In addition, the number, structure, permeability, function, and process of terrorist networks and organizations are significantly changing, along with the psychological, social, cultural, and physical boundaries they may need to cross.

Static wiring diagrams of terrorist entities may decrease in value to those charged with protection. Terrorist individuals and organizations are not formal members and formal teams. A new language is needed to describe the dynamics of ever-changing intent, cooperation, support, and social networking by terrorist individuals and organizations—how personnel for a specific terrorist act are mixed and matched; how individuals and organizations appear, disappear, and reappear; how operational and support capabilities are shared among individuals and organizations with radically different ideologies and motives; and how terrorists wittingly and unwittingly self-select and are selected for one-time acts. More and more, individuals can go online and find validation with others, as if in a self-reinforcing echo chamber, losing any doubts that aviation terrorism or other terrorisms are true, good, and right.

### Finding Explosives and Weaponry

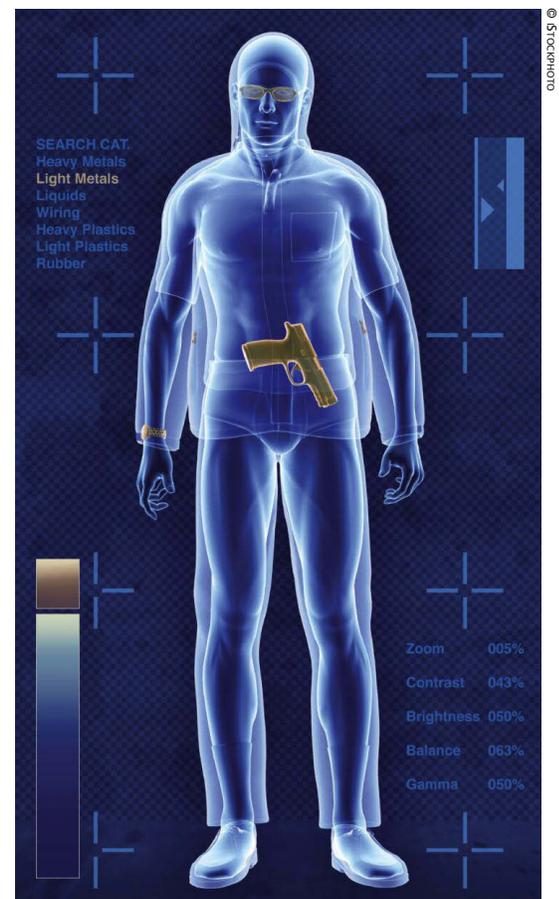
Experts rely on a variety of technologies to identify the physical characteristics of explosives and other weaponry intended for terrorism. Bulk forms and trace amounts of proscribed materiel can be detected and identified.

An example that highlights the main issues has been in the news as much for prurient interest as for security—the full-body scanner. The technology detects bulk forms of explosives and other weaponry via electromagnetic radiation, usually millimeter waves or X-rays. The radiation reflected from an individual's body is analyzed via computerized algorithms to depict differential densities of the body and objects that may be in or under clothing. Aviation security is supported when some of these objects prove to be explosives or other weaponry, or when the technology deters bringing these items into an airport.

### Technology Problems

Several problems arise; accuracy is the first. Technologies are not 100 percent accurate when tested realistically in a laboratory, tested in field conditions, or employed operationally. Accuracy is further affected by human performance factors, such as low motivation, fatigue, distractions, and the application of strategies for interpreting technical data. Many advocates of the technology concede that low-density items of interest—constituted of liquid, powder, or thin plastic, for example—may go undetected, as will items hidden between folds of body fat and within body orifices.

Second, a sophisticated terrorist entity has the intelligence, reconnaissance, and surveillance capabilities to learn what the technology does and how. Planning then can focus on how to beat the system, go around it, target another aspect of the aviation environment, or choose another transportation mode or some other target. Most terrorists do not harbor aviation fetishes or have a burning desire to disregard



The controversial full-body scanner is designed to detect explosives or other weaponry. Problems such as accuracy, cost, and possibility of malfunction must be addressed when relying on technology for aviation security.

the most effective security impediments to achieve explosive, ballistic, or some other more unspeakable satisfaction.

Third, scanners are costly. Many have estimated the cost of fielding full-body scanners at all security checkpoints, both domestically and internationally, at several hundred million dollars. This includes only the purchasing costs, not the costs of operations and maintenance, training, and any necessary structural modifications to the airport. Yet this or any other specific technology would be irrelevant for an infinite number of terrorism operations. The result is an extraordinary sunk cost, as well as the opportunity cost. This works to the advantage of terrorists, who aim to harm the United States economically, as well as physically.

Another cost problem involves the collateral economic damage that occurs when the integration of the technology with other aviation operations is sub-optimal. This can cut back the volume of air travel; online opportunities for communication, exploration, and other experiences are burgeoning.

Fourth, the exposure of people's bodies has led to modifications not in the best interests of security, such as blurring a passenger's face or lowering the fidelity of the body image. Moreover, full-body technology often is optional, with the alternative of body pat-downs with or without wand. The alternative, too, can be compromised through cultural and psychological concerns about sexual orientation, gender identity, sexuality, sexism, sexual harassment and discrimination, and their social implications. These concerns can bring out the worst in passengers, security personnel, and security.

Fifth, the cumulative effects of screenings and the possibility of a malfunction projecting higher radiation levels raise potential health issues. Although most experts state that the health risks are no more than those from background radiation in the environment or from a few minutes of flight, the health effects of screening systems have not been well researched.

Sixth, the applied physics of security technology may be poorly understood, or may be given the benefit of the doubt, or may be used as a cover for corruption. All three may depend on a global belief in the magic of technology and result in support for systems that may have failed to detect explosives, weapons, and illicit drugs in Thailand, Iraq, and Mexico, according to news reports.

In the era of globalization, the ease of knowing the parameters of a technology increases a terrorist's advantage. This also can lead to terrorists developing technology for use against security. Globalization's increase of social interconnectivity increases the pos-



PHOTO: WWW.TSA.GOV/BLDC

sibilities of the type, timing, and location of a terrorist attack obviating the specific technology at an airport or other venue.

### Layers of Security

In addition to the goals of finding terrorists, explosives, and weapons, five other important issues affect aviation security and terrorism in an era of globalization.

#### Intelligence Operations

Intelligence operations are necessary to find, apprehend, interrogate, and—under legal and ethical rules of engagement and adjudication—incarcerate or terminate terrorists before they can attack. The information from these operations needs to be transmitted continuously and securely to aviation-related authorities, who then must modify policies, plans, programs, and moment-by-moment layers of security. With globalization, layers of security must protect against ever-changing threats interacting with ever-changing vulnerabilities leading to ever-changing risks.

#### Psychological Factors

Industrial and organizational psychology play a role. For example, the morale and performance of aviation security personnel who screen at checkpoints would improve with higher pay, better training, a professional culture bordering on elitism, more positive marketing of security careers, scientifically validated professional training dealing with the detection of low-probability events, and more respect.

Too many leaders throughout the intelligence, security, law enforcement, and political communities, for example, cultivate a can-do attitude that may lead to turf battles and interpersonal conflicts. The dynamics of looking for evil may lead to committing

Analysts monitor the transportation network at the Transportation Security Administration (TSA) Operations Center, which facilitates communication between TSA, government agencies, and law enforcement and security agencies. Intelligence operations and communication are part of a multilayered approach to security.

In an international security cooperative exercise between the United States and Cameroon, a U.S. Navy lieutenant serves as a mock captive for the Cameroon Navy's Rapid Intervention Battalion team at Douala Naval Base.



PHOTO: U.S. NAVY MASS COMMUNICATION SPECIALIST 3RD CLASS RICHARD J. STEVENS

evil—such as illegal acts and atrocities—to the detriment of those who are being protected. Some of these dynamics include justifying unethical conduct as serving moral purposes, minimizing personal

responsibility for immorality, relabeling and misperceiving unethical and immoral consequences, and dehumanizing and blaming human targets. A significant body of research suggests that globalization is

## Under the Volcano

### *The Eyjafjallajökull Eruptions, Globalization, and Lessons Learned*

RICHARD W. BLOOM

The volcanic eruptions that began on April 14 from under Iceland's Eyjafjallajökull glacier have exemplified challenges for transportation in a world of globalization. The eruptions immediately became a headline story worldwide, as dense clouds of volcanic ash forced temporary closures of European airspace during April and May, affecting millions of travelers. Governments, companies, and other entities attempted to manage the reports—in some cases, to provide accurate information, to satisfy the requests and needs of travelers and the general public, and to reduce needless panic and distress. Other attempts, however, aimed to hide ignorance, to protect unprepared and poorly briefed decision makers, and to advance other agendas ahead of the public welfare.

All of the attempts at managing the reports proved difficult, because of the global, 24-hour news cycle. The best informed and most effective managers of the story seemed to be not those with formal authority over aviation and intermodal transportation, nor credentialed reporters, but the proverbial men and women on the street—now the cyberstreet—sending information via cell phone chatter and photos, by texting, Twitter, blogs, Internet chat rooms, Facebook, and You Tube—with some of the videos going viral, that is, gaining rapid and vast worldwide distribution.

#### Emergency Planning

One lesson for all transportation decision makers is that these and other ever-emerging social networking media need to be integrated into emergency planning and operations. The perceptions of travelers and the general public will continue to influence behavior and other reactions, for good or for ill. Managing the story of a transportation emergency is as important as any other emergency task—not just spinning the challenge but helping to understand and meet it.

In an increasingly interdependent world, the eruptions immediately demonstrated the expanding role of politics in emergency response. The question of who owns the skies was difficult, and perhaps impossible, to answer to everyone's satisfaction. National sovereignty; professional, sociocultural, and personal turf battles; and electoral campaigns were exposed as impediments to daily commercial aviation operations, planning for emergencies, and the implementation and evaluation of emergency plans.



PHOTO: NASA

Ash and steam continued to billow from Eyjafjallajökull in Iceland in early May 2010.

exposing people to disinhibiting stimuli, rendering terrorism and inappropriate counterterrorism more likely.

### Public Relations

All foreign policy tools—military, diplomatic, economic, social, cultural, and humanitarian—should be used to improve international perceptions of the United States, so that fewer people engage in or support terrorism. With globalization, an increasing number of information sources compete for attention, so that actual threats may be ignored or discounted.

Many people, at least within the United States, expect 100 percent safety and security. Many will not tolerate casualties or terrorist attempts and seem to expect a perfect imperviousness to threats. Despite the low frequency and small objective consequences of previous terrorism, the subjective psychological consequences have been much larger and longer-lasting. This psychology makes the United States a lucrative target and increases the probability of terrorist success—because objective success and

objective failure both qualify as subjective success.

A more mature perspective on reality, the meaning of life, and the nature of risk is needed. Globalization may help by facilitating an understanding that significant risk is omnipresent, even as it varies from place to place and moment to moment.

### Psychological Warfare

Terrorism is ultimately psychological, and the war against terrorism, a specific warfare technique, is actually a global psychological war. The conflict is with ever-changing groupings of people who have used and are willing to use extraordinary violence to create a world that tolerates certain ways of living but not others.

Antiterrorism and counterterrorism may identify, apprehend, incarcerate, and terminate many terrorists but may create as many—if not more—terrorists, because of the way these actions are communicated. Aviation security is only a part of the global psychological war, in which the victors and vanquished may not be people, but the ideas they carry.



IMAGE: YOUTUBE

*Videos on YouTube, Internet discussions, and other forms of social media sharing proved to be the most effective methods of disseminating information about the volcanic eruption.*

Political decisions carving up the Middle East and Africa in the past 200 years have contributed to seemingly intractable problems of governance, war, poverty, and disease; politically carving up the skies has contributed to present and future accidents. International and transnational organizations need to take the lead in developing optimal education, professionalization, standardization, and viable policies and programs.

### Sharing Applied Science

The eruptions demonstrated that applied science and engineering need to be shared worldwide. First-hand experience during the 1991 Mount Pinatubo eruptions in the Philippines—with a concurrent typhoon and earthquake—revealed that volcanologists and seismologists have more work to do in predicting the time, duration, intensity, and pattern of eruptions. Engineers have more work to do in understanding and predicting the effects of silicates, glass fibers, and other products of an eruption on aircraft and aircraft engines.

The same applies to the short- to long-term health effects of contact with volcanic debris and its sequelae—although this knowledge has advanced further than attempts to identify the health effects of the inhalation of, or physical exposure to, debris during the 1989–1990 Persian Gulf War, the 2003 invasion of Iraq, or the September 11, 2001, attacks on the World Trade Center.

In addition, more work is needed in operations research for aircraft, intermodal transport, passenger, cargo, and support logistics, particularly the development of mathematical models. More adaptive, quantitative approaches are needed for modeling revenue and cost projections, including insurance risk. The more that globalization fosters a global village—even one with variations in the permeability of boundaries—the more applied mathematics can inform subjective judgment.

### Security Implications

In a world of globalization, nearly every transportation event and the response to it have security implications. In effect, the world has become a research laboratory for criminals, including those who practice terrorism. Like daily security violations, a natural disaster precipitates a response that those who seek to harm the transportation system can easily study. Not only can the response to an event be studied to help predict and exploit a countercriminal response, but the event itself and the response can serve as an ideal time for criminal behavior. An example is the terrorist tactic of causing one explosion and then timing another to hit the first responders and any gathered observers. Another is the worldwide sharing of suicide terrorist tactics against transportation on land, sea, and in the air.

The increasingly sophisticated cybersecurity challenge exacerbates the challenge to live, work, plan, and respond as if always being observed and analyzed for the next attack.



## GLOBALIZATION AND TRANSPORTATION

# Globalization and the U.S. Southeast

## *Considerations for the Transportation Infrastructure*

BRUCE LAMBERT

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**G**lobalization means different things to different people—from job loss to economic opportunities, to the standardization or homogenization of cultures and the environment, and the perception that the world is shrinking. Globalization is evidenced by an increasingly integrated world. Consumers have benefited from the lower prices of imports and the variety of goods and services that a modern global supply chain supports. Businesses have benefited from new markets, resources, and opportunities, but also face increased competition at home and abroad.

According to one commentator, the world is global because its “core components have the institutional, organizational, and technological capacity to work as a unit in real time, or in chosen time, on a planetary scale” (1). Globalization reflects major trends, such as the internationalization of business through trade, financing, and organizations; increased interaction between cultures; integration of laws, treaties, and institutions; and the perception that problems and solutions are worldwide, not national or regional.

Loading containers at the Port of Charleston, one of the busiest in the country.



PHOTO: SOUTH CAROLINA STATE PORTS AUTHORITY



PHOTO: MAERSK LINE

Maersk Line freight vehicles travel alongside one another on rail and roadway, an example of intermodal, streamlined shipping through containerization.

### Effects on the Southeast

Globalization is shaping the freight transportation needs of the Southeastern United States—Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. The implications for the transportation system are varied, complex, and often not properly understood.

Three main elements shape the relationship between infrastructure and globalization. The first is the economy. The Southeast has benefited from direct foreign investment attracted by its relatively less congested transportation networks, labor structures, and related economic incentives. The region itself depends on exports and imports for its industries. Globalization, however, represents only a subset of total economic activity.

Second, globalization has many facets; only a subset involves the physical transportation related to goods movement, because international trade requires other activities related to financing, communications, and security. Finally, although the area around a port or airport may have the largest concentration of freight movements related to international trade, the infrastructures support many different users, blurring the distinctions between international and domestic.

## Framework for Global Trade

The United States always has been—and continues to be—a global trading nation. After 1946, international trade transformed much of the world's economies, with transportation, telecommunications, financing, political reform, economic development, and increased consumerism from the emergence of a worldwide middle class contributing to a global trading framework.

A list of the changes in the past 60 years includes many examples of how the pace and integration of economic activities, supported by transportation, dramatically increased. The advent of containerization, for example, allowed carriers and shippers to develop unitized shipments; logistics were streamlined, avoiding multiple handling at ports and terminals during transit.

American intermodalism in the 1980s also benefited from containerization. The Staggers Act and other deregulatory efforts allowed carriers and shippers more flexibility to determine contract rates and services. Intermodalism changed the dynamics of national markets, allowing firms to integrate international flows more easily into their domestic supply chains. U.S. firms also benefited from a large transportation network that connected domestic markets, via rail and water networks and the Interstate Highway System.

The ability to monitor and predict service schedules, with just-in-time management strategies, produced more efficient supply chains. The supply chains also were aided by the adoption of information technologies that recorded, predicted, and managed a firm's inventory, sales, and related activities. The information revolution allowed for global communications, including information for customs processing, which generated massive productivity gains. Banking and other financial and capital reforms allowed funds to cross international boundaries more easily.

Seeking to lower costs, U.S. businesses began to move production to offshore plants, supported by consistent supply chains and improved information exchanges. The lower cost of airfare and international travel, with programs assisting U.S. firms to develop international markets, and increased foreign direct investment in the United States, brought globalization closer to most Americans.

The result was an expansion of international trade in the United States (Figure 1). Not only did the nature of trade change, but so did the trading partners. The growth of Japan, the Asian dragons—South Korea, Taiwan, Singapore, and Hong Kong—and China shifted trade patterns into a truly global and open marketplace.

Photo: FedEx



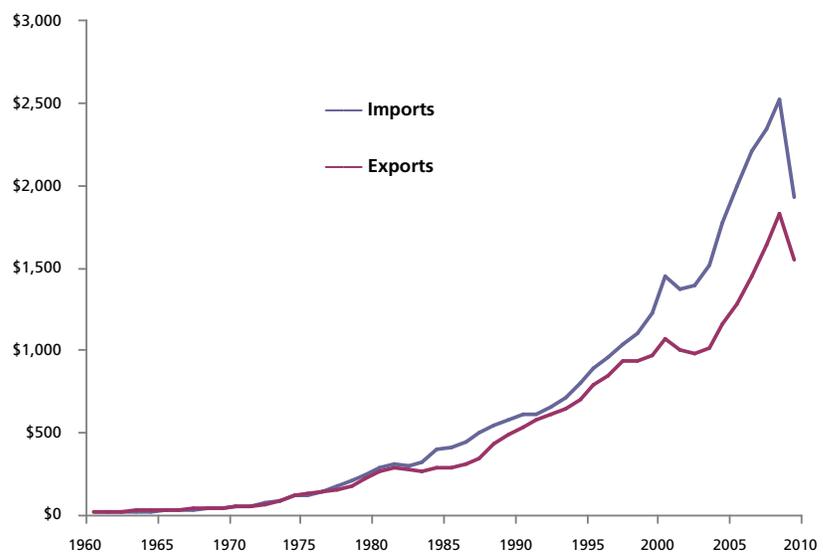
## Southeast Gateways

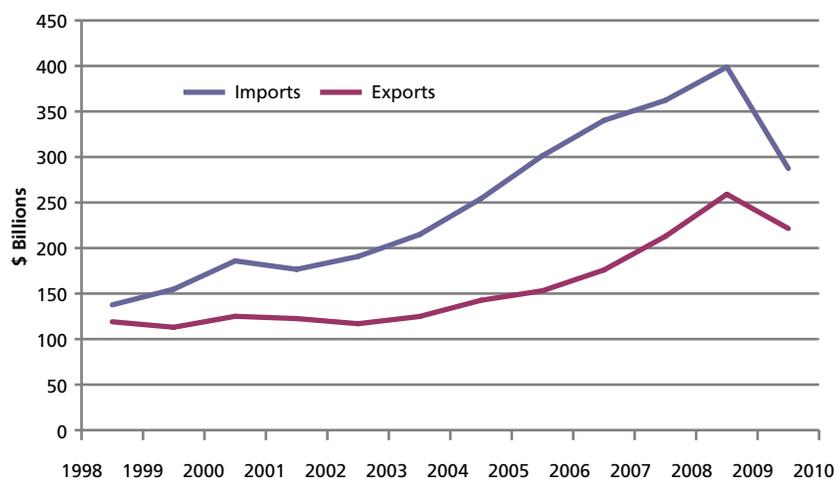
Before globalization began transforming the U.S. economy, the Southeast was undergoing a metamorphosis. In 1936, Mississippi launched the Balance Agriculture with Industry program to attract firms through bond actions, civic promotion, and public outreach. Other states had similar strategies, mostly to attract domestic firms to relocate or expand into the Southeast. This set the stage for opportunities to integrate the region into world markets.

The Southeast contains some of the nation's largest airport and port facilities. According to the Bureau of Transportation Statistics, six of the top 25 freight gateways are in the Southeast (2). Norfolk, Savannah, Charleston, and New Orleans are among the top ports, and the top air cargo airports include Miami and New Orleans. Other major gateways in the region are the Atlanta and Memphis airports, as well as port facilities along the Atlantic and Gulf coasts.

Delivery aircraft at the FedEx hub in Memphis, Tennessee—FedEx's largest hub.

**FIGURE 1** Total U.S. imports and exports, 1960–2009, in billions of dollars. (Source: Foreign Trade Division, U.S. Department of Commerce)





**FIGURE 2 Trade at Southeastern ports and airports, 1998–2009, billions of dollars.** (Source: WISERtrade)

Shipments of petroleum, chemicals, grains, and steel remain critical to the Mississippi River port complex in Louisiana, and gateway trade has grown dramatically throughout the region. Miami serves as a regional hub for Latin America, handling such items as cut flowers from Colombia and Ecuador. Memphis is the largest hub for Federal Express, and Atlanta serves that role for UPS. Norfolk, Savannah, and Charleston have benefited from increased container shipments.

Trade through the region’s ports has experienced strong growth in the past 10 years, before volumes declined in 2009. Some of the increase was from Asian containerized trade moving from the West Coast, because of shippers’ concerns about congestion and delays.

In 2009, the region’s gateways handled \$287 billion in imports and \$221 billion in export cargos (Figure 2). The top five originators of imports into the Southeast are China, Germany, Japan, Mexico, and Ireland, which edged out the United Kingdom. The top five export markets were Germany, Brazil, China, the Netherlands, and the United Kingdom.

In its first two months, the second dry excavation for the Panama Canal expansion project removed more than 260,000 cubic meters of material. The expansion project and a new set of locks will accommodate large post-Panamax vessels.

### Forecasts and Changes

Increased trade from globalization will increase congestion at the gateways. According to the Federal Highway Administration, the small segments of roads that connect facilities to the National Highway System tend to be in poor condition, and improvements are often difficult because of multijurisdictional overlaps (3).

For the region, one of the greatest unknowns involves the Panama Canal Authority’s construction of a third set of locks, expected to open in 2014. This may lead some cargo to switch from the West Coast to the East Coast. Most Southeastern ports are planning or constructing projects to handle the growth expected when the new locks open.

Receiving larger vessels than those now calling at the Southeastern ports could create a ripple effect for investment needs. Ports will need deeper and wider channels to accommodate the larger post-Panamax vessels<sup>1</sup> (Figure 3); this may require dredging to shape the channel. But the port also must have turning basins large enough for the ships to maneuver, as well as cranes large enough to work the wider vessels; this may require improvements to the berths. Furthermore, the cargo will need additional stacking areas and possible reconfiguring of the gates. The same problems would apply to airports, which may have to extend runways and make other improvements to handle the anticipated cargo.

The forecasts suggest that trade volumes through the region’s gateways will grow when the economy recovers (Figure 4). Potential changes include new trade patterns, such as opening up trade with Cuba or increased trade with Latin America. The recent economic growth in Brazil has opened opportunities for U.S. exporters. Higher energy prices, as experienced a few years ago, could negate the cost advantage for Asian exports to the United States and may result in some industries moving to production platforms in the Americas, including Canada and Mexico.

A gateway facility’s success often depends on its relationship to other markets. To generate cargo, the port hinterland—or the area that a port serves—must have access to large consuming or producing areas, provide transportation interchanges between modes or crossroads, or offer warehousing or distribution facilities. Ports and gateways often compete for service to their hinterlands; discretionary cargo can move through any of several ports with overlapping markets. The ports or airports that do not make the investment are unable to compete for future cargos, but those that make the investment are not guaranteed that they will capture more cargo.

<sup>1</sup> A Panamax vessel represents the largest vessel capable of transiting the Panama Canal. A post-Panamax vessel is too large to transit the canal.



PHOTO: PANAMA CANAL AUTHORITY

At the same time, the trend is to link broad markets—an example is the Heartland Corridor, an intermodal link between the Norfolk, Virginia, port region and the Midwest destinations of Columbus, Ohio, and Chicago, Illinois. Connecting container services from gateways to the hinterland via waterways is another strategy. The Crescent Corridor and the National Gateway program reflect a need to link large regions, combining domestic and international cargos within the same system.

### Supporting Exporters

The movement of imports through the U.S. system is not well understood, especially when the goods move into domestic supply chains with other products. From a transportation perspective, import cargos are limited to the narrow bands around the gateways or along rail intermodal corridors. These can generate large volumes of traffic, but the economic effects are distributed over many domestic activities, so that directly observing the relationship of imports to total transportation movements is difficult.

The top 10 exporters tend to be located along the coastal and border areas. In terms of value, Florida and Louisiana were the largest sources of export shipments in the Southeast in 2008.

Throughout the region, exports contribute to job creation. Figure 5 shows the export-supported jobs linked to manufacturing.<sup>2</sup> The states that have been successful in supporting the automotive industry—Kentucky, South Carolina, Tennessee, and Alabama—have a higher share of export-related jobs.

In 2004, the Southern Growth Policies Board estimated that reaching the national level of exports would generate an additional \$48 billion in revenues and more than 660,000 new jobs (4). At the same time, the United States is reexamining free trade agreements to promote U.S. exports. In addition to the North American Free Trade Agreement with Canada and Mexico, agreements with Colombia, Panama, and South Korea await Congressional approvals. This should mean more opportunities for U.S. businesses, with corresponding increases in trade through the Southeast's gateways and along its major corridors.

Another goal is to support small to medium-sized enterprises (SMEs) to enter international markets (Table 1). Exports from SMEs represent a growth market for the region. Florida has the highest share of SMEs engaged in international trade in the United

<sup>2</sup> The role of exports is difficult to estimate, as firms may expand to overseas markets and add a few workers, or a firm may use a broker to handle the international transaction. Furthermore, trade expansion is viewed as proprietary information—firms may be unwilling to share information for competitive reasons.

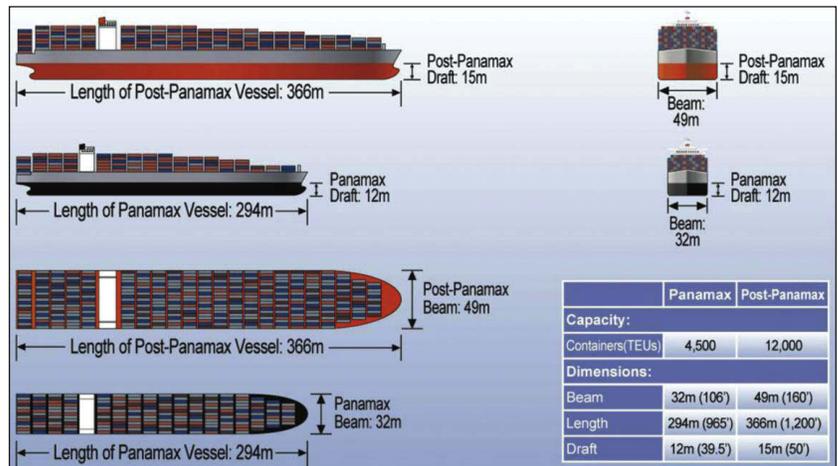


FIGURE 3 Comparison of Panamax and Post-Panamax container vessels. (Source: Panama Canal Authority)

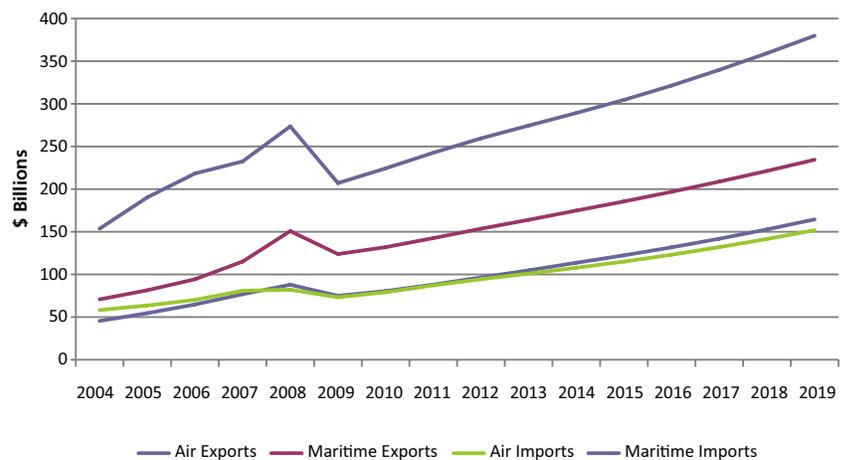


FIGURE 4 Total trade through the Southeast region's gateways, by mode, 2004–2019, in billions of dollars. (Source: IHS Global Insight)

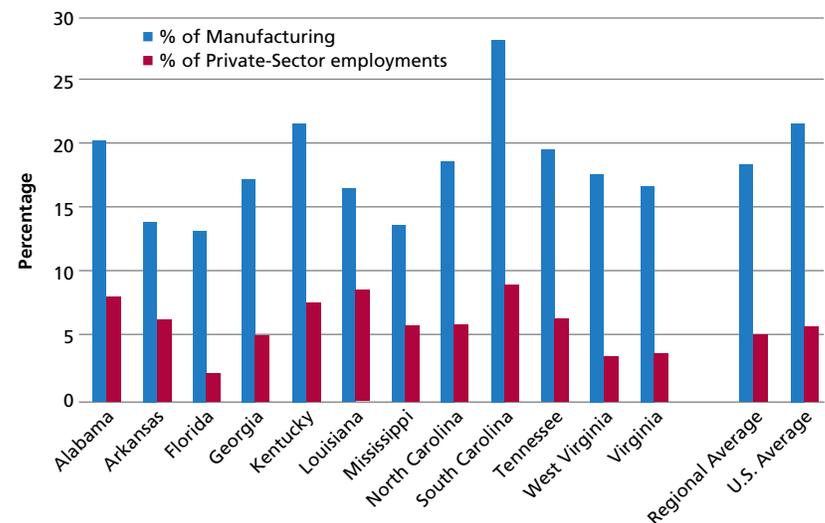


FIGURE 5 Export-related jobs in the Southeast, 2008. (Source: International Trade Administration, 2008)

**TABLE 1 Importance of Small to Medium-Sized Shippers in the United States and the Southeast, 2006**

State	Exporters of Record	Small to Medium-Sized Establishments (SMEs)	SMEs as % of Total Shippers	Value of SME Shipments (millions)
Alabama	2,371	1,896	80.0	\$1,642
Arkansas	1,383	1,048	75.8	\$542
Florida	30,313	28,775	94.9	\$19,643
Georgia	7,891	6,765	85.7	\$4,497
Kentucky	2,858	2,192	76.7	\$2,496
Louisiana	2,371	1,998	84.3	\$4,296
Mississippi	1,111	799	71.9	\$1,109
North Carolina	7,076	6,051	85.5	\$4,058
South Carolina	3,269	2,653	81.2	\$1,763
Tennessee	4,295	3,446	80.2	\$2,581
Virginia	4,596	3,834	83.4	\$3,124
West Virginia	718	514	71.6	\$321
<b>Regional Total</b>	<b>68,252</b>	<b>59,971</b>	<b>87.9</b>	<b>\$46,072</b>

Source: International Trade Administration, 2008. [www.trade.gov/mas/ian/state-reports/states/tg\\_ian\\_002730.asp](http://www.trade.gov/mas/ian/state-reports/states/tg_ian_002730.asp).

States. In 2007, Florida firms were responsible for more than \$46 billion in exports. Exports from SMEs represent a growth market for the region.

Organizations engaged in international trade generally approach exporting as a secondary business. New exporters may be unfamiliar with the options for international shipments. For example, a shipper in a rural area may incur additional costs to reposition a container for an export load. Exporters do not necessarily use the gateways within their state, preferring the gateway that provides the best services or cost to meet logistical needs.

The Appalachian Regional Commission's study, *Network Appalachia*, examines the influence of globalization on commodity flows and emerging trade

lanes and identifies opportunities for businesses to attract new enterprise and employment (5). By focusing on access to international trade, and not on the gateway, the report illustrates how hinterland regions regard the connectivity of modal options to markets and ports.

### Foreign Direct Investment

The Southeast has enjoyed a wave of foreign investment since the 1980s. In 2007, more than 1.3 million people in the region worked for a majority foreign-owned company. As the hemispheric crossroads of Latin America, Florida led the region in employment of U.S. workers by non-U.S. firms. In 2007, almost 246,000 workers were employed by a U.S. affiliate of an overseas company; the largest category in Figure 6, Other Industries, includes transportation and warehousing.

North Carolina has attracted manufacturing investment and financial and insurance firms. For most of the states in the region, investment has favored manufacturing. Economic developers seek foreign direct investments, because these firms on average pay higher wages, provide more generous compensation packages and better job security, and invest more in training per worker (6).

### Auto Industry Lessons

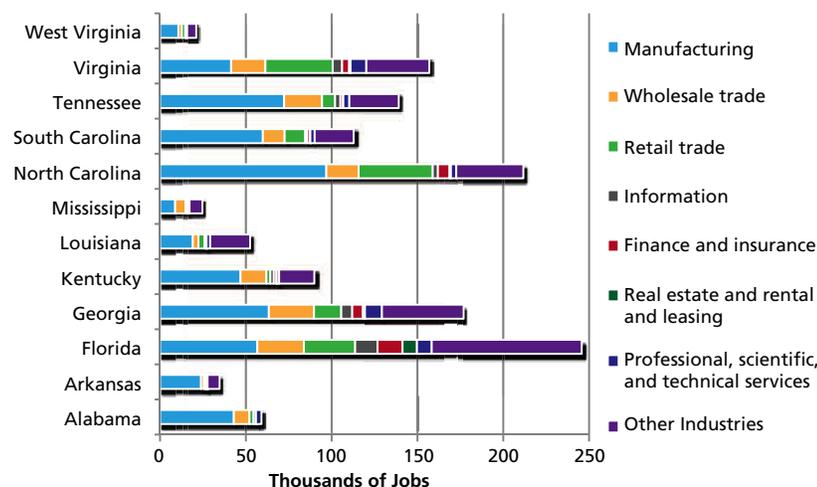
The automobile industry is the poster child of foreign direct investment in the South. Beginning in the 1980s, the automotive plants and suppliers clustered in Michigan began migrating south, seeking to lower production costs and to move closer to the growing markets. Meanwhile, foreign automakers and suppliers entering the U.S. market chose to locate in the region because of incentive packages and political pressures to sell cars built in the United States. From 1979 to 2009, the number of assembly plants in the South grew from 5 to 13.

These foreign-owned plants have unique characteristics. For example, the Mercedes plant in Alabama is not the equivalent of a production facility in Europe. The engines come from Germany, and modular production reduces some of the complexity of building the finished automobiles. In this way, foreign-owned plants depend on global supply chains to move the components for production.

Foreign automotive parts and component suppliers also have moved into the Southeast. As a result, the transportation needs for a single plant are diverse, as suppliers tend to locate close to reliable transportation access, not necessarily adjacent to the plant, and often across county and state lines.

The supply network supporting the Mercedes Benz plant in Alabama depends on two ports; direct sup-

**FIGURE 6 Employment for U.S. affiliates of non-U.S. companies, by state and industry, 2007.**



pliers located close to the plant, but still along the Interstate; and parts suppliers across the region (see Figure 7). Transportation is critical to the plant's operation, and many of the flows cross state borders. The majority of the finished automobiles leave the plants by rail, making rail access important in site development.

**Site Development**

Transportation needs are critical for any site under consideration for foreign direct investment; these firms are more likely than a domestic company to import and export at the same facility. Encouraging local agencies to work with carriers and transportation departments early in a project would ensure that new sites can achieve full potential. This may move logistics to the top of the economic development list for the region, but improved coordination between commerce agencies and transportation providers could avoid straining transportation budgets with last-second requests for infrastructure projects.

Foreign direct investment has risks. Without a strong headquarters presence in the Southeast, most of the plants operate as branch facilities. Branch facilities generally are considered more disposable in comparison with firms located in parent countries when decisions are made about plant closings, relocations, or expansions.

Foreign direct investment may encourage public-private partnerships (PPPs) for investment in transportation infrastructure. Most states allow PPPs, and some agreements have involved foreign-owned firms. This can lead, however, to political fallout over selling public roads. Fear about foreign ownership of transportation assets—including roads and ports—emerged with the failed attempt of Dubai World Ports to purchase Peninsular and Oriental Steam Navigation Company in 2006.

**Other Considerations**

**Resource Competition**

Although globalization has led to increased traffic on the region's infrastructure, it also has changed financial concerns. Before the recent economic collapse, the world was eager for energy and materials. The prices of many of the materials for constructing highways rose dramatically as global prices for steel, petroleum, and other products increased with increased global demand, restricting budgets. State departments of transportation suffered another effect—with higher gas prices in 2007 and 2008, drivers began using other modes and limiting gasoline purchases, reducing income from fuel taxes, a leading source of highway investment funds.

PHOTO: HYUNDAI MOTOR MANUFACTURING ALABAMA



A worker assembles a 2007 Santa Fe at the Hyundai Motor Manufacturing plant in Montgomery, Alabama. Many foreign automakers and suppliers entering the U.S. market have settled in the Southeast.

**Security**

With the concerns about transportation and security since September 11, 2001, the federal government has imposed new regulations and policies to protect citizens from terrorist attacks. The U.S. Customs and Border Protection agency is responsible for ensuring that cargo inspections do not place an undue burden on international trade. Several programs have addressed security improvements at the nation's gateways, but often have lacked funding, so that state or local agencies must bear the costs. In addition, operations were disturbed as ports and airports had to put in new facilities or take action to address security issues.

**Information and Skill Sets**

The problem is how to develop a world-class transportation system with limited resources and compressed timelines for project delivery. Other regions of the world have more experience in bidding and in operating public-private partnerships for transportation, as well as with new approaches to corridor planning. Some of these firms are competing in U.S. markets, as U.S. firms are competing overseas; this may provide insights that can be applied in the United States.

**FIGURE 7** Location of suppliers for Mercedes Benz automobile production in Alabama.

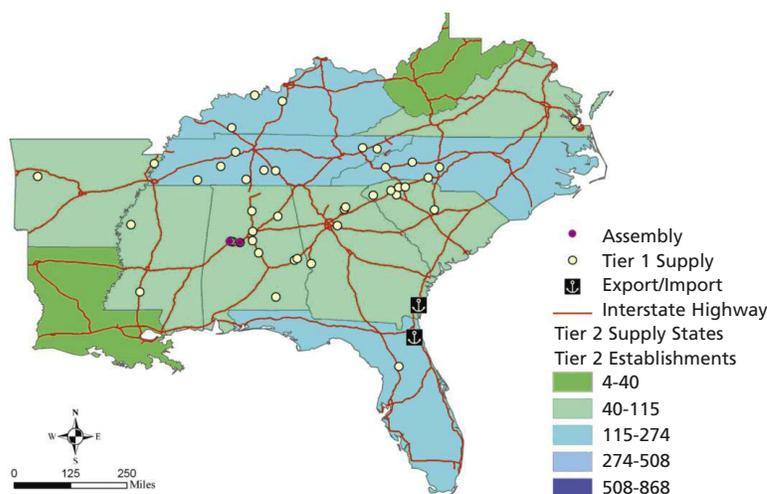




PHOTO: MERCEDES-BENZ U.S. INTERNATIONAL, INC.

At the Mercedes-Benz plant in Tuscaloosa County, Alabama, automobiles are assembled with engines that are shipped from Germany.

## Implications for Infrastructure

Infrastructure comprises the facilities and terminals that handle cargo and the supporting network of roads, railroads, and waterways that move the cargo. Recognizing the need to evaluate the potential for increased trade with Latin America on the region's network of railroads, ports, airports and highways, the Southeastern states, including Texas, conducted the Latin American Trade and Transportation Study (LATTS). Although the forecast is dated, if Latin America trade alone were to grow, the implications for infrastructure investment are clear—port and airport investment needs would rise with increased trade, and traffic would increase throughout the region, mostly on the Interstate system.

LATTS recommended several initiatives, not necessarily construction-oriented but reflecting an integrated approach, including use of the existing infrastructure; adding physical infrastructure; increasing operating throughput; taking a corridor approach for investing; developing agile freight operations; improving clearance at gateways; giving attention to connectors; encouraging technology; integrating information and implementing applications; increasing public awareness; improving institutional relationships; improving the freight profile; and establishing partnerships.

These recommendations would require an aggressive, regional approach to transportation planning and project implementation, with states recognizing their interdependence in addressing transportation concerns. According to the Federal Highway Administration, four out of every 10 truck trips cross a state line (7).

International trade should be viewed as a component not only of infrastructure investment but of economic development, business attraction and retention, site development, and foreign direct investment. Many of the parties involved in making transportation decisions do not yet fully understand their interrelationship with others that build, maintain, operate, or use the infrastructure of ports, roads, airports, and waterways.

## Bridges to the Globe

Infrastructure investment and improved operations are critical to economic growth and commercial development. By identifying key businesses, the Southeast can position itself to provide the necessary infrastructure. A regional focus may require a systems approach to allocating scarce resources, as reflected in calls for a national freight strategy that recognizes the priorities and needs of infrastructure projects to support international activities.

Globalization may continue at a slower rate than in the past few years. Nevertheless, the implications for the Southeast economy and its transportation system are clear. The development of gateways, exporters, and foreign direct investment will lead to more traffic on the region's infrastructure and across jurisdictions.

Transportation is changing, as the U.S. economy shifts from an infrastructure funded to support domestic markets to one that also supports international trade. Multimodal corridors, which carry both domestic and international cargo, will play a key role in sustaining economic growth. State departments of transportation have become responsible for a larger scope of economic development. Building a road today also may mean building a bridge to global economic prosperity tomorrow.

## Acknowledgment

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## References

1. Castells, M. *The Rise of Network Society*. Blackwell Press, Malden, Massachusetts, 2000.
2. *America's Freight Transportation Gateways*. Bureau of Transportation Statistics, Research and Innovative Technology Administration, Washington, D.C., 2009. [www.bts.gov/publications/americas\\_freight\\_transportation\\_gateways/](http://www.bts.gov/publications/americas_freight_transportation_gateways/).
3. *NHS Intermodal Freight Connectors: A Report to Congress*. Federal Highway Administration, Washington, D.C., 2000. [http://ops.fhwa.dot.gov/freight/freight\\_analysis/nhs\\_intermod\\_fr\\_con/index.htm](http://ops.fhwa.dot.gov/freight/freight_analysis/nhs_intermod_fr_con/index.htm).
4. Clinton, J., C. Conway, and L. Hoke. *The Globally Competitive South (Under Construction)*. Southern Growth Policies Board, Research Triangle Park, N.C., 2004. [http://bus.utk.edu/globi/business\\_community/globally\\_competitive\\_south\\_op.pdf](http://bus.utk.edu/globi/business_community/globally_competitive_south_op.pdf).
5. *Network Appalachia: Access to Global Opportunity*. Appalachian Regional Commission, Washington, D.C., 2009. [www.arc.gov/program\\_areas/NetworkAppalachia.asp](http://www.arc.gov/program_areas/NetworkAppalachia.asp).
6. *Assessing Trends and Policies of Foreign Direct Investment in the United States*. International Trade Administration, U.S. Department of Commerce, July 2008.
7. *Freight Analysis Framework*. Federal Highway Administration, Washington, D.C., 2007. [http://ops.fhwa.dot.gov/freight/freight\\_analysis/faf/](http://ops.fhwa.dot.gov/freight/freight_analysis/faf/).



## GLOBALIZATION AND TRANSPORTATION

### POINT OF VIEW

# Investments in Seaports Deliver Goods, Prosperity, and Jobs

KURT NAGLE

*The author is President and CEO, American Association of Port Authorities, Alexandria, Virginia.*

**F**or centuries, U.S. seaports have served as economic lifelines, sending out goods and services to people around the world and delivering prosperity to the nation. Port activities generate more than \$3 trillion in economic activity annually and support more than 13 million American workers, including some of the highest-paying union jobs. With ambitious greening—that is, environment-enhancing—initiatives nationwide, seaports are providing and developing new green jobs. More can be done, however, with federal investment.

Additional funds for port-related and freight transportation infrastructure can modernize maritime transportation and can provide jobs now and tomorrow. These federal investments also would create transportation savings—a major benefit.

*POINT OF VIEW presents opinions of contributing authors on transportation issues. The views expressed are not necessarily those of TRB or TR News. Readers are encouraged to comment in a letter to the editor on the issues and opinions presented.*

### Achieving National Goals

In almost every month in the past year, the U.S. Census Bureau has reported positive growth in exports, sometimes in the double digits. In 2008, U.S. exports increased almost 12 percent from 2007 levels. In his 2010 State of the Union address, President Barack Obama cited the doubling of exports in the next 5 years as one of his administration's key objectives.

The cost savings from additional federal investments would help exporters of American products, such as U.S. farmers. U.S. manufacturers would benefit from import and export transportation savings, because they rely on imported parts, components, and bulk commodities.

By decreasing diesel emissions and improving energy efficiency in maritime operations, seaports can help achieve the national goal of creating jobs through programs that enhance the environment. Moreover, seaports can protect the homeland by bolstering security.

As Congress and the Obama Administration work to develop national job-creating policy and funding strategies, the American Association of Port Authori-

U.S. Department of Transportation programs include state highway projects for intermodal connectors into ports; activity at the Port of Tacoma Road Overpass in Washington State.



PHOTO: BRIAN DALBALCON, PORT OF TACOMA

ties (AAPA) has outlined several key federal programs and tax incentives related to ports that will aid in job creation, enhance sustainability, and provide long-term economic growth and prosperity for the nation.

### Maintaining Access

The U.S. Army Corps of Engineers is responsible for improving and maintaining the nation's water access to ports. The money to maintain these channels is collected from cargo owners via the federal Harbor Maintenance Tax (HMT). Nevertheless, the federal government does not use this tax for its intended purpose—to pay for navigation dredging. Since its inception in 1986, the HMT too often has funded other programs while serious dredging needs have been neglected.

Despite a \$5 billion surplus in the Harbor Maintenance Trust Fund, the Corps has been unable to maintain most federal navigation channels at authorized depths and widths. Projects to maintain these navigation channels would create jobs immediately and would provide transportation savings to benefit U.S. businesses. With decreases in the cost of freight transportation, these sectors can enhance their competitiveness in the global marketplace and can create more jobs. AAPA has recommended that the U.S. Congress appropriate 100 percent of the amount collected annually from the HMT for civil works programs to maintain federal navigation channels.

The development of a deep-draft center of expertise with a dedicated staff of subject-matter professionals would expedite and improve the quality of the Corps' navigation project planning and review process. Congress should work with the Corps, the Office of Management and Budget, other involved federal agencies, and the nation's ports to ensure that a thorough and reliable process is in place for the review

Dredging at the Port of Houston in Texas. The Harbor Maintenance Tax collected from cargo owners is dedicated to maintaining channels and water access to ports; however, the federal government often uses these funds for other projects.



PHOTO: PORT OF HOUSTON AUTHORITY



PHOTO: PORT OF LOS ANGELES

As part of its green terminal program, in 2009 the Port of Los Angeles purchased 20 electric, heavy-duty trucks capable of hauling 30-ton shipping containers in and around the San Pedro Bay port complex.

and approval of feasibility studies for dredging projects. In this way, U.S. consumers and workers can continue to reap the benefits that efficient ports can bring to a global economy.

### Enhancing Programs

Several programs funded through the U.S. Department of Transportation also can improve port access, efficiency, and modernization. These programs would create jobs if additional funds are provided. The programs include the following:

- ◆ State highway projects for intermodal connectors into ports—roads, railways, tunnels, and rail crossings—and for the mitigation of traffic congestion;
- ◆ The National Corridor Infrastructure Improvement Program and the Projects of National and Regional Significance, both of which address the movement of freight;
- ◆ The Transportation Investments Generating Economic Recovery (TIGER) program, which awarded \$1.5 billion in discretionary stimulus grants for freight and port infrastructure—although only 8 percent went to port projects, leaving unfunded the majority of critical port infrastructure applications;
- ◆ The National Infrastructure Investment Program, with \$600 million in funds for fiscal 2010 that have not yet been distributed; and
- ◆ The Secure Efficient Ports Initiative, a new program to promote short sea shipping, which can remove freight from the roads and deliver more cargo via an environment-friendly mode of transportation.

In particular, TIGER grants for port infrastructure projects could sustain and create family-wage jobs and improve the efficiency of moving goods to, from, and through U.S. seaports, helping make American exports more competitive in the global marketplace.

## Enhancing the Environment

Enhancing the environment is a great opportunity for creating jobs. Investments in environmental enhancements at U.S. seaports can help reduce emissions, while creating green jobs. The programs that have shown promise include the following:

- ◆ **The Environmental Protection Agency's Diesel Emissions Reduction Act (DERA) grants.** Ports that receive DERA funds can retrofit cargo-handling equipment; purchase lower-emissions trucks and equipment; retrofit ships, including dredges and tugs; provide electric shore power for ships; and retrofit rail locomotive engines. DERA funds have been among the first to be released and have yielded immediate buying power that creates American jobs.

- ◆ **The Department of Energy's (DOE) Transportation Electrification funding.** Ports were eligible for the \$400 million available, but DOE has oriented the program to fund research into electrifying passenger cars and light trucks, neglecting port-related transportation projects. If additional funds are provided, Congress should direct DOE to reevaluate the criteria to be more inclusive of port projects.

- ◆ **DOE block grants to states for energy efficiency.** If additional funding is provided for improving energy efficiency, some of the money should assist ports in making green improvements at their facilities.

The American Recovery and Reinvestment Act (ARRA) included \$150 million in cost-share waived funds to build security-related jobs and to protect ports from terrorism. Funding for additional security improvements can create more jobs, especially if the Federal Emergency Management Agency (FEMA) is allowed to provide funding for operational security positions, as it did under the ARRA; even more jobs could be created if FEMA expands its operational security personnel allowances. Continuing the cost-share waiver is critical to job creation.

## Tax and Trade Policies

Several tax incentives could enhance goods movement. The incentives include the following:

- ◆ **Exempting certain U.S. port-to-port movements of maritime cargo from the federal HMT.** Many in the maritime industry have recommended an exemption from the HMT to promote short sea shipping, which would create maritime jobs, reduce road congestion and wear, and reduce pollution. Although several bills have been introduced, Congress has taken no action. This provision would help to create jobs; the change would remove a federal disincentive to start up a greener way to move freight.

PHOTO: VIRGINIA PORT AUTHORITY



The Virginia Port Authority received a \$750,000 grant from the Environmental Protection Agency for the Green Goat, a hybrid locomotive, at Norfolk International Terminals.

- ◆ **Elimination of the Alternative Minimum Tax (AMT) on private activity bonds issued by public entities.** The AMT reduces the attractiveness of bond issues to investors; private activity bonds are necessary for infrastructure development projects. Without investors, public port authorities must discount the bonds, reducing the funds available for investment in infrastructure, as well as the jobs and income that would have been created. AAPA strongly supports the elimination of the AMT for private activity bonds.

- ◆ **Passing pending and new free trade agreements, including those with Panama, Colombia, and South Korea.** Free trade agreements help small and large U.S. businesses sell their products overseas, increasing exports, which create jobs for farmers, manufacturers, freight transportation workers, and others in the United States. Timely ratification of these trade agreements should be part of congressional efforts to create jobs.

America's seaports generate trillions of dollars of economic activity annually, support the employment of tens of millions of people, and handle approximately 2.5 billion tons of import, export, and domestic cargo, including food, clothing, medicines, fuel, building materials, and green technologies, such as wind-powered turbines to generate electricity. By funding ports in the program and policy areas noted, the United States can achieve modern, navigable seaports that are safe and environmentally sustainable and can create jobs now and for the future.

PHOTO: SHIPSPOTTING.COM



The Secure and Efficient Ports Initiative promotes short sea shipping, which can remove freight from the nation's roads.

## TRB SPECIAL REPORT

# Funding Options for Freight Transportation Projects

*This article is adapted from the Summary of Special Report 297, Funding Options for Freight Transportation Projects.*

During the 1990s, capacity constraints became evident in parts of the U.S. freight transportation system, the consequence of economic and population growth and changing patterns of domestic and global commerce. The constraints impaired economic productivity, but resolving them taxed the institutional and financial capacities of public- and private-sector transportation providers. The most visible problems were congestion at certain important nodes of the system—for example, at the largest seaports and at terminal operations at inland hubs like Chicago, and their surrounding areas.

Improving freight flow at congested locations is a complex undertaking, requiring cooperative action by state and local government jurisdictions, federal agencies, and private-sector firms. Typically, the projects are intended to produce a mix of benefits to private firms—such as lower costs to freight carriers and shippers—as well as to local residents and noncommercial travelers—for example, reduced congestion. The projects usually involve coordinated packages of capital and operational improvements at publicly

owned facilities, such as ports and highways, and private facilities, such as railroads and terminals.

The charge to the Transportation Research Board's Committee for the Study of Funding Options for Freight Transportation Projects of National Significance involved (a) an analysis of the rationale for public investment in freight infrastructure and an assessment of national significance as a criterion for determining federal government responsibility; and (b) an evaluation of alternative finance arrangements for freight infrastructure.

## Government Responsibilities

To analyze the rationale for public investment in freight transportation projects, the committee considered three questions:

1. In what circumstances is public-sector involvement in the freight transportation system needed?
2. When is federal government involvement warranted?
3. When does the public-sector responsibility require building or paying for infrastructure, as



PHOTO: AL COVEY, VIRGINIA DOT

Heavy traffic volume on northbound I-81 south of Salem, Virginia.

opposed to any other form of intervention—for example, regulation?

### ***Need for Government Involvement***

In practice, government roles are dictated primarily by established responsibilities that are not likely to change fundamentally in the near term. Governments provide and operate most freight infrastructure, impose fees and taxes to support these facilities, provide research and information, and impose environmental and economic regulations.

Expansion of government involvement should be limited to certain defined circumstances in which market-dictated outcomes would be far from economically efficient. These include restraining the exercise of monopoly power and dealing with the nonmarket costs of pollution, congestion, and accidents.

Government involvement and leadership are practical necessities in complex projects—for example, large projects that extend through multiple jurisdictions, involve sensitive environmental issues, and entail coordinated improvements to publicly and privately owned facilities serving passengers and freight.

### ***Need for Federal Involvement***

The federal government has important opportunities for contributing to freight system performance and infrastructure development by improving established functions: the federal-aid programs for highways and airports; the systems directly provided by the federal government, such as air traffic control, inland waterways, and marine harbor channels; customs and border security; and environmental and economic regulations.

The federal government has responsibility to intervene when state and local governments and the private sector lack the capability to carry out an economically beneficial project. The federal government needs more effective instruments to carry out these responsibilities, however, including reforms in financial aid programs.

Although the term has been used in federal laws and in transportation policy debates, national significance is not a definitive criterion for deciding which transportation projects merit federal support or involvement. Any substantial freight transportation infrastructure project is significant to the national economy. A project should merit federal assistance if it is of high economic value and would not be accomplished by state and local governments and the private sector acting alone.

### ***Forms of Government Intervention***

Once the determination is made that government



PHOTO: JOEY CAMBRIDGE

involvement at the federal, state, or local level is required, the most cost-effective action should be determined, considering public investment as well as other forms of intervention. Building or paying for infrastructure seldom is the only option for fulfilling the government responsibility. Regulation, taxation, pricing, and closer public–private cooperation can mitigate problems of pollution and congestion without shifting cost burdens for commercial facilities to the public.

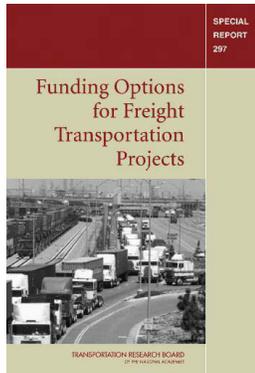
Freight projects often include the goal of reducing the adverse community impacts from traffic. In practice, public–private cost sharing in such projects as rail–highway grade crossing separations is determined by negotiation. Inducing or requiring shippers and carriers to pay for impact mitigation is not detrimental to efficient freight system development, as long as the cost is justified by the benefit to the community.

## **Evaluating Finance Alternatives**

The committee reviewed the finance arrangements in prominent projects and the forms of government involvement in project development and finance to determine if present arrangements are adequately serving the needs of industry and the public. The criterion for judging the arrangements was the impact on the performance of the freight transportation system. Satisfactory finance arrangements should promote efficient investment and operation. The committee's findings are as follows:

1. **Present finance arrangements are inadequate for maintaining and improving freight transportation system performance.** The future reliability of present major sources of public funding is uncertain. Of equal importance, public-sector finance

Freight facilities at the Port of Oakland in California. Investments in port and freight infrastructure projects are often a complex undertaking involving local, state, and federal government entities, as well as private-sector firms.



TRB Special Report 297, *Funding Options for Freight Transportation Projects*, is available from the TRB online bookstore, [www.trb.org/bookstore/](http://www.trb.org/bookstore/); to view the book online, go to <http://onlinepubs.trb.org/onlinepubs/sr/sr297.pdf>.

arrangements often are not designed to provide incentives for the efficient development and operation of transportation facilities. Several problems hinder efficient operation and optimum investment:

- ◆ Public infrastructure providers fail to optimize performance; congestion often could be avoided by demand management through pricing or other methods.

- ◆ Capital spending often is directed by distributional considerations instead of targeting investments that would yield the greatest public benefits.

- ◆ Public policies add to costs and discourage investment—for example, through regulatory delays and subsidies that distort competition.

- ◆ The institutional capacity and authority to undertake complex projects at major ports and transportation hubs are lacking, particularly when the participation of several government jurisdictions is necessary.

- ◆ Problems arise from external, social, and economic trends: rapid changes in patterns of freight demand complicates planning; increasing population density drives up the costs of infrastructure expansion; and security requirements—especially at ports and border crossings—impose new costs and administrative bottlenecks.

2. **Finance reforms should be designed to promote productivity gains.** Finance arrangements are among the most powerful instruments available for improving the performance of the freight transportation system. Choices concerning funding sources and fees charged to users strongly influence investment decisions and the use of facilities.

3. **Finance reform options differ in their probable impacts on freight system performance.** The committee reviewed proposals for new finance arrangements that differed primarily in four characteristics: the division between public and private responsibility for providing funds and for investment decisions; the division of responsibility between the federal and state governments; the kinds of fees charged to users of facilities and the dependence of project funding on fee revenue; and the extent of subsidies that allow shippers to pay less than the cost of service.

Revenue adequacy is a primary concern in designing finance arrangements. The most prominent revenue proposals include increasing the rates of the taxes that now pay for infrastructure, creating a new national or regional freight user fee, and funding more capital spending out of general government revenue. Another option, developing facility-specific user fees that reflect the cost of providing service—

such as highway tolls and charges to port users—is consistent with the goal of improving system performance in most circumstances, although creating new facility-specific fees will be a challenge.

## Recommendations

### *Guidelines for Federal Assistance*

The guidelines listed below are intended to apply to federal involvement in projects that fall outside the bounds of the established finance arrangements for federal-aid highways and facilities directly provided by the federal government, such as inland waterways, harbor channels, and air traffic control.

- ◆ *The federal role in financial assistance should be facilitative and incremental.* Federal assistance should be employed to stimulate action by state and local governments or by the private sector when the potential economic benefit from improved freight mobility or the potential reduction in external costs is great.

- ◆ *Federal assistance programs should promote the development and use of well-designed facility charges and other local and facility-specific revenue sources.* Federal policy should encourage and provide incentives for the development of local and facility-specific revenue sources to pay for the construction and operation of freight facilities. Federal law should not impede the imposition of user charges, and federal programs should not offer grants if funds could be raised through user charges or other local sources.

- ◆ *Federal assistance programs should be flexible and adaptable to diverse infrastructure projects.* Any federal freight infrastructure assistance program should address projects on a case-by-case basis and should be flexible to address diverse needs. Federal assistance should include a variety of grants, loans, and other kinds of credit.

- ◆ *Legislation establishing federal assistance programs should direct the administration of the programs by defining project evaluation criteria instead of identifying projects to receive aid.* Project earmarking that circumvents executive agency evaluation weakens the effectiveness of federal transportation assistance programs.

- ◆ *Federal policy to promote efficient freight infrastructure development should encompass reforms in regulatory, management, and tax policies that affect freight infrastructure performance.* The scope of federal laws and programs that affect freight system performance and infrastructure development includes grant programs; direct federal provision and operation of facilities; environmental, safety, and economic regulation; border security; and impositions of special user taxes and general taxes that influence investment. A com-

prehensive federal policy must coordinate all of these to achieve the common objective of improved system performance.

### **Federal Discretionary Assistance Program**

Congress should create a new discretionary assistance program to support freight infrastructure projects. The objective should be to apply federal resources to ensure completion of freight projects that would yield large national economic benefits or large reductions in external costs and that other government and private-sector parties could not complete in a timely and cost-effective manner. The program should be established initially as a test of the need for and value of a responsive and flexible federal program of assistance to freight projects. The main features of the program should be as follows:

- ◆ *Limited initial scale.* The program should be funded by a multiyear congressional authorization. Funding preferably would not be taken from revenue now dedicated to other transportation purposes, but initial funding from existing user taxes or general revenue funding would be acceptable.

- ◆ *Assistance awarded competitively.* Project selection should be based on policy objectives and evaluation criteria.

- ◆ *Limited initial duration and sunset.* The program should be enacted as a 4- to 6-year trial with an independent evaluation to determine if a larger, longer-term program is warranted.

- ◆ *Assistance in the form of grants and credit.* Aid should be in the form of credit assistance. Grants should be considered only when a loan would not suffice for a project to proceed and only for certain purposes, including preconstruction development assistance, incentives for projects that demonstrate innovative finance arrangements and administrative structures, incentives for multistate projects, and as leverage in promoting projects that are of high economic value yet face difficult local obstacles.

- ◆ *Limited federal participation.* The value of federal loans and grants should be a small share of the total project cost.

- ◆ *Focus on capacity enhancement or environmental mitigation.* The program should be devoted to projects to construct freight capacity, or to mitigate the harmful external impacts of freight traffic, or for equipment and start-up costs associated with operational improvements.

- ◆ *Preference for projects with user charges.* A project's ability to generate revenue from its users is evidence of its economic benefit and helps ensure that its operation will be sustainable.

- ◆ *Economic justification.* Applications for aid



PHOTO: ALAMEDA CORRIDOR TRANSPORTATION AUTHORITY

through the program should include standardized requirements to present the economic justification of the project.

- ◆ *Justification for federal involvement.* Applicants should show that federal involvement would speed project completion, lower costs, or increase the likelihood of success.

- ◆ *Outcome evaluation.* Applicants should present an analysis plan and commit to an evaluation of the completed project, comparing actual cost and use with projections.

- ◆ *Integration with other assistance programs.* A single application and review process should integrate administration of the program with freight project assistance.

### **Federal Credit Assistance and Tax Incentives**

The federal government should make credit assistance more accessible and attractive to freight projects that merit federal support. Congress should reduce the bias in tax law for public instead of private development of highways and other infrastructure.

- ◆ *Direct federal loans and loan guarantees.* Changes should make the provisions of the Transportation Infrastructure Finance and Innovation Act more accessible to sponsors of freight projects and should give the U.S. Department of Transportation (DOT) increased flexibility to adapt assistance to the individual projects.

- ◆ *Tax-exempt bond finance.* To encourage private-sector participation, the tax laws should be neutral about the private management and finance of the

A freight train passes over the Henry Ford Bridge on California's Alameda Corridor.

## Committee for the Study of Funding Options for Freight Transportation Projects of National Significance

**Genevieve Giuliano**, *Chair*, School of Policy, Planning, and Development, University of Southern California, Los Angeles

**Peter J. Basso**, American Association of State Highway and Transportation Officials, Washington, D.C.

**Mary R. Brooks**, Dalhousie University, Halifax, Nova Scotia, Canada

**Kenneth J. Button**, George Mason University, Fairfax, Virginia

**Mortimer L. Downey**, Mort Downey Consulting, LLC, Vienna, Virginia

**William Ellis**, Port Authority of New York and New Jersey, New York

**Robert J. Gernon**, Maine Pointe, LLC, Boston, Massachusetts

**Michael K. Gray**, Round Rock, Texas

**Gill V. Hicks**, Cambridge Systematics, Inc., Pacific Palisades, California

**Jeffrey Holt**, BMO Capital Markets, San Francisco, California

**Adib Kanafani**, University of California, Berkeley

**James W. McClellan**, Independent Consultant, Virginia Beach, Virginia

**Therese McMillan**, Federal Transit Administration, Washington, D.C.

**David W. Seltzer**, Mercator Advisors, LLC, Philadelphia, Pennsylvania

**Joseph R. Morris**, TRB, *Study Director*

kinds of facilities commonly built by the public sector. This would require adjusting or eliminating the caps in federal law on the volume of private activity bonds that may be issued for highways and other projects.

◆ *Infrastructure banks.* If new federally sponsored infrastructure banks are created—as revolving funds capitalized by the government—their operation should be consistent with the principles for federal assistance recommended above. Preference should be given to projects that generate revenue for loan repayment and that meet requirements for efficient operation and pricing.

### **Federal Actions to Promote Revenue Sources**

The federal government should reduce barriers to the development of local and facility-specific revenue sources to pay for construction of freight transportation facilities and should provide incentives to use these revenue sources.

◆ *Remove barriers to user charges and establish federal policy to support such charges.* Congress should reduce impediments to the imposition of charges by port authorities on cargoes passing through their ports. Federal policy should support such charges to provide revenue for the construction and operation of port facilities and access routes. In addition, provisions in the federal-aid highway program that restrict the imposition of tolls should be removed, although federal oversight may be necessary.

◆ *Promote user charges with incentives.* Federal assistance to freight infrastructure projects should include incentives to encourage transportation facility operators to undertake user-charge funding and to establish organizational arrangements for setting charges and providing facilities.

◆ *Remove barriers to international investment.* Congress should reduce legal barriers to foreign ownership, operation, and investment in the U.S. transportation industry, particularly in the maritime and aviation industries, to the extent consistent with national security.

◆ *Provide information, planning, and training assistance.* The federal government can promote use of local and project-specific revenue sources through information dissemination, planning assistance, and training.

### **Freight System Monitoring, Planning, and Project Evaluation**

The federal government should expand its capabilities for freight system planning and project evaluation and for data collection for freight system performance monitoring.

◆ *Organizational structure.* U.S. DOT should designate or create a discrete, identifiable institutional home for project evaluation, performance monitoring, and technical assistance to state and local governments. The organization should have cooperative relationships with state and local governments and with the freight industry. It should provide useful products, including the evaluation and planning techniques that define best practices.

◆ *Freight system monitoring.* The federal government should expand its freight system monitoring program by developing a continuing, comprehensive, and systematic program to monitor the performance of the national freight transportation system and to identify sources of inefficiency. Monitoring should measure performance in physical and economic terms.

◆ *Freight system planning.* The federal government should improve capabilities for short-term forecasting and for short- and long-term scenario analysis of freight transportation markets and system performance. Planning methods should incorporate the consideration of risk and uncertainty.

◆ *Project evaluation.* The federal government should undertake a program of research, demonstrations, and outreach activities to develop and promote sound project evaluation in public freight infrastructure programs. The federal government should assist state and local government agencies in developing technical capacity for project evaluation.

## CALENDAR

## TRB Meetings

## September

- 4 Pavement Performance Data Analysis Forum  
São Paulo, Brazil  
*A. Robert Raab*
- 15–17 International Conference on Sustainable Concrete Pavement Technologies: Practice, Challenges, and Directions\*  
Sacramento, California
- 20–23 Workshop on Research Needs for IntelliDrive<sup>SM</sup> Applications for the Public Sector  
Irvine, California
- 22–24 12th National Conference on Transportation Planning for Small and Medium-Sized Communities: Tools of the Trade  
Williamsburg, Virginia
- 22–24 Symposium on Mineral Aggregates in Transportation  
Charleston, South Carolina
- 23 Workshop on Rail Network Capacity Issues\*  
Jacksonville, Florida

## October

- 10–13 9th National Conference on Access Management\*  
Natchez, Mississippi
- 11–13 European Transport Conference\*  
Glasgow, Scotland
- 18–19 Transportation Systems for Livable Communities Conference  
Washington, D.C.
- 24–27 19th National Conference on Rural Public and Intercity Bus Transportation  
Burlington, Vermont

- 24–29 Pavement Evaluation 2010\*  
Roanoke, Virginia
- 25–27 Sustainable Transport and Quality of Life in the City\*  
Buenos Aires, Argentina

## November

- 8–10 International Conference on Commercial Driver Health and Wellness  
Baltimore, Maryland
- 16 Commodity Flow Survey Workshop  
Washington, D.C.

## December

- 1–3 7th International Bridge Engineering Conference: Improving Reliability and Safety—Restoration, Renewal, and Replacement  
San Antonio, Texas

## 2011

## January

**23–27 TRB 90th Annual Meeting**  
Washington, D.C.  
[www.TRB.org/AnnualMeeting](http://www.TRB.org/AnnualMeeting)

## February

- 7–11 2nd International Conference on Construction Management\*  
Orlando, Florida

## March

- 13–16 Geo-Frontiers 2011\*  
Dallas, Texas

## May

- 1–4 International Transportation Economic Development Conference: Economic Impact of Connecting People, Goods, Markets, Employment,

Services, and Production\*  
Charleston, West Virginia

- 8–12 13th TRB National Transportation Planning Applications Conference  
Reno, Nevada

- 18–20 3rd International Conference on Roundabouts  
Carmel, Indiana

- 18–21 4th U.S. and International Conference on Performance Measurement for Transportation Systems  
Irvine, California

## June

- 2–3 5th International Conference on Bituminous Mixtures and Pavements\*  
Thessaloniki, Greece
- 6–7 Using National Household Travel Survey Data for Transportation Decision Making Workshop  
Washington, D.C.
- 6–8 2nd GeoHunan International Conference: Emerging Technologies for Design, Construction, Rehabilitation, and Inspections of Transportation Infrastructure\*  
Hunan, China
- 14–17 1st International Conference on Access Management\*  
Athens, Greece
- 27–30 6th International Driving Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design\*  
Lake Tahoe, California
- 28–July 1 6th International Symposium on Highway Capacity and Quality of Service  
Stockholm, Sweden

Additional information on TRB meetings, including calls for abstracts, meeting registration, and hotel reservations, is available at [www.TRB.org/calendar](http://www.TRB.org/calendar). To reach the TRB staff contacts, telephone 202-334-2934, fax 202-334-2003, or e-mail [lkarson@nas.edu](mailto:lkarson@nas.edu). Meetings listed without a TRB staff contact have direct links from the TRB calendar web page.

\*TRB is cosponsor of the meeting.

## Richard Golaszewski

*GRA, Inc.*

**R**ichard Golaszewski specializes in applying economic, financial, and statistical analysis to the transportation industry in the public and private sectors. His abiding interest in public policy was developed at the Wharton School of the University of Pennsylvania. After he graduated in 1977, he joined GRA, Inc.—then called Gellman Research Associates—and began working on projects in the rail sector after the collapse of the Northeast railroads. These projects led to the formation of Amtrak and Conrail, and as the rail work shifted from policy to operations, he began to work with the aviation sector.

In his career, Golaszewski has examined the economics of safety regulatory programs, airports, airlines, aircraft manufacturing, and air traffic management; has testified during airline mergers; and has investigated policies on the public's role in funding aeronautics research and development. In 1989, he con-



**“Many of the problems faced by transportation are not unique to the United States, and we can learn from advances made by others just as they can learn from us.”**

ducted the first major study to develop a single air traffic control system for Western Europe, and led a GRA, Inc., study of Airbus finances for the federal government in the following year.

Golaszewski directed a study for the U.S. Department of Transportation (DOT) on developing a corporatized air traffic control model for the United States, led air traffic control restructuring assessments, and researched the costs of providing air traffic control services. His 1994 GRA report to the U.S. DOT on international airline alliances, “A Study of International Airline Code Sharing,” led to major changes in U.S. policy. Other international projects include a model of the economic effects of a new airport for the Hong Kong government.

In 1966, Golaszewski was drafted into the U.S. Army. He was commissioned as a second lieutenant in the field artillery and served as a first lieutenant in Vietnam from 1968 to 1969. After returning to the United States, he extended his army service, was promoted to captain, and completed rotary wing flight training; he returned to Vietnam in 1971 and flew a Huey Cobra gunship as an air cavalry unit flight platoon leader. The next year he came back and enrolled at LaSalle University, where he received a bachelor's degree in accounting before attending the Wharton School.

Golaszewski currently is developing economic, policy, and

safety analyses for the Federal Aviation Administration and working with the interagency Joint Planning and Development Office to establish the Next Generation Air Transportation System (NextGen). A frequent writer and speaker on the economics of aeronautical research and technology, privatization, and financing of aviation infrastructure, Golaszewski has testified before Congress, has provided expert advice on subjects including airline mergers and aviation safety, and has assisted clients in the air transportation industry with financial decisions, cost-benefit and economic impact analyses, and air services development.

A frequent presenter at TRB's Annual Meeting, Golaszewski believes in the value of research and in the importance sharing research results with colleagues from around the world. “Many of the problems faced by transportation are not unique to the United States, and we can learn from advances made by others just as they can learn from us,” Golaszewski observes. “Aviation is truly a global and interconnected industry, facing the same types of problems in congestion, economics, safety, and the environment. The mutual exchange of ideas helps both parties.”

Golaszewski published his first TRB paper, “Weather Briefing Use and Fatal Weather Accidents,” in the *Transportation Research Record* in 1988. He was appointed to the Committee for the Study of Strategic Transportation Data Needs in 1990, and in 1992 became a member of the Aviation Economics and Forecasting Committee, which he served until 2008. Other TRB activities have included the Committee for Developing Aviation Environmental Design and Aviation Environmental Portfolio Management Tools, and the Airport Cooperative Research Program (ACRP) Project Panel on Risk Assessment of Proposed Aircraft Rescue and Firefighting Standards. In 2007, he also helped to prepare one of the ACRP's first publications, *Airport Aviation Activity Forecasting: A Synthesis of Airport Practice*.

He is currently involved in the ACRP Project Panel on the Graduate Research Award Program on Public-Sector Aviation Issues, which he describes as his most rewarding activity at TRB. “I believe that activities like this help bring new talent into aviation from the most promising students in the United States,” Golaszewski comments, and notes that the papers submitted allow him to keep apprised of the latest developments in transportation research.

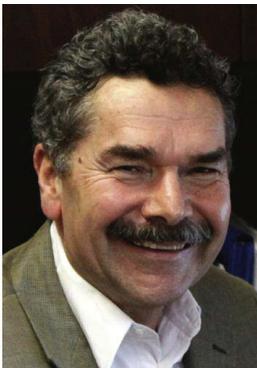
Golaszewski served on the National Academies' Aeronautics and Space Engineering Board for 6 years. In 2003, he was appointed a lifetime National Associate of the National Research Council of the National Academies. He is a member of many research and professional associations, including the Air Traffic Control Association, the American Institute of Aeronautics and Astronautics, the Helicopter Association International, and the Transportation Research Forum.

## Thomas H. Wakeman

### *Stevens Institute of Technology*

**T**homas H. Wakeman III started out as an engineering student at California Polytechnic University, but a desire to spend time at the San Luis Obispo beach led the Pasadena native to graduate instead with a bachelor of science degree in marine biology. Wakeman was inducted into the U.S. Army in 1970 and attended Engineering Officers Basic Training at Fort Belvoir, Virginia. His long career with the U.S. Army Corps of Engineers began with an assignment to the San Francisco Corps District, where from 1970 to 1994 he dealt with issues in navigation dredging, ports, environmental concerns, and maritime transportation and commerce.

Assigned to answer public criticism about the Corps District's dredging practices, Wakeman began to study the influence of dredging and sediment contamination on the San Francisco Bay entrance channel as well as its sediment transport regime and



**"I am delighted to help Stevens Institute educate students and young professionals as members of the next generation of port, maritime, and navigation engineers and scientists."**

biota. "During this period, I sought opportunities to share my experiences, writing more than 80 technical articles and coediting two books on dredging activities, environmental issues, engineering management, and maritime transportation," Wakeman recalls.

While working on a master's degree in marine biology from San Francisco State University, Wakeman realized that managing sediment contamination required that pollution be stopped before it entered the marine environment. In 1976 he returned to graduate school in sanitary engineering at the University of California (UC), Berkeley. He worked at the U.S. Army Hydraulic Engineering Center as a research hydraulic engineer, assisting with the design and construction of the San Francisco Fisherman's Wharf breakwater project. He then received a master's degree in civil and environmental engineering from UC Davis.

After operating a consulting firm in Sacramento, California, Wakeman returned to the Army Corps of Engineers as director of the Bay-Delta hydraulic model in Sausalito, California. During a dredging crisis in the San Francisco Bay in the early 1990s, Wakeman led a major multiagency planning program to resolve the regional "mudlock." In 1994, he was hired by the Port Authority of New York and New Jersey, which was having prob-

lems with dioxin and dredging and had noted Wakeman's success in California. He worked with the Port Authority on navigation in the New York Harbor, first as the program manager and later as general manager of waterways development. He taught graduate courses in maritime infrastructure and environmental issues at the Maine Maritime Academy and at other schools on a part-time basis.

In the 1990s, the maritime industry was transformed by globalization and new megaships that could distribute goods throughout the world. A comprehensive harbor development plan was authorized by Congress in the Water Resources Development Act of 2000, and Wakeman oversaw solutions to problems from rock blasting to disposal in a \$2 billion, 50-foot dredging project of the Port Authority and federal government. In 2004, Wakeman traveled overseas to lead multinational efforts to rebuild the five ports of Iraq. He returned to the United States in late 2004 and developed an international goods movement strategy for the New York-New Jersey region.

"Because of my lifelong experiences in the maritime sector and marine environment, and my concerns about America's limited maritime workforce, I wanted to teach young people about the industry's opportunities and challenges," Wakeman comments. He received a doctorate of engineering science from Columbia University, New York, in 2006; he continued to teach at Columbia, Rutgers University, and the Stevens Institute of Technology. In 2007 he retired from the Port Authority and joined the Stevens Institute in Hoboken, New Jersey, as research professor of civil, environmental, and ocean engineering and as deputy director of the Center for Maritime Systems and of the new Department of Homeland Security National Center of Excellence for Port Security.

"I am delighted to help Stevens Institute educate students and young professionals as members of the next generation of port, maritime, and navigation engineers and scientists," Wakeman affirms. His research interests include port security and resiliency, freight policy, intermodal transportation, coastal shipping, the marine transportation system, short sea shipping, and marine environmental issues.

In 1976, Wakeman was awarded a Civil Works Fellowship for Long-Term Training by the U.S. Army Office of the Chief of Engineers. At TRB, he is a member of the Marine Group, the Oversight Committee for the National Cooperative Freight Research Program (NCFRP), and two NCFRP project panels, and is chair of the Committee on the Marine Environment. Wakeman is a member of the American Society of Civil Engineers and a Fellow of the U.S. Section of the World Association for Waterborne Transport Infrastructure.

# NEWS BRIEFS



PHOTO: AAA FOUNDATION FOR TRAFFIC SAFETY

Adults are more likely than teens to talk on cell phones while driving their cars, according to a new study.

## Adults and Teens Admit to Distracted Driving

Adults are just as likely as teenagers to have texted while driving, and substantially more likely to have talked on their cell phones in the car, according to a report from the Pew Internet and American Life Project. Almost half of all adults who regularly receive or send text messages said that they have sent or read a text message while driving; but slightly more than one-third of texting teens responded that they had texted while driving, the study found. The numbers diverged more dramatically when it came to talking on the phone while driving: three in four cell phone-owning adults said that they have talked on the phone while operating a vehicle; half of all teenage cell phone owners have reported doing so.

Roughly the same number of teens and adults—44 percent and 40 percent, respectively—reported that they had been in the car with a driver who was using a cell phone in a way that put themselves or others in danger, according to the report. The study also found that 17 percent of cell phone-owning adults have been so distracted while walking by talking on their phones or texting that they have bumped into another person or object.

Researchers conducted a phone survey of more than 2,000 American adults between April 29 and May 30, 2010. The data for teens comes from a 2009 study conducted by Princeton Survey Research International.

The report is accessible at <http://www.pewinternet.org/Reports/2010/Cell-Phone-Distractions.aspx>.

## Durable Beam Gains Honor and Use

The *Engineering News Record* has presented its 2010 Award of Excellence to John Hillman for his invention of the hybrid composite beam (HCB). Also referred to as the Hillman composite beam, the HCB is corrosion-resistant, has an anticipated service life of more than 100 years, and is lightweight. A 30-foot bridge using HCBs weighs approximately one-seventh as much as a precast concrete bridge and one-third as much as a steel bridge of the same span.

Hillman's concept benefited from a \$320,000 development grant in 2000 from TRB's Innovations Deserving Exploratory Analysis (IDEA) program.

HCBs have been used in the construction of several bridges, and a field test and evaluation is under way at the Transportation Technology Center in Pueblo, Colorado. With assistance from five Class I railroads, the evaluation will determine how well prototype beams can hold up under locomotives and fully loaded freight cars for a prolonged period of time. Two highway bridges were constructed in 2009: a six-beam, 58-foot bridge in Illinois, and a six-beam, 31-foot bridge in New Jersey. HCBs also are being used in the construction of the 8-beam, 540-foot Knickerbocker Bridge in Maine, expected to open to highway traffic in fall 2011.

Hillman is a senior associate at Teng & Associates, Inc., a design and construction management firm based in Chicago, Illinois.

To find out more about Hillman's IDEA project, contact Chuck Taylor, [ctaylor@nas.edu](mailto:ctaylor@nas.edu), or Hillman, [HillmanJR@teng.com](mailto:HillmanJR@teng.com).



PHOTO © RICHARD SCHULTZ

John Hillman, who developed his hybrid composite beam with assistance from a TRB grant, has received an award for his invention.

# TRB HIGHLIGHTS



T. C. Kao, National Taiwan University and Taiwan High-Speed Rail Corporation (retired), delivers the keynote speech, "Overcoming Challenges to the Vision for High-Speed Rail in America," at the Joint Rail Conference Banquet.

## Conference Focuses on High-Speed and Intercity Passenger Rail

In April, more than 450 rail transportation professionals, academics, and students convened at the University of Illinois at Urbana-Champaign (UIUC) for the 2010 Joint Rail Conference. Updates on rail operations, engineering, and planning—especially in high-speed rail in Asia and Europe—were discussed in six tracks, 47 sessions, and nearly 250 spoken and poster presentations, along with a review of the Federal Railroad Administration's safety approach in high-speed operations and of new technologies and operational methods.

Conference cosponsors—the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Institute of Electrical and Electronic Engineers, the American Railway Engineering and Maintenance of Way Association, and TRB—took advantage of the resurgence in rail transportation and new attention to high-speed and intercity passenger rail to broaden the conference's scope beyond engineering. The conference featured substantial international participation, with attendees from China, Canada, Spain, Taiwan, Korea, and other nations.

**DATABASE FOR SAFETY**—Omar Smadi, Iowa State University, presents information on the development of the second Strategic Highway Research Program (SHRP 2) Roadway Information Database, a project in the SHRP 2 Safety focus area. Contractors, potential contractors, and interested public convened at the National Academies' Keck Center in Washington, D.C., July 13–14, for the SHRP 2 Safety Symposium, during which project coordinators reviewed progress on SHRP 2 safety projects.



The conference program included the discussion of recent research results and new research needs. Representatives from TRB's rail committees organized several tracks and sessions, reviewed and wrote papers, and made presentations. Former Rail Group chair Chris Barkan, UIUC, chaired the conference and organized programs in the High-Speed Rail Experience and Development track. Outgoing Rail Group Chair Robert Dorer was the TRB liaison, a member of the conference planning committee, and leader of the Safety, Security, and Environment track. Committee members G. Avery Grimes and J. Riley Edwards directed the Planning, Management, and Operations track and the Infrastructure Engineering track.

T. C. Kao, a visiting scholar at UIUC from National Taiwan University, drew from nearly 20 years of experience developing a successful, privately financed rail system in Taiwan in his keynote speech. Kao addressed challenges to high-speed rail in America and ways to overcome them. At the conference, UIUC announced the formation of the Rail Transportation and Engineering Center. The conference exhibit hall featured displays ranging from railway supply companies to consulting firms and railway publishers.

After the conference, participants attended technical tours of the UIUC College of Engineering's rail research laboratory facilities—the Newmark Civil Engineering Laboratory, the Beckman Institute for Advanced Science and Technology, the Mid-America Earthquake Center, the Computer Vision and Robotics Laboratory, and several university railroad research projects—and of the Illinois Terminal in Champaign, hosted by Bill Volk, Champaign-Urbana Mass Transit District. The transportation hub for Champaign-Urbana and the region, Illinois Terminal is regarded widely as an example of a successful small-city, multimodal passenger transportation center.

# TRB HIGHLIGHTS

## Marine Board and TRB Marine Group Meetings Address Timely Topics

Meetings and workshops sponsored by the Marine Board in 2010 focused on offshore wind energy, offshore oil drilling, the Deepwater Horizon–BP oil spill in the Gulf of Mexico, harbor safety and security, marine research and development, and other topics.

### ◆ Offshore Wind Energy Workshop, March 25–26

At a workshop sponsored by the Minerals Management Service (MMS) and organized and hosted by TRB and the Marine Board, participants examined offshore wind facility hazards and design and operational options for turbines, blades, towers, substructures, foundations, and electrical connections to the grid. MMS regulatory processes and procedures to minimize risk to safety and to the environment, protect the interests of other users of the outer continental shelf, and minimize disruptions to maritime transportation operations and to the supply of electricity were highlighted.

### ◆ Marine Board Spring Meeting, May 17–18

The Marine Board's 2010 Spring Meeting was held at the Virginia Port Authority. Issues covered included offshore platform safety and



Capt. Andrew McGovern, Sandy Hook Pilots Association, welcomes participants to the first session of the Harbor Safety and Security Conference, Jersey City.

the Gulf of Mexico oil spill, a vision and strategy for marine transportation in the Arctic, port security, innovations in ship design, offshore wind energy installations, and the America's Marine Highways pilot project. Marine Board agency liaisons gave general updates and provided presentations on current and upcoming projects.

◆ **Joint Conference of Harbor Safety Committees and Area Maritime Security Committees: Transcending Boundaries of Effort, Safety, Security, and Stewardship**, June 8–10

## Cooperative Research Programs News

### Developing and Maintaining Support for New Airport Capacity

Successful delivery of new airport capacity projects—runway creation and extension, airspace improvements, terminal expansion, and ground access improvements—depends on support from airport sponsors, political constituencies, airport users, interest groups, regulatory agencies, and nearby communities. Efforts to identify, maintain, and broaden support—while dealing constructively with project opposition—should start early and continue at each critical stage, from planning to regulatory approval to financing. Research can help identify useful lessons on developing and maintaining airport capacity project support and can provide guidance to airports.

Mead & Hunt, Inc., has received a \$299,980, 15-month contract (ACRP Project 03-21, FY 2010) to prepare a guidebook for airports with strategies for developing and maintaining stakeholder support in new airport capacity initiatives.

For further information, contact Joseph D. Navarette, TRB, 202-334-1649, [jnavarrete@nas.edu](mailto:jnavarrete@nas.edu).

### Monitoring Runoff from Airport and Aircraft Deicers

To ensure effective management of deicer runoff at airports, onsite measurements of total chemicals—organic carbon, biochemical oxygen demand, chemical oxygen demand, ammonia, pH, dissolved oxygen, and glycols—must be taken at several locations, at differing frequencies, and across a range of deicer concentrations. Accurate and reliable onsite measurements are essential for internal runoff management and to meet regulatory requirements; correctly done, they can reduce operating and infrastructure costs.

Although many onsite monitoring options are available or are being developed, the performance of individual instruments and methods is uncertain, making it difficult for airports to select appropriate monitoring techniques. Research is needed to review and evaluate onsite monitoring options to assist in the decision-making process, especially with pending environmental regulations.

Gresham, Smith and Partners has received a \$150,000, 16-month contract [Airport Cooperative Research Program (ACRP) Project 02-14, FY 2010] to prepare a guidebook to help airports identify, compare, and select practical onsite methods for monitoring deicing materials in water.

For further information, contact Joseph D. Navarette, TRB, 202-334-1649, [jnavarrete@nas.edu](mailto:jnavarrete@nas.edu).

### Highway Bridge Fire Hazard Assessment

Although infrequent, major bridge fires can cause severe structural damage or collapse. An undocumented number of smaller bridge fires throughout the United States each year cause disruption, necessitate repair, and add to maintenance costs. Vehicle fires are the primary cause of these incidents. Recent bridge fires in California, Michigan, and New York have underscored a need to understand these incidents and to review information on mitigation strategies, damage assessments, and repair.

Research can provide highway bridge owners with mitigation strategies, postevent assessments, and repair techniques after a bridge fire and can lead to AASHTO guidelines for planning, designing, constructing, maintaining, and inspecting highway bridges and for emergency management, as well as a risk-based management approach for bridge safety inspection and maintenance.

The first joint conference of the nation's Harbor Safety Committees (HSC) and Area Maritime Security Committees (AMSC), in Jersey City, New Jersey, combined two events to allow committees to exchange information on current challenges, best practices, case studies, and lessons learned, and to engage with public- and private-sector leaders on issues in marine transportation and harbor safety and security. Comprised of local governmental agency representatives, maritime labor and industry organizations, and public interest groups, HSCs work with the U.S. Coast Guard (USCG) to address safety, security, mobility, and environmental protection of ports and waterways. AMSCs—whose members include personnel from federal, state, and local law enforcement; USCG; emergency response teams; port management; and labor—bring together representatives to assess port security risks and determine risk mitigation strategies.

◆ **Transforming the Marine Transportation System: A Vision for Research and Development**, June 29–July 1

Cosponsored by TRB, this conference in Irvine, California, explored progress in scientific and technical solutions to marine transportation and waterway management challenges; examined potential research and technology needs in the Marine Transporta-

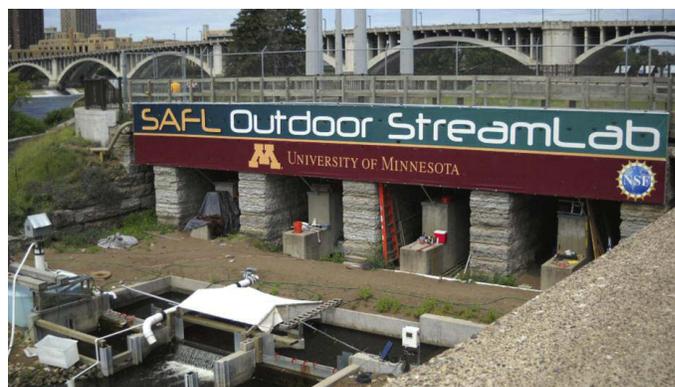


PHOTO COURTESY JEREMY CAMBRIDGE

The TRB Joint Summer Meeting, July 11–14, featured tours of the University of Minnesota's St. Anthony Falls Laboratory and Upper St. Anthony Falls Lock and Dam for attendees of the Multimodal Freight–Waterways track.

tion System; and helped foster potential partnerships between federal, state, private, and academic institutions.

For more information about upcoming or past TRB and Marine Board Events, see the TRB calendar at [www.trb.org/calendar](http://www.trb.org/calendar).

Virginia Polytechnic Institute and State University was awarded a \$350,000, 24-month contract [National Cooperative Highway Research Program (NCHRP) Project 12-85, FY 2010] to investigate the susceptibility of highway bridges to fire damage by material and design types, geometry, and fire load; to develop guidance for damage assessment and repair techniques; and to develop guidance for fire damage risk reduction.

For further information, contact Waseem Dekelbab, TRB, 202-334-1409, [wdekelbab@nas.edu](mailto:wdekelbab@nas.edu).

### Consequences of Delayed Maintenance

Highway agencies use various maintenance treatments to restore and slow deterioration of highway pavements, bridges, and other physical assets. Budget constraints can delay or eliminate the application of these treatments, adversely influencing condition and performance. Delayed maintenance eventually reduces service through early deterioration, requiring costly rehabilitation or replacement. Although analytical tools can quantify the consequences of delayed maintenance, processes to determine the potential savings and performance enhancement from proper maintenance are not readily available. These processes can help highway agencies assess the economic benefits of maintenance actions and their enhancement of the highway system's level of service. Incorporated into asset management systems, these processes can provide a way to optimize the allocation of resources.

Cambridge Systematics, Inc., of Cambridge, Massachusetts, has been awarded a \$599,997, 36-month contract (NCHRP Project 14-20, FY 2010) to develop a process applicable to highway pavements, bridges, and other physical assets that will quantify the consequences of delayed application of maintenance treatments—

defined by the inability to meet the agency-approved application schedule or the available budget relative to an unconstrained budget. The process will incorporate performance indicators, costs to owners and road users, and other relevant factors.

For further information, contact Amir N. Hanna, TRB, 202-334-1432, [ahanna@nas.edu](mailto:ahanna@nas.edu).

### New Specifications for Structural Supports for Signs and Signals

An agreement between the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration for the design of highway structures using load and resistance factor design (LRFD) methodology requires that states must use LRFD specifications to design new standard structures such as culverts and retaining walls starting October 1, 2010. AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals* contains sections on the LRFD approach; however, the specification is based on working stress design methods. The combination of design, construction, and inspection terminology has proved cumbersome and difficult for users to follow.

To help states successfully meet the October 1 implementation, the specification will be converted to the LRFD approach; reorganized into separate sections for design, construction, and inspection; and be made consistent with other AASHTO documents.

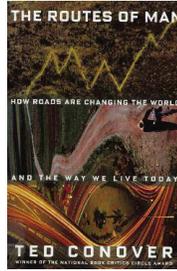
BridgeTech, Inc., has received a \$400,000, 30-month contract (NCHRP Project 10-80, FY 2010) to develop a new edition of the specifications based on the LRFD methodologies.

For further information, contact Waseem Dekelbab, TRB, 202-334-1409, [wdekelbab@nas.edu](mailto:wdekelbab@nas.edu).

**The Routes of Man: How Roads Are Changing the World and the Way We Live Today**

*Ted Conover. Alfred A. Knopf, 2010; 352 pp.; \$26.95; 978-1-4000-4244-9.*

Pulitzer Prize finalist and award-winning author Ted Conover explores the way roads connect people and transform landscapes, tracing the paths of six key roads in vastly different areas. Stories include the journey of a load of rare mahogany through Peru from its origin—an untracked part of the Amazon basin soon to be traversed by an east–west route across South America. In the West Bank area of Israel, highway checkpoints are experienced from the perspectives of Israeli soldiers and of Palestinian travelers; the effect of a new road on the now-isolated Indian region of Ladakh is examined; truck routes through an area of Kenya struggling with the spread of AIDS are traversed; a Chinese auto club is studied; and an ambulance ride provides a glimpse of Lagos, Nigeria, where freeway congestion and chaos provide a glimpse into one future of the global megacity.

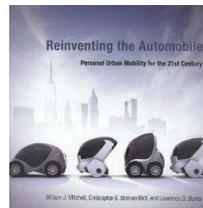


**Reinventing the Automobile: Personal Urban Mobility for the 21st Century**

*Christopher E. Borroni-Bird, Lawrence D. Burns, and William J. Mitchell. The MIT Press, 2010; 227 pp.; \$21.95; 978-0-262-01382-6.*

Although today's automobiles—designed using the same underlying design principles as the Model T—are meant to convey multiple passengers over long distances at high speeds, they are less efficient at providing personal mobility within cities. The late William Mitchell and industry experts Lawrence Burns and Christopher Borroni-Bird offer a reimagining of the automobile as small, environmentally friendly, and connected to a vast network.

This redesigned automobile, authors suggest, uses an electric drivetrain and wireless communication instead of an internal combustion engine and stand-alone operation. This vehicle would be lighter, cause fewer greenhouse gas emissions, and could use technology to avoid crashes and traffic jams. The plan for a mobility internet that allows automobiles to collect and share data on traffic conditions, coordinate movements, and keep drivers connected to their social networks is presented. Also recommended is an infrastructure integrated with smart electric grids and renewable energy sources and a dynamically



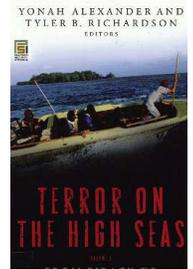
priced market for electricity, road and parking space, and shared-use vehicles.

**Terror on the High Seas: From Piracy to Strategic Challenge, Vols. 1 and 2**

*Edited by Yonah Alexander and Tyler B. Richardson. Praeger Security International, 2009; 638 pp.; \$195; 978-0-275-99750-2.*

From the hijacking of the *Achille Lauro* in 1985 to the 2000 attack on the *USS Cole*, maritime terrorism presents an obstacle to international security, trade, and commerce. According to authors, the maritime industry—the U.S. Navy, the merchant marine, and American shipbuilding industries—are still vulnerable to terrorist attacks.

The first research effort on this topic since September 11, 2001, *Terror on the High Seas* examines maritime security and proposes steps that must be taken to nullify terrorist threats. Maritime terrorists' tactics have included the smuggling of arms and plots to bomb shipyards; attacks on merchant marine ships, maritime offices, and fuel storage facilities; and attacks on Navy personnel, ships, and facilities, both on shore and in port. Government and international perspectives on maritime terrorism are reviewed and presented along with a look at maritime terrorism in the 21st century and a tactical and strategic outlook for the future.

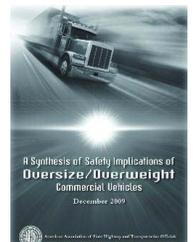


**A Synthesis of Safety Implications of Oversize–Overweight Commercial Vehicles**

*American Association of State Highway and Transportation Officials (AASHTO), 2009; 116 pp.; AASHTO members, \$80; non-members, \$96; 978-1-56051-466-4.*

This volume identifies the known relationships between commercial vehicle safety and crash causes and presents a synthesis of the safety implications of oversize–overweight commercial vehicles. Designed to support commercial vehicle enforcement and permitting practices and to help justify safety-enhancing size and weight enforcement investments, this volume features three case studies that provide insight into the impacts of truck size and weight regulations and highlight the role of excess bulk and weight in commercial vehicle crashes.

The books in this section are not TRB publications. To order, contact the publisher listed.



## TRB PUBLICATIONS

### **Recommended Design Specifications for Live Load Distribution to Buried Structures** NCHRP Report 647

Presented in this report are recommendations to revise AASHTO's *Load and Resistance Factor Design Bridge Design Specifications* for the distribution of live load to buried structures. Also examined is the development of simplified design equations for structural response based on the three-dimensional analysis of more than 800 buried culverts. The report suggests guidelines for conducting two- and three-dimensional modeling for design situations under conditions that are not covered by the equations.

2010; 75 pp.; TRB affiliates, \$35.25; nonaffiliates, \$47. Subscriber categories: highways; bridges and other structures.

### **Mixing and Compaction Temperatures of Asphalt Binders in Hot-Mix Asphalt** NCHRP Report 648

Although modified asphalt binders currently comprise more than 20 percent of paving grade asphalt sales in the United States, no reliable method exists for selecting mixing and compaction temperatures of modified asphalt binders. Many agencies' specifications allow the binder supplier to set an appropriate mixing temperature for each modified binder; in other cases, mixing and compaction temperature ranges are based on the Superpave® performance grades; and in yet other cases, temperatures are based on field experience. Seeking a standardized method or more formal process to select mixing and compaction temperatures, this report explores enhanced test methods for determining laboratory mixing and compaction temperatures of modified and unmodified asphalt binders.

2010; 147 pp.; TRB affiliates, \$46.50; nonaffiliates, \$62. Subscriber category: materials.

### **Adaptive Traffic Control Systems: Domestic and Foreign State of Practice** NCHRP Synthesis 403

Adaptive traffic control systems (ATCS) use current traffic conditions, demand, and system capacity measurements to adjust signal timings in real time. Approximately 25 ATCS are deployed nationwide, but many traffic signal practitioners do not understand the systems and have reservations about deployment. This synthesis brings together a literature review, two electronic surveys, and an assessment of U.S. transportation agencies that use ATCS to explore the state of the practice of the system.

2010; 104 pp.; TRB affiliates, \$39.75; nonaffiliates, \$53. Subscriber categories: highways; operations and traffic management.

### **Estimating Soft Costs for Major Public Transportation Fixed Guideway Projects** TCRP Report 138

Although information is readily available on the "hard costs" of new fixed guideway public transportation project lines—steel, concrete, rail cars and buses, or construction labor—few resources address professional services, or the "soft costs" of transit systems, which can comprise up to 54 percent of the hard costs for rail transit projects. This report defines and describes soft costs and provides a suggested methodology to estimate soft costs based on historical projects. Detailed technical information is provided about the data collection, methodology, and statistical analysis used to develop the suggested estimation process.

2010; 99 pp.; TRB affiliates, \$39.75; nonaffiliates, \$53. Subscriber categories: construction; finance; public transportation.

### **Transit Fare Arrangements for Public Employees** TCRP Synthesis 82

Results from case studies and surveys of transit agencies reveal the state of the practice of fare arrangements for public employees. Leadership of the program and other issues are examined, as well as barriers, obstacles, and constraints; administrative procedures; implementation; lessons learned; cost, financing, and pricing; and program evaluation. Details on successful, innovative practices come from the results of a survey of more than 30 transit agencies, lessons from the implementation of fare programs for public employees, and six case studies.

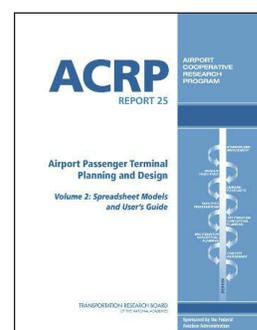
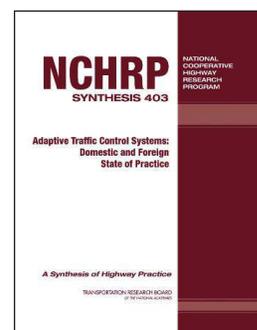
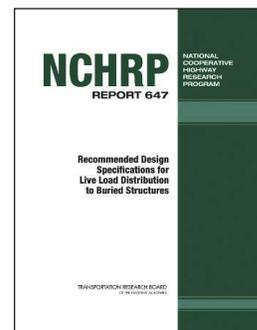
2010; 81 pp.; TRB affiliates, \$36.75; nonaffiliates, \$49. Subscriber categories: energy; environment; public transportation.

### **Airport Passenger Terminal Planning and Design, Volume 2: Spreadsheet Models and User's Guide** ACRP Report 25

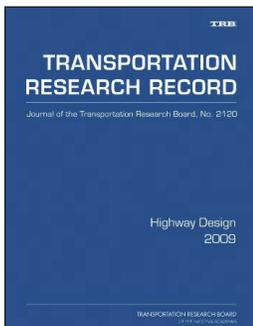
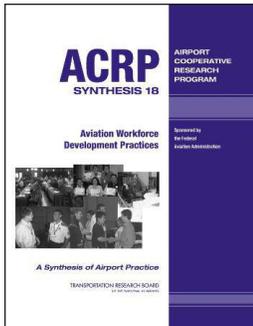
The second volume of this report includes 11 spreadsheet models and a user's guide to assist planners and developers of airport passenger terminals. Spreadsheet models include practical learning exercises and airport-specific sample data sets so that users can determine the model inputs appropriate to their situations and make decisions about input values, analysis techniques, and data sources. A CD-ROM presents models for terminal planning, including design hour determination; gate demand; and check-in, passenger, and baggage screening.

2010; 74 pp.; TRB affiliates, \$42; nonaffiliates, \$56. Subscriber categories: planning and administration; aviation.

BOOK  
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## TRB PUBLICATIONS (continued)

**Marketing Guidebook for Small Airports**

## ACRP Report 28

Guidance is presented on developing a marketing program for general aviation or commercial service airports on a small or minimal budget. The report reviews the basics of marketing, outlines the process of developing and implementing a plan, proposes marketing and public relations approaches, and concludes with a selection of case studies. Ideas for regular communication with tenants and the community, effective positioning of the airport in the region, and development and retention of airport activity are explored, with worksheets and tools to assist airport managers in assessing their situations, setting goals, and selecting strategies to deliver their messages.

2010; 175 pp.; TRB affiliates, \$48; nonaffiliates, \$64. Subscriber category: aviation.

**Developing Improved Civil Aircraft Arresting Systems**

## ACRP Report 29

Many airports today are constrained by available space and cannot comply with Federal Aviation Administration (FAA) design standards that mandate adequate room at runway ends for overruns. Airports with restricted space can pursue such alternatives as an engineered material arresting system (EMAS) or potential active arrestor designs for civil aircraft applications. Several ideas for alternative civil aircraft arresting systems have been submitted to FAA, but none have undergone testing or include the data necessary for approval. Evaluated in this report are alternatives to the one EMAS currently approved by the FAA: cellular glass foam, aggregate foam, engineered aggregate, and a main-gear engagement active arrestor system. The report traces out the steps to approval and describes the performance characteristics of the candidate materials.

2009; 196 pp.; TRB affiliates, \$49.50; nonaffiliates, \$66. Subscriber category: aviation.

**Aviation Workforce Development Practices**

## ACRP Synthesis 18

This synthesis explores jobs and the related skill sets at airport operating entities. The report identifies ways to obtain training in the skill sets to fulfill airport-related jobs and notes the gaps between skill sets, educational opportunities, and prospects for advancement.

2010; 36 pp.; TRB affiliates, \$29.25; nonaffiliates, \$39. Subscriber categories: aviation; education and training.

To order TRB titles described in Bookshelf, visit the TRB online Bookstore, at [www.TRB.org/bookstore/](http://www.TRB.org/bookstore/), or contact the Business Office at 202-334-3213.

**Highway Design 2009**

## Transportation Research Record 2120

Papers in this volume explore geometric design as it is influenced by speed; sun glare, driveways, and sag vertical curves; impact testing, guardrails with round timber posts, bridge rails, median barriers, and urban roadside safety; landscape and environmental design in the Himalayan regions; tree, lighting, and safety in context-sensitive solutions; and best management practices for storm water control on highways.

2009; 122 pp.; TRB affiliates, \$42.75; nonaffiliates, \$57. Subscriber category: highway and facility design.

**Data Systems and Travel Survey Methods 2009**

## Transportation Research Record 2121

A geographic information system framework for storm water drainage asset management, innovative components in asset management implementation, environmentally friendly performance metrics for a transportation data archive, and an analysis of multimodal public transport journeys with smart card data are presented in this volume, along with seasonal factors of similarity-based urban traffic, video-based vehicle detection and tracking, the use of transit vehicles to measure freeway traffic conditions, real-time estimation of arterial travel times, tracking large trucks with license plate recognition and text-mining in real-time, commodity-specific disaggregation of freight data to the county level, intercity person trip tables from cell phone data, and combining information on state route and local road linear referencing systems.

2009; 159 pp.; TRB affiliates, \$45; nonaffiliates, \$60. Subscriber category: planning and administration.

**Traffic Control Devices, Visibility, and Highway–Rail Grade Crossings 2009**

## Transportation Research Record 2122

Authors present findings on the effectiveness of dynamic speed display signs in rural highway transition zones, alternative procedures for setting curve advisory speed, ways to improve sign installation, advance warning signals, traffic control device guidelines for horizontal curves, path guidance for work zones at freeway interchanges, traffic sign luminance and text size, highway–rail grade crossing collisions, driver behavior at highway–railroad crossings, and stop sign treatments at highway–railroad grade crossings.

2009; 85 pp.; TRB affiliates, \$39.75; nonaffiliates, \$53. Subscriber category: highway operations, capacity, and traffic control.

## INFORMATION FOR CONTRIBUTORS TO

# TR NEWS

*TR News* welcomes the submission of manuscripts for possible publication in the categories listed below. All manuscripts submitted are subject to review by the Editorial Board and other reviewers to determine suitability for *TR News*; authors will be advised of acceptance of articles with or without revision. All manuscripts accepted for publication are subject to editing for conciseness and appropriate language and style. Authors receive a copy of the edited manuscript for review. Original artwork is returned only on request.

**FEATURES** are timely articles of interest to transportation professionals, including administrators, planners, researchers, and practitioners in government, academia, and industry. Articles are encouraged on innovations and state-of-the-art practices pertaining to transportation research and development in all modes (highways and bridges, public transit, aviation, rail, and others, such as pipelines, bicycles, pedestrians, etc.) and in all subject areas (planning and administration, design, materials and construction, facility maintenance, traffic control, safety, geology, law, environmental concerns, energy, etc.). Manuscripts should be no longer than 3,000 to 4,000 words (12 to 16 double-spaced, typed pages). Authors also should provide appropriate and professionally drawn line drawings, charts, or tables, and glossy, black-and-white, high-quality photographs with corresponding captions. Prospective authors are encouraged to submit a summary or outline of a proposed article for preliminary review.

**RESEARCH PAYS OFF** highlights research projects, studies, demonstrations, and improved methods or processes that provide innovative, cost-effective solutions to important transportation-related problems in all modes, whether they pertain to improved transport of people and goods or provision of better facilities and equipment that permits such transport. Articles should describe cases in which the application of project findings has resulted in benefits to transportation agencies or to the public, or in which substantial benefits are expected. Articles (approximately 750 to 1,000 words) should delineate the problem, research, and benefits, and be accompanied by one or two illustrations that may improve a reader's understanding of the article.

**NEWS BRIEFS** are short (100- to 750-word) items of interest and usually are not attributed to an author. They may be either text or photographs or a combination of both. Line drawings, charts, or tables may be used where appropriate. Articles may be related to construction, administration, planning, design, operations, maintenance, research, legal matters, or applications of special interest. Articles involving brand names or names of manufacturers may be determined to be inappropriate; however, no endorsement by TRB is implied when such information appears. Foreign news articles should describe projects or methods that have universal instead of local application.

**POINT OF VIEW** is an occasional series of authored opinions on current transportation issues. Articles (1,000 to 2,000 words) may be submitted with appropriate, high-quality illustrations, and are subject to review and editing. Readers are also invited to submit comments on published points of view.

**CALENDAR** covers (a) TRB-sponsored conferences, workshops, and symposia, and (b) functions sponsored by other agencies of interest to readers. Notices of meetings should be submitted at least 4 to 6 months before the event.

**BOOKSHELF** announces publications in the transportation field. Abstracts (100 to 200 words) should include title, author, publisher, address at which publication may be obtained, number of pages, price, and ISBN. Publishers are invited to submit copies of new publications for announcement.

**LETTERS** provide readers with the opportunity to comment on the information and views expressed in published articles, TRB activities, or transportation matters in general. All letters must be signed and contain constructive comments. Letters may be edited for style and space considerations.

**SUBMISSION REQUIREMENTS:** Manuscripts submitted for possible publication in *TR News* and any correspondence on editorial matters should be sent to the Director, Publications Office, Transportation Research Board, 500 Fifth Street, NW, Washington, DC 20001, telephone 202-334-2972, or e-mail [jawan@nas.edu](mailto:jawan@nas.edu).

- ◆ All manuscripts should be supplied in 12-point type, double-spaced, in Microsoft Word 6.0 or higher versions, on a CD or as an e-mail attachment.

- ◆ Submit original artwork if possible. Glossy, high-quality black-and-white photographs, color photographs, and slides are acceptable. Digital continuous-tone images must be submitted as TIFF or JPEG files and must be at least 3 in. by 5 in. with a resolution of 300 dpi or greater. A caption should be supplied for each graphic element.

- ◆ Use the units of measurement from the research described and provide conversions in parentheses, as appropriate. The International System of Units (SI), the updated version of the metric system, is preferred. In the text, the SI units should be followed, when appropriate, by the U.S. customary equivalent units in parentheses. In figures and tables, the base unit conversions should be provided in a footnote.

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# Transportation Research Board 90th Annual Meeting

Washington, D.C. • January 23–27, 2011

## Transportation, Livability, and Economic Development in a Changing World

The global economic downturn and continuing fiscal uncertainties are changing the context in which transportation programs are planned and implemented. National attention recently has focused on the concept of livable communities and how to promote them. Spotlight sessions at TRB's 90th Annual Meeting will examine the synergies among transportation programs, livability, and economic development—and how the interactions could contribute to a more sustainable future.

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- Explore livability and economic development issues from the perspectives of all transportation modes and a range of stakeholders and subject-matter experts;
- Examine how recent developments and changing contexts may affect transportation policy making, planning, design, construction, operations, and maintenance; and
- Discover what federal, state, regional, and local transportation agencies are doing—and can do—to address these issues.

**NEW—All TRB Annual Meeting registrants will receive complimentary access to presentations and to more than 40 recorded e-sessions.**

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