INNOVATIVE INTERSECTIONS

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Current Tools

Common Project Solutions

- Traffic Signalization
- Widening Projects
- New Roadways

If all you have is a hammer, everything looks like a nail

~ Law of the instrument
Expanded Tools

Expanded Solutions

● Restricted Movements
  ○ Improve Safety

● Innovative Intersections
  ○ Improve Capacity

● New Technologies
  ○ Adaptive Controllers

● Removal of Signals
Why Innovative Intersections?

Current Situation:

- We need to improve safety
  - About half of all severe injuries occur at intersections
  - Left-Turn and angle crashes account for 60% of fatal crashes at intersections
- Congestion is increasing
- Funding is constrained
- Right-of-Way is expensive
- Projects take a long time to construct and have many impacts

Innovative Intersections are a tool that can help address each of these
What are Innovative Intersections

Innovative designs that:

- Improve the way traffic makes certain movements by eliminating, relocating or modifying conflict points

- Strategically improve signalization
  - Remove signalization
  - Reduce signal phases if signalization is required (Two-Phased Operation)
Signal Phase Impacts

- Reduces Intersection and Roadway Capacity
  - Signals reduce roadway capacity
  - Capacity reduction is a function of green time
- Increases delay
- Reduced mobility
  - Makes it difficult to coordinate traffic signals for progression
- Inefficient Use of Green Time (Lost Time)
  - Start up loss
  - Yellow Time
  - All-Red Time
Signal Phase Impacts

Eight-Phased Signal

~50% reduction in control delay
~46% increase in green time

Four-Phased Signal

Conventional

Innovative

50 sec
40 sec
90 sec cycle
Opportunity Costs.....Scenario Comparison

**Strategy 1**
- Widen corridor by one lane in each direction
  - $90,000,000

**Strategy 2**
- Convert entire corridor to innovative intersections, install adaptive signal controllers, and install transit signal priority
  - $30,000,000
Series of innovative intersections on US 281 in San Antonio, TX resulted in 34 - 40% decrease in peak hour corridor travel times

“As traffic congestion on the U.S. Highway 281 eases due to the completion of the superstreet project, construction of new commercial and retail developments along the far North Central San Antonio corridor is ramping up.”
Benefits of Innovative Intersections

● Safety
  ○ Fewer conflict points
  ○ Significant before/after crash reductions

● Mobility
  ○ Reduced delay
  ○ Reduced congestion

● Value
  ○ Less right-of-way needed
  ○ Lower construction costs
  ○ Quicker project delivery
Innovative Intersection Policy

- **Roadway Design Manual**
  - Expanded guidance on innovative junction designs
- **IIM – TE-387.0 – Signal Justification Report**
  - Requires consideration of viable innovative junction design options before recommending signal
- **IIM – TMPD-2.0 – Corridor Planning Studies – Arterial Management Plans**
  - Requires consideration and evaluation of Innovative Intersection/ Interchange designs
- **IIM – LU-501.1 – Land Development Review**
  - Requires consideration of IIM–TE-387.0 for waivers or exceptions involving potential signals
- **Strategic Highway Safety Plan (SHSP)**
- **Increased SMART SCALE readiness requirements encourage innovative intersections**
  - Major Widening Projects
  - New Signals
  - Grade separations of at-grade facilities
Innovative Intersection Resources

- VDOT Innovative Intersection/Interchange Committee
  - IIM – TE-389, LD-257

- Developed tool to screen for potential innovative intersection solutions at intersections/interchanges
  - VDOT Junction Screening Tool (VJuST)

- Developed educational materials for staff and the public
  - Education is key to moving forward with innovative intersections
VDOT Junction Screening Tool (VJuST)

- Sketch-planning tool to aid consideration of innovative intersections
  - Results not meant to replicate results obtained from detailed analyses
- Advance configurations for further study, analysis, and design
- Only applicable to isolated intersections or interchanges
VDOT Junction Screening Tool (VJuST)

- 17 unique intersection configurations
- 9 unique interchange configurations
- Will help screen alternatives during:
  - Traffic studies (narrow potential design options)
  - Signal justification applications
VDOT Junction Screening Tool (VJuST)
Public Education and Understanding

- Lessons learned from other states
  - Communication is KEY!
- VDOT has adopted a holistic approach
  - Communications representative in committee
  - New and improved webpage has been developed ([http://www.virginiadot.org/innovativeintersections](http://www.virginiadot.org/innovativeintersections))
  - Brochures, handouts, videos for public meetings
  - List of best practices being developed
- Local agencies can use these materials
Public Education and Understanding

- Pedestrians use marked crosswalks to safely cross the intersection.
- To make a left turn from the side street to the major street, turn right onto the major street, make a u-turn, and continue straight.
- From the major street, navigate the intersection like at a conventional intersection.
- To turn right from the side street, turn right like at a conventional intersection.
- Depending on their level of comfort, cyclists may navigate the intersection using vehicle or pedestrian paths.
- To continue straight on the side street, turn right onto the major street, make a u-turn, and turn right onto the side street.

Note: For simplicity, only two directions of traffic are shown. Opposing traffic follows similar routes.
Other Considerations

- Innovative Intersection/Interchange Designs are not “One Size Fits All”
  - Configurations may or may not be applicable
  - Consider a variety of factors in design
  - Engineering is encouraged!
  - The solution may not be a standard configuration

- Public involvement is key
  - Public education is important

- Consider life-cycle costs
  - Innovative intersections protect the long-term investments on roadways
  - Innovative intersections can reduce the need for signalization
  - Innovative intersections provide improved safety
Questions