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HOUSTON TRANSTAR

2015 ANNUAL REPORT

Texas Department of Transportation

HARRIS COUNTY TEXAS

CITY OF HOUSTON TEXAS

New METRO Going Places

This document is the 19th annual report for the Houston TranStar Transportation Management and Emergency Operations Center. This annual report provides a review of the performance of the center and summarizes the estimated return on investment as quantified by the estimated benefit/cost ratio. It also includes conservative estimates of the impact of center operation on regional mobility (travel time, speed and delay), customer satisfaction, and energy and environmental benefits.

Houston TranStar is a formal partnership among the principal transportation and emergency management agencies in Harris County, including:

- Texas Department of Transportation (TxDOT);
- Metropolitan Transit Authority of Harris County (METRO);
- Harris County, including:
  - Traffic & Transportation Group,
  - Harris County Toll Road Authority,
  - Harris County Sherriff's Office, and
  - Office of Homeland Security & Emergency Management; and
- The City of Houston.

Established in 1993, Houston TranStar provides for multi-agency operations and management of the region's transportation system and has evolved into a primary resource from which multiple state, county and local agencies respond to incidents and emergencies in Harris County and beyond. It is the mission of Houston TranStar and its partner agencies to provide highly effective transportation and emergency management services through the combined use of the partners' collective resources to maximize safety and mobility to the public.

Houston TranStar plays a pivotal role in the travel of people and goods in the greater Houston region, with an estimated savings to motorists of nearly $5 billion in reduced travel costs since 1997.

In 2015, the reduction of travel time attributable to Houston TranStar operation was estimated to be over 20.7 million vehicle-hours. This level of delay savings has a corresponding value of over $460 million in road user cost savings and an additional $87 million (or more than 38 million gallons) in reduced fuel consumption. The total estimated benefits of Center operation in 2015 were over $546 million.

Comparing the annualized TranStar operating cost estimate of $34.3 million to the estimated annual benefit of $546.3 million yields an estimated benefit/cost ratio for Houston TranStar center operation of 15.9 for 2015.

Houston TranStar 2015 Activities

In 2015, the TranStar Partner Agencies continued ongoing, 24-7, transportation system operations and emergency planning and response. In addition to hosting more than 2,540 visitors during the year, significant agency activities at the center in 2015 included:

- Building expansion efforts continued through 2015. However, in January, the Harris County Office of Homeland Security and Emergency Management (HCOHSEM) staff moved into to their third floor dedicated facilities. The entire staff (except for CERT) are under one roof for the first time.
- TxDOT tested an over-height truck detection system intended to reduce on-system bridge hits. Truck bridge hits reduced significantly in 2015.
- TxDOT completed expansion of travel time monitoring on IH 10 west to Luling, and largely converted most of the urban travel time system from AVI (toll tag) to AWAM (Bluetooth-based) technology. TxDOT was presented an Intelligent Transportation Society of Texas Project Award for the conversion effort at the Sugar Land meeting in November.
- In June, local media broadcast live from the HCOHSEM Situation Room as part of the annual hurricane season kick-off for media.

Following the broadcast, meteorologists from local television stations and the National Weather Service met with County Judge Ed Emmett and Houston Mayor Annise Parker.

- Between June 14 and 17, HCOHSEM activated the Emergency Operations Center to Level 2 in anticipation of Tropical Storm Bill. More than 140 individuals from more than 35 agencies supported this activation.
- In July, HCOHSEM hosted a county-centric social media functional exercise. This event simulated Facebook, Twitter, and Instagram traffic during fictional Category 4 Hurricane Alexis. More than 15 county departments participated along with Houston TranStar and the Texas Department of Transportation.
- Harris County continued significant work on development and support for the Houston Ship Channel Security District, including construction of new communications facilities and enhanced capability through interagency infrastructure leveraging.
- TxDOT continued significant ITS infrastructure upgrades with numerous Closed Circuit Television Camera and Dynamic Message Sign retrofits and upgrades throughout the area.
- TxDOT Transportation Management Systems staff accepted operations and maintenance responsibility for ITS equipment on the Grand Parkway Segments F1 & F2.
- In late October (24-25), HCOHSEM activated to Level 3 – Increased Readiness - in response to a potential flooding threat. More than 120 individuals from more than 20 agencies staffed the EOC and Regional Joint Information Center (RJIC). The RJIC issued 130 social media posts and several public and partner alerts. The center also conducted a joint news conference with Harris County Judge Ed Emmett, Houston Annise Mayor Parker and Congresswoman Sheila Jackson Lee.
- In December, Houston TranStar held the initial Super Bowl LI Transportation Committee meeting in preparation of the February 2017 event.

Agency Activities

The following sections summarize each partner agency's activity during 2015. This includes various measures of performance of the center and programs operated from Houston TranStar.

Texas Department of Transportation

The Texas Department of Transportation (TxDOT) is responsible for traffic management of freeways and state-maintained arterial highways in the region. TxDOT's mission is to deliver a safe, reliable and integrated transportation system to enable movement of people and goods. Since the 1980's, TxDOT's Computerized Traffic Management System (CTMS) has been in continuous deployment on Houston area freeways, covering about 1550 bi-directional miles in the urban areas of the Houston District and extending further outward to cover evacuation routes on IH10, IH45, US 290 and other key routes. This system enables TxDOT to promote a safer system through aggressive incident monitoring and management, and a more reliable system through providing effective traveler information.

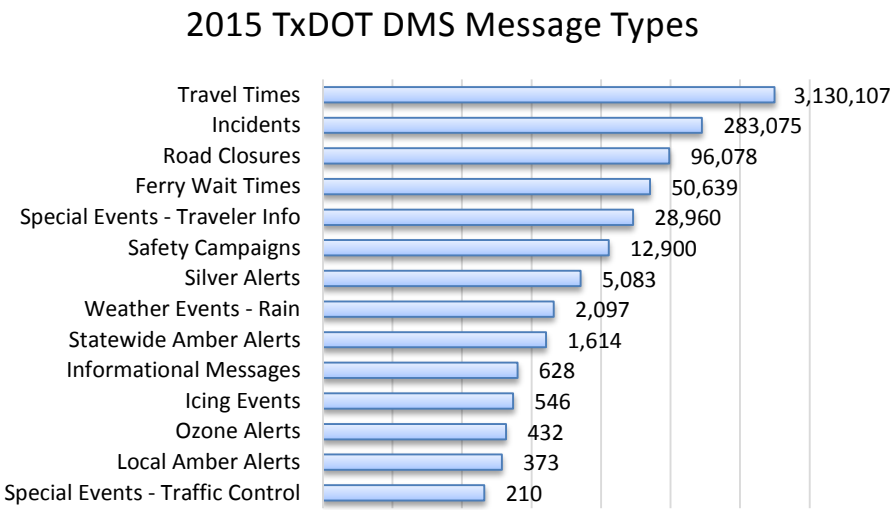
Major components of the CTMS include cameras, dynamic message signs (DMS), freeway entrance ramp flow signals, travel time monitoring using the Automatic Vehicle Identification (AVI) system and AWAM (Anonymous Wireless Address Matching) system, and radar speed and volume sensors. Safety enhancing systems deployed include queue warning, overheight truck detection and truck rollover warning systems. These devices and systems are connected via a hybrid wireless and hardwire communication system, processed by central facility computer systems.

TranStar's traveler information systems are the cornerstone of the partner agencies' traffic management function and its ability to respond to and manage incidents. TxDOT operates and maintains this system for the TranStar consortium.

Information is provided to motorists by three primary means: roadside dynamic message signs, the Internet (by desktop, mobile Internet, and through social media), and through local broadcast media.

The 275 system-wide permanent roadside DMSs (244 TxDOT operated and 31 HCTRA operated) provide information on traffic incidents and planned construction, giving location, travel direction, and nature of the incident or activity. The system is also used to display current travel times; weather alerts; Amber (missing child), Silver (missing elderly or disabled persons), and Blue (law enforcement-related) Alerts; and traffic safety messages.

There were more than 482,000 operator activated messages and over 3.1 million automated messages displayed on DMSs in 2015. The total number of operator-activated and automated messages increased 11% over 2014 levels.



City of Houston

The City of Houston Traffic Operations Branch directs the design and installation of new traffic signals, operates and manages the city's signal system, and oversees operations and development of the traffic signal communications infrastructure. Houston has more than 2,450 signalized intersections maintained and operated by the city.

The Public Works and Engineering Department's Traffic Signal Performance Improvement Program (TSPIP) is a coordinated effort to ensure the city's traffic signals are using the most up-to-date traffic data, while taking advantage of the most recent technologies to produce new customized signal timings. TSPIP'S revolving program is scheduled to revisit each major corridor every four years for retiming.

The City of Houston manages:

- 2,450 traffic signals
- 1,600 school flashers
- 180,000 streetlights
- 1,800 freeway lights

In addition to providing the program management for TSPIP, the Traffic Operations Branch is responsible for developing signal optimization plans for the selected zones. The Traffic Operations Branch's role in this process consists of field data collection, timing plan design, and signal timing implementation. Approximately 800 traffic signals are evaluated and optimized each year.

Metropolitan Transit Authority of Harris County

The Metropolitan Transit Authority of Harris County provides bus and light rail transit services as its core function but is also involved in other transportation and law enforcement functions. METRO programs operated from Houston TranStar include METRO bus and METRORail dispatch, METRO Police Communication Section operations,

traffic signalization systems, HOV management systems, SAFEClear and incident management programs.

METRO activity highlights for 2015 included conducting updated NIMS and Incident Command System (ICS) training, a pilot operation of the HOV/HOT lane system for extended weekday and weekend hours, and continued operation of the High Occupancy Toll (HOT) Lanes in the Houston region.

Harris County Traffic Management

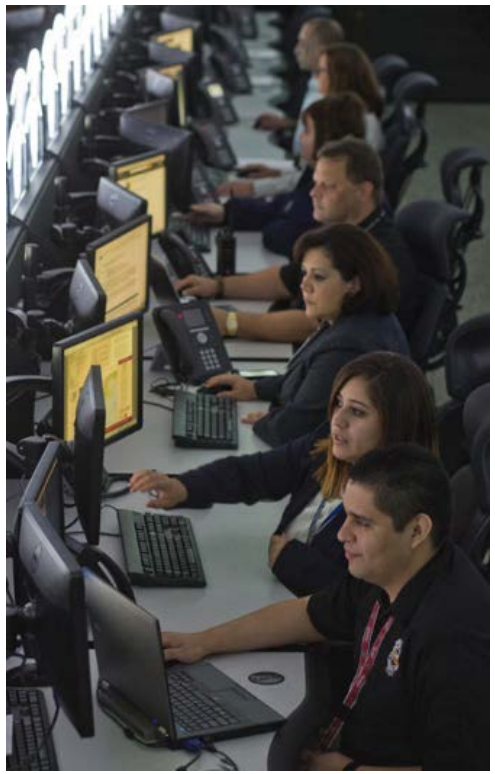
The Harris County Public Infrastructure Department's Traffic Maintenance Group (TMG) is responsible for the operation and maintenance of the County's traffic signal infrastructure, which includes the fiber optic interconnect communications network. Major initiatives during 2015 included:

- Conversion of Harris County video from internal network to TranStar Video network;
- Continued support for Ship Channel Security District;
- Progressed on a public safety LTE-based communications system for Harris County use and multiagency support/connection;
- Continued work on Washburn Tunnel camera deployment for incident management.

Harris County Office of Homeland Security and Emergency Management (HCOHSEM)

With almost 4.3 million residents, Harris County is the most populous county in the State of Texas and the third most populous county in the United States.

While the proximity to the Gulf of Mexico makes Harris County vulnerable to hurricanes, it has seen its share of other incidents. The Harris County Office of Homeland Security & Emergency Management (HCOHSEM) is ready to activate its Emergency Operations Center (EOC) for any natural or man-made disaster. In the past, the EOC has activated for emergencies that have included weather events, health related events, hazardous materials, industrial accidents and wildfires. HCOHSEM serves as a liaison to local, county, state, federal and military agencies and departments. In total, HCOHSEM activated and staffed the EOC 13 times in 2015, including for significant weather events in May and October.



Homeland Security

The HCOHSEM collaborates with local, state and federal partners to prevent, protect against, respond to and recover from natural and man-made disasters, health emergencies and terrorism. Partner agencies include the Harris County Sheriff's Office, Harris County Fire Marshal's Office, Federal Bureau of Investigation, U.S. Department of Homeland Security, U.S. Coast Guard, Federal Communications Commission, State of Texas, the local Fusion Center, and countless first responder organizations as well as other local, state, national and international partners.

Emergency Operations Center (EOC)

HCOHSEM activates its Emergency Operations Center (EOC) for a wide range of emergencies or special events. The EOC is where emergency partners coordinate response efforts, make decisions, locate and deploy

resources, and gather and disseminate information. 2015 saw the new EOC fully staffed with key personnel under the same roof for the first time. In 2015, more than 140 visitors toured the Harris County EOC and TranStar.

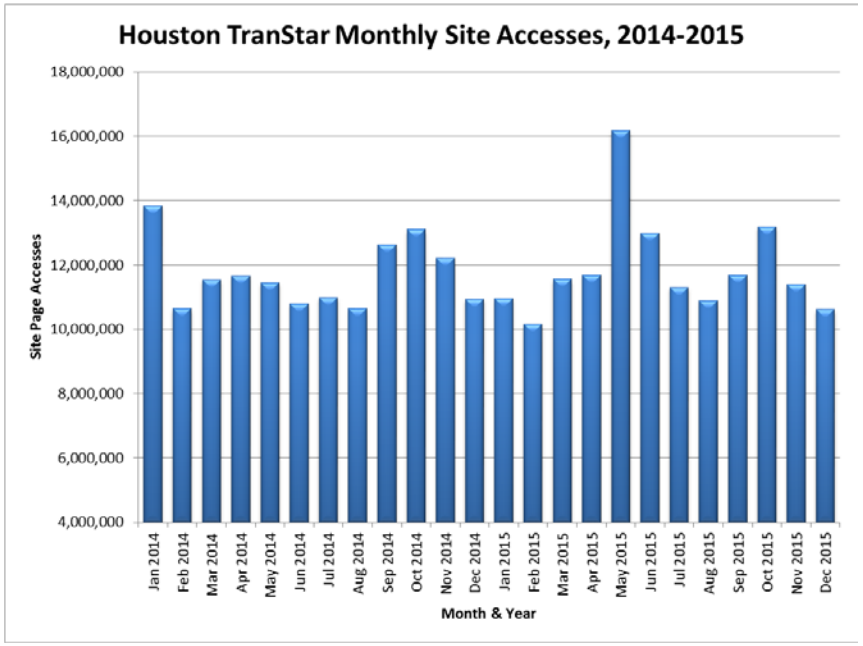
Traveler Information

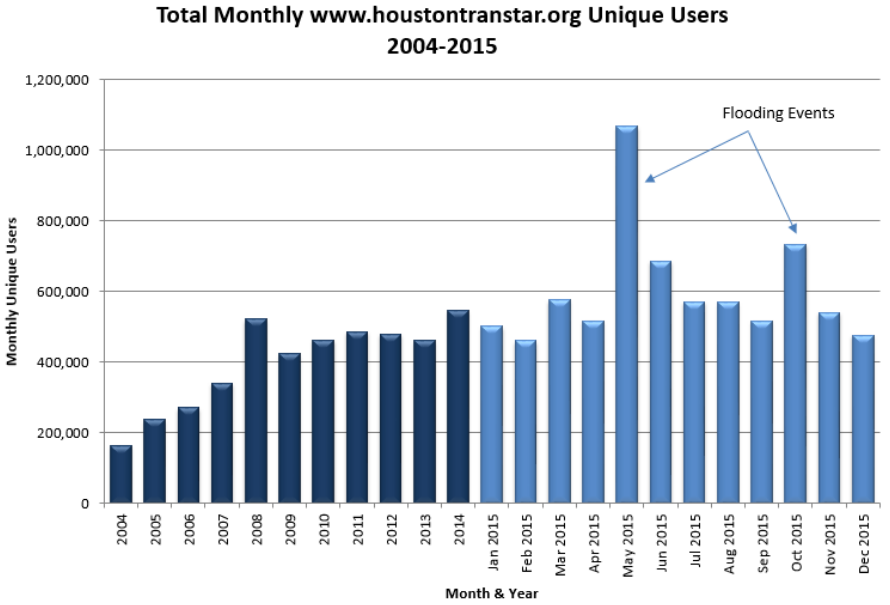
One of the most visible products of Houston TranStar center operation is traveler information. Local Internet and media outlets use the TranStar CCTV feeds, Internet-based incident reporting capabilities, and travel time reporting systems in their daily traffic reporting functions. In addition, traffic service organizations are housed on the operations floor of Houston TranStar.

Operational highlights for the TranStar Website in 2015 included:

- Total accesses up 1.6% over 2014 levels (to 142.6M);
- Unique users up 31.7% over 2014 (607,600 per month);
- Traffic alert subscribers up 4% to 11,250 subscribers;
- Construction information page views up 31% to 882,000;
- DMS information page views up 43% to 11.0M;
- CCTV page views up 13.9% over 2014 at 138.8M views;
- Data feed accesses were steady at 23.3M accesses;
- Route builder access were down 11% at 1.25M accesses;
- TranStar Homepage views were down 6.6% at 2.2M views; and
- Use of the Bing Maps interface was up 364% in 2015 over 2014 levels. While still very low compared to the "black background" map, addition of arterial data may be driving increase use.

The 31.7% increase in average monthly unique users was notable in 2015, and somewhat attributable to website activity in May and October during regional flooding events. However, if May and October are discounted, the number of average monthly unique users was still up nearly 19% (to 542,000) for 2015.





Incident Management

Incident Management and Clearance

There were 47,933 system-wide incidents entered into the Regional Incident Management System (RIMS) in 2015. This was a 215% increase over 2014, primarily due to the increase of agency floor staff and more aggressive reporting of stalls and other minor incidents.

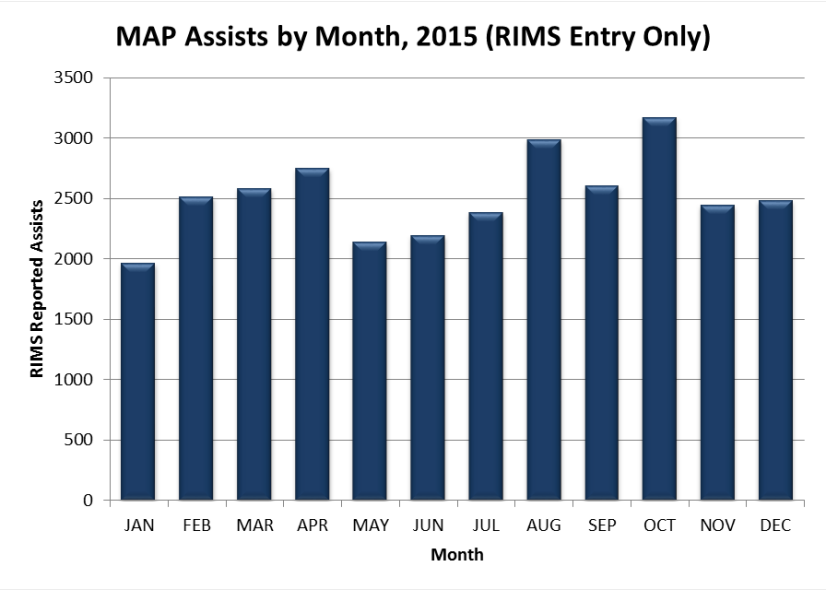
The average incident cleared in 33 minutes in 2015, up from 31 minutes in 2014. However, major flooding events in May and October skew this number somewhat, with a 24.7 minute average incident clearance time without including May and October in those calculations.

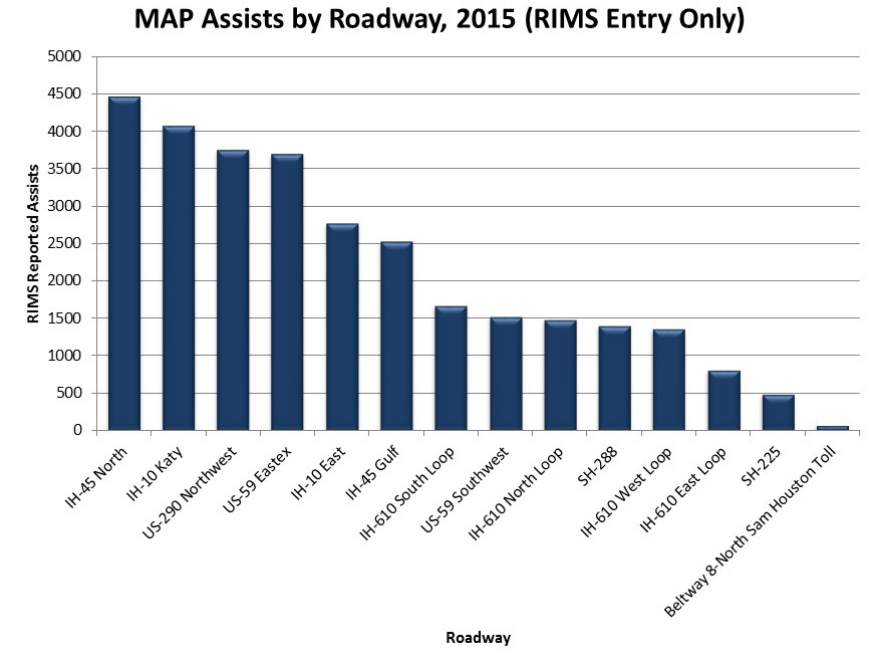
The number of average daily incident hours increased from 36.6 to 72.2 hours, again driven by the increase of agency floor staff and more aggressive reporting of stalls and other minor incidents.

Motorist Assistance Patrol (MAP)

The Motorist Assistance Program (MAP) continues to be one of the most visible services operated by the Houston TranStar agency partnership. MAP began in 1986 with two vans operating eight hours per day. The program has expanded significantly since, operating 16 hours per day on all major freeways, Monday through Friday.

There were 30,258 RIMS-reported assists handled by MAP in 2015, an increase of over 20% from 2014. The increase was likely due to staffing normalization in the program. The RIMS-reported MAP assists are for Harris County Deputy MAP activity only. TxDOT operators previously provided dispatch service to the MAP program, but that function has been moved to the Harris County Sheriff's Office.





SAFEClear

SAFEClear, the City of Houston's rapid clearance program, was instituted in 2005. SAFEClear is intended to bring quick response to disabled vehicles to reduce the occurrence of secondary crashes in the freeway queue. There were 22,471 RIMS reported SAFEClear assists in 2015; a decrease of 3.7% from 2014 levels. In 2015, the average time from tow authorization to clearance was 49 minutes, up 7.4% from 2014.

Benefits

Estimates of those benefits which are quantifiable, such as the cost of motorist delay savings (in time and dollars), fuel savings (in gallons and dollars), and emissions reductions (in tons of emissions) are presented in this section. Determining the benefits of Houston TranStar is treated conservatively because many benefits are not easily quantifiable and some are intangible. For the past 19 years, this report has used an approach which estimates the operational benefits in terms of freeway motorist delay savings.

Traffic delays on the freeway mainlane system were estimated using the TxDOT travel time monitoring system and traffic volumes from the TxDOT annual volume-roadway inventory files; and from HCTRA on the toll road system. The procedure for evaluation uses national benchmarks and experience to establish Houston TranStar quantitative goals for expected benefits. The expertise of Houston TranStar staff is relied upon to estimate performance of the transportation systems in terms of percent attainment of the goals.

The estimated costs of congestion in the Houston TranStar monitored region were calculated to be just under $1.175 billion in 2015. Annual benefits in the reduction of travel time due to TranStar operations were estimated to be more than 20.7 million vehicle-hours with an estimated monetary benefit of about $460 million. The saving in travel time is equivalent to reducing fuel consumption more than 38 million gallons, which results in an additional savings of about $87 million. The total 2015 motorists' savings in delay and fuel cost was in excess of $546 million. The annualized cost estimate of center operation was $34.3 million in 2015.

Since 1997 (when benefits were first estimated), Houston TranStar has saved Houston area motorists nearly $5 billion in reduced traveler delay and fuel costs.

Benefit Cost Calculation:

Annual Benefits	$546,366,000
Annualized Costs	$34,348,000
Benefit/Cost Ratio	15.9

An estimated reduction in the amount of fuel consumed would also result in a reduction of mobile source exhaust emissions. Based on USDOT Bureau of Transportation Statistics, the reduction of 38.9 million gallons of fuel is equivalent to an estimated reduction of 1003 tons of hydrocarbons; 6486 tons of carbon monoxide; 343,522 tons of carbon dioxide, and 1,460 tons of nitrogen oxides.