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Keynote Speech: Megatrends in US Transportation

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Let me begin by saying that I am honored to be a keynote speaker at the China Urban Transport Congress. And a special thank you to the China Planning Network, which has been such a gracious host for me this week. I last visited China in December, on a trade mission with Massachusetts Governor Deval Patrick. It is a pleasure to be back in Beijing, both to participate in this exciting conference and to renew contacts and relationships we made on our first trip. Governor Patrick believes strongly in fostering a robust economic, academic, and cultural partnership between China and our state, and my visit here this week is meant to strengthen that partnership.

It is truly an exciting time to be in China – and not only because we are just a few weeks away from the opening of the Olympics. The country has emerged on the international stage as an economic force of tremendous reach and depth. Today, it is connected to the rest of the world like never before. The connection between China and the United States is particularly strong, and growing stronger every day.

As these economic and cultural ties grow, the challenges facing China and the United States grow more and more alike. Nowhere are the similarities more apparent than in the transportation arena, where we must figure out how to connect jobs with housing, how to solve the problem of urban gridlock, how to move goods within cities, within regions, and around the world, and how to do all this in a way that preserves the environment, expands our mobility, and improves our quality of life.

America's prosperity and place in the world today are based on many factors, but certainly its transportation system has to be at the top of the list. The transcontinental railroad in the late 1800s and our extensive highway network dating back to the 1950s are evidence that economic development and infrastructure development are closely tied. China understands this connection. It is currently building a 53,000-mile National Expressway System which, when complete in 2020, will rival the 47,000-mile U.S. Interstate System. It is investing in transit, seaports, and airports at an unprecedented rate, and spending \$146 billion to improve and expand rail networks by 2010.

These investments will bring substantial changes to China's transportation infrastructure. But if the Chinese experience is anything like the American one, in the coming months,

years, and decades, the system will also be shaped by a number of external factors – some known and some still unknown.

In the United States, there are some new forces -- I call them mega-trends -- that are radically altering the transportation landscape. Unless transportation officials in the United States take serious account of these megatrends, America will not be able to maintain the kind of mobility of people and goods we will need for continued quality of life and prosperity in the twenty-first century. These megatrends are 1) the rising cost of energy, 2) a new environmental consciousness, 3) the state of infrastructure, 4) population changes, 5) funding, and 6) new technologies.

Megatrend I: The Rising Cost of Energy

In the decades following World War II, the United States experienced a tremendous increase in wealth and economic activity. The combination of cheap gasoline and a national transportation policy focused on interstate-highway construction, encouraged millions of families to move into new communities at the edges of cities. The automobile came into its own as the most efficient way to travel. Since driving was relatively cheap, longer commutes were affordable; suburban sprawl was born.

The distances between American cities and suburbs, and a reliance on inefficient automobiles, have created an incredible thirst for fuel: the United States now consumes more than 20 million barrels of oil each day, two-thirds of it on transportation. With oil prices at \$30 or \$50 a barrel, this system and growth pattern served the U.S. economy well. It was cheap to drive and cheap to move goods from one place to another.

Now that oil is at \$140 a barrel, the cost of driving can no longer be ignored. Filling up a gas tank can cost more than \$100, more money than many workers earn in an entire day. Though the price of a gallon of gas only recently reached \$4 in the United States, we are starting to see real changes on the part of travelers, who are trying to consume less fuel and to find cheaper ways to get around. In March, Americans drove 11 billion fewer miles on public roads than in the same month the previous year, a 4.3 percent decrease — the sharpest one-month drop since the Federal Highway Administration began keeping records in 1942. For the first time in nearly twenty years, gasoline demand is expected to decrease by up to 1.3 percent.

There are a lot of different ways that people are making fewer trips: they are bunching errands together, they are thinking twice about taking gas-guzzling road-trip vacations, and many are working more from home. State agencies in Utah and county agencies in suburban Detroit will be adopting a four-day work week to save on agency and employee fuel costs, a policy that has received significant national attention.

The lucky ones are migrating to mass transit. Across the country, we are seeing sizable ridership growth on our buses and trains. In the New York City area, public transportation ridership is up between four and six percent. The increase is particularly striking in parts of the country where many are not accustomed to taking transit. For

example, San Antonio, Texas has seen bus ridership increase by ten percent, while Charlotte, North Carolina experienced a 34 percent increase in its transit-system ridership. In Massachusetts, our largest transit system, the MBTA, is on track to record the highest ridership in its forty-four-year history.

Of course, transit systems must also cope with rising fuel costs. While many MBTA buses no longer rely on diesel, the agency predicts fuel costs will exceed its budget by \$26 million this year. The challenge for all of the nation's transit systems will be how to best accommodate ridership growth and increased demand for service, while covering the growing operating costs associated with higher energy prices.

The commercial airline industry is particularly vulnerable to the increased cost of fuel. The price of jet fuel has increased 84.5 percent in just the last year. In response, airlines have reduced flights into large airports by as much as 10 percent. Across the industry, airlines have cut 25,300 flights since May of 2007, eliminating newly unprofitable routes and reducing frequency. As many as 100 smaller communities are likely to lose all commercial air service by the end of the year. Passengers once stored luggage for free – now they pay based on size and weight. Delta Airlines charges a \$50 “fuel fee” for customers using their frequent-flier miles, a service that was once free. And more bad news appears to be on the way. We're being told to expect additional sizable reductions in scheduled flights this fall. American Airlines, for example, expects to cut 7,000 employees by the end of the year as it reduces flights and grounds aircraft because of high fuel costs.

Americans are beginning to understand that high energy prices are here for the long term, and they are changing their preferences. Ford Motor Company reported that S.U.V. sales were down 55 percent from a year ago. Sales of the Ford F-Series pickup, until recently one of the most popular vehicles in the country, are off 40 percent. Only one Ford model is on track to sell more this year than last year - that is the mid-sized, fuel-efficient Fusion. A company spokeswoman says the market shift is “totally unprecedented and faster than anything we've ever seen.”

For the first time in decades, Americans are starting to factor the cost of travel into their decisions about where to live. The trend of moving further from city centers has reversed. Nationwide, home prices in neighborhoods with long commutes and no public transportation are falling faster than prices in communities closer to cities, according to a study by economist Joseph Cortright. For example, last year, home values in distant suburbs of Tampa fell 14 percent, compared to a 9 percent drop in areas nearer the city.

Transportation planners and government officials should be encouraging these shifts. We need to promote high-density development near transit hubs to keep down housing prices in conjunction with lower transportation costs. In Massachusetts, state transportation and housing policies encourage Transit-Oriented-Development through tax incentives and grant programs. On the infrastructure side, we are advancing a number of important transit projects, including a \$600 million extension of an existing light-rail line through the densest community in the state, and a thirty-mile extension of the commuter-rail

network to two of the state's largest cities not currently served by direct transit connections to Boston. We can also help by encouraging ride-sharing, car-pooling, and the development of new fuels, and by investing in pedestrian and bicycling infrastructure.

The country's dependence on oil for transportation has created a problem even more threatening than high fuel costs: extensive damage to the local and global environment in the form of global warming.

Megatrend II: A New Environmental Consciousness

Americans are developing a new environmental consciousness. Sixty-two percent of respondents to a national survey believe that life on earth will continue without major disruptions only if society takes immediate and drastic action to reduce global warming. Thanks in part to efforts like former Vice President Gore's movie "An Inconvenient Truth," more and more Americans are now willing to make changes in their lives to minimize their impact on the environment. They are also becoming increasingly aware of the connection between transportation and the environment. The two are intimately bound – transportation is both a cause of global warming and it is likely to be a victim of global warming in ways that are not always obvious to those outside of the transportation industry.

There are at least five ways in which global warming will impact transportation infrastructure worldwide: (1) rising sea levels will lead to more frequent and intense flooding, (2) high temperatures will cause thermal expansion of bridges and pavements, and cause track deformities, (3) warmer temperatures in the arctic will thaw permafrost that supports infrastructure, (4) increased precipitation will cause traffic disruptions, flooding, and accelerate the deterioration of infrastructure, and (5) more intense and more frequent hurricanes will wreak havoc on coastal regions – one only needs to recall the efforts of Hurricane Katrina on the Gulf Coast of the United States to know how an intense hurricane can bring our regional transportation system to a grinding halt. In Massachusetts, we are considering undertaking a full study of the threats to our transportation system posed by climate change. As a coastal state, Massachusetts must take these threats seriously, or risk disrupting our economy through the temporary or permanent loss of important transportation infrastructure.

But our greatest challenge is reigning in the one-third of all greenhouse gas emissions that come from the transportation sector. Each year, Americans travel a total of 4.8 trillion person-miles, an amount nearly equal to a trip around the world for each and every American, every year. By far the largest share of that is attributed to single-occupancy vehicles. Americans have awakened to the fact that this pollution is having a profound effect around the world and in their own backyards. Experts indicate that we need to reduce total CO₂ emissions to 60%-80% of 1990 levels by 2050. The country is rethinking its choices with environmental impacts in mind. Climate change strategies related to transportation need to consider a number of factors, including regulatory steps, vehicle technology, new fuels, and demand management.

Public transportation agencies are taking the lead in reducing their carbon footprints. The transit agency in Portland, Oregon has implemented procedures to reduce idling and improve vehicle maintenance, lowering vehicle fuel use by 10%. Metro, in Cincinnati, Ohio, runs its entire 390-bus fleet on a blend of 50% soy-based biodiesel and 50% regular diesel fuel. In Massachusetts, many of our state vehicles run on natural gas, and we are actively looking at placing solar panels and wind turbines on transportation corridors.

I spoke earlier about how fifty years of transportation policy has created land-use patterns that leave us poorly positioned for an era of high energy prices. The legacy of the last fifty years is not just our land-use patterns. We must also attend to aging infrastructure that was built during the tremendous growth of the twentieth century.

Megatrend III: The State of Infrastructure

Any discussion of transportation in the United States must take into account the condition of the nation's infrastructure. The catastrophic collapse of the I-35 bridge in Minneapolis, Minnesota, last year reminded us that many of the nation's roads, rails, bridges, and tunnels are old, have suffered from years of deferred maintenance, and lack the capacity to handle existing and expected demand.

At the core of transportation and mobility in the United States is our system of roads, in particular the interstate highway system that was designed under President Eisenhower in the 1950s. After 50 years, significant portions of the system need major repairs beyond just simple maintenance or resurfacing.

In my state of Massachusetts, many of our bridges were built in the 1960s and 1970s. While our bridges were well-built and have fared well over the test of time, 30-50 years of freezing cold winters, hot summers, high traffic volumes, and neglected maintenance have left us with 540 structurally-deficient bridges. At the rate we are going, two bridges become structurally deficient for every bridge we repair and rescue from that rating.

A signature bridge in Massachusetts is the Longfellow Bridge, a 100-year old stone structure that connects Boston with Cambridge, home of MIT, Harvard, and one of the world's greatest centers for bio-tech and life-science innovation. The bridge carries 50,000 cars and trucks a day and 100,000 riders on a rapid-transit subway line, the busiest line in the state. In 100 years, it has only undergone two repair projects. Because of this neglect, we have been forced to close a lane on each side of the bridge, and the subway line is forced to crawl over the bridge at 10 miles per hour while we make emergency repairs; repairing the entire bridge will cost upwards of \$200 million.

In many places, our transit infrastructure is even older than our roadways. The transit agency in Massachusetts, the MBTA, is the oldest in the country. It spends virtually its entire capital budget each year on maintenance, investing \$470 million a year in State-of-Good Repair projects, and still has a \$2.7 billion maintenance backlog that negatively impacts daily service.

Even infrastructure that is in decent shape does not meet our capacity needs. In addition to needing major repairs, the country's system of roadways is also tremendously congested and used far beyond its intended capacity. In 1955, our highways carried 65 million cars and trucks. Today they carry 246 million, and that number is expected to reach nearly 400 million by 2055. Traffic congestion continues to worsen in American cities of all sizes, creating a \$78 billion annual drain on the U.S. economy in the form of 4.2 billion lost hours and 2.9 billion gallons of wasted fuel. Freight transportation demand will continue to grow. The U.S. DOT is projecting that total freight transportation demand will rise 92 percent from 2002 to 2035, including an 88 percent increase for railroads. U.S. freight rail traffic density – defined as ton-miles per mile of railroad – has been moving steadily upward for years. From 1980 through 2007, traffic density on average is up 237%. Since 1990, it's up 118%. To ensure continued mobility for people and for goods, it is vital that the capacity of the system be increased.

The cost of repairs to the system and the creation of additional capacity are high, but so are the costs of doing nothing. The combined cost of extra fuel and lost productivity for each Boston-area rush-hour driver is more than \$900 a year. To begin to address this problem, in Massachusetts we have initiated a plan to invest \$3 billion in improving our bridges over the next eight years. Our state recently completed the Central Artery/Tunnel Project, a \$15 billion dollar highway project that took an old, elevated highway through the center of Downtown Boston and replaced it with a modern tunnel through the heart of the city. These types of investments will be needed across the United States to sustain the country's economic competitiveness.

As our infrastructure changes with time, so does our population.

Megatrend IV: Population Changes

Two population shifts are shaping the country's transportation system: demographics and geography.

In the United States, millions of "baby-boomers," the generation of Americans who were born and raised following World War II, are now approaching the age of retirement. This generation represents over 70 million people, about one-quarter of the entire United States population. As the baby-boomers age, more and more of them will be forced to give up driving, mobility they have relied upon since they were teenagers. By age 85, elderly drivers are involved in accidents at rates nine times as high as the rate for drivers 25 to 69.

So the nation will soon be forced to confront the needs of a large segment of the population no longer able to participate in the principle form of transportation. In some places, this demographic shift will create increased demand for more mass-transit service, placing even more pressure on supply. Elderly living in suburban and rural areas, where transit services are scarce, are particularly vulnerable to isolation. A U.S. Department of Transportation study found that as many as 50% of non-drivers stay at home on any

given day because they do not have access to another form of transportation. We will have to increase mobility for this aging population if we want to maintain quality of life.

Another important demographic to consider is the change in settlement patterns and economic clusters we are seeing around the country. Economic activity in the United States is concentrating on ten mega-regions – places like the Northeast Corridor between Boston and Washington D.C., or the Southern California mega-region formed by the triangle of Los Angeles, San Bernardino, and San Diego. These closely-linked groups of metropolitan areas figure to be primary drivers of growth in this century. Between now and the year 2050, more than half of the nation's population growth, and perhaps as much as two-thirds of its economic growth, will occur in these regions. These regions often cross county and state lines, presenting a challenge for planners, builders, and public officials, who are not always accustomed to working across these political boundaries.

The Federal government, states, regions, and local areas need to respond to geographically-focused population growth, increased and expanding traffic congestion, and the loss of economic competitiveness in the global economy. To maximize economic development, we need to structure transportation and infrastructure investment in a way that fits these regions.

Megatrend V: Funding

Governments at all levels across the United States are strapped for cash as they face many other priorities such as health care and education. The transportation funding outlook is as bleak as any other. In February, the President's budget forecast a \$3.2 billion shortfall in the revenue needed in the Highway Trust Fund to support the \$42 billion federal-aid highway-program authorizations in the coming year. The federal gas tax has not been raised since 1993, and there seems to be little appetite now to raise it with energy prices already at record highs.

The United States Department of Transportation estimates that the cost to improve our transit systems to needed levels is \$24 billion annually for the next 20 years. The AASHTO 2007 Future Needs Report found that we invest \$9 billion per year in interstate preservation, when the need is closer to \$31 billion. Estimates indicate that the U.S. needs to invest at least \$225 billion annually for the next fifty years to upgrade our existing transportation network to a state of good repair and to expand in a way that allows us to remain economically competitive. Today, we spend less than 40 percent of this amount. In Massachusetts, a blue-ribbon transportation finance commission found a gap of \$15-19 billion just to maintain the infrastructure we already have.

This funding climate has required transportation officials to think in innovative ways. We are turning to new places for our resources, and I think some of these innovative funding mechanisms show promise.

The long-term leasing of revenue producing assets is one way in which governments have tried to fund infrastructure maintenance and improvements. In 2004, the City of

Chicago leased the 7.8 mile Chicago Skyway, for \$1.8 billion, to a joint-venture between a Spanish and Australian company. The lease is set to last 99-years – it will far outlive any of us. In 2006, the same consortium leased the Indiana Toll Road, one of the major interstates across Indiana, for \$3.8 billion for 75 years.

Governments see long-term asset leases as a way to fund infrastructure because it allows them to pay-off significant amounts of transportation-related debt. With assets in the hands of a private operator, maintenance is covered by those operators who, not surprisingly, are often much more willing than elected officials to raise tolls and fares.

After a flurry of these deals in 2006, the pace of these concessions has slowed down considerably. The public has been wary of deals that privatize vital public assets, effectively giving private entities monopoly control of important corridors, and the ability to set increasingly high tolls and fares. When done right, these deals can make a lot of sense, but we need to be careful to maximize value for the state and its citizens.

Even if long-term leases are not the answer, it is clear that the private sector needs to play more of a role in infrastructure development and construction. In Massachusetts, we have entered into a number of partnerships with developers in which they contribute a significant amount of the overall cost of the project. At the Burgin Parkway in Quincy, private developers paid for the design and the construction of public roadway improvements, saving the state millions.

We can also save millions by advancing new transportation technologies.

Megatrend VI: New Technologies

Technology has the potential to revolutionize our transportation system. If we invest in these technologies and utilize them in the right ways, they will be good for business, provide safe and affordable mobility, lessen our burden on the environment, and make our economies stronger and more dynamic. The future could be here sooner than you think.

I hope I've made it clear that a big part of the solution to our transportation challenges involves increased investment in public transportation, getting people out of their cars and into that transit, and getting people to live closer to where they work. But we also need to come to grips with the reality that cars and roads are here to stay. We've invested billions upon billions of dollars in this system over the last hundred years. That system is not working well for us now, but the answer is not to scrap the whole thing. We need to rethink and reengineer our basic transportation model – the single-occupancy vehicle – to make it smarter and more efficient.

According to Amory Lovins at the Rocky Mountain Institute, only one-eighth of the fuel energy generated by an automobile ever gets to the wheels. Of that, half heats the tires and road or heats the air that the car pushes aside. Only the last 6 percent accelerates the car. And since about 95 percent of the mass being accelerated is the car, not the driver,

less than 1 percent of the fuel energy ultimately moves the driver. So simply by making cars a lot lighter, and by focusing on moving people and goods, not cars and trucks, we can save a lot of energy.

As our cars get lighter and more efficient, technology will enable us to use fewer of them. A company from Massachusetts, known as ZipCar, has pioneered the practice of car-sharing, making cars available to customers on an on-demand basis. The program started in Boston and has now expanded across the country. ZipCar customers log on to the internet, reserve a car, and walk a few blocks to a waiting vehicle. By providing on-demand automobile access to those that do not need to own a car full-time, ZipCar encourages people to give up their cars and live in dense areas. The idea of splitting up the cost of a car among many drivers is a novel way to harness markets and make more efficient use of limited resources.

I would like to highlight another new technology that harnesses markets, and that has the potential to help us fund infrastructure improvements and transform our transportation system. The 91 Express Lanes is a four-lane, 10-mile toll road built in the median of California's Riverside Freeway. The state-of-the-art facility boasts several firsts — the first privately financed toll road in the U.S. in more than 50 years, the world's first fully-automated toll facility, and the first application of dynamically-priced toll lanes in America. These lanes, known as High Occupancy Tolling or HOT lanes, charge a variable fee for the use of an un-congested lane. Prices are automatically adjusted in real-time to ensure that traffic always moves freely. In Southern California and in other parts of the country where they have been piloted, dynamically-priced toll lanes have been well-received by the general public. The challenge now is to increase their usage and expand these lanes around the country.

Governments also need to explore cordon or congestion pricing – similar to a system already in place in London and Stockholm. Under these proposals, access to certain areas, usually city centers, is priced higher at busier times of the day. Just this past year, New York City proposed such a plan under which all vehicles entering downtown Manhattan would have been charged a toll from morning until evening. Revenues from these tolls would go towards public transportation and other transportation improvements. While the proposal did not make it through the state legislature, transportation officials see it as a model for the future.

Innovative financing mechanisms can and must play a critical role in developing and maintaining infrastructure in the United States. They provide ways to raise revenue, manage congestion, and increase the overall efficiency of our transportation system. These technologies can radically change the way our transportation system is organized, financed, and experienced by the user. If implemented correctly, dynamically-priced highways and congestion pricing can drastically reduce our need for expanded capacity, strengthen the link between infrastructure and the users of that infrastructure, and can relieve our dependence on the gas tax.

We have an opportunity to move closer toward that future, and to begin to address all six of the megatrends I've outlined today, with the next federal surface transportation reauthorization.

Re-Authorization

Every six years, the U.S. Congress "re-authorizes" the nation's surface transportation programs by setting funding levels for highways and transit and establishing the rules for a wide range of specific programs. In 1991, ISTEA established the landmark principle that some federal highway funds could be used for either highway projects or public transportation projects, depending on the needs of individual areas and states. In 1998, TEA-21 significantly increased the authorization for public transportation. In 2005, SAFETEA-LU, the current legislation, again authorized a record level of federal transit investment and made mostly modest program changes.

SAFETEA-LU runs out in 2009. Because we will be electing a new President and Congress this fall, it is likely that SAFETEA-LU will be extended to 2010. Many transportation policymakers in the U.S. are calling the next round "Authorization" not "Re-Authorization" in order to send the message that a truly fresh approach is needed. I would hope that the next legislation will intelligently address many of the mega-trends that I have described. Just to give one example, I would love to see the federal government provide greater incentive for states to work together on transportation projects that will benefit entire "mega-regions" as opposed to individual regions within states.

Earlier I talked about transportation funding issues. One of the central challenges in the new authorization will be the federal funding shortfall and how the role of the federal government is to be defined. We have always looked to government at all levels to fund infrastructure, supplemented by public transportation fares and tolls on some roads. The National Surface Transportation Policy and Revenue Study Commission has called for an increase in the federal fuel tax of 25 cents to 40 cents, phased in over five years. It also advocates other federal user-based fees and elimination of barriers to expanded tolling and congestion pricing. Finally, it supports use of public-private partnerships, including concessions for highways and other surface transportation modes. But it makes it clear that the central role still belongs with the federal government.

Beyond pure funding, the Commission recommends reducing the 108 separate USDOT programs to 10 that focus on outcomes such as congestion relief, global competitiveness, energy security and safety. I think there will be other calls for greater flexibility, not just between modes but among programs, and simplification and consolidation of planning requirements. Beyond that, I cannot predict what will the next legislative authorization will look like or how it will change programs. But I strongly believe the legislation must take into account America's need to stay mobile, particularly in an era that will pose challenges we have never faced before.

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Thank you for this great opportunity to speak with you today. It has been an honor to address the Urban Transport Congress, and I look forward to our discussion.