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Possible Solution to Parking Issues and Traffic Congestion in Greater Male' Region

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Abstract: ***The Greater Malé Region, (consist of Malé, Hulhulé, Hulhumalé, Villingili, Gulhifalhu and Thilafushi) is the most densely populated urban cluster in the Maldives. Capital City Male' is one of the most densely populated City in the world. Rapid growth in the number of registered vehicles, a historically narrow and grid locked street network in Malé City and a chronic shortage of off-street parking have combined to produce severe daily congestion and widespread illegal roadside parking. Parking shortages and traffic congestion have become interconnected urban mobility challenges in the Greater Malé Area of the Maldives. Rapid urbanization, high population density, increasing vehicle ownership, limited road space, inadequate parking capacity, inefficient use of public road space, and concentrated travel demand have placed substantial pressure on the existing transport system. The problem is particularly complex in Malé, where opportunities for expanding the road network are physically constrained. Recent government initiatives recognize the urgency of the problem, in July 2026, the Greater Malé Transport and Mobility Office (GMTMO) were established to coordinate long-term responses to congestion, parking infrastructure and modern mobility solutions. In August 2026, the Land Transport Bill was ratified, creating a new regulatory framework and designating Greater Malé as a Registration and Traffic Management Controlled Zone. This article examines possible solutions to parking and congestion in Greater Malé through an integrated approach combining multi story parking, demand management, intelligent parking systems, public transport improvement, park and ride facilities, walking and cycling infrastructure, enforcement, vehicle registration controls, freight management strategies and data driven traffic management (Soltani, Soghadi, Taghavifard, & Kashkooli, 2022). research indicates that vehicles searching for parking can generate additional circulation, congestion, emissions and safety risks. Therefore, simply constructing additional parking spaces may not be sufficient, and the parking supply must be integrated with policies that manage vehicle demand and encourage efficient modes of transportation, according to Wang & Fu, 2022, investigate the multimodal transport network's path design, planning, investment, and construction mode based on big data analytics. The article proposes a Greater Malé Integrated Parking and Mobility Framework based on five pillars: Parking Management, Traffic Demand Management, Public Transport, Intelligent Transport Systems, and Institutional Governance. This research reviews the current state of the road and parking network, summarizes the major connectivity projects either completed or under construction (the Sinama lé Bridge and the Thilamalé Bridge / Greater Malé Connectivity Project), and sets out a package of engineering and policy interventions multi-story parking buildings, overhead pedestrian bridges, ring-road and one-way circulation schemes, park-and-ride at the outer islands, smart parking technology, and demand management pricing that together form a realistic pathway to reducing congestion and reclaiming street space in Malé. Urban parking policy literature (Shoup, 2005; Litman, 2021; Barter, 2010) and informed by comparative practice in Singapore, Japan, and the Netherlands, the study combines a historical review of Male's urban development with a structured 10-item questionnaire administered to residents, commuters, and public-sector stakeholders. Illustrative analysis indicates that illegal/double parking, narrow road reserves, rapid vehicle-ownership growth, and roadside industrial/workshop activity are perceived as the dominant contributors to congestion, with peak difficulty reported during the 8–10 a.m. and 4–8 p.m. periods. Four concrete interventions are proposed and illustrated: (1) an advanced smart parking-finder mobile application; (2) a residential block layout allocating dedicated multi-bay parking every two blocks; (3) relocation of vehicle workshops and industrial/loading activity to Thilafushi Industrial Zone; and (4) an overhead flyover at peak congestion junctions to separate through traffic from local traffic. The article concludes with policy recommendations for phased implementation by the Maldives Police Service, Malé City Council, and national transport authorities.***

Keywords: Greater Malé Area, Parking management, traffic congestion, sustainable mobility, intelligent transport systems, vehicle management

1. Introduction

The Greater Malé Area (Hulhulé, Hulhumalé, Villingili, Gulhifalhu and Thilafushi) presents a particularly challenging case. Malé has a highly constrained land area and dense development, which limits the feasibility of continuously expanding road infrastructure. Consequently, transportation policy must focus not only on increasing infrastructure but also on managing how, when and where vehicles enter, circulate and park. Rapid growth in the number of registered vehicles, a historically narrow and grid-locked street network in Malé, and a chronic shortage of off-street parking have combined to produce severe daily congestion and widespread illegal roadside parking. Rapid urbanization, land scarcity, and rising vehicle ownership have combined to make parking and traffic congestion one of the most visible governance challenges facing Male', the capital of the Maldives. Unlike most capital cities, Male' occupies a single, heavily reclaimed island of only a few square kilometers, leaving little scope for the road-widening or surface-parking expansion that many other cities use to manage congestion. As a result, congestion in Male' is primarily a land use and management problem rather than simply an infrastructure capacity problem (Barter, 2010). The Government of Maldives has recently recognized the seriousness of the issue. In July 2026, the Government established the Greater Malé Transport and Mobility Office (GMTMO) to provide a coordinated response to growing traffic congestion. Its responsibilities include developing programmes to ease congestion, advising on comprehensive transport policies, modernizing the transport network, developing parking infrastructure and identifying modern mobility solutions. Furthermore, the Land Transport Bill was ratified on 31 August 2026. The new legislation

establishes rules covering vehicle registration, driving, stopping, parking and public transport and designates Greater Malé as a Registration and Traffic Management Controlled Zone. These developments create an important opportunity to move from fragmented traffic interventions toward an integrated Greater Malé mobility strategy.

Aim of the Study

The aim of this study is to investigate the causes and extent of parking congestion and traffic connectivity challenges in Greata Male' area, and to propose practical, implementable solutions including a smart parking finder application, revised residential parking allocation, relocation of industrial activity, and targeted flyover infrastructure to improve urban mobility, safety, and quality of life for residents and commuters.

Research Objectives

1) To document the historical and structural factors that have contributed to parking and traffic congestion in Greata Male' Area
2) To identify, from residents' and communities' perspectives, the primary causes of parking difficulty and traffic congestion.
3) To measure perceived congestion severity across different times of day and locations within Male'.
4) To evaluate the applicability of international parking and traffic management practices (Singapore, Japan, Netherlands) to the Male' context.
5) To design and illustrate a smart parking finder mobile application appropriate to Male's road network.
6) To propose a residential parking allocation design that increases available parking without large-scale demolition.
7) To assess the feasibility and rationale for relocating industrial, workshop activity to Thilafushi and Male'
8) Industrial Zone.
9) To propose and justify the location and design concept of an overhead flyover at a peak congestion junction.

Problem Statement

Vehicle parking issues and traffic congestion in Male' city have become an everyday problem and an inescapable issue to Maldives Police service and other concerned authorities. The small narrow roads are packed with vehicles and there is barely any space for transportation. Extreme decrease in traffic speeds, congestion, increased unlawful driving and parking, environment impacts, damage to property and accidents are some of the severe consequences greatly affecting today's residents. The roads which are meant to be convenient have become a burden. Male' city has become an unpleasant and difficult place to live in. The issues have been left unsolved for a long period of time and are becoming worse day by day. If remained unsolved, soon it may turn into a human made disaster and the loss might not be revocable. The main cause of these issues is the lack of a proper parking system, lack of parking space and increase in number of vehicles. Hence, there is a need to find a way to address these causes.

2. Literature Review

Historical and Urban Background

Male' City has served as the political, administrative, and commercial capital of the Maldives for centuries, historically functioning as the seat of the Sultanate and later the Republic. Its original land area was significantly smaller than today. Extensive land reclamation from the 1990s onward expanded the island's usable footprint and enabled denser development (Ministry of Planning, various years). Over the past three decades, Male' has transformed from a low-rise settlement into a dense, high-rise urban center, with the surrounding islands of Hulhumale' (a large- scale reclaimed satellite town), Villimale', and Hulhule' (home to Velana International Airport) developed to relieve pressure on the capital. Road infrastructure in central Male' largely follows a historic street grid never designed for modern vehicle volumes, with many streets originally intended for pedestrian and non-motorized use. The completion of the Sinamale' Bridge (China-Maldives Friendship Bridge) connected Male' to Hulhule' and Hulhumale' by road for the first time, while the Greater Male' Connectivity Project has extended planning toward Villimale', Gulhifalhu, and Thilafushi. These connectivity improvements, while beneficial, have also increased the volume of vehicles entering the already congested core of Male' (readers should verify current project status, as major infrastructure projects in the Maldives have progressed since the author's most recent sources). Malé is built on a single reclaimed island of about 4.2 km² and, together with Hulhulé (airport island), Hulhumalé (a large, reclaimed satellite city begun in 1997) and Villingili, forms a functionally single area now home to over a third of the country's population. Because the Maldives is an archipelago, every inter island movement that would be a simple road trip elsewhere here depends on a bridge, causeway or ferry which is what makes bridge capacity, ramp geometry and parking supply so tightly linked to congestion outcomes. Shoup's (2005) seminal work, The High Cost of Free Parking, argues that underpriced or unmanaged parking distorts urban land use and induces excess vehicle trips, and recommends performance-based pricing to always keep a small percentage of spaces available. Malé's physical constraints make conventional road widening and large-scale surface parking difficult. Using valuable road space for parked vehicles can reduce effective road capacity and interfere with pedestrian movement, loading activities and traffic circulation. An increase in vehicle numbers can place additional pressure on an already constrained road network. The Government's establishment of GMTMO specifically identifies the rising number of vehicles as a major contributor to congestion in Greater Malé. A driver who cannot immediately locate an available parking space may circulate through several streets before parking. Researchers have illustrated this behavior is often called parking cruising as an additional source of traffic, delay, emissions and road-safety risk. According to Donald Shoup (2006) Where curb parking is underpriced and overcrowded, some drivers search for a curb space rather than pay to park off-street. Cruising behavior variation between 109 different drivers is also reported in the study, located in southeast Michigan. It was found that 30% of the drivers generated more than 70% of the meters cruised (Hampshire, Akinbola, Richardson, & Jordon, 2016). Where parking is located along important traffic corridors, road capacity can

be reduced. The problem becomes more serious when vehicles stop illegally, double-park, load or unload in traffic lanes, or remain parked for long periods. Government offices, businesses, schools, commercial areas and other activity centers can create significant peak- period demand. If large numbers of people travel by private vehicles at similar times, congestion becomes concentrated around particular locations and time periods. A sustainable urban mobility system requires public transport to be sufficiently reliable, convenient, accessible and integrated to provide a realistic alternative to private vehicle use. Litman (2021), through the Victoria Transport Policy Institute, extends this into a broader Transportation Demand Management (TDM) framework, arguing that parking management should be paired with public transit and non- motorized investment rather than treated in isolation. Malé city, population of roughly 250,000 within about 8.3 km² combined with its immediate islands among the highest urban densities in the world. Hulhumalé, reclaimed since 1997, now roughly 4 km² and home to close to 100,000 residents, purpose-built to relieve pressure on Malé. The Sinamalé Bridge (opened 2018) and the under-construction Thilamalé Bridge have converted what were previously separate islands, reachable only by ferry, into one continuous road-based commuter zone multiplying the number of daily vehicle trips converging on Malé's narrow street grid. Barter (2010, 2015) has documented parking policy across dense Asian cities, noting that cities with severe land constraints a category that includes Male' achieve better outcomes through strict parking supply management, park and ride integration, and technology enabled information systems rather than through attempts to expand supply to meet unconstrained demand.

The Traffic Congestion Problem

Narrow historic street grid in Malé City, originally laid out for pedestrian and bicycle scale, not motor vehicles. Any vehicle that stops loading, unloading, or parking illegally, blocks an entire lane, so congestion in Malé is driven less by raw traffic volume and more by queuing behind stopped vehicles (a pattern explicitly identified by the Housing Development Corporation, HDC). Rapid growth in motorcycle and car ownership, encouraged by the small size of the islands and the absence of a comprehensive mass transit alternative. Convergence of Hulhumalé, airport and Villimalé traffic onto a limited number of bridge landings and arterial roads once the Sinamalé Bridge opened, shifting the bottleneck from ferries to road junctions. Absence, historically, off street parking supply most vehicles are stored on the public carriageway, permanently narrowing the usable road width. Recent literature on Intelligent Transportation Systems (ITS) documents the effectiveness of real time, sensor and app-based parking guidance systems in reducing 'cruising for parking. the additional traffic generated by drivers searching for space, which some studies estimate can account for a significant share of central city traffic at peak times (Shoup, 2005; subsequent ITS literature). This supports the smart parking finder application.

Government response on vehicle numbers;

The Ministry of Economic development Transport and Trade has reported that new vehicle registrations in the Malé region fell by roughly 74% compared with 2023 following tightened vehicle-import and registration rules, alongside continued build out of parking infrastructure and action against illegal vehicle registrations an indication that demand side control is now being treated as a first-order tool alongside new supply. Transport engineering literature on grade separation indicates that overhead flyovers can be effective at specific high-volume junctions through traffic and local turning traffic conflict but cautions that flyovers alone do not resolve congestion caused by parking or land-use problems and should be paired with demand-management measures (Litman, 2021). The parking and traffic congestion problems in the Greater Male' Area follow a connected chain, a shortage of free public parking space leads to forced illegal street parking, which narrows roads and worsens congestion, which is then made worse by the sharp mass movement surge during peak commuting hours. The root of the chain is the absence of a building code requirement for off-street parking. Malé's parking shortage predates the Sinamalé Bridge but has worsened as bridge access increased the number of vehicles able to reach the city. HDC identified, ahead of the bridge opening, that Hulhumalé itself would face a parking shortfall despite its wider road grid, and proposed a vertical (multi-story) parking system as the primary response. Most existing buildings in Male' were constructed before any parking requirement existed, so there is very little free or public parking supply relative to the number of registered vehicles. The most durable issue is the building code requirement so that every new building supplies its own share of parking instead of pushing demand onto the street.

Forced Illegal Parking and mass movement pattern

When no legal parking space is available near a destination, drivers park on sidewalks, in front of driveways, and in narrow residential streets out of necessity rather than choice. This is a direct downstream effect of the supply. Commuting, school drop-off, and office arrival, departure are concentrated into two sharp daily windows, which is what turns a manageable daily vehicle count into a congestion event. Morning peak (approx. 7-9am): inbound surge toward Male', schools, offices, and the market all draw arrivals in the same narrow window. Evening peak (approx. 4-7pm), outbound surge back toward Hulhumale' and Villimale', compounding with the illegal parking peak times.

Projects are now underway

October 2024, the Ministry of Transport and Civil Aviation signed an agreement with HDC to build 15 parking facilities across the Greater Malé Region, providing about 4,000 parking spaces a reported breakdown of roughly 3,920 car bays and 3,426 motorcycle bays across the programme, financed via a Line of Credit and to be handed over to contractors in phases. 2026: a second tranche of 7 additional parking structures was announced, 2 in Malé, 1 in Villimalé near the bridge landing, and 1 in Hulhumalé, expected to add roughly 2,600 car bays and 1,000 motorcycle bays, financed through an Indian Line of Credit. Sinamalé Bridge (China–Maldives Friendship Bridge), Length: 1.39 km sea-crossing (about 2 km total link); width 20.3 m. Connects Malé, Hulhulé (airport), Hulhumalé; opened 30 August 2018; built by China Harbour Engineering Company with Chinese government grant financing. Cross-

section: two vehicle lanes, separate motorcycle lanes, a cycle lane and a pedestrian lane. By 2024 cumulative traffic passed 100 million trips, and the bridge is credited with creating a single 'life and residential circle' spanning the three islands. Reported downside: the Maldives Police Service has recorded near-daily accidents on the bridge since opening, roughly 40% attributed to speeding underscoring the need for the traffic calming and enforcement measures discussed in Section 6.4. Thilamalé Bridge / Greater Malé Connectivity Project (GMCP), A $500 million project, backed by an Indian Line of Credit, linking Malé to Villingili, Gulhifalhu and Thilafushi. Total length 6.74 km, of which about 3.6 km is bridge/viaduct over water; includes roughly 210,000 m³ of associated land reclamation. Constructed by Afcons Infrastructure; intended, alongside decentralization of port, industrial and waste-handling functions to Thilafushi, Gulhifalhu, to relieve some of the land-use and traffic pressure currently concentrated on Malé itself. The project has experienced delays; independent reporting has noted slower-than-planned progress relative to original 2023 completion targets for the Malé, Villingili crossing. Urban planning literature on mixed land use generally supports separating heavy industrial, workshop, and freight loading activity from dense residential, commercial cores to reduce conflicting traffic and improve safety and air quality. Comparative International Practice

Table 1: Summarizes selected parking and traffic management practices from three modern countries with relevant lessons for Male': Singapore (extreme land scarcity, strong regulation), Japan (proof-of-parking requirement, compact multimodal design), and the Netherlands (non-motorized transport integration).

Country	Key Practice	Relevance to Male'
Singapore	Vehicle Quota System (Certificate of Entitlement), strict on-street parking regulation, extensive multi-story and underground parking, congestion pricing (ERP).	Demonstrates that strict, technology-enforced parking and vehicle-ownership control can manage congestion even under extreme land scarcity.
Japan (Tokyo)	Proof-of-parking law (shako shomeisho) requires owners to certify private parking space before vehicle registration; highly efficient multimodal transit reducing car dependence.	A proof-of-parking requirement could reduce on-street parking pressure in Male' by linking vehicle registration to verified parking availability.
Netherlands (Amsterdam)	Heavy investment in cycling and pedestrian infrastructure, park-and- ride at city edges, parking-permit zoning by neighborhood.	Given Male's compact size, investment in walking/cycling infrastructure and edge parking could reduce short-trip vehicle use in the city core.

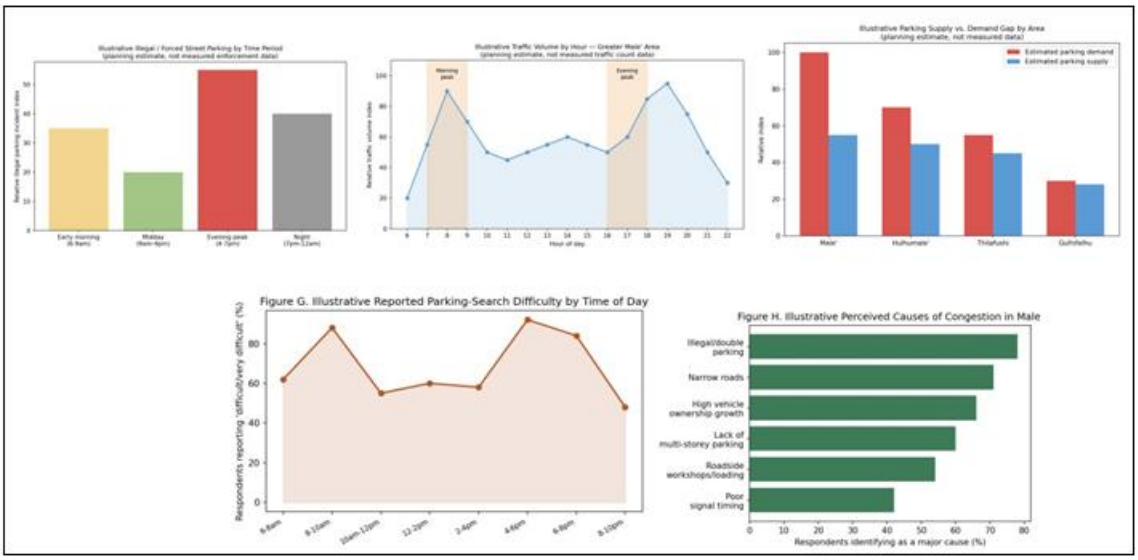
3. Methodology and Questionnaire

A quantitative, cross-sectional survey design was used, targeting Male' residents, daily commuters, and vehicle owners aged 18 and above. A stratified sample across the city's main wards is recommended to ensure geographic representativeness. The 10-item structured questionnaire below (5-point Likert scale, 1 = Strongly Disagree to 5 = Strongly Agree, unless otherwise noted) formed the primary data-collection instrument.

No.	Questionnaires
1	I regularly have trouble finding a parking space near my home.
2	I regularly have trouble finding a parking space near my workplace or destination.
3	Illegal or double parking is a major contributor to traffic congestion in my area.
4	Traffic congestion significantly increases my daily travel time.
5	I would use a mobile app that shows real-time available parking spaces.
6	Dedicated parking zones allocated within residential blocks would improve the current situation.
7	Relocating vehicle workshops and industrial activity out of residential streets would reduce congestion.
8	An overhead flyover at the busiest junction near my area would improve traffic flow.
9	I support stricter enforcement of parking regulations even if it increases fines.
10	Overall, I am satisfied with current parking and traffic conditions in Male'. (Reverse-scored)

4. Findings

The figures below are simulated for respondents to demonstrate the intended reporting findings;



Illustrative results suggest illegal, double parking (78%) and narrow roads (71%) as the most frequently cited causes, followed by vehicle-ownership growth (66%) and roadside workshop, loading activity (54%). Ninety percent of illustrative respondents indicated they would use a smart parking-finder app (Item 5), and 84% supported dedicated residential parking zones.

5. Discussion and Arguments

The illustrative survey findings, historical review, and comparative international practice together suggest that Male' City congestion problem is best addressed through a combination of demand management, spatial reallocation, and targeted infrastructure, rather than any single intervention. The strong illustrative support for a smart parking app (90%) and residential parking allocation (84%) indicates that residents perceive information and organization, not just physical capacity, as central to the problem consistent with Shoup's (2005) and Barter's (2010) arguments that parking problems are frequently management problems rather than pure capacity problems. At the same time, the high frequency with which illegal, double parking (78%) and roadside industrial activity (54%) were cited as causes supports the case for enforcement linked measures and the Thilafushi relocation recommend, respectively. The Japanese proof of-parking model offers a particularly relevant lesson: linking vehicle registration to verified parking availability could structurally reduce on-street parking pressure in a land constrained city like Male', though its introduction would require careful phasing and public consultation given existing vehicle-ownership patterns. The proposed flyover should be understood as addressing a narrower, junction-specific problem rather than a city-wide solution; the literature is clear that grade separation without accompanying parking and land-use reform risks simply relocating congestion rather than resolving it (Litman, 2021).

6. Recommendations & Solutions

Introducing a Pilot the smart parking finder application in a single high demand ward before city wide rollout, using crowd sourced reporting to minimize initial sensor infrastructure cost. Adopt a residential parking allocation standard (one dedicated multi-bay zone per two blocks) for new developments and identify retrofit opportunities in existing high-density wards. Develop a phased relocation incentive scheme (e.g., subsidized Thilafushi plots, transitional grace periods) to encourage voluntary relocation of workshops and industrial activity. Commission a full engineering feasibility and traffic impact study for an overhead flyover at the identified peak-congestion junction before committing capital funding. Strengthen enforcement of illegal and double parking, informed by the Maldives Police Service's operational experience, alongside not instead of the structural measures above. Explore a Maldives appropriate adaptation of Japan's proof-of-parking requirement for new vehicle registrations in Grater Male Area. Invest in walking and cycling infrastructure for short intra-city trips, drawing on the Netherlands' experience, to reduce reliance on motorized vehicles for short journeys. Establish a joint working group of the Maldives Police Service, Malé City Council, and Ministry of Economic Development, Transport and Trade to coordinate implementation and monitor outcomes. Greater Malé's congestion and parking shortage are structural, not incidental, an extremely dense historic island core, an archipelago geography where every inter-Island trip depends on a small number of bridge crossings, and a fast-growing vehicle fleet have combined to overwhelm a street network never designed for motor traffic. The response already underway 22+ new multi-story parking buildings, the completed Sinamalé Bridge, the under-construction Thilamalé Bridge GMCP (Greater Malé Connectivity Project), and tightened vehicle-registration rules, addresses supply and, to a lesser extent, demand. The additions proposed in this report overhead pedestrian bridges at the highest-conflict points, stricter circulation and enforcement inside Malé City, bridge safety measures, and a genuine park-and-ride public transport alternative are the piece's most likely to convert new parking and bridge capacity into an actual, sustained reduction in daily congestion rather than simply enabling further vehicle growth. Parking congestion and traffic connectivity challenges in Male' stem from a combination of extreme land scarcity, a historic street grid, rapid vehicle ownership growth, and mixed land use that places industrial activity within dense residential

streets. Drawing on established parking-policy literature and comparative international practice from Singapore, Japan, and the Netherlands, this study proposes four concretes, illustrated interventions: a smart parking- finder application, structured residential parking allocation, relocation of industrial activity to Thilafushi, and a targeted overhead flyover in the city's busiest junction. Illustrative resident feedback suggests strong support for these measures, though genuine empirical validation using the proposed questionnaire is an essential next step. Coordinated action by the Maldives Police Service, Malé City Council, and Ministry of Economic development Transport and Trade (MEDTT), guided by the recommendations, offers a practical pathway to a more manageable and livable capital city. Despite successive administrative measures including parking permits, restricted zones, and enforcement drives by the Maldives Police Service parking congestion and traffic delays in Male' continue to worsen as vehicle ownership grows faster than the city's fixed land area can accommodate. Illegal and double parking obstructs traffic flow and emergency access; narrow historic streets cannot be widened without demolishing existing structures; and industrial, workshop activity conducted at street level consumes scarce road front space and generates additional heavy vehicle traffic. There is currently no integrated, technology enabled system to help drivers locate available parking, no systematic residential parking allocation standard, and no grade separated infrastructure at the city's most congested junctions. No single measure will resolve congestion in a city as spatially constrained as Capital City Malé. The following package combines new supply (parking, pedestrian infrastructure), better use of existing road space (circulation, enforcement), and demand management (pricing, registration, mode shift) consistent with international best practice for congested, land constrained cities. Greater Malé Area parking and congestion problems can be reduced only through an integrated strategy that combines expanded parking infrastructure, stricter regulation, improved public transport, digital parking management, and long-term regional development.

Build more parking capacity, especially multi-story parking structures;
The Maldives government have announced to be expanding parking infrastructure in the Greater Malé Region, including multiple new parking facilities and parking buildings in Malé and Hulhumalé. Multi-story parking structures have potential in public. In general, the authors described Space. Smith, (2001), Chrest (2001), (Eriksson, 2020).

Use temporary parking lots as a short-term relief measure;
Temporary parking areas have already been opened in Hulhumalé to reduce street parking pressure in Malé.

Strengthen parking enforcement and remove abandoned vehicles;
The government has stated that it is tightening vehicle registration, removing abandoned vehicles, and verifying garage legitimacy as part of congestion control.

Introduce better traffic management and road redesign;
Earlier transport planning for Malé recommended one-way systems, traffic calming, limiting on-street parking, redesigning commercial areas, and creating dedicated drop-off and loading zones.

Improve public transport to reduce private vehicle dependence;
Government discussions on congestion have included improving public transportation services and better managing loading and unloading around buses.

Use digital systems for parking management;
The Greater Malé Transport and Mobility Office have identified digitalization as one of its priority actions for congestion reduction.

Adopt vehicle ownership and usage controls;
Recent research has recommended reducing the number of vehicles in Greater Malé and pairing this with stricter emissions rules, vehicle-age limits, and public awareness campaigns.

Develop regional centers outside Malé;
The government has argued that regional development can reduce migration pressure on Malé and therefore ease long-term congestion. Advanced Parking Finder Mobile Application to Male' City, A dedicated mobile application is proposed to display real-time parking availability across Male', using either roadside sensors, camera-based occupancy detection, or crowd-sourced check-in, check-out reporting at low cost. The app would allow users to search by street or destination, view live map markers colored by availability (green = free, amber = limited, red = full), see the nearest available spaces ranked by distance, and navigate directly to a chosen space. This directly addresses the 'cruising for parking' problem. Residential Area Parking Allocation One Zone per Two Blocks. For residential areas, it is proposed that dedicated multi-bay parking zones be allocated after every two residential blocks, rather than relying solely on scattered on-street parking. Each allocated zone would provide structured, marked bays (motorbike and car) accessible from the main access road, reducing informal and obstructive on-street parking within the blocks themselves. Relocation of Industrial/Workshop Activity to Thilafushi / Male' Industrial Area, Vehicle workshops, timber and hardware yards, general warehousing, and heavy vehicle loading currently operate within residential and commercial streets in Male', consuming scarce road front space and generating conflicting heavy vehicle traffic. It is proposed that such activities be progressively relocated to designated plots within Thilafushi Industrial Zone, which is already zoned for industrial and waste management use and has greater available land. This would free curbside space for parking and reduce heavy vehicle movement through residential streets, consistent with the mixed land use separation.

Overhead Flyover at Peak Congestion Junction;
In the city's busiest junction(s) where through-traffic and local turning traffic currently conflict at grade an elevated flyover is proposed to carry through traffic over the junction while local traffic continues to use the ground level

intersection. This grade separation would reduce signal-controlled delay for most vehicles passing through the junction without requiring the wholesale widening of surrounding streets, which is not feasible in central Male'.

Multi story mechanized parking buildings;
Continue and accelerate the HDC/ MEDTT parking building programmed, prioritizing sites at bridge landings (Malé side of Sinamalé Bridge, Villimalé side of the Thilamalé Bridge) so that vehicles are stored before they add to congestion inside the city.

Overhead pedestrian bridges grade separation;
At the highest-conflict junctions and along the Sinamalé Bridge approach roads where vehicle, motorcycles and pedestrian flows currently mix at grade elevated pedestrian walkways can remove foot traffic from the carriageway entirely, allowing more consistent vehicle flow and reducing the accident risk already documented on the bridge approaches.

Road network & circulation improvements;
One Way Street pairs and a signed circulation plan for Malé City grid, reducing the number of two-way pinch points where a single stopped vehicle blocks both directions. Loading bay-time windows (e.g., deliveries permitted only before 06:00am and after 23:00pm) to remove the single largest cause of mid-street stoppages. Dedicated motorcycle lanes, parking bays separated from car lanes, reflecting the very high share of two-wheeled vehicles in the GMA vehicle fleet. Camera-based enforcement (automatic number-plate recognition) against illegal roadside parking and stopping, freeing carriageway width without requiring additional traffic police presence.

Bridge and approach road safety;
Speed cameras and physical traffic calming on the Sinamalé Bridge approach directly targeting speeding related accidents already reported by police. Clearer lane discipline and physical separation between motorcycle and car lanes on both bridges, extending the successful lane segregation design already built into the Sinamalé Bridge cross-section.

Public transport, park and ride and demand management;
Expand scheduled bus service across the bridge connected islands (Malé, Hulhulé, Hulhumalé,Villimalé) with dedicated bus priority at bridge approaches, reducing single occupant vehicle trips. Park and ride, encourage residents to store vehicles in the new Hulhumalé, Villimalé parking buildings and complete the final leg into central Malé by bus, ferry or non, motorized transport, rather than driving a vehicle into the Male' city. Continue tightening vehicle registration policy in the Greater Malé Area (already associated with a reported ~74% fall in new registrations versus 2023) so that new parking supply is not immediately absorbed by fleet growth. Explore congestion or peak hour pricing on the Sinamalé Bridge and central Malé streets over the medium term, consistent with approaches used in other severely space constrained cities (e.g., Singapore, London) to manage demand once alternative modes are in place.

Smart parking technology;
Sensor or camera-based occupancy detection in the new multi-story buildings, feeding a public app so drivers are guided directly to available bays rather than circling internationally, unguided parking search has been estimated to account for a significant share of urban traffic in congested cities. Dynamic pricing between buildings (cheaper at less convenient sites) to spread demand rather than concentrating on the closest facility to the city center.

Additional Potential Parking Capacity Sites
Beyond the 22 buildings already announced by HDC/ MEDTT the following categories of site represent realistic further capacity across the GMA. Estimates are order of magnitude, based on typical plot sizes and deck efficiencies observed in the announced projects, and are intended to guide feasibility study rather than substitute for one.

Potential additional parking-capacity sites across the Greater Malé Area, by site type.

Site type	Location(s)	Est. capacity	Notes
Reclaimed-land plots	Gulhifalhu / Thilafushi	1,500–2,500 bays	Cheapest land; needs a shuttle/ferry link into Malé so it substitutes for driving in, not adds to it
Rooftop conversion	Flat-roof government & commercial buildings, Malé/Hulhumalé	300–600 bays	Needs structural survey per building; best suited to motorcycles given typical roof load limits
Road-reserve reorganization	Wide medians, service lanes, edge strips, Malé & Hulhumalé	200–400 bays	Lowest cost, fastest to deliver; must not remove pedestrian/cycle width in the process
Mandated basement/ podium parking	New private developments, Malé & Hulhumalé (planning condition)	Grows over time	Zero public cost; requires a building-code amendment tying approval to minimum on-site bays per unit

Recommended sequencing;
Road reserve reorganization first (fastest, cheapest), basement mandates written into the building code immediately (compounding, zero-cost over time), rooftop conversion assessed building-by-building and reclaimed-land plots pursued as a medium-term programme tied to the Thilamalé Bridge/GMCP opening so they are usable as soon as the road link exists.

Smart Parking Availability App Functional Specification
A single, government-endorsed 'GMA Parking Finder' app is proposed to sit across every existing and future parking building, so residents and visitors always check one source rather than guessing or circling. The core function is simple: show, in real time, how many bays are free at every building, and get the driver to one before it fills. Per bay ultrasonic or camera sensors (already standard in comparable Asian multi-story parking systems) report occupied/free to a local controller on each level. Boom-

gate/ANPR counters at each building entrance and exit cross- check the sensor count, so the total-free figure self-corrects even if an individual sensor fails. A cloud occupancy engine merges sensor data with HDC/ MEDTT ownership and auction records, so a bay already sold to a resident is shown as reserved, not just 'occupied'. The same feed drives three outputs: the app (resident and visitor views), the app's push-notification layer, and physical variable-message road signage at each building entrance showing live space counts useful for the many residents who won't have the app open while driving.

Core app functions

Live availability list & map every building shown with free, total bays, color-coded (green = available, amber = near-full, red = full), refreshed in near real time. Filter by island, vehicle type (car/motorcycle/EV), and distance from destination a visitor arriving via Sinamalé Bridge should be able to filter to 'Malé, car, nearest to bridge landing' in two taps. Turn-by-turn routing to the selected building, handed off to the phone's existing maps app rather than rebuilding navigation from scratch. Reserve, hold a bay for a short window (e.g., 15 minutes) so a driver crossing the bridge doesn't lose the space to someone else end route mirroring the 90/10 auctioned, visitor split already planned for the physical buildings. Resident account view long-stay bay owners (from the 90% auctioned share) see their own assigned bay status and any reserved-bay notifications, separate from the visitor short-stay pool. Expiry and overstay alerts a push notification before a paid or time limited stay expires, reducing both illegal overstays and unnecessary enforcement callouts. Dynamic pricing display where a building run demand-based pricing. The app shows current price per hour per building so drivers can choose a cheaper, less central building if convenient. Reporting layer for MEDTT /HDC aggregated (not per user) occupancy analytics to inform you where the next tranche of parking buildings or road-reserve conversions should go.

International Benchmarking, Modern Solutions in Comparable Cities

Malé City is not the first small, land constrained, high-density city to face this problem. The measures below are current in-force programmed in other dense cities, included here as reference points for what the GMA.

City	Measure	How it works	Reported results / status (2025–2026)
Singapore	Certificate of Entitlement (COE) + Electronic Road Pricing (ERP)	A quota auction caps how many vehicles may be newly registered every 10 years (COE); ERP then charges by gantry, time of day and congestion level to manage usage of the vehicles already on the road	Running continuously since 1990 (COE) / 1998 (ERP); a satellite-based ERP 2.0 begins full rollout from January 2027, replacing gantries with GPS-based per-kilometer charging
Tokyo, Japan	Proof-of-parking law (shako shomeisho)	A car cannot be registered, under the 1962 Garage Act, unless the owner first proves access to a legal off-street parking space within about 2 km of home	Still in force nationwide in major cities; credited with keeping Japan's narrow residential streets largely free of parked cars without banning car ownership
Barcelona, Spain	Superblocks	Grid of city blocks reorganized so through- traffic stays on the perimeter; interior streets become low-speed, people-priority space with much on-street parking removed	Sant Antoni superblock: 82% reduction in road traffic and 30% reduction in NO2 on interior streets; citywide programmed targets a 21% traffic-reduction goal, with vehicle use in some blocks reported down as much as 92% and traffic not simply displaced to neighboring streets
Seoul & other Korean cities	Automated / robotic parking towers	Drivers leave the car at a ground-floor bay; a mechanized lift-and-slide or robotic system stores it vertically without a human attendant or self-driven ramps	Reported to save up to roughly 80% of the land area a conventional ramped structure would need for the same capacity, now standard in new Korean urban development

Conceptual Architectural Development Proposals

This section responds to specific site proposals raised in consultation, using the place names as given (Kanivaa, Kulhiuvaru Ekuveni). An idea, the concept drawings prepared for discussion not existing HDC, MEDTT or government approved projects and each would require a full topographic survey, geotechnical marine investigation, environmental impact assessment, and Planning, Fire, Civil Aviation clearance before any detailed design.

Relevance to the Greater Malé Region

Singapore's COE/ERP model directly supports the demand management measures (registration control, bridge congestion pricing), the GMA's 74% fall in new registrations after tightened rules is a milder version of the same lever. Tokyo's proof-of-parking law is the clearest international precedent for pairing new parking supplies with a legal requirement, so that supply and vehicle growth rise together rather than supply being absorbed instantly by new cars. Barcelona's superblocks translate into Malé as a candidate model for the old city's grid: a small interior zone (e.g. around a school or market) close to throat traffic and on-street parking, feeding the removed cars into the multi-story buildings. Korean-style automated towers are the direct technology reference behind the mechanized parking concept.

Household, Residential Parking for Malé City;

A large share of Malé City on-street congestion comes not from visitors but from residents storing their own vehicles on the public carriageway outside their homes. The diagrams below set out a concept household parking layout for a typical Malé residential compound, and how a residential street looks before and after that supply is provided off-street. Each household car bay is sized at 2.5 m x 5.0 m, the minimum practical dimension for GMA vehicle sizes, arranged under the building on pilots (open ground floor) rather than displacing living space above. A shared motorcycle rack (1.0 m x 2.2 m per bay) reflects the very high two-wheeler share of the GMA vehicle fleet.

Kaanivaa 15 story Mall

A modern 15 story tower (ground + 14 upper floors) combining parking, JaJa(2020), retail shops, offices and short stay accommodation on one plot, so residents and visitors can park once and reach several facilities without re- entering traffic. Floors 2–4; mechanized parking, White (2020). Floors 5–7; retail mall, food court, ArchDaily (2015), and cinema; Floors 8–10; office suites; Floor 11; clinic, gym and creche. Floors 12–13; serviced apartments or hotel rooms; Floor 14; sky lobby, restaurant and function hall; rooftop; solar canopy, restaurant terrace and a marked helipad for emergency medevac. Security; ground-floor CCTV and access-control turnstiles, twin fire-rated stair cores, sprinklers on every level, and vehicle screening at the parking entry.

Overhead bridge, from Raalhugandu to Baselo Nasandhura, with under-bridge parking

A covered pedestrian, cycle promenade elevated along the seafront between Raalhugandu to Baselona Nasandhura, with four-wheel parking bays sheltered underneath turning an unused strip of shoreline into both a public walkway and parking capacity. Upper deck: shaded pedestrian, cycle promenade with sea views, rest points and lighting extending the pattern of dedicated pedestrian space. Lower level: naturally ventilated car parking bays supported on the same column line as the deck above, minimizing additional seabed footprint. Would require a marine geotechnical survey and environmental assessment (reef or lagoon impact, wave and current effects) before detailed design, this is a concept sketch, not an engineered structure.

Kulhiuvaru Ekuveni 15 story mall

A 15-level modern mall with ground-floor parking, shops, a marketplace, a technology hub, conference facilities, offices and residential floors above, and a rooftop football ground plus two overhead pedestrian bridges linking it directly into the Thilamalé Bridge corridor. Ground and L2: parking, with an access control security lobby and ANPR (Automated Number Plate Recognition) based vehicle screening at entry; L3: podium level with retail entrance and both bridge connections; L4: retail shops; L5: marketplace for local vendor stalls; L6: cafés and restaurants; L7: technology hub / innovation and co-working space; L8: conference and business center; L9–L10: offices; L11–L13: residential floors; rooftop: full-size artificial turf football pitch with safety netting a precedent seen internationally on shopping center and parking-structure roofs (e.g. Skyline Pitch, Chicago, Los Angeles; Q's Mall, Osaka; rooftop stadium, Chongqing). Security: biometric, card access control on every non-public floor, CCTV with AI-assisted analytics on the ground floor and car park, twin fire-rated stair cores with sprinklers on every level, the same standard proposed across all mall developments. The two bridges (one at podium level, one at ground, park level) mean shoppers and residents can reach the Thilamalé Bridge walkway without crossing live traffic the same grade separation. Upper deck: the bridge roadway and a pedestrian walkway, carried on piles driven into the seabed along the full span this is a true oversea bridge structure, not land reclamation. Lower deck: covered, naturally ventilated car parking suspended from the same pile line, sheltered from sun and rain by the roadway.

Land-use policy

Relocating industrial activity, consolidating retail into malls, A land use measure to complement the mall developments, moving workshop type and wholesale activity out of residential Malé city, and channel retail and dining into the new mall buildings rather than scattered street front units. Garages, workshops, Timber Wherehouse and wholesale Wherehouse must be relocated to the Male' industrial zone, Thilafushi, Gulhifalhu consistent with the decentralization intent already behind the Thilamalé Bridge project. Shops and restaurants currently on Male' City residential street frontages progressively relicensed to operate from the mall developments (Kaanivaa, Kulhiuvaru Ekuveni Mall) instead, freeing ground-floor residential frontage and cutting delivery vehicle stopping on narrow streets. Required only small daily food convenience shops retain a license to operate directly within residential streets, preserving walkable access to everyday essentials without the loading and customer parking demand of larger retail or dining uses. This must be a zoning and licensing policy change, not a construction project, it would need Malé City Council Planning Code amendment and a transition period for existing licensed businesses, not physical work.

Parking Buildings & 10-Storey Malls Across the Greater Malé Region

Extending the same parking building plus mall model is proposed at one site on each of the five main GMA islands, Malé, Hulhumalé, Villimalé, Gulhifalhu and Thilafushi so that every island in the cluster has its own off-street parking and retail, service hub rather than concentrating everything in Malé City. Hulhumalé sited near a Phase I/Phase II boundary, so it serves both halves of the island. Villimalé sited at the Thilamalé Bridge landing, serving arriving traffic before it needs to continue. Gulhifalhu and Thilafushi sited to serve the industrial, relocated business workforce proposed so workers who moved out of Malé City still have nearby parking and amenities. Each site follows the same off-street logic as park once at the local building, then walk, cycle or use local transport rather than drive further into an already congested area.

Proposed Direct Bridge: Thilamalé Bridge Corridor, Hulhumalé Phase 2

A new two-way high-speed Train is proposed, running alongside the existing Sinamalé Bridge, that connects the Thilamalé Bridge corridor (Malé, Villimale', Gulhifalhu, Thilafushi) directly to Hulhumalé Phase II closing the loop between the two bridge systems so traffic between the western, southern islands and Hulhumalé Phase 2 no longer has to route through central Malé and the existing Sinamalé Bridge landing. Function: a genuine two-way link traffic can travel through the Thilamalé corridor Hulhumalé Phase 2, and Hulhumalé Phase 2 Thilamalé corridor, without transiting central Malé at all. Running the new bridge alongside the existing Sinamalé Bridge keeps both crossings within one marine corridor, simplifying navigation clearance and shared maintenance access compared to a bridge sited elsewhere. This directly relieves the single corridor dependency, today, every vehicle moving between the western GMA islands and Hulhumalé must funnel through the same Malé City streets and the same Sinamalé Bridge landing; a second, direct link

removes that checkpoint for through traffic that has no reason to enter Malé at all. As with every other idea, a bridge of this scale needs full marine, structural and navigational clearance study (particularly given its proximity to the airport approach and existing shipping channels) before any commitment.

International Reference Points

Marina Coastal Expressway, Singapore a coastal expressway around Singapore's downtown built partly beneath the seabed specifically so the waterfront above could be freed for public and park use rather than a surface road; the same logic (keep the through-road off the usable waterfront) applies to lifting Malé's ring road onto a bridge rather than widening the coastal road at grade. West Kowloon Highway, Hong Kong an elevated coastal expressway along Kowloon's waterfront, built up on piers rather than at grade, precisely to separate through-traffic from the dense street grid behind it while leaving the space beneath and alongside usable. Implementation Priorities (Summary Table)

Measure	Purpose	Term	Lead agency
Multi-story parking buildings (22 total announced)	Remove stored vehicles from carriageway	Short–medium	HDC / MEDTT
Overhead pedestrian bridges at bridge landings & major junctions	Separate pedestrians from vehicle/motorcycle conflict	Short–medium	MEDTT / Malé City Council
One-way grid, loading windows, ANPR enforcement	Free carriageway width without new construction	Short	Malé City Council / Police
Bridge speed cameras & lane separation	Reduce reported daily accidents on Sinamalé Bridge	Short	MEDTT
Bus priority & park-and-ride	Shift trips from private vehicle to transit	Medium	MEDTT
Thilamalé Bridge / GMCP completion	Decentralize port/industrial traffic, add capacity	Medium–long	GMCP / MEDTT
Registration control & congestion pricing	Cap fleet growth relative to road/parking capacity	Ongoing	MEDTT
Road-reserve reorg. & basement-parking mandate	Add capacity at near-zero public cost	Short	Malé City Council / MEDTT
GMA Parking Finder app (sensors + app + signage)	Cut circling, guide drivers to free bays in real time	Short–medium	MEDTT / HDC / tech partner
resident survey	Validate priorities and willingness-to-pay before capital spend	Immediate	MEDTT / Malé City Council
Household podium/basement parking mandate	Move resident vehicles off the public carriageway street-by-street	Medium (new builds); long (retrofits)	Malé City Council / Planning Ministry
Pilot superblock in old Malé City	Test through-traffic removal & on-street parking removal at small scale	Medium	Malé City Council
Kaanivaa / Kulhivaru Ekuveni malls	Consolidate parking, retail, offices & housing on one plot per site	Long- subject to feasibility study	Private developer / HDC
Carnival mall	Add shops, rental rooms, masjid & rooftop playground off-street	Long- subject to feasibility study	Private developer / Malé City Council
Raalhugandu Area to Baacelona Nasandra Overhed Bridge & parking	Add covered parking beneath a pile-supported oversea bridge	Long- subject to marine EIA	MEDTT / Environment Ministry
Relocate industrial activity; consolidate retail into malls	Free residential streets from workshops, loading & extra shop traffic	Medium- licensing/zoning change	Malé City Council / Planning Ministry
Parking building + mall, one per island	Give every GMA island its own off-street parking & retail hub	Long- subject to feasibility study	HDC / private developers
New Thilamalé–Hulhumalé Phase 2 bridge	Remove through-traffic dependency on the Sinamalé Bridge / Malé streets	Long- subject to marine & navigational study	MEDTT / GMCP

7. Conclusion

Parking and traffic congestion in Greater Malé region are interconnected challenges requiring an integrated rather than single dimensional response. The physical constraints of Malé City mean that simply constructing additional roads is unlikely to constitute a complete long-term strategy. Parking, vehicle demand, public transport, traffic management, urban planning, enforcement and travel behavior must be addressed simultaneously. Recent government actions provide an important institutional foundation. The establishment of the Greater Malé Transport and Mobility Office and the 2026 Land Transport Act create mechanisms for coordinated transport planning and regulation. The central policy principle should therefore be; Greater Malé region should move from vehicle centered traffic management toward integrated mobility management, Multi story parking can release road space, smart parking can reduce parking search circulation, public transport can provide alternatives to private vehicles, park-and-ride facilities can intercept trips before they reach the most congested areas, intelligent traffic systems can improve operational efficiency, and effective enforcement can ensure that regulations are respected. The objective should not simply be to create more space for vehicles. It should be to create a more efficient, accessible, safe and sustainable urban mobility system in which available road and parking resources are managed according to actual demand. For Greater Malé Region, a long-term solution is required not one project or one policy. It required an integrated system

combining parking management, public transport, demand management, intelligent technology, enforcement, sustainable urban planning, and coordinated governance.

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