Park design

Principle #1

- Group similar facilities together – separate dissimilar facilities.

- Why do we do this?
  - Safety
  - Differences in admission fees
  - Differences in seasonal use
  - Reduce user conflicts

Principle #2

- The heaviest use will occur near park attractions so plan for it!

- How do we plan for it?
  - Install durable facilities
  - Design to minimize impacts

Principle #3

- Keep heavy-use areas local to staff when possible.

- Why do we do this?
  - Prevents excessive travel/time loss by staff
  - Quicker response time by staff for emergencies
  - Easier maintenance

Zone management

- Maintenance zone
- Camping zone
- Play zone
- Group day-use zone
- Day-use zone
- Interpretive zone
- Boating zone

Use zones

- Maintenance zone
  - Park entrance
  - Park office
  - Maintenance buildings
  - Dumping station
  - Entrance booth

Where does it go?

- Maintenance zone
  - Near the entrance usually
  - Entrance booth, dumping station, & park office on main road
  - Maintenance buildings should be out of sight with a separate access road

Use zones

- Camping zone
  - Campground loops
  - Rest rooms
  - Playground

Where does it go?

- Camping zone
  - Relatively flat area (use topo maps)
  - Within walking distance of park attraction(s) & interpretive zone
  - Other use zones should not be accessible via campground loops
  - Use a separate entrance road for loops
  - Gated access road

Use zones

- Play zone
  - Active play:
    - Ball fields
    - Courts
    - Playground
  - Passive play:
    - Horseshoe pits
    - Shuffle board
    - Game tables

Where does it go?

- Play zone
  - Within walking distance from camping, day use, and group day use zones
  - Do not locate near main park attraction

Use zones

- Group day-use zone
  - Group picnic areas
  - Rest rooms

Where does it go?

- Group day-use zone
  - Use separate, gated entrance road
  - Within walking distance of park attractions

Use zones

- Day-use zone (Family picnic/beach zone in text)
  - Picnic areas
  - Rest rooms
  - Swimming area
  - Concession stand
  - Playground (if no play zone nearby)

Where does it go?

- Day-use zone
  - Can be directly off main park road
  - Adjacent to main park attraction (e.g., swimming area).
  - Within walking distance of interpretive zone.

Use zones

- Interpretive zone
  - Interpretive center
  - Trail heads
  - Amphitheater
  - May or may not have rest rooms

Where does it go?

- Interpretive zone
  - Locate near resources requiring interpretation.
  - Within walking distance of day use, group day use, and camping zones.
  - Easy to locate off main park road.
  - Place trailheads in this zone.

Use zones

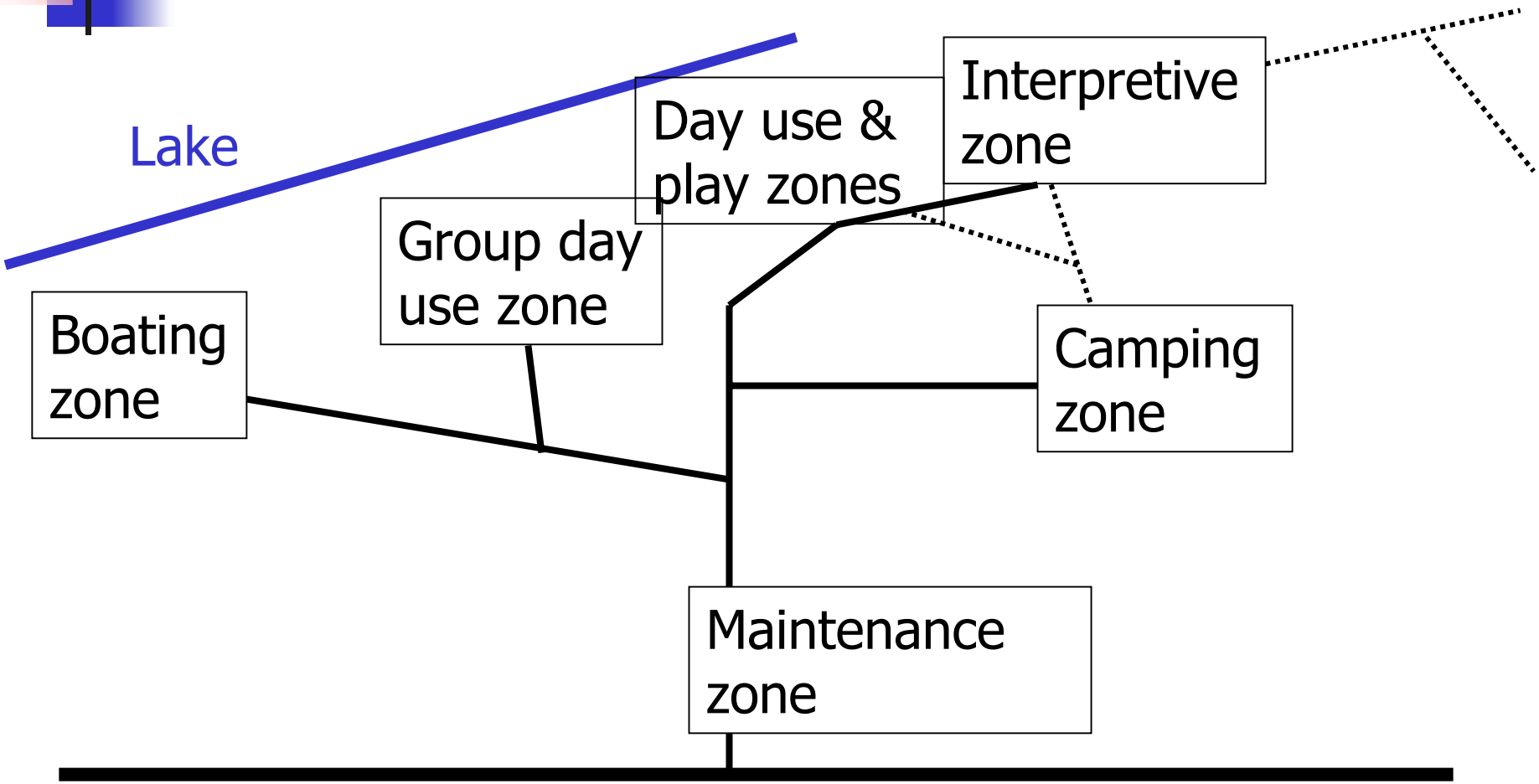
- Boating zone
  - Boat launch (separate non-motorized from motorized)
  - Marina
  - Rest rooms

Colebrook Lake, MA

Where does it go?

- Boating zone
  - On the water but separate from day use area
  - Use separate, gated access road

Zone placement



Connecting zones with roads

- Create separate access roads off main park road for camping, boating, and group use areas.
- Use one-way roads on camp loops.
- Use two-way roads on entrance and other access roads.
- Never create dead-ends – Always provide a turn-around area.

One lane vs. two lane

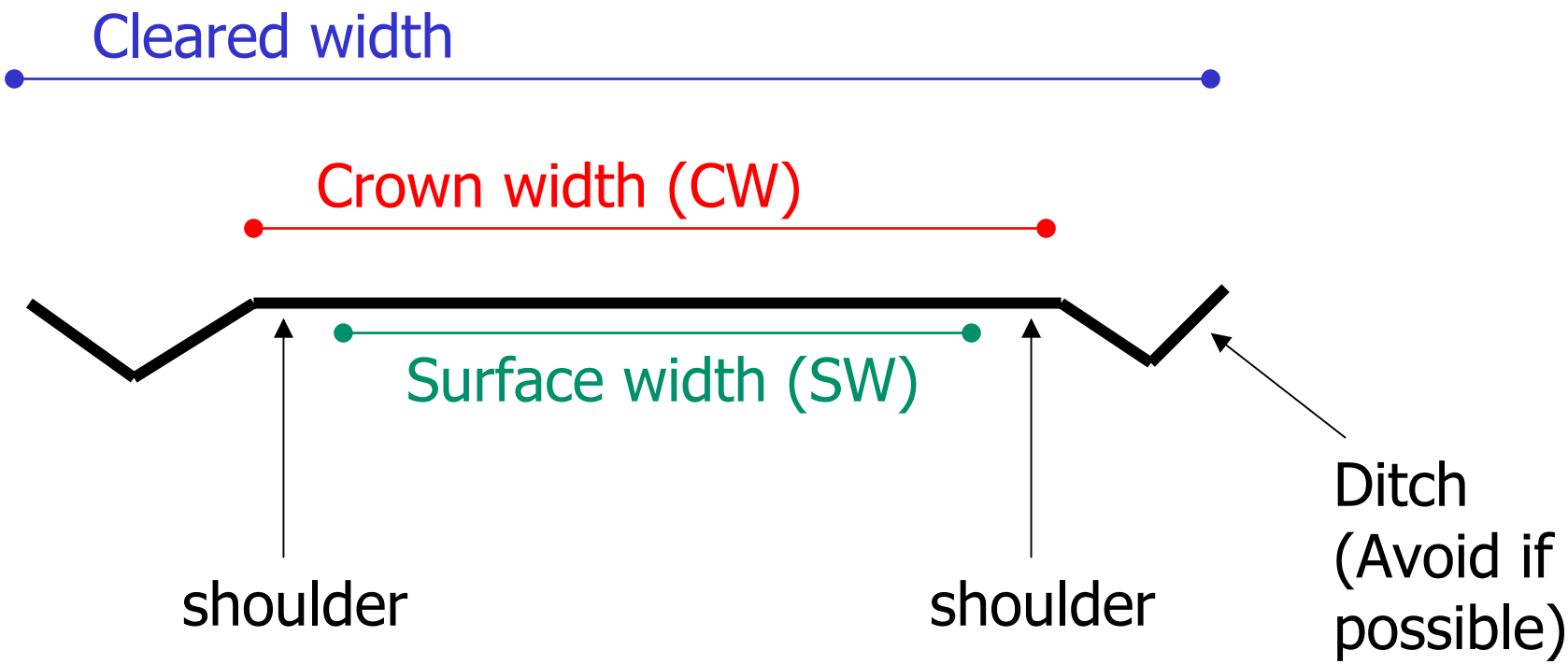
One Lane

- Limited tree removal needed
- Safer (one-way traffic)
- Limits roadside parking
- Less expensive

Two Lane

- Tree removal required
- Two-way traffic
- Encourages roadside parking (signage needed)
- More expensive

Road terminology



Road measurements

Single Lane Roads

- Crown width (CW)
  - 12 to 14 feet
- Surface width (SW)
  - 8 to 10 feet
- If no shoulder (i.e., CW=SW)
  - 12 feet

Road measurements

Double Lane Roads

- Crown width (CW)
  - 20 to 24 feet
- Surface width (SW)
  - 18 to 20 feet

Cleared width

- Width depends on road use
- 5 to 15 feet on each side of CW
- Especially important on turns!

Cleared width

- In parks:
  - Single lane: 22’ total
    - 5 feet on each side of a 12-foot-wide CW
  - Double lane interior: 30’ total
    - 5 feet on each side of a 20-foot-wide CW
  - Double lane entrance: 34 to 36’
    - 6 feet on each side of a 22 to 24’ CW

Road measurements

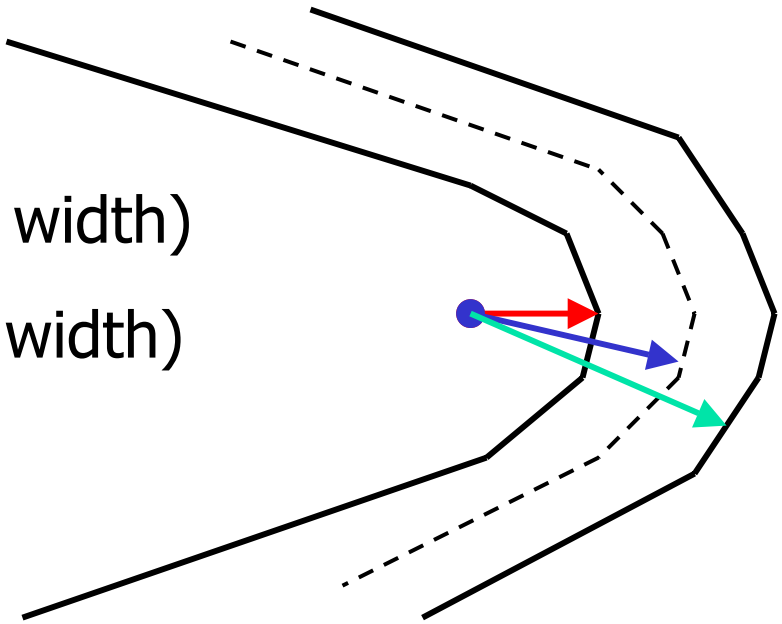
- Right of way
  - Depends on road jurisdiction (e.g., county, town)
  - Normally 50 – 66 feet (can be more)

Turning radius

- Rc = radius from center of road
- Ri = inside radius
- Ro = outside radius

Rc = Ro – (1/2 road width)

= Ri + (1/2 road width)

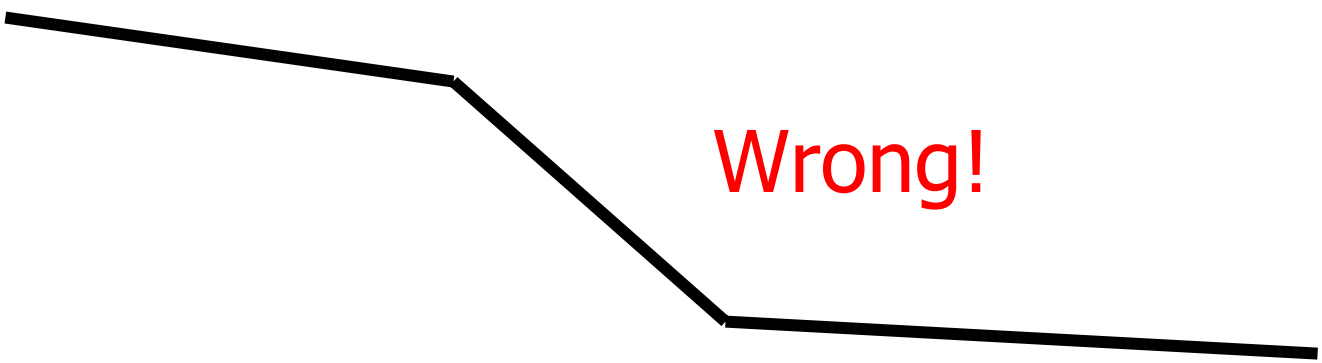


Turning radius

- Use curves, road width, and bumps to slow traffic down
- Speed and size of vehicles determines turning radius
- In a park:
  - Rc = 35 feet for trailers
  - Rc = 25 feet for cars

Vertical clearance

- 20 feet for trailers
- No abrupt vertical changes



Drainage

- Avoid using culverts and ditches for roads when possible.
- To improve drainage:
  - gradual dips in the road
  - slope of the road

Road construction

- Gravel
  - Remove organic layer of soil!!
  - Fill with 6” of gravel (1-2” diameter chunks)
  - Cost: $30/cubic yard of gravel
- Blacktop
  - Remove organic layer of soil!!
  - Use 4 to 6” gravel
  - Cover with 4” asphalt

Gravel requirement calculations

For a 10’-wide x 500-foot long road:

- Gravel needed per linear foot of road =
  (1’ long) (10’ wide)(0.5’ deep gravel) = 5 cubic feet
- Gravel needed per entire road =
  (500’ long)(5 $feet^3$/linear foot) = 2500 cubic feet
- Convert to cubic yards to order:
  (2500 ft^3)($yard^3$/27 ft^3) = 92.6 $yards^3$ = $2778

Parking

- Important to design correctly
  - Prevents visitor confusion

Parking

- Important to design correctly
  - Permit maximum desired access or limit use
    - Consider social, physical, managerial, and ecological carrying capacities.
    - Use the most limiting CC.

Parking

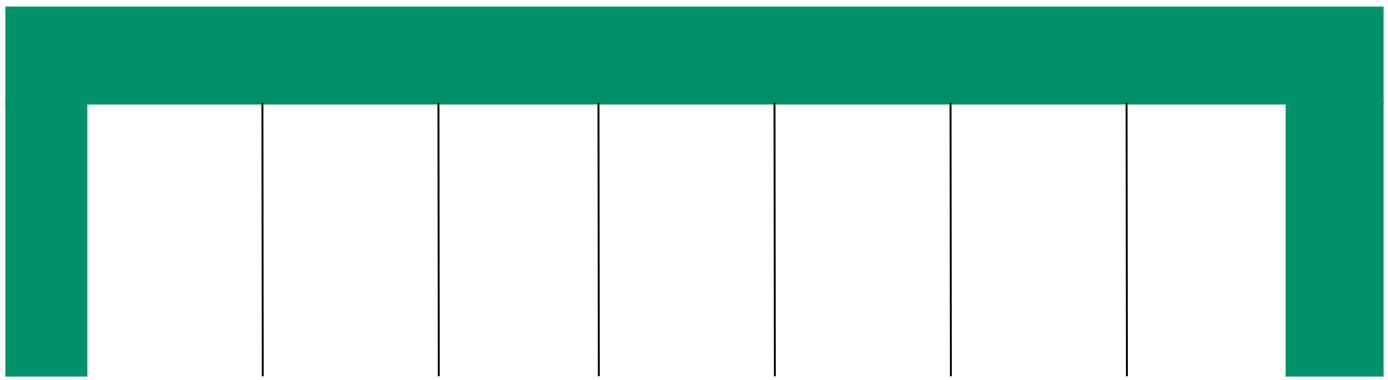
- Important to design correctly
  - Maintain maximum level of shade

Parking

- Important to design correctly
  - Make construction as easy as possible

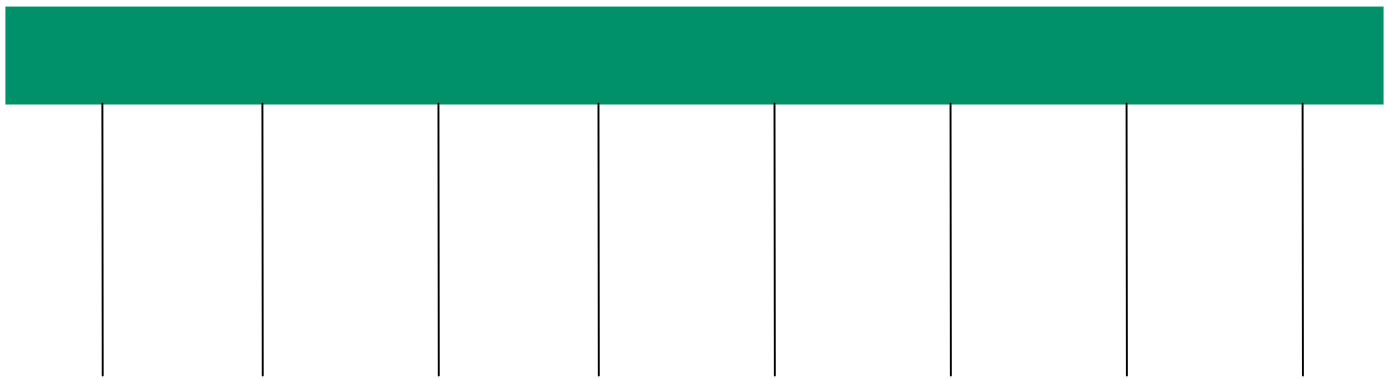
Parking

- Important to design correctly
  - Make snow removal possible



Parking

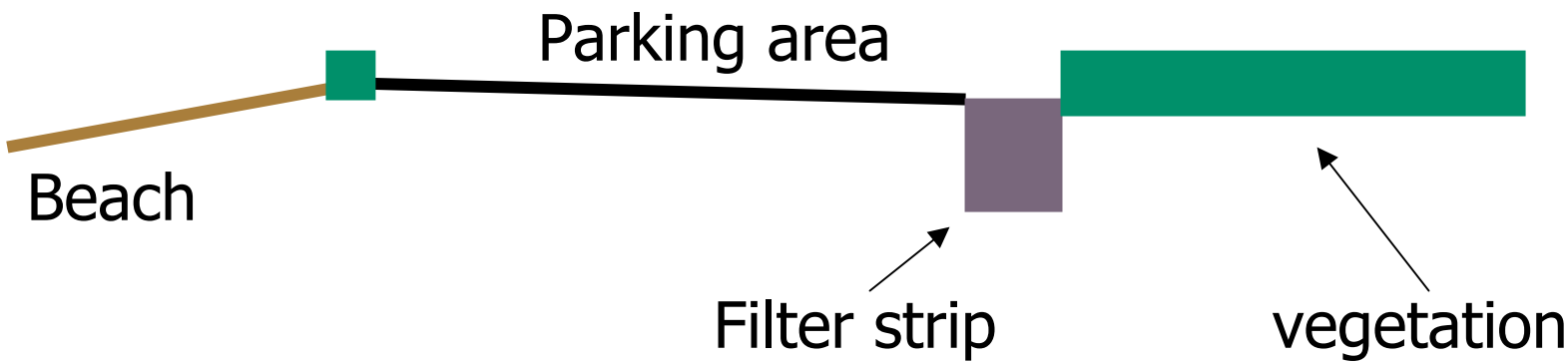
- Important to design correctly
  - Make snow removal possible



Better!

Parking

- Important to design correctly
  - Best Management Practices
    - Slope – Where is run-off going??
    - Filter strip



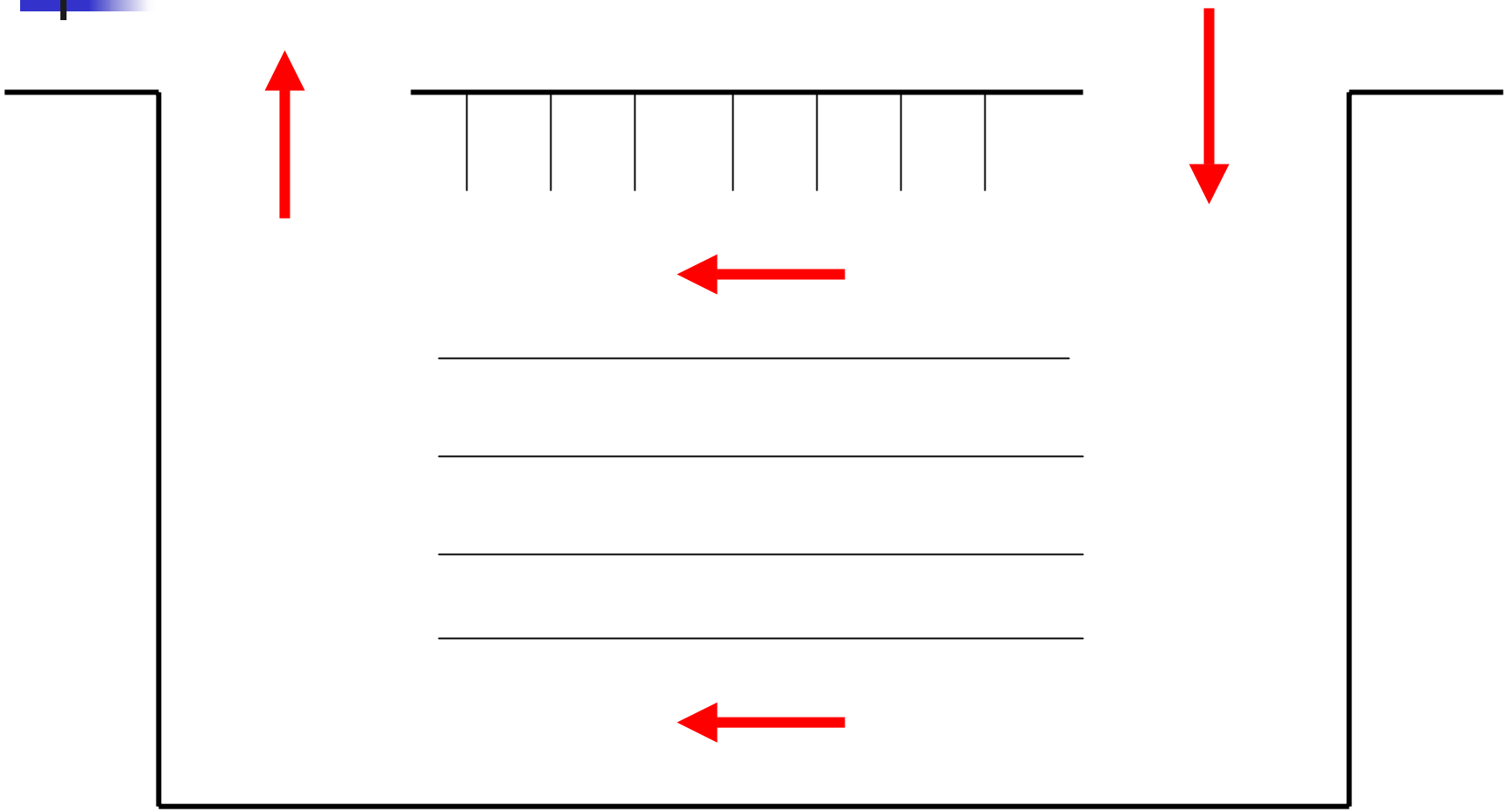
Parking calculations

- 100 cars/acre
- 2.7 people/car
- 270 people/acre
- ADA – one accessible space per 25 spaces

Parking space sizes

- Cars:
  - Recent standards: 19’ long x 9’ wide
  - Old standards: 20’ long x 10’ wide
- Trailers:
  - ATV use: 40’ long x 15’ wide
  - Campers: Up to 55’ long
- Add 20% of trailer spaces as car spaces
  - In a lot containing 20 trailer spaces, provide at least 4 car spaces

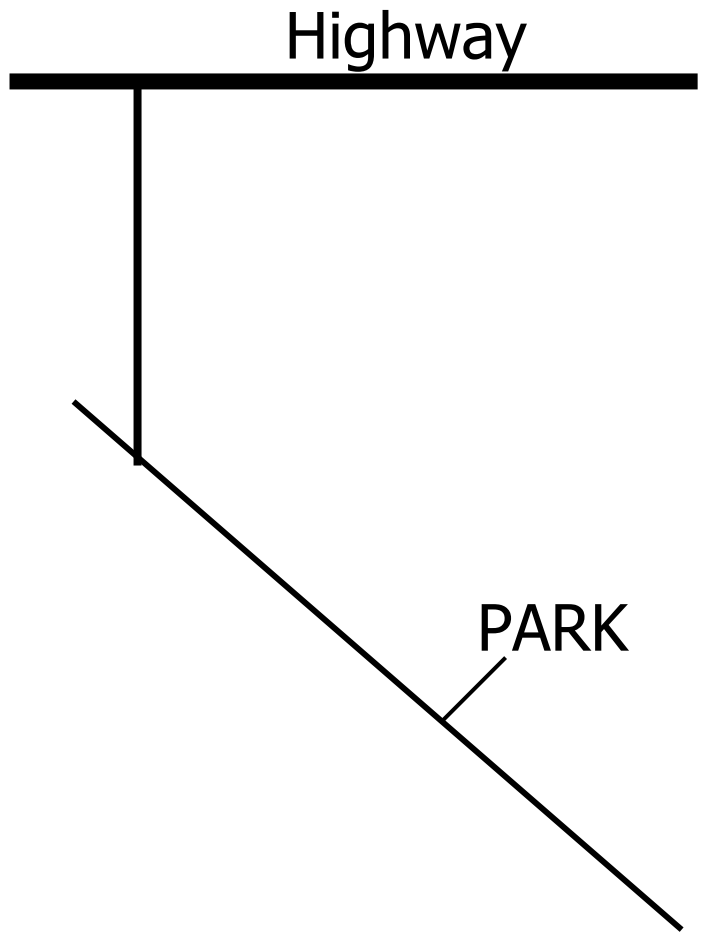
Basic parking lot flow



Maintenance zone

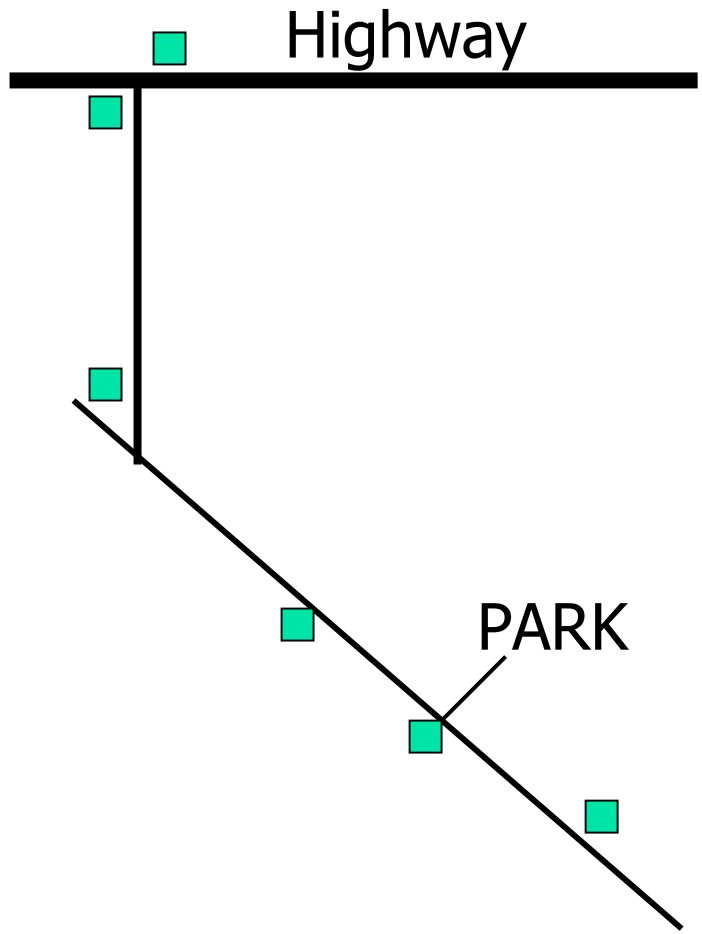
Entry signage

- Install directional signs leading from major roads to park



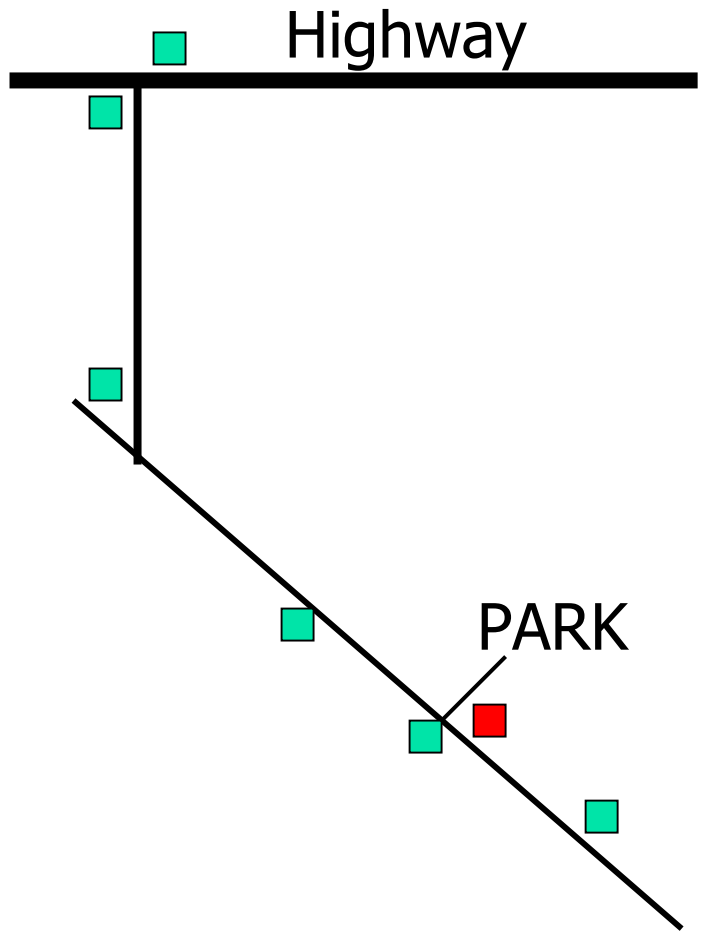
Entry signage

- Install directional signs leading from major roads to park



Entry signage

- Install directional signs leading from major roads to park
- Install sign at entrance



Park entrance/exit areas

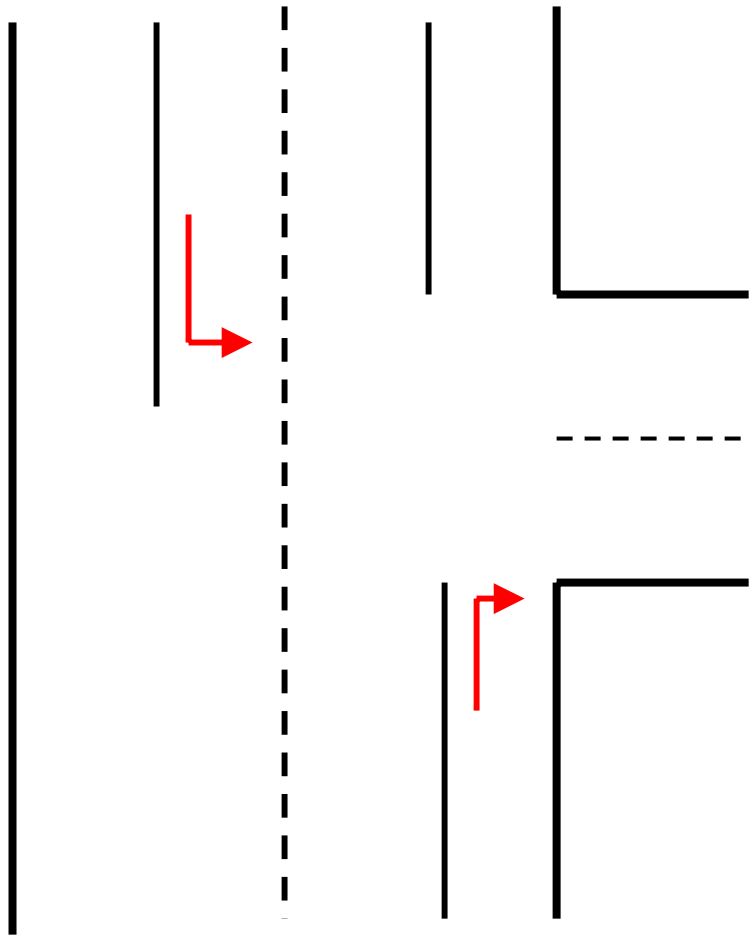
- Have one entry/exit point only (if possible)
  - Eliminates visitor confusion
  - Easier to manage visitor access
  - Easier to monitor visitor use
- Use more entries/exits …
  - If the park has subdivisions
  - For emergency exit purposes

Where do we locate entrance/exit areas?

- Avoid putting entrances on a blind curve in the road.
- Avoid putting entrances at the bottom of a hill.

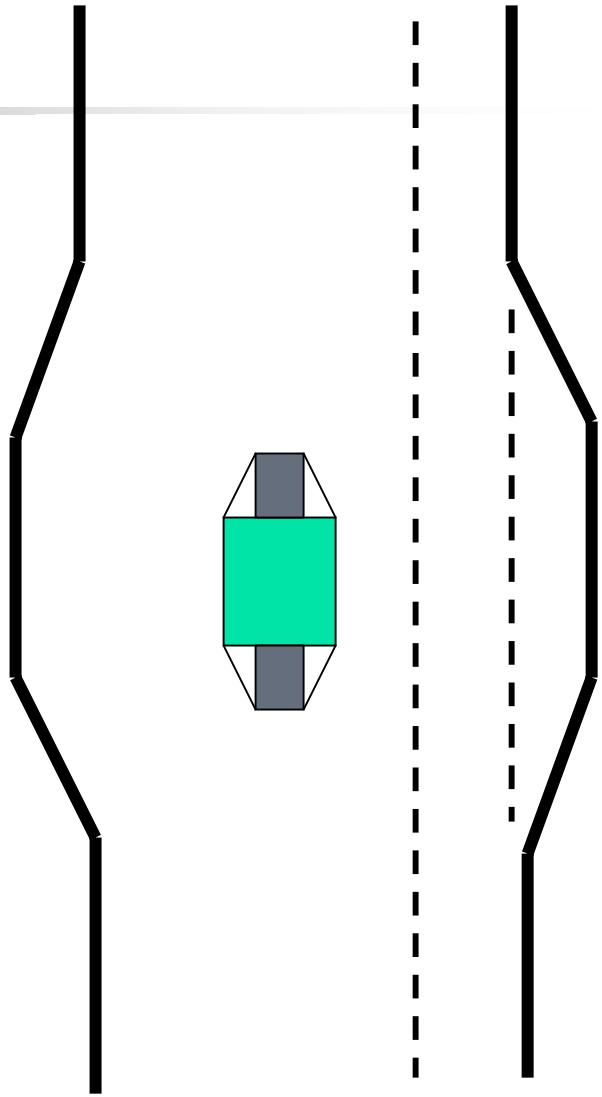
Entrance/Exit Areas

- Add turning and acceleration lanes near entrance



Entrance booths

- Double lane road near entrance booths
- Concrete barrier
- Vehicle turn around area
- Directional sign on booth
- Provide map, list of rules, program fliers



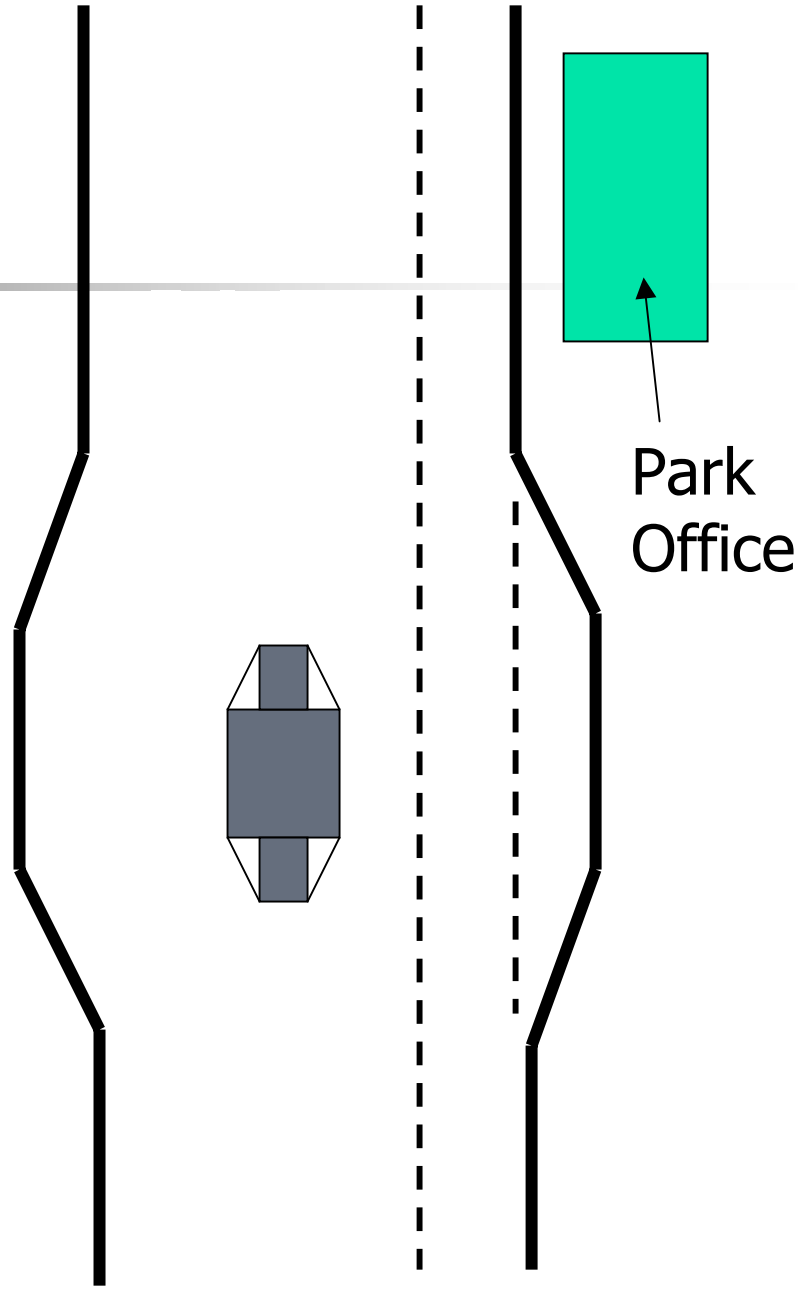
What's wrong with this?

Bruce Peninsula National Park, Canada

Park Office

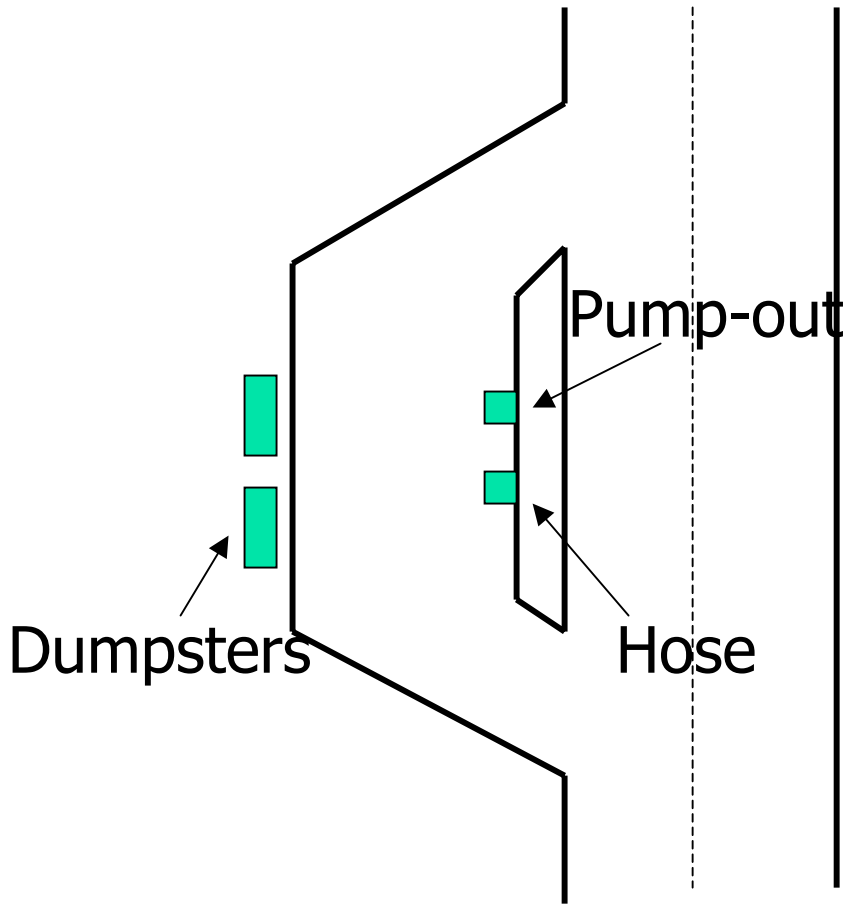
- Locate:
  - Near entrance booth

  OR
  - Near maintenance building
- Must be easy to find by visitors



Dumping facilities

- Locate near entrance on the way out
  - Pump-out facility
  - Garbage drop-off (these are also placed near campgrounds)



Maintenance buildings

- Keep near entrance and park office, but not within view of visitor use areas

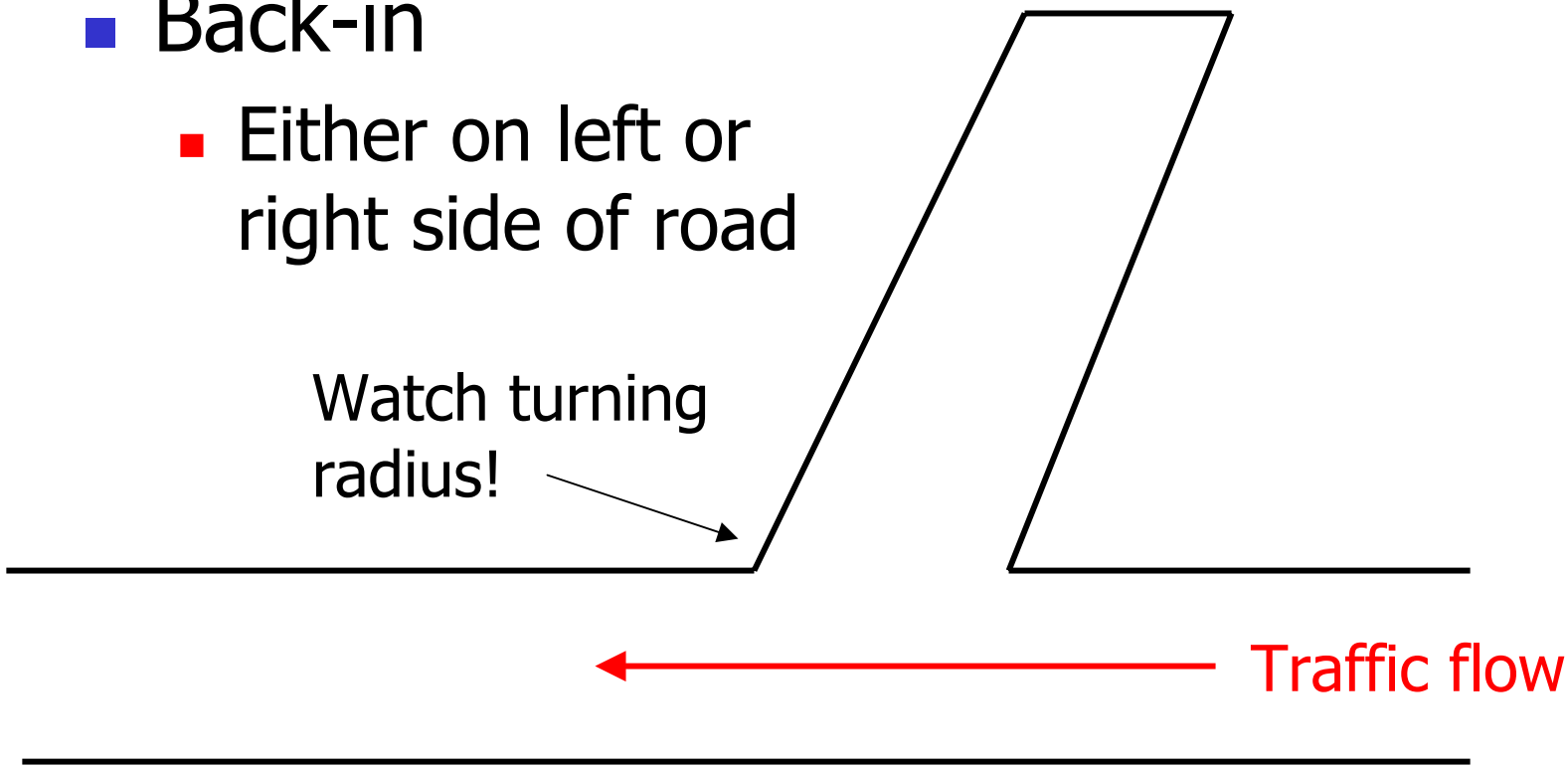
Campgrounds

Campgrounds

- Tent camping
  - 20’ x 20’ minimum
- Trailer camping
  - 55’ x 20’ minimum

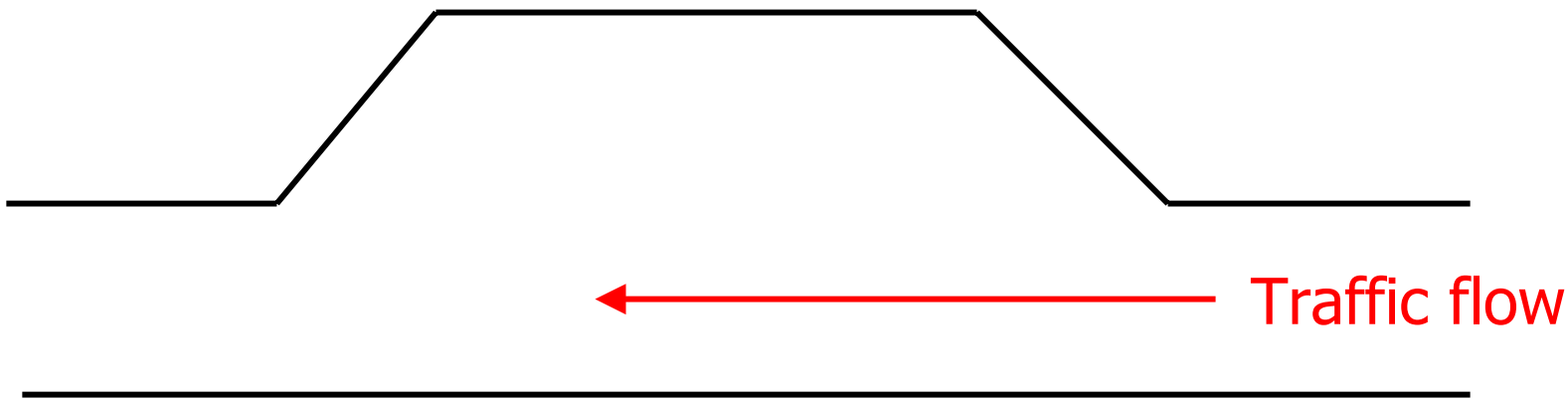
Types of sites

- Back-in
  - Either on left or right side of road



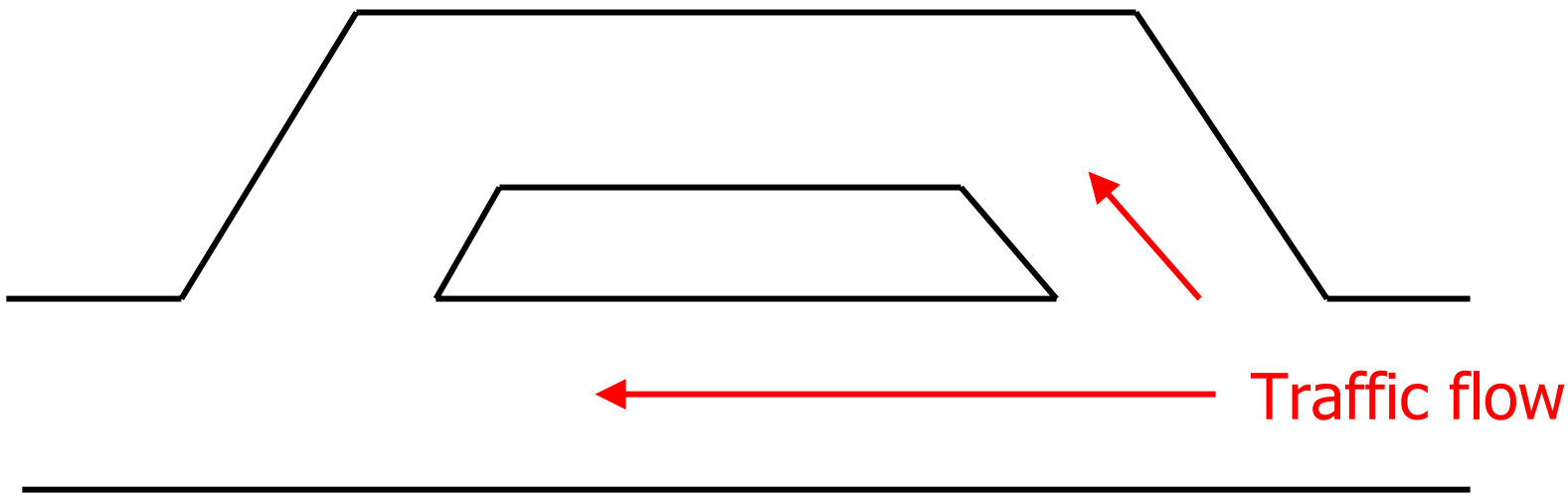
Types of sites

- Pull-off
  - Right side only!



Types of sites

- Pull-through
  - Right side only!



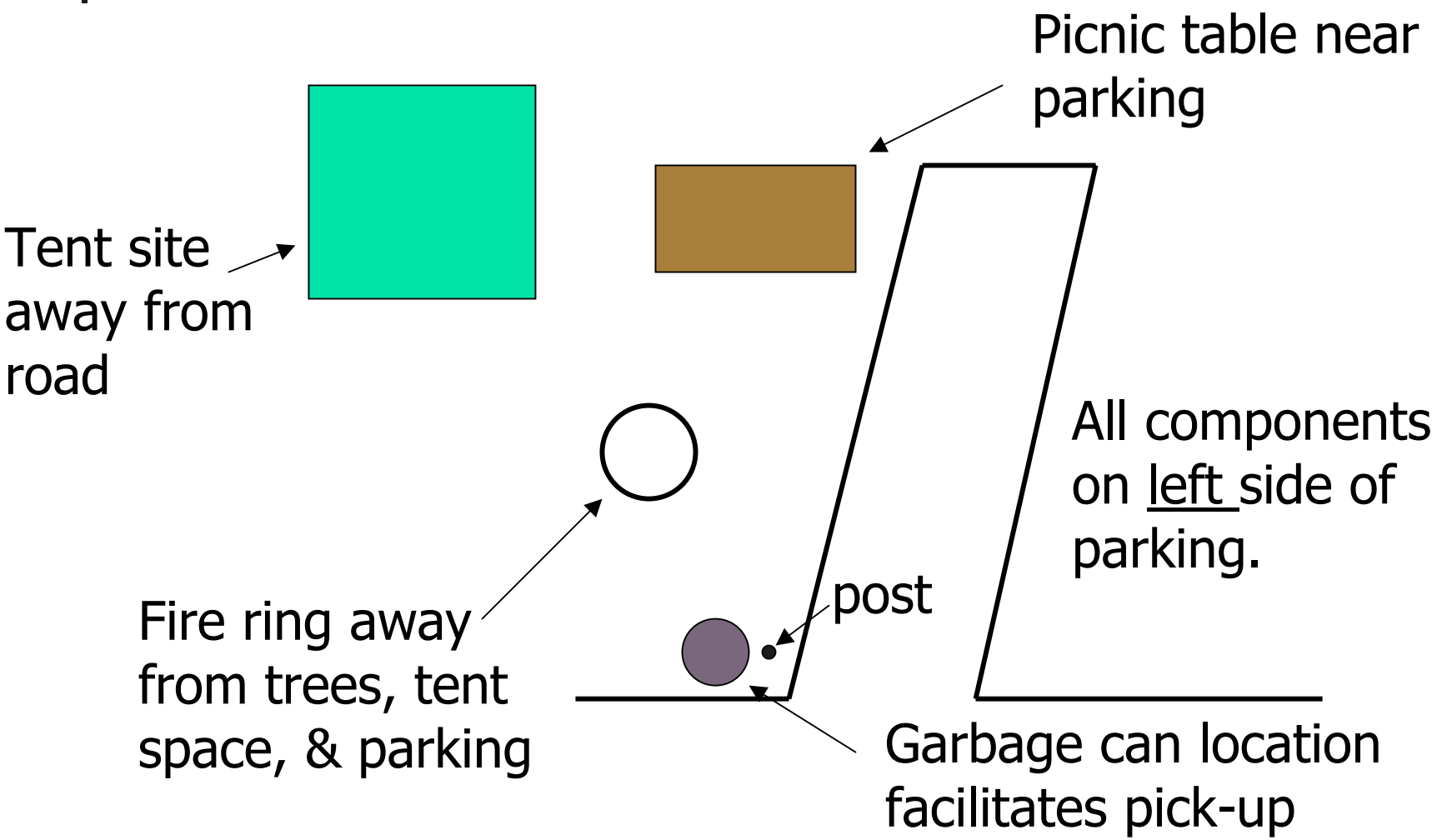
Campsite components

- Tent space
- Picnic table
- Fireplace
- Garbage can/Recyclables container
- Parking space
- Numbered post

Multi-site components

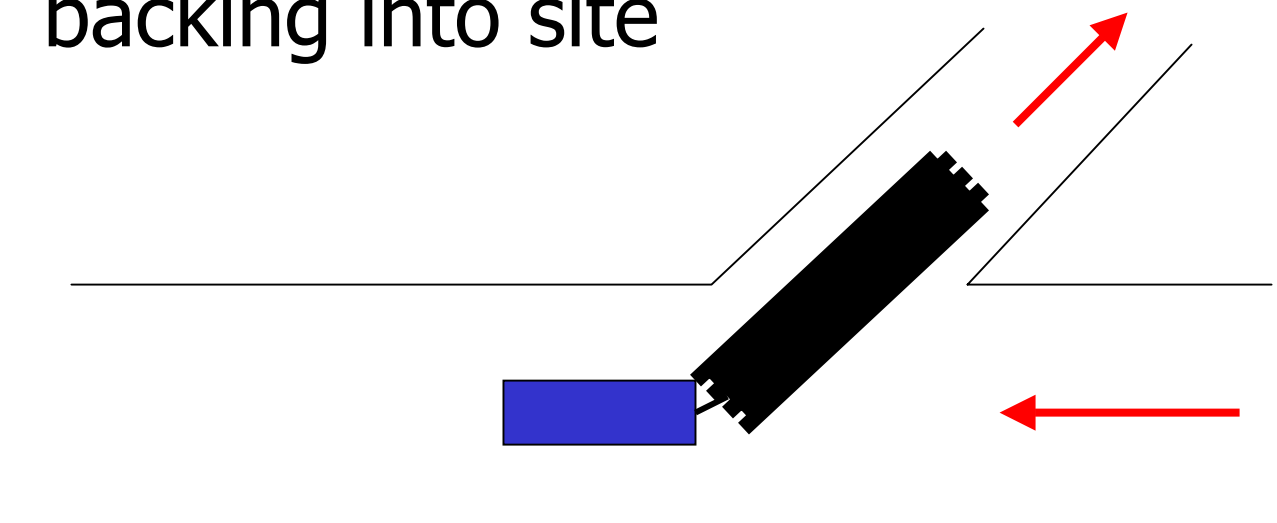
- Water spigots
- Bathrooms
- Central garbage disposal

Placement of components



Parking on site

- Allow 55 feet for trailer sites
- Allow 20 feet for tent sites
- Angle parking for trailers to enable backing into site



Picnic tables

- 30” high table/18” high seat
- Usually wood, metal, plastic wood, or cement
- Leave gaps between tabletop boards
- Screw boards on from bottom up
- Anchor table if necessary
- Extensions for accessibility or grills
- Gravel apron beneath
- Not cheap: $250 and up for durable tables

Picnic tables

Fireplaces

- Type depends on site
  - Primitive site: stone ring
  - Average site:
    - metal ring (about $75 each)
    - Reinforced cement or brick ($400-$500 each)

Fireplaces

- Type depends on site
  - Day use area:
    - Charcoal grill ($200 - 250 each)

Garbage cans

- Galvanized steel vs. plastic
  - $40 vs. $20
  - Steel is more durable to bumps
  - Bottom of plastic doesn’t rot
- Steel on platform is most durable
- Chain to numbered post

Water spigots

- Within 50 feet of each site
- Use gravel sump beneath spigot

Bathrooms

- Pit toilets
  - Not acceptable to many visitors
  - Good for light use
  - Need well-drained soils
  - Cheap ($500)

Bathrooms

- Port-a-jons
  - Waste is pumped out
  - Good for light or fluctuating use
  - Good for temporary use
  - Place on level ground (preferably on gravel apron)
  - Waste removal contract – easy on manager
  - Can place throughout an area

Bathrooms

- Septic tank system
  - Waste flushed into concrete holding tank
  - Water flows into leach field
  - Must clear trees to install
  - Expensive ($10,000 - $50,000)

Bathrooms

- Zero discharge toilets
  - Most environmentally friendly
  - Uses electricity or solar power to heat waste
  - Microorganisms break waste down
  - Expensive ($50,000)

Calculating number of toilets

- Assume 50/50 mix of males/females in campgrounds
  - 1 toilet per gender for every 35 people
  - Assume 4 users per campsite
  - (9 campsites)(4 users) = 36 users
  - Install one toilet for men and one for women

Other rest room tips

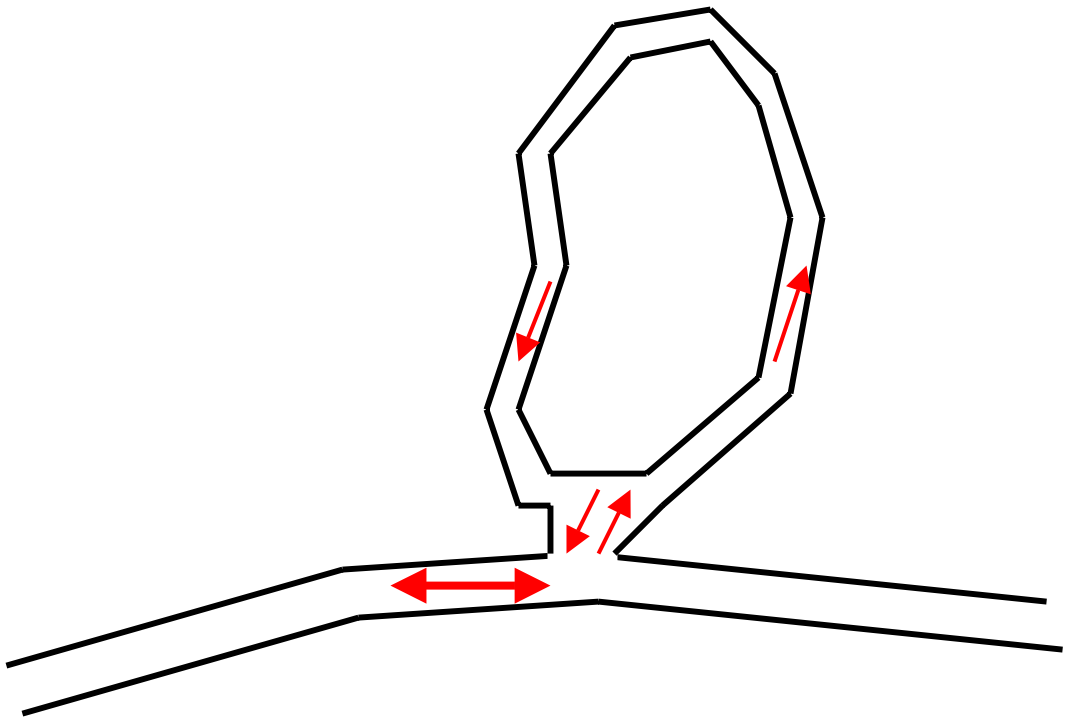
- Place them no more than 300’ from campsites
- In day use areas, no more than 500’
- Place on visitor access route so that informal trails are not created (end of a loop works well)

Designing loops

- Look for relatively flat areas for campsite development
- Use small dips in loop road to help water run-off
- Include between 10 to 30 sites per loop
- Loops should be between 100 and 120 feet wide

Loop orientation

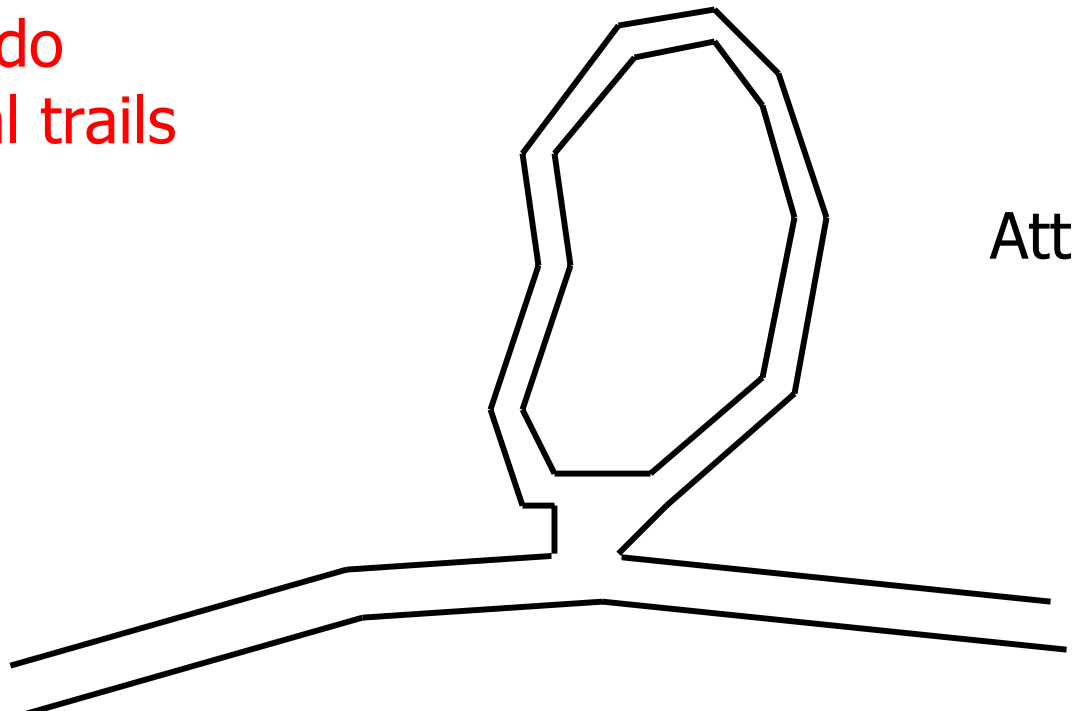
- One-way roads only



Loop orientation

- Orient loop towards park attraction

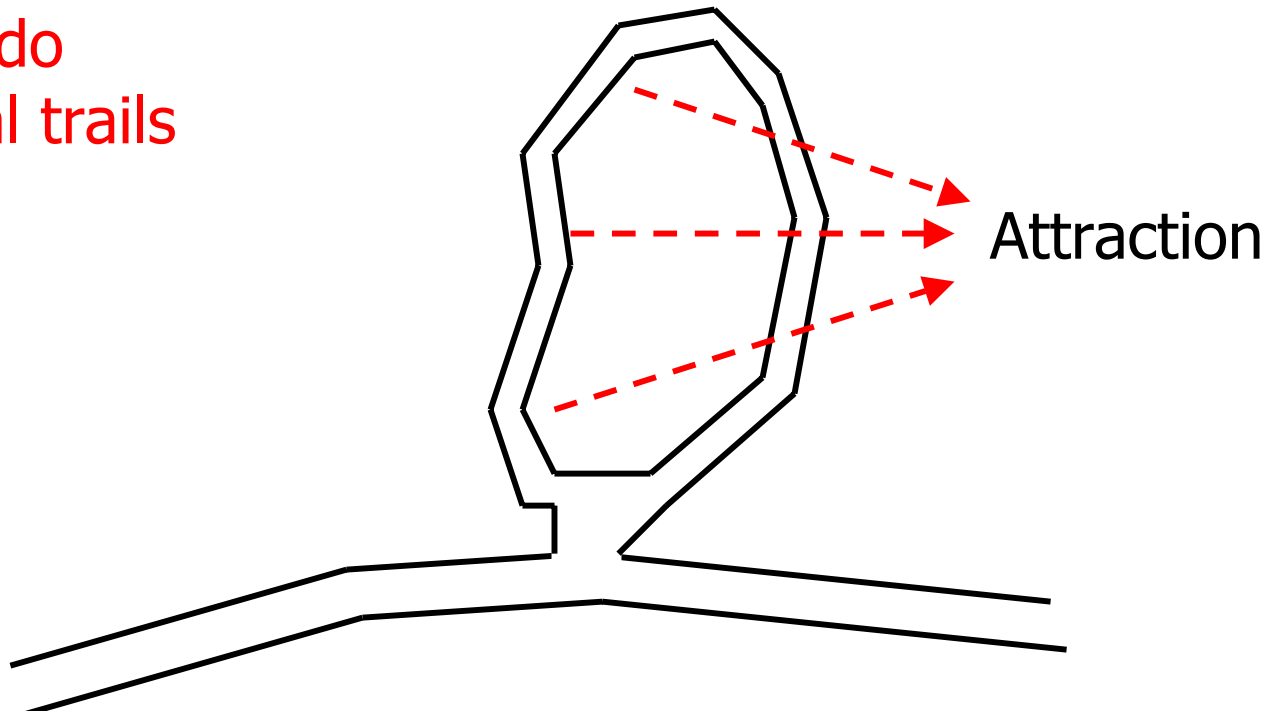
Where do informal trails form?



Loop orientation

- Orient loop towards park attraction

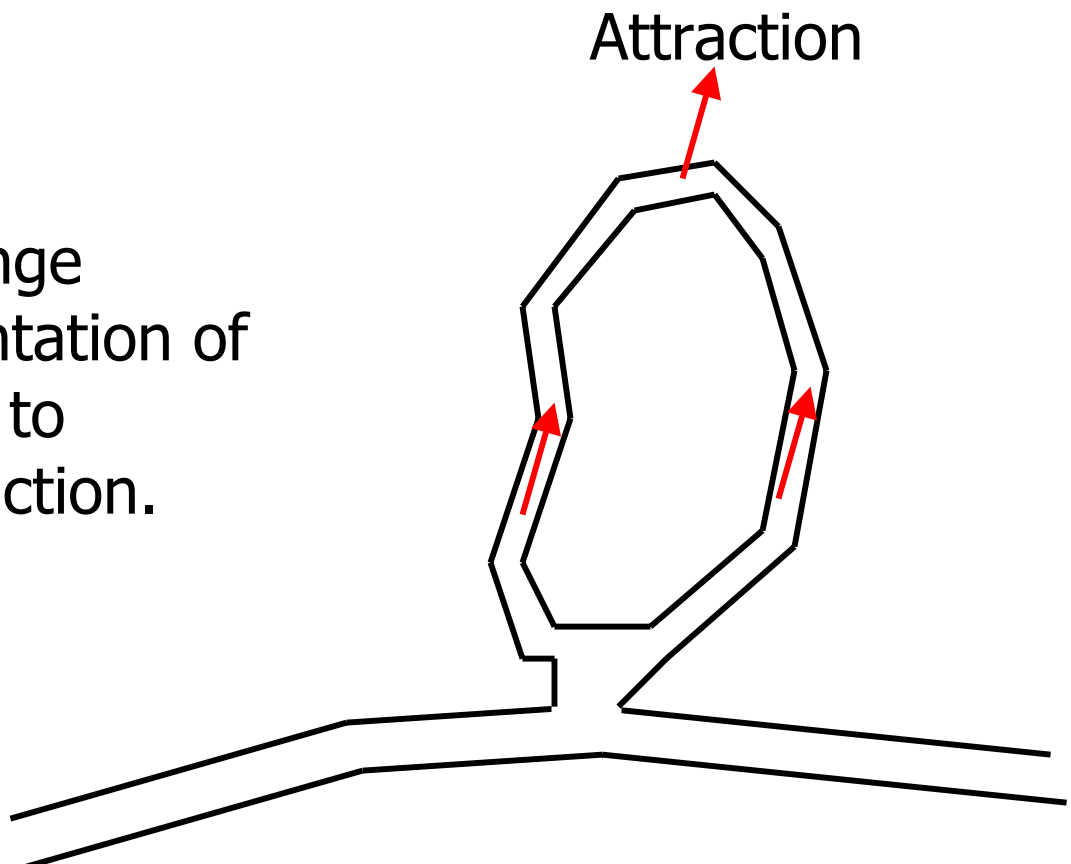
Where do informal trails form?



Loop orientation

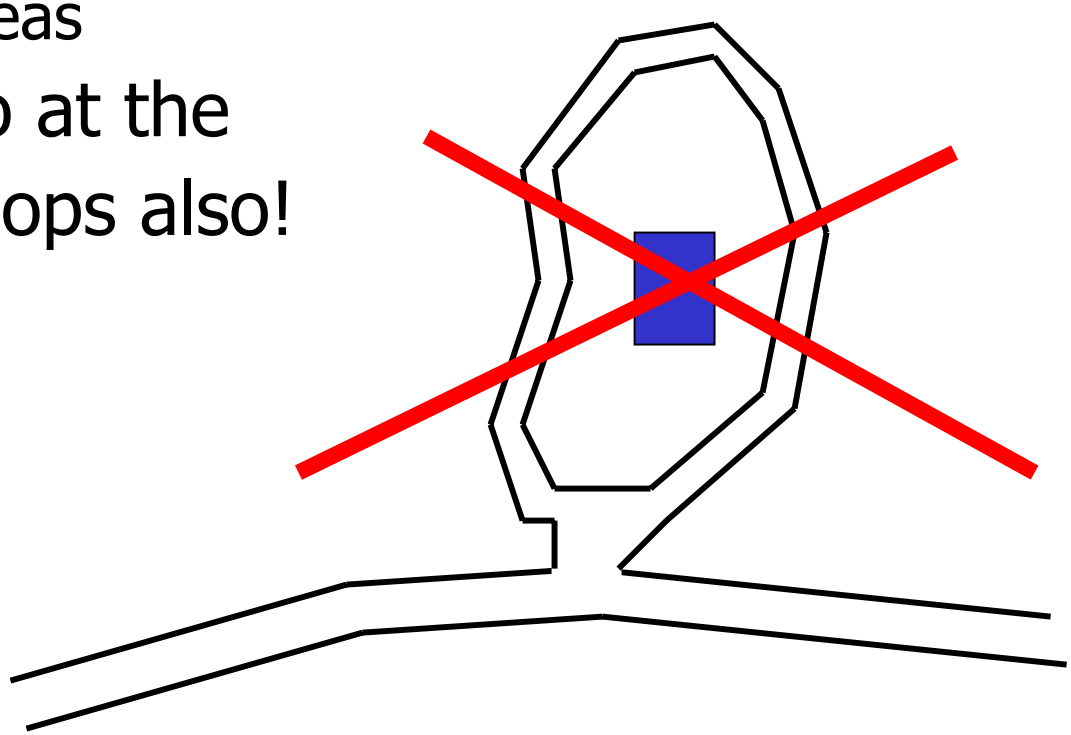
- Orient loop towards park attraction

Change orientation of loop to attraction.



Loop orientation

- Do not place the following in loop centers:
  - Bathrooms
  - Play areas
- These go at the end of loops also!



Other types of loops

- Pull-through site loops