Roundabout Challenges: From Concept to Construction

TexITE Summer Meeting 2010

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Outline

- Roundabout Development
- Concept Challenges
- Design Challenges
- Construction Challenges
Roundabout Development

- Roundabout Consideration
- Traffic Analysis
- Education
- Concept Design / Feasibility
- Detailed Schematic
- PS&E Development
- Construction
Roundabout Development

Concept Stage
- Roundabout Consideration
- Traffic Analysis
- Education
- Concept Design / Feasibility

Design Stage
- Detailed Schematic
- PS&E Development
- Construction

Construction Stage
Concept Challenge

- Is roundabout even an option?
- Often not part of “toolkit”
- Rdbt vs TWSC, AWSC, or Signal
- Introduce early in planning stages
  - TIA / Thoroughfare planning
- New vs Retrofit
Guidance Statement:

“Roundabouts are the preferred safety alternative for a wide range of intersections. Although they may not be appropriate in all circumstances, they should be considered as an alternative for all proposed new intersections on Federally-funded highway projects…”
Traffic Analysis

- Which Software?
  - RODEL
  - SIDRA
  - VISSIM
  - Synchro
Concept Acceptance

- Staff
- Council
- Public
- Funding source
Education Examples
Education Examples

- **Southlake, TX**
  - Single Lane Modern Roundabout
  - ICD ~ 130’

- **Addison, TX**
  - Two Lane Modern Roundabout
  - ICD ~ 185’

- **Ft Worth, TX**
  - Multi-Lane Benbrook “Circle”
  - ~1000’ x 700’
Educate – Build Support

- Education
  - Create a believer at every level
  - Gain an advocate / champion
Public Acceptance

Prior to Construction
68% of the responses negative or very negative

After Construction
73% of the responses positive or very positive
Design Challenge

- Design Vehicles
- “Minor” Changes
- Cost Variability
- Curbing
- Grades
Design Vehicles

- Design Vehicle Tradeoffs
  - ICD Size
  - Circulating Roadway Size
  - Vehicle Speeds
  - Aesthetics
Design Vehicles

- Decisions
  - Fire Truck / School Bus - Where?
  - Type of Truck (if any)
    - Truck apron
Design Vehicles

WB-50
115’ ICD
10’ Apron
63’ Island

WB-67
115’ ICD
22’ Apron
39’ Island

WB-50
130’ ICD
8’ Apron
82’ Island

WB-67 - 130’ ICD
19’ Apron
60’ Island
“Minor” Changes

- Layout is iterative
- Snowball effect

Check fast paths
- Redesign to balance
- Check trucks
- Change entry radius
- Redesign for truck
Cost Variability - Signal

- **Low**
  - Span Wire, No Turn Lanes

- **Medium**
  - Standard Poles, No Turn lanes

- **High**
  - Realign Intersection, LMA, ITS Decorative Poles, Pavement, Drainage, Dual Turn Lanes
Cost Variability - Roundabout

- Low - < $20k
  - Rubber curbing

- Medium - < $150k
  - Fill outsides, build islands, overlay

- High - > $1 million
  - Approach Work, Pavement, Major Drainage, Landscaping, Art
“Low" < $20,000
“Medium” < $150,000
“High” - $525,000 +

Substantial Drainage
Complete reconstruction
“High” - $525,000 +
Public Art
Curbing

- Curb selection affects operation
- Laydown/Mountable
- Barrier
- Height
  - Splitter
  - Apron
  - Outside edges
Curbing
Curbing
Curbing
More restrictive
May lead to more earth work
Truck concerns
Construction Challenges

- Accommodating all users
- Complete Closure
- Build Under Traffic
  - Partial Closures
  - Temporary Detours
All users

- Pedestrians
- Trucks present without apron
Apron is part of the traveled way
Construction Sequencing

- **Complete Closure**
  - Fastest construction
    - 30 – 60 Days
  - Less $$$
  - Requires alternate routes
  - Politically unpopular

- **Build Under Traffic**
  - Slower construction
    - 3 – 9 months
  - More $$$
  - May still require alternate routes
  - Politically unpopular
Construction Sequencing

- Complete Closure
Construction Sequencing
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Conclusion

- Wide variety of challenges at every stage
- Key challenges
  - Stakeholder buy in
  - Iterative principle based design
  - Design vehicle tradeoffs
  - Construction