Evaluation of Urban Access Controlled Road System as a Congestion Mitigation Strategy

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Presentation Structure

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Introduction

- Growing traffic congestion is one of the most significant and pressing problems in urban India.
- Increasing affinity to personal vehicles
- Congestion affects the movement of people and the flow of goods to market.
- It affects quality of life, energy consumption and the environment, including air quality.
- As India’s economy grows, congestion on urban roads will only worsen. A critical challenge is to use a variety of practical, relevant congestion mitigation options in an appropriate manner.
Scope and Objectives

The scope was restricted to evaluate the travel benefits of the access-controlled elevated expressway system in urban scenarios.

The objective was to evaluate the benefits of access-controlled road corridors in urban scenarios in India, taking Chennai as a case study through selected Measures of Effectiveness (MoEs).
Methodology

(a) WITHOUT ACCESS CONTROLLED CORRIDORS
(b) WITH ACCESS CONTROLLED CORRIDORS (MULTIPLE SCENARIOS)

DATA COLLECTION
• NETWORK DATA LINK NODES ZONES
• OD PATTERN
• LINK VOLUME
• LAND USE DATA

LINK ATTRIBUTES:
CAPACITY LENGTH
SPEED (FREE FLOW & CAPACITY)
NUMBER OF LANES
etc.

EXITING AND PROPOSED NETWORK ON CUBE 5

REDUCTION IN
• SYSTEM TRAVEL TIME
• VOL. CAPACITY RATIO
• OD TRAVEL TIMES

EVALUATION OF BENEFITS OF VARIOUS SCENARIOS

ASSIGNMENT OF O-D TRIPS THROUGH CUBE

• LINK VOLUMES
• TRAVEL TIMES
• V/C RATIOS

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Case Study and Data Collection

Case Study: Chennai Metropolitan Area.

Data Collected

- Network Data
- Link Attributes Data
- Speed-Delay Data
- Maps (Land Use)
- Road Alignment Data
- O-D Trip Table Data
- etc.
Fixing the Alignment

To fix the corridor alignment, following were considered:

- OD Data
- Speed-Delays Survey Data
- Land Availability
- Land Use Maps
OD Data

Major OD pairs identified

Desire Lines for major OD pairs.

Serve as many major OD pairs as possible with the proposed alignment.

Proposed alignment validated with Desire Lines
Speed-Delay Survey

Congested corridors identified

City Centre highly congested

More than 50% roads congested

Source: CTTS Inception Report CMDA

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Land Availability

Open Space available along river course

Road along Adyar and Coovum river can decongest the existing roads.

Almost no land acquisition required with minimal dislocation.

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Land Use Map 2026

Identifies areas along Anna Salai as major commercial area.

Anna Salai is existing major arterial of Chennai city. It’s a 8L-2W-D road facility.

Surveys observed high traffic volumes on Anna Salai.

Connects City Centre to Guindy.

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Proposed Alignments for Access Controlled Roads

Five alignments were identified for the study.

- i) Adyar - Kathipara Junction - Airport, along Adyar River
- ii) Along Inner Ring Road (IRR)
- iii) Port Trust - Maduravoyal along Coovum river
- iv) Coovum creek - St. Thomas Mount (along Anna Salai)
- v) Tiruvottiyur - Neelankarai (along Beach Road and ECR)

Scenarios of elevated access controlled corridor systems were generated.

- Elevated road on Anna Salai only
- On Anna Salai and Coovum river
- On Anna Salai, Coovum river and Inner Ring Road (IRR)
- On Anna Salai, Coovum river, IRR and Beach Road-ECR
- On Anna Salai, Coovum river, IRR, Beach Road-ECR and along Adyar river

These scenarios were then evaluated using the software, considering each scenario one at a time.

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Comparison of Scenarios

Percentage Reduction in Total System Travel Times

% Reduction

Scenario 1  Scenario 2  Scenario 3  Scenario 4  Scenario 5

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Proposed Road Alignment

i) Adyar to Kathipara Junction (going up to Airport) along Adyar River  = 18.2 km

ii) Along IRR  = 8.2 km

iii) Port Trust to Maduravoyal along river Coovum = 20.2 km

iv) Coovum Creek to St. Thomas Mount (Anna Salai) = 17.0 km

v) Tiruvottiyur to Neelankarai (along Beach) = 27.4 km

Total Length  = 91.0 km
Results and Findings

Improvement in V/C of existing roads, new facility will witness significant vehicular shift.

Travel Time between major OD pairs reduced significantly.

Significant reduction in percentage of congested roads.

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Conclusions

Scenario 5 - most attractive.

The key findings are:

- The overall total system travel time in the network reduces by 26% (as compared to base scenario);
- Travel times between major O-D pairs reduce; the reduction is about 40% for OD pairs with travel times more than 60 minutes.
- Percentage of roads with V/C ratios greater than or equal to 0.80 reduces from about 47% to about 29%, signifying significant decongestion.
- Percentage of congested roads (speed <30 km/h) will also go down from about 57% to about 37%.
Conclusions

• This facility will facilitate speedier movement of buses as the existing roads will become decongested.
• Pedestrian walkways and bicycle tracks can also be planned.
• The secondary benefits of the above proposal will be reduction in fuel consumption, pollution and accidents.
• While promoting public transportation should be the top priority, expansion of road network where it is grossly inadequate is inevitable. In particular, high class roads with capacity for moving greater volumes at higher speeds need to be thought of for major cities.
• Further feasibility analysis be taken up before considering adoption of this strategy.
• The above analysis can be performed considering future scenario
• A detailed economic analysis of implementing such infrastructure projects can also be taken up.
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