America's Roadway Operations: Improving Capacity and Efficiency

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America's Roadway Operations: Improving Capacity and Efficiency

American Road & Transportation Builders Association

The Washington, DC-based American Road & Transportation Builders Association (ARTBA) is the only national organization that exclusively represents the collective interests of the U.S. transportation construction industry before the federal government, judicial bodies, and the media.

One of the nation's oldest and most respected associations, ARTBA celebrates its 100th Anniversary in 2002. ARTBA is a national federation of private firms, public agencies and associations with a primary goal of advocating strong federal investment in transportation infrastructure to meet public and business demands. On behalf of its members, ARTBA aggressively and progressively promotes market development of safe and efficient transportation systems. Complementing its vital leadership roles in this area, the association also provides regulatory advocacy and services and benefits designed to help its member firms and agencies operate more efficiently.

The industry ARTBA represents generates more than $185 billion annually in U.S. economic activity and sustains 2.2 million American jobs.

Background

ARTBA believes that the United States must take a balanced approach to improving the efficiency of its transportation network, including enhancements to operations in air transport, roadways, ports and waterways, railroads and public transit. The problems facing America's increasingly congested transportation system can only be improved by a comprehensive, intermodal approach to improving the network.

ARTBA also believes that the U.S. must take full advantage of its arsenal of available tools to conquer this problem, including new construction, improved maintenance, implementation of ITS technologies, and adaptation of "best practices" that can be found across the country and around the world.

The focus of this ARTBA paper, however, is limited to the operations of the national roadway system because, according to a 1999 U.S. DOT report to the Congress and other authoritative sources, America's road network facilitates 90 percent of all personal travel in the U.S. each year and 76 percent of all domestic freight shipments, with an annual value of more than $5 trillion.

According to the U.S. Department of Commerce's latest report on the tangible assets of the United States, federally aided roads and bridges represent a capital investment with a value of over $25 trillion.

The Federal-aid Highway System, along with all roadway development projects, should not be viewed as "just construction programs." They are rightly put in a larger context, including a more acute focus on efficient operations. Today, America's roadway transportation network impacts virtually every aspect of American business and our quality of life.

Over the past decade, the Federal-aid Highway Program has been guided by two laws—the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and 1998's Transportation Equity Act for the 21st Century (TEA-21)—that rewrote federal surface transportation policy.

While both ISTEA and TEA-21 significantly boosted federal highway investment (and stimulated increased state investments to take advantage of matching funds), changes in the federal program, such as allowing more state flexibility in using the funds, combined with inflation and ever-growing highway traffic to result in a *highway and bridge investment* that does little more than maintain the physical condition of the overall system. System performance is actually further deteriorating.

As we enter the new century, the nation's highway system is literally American business' warehouse. The speed and efficiency promises of "e-commerce" will mean little without an efficient surface transportation system. The same goes for emergency response and public safety services. The nation's defense and emergency mobilizations—and its two largest industries—grocery and travel—depend on good roads.

The reality America faces today, as the U.S. DOT Report to Congress attests, is that the overall physical condition of the nation's highway and bridge system improved only slightly and its performance declined over the past 12 years. ISTEA and TEA-21 did not trigger a surge in construction of ***new*** roads, highways or bridges ***that add significant system capacity***, nor have the led to improved operations that keep pace with the exponential increase in vehicular traffic.

ARTBA believes that more must be done, both in terms of new construction and improved operations, to meet the growing demands for an efficient national transportation system.

Introduction: Operations and Capacity

ARTBA advocates that America's future roadway transportation needs can only be met by implementing a dual approach of increasing system capacity while simultaneously improving operating efficiency. Efforts to promote one prong of this strategy without the other will not meet the nation's growing demand for roadway safety, mobility and efficiency.

While aspects of improved operations have been developed and implemented for many years, there are few examples that can be used as models to fit the unique and large-scale needs of the U.S. transportation infrastructure and the American demand for efficient and convenient transportation. Some have cited extraordinary events as models, such as Olympics and other major entertainment and sporting events that have placed exceptional demands on our transportation capacity. While transportation planners have met these challenges with admirable success, the models still are "events" and do not fairly represent the long-term daily demands that are not being met in many U.S. metropolitan areas.

The precedent-setting efforts of the U.S. to develop and build the interstate roadway system are remarkable. Several decades later, however, it is fair to evaluate the question of whether we

adequately planned for future maintenance, rehabilitation and expansion of the system. Surely, the early planners of the interstate system did not believe that their plans would endure a half-century without enhancements, but in many cases, that is what has happened and we are now seeing the results. Moreover, some early planned roadway systems have not been built. Those areas are suffering the backlash of congestion that an under-capacity system delivers.

As the U.S. population and vehicle miles traveled grows exponentially faster than our new capacity, improved operations alone can only mitigate congestion, but not solve the problem in its entirety. Nevertheless, this paper focuses primarily on improved operational aspects of our roadway system.

The U.S. needs a dynamic transportation network to meet the needs of a growing population and economy. Among the primary methods to ensure the efficiency of this system is adding road capacity, where appropriate and desired by a majority of local citizens. This is key to reducing traffic congestion and the resulting unnecessary auto, truck and bus emissions. Adequate road capacity is essential to maintaining time sensitive ambulance, police and fire emergency response service. In the emerging era of "e-commerce," even more will be expected of the U.S. basic roadway infrastructure. The speed and convenience of purchasing goods via the Internet will be of little use without an efficient road network for delivering them.

Fifty-three percent of urban interstate highway miles are congested during the peak travel hour. In the nation's 68 largest urbanized areas, 64 percent of all travel occurs in "moderate" to "extreme" traffic congestion, compared to only 35 percent in 1982. This congestion costs the U.S. economy more than $70 billion each year, more than triple the $22 billion cost in 1982. Perhaps even more distressing is the cost traffic congestion is imposing on the quality of life for American families.

Other measures to reduce traffic congestion include:

- Improving local management of traffic incidents to clear roadways quickly;
- Increasing utilization of synchronized traffic signalization and other "smart road" technologies to increase traffic flow; and
- Improving public transportation systems, including bus, vanpool, car pool and demand-response networks that handle 64 percent of all public transit trips in the U.S.

In ARTBA's analysis, the operational aspects of the roadway system can be enhanced primarily in three ways: 1) operational improvements to the infrastructure, 2) more efficient traffic management, and 3) improved traffic management in temporary traffic control situations (e.g. work zones and emergency incident management).[1] Each of these approaches is impacted, to varying degrees, by the general themes related to a) funding, b) institutional cooperation, understanding, and coordination, c) federal involvement, and d) planning.

This paper analyses each of the three approaches identified by ARTBA as they relate to the themes.

[1] NOTE: It is relevant to note that many members of ARTBA's Operations Task force felt that the term "operations" is very general and vague. For this reason, ARTBA developed its discussion around these three themes.

Improved Operations: The Need

The need for operational improvements to the transportation infrastructure is apparent:

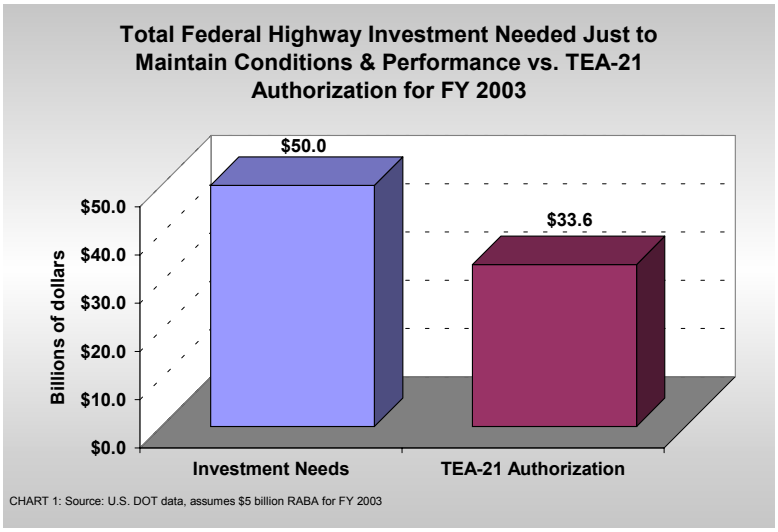
- More than 40,000 people die and 3 million are injured in crashes on U.S. roads each year, costing American society more than $160 billion annually. Traffic accidents are the leading cause of death of Americans 6 to 28 years of age and result in more permanent disabling injuries than any other type of accident. Poor road conditions or outdated alignments are a factor in an estimated 13,000 U.S. road-related fatalities each year. This is unacceptable.

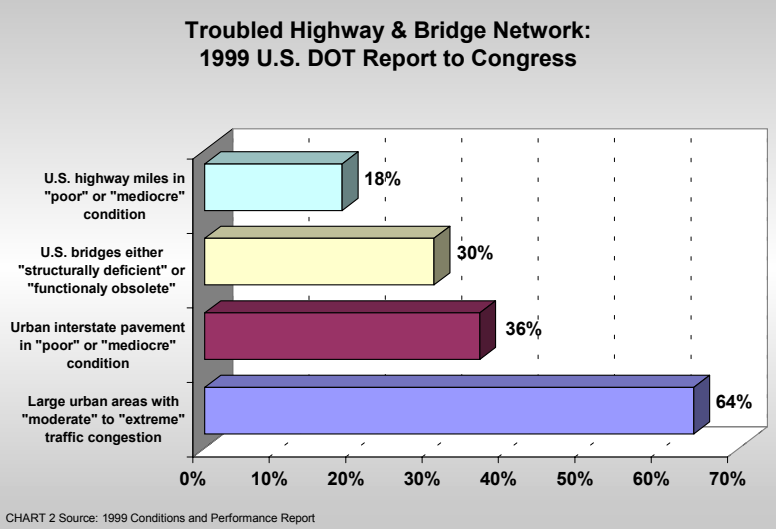
- Twenty-eight percent of all arterial road miles in the U.S. are in “poor” (nine percent) or “mediocre” (19 percent) condition. Twenty-six percent, government data show, are in “fair” condition. The situation is worst on the nation’s heavily traveled urban interstates, where 36 percent of the pavement mileage is classified as in “poor” or “mediocre” condition.

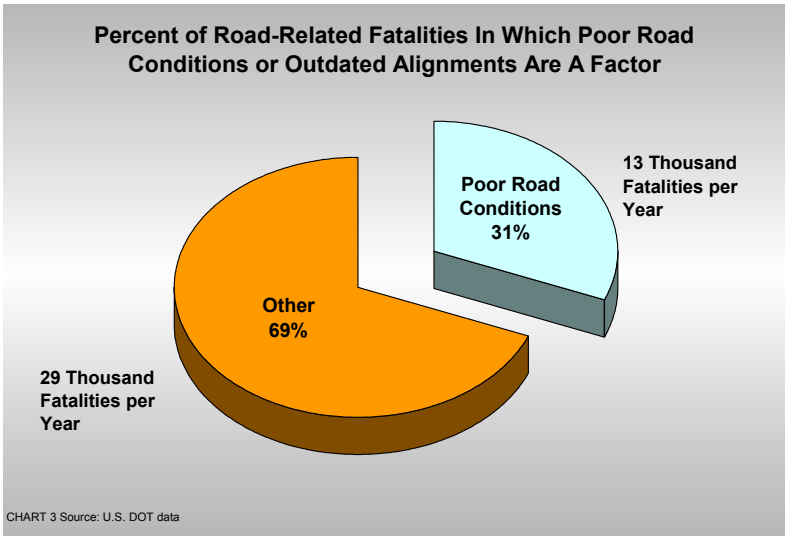
- Thirty percent—172,572 U.S. bridges—are either “structurally deficient” or “functionally obsolete.” That includes more than one out of every four bridges (27 percent) on urban interstates.

- While two-lane roads account for just about half of total vehicle miles traveled (VMT) each year, they are the sites of 77 percent of all fatal motor vehicle crashes.

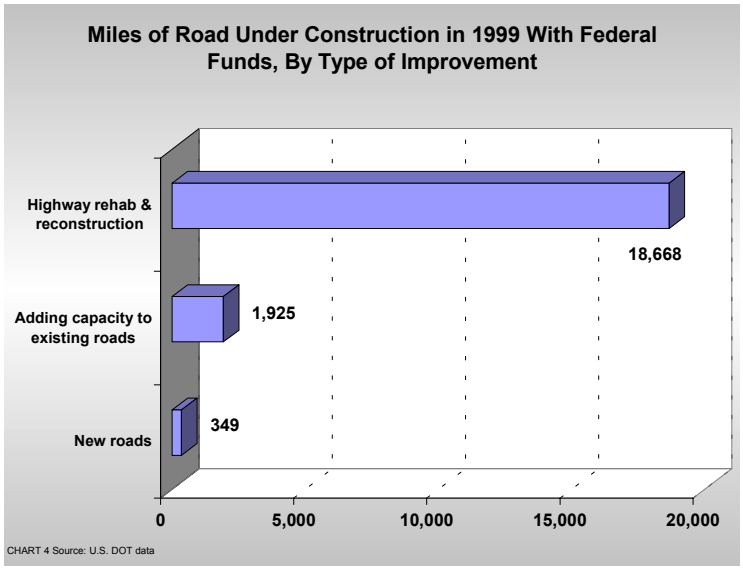
- Poor road conditions impact the American family budget. According to an analysis by The Road Information Program, driving



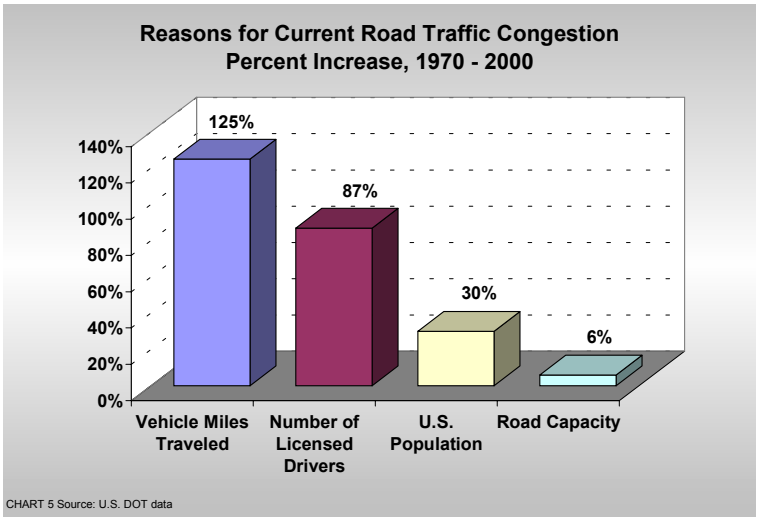




on roads in need of repair increases the annual cost of operating a motor vehicle by an average $222 per year. For the average American family, which owns two motor vehicles, that's almost an extra $450 slice out of their annual household budget. Collectively, Americans are paying an additional $41.5 billion per year in motor vehicle operating costs due to substandard road surface conditions.



- Highway capacity is a growing concern. Fifty-three percent of urban interstate highway miles are congested during the peak travel hour. In the nation's 68 largest urbanized areas, 64 percent of all travel occurs in "moderate" to "extreme" traffic congestion, compared to only 35 percent in 1982.



- Research by the Texas Transportation Institute provides insights into the traffic congestion crisis. Traffic congestion delays are up 213 percent since 1982, TTI says. Over the same time period, the U.S. population has increased 19 percent and vehicle miles traveled (VMT) is up 72 percent. New road capacity in terms of lane miles, however, has increased only six percent. Traffic congestion costs the U.S. economy more than $70 billion each year, more than triple the $22 billion cost in 1982. Perhaps even more distressing is the cost traffic congestion is imposing on the quality of life for American families.

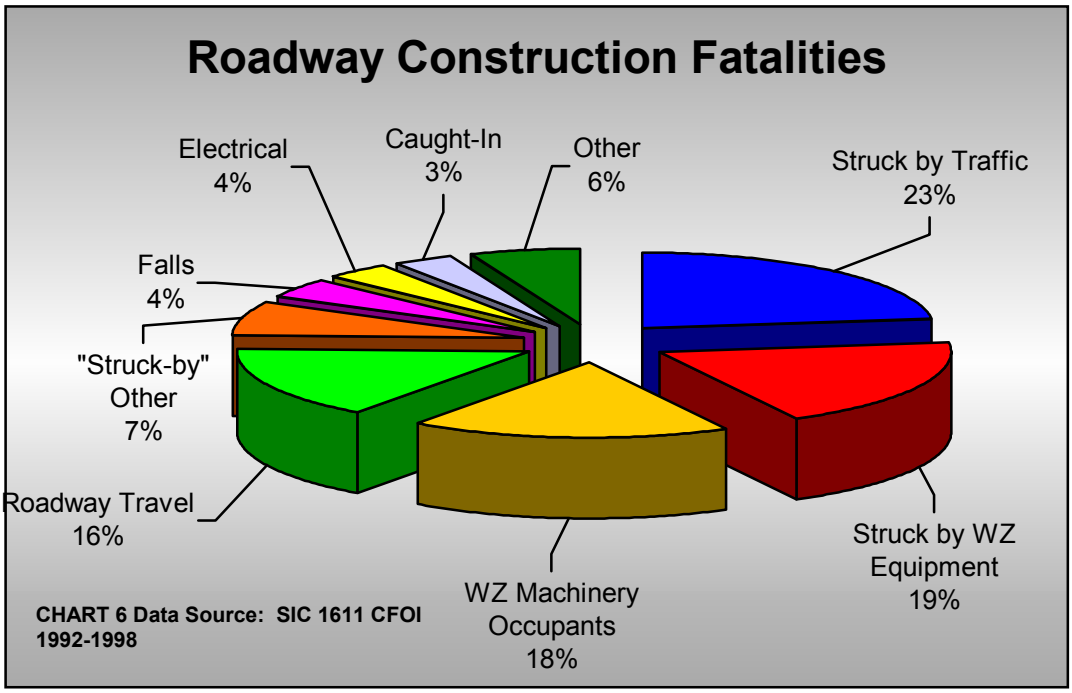
These issues affirm ARTBA's belief that greater emphasis must be given aspects of operating, managing and maintaining the national transportation infrastructure. Nevertheless, ARTBA strongly believes that the need to address transportation operations should not be construed as "shift" from construction and maintenance programs. New construction and maintenance are critical components to keeping pace with a growing and efficiency-demanding population. Rather, the critique and added emphasis on operations reflect the natural progress of understanding and need as our transportation infrastructure matures, and some badly congested areas do not have the funds or available space to continuously expand.

Institutional Issues

Improved Cooperation, Building Relationships at Local and State Levels: As the U.S. is now undergoing significant maintenance and rehabilitation to the interstate highway system, planners and designers should seriously look at the challenges that the industry is now facing and make improvements to facilitate maintenance and rehabilitation efforts several decades from now.

Construction Under Traffic—As we repair our system, few traffic diversion alternatives are available, forcing work to be done while keeping the roadway open. These roadway work zones are posing serious challenges, delays and safety problems for motorists and workers as the drivers attempt to maneuver through unconventional paths in close proximity to workers.

As construction disrupts traffic, motorists often put great pressure on the government (the owner) to conduct work with minimal disruption. In turn, the government passes this mandate to the contractor. As a result, the contractor is required to conduct work in an atmosphere that is not always conducive to the safety of the workers.



Increasingly, government owners are placing greater restrictions on contractors regarding the timing and organization of roadway construction. Because the roads are in use, construction specifications and even traffic ordinances are being drafted and implemented to: 1) encourage work to be done more quickly; 2) minimize the size of the work zone; 3) work during evening and night-time hours; and 4) maintain normal traffic speeds for passing motorists.

While these requirements are helpful to minimize motorist inconvenience and improve traffic safety conditions, they directly impact worker safety. Smaller work zones coupled with expedited schedules create hazardous conditions leading to the primary worker hazard *within* the work zone: “struck-by” incidents. Data from the Census of Fatal Occupational Injuries (CFOI) 1992 – 1998 show that 19 percent of worker deaths in the heavy and highway construction industry were caused when construction vehicles and equipment struck pedestrian workers. The only greater hazard is that posed by motorists who intrude past the barricades

and strike workers, accounting for 23 percent of the fatalities. Recent data trends indicate the primary cause is shifting, with more workers being killed by construction vehicles and equipment than motorists.

Large vehicles operating in confined areas, adjacent to pedestrian workers create situations that place workers at great risk for injuries and fatalities. Night work increases these risks because of impaired vision and fatigue, not only from motorists but also from the workers themselves. Moreover, workers are much less likely to be struck by a vehicle intruding past the barricades when traffic moves by at 30 miles per hour (mph) as opposed to 65 mph.

These hazards are not created nor easily controlled by the contractor. The owner (e.g. the state department of transportation) and motorists impose many of these hazardous conditions upon the worker and contractor. As a result, the contractor alone is not always in the best position to implement changes to improve work zone safety.

It is not enough to simply "repair" our interstates, returning them to optimal condition. Infrastructure improvements must be made to allow for future maintenance with minimal disruption to traffic flows and creation of fewer safety hazards.

ARTBA Recommendations:

- *Frequent, formal and regular dialogue should take place between contractors, state departments of transportation, organized labor (where appropriate), safety professionals, and the Occupational Safety & Health Administration (or their state counterparts) to coordinate roadway construction, maintenance and operations programs and policies. This dialogue should take place through partnerships, backed by formal agreements, wherein the parties work together, on specific, agreed upon milestones to effectuate change. Such partnerships should be encouraged by national federal agencies, associations, and public interest groups*

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- *Safety considerations during construction, renovation and operations—for both the motorist and the construction worker—must be considered as early as the design phase to ensure adequate safety protections can be implemented in a timely, cost-effective manner. Government bodies should work with contractor organizations to ensure that the contractor, who has first-hand knowledge of operations and safety challenges during construction, can provide critical information to improve design efficiency if they are allowed to participate earlier in the process.*

Arterial, local and two-lane roads can present even greater hazards than the interstates for work zone safety because of the combination of possible high speeds, narrower lanes, no barriers between lanes of opposing traffic, and the increased distractions noted previously. In these instances, worker visibility takes on paramount importance. The driver must be able to distinguish the worker from the surrounding area. Also, it is less likely (though just as important) that a physical barrier will protect the worker.

ARTBA Recommendation:

- *FHWA, state departments of transportation, and local roadway owners should encourage compliance with industry standards related to worker visibility and use of high visibility garments. High visibility clothing refers to reflective garments that workers should wear whenever their work place contains hazards related to low visibility or proximity to moving vehicles or equipment. In 1999, the International Safety Equipment Association (ISEA) and the American National Standards Institute developed a new industry standard to provide*

national uniformity for such clothing—ANSI/ISEA 107-1999. Such compliance may be mandated through contract documents, model specifications, etc. to ensure a "level playing field" in the low bid system for contractors who place proper emphasis on worker and motorist safety.

Incident Management: According to several recently published studies, including an abstract by the American Trucking Association (ATA) Foundation, traffic accidents and related inadequate incident management procedures are the cause of 50 – 60 percent of total congestion. In smaller, urban areas it can account for an even larger proportion. Common occurrences, such as the rollover of a large truck carrying hazardous materials, can cause major roadways to be closed for hours. While public safety is a paramount interest in these situations, incident commanders from the police and emergency response services need to be better trained on the importance of and proper procedures for implementing timely temporary traffic control.

The Federal Highway Administration, state departments of transportation, and the construction industry have significant experience in planning and implementing temporary traffic control. Similar experience is not evident in emergency response situations, as motorists are often confused, distracted and delayed by the chaos.

ARTBA Recommendations:

- *State and local governments, municipal organizations and private industry should meet at least annually conduct interagency pre-incident planning, particularly for important interstate roads, intercity heavy traffic corridors, and rural linkage roads, to ensure that plans, communications, and equipment are available to deal with predicable closures and emergency situations.*

- *Roadways should be planned, designed and constructed to allow accessibility by emergency response vehicles, and provide space for traffic management and diversion in high use areas. This consideration must take place as early as the land acquisition phase to provide for smooth future operations.*

Temporary traffic control can be very challenging on rural and two-lane roadways due to typically smaller roadway surface areas. Often, the smaller roadways do not allow many options for traffic diversion or use of alternative routes, and are encumbered by the limited sight-distance problems noted previously. On rural roadways that provide critical linkages, it is important for local officials to conduct pre-incident planning and accident analysis to determine causes of incidents, and determine how to deal with traffic operations in the event of an emergency or construction work.

While ITS applications are important to improved operations on all types of roadways, they are particularly useful in areas served by urban and local roadways because of increased opportunity for informed motorists to take alternative routes when some areas are overly congested or hampered by construction or emergency incidents.

ARTBA Recommendation:

- *Local and municipal governments should work with adjacent governments and roadway owners, local businesses, and law enforcement to identify alternative routes to some of the more heavily traveled corridors. For example, when the main roadway is congested, ITS applications should be initialized to redirect traffic to alternative routes. Contingency plans should be in place to quickly change traffic signaling along the alternative corridor, limit the curbside parking to free up lane space, and, where feasible, change the direction of traffic to*

ease the flow of traffic through the area. These same procedures can be implemented for long-term use, special events, during construction operations, and/or during emergency incidents.

A critical component to this type of traffic control is clear public communications, using all mediums including ITS messages, roadway signs designating the alternative corridors, and work with local media outlets.

Standardized Communication with the Motorist: Feeder and arterial roads can have a more confusing environment because of the increased amount of information that is targeted to attract the driver's attention. In addition to the standard roadway signs and billboards, motorists often find businesses and other advertisers displaying a plethora of information that can distract the driver. Also, drivers must be more aware of pedestrians and traffic moving in different directions, such as at intersections.

Because of these conditions, it is more important to ensure that standard signs and road markings are well maintained and properly posted so that the driver is not surprised by the condition of traffic information and control devices under control of the owner, roadway construction contractor or the maintenance industry.

ARTBA Recommendation:

- *State and local governments should pay particular attention to signs, markings and signals on arterial roadways, ensuring that they are maintained in optimal condition. State and local entities should work together to ensure that sign placement and maintenance is standardized. Local governments should routinely inspect roadways to make sure that advertising and business signs do not overly compete with roadway signs, signals and markings.*

Heavy Directional Traffic: Local and urban roadway owners often face traffic congestion problems that are tied to directional traffic flows during certain peak usage periods, such as "rush hour." In these situations, traffic lanes in one direction may be congested while the opposite lane traffic flows are minimal.

ARTBA Recommendation:

In areas of directional traffic flows during predicable time periods (where space may be limited for expanding the roadway infrastructure due to buildings, bridges, parks, etc.), roadway owners should seek to utilize under-used opposing traffic lanes though ITS directional indicators, pavement markings, and moveable concrete barrier systems which provide positive buffers between traffic lanes. Such changes to traffic flows must be coordinated by all local jurisdictions who will be impacted by the changes.

Federal Role

ARTBA Recommendation

- *FHWA should support training and cooperative efforts between government agencies, civic institutions and private industry organizations involved in road construction, law enforcement, and emergency response to ensure a sound understanding of transportation operations and cooperation between agencies and governments at all levels.*

The hazards of rural roads are often tied to their design, such as no passing lanes, "blind curves," narrow or non-existent shoulders, etc. These hazards can only be addressed through the infrastructure improvements, as noted above. There are, however, several traffic management principals and ITS applications that may be useful to prevent accidents and improve traffic flow. The federal government (and national organizations) should conduct research and provide for educational outreach programs to assist local entities with their safety and operational needs.

ARTBA Recommendations:

- *On the "low-tech" side, the federal government should encourage roadway owners to consider elimination of unmarked intersections, and make greater use of signage and pavement markings to indicate known and predictable hazards. The federal government should assist with research, create forums for sharing best practices and develop educational outreach programs to assist local owners.*
- *In areas of known dangers, such as limited visibility due to curves or hills, the federal government should assist with development / implementation of ITS applications to warn motorists of on-coming or cross-directional traffic that may not be visible from a safe stopping or slowing distance.*

Funding

ARTBA is supportive of seeking additional federal funding to assist states and local governments meet their increasing operational needs. ARTBA wishes to make clear, however, that such funds must come by increasing the amount of federal funds dedicated to transportation projects, and not diverting funds from programs that still have pressing, unmet needs. To state the matter plainly, ARTBA would not support creating new categories of operational funding from monies set aside in the highway trust fund unless the fund revenue is increased with monies for that purpose.

With that funding caveat in mind, there are several areas in which ARTBA recommends increased funding for operational programs.

Expand Federal Funding for Research: Increased federal investment in research is consistent with the need for an integrated and standardized national transportation system and commensurate with the ability of research to add value to the field of transportation by improving the overall cost-effectiveness, durability, safety and environmental soundness of highway and bridge projects to meet national mobility requirements.

Federal surface transportation research activities should include projects that address construction materials, innovative technologies, intelligent processes and methods, inventive

contracting and financing, and promote the testing and experimental use of innovative technologies and materials.

ARTBA Recommendation:

- *The reauthorization of TEA-21 should establish roadway safety as one of the priorities for federal research activities. The program should seek to apply new technologies and other innovations to help advance new infrastructure safety initiatives. Additional funding sources need to be obtained to meet this objective.*

The federal government, as the distributor of federal highway funds, is rightfully in the best position to encourage/require states and local agencies to use of funds in ways that promote smoother and safer operations.

- *Capital improvements, such as broader right-of-ways, full depth shoulders, and construction of parallel frontage roads should be completed to provide locations for safe and smooth traffic diversion for current and future rehabilitation projects and emergency response incidents.*

A Well-Maintained System—Arguably the greatest operational aspect of our Interstates – or any road system – is maintaining the roadway surface in good condition, including clear pavement markings and signage. As noted previously, according to data from the Federal Highway Administration, federal investment in roadway infrastructure maintenance has been inadequate to simply maintain the roads in good condition, let alone improve them.

ARTBA Recommendation:

- *Adequate funding should be obtained through federal and state legislatures, and public/private partnerships to provide for roadway construction, maintenance and operations. For the Federal-aid Highway program, ARTBA recommends a minimal $50 billion annual investment, beginning with the 2003 TEA-21 Reauthorization. This is the level of investment suggested by data in the most recent U.S. DOT report to Congress on highway and bridge conditions and investment requirements.*

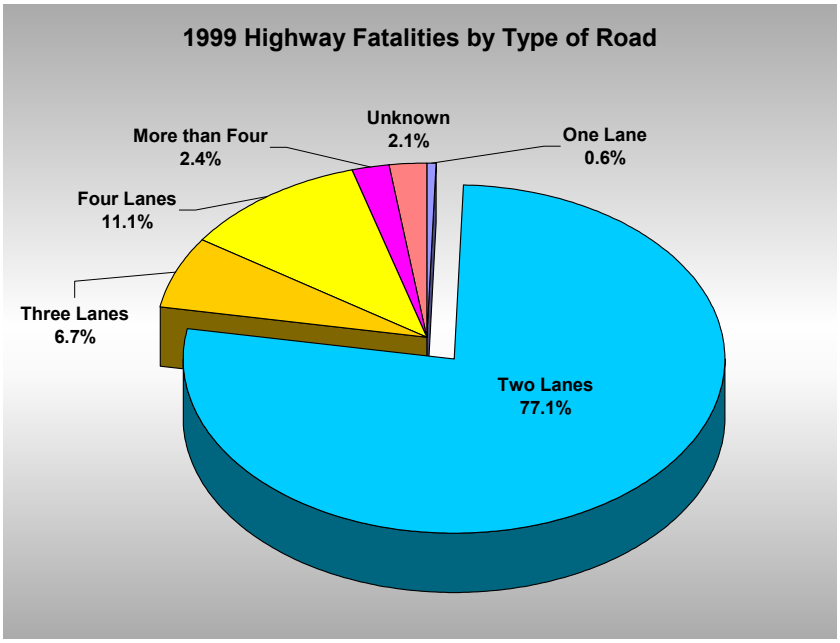
Railroad grade crossings continue to create hazards in roadway, rail, and transit operations. Moreover, at-grade crossings can cause varying degrees of delay to traffic operations.

ARTBA Recommendation:

- *When a railroad grade crossing is present at the site of a capital improvement project, the roadway owner should, if feasible, eliminate the at-grade crossing. Rail and transit owners should likewise work with governments to eliminate crossings if or when they are conducting renovations or maintenance operations. Similarly, "private grade crossings," which are now fully accessible and used by the general public, should be redefined to make them eligible for Section 130 funding. In addition, innovative methods to further improve safety at highway-railroad grade crossings, such as low-cost active warning systems for lower volume grade crossings and photo enforcement at grade crossings, should be explored. Additional funding sources need to be obtained to meet this objective.*

More than 28,000 people die, and almost 841,000 more are injured, each year on two-lane roads. Nevertheless, this death rate is virtually the only major public health problem that receives very little federal funding for prevention or cure. In the post-Interstate era, increased attention should be given to targeted road improvements that have a high likelihood of reducing

crash potential. As the chart suggests, special focus should be given to rural and suburban two-lane roads.



During the last two federal surface transportation program reauthorization bills, a federal trend toward allowing governments with direct knowledge of a region's unique transportation needs to address those needs has emerged.

ARTBA Recommendations:

- *ARTBA recommends establishment of a federal "High-Risk Rural Road Safety Program" program that empowers local officials, in coordination with the appropriate state department of transportation, to perform safety improvements on identified high-risk two-lane roads, where a disproportionate share of crashes and fatalities occur. Additional funding sources need to be obtained to meet this objective.*

- *Provide local control to meet local needs—Within each state, state and county/municipal officials should establish a system to direct these funds to the non-metropolitan two-lane roads where the potential roadway safety benefit is greatest.*

- *Improvement projects should include:*
  - *improving horizontal and vertical alignment*
  - *eliminating wheel lane rutting*
  - *increasing skid resistance*
  - *smoothing roadways*
  - *improving sight distances*
  - *widening lanes and shoulders*
  - *installing dedicated turn lanes*
  - *installing guardrails, traffic barriers, crash cushions, and protective devices; and*
  - *installing traffic and safety lights, improved signage, pavement markers and pavement markings.*

Use New Technologies to Help Meet System and Mobility Needs: U.S. mobility can be improved through breakthrough advances in adapting and integrating existing and new technologies into transportation by continued federal investment in transportation technology through the Intelligent Transportation System (ITS) and Technology Deployment programs.

ARTBA Recommendation:

- *To ensure the wise use of federal investments in this area, the U.S. General Accounting Office or U.S. DOT should evaluate past ITS expenditures and report on their effectiveness.*

Adequately Fund University Research: Higher educational institutions are uniquely positioned to provide solutions to complex problems and opportunities for states to develop a university research program that focuses on each state's individual transportation challenges.

ARTBA Recommendation:

- *ARTBA encourages increased federal investment in the University Transportation Centers Program to capitalize on the critical role these centers play and allow each state to participate in resolving regional and national issues through partnerships with universities. Additional funding sources need to be obtained to meet this objective.*

Provide Funding For Transportation Education Programs: A well-trained and educated workforce is critical to meeting the growing challenges that face the nation's transportation network.

ARTBA Recommendation:

- *A federal research program that promotes careers in transportation should be initiated to further develop knowledge workers for the transportation community. This initiative will help ensure human capital is available to: construct and maintain the nation's transportation network using the latest techniques and technologies; educate the prospective transportation leaders in a innovative, enlightened, and competent fashion; and operate the transportation system to produce significant increases in mobility for the United States. Additional funding sources need to be obtained to meet this objective.*

Invest in Federal Technology Transfer Initiatives: The reauthorization of TEA-21 should provide the necessary funding for technology transfer to the transportation construction and corresponding support industries to ensure the latest knowledge and information is available to accelerate the development of needed transportation improvement projects. These initiatives should also seek to enhance the safety, quality, and durability of the nation's transportation infrastructure.

Planning and Operations

The critical component of traffic management operations is communication. That communication takes place in many forms ranging from roadway signage and traffic control, to ITS applications, to local traffic reports, to meeting the preconceived expectations of motorists.

Since its inception, the U.S. Interstate System has, purposefully, developed a reputation as a safe, smooth, fast and efficient network for moving vehicular traffic and motor freight. That communications campaign to the public created an open invitation make use of its lanes, resulting in a system that amounts to only about one percent of total roadway capacity while handling approximately 30 percent of the vehicle miles traveled.

In areas where the Interstate expectation is not being met, concern is being expressed.

While ITS applications, 511 information systems, news reports, etc. are excellent means to provide information, ARTBA believes that the best way to manage traffic on the interstate is to continue to meet public expectations—maintaining the system in good working order. While this necessitates construction operations, it also mandates that roadway maintenance be conducted in a planned, regular manner to prevent significant deterioration before repairs are made.

ARTBA Recommendations:

- *State departments of transportation need to carefully evaluate their maintenance programs to ensure consistent and timely maintenance. Options for contracted maintenance should be carefully evaluated to determine the most efficient and cost-effective means to optimize roadway conditions.*

- *ARTBA recommends that studies be conducted to evaluate creating a link between federal roadway financing and the states departments of transportation adherence to national specifications for maintenance.*

Work Zones—Most motorists realize that roadway construction work zones are dangerous places. Workers who labor eight hours a day adjacent to speeding traffic understand more acutely the hazardous nature of these construction sites. Nevertheless, motorists and workers continue to die at alarming rates in work zones. The most recent federal data show that 1093 people died and over 40,000 were injured in 2000. Those numbers demonstrate that nearly four people are killed every day; approximately 130 of the fatalities are workers who die at a rate of one every three days.

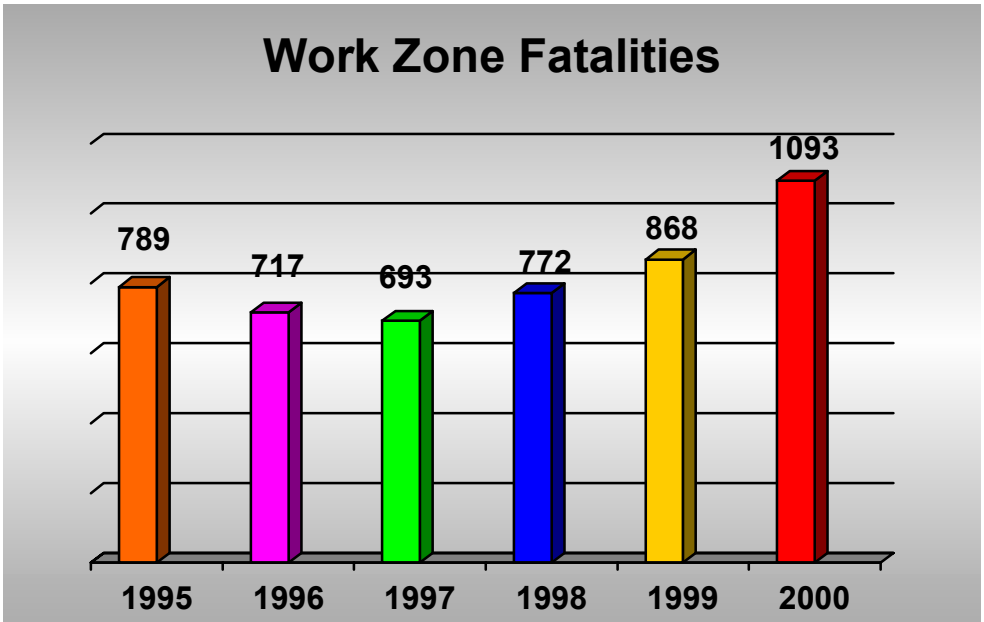


CHART 7 Source: National Work Zone Safety Information Clearinghouse

The enactment of TEA-21 created record-level funding for transportation improvement projects with well over $200 billion in scheduled improvements over the next several years. As a result, the American Road & Transportation Builders Association (ARTBA) predicted a 66% increase in roadway work zones. The challenging aspect of this escalation in construction is that most of it will be done on existing roadways that will remain open to motorists during the construction phase. This “construction under use” situation creates hazards and safety conflicts for roadway contractors, workers and motorists.

As noted previously, ARTBA believes the best way to improve Interstate operations in and around work zones is to have parallel capacity available to divert traffic, such as full depth shoulders or parallel frontage roads, especially in high-traffic areas. The most effective means to eliminate hazards to motorists and workers in road construction areas is to close the road. This has been done effectively in some places, such as Interstate 95 in Delaware where a parallel beltway was available for diversion. The ability to divert traffic in Delaware resulted in completion of the construction project many months ahead of schedule.

ARTBA Recommendations:

- *In areas where complete traffic diversion away from the work area is not available, states should be encouraged and funded to provide positive separation between workers and traffic through use of Jersey-type, portable or moveable barriers. The use of positive barriers provides clearer communication to the driver on the correct traffic path to follow, thus resulting the better maintenance of traffic speeds and reductions in dangerous and annoying traffic queuing. Use of barriers also better protects workers from errant vehicles that leave traffic space and strike and kill or injure workers. This type of effective barrier has been done effectively on the I-95 project in Springfield, Virginia, and in the renovation of New York Avenue in Washington, DC.*

- *At a minimum, states should take a more active role in developing contract specifications and special provisions to better specify and ensure sound safety programs, usage of good traffic control devices and sound traffic control methods.*

Remove the "Fiscally-Constrained" Requirement for State and MPO Plans: The "fiscally-constrained" requirement for long-range transportation plans has become a barrier to the consideration of visionary surface transportation projects (transit and highways) in state and metropolitan transportation plans. The multi-year nature of transportation development projects and the transportation planning process makes the identification of funds before projects can be considered unrealistic and unnecessarily delays needed transportation improvements.

ARTBA Recommendation:
The fiscally constrained requirement should be eliminated.

Conclusion

The U.S. transportation system, particularly its impressive network of roadways, is a tribute to American foresight, planning, and commitment to efficient movement of goods, services and people. The U.S. must continue to invest in this achievement, however, to ensure that it remains viable in the future. To maintain the needed level of efficiency, adequate resources must be given to new construction, maintenance, and operational needs of the network. The investment must be carried out across all transportation modes, including roadways, air, rail, transit, ports and waterways.

The U.S. must also look at all available resources, including emerging technologies and best practices, to improve and maintain the system in the highest possible condition at the best feasible cost.

In many areas of the country, the pace of construction, the level of maintenance, and the efficiency of operations are not meeting the growing population and public demands on the system, and more must be done as congestion increases at alarming rates in several of the most-favored modes.

Public and private sectors of the U.S. transportation industry understand the majority of the problems, and know many of the solutions to them, but do not yet have the public support nor financial capital to make the necessary improvements.

The National Dialogue on Transportation Operations is a critical step in bringing transportation leaders together to create a common agenda and strategy to improve transportation operations. The recommendations presented by ARTBA in this paper reflect the deep understanding of the issue by public and private leaders who represent a broad cross-section of the industry through the Association.

After 100 years of operation, ARTBA and its members from many backgrounds will continue to work with other national and local organizations and agencies to see that America's transportation needs are met for the next century.

Bibliography of Cited Sources

1. A Blueprint for 2003 Reauthorization of the Federal-aid Highway and Mass Transit Program, American Road & Transportation Builders Association (June 2001).

2. 1999 Conditions and Performance Report to Congress, U.S. Department of Transportation

3. Traffic Safety Facts, U.S. National Highway and Traffic Safety Administration (1999)

4. Highway Statistics, U.S. Federal Highway Administration (1999)

5. Analysis of fatalities noted under the Standard Industrial Classification code (SIC) 1611 (Heavy and Highway Construction) by the Census of Fatal Occupational Injuries (CFOI) 1992-1998, U.S. Bureau of Labor Statistics.

6. Work Zone Statistics, National Work Zone Safety Information Clearinghouse, http://wzsafety.tamu.edu (October 2001).

7. Incident Management – Challenges, Strategies, and Solutions for Advancing Safety and Roadway Efficiency, ATA Foundation (January 1977, Updated September 2001).