THE TWIN CRISES

Immigration and Infrastructure

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The Twin Crises

Immigration and Infrastructure

Introduction

By Edwin S. Rubenstein

This article highlights the role of immigration in depreciating and driving up the cost of maintaining, improving, and expanding infrastructure in the U.S. Fifteen different categories of public infrastructure are covered:

- airports
- bridges
- dams
- drinking water
- energy (national power grid)
- hazardous waste
- hospitals
- navigable waterways
- public parks and recreation
- public schools
- railroads
- border security
- solid waste
- mass transit
- water and sewer systems.

Infrastructure and immigration? That's an odd couple. Immigration policy has been debated for years, but the debate usually focuses on border security, amnesty, and whether illegal alien workers are really needed to do the jobs that Americans "won't do."

Immigration's impact on public infrastructure is rarely discussed.

Until the past few months, infrastructure policy was itself on the back burner, surfacing only when a bridge or levee collapsed, but generally of interest only to civil engineers and policy wonks.

How things change! Today, infrastructure spending is widely seen as a key lifeline for a sinking economy. The lion's share of President-elect Obama's stimulus package will fund road and mass transit projects, school construction, port expansions, and alternative energy projects.

Yes, our infrastructure is in trouble. The American Society of Civil Engineers' *2005 Report Card* assigned an overall grade of D to the 15 infrastructure categories.[1] Grades were selected on the basis of physical condition and capacity following a traditional grading scale (for example, if 77 percent of our roads are in good condition or better, the roads would be given a grade of C).

But if money were the problem, there would be no problem. Since 1982, capital spending on public infrastructure has increased by 2.1 percent per year above the inflation rate. Over this period, governments have spent $3.1 trillion (in today's dollars) to build transportation infrastructure, and another $3.8 trillion to maintain and operate it. Last year, we spent 50 percent more, after adjusting for inflation, on highway construction than we did a quarter of a century ago. Yet over this period, highway miles increased by only 6 percent, while U.S. population grew by 31 percent—half of it due to immigration.

The "demand" for highway infrastructure, as measured by population growth, grew six times faster than the "supply" of highway infrastructure.

Bottom line: Our infrastructure is "crumbling" because population growth has overwhelmed the ability of government to productively spend the vast sums it already devotes to infrastructure.

All types of infrastructure are under stress because of immigration.

Public schools are a prime example**.** Although immigrants account for about

13 percent of the U.S. population, they are 21 percent of the school-age population. In California, a whopping 47 percent of the school-age population consists of immigrants or the children of immigrants. Some Los Angeles schools are so crowded that they have lengthened the time between classes to give students time to make their way through crowded halls. Los Angeles' school construction program is so massive that the Army Corps of Engineers was called in to manage it.

This is a boom time for **hospital** construction. Sixty percent of hospitals are either building new facilities or planning to do so. But we have a two-tier hospital system in the U.S. Hospitals in poor areas—that serve primarily uninsured immigrants and Medicaid patients—cannot afford to upgrade their facilities. The uncompensated costs are killing them. In California, 60 emergency departments (EDs) have closed to avoid the uncompensated costs of their largely illegal alien caseloads.

Immigrants may not use any more **water** than other people. But they disproportionately settle in parts of the country where water is in short supply—and their sheer numbers have overwhelmed conservation efforts. Cities like San Antonio, El Paso, and Phoenix could run out of water in 10 to 20 years. San Diego's water company has resorted to a once-unthinkable option: **recycling toilet water for drinking.**

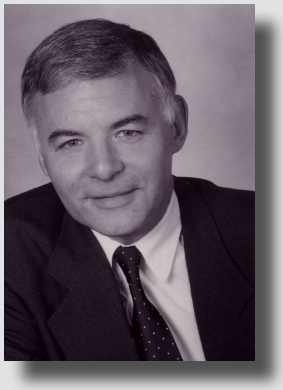
National parks along the southern border are scarred by thousands of unauthorized roads and paths used by illegal aliens

About the Author

Edwin S. Rubenstein, *president of ESR Research, economic consultants, has 25 years of experience as a business researcher, financial analyst, and economics journalist. Mr. Rubenstein joined the Hudson Institute, a public policy think tank headquartered in Indianapolis, and served as director of research from 1997–2002. While at Hudson he wrote proposals and conducted research on a wide array of topics, including workforce development, the impact of AIDS on South Africa's labor force, Boston's "Big Dig," the economic impact of transportation infrastructure, and the future of the private water industry in the United States.*

As a journalist, Mr. Rubenstein was a contributing editor at Forbes *Magazine and economics editor at* National Review, *where his "Right Data" column was featured for more than a decade. His televised appearances include Firing Line, Bill Moyers, McNeil-Lehrer, CNBC, and Debates-Debates. He is the author of two books:* From the Empire State to the Vampire State: New York in a Downward Transition *(with Herbert London) and* The Right Data.

Mr. Rubenstein also served as an adjunct fellow at the Manhattan Institute, where he was principal investigator in the institute's ongoing analysis of New York state's budget and tax structure. He published a newsletter devoted to economic statistics and contributed regularly to The City Journal, *the Manhattan Institute's quarterly publication. From 1980 to 1986 he was senior economist at W.R. Grace & Co., where he directed studies of government waste and inefficiency for the Grace Commission.*

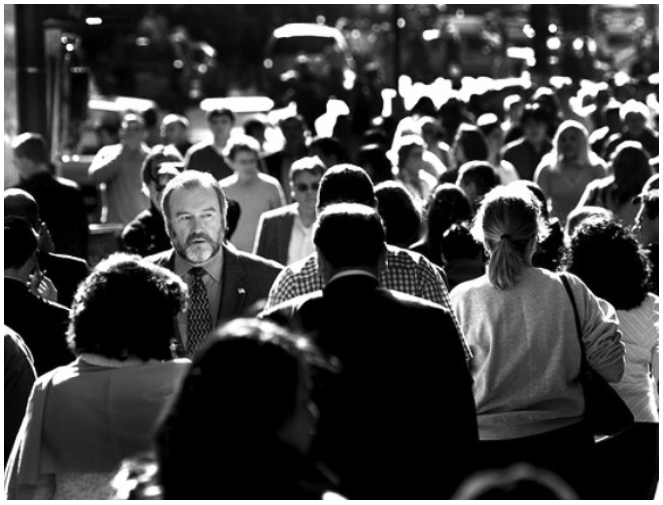


From 1978 to 1980 he was a municipal bond analyst for Moody's Investors Service, where he was also editor of the Bond Survey, *a weekly review of the municipal bond market. He served as senior quantitative analyst for the Office of the Mayor of New York City from 1973 to 1978. His writings have appeared in the* Wall Street Journal, *the* New York Times, Harvard Business Review, Investor's Business Daily, *and* Newsday. *He is a regular contributor to the* Social Contract *and* VDARE.com.

Mr. Rubenstein has a B.A. in economics from Johns Hopkins University, and an M.A. in public finance from Columbia University.

crossing into the U.S. Their fires, trash, and vandalism have despoiled thousands of acres of pristine parkland.

The traditional response to these problems was to throw more federal, state, and local tax money into infrastructure. When public support falters, infrastructure users are usually hit with higher tolls, higher transit fares, higher water bills, and other usage-related fees. As a last resort, many governments sell or lease entire highways, water systems, parks, and other infrastructure systems to private companies.



In August 2008 the Census Bureau projected that U.S. population will be 433 million in 2050—an increase by 135 million, or 44 percent, from current levels. Eighty-two percent of the increase will be from new immigrants and their U.S.-born children.... The brutal reality is that no conceivable infrastructure program can keep pace with that kind of population growth.

There is no end to the financial chicanery that infrastructure junkies will employ to support their habit. Wall Street veteran Felix Rohatyn recently proposed this "novel solution" to the problem[2]:

> Although private investors have successfully built new roads in places such as Poland and Spain, they have not done so extensively in the U.S. But a National Infrastructure Bank could redirect private efforts away from refinancing old facilities—as in the case of Chicago's Skyway—to building new ones.
>
> According to our plan, most of the funds the federal government now spends on existing programs (along with many of those program's experts and facilities) would be transferred to the bank, which could not only finance the projects but also resell the loans it makes to investors in capital markets, much as other assets are rebundled for investors. The receipts from these sales would allow a new round of lending, giving the bank an impact far in excess of its initial capitalization.

That is no solution; it is a recipe for another debacle *a la* sub-prime mortgages.

The prognosis is not good. In August 2008 the Census Bureau projected that U.S. population will be 433 million in 2050—an increase of 135 million, or 44 percent, from current levels. Eighty-two percent of the increase will be from new immigrants and their U.S.-born children.

The brutal reality is that no conceivable infrastructure program can keep pace with that kind of population growth. The traditional **"supply-side"** response to America's infrastructure shortage—build, build, build—is dead, dead, dead. Demand reduction is the only viable way to close the gap between the supply and demand of public infrastructure.

Immigration reduction must play a role. ■

Notes

1. American Society of Civil Engineers. *2005 Report Card. ASCE News*, Vol. 30, No. 3, March 2005.
2. Felix Rohatyn and Everett Ehrlich, "A New Bank to Save Our Infrastructure," *New York Review of Books*, October 9, 2008. http://www.nybooks.com/articles/21873.

Aviation Infrastructure

Section 1

What a difference a year makes! Years of rising passenger volumes; the shift to smaller, regional jets; and the modest expansion in airport capacity produced a perfect storm in 2007. It was the worst for airline delays since the Bureau of Transportation Statistics started keeping comprehensive data 13 years earlier.

Enter 2008. Buffeted by soaring oil prices, a weak economy, and excess capacity, U.S. airlines are cutting flights to levels not seen since 2002, when travel fell sharply after the 9/11 attacks. U.S. airports of every size—from LaGuardia to Oakland—will be affected as airlines cut flights. By year's end, approximately 100 U.S. communities will lose regular commercial air service altogether, a number that may double next year, according to the Air Transport Association.[1]

Overall the cuts will reduce flights by U.S. carriers from 11 percent to 12 percent, industry analysts estimate. U.S. airlines are selling off hundreds of older, less efficient planes, so the airline traffic is unlikely to grow sharply again even if oil prices stay down and the economy rebounds.

Fewer flights will not necessarily alleviate the pressure on airport infrastructure. Most of the discontinued flights are among small market airports where capacity was already too high. The large hub airports may see more connecting flights as direct service is terminated. Just seven such locations—Hartsfield-Jackson Atlanta International Airport, Chicago's O'Hare International Airport, Philadelphia International Airport, Newark Liberty International Airport, Houston's George Bush Intercontinental Airport, and New York City's LaGuardia and John F. Kennedy airports—accounted for 72 percent of delays last year. The delays will undoubtedly rise in 2008.

Airport capacity is not the only aviation infrastructure issue requiring attention. The nation's air traffic control system, NextGen, which currently relies on ground-based radar, needs upgrading. A satellite-based navigation, surveillance, and networking system is scheduled for adoption between now and 2025. NextGen would use global positioning technology to determine where a particular aircraft is at any moment, enabling aircraft to take off and land in closer proximity to one another and thereby boost the number of flights per hour.

Protecting airports from terrorist attack and screening incoming international passengers are infrastructure issues we discuss on the following pages.

Aviation by the Numbers

19,990 total airports (2006)
604 airports certified for planes carrying more than 9 passengers (2006)
8,225 commercial passenger and cargo planes (2005)
224,352 private and business planes (2005)
9.7 million total aircraft take-offs (2004)
655.1 million paying air passengers (2004)
58.5 million air passengers leaving the U.S. (excludes Canada)
0.605 fatalities per 100 million aircraft miles (2006)

Aviation Infrastructure Spending (a)
2005 estimate: $29.9 billion ($101.11 per capita)

2050 Spending Projections (b)
$44.3 billion: at current population trends
$38.4 billion: at 50-percent reduction in immigration
$29.9 billion: at zero population growth

Notes:
a. Capital, operation, and maintenance spending by all levels of government. b. Assumes per-capita spending remains at 2005 levels.

Sources:
American Society for Civil Engineers, Bureau of Transportation Statistics, Congressional Budget Office, Pew Research.

Overarching everything is money. Capital spending on aviation infrastructure currently runs about $14.4 billion per year. According to the Federal Aviation Administration (FAA) and other sources, annual investment of $18 billion—about $4 billion above the current level for airports and air traffic control—is needed to maintain performance, given the expected growth in demand.

Stranded passengers as a result of flight delays or cancellations overcrowd our nation's airports.

Airport infrastructure projects are generally funded by two sources. First is the federal government through the Airport and Airway Trust Fund—a dedicated funding source based on fuel taxes and other user fees. Second is by the airports through the passenger facility charges that are collected on every passenger at commercial airports controlled by public agencies, along with landing fees, parking fees, and other charges for the use of airport facilities.

The flat per-passenger fee presents a problem at a time when airlines are shifting to smaller regional jets that seat 50 to 90 passengers. Smaller jets are more likely to be filled, and thus more profitable for the airlines, than large airliners. But two such jets impose roughly twice the infrastructure costs—and yet the same amount of revenue—as a large jet carrying the same number of passengers.

The FAA has proposed switching from the current flat fee per passenger structure to a cost-based mechanism that would contain provisions for congestion pricing. General aviation, which includes scheduled cargo flights, charter flights, sightseeing flights, and recreational flights, has also been singled out by federal air agency. It is responsible for at least 11 percent of air traffic costs yet pays only about 3 percent of the taxes that go into the federal aviation trust fund.

Illegal Immigration by Air

They cross the southern border secretively at remote places. They sail in jury-rigged boats from Cuba. They fly in under the radar and land in the desert. At least that is how most Americans believe illegal aliens enter the U.S.

In fact, a sizable number may arrive on regularly scheduled flights from their home countries. Evidence for this view was assembled by University of Pennsylvania demographer Daniel R. Vining in the early 1980s. Vining focused on one component of the net inflow of persons to the United States: commercial airline passengers.[2]

The official U.S. government tally of arriving and departing air passengers consistently shows that more people fly in each year than fly out. When Vining looked at the data in the late 1970s, he found the excess to be about 1 million. In the 1990s, the annual excess averaged 3.7 million. From 2000 to 2006, the latest available year of data, it was 3.9 million.

Interestingly, while the number of international passengers rose more than 4-fold since then, the percentage difference between arriving and departing international passengers, which Vining called the "retention rate," has hardly changed: it was 7.8 percent in the 1970s, 7.7 percent in the 1990s, and 6.7 percent

from 2000 to 2006. The constancy implies that the impact of commercial air travel on U.S. immigration has risen in lock step with the number of airline passengers coming into the country.

In 2006, the gap was 3.5 million, with 63.0 million arrivals and 59.5 million departures. The gap exceeds even the largest estimates of net immigration into the United States.

What gives?

Vining found a systematic undercount of departing air passengers:

> The source of the implausibly large difference between arrivals and departures in USIATS [U.S. International Air Travel Statistics] appears to be an undercount of departures on charter flights.

He attributed the undercount to the relative laxity of the Immigration and Naturalization Service (INS) in collecting paperwork from departing passengers:

> While INS assures that the I-92 forms are filed out properly on all flights arriving in the United States, both chartered and scheduled, because all arriving passengers must proceed through immigration and customs and because INS is careful that their own counts tally with those turned in on the I-92 form by the air carrier, it is only a passive receptor of the forms on departing flights…. Thus the… general lack of vigilance on the part of INS… could cause a significant number of departing passengers …. to go unrecorded in USIATS.

The paperwork problem still exists, only now it is a major security issue:

> Unresolved weaknesses in DHS's long-standing system for tracking visitors' arrivals and departures (based on Form I-94) include, among others, noncollection of many departure forms and an inability to match departure forms to arrivals. As a result, there is no accurate list of overstays.[3]
>
> Weaknesses in the overstay tracking system may hamper efforts to monitor potentially suspicious aliens who enter the country legally. Although the vast majority of visitors come only for business or pleasure, the few who are potential terrorists or terrorist supporters could present a threat to domestic security….
>
> … Overstays who settle here in large numbers can affect domestic security because they (like other illegal immigrants) are able to obtain jobs and security badges with fraudulent identity documents, thus gaining access to critical infrastructure locations, such as airports, or special events, like the Super Bowl—making efforts to secure these venues more difficult.

Regarding airport security, the Government Accounting Office (GAO) chillingly notes:

> …overstays with fraudulently obtained badges were found at 25 of 26 airports examined.

The U.S. Department of Homeland Security (DHS) estimates that one-third of all illegal aliens are overstays, that is, individuals who entered legally but stayed past the time allowed on their visa. It is not clear whether the overstay figure includes citizens of so-called "visa waiver" countries, who are allowed to enter the U.S. without visas.

Overstays come in as tourists, or businessmen, or students. Many arrive on commercial airlines. They may not look or sound like the quintessential illegal border crosser. That

could make them all the more dangerous.

General Aviation Airports

In the U.S., there are more than 19,000 total airports, including publicly and privately owned facilities. Only about 450 serve regularly scheduled commercial passenger flights. The remainder consists of general aviation (GA) facilities: airports, heliports, and seaplane bases.


The New York Times

U.S. ATTACKED

HIJACKED JETS DESTROY TWIN TOWERS AND HIT PENTAGON IN DAY OF TERROR

A CREEPING HORROR

President Vows to Exact Punishment for 'Evil'

A Somber Bush Says Terrorism Cannot Prevail

Awaiting the Aftershocks

GA airports differ widely with respect to their traffic levels and infrastructure. Those near major metropolitan areas house hundreds of planes and have control towers that can orchestrate more than 1,000 flights per day. Rural GA airports are often "uncontrolled" because they have no operating control tower. They may see less than 50 flights per day, mostly from planes housed at the airport.

Because GA facilities are relatively open compared to commercial airports, they pose different security risks. The threat is not so much to GA infrastructure itself, but from terrorists seeking to steal or hijack planes housed at these airports to attack critical infrastructure or other high-profile targets. GA facilities could themselves be at risk if, for example, a plane carrying business leaders, such as corporate CEOs, is targeted.

It is widely known that some of the 9/11 hijackers trained in small airplanes housed in GA airports. Subsequent legislation requires the Transportation Security Administration to conduct background checks of all foreign aliens applying for flight training on aircraft weighing more than 12,500 pounds and to provide security training for flight school employees.

Since 9/11, regulatory actions have focused mainly on airspace restrictions around the nation's capital, vetting GA pilots, and more recently, charter and lease customers. Physical security of GA airports and planes has been left to aircraft owners and pilots, airport operators, and local authorities. While this less-than-rigorous approach is welcomed by the GA industry, it is a concern to many security experts.

The Weakest Link

Since 9/11, airline security infrastructure has increased dramatically. Bag scanning systems, metal detectors, and elaborate machines to detect explosive substances are mandated by federal law. Enormous sums have been spent screening passengers and their bags. We all feel safer, albeit more inconvenienced.

Are we was a safe as we think? Approximately 60 percent of all U.S. air cargo flies on passenger planes, but only about 5 percent is required to undergo screening for dangerous items. While the cargo screening gap is a dangerous security oversight in passenger aviation, it reflects an even larger threat in the cargo industry itself.

In reality, cargo aircraft could be more destructive than passenger airliners due to their size and fuel capacity. Cargo planes also carry packages that are subject to minimal screening, and they are operated in a less intensely screened area of the airport. Yet cargo security infrastructure is routinely excluded from anti-terrorism legislation. ■

Notes

1. American Society of Civil Engineers, 2008.
2. Daniel R. Vining, Jr., "Net Migration by Commercial Air: A Lower Bound on Total Net Migration to the United States," *Research in Population Economics* 4: 333-50, 1982.
3. Government Accounting Office, "Overstay Tracking A Key Component of Homeland Security and a Layered Defense," May 2004. http://www.gao.gov/new.items/d0482.pdf.

Border Security Infrastructure

Section 2

For FY 2009, the Bush administration proposed a Department of Homeland Security budget of $44.3 billion, up 4.5 percent from the $42.4 billion expected to be spent in FY 2008. Customs and Border Protection spending—which includes funds for the border patrol, electronic surveillance, the border fence, and other infrastructure to secure the border—is slated to increase a whopping 20.6 percent in FY2009.[1]

Post-9/11 security achievements highlighted in the budget document include 11,000 new Border Patrol agents; increased inspections of cargo containers unloaded at U.S. seaports (82 percent inspected in FY 2006, compared with 48 percent in FY 2004); and "significantly" more buffer zone protection plans for chemical facilities (58 percent in FY 2006, compared with just 18 percent in FY 2005).

We discuss security issues in the sections devoted to port, airport, rail, and other types of infrastructure. This section zeroes in on border infrastructure—the physical barriers and electronic screening devices deployed along the nation's borders.

Evaluating border security infrastructure is difficult. From an engineering standpoint, there is simply not enough information to accurately assess the performance of, say, the border fence and electronic surveillance devices deployed with it. While data on apprehensions of illegal border crossers may show a decline along areas of new fencing, this may simply reflect a shift to other, less secure border entry points.

Scientific testing of border infrastructure and its ability to prevent, detect, and ultimately discourage illegal border crossings is not feasible. We are left with a description of its physical dimensions—which have increased dramatically in recent years—and anecdotal evidence of its efficacy.

Border Security by the Numbers

1,952 miles of border between U.S. and Mexico
344.2 miles of border fence constructed by the Department of Homeland Security (DHS) (August 29, 2008)
$2 billion DHS spending on border fence and technology (FY 2009)
$400 million needed to complete the border fence (FY 2009)
1.2 million illegal immigrants apprehended by the Border Patrol (2005)
1 in 5 illegal immigrants apprehended and arrested (2005 estimate)
11,000 new Border Patrol agents funded since 2001 (2008)
250 million legal incoming border crossings from Mexico (2003)
4,500 legal border crossings per hour at San Ysidro, California (2003)

Sources:
Office of Management and Budget (FY2009 budget), Department of Homeland Security, Wikipedia, American Society of Civil Engineers.

The Border Fence

On September 29, 2006, Congress passed the Secure Fence Act of 2006, which authorized, and partially funded, the construction of 700 miles of physical fence/barriers along parts of the southern border. Support for the measure was achieved by assuring opposing parties—the Democrats, Mexico, and the pro "comprehensive immigration reform" minor-

ity within the GOP—that Homeland Security would proceed very cautiously.

Michael Chertoff initially authorized only the virtual fence that he favors. Following an eight-month test period, during which the virtual fence failed to perform effectively, he OKed the physical barrier.

As of August 29, 2008, the Department of Homeland Security had built 190 miles of pedestrian border fence and 154.3 miles of vehicle border fence, for a total of 344.3 miles of fence.

The border fence is not one continuous structure. It is actually a hodge-podge of walls of different designs and sizes, that stop and start, secured in-between with the "virtual fence" that includes a system of sensors and cameras monitored by Border Patrol agents.

An illegal alien climbs a barrier at the Arizona border.

Congress has appropriated $2.7 billion for the fence, but no one really knows how much the entire system—the physical fence and surveillance technology—will cost to build, let alone maintain.

A "state of the art" design—two parallel 15-foot steel and wire fences separated by a 100-yard gap, supplemented by a middle fence, powerful lighting, and sensors to detect illegal border crossers—has been estimated to cost between $4 billion and $8 billion dollars. Costs for a standard 10-foot prison chain link fence that would run along the entire 2,000 mile border might be as low as $850 million. For another $360 million, the fence could be electrified.[2]

Some believe a fence is not needed, that the whole U.S.-Mexico border could be sealed with as few as 100 helicopters equipped with night vision/infrared scopes and a few hundred men equipped with state of the art sensors, scopes and other electronics.[3]

No matter what one may think of the cost, the esthetics, or the political ramifications of the fence, the overarching question must be: Will it work?

Preliminary indications are quite favorable. Two years ago, the Yuma district in southwestern Arizona was the busiest jurisdiction for the entire U.S. Border Patrol. The 118-mile stretch of border was a well-known gap through which people and drugs flowed north while guns and money flowed south. Scores of people would gather on the Mexican side and dash across a nearly open border. Border Patrol agents grabbed as many as they could; the rest melted away northward.

Then came the state-of-the-art barrier running through the desert. Border Patrol agents in the Yuma district, who had nabbed as many as 800 illegals a day prior to the fence, suddenly had days when they saw no border crossers.[4]

U.S. opponents claim the border fence merely shifts illegal border crossers to unfenced parts of the Mexican border. But Department of Homeland Security Secretary Chertoff stated in Congressional testimony on April 2, 2008, that there was a 20-percent decline in apprehensions along the entire southern border in FY 2007, and that in the first quarter of FY 2008 apprehensions were down 17 percent from the same period the previous year.

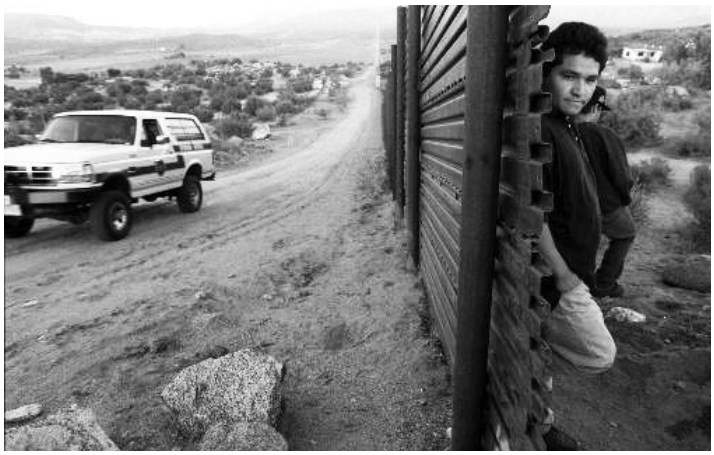
Not all illegals are apprehended, of course. But given the big increase in border patrol agents stationed along the southern border, it is highly unlikely that a *smaller* fraction of crossers would be apprehended this year than last.

Implication: The decline in illegal border

crossings may be even greater than the decline in apprehensions suggests.

Environmental Impact

The border fence is being built without regard to its environmental impact. This is because in 2005 the Real ID Act gave the Secretary of Homeland Security "Notwithstanding any other provision of law," authority to waive all legal requirements he deems necessary to ensure "expeditious construction" of the barriers and roads. Secretary of Homeland Security Chertoff has used this power to "waive in their entirety" the Endangered Species Act, the Migratory Bird Treaty Act, the National Environmental Policy Act, the Coastal Zone Management Act, the Clean Water Act, the Clean Air Act, and the National Historic Preservation Act, to extend triple fencing through the Tijuana River National Estuarine Research Reserve near San Diego.



The border fence is not one continuous structure. It is actually a hodge-podge of walls of different designs and sizes, that stop and start, secured in-between with the "virtual fence" that includes a system of sensors and cameras monitored by Border Patrol agents.

The Real ID Act further stipulates that his decisions are not subject to judicial review, and in December 2005 a federal judge dismissed legal challenges by the Sierra Club, the Audubon Society, and others to Chertoff's decision.[5]

The environmental damage done by illegal aliens crossing into the U.S. from Mexico is arguably far more extensive than that resulting from construction of the border fence. Has the Sierra Club taken this into account? Why not?

Illegal Infrastructure

While the U.S. builds a fence across much of the border, many illegals are taking a different route. Underground. Authorities have discovered dozens of illegal tunnels across the international border in recent years. Smuggling of drugs, weapons, and immigrants takes place daily through these underground passageways.

Illegal immigrants have breached drainage systems all the way along the border, from El Paso to San Diego. Most of the subterranean drainage tunnels are of the claustrophobic crawl-through variety that prevents large-scale incursions. One tunnel, actually a system of two half-mile passages connecting Tijuana with San Diego, is by comparison a superhighway.

Once open waterways, the tunnels stretch for miles under the downtown streets of both cities, zigzagging roughly parallel to each other. In the smaller one, called the Morley Tunnel, an ankle-high stream of raw sewage and chemical runoff from factories in Mexico usually flows. The neighboring Grand Tunnel is up to 15-feet high and wide enough to fit a Humvee. It has a concrete floor and electricity. Dozens of illegal immigrants can travel through it at one time.

Above ground, double fences, sensors, and stadium lighting clearly separate the two cities. Underground, they are linked of necessity by the system built decades ago to channel monsoon rains. The drainage tunnels doubled as smuggling routes from the beginning. For many years, gangs of children took control of the passages.

The Border Patrol periodically stems the underground influx of illegal immigrants and drugs by installing heavy steel doors, surveil-

lance cameras, and sensors. But heavy rains often produce floods that tear down the barriers. Then the smugglers re-enter, rip down the cameras, and destroy the lights and sirens used to discourage incursions—permitting the chaotic human inflow to resume.

In a recent six-month period, Border Patrol agents apprehended 1,704 illegal immigrants in the tunnels, a nearly five-fold increase from the previous six months.

As the border fence reaches full length, we expect underground illegal infrastructure will grow also.

Legal Border Crossings

In early 2008, U.S. Customs and Border Protection officers stopped taking verbal declarations of citizenship from travelers entering the country. All travelers, including U.S. citizens, must now show a valid passport or other authorized documents when entering the U.S. at sea and land ports of entry. The change, according to the U.S. Department of State and Department of Homeland Security, will strengthen border security and facilitate entry into the United States for both legitimate citizens and foreign visitors.

The logistics of this move are daunting. More than 325 million border crossings are recorded every year—about 250 million at the Mexican border and 75 million from Canada. About 80 percent are "day trippers" or commuters—people who live in one country and work or shop in another.

The border crossings are so large that they must be put in context: On average, 29,000 people *per hour* enter the U.S. from Mexico.

Long delays, common under the old verbal declaration system, are expected to worsen under the new protocol. Federal authorities are betting that new electronic screening infrastructure will ease the crunch.

The State Department is developing a passport card—a wallet-sized card that would be cheaper and more convenient than standard passports but would meet the new security requirements. The Department of Homeland Security is working with border states to develop an "enhanced driver's license" that would be an acceptable alternative to passports for U.S. citizens.

Both cards will have radio frequency identification, or RFID chips, which can identify the holders as they approach border checkpoints. The chips will not transmit personal information, according to Customs and Border Protection (CPB). They will only contain a unique number that the CPB can automatically scan and compare to those in law enforcement databases.

Not so fast! People knowledgeable in credit card fraud matters say the new passport card will be easy to counterfeit: just remove the photograph with solvent and replace it with one from an unauthorized user. The cards should have been designed with special optical security strips—devices that "have never been compromised," says a former chief intelligence officer for Immigration and Customs Enforcement (ICE). In selecting the RFID card, the State Department favored speedy processing over national security.[6]

But even completely secure cards would rely on government databases to flag individuals on terrorist watch lists. How secure are those databases? Can they be compromised by insiders? By foreign hackers?

Cyber infrastructure may be the weakest link in U.S. border security. ■

Notes

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2. http://www.globalsecurity.org/security/systems/mexico-wall.htm.
3. Wikipedia.
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5. http://en.wikipedia.org/wiki/United_States%E2%80%93Mexico_barrier.
6. Bill Gertz, "Passport Cards Called Security Vulnerability," *The Washington Times*, May 16, 2008.

Bridge Infrastructure

Section 3

In August 2007, a horrific incident forced the American public and the nation's leaders to take a close look at the state of the country's highway bridges. The collapse of the eight-lane bridge in Minneapolis carrying Interstate-35W over the Mississippi took the lives of 13 people and injured more than 100 others. Although the 40-year-old steel structure had been considered "structurally deficient" since 1990, engineers with the Minnesota Department of Transportation did not believe that the bridge was in danger of imminent failure.

In August 2007, the collapse of the eight-lane bridge in Minneapolis carrying Interstate-35W over the Mississippi River took the lives of 13 people and injured more than 100 others.

Mary E. Peters, the U.S. Secretary of Transportation, spoke for most of us when, at a news conference after the disaster, she declared that "Bridges in America should not fall down." In fact, bridges do collapse—and at greater rates than you might think. Some 1,500 U. S. bridges collapsed between 1966 and 2005, according to the American Society of Civil Engineers (ASCE).[1] More than 60 percent of these failures are traceable to soil erosion around bridges during floods. Ship collisions, overloads, design flaws, corrosion, and poor maintenance are among other causes. Unanticipated bridge traffic, which could arguably be blamed on immigration, does not seem to be a contributing factor.

More than 70,000 bridges are rated structurally deficient, like the span that collapsed in Minneapolis. They carry an average of more than 300 million vehicles per day.[2] While it is unclear how many of them pose actual safety risks, structurally deficient bridges are closed or restricted to light vehicles because of their deteriorated structural components. Another bridge classification—the functionally obsolete bridge—is described by ASCE as having older design features that make it unable to safely accommodate current traffic volumes, vehicle sizes, and weights.

The news about bridges is not all bad, however. Another report—the Bureau of Transportation Statistics' (BTS) *Condition of U.S. Highway Bridges: 1990–2007*—indicated that nearly 42 percent of all highway bridges were classified as structurally deficient 17 years ago. By mid-August 2007, however, the combined number of structurally deficient and functionally obsolete bridges had decreased to 25.6 percent of all bridges, even as the total number of bridges increased by nearly 5 percent to approximately 600,000 structures, the BTS report noted.[3]

As of 2003, 27.1 percent of the nation's bridges (160,570) were structurally deficient or functionally obsolete. In that year, however, one in three urban bridges—a much higher rate than the national average—was in those categories.

Do immigrants use highway bridges at greater rates than natives? Probably not. But

given the role of immigration in U.S. population growth, it is not unreasonable to expect that immigrants and their U.S.-born children account for a disproportionate share of the *rise* in urban bridge traffic.

Bridges by the Numbers

600,000 bridges in the U.S. (2007)
12.6 percent of bridges classified as "structurally deficient" by the Federal Highway Administration (2007)
300 million vehicles cross structurally deficient bridges daily
$223 million cost of "Bridge to Nowhere" in Alaska (not funded)
8.0 percent of the 2006 highway bill earmarked for "pork" projects.

Spending Required to Repair All "Structurally Deficient" Bridges
2007: $188 billion (a) ($636 per capita)

2050 Projections (b):
$279 billion: at current population trends
$241 billion: at 50-percent reduction in immigration
$188 billion: at zero population growth

Notes:
a. ASCE estimate.
b. Assumes per-capita spending requirements are at 2007 levels.

Sources:
American Society of Civil Engineers, Congressional Budget Office, Pew Foundation, Texas Transportation Institute, U. S. Department of Transportation.

It would cost $9.4 billion a year for 20 years to repair all substandard bridges, according to the latest estimate, made in 2005, by ASCE.[4] In a separate report, the Federal Highway Administration says meeting the backlog of needed bridge repairs would take at least $55 billion.[5]

That was before the Minneapolis disaster.

State bridge inspections in the wake of the I-35W collapse have uncovered additional structural deficiencies, raising estimated costs of a national bridge makeover. Colorado, for example, identified 125 major bridges in need of major repair, at a cost of $1.4 billion. New Jersey is moving funds from other road projects in order to spend $605 on bridge repairs this year, up from $96 million last year. Nine other states are issuing bonds—taking on debt—raising taxes, hiking fees, or shifting funds from other road projects.[6]

Meanwhile, federal funding is in decline. Federal highway trust fund disbursements fell by $3.2 billion in FY 2008 and are expected to fall further because Americans are driving less.

The administration is also demanding that Congress show more discipline, citing thousands of special projects, or earmarks, in highway bills that do not reflect the real priorities. The best known among them was the $223 million "Bridge to Nowhere" in Alaska. That provision eventually faltered, but about $24 billion—a little less than 8 percent of the total—in the last highway bill was still devoted to projects singled out by lawmakers for funding.

Shrinking revenues and credit market turmoil will inevitably reduce the funds available for bridges and other infrastructure projects. Reducing the demand for such projects—by population and immigration controls—may be the best alternative.

Immigration's Fiscal Impact

Federal motor fuel taxes generate most of the money available for bridge construction and repair. As described in the highway section, the gas tax does not yield enough revenue to fund needed infrastructure improvements. Tax rates have not changed since 1993, and with the economy in recession, a gas tax hike is even more unlikely today.

Of course, the feds could share other tax revenues with state transportation departments. The problem is that 98 percent of our

bridges (and 97 percent of our roads) are owned by state and local governments, and these governments have often used past increases in federal transportation aid merely to replace their own infrastructure spending.

It is clearly a matter of priorities: Politically popular programs like Medicaid and education have crowded out infrastructure. The numbers tell the story:

In 1960, at the height of President Eisenhower's commitment to the interstate system, federal infrastructure spending accounted for nearly 12 percent of all non-defense expenditures. By 2006, infrastructure's share was just 3.5 percent. Meanwhile, education and social programs usurped more than 33 percent of non-defense spending in 2006, up from 21 percent in 1960.

Put differently, in 1960, the federal government spent about half as much on infrastructure as it spent on education and means-tested programs; by 2006, it spent only one-tenth as much on infrastructure as on those programs.

Immigration played a major role in this process. Immigrants are poorer, pay less taxes, and are more likely to receive public benefits than natives. It follows that the government's ability to finance discretionary outlays like bridge upgrades and repair is adversely impacted by immigrants—and this negative will increase as the share of immigrants in the population increases.

There is surprisingly little objective research on the fiscal burden imposed by immigrants. The best study is still *The New Americans*, the National Research Council's (NRC) 1997 study of immigration's economic and demographic impact. The NRC staff analyzed federal, state, and local government expenditures on programs such as Medicaid, Aid to Families with Dependent Children (now TANF, Temporary Assistance for Needy Families), and Supplemental Security Income (SSI), as well as the cost of educating immigrants' foreign- and native-born children. The NRC also estimated the average immigrant household's share of police and fire protection, public works, recreation, higher education, and municipal assistance.

NRC found that immigrant households receive an average $13,326 in federal benefits while paying $10,664 in federal taxes, that is, they generate a fiscal deficit of $2,682 (1996 dollars) per household. In 2007 dollars, this deficit is $3,408 per household.

The fiscal damage is even more acute at the state and local level. Public education, at a cost of $7,737 per immigrant household, accounts for nearly half of what immigrants currently receive from state and local governments. Means-tested welfare programs rank second, accounting for about one-fifth of all immigrant-related spending by state and local governments. States are required to contribute to as many as 60 different federal means-tested programs, including Medicaid and TANF.

The NRC study found that state and local benefits received by the average immigrant household exceed the amount of state and local taxes paid by such households by $4,398 (2007 dollars).

Thus, the average immigrant household generates a total (federal, state, and local) fiscal deficit of $7,806 ($3,408 + $4,398.) This is the net subsidy immigrant households receive from households headed by U.S. natives. There are currently about 36 million immigrants living in about 9 million households, so the aggregate deficit attributable to immigrants comes to $70.3 billion ($7,806 x 9 million.)

Bottom line: Immigrants could deplete the amount of public funds available for infrastructure by as much as $70 billion per year.

California Bridges Falling Down?

California is the immigration capital of the U.S. In 2007, the state's nearly 10 million immigrants accounted for nearly 28 percent of the state's population. New York state is a distant second with 4.1 million immigrants (22 percent of the state's population).

While there is no proof, there is ample circumstantial evidence that California's immigrants are crowding out its infrastructure. In 2004, for example, the state transferred $3.1 billion from the transportation trust fund to the general fund—which finances social programs for immigrants and other economically disadvantaged individuals. That same year, a civil engineer from Modoc, California, was quoted as follows:

> California's diversion of funds has almost halted the bridge replacement program in most jurisdictions, including our shaky wooden truss bridge with a 3-ton load limit, that provides the only access to a hundred square miles of land, people, and forests. Ever tried to take a 12-ton fire engine over a 3-ton bridge?[7]

This news item is also from 2004:

> A chunk of the Richmond-San Rafael Bridge fell into the bay yesterday afternoon, forcing the closure of a lane and causing major traffic tie-ups in the county that lasted for hours. The 3-foot-wide, 1-foot long hole opened along the trestle section of the bridge exposing the bay below. The span has been bedeviled by holes in recent years. Opened in 1956, the decks on the span have never been replaced and are showing signs of age.[8]

As was this:

> The Victoria Avenue Bridge, which dates to 1928, will be retrofitted to withstand an earthquake of magnitude 7.4 if the City Council approves the $9 million project. The bridge was not built to handle a major earthquake and has deteriorated over the years. 'The work must be done,' said Councilman Art Gage, who lives nearby and drives across the bridge several times a day. 'It's a little scary looking,' he said of the span. 'You see the concrete cracked everywhere.'[9]

The Golden Gate Bridge in San Francisco opened to vehicular traffic at twelve o'clock noon on May 28, 1937. The bridge opened ahead of schedule and under budget.

Perhaps we should not be surprised at the following factoid: 38 of the nation's 50 most heavily trafficked bridges and overpasses deemed structurally deficient are in Southern California. Of those, 32 are in Los Angeles County, five in Orange County, and one in Riverside County.[10]

Drivers in the three Southern California counties alone make more than 27 million crossings on structurally deficient bridges each day.

The Role of Illegal Aliens

Before Minneapolis, there was Katrina. The 2005 hurricane weakened bridge infra-

structure throughout the Mississippi delta. Within a year of that disaster, the Mississippi Department of Transportation (MDOT) spent more than $1 billion on infrastructure projects in south Mississippi, including 90 bridges.

At the top of MDOT's to-do list were two spans washed away by the hurricane: the bridge over Biloxi Bay and the one at Bay of St. Louis. Those spans were in need of dire repair well before Katrina. Understandably, the locals did not care who worked on the bridges as long as the structures were completed on time and were safe to drive on. Apparently MDOT did not care, either.

Last year, the owner of Tarrasco Steel, a company that supplied workers on the Biloxi Bay Bridge, was arrested and charged with hiring immigrants on projects in three states. Federal immigration agencies found that most Tarrasco employees were using bogus Social Security numbers. Far worse: They lacked valid welding certifications attesting to their competence for the job. Seventy-seven workers were arrested.[11]

According to an Immigration and Customs Enforcement press release, the Tarrasco probe was a Critical Infrastructure Protection investigation, which **"are generally predicated on the threat to national security posed by unauthorized workers employed in critical infrastructure-related facilities."**[12]

The terrorism threat is far less than the danger of a catastrophic infrastructure failure due to cheap—and incompetent—alien labor. ■

Notes

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Fire and emergency rescuers sift through the wreckage of the Minneapolis bridge shortly after it collapsed into the Mississippi River during rush hour traffic. Some 1,500 U. S. bridges collapsed between 1966 and 2005, according to the American Society of Civil Engineers.

Dams and Levees

Section 4

Catastrophic Midwestern floods in June 2008 drew national attention to a part of the American infrastructure that often goes unnoticed—the physical barriers that hold back water. Dam and levee failures occurred up and down the Mississippi watershed, inundating cities and cropland with water and raw sewage. The Federal Emergency Management Agency (FEMA), the Army Corps of Engineers, and a myriad of other state and federal agencies assessed the damage—and will presumably draft recommendations aimed at preventing a recurrence.

We have been here before.

After the last devastating floods in the Midwest 15 years ago, a committee of experts commissioned by the Clinton Administration issued a 272-page report recommending a more uniform approach to managing the Mississippi and its tributaries, including giving the Army Corps of Engineers principal responsibility for many of the levees.

The committee chairman, Gerald E. Galloway, a former brigadier general with the Corps of Engineers, says that few of the recommended changes were made. Once the floodwaters receded from the land, the infrastructure program was forgotten.[1]

Dams and Levees by the Numbers

83,000 dams listed in the government's national inventory of dams (2007)
3,200 dams classified as "unsafe" (2007)
80 percent increase in unsafe dams from 1998 to 2007
15,000 miles of levees in the U.S. (2007)
$60,000 cost-per-mile of assessing a levee's hydrologic condition

Spending Required to Rehabilitate U.S. Dams
2007: $36 billion (a) ($119 per capita)

2050 Projections (b)
$ 53.3 billion: at current population trends
$46.2 billion: at 50-percent reduction in immigration
$36.0 billion: at zero population growth

Notes:
a. American Society of Civil Engineers estimate.
b. Assumes per-capita spending requirements are at 2007 levels.

Sources:
American Society of Civil Engineers, Pew Research Center.

Similarly, after Hurricane Katrina destroyed the levee at Lake Pontchartrain in 2005, Congress set up a program to inventory and inspect levees. But the legislation failed to provide enough money to do this. According to the Army Corps of Engineers, the **"geotechnical conditions of the levees or the hydrological conditions of the areas to be protected**" could cost as much as $60,000 for each mile of levee, or $100 million just for the 1,600 miles of levees that protect California's Central Valley region.

Regarding the nation's roughly 15,000 miles of levees, **"one of the fundamental problems is that there is a lack of good information about where all the levees are and what level of protection they are supposed to provide**," noted Mark Ogden, president of the Association of State Dam Safety Officials (ASDSO), in 2007.[2]

There is no silver bullet. Even if the post-Katrina legislation had been fully funded and complied with, there still would have been flooding in 2008—but with considerably less damage, according to Dr. Galloway.

Whose Dam Responsibility?

It would be unthinkable for a state to build its highways without regard to where

neighboring states were building theirs. To prevent this, the entire interstate highway system is owned and managed by the federal government. Similarly, mass transit systems are usually run by city governments, and electricity generation in a city or metropolitan area is usually the responsibility of one private, albeit publicly regulated, utility.

By contrast, responsibility for the nation's dams and levees is spread willy-nilly across many entities. Of the more than 83,000 dams listed in the Army Corps of Engineer's National Inventory of Dams (NID), nearly 56 percent are privately owned. Some are owned by state or local governments or private utilities, and fewer than 5 percent are owned by the federal government—although the federal share includes high-profile structures such as the Hoover and Grand Coulee dams.[3]

A fairly short stretch of river might have dams and levees built and operated by private individuals, corporations, towns, or other governmental entities. Some are inspected and certified by federal authorities as meeting their standards, while others fall through the cracks—figuratively and literally.

An estimated 86 percent of NID dams are monitored by state regulatory programs, programs that are often understaffed and underfunded. In some states, each full-time dam safety official must monitor more than 1,000 structures. Alabama, the only state without a dam safety program, does not have a single full-time employee dedicated to dam safety regulation, despite the fact that the state has more than 2,000 dams on the NID list, ASDSO data indicate.

Many states are either unwilling or unable to force dam owners to make needed repairs. In Indiana, for example, four dams were damaged by the 2008 floods. Although the state's Department of Natural Resources (DNR) had repeatedly warned their owners—in some cases for more than 10 years—that the structures were deficient, no fines or other sanctions were imposed. DNR officials say half of the state's 1,100 dams need work. Indiana initiated legal action against dam owners only 15 to 20 times in the past five years, a DNR spokesman says.[4]

Similar derelictions of responsibility have been reported in other states.

At the same time, state dam safety budgets and federal grants have been declining. In May 2007, an ASDSO spokesman testified that funding for state assistance grants has **"been creeping downward for the past five years."** One particularly dramatic example: the 12 percent drop in a single year—2003 to 2004—from approximately $33 million to approximately $29 million.[5]

A coordinated flood control system is essential. Building up a levee over one stretch of waterway pushes more water to the opposite shore and downstream, with potentially damaging consequences. While the Upper Midwest has wrestled with a hodge-podge of dams and levees for decades, the lower portions of the Mississippi have a more standardized system of protection.

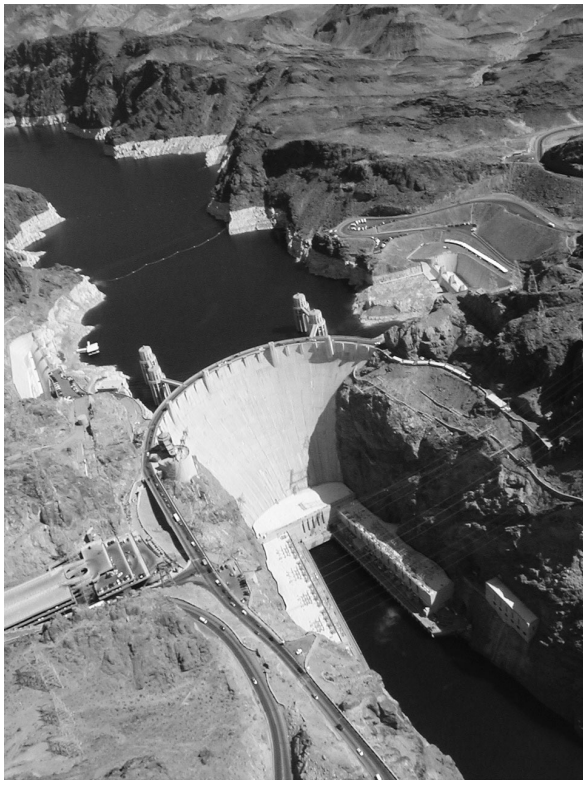
The north-south flood control gap is rooted in history. After an enormous flood in 1927, the southern portion of the river was declared part of a flood control project area and ordered to have levees designed and inspected by the Corps of Engineers. That flood spared the Upper Mississippi, and—given the enormous cost of levee building—left those in the north out of the equation. People there kept building on their own. Their descendants now suffer the consequences.

The Condition of U.S. Dams

More than 3,200 dams were classified as "unsafe" in 2007—meaning that their deficiencies leave them more susceptible to failure. This figure has increased by as much as 80 percent since 1998, according to a spokesman of the ASDSO. Moreover, the distribution of unsafe dams is skewed toward several states—Ohio has 825, Pennsylvania 325, and New Jersey 193. The actual number of unsafe

dams is potentially much higher, because some states do not report statistics on such dams.[6]

In its latest infrastructure Report Card, the American Society of Civil Engineers (ASCE) assigns a grade of D to dams, noting that**: "While federally owned dams are in good condition, and there have been modest gains in repair, the number of identified as unsafe is increasing at a faster rate than those being repaired."**



Hoover Dam, when it was completed in 1935, was both the world's largest electric-power generating station and the world's largest concrete structure.

Age is a factor. At present, an estimated 30 percent of NID structures have reached their design life of 50 years; within a decade, 1,700 more NID structures will surpass that 50-year mark, according to the 2005 Congressional Research Service report. While older federal dams are well maintained, structures regulated by states and localities are often allowed to deteriorate until disaster strikes.

It is estimated that $10.1 billion is needed over the next 12 years to address structural deficiencies in all critical non-federal dams—dams that pose a direct risk to human life should they fail.[7] In November, the House passed the Dam Rehabilitation and Repair Act of 2007. The legislation would provide a little more than $200 million over five years for the repair, rehabilitation, or removal of publicly owned dams that are structurally deficient. This is only a fraction of what is needed to fix all unsafe dams in the nation.

ASCE puts an upbeat spin on it:

> Although the measure represents only a "modest amount of money" toward the billions of dollars needed to fix all unsafe dams in the nation, it will be a good first step—if it becomes law—in creating a dedicated funding source for dam safety similar to that in other federal infrastructure funding programs.[8]

Will the 2008 floods loosen Congressional purse strings? Stay tuned.

Immigration and Dams: California

California is not the Midwest. The state's extensive network of dams was built to cope with too little, rather than too much, water. But the expense and potential dangers posed by dams are as daunting.

The Golden State has long struggled with two basic—and conflicting—facts. More than 70 percent of its surface water flow occurs in the northern third of the state, but the majority of its population lives in its more arid central and southern regions. Compounding the problem, the state's rainfall tends to occur in the winter; summers are usually dry. Ensuring an adequate, year-round water supply for the state's expanding population has spurred numerous efforts to convey water long distances.

The first north-south water system, the Los Angeles Aqueduct, was completed in

1913. In 1941, the Colorado River Aqueduct began lifting water and transporting it across 242 miles of desert to southern California. In 1973, the biggest water project of them all, dubbed the California State Water Project, was completed. At a cost of more than $2 billion, it was the largest public works project ever undertaken by a single state.

Thanks to immigration, the demand for water now exceeds the California State Water Project's capacity. Governor Schwarzenegger's "solution" is to build more dams and reservoirs. In particular, the Guv is pitching a $6 billion reservoir at a location called Sites in the Antelope Valley near Sacramento. Others claim that there will not be enough surplus water to fill the new dam. Moreover, the dam would contribute adversely to global climate change. Although energy would be produced as water is released, since water must be pumped uphill to it, Sites would end up consuming more energy than it makes. Nearly one-fifth of California's electricity already is used to collect, store, and transport water.

There is an alternative: Reduce per-capita water usage. But this would require terminating water subsidies to corporate agriculture—something the governor would never support. His aversion to immigration controls on seasonal farm workers is similarly designed to coddle big agriculture.

In fact, the entire Sites project is an exercise in special-interest legislation. Big corporations and construction companies benefit, while taxpayers lose their shirts. No wonder that the California State Department of Water Resources, the state agency that has been running the numbers on the Site project for the past seven years, has not released a feasibility study. It simply does not like the results.

Even if no new dams were constructed, immigration will increase the number of California dams that pose a safety hazard. That is because the urban sprawl and development that accompanies it bring homes and businesses closer to dams built in what were once remote locations. Dam safety officials refer to the situation as "hazard creep."

One thing is certain: Absent a decline in immigration, the water supply infrastructure in southern California will be increasingly inadequate and dangerous.

Dams at the Southern Border?

For most of its length, the Rio Grande is a narrow, unimpressive river—completely dry for parts of year along much of its length. In a word, it is not a candidate for new dam infrastructure. But the flow of illegal immigrants over its banks has been large enough to get the locals thinking about it.

In 2007, a group of mayors from Texas border towns called for sections of the river to be dammed as a deterrent to illegal immigrants.[9] The mayors want to deepen and widen the natural border with Mexico through a series of low dams—making it too hazardous to cross. They say the dams, together with beefed-up border patrols and electronic surveillance, would be much more cost-effective than a fence.

The Bush Administration's response has been to start construction of hundreds of miles of security fence along the border. It is not clear whether anyone in Washington, D.C., compared the cost/benefit ratios of the two proposals.

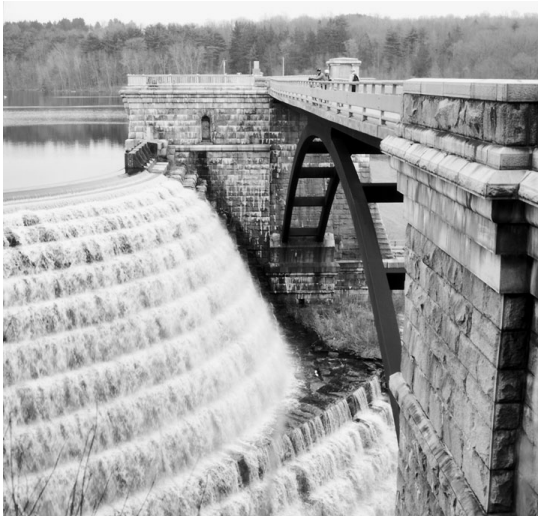
When Immigrants Built Dams: New York State

For the first 200 years of its existence, New York City relied on local sources for its water. Residents drew water from private wells or from a large Manhattan pond called the Collect. The Hudson and East rivers were too brackish to be used for drinking water. As the city's population grew, the quality of well water deteriorated.

By the 1830s, it became clear that the city could never obtain sufficient drinking water from sources in Manhattan alone. A plan to draw water from the Croton River, a tributary of the Hudson, was approved. By 1842, the Croton dam and 41 miles of what became

known as the Croton Aqueduct were successfully transporting water from upstate to the city.[10]

Within decades, the demand for water exceeded the system's maximum for safe operations. A new Croton aqueduct and dam was constructed, and the city went on to tap even more distant watersheds. The dam could not have been constructed without the masonry and artistic skills of Italian immigrants—many of whom were brought over specifically for that purpose.



The New Croton Dam, completed in 1907, is often called "the eighth wonder of the world."

> The great achievement of Italian manual labor in Westchester is the New Croton Dam, in Cortlandt. It was started in 1892 and was regarded at the time of its completion, in 1907, as the eighth wonder of the world. By any standards, it is an impressive structure: huge blocks of granite taken from nearby quarries rise in a tapering curve to a height of 290 feet on a foundation sunk a 124 feet below the riverbed. A decorative corniced border runs along the top layer of blocks between two of the three buttresses and under the concrete road where motorists can get out, lean on the silver-painted guardrail, and take in the view.
>
> The great dam spans 2,500 feet in all, looming over the Croton Gorge and a small county park with scattered maples and evergreens far below. It holds back 32 billion gallons, whose overflow, released gradually over a series of steps into a thousand-foot spillway, runs under a huge steel arch and then comes thundering down into the gorge in three stages, with natural outcroppings of rock to break its fall, throwing up mist, rainbows, and a fresh organic smell.[11]

The New Croton Dam story is instructive—both as to the changed esthetics of public infrastructure and the changed quality of U.S. immigrants. ■

Notes

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Electricity Infrastructure

Section 5

Americans take electricity for granted. We do not worry about "generation capacity" or the "power grid" until the lights dim or air con no longer clicks on. But people who do think about these things see dark days ahead. **"Thirty years ago, America had the best electrical utility grid system in the world,"** says Otto Lynch, the chair of the American Society of Civil Engineers' (ASCE) Structural Engineering Institute. The problem is that while the country has the same system today, "**It's not the best anymore."**

Electricity by the Numbers

16,924 electric utility generators in the U.S. (2007)
2.5 billion tons electric industry CO2 emissions (2006)
49 percent coal's share of the nation's electric industry fuel (2007)
3 percent renewable (biomass, wind, solar, geothermal) share of electricity fuel (2007)
$5.1 billion annual cost of complying with federal environmental regulations
5 to 10 added cost factor of putting overhead power lines underground

Electric Distribution Spending
2005: $15 billion ($50.73 per capita)
2050 Projections (a)
$22.2 billion: at current population trends
$19.3 billion: at 50-percent reduction in immigration
$16.4 billion: at zero population growth immigration

Note: a. Assumes per-capita spending remains at 2005 levels.

Sources: Edison Electric Institute, Pew Foundation Research.

The nation's electric power grid is aging. Power lines with an expected life of 50 years are still in use 80 years after installation, and wooden poles that should have been replaced after 30 years are rendering as much as 20 additional years of service, Lynch notes. And this system is facing new challenges as the population grows, industrial activity increases, and the demand for power rises.[1]

The need for more generating capacity was starkly demonstrated by an electricity shortage in California in the first half of 2000, the most severe energy crisis in the U.S. for many years. This was followed in August 2003 by the most extensive blackout in U.S. history, affecting 50 million people across a wide swathe of the northeastern U.S. and southern Canada.

Without additional resources, many parts of the nation, especially California, the Rocky Mountain states, New England, Texas, the Southwest, and the Midwest, could again fail to meet the demand for power, warns the North American Electric Reliability Corporation (NERC) of Princeton, New Jersey.[2] While prolonged blackouts are expected to be rare, the power grid would be less capable of handling unexpected events, such as extreme weather or the sudden outage of a major plant.

When NERC surveyed 230 bulk power system users, owners, and operators in 2007, ranked first among the technical concerns listed in the survey was the **"aging infrastructure and limited new construction."**

The Problem: Too Many People

Why haven't electric utilities built sufficient supply? Many factors can be cited as explanations, but a good place to start is at the source of all power: electric generators. They are costly and must be sized according to the population served. Here are the

ballpark figures:

> The purchase price of electric generators is something like $1 per watt. Coal plants may cost more, nuclear plants will cost a lot more, while natural gas turbines cost perhaps half of this. Let's use $1 per watt as the basis for some very simple calculations. As a rule of thumb, utilities need about 1,000 watts of capacity for one person. This means that for every person who moves into the service area of an electrical utility, the utility must spend about $1,000 in capital costs for the purchase of new electric generators. (This does not include fuel and other operating costs, nor does it include the costs of expanding the electrical distribution system that conveys electricity to the consumer. This is simply the cost of purchasing and installing the hardware that generates the electricity.)[3]

If a million people are added to the U.S. population, then utilities must come up with another $1 billion for a billion watts (one gigawatt) of new electric generators. If 142 million are added—the expected population growth between now and 2050—utilities must come with an added $142 billion *just to keep generator capacity at recommended per-capita levels.*

The dilemma facing utilities is perhaps best appreciated at the individual customer level. If a utility's population base is growing by 1 percent per year, then every person in the service area must pay an additional one percent of $1,000, or $10. This is the per-person cost of generators needed to keep capacity at the recommended 1,000-watt per-capita level.

The U.S. population is growing at 1 percent per year, on average. In areas of high immigration, higher rates are not unusual. If a utility's population base is growing at, say, 3 percent per year, then every man, woman, and child in the service area must pay an additional $30 per year to fund new generating plants. That is $120 a year for a family of four.

If bonds are used to finance the generators, the annual costs may triple.

These numbers suggest why, in recent decades, electric utilities in high immigration areas of the U.S. have been reluctant to purchase new generating capacity. They do not want to hit customers with rate hikes of this magnitude. In many locations, utilities were not allowed to pass these costs on to customers.

Is 1,000 Watts per Person Too Much?

Little by little, Americans are learning to conserve power. Case in point: California's per-capita electricity demand actually decreased 5 percent during the 20 years before the electricty crisis hit, from a carrying capacity of 7,292 kwh in 1979 to 6,952 kwh in 1999.

Let's assume that the "rule of thumb" for generator capacity in California also dropped by 5 percent, or from 1,000 to 950 watts per person. Where would that have left the state's utilities?

Answer: Still behind the curve.

That is because the state's population grew by 43 percent, or more than 8 times the decline in per-capita demand, over the same period (1979 to 1999). Rate hikes in excess of $1,600 per year for a family of four would have been required to maintain per-capita generator capacity at recommended levels over that period of time. That is obviously

unthinkable—even in a deregulated market. The resulting energy shortage was, by comparison, easier to accept.[4]

Bottleneck Ahead: the Power Grid

If you generate power, will they receive it? At one time this was a silly question. The U.S. had the most extensive power grid in the world, full of redundancies that insured uninterrupted power flow. Those days are over. ASCE's latest infrastructure *Report Card* was decidedly pessimistic on the U.S. power grid:

> The U.S. power transmission system is in urgent need of modernization. Growth in electricity demand and investment in new power plants have not been matched by investment in new transmission facilities. Maintenance expenditures have decreased 1 percent per year since 1992. Existing transmission facilities were not designed for the current level of demand, resulting in an increased number of 'bottlenecks' which increase costs to consumers and elevate the risk of blackouts.[5]

Problems with the U.S. power grid have been apparent for most of this decade. The extensive blackout of August 2003, for instance, started with a shorted-out power line in a remote area of Ohio. The subsequent event plunged approximately 50 million people into darkness from New York City to Toledo, Ohio, and from Ottawa to Windsor, Ontario.

The cascading disaster demonstrated just how fragile our interconnected power system is. The electrical grid across America relies heavily on individual power lines and did not possess the redundancy needed to cope with the Ohio breakdown. It was, according to Otto Lynch, a **"perfect example of a bottleneck…. They lose a single line and it caused a catastrophic failure."**

Making matters worse, attempts to provide such redundancy through new infrastructure are often stymied by the not-in-my-backyard (NIMBY) reflex. During the 1990s, American Electric Power, of Columbus, Ohio, proposed a new transmission line to serve Virginia and West Virginia. Construction of the line, which crossed several areas of federal land, took just two years. But the approval process lasted 14 years.

This is not an isolated incident: politicians and regulators in one state or region often will not allow expansion of the power grid for fear of angering their constituents or activist groups.

The electric power grid is arguably in worse shape than electric generation infrastructure. This is not surprising, given the possibility that urban and suburban sprawl—the area over which electricity must be conveyed—is growing faster than the overall demand for electricity. By displacing residents from central cities, immigration could well be a contributing factor.

California's Energy Debacle

The California power crisis was triggered by a fundamental imbalance between the growing demand for power and stagnant power supply. It can be argued that the state's accommodative policy toward illegal immigrants was a major factor behind demand growth. At the same time, state regulation artificially reduced electricity supply.

The energy crisis was characterized by a combination of extremely high prices and rolling blackouts lasting from May 2000 to September 2001. Due to price controls, utility companies were paying more for electricity than they were allowed to charge customers, forcing the bankruptcy of Pacific Gas and Electric and the public bailout of Southern California Edison. This led to a shortage in energy and subsequently to the blackouts.

California's energy regulations did not allow utilities to hedge against future price hikes by purchasing forward contracts. This gave energy suppliers enormous leverage

over their utility customers. By keeping their capacity low relative to demand, suppliers could effectively hold the state hostage by shutting down their plants for "maintenance" in order to tip the demand-supply balance in their favor. These critical shutdowns often occurred for no other reason than to force utilities to purchase electricity on the "spot market," where private suppliers could charge astronomical rates.[6]

Middleman wholesalers such as Enron exacerbated the crisis. In a market technique known as megawatt laundering, for example, Enron bought up electricity in California when prices were low to sell out of state, creating shortages. In some instances, Enron deliberately timed the out-of-state sales to create congestion and drive up prices in California.

Under California's bizarre regulatory regime, utilities no longer owned their own generators. They thus had no incentive to continue funding demand-side management programs as a means of avoiding generator costs. The California Energy Commission estimates that Demand-Side Management (DSM) programs helped reduce California's electricity loads by about 10,000 MW, the equivalent of 20 medium-sized power plants. California was the U.S. leader in energy efficiency. During the 1990s, power consumption in the U.S. grew at 2.2 percent per year, more than twice the annual growth in the nation's population, and 0.7 percentage points higher than California's growth rate.[7]

Could demand reduction have prevented the crisis? Not a chance. As noted, California's population growth more than offset the reduction in per-capita electricity demand. Bottom line: California's flawed energy deregulation scheme only masked the primary culprit — explosive population growth.

Green Electricity?

Al Gore wants the U.S. to generate 100 percent of its electricity from zero-carbon energy sources within a decade. This is achievable, he claims, because the cost of power from renewable sources, like wind and solar, has been rapidly reduced in recent years while fossil fuel prices have skyrocketed.

Former Vice President Al Gore

Further technological advances could obliterate the cost advantage of conventionally produced electricity altogether, making green power both economically and environmentally optimal.

Reality check, please.

Fossil fuels are used in 71 percent of U.S. electricity production, led by coal (49 percent), natural gas (20 percent) and oil (2 percent). Nuclear power underlies 19 percent of electric output, and hydropower 7 percent. That leaves the carbon-free renewables—wind, solar, geothermal, and biomass—at 3 percent.[8]

The inexorable reality is that a 90-some fold increase in renewable energy infrastructure would be required to realize Gore's goal. This in inconceivable, especially given the unfunded needs of existing (conventional) power plants.

If any place is capable of going 100-per-

cent green, it is California. The state is well endowed with wind and solar energy sources. Hydropower already constitutes about 15 percent of California's in-state production—more than twice the national average. And over the past three decades Californians have managed to keep their per-capita energy usage, already the lowest on the nation, essentially flat, even as energy use per-capita rose 50 percent in the rest of the country.

But population growth overwhelmed the good wrought by efficiency and green electricity initiatives. Carbon emissions from the Golden State are higher than ever.

Gore should learn from California's experience, and add population—and immigration—control to his green agenda.

Indeed, anyone concerned about the sustainability of America's power grid should make immigration control a top priority.

The Terrorist Threat

When the largest power failure in U.S. history struck the U.S. and Canada in August 2003, terrorism was among the initially suspects. That fear proved unfounded—but the vulnerability of the power grid to attack is real and has not been adequately addressed since 9/11.

Although nuclear plant security has been the focus of most anti-terrorism efforts in the energy space, Al-Qaeda and other terrorist groups are known to have considered all power facilities as possible targets. Extremist groups around the world often attack power lines.

Cyber attacks against the programs that orchestrate power plant operations would be equally disruptive. According to Richard Clarke, a former National Security Council member, a Chinese general has said they would reach out through cyberspace and turn off our electric power grids before any conflict with the United States.[9]

Increased surveillance, employee background checks, strengthened physical barriers, and computer firewalls, are all part of the standard anti-terrorism response. Immigration policy should be on the list also: All the 9/11 terrorists entered the country legally – some as students, some as "tourists." [10] ■

Notes

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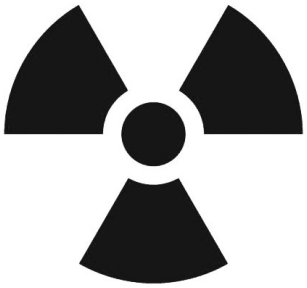
Hazardous Waste Removal Infrastructure

Section 6

The term "hazardous waste" refers to substances that have the potential to increase deaths or serious illnesses, or to pose a hazard to human health when improperly stored, transported, or otherwise disposed of. Most hazardous wastes are the unwanted by-products of industrial processes. Some are generated by small businesses in cities and towns—for example, dry cleaners, auto repair shops, and exterminators. Hospitals and power plants also contribute to the hazardous waste disposal problem.



Legislation aimed at cleaning up hazardous waste was first enacted in December 1980. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) initially targeted 400 high-priority hazardous waste sites for clean up.

CERCLA was enacted in the wake of the discovery of toxic waste dumps such as Love Canal and Times Beach in the 1970s. It allows the Environmental Protection Agency (EPA) to clean up such sites and to compel responsible parties to perform cleanups or reimburse the government for EPA-lead cleanups.

Since its inception nearly 30 years ago, the Superfund Trust Fund has received more than $40 billion to support hazardous waste cleanups. Billions more were appropriated to clean up leaking underground storage tanks and brownfield sites. States have also contributed billions to hazardous waste clean-ups.

Progress toward cleaning up toxic chemicals and other hazardous substances has been "sluggish," according to the American Society of Civil Engineers (ASCE). Monies allocated to the Superfund have declined steadily since 1998, and currently represent a 40-percent reduction in real purchasing power from 1980s levels.

Meanwhile, the number of contaminated sites on the National Priorities List (NPL) —EPA's official record of the most hazardous sites in the nation—has increased to 1,500. An additional 20,000 sites need to be cleaned up but are not on the NPL because they fall under the assessment of other federal cleanup programs, according to the Congressional Research Service.[1]

Brownfields

Abandoned industrial properties where expansion or re-development is complicated by environmental concerns are called "brownfield sites" in environmental parlance. While less severely contaminated than Superfund sites, the sheer number of them—600,000 according to one estimate—is troubling.

Brownfield sites are usually located in a city's industrial sections or on mountains containing abandoned factories, commercial buildings, or other previously polluting operations. Small brownfields also may be found in many older residential neighborhoods. For example, dry cleaning establishments or gas stations that produced high levels of subsurface contaminants during prior operations, and the land they occupied, might sit idle as brownfields.

Many contaminated brownfield sites

sit unused for decades because the cost of cleaning them to safe standards is more than the land would be worth after redevelopment. However, redevelopment of brownfield sites has become more common in the first decade of the 21st century, as developable land grows less available in highly populated areas.

Infrastructure Supply v. Infrastructure Demand

ASCE's 2005 Report Card gave the nation's hazardous waste cleanup infrastructure a D. This grade has been disputed, however:

> While the nation's financial commitment to cleaning up hazardous waste sites might have earned a poor grade from ASCE, the infrastructure needed to conduct those cleanups is in much better shape," explains David Case, the executive director of the Environmental Technology Council, a trade association based in Washington, D.C., representing the hazardous waste industry.[3]

"Companies have the equipment, the trained personnel, and the capacity" to conduct Superfund cleanups, brownfield redevelopments, and other private-sector environmental projects, Case says. But the demand—in the form of public or private funding for such cleanups—is inadequate. Indeed, Case believes that **"There are more people able to do the cleanups than there are people willing to pay for the cleanup work."**

The hazardous waste remediation industry has invested billions of dollars in acquiring modern equipment, training personnel, and obtaining the necessary permits to conduct environmental cleanups, but the industry has encountered reduced state and federal funding for such programs **"across the board for the past eight years,"** says Case.

Hazardous Waste by the Numbers

38.3 million tons of hazardous waste generated (2005)
1,500 contaminated sites on the Environmental Protection Agency's (EPA) National Priorities List (2006)
16,191 number of businesses and industrial facilities that generate more than 1 kg (1.1 tons) of hazardous waste per month (2005)
11.2 percent of hazardous waste shipped out of state (2005)
40.0 percent reduction in inflation adjusted Superfund spending since 1987 (2005)
600,000 possible brownfield properties (contaminated sites too small for Supefund)
42 percent of Hispanics supporting environmental regulations (2003)

Superfund Spending (a)
FY 2007: $1.3 billion ($4.29 per capita)

2050 Projections (a)
$1.9 billion: at current population trends
$1.7 billion: at 50 percent reduction in immigration
$1.3 billion: at zero population growth

Note: a. Projections assume per-capita spending stays at 2007 levels and U.S. population grows per the Pew Research Center's February 2008 forecast[2]

Sources: American Society of Civil Engineers, Environmental Protection Agency, Office of Management and Budget (FY 2009 budget).

Public Support Slipping

Public support for cleaning up hazardous waste dumps has declined in recent years, according to public opinion surveys. A slowing economy, terrorism, health care costs, and drug abuse have displaced environmental concerns in the minds of most Americans.

Attitudes toward environmental activism vary greatly with race and ethnicity, however.

For more than two decades, the Gallup

and Eagleton polls have asked if environmental protection should be a priority even if it might reduce economic growth. In March 2003, less than half (47 percent) of those surveyed nationally said it should. In March 2000, 70 percent responded in favor of the environment; in March 1990, 71 percent chose environmental protection over economic growth.

Even in 1992, when U.S. unemployment spiked at 7.5 percent, 58 percent chose the environment.

An important finding of these surveys is that middle-aged, white, college-educated males are the strongest proponents of environmental protections. This group is the core of the American political mainstream, a group that elected officials cannot afford to ignore—at least for the next few years.

Among all whites, 68 percent supported environmental regulations in 2003. The corresponding figures for blacks, Hispanics, and Asians were 49 percent, 42 percent, and 38 percent, respectively.[4]

In 1990, blacks, Hispanics, and Asians constituted 24 percent of the U.S. population. In 2000, they made up 28 percent population. By 2050, today's minorities will be a majority.

Immigrants and their U.S.-born children will account for 82 percent of U.S. population growth between now and 2050. Most of the foreign-born come from countries in which environmental conditions are far worse than anything found here.

Implication: Demographic changes stemming from immigration will put nearly 40 years of U.S. environmental progress at risk.

Importing Hazardous Waste from Mexico

The North American Free Trade Agreement (NAFTA), the U.S.-Mexican-Canadian agreement that went into effect in 1994, affects the management of hazardous waste. The trade agreement considers hazardous waste a "good" that is accordingly free from all international restrictions. Although the General Agreement on Tariffs and Trade (GATT) allows countries to restrict entry of a good if it is "necessary to protect human, animal, or plant life or health," NAFTA also recognized the La Paz agreement—an earlier U.S.-Mexico agreement that waived this right.

In particular, the 1983 La Paz agreement states that if Mexico requires hazardous waste generated by maquiladora industries in northern Mexico to be returned to the U.S., then the U.S. has to accept it for disposal and treatment. Moreover, Mexico is allowed to keep U.S. solid waste out because it lacks adequate infrastructure for disposal.

Imports of Hazardous Waste from Mexico into the U.S., 1991-1997

YEAR	TONS
1991	5,779
1992	6,826
1993	9,836
1994	10,513
1995	8,510
1996	6,983
1997	11,057

Source: Environmental Protection Agency, Region VI and IX, HAZTRAKS Database, 1998.

Maquiladoras are U.S.-owned factories operating in Mexico. Their waste by-products typically start as chemicals in the United States that are shipped to the Mexican plant. Nearly 3,000 such factories line Mexico's northern border.

How much Mexican waste comes into the U.S.? Good question.

U.S. environmental officials cannot say how much of the waste is trucked in each year, which chemicals are transported in most often, or where the hazardous Mexican waste is dumped in the U.S. This lack of data, compounded by spotty inspections, has hampered regulatory efforts at the state and national levels. It also has undermined scrutiny of major waste importers because there is almost no way for the public to know who these companies are without sorting through thousands of forms.

Some environmentalists and border regulators even suggest that terrorists could take advantage of the limited inspections to shuttle dangerous materials into the United States.

> The federal government really hasn't done its job in terms of having people on the border to check (hazardous cargo)," says Steve Owens, director of the Arizona Department of Environmental Quality. "We see it not only as an environmental issue but as a security risk.[5]

From 1995 to 2002, the government tracked hazardous waste imports. EPA's Haztraks database registered the amount and kinds of waste, such as heavy metals and solvents, coming into the U.S. from Mexico and also noted where the waste was treated or disposed.

EPA operated Haztraks with its own staff and contract workers who were paid $250,000 per year. In 2003, budget cuts terminated the program. Today, EPA relies on a $30,000-a-year program that is much smaller in scope and administered by the Border Compliance Assistance Center, a nonprofit educational group. The center hires a private contractor in Virginia to replicate some of the data entry capabilities that EPA lost. It started compiling numbers on cross-border hazardous waste in early 2007. By the time the center's computerized figures are made public, they are several months old and riddled with uncertainties.

The state of California is trying to fill the data gap. Crews from the California Department of Toxic Substances Control check inbound trucks as they queue up for hazardous waste inspections at Otay Mesa—the busiest hazardous waste entry port on the U.S. border. The inspectors actually check the contents of barrels of waste against the information contained in truckers' manifests.

As a result, more and more waste haulers are avoiding California.

> It's kind of the hazardous waste version of undocumented folks coming across the border," Steve Owens, director of Arizona the Arizona Department of Environmental Quality, said. "When they tighten up the borders for hazardous waste entry (in California), importers are going to come through Arizona because our borders aren't controlled.

Arizona, New Mexico, and Texas rely on U.S. Customs and Border Patrol officials to inspect imports of toxic waste. But those agents are focused on illegal immigrants and drug traffickers. Border officials typically inspect a very small percentage of hazardous waste shipments, according to a 2005 report by the Commission for Environmental Cooperation, which is sanctioned by the governments of the United States, Canada, and Mexico. The report described the current controls as ineffective and inconsistent.[6] ■

Notes

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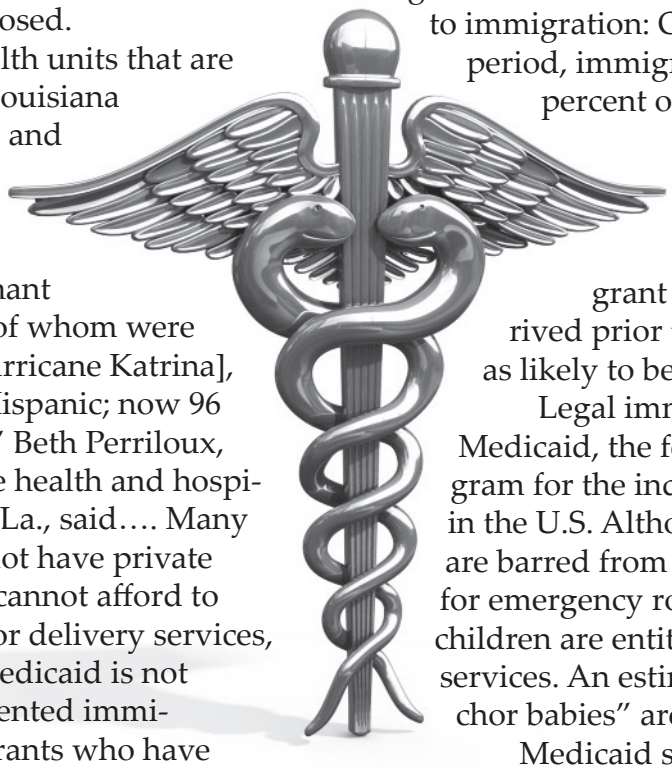
Hospital Infrastructure

Section 7

Hundreds of infants born to Hispanic immigrants who moved to the New Orleans area after Hurricane Katrina to work on reconstruction have placed additional strains on the region's health infrastructure, the *New York Times* reports. According to the *Times*, much of the state-financed Charity Hospital system, which provided care to most of the uninsured and low-income residents in the area, remains closed.

The two local health units that are administered by the Louisiana Department of Health and Hospitals from January through mid-November admitted more than 1,200 pregnant women, the majority of whom were Hispanic. "Before [Hurricane Katrina], only 2 percent were Hispanic; now 96 percent are Hispanic," Beth Perriloux, head nurse at the state health and hospitals clinic in Metairie, La., said…. Many Hispanic women do not have private health insurance and cannot afford to pay for prenatal care or delivery services, and nonemergency Medicaid is not available to undocumented immigrants or legal immigrants who have been in the country for fewer than five years…."[1]



New Orleans suffered a unique natural disaster. The stress placed on its hospital system is increasingly common, however. Hospitals throughout the country have been inundated by uninsured immigrant. The financial strain has affected the quality of medical services, forced hospitals to close clinics and emergency rooms, and put infrastructure expansion plans on hold.

Immigration v. Hospitals

Immigrants are disproportionately employed in low-wage jobs, small firms, and service or trade jobs that are less likely to offer health benefits. More than 46 percent of foreign-born noncitizens were uninsured in 2006—three times the uninsurance rate of native-born persons (15 percent). Most of the growth of the uninsured population is due to immigration: Over the 1994 to 2006 period, immigrants accounted for 55 percent of the increase.[2]

Although recent immigrants are the most likely to be uninsured, even the oldest immigrant cohorts—those who arrived prior to 1970—are nearly twice as likely to be uninsured than natives.

Legal immigrants are eligible for Medicaid, the federal insurance program for the indigent, after five years in the U.S. Although illegal immigrants are barred from medical benefits except for emergency room care, their U.S.-born children are entitled to the full gamut of services. An estimated 3 million such "anchor babies" are living in the U.S.

Medicaid spending on behalf of immigrants has increased far more rapidly than the amounts paid for native-born recipients.

Hospitals are required to care for Medicaid beneficiaries as a condition for receiving federal tax exemptions. This is a financial burden for hospitals, however, because Medicaid reimbursements do not cover the full cost of services. Medicaid underpaid hospitals by $11.3 billion in 2006, up from $2.6 billion in 2000. This translates a payment of 86 cents

for every dollar spent by hospitals caring for Medicaid patients in 2006.[3]

Uncompensated health care costs have created a two-tier hospital system. Treatment at "safety net" hospitals—that is, those catering primarily to immigrants and other Medicaid patients—lags behind that offered at facilities that do not treat large numbers of such patients:

> Hospitals with high percentages of Medicaid patients had worse performance in 2004 and had significantly smaller improvement over time than those with low percentages of Medicaid patients. Hospitals with low percentages of Medicaid patients improved composite acute myocardial infarction performance by 3.8 percentage points vs. 2.3 percentage points for those with high percentages…. Larger performance gains at hospitals with low percentages of Medicaid patients were also seen for heart failure (difference of 1.4 percentage points, P = 0.04) and pneumonia (difference of 1.3 percentage points, P <.001). Over time, hospitals with high percentages of Medicaid patients had a lower probability of achieving high-performance status.[4]

Hospitals by the Numbers

5,747 hospitals in the United States (2006)
$607.4 billion total expenses of all U.S. hospitals (2006)
35.4 million inpatient admissions in 2006
118.4 million emergency room visits (2006)
5.6 days average length of inpatient stay (2006)
2.0 days reduction in average inpatient stay, 1981-2006
12 million+ uninsured immigrants in the U.S. (2006)
92 percent immigrant share of uninsured population growth, 1998-2003

Hospital Infrastructure Spending (a)
2005 estimated: $41.0 $billion ($135 per capita)

2050 Spending Projections (b)
$60.7 billion: at current population trends
$52.6 billion: at 50-percent reduction in immigration
$41.0 billion: at zero population growth

Notes:
a. Value of hospitals and clinics under construction in the fourth quarter of 2007.
b. Assumes per-capita construction spending remains at 2007 levels.

Sources: American Hospital Association, Health Facilities Management, Employee Benefit Research Institute, Pew Research Center.

Uninsurance v. Infrastructure

This is a boom time for hospital construction. A record $41 billion in hospitals and clinics was under construction in the fourth quarter of 2007. Despite the credit crunch and recession fears, medical infrastructure construction growth is expected to continue in the low double digits through 2009.[5]

There are several reasons for the building boom: obsolete facilities, new technology that improves the efficiency and quality of hospital care, and seismic code changes that require replacing buildings in California. Overarching everything is the aging of the baby-boom generation.

Abut three-fifths of hospitals of surveyed by the American Hospital Association (AHA) in October 2007 either had projects under construction or planned to initiate construction of new projects within three years.

Unfortunately, many hospitals cannot afford to replace inferior facilities. They are deterred by the double whammies of rising uninsured case loads and declining federal reimbursement rates for Medicaid patients, which provide 60 percent of the income received by some safety-net hospitals:

"**As you continue to fight reimburse-**

ment issues at a facility and you're trying to upgrade, it becomes difficult," says Donna Craft, executive director of support services, NorthEast Medical Center in Concord, N.C. "**It is getting much harder to elevate the aesthetic standards and the bottom line.**"[6]

Making matters worse is that the cost of hospital construction is highest in immigrant gateway cities such as New York, Los Angeles, San Francisco, and Chicago.

The Emergency Department

Emergency departments are the most common item found on the infrastructure "wish lists" of U.S. hospitals. Architect and engineering expert Joseph Sprague, director of health facilities for the Dallas-based architectural firm HKS Inc., says that almost every project his firm does has some sort of emergency department (ED) component: "**The ED has become the front door of the hospital… People go to use the emergency room and they end up using the hospital."**[7]

But EDs are an endangered species. The number of EDs fell from 5,108 in 1991 to 4,587 in 2006—a 10-percent decline. Over the same period ED visits increased by a whopping 33.8 percent.

A Centers for Disease Control (CDC) study found that half of EDs experienced overcrowding in 2003 and 2004. An ED is deemed to be "crowded" if ambulances had to be diverted to other hospitals; if average waiting time for urgent cases was 60 minutes or more; or if at least 3 percent of patients left before being treated.[8]

People die from these delays. Autopsies of accident victims who died after reaching EDs in San Diego hospitals suggested that 22 percent of the deaths were preventable.[9]

Illegal immigration is a major factor behind the ED emergency. On the demand side, illegal aliens utilize hospital EDs at more than twice the rate of the overall U.S. population: 29 percent versus 11 percent.[10] On the supply side, uncompensated illegal alien care is the cause of many ED closures.

Not surprisingly, California EDs are among the hardest hit. Fox News reports that "Sixty percent of [LA County's] uninsured patients are not U.S. citizens. More than half are here illegally. About 2 million undocumented aliens in Los Angeles County alone are crowding emergency rooms because they can't afford to see a doctor."[11]

In the last decade, 60 California emergency rooms closed.

The University of North Carolina builds a new cancer hospital in Chapel Hill in February 2007.

One federal law in particular has made things worse. The Emergency Medical Treatment and Labor Act (EMTALA), enacted in 1986, requires that every emergency department in the country treat uninsured patients for free. Naturally, this includes immigrants and illegal aliens.

EMTALA defines medical "emergency" as any complaint brought to the ED, from hangovers to hangnails, from gunshot wounds to AIDS. The hottest ED diagnosis, according to medical lawyer Madeleine Cosman, is "permanent disability" – a vaguely defined condition that covers mental, social, and personality disorders.[12]

Drug addiction and alcoholism are among the fastest growing of such "disabilities." A disability diagnosis automatically qualifies illegal aliens for Supplemental Security Income, a federally funded cash transfer payment.

Fines of up to $50,000 are imposed on hospitals refusing to treat ED patients—even when the attending physician examines and declares the patient's illness or injury to be a non-emergency. Lawyers and special interest groups are granted more authority than doctors in these matters.

EMTALA was supposed to make EDs more accessible to the uninsured. Talk about unintended consequences!

> Not only did this unfunded mandate contribute to the closure of numerous emergency departments and trauma centers, it also created a perverse incentive for hospitals to tolerate emergency department crowding and divert ambulances while continuing to accept elective admissions. Rather than improving access to emergency care, EMTALA diminished it.[13]

Hospitals Strike Back

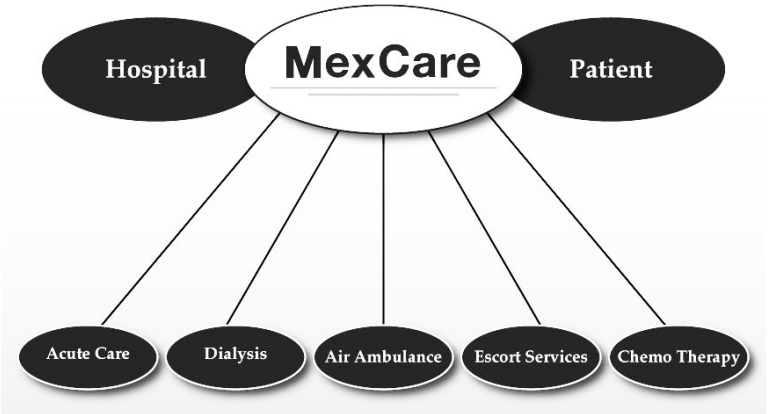
Illegal aliens enter the U.S. medical system via the EDs. Their ED stays are usually short, albeit costly in the aggregate. Sometimes things go horribly awry, however.

Case in point: Luis Alberto Jimenez. Mr. Jimenez, working as a gardener in Stuart, Florida, suffered devastating injuries in a car crash with a drunken Floridian. Martin Memorial Hospital saved his life, but the crash's impact on his brain left Jimenez incapacitated. After failing to find a rehabilitation center willing to accept an uninsured patient, the hospital kept him as a ward for years at a cost of $1.5 million.

Medicaid does not cover long-term care for illegals. Neither does the state of Florida. Martin Memorial originally had no recourse except to keep Mr. Jimenez as a long-term care patient. He became essentially a boarder at the hospital, wheeling around the hallways and hanging out with the nurses. Over time, Mr. Jimenez became depressed, exhibiting anti-social habits such as spitting, yelling out, kicking, and defecating on the floor.

What happened next set the stage for a continuing legal battle: Martin Memorial leased an air ambulance for $30,000 and flew Mr. Jimenez back to his home country of Guatemala. U.S. immigration authorities were not consulted and played no role in his transfer.

Prior to the transfer, the hospital contacted Guatemalan authorities. Eventually a letter from the Guatemalan health minister arrived, assuring Martin Memorial that his country was prepared to care for Mr. Jimenez.



Martin Memorial is not alone. Medical deportations are happening with varying frequency and varying degrees of patient consent throughout the country. No government agency tracks them, but a recent *New York Times* article provides snapshots of the phenomenon: 96 medical deportations at St. Joseph hospital in Phoenix, Arizona; 6 to 8 patients repatriated from Broward County Medical Center in Ft. Lauderdale, Florida; 10 flown to Honduras from Chicago hospitals since early 2007; some 87 cases involving Mexican illegals deported by San Diego area hospitals.[14]

There is enough medical deportation traffic to sustain at least one transportation company. MexCare, founded six years ago to service this niche, is headquartered in California but connects hospitals throughout the U.S.

with a network of 28 hospitals and treatment centers in Latin America.

Hospital administrators view these as costly, burdensome transfers that force them to shoulder responsibility for failures of the U.S. immigration system. Medical deportations are a last resort—designed to free up beds for ill U.S. citizens. In the long run, these transfers prevent an even worse scenario: financial insolvency and closure of a community's hospital.

Martin Memorial is being groomed as a test case by the pro-immigration lobby. Perhaps the hospital should sue the U.S. Department of Homeland Security. ■

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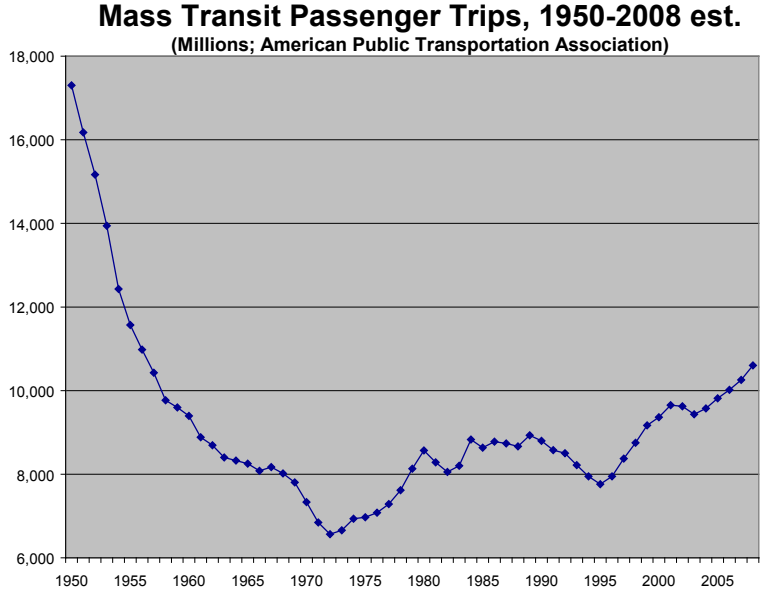
Mass Transit Infrastructure

Section 8

With the exceptions of Boston, Chicago, New York, and perhaps San Francisco, mass transit has traditionally been regarded as a service used primarily by the poor, immigrants, and others on the fringes of society. That perception changed dramatically in 2008. As gasoline prices crossed the $4.00 mark, middle-class commuters left their cars for bus and rail lines. Cities with long-established public transit systems saw their ridership go up 5 percent or more over the prior year. But the biggest surges—10 percent to 15 percent percent—occurred in metropolitan areas of the South and West where the driving culture is strong and bus and rail lines are more limited.[1]



Increased transit ridership has pushed many cities to a "tipping point" at which adding new mass transit infrastructure makes economic sense. It would be wrong to say that 2008 marked the start of a new trend, however. Public transit ridership has been increasing for decades:

Americans took more than 10.3 billion trips on mass transit in 2007, the industry's best year since 1957, and a 34-percent increase from the 7.7 billion trips reported in 1995. Data for the first three months of 2008 indicate a 3.3 percent rise over the same period in 2007.[2]

There is plenty of upside, however. In the 2000 Census, just 4.7 percent of people said they used public transit to get to work. Mass transit represents only 2 percent of daily trips in auto-clogged Southern California.

New York is the only city in America in which more than half of the workforce uses mass transit. In most cities, even if the share of trips using mass transit were to triple, the drop in highway congestion would soon be overwhelmed by population growth.

The Public Wants It

When given a chance to vote, the public usually supports new infrastructure. For the past seven years, ballot measures to fund new mass transit systems or to expand existing ones have passed about 70 percent of the time—although some of the electoral triumphs involved second attempts that the voters initially rejected. **"Often, if that same [ballot] question comes back, it meets with more success,"** explains Art Guzzetti, vice president of the American Public Transportation Association (APTA), adding that **"once you get a system in place in a community and people can see the benefits, they are inclined to sup-**

port extensions."[3]

While new infrastructure projects are voted in, the taxes needed to maintain and operate them are languishing. A weak economy has reduced local sales tax receipts available to support mass transit. The largest single funding source—the federal gasoline tax—is also down, the result, ironically, of the stampede to mass transit from private automobiles. At the same time, the costs of fuel and power used by mass transit systems are about three times those of four years ago. Rising steel prices have pushed transit infrastructure costs up more than anticipated.

So while the public's desire for mass transit systems is up, the reliability of the infrastructure is on the decline. Sixteen percent of the buses in the nation's bus fleet are operating beyond their expected service lives, and 54 percent will reach the end of their expected service lives over the next six years, according to a 2007 investment analysis. Corresponding figures for the nation's railroad rolling stock are 35 percent and 18 percent, respectively.[4]

The same report also found that one out of 10 railroad switching systems and power plants were operating beyond their expected service lives.

Maintaining mass transit systems at their current conditions will require capital investments from all levels of government of approximately $20 billion to $35 billion annually through 2025. But in 2004, total capital infrastructure investment for mass transit reached only $13.2 billion. As ridership grows, so will the required dollar amounts.

Cost Savings

Until recently, mass transit was seen as the best way of alleviating metropolitan area traffic congestion. Gasoline prices and a weak economy have relegated congestion to the back burner; today, mass transit is prized primarily for its low cost relative to the private automobile.

Mass Transit by the Numbers

120,659 mass transit vehicles operating in U.S. cities (2004)
7.8 years average age of transit buses (2007)
$0.89 average paid fare per bus trip (2006)
33.2 percent share of mass transit costs covered by passenger fares (2006)
37 percent immigrant share of San Francisco Bay area transit commuters (2000)
33 percent share of U.S. mass transit riders who live in New York metropolitan area
7.4 million tons annual reduction in $C0^2$ emissions from transit

Mass Transit Capital Spending
2006: $13.3 billion ($44.33 per capita)

2050 projections (a)
$19.7 billion: at current population trends
$17.1 billion: at 50-percent reduction in immigration
$13.3 billion: at zero population growth

Note:
a. assumes per-capita spending remains at 2006 levels.

Sources: American Public Transportation Association, American Society for Civil Engineers, Pew Research, Transportation Research Board, Wikipedia.

The average fare for an unlinked mass transit trip in 2006 was $1.12, according to the APTA. For buses it was $0.89; commuter rail $4.22; and light rail $0.72.[5]

Fare revenues account for only 33.2 percent of mass transit operating funds. The balance is covered by local governments (21.1 percent); state governments (22.8 percent); the federal government (7.7 percent); and by taxes, advertising, and other sources collected directly by the transit agencies themselves (15.3 percent).

Mass Transit Efficiency

While mass transit consumes large amounts of energy, it uses considerably less per passenger mile than private autos. A

single bus filled with 80 people, for example, uses only slightly more fuel than does a single private automobile. On average, mass transit uses one-half of the gasoline used by cars per passenger mile, and one-third of that used by SUVs and light trucks. [6]

Public transportation reduces U.S. gasoline use by an estimated 4.2 billion gallons a year. That is more than three times the amount of gasoline refined from oil imported from Kuwait.[7] The fuel savings reflects both lower fuel consumption per mile and fewer miles traveled as people change their travel habits in response to mass transit.

If Americans used public transportation at the same rate as Europeans, scientists estimate that our imports of foreign oil would decline by more than 40 percent.[8]

Mass transit systems also take up much less space than highways. For example, a subway system operating on two tracks 36 feet wide can transport 80,000 passengers per hour. By comparison, an 8-lane freeway 125 feet wide can carry only 20,000 passengers per hour. In some cities, the streets, highways, bridges, overpasses, and parking lots occupy as much as one-third of the available land area.

Environmental Benefits

The daily transit pass may be the most powerful weapon in the war against global warming. When a commuter switches from driving to public transportation, his or her household carbon footprint falls by 4,800 pounds per year, or 10 percent. If a household's second commuter gives up a second car, that household can reduce its carbon emissions up to 30 percent. Compared to other things that individuals might do, nothing reduces greenhuse gases more.

Most commuter rail and trolley lines are powered by electricity, thus emitting little or no pollution directly. Most buses and commuter rail locomotives use diesel fuel. Newer buses are increasingly fueled by alternative fuels such as compressed gas, propane, and hydrogen fuel cells.

Public transportation reduces CO^2 emissions by an estimated 37 million metric tons annually—equivalent to the emissions from the electricity used by 4.9 million households.[9]

Economic Development

One of the prerequisites for a viable mass transit system is a sufficient density of riders and destinations within walking distance of transit stops. The absence of such densities in sprawling, automobile-dependent suburbs makes it difficult for mass transit to attract a critical mass of ridership—even with highly subsidized fares.

To a considerable degree, however, new transit systems can create density. A well-designed public transit system will stimulate economic development along the route, attracting residents, workers, and shoppers from other parts of the metropolitan area.

Real estate—residential, commercial and business—served by public transportation usually commands higher rents and maintains higher value than similar properties not as close to transit infrastructure. For example, a 2002 University of North Texas study found that commercial properties located near suburban Dallas Area Rapid Transit (DART) stations increased in value 24.7 percent, while properties not served by rail increased only 11.5 percent. Values of residential properties near the stations rose 32.1 percent compared to the 19.5 percent increase for properties not served by rail stations.

Also, according to the Urban Land Institute, residential properties for sale near commuter rail stops in California consistently enjoy price premiums, including a 17-percent advantage to properties in the San Diego region.

In some countries—notably Hong Kong—mass transit agencies generate a profit by developing land around the stations. This is a mixed blessing, eliminating the need for government subsidies while also generating opposition to new transit construction by

individuals concerned about congestion.

Safety and Emergency Use

Public transportation is one of the safest modes of travel in the U.S. According to the National Safety Council, transit bus riders and commuter rail riders are both 25 times safer than people traveling in private automobiles.

Mass transit has also shown a remarkable ability to function during crises. On September 11, 2001, New York City bus and subway lines moved people safely away from the World Trade Center disaster. After the Pentagon was attacked, the Washington, DC, metro and bus lines evacuated hundreds of thousands of people in an early rush hour.

Conservative Skepticism

Could mass transit survive in a free market? Most laissez-faire conservatives would answer this question with a resounding "NO!" As they see it, mass transit is a government creation. In a pure free market, virtually all forms of public transit would vanish as people turned to an inherently superior mode of travel: the private automobile.

This view is expressed in a policy paper, "Myths and Facts of Nation's Transit Policy" by Peter Gordon:

> The long-term growth of incomes has spawned demands for low-density living. The auto-highway system has facilitated these lifestyles, causing the demand for conventional transit (defined as traditional fixed-route, fixed schedule, most often bus service) to decline….
>
> Publicly run transit monopolies are inefficient and rarely responsive to demand. As a result, they serve ever smaller markets at ever higher costs. Their subsidization has, therefore, increased considerably.[10]

Reality check, please. The automobile's current domination of U.S. transportation could not have happened without government policies designed to promote highway use. For decades, massive amounts of federal tax revenues—other than the gas tax—have supported highway construction. Interest paid by the state departments of transportation on highway bonds is exempt from taxation. And the suburbanization of America's cities—arguably the biggest factor behind the post-World War II explosion in automobile ownership—was subsidized mightily by federal tax deductions for property taxes and mortgage interest.

Another widespread belief is that mass transit ridership is overwhelmingly low income, minority, and therefore unlikely to support a conservative agenda. A Cato Institute study debunks this:

> Transit provides essential mobility to many of the poor, but transit accounted for less than 7 percent of trips made by low-income people in 1983. . . . If public transit subsidies benefit anyone, they benefit affluent suburbanites, not the poor. A Los Angeles study determined that inner-city service, patronized largely by the poor, received less than 22 cents in total operating subsidy per passenger boarding, while express service, patronized largely by the affluent, received more than $1.18 per boarding….[11]

Whites accounted for 41 percent of mass transit riders in 2007—more than any other group. Thirty-five percent of transit riders have household incomes over $50,000; 10 percent are in the $100,000 and above income bracket.[12] Many of these people can afford to drive but opt for high quality commuter rail or express bus service.

Mass transit infrastructure may indeed

be part of the social safety net. But it is a wide net, available to all. ■

Notes

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A Brown line train and Orange line train contend for the intersection at the southeast corner of the Loop in Chicago.

Park and Recreation Infrastructure

Section 9

Immigrants account for 13 percent of the U.S. population. It would be wrong, however, to attribute a like percentage of national park usage to the foreign-born. National parks do not draw immigrants in as great a proportion as they do the native-born.

Park system recreational infrastructure was designed for an earlier time, when the nation was less diverse. The Army Corps of Engineers manages recreational infrastructure within the park system. More than 90 percent of its facilities were constructed prior to 1980. In fact, 40 percent of those projects were built before 1960.

Public Parks by the Numbers

84.3 million acres of National Park land (2007)
270.4 million recreation visits to national parks (2008 forecast)
2 percent of total outdoor recreational area in state parks
15,000 miles of roads (paved and unpaved) in national parks (2007)
1.8 million acres of privately owned land within national park boundaries
39 percent of southern border managed by the National Park Service
500 illegal immigrants enter the U.S. daily through Organ Pipe National Monument in Arizona (Border Patrol estimate, 2007)

Park and Recreation Infrastructure Needs (a)
2007: $7.8 billion ($25.74 per capita)

2050 Projections (b)
$11.6 billion: at current population trends
$10.0 billion: at 50-percent reduction in immigration
$7.8 billion: at zero population growth

Notes:
a. Backlog of deferred maintenance and preservation needs in 2007 dollars.
b. Projected maintenance and maintenance backlogs assume per-capita amounts stay at 2007 levels and U.S. population grows per the Pew Research Center's February 2008 forecast.[1]

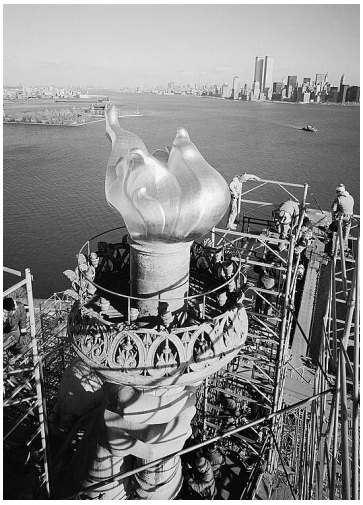
Sources:
American Society of Civil Engineers, National Parks Conservation Association, National Parks Service.

Years of heavy use and deferred maintenance have taken a toll. The American Society of Civil Engineers' (ASCE) 2005 Report Card estimated the maintenance backlog for national park facilities at $6.1 billion, noting that many of America's parks, beaches, and recreational harbors **"are falling into a state of disrepair."** ASCE assigned these tourism and economic development resources a grade of C-.

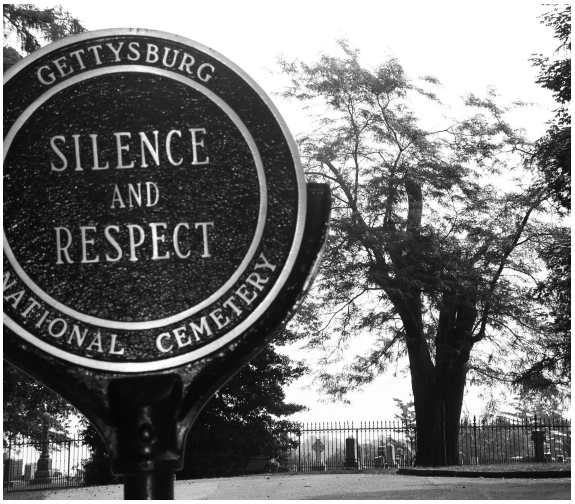
But no matter how much is spent on maintenance, existing infrastructure may not be up to the job:

> Further, modern recreational equipment and recreational use patterns of today's diverse population no longer fit Corps recreational areas. Equipment has changed drastically both in size and in infrastructure requirements. New uses for Corps' lakes like sail boarding were never anticipated when Corps' facilities were designed. Even more significant is the rapid diversification of this nation's population. While we know that use patterns and recreation preferences vary according to population segments, Corps' facilities continue to provide recreation for the much less diverse population of the 1960s.[2]

Rising transportation costs and a weak economy have reduced visits to national parks by 1 percent since 2006. State parks have filled the void. They represent less than 2 percent of total outdoor recreational acreage but serve more than 29 percent of visitors at outdoor recreational areas, state or federal.



In the mid-1980s, the Statue of Liberty received an extensive restoration, including a new torch.



A sign greets visitors to Soldiers' National Cemetery within Gettysburg National Military Park, a national landmark among Civil War battle sites.

While most big national parks are in remote wilderness areas, many state parks are located close to large, often blighted, urban areas. These projects are funded by a diverse range of resources, including government subsidies, corporate donations, and private foundations. Their success has turned around entire communities, demonstrating what some believe to be an ideal cost-sharing model for infrastructure renewal.

Unfortunately, there are too few such success stories.

Protecting the Parks

Securing park infrastructure in places like the Grand Canyon, Gettysburg, and the Statue of Liberty for future generations has been the top priority of the National Park Service since its inception. This stewardship goes hand-in-hand with interpretation, as the agency seeks to inspire and educate nearly 300 million visitors annually.

But 9/11 forced the agency to consider the protection and interpretation of many park sites differently. When the Department of Homeland security tightened control over heavily trafficked border areas, less protected landscapes such as the national parks suddenly became popular ports of entry for illegal crossers—including drug smugglers.

The physical dimensions of government-owned border lands are eye-popping. The Department of the Interior (DOI) manages approximately 14 percent of the land along the Canadian border, 31 percent along the southeast border, and 40 percent of the southwest border. This area includes 17 border parks, 6 along the United States-Canada border, 4 in south Florida, and 7 on the United States-Mexico border.[3]

The parks along the United States-Mexico border share approximately 365 miles of land and 72 miles of seashore with Mexico that are directly affected by increased illegal border activity. Big Bend National Park alone shares 245 miles of border with Mexico, nearly 13 percent of the entire United States-Mexico border.

In 2004, the U.S. Border Patrol apprehended over 1 million illegal immigrants attempting to enter the United States. Of these, approximately 14,000 were seized in Organ Pipe Cactus National Monument, New Mexico.

Two units of DOI—the Bureau of Land Management (BLM) and the National Park

Service (NPS)—are responsible for managing public lands, including those along the southern border.

The role of illegal aliens in preventing NPS from achieving its stewardship mission is summarized in congressional testimony by Michael D. Snyder, a regional NPS director:

> Parks in border areas were originally established to preserve some of this country's natural and cultural resources, irreplaceable treasures contained in unique environments. The unchecked movement of significant numbers of humans, vehicle traffic, and contraband across the borders negatively impacts natural and cultural resources, causing considerable resource degradation, soil compaction, and endangering sensitive or threatened wildlife and plant species.
>
> Drug and immigrant trafficking patterns impact parklands many miles from the actual borders. These parks continue to work to provide a safe and memorable experience for their visitors. However, because of these illegal activities, there have been times when we have had to close sections of parks to visitors out of concern for visitor safety.[4]

The Department of Homeland Security (DHS) investigates numerous incidents of drug and alien smuggling annually along the southern border. DHS' records do not record the land ownership of the locations where these incidents occur, so BLM has no reliable gauge of the volume of border-related illegal activity occurring on the public lands under its jurisdiction. However, the presence of trash on remote trails and roads indicates that such activity is an ongoing and increasing problem on BLM lands in the border area.[5]

The border barrier at Organ Pipe Cactus Monument (left) stretches 23 miles along the southern boundary with Mexico. A sign in Spanish at Organ Pipe (above) cautions illegal aliens of the dangers associated with exposure to the elements.

Patrolling the border is like squeezing a balloon: applying pressure at one end increases pressure at the other. Thus, the construction of a fence along the Mexican border just east of San Diego pushed illegal crossings further east, into the wilderness areas of California and Arizona. This means an increase in trash, human waste, and other ecologically damaging activities within that area.

Campfires lit by immigrants continue to be a major threat to wildlands along the border. The increased frequency of wildland fires is a primary issue for resource management along the border and is having a serious impact upon certain unique species of flora.[6]

The Cost of Protecting the Parks

Since 2001, the Park Service has received $35 million in annual money for homeland security projects. Congress also provided $91 million in one-time funding for icon parks and $18 million for Organ Pipe's border barrier.

But superintendents say the costs are much higher. Rangers are pulled from other duties to patrol the border. Managers at Organ Pipe, for example, spend about $100,000 a year from its maintenance budget to repair the vehicle barrier and an adjoining road along the border.

Interest in mitigating the damage done by illegal immigrants along the southwestern border was stimulated by a study pushed forward by Congressman Jim Kolbe (R., Arizona), and released jointly in 2002 by the Interior Department, the Immigration and Naturalization Service, and the Environmental Protection Agency.

> **As a result of the vast amount of smuggling of humans and controlled substances in southeast Arizona," said the study, "the extremely valuable, and sometimes irreplaceable, natural and cultural resources... are in jeopardy.[7]**

The *Report to the House of Representatives Committee on Appropriations on Impacts Caused by Undocumented Aliens Crossing Federal Lands in Southeast Arizona* included a draft plan to mitigate damages caused by smugglers of controlled substances and undocumented aliens in southeast Arizona. The estimated funding needs for the first year of implementation was $23.5 million and more than 90 full-time equivalents (FTE). The first-year estimate for BLM was $3.8 million and 24 FTEs. Full-time equivalents are the number of full-time employees needed to do the work of the actual (full- and part-time) workforce. Thus, two employees working half-time are equal to one FTE.

In 2003, as a result of the report, the House Appropriations Committee approved a $1 million appropriation for federal lands in southeastern Arizona to begin mitigating impacts from smuggling and immigration. After conference and rescission, the final amount received was $695,000 in March 2003.Thereafter, BLM received these amounts for the mitigation of impacts caused by illegal smuggling:

- FY 2003 $695,000
- FY 2004 $790,000
- FY 2005 $986,000
- FY 2006 $971,000

Bottom line: BLM has received less than one-fourth of the estimated $3.8 million the Kolbe report says was needed to mitigate the damage illegal aliens do along a portion of the Arizona-Mexico border.

The scope of the environmental damage caused by illegal aliens is detailed in a BLM report, which we excerpt here:[8]

Litter: Thousands of acres are covered by trash. It has been estimated that each immigrant…. discards at least eight pounds of trash on his or her journey through southern Arizona. This anecdotal figure feels correct to many individuals involved in removing trash. On this basis, with over 3.2 million immigrants apprehended by the U.S. Border Patrol (USBP) since FY 2000, almost 25 million pounds of trash could have been left, 86 percent on federal and tribal lands in southern Arizona. Not included in this estimate is the number of illegal immigrants who were not apprehended but who left trash on these lands.

What is in the litter? Essentially, it includes the following:

• **Containers and bottles**: thousands of plastic water bottles from one-gallon size to pint size, broken glass jars, electrolyte bottles, juices, milk containers, baby bottles, soda and beer bottles (many beer bottles shot to pieces).

• **Personal hygiene items and medications:** razors, combs, brushes, shampoo, toothpaste, mouthwash, soap, makeup, toothbrushes, medications, (Naproxin, Advil, aspirin, stomach medications, electrolytes), vitamins.

• **Clothing and shoes:** pants, socks, underwear, shirts, hats, caps, gloves, coats, high heels, shower shoes, boots, tennis shoes, sandals, and thongs.

• **Food and food cans**: food cans, mostly from Mexico; food cans opened with a pocketknife, leaving ragged edges and torn metal lids; tortillas; baby foods; food items in American store containers and bags.

• **Jewelry:** watches, necklaces, bracelets, knives, and key chains.

• **Paper**: forms from maquiladore factories; airline and bus ticket stubs; phone cards, Social Security cards, identification cards; pay receipts from the U.S.; photographs, letters, books, promissory notes, paper money; toilet paper, sanitary pads, disposable diapers.

Clothing, bicycles, human waste, and assorted litter left by illegal aliens are environmental hazards all along the southern border.

• **Fabric and plastic:** backpacks by the hundreds; blankets, towels, table cloths, serapes, rags, rope, string, wire, lots of plastic bags used for carrying food, or large ones for use as raincoats; fanny packs, shoulder packs, wallets, and gloves.

• **Miscellaneous**: batteries, cell phones, radios, homemade weapons.

• **Human waste**: disintegrating toilet paper and human feces, which accumulates and represents both health and safety concerns and is unsightly to visitors.

Damage to Infrastructure and Improvements

Thousands of illegal roads and trails fragment the habitat, destroy vegetation, cause erosion, and leave unsightly scars that, if not rehabilitated, will last for decades in areas considered pristine less than a decade ago. Legal roads become unusable due to illegal vehicle traffic and required law enforcement use. Paths made by thousands of feet cross sensitive areas such as archaeological sites, riparian zones, and springs. Gates are rammed and range improvements are damaged. Fences are cut, run over, left open, or removed. Water tanks for cattle and wildlife are emptied of water or destroyed, adding to the critical shortage in severe drought conditions.

Abandoned Vehicles and Bicycles

Bicycles began to emerge as a significant item in 2003 and some use may stem from transporting drugs as well as humans. The Tohono O'odham Nation reports that bicycles are used at night across the reservation. Hundreds of smuggling vehicles have been abandoned, and tires, batteries, gas cans, and seats have been scattered across the landscape. Abandoned and often burned vehicles are difficult and costly to remove, and great care is needed to avoid further damage. Even though hundreds of vehicles have been removed, hundreds more need removal.

Campfires and Escaped Fires

The impacts of warming and cooking fires by illegal immigrants cannot be overlooked in southern Arizona, where the drought is a serious issue with no end in sight. Fires not only escape and destroy vegetation and wildlife and cause a safety hazard to people, but they increase the costs of suppressing fires and increase the requirements for prescriptive burns.

Vandalism, Graffiti, and Archaeological Site Damage

New images scratched or spray-painted on trees, boulders, and sites sometimes mark the path and sometimes indicate time spent in waiting. Historic and prehistoric sites are

covered with litter, trampled, or cut through with paths.

Public lands are cleaner because of the money spent by BLM to mitigate the environmental damage done by illegal border crossers. The cleanup also makes it easier to spot new incursions, thereby increasing apprehensions. A cleaner border is, in many ways, a safer border.

But the border cleanup program is still woefully underfunded:

> It is also true…that some areas have yet to receive any attention due to the funding levels or to remoteness and steepness, and the crews on the ground are just barely keeping ahead of the litter and constant damages to infrastructure. 'If we didn't have this funding to… to do the work, we would be buried in trash.' This has been absolutely beneficial and remains extremely important.[9] ■

Notes

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Ports and Navigable Waterways

Section 10

Marine infrastructure consists of port facilities and a network of navigable waterways that connects oceans to rivers, lakes, and canals. U.S. ports are responsible for moving 99 percent of the nation's international cargo. Inland waterways carry about one-sixth of the nation's intercity freight, at a cost per ton-mile that is about half that of rail and one-tenth that of trucks. These waterways also provide flood control; hydropower; municipal water supplies; and a venue for boating, fishing, and cruise lines.

A disproportionate share of the demands placed on maritime infrastructure stems from immigration. This assertion merely recognizes a demographic reality—namely, that immigration accounts for the lion's share of U.S. population growth. More than 80 percent of the population increase between now and mid-century will consist of new immigrants and their children. Even if immigrants consumed half the imports that natives do per capita, they would account for a disproportionate share of future import demand due to their overwhelming numbers.

Concerns have been raised about the adequacy of both port and waterway infrastructure.

Because ports do not have naturally deep harbors, they must be regularly dredged to allow ships to pass more safely through navigation channels. Each year several hundred million cubic yards of sand, gravel, and silt must be removed just to maintain navigability. This is enough for a four-lane highway four feet deep stretching between New York and Los Angeles.

Inadequate channel depths hamper about 30 percent of the 95,550 vessel calls at U.S. ports, according to a recent U.S. Army Corps of Engineers study.[1]

Unloading cargo from ships to surface transport requires connectivity among port, highway, and rail infrastructure. Seemingly minor problems like traffic signals for trucks leaving marine terminals or at-grade rail crossings on local streets can cause escalating delays. But for the last several decades, federal and state investments in transportation infrastructure have taken a back seat to passenger transit.

Ports and Waterways by the Numbers

$125 billion cost of replacing the present system of locks
58 number of semi-trucks replaced by one cargo-carrying barge
3.5 miles length of the 870 trucks required to carry cargo in 15 barges
71,000 average number of 20-foot containers handled in U.S. ports daily (2005)
1 in 9 fraction of containers carrying world trade coming to or leaving the U.S.
2nd U.S. ranking in world container traffic, behind China
2003 the year China passed Japan as the largest exporter to the U.S.
55 percent of U.S. container traffic coming through West Coast ports (2005)

Navigable Waterway Infrastructure Spending (a)
2005 estimated: $5.7 billion ($19.28 per capita)

2050 Spending Projections (b):
$8.4 billion: at current population trends
$7.3 billion: at 50-percent reduction in immigration
$5.7 billion: at zero population growth

Notes:
a. Capital, operation, and maintenance spending by all levels of government.
b. Assumes per-capita spending remains at 2005 levels.

Sources:
American Society for Civil Engineers, Bureau of Transportation Statistics, Congressional Budget Office, Pew Research.

Neglect is also evident on our navigable waterways. Lock chambers have a design life of about 50 years. The average age for all the Corps' locks was 55 years in FY 2005. The oldest lock chamber in use dates from 1839; 29 others date from the 19th century.[2]

In March 2006, the Inland Waterways Users Board—a federal advisory committee—expressed **"grave concern that inland waterways are one of our most underappreciated national assets…."** Unscheduled lock outage hours—for the most part a result of insufficient maintenance—had increased 110 percent over the past 10 years, and the maintenance backlog for navigation facilities had grown to more than $600 million, the board noted.[3]

In its 2007 annual report, the board lamented the **"[c]hronic underfunding of projects"** and the fact that authorized projects that once were completed in 6 to 10 years were now taking as much as 20 years to complete, sometimes doubling a project's cost.

Among various types of craft the U.S. Coast Guard uses to perform its Port Security–Law Enforcement duties is the 65-foot harbor tug shown here inspecting the piers at the Port of Philadelphia.

All About Money

Funding for the Corps of Engineer's marine infrastructure projects has decreased by 50 percent in the last 50 years, with many dredging projects falling victim to the cuts. New port and waterway construction is rare, in part because Congress failed to pass water bills in two of the past three years, thereby freezing spending at FY 2006 levels.

While federal spending on highways and airports goes up every year, maritime infrastructure is starved for funds. Why?

Here is why: The vast majority (about 90 percent) of federal funding for highway and airport infrastructure comes from user fees that are deposited in trust fund accounts. The money is earmarked for projects used by the people and companies that pay the fees. By contrast, maritime infrastructure is funded primarily (80 percent) by general fund revenues. They must be approved by Congress every year, making them a much less secure and reliable source of funding.

The revenue crunch has stimulated creative financing arrangements. Maersk, a large private shipping company, constructed its own marine terminal in Portsmouth, Virginia, the first such terminal to be independently constructed and privately financed in the U.S. The Port of New Orleans is considering selling bonds covered by its own user fees.

A relatively new—and controversial—trend is the sale of port infrastructure to private investors. Recent examples include the purchase of long-term leases to the Port of Newark by the AIG Global Investment group and the acquisition of a company that runs the Port of Elizabeth in New Jersey by Deutsch Bank.[4]

The proposed sale of six U.S. ports to a corporation headed by the United Arab Emirates was famously scuttled in 2006. Other global investors will undoubtedly think twice in light of the political furor aroused by that deal. In the long run, however, a cheap dollar

plus the growing scarcity of U.S. port capacity portend continued foreign investment in U.S. maritime infrastructure.

The Alternative Scenario: Excess Port Capacity

"By 2020 North American ports and their associated intermodal systems will be severely congested, with demand exceeding capacity by as much as 200 percent, assuming current growth in international trade continues."[5]

That is the conventional wisdom. Could it be wrong?

Long-term trends in fuel costs, environmental concerns, and the perception that globalization poses a threat to U.S. workers have led many observers to question the inevitability of increased foreign trade flows.

"If we think about the Walmart model, it is incredibly fuel-intensive at every stage, and at every one of those stages we are now seeing an inflation of the costs for boats, trucks, cars."[6]

Walmart is the largest importer of foreign goods in the U.S. The retailer demands that suppliers match the "China price"—which for most of them is doable only by moving production there. But now some are moving production back to the U.S. to save on transportation costs.

Another potential fly in the maritime infrastructure story is the coming online of new port capacity in both Mexico and Canada. Motivated by a desire to avoid U.S. labor costs—and the longshoreman's union—an increasing share of the China trade now disembarks at Lazaro Cardenas in Mexico instead of Long Beach and the Port of Los Angeles. Significant infrastructure expansion at Prince Rupert on Canada's west coast is expected to have a similar impact on the port of Seattle.

U.S. environmentalists and anti-globalizers see this as a welcome pause, perhaps even a reversal, of a destructive trend. Economists are not so sure. Shipping costs are one of many factors determining international trade flows. When companies decide where to build a new factory, they also consider exchange rates, relative wages, government regulations, tax rates, and the availability of skilled managers.

Heavy goods with low value relative to weight—raw materials and furniture, for example—are the most likely to relocate in response to high fuel costs. For electronic manufacturers, by contrast, the benefits of offshore location trump higher transportation costs.

Globalization may slow, but it will not recede. The demand for additional port capacity will continue for the foreseeable future.

How Secure Are U.S. Ports?

The containership revolution started in the U.S. 50 years ago, when it was demonstrated that standard metal containers could be moved seamlessly from ships to rail and

truck lines. Today, this sea-land intermodalism is pervasive. About half of incoming U.S. trade (by value) arrives in containers aboard ships. More than 11 million cargo containers arrive on ships and are offloaded at U.S. seaports each year.

The standard 40-foot container holds 2,720 cubic feet of space. By comparison, a typical cardboard box used by movers in the U.S. holds 1.67 cubic feet. Thus a standard cargo container is equivalent to 1,629 packing boxes, enough to store the possessions of many households.

A containership can hold 3,000 such containers; ships with 10,000 container capacity are in the works.

The sheer number of containers, their size, and importance to the U.S. economy make them a juicy target for terrorists. In fact, the vulnerability of container transport has become arguably the greatest economic threat to come out of 9/11. An attack at the ports of Los Angeles and Long Beach—the two largest container entry points in the U.S.—would cost the nation's economy $150 million a day, according to a Congressional Budget Office Report.

In 2002, a program to prescreen U.S. bound cargo was initiated by the U.S. Bureau of Customs and Border Protection. The Container Security Initiative (CSI) was designed to "extend [the] zone of security outward so that American borders are the last line of defense, not the first."[7]

Easier said than done. Although most foreign ports have signed on to the plan, CSI inspects less than 1 percent of incoming containers. Of cargo containers flagged as "high-risk," which are supposed to be inspected before leaving a port, 17.5 percent are checked. And there are no minimum standards for such inspections.[8]

In identifying "risky" cargo, the program relies on information provided by the shipper without independently verifying it. We should not be surprised to learn, therefore, that only one of several containers used to smuggle Chinese immigrants into the country last year through the ports of Los Angeles and Long Beach was identified as high-risk.

Inspections take time. Time is a scarce commodity in a world of just-in-time supply chains. Many companies do an end run around CSI inspections by shipping goods bound for the U.S. to ports in Canada and Mexico. One wag has called CSI the "Port of Montreal Development Act," as cargo from Europe heads to Montreal to be hauled in the U.S. by rail or truck rather than by ship. ■

Notes

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Public Schools

Section 11

More than 49 million elementary and secondary students are educated in approximately 97,000 public schools in the United States. While enrollments are growing, neither the quantity or quality of the school infrastructure has kept pace. The U. S. Department of Education reports that 18 percent of all schools are overcrowded and 37 percent are forced to make do with trailers and other portable classroom structures.[1] The average age of our country's school buildings is now more than 40 years; they were built to accommodate teaching practices and the community needs of earlier generations.

Public Schools by the Numbers

97,382 public schools in the U.S. (2006)
18 percent of public schools classified as overcrowded by the U.S. Department of Education (2005)
$43.0 billion annual public school construction expenditures (2002)
$171.43 average construction cost per square foot for a high school (2007)
20.2 percent of school-age population with an immigrant parent (2007)
96.1 percent of school-age population growth due to immigration (estimate) (2000-50)

Spending Required to Rehabilitate U.S. Public Schools:
2000: $127 billion (a) ($2,397 per student)

2050 projections (b):
$165.0 billion: at current population trends
$146.7 billion: at 50-percent reduction in immigration
$127.0 billion: at zero population growth

Notes:
a. Department of Education estimate (1999).
b. Assumes per-student spending requirements are at 2000 levels.

Sources:
Department of Education, Federation for American Immigration Reform, Center for Immigration Studies, School Planning and Management.

Educational programs have changed to include early childhood education, English as a Second Language (ESL) classes, social services and psychological counseling, programs for severely disabled students, and the use of new instructional technologies. Many schools are also now being designed or reconfigured for use by members of the community outside of regular school hours.

Getting up-to-date information on the physical condition of U.S. schools is not easy. **"Currently, there is no reliable measure of how much money is needed to provide children with adequate public school facilities,"** noted an October 2006 report by Building Education Success Together, an initiative of the 21st Century School Fund. **"No public agency is monitoring school conditions nationally,"** the report said, **"and many states do not have a way to evaluate the extent or level of need at the state level."**[2]

There has been no authoritative report on school facilities since the Department of Education's report, "Condition of America's Public School Facilities: 1999."[3] The department's website posts construction spending amounts only through 2002. While somewhat dated, the data reveal a startling rise in construction expenditures throughout this period.

In fiscal years 1990 to 2002, inflation-adjusted spending to acquire or construct public school facilities increased from $19.5 billion

to $43.0 billion, a 121-percent increase. This dwarfed the rise in public school enrollment, which grew by 17 percent over the same period. As the graphic shows, spending accelerated dramatically after 1995.

More spending, fewer schools?

A newer set of statistics, published by a private company, shows continued construction spending growth—albeit at far lower annual amounts than the federal figures indicate. School construction completed in 2007—including new buildings, additions to existing buildings, and major rehabilitation of existing buildings—totaled about $20.8 billion, a significant increase over the $20.1 billion spent in 2006. This marks the seventh year of the last eight in which completed construction exceeded $20 billion.[4]

Unfortunately, even after adjusting for inflation, more money does not necessarily mean more physical infrastructure. That is what appears to have happened in 2007, when the total real dollars increased by 3.2 percent, but the cost per square foot of new buildings rose by more than 6.0 percent. As a result, while school districts increased spending on new school buildings by more than $800 million, they actually added less space and fewer buildings.

The inflation rate applicable to school construction is cost per square foot. The one-year increase in schools completed in 2006 ($151.52 per square foot) to those completed in 2007 ($171.43 per square foot) was a whopping 13 percent. Some of this may be because schools are more concerned about building "green," but most of it is because the price of materials and manpower used to build schools went up by more than the overall rate of inflation. Under these conditions, more construction dollars can mean less space added.

State Spending Varies Greatly

Construction spending varies greatly among the states. Average per-student construction expenditures over the 1990 to 2002 period ranged from a high of $1,039 in Alaska to a low of $196 in Rhode Island. The overall U.S. average was $629 per student.[5]

School construction costs are noticeably above average in states with large immigrant populations. Florida ($998), Arizona ($954), and Nevada ($926) were, respectively, second, third, and fourth in per-student construction expenditures. California ($689) ranked tenth.

Areas with large immigrant populations spend extraordinary amounts constructing new facilities. The Los Angeles Unified School District, for example, is in the midst of a $19 billion new construction program that will deliver 150 new schools by 2012.[6] LA's school construction program is so massive that the Army Corps of Engineers was called in to manage it.[7]

For the most part these extraordinary construction expenditures have not been wasted on gold plated, overbuilt palaces of education. They are used to provide basic infrastructure needs of a burgeoning student population. As detailed below, many school districts have failed in this effort.

Immigration Drives Enrollment Growth

Public school enrollment growth has accelerated in recent years. Many observers attribute the resurgence to the so-called "baby-boom echo"—children of persons born between 1946 and 1964. It is clear from U. S. Census data, however, that immigration policy accounts for the vast bulk of this increase.

Although immigrants account for 12.6 percent of the U.S. population, 20.2 percent of the nation's school-age population is children of immigrants.[8] There are 10.8 million children of immigrants in the school-age population.

Children of immigrants account for such a large share of the school-age population because a higher proportion of immigrant women are in their childbearing years, ages 25 to 34. Immigrant women also tend to have more children, on average, than their native-born counterparts. The fertility rate of foreign-born women is 37 percent higher than the fertility rate of native women.[9]

Although less than one-fourth of school-age children of immigrants are immigrants themselves, by law any child born to immigrant parents in the U.S. is a citizen entitled to public education. They would not be here had immigration policy not allowed their parents to enter the country.

Not surprisingly, states with above-average school construction costs also tend to have above-average shares of children of immigrants in their school-age populations. The future offers no demographic relief, as evidenced by the even larger share of immigrants in the *preschool* populations of most states (see table above).

Immigration's Impact on School-Age Populations, 2007

	Percent with immigrant fathers	
	School-age population (5 to 17) (%)	Preschool age population (0 to 4) (%)
California	46.9	45.5
LA County	57.4	56.4
Nevada	32.9	33.2
New York	31.1	36.5
NY City	54.8	57.1
Florida	26.7	29.2
Arizona	22.7	33.1
U.S.	20.2	22.6

Source: Steven A. Camarota.[10]

The Condition of School Infrastructure

The American Society of Civil Engineers' (ASCE) *2005 Report Card for America's Infrastructure* assigned a D to the physical condition of America's K through 12 public schools, noting that the projected costs of improving the nation's school facilities varies widely.

Survey data from the National Center for Education Statistics indicate that a one-time investment of $142 billion beyond current amounts would be necessary to bring school facilities into a good state of repair.[11] The National Education Association has estimated that a one-time investment of $360 billion beyond current spending would be necessary to "modernize" schools (both figures are in 2004 dollars). However, neither estimate specifies the period over which the investment would be made.[12]

Lacking an overall national picture of the condition of public schools, it is necessary to look state by state and, in some cases, school district by school district. Below we cite anecdotal evidence assembled by the American Society of Civil Engineers and the Federation for American Immigration Reform (FAIR.)

Nevada: Nevada's school enrollment grew a whopping 54 percent between 1995 and 2004—more than that of any other state and over five times the U.S. average of 10 percent. Clark County schools are so crowded that students complain that they cannot find available restrooms between classes. The district (which includes Las Vegas) projects that it will add 10,000 to 15,000 students every year. The average student-teacher ratio in the district's secondary schools is 32 to 1; some classes have more than 40 students.[13]

California: A Rand Corporation report concluded that California has made prog-

ress in addressing K-12 public infrastructure needs.[14] "Progress" is a relative term, of course. California schools are the most crowded in the nation, classes often exceed 35 students per teacher (18 is considered ideal). Lack of space forces some students to attend class in trailers, on school stages, or in the gym. Yet the state is still adding 100,000 new students each year.

Los Angeles schools are so crowded that some have lengthened the time between classes to give students time to make their way through packed halls. Some Los Angeles schools will have to hold double sessions (one in the morning and one in the afternoon) and Saturday classes. Conversion of library, music, and laboratory space to classrooms is among the other expedients the Los Angeles Unified School District has used to cope with its burgeoning school population.

Even if the district builds 86 new schools, all 49 existing high schools will still have to adopt year-round schedules to keep pace with enrollment increases.

California's Class Size Reduction program calls for adding thousands of new K-3 teachers, but finding classroom space has proved impossible in some areas. Playgrounds are being transformed into parking lots for portable classroom trailers.[15]

Florida: Public school enrollment grew 23 percent between 1995 and 2004, faster than any state east of the Mississippi. Florida's schools are so overcrowded that legislators are considering paying students to go to private schools instead of public ones. In Miami-Dade County, 41 percent of schools are at least 150 percent over capacity, and locker rooms and custodial closets have been converted into classrooms. In Sarasota, some classrooms have more than 40 students at a time. In Manatee County, lunch lines are sometimes so long that students do not have time to eat unless they miss class. Pasco County has opened six new schools in the last three years, has three more scheduled to open in the upcoming months, and still projects that by 2005 two high schools each will receive 700 more students than they have room for. No affordable land is available for further school construction.[16]

Florida's high immigration rate means that population growth often exceeds projections. As a result, the state's school funding formula frequently underestimates actual enrollments, "leaving school districts scrambling to provide additional personnel and programs without fresh infusions of cash."

"Our anticipated gains in the number of foreign-born students alone will require us to build one elementary school a month just to keep up," Miami-Dade school superintendent Roger Cuevas says. Every year since 1994, between 12,000 and 20,000 new foreign-born students have enrolled in the district's schools.[17]

New York: Three years ago, a court-appointed panel found that $9.2 billion for new classrooms, laboratories, libraries, and other facilities is needed to relieve crowding, reduce class sizes, and give the city's 1.1 million public school students adequate school facilities.[18] In May 2008, a report by the City Comptroller's office stated that **"There are too many neighborhoods with overcrowded schools, elementary schools in particular, and no relief for years to come."[19]** ■

Notes

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Railroad Infrastructure

Section 12

Freight railroads carry over 40 percent of the nation's freight tonnage on privately owned rail lines that were largely built more than 100 years ago. Rail infrastructure includes over 140,490 miles of standard gauge track; 76,000 railroad bridges; and over 800 tunnels.[1]

Rail intercity passenger service is limited to AMTRAK. Unlike mass transit, immigrants probably do not use intercity rail more frequently than natives. As a means of crossing the border legally, rail is in a distant last place. In 2003, for example, 193.7 million passengers entered the U.S. from Mexico by car; 48.7 million walked across; 4.2 million came by truck; while only 12,101 came by train.[2]

Border crossings by rail are likely to increase dramatically when the NAFTA "highway" is completed, however.

Freight Railroad Infrastructure

America's diminished ability to transport cargo by rail is explained by a few simple facts. Rail traffic is increasing, while the miles of track are decreasing. Rail cargo is also becoming heavier, as evidenced by a 106-percent rise in ton-miles per route mile beteen 1990 and 2006. The weight of freight hauled per mile of track increased from 8.63 million tons in 1990 to 17.70 million tons in 2006. These trends have focused more and heavier traffic over fewer core lines, thereby increasing both the strain and the importance of railroad bridges and tunnels.[3]

Aging infrastructure raises the potential for catastrophic failure. According to a Federal Railroad Administration (FRA) survey completed in 1993, more than half of the nation's railroad bridges were built before 1920. The survey, which FRA's chief engineer says is still applicable today, found that 36 percent of railroad bridges were made of timber, 32 percent of steel, and 20 percent of masonry; the remaining 12 percent were not identified by bridge type.

The survey, released prior to the August 2007 Minneapolis bridge disaster, reports that the most recent fatality from a bridge structural failure occurred in 1957. Thirteen were killed in Minneapolis.

Railroads by the Numbers

140,490 route-miles of standard gauge rail operated in the U.S. (2006)
1.6 million freight cars in service in the U.S. (2008)
$54.0 billion total freight revenue (2006)
$0.299 cents freight revenue per ton mile (2006)
3,274 average tons of freight per train (2007)
7 class I railroads (revenues above $350 million)
186 miles of high-speed rail service in the U.S. (2007)
1,243 miles of high-speed rail service in Japan (2007)

Railroad Infrastructure Spending (a)
$9.3 billion (2006) ($31.44 per capita)

2050 Spending Projections (b):
$13.5 billion: at current population trends
$10.5 billion: at 50-percent reduction in immigration
$9.3 billion: at zero population growth

Notes: a. Private and public spending on railroad infrastructure.
b. Assumes per-capita spending remains at 2005 levels.

Sources: Association of American Railroads, American Society for Civil Engineers, Bureau of Transportation Statistics, Pew Research,Wikipedia.

Similarly, very few railroad tunnels have been built in the past 50 years, although some have been been upgraded. Tunnels do not deteriorate with use as rapidly as bridges do, but they are vulnerable to water and drainage problems.

Most bridges and tunnels were designed to have long useful lives—for the rolling stock of the time. Until recent years, this provided an extra cushion, because the old steam locomotives were even heavier than today's diesel and electric locomotives. The problem now is freight cars. Average railcar weights have increased from 263,000 pounds to 286,000 pounds, and some can weigh as much as 315,000 pounds. In addition, freight car height has increased as intermodal freight traffic requires double-stacking of cargo containers. Some bridges and tunnels do not have the clearance needed to accommodate these trains.

Grading the Railroads

In its 2005 Report Card for America's Infrastructure, the American Society of Civil Engineers (ASCE) gave heavy rail infrastructure—including freight rail traffic, Amtrak, and intercity rail service—a grade of C– because **"limited rail capacity**" had created **"significant chokepoints and delays"** for the first time since World War II. The I-35W bridge collapse also raised questions about the safety of railroad bridges and led the FRA in September 2007 to recommend that rail operators **"adopt and implement safe maintenance practices to prevent bridge failures,"** according to an FRA fact sheet on railroad bridge safety.[4]

A study underwritten by the American Association of Railroads and released in September 2007 concludes that freight railroads need $148 billion in infrastructure expansion over the next 28 years. Without such an increase, one-fourth of the nation's track will be operating at or near full capacity by 2035, **"causing severe congestion that will affect every region of the country and potentially shift freight to an already heavily congested highway system."**

A Southern Pacific locomotive pulls passenger, mail, and observation cars along the Tillamook Branch in the Pacific Northwest.

We might dismiss this as another industry crying wolf, except that in May 2008 the Congressional Budget Office (CBO) reached much the same conclusion. The CBO claimed that freight railroads must increase their annual infrastructure spending by $4 billion per year to maintain performance.[5]

By contrast, current infrastructure spending for passenger rail is estimated to be *above* the optimal amount. This finding could reflect different definitions of capital spending and maintenance needs between passenger and freight rail lines. More likely, it illustrates an important general point: Not all investment is effective in maintaining, or even is intended to maintain, the performance of existing infrastructure.

Waste happens.

Railroad Finance

Freight railroads are privately owned

and are subject to fairly little federal economic regulation. That is the good news. The bad news: Railroads receive little federal and no state financial support—in sharp contrast to highway and mass transit systems, which are dependent on public infrastructure funding.

The Government Accountability Office (GAO) reports that the federal government provided only $263 million for freight rail infrastructure in 2006—a fraction of the estimated $9 billion spent by the railroads themselves. Equally important was the GAO's observation that the federal funds **"are not invested under any comprehensive national freight strategy, nor are the public benefits they generate aligned with any such strategy."**[6]

Part of the problem is a lack of information on the condition of railroad infrastructure. Freight railroads are privately owned. Most of them consider information about the condition of their bridges and tunnels proprietary, citing concerns about security and liability. They collect such information sporadically—only 16 of the 43 smaller freight railroads surveyed by the Federal Railroad Administration inspect their bridges at least once a year—and share it with Washington selectively.

The federal government has no regulations or standards for the safety of railroad bridges and tunnels. The value of Washington conducting independent inspections of railroad infrastructure is therefore limited.

Compared to other modes of transportation, the railroads spend heavily on infrastructure. Truckers and maritime barge operators, for example, use infrastructure that is owned and maintained by the government, providing them with a competitive advantage over the railroads. The economic, environmental, and safety benefits of railroads vis-a-vis the other modes may warrant federal funding for rail infrastructure.

The NAFTA Railroad

NAFTA was supposed to combine cheap Mexican labor with U.S. capital and technology to enable both countries to compete with cheap Asian imports. C. Fred Bergsten and Jeffrey Schott of the Institute for International Economics testified to Congress in 1997**:"We wanted to shift imports from other countries to Mexico since our imports from Mexico include more U.S. content and because Mexico spends much more of its export earnings on imports from the United States than do, say, the East Asian rivals."**[7]

While official Washington endorses those goals, NAFTA's transportation plans make a mockery of them.

The NAFTA "highway" is, in reality, a 1,200-foot wide transportation corridor that will ultimately include six passenger vehicle lanes, four truck lanes, and six rail lines, with utility, maintenance, and safety zones.

We refer to a secretive, under-the-radar, plan for a north-south super-highway spanning three countries—from Mexico through the United States and into Canada. The word "secret" is appropriate. The plan is regionalized, mostly in Texas—where the governor recently unveiled plans for a $184 billion superhighway project. While a lot of Texans know about it, few know the whole story because the project is being built in increments so as to keep it off the national radar screen of most, if not all, the mainstream media.[8]

The NAFTA "highway" is, in reality, a 1,200-foot-wide transportation corridor that will ultimately include six passenger vehicle lanes, four truck lanes, and six rail lines,

with utility, maintenance, and safety zones. The highway is to start at the port of Lazaro Cardenas in southwest Mexico. This port is being expanded to accommodate as many as 2 million containers per year by the end of the decade. Punta Colonel, about 150 miles south of Tijuana, is also being eyed for expansion to offload more cargo containers filled with Asian goods. It too will connect to the highway.

Chinese goods unloaded at Mexican ports are to be loaded onto the NAFTA railroad, which carries them north through the center of Mexico to the United States border at Laredo. In the U.S., the railway continues north through Texas and Arkansas to Kansas City, Missouri, with extensive connections to the south, Midwest, and ultimately, Canada.

Thanks to NAFTA, the historical east-west orientation of U.S. rail lines will give way to a north-south orientation. There is a irony here: Chinese immigrants helped to build the first transcontinental railroad in the U.S. Now Chinese imports threaten to put it out of business.

The maritime route from Shanghai to Lazaro Cardenas is about 2,000 miles longer than the route from Shanghai to Los Angeles. In spite of this 30-percent increase in overall mileage, the NAFTA railway offers customers a 15-percent cost reduction compared to shipping cargo containers to Los Angeles or Long Beach. These savings are achieved through the callous displacement of U.S. longshoremen and transportation workers by cheap, easily exploited Mexican labor. Taxpayer subsidies and privatization schemes further obscure the true cost of the NAFTA transportation corridor.

The wage effects will extend far beyond transportation, however, as the railroad will accelerate the offshoring of U.S. manufacturing jobs. While many new transportation jobs will be created here, most of the workers will be recruited from the South and will be paid minimal wages. The value of native labor will fall to unprecedented lows.

The railroad is but a cog in a much larger wheel—a planned North American Union that will allow labor and capital to move freely across the increasingly meaningless national borders of the U.S., Mexico, and Canada.

Rail Security

In the days and weeks following 9/11, Amtrak was inundated with passengers who could not, or would not, fly to their destinations. The intercity rail system operates in 46 states over a 22,000 mile network. Economic fallout from the disaster would have been far greater had the Amtrak alternative not been available.

Since then—and especially since the Madrid train bombings of March 2004—concerns have been raised over the security of passenger rail service in the U.S. Unfortunately, the nature of such systems makes them inherently vulnerable to attacks and difficult to secure. A Government Accounting Office study enumerates the problems:

> .....By design, passenger rail systems are open, have multiple access points, are hubs serving multiple carriers, and, in some cases, have no barriers so that they can move large numbers of people quickly. In contrast, the U.S. commercial aviation system is housed in closed and controlled locations with few entry points. The openness of passenger rail systems can leave them vulnerable because operator personnel cannot completely monitor or control who enters or leaves the systems.
>
> In addition, other characteristics of some passenger rail systems—high ridership, expensive infrastructure, economic importance, and location (large

> metropolitan areas or tourist destinations)—also make them attractive targets for terrorists because of the potential for mass casualties and economic damage and disruption...[9]

Efforts to strengthen passenger rail security have been minimal, at best. In particular, GAO notes that the Transportation Security Agency has not done a comprehensive assessment of the risks facing passenger rail—and therefore has no way to evaluate which security measures offer the best "bang for the buck." New screening technology has been tested, but no decisions have been made on installation. ■

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Road and Highway Infrastructure

Section 13

Falling gasoline prices and a weak economy have not altered a long-standing trend in American life: Roads are still crowded, and commuting times for most Americans are longer than ever.

The cause is supply and demand. Demand, as measured by vehicle travel on all public roads in the U.S., increased five-fold, from approximately 600 billion vehicle miles in the mid-1950s to about 3 trillion vehicle miles today, according to a report commissioned by the National Research Council.[1]

Stranded motorists on an expressway park their vehicles and wait out the traffic jam.

But the supply of road infrastructure has not kept pace: after expanding rapidly in the 1950s and 1960s, highway construction hit a wall in the mid-1970s. Few new roads are being built today. More important, the nation is having trouble maintaining existing road and bridge infrastructure.

The congestion "invoice" for the cost of the time and fuel wasted while stuck in traffic was $78 billion in 2005. This is five times the congestion cost of 1982 (in constant 2005 dollars.)[2]

At its most basic level, congestion is the result of population growth outpacing road capacity. America has about 70 million more people than it did a quarter century ago, but highway miles have increased by a little more than 5 percent over that period. And the gap between population growth and road capacity growth will only get worse: the U.S. Department of Transportation (DOT) estimates that the demand for ground transportation—either by road or rail—will be 2.5 times as great by 2050, while highway capacity is projected to rise by only 10 percent during that time.[3]

Immigration is the most important factor driving population growth—and commuter traffic—in urban areas. Immigrants are more likely than natives to live in metropolitan areas (90 percent do), and within metropolitan areas, immigrants are more likely to live in central cities over suburbs (55 percent versus 45 percent).[4]

Recent immigrants are less likely to own automobiles and more likely to commute to work via mass transit. Carpooling, like transit, is also much more common among immigrants, nearly 22 percent for those here less than 5 years versus less than 11 percent of U.S.-born. Over time, however, the travel patterns of immigrants resemble those of the

U.S.-born. For those here over 20 years, there is practically no difference.[5]

Even in the "short-run," immigrants add to traffic congestion woes. Cities with large immigrant populations experience larger increases in suburb-to-core commuter traffic—with many of the new suburban commuters having lived in urban cores until displaced by immigrants.

Roads and Highways by the Numbers

2.6 million miles of paved roads and streets in the U.S.
30 percent of fatal accidents in which road conditions play a role (2005)
38 hours for the average urban commuters spend stuck in traffic annually (2005)
26 gallons of gas wasted by the average urban commuter while delayed (2005)
$383 extra vehicle repair costs urban drivers incur due to poor roads (2005)

Road and Highway Infrastructure Spending (a)
$130.6 billion (2005) ($442 per capita)

2050 Projections (b):
$193.6 billion: at current population trends
$167.7 billion: at 50-percent reduction in immigration
$130.6 billion: at zero population growth

Notes:
a. Capital, operations, and maintenance spending by federal, state, and local governments in 2006 dollars.
b. Infrastructure spending projections assume per-capita spending stays at 2005 levels and U.S. population grows as per the Pew Research Center's February 2008 forecast.[6]

Sources:
American Society of Civil Engineers, Congressional Budget Office, Pew Research Center, U. S. Department of Transportation, Texas Transportation Institute.

More important, immigrants increase population density in metropolitan areas:

> … For economic reasons, immigrants often live with more people per dwelling unit than do native-born residents; when Fulton et al. (2001) conducted a study on sprawl for the Brookings Institution, they found that the single most important variable in explaining changes of density between 1982 and 1997 was the share of 1990 residents who were foreign born. Los Angeles, as a major immigrant port of entry, ranks near the top of their list of the United States' densest urban areas, and the top 20 are dominated by western urban areas like Phoenix, Modesto, Calif., and Fresno, Calif. Fulton et al. (2001) point as a counterexample to low-density Atlanta, where only 4.1 percent of the residents were foreign born in 1990."[7]

As density increases so does congestion, in part because it is hard to add more street space in areas that are already heavily developed. Most new lane mileage is built on the urban fringe. Finding a parking space is also more time consuming—not to mention expensive—in dense urban cores.

Transportation, Immigration, and Urban Sprawl

In the transportation sector, per-capita energy consumption rose 9.1 percent between 1973 and 2000, a fact that many environmentalists blame on the popularity of sport utility vehicles (SUVs). This popular theory, perhaps, is probably not true, as the following analysis explains:

> Per capita motor gasoline consumption in the U.S. was virtually unchanged between 1974 and 2000 despite major improvements in the fuel efficiency of new vehicles. Per-capita motor gasoline consumption was 471 gallons in 1974 and 463 gallons in 2000. Over this same time period the fuel efficiency of the U.S.

> passenger car fleet increased from 13.6 miles per gallon (mpg) to 21.4 mpg and the fuel efficiency of the light truck fleet (including vans and SUVs) increased from 11.0 to 17.1 mpg.
>
> The driving factor behind gasoline consumption is vehicle miles, which in turn is driven by population growth. Total vehicle-miles for passenger cars, motorcycles, light trucks, and SUVs rose approximately 113 percent between 1974 and 2000. The fact that vehicle-miles increased more than three times as fast as the population should not be surprising. In the first place, as the population of an urban region grows, the urbanized area increases in size, and the residential areas are almost always on the periphery of the urban region.
>
> Therefore, commute distances are increased. Secondly, population growth has caused property values near some urban centers to rise dramatically. People with modest incomes who have been priced out of the housing market in these urban centers have been buying more affordable homes in small towns that, in some cases, are located considerable distances from their places of employment.[8]

We drive more today because the areas in which we live, work, and shop are larger and more spread out. Sprawl occurs when rural land that had been undeveloped or used for agriculture is developed for residential or commercial use. At the most basic level, such sprawl has only three reasons: a rise in per-capita land consumption, a rise in population, or a rise in both.

The relative importance of these factors is quantified in a 2003 study by Roy Beck, Leon Kolankiewicz, and Steven Camarota.[9]

This is what they found:

- Nationally, population growth accounted for 52 percent of urban sprawl between 1982 and 1997, while increases in per-capita land consumption accounted for 48 percent.

- The more rapid a state's population growth, the more a state sprawled. For example, states that grew in population by more than 30 percent between 1982 and 1997 experienced a 46-percent rise in urban sprawl. In contrast, states that grew in population by less than 10 percent experienced an average rate of sprawl of only 26 percent.
- On average, each 10,000-person increase in state population resulted in the development of 1,600 acres of undeveloped rural land, even controlling for other factors such as changes in population density.

For decades, immigrants and their U.S.-born children have been responsible for more than half of U.S. population growth. Less widely appreciated is the impact they have had on urban sprawl. The conventional wisdom is that immigrants live in urban centers, often in crowded conditions. Contrary to the common perception, about half the country's immigrants now live in the nation's suburbs.

The pull of the suburbs is even greater in the second generation. Of the children of immigrants who have settled down and purchased a home, only 24 percent have done so in the nation's central cities.[10]

The suburbanization of immigrants and their children is a welcomed sign of integration. But it also means that they contribute to sprawl just like other Americans.

Indeed, controlling urban sprawl will be difficult—or even impossible—unless immigration is also controlled.

The Los Angeles Effect

As people get richer, they naturally want to live in larger houses with more land, further removed from crowded city centers. Over time, this trend increases per-capita land consumption, thereby contributing to urban sprawl. One would think that metropolitan areas that manage to reduce per-capita land consumption would be winning the anti-sprawl battle, with salutary impact on commuter times.

Think again!

Los Angeles should be a poster child for anti-sprawl efforts. Unlike most U.S. metropolitan areas, Los Angeles stopped per-capita sprawl dead in its tracks. In 1970, the average Los Angelino took up 0.12 acre of land—one of the densest living conditions in America.

The wartime experiences of President Eisenhower provided the impetus for a national highway system.... Under his leadership, the Federal Aid Highway Act of 1956 was passed.

Most cities with Los Angeles' low per-resident land use experienced significant growth in per-capita consumption by 1990. But in Los Angeles, per-capita land use actually declined. By 1990, the city had achieved the Smart Growth goal of becoming the most densely populated urbanized area in America. In no other city did residents live in closer proximity to one another.[11]

Yet commute times increased at well above the national average. The culprit was population growth: the population grew 36.5 percent, swamping the 8.4 percent decline in per-capita land consumption. As a result, the city continued to sprawl: 394 square miles of former orchards, farmland, natural habitat and other open spaces fell to residential or commercial development between 1970 and 1990.

Los Angeles was not the only city in which population growth overwhelmed the decline in per-capita land consumption. Among others were Las Vegas, Miami, Phoenix, and San Jose. Like Los Angeles, these cities have large and rapidly growing immigrant populations. Like Los Angeles, they are among the worst offenders in terms of urban sprawl and traffic congestion.

Highway Productivity: Doing More With Less

Notwithstanding the recent spike in gas prices, the nation's transportation bill has declined as a percent of gross domestic product (GDP). Freight costs have shown the most dramatic change, falling from 9 percent of GDP in 1960 to about 6 percent today. There are many reasons for this: Trucks are larger and more fuel efficient; connectivity among rail, truck, and waterborne modes has increased; and the shift from manufacturing to a service-based economy has reduced the fraction of GDP dependent on highways.

The information highway has alleviated congestion on the asphalt highway.

Two public policy decisions play a large role in the long-term rise in transportation productivity. First was the decision to build a national interstate highway system. In the 20 years following passage of the 1956 Highway Act, interstate route mileage exceeded the growth of both trucks and passenger vehicles. When highway growth slowed in the 1970s, a second policy decision—economic deregu-

lation of trucking, airlines, and railroads—enhanced the ability of private transportation companies to utilize existing infrastructure.

Unfortunately, both of these policies—infrastructure expansion and deregulation—are in decline.

Planning for a system of national highways began in the late 1930s when the Bureau of Public Roads (BPR)—a predecessor of the Federal Highway Administration—began studying the feasibility of a national system of toll roads. Although the BPR concluded that toll revenue would be insufficient to cover highway costs, it recommended a network of toll-free highways that would be even larger.[12] World War II put such plans on hold.

The Bureau of Public Roads developed an exhibit in 1957 — one of many over the years — to let the public know about the "controlled access Interstate System being built under the Federal-Aid Highway Act of 1956." LEFT TO RIGHT, Robert M. Monahan, special assistant for public affairs; Federal Highway Administrator Bertram D. Tallamy; Harold C. Wood, Sr., of the Motion Picture and Exhibits Section; and Assistant Commissioner for Research E. H. "Ted" Holmes.

Ironically, the wartime experiences of President Eisenhower provided the impetus for a national highway system. As commander of Allied forces in Europe, he saw first hand the effectiveness of the state-of-the-art German highways, or autobahns. Eisenhower returned from Europe determined to improve American highways, primarily for national defense purposes. Under his leadership, the Federal Aid Highway Act of 1956 was passed. It created for the first time a dedicated system of revenue—mainly federal gas taxes—and specified that the federal government would pay 90 percent of highway infrastructure costs.

Since 1956, the interstate system has been expanded to include 46,000 miles of highways. But the "highway model" provided by Eisenhower-era interstate legislation is approaching the end of easy additional capacity. Interstate highway mileage (measured in lane miles) increased only 16 percent since 1980, while vehicle miles traveled on those roads increased 123 percent.

The interstate highway network was designed with passenger cars in mind. Planners did not anticipate the tsunami of trucks that are responsible for a disproportionate share of roadway wear and tear and that now outnumber cars over many parts of the system.

Nor did highway planners anticipate the rapid—and, in many cases, immigration-driven—population growth of what were much smaller cities in the 1950s. Thus, there were no plans to build an interstate directly between Las Vegas and Phoenix. Today, these cities are among the largest and fastest growing of all U.S. metropolitan areas—yet still without an interstate link. There are about 70 urbanized areas with populations of 50,000 or more that are still not connected to the interstate system. Which of these will be the next Phoenix or Las Vegas?

At least one observer of the nation's surface transportation system—the American Association of State Highway and Transportation Officials (AASHTO)—suggests that the U.S. must essentially double its current highway arterial capacity to accommodate all of the projected growth in traffic.[13] In contrast,

the Federal Highway Administration estimates that capital highway spending by all levels of government would have to increase by 58 percent to accommodate future traffic increases.[14]

Such grand hikes in highway spending are unlikely. Highways are increasingly viewed not merely in traditional economic terms but in terms of how they impact environmental and ecological systems as well as the society as a whole. Because of such concerns, it is practically impossible to envisage a program to greatly expand the U.S. highway system today—even if economic and budget conditions were favorable.

Grading the Highway System

Not surprisingly, travel on the nation's public roads is increasingly crowded and rough. Nearly 32 percent of all trips in urbanized areas occurred during times of congestion in 2004, up from slightly more than 27 percent in 1997, according to DOT's 2006 status report. More than 55 percent of all trips in the United States in 2004 involved pavement that did not provide "good" ride quality, and approximately 48 percent of trips on the highways making up the national network involved pavement that did not provide a "good" ride, a report to Congress noted.[15]

Substandard road conditions are dangerous. Outdated and substandard road and bridge design, pavement conditions, and safety features are factors in 30 percent of all fatal highway accidents, according to the Federal Highway Administration (FHWA). On average, more than 43,000 fatalities occur on the nation's roadways every year. Motor vehicle crashes cost U.S. citizens $230 billion per year, or $819 for each resident for medical costs; lost productivity; travel delay; and workplace, insurance and legal costs.[16]

The nation's highways earned a D in the American Society of Civil Engineers' *2005 Report Card for America's Infrastructure.*

High Gasoline Prices: Boon or Bane?

The good news: Record gasoline prices will reduce traffic volume and average vehicle weight, thereby reducing wear and tear on U.S. highway infrastructure.

The bad news: Higher costs for materials used in highways could swamp these benefits.

The link between highway infrastructure and soaring oil prices is rarely discussed. But most of our road transportation system is built with asphalt—a substance obtained by petroleum refining. Asphalt is used primarily due to its remarkable waterproofing and binding properties. The hard surfaces of roads, for example, depend on the ability of asphalt to cement together aggregates of stone and sand.

There is no substitute for asphalt in the paving the nation's roads. This dark material covers more than 94 percent of the paved roads in the U.S.; it is the substance of choice for driveways, parking lots, airport runways, racetracks, tennis courts, and other places where a smooth, durable driving surface is required.

This material—in earlier incarnations referred to as hot mix asphalt, blacktop, tarmac, macadam, plant mix, asphalt concrete, or bituminous concrete—was originally taken from natural sources. Those sources declined, and for about a century asphalt has been produced as a by-product of refined petroleum.

Asphalt technology made a great leap forward during World War II, spurred by the need for rapid construction and stronger runways for military aircraft. The postwar boom in suburban development made road building a major industry. Larger, faster, and more efficient equipment for deploying asphalt on roadways was developed. Asphalt plants, once a dirty, dusty nuisance, are today well scrubbed and practically invisible.

But it is expensive! For example, the city of Green Bay paid $26 per ton of as-

phalt in 2002 but expects to pay $41 per ton this year. That is a smaller price hike than oil experienced over that period—reflecting the intense competition (and willingness to trim profit margins) among asphalt companies. But the inexorable math of road construction—e.g., about 2,500 tons of asphalt needed per mile of city street—translates to a total cost of $103,000 per mile today versus $71,000 in 2002.[17]

There are options. Concrete has a longer lifespan than asphalt, and its price has not risen as much. But concrete is also more expensive. Taxpayers would pay more initially.

Concrete also comes with a large environmental downside. Heating limestone to produce concrete, for example, requires burning about 400 pounds of coal for each ton of concrete produced. The resulting CO^2 emissions contribute to global warming —thereby increasing the deterioration rate of all road and highway infrastructure.

Bottom-line: A supply-side solution to the road infrastructure crisis is unlikely. Curbing demand via population and/or immigration controls offers far more promise.

Motor Fuel Tax Offers Weak Support

The Highway Trust Fund is the funding source for most federal spending on surface transportation infrastructure. About 90 percent of the fund's revenues are from motor fuel taxes. There are two such taxes. The tax of 18.4 cents per gallon on gasoline and gasoline–ethanol blends currently accounts for about two-thirds of the trust fund's total revenues. The levy of 24.3 cents per gallon on diesel fuel accounts for about one-fourth more.

Both tax rates have been unchanged since 1993. In 2007, receipts to the Highway Trust Fund from those taxes totaled about $38.8 billion. The trust fund's taxes are scheduled to expire in 2011. If they are reauthorized at current levels, the Congressional Budget Office (CBO) projects that, over the coming decade, revenues credited to the trust fund will rise at an average annual rate of about 2 percent—or below the expected inflation rate. Motor fuel tax collections are expected to decline as a share of GDP—from 0.28 percent in 2007 to 0.20 percent in 2018.

The main reason for that relative decline is that fuel tax collections depend on the gallons of gas consumed rather than on the price of gasoline. Over the years, increased fuel economy has also eroded the ability of this tax to keep pace with construction costs.

Although gas tax rates have not changed in 15 years—and have declined in real terms—a rate hike is unthinkable in the current economic environment.

CBO estimates that a current gasoline tax would need to be about 30 cents per gallon—about 63 percent above its current rate—to match 1993 purchasing power.[18] Even before the current taxes expire, the Highway Trust Fund will be depleted because revenues are not keeping pace with the outlays authorized under the latest two federal highway acts.

There is another problem with the Highway Trust Fund: Congress often diverts gas tax collections to non-infrastructure purposes. By law, the collections cannot be released to state departments of transportation until a contract for road or bridge work is signed. Since 2002, Congress has been using these unobligated funds for "recissions"—a budget device used to offset spending and make the deficit look smaller. Highway-related rescissions have grown from $374 million in fiscal 2002 to $4.3 billion in FY2007.[19]

The reality is that much Highway Trust Fund money is never used for its intended purpose. Congress simply cannot be trusted.

Given the dimensions of the problem, it is not surprising that proposals aimed at supplementing or replacing the gas tax have been put forth. Among them: substantial expansion of toll roads of the current design, and direct metering of all roads within a metropolitan area (for example, by using GPS technology), with charges based on distance traveled and

possibly varying with the road, time of day, and traffic conditions.

Such arrangements would invariably reduce federal involvement in highway finance. But pressures to underfund highway infrastructure would remain. From the public's point of view, tolls are taxes, so raising tolls is also politically radioactive. As a consequence, more and more governors are privatizing state toll roads.

The latest to employ this "solution" is Pennsylvania's Governor Ed Rendell. He recently leased part of the Pennsylvania Turnpike to the Albertis Group of Spain. The foreign company paid $12.8 billion for the right to collect tolls and undertake needed infrastructure improvements over the period of a 75-year lease. It now costs $22.75 to cross Pennsylvania. At the end of the lease it would cost $176.

To a cash-strapped state, foreign money up front looks too good to be true. It probably is.

Do Immigrants Pay Their Fair Share?

An immigrant arriving in 2008 immediately has access to all 46,000 miles of U.S. interstate. While he may pay the same gas tax as a native, his tax payment does not come close to covering his share of system's construction costs. Those of us who have been paying federal and state gas taxes since the 1950s are not as lucky. We have financed the current infrastructure.

This, in a nutshell, is the problem with "pay-as-you-go" finance. Under pay-as-you-go government procures infrastructure services by paying the full cost of the facility as it is being built. Proponents favor this arrangement because it is the least expensive, but it is patently unfair to have current taxpayers pay for facilities that will benefit future generations.

For many reasons, bond finance offers an attractive alternative. First, it exploits the power of leveraged finance. For example, if the gas tax generates $100 million per year, the government can build only $100 million worth of highways under pay-as-you-go. If the $100 million is used to cover debt service on a 30-year bond at 6 percent, the government can build $1.3 billion worth of highways.

If the term of the bond matches the physical life of the project, and debt service is paid out of tolls and other user fees, then all beneficiaries—immigrant and native alike—pay a fair share. Intergenerational equity is achieved.

Even bond finance is not without dangers. There are hidden debt service costs involved in paying off the principal and interest over long periods of time. In the above leveraged finance example, for example, the $1.3 billion highway project actually costs taxpayers $3 billion—$100 million per year for 30 years. By focusing on the principal rather than on total debt service payments, borrowers lose sight of their true liability. Economists call this "debt illusion" for good reason.

Mass Transit to the Rescue?

Until recently, mass transit was seen as the best way of reducing metropolitan area highway congestion. There are some success stories. For example:

> Less than 18 months after the October 2005 opening of the city's [Los Angeles's] Orange Line — a high-speed bus line using an old railroad right of way to avoid traffic — ridership had reached the city's 2020 projections. And unlike nearly every other city, Los Angeles drivers spend less time in traffic now than they did a decade ago, thanks to both mass transit and aggressive traffic management.[20]

But experts are increasingly skeptical that public transportation offers a real solution. In the 2000 census, just 4.7 percent of people said they used public transit to get to work.

Transit represents only 2 percent of daily trips in Southern California. In most cities, even if the percentage of trips using transit tripled, which is not likely, the resulting drop in congestion would be overwhelmed by the projected growth in population.

And expanding mass transit capacity is extraordinarily expensive. Los Angeles Mayor Villaraigosa estimates that a public transit system that would seriously reduce congestion, rather than just slow its growth, would require funding **"that has heretofore been unprecedented. I'm talking about ... tens of billions of dollars and beyond."** That is in Los Angeles alone.[21]

The prohibitive cost of building new mass transportation infrastructure is one factor behind DOT's new congestion initiative, announced last year. In FY 2008 the program will make $175 million available to local governments to demonstrate innovative ideas for curbing congestion.[22]

> "A select number of large-scale pilot projects would be chosen based on their willingness to implement a comprehensive congestion reduction strategy. That strategy would include a broad demonstration of some form of congestion pricing, commuter transit services, commitments from employers to expand work schedule flexibility, and faster deployment of real-time traffic information."[23]

Clearly, DOT's anti-congestion strategy emphasizes efficiency—making better use of existing infrastructure—rather than building new roads and mass transit facilities. Urban choke points are its major focus. Only $25 million is earmarked for expanding capacity along interstate highways and trade corridors.[24]

"Cordon tolls," which charge drivers upon entering crowded urban centers, are already in place in London and Singapore; Mayor Bloomberg's proposed $8 charge for entering Manhattan, assessed using EZ-pass technology and cameras, would be the first in the U.S. Tolls that vary with the time of day and congestion can increase the number of cars able to travel on existing roads by 40 percent, according to the DOT.

But politics takes a heavy toll on congestion toll plans. Bloomberg's proposal faces an uphill battle in the state legislature. Trucking unions oppose the plan. Suburban politicians are generally unwilling to support a plan that would place a daily charge on many of their constituents. The mayor's pledge to increase mass transit to compensate for the toll has not changed many minds.

Another option—High Occupancy Transit (HOT) lanes—in which drivers who carpool or use buses are charged lower tolls—has proved effective in several states. But here, too, politics often intervenes. HOT lanes are derided as "Lexus lanes" for the wealthy. More importantly, HOT lanes lack the major advantages of universal tolls, since drivers can still use the un-tolled lanes and they do not discourage drivers from traveling in peak travel periods.

Implication: While increasing roadways, congestion tolls, and enhanced driver information can help decrease traffic congestion, the problem will continue to grow unless population growth is slowed.

The bottom line: Enforcing immigration laws may be the most cost-effective technique for controlling traffic congestion in urban areas. ■

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Solid Waste Infrastructure

Section 14

In 2006, the United States generated 251 million tons of municipal solid waste, 32.5 percent of which—82 million tons — was recycled. Approximately 12.5 percent of the total—31 million tons of municipal solid waste — was incinerated to generate energy at waste combustion facilities that year. The remaining 55 percent — 138 million tons— was discarded in landfills, according to the Environmental Protection Agency (EPA).[1]

Our trash is made up of things we use and then throw away. By weight, the largest categories are containers and packaging (31.7 percent); nondurable goods such as newspapers, office papers, and clothing (25.5 percent); and durable goods (16.0 percent). Municipal solid waste includes waste generated by schools, businesses, and hospitals. It does not include industrial, hazardous, or construction waste.

The recycled share of such waste has doubled since 1990.[3]

Although the number of U.S. landfills has decreased dramatically, from more than 6,300 in 1990 to 1,700 in 2006, the average size of such landfills has increased, ensuring "sufficient" landfill capacity at the national level but also creating some local limitations.[4]

A landfill shortage has been averted primarily because ever larger fractions of solid waste have been recycled or used for the generation of energy. Indeed, the total volume of solid waste going to landfills actually declined from 142.3 million tons in 1990 to 138.2 million tons in 2006.

Bruce J. Parker, chief executive officer of the National Solid Waste Management Association, says that the nation has 19 years' worth of landfill capacity. He agrees, however, that there are regional variations in that capacity—a problem often remedied by shipping waste across state lines.[5]

Solid Waste by the Numbers

251 million tons of municipal solid waste generated in the U.S. (2006)
4.6 pounds per person per day of solid waste (2006)
32.5 percent of solid waste recycled (2006)
1,700 landfills in the U.S. (2006)
22.5 percent increase in solid waste generation, 1990-2006
73.0 percent reduction in number of landfills, 1990-2006
42 million tons of solid waste transported across state lines for disposal (2006)

Solid Waste Management Spending (a)
$12.1 billion (2004) ($40 per capita)

2050 projections (b):
$17.9 billion : at current immigration trends
$15.5 billion: at 50-percent reduction in immigration
$12.1 billion: at zero population growth

Notes:
a. Solid waste collection and disposal spending by state and local governments in 2004.
b. Projections assume per-capita spending stays at 2004 levels and U.S. population grows as per the Pew Research Center's February 2008 forecast.[2]

Sources: American Society of Civil Engineers, Environmental Protection Agency, Statistical Abstract of the U.S. (2008).

Immigration's Impact

Of all the problems associated with rapid population growth, waste disposal may be the most visible. Today, our cities generate nearly three times as much solid waste as they

did in 1960.[6] The number of active landfills is down, not because they are no longer needed, but because many of them were polluting or simply full.

Some cities have unsuccessfully tried to unload the waste on third-world countries. Since the passage of the North American Free Trade Agreement (NAFTA), waste generated by U.S. production facilities in Mexico has been dumped in landfills in Texas and other southern states. Major eastern cities have been negotiating with rural counties as far away as New Mexico and Texas to accept the stuff.

"The nation is on a solid waste treadmill."[7]

In 2006, the average American generated 4.6 pounds of solid waste per day—1,680 pounds per year. Immigrants probably do not generate more trash per capita than U.S. natives. They are responsible for a disproportionate share of U.S. population growth, however. An astounding 82 percent of population growth between 2005 and the year 2050 will be due to immigrants arriving after 2005 and their U.S-born children.[8]

The potential impact of immigration on solid waste generation is easily estimated using population projections and per-capita waste figures:

Solid Waste Generation Under Different Immigration Scenarios, 2050

Year	Solid waste generation (millions of tons)	U.S. population (millions)	Solid waste generation per capita (pounds)
2006 — actual	251.3	299.4	1,680
2050 — projections			
Current immigration trends	367.8	438.2	1,680
50-reduction in immigration	318.7	379.7	1,680
Zero immigration	269.6	321.2	1,680

If current rates of legal and illegal immigration persist, U.S. population will reach 438.2 million in 2050, and municipal solid waste generation will be 46 percent above its 2006 level.

The projected increase in solid waste over the 2006 to 2050 period—116.5 million tons—equals the total solid waste generation in 1970.

A 50-percent reduction in immigration would reduce solid waste by nearly 50 million tons, or 13 percent, below amounts projected for 2050 under current immigration trends.

If immigration were halted entirely, the U.S. population would increase by only 22 million between 2005 and 2050. Solid waste generation would be more than 25 percent below levels currently estimated for 2050.

These are conservative estimates. They assume, for example, that per-capita waste generation remains its current level of 1,680 pounds per person per year. Per-capita amounts have increased 72 percent since 1960.

More important, the waste totals are based on the EPA's estimates of municipal waste collections. The EPA reported in 1988 that municipal waste accounts for only 20 percent of all waste generated. The other 80 percent of the waste steam includes industrial waste, construction and demolition debris, agricultural waste, municipal sludge from, say, wastewater treatment plants, and other debris that may be deposited in municipal landfills but is not considered municipal solid waste.

The 5-to-1 ratio implies that 1.3 billion tons of waste is generated annually.

At $100 per ton (EPA's estimate of waste disposal costs), we estimate total waste disposal costs at $130 billion in 2006.

Landfill Problems

Basically, a landfill is a depression in the ground into which wastes are put. Ideally, they are carefully engineered and monitored so as to keep the garbage dry and contained. The aim is to avoid any leakage into the surrounding water or air.

The best landfills are lined with state-of

the—art plastic bottom liners .10 of an inch thick. The liner effectively creates a bathtub in the ground. If the bottom liner fails, liquefied garbage will migrate directly into the environment.

In fact, all landfills eventually fail. Plastic is not inert. As chemicals and gases flow along plastic liners and pipes, they become brittle, swell, and eventually break down.

"…82 percent of surveyed landfill cells had leaks, while 41 percent had a leak area of more than 1 square feet," according to Leak Protection Services, Inc. (LLSI) website, March 15, 2000.[9]

Detecting leaks is not easy. **Monitoring wells are supposed to be located in spots most likely to detect contamination from landfills.** But because landfills are usually located near large bodies of water, such as rivers, lakes, and bays that may be contaminated from non-landfill sources, it is often impossible for the monitors to determine whether the landfill itself is secure.

The health effects of leaking landfills are well documented. A recent paper shows an association between proximity to such sites and increased incidence of hospitalization for diabetes. Elevated birth defect and cancer rates have been noted in neighborhoods close to defective landfills.[10]

Another study identifies airborne chemicals as problematic:

> Many of the typical landfill gases…. may present an odor problem that can cause adverse health effects such as mucous membrane irritation, respiratory irritation, nausea, and stress. If an individual has a pre-existing health condition (e.g., allergies, respiratory illness), these additional health impacts can be significant.[11]

Clean Energy from Dirty Garbage

Landfills produce significant amounts of methane gas, which must be vented or collected. Most captured methane is burned off — but more than 100 landfills use the gas to generate power.[12]

After methane gas is drawn out of the landfill, it is placed in a pipeline and sent to the generator facility. One such facility is located at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Barry Green, the center's energy manager, describes the process:[13]

> The gas comes from the Sandy Hill landfill about 5 miles away. It comes under ground in a 10-inch pipe and then it pipes it to the power plant here. It comes above ground and goes to two of our five boilers inside the power plant. From there we use that gas to heat water to make steam, and we send that steam through an underground network that heats about 31 buildings.

Methane is the second-most important greenhouse gas after carbon dioxide. It is responsible for about 15 percent of the global warming that has occurred over the last 150 years. Methane burned for fuel is not released to the atmosphere, thereby reducing greenhouse gas emissions.

Transporting Solid Waste

More than 42 million tons of municipal solid waste crossed state lines for disposal in 2005, an 8 percent increase over 2003 shipments. Such shipments have grown 147 percent over the past decade, and now account for more than 25 percent of all municipal solid waste disposed of at landfills or in energy generation facilities.[14]

According to the Congressional Research Service report, at least 11 states each export more than 1 million tons of waste annually and at least 11 states accept that amount. New York and New Jersey are the largest exporters of municipal solid waste, while Pennsylvania is the largest importer,

accepting 9.6 million tons in 2005. An infrastructure problem—namely, the absence of rail service at Pennsylvania landfills—contributed to a 2.7 million ton drop in that state's waste imports between 2001 and 2005, making Pennsylvania the only major importer to experience such a decline in recent years, the report noted.

Interstate waste shipments represent an especially efficient use of solid waste infrastructure. It enables underutilized landfills to process waste turned away from facilities operating above capacity. For years the solid waste industry had to fight the NIMBY reflex, manifested by attempts to ban such commerce through federal or state legislation. But no significant bans are currently under consideration, according to the American Society of Civil Engineers (ASCE).

ASCE's 2005 Report Card conferred a grade of C+ on the infrastructure for handling America's solid waste—the best score earned in any in any infrastructure category. ■

Notes

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Water and Wastewater Infrastructure

Section 15

This section discusses water and wastewater (sewer) infrastructure issues. The two systems are increasingly integrated through dual distribution systems, which transport recycled water from treatment plants to farm or industrial users — thereby reducing the net amount of water needed. California is the leader in the use of reclaimed water for non-drinking purposes. As water shortages proliferate, we expect integration of the two systems will expand nationally.

If current trends continue, the population of the U.S. will rise from today's 300 million to almost 438 million by mid century. More than 80 percent of this growth will be due to immigrants arriving from 2005 to 2050 and their U.S.-born descendants. Liberal immigration legislation could boost that number even higher.[1]

Will population growth of this magnitude erode living standards for the average American? This question is often framed in terms of the future supply — and prices — of basic commodities like oil and food. But the real limiting factor may be water.

Water shortages, which used to be a problem in western states, are now a problem throughout the country. For example:

Florida: The state has hundreds of lakes and wetlands and receives more than 50 inches of rainfall a year. Yet it will run out of water unless its population growth slows or new water sources are discovered. The water shortage is so severe in parts of the state that people have been ordered to appear in court for violating water rationing standards.

Kansas: Parts of the High Plains aquifer will be used up within the next 25 years, and vast areas of land will have no usable groundwater in the next 50 years, according to the Kansas Geological Survey.

Idaho: Population growth is expected to nearly double the region's water demand by 2025. The major water supplier to Boise says it will have trouble supplying water to the city within two years.

Water and Sewer Systems by the Numbers

850 billion gallons of untreated wastewater discharged annually
32 years average useful life of water treatment equipment
$390 billion to replace and build new wastewater systems over next 20 years.
$10,000 per household cost of replacing water mains and treatment plants
3 percent of U.S. electricity demand accounted for by water systems.

Water and Sewer Infrastructure Spending (a)
2005: $90.1 bil. ($305 per capita)

2050 projections (b):
$133.5 billion: at current population trends
$115.7 billion: at 50-percent reduction in immigration
$90.1 billion: at zero population growth

Notes:
a. Capital, operations, and maintenance spending by federal, state, and local governments in 2006 dollars.
b. Assumes per-capita spending remains at 2005 levels.

Sources:
Congressional Budget Office, American Society of Civil Engineers, American Water Works Association, Pew Research Center.

Chicago: The metropolitan area is expected to suffer water shortages by 2020, by which time the region will have added about 1.3 million residents

Even regions that once seemed to have unlimited supplies are losing the water war. In the suburbs around waterlogged Seattle, for example, the demand for water is outstripping supply, raising the prospect of shortages within 15 to 20 years.[2]

Water Infrastructure

By global standards, the U.S. is water rich. It has 4 percent of world's population but 8 percent of its fresh water.[3] But at approximately 1,500 gallons per person per day, Americans also consume more water than any other people on earth. The availability of fresh water varies widely by region and several trends—shifting population growth, aging water infrastructure, and global warming—make it increasingly difficult for many communities to meet demands placed on their water systems.

The provision of drinking water requires a massive complex of piping, pumps, and water purification works. Much of this infrastructure is aging and will reach the end of its useful life within the next 20 years or so. Maintenance costs are staggering.

The American Society of Civil Engineers (ASCE) estimates an annual need of $11 billion to replace aging water system facilities and comply with safe drinking water regulations. The corresponding national wastewater requirement is estimated by EPA to be $20 billion per year.[4] Annual federal appropriations for drinking water are envisioned at approximately $842 million through 2018, according to the Environmental Protection Agency's (EPA) Drinking Water Fund drinking water. Yet the Bush administration's FY 2008 budget sets annual spending for both water and wastewater infrastructure at less than one-tenth of the amounts deemed necessary.[5]

These amounts do not reflect the private water infrastructure needs. More than 1.7 million people in the United States—more than 670,000 households—still lack full indoor plumbing, the "basic plumbing facilities that most of us have come to take for granted," according to an April 2004 report.[6] Homes without adequate plumbing are concentrated among the poorest Americans in 10 states—California, New York, Texas, Florida, Pennsylvania, Illinois, Arizona, Virginia, Ohio, and North Carolina—but can also be found in Alaska (which, at 6.32 percent, has the largest fraction of all households) to Nebraska (which has the least, at 0.36 percent.)

In theory, the public water infrastructure shortfall could be closed if municipal water authorities raised the cost of water to consumers. This would allocate the costs of new infrastructure to the beneficiaries of that infrastructure—an economically efficient outcome. But for most large systems, this would require rate increases that would charge each household an additional amount ranging from $550 to $2,300 over the next three decades; smaller systems would impose even higher bills, ranging from $1,490 to $6,200 per household over a 20-year period.[7]

The conventional wisdom is that rate hikes of this magnitude are non-starters politically. Water consumption in the U.S. is the highest in the world—in large part because our water rates are the lowest in developed world. We like it that way.

Reality check: Americans buy billions of gallons of bottled water each year—at a per unit cost up to 10,000-times greater than tap water. Bottled water is also more energy intensive. Each year the bottles themselves require 17 million barrels of oil to manufacture, and the energy required for a bottle's production, transport, and disposal is equivalent, on average, to filling it one-quarter full with oil.[8]

As for quality, 40 percent of bottled water should be labeled bottled tap water, because that is exactly what it is.[9]

The marketing geniuses who got us to buy Aquifina should be hired by municipal water companies. Rate hikes to upgrade water

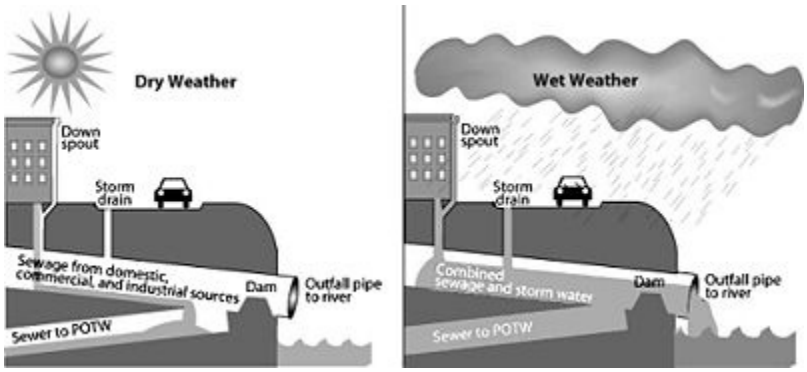
infrastructure could be a much easier sell.

Wastewater Systems: From Brown to Green

In many older cities, the pipes that collect human and industrial waste also collect the stormwater runoff from streets and roofs. The rationale was economic: it is cheaper to build a single system. Cost considerations also meant the collection lines were designed to handle certain size storms.

Environmental issues weren't an issue during that time (late 19th and early 20th century.) The sewers were designed with overflow pipes that bypassed the treatment plant and channeled excess sewer water directly into a nearby body of water:

In 2004 the Environmental Protection Agency (EPA) reported that municipal wastewater systems were annually discharging an estimated 850 billion gallons of untreated wastewater and storm water into the environment. These discharges were causing an estimated 3,500 to 5,500 cases of gastrointestinal illnesses per year just at coastal and Great Lakes beaches, the EPA noted.[10]



There are about 772 communities in the U.S. with these combined sewer systems. Many have begun to look for ways to mitigate the environmental impacts. One solution is to build a separate facility to screen out solids, store, and eventually return the excess sewer water to the normal system.

The sewage, which previously flowed into the water, would flow into a large storage tank, typically underground. That tank would have the capacity to hold runoff from all but the largest storms that occur once every 100 years or less. Once the storm passes, the facility's pumps would send the retained water back into the system to be treated under the normal dry-weather process. The result of this effort is the near elimination of raw sewage flowing into the body of water.

By increasing the amount of ground cover and the natural absorption ability of soil, this "green infrastructure" process reduces the volume of runoff entering the combined sewer system. The enhanced vegetation also increases the rate at which groundwater aquifers are "recharged" or "replenished" by water in plant roots. This is significant because groundwater provides about 40 percent of the U.S. water supply.

Global Warming

Scientific evidence for global warming is persuasive. Eleven of the 12 years from 1995 to 2006 rank among the 12 warmest years since 1850, according to Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report published in 2007.[11] The year 2007 has now registered as the second hottest year, extending the trend.

Increased frequency and intensity of rainfall is one of the effects of global warming that is already apparent in meteorological records in the U.S. According to a 2007 report by the Association of Metropolitan Water Agencies on the implications of climate change for water utilities, more severe storms will likely produce more severe urban flooding, which will result in additional water pollution from a large variety of sources. Chief among these are wastewater treatment, storage, and conveyance systems.[12]

EPA research finds that, for the most part, wastewater treatment plants and combined sewer overflow control programs have been designed on the basis of the historic hydrologic record, taking no account of prospective

changes in flow conditions due to climate change. As a result, it is conceivable that water systems will face higher than anticipated sewage overflows, producing high concentrations of disease-causing bacteria.

Many water utilities have begun analyze the potential impact of climate change. So-called vulnerability analyses estimate the probability that current water resource development and facility plans could be disrupted by near-term (20 to 50 year) manifestations of climate change processes. Longer-term, water utilities are projecting how environmental, socioeconomic, and engineering trends will impact their plans to cope with climate change.[13]

California water managers are particularly concerned about global warming's impact on mountain snow packs and snow-water storage, a crucial part of the state's water capacity. California's Department of Water Resources, along with the California Energy Commission, has been tracking the climate change science since the 1980s.[14]

Demand Reduction No Panacea

Daily indoor per-capita water use in a typical American single family home is 69.3 gallons. An even larger volume of residential water consumption is used outdoors. These figures do not include water used in businesses and stores.

Overall, per-capita water consumption in the U.S. is about twice as high as that in Europe.

It would be wrong to blame the nation's deteriorating water problem on profligate residential use, however. Per-capita water usage in Los Angeles has declined, for example, keeping overall water demand flat for the past two decades. **"The problem,"** according to Steven Erie, an expert on water supply issues in Southern California, **"is that we're now talking about adding two and a half new Chicago's to Southern California. Just the sheer numbers are going to drive up demand even with all the conservation that we've had."**[15]

Population growth, fueled mainly by immigration, has forced communities in Southern California, Colorado, and elsewhere to buy up water rights formerly allocated to agriculture.

Nationally, less than 10 percent of water use is residential. About 35 percent is agricultural and 55 percent is industrial, including power generation. In California, 80 percent of treated water goes to irrigate crops.

Water and Energy

Pumping water is very energy intensive. This is especially true in the west, where water is conveyed over long distances through mountain terrain, and consumed in sprawling urban areas. The Metropolitan Water District of Southern California estimates that as much as 33 percent of the average household's electricity use comes from the energy embedded in water use. Nationally, water systems account for an estimated 3 percent of total electricity demand.[16]

Electric power companies are a major source of greenhouse gas emissions.

Implication: Global warming is both a cause and a result of the increased demands placed on water infrastructure.

Recycled Water

Recycled water is sewage that has been treated to remove solids and certain impurities and used for irrigation and other "non-potable" purposes. Absorbed into the roots of plants and crops, this water eventually flows into underground acquifers. This is not a new concept: Los Angeles County has been using recycled water for parks and golf-courses since 1929. There is controversy over possible health and environmental effects, however.

The solid material—called sludge—is also treated to a point where it is deemed safe for agricultural use. No matter how well treated, the sludge still contains rseidual amount of chemicals and bacteria. This reality has created conflict between federal regulators and the food industry:

> When EPA first promulgated criteria for land application of municipal wstewater sludges to cropland in 1979, some food processors questioned the safety of selling food crops grown on sludge-amended soils and their liability. In response, the principal federal agencies involved—EPA, the Food and Drug Administration (FDA), and the U.S. Department of Agriculture (USDA)—developed a Joint Statement of Federal Policy in 1981 to assure that current high standards of food quality would not be compromised by the use of high quality sludges and proper management practices.
>
> Nevertheless, the food processing industry remains concerned about safety and market acceptability, and at least one company has adopted an official policy that bans the purchase of any crops grown on fields receiving municipal sewage sludge or treated municipal wastewater.[17]

By and large, the public accepts using recycled wastewater for nonpotable urban uses such as watering parks and highway medians, car washes, and industrial processing. Agriculture is a tougher sell: Less than one percent of water used on farms is thought to be from treated wastewater.

Water recycling increases the supply of drinking water since less potable water is diverted to non-potable uses. There are two big problems with such projects, however. First, they require laying an entirely new distribution system in order to keep nonpotable water from mixing with drinking water. The second set of pipes is expensive to lay, in part due to the need to install costly backflow prevention devices at each hookup to keep recycled water out of drinking water lines.

The second problem is gravity. The logical place to site a water recycling facility is next to a sewage plant—but sewage plants almost always are located at a city's lowest elevation because that allows waste to get there by flowing downhill. As a result, using reclaimed water for irrigation typically means spending quite a bit on electricity to pump it back uphill.

These complications, combined with growing worries of water shortages, have convinced some utilities to take the next logical step: treat wastewater so thoroughly that humans can drink it.

Toilet to Tap

No one wants to drink water from their toilet. But in a water crisis, you can not be picky. Case in point: San Diego, where 90 percent of the city's water already comes from faraway sources in the Colorado River and Northern California. Those supplies are soon to be off limits, as neighboring states enforce their water right claims and federal-state agreements to preserve wildlife habitat are implemented. Pacific Ocean desalinization, once thought to be the city's best alternative, foundered on the rocks of technical and cost considerations.[18]

So in late 2007, San Diego's city council authorized—over the Mayor's veto—a pilot project to test the feasibility of pumping highly treated wastewater into one of the city's drinking water reservoirs. Council President Scott Peters explains: **"We're not really in a position to turn our noses up at any potential source of water."**[19]

San Diego is one of a small but growing number of drought-prone communities that are turning to a once-unthinkable option for drinking water. Just north of San Diego, in Orange County, toilet water is sent through $490 million worth of pipes, filters, and tanks for purification. The water then flows into lakes in nearby Anaheim, where it seeps through clay, sand, and rock into aquifers in the groundwater basin. Months later it travels

back into the homes of Orange County residents, to be used for drinking, showering, and cleaning.

It is a smart idea, one of the most reliable and affordable hedges against water shortages. But San Diego and Orange County are acting out of desperation. Studies show that most Americans reject the notion of indirect potable reuse (IPR)—or "toilet-to-tap," as its opponents would say it. The "yuck" factor present a daunting public relations problem. So these places have had to be clever about it. They focus on what the system does *not* do, i.e., pump treated wastewater directly back into the water mains that serve homes and businesses. Instead, the recycled water is pumped into reservoirs and streams, or injected into groundwater aquifers, thus recharging their freshwater sources by mixing all of the water together. Supporters don't call it toilet-to-tap. Orange County has labeled its process "groundwater replenishment."

Are there health risks? You bet. But a recent analysis of San Diego's current (non-recycled) drinking water found several contaminants, including ibuprofen, the bug repellent DEET, and the anti-anxiety drug meprobamate. No treatment system is 100-percent reliable. Skeptics who worry that pathogens in sewage water will make it past treatment and into our drinking water should worry about all drinking water, not just the water in a toilet-to-tap program.

The fact is that supertreated recycled water is safe to drink right after treatment. It has been used safely this way (in a process known as *direct potable reuse*) for years in the African nation of Namibia. EPA researchers in Denver and San Diego found recycled water is often of better quality than existing drinking water. Although putting water into the ground, rivers, or lakes provides some additional filtering and more opportunities for monitoring quality, the benefits of doing it that way are largely psychological. In a 2004 report on the topic, the EPA concluded that Americans perceive this water to be **"laundered"** as it moves through the ground or other bodies of water, even though in some instances, according to the report, **"quality may actually be degraded as it passes through the environment."**[20]

The upfront costs of a "toilet to tap" system are steep. But it could forestall even larger costs—economic and environmental—of finding another river or lake from which to divert water.

Toilet Technology to the Rescue?

How to alleviate the demands placed on water infrastructure? The bathroom is a good place to start. Toilets use more water than any other household device. More than one-fourth (26.7 percent) of the 69.3 gallons of water used daily in an average American family home are flushed away. Clothes washers (21.7 percent) and showers (16.8 percent) are second and third, respectively. [21]

We spend billions of dollars pumping water into our homes. Then we foul it and spend billions more making it clean enough—we hope—to discharge into our lakes and rivers. This flush-and-forget cycle is destructive to local governments and the environment, and some environmentalists say we can break it with composting toilets.

The composting toilet's mechanics are simple. The waste, via gravity, drops into a pipe leading to a composter unit installed in the basement. There it is left to decompose naturally, aided by bacteria, fungi, and time. Wood chips are added about once a month to aid aeration and prevent the compost from becoming too dense.

About 100 gallons of dark, liquid fertilizer, along with several bushels of solid compost, is produced per person each year. Some composting enthusiasts spray the liquid on "wastewater gardens" they plant on soil lined

with plastic sheets. The plastic leaves the liquid compost no where to go but up through the plants, which filter and evaporate it.[22]

The solid residue is removed from the bottom of the composter. It is reportedly safe to handle and has no odor.

While not exactly no muss, no fuss, the composting toilet has advantages. It does not use any water and is maintenance free compared to conventional systems. Unlike septic tanks, composting toilets do not have to be flushed out every few years. And no organic material ends up in the soil where it can carry *E. coli* bacteria, drugs, and hormones from human waste into groundwater.

> Compare this to the sewerage treatment system, where we disrupt our ecosystems," observes Greg Allen, a building engineer and environmentalist. "In the past few years, thinking has changed around food. People realized the importance of growing food locally, for example. I think as food shortages develop because of the poor conditions of the fields—fields that are actually dead—we may see acceptance of the compost toilet, which has the potential to be part of the solution.[23]

Composting toilets are not compatible with urban high rises. But at the fringes of metropolitan areas, where urban sprawl has outpaced the reach of municipal sewer system, they make a lot of sense. ■

Notes

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Federal Spending on Infrastructure and Social Programs, 1960-2006 (as percent of non-defense spending)

	Education and Social Programs (%)	Infrastructure (%)
1960	20.7	11.2
1970	26.5	7.1
1980	31.0	6.4
1990	25.5	3.6
2000	30.9	3.6
2006	33.9	3.5

Note:
Social programs include Medicaid and means-tested income programs. (Social Security and Medicare are not included.)

Sources:
Office of Management and Budget, *Historical Statistics*, FY 2009 Budget, Table 3.1. (social programs); Congressional Budget Office, *Trends in Public Infrastructure Spending*, August 2007, Table A-2. (infrastructure).