DRAFT INDOT ITS Strategic Plan

ITS = Intelligent Transportation Systems

...IF YOU HAVE A TOUCH-TONE PHONE, PRESS "ONE" NOW. IF YOU HAVE A ROTARY PHONE, THROW IT IN THE TRASH AND JOIN THE TWENTIETH CENTURY AT ANY TIME DURING THIS MESSAGE.
ITS = Intelligent Transportation Systems

- Expensive and increasingly difficult to add capacity to highways - ITS maximizes existing capacity and safety of highways through high-tech (ATMS) and low-tech approaches (2/10 Reference Markers)
- ITS: the application of technology to highways to save motorist’s lives, time, and money
- Slowed/stopped traffic = safety hazard, time wasted, lost productivity (value of time)
- TrafficWise: INDOT’s ITS initiative

Why Do a Strategic Plan?

- No requirement, it just makes sense…assess INDOT System needs and develop strategies for the next 10 -15 years to address the needs
- Most states have utilized consultants; INDOT ITS Strategic Plan developed in-house
- Project-oriented recommendations that support existing INDOT / FHWA / USDOT Strategic Plans and USDOT ITS goals
- Focus on primary field-oriented ITS devices (ATMS, CCTV cameras, DMS, Travel Time Signs (TTS)...new deployment for INDOT)
System Inventory / Assessment

- Roadway in Indiana = 94,287 miles
- INDOT System = 11,185 miles
- Interstate System = 1,169 miles (22% of VMT on only 1.2% of roadway in Indiana)
- Nationally: 41% of truck VMT on I-System
- INDOT’s ITS investment will focus on the Interstate System and other freeways
  - Proportion and composition of traffic
  - Limited ability to divert in case of incidents

System Inventory / Assessment

- 2004 AADT and generalized LOS for all Indiana Interstates and select freeways
- Minimum LOS policies for new or completely reconstructed freeways from the Indiana Design Manual (Chapter 53) will serve as a basis for possible ITS investment (i.e., LOS C or worse)
- System continuity within a particular Interstate corridor dictates that some segments operating at better than LOS C will have ITS devices
**System Inventory / Assessment**

- **Interstate 64** (123 miles)
  - LOS A: 105 miles (85%)
  - LOS B: 13 miles (11%)
  - LOS C: 1 mile (1%) (TRIMARC (Louisville) area)
  - LOS D: 4 miles (3%) (TRIMARC (Louisville) area)

- **Interstate 65** (262 miles)
  - LOS B: 120 miles (46%)
  - LOS C: 107 miles (41%) (TRIMARC area to Salem; Columbus to Franklin; Lebanon to Lafayette; Northwest Indiana)
  - LOS D: 26 miles (10%) (TRIMARC area; Franklin to Lebanon (Indianapolis area))
  - LOS E: 9 miles (3%) (Whiteland to Zionsville (Indianapolis area))
System Inventory / Assessment

**Interstate 69** (157 miles)
- LOS A: 7 miles (4%)
- LOS B: 102 miles (65%)
- LOS C: 22 miles (14%) (Anderson, Fort Wayne)
- LOS D: 23 miles (15%) (Indianapolis to Anderson, Fort Wayne)
- LOS E: 2 miles (1%) (Indianapolis)
- LOS F: 1 mile (1%) (Indianapolis)

**Interstate 70** (154 miles; 2 miles of I-65 travel over not included)
- LOS B: 78 miles (51%)
- LOS C: 62 miles (40%) (Terre Haute; Cloverdale to Indianapolis; Mt. Comfort to Knightstown; Richmond)
- LOS D: 12 miles (8%) (Indianapolis; Indianapolis to Mt. Comfort)
- LOS E: 2 miles (1%) (Indianapolis)
System Inventory / Assessment

- **Interstate 74** (150 miles; 21 miles of I-465 travel over not included)
  - LOS A: 81 miles (54%)
  - LOS B: 55 miles (37%)
  - LOS C: 14 miles (9%) (Brownsburg to Indianapolis; Indianapolis to Pleasant View)

- **Interstate 80/94** (Borman Expwy) (16 miles)
  - LOS C: 2 miles (12%) (I-65 Connector Ramps to Central)
  - LOS D: 10 miles (63%) (Kennedy to Broadway; Central to I-90)
  - LOS E: 2 miles (13%) (Calumet to Kennedy)
  - LOS F: 2 miles (12%) (State Line to Calumet; Broadway to I-65 Connector Ramps)

- **Interstate 90** (Indiana Toll Road *) (157 miles)
  - LOS B: 147 miles (94%)
  - LOS C: 10 miles (6%) (Northwest Indiana)
  - * - Currently has a Strategic Plan
System Inventory / Assessment

- **Interstate 94** (30 miles)
  - Significant Summer Friday & Sunday peaks (44% increase)
  - Normal LOS / Summer Friday & Sunday LOS
    - LOS A / B: 6 miles (20%)
    - LOS B / C: 18 miles (60%) (Porter to Michigan City)
    - LOS C / D: 6 miles (20%) (Toll Rd to Porter)

- **Interstate 164** (21 miles)
  - LOS A: 6 miles (29%)
  - LOS B: 15 miles (71%)

- **Interstate 265** (7 miles)
  - LOS C: 7 miles (100%) (TRIMARC area)

- **Interstate 275** (3 miles)
  - LOS B: 3 miles (100%)
System Inventory / Assessment

- **Interstate 465** (53 miles)
  - LOS C: 9 miles (17%) (South & East Legs)
  - LOS D: 23 miles (43%) (South, West, & East Legs)
  - LOS E: 11 miles (21%) (South, West, & North Legs)
  - LOS F: 10 miles (19%) (West & North Legs)

- **Interstate 469** (31 miles)
  - LOS A: 19 miles (61%)
  - LOS B: 10 miles (32%)
  - LOS C: 2 miles (7%) (Maplecrest to I-69 N jct)

- **Interstate 865** (5 miles)
  - LOS A: 5 miles (100%)

- **US 20/31** (St. Joseph Valley Pkwy) (32 miles)
  - LOS A: 5 miles (16%)
  - LOS B: 27 miles (84%)

- **SR 62/66** (Lloyd Expwy - Freeway Segments Only) (4 miles)
  - LOS C: 4 miles (100%) (Fulton Ave to Vann Ave)
System Inventory / Assessment

• **SR 265** (2 miles)
  - LOS B: 2 miles (100%)

• **SR 912** (Freeway Segments Only) (10 miles)
  - LOS A: 4 miles (40%)
  - LOS B: 2 miles (20%)
  - LOS C: 3 miles (30%) (US 12 to 15th Ave / 169th St)
  - LOS D: 1 mile (10%) (15th Ave / 169th St to I-80/94)

System Inventory / Assessment

• High Volume Arterials Intersecting the Interstate System – DMS candidates

• INDOT facility, 2-way AADT 40,000+ for 2+ miles approaching E+C full ATMS Interstate
  - US 30 west of I-65 (Northwest Indiana)
  - US 31 south of I-465 (South Leg) & north of I-465 (North Leg) (Indianapolis)
  - US 36 west of I-465 (West Leg) (Indianapolis)
  - SR 431 north of I-465 (North Leg) (Indianapolis)
  - SR 912 north of I-80/94 (Northwest Indiana)
INDOT Major Capital Improvements

- Expansion Projects & Pavement Replacement Projects provide opportunity to implement ITS
  - Interstate System & High-Volume Arterials approaching the Interstate System
- New Interstates & Freeways with Projected LOS C or worse; part of system / not isolated
  - I-69 (need more data from Tier 2 Environmental Studies...possible Bloomington northward; likely approaching Indianapolis)
  - I-265 (Louisville Far East Bridge) (TRIMARC area)
  - US 31 (Hamilton County)

Existing / Committed ITS Deployments

- INDOT has concentrated on Interstate System in larger urban areas; consistent with FHWA's 1996 goal of deploying ITS in 75 largest areas
  - ATMS in Northwest Indiana (essentially complete)
  - ATMS in Indianapolis (CN through 2008)
  - ATMS in Louisville Area / Southern IN (TRIMARC)
  - DMSs in Evansville, Fort Wayne, & Kokomo (no ATMS or CCTV camera detection or verification)
- Committed: Indianapolis ATMS, US 31 Kokomo (CCTV / Signal Preemption), & TRIMARC
Architecture / Market Packages

• Architecture: the framework of an ITS
  – Defines the pieces of the system and information exchange (what needs to be done, not how it will be done)

• Market Packages: more deployment-oriented
  – Identify pieces of the Architecture needed to implement a transportation service
  – Evaluation of 85 Market Packages not focus; but comparison of Market Packages and their applicability to INDOT provides general direction

Deployment Recommendations

• By Deployment Type with General Priorities
  – ATMS, CCTV, DMS, TTS, Hoosier Helper FSP, Reference Markers
Advanced Traffic Management Systems

• Not practical to instrument all Interstates with ATMS for detection and verification of incidents
• Logical to expand ATMS in 2 metro areas with a TMC and E+C ATMS: Northwest Indiana & Indianapolis; by far most populated in Indiana, plus Louisville (TRIMARC)
• ATMS: 224 miles under INDOT control (except Toll Road) + TRIMARC 17 miles = 241 miles of ATMS on Interstates & freeways in Indiana

Advanced Traffic Management Systems

• 1) Completion of Indpls ATMS: $18,365,000
• 2) Additions to Indpls ATMS: 1,300,000
• 3) Additions to NW IN ATMS: 2,750,000
• 4) ATMS replacement: 20,455,000
• 5) ATMS on new freeways: 3,775,000
• Total ATMS cost: $46,645,000
Closed Circuit Television Cameras

- The key to real-time, accurate information is the ability to detect and verify incidents
- Not practical to instrument all Interstates with ATMS
- CCTV cameras at strategic locations on higher volume freeways can serve this function
- CCTV cameras also support INDOT winter operations and overall security of transportation infrastructure
- CCTV cameras installed before DMSs
Closed Circuit Television Cameras

• Recommended CCTV camera spacing
  – LOS D or worse: Every 2 miles
  – LOS C: Every 3 miles
  – LOS B: Every 4 miles *

  * - While LOS B is better than the LOS C threshold, some segments of LOS B or better are recommended for CCTV camera deployment for system continuity purposes

• 237 CCTV cameras recommended (in addition to ATMS cameras)
  – Comprehensive coverage of rural I-65, I-69, I-70, I-94, & I-469 (limited coverage of rural I-64 & I-74)

Closed Circuit Television Cameras

• 1) Kokomo (+ signal preempt) (4): $ 350,000
• 2) Rural LOS D, DMS A of I (17): 1,275,000
• 3) Rural LOS C, DMS A of I (40): 2,925,000
• 4) Urban LOS C, DMS A of I (12): 825,000
• 5) Rural LOS C & B (81): 6,000,000
• 6) Rural LOS B (Continuity) (73): 5,325,000
• 7) R.A. / W.S. (low AADT) (10): 675,000

• **Total CCTV camera cost (237): $17,375,000**
Overhead Dynamic Message Signs

• Provide real-time motorist information at strategic locations (before decision points or suitable alternate routes)
• Motorists can divert, delay, or even cancel trip
• Most effective when detection / verification present downstream (ATMS or CCTV cameras)
• Currently: 48, plus 4 (TRIMARC area)
• Supplemented by HAR (23 stations)

Overhead Dynamic Message Signs

• Rural DMS spacing: every 30-40 miles in advance of a suitable INDOT roadway for diversion purposes
• 46 new DMSs recommended, refurbishment of 9 existing DMSs and 2 undeployed DMSs, and removal of 4 DMSs
• INDOT will operate 92 Permanent Overhead DMSs, plus 5 TRIMARC = 97 DMSs in Indiana
  – Comprehensive coverage of rural I-65, I-69, I-70, & I-94
Overhead Dynamic Message Signs

- 1) Additions to Indpls (9 new/9r): $2,880,000
- 2) Additions to Indpls/NW IN (7n/2r): 1,590,000
- 3) Rural I-System (27 new): 5,130,000
- 4) Additions to Indpls/NW IN (3 n): 570,000
- **Total DMS cost** (46 new/11 refurb): $10,170,000

- CCTV cameras not recommended in Evansville; thus, no additional DMSs; remove 4
- Remove US 31 Kokomo DMSs when US 31 relocated in future

Travel Time Signs

- Requires ATMS (vehicle detection)
- Algorithms automatically estimate travel times to specific locations (major downstream interchange or a state line)
- Some states use DMSs to convey travel times
- Indiana: DMSs used for incident information; TTSs supplement the DMSs with travel times
- Provide info to public via a static panel sign with a small electronic, dynamic insert component
Travel Time Signs

- 1) Northwest Indiana (2): $90,000
- 2) Indpls ATMS Ph 3&4 / I-70E (12): $600,000
- 3) Indpls ATMS Phase 5 (6): $350,000
- 4) Northwest Indiana (5): $480,000
- 5) Indpls I-465 West Leg (4): $250,000
- 6) Indpls I-465 N&E; W@I-65 (8): $400,000
- 7) Indpls US 31 Frwy & I-69S (2): $100,000
- **Total TTS cost (39):** $2,270,000
Hoosier Helper Freeway Service Patrol

- Serve approximately 130 miles of freeways in Northwest Indiana, Indianapolis, Southern Indiana near Louisville, & Fort Wayne
- Respond to incident quickly…get traffic moving
  - Safety, economic, & environmental benefits
- Historically a function of Districts
  - Service dependent upon need & availability of personnel…recommendations for expansion made, but no years or costs identified
  - Eliminate FSP on I-64 from Lanesville to SR 62/66

Reference Markers

- 1/10 & 2/10 Mile Reference Markers
  - Assist motorists & emergency responders in location identification (“street address” of a freeway)
  - Located in Indianapolis, Northwest Indiana, Southern Indiana near Louisville, Evansville, Fort Wayne, & Kokomo…DMS & HAR reference these
  - 1/10 Mile RM recommended on freeways with AADT 75,000+ for at least five miles

- 1/2 Mile Reference Markers
  - Install on Rural Interstates as part of sign or reconstruction projects…no prioritization by year
Reference Markers

Current 2/10 Mile RM  Proposed 2/10 Mile RM  Proposed ½ Mile RM

• 1) Additions to Indpls & NW IN: $ 604,000
• 2) 1/2 Mile RM on Rural Interstates: $ 566,000
• Total RM cost: $ 1,170,000
Summary – by Deployment Type

- Advanced Traffic Mgmt Systems: $46,645,000
- Closed Circuit TV Cameras (237): 17,375,000
- Dynamic Message Signs (46n/11r): 10,170,000
- Travel Time Signs (39): 2,270,000
- Reference Markers (1/10, 2/10, 1/2 Mile): 1,170,000
- Total cost: $77,630,000