

Paia Relief Route

Intersection Treatments

Traditional & Roundabouts

March 15, 2010

Movement of People and Goods

Economic and Social Purposes

Access vs. Mobility

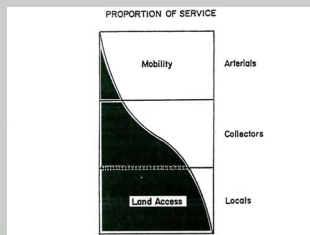


Exhibit 1-5. Relationship of Functionally Classified Systems in Serving Traffic Mobility and Land Access

Functional Classification of Roadways

- Hierarchy of facilities for efficient movement
 - Principal Arterials (substantial countywide travel)
 - Minor Arterials (region to region travel)
 - Collectors
 - Local Roads

What is an Intersection

- Where two or more roadways join or cross
 - Including approaches
- Important part of Highway facility
 - Impacts overall facility efficiency, safety, speed, cost of operation, and capacity

Objective of Intersections

- Facilitate the convenience, ease, and comfort of people traversing the intersection while enhancing the efficient movement of motor vehicles, buses, trucks, bicycles, and pedestrians
- Should be fitted closely to the natural transitional paths and operating characteristics of its users

Five Basic Elements

- Human Factors
- Traffic Considerations
- Physical Elements
- Economic Factors
- Functional Intersection Area

Human Factors

- Driving Habits
- Ability of drivers to make decisions
- Driver expectancy
- Decision and reaction time
- Conformance to natural paths of movements
- Pedestrian use and habits
- Bicycle traffic use and habits

Traffic Considerations

- Design and actual capacities
- Design-hour turning movements
- Movements (merge, diverge, weave, & crossing)
- Vehicle speeds
- Transit involvement
- Crash experience
- Bicycle movements
- Pedestrian movements
- Size and operating characteristics of vehicles

Large Trucks



Emergency Vehicles



Physical Elements

- Character and use of abutting properties
- Vertical alignments at the intersection
- Sight distance
- Horizontal Alignment – Angle of the intersection
- Conflict area
- Speed-change lanes
- Geometric design features
- Traffic control devices
- Lighting equipment
- Safety features
- Bicycle traffic
- Environmental factors
- Crosswalks

Economic Factors

- Cost of improvements
- Impacts of Access Management
- Energy consumption

Functional Intersection Area

- Physical Area
- Functional Area (approach)
 - Perception-Reaction Distance
 - Maneuver Distance
 - Queue-Storage Distance

Types of Intersections

- Grade Separated
 - Three-leg Intersections
 - Four-leg Intersections
 - Multi-leg Intersections
- At-Grade

Grade Separated Intersection



Characteristics

- Efficient
 - Very High Traffic Volumes
 - Reduce # of Conflicts
- Bridge & Ramps
- Expensive
- Needs lots of ROW

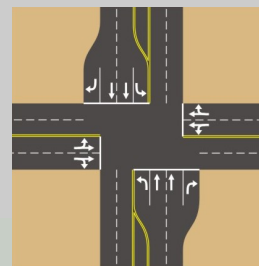
Grade Separated Intersection



Characteristics

- Visual Impacts
- Physical barrier
 - May restrict access to adjoining properties
- Construction Issue
 - Detouring
 - Longer to build

Traditional 4-Way Intersection



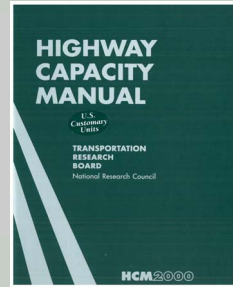
Characteristics

- Channelization
- Turning Lanes
- Acceleration Lanes
- Shelter Lanes
- Divisional Islands

Design Elements

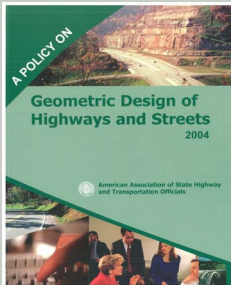
- Based on Functional Classification
- National Standards
 - Highway Capacity Manual
 - A Policy on Geometric Design of Highways and Streets
 - Manual on Uniform Traffic Control Devices

HCM 2000



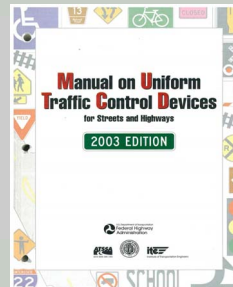
- Roadway Capacity
- Intersection Capacity
 - Delay

Green Book



- Sight Distance
- Alignment
- Profile
- Truck Turning Radii
- Pedestrian Crossings
- Pavement Thickness
- Width of lanes and shoulders

MUTCD



- Signs
 - Regulatory (Stop, Yield, Speed Limit)
 - Warning
 - Guide
- Striping
- Markings
- Traffic Signals
 - Warrants

Modern Roundabout

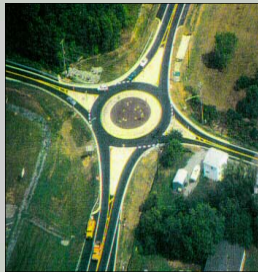


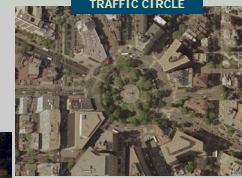
Photo: Maryland SH&T

- Alternative intersection configuration
- Overall reduction in number of accidents
 - Severe accidents
- Require more right-of-way
 - Restrict access to adjoining properties
- Provide opportunities for landscaping
- Not to be used solely for traffic calming on arterial highways

Other Types of Roundabouts



ROTARY



TRAFFIC CIRCLE



NEIGHBORHOOD TRAFFIC CIRCLE

Photo: Washington

Photo: Shikun Geographical Survey

Single-Lane Roundabouts



Characteristics

- Slow speed approach (25-30 mph)
- Yield on Entry
- Low Speeds entering and circulating (Operating speed 12-16 mph)
- No pedestrian activity in central island

Accident Reduction

- Reduce number of conflict points
- Eliminate left-turn and right-angle accidents
- Reduce severity of pedestrian accidents
- 90 percent reduction in fatal intersection accidents

Safety Impacts of Modern Roundabouts

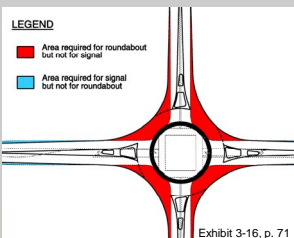
Type of Roundabout	Converted from	# of Conversions	% Reduction of all Crashes	% Reduction of Injury Crashes
Single Lane, Rural	Stop Controlled	9	65%	68%
Single Lane, Urban	Stop Controlled	12	69%	80%
Multi-Lane, Urban	Stop Controlled	9	8%	73%
Urban	Signalized	5	37%	75%
All		33	47%	72%

Source: NYSDOT Study, October 2003

Appropriate Use of Roundabouts

- Preserve functionally classified roadway system
- Where traffic volumes on both roadways are high and well balanced
 - Not to be used where traffic enter from minor street less than 10%
- Where turning movements are relatively high
- Level terrain

Right-of-Way Needs



- Single-lane Roundabout inscribed island of 90-foot to 150-foot diameter
- Commercial and Emergency Vehicles
- Environmental Impacts due to land acquisition
- Access Restriction

Pedestrians & Cyclists

Intersections also introduce concerns for transportation professionals on the safest way to accommodate pedestrians and cyclists.



Pedestrians

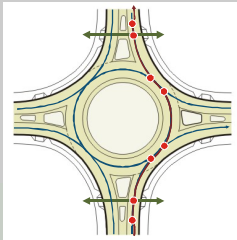
- Lower speed so less severe accidents
- Farther walking distances
- Proper guidance critical (way finding)
- Visually impaired have difficulty
 - Can't hear slower cars
 - No breaks in traffic flows (do not stop)
 - May have difficulty finding crossing location
 - ADA law requires equal treatment

Bicycles

- No striping through central island
- Experienced bicyclists
- Inexperienced bicyclists

Pedestrians & Cyclists

Bike lanes are not recommended within a roundabout. Instead, cyclists merge with traffic before entering the roundabout, circulate with traffic, and then re-enter the bike lane after exiting.



Pedestrians & Cyclists

If a cyclist is uncomfortable riding with traffic, a cyclist can choose to travel instead as a pedestrian.

