ITDP

Public Cycle Sharing System for Chennai

Contents

1. Introduction

Cycle sharing is a public transport system in which people have access to cycles that can be used across a network of closely spaced stations. With a smart card or other form of identification, a user can check out a cycle from a station and return it to any other station. The Corporation of Chennai (COC) is planning a public cycle sharing system with approximately 3,000 cycles and an initial coverage area of about 19 square kilometres.

Chennai, the capital of Tamil Nadu state, has a population of 4.6 million, with nearly 9 million inhabitants in the larger metropolitan area.[1] The core city's density is around 26,900 persons per sq km. Public transport in Chennai consists of Metropolitan Transport Corporation (MTC) buses, suburban rail, and MRTS. In addition, a 45 km metro rail network is under construction. Currently MTC has around 3,800 buses carrying 52 lakh passengers per day.[2] The three suburban rail lines and MRTS line comprise 123 km of corridors linking the city to suburban regions such as Tambaram, Thirunindravur, Velachery and Minjur.

Cycle sharing is considered a key element in Chennai's strategy to expand the use of sustainable transport modes. The system will help COC achieve the goals laid out in the city's Non-Motorised Transport Policy, namely an increase in the mode share of non-motorised modes from 34 to 40 per cent of all trips by 2018, and an increase of public transport use from 41 to 60 per cent of motorised trips over the same time period.[3] Cycle sharing is expected to boost the use of public transport by providing crucial last-mile connectivity, thereby expanding the catchment areas for the region's rapid transit systems. By encouraging a shift to sustainable modes, the cycle sharing system will reduce dependency on automobiles, particularly for short trips in the city centre, reduce traffic congestion, vehicle emissions, and demand for motor vehicle parking. In addition, the system will expand the health and wellness benefits of bicycle transport to new users. Finally, the system will support the transformation of city streets to become environments where pedestrians and bicyclists feel safe and comfortable. The system will offer the convenience of cycling without the burden of ownership and the flexibility to accommodate one-way trips.

In implementing the system, Chennai will join over 700 cities in 57 countries that are enjoying the benefits of cycle sharing.[4] Together these systems comprise around 8 lakh bicycles. Some of the largest cycles sharing systems are in Chinese cities like Hangzhou and Shanghai. Washington, D.C. (USA), Paris (France), and London (U.K.) also have hugely successful systems that have helped re-energize cycling in those cities and encourage more people to use this non-polluting and healthy mode of transport.

2. Cycle sharing features at a glance

The Chennai cycle sharing system will employ the following best practice features:

- A dense network of stations across the coverage area, with spacing of approximately 300 m between stations.

- Cycles with specially designed parts and sizes to discourage theft and sale as whole or for parts.

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[1] http://www.indiaonlinepages.com/population/chennai-current-population.html
[2] http://www.mtcbus.org/
[3] http://www.chennaicorporation.gov.in/images/nmt%20english.pdf
[4] http://www.earth-policy.org/press_room/C68/bicycle_share_fact_sheet

- A fully automated locking system at stations that allows users to check cycles in or out without the need for staffing at the station.

- Radio frequency identification devices (RFIDs) to track where a cycle is picked up, where it is returned, and the identity of the user.

- Real-time monitoring of station occupancy rates through General Packet Radio Service (GPRS), used to guide the redistribution of cycles.

- Real-time user information provided through various platforms, including the web, mobile phones, and/or on-site terminals.

- Advertising space on cycles and at stations (provides revenue generation options for system operator or city).

- Pricing structures that incentivise short trips, helping to maximize the number of trips per cycle per day.

These characteristics are described in more detail in the sections below.

Figure 1. Modern cycle sharing systems feature a dense network of stations. A user checks out a cycle using an RFID-enabled smart card and can return it to any other station.

3. Project goals

Chennai has embarked on several sustainable transport initiatives, including the construction of expanded footpaths on all of the city's arterial streets; implementation of pedestrian zones to facilitate access to commercial areas and cultural landmarks; expansion of the rapid transit network with new

metro rail, BRT, and monorail lines; and the implementation of an IT-based parking management system. The cycle sharing system will complement these efforts by helping the city achieve the following goals:

- Facilitate the use of the city's public transport system by expanding the reach of the city bus and rapid transit lines.

- Reduce congestion and improve air quality by attracting users from private motor vehicles.

- Increase the mode share of cycling in Chennai.

- Transform the image of cycling, making it a popular means of travel for the middle and upper classes.

- Promote the use of active transport, helping to improve public health.

- Integration with the public transport system

The cycle sharing system will help improve access to Chennai's rapid transit modes and the city's bus service, providing seamless connectivity between public transport stations, homes, and workplaces. The introduction of a cycling option will increase the catchment area of each station, expanding it from a walking radius of 500 m to a convenient cycling distance of 2 to 3 km. Cycle sharing stations will be strategically placed, ensuring physical connectivity and filling in the gaps where access to public transport is limited. Besides physical integration, the same electronic fare collection system should be employed across the cycle sharing system, the city bus service, metro, and MRTS in order to simplify the payment process.

Cycle sharing will be faster, cheaper, and more flexible than existing feeder modes, particularly auto rickshaws. Cycles will be available on demand, so users will not need to wait for a bus or rickshaw to appear. In addition, cycle sharing will be less expensive: most feeder trips will be accomplished within a 30-minute timespan for which there is no user fee.

4. Target user groups

The cycle sharing system will target a different user group from those who currently own cycles or rent them on a daily basis. The target user will be the commuter who uses public transport, auto rickshaws, or walks long distances to complete some portion of his or her trip. The user will tend to have a higher income than typical cyclists in Chennai, and s/he will place a premium on the quality of the system: the ease of use, the level of upkeep of the cycles and stations, and seamless integration with other modes. Examples include:

- College students who do not own vehicles and for whom the cycle provides connectivity from the campus to nearby recreational and shopping areas

- Daily commuters to central areas who use cycling for midday errands

- Commuters who travel on the MRTS or bus for the main leg of a journey but use the cycle sharing to travel between the station and the office.

The placement of stations, system pricing, and marketing campaigns will be tailored to appeal to these key user groups.

5. Cycle sharing components

5.1 Bicycles

The bicycle should be attractive, durable, and theft-proof. The following design standards should be followed:

- Protection against theft and vandalism: unique parts, hidden wiring, RFID tags that allow the system to connect the cycle to the user.

- Universal design: should satisfy all genders and clothing

- Distinctive styling: should project a modern image

- Convenience: basket for carrying and mud guards to protect clothing

- Safety: reflectors, LED lights for night riding

- Longevity: solid frame and puncture resistant tyres

Figure 2. A unique, robust cycle design is critical the branding and reliability of the system. The cycle should be a unisex model with an adjustable seat.

Figure 3. Special parts help deter theft and vandalism.

5.2   Stations

Cycle sharing station design is a function of the level of demand, the amount of space available, and the nature of the roadside environment. Decisions regarding station design also need to take into account the impact on the city's image. All stations need to accommodate a fully automated smart card check-in and check-out. IT-based management of cycles and users is critical to the delivery of modern cycle sharing systems. It also allows a user to check out a cycle without interacting with an attendant, thus decreasing the time required to take out or return a cycle and limiting the possibility of a station being off-line because an attendant is not present. While fully automated stations may represent higher capital costs, it will help the city save on operating costs because the stations do not need to be manned all the time.

Figure 4. A typical cycle sharing station includes docking positions, a user terminal, and space for advertising.

Stations in the Chennai system will be comprised of a separate dock for each cycle. The size of stations will depend on the level of demand, ranging from small stations with 12 docks to large stations with 36 docks. Stations will be placed at frequent intervals, with a distance of 300 m between stations in the city. Close station spacing will help make cycle sharing competitive with other modes and will reduce the distance that a user has to walk to the next station, should s/he find a station either completely full or completely empty.

Stations will be placed near important origins and destinations, including:

- Around public spaces and recreation spaces, such as the Marina Beach and the Nageshwara Rao Park.

- Public transport hubs such as the Chennai Central and bus terminals in Broadway, Mandaveli, and Anna Square.

- Market areas and mixed use centres such as Mylapore and Royapettah

- Shopping malls like Express Avenue, Spencer's Plaza, and City Centre.

- Cultural landmarks like Kapaleeshwarar Temple in Mylapore.

- Academic institutions and Libraries, such as University of Madras and Queen Mary's College.

- Government offices on Kamarajar Salai.

- Strategic positions in residential areas.

Figure 5. Representative station locations (clockwise from top left): bus stop on Kamarajar Salai/Marina Beach, Chennai Central, Express Avenue mall, and Kapaleeshawarar temple.

In the absence of a single important building, stations will be placed at existing nodal points, important public spaces, and near intersections to serve origins and destinations in multiple directions.

Each station should be placed in such a location that it is clearly visible to passers-by and should make use of the underutilised and vacant spaces to reduce interference with other activities. A station can fit into a 2 m wide on-street parking lane. Stations should not be placed on footpaths unless there is sufficient clear space for walking beside the station.

Figure 6. A cycle sharing station can fit in a 2 m wide parking lane.

The specific siting of stations will be determined on a case-by-case basis. Typical placement options include the following:

- On-street parking spaces
- Vacant space in roadside landscaping strips
- Areas beneath flyovers
- Adjacent to bus stops
- Areas around MRTS and metro station entrances
- Private property near large commercial and housing developments
- The furniture zone of pedestrian footpaths (where the furniture zone is wide enough to accommodate the station without compromising clear space for pedestrians)
- Plazas and other public spaces

Figure 7. Potential station locations: beneath a flyover (L) and outside a suburban rail station entrance (R).

Figure 8. Potential station locations: the furniture zone of footpath (L) and space adjacent to a bus stop (R).

Figure 9. Station location at Chintradipet MRTS station: before (L) and after (R).

Figure 10. Station location adjacent to MTC bus stop: before (L) and after (R).

5.3 User interface

Customer service platforms will collect and disseminate information from and to the user through various media, including the web, mobile phones, terminals, and face-to-face interaction. They allow customers to set up accounts and receive information about the system and their account. The web is an ideal platform as it has the advantage of being available 24/7 and offers seamless interaction without the hassle of waiting in long queues. It also reduces operational costs and gives the system a modern, hi-tech image. While the majority of users may access the system through the website or

station terminals, it is important to have a face-to-face platform at the operational headquarters and/or at large stations. "Brick and mortar" kiosks offer the same benefits of the online system to users who do not have access to technology. An optimal location for the customer service centre would be a shopping mall like Express Avenue, Egmore railway station, and government offices like Ezhilagam building on Kamarajar Salai.

Users who want to want to avail of long-term memberships to the cycle sharing system will be required to complete a registration online or fill out a membership form at the customer service kiosk. Along with a registration form, the prospective user will be required to submit identification proof and pay a registration fee. Besides the registration fee, around Rs 50 shall be paid towards the user's opening balance to cover initial user fees. Once the registration is completed, the cycle sharing operator will carry out a background check to verify the information submitted. The operator will mail a smart card within 24 hours to the address listed on the identification document submitted by the user. Upon receipt of the card, the user may begin using the system. For daily subscriptions, users may register online or at specific cycle sharing stations using an active credit card.

6. Operations

6.1   Security mechanisms

Cycle sharing systems ensure security by tracking the identity of both users and cycles. On the user side, the system obtains identification details during the registration process (see Section **Error! Reference source not found.**) and the user is issued a smart card with an RFID chip linked to the user's account. RFID chips are also present on the cycles. When a user checks out a cycle using a smart card, the identity of the user is linked that of the cycle that s/he checks out. If the cycle is not returned within a specified time period, say 24 hours, the user's balance is forfeited and his/her smart card is deactivated. In addition, the user will be barred from registering for the system again.

In the case of daily or weekly subscriptions by walk-up users who pay by credit or debit card, the system places a hold on the user's credit card account for the duration of the subscription. If the user is in good standing, the hold is removed at the end of the subscription. However, if a cycle is not returned, then the hold remains on the user's account.

To ensure security for the cycle sharing system, the stations can be located on premises of government facilities and police stations where such facilities are near an optimal location from the standpoint of cycle sharing operations.

6.2   Redistribution and maintenance

Redistribution is broadly defined as the rebalancing of bicycles from stations that are near or at capacity to stations that are nearly empty. The operator will be responsible for redistributing bicycles during peak periods to ensure that bicycles remain available at all stations and that some docking positions remain open at each station. Redistribution is one of the greatest challenges to operating the cycle sharing system, and accounts for a large portion of operating costs.

The cycle sharing system will be operated on a day-to-day basis by a private sector contractor appointed by COC (see Institutional Structure, below). The private operator will have several responsibilities, including redistribution, maintenance, and customer service. For an experienced operator, redistribution becomes predictive, and is better thought of as the rebalancing of cycles to stations where the operator expects a shortage to occur. The RFID devices on the cycles allow the

operator to record all of the trips that are made with the system. After a short period of operation, the IT system generates a full record of the trip patterns and station occupancies. This information can be used to guide the redistribution process. Many operators use logistics software to assign routes and schedules to redistribution crews.

Regular preventative maintenance is necessary to keep the cycles in good working condition. Cycle redistribution vehicle maintenance teams will be responsible for fixing minor repairs onsite and notifying redistribution teams to collect major repairs that need to be completed at the depot. In addition to cycle maintenance, cycle maintenance teams need to have basic knowledge of fixing minor problems at cycle docking stations and terminals. Station and cycle cleanliness is an important aspect of the image of the system. Cycle maintenance teams should wipe down all cycle sat least once a week. They should also clean the station area. The implementing agency will set service level standards to ensure that redistribution and maintenance activities are carried out diligently.

7. Institutional Structure

The Chennai cycle sharing system will be structured as a public-private partnership in which COC carries out planning and oversight activities and the private sector handles day-to-day operations. The following table indicates the respective roles of the government and the private sector.

Table 1. Respective responsibilities of the government and the private operator

Government	Private operator
• System planning and implementation • Cover system operating costs • Provide space for stations and control centre • Set service level benchmarks • Monitor the operator's performance • Collect fares and revenues • Market and conduct outreach	• Maintenance of cycles and stations • Redistribution of cycles within stations to maintain optimum number • Customer service • Operate the control centre • Provide information on real time basis
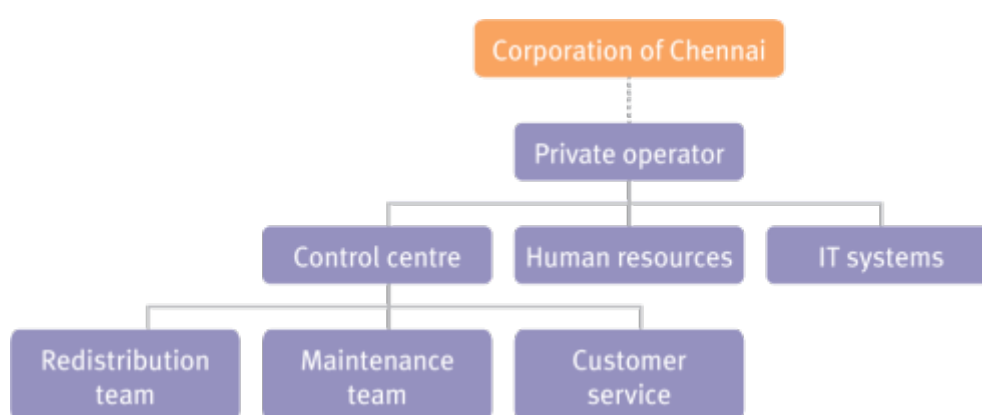
Figure 11. Management structure for the Chennai cycle sharing system

The cycle sharing operator will be compensated on the basis of the number of cycles operated in the system. Beyond a base payment, the operator will receive an incentive payment that will increase with system usage (i.e., the number of rides per cycle per day). At the same time, penalties will be applied

if system performance falls below service levels stipulated in the operator's contract. Categories of service level standards include the following:

- How many hours per day a station can remain completely full or empty

- How long a damaged cycle can stay in the system before being fixed or taken to a depot

- The fraction of the total fleet that can remain in repair facilities at any particular time

- How often cleaning of cycles and stations should be performed

- How often a terminal can remain out of service

These standards need to be measurable and will be spelled out in detail in the operator contract. The contract will require the operator to deliver the service level statistics to the nodal agency on a real-time basis to enable the nodal agency to monitor the operator's performance. Compensation will be calculated based on these operational data.

8. Outreach

Marketing of the Chennai cycle sharing system will begin well before the system is up and operational and carry on through the life of the system. Initial marketing efforts include promoting the system name, 'tag line,' and logo. A user doesn't take a cycle—s/he takes "Velib" (Paris) or "Bicing" (Barcelona). A trendy name and logo will be established for the system. Due to cultural barriers, women are mostly prevented from taking cycles, thus it is important to actively encourage them to use the system and generate awareness through media / social campaigns at schools, colleges/universities covering on what works best in cycle sharing system, the healthy lifestyle and safety of women.

The early marketing efforts will focus on information:

- What is cycle sharing?

- The process of checking out a bicycle

- How to register for the system

- Station locations

- Hours of operation

- The pricing system

- Phone numbers and websites for obtaining more information

The marketing campaign needs to put forth that a cycle sharing system is a trendy, health and environmentally friendly, more efficient alternative to their crowded buses, uncooperative auto rickshaw drivers, or long walks. COC will bring in celebrities and prominent citizens to project a positive image. The system will be promoted through give-aways and promotional events prior to the launch. COC will retain a professional public relations firm to handle these events. Even after the launch, an on-going campaign will communicate with existing and potential customers and public at large through newspapers, a website, blogs, smart phone apps, advertisements on cycle sharing stations and bus stops, and other collateral.

Moreover, other initiatives such as involving the health and recreational clubs to actively promote the concept of cycle sharing system. The COC shall tie up with major hotels in Chennai where the hotels

lend the cycles to tourists at no cost. Yet the hotels are responsible for the cycles and shall ensure that no theft or significant damage is done.

9. Project Planning and Phasing

The delineation of a coherent coverage area and the saturation of the coverage area with stations at frequent intervals are critical to the success of the Chennai cycle sharing system. From the day operations begin, the coverage area needs to sufficiently large to cover a robust set of origins and destinations. It also needs to augment the city's public transport system in a meaningful way.

9.1 Station identification and system size

The cycle sharing system in Chennai will be implemented in an initial area covering 19 sq km of the city. The coverage area begins from the Gemini, Cathedral Road, Alwarpet, and C.P. Ramaswamy Road to the west; Egmore, Central Station, Broadway, and Fort to the north; Marina Beach to the east; and Madavelli station and South Canal Bank Road to the south. The east-west connectivity provided in the coverage area will help commuters reach important employment centres from the first-phase MRTS line. It also covers important mixed-use commercial centres, including Egmore, Chintadripet, and Mylapore.

Several types of information were observed to guide the placement of cycle sharing stations:

- Important public landmarks, including public buildings, colleges, and gardens
- Designated as well as informal autorickshaw stands
- Bus stops
- MRTS stops
- Streets with a high density of parked vehicles, as a proxy of commercial and mixed land uses

ITDP staff visited all the preliminary locations and then identified specific locations where it is viable to install cycle sharing stations. The station locations were recorded using a global positioning system device and mapped using geographic information system software.

For the initial rollout of the system, 157 station locations were identified. These stations provide reasonably good access to major destinations throughout the coverage area, as shown in Figure 12. After 3 months of operations, new stations will be added, bringing the total number of stations in the system to 200. With these additional stations, the system will achieve a target of around 10 stations per sq km. This density is considered necessary to provide high level of service to the target users, based on the experience of cycle sharing systems around the world.[5]

The expansion will involve a increasing the size of existing stations as well as the installation of new stations in locations where expansion is not possible or in potential destinations that were not covered in the initial rollout.

Stations were sized according to the level of patronage at nearby destinations, using proxies such as observed foot traffic and the number of vehicles parked nearby. Stations were categorised into three groups: small stations with 12 docks, medium stations with 24 docks, and large stations with 36 docks. Some large stations can be constructed as parking area stations, in which a large number of

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[5] Institute for Transportation and Development Policy (2013). The Bike-Share Planning Guide. https://www.itdp.org/the-bike-share-planning-guide-2/.

cycles are retained in a walled parking area. In such stations, a user completes the checkout process by passing through turnstiles with a cycle. Parking areas can reduce implementation costs by reducing the number of docks that need to be installed. The number of cycles was calculated assuming a ratio of approximately 1.5 docks per cycle. System parameters are summarised in Table 2.

Table 2. Phase 1 system parameters

		Initial rollout	Subsequent expansion*
Number of stations	Small (12 docks)	79	6
	Medium (24 docks)	41	15
	Large (36 docks or parking area)	37	22
	Total	157	43
Number of cycles		2,000	1,000

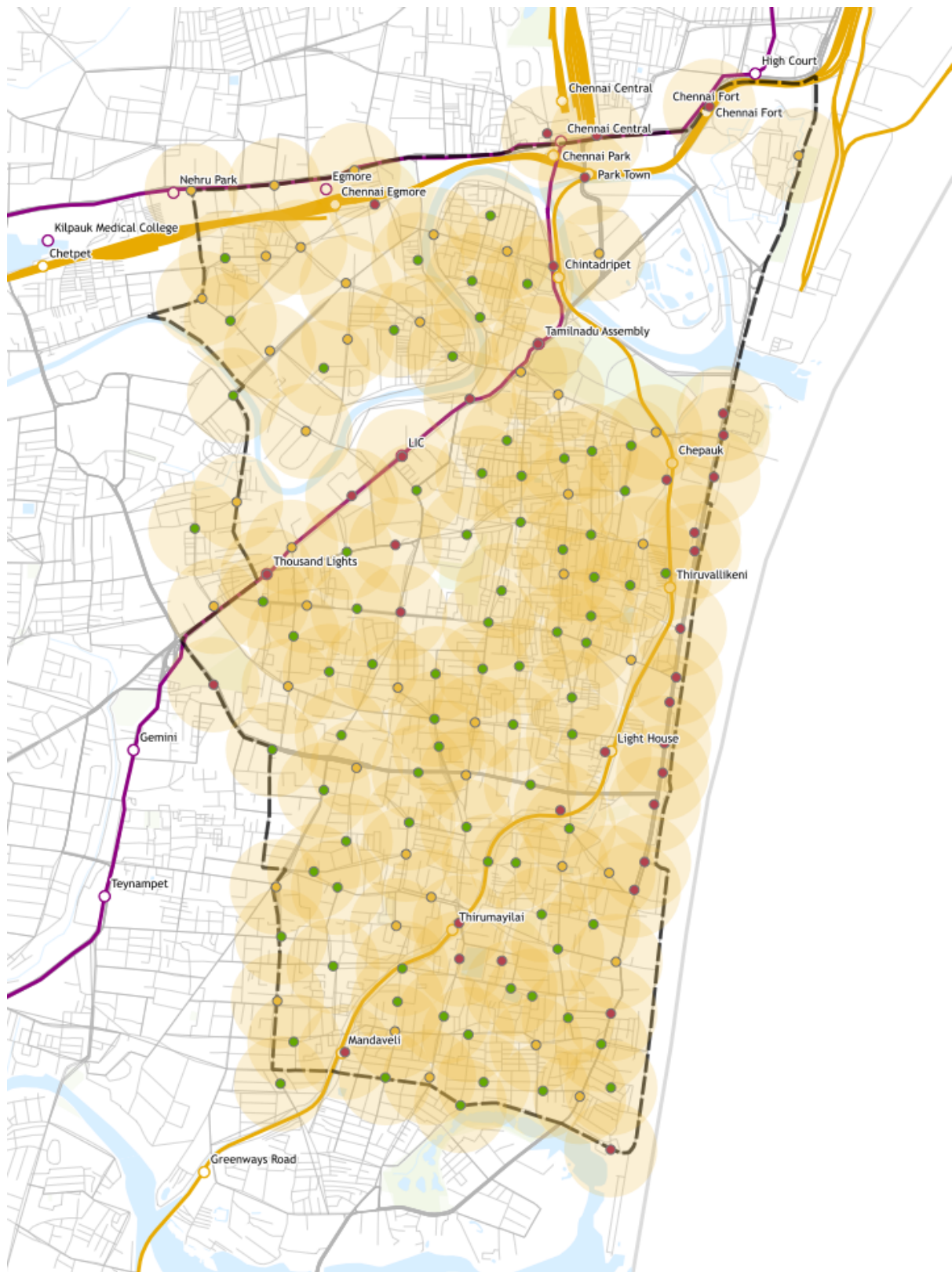* Representative values to be refined based on observed system demand.

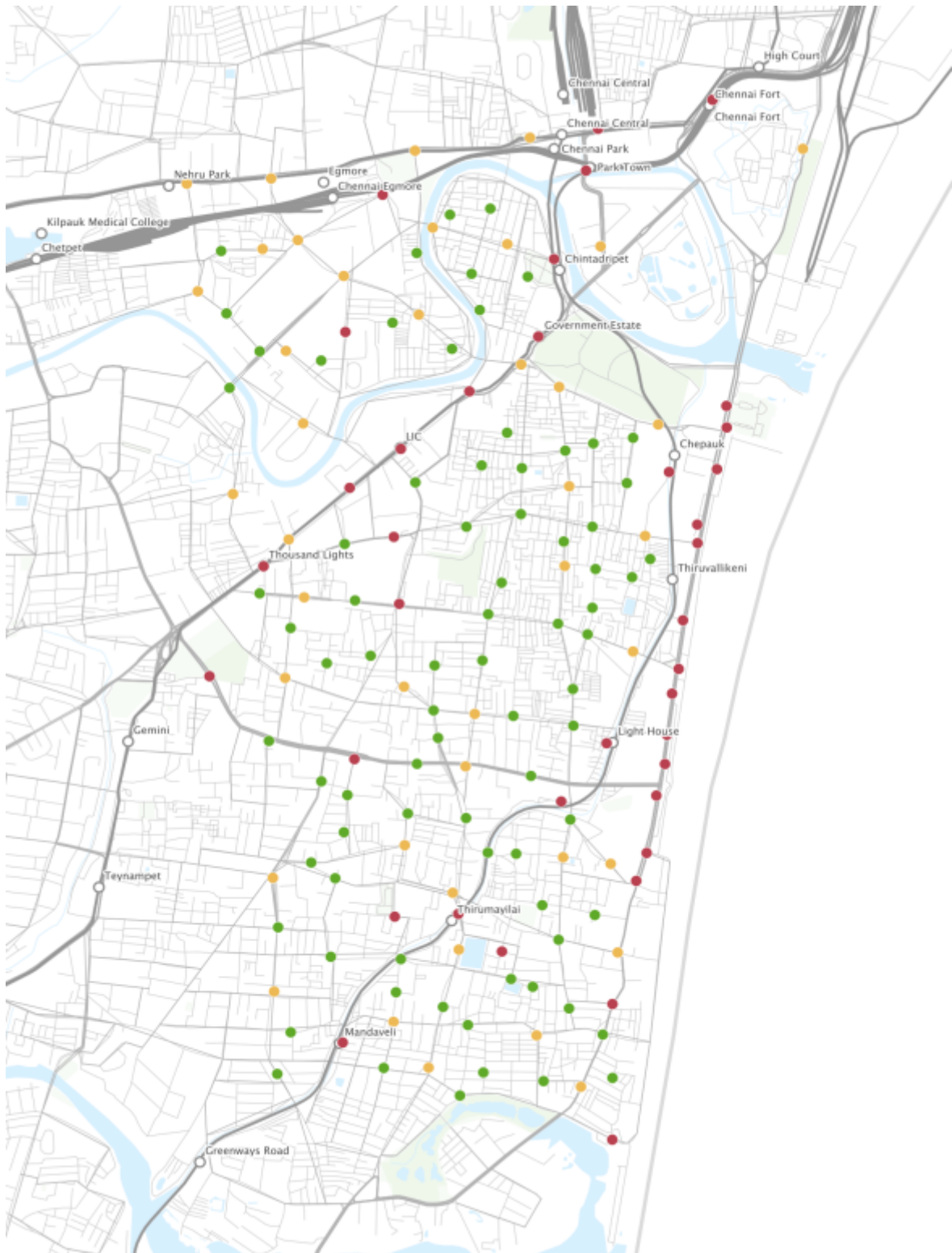**Figure 12. The cycle sharing coverage area, shown as a 300 m radius around each station.**

Figure 13. Station locations of Chennai cycle sharing system (green =small (12 docks), orange= medium (24 docks), red=large (36 docks).

9.2   Pricing structure

This section presents a possible pricing structure for the Chennai cycle sharing system. The annual membership rate should be set at a rate that is high enough to discourage theft of cycles but low enough to encourage broad uptake within the study area. The daily subscription rate would be offered at a lower price for the first month of operations in order to encourage new users to try out the system. However, the daily subscription rate should be offered at a lower price for the first month of operations in order to encourage new users, including local residents, to try out the system. The usage rates should be calibrated so that the cycle sharing system remains competitive with other modes in Chennai. Annual memberships can be offered in monthly instalments of Rs. 100 to expand access to the system to lower income residents.

Table 3. Possible subscription rates

Subscription type	Rate (Rs)
Daily subscription	30
Monthly subscription	300
Annual subscription	800

The objective of the user fee structure is to incentivise short trips. This increases the number of times that each cycle in the system can be used. Trips with duration under 30 minutes are not charged.

Table 4. Possible usage fees

Time period	User fee (Rs)
First 30 minutes	free
30-59 minutes	5
60-119 minutes	10
each additional hour	15

9.3   Ridership scenarios

Some initial estimates of the number of potential subscribers and daily users were prepared using the following demographic data:

- Population density in Chennai: 26,903 persons per sq km[6]

- Study area size: 19 km^2

- Trip generation rate: 1.06 motorised trips per day[7]

The following table indicates the subscriber base as a fraction of the population residing in the study area (19km^2 study area * 26,903 persons / km^2 = 511,157 persons). It also estimates the number of trips per day assuming that each subscriber makes 1.06 trips on the cycle sharing system. These trips include users of personal motor vehicles who switch to cycle sharing as well as public transport customers who begin using cycle sharing as a feeder mode.

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[6] http://www.census2011.co.in/census/district/21-chennai.html
[7] Chennai Comprehensive Transportation Study, CMDA 2010, page 19.

Table 5. Estimated subscriptions and trips by residents

Uptake rate (% of population residing in the coverage area)	Number of subscribers	Number of trips	Number of trips per cycle
2% of 511,157	10,200	10,800	3.4
4% of 511,157	20,400	21,700	6.8
6% of 511,157	30,700	32,500	10.2

9.3.1 Financial analysis

As in most public transport systems, cycle sharing systems generally require supplemental revenue sources to cover operating and investment costs. Revenue streams used in major bicycle sharing systems around the world include advertising, sponsorships, and on-street parking fees. Capital costs, operating costs, and revenue are summarised in the table below.

Table 6. List of costs incurred for implementing cycle sharing system

Capital costs	Operating costs	Revenue streams
• Stations • Bicycles • IT equipment • Software • Redistribution vehicles • Control centre • Website	• Maintenance • Stations • Bicycles: cleaning + repair • IT: software + web • Docks • Administration: supervisors, managers, call centre, membership process • Redistribution of Bicycles: diesel + vehicle repair	• Subscriptions (annual and temporary) • Advertising • System sponsorship • On-street parking fees

The following cost estimates have been prepared taking into account the capital cost categories listed in Table 7. The cost per cycle per day is the service cost required for investing in the installation of 3,000 cycles and 200 stations in Chennai. It is inclusive of hardware, software and operational costs of the system and it will vary with the general price of inflation. Capital costs for the system amount to around Rs 36 crore, or Rs 86 per cycle per day of operations.

Table 7. Capital costs

Items	Quantity	Price per item (Rs)	Total value (Rs Cr)
Cycles	3,000	15,157	4.5
Docks	3,500	33,440	11.7
Terminals	200	1,81,881	3.6
Spare parts for cycles	150	2,12,500	3.0
Spare parts for stations	60	4,80,000	2.9
Vans, tools, ebikes for maintenance and redistribution	-	-	0.6

Software Implementation & project development	-	-	0.1
Total cost			26.4
Total cost (including interest)*			35.9
Service cost/cycle/day			86

*Exclusive of customs duty and shipping

Based on the experience in cycle sharing systems in Asia, operating costs are likely to amount to around Rs 10,000 per cycle per year. This figure includes the on-going cost of cycle redistribution, maintenance, licenses for hardware and software, electricity, staff salaries, and insurance.

Table 8. Annual operating cost

	Operating cost (crore Rs)
Aggregate operating costs @ Rs 10,000 per cycle per year	3.6

As per the proposed contracting structure, COC will receive all system revenues, including subscription fees, usage fees, and advertising revenue. COC will in turn compensate the cycle sharing operator on a monthly basis for the services performed, subject to penalties associated with the stipulated service levels.

Subscriptions are estimated to account for the bulk of system revenues, as displayed in Table 9. User fees are not expected to be a significant revenue source because most trips will be under 30 minutes—the period for which there is no charge. Another potential source of revenue is advertising on large and medium sized stations, which are likely to be in highly visible locations. In addition to the revenue sources outlined above, COC can allocate an annual reserved fund in the budget as a subsidy for the system. This supplementary funding can be generated through other sources, such as fees for on-street parking. Revenue sources directly related to the cycle sharing system: advertisements on the system, membership fees, and user fees—earn Rs 8.4 crore per year, or approximately half of the annual costs of Rs 15 crore, assuming the operator is compensated on a per cycle per day basis.

Table 9. Annual earnings from revenue sources

Source	Earnings (crore Rs)
Revenue/year from 150 regular stations	0.3
Revenue/ year from 50 prime stations	0.6
Revenue/year from cycles	3.1
Revenue/year from smart cards	0.1
Subtotal: revenue from advertisement	**4.1**
Annual subscriptions: 30,700 @ Rs 800 per subscription	3.1
Weekly subscriptions: 5,112 subscriptions @ Rs 400 per subscription	0.2

	0.5
Daily subscriptions: 51,100 subscriptions @ Rs 100 per subscription	0.5
User fees	0.3
Subtotal: revenue/ year from subscriptions and user fees	**4.1**
Total revenue/year from all sources	8.2

9.3.2 Implementation timeline

The proposed timeline for the rollout of Phase 1 is presented below. The total timeframe required for the implementation of the system is approximately one year.

Table 10. Implementation timeline.

	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Tendering	■	■										
Cycle & station design specifications			■									
Station location surveys, drawings				■	■							
Demonstration of prototype station & cycle					■							
Website launch and marketing						■						
Manufacturing and installation of stations							■	■	■	■	■	
System testing									■	■	■	
Applications accepted											■	■
System launch												■

10. Appendix: Supporting infrastructure

Cycle sharing can achieve greater results when paired with measures to improve safety and convenience for cyclists on city streets. Such cycle infrastructure can take the form of physically separated cycle tracks or traffic calming measures to reduce motor vehicle speeds.

Cycle tracks are typically built on larger streets where there is a large differential between the speed of mixed traffic and that of cyclists. Cycle tracks can be placed in the median or at the outer edges of the carriageway, with a minimum width of 2 m for one-way movement and 3 m for two-way movement. On smaller streets, traffic calming measures can be instituted to ensure that motor vehicles and cyclists can safely travel together in the carriageway.

Figure 14. Continuous cycle tracks can enhance safety and convenience for cyclists on major arterial streets in Chennai.

Figure 15 shows a proposed network of cycle tracks, greenways, and traffic calmed streets in Chennai. The network of segregated cycle tracks covers 33.5 km of streets. An additional 50 km have been identified for traffic calming. The cycle infrastructure will serve locations that are expected to generate high demand for the cycle sharing system, including the Kamarajar promenade and neighbourhoods like Mylapore, Mandaveli and Triplicane. The network will help both cycle sharing users and existing cyclists travel through central Chennai and reach MRTS stations and proposed metro stations safely and conveniently.

Figure 15. Proposed cycle network for the cycle sharing coverage area.