FOOTPATH / SIDEWALK ?




Insufficient footpath, No place for loading / unloading, Un authorized X ing
1 2 2007


Office without parking provision leads people to park their veh on street, reducing effective width, roadway capacity hindering through tfc
10 4 2007



Shopping malls without parking provision, reduces capacity, causes hindrances to others



Parking on the main road in front of SCHOLASTICA





Parking on Mirpur road in front of Residential Model School and College





Richshaw on the side road
i.e. Rikshaw only road



Effect of On- road loading / unloading and NMV





Passenger loading and unloading (Intersection?) and ped crossing (Foot over br?)



Veh Stop near Intersection



Turning Move



Road side friction, MV & NMV, Parking



Is the parking space sufficient ?



Ped Crossing (Use of Foot over br ?)
No 'Bus lay by', Passenger in/out on the road




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"নামাজ বেহেস্তের চাবি"
থামুন


Channelization: Smooth flow, Minimize conflict


Faulty Design
ডাক বিভাগ
NAVANA


Proportion of Pte veh ?
ডাক বিভাগ





Effect of turning







Effect of Bus lay by








Steeltech Industries Ltd.

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Effect of turning







Effect of Bus lay by








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Effect of Right Turn







Effect of Ped and NMV







Effective Width?







Road/Traffic System

Rd/Tfc system comprises what?

Road

Veh : MV, NMV, Public, Pte (Mass transit, Rapid transit, Pers transit), pax veh, freight veh etc.)

Road users: Dvr, Passengers, Ped, Bicyclist

Environment: Rdway geom cond, Tfc con and regulation, Rd side mgt, Lighting cond etc.

Traffic Engineering

Defn:

TE is the **science of measuring** tfc and travel, the **study of** basic laws relating to tfc flow and generation, and **application of** this knowledge to the professional practice of planning, designing, and operating tfc system **to achieve safe, efficient and convenient mov of pers and goods.**

TE includes:

- Studies and analysis of tfc characteristics and flow parameters
  - geometric design
  - planning of regulatory measures
  - design and application of control device
- Functional planning of road network

Traffic Engineering

Why TE is Essential?

- Increased urbanization process
- Increased tfc demand
- Difficulties in expanding rd way facilities within BUA
- Chronic congestion everywhere
- Increased pollution,
- Increased accdt
- Increased rd network

Major tfc related problem in Bangladesh

Congestion / delay
Accident
Environmental pollution

General Causes of tfc Related Problems

External factors (geometric factors)

road intersection/junction
railway crossing
narrow road/br/culverts
inconsistent rdway width
poor turning radius
side friction : *scattered parking, rd side NM activities, frequent access, illegal or improper bus stop / parking, uncoordinated public wk etc.*
poor rdway environment : *poor rd discipline, uncontrolled ped crossing, poor rd surface condition, speed breaker, poor sight dist, poor lighting, poor drainage facilities etc.*

Internal factors

heterogeneous tfc stream
high vol of tfc

Possible Approaches to Solve Tn Prob

- Investment on new highway projects.
- Traffic system management (TSM) which include supply and demand managements

Possible Approaches to Solve Tn Prob

Traffic system management (TSM)

- **Traffic system management (TSM)** is the pseudo science of optimizing output (ensure safety, improve overall roadway capacity and environmental condition) of existing facilities through improved management, improved technology and operation of traffic, vehicles and the roadway, without any significant investments.
- Effective management reduces fuel consumptions, congestions and emissions by idling vehicles.
- **TSM includes both supply side management and demand side management**.

Supply Management Measures

- Supply management measures (managing transportation supply) deals with transportation facilities and operation to improve the roadway capacity, safety and aesthetic.

- Supply management techniques or measures include
  - physical measures
    - Low cost measures
    - Expensive measures
  - regulatory measures and
  - technological measures.

- All these measures can significantly increase the roadway capacity but their implementation need a well planned and well developed road network, corruption free, efficient and committed policy makers and executives and above all healthy financial back up and mass people participation.

Low Cost Physical Supply Management Measures

- ✓ correcting/improving roadway geometry and surface condition
- ✓ channelization
- ✓ flaring
- ✓ exclusive lane marking
- ✓ provision of improved signs
- ✓ introduction of median barrier
- ✓ pedestrian guard rail
- ✓ controlled road crossing,
- ✓ street lighting,
- ✓ improved traffic control system
- ✓ traffic calming measures
- ✓ bus lay by etc.

Expensive Physical Supply Management Measures

- ✓ widening of intersection/ junctions
- ✓ grade separation at junctions/level crossing, segregated transit facilities as elevated bus way, underground rail
- ✓ pedestrianisation /pedestrian mall
- ✓ construction of new links/road
- ✓ construction of off street parking lots
- ✓ construction of terminals etc.

Regulatory Supply Management Measures

- provision of clear ways
- banning right or U turn
- entry restriction for particular vehicle to city center
- access control from side roads
- banning/restricting freight vehicle
- one way operation
- tidal flow operation
- parking control
- use of terminal facilities
- restriction over speed, weight, overtaking
- provision of auto free zone etc.

Technological Supply Management Measures

- Int/automated highway/veh
- Advance tfc info system
  - Dvr- route guidance/navgation system
  - Users- uptodate travel info system
- Advance tfc control and mgt system
  - Use of VMS or dynamic sign
  - Auto surveillance system
  - Active marking/headlight
  - Adaptive tfc signal control

Implementation of various technological measures demands for modern information infrastructure, monitoring system, modern equipment and efficient technical personnel

Transportation Demand Management (TDM)

TDM measures that result in more efficient use of existing roadway capacity can support economic, social and environmental objectives simultaneously, by increasing overall transport system efficiency, reducing congestion and improving access at lower cost to society.

TDM measures consist of

- restrictive measures and
- strategic measures.

Transportation Demand Management (TDM)

Restrictive measures

- ✓ fiscal measures as road pricing, increasing fuel price/tax
- ✓ parking control
- ✓ control over vehicle ownership etc.

Strategic measures

- ✓ increasing vehicle occupancy
- ✓ providing improved alternatives modes
- ✓ introducing staggered/ flexible office hours
- ✓ strict land use planning and control
- ✓ introducing one stop services
- ✓ using improved telecommunication and IT facilities
- ✓ introducing IT enabled services etc.

Access Management / Control

Access management includes several techniques that are designed to increase the capacity of the roads, manage congestion, and reduce crashes.

Advantages

- Improvement in journey time and running speed
- Reduction of accdt
- Usage of linked signal
- Usage of parking
- Usage of parking orecinct

Disadvantages

- Congestion at intersection
- Increased parking on maid road
- Interference with other mgt measures
- Non-availability of alternative routes

Access Management / Control

Access management/ control measures

- Introducing signal
- Increasing spacing between signals and interchanges;
- Closing side road, Driveway location, spacing, and design;
- Use of exclusive turning lanes;
- Median treatments, including two-way left turn lanes (TWLTL) that allow turn movements in multiple directions from a center lane and
- Raised medians that prevent movements across a roadway;
- Use of service and frontage roads; and
- Land use policies that limit right-of-way access to highways.

Warrant of Access Control

- When there are no. of lightly traveled cross road along an important route
- When density of various accesses are higher than the std density of the road
- When nec to control ribbon development along a particular road
- When nec to provide safe ped precinct in residential areas


MIKIMOTO



Speed Restriction

Consequences of High Speed / Over Speed

- Increase Stopping dist
- Increase headway
- Decrease resistance to skid
- Decrease sign legibility
- Decrease ped perception etc.

Why lower sped limit is also required?

- To eliminate forced lane changing imposed by slow leading veh
- To reduce the chance of accdt

Speed Restriction Measures





Tidal Flow Operation

What is it?

It refers to the tfc mgt process whereby the total width of a road is shared beteen the two direction of tfc travel in near proportion to the flow in each dir i.e. $w_1 / w_2 = q_1 / q_2$

Due to flow fluctuation the width assigned to a given dir varies with the time of the day

Methods

For same road

For two roads

Benefit

Increase capacity

Capacity of 6 lanes wit tidal flow op is eqvt to 8 lanes road

Method of controlling reversible lanes

Signing

Overhead tfc signal

Moveable barrier / divisional medians



Con Reversible Lane: Signs



Con Reversible Lane: Moveable barrier

The "Zipmobile" in action at the end of the morning rush on H-1, moving eastbound (toward me) to convert the single zipper lane back into two westbound lanes. (Note the "guide line" for the Zipmobile operator, in the middle of the westbound #2 lane.) Hawaii DOT is considering whether to implement a similar zipper lane arrangement for the afternoon rush, to convert two eastbound lanes into one HOV-3 westbound lane. However, a left exit to and entrance from Interstate H-2 would make a westbound zipper lane more complicated than the eastbound lane. (May 2000)



Tidal Flow op, HOVL





Restriction of Turning Movement

Turning Movement

- Right Turn
- Left Turn
- U turn

Right Turn

Effect

- Reduce junction capacity
- Causes safety problem

Forms

- Off-side turn
- Near- side turn
- Protected turn
- Un protected turn

Restriction on Turning Movement

Control tech

Geometric masures

- Channelization
- Flaring

Protective measures

- Extended intergreen pd
- Early cutoff
- Late release
- Separate phase

Restrictive measures

Flaring for Right Turn







Restriction of Turning Movement

Banning of Left turn When?

- When no of ped is heavy
- When there is no separate ped phase in the tfc signal
- when exit width <= approach width of other die
- When provision of channelization is not there

Banning of U turn When?

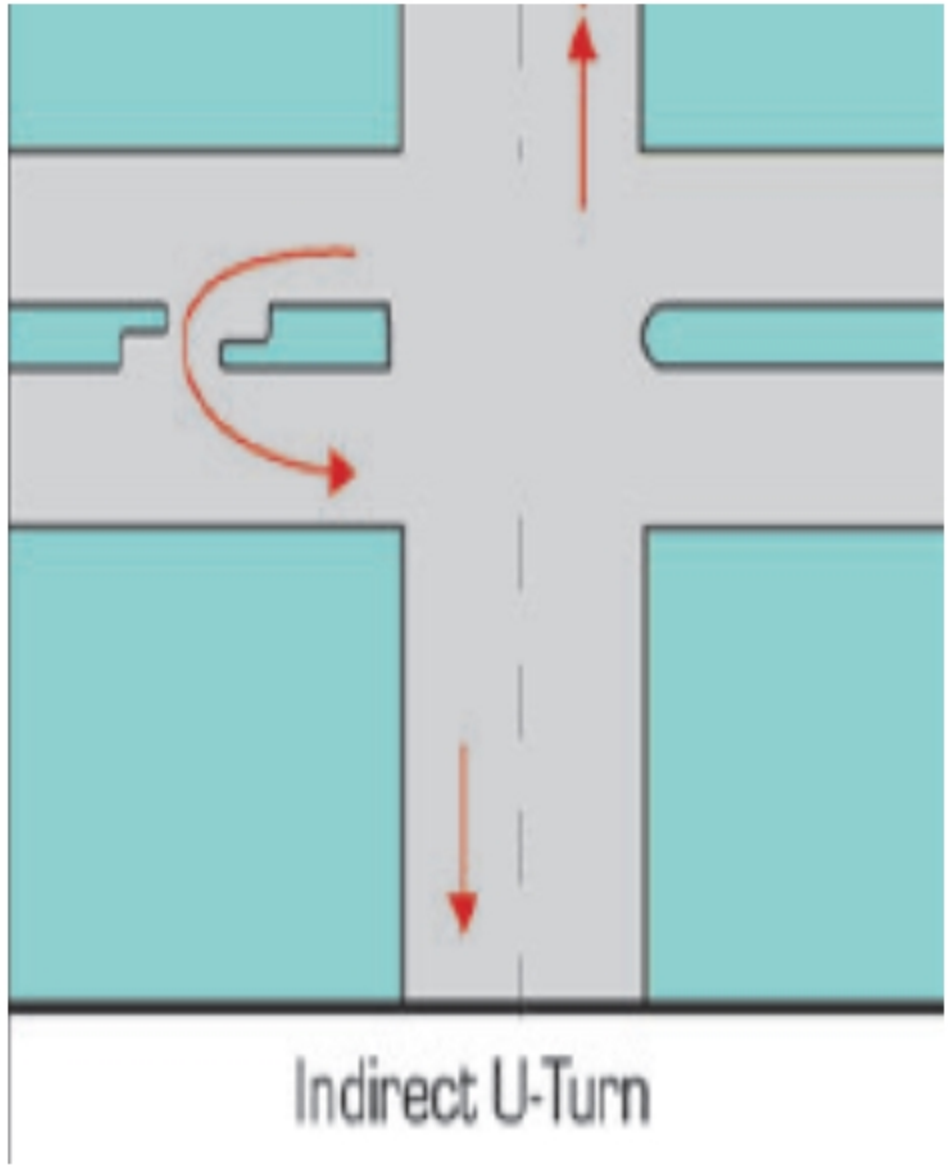
- **When tfc vol is heavy in both directions**
- **At high speed jubc**
- **On narrow roads where majority of veh cannot complete the turn in one move**

Rerouting of Right Turn

U turn

G turn

Q Turn



Indirect U-Turn

Parking Management

Parking to be Prohibited at:

Intersection
Narrow street
Driveway
Ped crossing
Hor curvature and Ver grade
Br and tunnels
Hy ped concentration areas
Priority locations etc.

Parking Control and Management

Benefits of Parking Control:

Obj of Strict Parking Control:

- ✓ Reduce side frictions
- ✓ Bring rd way discipline and parking culture
- ✓ Use rd space more efficiently and increase productivity
- ✓ Encourage mass public tpt system
- ✓ Encourage use of bicycle
- ✓ Improve safety, reduce congestion

Development of Parking Schemes:

Layout of Parking Spaces:

Ways of Parking Control:

- ✓ Parking prohibition policy
- ✓ Parking charge
- ✓ Duration of parking time

Park and Ride facility:

It is traffic control system in which motorists are encouraged /sometimes forced to park their car at selected locations usually at the periphery of the central area and then use the public tpt to travel to their destination and come back again.
It is very effective for large city.
It has potential to make public tpt popular, to rdiuce dmd for parking space, to reduce traffic volume

Service roads / Frontage roads

- A *frontage road* is a type of service road that parallels a major road or freeway and is located between the road and building sites abutting the road. *Service roads* can also run behind businesses.
- Service roads that run behind highway properties are often less disruptive to existing businesses than frontage roads, less costly for an agency, and more functional than a frontage road.
- Rear service roads can provide access to businesses on each side and can operate safely from both directions.
- Frontage roads provide access only to businesses fronting on the highway and are much safer when designed for one-way traffic.