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Review of Internal and External Transportation Issues of Artificial City Developments: Port City, Colombo, Sri Lanka

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Abstract

Artificial islands are considered as a lucrative option for countries facing land shortage and congestion. However, many countries such as, Australia, China, Canada, Hong Kong, Japan, UAE and Maldives have constructed such artificial islands for various reason. The Colombo Port City is an offshore artificial island which will be constructed next to the extended Colombo harbour in Sri Lanka which has a gross land area of 269 hectares (2.66 km^2). The main purpose of this city development is to offer an eminent potential for business, leisure and tourism, high quality of living not only for Sri Lankans but also for internationals. The land use of the new city will consist of residential developments, shopping areas, hotels, apartments, offices, educational institutes, recreation areas, a variety of sport facilities, marinas as well as a supporting transportation network.

Colombo City is full with congestion most of the times and recent studies have found that the average vehicle speed has gone down to less than 20km/hr. In addition to that, some major developments are under construction in the heart of Colombo City which will attract more traffic. Given the circumstances, there is a massive public and political concern about how this sort of an artificial city could be connected to the main land. Therefore, the objective of this study was to review the viability of this development in the transportation aspect. This paper will also evaluate the inland transportation planning, operational as well as construction phase and its integration with the main network. Author's direct involvement to the Traffic Impact Assessments has given a great insight to the paper. Transportation network connectivity between port city and main land was reviewed, potential problems are identified and some solutions were discussed to maximize the efficiency of the network. The smooth integration with proposed future transport developments in the main city is also considered.

Keywords: Artificial city, Transportation planning, Land use, Traffic Impact Assessment

1.Introduction

An artificial island is a man-made island created by expanding existing islands, constructing on reefs or by amalgamating several natural islets into a bigger island. Although artificial islands have become popular in the recent years, their history is rooted back into ancient Egypt civilization (1). Examples of modern artificial islands are, the World Islands in the Persian Gulf, Palm islands in Dubai, Île aux Cygnes in France, Spiral Island in Mexico, the Pearl-Qatar, the

Balboa in California, USA and Port City in Colombo, Sri Lanka. Even though it is called as a port city, with its proposed functions, it is does not fall into the category of a port city by definition. It is rather an artificial city with a reclaimed land area.

The primary concept behind such man-made islands/ cities is to create land area for merchandize use, where, spare real estate is unable to obtain from crowded metropolitans. For the said reason, most of the artificial islands are made next to harbours. However, the artificial islands are now being made for a variety of uses, such as for housing, airports, agricultural towns, and for recreational areas.

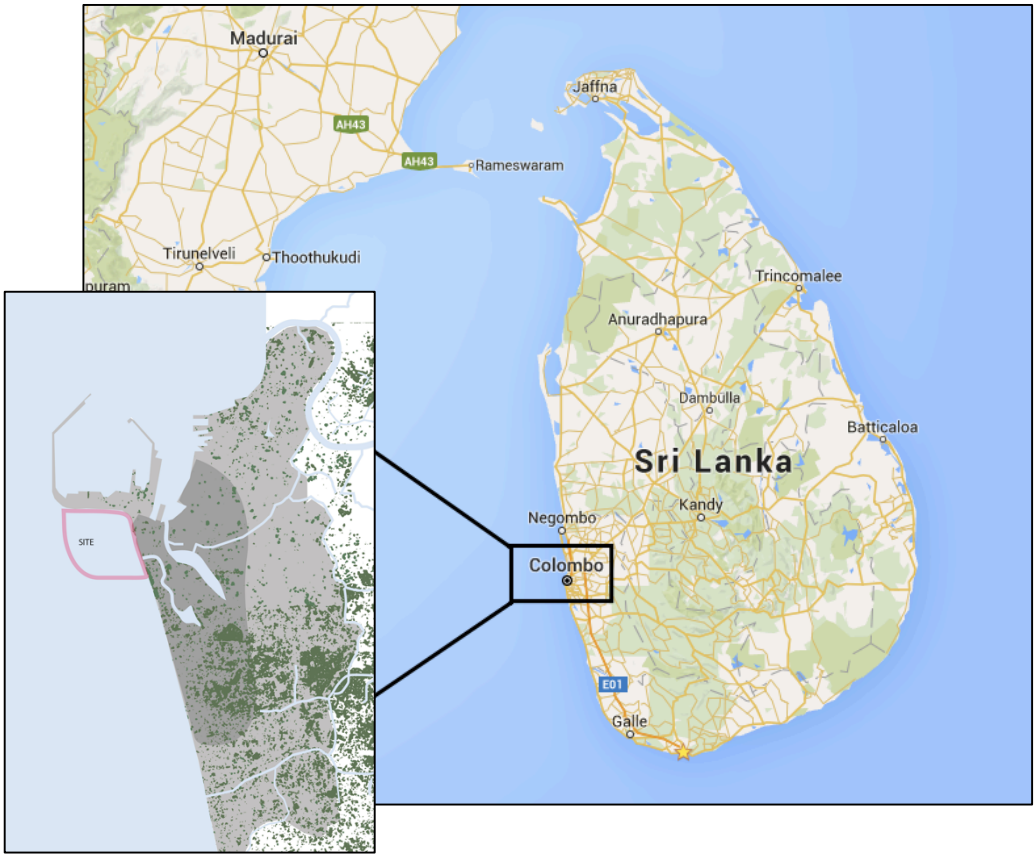

Figure 1 Location of the Colombo Port City

The Colombo Port City is an extension of central Colombo city in Sri Lanka, through a land reclamation from the Indian Ocean (See Figure 1, Figure 2). The proposed city is of 2.66 km^2 land area and of approximately 5.5 km^2 ground floor area (GFA). The majority of the GFA (49%) would be residential, followed by 28% of offices, 12% of commercial land use, 6% of hotels and 5% other developments. As a vision, the port city is expected to be a sustainable addition to Colombo, generating business, tourism and accompanying high quality of life. Even though it is called a Port City, by definition it should rather be an artificial island connected by several road links to the hinterland.

The Colombo Port City Project (CPCP) was reportedly conceived by the Prime Minister, Ranil Wickremesinghe before 2001,later initiated by the Rajapaksa Government in 2009 (The Daily FT, 2015; Path Finder Foundation, 2015). The China Communications Construction Company Limited (CCCC) is the current contractor of the project. According to CCCC,the concept behind the Port City in Colombo is to build a Central Business District as an extension of the existing City of Colombo, which will enable the establishment of a Centre/Hub of the marine silk road in Asia with a potential of becoming the preferred global tourism destination in Asia (Colombo Port City, 2016). As promoted by CCCC, the Colombo Port City will contain a marina and yacht club, a central boulevard, a sea view apartment complex and a five star hotel, shopping

and entertainment centre, office space, a mini golf course, and many other modern facilities (Colombo Port City, 2016; Silva, n.d.).

Developments such as Dubai maritime city port project (Dubai Maritime City Authority, 2016; Herath, 2015) and Singapore's maritime cluster (World Maritime News, 2012), had direct government initiative, and some projects have been co-funded by the government of the host country. In the latter case, the balance investment is typically generated from other friendly nations and private sources (The Daily FT, 2015; Path Finder Foundation, 2015). As for a massive port city project with a very long development period (50 years), attracting 100% foreign investment for the Colombo Port City can be considered as a rare occurrence (The Daily FT, 2015; Path Finder Foundation, 2015). That fact itself can be considered as a major benefit of the CPCP. According to China Chamber of Commerce in Sri Lanka (CCCSL) Spokesman Chen Chuan, 90% of workers in Chinese-funded projects are Sri Lankans (The Sunday Leader, n.d.). The CPCP is estimated to generate 83,000 local jobs itself (Herath, 2015).

Figure 2 Masterplan: Illustration plan

(Source: Colombo Port City preliminary planning clearance update submission)

2. Problem Statement and Objectives

Colombo City is currently a congested city with with an average vehicle speed less than 20km/hr. Instead of decentralizing the developments, several investors have proposed or have initiated multi story building projects in the very heart of Colombo. The proposed Colombo Port City is also located at a critical location where, on of the adjoining roads, Galleface Center Road itself is carrying more than 50,000 vehicles per day.

Given the circumstances, there is a massive public and political concern about how this sort of an artificial city could be connected to the main land. Therefore, the objective of this study was to review the viability of this development in the transportation aspect. This paper will also evaluate the inland transportation planning, operational as well as construction phase and its integration with the main network.

3. Political and Public Acceptance

During the presidential election campaign in Sri Lanka in year 2015, all most all the Chinese projects were subjected to debate (Ada Derana, 2015). Unfortunately, the CPCP was being subjected to senseless attacks by many politicians rather than substantive criticism based on facts and figures(The Daily FT, 2015; Path Finder Foundation, 2015).

The CPCP was initiated in 2011 by then president Hon. Mahinda Rajapakse. However, the constructions started a couple of years after. With the change of government in 2015, the project was suspended by the current president Hon. Maithripala Sirisena. The reasons behind this suspension were interpreted in many ways by many parties, but the current government somehow decided to continue the project, claiming the suspension was only temporary. As the Deputy Minister of Highways, Eran Wickramaratne has told media (Xinhua, English.news.cn, 2015), "The investigation launched by the government was not against the Chinese funded project but was to probe whether the former government had followed the proper procedures before approving the project." He also added that there was no corruption involved in a multi billion-dollar Port City Project.

About the vast amounts of sand dredging itself, environmental issues may arise as well as protests from the general public along with Non- Governmental Organisations (NGOs). Such environmental issues, or the relevant solutions that are being recommended will not be discussed in this paper.

4. Land Use and Traffic Demand Management

Land area of the Colombo Port City is divided in to three precincts for the construction process. Further, when the land use aspects are considered, it is categorized in to five districts: the international island, port city CBD, central park living, living island, and marina. It should be noted that, these sections are not equal in area.

With a potential of creating over 92,000 job opportunities, arises the questions, how these workers will commute to the Port City? What percentage of the workers gets accommodation within the Port City itself? With the proposed hotels, and all other recreational activities, how much of a trip generation is forecasted? And what is the prediction/ estimation of daily vehicle flow, entering and exiting the Port City? Not all these questions are answered at this stage of the development. Land uses are at a conceptual master plan level, with a possibility of change according to the buyers who invest their money in CPCP and several other factors. The said questions can be looked at using two steps, internal traffic demand management and integration with external network. The identified issues in transportation along with the suggested solutions are discussed in the following sections.

4.1. Internal Traffic Demand Management

City planning for the port city is a very critical aspect. A port city shall be developed with a self-contained neighbourhood, so that everything can be accessed by walking or cycling (Gazibara, et al., 2010). Waterfront developments exhibit common land use characteristics: high densities and mixed land uses of commerce, services, entertainment, and housing (Gospodini, 2001). In their conceptual master plan, around 36% of the land area of the port city would be residential land use, whereas, percentages for commercial, hotels and open spaces would be around 14%, 2.5%, 19%, respectively. The goal of the internal traffic management is to create new, safe and attractive public transportation boulevard, "a spine", with improved accessibility. Identified urban nodes according to the land uses will be connected to the mainland in the using this "spine".

When the internal transportation is concerned, approximately 19% of land area is dedicated to public streets. Transport vision of the Port City, prioritizes the use of non motorised transportation modes. The proposed Forest City in Malaysia on the other hand is limited in

favour of pedestrian traffic (Green, 2016). As a tropical country, Sri Lanka has high humidity, hot temperatures and seasonal heavy rains, which can be a major hindrance when walking and cycling is considered, especially near sea side. This issue is addressed within the port city design using tree shades, arcades between buildings, proper orientation of buildings to improve the breeze, as well as air-conditioned malls, and roofed walkways. Another measure taken to reduce the walking time is giving the priority to pedestrians and cyclists when setting up the signal timing at signalized intersections.

To encourage cycling, one cycle parking space will be provided for each apartment, and one space per five employees, ending up with 45,000 bicycle parking spaces in the entire development. Moreover, there will be a bike renting system and the suitable locations for bike rental stations are identified in the Masterplan (See Figure 3). As for high volume roads, 2.5 m wide two-way bicycle paths are designed for boulevards and 1.25 m wide one-way bicycle paths are designed for primary roads. Whereas, cycling in traffic (shared roadway) allowed on low volume roads.

Planners of the CPCP have envisaged the modal split, such that public transportation would minimize the use of private transport within port city, to prevent congestion and unattractive environments for the residents and working population. Hence, public transportation will be given designated space in the roads where ever possible. Bus halts are located considering 400m as the maximum convenient walking distance (See Figure 4). Estimations have forecasted some 300,000 internal and external public trips made per day, equating to about 25,000 trips in a peak hour. For high usage of public transportation, high frequencies such as, two to three services per minute will be served. Furthermore, there will be a ferry service linking the tourist district, the north eastern part of Port City and the Marina in the south east. To be a comprehensive network, ferries will stop at intermediate stations along the canal to connect with the public transportation.

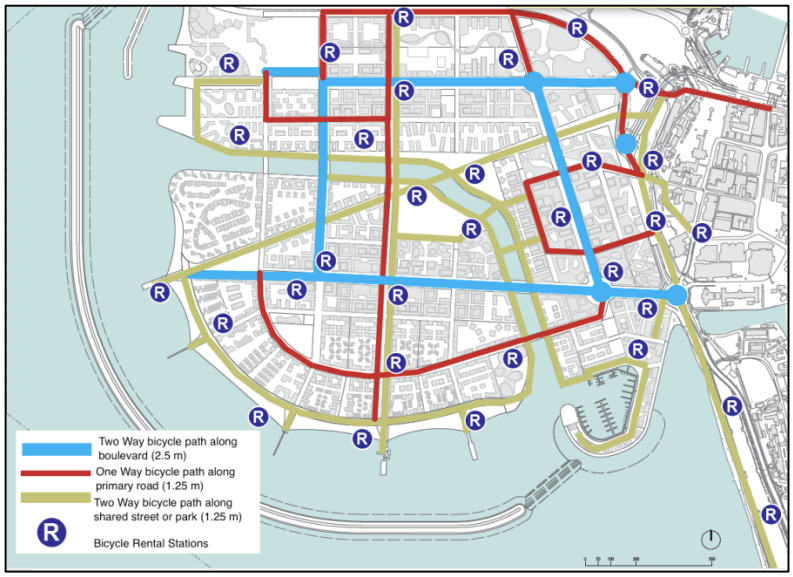

Figure 3 Bicycle strategy
(Source: Colombo Port City preliminary planning clearance update submission)

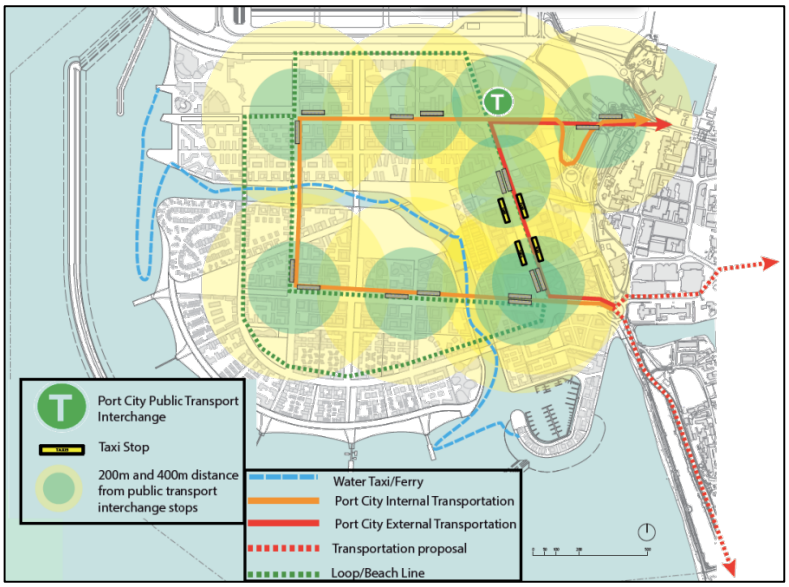

Figure 4 Public transport system
(Source: Colombo Port City preliminary planning clearance update submission)

Another aspect of transportation would be transportation security within the port city. Inner road network is always surrounded by built up areas which makes the road users feel safe. Coastal streets have shared spaces to make users safe, apart from all the activities across the street. When there is a possibility to exceed the traffic speed over 30 km/h, these shared spaces serve as a traffic calming measure as well.

4.2. Integration with External Network

Before moving on to the functioning phases of the port city, relevant authorities were concerned about the traffic impact during the construction phase of the port city to the city of Colombo and beyond. One major aspect of traffic impact during the construction phase would be the rock haulage from the quarries to the port city construction sites. Due to the recommended quality of rock material, quarries are selected from a range of locations in Sri Lanka. The distance to quarries from the port city varies from 20 km to 50 km. According to its Traffic Impact Assessment (TIA), the increase of traffic due to the trucks carrying quarry material would be less than 5% of the current (April 2016) traffic, with the available number of trucks. Six major routes are being selected to access the eleven quarries and identified concerns over narrow and congested road links in the routes were addressed by recommending alternative routes. Critical location along those routes are identified, in order to take necessary precautions. For an example, a famous Hindu Kovil and a shrine are located and different truck schedules will be considered during festival seasons. Also, regular peak hours are identified so that all the trucks would use the city roads during off peak hours. When the damage to the roads are concerned, several parties, including the Sri Lanka Police has paid attention to overloading of trucks when transporting rock materials to the site. These were duly emphasized in the TIA and the CCCC has agreed upon the said recommendations.

When the functional phases are considered, there will be two main road connections from the port city to the existing Colombo city in the mainland, one in the north east (NE) to the port city on the extension of Chatham street and the other in the south east, named Lotus Roundabout. Port Access Road and Marine Drive Extension Roads are currently considered as projects linking to the development of the Colombo Port City. Traffic control system used at both these access points are roundabouts. In the early stages of the planning, these access points were assigned as one for egress and one for ingress. However, the current version, which is the finalized version of the conceptual plan considered these access points as two-way access points, where any access point can be used to enter or exit the Colombo Port City. Internal

Boulevards connects to these two access points and terminates, primary roads continue from the NE access point until the Colombo main transportation hub in Pettah, and secondary roads have three access points to the mainland and tunnel ramps are also serving to connect the port city to external roads. As the current traffic condition in this area is very much congested, this arrangement minimizes the congestion at access points to the port city, inviting more people to interact with the new city.

Integrating port city with external transport network was one of the main failures found in initial port city plan. It was only connected to the main land through Galadari roundabout (Point E: See Figure 5). Then it was studied further and several other connections were proposed as it appears now in order to dilute the impact. Also these outer most access roads are designed in such a way that through traffic is discouraged to use those access roads. In other words, all the trips within the roads of Colombo Port City, would have either their origin or destination located within the Port City.

Outside the Port City, there are few transportations projects on way, where the effects from them to the Port City is yet to be determined as the exact proposals are not yet confirmed. Port Access road, Light Rail Transit/ monorail, proposed by Megapolis development, and proposed bus rapid transit are these said projects.

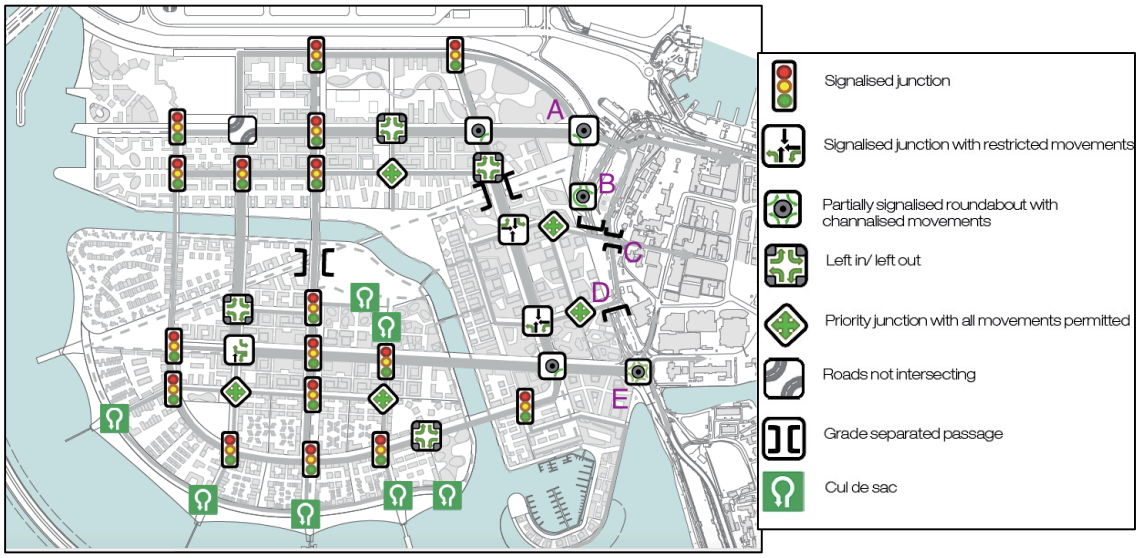

Figure 5 Traffic controlling system
(Source: Colombo Port City preliminary planning clearance update submission)

According to the Road Development Authority (RDA) of Sri Lanka, accommodating the majority of the traffic demand through the Port Access Road can generate a heavy congestion in Colombo municipal region and adjacent areas. Therefore, a proposed elevated highway will connect the port access road in front of Presidential Secretariat to the second new Kelani Bridge with minimum effect to the local traffic. This Port Access Road will be 5.2 km long, with 4 lanes and a design speed of 80 kmph (CECB, 2015).

Other than that, Traffic Impact Assessment team is also looking at the future developments in the vicinity, that has a potential of a significant effect on the same road links connecting to port city. The future developments that are taken for consideration are, Keels Waterfront Development, TATA mixed development, Destiny Towers, Shangri –La, ITC Hotels Galle Face, Hyatt Colombo, and the Krrish development. Trip generation and attractions to these developments, as well as that of port city would be super-imposed on the traffic forecast in order to observe any impact. As the port city will be developed and populated through the years, phase by phase, these impacts are monitored with a timeline.

5. Discussion and Conclusions

There are success stories about port cities, artificial islands, bay cities and other sorts of land reclamation projects. Manila Bay city in Philippines, Beirut City in Lebanon, Marina Bay in Singapore, Marine Façade in St. Petersburg – Russia, Foreshore, Cape Town – S. Africa, islands of Punta Pacifica in Panama, the Cinta Costera – Panama, and Battery Park City – New York – USA can be named as some similar concepts that are considered successful.

On the way to become a successful land development, several aspects should be evaluated in the planning stage, construction stage as well as the functional stage. During the early stages of the Traffic Impact Assessment, authors have observed that the rock haulage would not affect the existing traffic flows of the Colombo City significantly and necessary precautions are suggested in order to minimize any inconvenience to the regular traffic as well as to minimize the damages to the roads due to heavy loads of quarry materials. The addition of truck trips to the daily traffic flow increases the traffic volume by less than 5%, even in the most critical road links. Some of the suggested precautions were, a proper truck weighing system, regular monitoring of the road segments that were identified to have unsatisfactory road roughness values prior to the rock haulage phase, distribution of truck trips to avoid peak hours.

Next, internal traffic management is considered; but with the lack of exact data, about the exact land use types, the conceptual master plan was used to identify tentative trip generation and attractions within the port city. Somehow, the proposed bicycling facilities, promoted walking facilities, improved traffic signal timing and with the priority to public transportation with the port city, it can be considered as a huge step towards sustainable transportation in Sri Lanka. Other cities around the country would probably get inspired by the city planning and streetscaping of the Colombo Port City.

When the port city is considered as a whole, it is connected to the hinterland through two major access points, and two other secondary access points. Those traffic ingress arrangements are properly made so that the existing or the regular traffic flow of Colombo city will still have its smooth flow regardless of the traffic to and from the port city. That was a major concern of the general public which arose with the announcement of the development and to authors understanding, the necessary precautions are taken wherever possible to reduce negative impact on the traffic flow of Colombo city. Upcoming Light Rapid Transit and Bus Rapid transit would make the things easier, but yet to be determined using a traffic simulation. Findings and reviews of this paper were beneficial to the planners and the stakeholders as authors are active participants of the planning meetings that discusses and reviews the designs. As the land uses are not yet finalized, these insights were duly noted by the attendees of such meetings.

Followed by this study, a stakeholder questionnaire survey would be carried out to bring out the critics of people who are expertise in the urban planning, transportation planning and economics areas, so that different aspects of the development are further assessed. As the development has two phases, spanning 25 years, continuous reviews will always benefit the stakeholders as well as the general public both directly and indirectly.

As a future study, the future of port city with respect to growth in activities followed by transportation demand and supply, can be discussed.

6. Acknowledgement

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