

# Getting It Right: Some Common Issues for Traffic Operations

Richard A. James, P. Eng., PTOE  
Richard James & Associates, Victoria, B.C.

Jon Conquist, P. Eng.  
Manager, Highway Planning  
B.C. Ministry of Transportation, Victoria, B.C.

CITE Annual Conference  
Saskatoon, SK, June 2005

  
rjassociates.ca



## Getting What Right?

- Identifying "The Client"
- Lane drops, merges & auxiliary lanes
- Access location – safety & capacity
- Traffic projections
- Analysis time periods
- Pedestrian volumes and signal phasing
- Saturation flow, arrival rate, and departure rate

  
rjassociates.ca



## Who is "The Client"?

- This is the fundamental question?
  - The owner
  - The Road Authority?

## Who is "The Client"?

- This is the fundamental question?
  - The owner
  - The Road Authority?
  - Or is it "the users" – the public using the road or development?

If it is "The Public" – this changes the picture...

## Who is "The Client"?

- APEGBC's Code of Ethics:
  - the Engineer has a duty to "Hold paramount the safety, health and welfare of the public..."
- Primary responsibility is to the public at large rather than to the project "owner"
- Provide a high standard of design that works well now and into the future

## Lane Drops, Merges and Auxiliary Lanes

- Freeways & expressways
  - Significant lengths
  - Effective advance signing
  - Avoid safety & capacity issues



80kph Expressway

- No merge distance
- (No deceleration distance on exit either)

## Lane Drops, Merges and Auxiliary Lanes



80kph Expressway

- Added lane
- Immediately downstream of signal
- Inadequate merge distance
- Congestion

## Lane Drops, Merges and Auxiliary Lanes

- Design criterion - adequate distance to:
  - *Accelerate to ambient traffic speed*
  - *Find an acceptable gap*
  - *Merge without compromising the safety of a following vehicle while leaving adequate additional lane length for an aborted merge*

# Trap Lanes

- An apparent through lane becomes a “must turn” or merge lane



50 kph Street

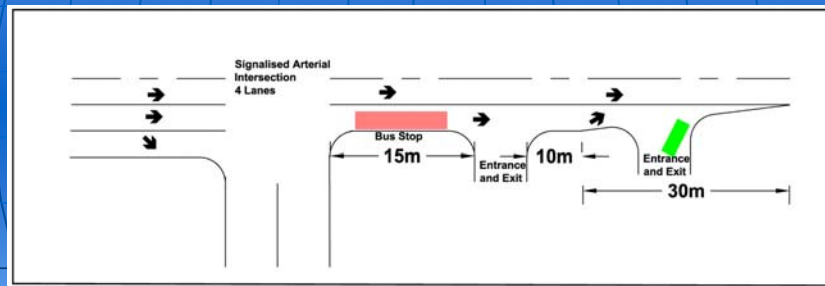
- Downstream of signal
- No advance signing
- 2 driveways – one on the taper
- Bus stop

rj+ associates

rjassociates.ca



# Trap Lanes



rj+ associates

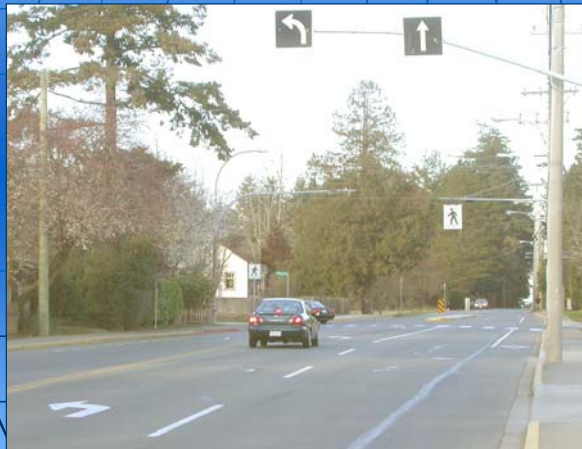
rjassociates.ca



# Trap Lanes

- *If trap lanes can't be avoided:*
  - Need to clearly sign, with adequate warning time to safely change lanes at ambient speed and traffic conditions

# Trap Lanes



50 kph Collector

- 2 lanes – left lane drops

Would be better to

- drop lane first, then add turn slot

or

- Continue through intersection, then drop right lane

## Access Location

- Safety issues include:
  - Sight distance
  - Geometry
  - Turn conflicts
  - Pedestrians/Cyclists
- Capacity issues include:
  - Storage
  - Signal progression (spacing)

## Access Location

- "Inside out" development:
  - Parking located on whatever "spare" space is available after buildings have been located on the site
  - Access "made to fit" with what's left
- *Key to the solution:*
  - *Full consideration of access location and design from the earliest stages of planning*

## Safety Aspects of Access Location

- Work around key constraints
  - Ensure best possible access
    - From viewpoints of both developer & Road Authority
- Developer must consider access as a primary design criterion
  - May Impose "up-front" cost, but:
    - *Improved Access*
    - = *More Customers*
    - = *A More "Saleable" Development*

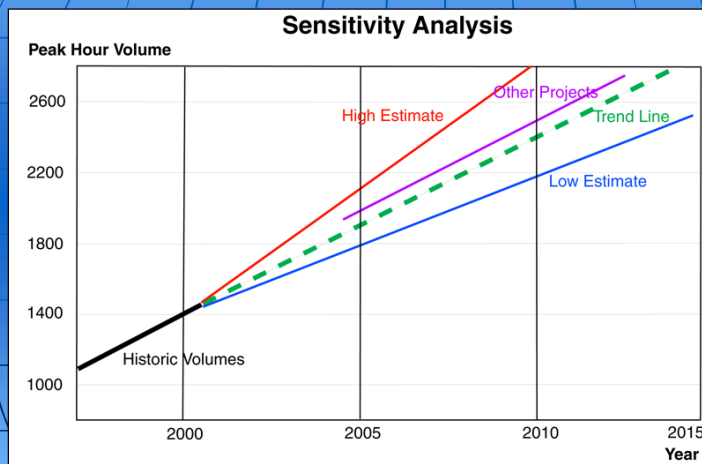
## Traffic Projections: What is the Future Anyway?

- Does history repeat itself?
- *Data*
  - *Available?*
  - *From right time of year?*
- Projecting data:
  - Growth factors,
  - Build-up based on land use projections,
  - Regional demand model
- Population & employment projections

## How Accurate are we?

- Sensitivity analysis
  - The “average” is wrong!
  - Identify range of volumes

## Sensitivity Analysis



- Trend line
- Other developments
- High/Low range estimates

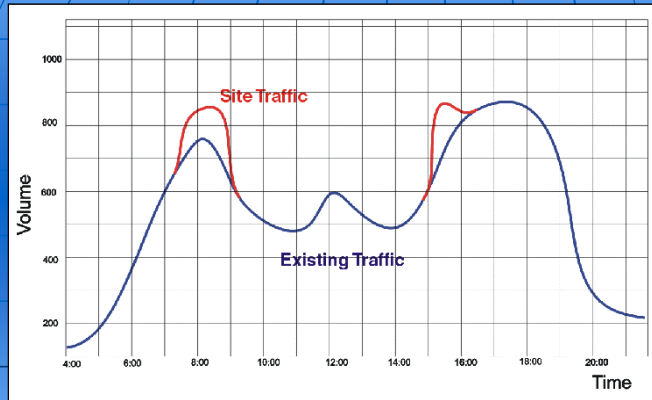
## Sensitivity Analysis

- Provide a range of mitigation options
  - *Enables a robust solution which can survive a range of conditions*
- Must assess changes in both street and site traffic
- *What if adjacent developments exceed assumed traffic projections?*

## Intersection Analysis Time Periods

- When is the “peak” for traffic?
  - *Urban vs. rural vs. recreational areas*
  - Urban “peak spreading”
- *“Regular recurring peak condition”*
  - Major employer shift changes
- *“Worst conflict” situation... may not be PM Peak*
- Signal design: need AM, PM, Off-peak

## Intersection Analysis Time Periods



Site Peak

- AM co-incident
- PM early (hospital?)
- AM peak as high as PM

## Pedestrian Volumes & Signal Phasing

- Impacts on signal timing
  - Fixed time vs. actuated
  - Signal in a coordinated system
- Impacts on signal capacity
  - Capacity of conflicting vehicle movements
  - Left turn capacity & conflicts
- Pedestrian peak times
  - Transit, shift changes

## Saturation Flow, Arrival Rate & Departure Rate

- “Saturation Flow Rate” (SFR):
  - Highest volume (pcu’s per hr. of green) that can be discharged through a single lane under ambient road conditions
- Queuing over many cycles
  - Discharge rate vs. true demand for service: arrival rate at back of queue

## Saturation Flow, Arrival Rate & Departure Rate

- Intersections & accesses close to saturated location
  - Standing queues: big operational issue
- Collect data using correct methodology for analysis procedure to be used
  - Site specific SFR vs. default values
- *Visit site under key conditions*
  - (AM, Mid-day, PM peaks) to see queue lengths & duration and any constraints not shown by data

## Getting It Right - Summary

- ✓ *Many issues need careful attention to get lasting safety and efficiency*
- ✓ Diverse responsibilities: highway planners, designers, traffic engineers, architects, developers, administrators
- ✓ *Need good iterative work & proactive communications among all parties*
- ✓ Tradeoffs: consequences must be clear before decisions are made
- ✓ *The real client is the traveling public!*

*rj+ associates*

*rjassociates.ca*

