

**City of Chico**

# **INTERSECTION SAFETY**

## **The Modern Roundabout SOLUTION...**

**Slower Speeds**

**Fewer Vehicle Accidents, Injuries, and Fatalities**

**Fewer Pedestrian & Cyclist Accidents**

**No Red Light Running**

**Faster Commute Travel Times**

**Less Traffic Congestion & Delays**

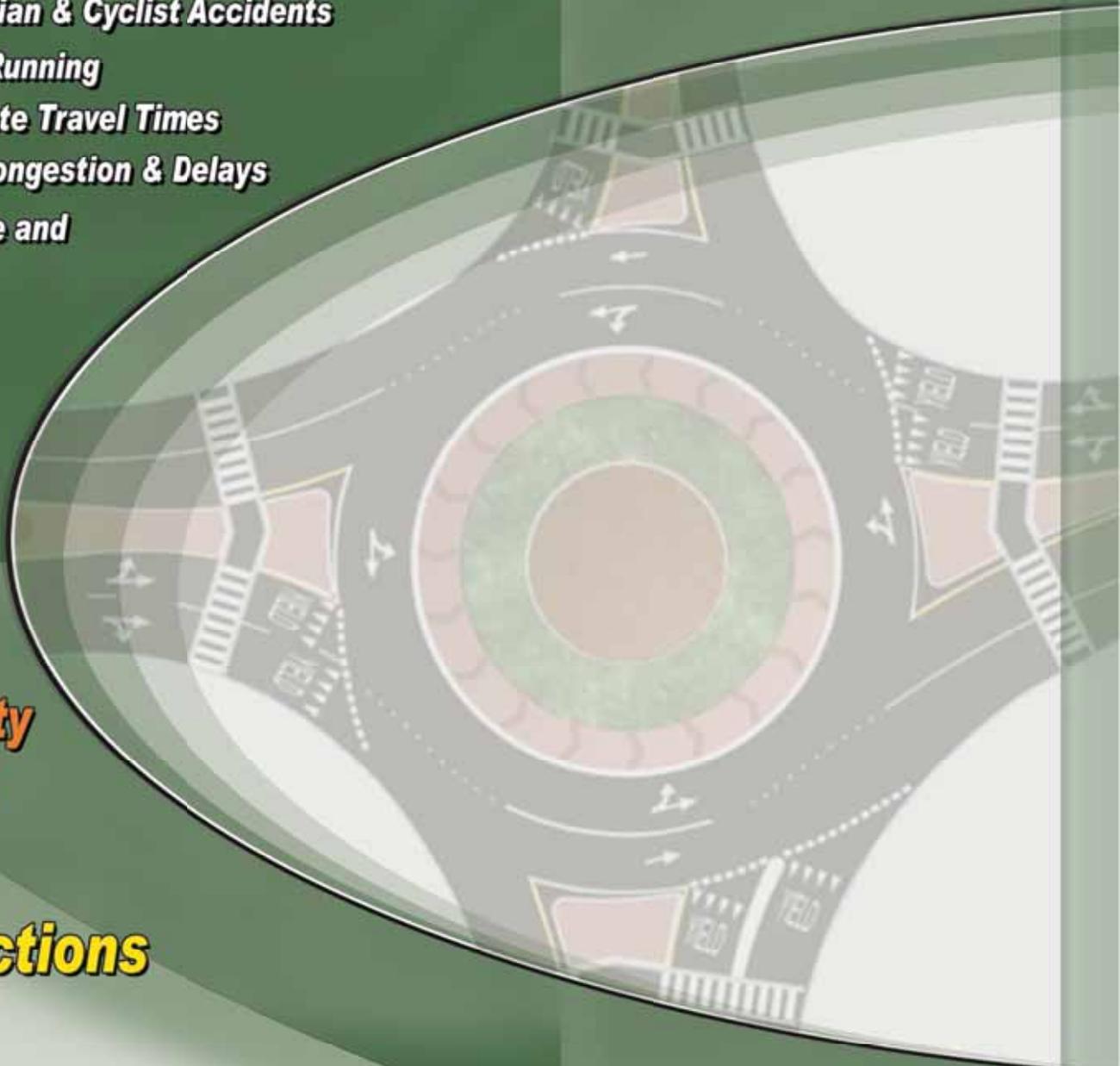
**Reduced Noise and**

**Air Pollution**

**Less Driver**

**Frustration**

**Your  
Community  
Deserves  
Safer  
Intersections**



# Modern Roundabout User Guidelines

## Public Safety is About Saving Lives

*"The most serious kinds of crashes at conventional intersections are virtually eliminated with Modern Roundabouts."*

### Motorists

1. Slow Down Prior to Roundabout Approach
2. Select Desired Destination Lane (Multilane Roundabouts)
3. Yield to Traffic Already in the Roundabout
4. Obey One-Way Signs at All Times
5. Yield to Pedestrians and Bicyclists circling around the center island and making a slight right-turn to exit the roundabout completes left or U-turns.

### Pedestrians

Always use caution and use crosswalks.

### Bicyclists

Follow the rules of the road or walk your bike in crosswalks.

### Large Trucks, RVs and Boat/Horse Trailers

A Modern Roundabout is designed to accommodate all vehicle wheel base types.

### Emergency Vehicles

Motorists yield to emergency vehicles and pull over when safe, after exiting the roundabout.

## Modern Roundabouts Save Lives

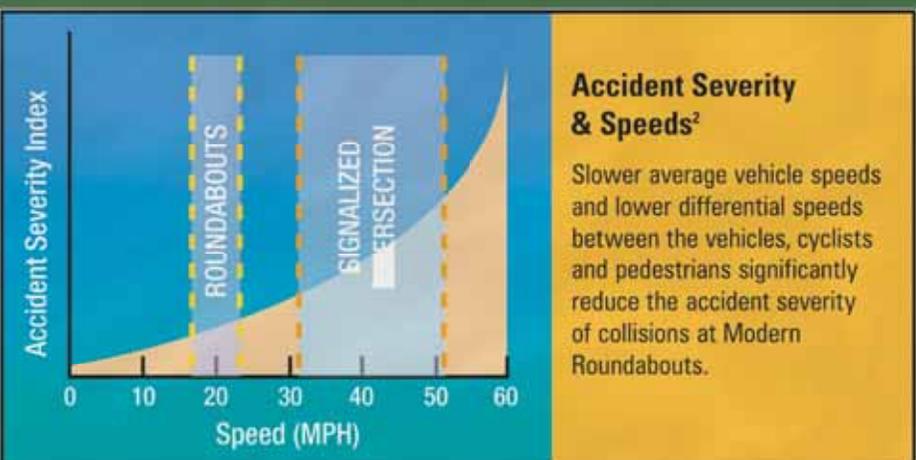
*Slower traffic movement at intersections significantly reduce accident severity and eliminates the potential threat associated with fast moving vehicles.*

Public safety is the driving force and highest-ranking priority in all City of Chico intersections designs. Accident injury and fatality rates are the traffic engineer's most compelling indicator of the operational and safety performance of an intersection. While speed, traffic volume, congestion and capacity demands are factoring design components, the constant challenge and primary objective of traffic engineering is to reduce and minimize incident rates at existing intersections and incorporate all possible public safety elements into every new intersection design.

Federal Modern Roundabout guidelines state that accident frequency and severity is less for a roundabout intersection than a traffic signal. Roundabouts have fewer conflict points for vehicles, pedestrians and bicyclists and the potential for many hazards incidents, such as right-angle "T-bone" and

conflicting left-turn or head-on crashes are eliminated with Modern Roundabouts.

Safety study findings worldwide provide and support quantitative evidence that in most circumstances the selection of a Modern Roundabout intersection design, over the more conventional intersection traffic control options, can have significantly positive traffic safety implications.



- 40% Average Reduction in All Crash Types
- 80% Average Decrease in Injury Accidents
- 90% Average Decrease in Fatalities or Incapacitating Injuries
- 30% Average Decrease in Pedestrian Accidents

Insurance institute for Highway Safety (IIHS) and Federal Highway Administration (FHWA) 2003

In 2002, more than 1.8 million intersection crashes occurred in the United States. 219,000 of these crashes were the result of red light running and the cause of nearly 1,000 deaths and 181,000 injuries.

Federal Highway Administration (FHWA) 2002, American Trauma Society.

One in three Americans knows someone who has been injured or killed in a red light running crash.



# A Modern Roundabout...

*is a one-way circular intersection without a traffic signal or stop signs. Traffic flows in one direction around a center island.*

Modern Roundabouts are a relatively new type of intersection traffic control device in the United States and differ significantly from traffic circles used primarily for "traffic calming" in residential areas or older rotaries or traffic circles frequently found on the east coast. The basic difference between a Modern Roundabout and a signalized intersection is lower intersection speed, reduced accident and injury rate and control of intersection entry and exit.

**Slower, more consistently paced traffic increases safety and results in faster overall travel times.**

Increasing traffic volumes, stop signs, and traffic lights hinder quick and efficient traffic flow. Stop... go... slow-down... speed-up traffic motion during peak rush-hour commutes causes driver frustration, congestion and travel delay. Stopping for a red light during early morning or later evening off-peak

travel times, when no cars are in sight, also causes unnecessary delays. A Modern Roundabout eliminates these "enforced" traffic pauses and provides safe, efficient and continuous traffic flow.

**Modern Roundabouts, in place across the country, effectively and safely accommodate high volume traffic situations in major roadway intersections and freeway interchanges**



Modern Roundabouts are a circular intersection design with traffic control features that control driver behavior. These features include entering traffic yield signs, canalized approaches and design that helps to insure relatively low and safe travel speeds.

**Modern Roundabout design controls speeds through intersections and provides a traffic calming effect that significantly reduces the number and severity of accidents.**

- A 22 mph average roundabout speed allows drivers more time to react to potential conflicts
- A lower speed differential between vehicles, pedestrians, & cyclists means all road users are traveling at similar rates of speed and accident severity is significantly less

The Modern Roundabout is a self-regulating traffic control device using intersecting roadway widths and curves, medians, signing and landscaping to regulate speeds. The layout of a Modern Roundabout is typically compact, with a raised central island fit into a circle of generally 100 to 300-feet in diameter. Design is very flexible and allows several variations depending on traffic flow and public right-of-way constraints.

On approach, roundabouts may flare from one lane to two lanes in a very short distance. This feature greatly increases intersection capacity without widening the corridor along its entire length.

Modern Roundabouts are unique from other intersections in that they use "splitter islands" (curved medians) and raised concrete curb to control traffic entering and traveling through the roundabout. Splitter islands increase intersection safe-

ty by slowing vehicle speeds, deterring "wrong-way" drivers and by providing safe refuge for pedestrian crossings. Entering and exiting traffic streams are physically separated.

**Modern Roundabouts convert all traffic movement into right-turns only**

Approaching drivers slow down and yield to the counterclockwise flow of circulating traffic in the roundabout. Drivers travel around rather than through the intersection and exit by making a slight right-turn towards the desired destination.

Modern Roundabouts are designed and sized to ensure specific travel speeds and accommodate traffic flows, large trucks and vehicles. The raised center island and right-turn conversion of all traffic flow through the intersection substantially reduces vehicle-to-vehicle conflicts.

## Modern Roundabout Benefits:

- Lives Saved - Major Reduction in Injury and Fatal Accidents
- Reduced Travel Delays and Congestion
- Enhanced Pedestrian Safety
- Reduced Intersection Speeds
- Reduced Environmental Impact Noise Levels
- Reduced Vehicle Emissions
- Reduced Fuel Consumption
- Provides Traffic Calming
- Red-light Running Incidence Eliminated
- Increased Intersection Capacity
- Faster Overall Roadway Travel Times
- Less Right-of-Way Needs, Construction and Maintenance Costs
- Opportunity for Community Aesthetic Enhancement

### Traffic Calming

**"Crashes that do occur tend to be minor because speeds are slower."**



The radius of the circular road and the angle of entry points of a Modern Roundabout can be designed to slow vehicle speeds. Lower speeds allow drivers more time to judge and react to other vehicles and pedestrians.

- Reduced Speed
- Controlled Entry Angle

### Pedestrian and Bicyclist Safety

By reducing speed and eliminating through and left-turn traffic movement at an intersection, pedestrian safety rises considerably and pedestrian/vehicle conflict points are decreased by 50 percent. The traditional signalized intersection has up to 16 potential pedestrian/vehicle points of conflict and a Modern Roundabout has only eight

pedestrian/vehicle points of conflict. Fewer conflict points and lower rates of speed also reduce the likelihood of driver and pedestrian perception error, and correspondingly, the number of vehicle/pedestrian crashes.

Bicyclists have the option of traveling through the Modern Roundabout either by riding in the travel lane as a vehicle, or by exiting the roadway and using the shared-use path and pedestrian crosswalks. Most Modern Roundabouts typically provide a multi-use path at the perimeter of the roundabout to accommodate pedestrians, wheelchairs, strollers and bicyclists with highly visible roadway crossings set back behind the traffic yield line.

### Pedestrian Fatality Rates

Chance of death when a pedestrian is hit by a vehicle



Insurance Instituted for Highway Safety (Note: Average red light running speed is 45-50 mph)



- Slower Speed = Reduced Fatalities
- Reduced Pedestrian/Vehicle Conflict Points
- Shorter Crosswalk Distance
- Predictable One-Way Vehicular Direction
- Protective Splitter Islands
- Shared Perception and Sight Triangle

### **Shorter Travel Time Reduced Congestion and Delays**

A Modern Roundabout's continuous traffic flow means decreased traveler delays. All roundabout lanes and legs operate simultaneously. Both the Modern Roundabout and traffic signal intersection are capable of relieving traffic congestion, but in many circumstances, Modern Roundabouts can offer higher traffic flow volumes and overall operational performance, meaning vehicles can more easily, efficiently and safely navigate through an intersection.

In certain circumstances, a Modern Roundabout also has a higher potential for meeting the increasing traffic demands of a growing community and relieving congestion caused by future traffic growth because of its unique capacity capabilities. In some situations, as much as a 75 percent reduction in travel delay time has been realized where Modern Roundabouts replaced existing traffic signal intersections.

- Continuous Traffic Flow
- Reduced Congestion and Delay Time
- Less Driver Frustration

### **Community Benefits**

Landscaped buffers, separating pedestrian and traffic, encourage pedestrians to cross only at designated crossings and provide Maricopa County communities the opportunity to enhance the aesthetics of an intersection.

By design, a Modern Roundabout is itself a traffic calming measure, slowing vehicle speed and reducing noise, as well. With slower speeds and shorter congestion-related delays, business access is safer, easier and more flexible. Municipalities benefit from the economic savings associated with a roundabout intersection. The "life" or longevity of a Modern Roundabout is generally 2-times longer than a signalized intersection. Construction costs and right-of-way requirements are typically less with fewer lanes required than traditional signalized intersections.

- Attractive Community Entrance
- Traffic Calming
- Enhanced Business Access
- Enhanced Pedestrian Safety
- Lower Construction and Maintenance Costs
- Less Public Right-of-Way Required

### **Environmental Benefits**

Modern Roundabouts reduce the number and duration of vehicle stops and eliminate red-light sitting engine idle time (when auto emissions are often worse than that of a moving vehicle). These combined benefits result in reduced noise, air pollution and reduced fuel consumption.

- Reduced Noise
- Reduced Auto Emission
- Reduced Fuel Consumption

### **Modern Roundabout Applications**

- Town Centers
- Urban, Suburban, Residential or Rural Areas
- High-Speed & Low-Speed Roadways
- High Volume & Low Volume Roadways
- Urban/Rural Crossroads
- Speed Change Transition
- Roadway Alignment Change
- Unbalanced Traffic Flow Conditions

### **Design Considerations**

- Right-of-Way Requirements
- Business Access
- Traffic Circulation Patterns & Volumes
- Pedestrian, Bicyclist and ADA Accommodation
- Project Cost and Budget
- Aesthetic Treatments
- Design Flexibility for Slower Approach, Entry and Exit Speeds

### **Modern Roundabout Challenges**

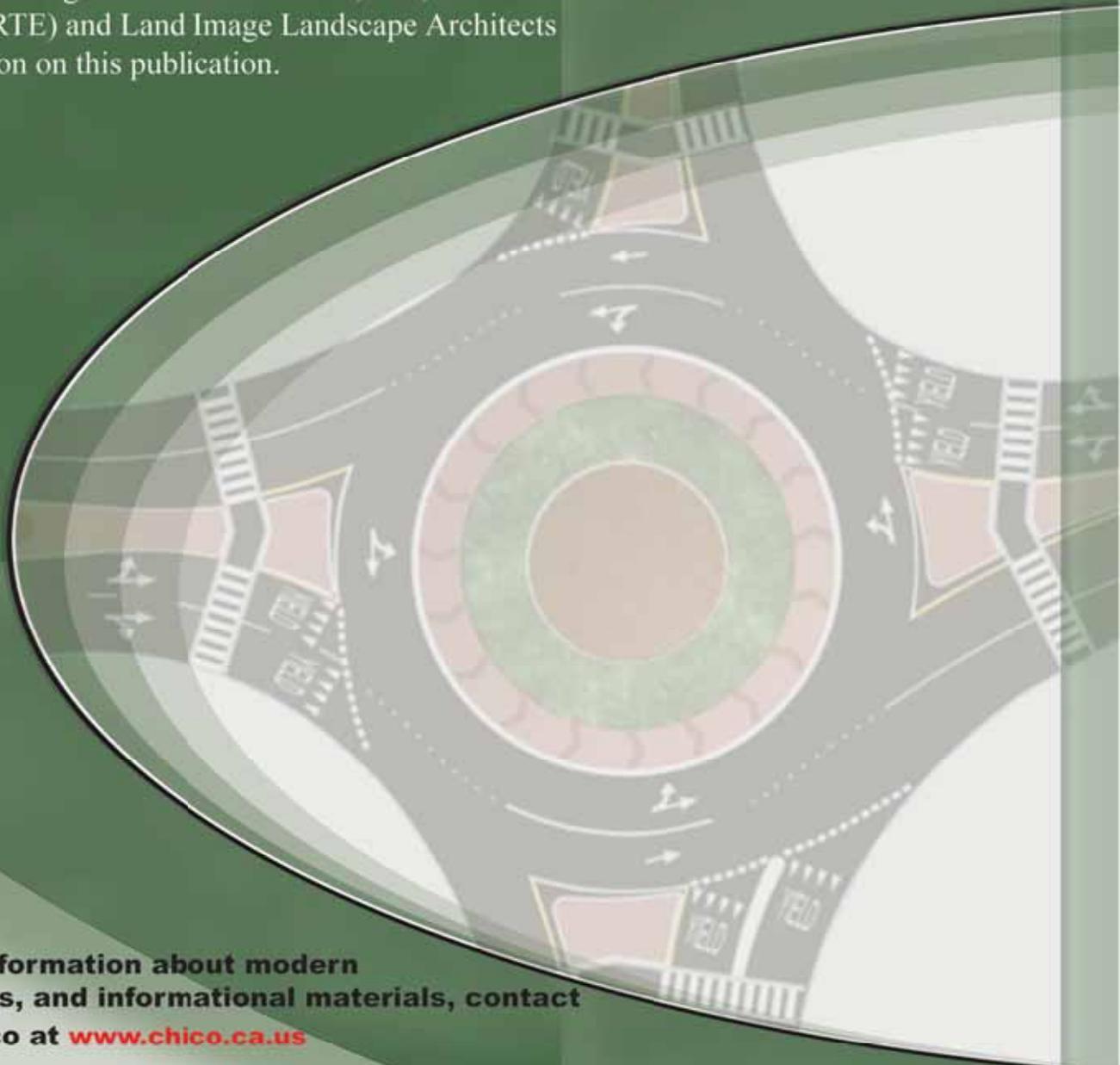
- Highly-Developed Design Method Requirements
- Increased Design Complexity
- Incorporating Right-of-Way Constraints
- Conflicting Design Objectives



# Modern Roundabouts = Safety and Capacity

Additional information may be obtained by contacting the Institute for Highway Safety (IHS), the Federal Highway Administration (FHWA) or Roundabouts & Traffic Engineering (RTE) (530) 550-1181 [www.roundabouts.us](http://www.roundabouts.us).

Special Acknowledgement to Scott Richie, P.E., Roundabouts and Traffic Engineering (RTE) and Land Image Landscape Architects for collaboration on this publication.



**For more information about modern roundabouts, and informational materials, contact City of Chico at [www.chico.ca.us](http://www.chico.ca.us)**



Note: The content, design, tone and writing style of this document is owned by Scott Ritchie Roundabout and Traffic Engineering (S.E. Ritchie Corp.), the City of Chico, RTE and Land Image. Duplication or copying of the content, design, tone and/or writing style of this document, without permission, is strictly prohibited. All inquiries must be directed to RTE or City of Chico.