INNOVATIVE INTERSECTION DESIGN

J. Eddie Valtier, P.E.
ELP TP&D Director
Introduction

Why Do We Need To Start Looking For Innovative Intersection Designs?

- Congestion is worsening and traffic volumes and travel demands often lead to safety problems that are too complex for conventional intersection designs to properly handle.
- Innovative intersections provide improved safety typically at minimal cost.
- Limited resources available to meet the mobility needs of and increasing population.
- Building more lanes or grade separations is not always practical.
What Are Innovative Intersection Designs?

Designs that eliminate, relocate, or modify conflict points by improving the way traffic makes certain movements.

**Safety**
- Fewer Conflict Points
- Significant Before and After Crash Reductions and Severity

**Mobility**
- Reduced Delay
- Reduced Congestion

**Value**
- Typically Less ROW needed
- Decreased Construction Costs
- Quick Implementation
FHWA Innovative Intersections

- Roundabouts
- Diverging Diamond Interchange
- Displaced Left Turn Intersection
- Median U-Turn Intersection
- Hamburger or Through–About Intersection
- Continuous Green T-Intersection
- Jughandle Intersection
- Offset T-Intersection
- Parallel Flow Intersection
- Quadrant Roadway
El Paso Regional Innovative Intersections

Modern Roundabout

Diverging Diamond Interchange

Displaced Left-turn Intersection (Continuous Flow)

Median U-Turn Intersection
Roundabout Humor
What is a Roundabout?

A Roundabout is a type of circular intersection with yield control of entering traffic, islands on the approaches and appropriate roadway curvature to reduce vehicle speeds.

Why consider a Roundabout?

- Improves Safety
- Reduces Congestion
- Reduce pollution and fuel use
- Save money
- Complement other common community values
Roundabout Benefits

**Improve safety**

- Less Conflict Points
- More than 90% reduction in fatalities
- 76% reduction in injuries
- 35% reduction in all crashes
- Slower speeds are generally safer for pedestrians, 30-40 percent reduction in pedestrian incidents
- 10 percent reduction in bicycle crashes
- 30-50 percent increase in traffic capacity

With roundabouts, head-on and high-speed right angle collisions are virtually eliminated.

**Potential Vehicle Conflict Points**

- Red dots indicate 32 vehicle-to-vehicle conflict points in a standard four-way intersection.
- Red dots indicate eight vehicle-to-vehicle conflict points in a modern roundabout.
Roundabout Statistics

Reduce congestion
• Efficient during both peak hours and other times
• Typically less delay

Reduce pollution and fuel use
• Fewer stops and hard accelerations, less time idling

Save money
• Often no signal equipment to install, power, and maintain
• Smaller roundabouts may require less right-of-way than traditional intersections
• Often less pavement needed

Complement other common community values
• Quieter operation
• Functional and aesthetically pleasing
Sun Bowl Drive Roundabouts

1. Sun Bowl Dr. Roundabout
2. Sun Bowl Dr. at University Ave. Roundabout
3. Spur 1966 at Schuster Ave. Roundabout
OH NO! IT'S A ROUNDABOUT INTERSECTION. WHAT DO I DO?
JUST PULL IN AND KEEP TURNING TO THE LEFT.

LIKE NASCAR!
ONLY SLOWER.
Sun Bowl Drive at University Avenue

Description:
The previous configuration was a “T” intersection.

Issues:
• Heavy Pedestrian Traffic
• Adjacent Parking Lot Configurations
• Event Traffic
• Commuter Traffic
• No exit /entrance from I-10.
Sun Bowl Drive at University Avenue

Description:
A Roundabout was constructed at University Avenue and Sunbowl Drive.

Date Completed
June 2011

Roundabout Cost
$.7M

Total Project Cost
$5.6 M

Benefits:
• Improved Pedestrian Pathways
• Traffic Calming
• Supporting the University Closed Campus Initiative
• Increased efficiency and mobility for high volume events
• Opportunity for Aesthetic treatment: Approximate 25 ft. tall Pickaxe in the center.
Sun Bowl Drive at University Avenue
Sun Bowl Drive at University Avenue
**Sunbowl Drive Roundabout**

**Description:**
The previous intersection was a “T” intersection. This area was hard to navigate at University Football Games, Graduation or any other special events at these venues.

**Issues:**
- Heavy Pedestrian Traffic
- Event Traffic for Sunbowl, Don Haskins Event Center and Kidd Field
- Back up Traffic
- Over 22,000 students and over 3,000 UTEP employees commute to this area daily since only 3% live on campus.
Sunbowl Drive Roundabout

Sunbowl Drive

Glory Road
Sunbowl Drive Roundabout

Description:
A Roundabout was constructed at Glory Road and Sunbowl Drive.

Date Completed
May 2015

Project Cost
$5.6M

Benefits:
• Improved Pedestrian Pathways
• Traffic Calming
• Supporting the University Closed Campus Initiative
• Increased efficiency and mobility for high volume events
• Opportunity for Aesthetic treatment.
Schuster Avenue at SPUR 1966

Description:
SPUR 1966 is a new connection to Paisano (US 85) and provides an alternate route to the University and the Medical Centers. A Roundabout was designed at the new intersection of SPUR 1966 and Schuster.

Issues:
- Commuter Traffic
- Medical Center Access
- Congestion Mitigation
- Over 22,000 students and over 3,000 UTEP employees commute to this area daily since only 3% live on campus.
Schuster Avenue at SPUR 1966
Description:
An elevated roundabout creating an intersection at SPUR 1966 and Schuster Avenue.

Completion: May 2015

Project Cost: $31 Million

Benefits:
- High volumes of pedestrian traffic
- New connectivity
- Reduced delayed time for emergency vehicles
- Reduce Commuter Congestion and special events
- Opportunity for Aesthetic treatment
Intersection of Alameda Ave. and Paisano Dr.

SH 20 Alameda Ave. and Paisano Dr.
Roundabouts
Intersection of Alameda Ave. and Paisano Dr

Description: 

Traffic Volumes
Existing 2015
15000 ADT

Accident Data
2010 -2012
28 accidents

Issues:
• Complex
  Intersection/Interchange
• Safety Issues
• Pedestrian Safety
• Historic Bridge
• Heavy Commercial/Residential Mixed use Properties
Existing Pedestrian Crossing Patterns
Proposed Pedestrian Crossing Patterns
Alameda/Paisano Double Roundabout

Description:
A Double Roundabout was constructed at the Alameda Ave/ Paisano Drive Intersection.

Open to Traffic:
2015

Project Cost:
$11.3M

Traffic Volumes
2035 Projections:
2100 ADT

Benefits:
• Improved Pedestrian Pathways
• Traffic Calming
• Increased efficiency and mobility
• Improved Safety
• Opportunity for Aesthetic treatment.
Alameda/Paisano Double Roundabout
Diverging Diamond Interchange Information

- **What is a Diverging Diamond Interchange (DDI)?**
  
  A DDI is a type of intersection that connects a freeway with a major highway. It is based on a modified diamond intersection with a shift in traffic within the intersection to safely and efficiently accommodate high volume left turn movements.

  Traffic within the intersection briefly drives on the left side of the road to allow left turn movements to occur without crossing oncoming traffic or stopping.

- **How do pedestrians and cyclists use a DDI?**

  Pedestrians use signalized pedestrian crossings and then are directed to a center pedestrian island in the middle of the road.

- **Why consider a DDI?**
  
  - Improves Safety
  - Reduces Congestion
  - Reduce pollution and fuel use
  - Save money
  - Complement other common community values
  - Efficient during both peak hours and other times
  - Typically less delay
Diverging Diamond Interchange Statistics

Improve safety

- Less Conflict Points
- 60% reduction in all crashes and injuries
- Slower speeds are generally safer for pedestrians, 30-40 percent reduction in pedestrian incidents
- This is relatively new Interchange concept therefore the statistics on the reduction in crashes and the increase in traffic capacity varies by location.

Source: FHWA.

Pink dots indicate 10 crossing conflict points, 8 merging conflict points and 8 diverging

Pink dots indicate two crossing conflict points, 6 merging conflict points and 6 diverging
Loop 375 at SPUR 601 DDI

Loop 375 at Spur 601
Double Divergion Intersection
Description:
Traditional Diamond Interchange with Texas turnarounds.

Traffic Volumes
2015 = 2,100 VPH (7-9am)

Issues:
• Heavy Morning Peak Traffic Northbound LP 375 to Westbound SPUR 601
• Heavy Evening Peak Traffic Eastbound SPUR 601 to Southbound LP 375.
LOOP 375 at SPUR 601 DDI
Description:
This intersection is a modified diamond intersection with a shift in traffic within the intersection to safely and efficiently accommodate high volume left turn movements.

Traffic Volume:
2035: 4500 VPH (7-9 am)

Accident Data
TBD- Still gathering Data

Completed:
April 2015

Cost
$0.9 Million

Benefits:
• Continuous flow
• Improve Safety
• Reduce congestion
• Relatively inexpensive short to midterm solution
LOOP 375 at SPUR 601 DDI
Other innovative intersections in the Region

- Displaced Left Turn Intersection (Continuous Flow) - Cd. Juarez Mexico
Other innovative intersections in the Region (MUT)

Median U-Turn Intersection (MUT) - Cd. Juarez Mexico

![Median U-Turn Intersection](image.png)
Lessons Learned

- Extensive Public Outreach
- Invest in Renderings
- Education for Drivers and Pedestrians
- Positive Publicity
- Clear Signing and Pavement Markings