U.S. Department of Transportation
Federal Highway Administration

Office of Highway Policy Information

Traffic Monitoring Sensor Technology

Thursday September 30, 2010

By: David L. Jones Sr.
Transportation Specialist

OBJECTIVE

- Summarize the Traffic Monitoring Program
- Traffic Monitoring System Deployment
- Identify Traffic Monitoring Sensor Technology

FHWA's Role

National Leadership

The FHWA is in a unique position to frame the discussion and define the debate on major issues that impact the transportation community nationwide.

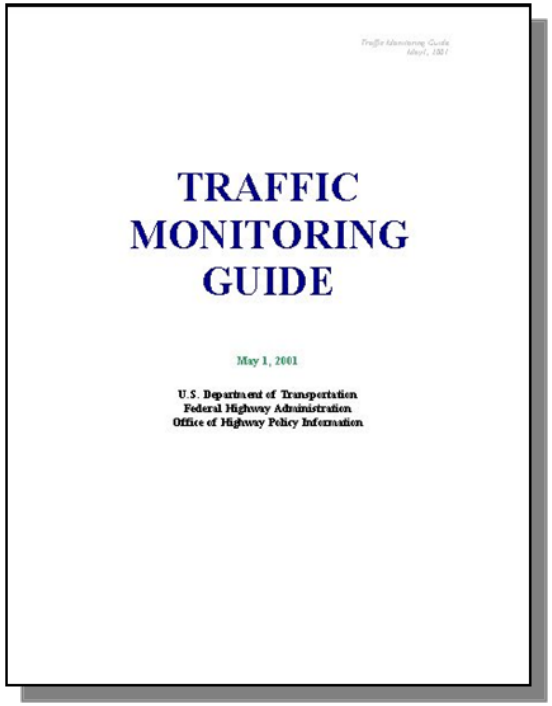
FHWA can be an agent of change…leading the way in developing and implementing sound national transportation policy…

This approach includes collecting meaningful data, undertaking sound analysis, developing strategic approaches with our transportation partners…

FHWA's Role

1. Reviews and Approvals
2. Develop Regulations
3. Develop Standards
4. Technical Assistance
5. Distribute Line of Credit
6. Reimburse States

FHWA's Current Role


TRAFFIC
MONITORING
GUIDE

May 1, 2001

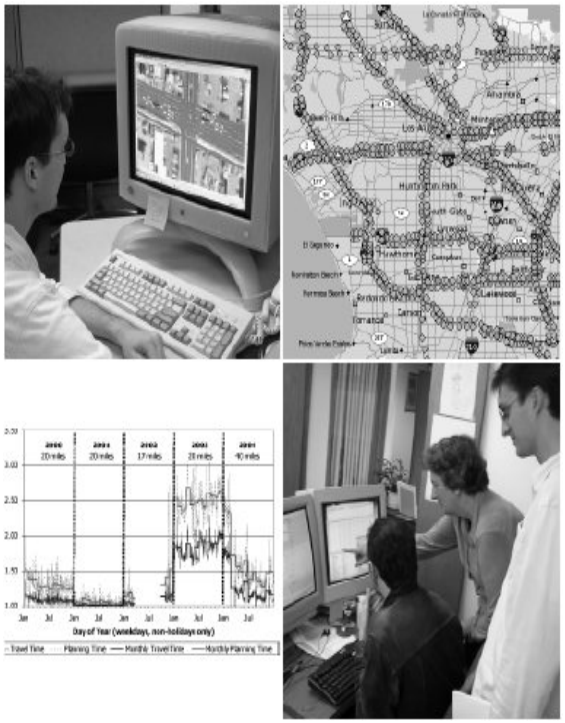
U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information

Program Design

Traffic Monitoring Guide (TMG)

http://www.fhwa.dot.gov/ohim/tmguide/index.htm

FHWA's Current Role



Program Design

ITS (ADUS)

Archived Data Users Service

http://www.fhwa.dot.gov/ohim/travel/adus.htm

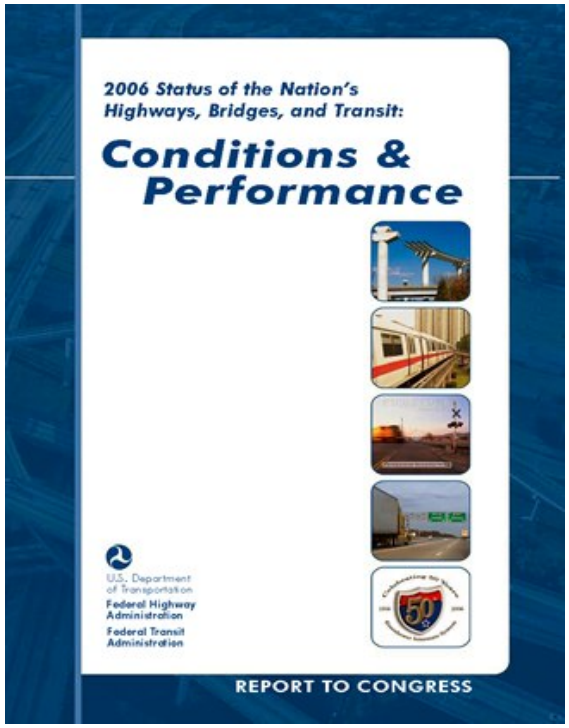
FHWA's Current Role

- Program Design
- ITS (ADUS)
- **LTPP**

Long-Term Pavement Performance

http://www.fhwa.dot.gov/pavement/ltpp/index.cfm

FHWA's Current Role



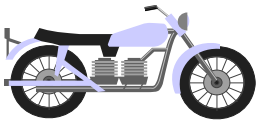
- Program Design
- ITS (ADUS)
- LTPP
- **HPMS**

Highway Performance Monitoring System

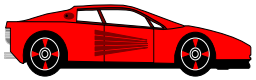
http://www.fhwa.dot.gov/policy/2008cpr/index.htm

FHWA VEHICLE CLASSIFICATIONS

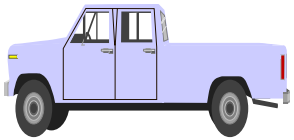
1 Motorcycles



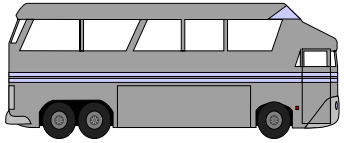
2 Passenger Cars



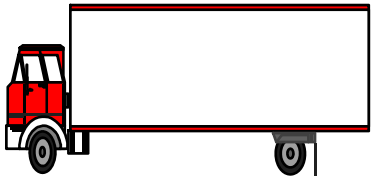
3 Two Axle, 4 Tire Single Units



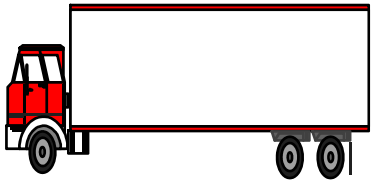
4 Buses



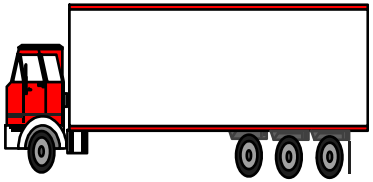
5 Two Axle, 6 Tire Single Units



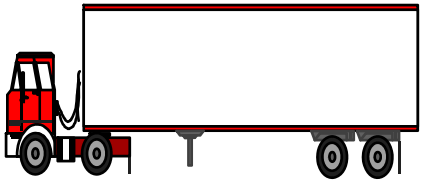
6 Three Axle Single Units



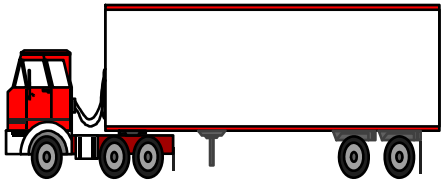
7 Four or More Axle Single Units



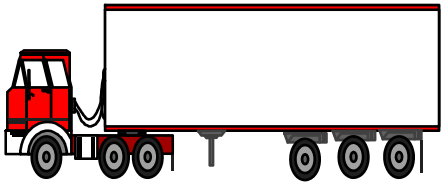
8 Four or Less Axle Single Trailers



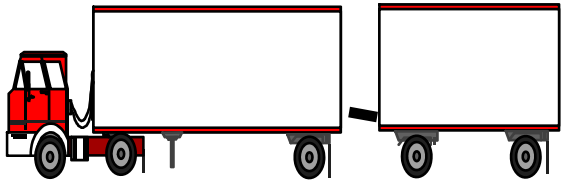
9 Five Axle Single Trailers



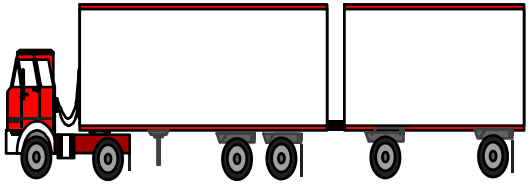
10 Six or More Axle Single Trailers



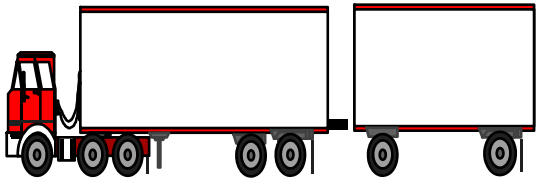
11 Five or Less Axle Multi-Trailers



12 Six Axle Multi- Trailers



13 Seven or More Axle Multi- Trailers



Traffic Data Program

Federal Requirements: State Planning & Design

Data →

Volume	Classification	Weight	Speed

Components →

Planning	Design	Collection	Analysis	Reporting	Maintenance

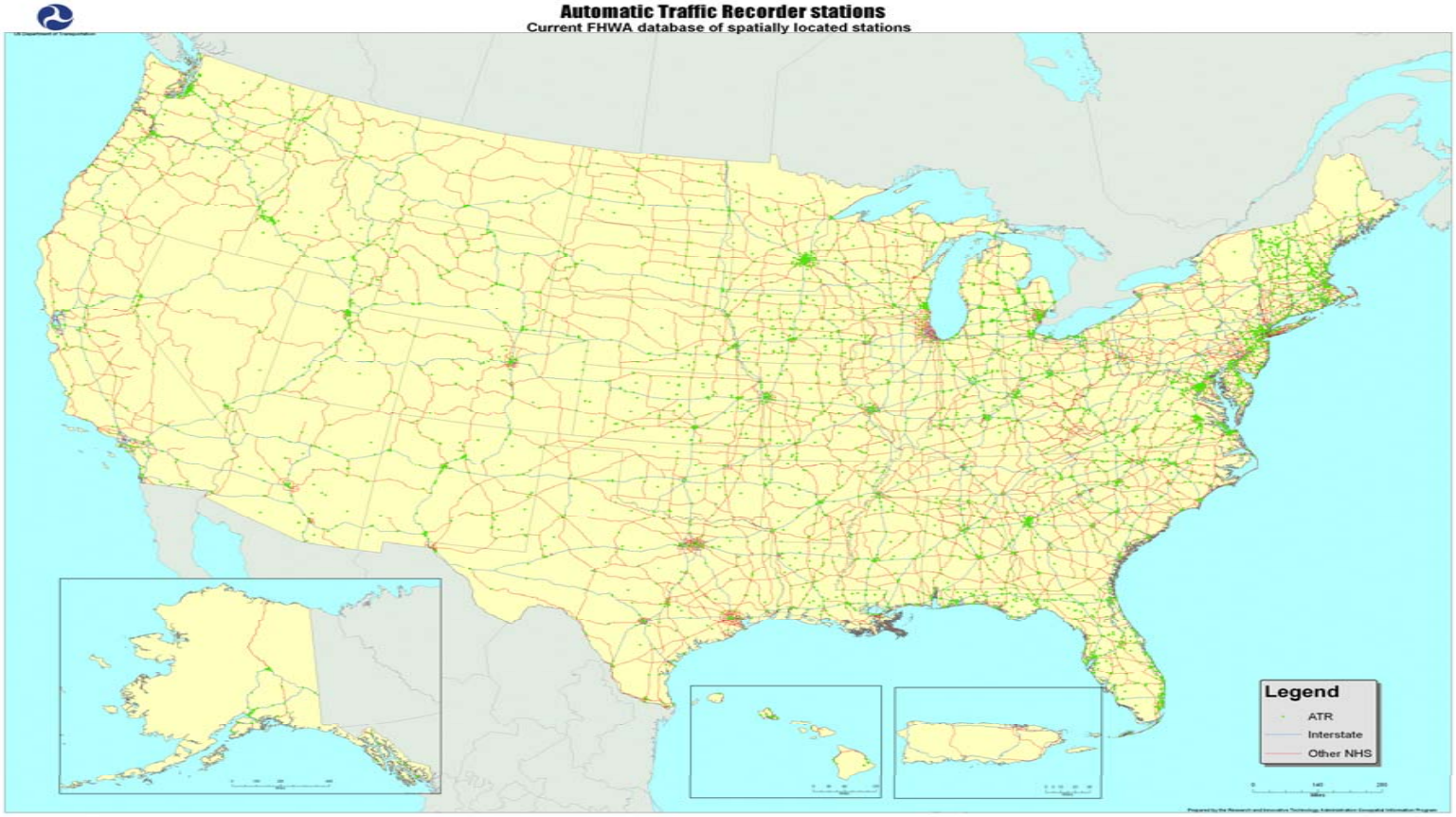
Customers →

State DOT	State DOT	State DOT
Planning Design Project Development Safety	HPMS Policy Freight Safety Design, etc.	Local partners Developers/ Realtors

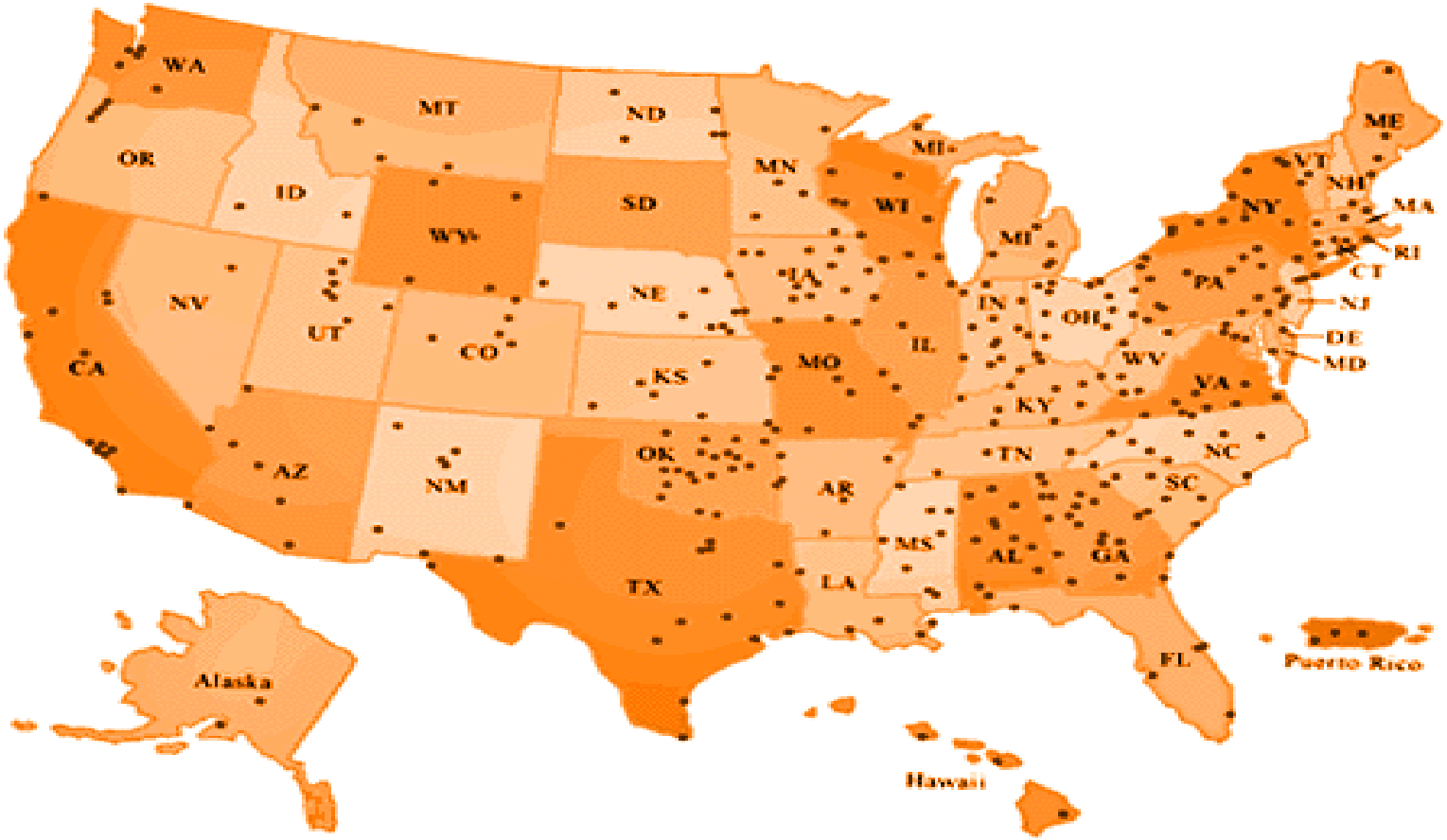
Guidelines →

AASHTO Guidelines	TMG	HPMS Field Manual	Other

Automatic Traffic Recorders Sites



Weigh-In-Motion Sites



None-Intrusive Sensors

- Active Infrared
- Passive Infrared
- Microwave / RADAR
- Ultrasonic

None-Intrusive Sensors

- Passive Acoustic
- Video
- Magnetometer
- Bluetooth

Intrusive Sensors

- Inductive Loops
- Magnetometer
- Road Tube
- Load Cell – Hydraulic / Strain gauge
- Bending Plates – Strain gauge

Intrusive Sensor

- Piezo electric cables / film / quartz
- Fiber Optics
- Capacitance mats / pads
- Strain gauges on bridge beams

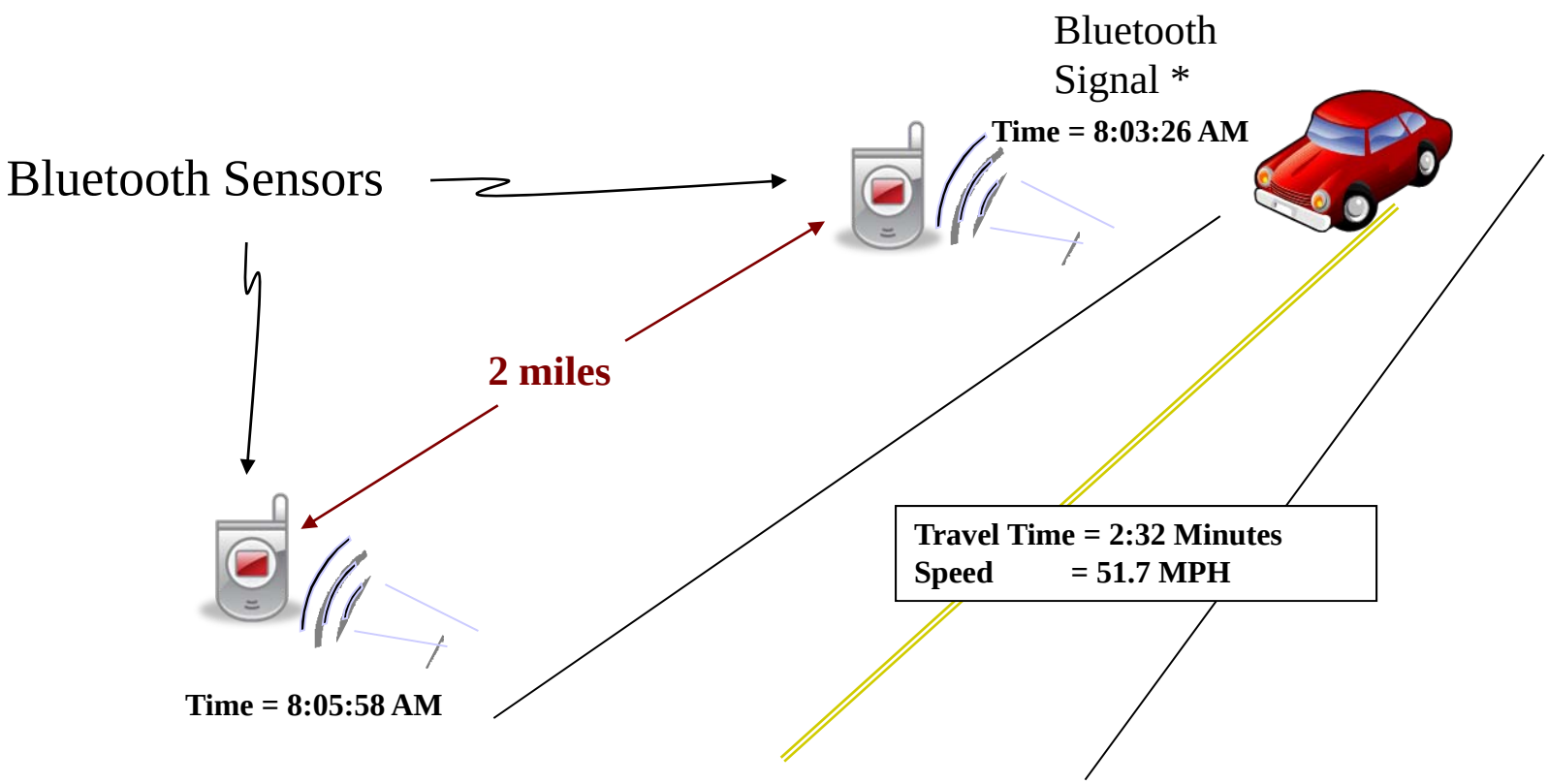
Radar

Infrared Active/passive

Video

Acoustic Detector

Bluetooth Traffic Monitoring



* Bluetooth signals come from cell phones, PDAs, laptops, GPS, car radios…
** Provisional patent received

Road Tube

Magnetometer

Inductive Loop

Load Cell Sensor

Bending Plate Sensor

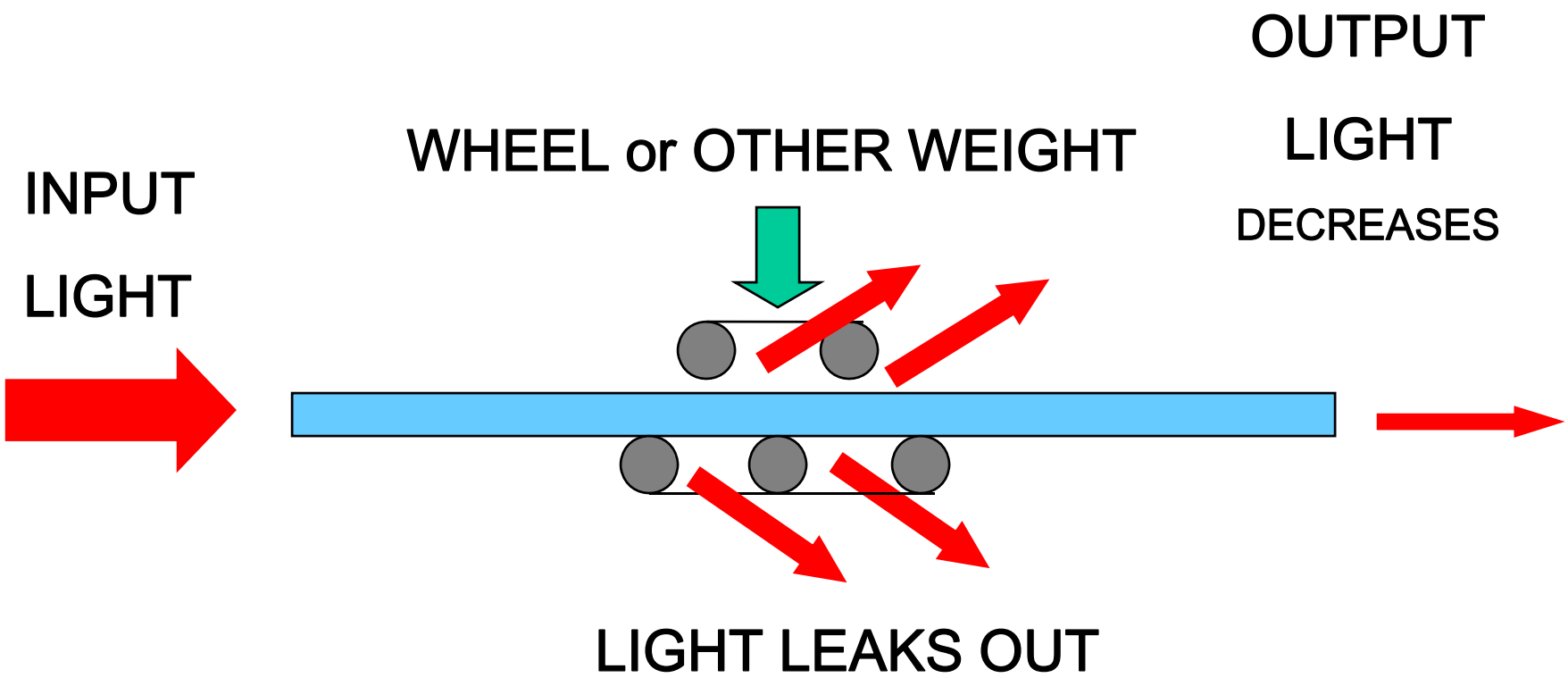
Quartz Sensor

Piezo-Ceramic Sensor

Capacitance Mat

Strain Gauges

Fiber Optics



NIT Phase I
Detection Accuracy

	Freeway Volume	Intersection Volume
Eltec - Passive IR	N/A	<30%
ASIM - IR 224 - Passive IR	1%	5%
Autosense - Active IR	0.5% - 2.4%	N/A
Safetran - Magnetic	5%	N/A
PEEK - PODD - Microwave	1% - 3%	N/A
Whelen TDN-30 - Microwave	3% - 8%	N/A
EIS - RTMS - Radar	1% - 2%	N/A
IRD - Smartsonic - Passive Acoustic	4% - 20%	N/A
MS Sedco - TC-30 - Ultrasonic	1% - 1.5%	N/A
Novax - Lane King - Video	N/A	5% - 20%
PEEK - VideoTrak - Video	2% - 5%	N/A
Autoscope - Video	2% - 5%	N/A
Eliop Trafico - EVA - Video	2% - 5%	N/A
Rockwell - Trafficam - Video	5% - 20%	N/A

*Installed in optimal locations

Traffic Level Impact

- Traffic level impact varies depending on technologies
- Congestion decreases sensor performance
- Minimum speed for detection is 3-5 mph

Freeway Test Site			
		Volume	
Technology	Speed	Peak	Off Peak
Active Infrared	+	+	+
Magnetic	+	+	+
Microwave	+	+	+
Passive Acoustic	+	+/–	+
Passive Infrared (PIR)	+/–	+/–	+
PIR/Ultrasonic	N/A	+/–	+
PIR/Ultrasonic/Radar	+	+	+
Video	+	+	+

Legend
+ Good
+/- Fair
- Poor

Useful Links

- http://www.nmsu.edu/~traffic
- http://www.ops.fhwa.dot.gov/freight/size_weight.htm
- http://www.fhwa.dot.gov/policy/index.htm
- http://apps.fhwa.dot.gov/vtris/

Visit US

Office of Highway Policy Information
Travel Monitoring & Surveys Division

Questions?

THANK YOU

DAVID L. JONES
DJones@dot.gov