Overview: Why is STARS II important?

- STARS II – Statewide Traffic Analysis and Reporting System II

- Federal requirement for all State DOTs to develop, establish, implement, and continue operation of Traffic Monitoring System
  - 23CFR500 Subpart B

- Transportation Planning and Programming Division (TPP) is OPR for collection, analysis, and reporting of traffic data

- TxDOT’s current annual budget investment for collecting traffic data: Approx. $5,000,000

- TxDOT has an obligation to use, make available, and preserve collected traffic data
  - First traffic maps published for 1936-1938
How is Data Used?

- Engineering
- Engineering Economy
- Environmental Analysis
- Finance
- Legislation
- Maintenance
- Operations
- Planning
- Safety
- Statistics

And By Whom?

- Legislature
- Governor
- County Judges
- Federal Highway Administration (FHWA)
- TxDOT Districts
- TxDOT Divisions
- Public
Traffic Monitoring System

- Statewide coverage – On- and Off-System
- Short Term Traffic Monitoring – 24 Hour Data
  - Pneumatic tube axle counts – (Contracted)
  - Manual classification counts – (Contracted)
  - Special counts – (Pneumatic tube – In-House)
- Continuous Counter Operations – 24/7/365 Data – aka Permanent Counters – (Contracted and In-House)
  - 362 sites
  - Volume
  - Classification (including Speed)
  - Weight (Weigh-in-Motion (WIM))
**Pneumatic Tube Counts**

- **24-hour Pneumatic Tube Counts**
  - Axle counts on urban and rural roads including county roads, bridges and city streets
  - Approximately 75,000 to 85,000 locations annually
    - Including 25,000 to 35,000 urban counts
  - Contract personnel since late 1980s

- **Counting cycles**
  - Statewide annually – On-System
  - Urban areas (aka Saturation counts) on 5-yr rotating cycle
Pneumatic Tube Counts Quality Control

- Trimble Nomad G Series® Receiver
  - Barcode Scanner
    - Counter (machine) serial number tracking
    - Schedule and Site identification
    - Data entry error elimination
  - GPS coordinates including date/time stamp
  - Integrated Digital Camera – provides visual information on roadway condition (construction, road washed out, bridge closed, etc.)
Manual Traffic Counts

- 24-hour Manual Classification Traffic Counts
- Collect vehicle classification information relative to the type of vehicle
- Over 700 locations annually statewide
  - Including Texas / Mexico border bridges
- Contract personnel since 1996
- Used to establish axle factors for pneumatic tube axle counts
Continuous (aka Permanent) Counter Operations

- The Transportation Planning and Programming Division (TPP) works cooperatively with District personnel for the installation, repair, and upgrade of permanent traffic data collection sites.
  - Majority of work performed by contractors through District issued contracts
  - Some work performed with in-house forces
- Data collected 24/7/365
  - Volume
  - Classification including speed
  - Weight
Permanent Volume

- Collects data on the number of vehicles (not axles)
- Statewide: 169 active sites
- Upgraded, whenever possible, to collect continuous classification data
Permanent Vehicle Classification

- Collects types and percentages of vehicles
  - Is it a motorcycle?
  - Is it a car?
  - Is it a bus?
  - Is it a truck? If so, what type?
- Statewide – 161 active sites
  - Includes 25 border region locations
- Used to develop axle factors
- Volume and speed are also collected data fields
FHWA Vehicle Classifications

1. Motorcycles
   2 axles, 2 or 3 tires

2. Passenger Cars
   2 axles, can have 1- or 2-axle trailers

3. Pickups, Panels, Vans
   2 axles, 4-tire single units
   Can have 1 or 2 axle trailers

4. Buses
   2 or 3 axles, full length

5. Single Unit 2-Axle Trucks
   2 axles, 6 tires (dual rear tires), single-unit

6. Single Unit 3-Axle Trucks
   3 axles, single unit

7. Single Unit 4 or More-Axle Trucks
   4 or more axles, single unit

8. Single Trailer 3- or 4-Axle Trucks
   3 or 4 axles, single trailer

9. Single Trailer 5-Axle Trucks
   5 axles, single trailer

10. Single Trailer 6 or More-Axle Trucks
    6 or more axles, single trailer

11. Multi-Trailer 5 or Less-Axle Trucks
    5 or less axles, multiple trailers

12. Multi-Trailer 6-Axle Trucks
    6 axles, multiple trailers

13. Multi-Trailer 7 or More-Axle Trucks
    7 or more axles, multiple trailers
Weigh-in-Motion (WIM)

- Statewide – 32 active sites collect weight, classification, speed, and volume data

- Freight Planning Program
  - Ramping up installation efforts to ensure widespread WIM coverage of Texas’ freight network

- Mechanistic-Empirical Pavement Design Guide (MEPDG) (TxME)
  - Work cooperatively with CST to provide traffic data inputs for flexible pavement design

- Long Term Pavement Performance (LTPP)
  - Provide FHWA with high quality WIM traffic data design, build, and maintain cost-effective and long-lived roads and bridges
## Types of Collected Traffic Data

<table>
<thead>
<tr>
<th>Short Term Traffic Counts</th>
<th>Permanent Traffic Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axle Counts (Pneumatic Tube) – Contracted</td>
<td>Volume</td>
</tr>
<tr>
<td>Classification (Manual Counts) – Contracted</td>
<td>Classification / Speed</td>
</tr>
<tr>
<td>Special Counts (Pneumatic Tube) – In-House</td>
<td>Weight – Weigh-in-Motion (WIM)</td>
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</tbody>
</table>

### Traffic Monitoring Systems

- Different types of equipment and sensors are used to collect a variety of information to characterize the traffic stream at selected statewide locations.
Developed by Texas Highway Dept. and Texas Transportation Institute in the 1960s and 1970s
Original Traffic Analysis Systems Issues (Some of them...)

- Subsystems not integrated
- Adhoc requests could be difficult to compile and customize
- Complexity of the system made it hard to:
  - Add new processes
  - Modify existing processes to meet new requirements
- High reliance on skilled programming staff
  - Use of mainframe computer systems
  - Use of obsolete computer languages
- Highly prone to potential errors
  - Upwards to 100 different operations requiring human interaction
Statewide Traffic Analysis and Reporting System (STARS)

- First generation system to process, manage, and safeguard the approximately $5,000,000 TxDOT annual traffic data asset
- Functionality limited
  - Only limited types of data files could be loaded and analyzed
- System no longer supported
STARS II – How we got here...

- Purchase, customize, and install a web-based Commercial Off-the-Shelf (COTS) software for statewide traffic analysis and reporting
- Pursued Department of Information Resources (DIR) Deliverables-Based Information Technology Services (DBITS) Contract
- Developed System Requirements Specification – DIR Texas Project Delivery
- STARS II identified as priority system – In TxDOT’s Top Ten
  - Funding for Phase I: $1.9 million
  - Funding for Phase II: $635,000
  - Estimated minimum financial benefit over the next ten years: $2.3 million (net present value)
Vendor hosted solution in the Cloud was preferred
  – Vendor offered a discount totaling $310,000 for five years of hosting
  – DIR waiver required
  – TxDOT owns the traffic data that is stored in a secure environment

Contract signed January 2013
  – Prime Vendor: Data Transfer Solutions (DTS), Florida
  – Subcontractor: Midwestern Software Solutions (MS²), Michigan
STARS II Description

- Used in analyzing and reporting traffic data for TxDOT and replaces:
  - Legacy mainframe subsystems
  - PC applications
  - Manual processes

- Substantially fewer opportunities for introduction of errors and more time for analyzing data

- Improves business processes and data accessibility

- Leverages mapping and reporting tools to improve efficiency and accuracy

- Vendor-hosted solution with a centralized traffic database:
  - Free from data duplication
  - Free from unnecessary redundancies
Historical Perspective

- ...from the early days to today...
Until 1959, State Highway 9 was the previous designation of IH-37.
Accessing STARS II

- **http://txdot.ms2soft.com/**
  - Transportation Data Management System (TDMS)

- Public interface
  - Latest official traffic data counts
  - Similar to District Traffic Maps, but interface is interactive and provides available historical and truck percentage information
### Texas Department of Transportation

#### Transportation Data Management System

**Location:** S149 - Year: 2014

**Total Counts:** 135

**Select Year:** 2014

**Show Types:**
- Volume
- Class
- Speed
- Gap
- Weight
- Update

**Directions:**
- EB
- WB
- AWAY

**Count Exists**
- 1
- 2
- 3
- 4

**Count Missing Interval Data**
- Yes

**No Counts Exist**
- Yes

**Flagged Counts in bold Red**
- Yes

<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
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<tbody>
<tr>
<td>Su</td>
<td>Mo</td>
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<tr>
<td>5</td>
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<td>19</td>
<td>20</td>
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<tr>
<td>26</td>
<td>27</td>
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Counts in January = 31

Counts in February = 26

<table>
<thead>
<tr>
<th>March</th>
<th>April</th>
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<tbody>
<tr>
<td>Su</td>
<td>Mo</td>
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<tr>
<td>2</td>
<td>3</td>
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<td>17</td>
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Counts in March = 28

Counts in April = 29

<table>
<thead>
<tr>
<th>May</th>
<th>June</th>
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<tbody>
<tr>
<td>Su</td>
<td>Mo</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
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</tbody>
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Counts in May = 21

Counts in June = 0
Future Vision - STARS III

- STARS III will build important productivity, reporting, and mapping enhancements into the successful implementation of STARS II.

- Additional tools:
  - Traffic forecasting
  - Production of high quality maps
  - Integration with other systems
  - Increased accessibility and visualization ease for end users
The Real Stars of STARS II

- Traffic Analysis System Support
  - Mike Carrizales – 34 yrs
  - Rhonda Christensen – 26 yrs
  - Paul George – 26 yrs
  - Cleo Williams – 17 yrs

- Traffic Data Collection
  - Richard Peters – 28 yrs
  - Catherine Wolff – 26 yrs
  - Glen Bates – 23 yrs

- Total TxDOT Years of Service ~ 200 yrs
For More Information

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