ANATOMY OF A TRAFFIC DISASTER:
TOWARDS A SUSTAINABLE SOLUTION TO BANGKOK'S TRANSPORT PROBLEMS

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This thesis is presented for the degree of Doctor of Philosophy
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I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary educational institution.

........................................

Chamlong Poboon
To my parents,
my brother and sisters,
my wife and my son
ABSTRACT

Bangkok's extreme traffic problems have been traditionally explained in terms of a lack of road infrastructure and policy responses for many years have almost exclusively stressed road investment to the exclusion of all other forms of transport infrastructure development. This thesis questions this interpretation of the traffic problem and its chief policy response: building still more roads. It suggests that in order to effectively analyse Bangkok's traffic predicament and to formulate more sustainable responses to the crisis, an understanding is required of Bangkok's land use and transport development, as well as a systematic and detailed perspective on the similarities and differences between Bangkok and many other cities around the world, particularly those in Asia.

This thesis suggests that Bangkok has passed through three key periods: a water-based transport and walking period, a transport modernisation period and a motorisation period. In each period up to motorisation Bangkok appeared to maintain a harmonious relationship between its high density, mixed use urban form, ideally suited to non-motorised modes and to public transport. Even in the motorisation period, high density, mixed use development has mostly followed major road corridors and remains well-suited to much higher public transport and non-motorised mode use than currently exist. However, in this period, rapidly rising motor vehicle ownership and use began to come into conflict with the city's pre-automobile form. Road infrastructure could not be built fast enough to keep pace with traffic growth, despite almost exclusive commitment of resources to roads. High capacity public transport systems, including rail, renewed water transport and busways failed to materialise to help curb the motorisation process and to provide much needed relief on the roads. A basic conflict or mismatch between urban form and transport began to emerge, leaving the city ill-equipped to cope with the automobile and subject to large environmental, social and economic impacts from congestion.

The thesis argues that while Bangkok's per capita road supply is low in an international sense, it is not atypical for an Asian city and road availability per hectare is similar to many other cities around the world. Likewise, common arguments about an inadequate road hierarchy are systematically analysed and are shown to be insufficient in explaining Bangkok's present crisis. The thesis thus suggests that attempting to tackle the traffic problem through an intensification of road building efforts will not provide the relief sought, but will only exacerbate the traffic impacts which are shown to be already at the limits of international experience.
The international comparison of Bangkok with other cities, highlighting basic similarities and differences in land use and transport features, continues to build upon this argument. It shows that Bangkok lies at one extreme in many transport characteristics such as the amount of travel per hectare, and within the Asian cities, it is very high in vehicle ownership and use and energy use, comparatively low in public transport use and very low in non-motorised modes. The thesis suggests that in physical planning terms, Bangkok’s traffic crisis appears to stem from a set of mismatches between its transport patterns, urban form and transport infrastructure. These mismatches are between: (1) vehicle use and urban form: higher levels of private vehicle use than can be properly accommodated in its dense, tightly woven urban fabric; (2) vehicle use and road supply: levels of private vehicle use which are incompatible with its road availability and which are uncharacteristically high compared to other Asian cities; (3) transit use, urban form and road supply: lower levels of overall transit use than would be expected in a city of its urban form and road availability; (4) transit infrastructure, urban form and road supply: a public transport infrastructure which is inadequate to meet the demands for transit movement inherent in such a dense city, particularly a lack of rail infrastructure; (5) non-motorised modes and urban form: levels of non-motorised mode use which are uncharacteristically low for such a dense, mixed use urban fabric. These mismatches are mainly the consequence of a long series of inappropriate and ineffective transport policies and investments which are biased towards private transport and which have at least in part arisen from narrow and outdated transport planning processes.

In order for transport planning in Bangkok to address the suggested roots of the crisis, the thesis contends that at least two key constraints would have to be dealt with: the traditional urban transport planning process and the institutional fragmentation in transport policy and implementation. Notwithstanding, there are forces pushing in the direction of change and these are examined in terms of the growing global and local trends towards sustainability, community outrage over traffic and the role of NGOs.

Based on these findings, this thesis provides a case for a series of policies to help deal with Bangkok’s traffic disaster. In line with global trends towards sustainability as an organising principle for urban policy development, these policies are offered within a framework of developing a more sustainable transport system in Bangkok. The policies suggested cover priority to public transport infrastructure development, transit-oriented, mixed land use development, transport demand management, improvement of waterway transportation, facilitation of walking and cycling and institutional reform of Bangkok’s transport decision making structure. Opportunities for further complementary research are suggested.
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GLOSSARY AND ABBREVIATIONS

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<tr>
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<tr>
<td>µm</td>
<td>micrometres</td>
</tr>
<tr>
<td>BMA</td>
<td>Bangkok Metropolitan Area, Bangkok Metropolitan Administration</td>
</tr>
<tr>
<td>BMR</td>
<td>Bangkok Metropolitan Region</td>
</tr>
<tr>
<td>BMTA</td>
<td>Bangkok Mass Transit Authority</td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CFCs</td>
<td>Chlorofluorocarbons</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>DLT</td>
<td>Department of Land Transport</td>
</tr>
<tr>
<td>DOH</td>
<td>Department of Highways</td>
</tr>
<tr>
<td>DPW</td>
<td>Department of Public Works</td>
</tr>
<tr>
<td>DTCP</td>
<td>Department of Town and Country Planning</td>
</tr>
<tr>
<td>ECMT</td>
<td>European Conference of Ministers of Transport</td>
</tr>
<tr>
<td>ESD</td>
<td>Ecologically Sustainable Development</td>
</tr>
<tr>
<td>ETA</td>
<td>Expressways and Rapid Transit Authority of Thailand</td>
</tr>
<tr>
<td>GBA</td>
<td>Greater Bangkok Area</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>GRP</td>
<td>Gross regional product</td>
</tr>
<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>HC</td>
<td>Hydrocarbons</td>
</tr>
<tr>
<td>ISTP</td>
<td>Institute for Science and Technology Policy</td>
</tr>
<tr>
<td>JICA</td>
<td>Japan International Cooperation Agency</td>
</tr>
<tr>
<td>klong</td>
<td>Thai word for canal</td>
</tr>
<tr>
<td>km</td>
<td>Kilometre</td>
</tr>
<tr>
<td>km/h</td>
<td>Kilometres per hour</td>
</tr>
<tr>
<td>km²</td>
<td>Square kilometre</td>
</tr>
<tr>
<td>LEQ</td>
<td>Equivalent sound level</td>
</tr>
<tr>
<td>LPG</td>
<td>Liquefied petroleum gas</td>
</tr>
<tr>
<td>MJ</td>
<td>megajoules</td>
</tr>
<tr>
<td>MRTA</td>
<td>Mass Rapid Transit Authority</td>
</tr>
<tr>
<td>NEA</td>
<td>National Energy Administration</td>
</tr>
<tr>
<td>NEDB</td>
<td>Office of the National Economic Development Board</td>
</tr>
<tr>
<td>NESDB</td>
<td>Office of the National Economic and Social Development Board</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-government organisation</td>
</tr>
<tr>
<td>NMV</td>
<td>Non-motorised vehicles</td>
</tr>
<tr>
<td>NO₂</td>
<td>Nitrogen dioxide</td>
</tr>
<tr>
<td>NOₓ</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>NSO</td>
<td>National Statistical Office</td>
</tr>
<tr>
<td>OCMRT</td>
<td>Office of the Commission for the Management of Road Traffic</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>ONEB</td>
<td>Office of the National Environment Board</td>
</tr>
<tr>
<td>OPM</td>
<td>Office of the Prime Minister</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Definition</td>
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<tr>
<td>Pb</td>
<td>Lead</td>
</tr>
<tr>
<td>PCU</td>
<td>Passenger car unit</td>
</tr>
<tr>
<td>PWD</td>
<td>Public Works Department</td>
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<tr>
<td>SDR</td>
<td>Special Drawing Right</td>
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<tr>
<td>SIMR</td>
<td>The Study on Medium to Long Term Improvement/Management Plan of Road and Road Transport in Bangkok</td>
</tr>
<tr>
<td>SO$_2$</td>
<td>Sulfur dioxide</td>
</tr>
<tr>
<td>SPM</td>
<td>Suspended particulate matter</td>
</tr>
<tr>
<td>SPURT</td>
<td>Seventh Plan Urban and Regional Transport</td>
</tr>
<tr>
<td>SRT</td>
<td>State Railway of Thailand</td>
</tr>
<tr>
<td>TDRI</td>
<td>Thailand Development Research Institute</td>
</tr>
<tr>
<td>TEI</td>
<td>Thailand Environment Institute</td>
</tr>
<tr>
<td>TPD</td>
<td>Traffic Police Division</td>
</tr>
<tr>
<td>UNEP</td>
<td>United Nations Environment Program</td>
</tr>
<tr>
<td>URA</td>
<td>Urban Redevelopment Authority, Singapore</td>
</tr>
<tr>
<td>UTP</td>
<td>Urban Transport Planning</td>
</tr>
<tr>
<td>VKT</td>
<td>Vehicle kilometres of travel</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile organic compounds</td>
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<tr>
<td>WCED</td>
<td>World Commission on Environment and Development</td>
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