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Next Level – Public Transport and Density in Metropolitan Jakarta

下一阶段——雅加达大都市的公共交通和城市密度



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Abstract

Jakarta, with a population of more than 10 million, has been rapidly growing since the 1970s. However, in the metropolitan area, Jabodetabek (consisting of 14 municipalities) has a population of more than 28 million, sprawling in an area of about 6,000km². The main problem of the Jakarta metropolitan area is the lack of public infrastructure, public transport in particular. Jakarta doesn't have adequate public transport and mass rapid transport. The Governor, inaugurated in October 2012, restarted the two most important transport infrastructure projects; Jakarta MRT and the Jakarta Monorail (private investment). These new infrastructures will provide development opportunities for Jakarta's future.

Keywords: Urban Design, Transportation, Density, Jakarta

摘要

自20世纪70年以来，雅加达人口发展迅速，目前已有超过一千万的人口。然而，它的都市区雅茂德丹勿，包括14个直辖市，面积约为6000平方公里，人口已超过两千八百万人。雅加达都市地区的主要问题是公共基础设施比较缺乏，其中公共交通是此地所面临的主要问题。雅加达作为印度尼西亚的首都，却没有足够的公共交通和轨道交通设施。他们的总督，于2012年10月重新启动了两个最重要的基础交通设施项目，分别是雅加达MRT和雅加达单轨捷运，此两个项目都是私人投资项目。这些新的基础设施为雅加达的未来提供了发展机会。

关键词: 城市设计, 交通, 密度, 雅加达

Jakarta Metropolitan: A City in (Mobility) Emergency

Jakarta, the capital city of Indonesia, was founded in the 16th century. Since it was founded, Jakarta has been the main trade hub for the archipelago. In 1950, as Jakarta's independence became widely recognized, the city has become the capital of the Republic of Indonesia. In 1966, the city became a special capital territory (Daerah Khusus Ibukota), led by a governor. Jakarta consisted of 6 municipalities; the majors are not elected but appointed by the governor. In its early years, Indonesia's president played a very important role in planning the capital city. The first president, Soekarno, was an architect; he initiated the first department store, five-star hotels, parliament complex, great mosque, a public square (including a national monument) and major city planning. He planned a north-south and east-west axis from Jakarta's old center (see Figure 1).

A city containing 10 million people in an area of 638 km², Jakarta is similar to Tokyo in size. In 2006, Jakarta's population actually decreased from 8.5 million to 7.5 million (source: BRT study). That was before it steadily increased to its current population of 10 million. However, the greater area, or what used to be called

雅加达大都市: 一个处于交通危机的城市

雅加达，印度尼西亚的首都，成立于16世纪。自成立以来，雅加达成为了众岛屿中的主要贸易中心。自1950年雅加达独立并得到广泛认可时，就已经成为印度尼西亚共和国的首都。1996年，雅加达成为了一个特殊的首都区，并由总督所领导。雅加达由6个直辖市所构成，主要是由选举所形成，并非总督任命而成的。在早些年时，印度尼西亚的总统在首都规划中占有重要作用。第一任总统，苏加诺是一名建筑设计师。在他任职期间，他发起了有关百货商店、五星级酒店、综合性议会大楼、大清真寺、一个公共广场和一些主要的大型城市规划。他规划了一个由雅加达旧中心为起止的南北和东西向的轴线(见图1)。



Figure 1. Early planning of Jakarta, inaugurated by President Soekarno

图1. 雅加达的早期规划，由苏加诺总统开创

Jabodetabek (Jakarta, Bogor, Depok, Tangerang, Bekasi), is an area of 6,400 km², including two other provinces; West Java and Banten; the total population is 28 million people. The issue is that the main economic activities are still in Jakarta. It is predicted that over 4 million additional commuters from the surrounding area of Jabodetabek go in and out of the city during workdays. Most of them are not well served by public transportation.

The transportation infrastructure is a big issue in Jakarta. The main transportation for commuters, for the greater Jakarta area, is the KA Commuter Line. This line has been using an old train track, but has been restructured and reorganized since 2011. Most commuters also use buses and private vehicles, such as cars and motorcycles. The traffic jam in the periphery of Jakarta, and also inside the CBD area, has been worsening every year. Studies that have been conducted in relation to mass rapid transit since 1980, suggest that without any major transportation infrastructure breakthroughs by 2020, traffic jams will cost the city over 5.7 billion USD annually. In the inner city area and CBD, various types of public transport exists; motorcycle taxis, bajaj (small three-wheelers), small minibuses, large minibuses, traditional buses, and since 2004, Jakarta has adopted the Bus Rapid Transit system (TransJakarta). The main issue is that almost all of the transportation modes are in the same level. When one transportation mode doesn't work, the other will also become stuck. As there is almost no reliable public transportation in Jakarta, the commuter tends to use private vehicles; cars and motorcycles. Furthermore, Jakarta lacks a pedestrian infrastructure, as sidewalks are almost non-existent. This discourages people to walk—using public transportation instead—as it is not easily accessible.

The lack of (transportation) infrastructure has always been a burden to the city and its developers. The parking requirements from the tenants are very high, and the regulation also requires a minimum number of parking spaces to be provided (i.e. one parking spot for every 100 m² of commercial office space and one parking space for every 60 m² of retail space). It is an opportunity loss as well as increase in construction costs. Most of ground floor is occupied by vehicle parking instead of pedestrian amenities. The land cost is also increasing; most recently, Jakarta's government increased the land tax up to 100%. Further, government policy does not incentivize people to use public transport; fuel price is heavily subsidized, while at the same time there is very little investment in public transport infrastructure. For the people who can afford unsubsidized fuel prices, as there is no adequate public transport, there is no alternative but to use a private vehicle. One of the indicators is the growth of the private vehicle market; 10% for cars and 14% for motorcycles, while the growth for road infrastructure is only 2%.

Jakarta's local government has limitations in their area of authority in regards to managing rail-based transportation, the national policy has stated. Only the national rail agency has the authority to operate rail-based transportation systems. This regulation was then amended when MRT Jakarta and Jakarta Monorail were established. The other limitation is that Jakarta's government cannot operate intercity transportation systems (including bus rapid transit), as the authority will be with other municipalities. This is crucial as the commuter is one of the issues in Jakarta's traffic condition (see Figure 2).

Bus Rapid Transit (TransJakarta)

Bus Rapid Transit is a temporary solution to Jakarta's public transport problem. The first operation was in January 2004, with the first line

雅加达面积约为638平方公里，人口近一千万，与东京的规模类似。实际上，在雅加达人口达到一千万人口以前，2006年，它的人口曾一路从八百五十万人降低到七百五十万人。然而，曾经被叫作雅茂德唐北区的地方(雅加达，茂物，德波，唐格朗，北加西)，面积约为6400平方公里，包括其他两个省份，分别是西爪哇省和印尼万丹，总人口达两千八百万。问题是，主要的经济活动仍在雅加达。估计有超过4千万的人口每天进出Jabodetabek，他们中大多数人不能享受到良好的公共交通服务。

交通基础设施是雅加达所存在的一个大问题。雅加达周边的乘客所使用的主要交通是KA通勤线，它是2011年由旧的火车轨道重新整改和重组而成的。大部分的人会使用公共汽车、私人交通工具如汽车和摩托车等交通工具。雅加达周边和中央商务区的交通拥堵日趋恶化。有研究对自1980年开始的相关交通做过总结，表明如果到2020年主要交通没有突破性进展的话，交通阻塞将会造成城市大于每年57亿美元的额外花费。在内城区和中央商务区，有各种类型的公共交通存在服务于大众，如摩托出租车，三轮车，小面包车，大面包车和巴士等。自2004年，雅加达也采用了总线快速运输系统。雅加达在交通方面上所存在的问题是所有的交通运输方式都存在同一水平上。如果有一个交通模式不工作或产生问题的话，其他的也会卡住了。因为在雅加达几乎没有可靠的公共交通，通勤者倾向于使用私家车；汽车和摩托车。此外，雅加达缺乏行人设施，人行道几乎是不存在的。这阻止了人们步行外出，使用公共交通也是很不容易的。

这些基础设施的缺乏(例如交通)给城市的发展和开发商带来了沉重的压力。入驻企业对于停车的要求比较高，另外条例对最小停车空间的设置也有相应要求。例如：每100平米的商业办公可以设置一个停车位，每60平米的零售商店可设置一个停车位。这样不仅会损失机会，也会导致建设成本增加。一般来讲，第一层往往用于停车使用，并代替行人设施。土地成本也在增加，最近印尼政府增加了土地税，高达100%。另外，政府的政策不鼓励人们使用公共交通，燃油价格可以得到补贴，很少有人投资于公共交通基础设施。对于那些可以负担得起燃油价格不需要补贴的人，因为没有足够的公共交通工具，他们没有别的选择，只能选择使用私人交通，如私家车等。私家车市场日益增长，显著的指标显示为有10%的人使用汽车，14%的人使用摩托车作为交通工具，然而道路基础设施的增长显示为只有2%。

雅加达的地方政府还在他们的领域利用权威限制管理轨道交通，国家政策规定，只有国家铁路局有权操作轨道交通系统。当雅加达MRT和雅加达单轨捷运建立时，此条例被进行了修改。另一个限制是，印尼政府不能跨区域操作城际轨道交通系统(包括快速

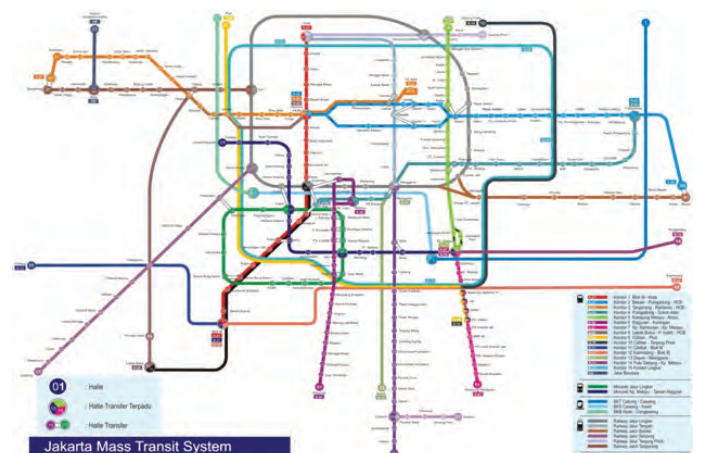


Figure 2. Jakarta Transportation Plan
图2. 雅加达交通平面

from South Jakarta to the city center (Blok M to Kota). Under Governor Sutiyoso's leadership (two terms; 1997-2007) there was a study about Jakarta's traffic problem, one of the results predicted that traffic as a whole will come to a complete stop in 2014 if there is no intervention in the current system. TransJakarta was then implemented. It was adopted from Bogota's TransMillenio (which is derived from the same system in Curitiba, Brazil). Former mayor of Bogota, Enrique Penalosa, was commissioned as the consultant to implement the system in Jakarta. One of the most important recommendations was to also upgrade the pedestrian amenities along the TransJakarta line. The system was then implemented along with sidewalk renovation project along the TransJakarta corridor. The writer, as part of PDW Architects, is involved in developing the strategy, design and implementation of sidewalk improvement in 2004 as a complement to the newly built bus rapid transit system.

TransJakarta now has twelve corridors in total, with a further three in planning. After ten years in operation, the system has helped reduce the traffic problem by using its own (priority) lane and stop in determined stops. Unfortunately, one of the recommendations wasn't fully implemented; sidewalk improvements. There are also more issues in the operation as TransJakarta still shares the same road level as other public and private vehicles; they are still affected by traffic jams, prone to demonstrations that happen frequently in Jakarta, and frequent flooding. TransJakarta changed the urban transport system in Jakarta, but it wasn't enough to move people from using private vehicles to using public transport (see Figure 3).

MRT Jakarta

The plan to build underground mass rapid transit (MRT) has been discussed since early 80's by the city; however, the plan was not continued until 2009 when the Government set up a company, PT. MRT Jakarta, owned by Jakarta's local government. For the first phase, there will be 13 stations, 6 undergrounds and 7 elevated. The first phase will be 16 km in length (from Lebak Bulus in South Jakarta to Bundaran HI, Central Jakarta). It is projected to carry 200,000 – 300,000 passengers per day with total capacity in peak hour: 16,600 passengers.

The next phase will be continuous MRT line from phase 1 to North Jakarta, and then it will continue the east – west line. The first phase will be in similar line to TransJakarta corridor 1, thus it will be replacing the TransJakarta. The project officially starts construction in October 2013 and is expected to be in operation in 2018. The planning stage of the project has started since 2008. A planning document, in the form of Urban Design Guidelines has also been issued. This has had an effect to development of the development along Jakarta's main corridor Sudirman – Thamrin. One of the study conducted, recommend that within 10 minutes walking distance from the MRT station, the floor area ratio can be increased with 1 coefficient multiply by the development area. The station walking distance radius is set to be 350 m in radius. The total development area affected is about 5 million m² with addition floor space area.

The challenge for the underground MRT system is the cost and time to build, the ground water level in Jakarta is relatively high and the risk of frequent flooding. Although the line will be built mostly under existing road, there is also issue of existing buildings, flyover, bridges, and canals. In one of the main station, the level of the station will be 40 meters under the ground level it is comparable to 10 story building underground as that line will be under major junction and canal.

公交运输), 作为当局每个区域必须与其他地方当局共同实行。这是使雅加达乘客在交通条件上面临的一个主要问题 (见图2)。

快速巴士运输

快速巴士运输是暂时缓解雅加达公共交通问题的一个办法。第一条交通线是2004年1月开通的由雅加达南部到市中心的线路(波洛克到科塔线)。总督约梭领导期间(1997-2007年), 在雅加达交通问题上有个研究表明, 如果对目前的交通系统没有任何行动和改善的话, 雅加达的交通在2004年将会瘫痪。因此, 雅加达对交通进行了改善。并采用了波哥大的TransMillenio系统(同时也吸取了巴西的库里蒂巴的系统经验)。波哥大的前首脑和恩克里被任命为此次雅加达交通完善行动的顾问。其中最重要的一条建议就是升级沿雅加达轨道交通线路附近的人行路线, 此系统稍后沿着雅加达轨交线和人行道改造共同实施。本文的作者作为PDW的建筑设计师, 在2004年也参与了此次交通系统改造的发展策略, 设计和人行道路的改善改造实行工作, 使雅加达建立一个全新的快速的交通系统。

TransJakarta交通系统目前有12条线路, 还有3条线路正在规划中。此系统运行10年的期间, 有效的减少了雅加达当地交通的问题。然



Figure 3. TransJakarta in Jakarta's daily traffic
图3. 雅加达每日交通情况

而, 对于之前提议的对人行道路的完善和改进却没有很好的实施。目前在运行快速交通线上仍然存在很多问题, 有很多其他的公共交通和私家交通与快速交通线路处于同一水平线路上, 并受交通阻塞的影响。特别是在雅加达洪水频发的时候, 更容易导致交通阻塞的形成。快速交通虽然使雅加达的城市交通系统得到了缓解, 但是它还不足以使乘客有信心将交通工具从私家车改到公共交通上 (见图3)。

雅加达MRT

自80年代初开始, 雅加达市政就是开始讨论建立地下大运量高速运输(MRT)的计划。然而, 此计划一直未被实施, 直到2009年, 雅加达政府成立了一家公司叫做雅加达轨道交通运输集团, 此公司被当地政府所拥有。第一期的轨交线路预计有13个站点, 6个站点在地下, 7个站点分别在在地上。第一期的轨交线路有16千米长, (是从雅加达南部的勒巴克布卢斯到雅加达中心位置的Bundaran HI)。此项目预计每日可载乘客量为200,000到300,000人, 高峰期载乘客量为16,600人。

下一阶段计划建设的轨交线路将继续延续第一期的线路并将其延伸至雅加达北部地区。稍后将会开展出由东到西的线路。第一期的线路与之前所建设的TransJakarta交通线路相同, 稍后通过完善

Jakarta's Local Government has also prepared urban design guidelines, to anticipate the development impact of The MRT. The guideline is based on transit oriented development, following the planned station, the development along the MRT line has been increased with the average floor area ratio (FAR) of 1. The total FAR for the land that are adjacent to MRT (station) development; in 350 m and 700 m radius; have been affected by the regulation. The concept of the density is bell concept, the closer it is to the MRT station, the higher density of the land increased (Center of Urban Design Studies, 2012) (see Figure 4).

Jakarta Monorail

Jakarta Monorail was started in 2003, it is planned to serve inner city transportation. There are two lines planned; Blue Line runs from east to west (17 stations) and Green Line (16 stations) runs in circle in CBD area, also known as Jakarta golden triangle. The total length of Jakarta Monorail is 29 km in total; it will serve directly 12 million m² of area within walking distance to the station. There was a design competition for the project in 2004, PDW's team was shortlisted and was asked to continue the work for several stations. Unfortunately, the project was stopped in 2008 because of the administration and financial issues.

After being stalled for 5 years, and at one time the previous governor, Fauzi Bowo (2007-2012) was about to change the use of already constructed piles and columns for elevated bus rapid transit; the project was restarted early 2013 by newly elected governor Joko Widodo (2012-present).

Jakarta Monorail is privately funded, by Ortus Holdings, a Singaporean investment company. They have bought the majority of shares from previous consortium and take over all responsibilities. The investor has also worked with international consultants, contractors and operators who specializing in monorail infrastructure project. As the project has stopped in more than 5 years, the re-planning is being conducted. PDW is appointed as the master planner and has designed the concept for typical station. They have also created new branding with naming competition; the winner is Jakarta Eco Transport or JET.

The criticism from the public about the monorail is that in several cities the system has failed. The public was misinformed that the monorail system that is used by Jakarta Monorail is the high capacity monorail, not the "theme park type" monorail. The system is chosen as it can be built in a relatively short time (3 years for the first phase) and requires only a minimal land. The monorail is projected to carry 200,000 people per day for the first phase with the potential projection to carry 600,000 people per day when the Blue and Green Lines are completed. As the monorail will be privately funded; to have the regulated (affordable) ticket price, there should be also real estate component in the stations for the investor's compensation. Further, there is no regulation at the moment that controls the air rights, especially above the public domain. There should also be an improvement in the pedestrian access, in the public domain as well as directly connected to the building.

The challenge for the station is how to design the station that it will contribute to the cityscape. The monorail station will be 12-16 meter above ground, with minimum width of 25 meter (to accommodate two lanes) and 90 meter length (for 6-cars monorail) with minimum 2 story high (8-10 meter). In the area that has high density, the station will be taller. As Jakarta Monorail has only limited land rights, the company needs to collaborate with adjacent land owners and developers to gain from the monorail infrastructure. Another benefit, as the monorail will be elevated, it will be able to operate during frequent flooding, it will also be



Figure 4. MRT Jakarta – Density Concept
图4. 雅加达轨交线—密度概念

将会代替TransJakarta交通线的使用。本项目是从2008年开始规划的，官方上开工的日期是2013年10月，预期2018年能够完工。关于城市规划设计的规范也因此而生成。规范的设定使雅加达主要的轨交线路从苏迪曼到坦林的规划都受到了影响。有一个研究表明，在到轨交站步行时间10分钟内的区域，容积率可以增加1。车站步行距离一般设置为半径350米，受到影响的总开发区域约五百万平方米可以额外增加的建筑面积。

建地下MRT线路具有很大的挑战性，既费时又需要很大的花费。洪水频繁的发生，使雅加达地面水位较高。虽然MRT线路将主要建立在现有的道路上，但是现有建筑物，桥梁，天桥和运河对于建立MRT也形成一定的难度。其中一个主要的站点，会建在地下40米左右，其高度等于地下10层的建筑，另外线路以上会有主要管道的接洽口。

为预计MRT线路的建立所带来的影响，雅加达的当地政府也颁布了有关城市设计方面的规范条例。本设计规范以运输发展为导向，按照轨交发展的计划，MRT沿线的容积率提高1个点。临近MRT站点半径350米和700米以内的开发都受到了设计规范的影响。密度概念是以带状的概念，越是近MRT站点，土地开发密度也相对高 (Center of Urban Design Studies, 2012) (见图4)。

雅加达单轨捷运

雅加达单轨捷运是2003年开始建立的，计划主要服务于城市内部交通。现有两条规划的线路。蓝色线路由东到西包括17个站点，绿色线路环绕中央商务区，包含16个站点，被众所周知的称为雅加达黄金三角。雅加达单轨捷运线路长29千米，共计可服务周边一千两百万平方米以内的可通过步行到达车站的区域。2004年单轨捷运主办方展开了一次针对本项目的设计竞赛，PDW的团队在竞赛中榜上有名，并承担了几个站点的设计工作。然而，由于资金和管理上的失误导致了本项目在2008年中途停止。

本项目被搁置了5年以后，正当时任总督Fauzi Bowo (任职期2007-2012年)想要将已经建成的单轨柱子改变成快速巴士公路的时候，单轨捷运的项目在2013年早期时候被新任的州长Joko Widodo (任职期2012年至今)重新启动。

雅加达捷运项目是由一个新加坡的投资公司叫作傲特集团私人投资建立的。他们从之前的联合体手中买了大部分股票并全权负责了此项目。投资商与那些专门从事单轨捷运项目的国际顾问，承包商和经营者共同合作开发建设此项目。因为此项目中途被搁置了5年多，在项目重启后又进行了重新规划。PDW被指任承担此项目的总体规划设计，并承担了一个典型车站的概念设计。他们还通过竞赛给项目品牌命名。最后获胜的是雅加达生态运输公司，或者叫做JET。

able to work when there is a demonstration or public strike in Jakarta's CBD that often worsen the traffic condition (see Figure 5).

Jakarta Monorail stations will also contribute to the possibility to increase the density of the adjacent development, with the same effect of the MRT development. The Jakarta Monorail developer has requested air rights in the planned stations in several areas where there are high economic activities. There is also an intermodal interchange in one area that, in the future, will connect MRT, Airport Train and Jakarta Monorail (see Figures 6 and 7).

Jakarta as a Benchmark

Jakarta has always been the benchmark for other metropolitan cities in Indonesia. There have been plans to develop transportation infrastructure in Surabaya (East Java) and Bandung (West Java). Those cities with population of approximately 3 million people, they also have similar problem to Jakarta; traffic congestion, flood and lack of urban green open space.

Urban Design Guidelines as a Tool

The urban design guidelines has been used by the authority as development control, it is becoming more widely use to help the city improve its planning process and development. The guidelines depend on the city ability to increase its carrying capacity. The planned Jakarta's transportation system will improve the carrying capacity of almost 20 million square meters with MRT Jakarta and Jakarta Monorail in operation, as soon as 2017. Further, other infrastructures also need to improve to support Jakarta as service city. The transformation of urban design guidelines need to accommodate and complement the improvement of infrastructure. Several urban design guidelines have

来自公众的批评主要是单轨捷运在很多城市最后以失败告终。公众把雅加达采用单轨大运力单轨系统想象成了游乐场里的过山车。此运输系统一般需要较短的时间建立完成，一般在3年左右，而且只需要较少的占地面积。第一期运行的单轨捷运预计每天可载乘客量在200,000人左右。等到蓝色和绿色交通线完成后，预计每天可载乘客量在600,000人左右。因为单轨捷运是由私人投资建立完成的，需要设置相对经济的交通票，这里需要建立相关的地产开发项目从而为投资者产生一定的回报。目前，没有相关的法律法规来限制上空使用权，特别是对公共领域的上空使用权没有界定。另外，对于公共领域的和相邻建筑物附近的人行道设施也需要进行完善。

站台设计的难点在于怎样的设计才能使其为城市景观做出贡献。单轨捷运一般会建在地上12到16米左右，轨道最低宽度为25米（可容纳两个车道），长度为90米（6节单轨车厢），和最少两层的高度（大概8到10米）。在高密度的地区，站台会稍微高一些。因为雅加达只对土地使用权有相关规定，轨交公司需要与轨交站附近的土地业主和开发商合作，通过一些基础设施建设获利。单轨交通的另一个优势是，它是通过高架架起的，在雅加达洪水频发期，此交通仍可运行。另外，在雅加达中心商务区经常会出现严重的交通阻塞情况，单轨交通可以有效的缓解此时所产生的交通压力（见图5）。

雅加达单轨捷运与MRT建设有相同的影响和作用，也会使周边开发建设密度增加。雅加达单轨捷运的开发商已经在几个高经济活动区域规划站点区域内申请使用了上空使用权。也有一些区域采用了联运换乘的方式，在未来大部分的交通方式都会链接起来，比如快速交通线，机场火车站和单轨捷运等（见图6,7）。

雅加达作为印度尼西亚大都市发展的标杆

雅加达一直以来都是印度尼西亚大都市的标杆。目前已经有计划发展泗水（东Jaya）和万隆（西Jaya）的基础交通设置。这些城市的人口近3百万人，他们与雅加达有着同样的交通拥挤，洪水和城市绿色开放空间的缺乏的问题。

城市设计规范作为一种工具

城市设计规范主要被相关管理机构用于控制城市开发来使用的，并被广泛应用于提升城市的开发过程和程序。此规范主要取决于一个城市的承载力。到2017年，被规划的雅加达交通运输系统，包括快速交通线路和单轨捷运的共同运行，可以使城市承载力增加两千万平方米。另外，其他的服务于公众的基础设施也需要进行完善。城市设计规范也需要对基础设施建设方面进行引导，城

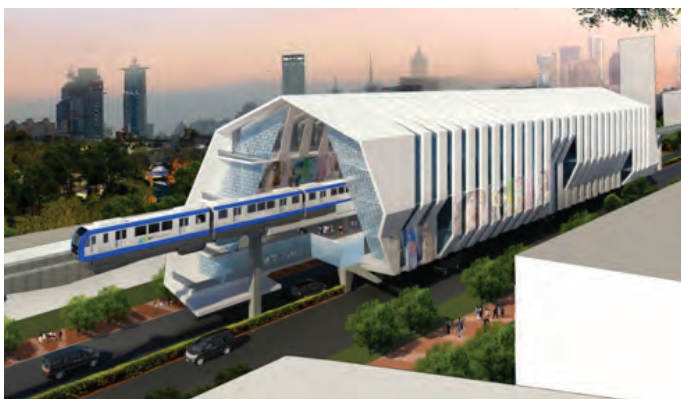


Figure 5. Jakarta Monorail Typical Station
图5. 雅加达单轨交通典型车站效果图



Figure 6. High Density Station Provides Connectivity to Adjacent Commercial Area
图6. 高密度的站点设置有效的链接起周边商业区域



Figure 7. High Density Station at the Intermodal Interchange
图7. 多式联运换乘的高密度站点

already correlated and complement one and another. This will improve the built environment quality of the area.

The high density development will be controlled in the urban design guidelines with the increase and redistribution of development intensity in the area. This will provide more (green) open space and public facilities in the development area. The infrastructure network should also be able to be a catalyst for the green infrastructure. The transformation of the guidelines rewards the development that contributes to city's infrastructure and reducing the development. The increase of development intensity will be given to the development that meets the criteria in the urban design guidelines that encourage, among others; provision for green open space, linkages and public facilities. The sustainability issue is also addressed more in the urban design guidelines review by the city planning authority.

In the absence of air rights development regulation, the urban design guidelines can also be used as the intermediate tools. The urban design guidelines for MRT stations have been issued; however, the one for Jakarta Monorail stations has yet been drafted. There will be 33 elevated stations around Jakarta's central business district; these stations can also be a hub for skywalk or above ground connectivity to cross the road. This is also another improvement for pedestrian facilities in Jakarta (see Figure 8).

Concluding Remarks

There are opportunities to increase the carrying capacity and density of the area affected by transportation infrastructure. The MRT Jakarta has provided this opportunity to many developments. The issue is that the transportation infrastructure will not be completed when the granted development has finished construction. There is also issue in the parking facilities that are required in the new development. The regulations should limit the maximum parking required rather than minimum number. In addition, the pedestrian and bicycle facilities need also to be improved to encourage the people to leave their private vehicles at home.

With these transportation infrastructure projects, Jakarta will be able to raise its level of services. The vision to be a service city could be realized. The density and the number of tall buildings have been increasing. Before the financial crisis in 1998, there is only one 50-story building in Jakarta. Recently, with the increase of land price and development cost, there are several buildings that higher than 40 stories are planned. Other metropolitan cities in Indonesia should follow Jakarta's lead in term of transportation infrastructure, as well as increasing the density thus creating the opportunities to build taller. to build taller.

市设计规范是起着相互指引和导向作用的。此规范的实施可以有效地提升区域内的环境质量。

城市设计规范可以有效地控制城市开发区域内的强度，起着引导和控制作用。它的实施可以有效地控制开发量，并在开发过程中尽量保留最大的绿色空间和公共设施场地。基础设施的改善也是促进绿色基础设施形成的催化剂。城市设计规范的方针是鼓励城市基础设施的发展，不鼓励过度开发。政府鼓励满足城市设计规范相关规定的开发强度，例如开发中能够提供公共绿色空间和服务设施是受政府政策鼓励的。可持续发展是城市规划管理局在设计规范中着重强调的一点。

由于开发规范中并未对上空使用权有相关规定，这使很多项目的开发将城市设计规范作为暂时使用的工具。雅加达的MRT交通站点建立就遵从了城市设计规范中的相关规定。但是关于单轨捷运站点的建设和建立却还没有起草相关的规定。在雅加达中心商务区会建设33个高架站点，这些站点不仅可以作为人行天桥上的一个通行枢纽，也可以通过与地面的链接成为一个步道。这样的设置，也是提升雅加达人行设施的一个重要举措（见图8）。

结束语

通过交通设施的改善将为提高区域的城市承载力和开发密度创造机会。雅加达MRT交通线路的建设就带来了许多发展机会。但是现在所存在的问题是当大部分开发项目完成时，基础交通设施却不能整体运行和完善。同时，停车问题也是开发中所面临的一个大问题。另外，为了鼓励人们减少对私家车的使用，人行道和自行车道设施也需要进行完善。

这些基础交通设施项目的开发和运行，使雅加达服务于大众的水平得到进一步提升，成为一个服务体系完善的城市的梦想指日可待。目前雅加达的高层建筑和开发密度随着开发强度的加深不断增长。在1998年金融危机以前，雅加达只有一幢高为50层的建筑。随着土地价值和开发成本的不断增长，现已经有几幢高于40层的建筑计划建成。印度尼西亚其他的大都市，应该跟随雅加达在基础设施建设上的脚步，加强开发节奏，建设高层建筑，为城市的不断发展带来更多机遇。



Figure 8. Jakarta CBD's Skyline
图8. 雅加达中央商务区的天际线