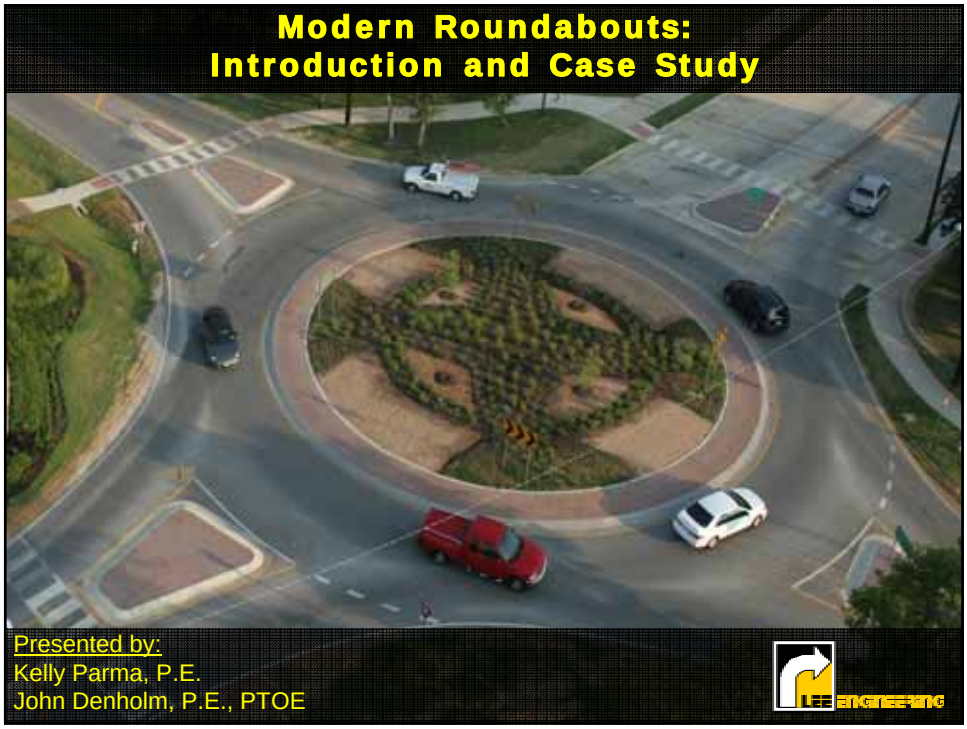
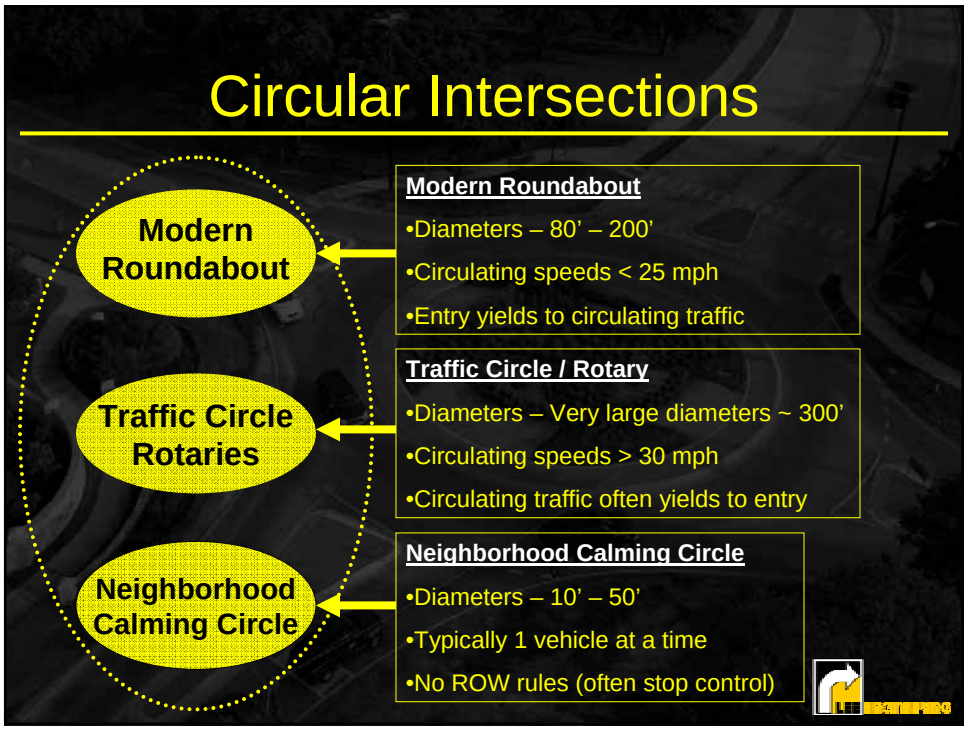
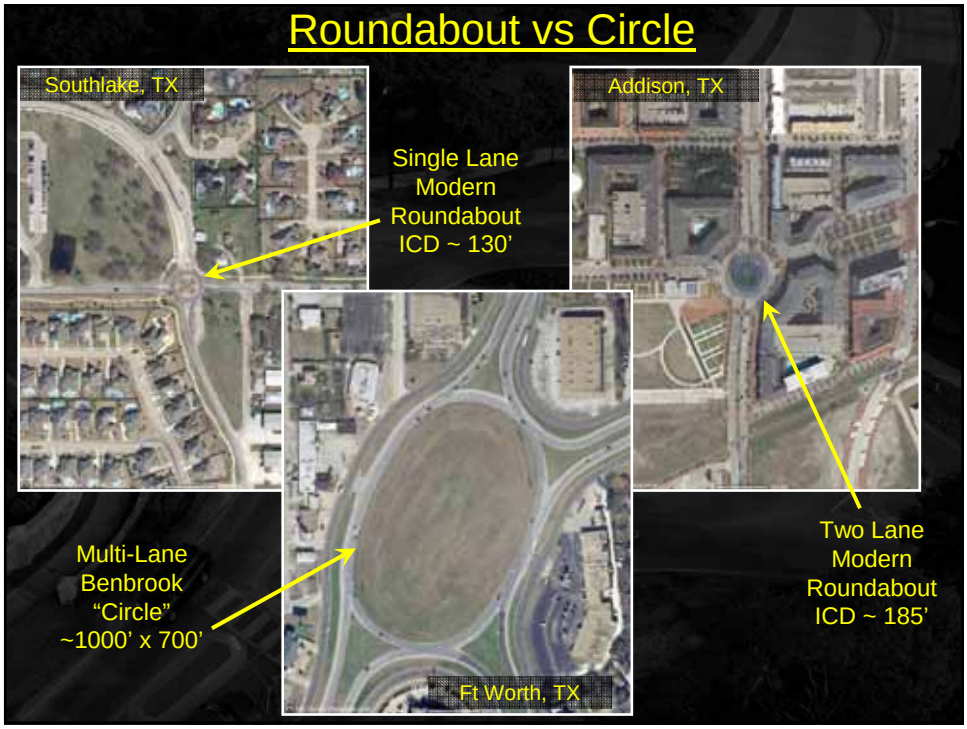
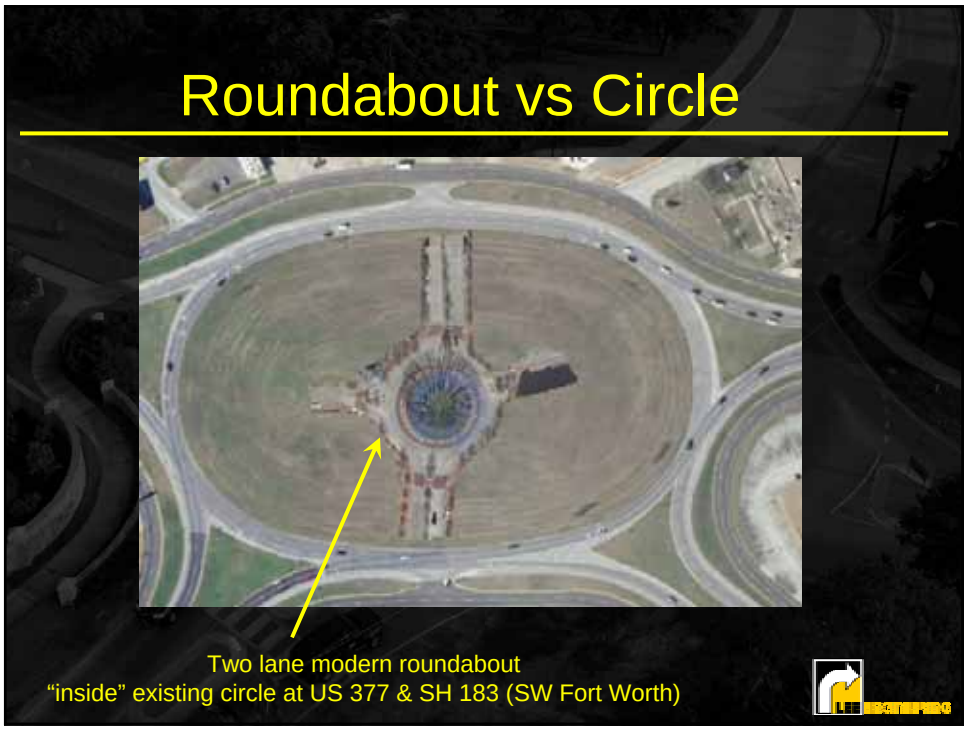

Modern Roundabouts:
Introduction and Case Study
Presented by:
Kelly Parma, P.E.
John Denholm, P.E., PTOE


Circular Intersections
Modern Roundabout
Traffic Circle Rotaries
Neighborhood Calming Circle
Modern Roundabout
•Diameters – 80' – 200'
•Circulating speeds < 25 mph
•Entry yields to circulating traffic
Traffic Circle / Rotary
•Diameters – Very large diameters ~ 300'
•Circulating speeds > 30 mph
•Circulating traffic often yields to entry
Neighborhood Calming Circle
•Diameters – 10' – 50'
•Typically 1 vehicle at a time
•No ROW rules (often stop control)

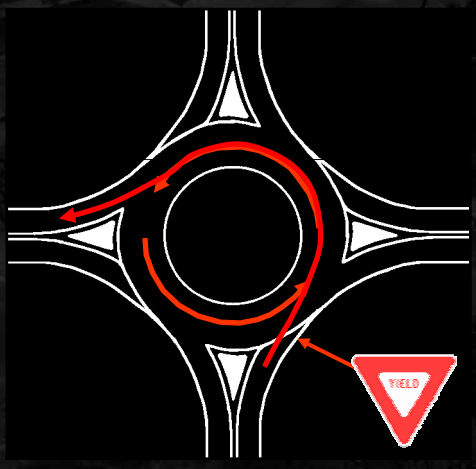

Roundabout vs Circle
Southlake, TX
Single Lane
Modern
Roundabout
ICD ~ 130'
Addison, TX
Multi-Lane
Benbrook
"Circle"
~1000' x 700'
Two Lane
Modern
Roundabout
ICD ~ 185'
Ft Worth, TX


Roundabout vs Circle
Two lane modern roundabout
"inside" existing circle at US 377 & SH 183 (SW Fort Worth)

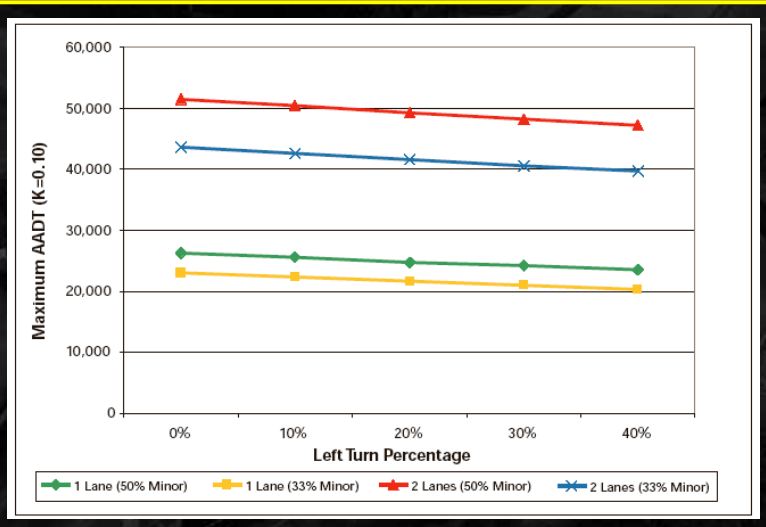
Roundabout vs Circle

How Do They Work?

- Counterclockwise rotation
- Yield before entering
- Circulate until desired exit is reached
- Pedestrians cross at approaches



Roundabout Capacity



Source: FHWA *Roundabouts: An Informational Guide*

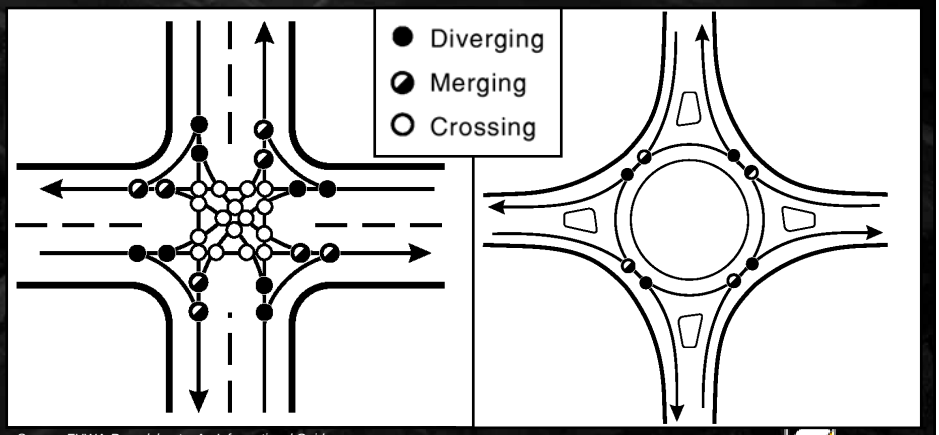
Roundabout Benefits

- Less delay than stop control
- Often less delay than signal control
- Significant crash reduction*
  - 39% reduction in total crashes
  - 76% injury crash reduction
  - 90% fatal crash reduction
- Aesthetically more appealing

* IIHS Study: *Crash Reductions following installation of roundabouts in the United States – March 2000*

Roundabout Safety

Fewer conflict points at a roundabout controlled intersection than a traditionally controlled intersection



Source: FHWA *Roundabouts: An Informational Guide*

Public Acceptance

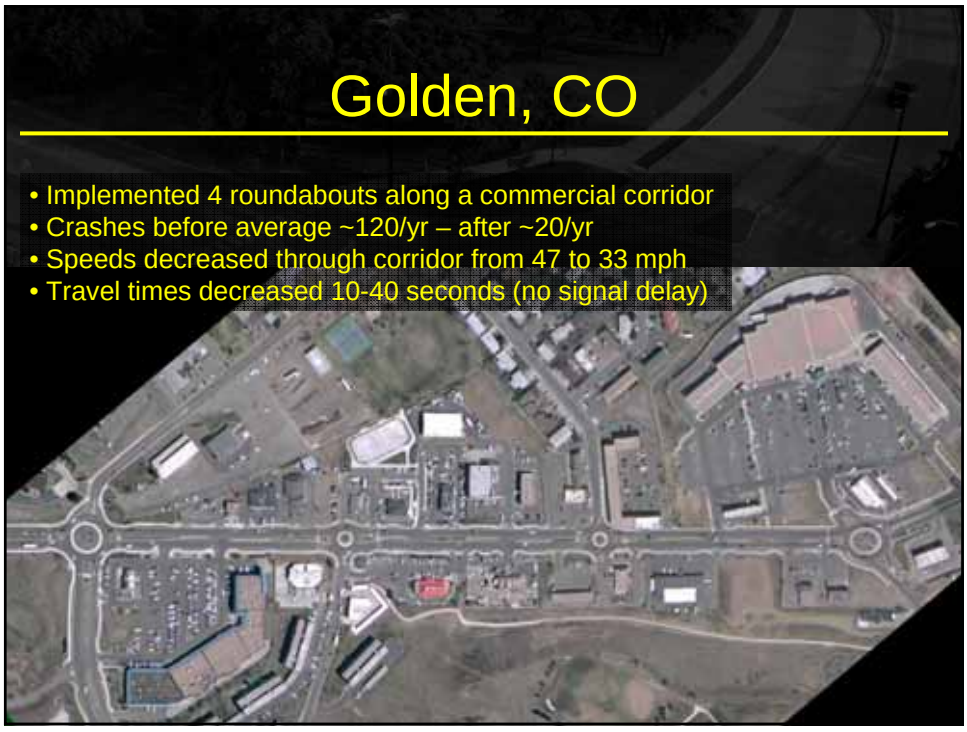
NCHRP Synthesis 264

Opinion Study

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

After Construction
73% of the responses positive or very positive


Asheville, NC


Golden, CO
• Implemented 4 roundabouts along a commercial corridor
• Crashes before average ~120/yr – after ~20/yr
• Speeds decreased through corridor from 47 to 33 mph
• Travel times decreased 10-40 seconds (no signal delay)

Avon, CO

Addison

Oregon

New York

Case Study: Southlake, Texas

- Project started as a neighborhood traffic calming study
- Residents' complaints of cut- through and speeding traffic
- Intersection congestion identified as cause of cut-through movements
- Alternatives for intersection evaluated:
  - Right Turn Lanes
  - Signalization
  - Roundabout

Deciding on a Roundabout

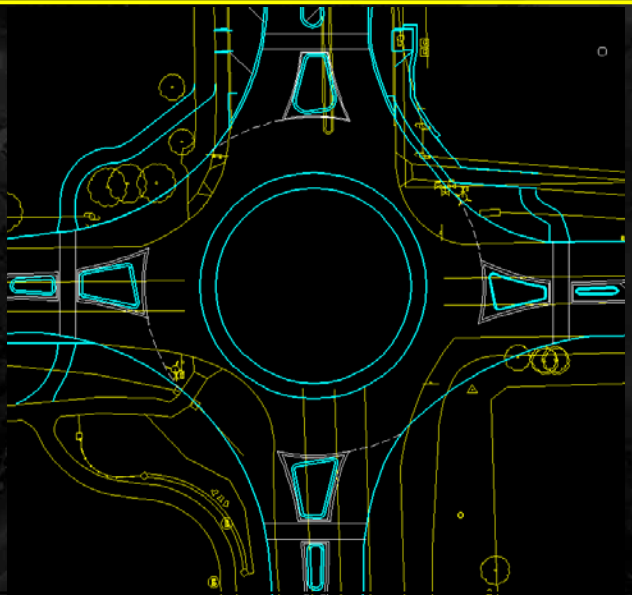
Roundabout

- Cost: $121,471
- Speed: 15-20 mph
- Safety:
  - 39% fewer crashes
  - 76% fewer injury crashes
- Delay: Shorter
- Space required: More
- Initial opposition: Can be fierce

Traffic Signal

- Cost: $100,000 + O&M
  - City's first signal
- Speed: 30 mph +
- Safety: Less
- Delay: Longer
- Space required: Less
- Initial opposition: Minor

Roundabout Construction



Roundabout Construction

- Build ultimate corners
- Build splitters
- **Roundabout operation**
- Construct center
- Apron
- Illumination
- Landscape center


Roundabout Construction


Roundabout Construction

Roundabout Construction

Before

After

Before

After

Before / After Study

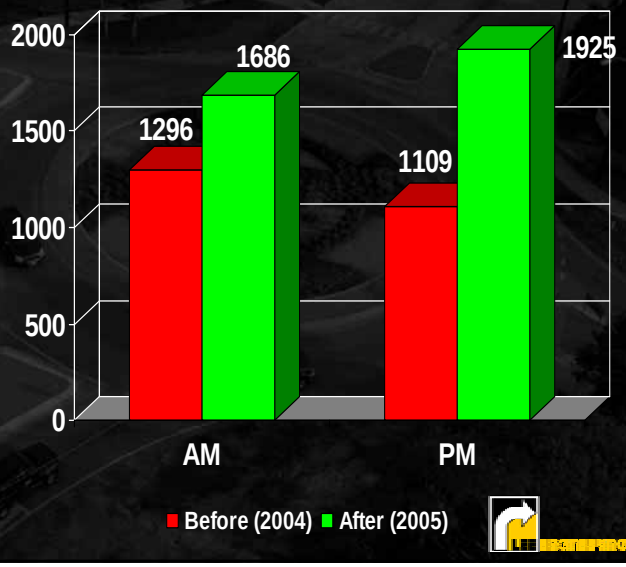
- Volumes increased significantly
- Delay decreased significantly
- Queues decreased significantly
- Travel time decreased significantly reducing cut-through traffic

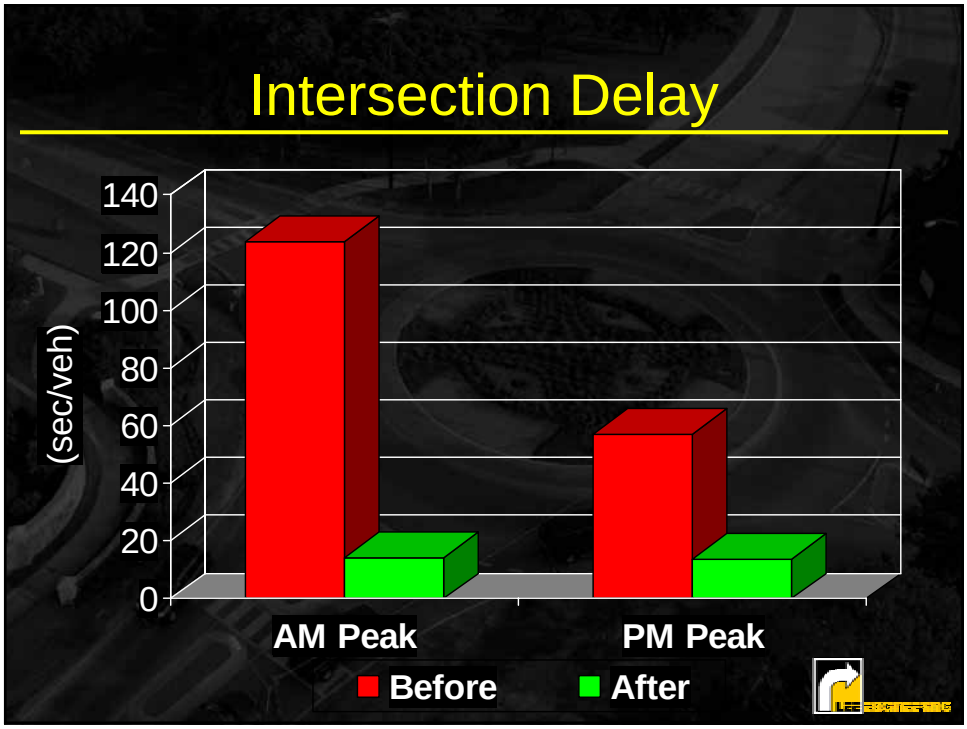
Intersection Entering Volumes

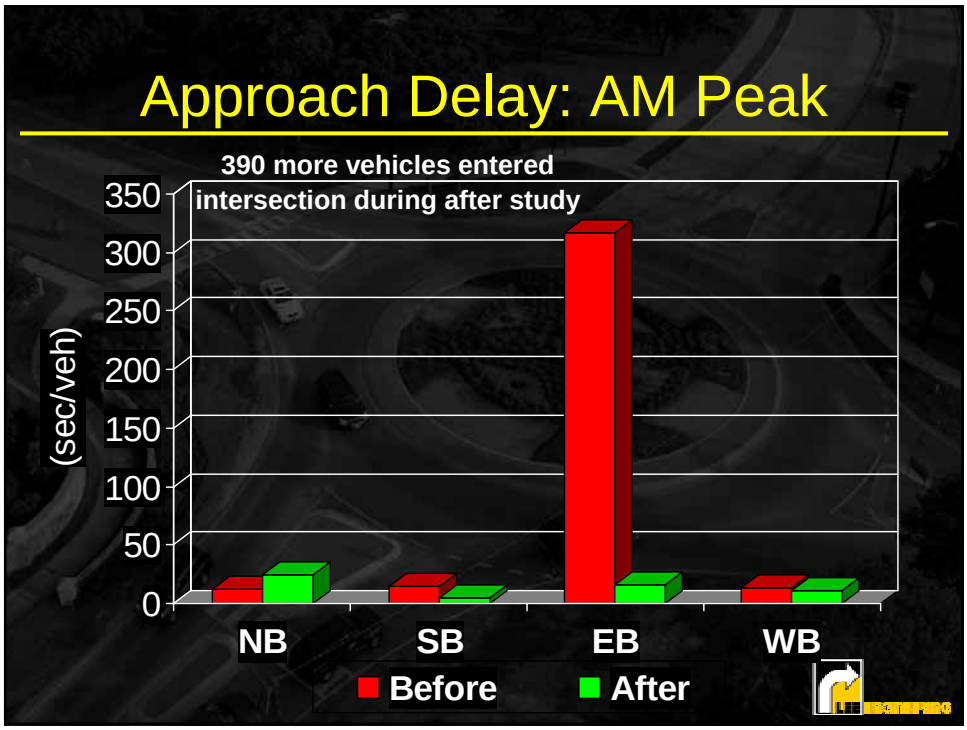
AM PEAK HOUR
- Increase = 30%

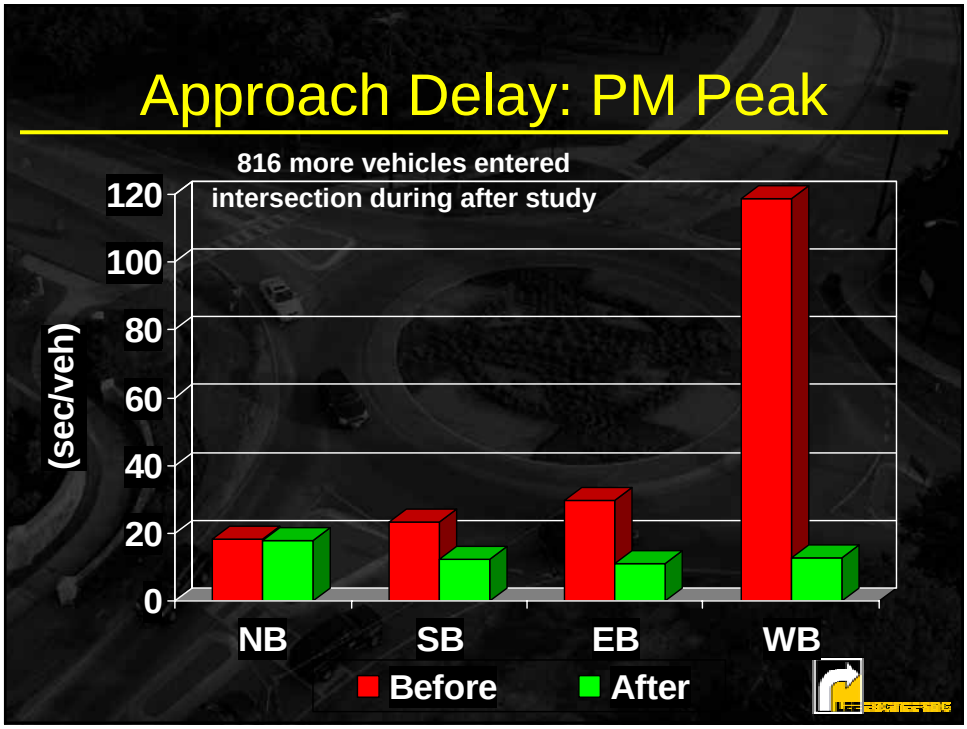
PM PEAK HOUR
- Increase = 74%

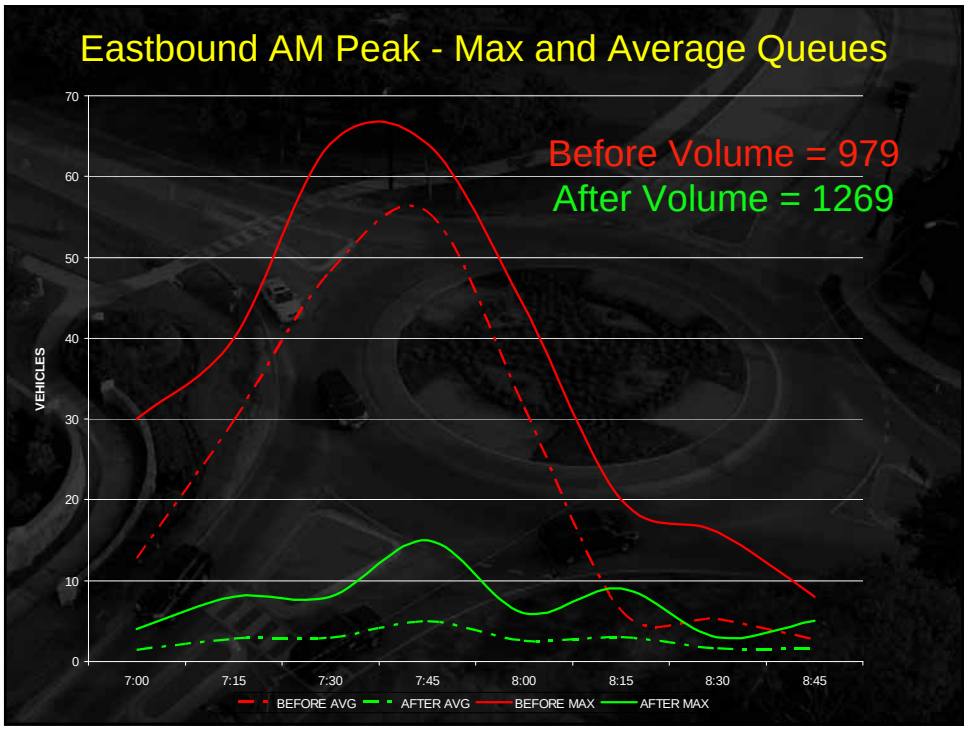
DAILY
- Increase = 15%

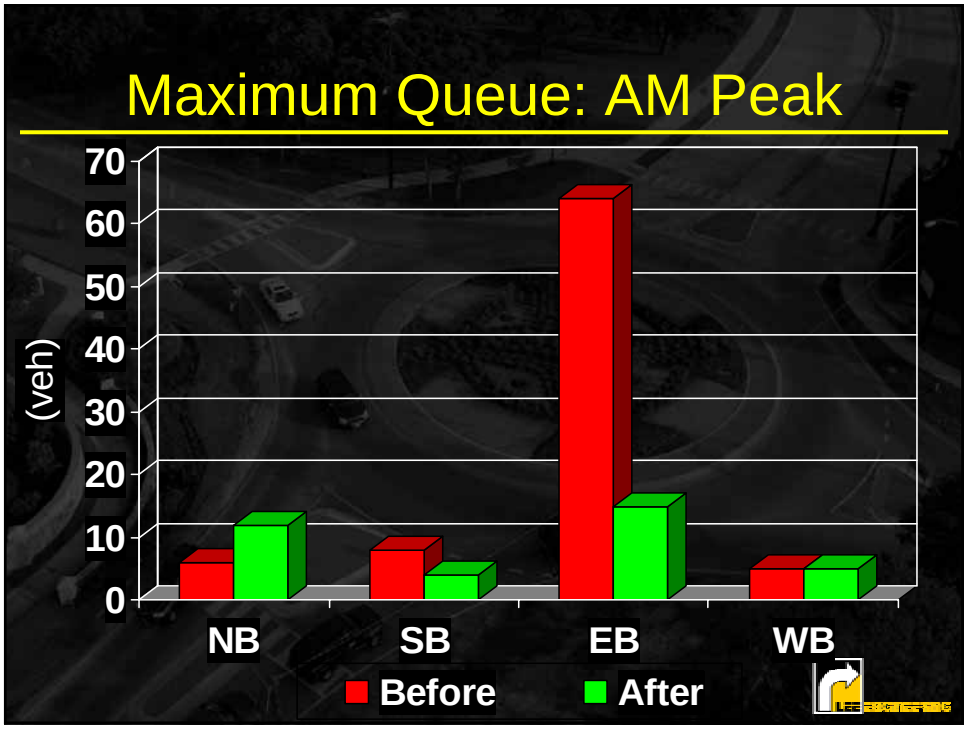


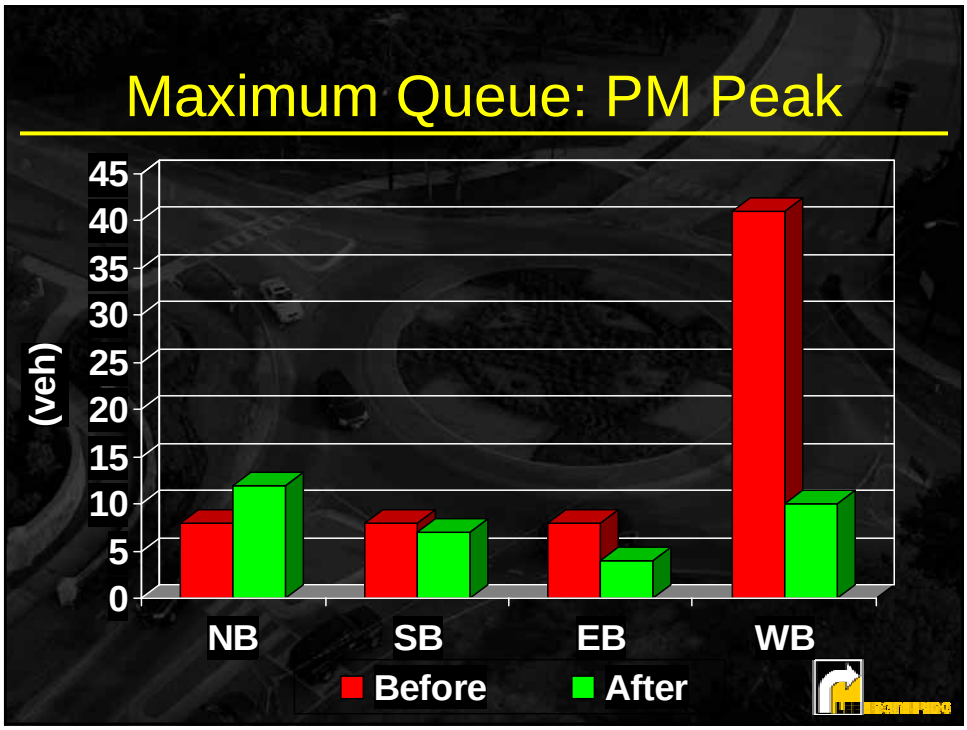

Intersection Delay
140
120
100
80
60
40
20
0
(sec/veh)
AM Peak
PM Peak
Before
After

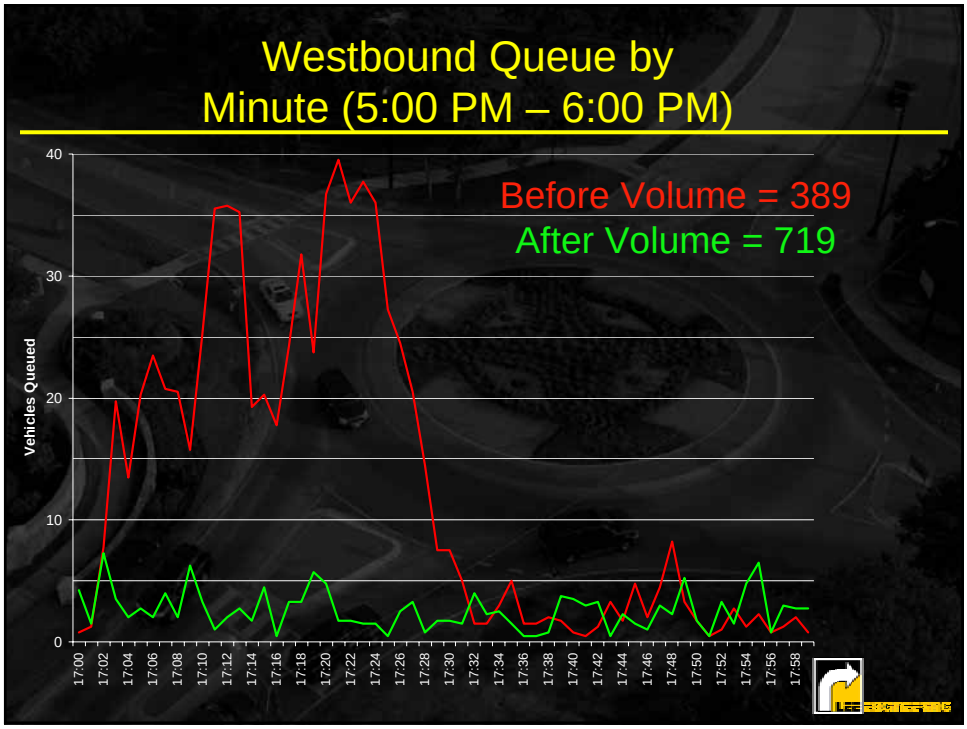

Approach Delay: AM Peak
390 more vehicles entered
intersection during after study
350
300
250
200
150
100
50
0
(sec/veh)
NB
SB
EB
WB
Before
After

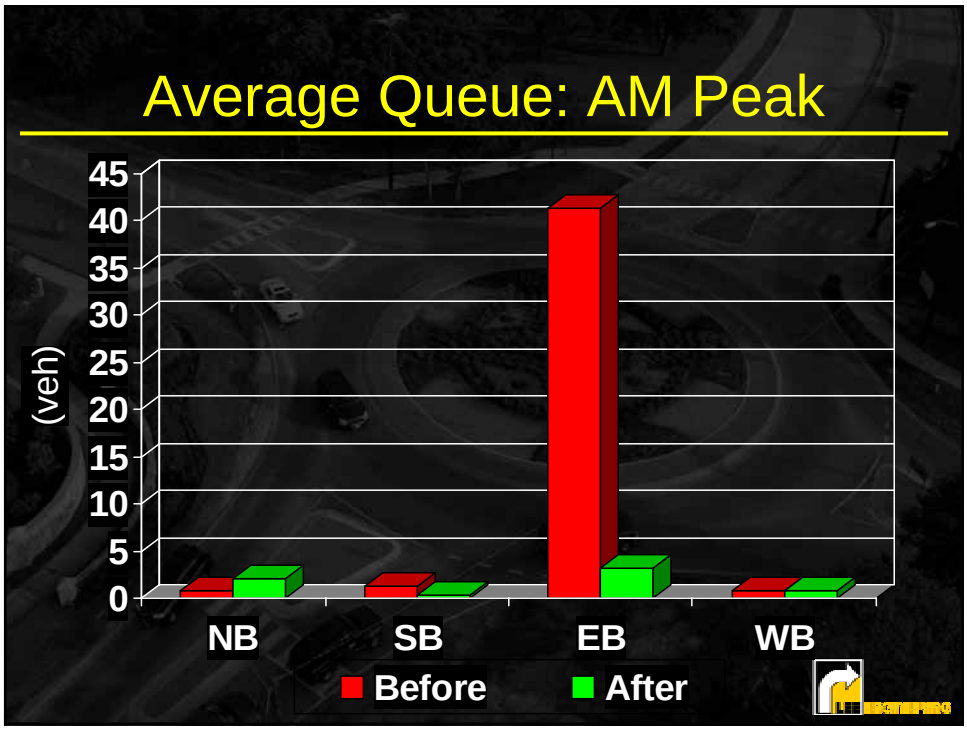

Approach Delay: PM Peak
816 more vehicles entered
intersection during after study
(sec/veh)
120
100
80
60
40
20
0
NB
SB
EB
WB
Before
After

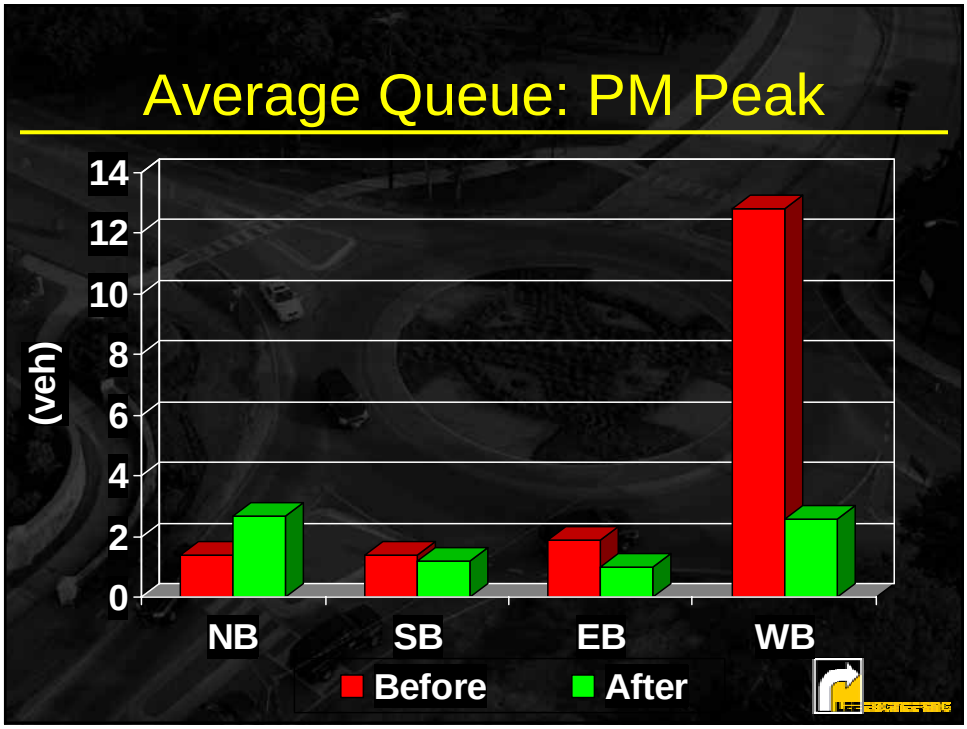

Eastbound AM Peak - Max and Average Queues
Before Volume = 979
After Volume = 1269
VEHICLES
70
60
50
40
30
20
10
0
7:00
7:15
7:30
7:45
8:00
8:15
8:30
8:45
BEFORE AVG
AFTER AVG
BEFORE MAX
AFTER MAX


Maximum Queue: AM Peak
70
60
50
40
30
20
10
0
(veh)
NB
SB
EB
WB
Before
After


Maximum Queue: PM Peak
45
40
35
30
25
20
15
10
5
0
(veh)
NB
SB
EB
WB
Before
After


Westbound Queue by
Minute (5:00 PM – 6:00 PM)
Before Volume = 389
After Volume = 719
Vehicles Queued
40
30
20
10
0
17:00
17:02
17:04
17:06
17:08
17:10
17:12
17:14
17:16
17:18
17:20
17:22
17:24
17:26
17:28
17:30
17:32
17:34
17:36
17:38
17:40
17:42
17:44
17:46
17:48
17:50
17:52
17:54
17:56
17:58


Average Queue: AM Peak
(veh)
45
40
35
30
25
20
15
10
5
0
NB
SB
EB
WB
Before
After


Average Queue: PM Peak
14
12
10
8
6
4
2
0
(veh)
NB
SB
EB
WB
Before
After


After
Max Queue Before
Avg Queue Before
Max Queue After
Avg Queue After
Before

In The News

Fort Worth Star-Telegram

"It's a traffic miracle in a congested region that needs more miracles."

Dallas Morning News

"…the four-way stop couldn't efficiently handle traffic during peak hours."

The Courier

"…highly successful in eliminating the bottleneck created by an intersection that relied on four-way stop signs."

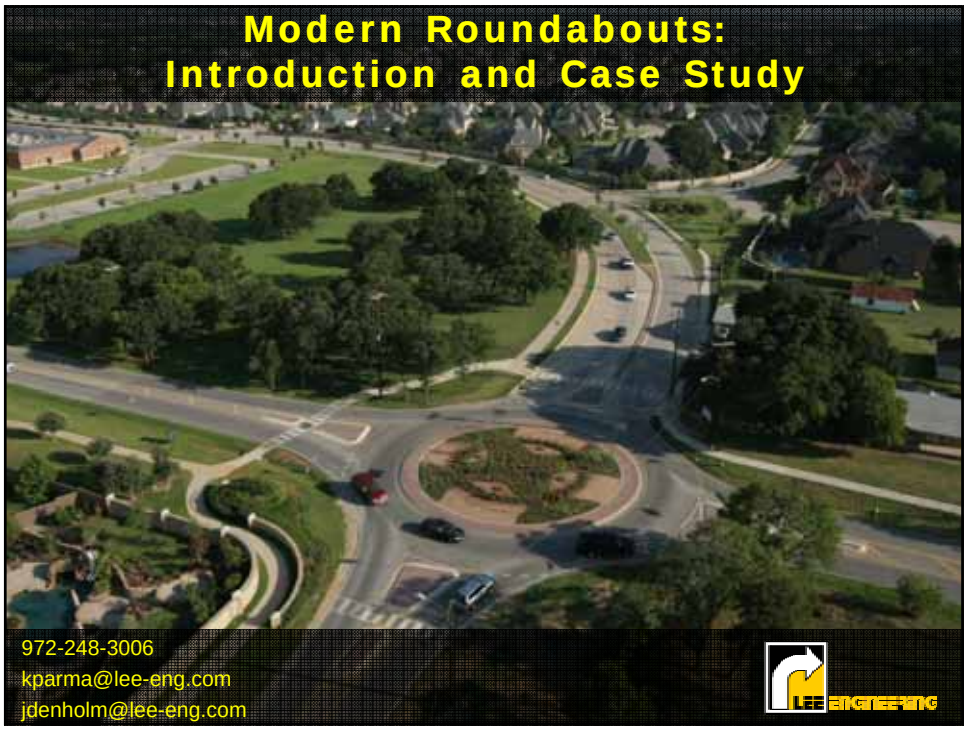
Southlake Video

Southlake Video

The Bottom Line

	AM Peak Hour	PM Peak Hour
Volumes	↑ 30%	↑ 74%
Intersection Delay	↓ 88%	↓ 76%
Critical Movement Queue	↓ 92%	↓ 80%


Emergency Services Acceptance


Modern Roundabouts:
Introduction and Case Study
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