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Improving the Quality of Life by Enhancing Mobility

University Transportation Center for Mobility™

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The Transportation Economy: Just in Time

Final Report

Richard Cole and David Dennis

Performing Organization
University Transportation Center for Mobility™
Texas Transportation Institute
The Texas A&M University System
College Station, TX

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16. Abstract

The purpose of this project was to produce a short educational video, targeted at middle school and high school students, illustrating the critical role transportation plays in our modern economy. This report documents the production of a 6.5-minute video that provides students with a glimpse of how transportation has become an integral part of the modern economy. The video, titled *The Transportation Economy: Just in Time,* is available in both streaming and downloadable formats to public and private schools online (http://transportationeconomy.tamu.edu/). The site includes a full transcript of the production and a downloadable PowerPoint® presentation. These materials are for use as supplemental material for middle school and high school economics and civics classes.

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THE TRANSPORTATION ECONOMY: JUST IN TIME

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Executive Summary

Transportation plays a critical role in the economic growth and stability of our nation. Indeed, modern industrial distribution incorporates a just-in-time delivery model predicated on the reliable, predictable movement of both raw materials and finished goods. The ability to move people and products across distances great and small has long been taken for granted.

Today, that ability is anything but certain. Increases in traffic volume, a deteriorating infrastructure and declining tax revenue threaten to bring our transportation system to a halt.[1] These challenges are not insurmountable, but the first step toward meeting them is a general understanding of what is at stake.

Public perception of the value and importance of transportation — as measured by declining support for adequately funding the maintenance and expansion of our transportation system — does not reflect the vital role this system plays in our daily lives.[2]

The purpose of this project was to produce a short educational video, targeted at middle school and high school students, illustrating the critical role transportation plays in our modern economy. The video, along with a classroom PowerPoint® presentation, is available to public and private schools online (http://transportationeconomy.tamu.edu).

These are not advocacy materials. Issues of policy and funding alternatives are not addressed. Rather, the goal was to illustrate the central role adequate transportation plays at every level of our lives.

It is the hope of the project team that the relevance of this material will lead to the production of additional short videos focusing on the importance of mobility to the delivery of emergency services and perishable goods.

Introduction

Background

Transportation is vital to the success of the five major economic sectors that account for 84 percent of the U.S. economy: service, manufacturing, retail, agriculture and natural resources, and transportation providers.[3]

Service Industry

The service industry is the largest and fastest-growing economic sector in the United States, now accounting for one-half of the nation's gross domestic product (GDP) and one-half of all jobs. Congestion, particularly in metropolitan areas, makes it difficult for service industry workers to get to work and for service industry customers to get to offices, medical facilities, schools and other service centers.

Manufacturing

Global supply chains and just-in-time manufacturing have been the basis for significant gains in the U.S. manufacturing sector, where increasing productivity (higher output and fewer employees) has helped maintain the nation's competitive advantage. Congestion, deteriorating travel-time reliability and escalating costs threaten the complex global supply chains that ensure competitive sourcing of materials, parts and labor.

Retail

Port congestion, tightening rail capacity and growing road congestion are making it more difficult for retailers to reliably meet consumer demand. Congestion drives up the cost of shipping, increasing the cost of doing business for retailers and the cost of living for consumers.

Agriculture and Natural Resources

The agriculture and natural resources sector depends on efficient, reliable and low-cost transportation to move commodities to processing facilities and trade gateways. As global competition grows, keeping transportation costs low will be key to keeping the United States competitive.

Transportation Services

According to the U.S. Chamber of Commerce, industry and household spending on transportation accounted for nearly 10 percent of the U.S. GDP in 2006. Americans spent some $1.3 trillion to move people and goods via trucks, railroads, public transportation, aviation, and ships and barges.

Support for Funding Infrastructure

Despite the central role of transportation in each of these vital areas, there is little evident support for adequately funding infrastructure maintenance or expansion. Public opposition to toll roads, mileage-based fees and increases to fuel taxes suggests a fundamental lack of

understanding of the importance of an efficient transportation system to the lives of all Americans.[3]

Reasons for this disconnect range from distrust that government will effectively address transportation issues to a blanket opposition to any tax increase, regardless of purpose or merit.[4]

Addressing the distrust issue is beyond the scope of this project, but a more effective explanation of the role transportation plays in our economy has the potential to give transportation funding equal weight in discussions of public interest and priorities.

The Interstate Highway System and Economic Growth

When the National System of Interstate and Defense Highways was established in 1956, few envisioned the overall impact it would have on the nation's economy. By linking major cities from coast to coast, border to border, the network of high-speed, limited-access highways not only improved travel times but also had other significant impacts, including:

- increasing commercial development along interstate routes,
- altering population growth patterns, and
- transforming manufacturing from a regional activity to a national one.[5]

By the time the original Interstate Highway System was completed in 1992, the transformative impact of the national highway system was undeniable. Manufacturing no longer need be located near raw materials or waterways. Greater mobility meant a more flexible labor pool. The nascent long-haul freight industry became, for many businesses, the default method of manufacturing support and product delivery.

Parallel improvements in roadside safety, vehicle design and driver education further enhanced the experience and acceptance of highway travel. As the economy grew, so did demand for goods and services. Automobile ownership became commonplace.

As the reliability of long-distance surface travel grew, freight logistics emerged as an important aspect of industrial distribution. Supply chains, over the years, became global instead of regional. The just-in-time manufacturing model altered business models and reduced the need for storing raw materials and finished products in large quantities. Access to shipping no longer required immediate proximity to the coast, bringing the world market concept to a much broader spectrum of businesses.

The decades of economic change that followed development of the Interstate Highway System were built upon the reliability of the transportation system — the certainty that goods and people could be moved from one place to another. Given the lifespan of most highway infrastructure, it is perhaps no surprise that the public began to take for granted this reliability. As population and vehicle ownership grew, reliability was maintained by adding capacity to the existing transportation system.

The Growing Challenge

In a very real sense, we are victims of our own success.

The strong economic growth of the past four decades has allowed Americans to live and work where they choose. The efficient transportation of goods to markets and manufacturers has become commonplace; overnight delivery has become more expectation than miracle.

Yet transportation investment has not kept pace with our growth. Subdivisions, office buildings, schools and other multi-occupant facilities have been built without adequate infrastructure to move people and goods to and from these facilities. Freight traffic continues to grow — in Texas, for example, freight traffic is expected to grow at twice the rate of passenger vehicle traffic over the next 25 years.[6]

Highway construction costs continue to outpace inflation. Fuel taxes, a primary source of transportation funding, have not kept pace with costs, much less need. The congestion that now plagues most cities is a symptom of the growing gap between need and resources.

There are no easy answers. Increasing the capacity of our surface transportation system is unsustainable — we are literally running out of space to build roads, even if we could afford to continue expanding our road system. Worse yet, infrastructure maintenance has been underfunded for many years.

Much of the nation's surface transportation infrastructure is now more than half a century old. While it is cheaper to keep roads in good condition than to fix them after they deteriorate, the dollars available to do either are declining.

Gains made in fuel efficiency in recent years are not without cost — according to the Transportation Research Board, government regulation and continued increases in fuel prices could cut fuel consumption in the United States by 20 percent by 2025. Add to this a declining supply of fossil fuel and a growing number of environmental concerns, and the complexity of the challenge we face becomes apparent.

The problem will not be solved without a clear understanding of what is at stake — were this not the case, it would have been solved already. *The Transportation Economy: Just in Time* is a 6.5-minute overview of the role transportation plays in our lives. Using real-world examples and down-to-earth language, the video provides students with a glimpse of how transportation has become an integral part of the modern economy.

Project Development

Message Design

Before a script was written, an informal content committee was assembled to discuss appropriate messages and ways to tell the story. This group included a Texas

Transportation Institute (TTI) subject matter expert and communications staff members who would be involved in the production.

Working from the background information outlined earlier, this group identified three broad transportation-sensitive areas of the economy and how transportation limitations would impact those areas (Table 1.)

Table 1. Original content grid used to define script focus.

Agriculture (perishables)	**Manufacturing (just-in-time)**	**Services (emergency medical services/fire response)**
Availability (quality of life)	Efficiency	Saving lives
Economic impact (supply chain)	Economic impact (direct)	Economic impact (losses)
Employment	Employment	Ripple effect

After discussing story options for each of these categories, the group decided to focus on the grocery supply chain, identified as "agriculture (perishables)." The number of ancillary occupations impacted by transportation delays in this area — from growers to truckers to grocery store employees — offered the best way to show the overall impact.

Production Challenges

The next step was to identify businesses willing to cooperate in this production — to discuss, at least in general terms, logistical details that are typically considered proprietary information.

Locating a company with nationwide operations willing to discuss its logistical planning and competitive risks — and to allow video documentation of relevant shipping operations — proved challenging. In all, four companies declined to participate before a firm meeting our criteria tentatively agreed to the project.

Unfortunately, events unrelated to this project led to the firm's withdrawal from the production. Specifically, the company discovered clandestine efforts by a key competitor to obtain specifics of the firm's transportation logistics operation. While this, in itself, illustrated the importance of transportation reliability to corporate profitability, it resulted in the company declining to participate in the video.

Script Redevelopment

The resulting delay ultimately led to recasting the narrative. Originally, the plan was to follow a perishable good — in this case, strawberries — from a California field to Texas store shelves, documenting the journey and the various people involved along the way (Appendix A). Without the cooperation of a large grocery chain, this approach was no longer viable.

Ultimately, two manufacturers willing to discuss the importance of reliable transportation to their business operations were located. Officials with the New Southwest Baking Co. (Figure 1), a commercial baker providing all buns and baked goods to McDonald's restaurants in a six-state region, and with DXP Incorporated, a manufacturer of oil exploration pumps and machinery, agreed to discuss the importance of reliable transportation to their corporate viability and allow videography in their facilities.

Figure 1. Location shoot and interview at New Southwest Baking Co.

Field Production and Editing

Field production, including site visits, studio interviews and location photography, was completed in March 2011, when the interview with economist David Ellis (Figure 2) was completed.

Editing was completed in July 2011. Closed-captioning was added to the final file to ensure the video meets federal accessibility requirements.

Figure 2. Interview with economist David Ellis.

Distribution

The video was posted on its own web page (Figure 3) (http://transportationeconomy.tamu.edu) in both streaming and downloadable formats. The site includes a full transcript of the production (Appendix B) and a downloadable PowerPoint® presentation (Appendix C).

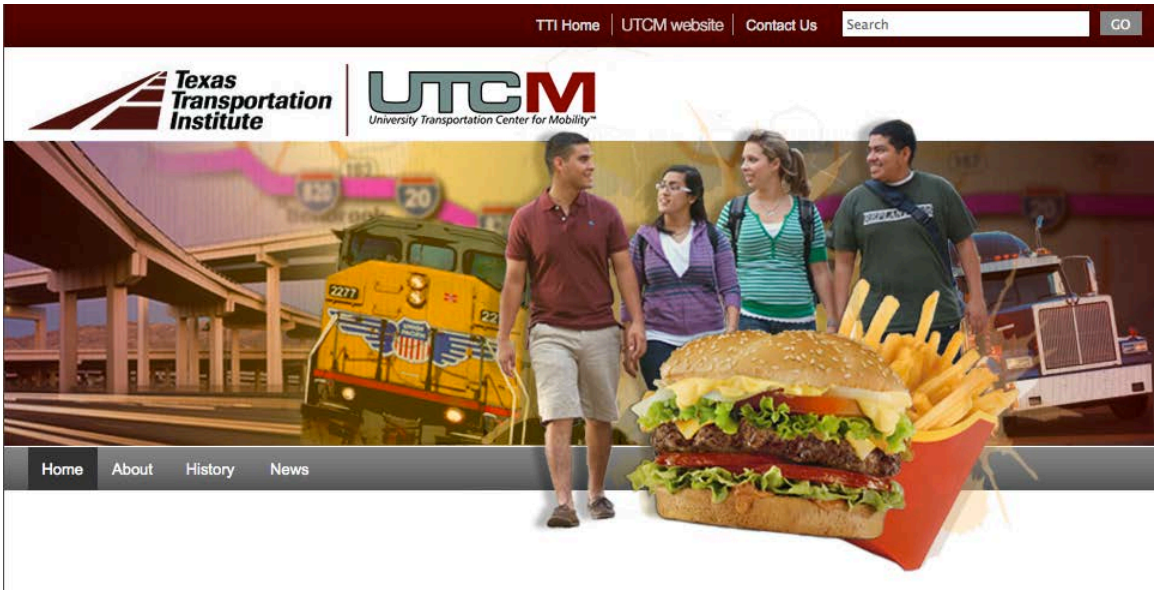

Figure 3. Web page banner.

Texas Education Agency regional service centers, a state resource for public school educators, will be notified of the video's availability upon final approval and publication. The video will also be promoted using the Twitter and Facebook social media outlets maintained by the Texas Transportation Institute.

Summary and Conclusions

Summary

The purpose of this project was to develop and produce a short video emphasizing the key role transportation plays in our modern economy. The video was to be targeted at students and distributed in a way to make it as accessible as possible to educators interested in incorporating it into math, science and/or economic curricula.

The obstacles encountered during production reflect the importance of transportation to businesses of all sizes, and the competitive edge perceived by businesses that devote significant resources to transportation logistics.

Conclusions

It is hoped that sponsors can be identified to continue to develop materials emphasizing the importance of transportation to our quality of life. Videos highlighting the impact of mobility on the delivery of emergency services, in addition to another video (similar to the one produced) focusing on the relationship between manufacturing jobs and the availability of raw materials, would complement the original concept of tracking perishable goods from field to market. This video, in such a scenario, would serve as an overall introduction to the series.

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Appendix A: Original Storyboard

09-27 UTCM Transportation Economy

1

EXTERIOR SALINAS VALLEY, CA. - PRODUCE FIELDS STRETCH TOWARD THE HORIZON.

TITLES OVER:

THE TRANSPORTATION ECONOMY
Moving the World

2

VOICE OVER
The industrial revolution made the mass production of goods possible; transportation made it profitable.

The movement of people and goods has always been at the heart of the American economy. Advances in manufacturing and agriculture created an ever-growing need

3

VO
The Interstate Highway System

-- Brief timeline
-- Impact on transportation
-- Costs

4

SALINAS VALLEY FARM WORKER
-- Family background in agriculture
-- Growing demand for fresh produce
-- Bigger farms, bigger yields
-- Generations live or die by the crops

Third Draft - Revised

5

EXTERIOR SALINAS VALLEY FREIGHT TERMINAL

Logistics section: overview of the complex undertaking of moving perishable goods across the country. Begins with this video, voice over is KEN ALLEN, senior HEB logistics executive.

INTERCUT WITH

6

SCENE OF TRUCK(S) ROLLING OUT OF SALINAS VALLEY

VO continues.

7

EXT. DAY. OPEN HIGHWAY FROM CAB OF TRUCK

We pick up the story with JEFF, a driver for HEB.

"I've got ___ days to get this produce to San Antonio..."

Driver story continues thru following

8

DRIVER MONTAGE CONTINUES

9

INT. HEB HEADQUARTERS.

Live portion of logistics discussion begun earlier.

Key points:

-- Size of challenge
-- Size of fleet

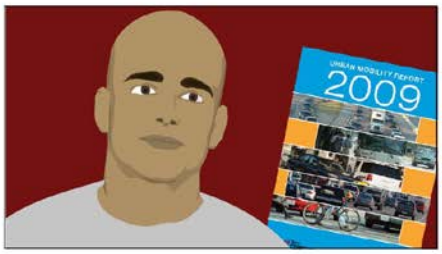
10

EXT. DAY. ALONG THE ROAD

Driver story intercuts with HEB interview

Emphasis on weather/stress of congestion

11



MOBILITY segment

ON CAMERA INTERVIEW TIM LOMAX

Charts/graphs illustrate key points

12

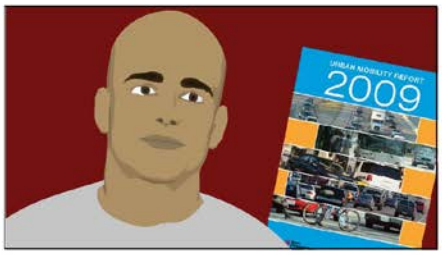
EXT. DAY TRUCK ARRIVES AT STORE

VO
<Newspaper ads, store displays, staff available to unload and stock each store... all choreographed to the movement of goods>

13

LOGISTICS SUMMARY

14



MOBILITY Summary

15

INT GROCERY STORE

Family shopping

Summary points.

END

Appendix B: Video Transcript

[UPBEAT MUSIC]

NARRATOR:
From your youngest days, you've been on wheels. From four wheels to Big Wheels to two wheels to combinations of wheels, then back to four, you grew up expecting wheels to carry you wherever you wanted to go.

[TIRES SQUEAL]

[40S MUSIC]

Not so long ago, no matter how many wheels you had, transportation was a challenge. Today's modern highways have been around a little more than 50 years.

[60S SURFER MUSIC]

In your parents' lifetime, it wasn't unusual for people to live and work within 50 miles of where they were born.

[ROCK MUSIC]

Today, it's not unusual to commute 50 miles each way just to get to work.

[MILITARY MARCH]

The Interstate Highway System was built to move military equipment and personnel across the country when needed.

What really moved was mail and packages and freight. And people!

[ROCK MUSIC]

Texans could drive to other states quicker than they could drive across their own.

Our love of wheels means Texas businesses ship products everywhere in America, quickly and economically. Our interconnected highway system is a just-in-time wheeled warehouse for businesses across Texas.

DAVID ELLIS:
Companies cut down on their inventories, expecting to get goods in on a daily basis. That means that they don't have to have such extensive warehouse operations and storage operations. That makes transportation more important, because now it's not just the consumer who potentially can suffer as the result of a transportation system that's not as effective and as efficient as it should be, but it's the manufacturer or the distributor.

NARRATOR:
New Southwest Baking Co. is just-in-time delivery on both ends. Baking never stops, 24 hours a day, 7 days a week, 364 days a year. Up to 1,200 hamburger buns leave the oven every minute.

RANDY CORUM:
Everything that we receive, we don't want to receive too soon because we don't want it sitting around for long periods of time.

Everything that we use in our products generally has a shelf life; therefore, the fresher the better. So receiving it on time is important to us, receiving it on time when we scheduled it to be received.

For some raw ingredients like flour, the bakery has about 18 hours on hand. Truckloads of flour arrive every day. Flour delivered early in the morning is being mixed for baking that night. Customers receive fresh-baked buns and English muffins by truck every three days. From the East Coast to eastern New Mexico, New Southwest trucks are always on the road.

MIKE LITTLE:
From the transportation perspective, we are taking only a certain number of products, only a certain quantity of products, to our customers. And we are doing it three times a week, so our customers don't have to have excessive inventory, spend the money on excessive inventory or have a product like ours — fresh bread — that could go out of code. They only want what they need to supply their customers for a certain period of time.

DAVID ELLIS:
If it takes you an hour to go from one place to another, and it takes you an hour every time, you can plan on that. And you set aside the hour it takes you to make that drive. But what if one time it takes you an hour, and the next time it takes you an hour and a half, and the next time it takes you two hours, and the next time it takes you an hour and fifteen minutes? And every time you drive it, it takes you a little bit different amount of time. That whole notion of reliability becomes very, very important in our supply chain all the way from the manufacturer to the distributor to the ultimate consumer. And it becomes more and more important when we talk about this concept of just-in-time inventory.

NARRATOR:
DXP Incorporated in Houston is another example of just-in-time inventory control. The pump platforms they build for use in the oil industry and others are custom- built to customer specifications. In most cases, the pump assembly is part of a larger project, like an offshore oil platform. The customer expects it to arrive on the day it is to be installed. Any delay can cause expensive problems.

JOHN PERRY:
The highways are the lifeblood of our business. I remember when I first got out of school and came to work, I was complaining, you know, because in the mornings they ought to just ban all the commercial trucks from the highways so everybody could get to work on time. My boss told me, you wouldn't need to be here at work on time, you wouldn't need to be here at work if it weren't for these trucks bringing stuff in and out. It's extremely important.

DAVID ELLIS:

We financed our roadway system, in this state and in this country, primarily through a motor fuels tax. Think about that. Every year, our automobiles get more and more fuel efficient; we use less fuel to drive the same number of miles. So our demand for our transportation system goes up as we get more and more people, but we use less and less fuel in using that system. It's the fuel that we tax that pays for that system. We have big decisions ahead, fundamental decisions ahead, about how we pay for and maintain this transportation system that has served us so well.

[TIRES SQUEAL]

NARRATOR:
If the wheels come off of our transportation system, there goes your burger. No bun. No veggies. No meat or cheese. No nothing!

It will soon be your turn to keep those wheels turning.

[MUSIC UP & OUT]

Appendix C: PowerPoint® Presentation

In your parent's lifetime, it wasn't unusual for people to live and work within 50 miles of where they were born.

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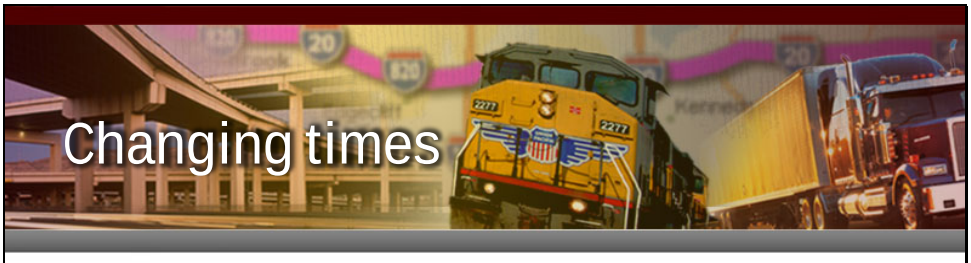

In your parent's lifetime, it wasn't unusual for people to live and work within 50 miles of where they were born.

Today, it's not unusual to commute 50 miles each way just to get to work.

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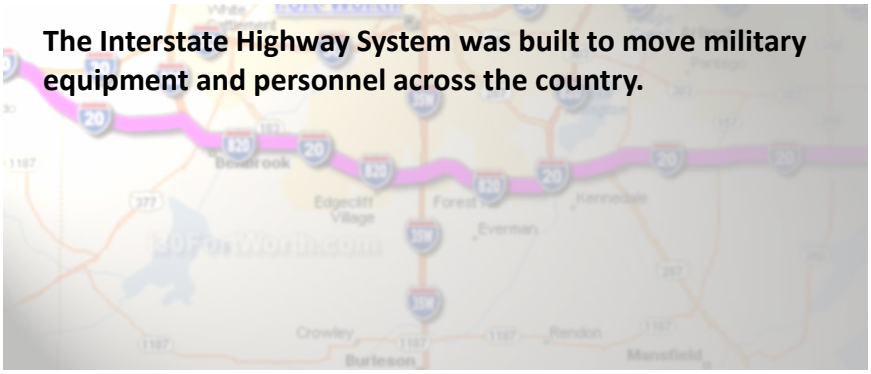
The Interstate Highway System was built to move military equipment and personnel across the country.



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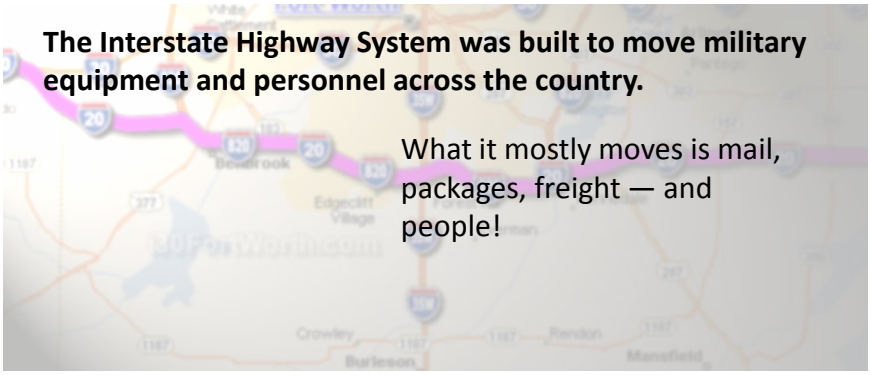
The Interstate Highway System was built to move military equipment and personnel across the country.

What it mostly moves is mail, packages, freight — and people!



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Economic impact
David Ellis, Research Scientist, TTI
"Companies cut down on their inventories, expecting to get goods in on a daily basis... That makes transportation more important because now it's not just the consumer who suffers, but the manufacturer and distributor as well."
– David Ellis
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New Southwest Baking Co.
New Southwest Baking Co. relies on just-in-time delivery for both raw ingredients and the products they produce.
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The bakery only has about 18 hours of flour on hand. The company supplies fresh-baked buns and English muffins to all outlets of a leading fast-food chain's restaurants from New Mexico to the East Coast.

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"Everything that we use has a shelf life…receiving it on time is important to us."

– Randy Corum
New Southwest Baking Co.

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Travel-time reliability

"If it takes you an hour to go from one place to another — and it takes you an hour every time — you can plan on that.

"But if one time it takes you an hour, and the next time it takes you an hour and a half, and the next time it takes you two hours…that whole notion of reliability becomes very important in our supply chain."

– David Ellis

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Deliver & install

DXP Incorporated is another example of just-in-time inventory control.

The pump platforms they build for the oil industry are expected to arrive on the day of installation.

There's no place to store them — at the plant or at the job site — if a shipment is delayed.

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"The highways are the lifeblood of our business.

"Early in my career, I remember complaining about all the trucks on the road slowing me down on my drive to the plant.

"My boss told me, 'You wouldn't need to come to work at all if it weren't for those trucks.' "

– John Perry
DXP Enterprises, Inc.

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"We financed our roadway system primarily through a motor fuels tax. But every year, our cars get more fuel efficient — we use less fuel to drive the same number of miles.

"Demand for our transportation system continues to rise, but we use less fuel to drive the same number of miles. It's the fuel tax that pays for our roads."

– David Ellis

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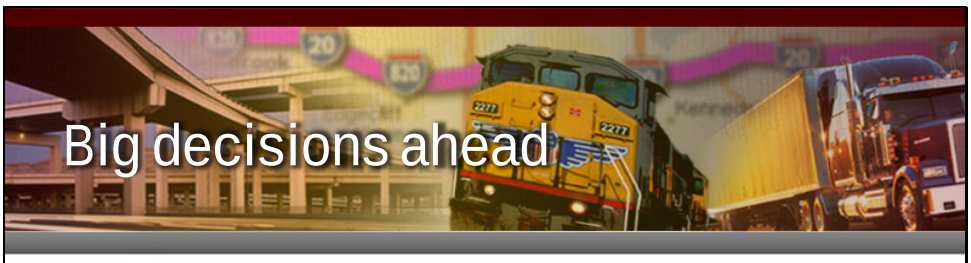

Our nation's economic health relies on a healthy transportation system.

We have big decisions ahead. How will we pay for and maintain the transportation system that has served us so well?

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