

## Downtown Cairo Urban Regeneration – A Model for Future Urban Regeneration Plans with Energy Efficiency Interventions

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The Implementation Plan is intended as a future prototype to explore new models for urban regeneration in historic zones that integrate energy efficiency into the plans, thereby linking planning and urban design measures for the improvement of mobility and the public realm with public and private investments in energy-efficient buildings.

### 1. Background on Population, Living Conditions and Environment

#### 1.1 Population

Egypt is one of the fastest-growing countries worldwide and will continue to grow at such a speed that by 2050 it could surpass many others around the globe countries. If countries are depicted not according to geographic size, but to population figures based on internal growth (not considering migration), countries like India or Egypt gain disproportionate importance compared to their size.<sup>[1]</sup>

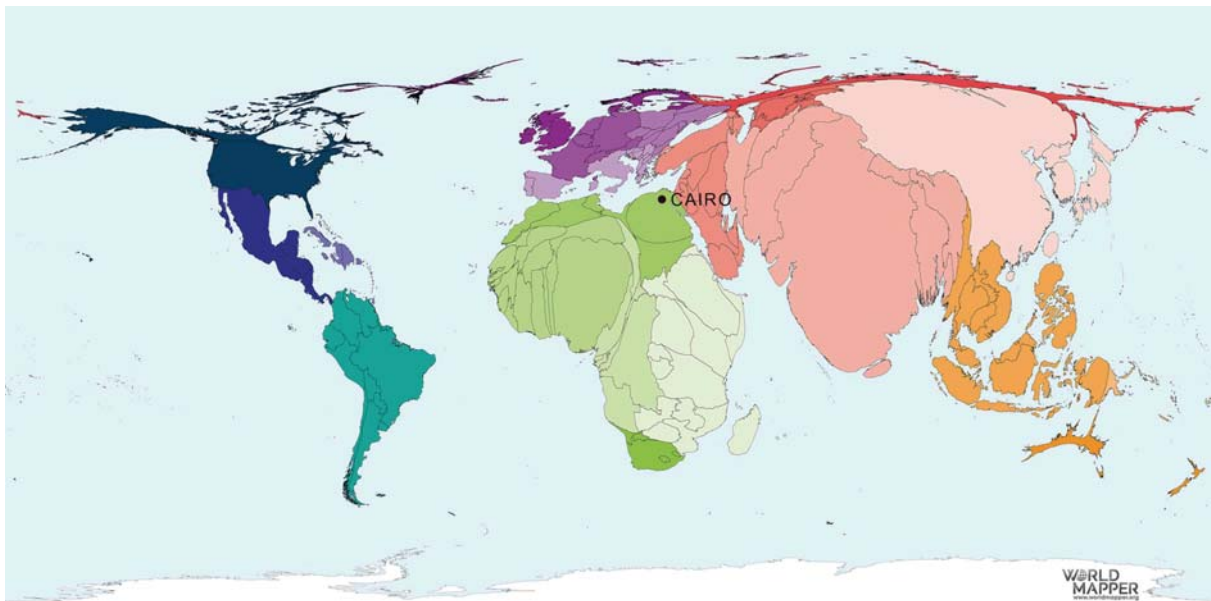


Figure 1: World Map based on internal population growth  
Data source: [https://worldmapper.org/maps/population-year-2050/?sf\\_action=get\\_data](https://worldmapper.org/maps/population-year-2050/?sf_action=get_data)

Greater Cairo is a megacity with—considering the contradictory numbers—approximately 27 million inhabitants. Even in 2016, Cairo had an estimated population as high as 12 million, with a metropolitan population of 20.5 million, which made it the largest city in Africa and the Middle East.<sup>[2]</sup> This unprecedented growth rate has caused negative consequences for Cairo with regard to the environment, living conditions and economics.



Figure 2: Cairo is located in the desert, the fast growth of the last decades caused immense construction on formerly green spaces Data source: <https://www.citymetric.com/fabric/cairo-has-dangerous-growth-problem-how-can-it-be-fixed-2865>

## 1.2 Living Conditions

Seventy percent of Cairo's inhabitants cannot afford to live in an apartment, based on the supply of the official housing market, but have to refer to the informal market with all its negative environmental consequences. The informal market bases its supply on illegal land or construction, following three different strategies. Firstly, farmers transform their land zoned for agricultural use into building sites without providing adequate infrastructure, i.e., public transport and utilities (sewers, water, electricity, etc.). Secondly, already densely-built up residential areas are further densified with illegal buildings or additions. Thirdly, illegal structures are added onto the roofs of historic buildings (mainly on buildings from the late 19<sup>th</sup> and early 20<sup>th</sup> century in Downtown Cairo) without structural reinforcement or safe access. The government and nearly all private developers, in contrast, focus on the development of new towns in the desert <sup>[3]</sup> on the outskirts of Cairo to accommodate numbers that have more than tripled since the 1970s, far from public transit and current living quarters. This new town development in the desert is not only negative for the environment, but also for the quality of life of the workforce and their families, who would be separated from their workplaces and social contacts. That is the reason why many of these new housing developments have failed to be accepted. Some young families, however, are gravitating towards the fast-expanding satellite cities in pursuit of cleaner air and to avoid the negative impacts of high noise levels generated by the city, where waste disposal is hugely inadequate and water pollution is a significant issue for many communities.



Figure 3: Informal construction in existing residential neighborhoods Data source: <http://www.mei.edu/content/informal-areas-cairos-silent-urban-revolution>

Downtown is currently the administrative center of Cairo and still houses all the government functions, but the ministries will soon relocate to the future capital, "New Cairo,"<sup>[4]</sup> which is under construction and proceeding fast. After its completion and the relocation of the ministries, as well as of the Egyptian Museum to Gizeh, the future of Downtown will depend on the success of revitalization efforts to make it more attractive as a place to live and work.

### 1.3 Environment

Cairo has been ranked as the second most polluted large city in the world, according to a report issued by the World Health Organization (WHO), which studied air pollution globally from 2011 until 2015. <sup>[5]</sup> The WHO report noted that seven million people worldwide die from exposure to polluted air, adding that nearly 4.2 million people died in 2016 from air pollution; pollution from fuel exhaust also resulted in the death of 3.8 million people in 2016. In 2017, the United Nations Environment Programme stated in a report that 40,000 people in different parts of Egypt all died from pollution. The report pointed to the absence of trees within Egypt's capital as leading to the increase of air pollution.

Hosting a population of 19.5 million, <sup>[2]</sup> Cairo <sup>[6]</sup> is considered to be the most congested city in Egypt. The Egyptian capital and its neighboring Nile Delta cities suffer from some of the worst air pollution on Earth. Two million cars on its clogged-up streets and a thousand factories surrounding the city cause severe pollution, which is aggravated regularly in the fall when farmers outside the city burn leftover rice husks. High emissions and Cairo's topography—the city lies in a valley surrounded by hills—and the extremely dry climate make the pollution even worse. In the fall, frequent temperature inversions settle over Cairo, stilling the winds and preventing the movement of air. As in other developing countries, the rapid urbanization and weak enforcement of environmental regulations have especially left the poorer urbanites vulnerable to bad air.



Figure 4: Smog over Downtown Cairo – illegal construction on rooftops  
Data source: Silja Tillner

Almost all of the city's trees, its most effective dust filters, have disappeared, as has much of the surrounding agricultural land. Every year approx. 30,000 acres of undeveloped land is lost to urban sprawl. Cairo's notorious traffic, the abundance of old cars without pollution measures, the high-rise buildings and narrow streets that trap poisonous air close to the ground have all contributed to the city's consistent ranking as one of the world's most polluted cities. Lately, promising efforts have been taken to reign in the problem.

*[...] perhaps, the public and private sectors both appear to have come up with some solutions to the rice straw-burning epidemic. Authorities appear to be slowly reining in illegal agricultural waste fires. An architect, Essam Hosni, has designed building blocks out of the straw, possibly providing an answer to Egypt's lack of affordable construction materials in the process. Potters in the capital's Old Cairo district have taken to packing their delicate wares with rice straw.* <sup>[7]</sup>

### 1.4 Downtown Cairo – City Form and Function

Downtown Cairo is equivalent to the Khedival Cairo and was once called "Paris on the Nile" at a time when it was an urban oasis full of greenery. The urban lay-out of its formerly tree-lined streets and squares, the landscape design of parks, and the architecture of the buildings was of the highest quality, because the Khedives used the most beautiful European

cities in France, Italy, Germany and Austria as models and hired the best craftsmen at that time to plan their city, open spaces and buildings. Downtown is full of valuable historic heritage and still the administrative center of Cairo, but it will change considerably when most of the government ministries move to the new capital.

## 2. EBRD Project – Strategy for Future Revitalization Projects – Ambition – Team

The Implementation Plan is intended as a future prototype to explore new models for urban regeneration in historic zones that integrate energy-efficiency into the plans, thereby linking planning and urban design measures for the improvement of mobility and the public realm with public and private investments in energy-efficient buildings. The EBRD supports private and public initiatives to revitalize the historic center and save its heritage with a financing model that offers sustainable alternatives to profit-driven private developments.

In parallel to the Government of Egypt's demonstrated intent to redevelop Downtown Cairo, the European Bank for Reconstruction and Development (EBRD) has emerged as an international development partner that is uniquely interested in Downtown Cairo and has taken a proactive approach to supporting the Government of Egypt's efforts. As such, the EBRD has commissioned technical assistance for the integrated and sustainable regeneration of Downtown Cairo by developing a strategic implementation plan for the regeneration of the area, maintaining its cultural and historical heritage, conducting energy and resource audits of major buildings in the Downtown area, and national policy engagement with key public and private stakeholders. <sup>[8]</sup>

### *Objectives of the Implementation Framework for Downtown Cairo Urban Regeneration*

The Implementation Plan was launched by the EBRD as a future prototype to explore new models for urban regeneration in historic zones and urban fabric. <sup>[8]</sup>

Work on the Downtown Cairo Regeneration Implementation Plan began in early 2016 and has been implemented by an Egyptian-Austrian consortium of urban regeneration and building energy efficiency experts, led in Egypt by OHK Consultants. This international / local team <sup>[9]</sup> worked in close collaboration with the Cairo Governorate to develop the Implementation Plan.



Figure 9: Traffic in Downtown Cairo Date source: Silja Tillner

## 3. Analysis of Current Conditions

The analysis of current conditions in Downtown Cairo shows they are a detriment to its citizens: Results from the analysis of the existing situation and the adaptive strategies developed to meet current and future challenges could contribute to the topics weather, water, food and energy. (See pages 1-4)

### 3.1 High Traffic Volumes

Current conditions have high negative environmental impact for the citizens because the high traffic volumes consist of many old and polluting vehicles. Since observations showed that

many are mostly passing through Downtown or are drop-off traffic opportunities arise from possible changes in street-hierarchies. (See page 10-11)

### 3.2 Environmental Pollution Heat

Pollution levels have been severe (see pages 1-4), but the hot and arid climate, combined with a disadvantageous topography that prevents air circulation through winds, all add to the extreme overheating of the whole city, but especially the urban core in Downtown Cairo. Air-conditioning also aggravates the heat island effect.

### 3.3 Lack of Public Spaces

Historic parks have been demolished and newly designed open spaces, e.g., the large plaza above the underground parking garage at Tahrir Square, neither provides greenery nor shade. Since 2011, the public realm has been transformed into a high-security zone with few open spaces left for the public; the design lacks planting and instead mostly consists of hardscape and grass. The few remaining green spaces and street trees suffer from a lack of irrigation. Therefore, the Downtown Cairo Urban Regeneration Plan emphasizes the creation of new open spaces and the refurbishment of existing ones with lush landscaping.

### 3.4 High Energy Consumption

Most buildings (see pages xxx) do not possess passive measures for cooling, e.g., insulation, exterior shading or natural cross-ventilation, but instead rely on air-conditioning which not only heats up the environment, but also generates high energy costs. Since 2016, Egypt had to reduce its massive energy subsidies, which kept prices extremely low for decades, leading to steep rises in energy costs. Finally, because of these high prices there is a new interest in reducing energy consumption and investing in building improvements. Therefore, the Downtown Cairo Urban Regeneration Plan emphasizes energy audits of public and private buildings, the training of local experts, and a set of recommendations for technical building improvements.

### 3.5 Built Form

#### 3.5.1 Situation

The Urban Morphology shows four different that exist in Downtown patterns developed over reflect the planning and eras. The orthogonal and derive from the original which was developed by planners and inspired by for Paris. These different diversified and Downtown Cairo. Its strengthening and base for the further development of an urban



Map of Downtown Cairo patterns of urban fabric Cairo. These different the course of time and building styles of different radial patterns in particular plan for Khedival Cairo, European (mainly French) the Haussmannian plan patterns generate the exceptional urban fabric of definition, clarification, exploration will form the process and the revitalization strategy.

Figure 5: Urban Morphology Map 8) Data source: Architects Tillner & Willinger

#### 3.5.2 Opportunity

This unique morphology presented a great potential for urban design strategies for future revitalization, since it structured Downtown into distinct characteristic areas. The proposals

built upon this differentiation thematically with regard to their content, as well as technically concerning proposed measures in the public realm, i.e., streets, squares and parks. The circular squares and connecting diagonal streets especially served as starting points and foci for revitalization, i.e., backbones in a network of measures for creating a pedestrian-friendly environment.

The radial pattern originates from three circular squares and two streets that break the regular orthogonal grid and diagonally connect these squares. Comparable to recent traffic-calming measures in Paris, <sup>[13]</sup> these circular squares and diagonal streets present an opportunity to create unique places within the Downtown grid. The design measures focus on supporting pedestrians, e.g., widened sidewalks, reduced parking, landscaping, etc.

The orthogonal pattern is characterized by perpendicular roads of different hierarchies and defines rectangular land parcels of similar size. The opportunity here lies in the differentiation of the various street hierarchies. Local, quieter and narrow streets will become pedestrian-friendly thanks to the removal of street parking and the introduction of special landscaping that invites pedestrians to slow down and rest. Wider streets and the linkage to Ramses Railway Station will be strengthened in their business-oriented character, i.e., the movement of pedestrians will be supported while not ruling out vehicular traffic.

Cairo's organic fabric is typical of traditional, older neighborhoods that are more residential in use. Narrow, curved streets and similar building heights define its homogenous organic fabric. The relatively high density and residential character present a challenge for potential interventions; therefore, these districts are considered secondary for regeneration in the future and were recommended for protection, as they provide affordable housing for low-income residents, near their workplaces in Downtown.

The fourth defined structure within Downtown's borders is spaces defined by voids and predominantly large, freestanding buildings like in the area around Tahrir Square or the undeveloped site at Azbekaya. Historically, this typology originated for important buildings, e.g., palaces, theatres or museums (the Egyptian Museum or Abdeen Palace). These undeveloped spaces present yet another opportunity for regeneration, and landscaping could be used to achieve important linkages, primarily to the Nile River and Islamic Cairo.

#### **4. The potential to develop adaptive strategies and become climate-proof is high thanks to existing strengths of Downtown Cairo, e. g. the metro, high-density neighborhoods with mixed-use heritage buildings**

##### **4.1 Metro, Railway, Buses**

Currently, Downtown is well served with public transport with metro lines, an extensive bus system and the railway station at Ramses Square. Metro Line 3 is under construction and will further improve the public transport network. Usage is high, but the ways to and from the transport stops are highly uncomfortable due to the negative climatic conditions and, particularly for women, are often unsafe. This leads to the high rate in drop-off traffic with especially Uber having become a major form of commuting service. The buses are stuck in traffic with all the individual vehicles and therefore not very effective. Furthermore, they are jam packed and often unsafe for women.

##### **4.2 Density and Mixed-Use**

Downtown Cairo is a truly mixed-use city center with retail uses on the ground floors, offices and apartments on the upper floors. At the shop opening hours from 10 am until 10 pm streets are busy with shoppers, especially in the cooler evening hours. Apart from these hours and on major holidays streets are deserted because many apartments are rented, but actually vacant depending on the area; light industrial uses and workshops are also found on ground floors, especially car repair shops, because streets are cluttered with dysfunctional vehicles and not compatible with pedestrian-friendly mobility and street concepts.

### 4.3 Open Space

The extension of the public realm is limited in Downtown Cairo and there are not enough green spaces. An option for increasing the amount of open space is reorganizing the already existing public space by introducing pedestrian space instead of roadways.

Downtown Cairo's historic gardens have largely disappeared and only a few remnants of the historic public spaces are visible today, e.g. the park connected to Azbekaya still partially exists and is a melancholy reminder of its former historic grandeur. The unique opportunity to again complete the park and bring it back to its original state according to the historic plans and recreate its former splendor will be used by the Cairo Governorate following the DCRP

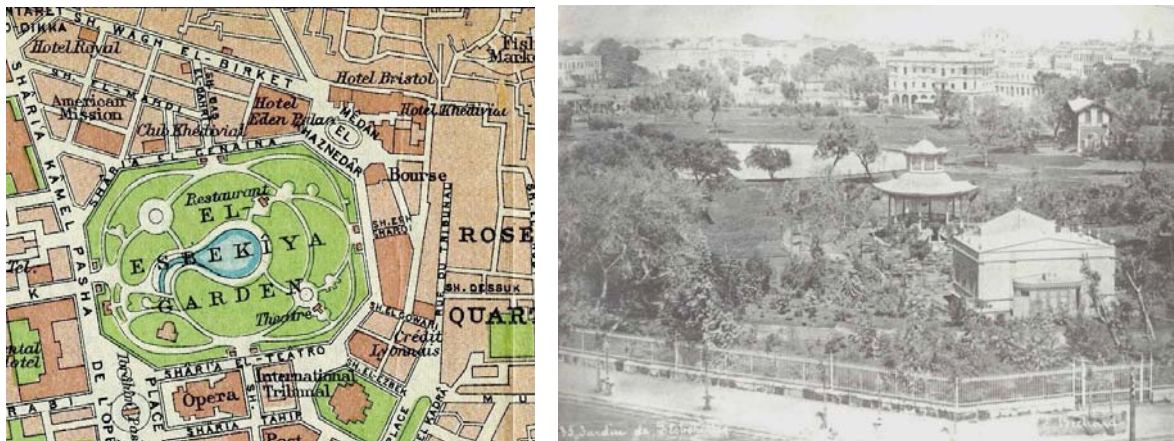


Figure 6: left: Historical map of Al Azbakeyah Garden, right: Historical picture of Al Azbakeyah Garden  
Data source: National Library Vienna

### 4.4 River Nile Waterfront

The embankment of the River Nile (see figure 7) and its environment offers an open space resource for Downtown Cairo as a continuous pedestrian promenade that currently suffers from a lack of connectivity. An option is to improve the pedestrian movement and linkage with safe crossings across Nile Corniche, and to include the existing bridges as a part of any new embankment design. By extending the embankment with platforms the pedestrian experience of the bridges can be expanded with safe terraces. A river transport terminal with ferries—like Venice's Vaporetto system—is an additional offer.

## 5. Vision and Guiding Principles

*The guiding principles build on and reinforce existing strengths and address current deficits.*

The following measures could lead to a more resilient city that takes into account its limited resources: improvements in infrastructure and resource-efficiency, mobility, landscape and urban design. Downtown Cairo could become a city center with less pollution as a result of a shift in the modal split towards clean public transport, improved connectivity for pedestrians and an overall strategy for a greener Downtown with unique open spaces embedded in its historic ambience.

### 5.1 Guiding Principles

Fourteen guiding principles were established to govern the regeneration efforts, providing detailed guidelines for considerations like structure and development form, land use and massing, public realm and pedestrianization, access and mobility, as well as infrastructure and municipal services.



Figure 7: left: Situation Nile embankment now, right: Photo montage with added terrace  
Data source: Tillner & Willinger

## 5.2 Concept Master Plan

The assigned area of Downtown was organized into different “regeneration zones” which share certain characteristics and introduces Strategic Urban Plans for five of these zones, setting a detailed planning methodology and toolset that can be replicated across Downtown.

## 5.3 Land Use and Massing

Guidelines that determine how the existing urban fabric, both in its massing/morphology and uses, could change in light of existing land and building ownership and historic preservation.

## 5.4 Public Realm and Pedestrianization

Guidelines that determine the improvement of existing public spaces and the creation of new ones, as well as the strategic conversion of vehicular areas into pedestrian-oriented spaces that encourage a more vibrant cityscape.

With an open space network, a refurbishment of the public realm related to public transport hubs and connected pedestrian paths in green corridors, landscaping and shading squares, parks and greening flat roofs. The environmental quality as a result of street infrastructure would be improved through better hard and soft landscaping, lighting improvements, and street furniture.

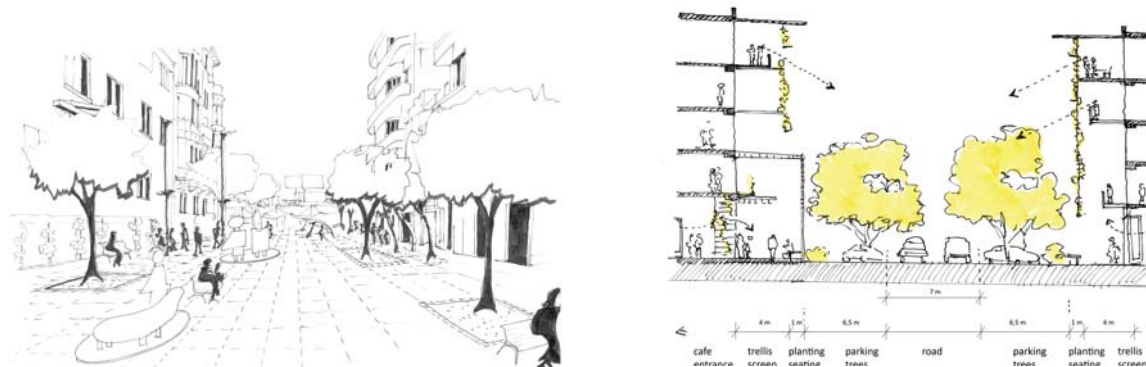


Figure 8: left: Pedestrianized street, right: Section of a “green street”  
Data source: Architects Tillner & Willinger

### 5.5.1 Public Realm Interventions

Streetscape and public realm improvements, a framework of general regeneration interventions and energy efficiency upgrades in the public realm:

The categorization for the urban regeneration of Downtown’s streetscape, energy efficiency performance and typology has emerged from project area analysis as well as best practices from the Project Team’s 9) urban regeneration experience. Categories cover several regeneration themes. *Streetscape Upgrades* encompass existing public spaces and squares, as well as major north-south and east-west corridors, and entail the refurbishment and improvement of streetscape elements, including hardscape, landscaping, furniture, lighting, signage, and other streetscape amenities.

**Pedestrianization** involves changes in squares that currently have high vehicular traffic and pedestrianization which entails the removal of vehicular traffic. (*Opera Square - figure 9*) **Public Space Creation** encompasses strategic vacant plots or open areas often currently being used as parking lots (Bab al-Louq) and entails their development as public spaces.

### 5.6 Open Space Strategy

Downtown Cairo, i.e. Khedival Cairo, has comparable density to European cities built at the same time as the building boom of the Gründerzeit in the late-19<sup>th</sup> century. Therefore, in the areas with intact historical urban fabric, only a few open spaces exist besides public squares and streets, larger ones at the edges of Downtown. The few publicly accessible spaces, e.g., the central green at Tahrir Square, are heavily used in spite of their environmentally disadvantageous situation, surrounded by heavy traffic. Therefore, these undeveloped spaces present a unique opportunity to provide more of these urgently needed resources for Cairo's residents. The goal is an evenly distributed network of green open spaces across Downtown, reachable within a walking distance of 500 meters and connected by landscaped streets, and linkages to the River Nile in the East and the Garden City in the South.

#### Parks, Squares and Open Spaces

"Open spaces," e.g., squares and parks, in Downtown Cairo, suffer from restrictions on accessibility which were implemented after 2011. An opportunity arises from transforming vacant sites and reopening currently closed open spaces to the public. Most open spaces have to be redesigned to meet the current needs of the Downtown population.



Figure 9: Data source: left: Silja Tillner, right: Architects Tillner & Willinger 8)

#### Opera Square

This historic square, once the most prestigious in Downtown Cairo, has seen better days. Its significance, however, lies in being situated along the main east-west entry gateway into Downtown and a connection point to Islamic Cairo. This zone is of extreme strategic importance. Though quite challenged by intensive vehicular use, it lies in proximity to Azbekiyeh Park and the Continental Hotel—key regeneration catalysts—as well as a Governorate office building that has potential for intervention. The iconicity of the square and its historic significance mean that successful regeneration efforts are likely to have a “multiplier effect.” Opera Square is to regain its status as a viable public space, rationalizing and optimizing different forms of mobility to catalyze regeneration in the surroundings.

##### 5.6.1 Open Space Zonation

The aim is a greener Downtown with unique open spaces embedded in its historic ambiance with tree-lined streets, parks and shaded open spaces. The zonation characterizes different types of open spaces. Typologies, guidelines and a catalogue of recommendations that define desired qualities and apply to the different zones were developed for each category. The following categories were proposed:

### **5.6.1.1 Pedestrian-Friendly Streets**

These streets will form the backbone of pedestrian circulation and connect important entry points, i.e., gateways, with main attractions. They will offer attractive and safe paths to the stations and will include major shopping streets which are highly frequented by pedestrians.

Pedestrian linkage will be achieved with an attractive, safe, and landscaped network of paths with better street lighting, seating areas, sanitary facilities, bus shelters, etc. Pedestrian-friendly streets have certain design characteristics, e.g. shaded sidewalks due to the planting of numerous new trees, safe wide sidewalks with handicap accessibility and places to rest, Vehicular through-traffic should be reduced by rerouting traffic to more peripheral streets and slowing it on central pedestrian spines and shopping streets with 30 km/h speed limits, traffic lights, and speed bumps. Driving lanes will be reduced and parking lanes eliminated, the space redistributed to wider sidewalks.

Public transport needs to be prioritized, providing attractive and safe bus stops with bus-shelters providing shade, lighting, and surveillance.

### **5.6.1.2 Pedestrianized Streets**

They are proposed on streets that are currently of no significance for the road network and are used more for parking than driving. They will connect to the existing pedestrian network. and will be reserved for pedestrians. Urban design measures, see 5.6.1.1 apply here as well.

### **5.6.1.3 Existing Pedestrian Network**

Existing passageways and pedestrianized streets are continued and connected to new pedestrianized and pedestrian-friendly streets.

### **5.6.1.4 Urban Square and Circular Squares**

Urban squares are connected to the pedestrian network, serving as areas of rest and contemplation within the bustle of Downtown. Landscaping will be introduced to provide shading. Roundabouts are important landmarks and will become exceptional places.

### **5.6.1.5 Park/Green Space**

Currently, Downtown Cairo has very few parks to offer its citizens. There are only a few possibilities within Downtown's densely built-up fabric to create new parks. Landscape design and plant selection should be sensitive to the climate and scarce water resources. The atmosphere should be inviting for families and provide enough spaces for children to play, as well as for rest and contemplation.

### **5.6.1.6 Connecting Open Space**

There are two main connections missing: in the west, to the River Nile and its promenades and in the east, to Islamic Cairo. Specific proposals for Opera Square, Nile see figure 7, 9

## **6. Access, Mobility, and Transportation**

Like in all megacities, transport is a major challenge for the Greater Cairo Metropolitan Area with more than 20 million inhabitants. To guarantee well-functioning and sustainable mobility in cities of such size, an adequate high-capacity public transport system is required. Over the last decades, Cairo's population has been growing faster than its infrastructural and mobility services. Major infrastructure projects, such as the Metro, may have arrived too late.<sup>[10]</sup> Nevertheless, the introduction of the Cairo Metro in 1987 was a major step towards sustainable mobility. The evolution of the modal share shows the positive effect of the Metro's introduction, creating a significant modal shift toward public transport. After 1987, the modal share of cars decreased significantly. The modal share of buses also decreased while informal transport with shared taxis increased significantly. Non-motorized traffic (mainly

walking) accounts for 32% of all trips in Cairo. <sup>[11]</sup> Compared with European or North American cities, this is a very high share.

While there is broad agreement among stakeholders that mobility solutions offering reduced vehicular traffic must be a part of any regeneration attempt, there is considerable disagreement on the scale, location and form of these interventions. The process of thinking should follow the principles on traffic reduction and pedestrianization in Downtown Cairo, including the fact that 40% of vehicular flow in Downtown Cairo is reportedly “drop-off traffic,” as much as 80% of vehicular flow in Downtown is purely through-traffic. The DCRP is proposing a redesign of Downtown Cairo’s vehicular flow and street hierarchy.

*Car Volume and Speed Reduction:* Reduce motor traffic volume and traffic speed

The ambition in Downtown is that to optimally reduce both vehicular traffic *and* speed in each street to privilege pedestrians, enhance road safety, improve air quality, reduce noise, and afford a better pedestrian streetscape quality. One way of looking at this is to reduce a street’s current position in the road hierarchy and move it towards the bottom—local streets and roads that have the lowest speed limit (30km/h).

The pedestrian network is mainly defined by the street network, with a few pedestrian zones and passages. The main pedestrian traffic flows have their source at public transport stops, mainly the Metro, with many areas of conflict between pedestrians and vehicles.

## **7. Specific Measures and Implementation**

Five Priority Areas were defined in consultation with the Cairo Governorate, those zones that, if planned and implemented, would have the most catalytic effect on the broader regeneration of Downtown Cairo as a whole were selected.

**Priority Area Concept Planning:** All five concept plans made concrete and spatially delineated recommendations for regeneration interventions in the following categories:

### **7.1. Streetscape Amenitization**

Streetscape Amenitization encompasses existing public spaces and squares, as well as major north-south and east-west corridors, and entails the refurbishment and improvement of streetscape elements, including hardscape, landscaping, furniture, lighting, signage, etc.

### **7.2. Pedestrianization Prioritization**

Pedestrianization Prioritization involves changes in squares that currently have some degree of vehicular traffic as well as various streets and corridors, and the creation of pedestrianized corridors that entail the removal of all vehicular traffic. Mobility Improvements encompass squares that are currently centers of mobility interchanges as well as various streets and corridors, the optimization of existing mobility patterns, whether through intersection redesigns or shared street infrastructures which continue to allow vehicular traffic, but in ways that improve pedestrian movement.

### **7.3. Exterior Lighting**

Exterior Lighting encompasses the systematic upgrading of exterior lighting to energy efficiency and more durable fixtures, recognizing current inefficiencies of existing luminaries.

### **7.4. Sustainability**

Sustainability includes the introduction of key green building interventions such as photovoltaic panels and green façade structures, particularly for governmental and institutional buildings where these interventions can more readily be financed.



Figure 10: Street furnishing  
Date source: Architects Tillner & Willinger 8)9)

### 7.5. Public Space Creation

Public Space Creation encompasses strategic vacant plots (often currently being used as parking lots) and entails their development as public spaces, particularly in the form of extensions to and expansions of adjacent or nearby public spaces and squares. *They were planned in detail in response to local needs and conditions, e.g. representative for the measures in these zones are Opera Square, see fig. 9 and Bab al-Louq. The vision is to reclaim Bab Al-Louq as a public space, which serves as an “urban interchange” (as opposed to a vehicular interchange) that links Tahrir Square to Abdeen Square, and Downtown’s charismatic southern neighborhoods.*

#### Regeneration Interventions

Street furnishings (see figure 10) are provided in the area of Bab Al-Louq Square and in the pedestrianized areas near-by. Trees and landscaping are to be provided on the boulevard streets and along the pedestrianized northern edge of the square.

All streets that are to become boulevards will feature expanded sidewalks through the conversion of parking lanes. Pedestrian crossings will be upgraded at strategic points along busy, e.g. El-Tahrir Streets with formal pedestrianization on adjacent quieter streets.

Substantial opportunities exist on Opera Square (see figure 9). Trees can be added to the Square, while greenscape can be provided on the platform, a de-facto, 24-hour pedestrianized zone. Energy-efficient lighting for the open spaces and the façades is intended for the Opera Parking Structure and the Continental Hotel. Green façade features and photovoltaic roof panels are proposed for the Opera Parking Garage.

The introduction of a sculptural, five-meter, raised platform above the traffic interchange of Opera Square and the reactivation of the green space directly east of the Parking Structure will dramatically improve the area.

### 8. Implementation Framework for Cairo Governorate’s Green Building and Energy Efficiency Efforts in Downtown Cairo Urban Regeneration

Guidelines were developed to promote building energy efficiency in Downtown Cairo’s unique built environment in public and private buildings and in public amenities. Downtown’s framework conditions were studied, especially its historic urban fabric. The potential for “greening” buildings in Downtown Cairo was examined.

#### Rehabilitating the Buildings of Downtown Cairo to Better Standards

This project has made efforts to further the development of sustainable building standards, and has produced a set of guidelines and cases about what is needed to modernize Downtown’s building stock and make it more efficient. Urban sustainability and green

considerations for energy efficient buildings, green walls, landscaping of roofscapes and solar panel installations should be integrated as part of any building modernization.

### **Public Building Upgrades and EE Retrofitting**

**Heritage:** Many of Downtown Cairo's historic buildings of outstanding value are worthy of being included in a registry similar to European cities with a comparable historic building stock from the end of the 19<sup>th</sup> and the beginning of the 20<sup>th</sup> century, e.g., Paris or Vienna, making heritage in spite of the neglect the single most valuable asset for urban regeneration.

#### **Opportunity**

The protection and safeguarding of heritage buildings and districts would lead to a greater attraction of Downtown Cairo for its citizens. Since buildings also tell stories, not only about architecture, but also about people, as was described in the book *Discovering Downtown Cairo*<sup>[12]</sup>, a well-preserved historic district with landmarks along a historic trail would create attractive linkages to the past and stimulate an active interest in the history of the city.

The total building stock in Downtown Cairo is estimated to be 1,492 buildings, of which 8% are government buildings of primarily office and institutional uses 8). As a result of a detailed building analysis and energy audits 8) several types of energy efficiency considerations such as exterior treatment, lighting, electromechanical systems and services were identified.

## **8. Conclusion and Future Outlook**

The Urban Regeneration Plan for Downtown Cairo could become a blueprint for future efforts in other cities in the developing world and in Eastern Europe facing similar challenges. The innovative revitalization approach combines classic components of urban design with novel energy-saving and educational measures (which are usually separated), i.e., the energy retrofitting of public and private buildings. The approach is based on valuing what exists – and builds upon it - a sensitive and practical planning method which allows the integration of the needs of stakeholders and leads to a higher acceptance than previous plans.

For Downtown Cairo this implementation oriented plan has, for the first time in its lengthy planning history, offered the Cairo Government and the authorities a practical handbook with strategies, guidelines and detailed proposals including cost estimates. The Cairo Governorate is currently proceeding with the implementation of Opera Square as a catalytic project and will continue with further measures in the public realm and building renovations.

These measures would – if implemented – contribute greatly to reducing pollution-levels and cooling the city center. Downtown could become a sustainable model for other neighbourhoods in Cairo.

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