



REPORT CARD FOR
TEXAS'
INFRASTRUCTURE

2017



Aerial Austin Ambulance Interstate Interchange

Texas Section of the American Society of Civil Engineers

INFRASTRUCTUREREPORTCARD.ORG/TEXAS

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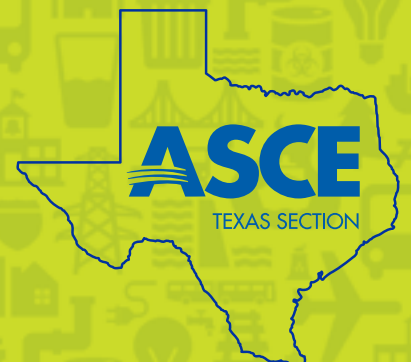
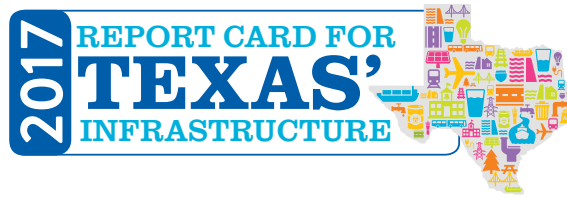


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EXECUTIVE SUMMARY

Texas. The geographically largest continental state, an economic powerhouse for the United States, leading the way in wind power energy production, population growth, and some of the largest infrastructure that has an ever-increasing need for improvement. This is the main theme of the *2017 Report Card for Texas' Infrastructure*, developed by the Texas Section of the American Society of Civil Engineers (ASCE Texas Section). In this update, though several of the infrastructure categories reviewed show areas of satisfactory performance, the clear majority indicate that Texas' infrastructure lacks funding, proper maintenance, and is poorly equipped to deal with environmental change as Texas continues to grow.

The population of Texas grows by 100 people per day, or roughly one U.S. Congressional District per year. It is the ethical and moral responsibility of the civil engineers of Texas to provide fellow citizens with solid working infrastructure for their daily lives. Too often, we take for granted that our lives are impacted by each of the seven infrastructure categories evaluated in this report card. Most people only think about infrastructure when it is broken. Consider the following:

- You only notice water infrastructure if your shower routine is interrupted by a funny smell coming from the pipes, or if the water doesn't come on at all.
- The bread you buy at the grocery store, which has its wheat grown and irrigated with the help of dams, has spoiled. The carton of eggs you purchase, transported on roads and across bridges, are cracked.
- Perhaps you're rushing to make a flight only to find out it has been delayed due to the aviation infrastructure lacking capacity for the influx of flights.
- You may take the garbage to the curb, where it is collected because of the roadway infrastructure; but what if it was never removed, or you had to haul it yourself in the back of the **minivan**?
- When you flush the toilet, fresh water rushes in to whisk the wastewater away, never to be worried about again. Have you ever wondered where it goes?
- During work, it starts to rain and the weather radio SHOUTS that it's the biggest storm in over 100 years. Do you feel safe because of flood control infrastructure protecting the community, or are you worried you cannot make it home?

We expect infrastructure to work effectively but when it doesn't, we may no longer take it for granted.

ASCE's mission is to provide essential value to its members and partners, advance civil engineering, and serve the public good. In carrying out that mission, ASCE advocates infrastructure and environmental stewardship and has developed an Infrastructure Report Card since 1998. The most current national Report Card, published in March 2017, indicated an overall grade of "D+" across 16 categories. **ASCE Texas Section grades the state's infrastructure an overall grade of "C-"** .

As civil engineers in the state of Texas, we have a responsibility to safeguard the life, health, property, and welfare of the public. We believe part of this responsibility includes providing the public and our elected leaders with critical information about the current state of our infrastructure, which is the main goal of this Report Card update. With this knowledge, the public will increase support for infrastructure improvement and maintenance. They will subsequently urge elected leaders to act to prioritize funding so that our vital infrastructure meets the needs of current and future Texas citizens. Additionally, we as civil engineers need to utilize best practices and design techniques to ensure the State's investment is wisely used.



OVERALL GPA AND GRADES BY INFRASTRUCTURE CATEGORY

Texas receives a “C-”, a slightly lower cumulative grade than received in 2012 when Texas received a “C”. This grade indicates a below average condition in many infrastructure categories including dams, drinking water, flood control, roads and highways, and wastewater in Texas, which all received a poor “D+ or below” grade. While the overall grade of Texas’ infrastructure has not changed significantly since the previous report card, half of the categories received unsatisfactory grades. These categories, if left unchanged, will hinder the growth and competitiveness of the Texas economy, now the largest and fastest growing in the nation.

METHODOLOGY

INFRASTRUCTURE CATEGORY SELECTION

Periodically, Texas’ civil engineers provide a comprehensive assessment of the state’s various infrastructure categories in the *Report Card for Texas’ Infrastructure*. In doing so, ASCE Texas Section follows in the footsteps of our parent organization, ASCE, which publishes an Infrastructure Report Card evaluating the nation’s infrastructure.

ASCE recognizes 16 major infrastructure categories for consideration in preparing infrastructure report cards. ASCE Texas Section’s Infrastructure Report Card Committee carefully considered each of these 16 major infrastructure categories within our state and determined which specific categories required immediate attention. The results reached by this infrastructure evaluation positively impact the public and enable elected leaders to make well-informed decisions with respect to infrastructure performance and funding.

ASCE Texas Section’s Infrastructure Report Card Committee is made up of dedicated civil engineers from across the state, with decades of expertise in all categories, who volunteered their time to work with ASCE Texas Section staff to prepare the Report Card. Infrastructure Report Card Committee members include civil engineers employed by public agencies, local government, private firms, and universities.

For the 2017 update to the *Report Card for Texas’ Infrastructure*, the Report Card Committee identified a need to update seven infrastructure categories. This Report Card includes the following infrastructure categories: *Aviation, Bridges, Dams, Drinking Water, Flood Control, Highways and Roads, and Wastewater*.

It is important to note two infrastructure categories that scored particularly well in the 2012 *Infrastructure Report Card* were deliberately not included within this Report Card update. The Infrastructure Report Card Committee concluded the *Energy and Solid Waste* infrastructure categories are performing above average, both receiving a letter grade of B+ in 2012, and, therefore, did not require reexamination when compared to the other categories in greater need of update.

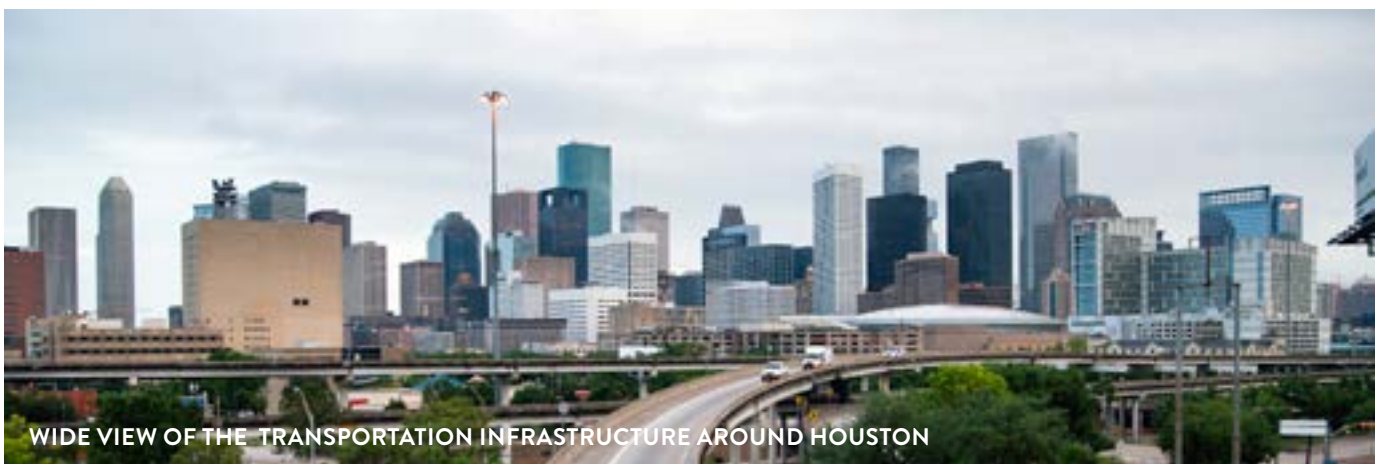
GRADING METHODOLOGY

Using a simple A to F school report card format, the Report Card examines current infrastructure conditions and needs, assigning grades and making recommendations to raise them.

ASCE Texas Section hired Susan Roth Consulting, LLC to gather data and prepare detailed summaries for each infrastructure category. Susan Roth Consulting, LLC coordinated with public agencies, private firms, and non-profit groups to gather the data and references presented herein. Summaries provided for each infrastructure category were peer reviewed by subject matter experts serving as members of the Infrastructure Report Card Committee, who often had no prior involvement with the Report Card. The collaboration of public, private, and university volunteers, along with the peer review process, resulted in this comprehensive assessment of Texas' infrastructure.

The Infrastructure Report Card Committee assessed all relevant data and references, consulted with other technical and industry experts, and assigned grades for each infrastructure category using the following criteria:

- **CAPACITY:** Does the infrastructure's capacity meet current and future demands?
- **CONDITION:** What is the infrastructure's existing and near-future physical condition?
- **FUNDING:** What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?
- **FUTURE NEED:** What is the cost to improve the infrastructure? Will future funding prospects address the need?
- **OPERATION AND MAINTENANCE:** What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?
- **PUBLIC SAFETY:** To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?
- **RESILIENCE:** What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?
- **INNOVATION:** How does future technology integrate with today's infrastructure?



WIDE VIEW OF THE TRANSPORTATION INFRASTRUCTURE AROUND HOUSTON

GRADING SCALE



EXCEPTIONAL, FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.



GOOD, ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable, with minimal capacity issues and minimal risk.



MEDIOCRE, REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.



POOR, AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of serious concern with strong risk of failure.



FAILING/CRITICAL, UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

REPORT CARD FOR
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Aviation



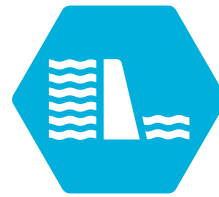
B-

Bridges



B

Dams



D

Highways
and Roads



D

Flood Control



D

Drinking Water



D+

Wastewater



D

G.P.A.



InfrastructureReportCard.org/Texas



AVIATION



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AVIATION

EXECUTIVE SUMMARY

Texas has 24 of the nation's primary/commercial service airports with scheduled passenger traffic, boarding 79.7 million passengers in 2015. The number of passengers (enplanements) at Texas' Commercial Service airports increased 8.49% between 2010 and 2015. To meet increased demand, Texas has made airport infrastructure investments through construction of new passenger terminal facilities, and renovation and expansion of existing terminals. Also, the Federal Aviation Administration (FAA) continues to increase Airport Improvement Program (AIP) grant funding of investments in Texas airfield infrastructure to improve resiliency and capacity. This increase in funding has resulted in improvement of the letter grade for Aviation from C+ in 2012 to B- in 2017.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

COMMERCIAL AVIATION

- Commercial service airports are defined as public airports receiving scheduled passenger service and having 2,500 or more enplaned passengers (also referred to as boardings) per year.
- Texas has 24 of the nation's primary/commercial service airports with scheduled passenger traffic, enplaning 79.7 million passengers in 2015. Six of these airports rank in the top 50 nationwide for annual passenger enplanements. Dallas-Fort Worth International Airport (DFW) ranks the 4th busiest in the nation with more than 31 million passengers annually. George Bush Intercontinental Airport in Houston (IAH) ranks the 12th busiest in the nation with more than 20 million enplanements annually.
- The number of enplanements at Texas' Commercial Service airports increased 8.49% between 2010 and 2015. During the same period, enplanements nationwide increased 7.19%.
 - Dallas Love Field Airport (DAL) saw enplanements grow by nearly 10% between 2015 and 2016. Growth is projected to slow to less than 1% in the coming years with a limit on the number of gates available.
 - Current traffic trends show an increase in international services traffic due to the initialization of international services from the William P. Hobby Airport in Houston (HOU), and a decrease in domestic enplanements in Houston due to the downturn in the energy sector. Overall, enplanements are down 4.5% year over year and are not expected to significantly rebound in the next six months.
 - International services capacity at IAH will be increased with the construction of a new international terminal by 2022.
- Most of the larger airports are experiencing aging infrastructure. As of 2016, the overall runway pavement condition is considered to be in good condition. The Federal Aviation Administration (FAA) maintains Airport Master Records (FAA Form 5010) for all airports. Those records include a condition assessment of runways. The assessment is done by FAA certification inspectors for the 139 airports and contractors hired by FAA for the smaller airports. For the airports in Texas in the FAA's National Plan of Integrated Airport Systems (NPIAS), the following is a breakdown of the runway condition:
 - Total number of runways at NPIAS airports = 273
 - Number of Runways in Excellent Condition = 50 (18%)
 - Number of Runways in Good Condition = 188 (69%)
 - Number of Runways in Fair Condition = 24 (9%)
 - Number of Runways in Poor Condition = 11 (4%)
- The Federal Aviation Administration (FAA) and other members of the aviation community have developed new standards to improve safety at U.S. airports during inclement weather. On October 1, 2016, U.S. airports, airline flight crews, dispatchers, general aviation pilots, and air traffic controllers will begin using new Takeoff and Landing Performance Assessment (TALPA) standards to reduce the risk of runway overrun accidents and incidents due to runway contamination caused by weather and other factors. As a result of the committee's work, the FAA has developed a new method for airports and air traffic controllers to communicate actual runway conditions to the pilots in terms that directly relate to the way a particular aircraft is expected to perform. Airports will continue to invest in pavement deicing and friction testing equipment. Interruptions in air service due to weather create a ripple effect across the industry both foreign and domestic costing the airlines money.
 - The number of NPIAS airports (200 or so) is only a small subset of all the airports in Texas (391 public and 1,614 private), but the NPIAS airports are the most significant.
 - DAL has developed a 7-10 year pavement management plan for the rehabilitation of the existing airfield. The pavement management plan along with capital planning is being coordinated with the FAA to ensure runway and taxiway projects can be supported through entitlement and discretionary grants.

- Houston and Dallas Airports are investing in asset management strategies to develop comprehensive pavement management systems for airfield infrastructures as outlined by the FAA Airport Improvement Program (AIP) Grant requirements. These outline the airport infrastructure investment needs over the next 10 years and allow the FAA to plan and prioritize investments. The majority of grant funds are distributed to hub airports. No major runway expansions are being considered at this time (i.e., no new runways).
- There continues to be support for FAA AIP Entitlement Grants into airport infrastructure, and the new Administration has indicated support for continued and increased infrastructure investment.

GENERAL AVIATION

- Airports that do not receive scheduled commercial service or do not meet the criteria for classification as commercial service airport location may be included in the National Plan of Integrated Airport Systems (NPIAS) as sites for general aviation airports if they account for enough activity (usually at least 10 locally based aircraft) and are at least 20 miles from the nearest NPIAS airport. General aviation airports tend to be distributed on a one-per-county basis in rural areas and are often located near the county seat.
- Texas has 243 general aviation (GA) airports and 2 heliports that are included in the Federal Aviation Administration (FAA) National Plan of Integrated Airport Systems and an additional 103 other airports deemed necessary for the system. These range from small airstrips to multi-runway reliever airports with hundreds of based aircraft.
- Texas GA airports are home to over 29,000 active aircraft. GA airports have 9,600 based aircraft reported with 2.4 million operations. General aviation as an industry has an annual impact that exceeds \$17.7 billion in Texas, and in 2010, was responsible for generating 56,635 jobs.
- Airport infrastructure, especially airfield pavements, is experiencing aging problems. Texas Department of Transportation (TxDOT) block grant funding for airports has made strides in recent years to bring infrastructure at some of the smaller GA airports to a condition of fair to good; 73% of the airports are in good condition and 14% are rated as fair or poor condition. In addition, eleven percent (11%) of the runways at the reliever airports are in good condition.
- Very few GA airports are financially self-supporting. Therefore, the operations, maintenance, and capital improvements at these airports are funded primarily by the city, county or airport board that runs the airport (i.e. Airport Sponsor). In San Antonio, a multi-airport system, the GA airport is subsidized by revenues from the commercial service airport.



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ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

COMMERCIAL AVIATION

- As the state economy grows, the number of enplanements at Commercial Service airports in Texas is forecast to increase at an average annual rate of about 2.64% through the 2025 planning period.
- Most of this growth will occur at the 7 busiest airports in the state. Strong growth in international enplanements is anticipated at DFW, Austin-Bergstrom International Airport (AUS) and IAH along with Southwest Airlines increasing international operations from HOU.
 - DAL recently completed the renovation of its terminal and is working on supporting projects for roadways and parking improvements. These improvements will assist with passenger turnover and are being designed to match the growth patterns of the region.
- Capacity at DFW and within the Dallas/Fort Worth metropolitan area will continue to be a concern as 15 million additional passenger enplanements are expected at the region's two Commercial Service airports in 2025. DFW is planning an expansion of international services facilities in response to this increase demand.
- Development of new airport facilities can take years for planning, environmental processing, and design before construction begins.
- Several airports have terminal expansion projects underway or in the planning/design stages [IAH, DFW, HOU, SAT, BRD, MFE, AUS, DAL (recently completed)].
 - DFW is planning an expansion of international services facilities in response to an increase demand.
 - Southwest Airlines initialized international services to 14 Latin American and Caribbean destinations in October 2015 from HOU.
 - IAH opened a new C-North Terminal Pier for United Airlines in March 2016 as an enabling project for the New Mickey Leland International Terminal Project.
- Encroachment by incompatible land uses such as residential development, along with increased awareness of and sensitivity to noise has increased noise complaints at commercial service airports. The FAA expects Airport Sponsors to actively work to control land use to maintain compatibility with airport operations. Many airports have found it difficult, if not impossible under existing laws, to impose meaningful zoning or development restrictions.
 - Houston Airports continue to monitor sound contours and invest in affected residential and commercial entities. Also, it continues to purchase available lots surrounding the airport as they come on the market to plan for future growth.
 - DFW has plenty of land left to develop; however, encroachment upon the proposed location of the future eighth runway will be problematic. This runway expansion is not anticipated within the next 10 years.
- The introduction of new large aircraft, such as the Airbus A380 and Boeing 747-8, in cargo service may demand facility improvements due to their size and weight capacities. Improvements may also be warranted at selected airports, including DFW and HOU, to keep pace with rapid growth in international air cargo.
 - ADG VI aircraft have been diverted from IAH to overseas markets and is down to one A380 flight.
 - The market is trending toward more efficient aircraft, such as the Boeing Dreamliner.
- New runway and taxiway construction / reconstruction will use the ADG VI design standard; however, airfield capacity will not be expanded just to accommodate ADG VI aircraft.

GENERAL AVIATION

- Financial difficulties and structural changes in the airline industry compounded by the economic recession that started in December 2007 lowered expectations for aviation activity. However, because the Texas economy is expected to grow at a rate above the U.S. growth rate, Texas aviation activity growth rates are expected to grow at somewhat higher rates than the average growth rates for the nation.
- Some Texas GA airports report sufficient capacity for the near term. The exception is the twenty-four larger GA airports designated Relievers and the more active GA airports. For these airports, the amount of traffic has continued to grow and capacity is near maximum.
- The FAA projects 3.1% average annual compounded growth in Texas' GA traffic during the period from 2015 through 2020. The forecasts indicate that Texas will maintain a level of 8.31% of the total U.S. aircraft fleet during this period.
- As lower cost business jets are introduced into the general aviation fleet, some business traffic can be expected to use selected GA airports for ease of access and lower operating costs.
- The FAA is currently mapping new Global Positioning System (GPS) approaches into many GA airports. While this will allow use of facilities in poor weather, implementation of these approaches requires additional land, clearing of obstructions, mapping, and equipment.
- A number of GA airports, particularly in the metropolitan areas, are experiencing encroachment from residential and other incompatible land use. Residential development is most sensitive to airport operations and is nearly always and incompatible to land use if located close to an airport. Some uses are incompatible because they actually represent a danger to aircraft using an airport.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

COMMERCIAL AVIATION

- Texas primary airports received over \$172 million in Federal Airport Improvement Program (AIP) funds in 2015, up from over \$141 million allocated to Texas in 2005. All Texas airports reported that current funding for maintenance is not enough, due to the age of the infrastructure and a large need to address failing facilities.
 - There continues to be support for FAA AIP Entitlement Grants into airport infrastructure, and the new Administration has indicated support for continued and increased infrastructure investment. The amount has been widely circulated as \$1 trillion over the next 10 years and equates to about a 10% increase in funding availability.
- Standards projects include development to bring existing airports up to design criteria recommended by FAA. This remains the largest development category, accounting for 29% of the National Plan of Integrated Airport Systems (NPIAS). Many commercial service airports were designed more than 50 years ago to serve relatively small and slow aircraft but are now being used by larger and faster turboprop and jet aircraft. As a result, runways and taxiways must be relocated to provide greater clearance for aircraft with larger wingspans, and aircraft parking areas must be adapted to accommodate larger aircraft. The FAA is looking to spend on safety improvements by eliminating “hot spots”, e.g. crossings in high energy zones, non-perpendicular intersections, and large expanses of pavement.
- The U.S. Department of Transportation (U.S. DOT) selected more than 36 communities from 22 states to participate in the Small Community Air Service Development Program. U.S. DOT received 36 proposals from communities in 24 states requesting over \$18.5 million. This exceeded the \$5.15 million that Congress approved for the program in 2016. One Texas airport in Amarillo will receive funds under this program in 2016; they were selected as a first-time grantee and will receive \$750,000 in order to secure service between PHX and AMA and provide twice daily regular jet service.

GENERAL AVIATION

- Current funding is unable to keep up with needed expansion and maintenance projects.
- The FAA's NPIAS estimated the need for \$833 million in Airport Improvement Program-eligible development projects at Texas GA airports over the five-year period from Fiscal Years 2015 to 2019. The estimate did not include planning costs necessary to provide development guidance, or funds to maintain existing infrastructure.
- Capital improvements at Texas GA airports are funded through a combination of Federal Airport Improvement Program (AIP) funds (administered by the State); Texas Aviation Facilities Development Program funds; and local funds invested by the Airport Sponsor. Federal apportionment is expected to be \$20 million annually and \$25 million in non-primary entitlement funds. State funds total approximately \$15 million annually based on current funding projections.
- TxDOT's Aviation CIP for 2017–2019, from which funding is programmed, has \$238 million available: \$148 million through federal funding; \$54 million from state funding; and \$36 million from local (sponsor) funding. A combination of state and federal funding can add up to as much as 90% of the project costs.
- TxDOT's successful Routine Airport Maintenance Program (RAMP) allows GA airport sponsors to use TxDOT contractors and bid prices to perform a variety of maintenance work on their airports. TxDOT encourages airfield maintenance work take priority, but nearly all maintenance is eligible. Funding is 50% of project costs annually up to a \$50,000 grant amount. TxDOT also provides funding (50% match up to a \$500,000 grant amount) for development of new terminal facilities at GA airports and for air traffic control towers at 90% of project costs up to \$1.5 million in federal funds.



AVIATION



RECOMMENDATIONS TO RAISE THE GRADE

- Provide additional state funding to aviation initiatives. Investing in aviation infrastructure helps Texas remain competitive and funding should be commensurate with the economic benefits the industry provides.
- The Texas legislature should explore reforms to existing laws that will better enable airports to control land by imposing zoning or development restrictions. Encroachment by incompatible land uses such as residential development, along with increased awareness of and sensitivity to noise has increased noise complaints at commercial service airports.
- Texas airports should continue to explore innovative third-party funding such as privatization, public private partnerships and others. Austin-Bergstrom International Airport has utilized this financing model for the design and construction of their parking garage and new terminal.

Sources

- *Small Community Air Service Development Program*, US DOT Order 2011-7-1
- *National Plan of Integrated Airport Systems (NPIAS), 2011-2015*, Federal Aviation Administration Report to Congress (www.faa.gov)
- FAA AIP Funding History http://www.faa.gov/airports/aip/grant_histories/
- *ACI-NA Economic Impact Fact Sheet*, Airports Council International – North America, September 2014
- Texas Airport System Plan Update 2010, Texas Department of Transportation, March 2010
- “Airports Focus on the Ground,” *The New York Times*, June 14, 2012
- Data provided by the Federal Aviation Administration and TxDOT General Aviation Division, August/September 2016



BRIDGES



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BRIDGES

EXECUTIVE SUMMARY

Texas has a significant challenge in managing the largest stock of bridges in the nation, over 53,000, and maintaining acceptable levels of mobility in its road network. Bridges directly managed by the state (on the designated state highway system) account for about 35,000 bridge records. Of these, 39% are culverts, meaning water flows beneath the structure. Off-system bridges (under direct jurisdiction of local governments such as a counties and cities) account for about 18,000 bridge records for which about 33% are culverts. Texas has made significant progress in decreasing the number of structurally deficient bridges since 2004, with less than 2% of the state's bridges now categorized as structurally deficient – well-below the 2016 national average of 9%.

The main challenges the State of Texas faces are related to a reduction of the federal-aid funds available for bridge Maintenance, Rehabilitation and Replacement (MR&R) and an aging bridge stock, with several bridges not meeting functional requirements for increased traffic volumes and loads. This scenario will require State Legislative action to increase funding for bridge MR&R.

The past Texas Legislative Session (2017), has approved several bills authorizing increases in truck size and weight (TS&W). These bills include the establishment of fees for these permits in order to recover road infrastructure costs. However, it is expected that these bills will result in additional bridge postings that will impact mobility on the Texas road network and require targeted investment on bridges and road corridors.

In summary, increased funding and drop in percentage of structurally deficient bridges has resulted in improvement of the letter grade for Bridges from a B- in 2012 to a B in 2017. However, Texas needs a long-term plan to ensure that mobility in the Texas road network is not affected by deficient bridges that do not meet load and traffic volume requirements. Legislators are encouraged to address these challenges through a revision of funding mechanisms for bridge infrastructure such as the fuel tax.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

- There are 53,488 bridges in Texas – almost twice as many bridges as in any other state. Of these, approximately 65% are on-system bridges (on the designated state highway system) and approximately 35% are off-system bridges (under direct jurisdiction of local governments such as a county or a city).
- The Federal Highway Administration (FHWA) and the Texas Department of Transportation (TxDOT) define a bridge as a structure erected over a depression or obstruction; having a roadway or railway for carrying traffic; and having a length of more than 20 feet.
- Bridge condition is categorized in terms of sufficiency: sufficient bridges, structurally deficient bridges, functionally obsolete bridges, and sub-standard for load-only bridges.
 - A sufficient bridge meets current federal and Texas requirements. It is not structurally deficient, functionally obsolete, or sub-standard for load only.
 - A structurally deficient bridge has an extreme restriction on or deterioration severe enough to affect its load carrying capacity or frequently overtopped during flood events, creating severe traffic delays.
 - A functionally obsolete bridge fails to meet current design criteria in deck geometry, load carrying capacity, vertical/horizontal clearances or approach roadway alignments.
 - A sub-standard-for-load-only bridge does not have significant enough load capacity, because its original capacity was not designed to carry current legal loads. These bridges are load-posted or recommended for load-posting.
- 50% of all bridges in Texas have been in service over 40 years, and 20% have been in service over 60 years: 15,070 built between 1950-1970 and 8,237 built before 1950 (these were generally designed for less than current legal load and many are load posted).
 - The average age of all on-system bridges is 44 years.
 - The average age of all off-system bridges is 31 years.
 - 112 of the on-system bridges are constructed of timber (>50 years old and near the end of their service life).
 - 2,441 of the bridges are load-posted or restricted to traffic (180 are on-system).
 - 124 bridges are closed (25 of these are on-system).
 - There are 29 vehicular international bridge crossings along the Texas and Mexico border.
- 43,368 of the bridges in Texas are sufficient bridges (81.8%), and 9,650 are non sufficient bridges (18.2%). TxDOT's goal is to continue to improve its percentage of sufficient bridges.

ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

- Texas has added 1,461 new bridges to the system since 2010.
- Bridge maintenance spending must increase to ensure that service life expectations are met for new bridges beyond 50 years as well as for older bridges.
- The number of both structurally deficient and functionally obsolete bridges is expected to rise over the next 10 years as the bridges that were built in the late 1950s exceed their 50-year design life. This will increase the required number of bridges that will need to be improved each year.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

- At the end of fiscal year 2014, 39% of the non-sufficient bridges were on-system. While it is clear that continued funding is required to improve off-system bridges, the majority of the required funds are needed for on-system bridges.
- In fiscal year 2014, TxDOT spent \$397.3 million on on-system bridge maintenance and replacement/ rehabilitations.
 - \$38.9 million on bridge maintenance
 - \$358.4 million on bridge replacement/rehabilitation
- Maintenance funds for on-system routine bridge maintenance were approximately \$22.0 million, or 1.6% of the agency total for routine maintenance expenditures.
- On-system bridge maintenance and repairs under statewide bid construction projects increased from \$8.4 million during fiscal year 2010 to approximately \$21.7 million during fiscal year 2014.
- Funds spent for on-system bridge replacement/rehabilitations have increased from \$320.4 million in fiscal year 2010 to \$358.4 million in fiscal year 2014.
- Given the tightening fiscal condition of the State of Texas, and since funding under the FHWA Highway Bridge Program (HBP) is limited, the use of additional funding mechanisms for bridge preservation is needed in order for TxDOT to continue to improve its percentage of sufficient bridges.



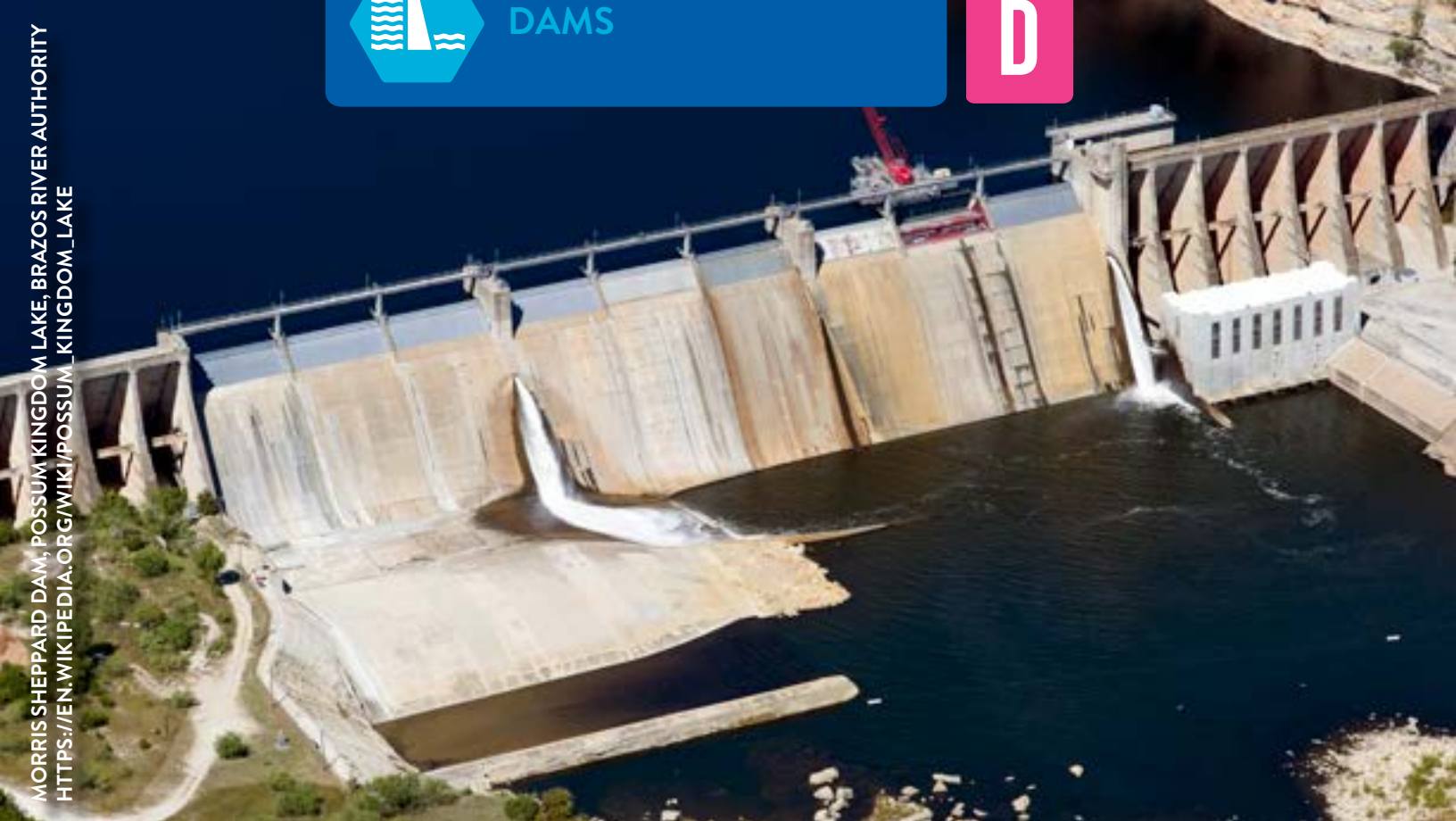
RECOMMENDATIONS TO RAISE THE GRADE

- Texas should continue the positive progress made toward reducing the number of structurally deficient bridges, decreasing the bridge maintenance backlog, and addressing bridges that have passed or are approaching the end of their design life.
- Texas should consider long-term funding solutions for transportation infrastructure and potential alternatives to the motor fuel taxes, including further study and piloting of mileage-based user fees.
- Bridge owners should consider the costs associated with the infrastructure's entire lifecycle to prioritize maintenance and rehabilitation.

Sources

- *Report on Texas Bridges as of September 2014*, Texas Department of Transportation
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MORRIS SHEPPARD DAM, POSSUM KINGDOM LAKE, BRAZOS RIVER AUTHORITY
HTTPS://EN.WIKIPEDIA.ORG/WIKI/POSSUM_KINGDOM_LAKE



DAMS

EXECUTIVE SUMMARY

Overall, dams have seen a modest improvement since Texas last released a Report Card. The State budget continues to fund the Texas Commission on Environmental Quality (TCEQ)'s Dam Safety Program to inspect the most critical dams, increasing funding for this program from \$2 million in 2012 to \$2.5 million in 2017. In 2015, the Legislature provided an additional \$15 million to repair or rehabilitate dams built by the USDA's Natural Resources Conservation Service (NRCS). However, the inventory of existing dams in Texas continues to age, and along with increases in hazard classification of 217 dams, the estimated costs of rehabilitation have risen from \$380 million in 2012 to \$812 million in 2017. Additionally, in 2013 the Legislature amended the Texas Water Code to exempt 3,222 dams from meeting the requirements related to dam safety, which is almost 45% of the nonfederal dams listed in the Inventory of Dams in Texas.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

- There are 1,263 high hazard dams (probable loss of life if dam fails), 416 significant hazard dams (possible loss of life), and 5,324 low hazard dams (no loss of life expected) in Texas. These classifications do not include 228 dams exempted from meeting requirements related to dam safety by the Texas Legislature permanently in 2013.
- There are 7,231 nonfederal dams listed in the Inventory of Dams in Texas, including the 3,222 dams exempted by Texas Legislation in 2013.
- There are 126 federal dams listed in the National Inventory of Dams, of which 46 are high hazard potential dams.
- From September 2012 to August 2017, there were 117 incidents on dams with 8 failures, one partial failure, and 108 dams with spillway damage, slides on the dam, and pipe failures. Most of these occurred during the rain events in May and June 2015, October 2015, December 2015, and March through May 2016.
- In 2013, the Legislature in House Bill 677 amended the Texas Water Code to exempt an owner of a dam located on private property from meeting the requirements related to dam safety if the dam: (1) impounds less than 500 acre-feet (top of dam capacity) at maximum capacity; (2) has a hazard classification of low or significant; (3) is located in a county with a population of less than 350,000; and (4) is not located inside the corporate limits of a municipality. This Legislation exempted 3,222 dams.
- Over 75% of the high hazard dams were built before 1975.
- A high percentage of the high hazard dams do not have a maintenance and inspection program.
 - Approximately 6% of the high hazard dams have good maintenance and inspection programs.
- Texas has improved dramatically on the number of Emergency Action Plans (EAP) for state-regulated high hazard potential dams, going from about 10% of high hazard potential dams with an EAP in 2005 to over 80% in 2015.
- Many of the private and municipal owned dams receive little to no maintenance nor have an EAP due to lack of available funds; the state inspection program makes maintenance and repair recommendations for all of the dams that are inspected.
- About 90% of the high hazard dams have uncontrolled spillways (i.e. no gates to regulate flow from the dam).
- According to the Texas State Soil and Water Conservation Board, of the 2,041 dams built in Texas since 1948 under the Small Watershed Programs:
 - 1,116 will exceed their life expectancy (50 years) by 2017, and 226 currently need repair due to aging and damage due to flooding in 2015 at a cost of \$76 million.
 - 406 high hazard dams need to be rehabilitated to meet current safety criteria at an estimated cost of \$812 million.
 - Dam owners and operators of larger dams are properly trained and professional about their responsibilities.
 - Houston and Dallas Airports are investing in asset management strategies to develop comprehensive pavement management systems for airfield infrastructures as outlined by the FAA Airport Improvement Program (AIP) Grant requirements. These outline the airport infrastructure investment needs over the next 10 years and allow the FAA to plan and prioritize investments. The majority of grant funds are distributed to hub airports. No major runway expansions are being considered at this time (i.e., no new runways).
 - There continues to be support for FAA AIP Entitlement Grants into airport infrastructure, and the new Administration has indicated support for continued and increased infrastructure investment.

ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

- Most owners have limited funds and cannot afford large rehabilitation.
- Only a few new, large dams are being built or are proposed to be built at this time. Construction projects are primarily subdivision dams.
- Many developers are purchasing property with small livestock dams and developing property around the lakes and downstream of the dams, creating additional risk.
- The State of Texas does not regulate development in high hazard areas immediately adjacent to or downstream of dams.
- As the dams continue to age, maintenance and inspection programs will become even more critical.
- Continued growth to rural areas is resulting in changes to hazard classification for dams. This will result in changes in requirements for the dams, possibly causing the need for rehabilitation of the structures.
- Many dam owners and operators do not receive training on their responsibilities for dam safety. However, since 2012, the Dam Safety Program has conducted 12 workshops for owners with 1,054 people registered. In 2016, three workshops were conducted with 332 total registrants.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

- In 2016, the TCEQ Dam Safety Program estimated the rehabilitation cost for Texas' non-federal high-hazard dams at \$2.5 billion. This estimate covers all high hazard dams (includes NRCS dams) that need rehabilitation (estimated to be around 1,000 dams), other than dams owned by the Corps of Engineers, Bureau of Reclamation and International Boundary Water Commission.
- Funding for the rehabilitation or repair of hazardous dams must be obtained by the owner. The State does not fund these projects.
- Dams with reservoirs used for power plants and water supply usually have adequate funds for rehabilitation.
- The state budget for the Dam Safety Program administered by TCEQ for fiscal year 2015 is \$2,508,306.16. An additional \$533,633 in grant funding was received from FEMA. The Legislature has provided \$15 million over the last two-year period for repair, or assistance with rehabilitation, of dams built by NRCS under the Small Watershed Program.
- The Dam Safety Program in Texas is funded for 26 staff persons. In 2015, the staff members completed the following tasks:
 - Reviewed 32 structural plans and change orders
 - Performed 259 inspections of dams
 - Reviewed 88 Emergency Action Plans
 - Reviewed other reports submitted by dam owners or their consultants
- The State Auditor's Office completed an *Audit Report on the Dam Safety Program at the Texas Commission on Environmental Quality* in May 2008. The report, which has not been updated since 2008, concludes that "The Texas Commission on Environmental Quality's (Commission) dam safety program, as currently designed and operating, is not able to accomplish its statutory mandate to ensure the safe construction, maintenance, repair, and removal of dams in the State of Texas."
- Funding for the Dam Safety Program must be increased in order to perform inspections and identify hazardous conditions as quickly as possible.



RECOMMENDATIONS TO RAISE THE GRADE

- Require maintenance and inspection program for all high hazard dams in the state. As the dams continue to age, maintenance and inspection programs will become even more critical than they are today.
- Increase funding for the Dam Safety Program in order to perform inspections and identify hazardous conditions as quickly as possible.
- Develop emergency action plans for the remaining 20% of significant and high-hazard potential dams, including those subject to reclassification as high-hazard due to population growth in rural areas.
- Create a state loan or grant funding program for dam repair, abandonment, or removal.
- The State of Texas, local political offices, and zoning boards should pursue regulation of development in high hazard areas immediately adjacent to or downstream of dams.
- Update the State Auditor's Office Audit Report on the Dam Safety Program at the Texas Commission on Environmental Quality.

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FLOOD CONTROL



CREDIT HMDB.ORG AND WILLIAM FISCHER, SAN ANTONIO

FLOOD CONTROL

EXECUTIVE SUMMARY

Texas has both a rapidly growing population and a propensity for flooding. Our combination of geography, geology and climate produce both coastal and riverine flooding on a regular basis. Combined with increased populations along the coast and in urban areas along rivers and creeks, Texas residents are at risk for flood threats. Flooding can cause loss of life and loss of property.

Flood preparation, floodplain management and flood prevention are largely the domain of local jurisdictions as the State of Texas does not have a central authority to guide these activities. While the major urban centers have implemented increasingly sophisticated floodplain management programs and flood mitigation systems, the needs of both large cities and less populated counties consistently outstrip the funding and regulations required to provide state-wide uniform, reliable flood mitigation.

The aforementioned discussion resulted in the rating of a “D” for the State of Texas’ flood control strategies.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

- There have been 94 federally declared disasters in Texas from 1953-2016, with 72 of these involving widespread, damaging flooding.
- There were 77 reported flood-related deaths in Texas in 2015-2016. In 2015, 64% involved vehicles trying to drive through low-water crossings. The life-safety issue of general flooding in Texas typically does not relate to the capacity or condition of the stormwater facility.
- As a direct result of these disasters, 247 flood mitigation projects totaling over \$381 million have been approved by the Federal Emergency Management Agency (FEMA) through the Hazard Mitigation Grant Program. Additionally, Texas has experienced historic floods in 2015 and 2016 and received six Presidential Disaster Declarations. In order to receive federal funds, local communities must provide a specified percentage of total project funds. The Texas Division of Emergency Management (TDEM) administers these grants, but provides no additional funding. Also administered through the TDEM, other FEMA grant programs, such as “unmet needs” and Pre-Disaster Mitigation grants, have accounted for five additional funding opportunities in the last ten years. These additional funding opportunities involve another 51 flood mitigation projects totaling over \$28.3 million.
- The State of Texas does not have a state-wide comprehensive floodplain management plan. Texas divides flood mitigation planning between three state agencies: the TDEM, the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB).
- Texas counties and cities are responsible for floodplain management and flood mitigation projects.
- The U.S. Department of Housing and Urban Development provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas; Texas Department of Agriculture (TDA) administers these grants. In response to Presidentially declared disasters, Congress may appropriate additional funding for the Community Development Block Grant (CDBG) Program as Disaster Recovery grants to rebuild the affected areas and provide initial funds to start the recovery process. CDBG-Disaster Recovery funding supplements other Federal recovery assistance programs administered by FEMA, the Small Business Administration (SBA), and the U.S. Army Corps of Engineers (USACE).
- The Flood Mitigation Assistance (FMA) Program is a pre-disaster program funded through FEMA and administered by the TWDB. Funds for FMA come primarily through the National Flood Insurance Program (NFIP) from flood insurance premiums. During the period from 1998-2015, approximately \$103.6 million in federal funds were utilized to fund 82 flood mitigation projects throughout Texas. These projects consist of a mix of elevation buyout with conversion of the land to open space, and drainage projects.
- The Severe Repetitive Loss (SRL) Grant Program under FEMA’s FMA program provides federal funding to assist state and communities in implementing mitigation measures, to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the National Flood Insurance Program (NFIP). SRL was created as part of the National Flood Insurance Reform Act of 2004 with the goal of reducing or eliminating claims under the NFIP and has been implemented since 2012 due to the Biggert-Waters Flood Insurance Reform Act. TWDB administers the SRL grant program for the state on behalf of FEMA; TWDB awarded \$93.5 million in funding for 20 projects during the period from 2008-2012.
- Texas has passed significant legislation within the past 18 years, which requires communities to be eligible to participate in the NFIP. Legislation has also provided General Law cities and counties the ability to enforce stronger flood plain ordinances and to levy fees and fines for violation of floodplain ordinances.
- Texas is not a participant in the NFIP, although a majority of its communities are. However, Texas accounts for approximately 12% of the total flood policies, insurance coverage in force, and total premium paid in the United States. It ranks second in the nation next to Florida.
- Texas has 595,214 NFIP flood policies in force with a total insurance coverage amount of \$159+ billion as of August 11, 2016. The total premium paid for policies in force equates to over \$357 million. Between 1978 and 2016, FEMA paid nearly \$6.5 billion in payments for 267,818 flood loss claims in Texas. These payments account for over 13% of the total claim dollars paid in the U.S. Texas ranks second in the nation to Louisiana in terms of dollars paid for flood claims.

ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

- The population of Texas is expected to double in the next 50 years. Development in the floodplains can be expected to increase, as homebuilders and commercial developers continue to build near the State's streams, rivers, lakes and coast.
- Many Texas communities have outdated floodplain maps and studies that do not adequately define the existing flood risks to community officials, therefore making flood plain management difficult or even nonexistent.
- Flood damages can be expected to increase state-wide, as population pressures lead to more development in high-risk areas, development increases in rural counties with no defined flood boundary maps, and property values (and, therefore, damage values) increase.
- Texas will continue to be a major financial drain on the National Flood Insurance Program from escalating flood claims.
- FEMA has implemented an aggressive Risk Mapping Assessment and Planning program across the nation, with the goal of updating (in five years) all of the maps used by local communities to manage flood plains. The program requires state or local participation in the mapping projects in order to receive federal participation and funding. The target for local participation is approximately 20% of project costs. This may limit the ability of many rural counties to participate.
- The Flood Funding Needs Database (FloodFUND) Research Study was initiated in order to gather information on flood mitigation projects throughout the State of Texas. The information obtained through this research project was used in the development of the 2012 State Water Plan. While the results of the study were not comprehensive, the research identified projects with a cost estimate of over \$5.64 billion for current and planned flood mitigation projects. This includes an estimated \$330 million in flood mapping studies for streams and rivers throughout Texas with out-of-date engineering data.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

- The U.S. Army Corps of Engineers (USACE) funding has decreased for major flood reduction projects in Texas. It takes an estimated 20 years to plan, design and construct a major project.
- Of the 27 USACE projects within Texas that have flood control features, only 12 received funding in the President's 2012 budget. Each of these projects requires a local sponsor to participate in the project and provide local matching funds. The State does not participate as a local sponsor in these projects, although the TWDB has provided some funds to the local communities for USACE planning projects through flood protection planning grants, generally providing 50% of the local share requirement of the USACE.
- The total for all grant funding received by Texas from FEMA to date is 298 flood mitigation projects totaling over \$408 million. Local communities provided the local matching funds. Although the grant programs are administered by the State, no state funds are provided.
- The TWDB funded approximately \$1.8 million in flood protection planning grants during each two-year cycle of the legislature (\$900,000 per year). Funds are available to political jurisdictions to develop flood protection plans that protect entire watersheds from flooding through structural and nonstructural measures. These funds require a 50% local match, which may prevent some communities from applying for the grants. This amount increased in 2016 to \$2,000,000 and expanded the grant to include early warning systems, flood response and continued flood protection planning.
- Without financial support from the State, many communities will be unable to plan and construct adequate flood mitigation projects and will be unable to participate in federal programs due to the requirements for local matching funds.
- With the exception of limited grants and low-interest loans, Texas does not fund state-wide flood control infrastructure or floodplain management. The funds collected by the Texas Department of Insurance from NFIP policies and licensing fees are returned to the general fund.
- Texas needs to develop a state-wide floodplain management plan to mitigate future flood disasters.



RECOMMENDATIONS TO RAISE THE GRADE

- Fund early warning systems tied to local weather radars and stream forecasts in areas prone to flash flooding.
- Support the development of a state-wide funding program for flood damage reduction projects. Based on the 2017 legislative session, TWDB will be spearheading the first standalone flood plan for Texas by December 2018; this plan will be modeled after the State Water Plan and will involve coordination with all applicable state agencies, as well as the 428 NFIP entities.
- Support additional federal funding to update floodplain mapping throughout the state.
- Support investment in infrastructure (like regional detention ponds, modern drainage systems, floodplain buyouts and levees) to reduce flooding.

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HIGHWAYS AND ROADS



PHOTO: JAMES DURBIN, MIDLAND REPORTER TELEGRAM



HIGHWAYS AND ROADS

EXECUTIVE SUMMARY

Texas is a large, dynamic and growing state with over 313,000 centerline miles of roadway facilities, more lane miles than any other state. Many rural roads and highways in Texas have exceeded their design life and most do not meet current design standards. Urban highways are often crowded, frequently in poor condition, chronically underfunded, and are becoming more dangerous. Nine Texas cities scored in the nation's top 100 gridlocked cities, according to the latest Urban Mobility Scorecard published by the Texas A&M Transportation Institute. The annual cost of congestion in our four largest cities is over \$1,000 per commuter.

Grading criterion for our Texas roads and highways included capacity and condition, operations and maintenance, public safety, transportation funding, future needs, innovation and resilience. There is no change in the grade for roads and highways in Texas for the 2012 grade of D.

The population of Texas, according to the 2010 U.S. Census Bureau, grew to 25.1 million people and is expected to increase to 35.8 million by 2040. Highway capacity must be addressed and congestion issues identified to match the increase in population trends. The 2030 Committee Texas Transportation Needs Report states that between 2009 and 2030, the state would need to invest \$315 billion (2008 dollars) into the roadway system to account for population growth and freight traffic movement.

Key recommendations to raise the grade include increased funding to tackle the massive backlog of highway needs, reducing congestion through policies and technologies that maximize the capacity of the existing road network and the prioritization of maintenance and the state of good repair to maximize the lifespan of roads.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

- Texas has more roadway lane miles than any other state. There are approximately 313,596 total centerline miles of roadway facilities in Texas. Of these, 80,423 miles (26%) are on-system, or part of the designated state highway system. The remaining 233,173 miles are off-system, or under the direct jurisdiction of local governments.
- Rural highways in Texas have exceeded their design life and most do not meet current design standards according to the Texas Department of Transportation (TxDOT).
- The 2015 statewide pavement conditions rated “good” or better was at 86.92%. With the current budget set aside for maintenance, the percentage of roadways rated “good” will drop to 83.17% by 2025.
- The state population increased by approximately 32% from 2000 to 2015; the annual vehicle miles traveled on state highways increased by approximately 24% during this time period.
- The average annual pavement routine maintenance expenditure for 2010-2015 was approximately \$80 million per year. The total pavement routine maintenance funding need for 2015-2030 is estimated at \$325.1 million per year.
- In FY 2016, TxDOT designated \$2.405 billion of the organization’s budget on maintenance operations for on-system facilities; this figure has decreased by 12% since 2011 and will continue to decrease due to current funding allocations.
- The 2015 Urban Mobility Scorecard, published by the Texas A&M Transportation Institute (TTI), reports traffic congestion data for major Texas cities, including: annual delay per auto commuter in hours, national ranking for annual delay per auto commuter, and annual costs of congestion in millions of dollars:

City	National Ranking for Annual Delay per Auto Commuter	Annual Delay per Auto Commuter (Hours)	Annual Costs of Congestion Per Auto Commuter
Dallas/Ft. Worth	11	53	\$1,185
Austin	15	38	\$1,159
San Antonio	34	30	\$1,002
Houston	48	61	\$1,490
Beaumont	57	22	\$800
El Paso	60	21	\$760
Laredo	93	12	\$496
Brownsville	94	21	\$494
Corpus Christi	96	10	\$697
National Average	N/A	42	\$960

- Nationally, the average commuter is expected to waste 47 hours in congestion in 2020, an increase of 5 hours from 2015.

ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

- The population of Texas, according to the 2010 U.S. Census Bureau, grew to 25.1 million people and is expected to increase to 35.8 million by 2040. Highway capacity must be addressed and congestion issues identified to match the increase in population trends.
- The 2015 Urban Mobility Report points out that traffic congestion has grown since the low point in 2009 during the economic recession. In major urban areas, drivers have to plan more than twice as much travel time as they would need to arrive on time in light traffic to account for the effects of irregular delays, such as bad weather, collisions, and construction zones.
- Current funding levels are not keeping up with maintenance needs of the aging infrastructure, and it is anticipated that pavement conditions on rural and metropolitan highways will continue to decrease as the system becomes older and traffic levels increase.

SAFETY

At least one person has died every day on Texas roads since November 7, 2000. In 2016, 3,773 people lost their lives on Texas roads, a 4% increase from the previous year.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

- Although the total amount of money available to states from the Federal Highway Trust Fund has declined 3.5% during the five-year period ending in 2013, total spending per capita on Texas highways has gone up almost 50% since 2003 from \$388 per capita in 2003 to \$567 in 2013.
- Although voters approved Prop 1 in 2014, which directs a portion of the oil and gas severance tax revenue to the State Highway Fund, and Prop 7 in 2015, which directs a portion of state sales and use tax and motor vehicle sales tax revenues to the State Highway Fund, highway funding is not meeting the highway infrastructure needs in Texas.
- The 2030 Committee Texas Transportation Needs Report states that between 2009 and 2030, the state would need to invest \$315 billion (2008 dollars) into the roadway system to account for population growth and freight traffic movement.
- Texas' mobility needs are identified regionally by 25 Metropolitan Planning Organizations (MPO) throughout the State, statewide generally every three years in a Metropolitan Transportation Plan (MTP). By mandate, the MTP is fiscally constrained, meaning that not all cost-effective projects can be funded.
- The increase of fuel-efficient and alternative fuel (electric) vehicles will decrease the amount of fuel tax generated and returned to the state.
- Texas remains a "Donor" state when receiving funding for the Federal Gas Tax. In FY2017, Texas received federal funds at a ratio of 0.83 from the Federal Highway program. This amount cost the state \$738 million in underpayments.
- Since the inception of the federal highway program in 1956, Texas has given more to the fund than it has received, with an average return ratio of 0.801.
- Funding for repairs and improvements of off-system roads (74% of Texas roads) is left entirely up to local governments.
- Texas Motor Fuels Tax Revenue as a share of total state tax revenue has decreased from 11.9% in 1995 to its lowest level of 6.7% in 2015.
- Texas A&M Transportation Institute's (TTI's) 2016 publication of Gas Tax Facts states that "Because of inflation, we have less and less money available to pay for roads and bridges." In 2015, TTI reported to a Texas legislative committee that the actual purchasing power of the state's gasoline tax, set at 20 cents per gallon in 1991, had fallen to 6.8 cents by 2014 due to inflationary effects.



HIGHWAYS AND
ROADS



RECOMMENDATIONS TO RAISE THE GRADE

- Address Texas road infrastructure funding challenges by increasing the \$0.20 gasoline and diesel fuel tax and indexing it to inflation.
- Allow full implementation of Proposition 7, a successful 2015 ballot measure which dedicates a portion of the state's general sales tax and motor vehicle sales, use, and rental tax collections to the State Highway Fund each year until 2029. If fully realized, an estimated \$2.5 billion will be transferred to the fund beginning in fiscal year 2018; however, the Texas legislature retains authority to reduce the amount deposited to the State Highway Fund in any given fiscal year.
- Increase funding from all levels of government and the private sector to tackle the massive backlog of highway needs .
- Address roadway congestion through policies and technologies that maximize the capacity of the existing road network and create an integrated, multimodal transportation system.
- Prioritize maintenance and the state of good repair to maximize the lifespan of roads.
- The State needs to think long-term about how to fund its roads and consider potential alternatives to the motor fuel taxes, including further study and piloting of mileage based user fees.

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DRINKING WATER



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DRINKING WATER

EXECUTIVE SUMMARY

Planning and funding safe and adequate drinking water supplies has become critically important to foster robust and comfortable growth and prosperity as Texas moves through the 21st century. Substantial water challenges will be created by unprecedented population growth projected in the next 50 years, from 29.5 million in 2020 to more than 51 million by 2070. Current and anticipated supply shortages must be addressed in areas dependent on surface water reservoirs. Also of paramount importance will be conservation, management and protection of sensitive groundwater resources, such as the Edwards and Ogallala Aquifers. The total capital costs of the recommended water management strategies in the 2017 State Water Plan are estimated at \$62.6 billion over the next 50 years.

The Texas Commission on Environmental Quality (TCEQ), the primary Texas agency authorized to enforce the rules associated with the federal Safe Drinking Water Act, regulates drinking water maintained to State and Federal standards for an estimated 6,915 public water systems,

which serve 93% of the State's population. The majority of regional plans show a need for an expanded State role to fund or finance water supply infrastructure fiscal shortages at the local and regional level. The Drinking Water State Revolving Fund and State Water Implementation Fund for Texas are two financing programs offered by the State and administered through the Texas Water Development Board (TWDB). The modestly improved 2017 report card grade of D+ over the 2012 grade of D- represents a generally improving trend in conservation, technology, planning, management, and overall increases in programs and availability of State funding and financing support. Provided funding and financing becomes available where needed, Texas is prepared with the engineering, technology and leadership to plan, develop, construct, and manage increased capacities to meet 21st century drinking water challenges head on.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

- By 2070, the TWDB estimates that all water user group categories will need additional water supplies. For some users, this can be achieved by a reduction in demand through conservation and/or drought management efforts, or by developing additional sources of water beyond those currently available.
- If a drought-of-record occurs in Texas in 2070, about 60% of municipal demand would be satisfied by current water sources.
- Groundwater is a major source of water for Texas. However, projected depletions of groundwater and water quality problems due to naturally occurring constituents (e.g. arsenic, chlorides, radionuclides, etc.), may create a water supply challenge for some municipalities.
- The TCEQ is the primary Texas agency authorized to enforce the rules associated with the federal Safe Drinking Water Act of 1996. The TCEQ regulates an estimated 6,915 public water systems, which serve 93% of the state's population. About 93% of the state's public water systems meet state and federal drinking water standards.

ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

- The population of Texas is expected to increase in excess of 73% in the next 50 years, from 29.5 million in 2020 to more than 51 million by 2070.
- Ensuring the long-term supply of safe water at affordable rates is the responsibility of the Public Utility Commission (PUC) as of September 1, 2015. This challenge grows as the population multiplies, posing greater demands on water systems for staying in compliance with federal water quality laws.
- To help public water systems maintain compliance, both the TCEQ and PUC offer free on-site financial, managerial and technical assistance.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

- The total capital costs of the recommended water management strategies in the 2017 State Water Plan are estimated at \$62.6 billion over the next 50 years.
- The Drinking Water State Revolving Fund (DWSRF), established by the federal Safe Drinking Water Act, is intended to protect public health by offering low-interest loans for designing, building, and improving public drinking water facilities. The TWDB and TCEQ review proposed water projects, and the TWDB processes and approves loan applications. Since the inception of the DWSRF Program, TWDB has issued 452 funding commitments for a total of \$1.87 billion.
- Both TWDB and TCEQ encourage the regionalization of water and wastewater systems. TWDB previously offered a 50% matching grant program for two or more political subdivisions of Texas to evaluate and determine regional solutions for water and wastewater infrastructure. TWDB does not have funding for this program at this time; however, the Legislature has appropriated as much as \$1,000,000 in annual funding for the program during 2000-2015 and efforts are underway to reinstate this grant program.
- The majority of the regional plans emphasized the need for an expanded State role in financing infrastructure and water supply improvements. The Texas Legislature created the State Water Implementation Fund for Texas (SWIFT) to provide affordable, ongoing state financial assistance for projects listed in the state water plan, and the Clean Water Act was amended to expand funding eligibility. The constitutional amendment for SWIFT, known as Proposition 6, became effective on November 6, 2014 and enabled the one-time investment of two billion dollars from the state's Rainy Day Fund to create a loan program for water projects across Texas. As a result, SWIFT will provide approximately \$27 billion in financial assistance over the next 50 years and approximately \$800 million in each of the next 10 years.
- Without external funding assistance, many local governments cannot develop the necessary internal expertise to provide the quality of service mandated under current health and safety requirements. Others, which may have the expertise, are unable to finance such service without external assistance.
- The need continually grows for State assistance programs to provide cost-effective regional water systems; support disadvantaged communities; and fund non-traditional water management strategies and agricultural and municipal water conservation.
- The State and Federal Governments must also commit adequate funding to the following additional financial assistance programs:
 - Rural Water Assistance Fund Program
 - Clean Water State Revolving Fund Loan Program
 - Drinking Water State Revolving Fund Loan Program
 - State Participation in Regional Water and Wastewater Facilities
 - Texas Water Development Fund
 - Economically Distressed Areas Program
- Increased funding is needed for Community Development Block Grants (CDBG) Programs offered by U.S. Department of Housing and Urban Development.
- The Legislature should target financial assistance for mitigating costs of compliance to new drinking water treatment standards.
- Other than low-interest loan programs, the State does not directly contribute to funding local water infrastructure or maintenance except in some economically disadvantaged areas.



RECOMMENDATIONS TO RAISE THE GRADE

- Ensure long-term funding for the State Water Implementation Fund for Texas (SWIFT), which was created by the Texas Legislature to provide affordable, ongoing state financial assistance to projects in the state water plan.
- The State and Federal Governments must commit adequate funding to the following additional financial assistance programs:
 - Rural Water Assistance Fund Program
 - Clean Water State Revolving Fund Loan Program
 - Drinking Water State Revolving Fund Loan Program
 - State Participation in Regional Water and Wastewater Facilities
 - Texas Water Development Fund
 - Economically Distressed Areas Program
- Increased funding is needed for Community Development Block Grants (CDBG) Programs offered by U.S. Department of Housing and Urban Development.
- The Texas Legislature should target financial assistance for mitigating costs of compliance to new drinking water treatment standards.
- Encourage utilities to conduct revenue forecasting models to determine the necessary rate revenues over a period of time and then institute rates that reflect the true cost of supplying clean, reliable drinking water.

SOURCES

- *Water for Texas, 2017 State Water Plan*, Texas Water Development Board
- Texas Water Development Board website (www.twdb.texas.gov)
- U.S. Department of Housing and Urban Development website (www.hud.gov)
- U.S. Environmental Protection Agency website (www.epa.gov)
- State of Texas Public Drinking Water Program 2015 Annual Compliance Report
- Data provided by TWDB and TCEQ, August and November 2016



WASTEWATER



ALLISON WASTEWATER TREATMENT PLANT, STANTEC CONSULTING SERVICES INC., CITY OF CORPUS CHRISTI

WASTEWATER

EXECUTIVE SUMMARY

Unauthorized or untreated wastewater discharges continue to be the leading cause of impaired freshwater sources in Texas. The quality, quantity, and timing of freshwater inflow from rivers is important to maintaining the natural salinity, nutrient, and sediment loading regimes, which support the unique biological communities of each estuary and also ensures the health of the ecosystem. As the state's population grows, increasing demands for water may limit the volume of freshwater reaching the bays as well as alter the quality or timing in which the water arrives, thus impacting the productivity and characteristic of Texas estuaries. The leading sources of water pollution in the state include municipal sewage treatment plants, agricultural runoff, urban runoff, atmospheric deposition, and unspecified point and nonpoint sources. In addition, wastewater sewers are subject to stormwater flooding overflows, producing a large influx to a water to the treatment plant, which overtaxes the infrastructure of the plant. The wastewater letter grade is the lone area of decrease on this Report Card, dropping from a C- in 2012 to a D in 2017.

KEY INFRASTRUCTURE FACTS: EXISTING CONDITION AND PERFORMANCE

- Based on the 2014 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d), 37% of assessed river miles and 43% of assessed reservoir acres in Texas have impaired water quality. Of the total square miles of estuaries and bays assessed, 13% do not fully support shellfish harvesting and 24% do not fully support aquatic life.
- The leading sources of water pollution in the state include municipal sewage treatment plants, agricultural runoff, urban runoff, atmospheric deposition, and unspecified point and nonpoint sources. In addition, wastewater sewer systems are subject to becoming overwhelmed by heavy rainfall events and stormwater flooding. As a result, the volume of wastewater can sometimes exceed the capacity of the wastewater sewer system or treatment plant and discharge untreated stormwater and wastewater directly to nearby streams, rivers, and other water bodies. As Texas has recently exited from record breaking drought with record breaking rains, the wastewater systems have experienced overflows or line breaks.
- Texas Beach Watch is a program funded by the U.S. Environmental Protection Agency (EPA) and the Texas General Land Office (GLO), which administers the program to monitor water quality at Texas' recreational beaches. The program monitors Texas' recreational beaches and when bacteria levels in the water exceed the acceptable standards established by the EPA, the GLO works with local governments to issue advisories and post signs provided by the GLO at beach access points warning the public not to swim in affected waters. Beaches are monitored year-round, with weekly monitoring from May to September for all monitored beaches and during the month of March at some beaches to coincide with spring break. For the 2015 Texas swimming season, 5.8% of beach days were affected by notification actions to prevent swimming across 61 monitored beaches. However, Texas was impacted in 2016 by several high-profile cases of people contracting bacterial infections at the state's beaches; there were 102 cases of vibriosis reported, including 35 cases with the bacteria *Vibrio vulnificus*, which can cause necrotizing fasciitis.

ANTICIPATED GROWTH AND OTHER FUTURE NEEDS

- The population of Texas is expected to increase in excess of 73% in the next 50 years from 29.5 million in 2020 to more than 51 million by 2070. Growth will continue to focus primarily around urban areas.
- The Texas Water Development Board (TWDB) and Texas Commission on Environmental Quality (TCEQ) encourage the regionalization of water and wastewater systems. TWDB previously offered a 50% matching grant program for two or more political subdivisions of Texas to evaluate and determine regional solutions for water and wastewater infrastructure. TWDB does not have funding for this program at this time; however, the Legislature has appropriated as much as \$1,000,000 in annual funding for the program during 2000-2015.

ADEQUACY OF CURRENT FUNDING AND NEED FOR EXPANDED FUNDING

- Texas must invest an estimated \$11.83 billion over the next 20 years to upgrade its wastewater treatment facilities. Based on the U.S. Environmental Protection Agency (EPA) annual inspections of potential pollution sources, approximately 170 municipal wastewater systems are currently under enforcement as of December 31, 2016; these treatment systems have received EPA federal notices and will potentially be faced with expensive penalties if the issues are not resolved in a timely manner.
- The Clean Water State Revolving Fund (CWSRF), a federal loan program that finances local wastewater infrastructure projects, is America's largest water quality financing source. It specifically targets municipal wastewater treatment and urban and rural runoff projects.
- The TWDB reviews proposed wastewater projects, processes and approves loan applications. Since the inception of the CWSRF Program, the TWDB has issued 935 funding commitments for a total of \$7.97 billion.
- Other than low-interest loan programs, the State does not directly contribute to funding local wastewater infrastructure or maintenance except in some economically disadvantaged areas.

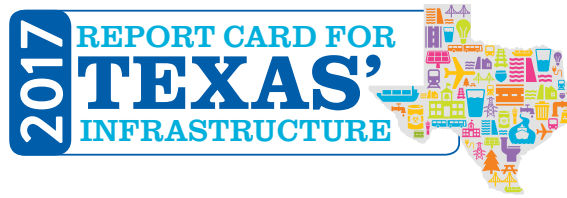


RECOMMENDATIONS TO RAISE THE GRADE

- Foster a financial environment that encourages sewer rate structures that provide sufficient revenue for maintenance and repair of existing systems.
- Increase public investment in Texas's wastewater infrastructure and allow communities across the state to access these additional funds for infrastructure improvements.
- Raise awareness of the true cost of wastewater treatment.
- Support green infrastructure, which provides co-benefits such as water and air quality improvement, aesthetic value to communities, and cost competitiveness.
- There is a growing need for State assistance programs to provide cost-effective regional wastewater systems.
- The State should dedicate additional funding sources to enhance the State's ability to assist local governments in implementing wastewater infrastructure projects and meet the needs of the State's growing population.
- The State must make up some of the funding lost from the projected cuts in the CWSRF.
- The State should create additional funding programs to support disadvantaged and fixed low-income communities with failing septic systems to develop centralized wastewater collection and treatment.

SOURCES

- *Water for Texas 2017 State Water Plan*, Texas Water Development Board
- Texas Water Development Board website (www.twdb.texas.gov)
- U.S. Department of Housing and Urban Development website (www.hud.gov)
- U.S. Environmental Protection Agency website (www.epa.gov)
- Data provided by TWDB and TCEQ, August 2016 and April 2017



ACKNOWLEDGEMENTS

ASCE TEXAS SECTION'S INFRASTRUCTURE REPORT CARD COMMITTEE

ASCE Texas Section's Infrastructure Report Card Committee, made up of more than 20 dedicated civil engineers from across the state with decades of expertise in all categories, volunteers time to work with ASCE Texas Section leaders and staff to prepare the *Infrastructure Report Card*. The Infrastructure Report Card Committee assesses all relevant data and references, consults with other technical and industry experts, and assigns grades based on the data collected. The following individuals are responsible for the successful completion of the *Infrastructure Report Card* through their leadership of the Committee and ASCE Texas Section:

ISABEL VASQUEZ, P.E., M.ASCE, HUITT-ZOLLARS

El Paso Branch

Ms. Vasquez is the Chair of the ASCE Texas Section 2017 Infrastructure Report Card Committee. She serves as a Vice President of Huitt-Zollars, managing their El Paso office. Ms. Vasquez previously served as ASCE Texas Section 2016 Vice President of Professional Affairs and is an active member of the American Council of Engineering Companies of Texas.

TRAVIS N. ATTANASIO, P.E., M.ASCE, CITY OF HASLET

Fort Worth Branch

Mr. Attanasio is the ASCE Texas Section 2017 Vice President for Professional Affairs and, as such, oversees the Infrastructure Report Card Committee. He serves as City Engineer for the City of Haslet, Texas. Prior to joining the City of Haslet, Mr. Attanasio worked with several private consulting firms ranging in size from six to over 500 employees with projects across the entire State. This career path has led Mr. Attanasio to understand the infrastructure needs of Texas from both a private investment point of view and the demand of public needs in differing regions and environments. Mr. Attanasio holds a B.S. degree in Engineering - Civil Specialty from the Colorado School of Mines.

CRAIG B. THOMPSON, P.E., M.ASCE, HANSON PROFESSIONAL SERVICES

Corpus Christi Branch

Mr. Thompson serves as the ASCE Texas Section 2017 President and oversees all activities of the Section. Mr. Thompson has been involved in ASCE in various roles for almost 20 years. He serves as a Vice President / Principal with Hanson Professional Services in their Corpus Christi office. Mr. Thompson holds a B.S. degree in Civil Engineering from Texas A&M University.

AUDRA MORSE, Ph.D., P.E., BCEE, M.ASCE, MICHIGAN TECHNOLOGICAL UNIVERSITY

Caprock Branch

Dr. Audra Morse serves as the ASCE Texas Section 2017 Past President. She proudly gives her time to serve the Texas Section and she also serves on many ASCE Society-level committees. Her Ph.D. is in Civil Engineering while her Masters and Bachelor of Science degrees are in Environmental Engineering from Texas Tech University.

AGENCIES AND ORGANIZATIONS

ASCE Texas Section would like to thank the following agencies and organizations for their assistance and reference material utilized during the research and preparation process for this *Infrastructure Report Card*:

ASCE, Committee for America's Infrastructure	Federal Aviation Administration	Texas Department of Transportation, Bridge Division
Association of State Dam Safety Officials	Federal Emergency Management Agency	Texas Department of Transportation, General Aviation Division
Center for Transportation Research	National Weather Service	Texas Division of Emergency Management
City of Austin	Texas A&M Transportation Institute	Texas Floodplain Management Association
City of Dallas Aviation Authority	Texas Association of Metropolitan Planning Organizations	Texas Office of the Comptroller
City of Haslet	Texas Commission on Environmental Quality	Texas State Soil and Water Conservation Board
City of Houston	Texas Commission on Environmental Quality, Dam Safety Program	
Dallas Fort Worth International Airport		

ASCE TEXAS SECTION STAFF

Annemarie Gasser – *Communications Manager, 2013-2017*
 Crespin Guzman, P.E., M.ASCE – *Executive Director, 2010-2016*
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ASCE STAFF

Anna Denecke – *Senior Manager, Infrastructure Initiatives*
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SUSAN ROTH CONSULTING, LLC

Susan Roth Consulting specializes in developing regional water and wastewater facility master plans for communities, preparing water conservation and drought contingency plans, assisting with the CCN and wastewater discharge permit application process, preparing grant and funding applications for water and wastewater infrastructure, and facilitating group discussions. Located in Austin, the firm is exceptionally well positioned to understand not only the engineering complexities of projects but also the public relations aspects of effectively communicating with surrounding communities.

Susan Roth, P.E., PMP is currently serving as the primary consultant with developing the 2017 *Infrastructure Report Card* update for the State of Texas. She previously consulted on the development of the *Infrastructure Report Card* for 2012, including coordination with key agencies around the state to evaluate 13 primary categories. She is a Past-President of the ASCE Austin Branch and previously served as Vice-President of Education and Chair of the Honors and Awards Committee for ASCE Texas Section.

WWW.KLD-DESIGN.COM

Karen Donohue, of KLD Design, is a freelance graphic designer based in the metropolitan DC area. KLD Design is a boutique graphic design shop with 20+ years of experience serving the creative services needs of non-profit and private organizations throughout the greater Washington area and worldwide.

KLD Design provided layout and graphic design services to ASCE Texas Section and has been involved in the design and implementation of the state templates for all of the ASCE infrastructure report cards.

2017 REPORT CARD FOR
TEXAS'
INFRASTRUCTURE

Category	TEXAS				National
	2004	2008	2012	2017	
Aviation	C+	C+	C+	B-	D
Bridges	C-	B-	B-	B	C+
Dams	D-	D-	D-	D	D
Drinking Water	D	D	D-	D+	D
Energy	B+	B+	B+	-	D+
Flood Control	D-	D-	D	D	-
Hazardous Waste	C	C	-	-	D+
<i>Inland Waterways</i>	<i>Not evaluated by ASCE Texas Section</i>				<i>D</i>
<i>Levees</i>	<i>Not evaluated by ASCE Texas Section</i>				<i>D</i>
Ports (Navigable Waterways)	D	D	C	-	C+
<i>Public Parks and Recreation</i>	<i>Not evaluated by ASCE Texas Section</i>				<i>D+</i>
<i>Rail</i>	<i>Not evaluated by ASCE Texas Section</i>				<i>B</i>
Highways and Roads	C-	D	D	D	D
Schools	D-	D-	D-	-	D+
Solid Waste	B	B	B+	-	C+
Transit	C	C	C+	-	D-
Wastewater	C-	C-	C-	D	D+
GPA	C-	C-	C	C-	D+
Cost to Improve¹					\$2.0T

1. Even though the U.S. Congress and some states have recently made efforts to invest more in infrastructure, these efforts do not come close to the \$2.0 trillion in needs. The good news is that closing America's infrastructure gap is possible if Congress, states, infrastructure owners, and voters commit to increasing our investment. To raise the overall infrastructure grade and maintain our global competitiveness, Congress and the states must invest an additional \$206 billion each year. (ASCE, 2017)

SOLUTIONS TO RAISE THE GRADES

To raise the Texas infrastructure grade, ASCE Texas Section urges action on the following policy statement:

Infrastructure in Texas will be improved and restored through strategic and sustained investment, bold leadership, thoughtful planning, and careful preparation for the needs of the future.

This Report Card is a useful and powerful tool. Where infrastructure is not performing satisfactorily, whether that be in its current condition, future need, funding, or other capacity, immediate action should be taken by all members of the public and elected leaders to change the trend and improve the grade. ASCE Texas Section plans to periodically update the Report Card to inform the public and our elected leaders on where we have improved and where more resources should be allocated. With this effort, we hope to share our knowledge and expertise to make Texas a stronger, safer, healthier, and a more prosperous state.

INVEST NOW FOR DIVIDENDS LATER

As the infrastructure of Texas ages and needs replacement, a solid, steady, long-term investment plan needs to be in place at the State and Local levels of governments. Delaying such investment only escalates the costs and risks of an aging infrastructure system – an option Texas cannot afford.

1. Put the “dedicated” back into “dedicated funds.” Approximately 45% of the state motor fuel tax is diverted to other programs. Surface transportation revenue from the state and local level should be safeguarded against non-transportation uses, such as paying for or offsetting other parts of a budget.
2. Fix the TxDOT funding gap by raising the state motor fuels tax. To ensure long-term, sustainable funding for surface transportation, the current tax must be raised and tied to inflation to restore its purchasing power, fill the funding deficit, and ensure reliable funding for the future.
3. Authorize and fund programs to improve specific categories of deficient infrastructure and support that commitment by fully funding them in an expedient, prioritized manner.
4. Infrastructure owners and operators must charge, and Texans must be willing to pay, rates and fees that reflect the true cost of using, maintaining, and improving infrastructure.

SOLUTIONS TO RAISE THE GRADES

LEAD WITH VISION

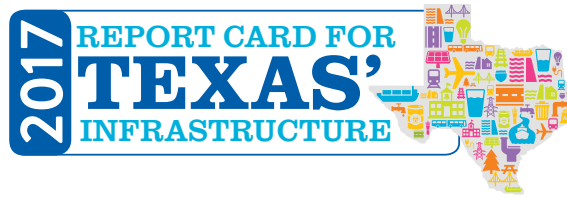
Smart investment will only be possible with leadership, planning, and a clear vision for our infrastructure. Leaders from all levels of government, business, labor, and nonprofit organizations must come together to ensure all investments are spent wisely, prioritizing projects with critical benefits to the economy, public safety, and quality of life, while also planning for the costs of building, operating, and maintaining the infrastructure for its entire lifespan.

1. Create incentives for state and local governments and the private sector to invest in maintenance.
2. Develop tools to ensure that projects most in need of investment and maintenance are prioritized to leverage limited funding wisely.
3. Streamline the project permitting process across infrastructure sectors, with safeguards to protect the natural environment, provide greater clarity to regulatory requirements, bring priority projects to reality more quickly, and secure cost savings.
4. Identify infrastructure projects attractive to private sector investment and public-private partnerships. ASCE recognizes civil engineers' unique leadership role in addressing our infrastructure challenges.

PREPARE FOR THE FUTURE

We must utilize new approaches, materials, and technologies to ensure our infrastructure is more resilient and sustainable. This is necessary to more quickly recover from significant weather and other hazard events and improve the “triple bottom line” with clear economic, social, and environmental benefits.

1. Develop active community resilience programs – the potential for damage from severe weather events, floods, and fires is increasing, meaning focus is needed to establish communications systems and recovery plans to reduce impacts on the local economy, quality of life, and environment.
2. Consider emerging technologies and shifting social and economic trends – such as autonomous vehicles, wind and solar power generation and storage, heavier trucks, and larger ships – when building new infrastructure, to assure long-term utility.
3. Improve land use planning at the local level to consider the function of existing and new infrastructure, the balance between the built and natural environments, and population trends in communities of all sizes, now and into the future.
4. Support research and development into innovative new materials, technologies, and processes to modernize and extend the life of infrastructure, expedite repairs or replacement, and promote cost savings.



ABOUT THE TEXAS SECTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

The Texas Section of the American Society of Civil Engineers (ASCE Texas Section) represents 10,000 members Statewide. Headquartered in Austin, the Texas Section unites 15 Branches, seven Technical Institute Chapters, and 17 Student Chapters including one at each major university. ASCE Texas Section belongs to ASCE's Region 6, which includes the Mexico, New Mexico, and Oklahoma Sections. ASCE has 150,000 global members.

ASCE TEXAS SECTION ADVANCES OUR COMMUNITIES THROUGH THE DEVELOPMENT OF CIVIL ENGINEERS AS LEADERS WHO CREATE A LEGACY OF SERVICE THROUGH TECHNICAL PROFICIENCY, EDUCATIONAL OPPORTUNITIES, AND PROFESSIONAL ADVOCACY.

Texas civil engineers are leaders in their communities building a better quality of life across the street and around the world. We are constantly presented with the challenge of improving infrastructure. In order to fulfill our mission to protect the public health and safety, and in keeping with the Code of Ethics all ASCE members adhere to, civil engineers must be involved in the policy making process at all levels of government. In order to contribute to the policy making process, ASCE Texas Section administers two major milestone projects: publishing the *Report Card for Texas' Infrastructure* approximately every four years and hosting a *Texas Legislative Drive-In* every two years. The *Texas Legislative Drive-In* allows members to continue building relationships with policy makers while providing feedback and educational tools based on the civil engineering industry's state of practice and our technical understanding of infrastructure design, operation, maintenance, and the associated environmental impacts.

In addition to the *Infrastructure Report Card* and *Texas Legislative Drive-In*, ASCE Texas Section hosts the annual ASCE Texas Student Symposium and the annual Texas Civil Engineering Conference (CECON). The Student Symposium is hosted each spring, gathering the best and brightest civil engineering students from over 22 universities from Texas and Mexico for professional development and networking. The event includes regional concrete canoe and steel bridge competitions for university students, a career fair, and continuing education sessions for local engineering professionals. It is a vehicle for idea exchange and networking between professionals and students preparing to enter the workforce.

EARLY MORNING LIGHT BATHES THE WATERS FLOWING OVER THE DAM OF THE LLANO RIVER IN CENTRAL TEXAS.



CECON is hosted every fall and is the premier conference for civil engineers in Texas. The conference is a gathering of professionals discussing and advancing civil engineering issues, by participation in networking, leadership development and technical training opportunities.

ASCE Texas Section also provides a platform to fulfill our state’s ever-growing science, technology, engineering, and math (STEM) based workforce needs through a variety of pre-college outreach events and programs. Our Branches work with local schools and venues such as science museums to engage students in fun engineering activities and to share insights about the career they love – civil engineering.

In early 2017, a giant-screen film about engineering, *Dream Big: Engineering Our World*, was released and played in museums and science centers in Texas and around the world. Combined with educational programming and powerful media, *Dream Big* will:

- Inform the public about the important work engineers do, helping to heighten interest and change perceptions about the profession
- Inspire young people to consider careers in engineering
- Answer the demand for K-12 engineering education resources, in alignment with the Next Generation Science Standards



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A MESSAGE FROM THE ASCE TEXAS SECTION PRESIDENT



Since 1998, ASCE has been releasing its quadrennial Infrastructure Report Card. In 2004, ASCE Texas Section developed its first Infrastructure Report Card and has been updating it approximately every four years. The message is starting to take hold: *public opinion surveys regularly show that Americans recognize the need to repair our aging and deteriorating infrastructure.* Yet the State's investment in infrastructure has not reached the level it requires and warrants as the backbone of our economy.

ASCE recently released an economic study, *Failure to Act: Closing the Infrastructure Investment Gap for America's Economic Future*. The study updates previous reports from 2011 and 2012, and quantifies how the persistent failure to invest in our aging infrastructure impacts the economy, including gross domestic product (GDP), jobs, personal disposable income, and business sales. Failing to act to rebuild America's infrastructure costs every American family \$3,400 a year, and the costs and consequences to our economy are significant.



ASCE Texas Section represents more than 10,000 civil engineers statewide who are the stewards of the state's infrastructure. We design, build, and maintain it. We must also recognize that the investments needed to improve our infrastructure continue to increase well beyond available funding. ASCE has developed the *ASCE Grand Challenge* that asks all civil engineers to join in the solution to significantly enhance the performance and value of infrastructure projects and foster the optimization of infrastructure investments for society.

Solving our infrastructure problems will take collective action and ultimately a choice to value Texas' infrastructure as the framework our economy is built around. Please join ASCE Texas Section and others in advocating for infrastructure investment by sharing this Report Card and contacting your elected officials.

Craig B. Thompson, P.E., M.ASCE
ASCE Texas Section 2017 President



512-472-8905

TexASCE.org

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ASCE Texas Section is one of the largest and most active sections of the American Society of Civil Engineers. Established in 1913, the Texas Section represents nearly 10,000 members throughout Texas. Headquartered in Austin, the Texas Section unites 15 Branches, seven Technical Institute Chapters, and 17 Student Chapters including one at each major Texas university. ASCE Texas Section belongs to ASCE's Region 6, which includes the Mexico, New Mexico, and Oklahoma Sections. ASCE has 150,000 global members.

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