Improvement of Al Shindagha Corridor and the Infinity Bridge

(Case Study)

dipmf.ae

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DUBAI INTERNATIONAL PROJECT MANAGEMENT FORUM

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RTA background

Brief history

The Roads and Transport Authority (RTA) in Dubai was established in November 2005 through decree number 17/2005. Since then, the RTA has made significant strides in improving Dubai's transportation infrastructure. The total length of Dubai's Road network has grown from 8,715 lane -km in 2006 to 18,768 lane-km in 2022 - marking a remarkable growth of 115 percent.

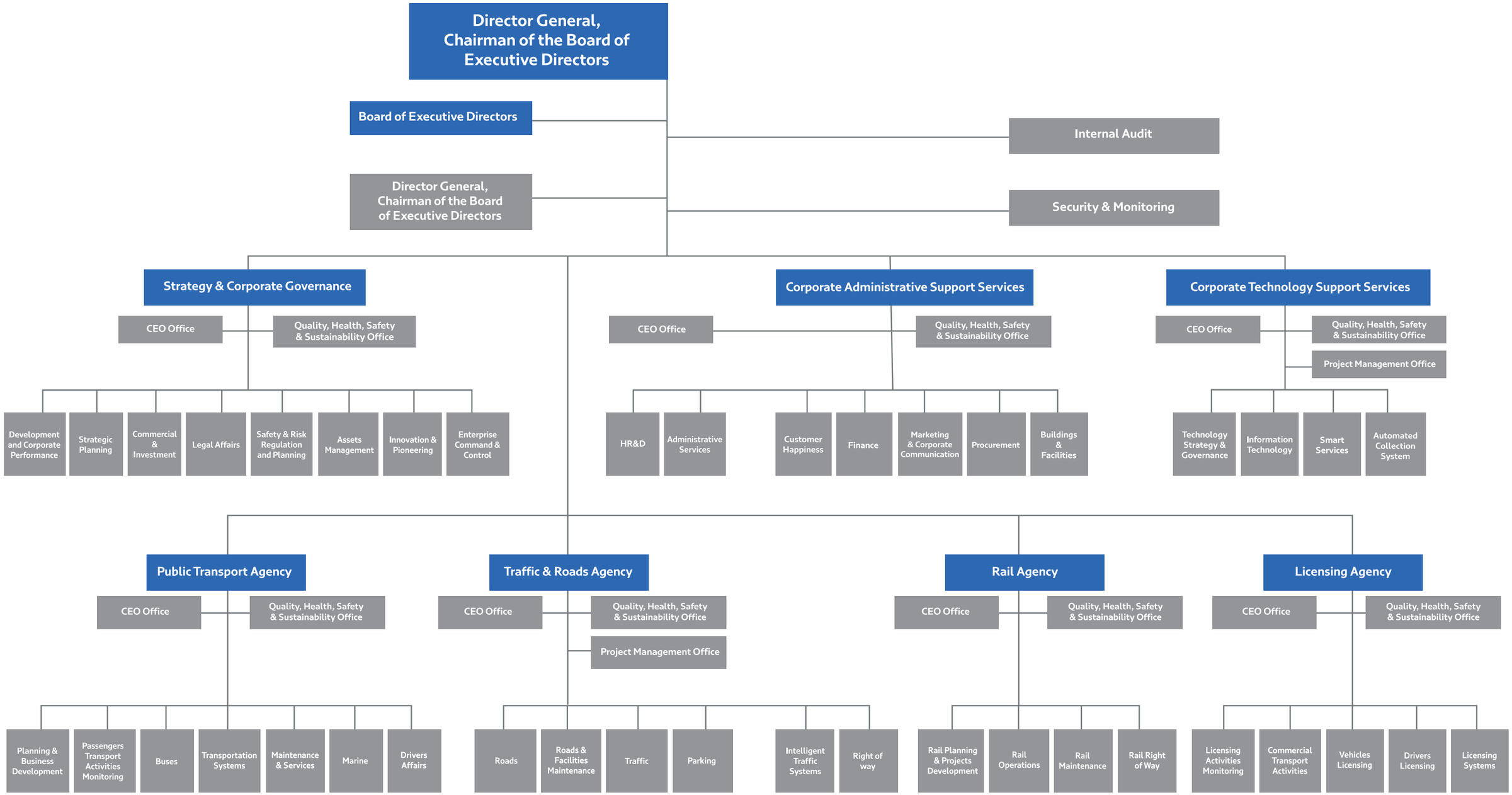
The number of bridges and underpasses has also seen a substantial increase, rising from 129 to 988 during the same period - an impressive expansion of 666 percent. Furthermore, the number of pedestrian bridges and underpasses has increased from just 26 in 2006 to an impressive total of 122 by the year 2022 - marking an incredible increase of over three times (369 percent).

Since its establishment, the RTA has adopted a challenging vision and mission aimed at effectively contributing to Dubai's overall vision and serving the vital interests of the Emirate. The RTA strives to become the world leader in seamless and sustainable mobility, providing innovative and safe travel experiences to make every journey in Dubai a world-class experience. The RTA has developed a highly integrated transportation system that includes various modes of transportation, such as the Dubai Metro, buses, taxis, and other forms of transport. The driverless and fully automated metro network spans over two lines with a total length exceeding 75 kilometres and includes about 49 stations connecting different parts of the city. Additionally, interchanges at various stations connect the metro system to other modes, such as buses and taxis. Dubai's bus network is extensive with more than 150 bus routes operated by RTA with over 500 buses equipped with air conditioning and free Wi-Fi for passenger convenience.

Taxis are also widely available in Dubai, with both regular taxis and luxury taxis operated by companies such as Uber and Careem. Taxis can be hailed on the street or booked through mobile apps. Overall, Dubai's transportation system is designed to provide residents and visitors with convenient access to all areas of the city through an integrated network of metro lines, bus routes, taxis, and water transport systems, ensuring safe travel for all users while improving their experience within the city to make every journey in Dubai a world-class experience.

Organizational Structure

The organizational structure of the RTA, as depicted in Figure 1, follows the “Agency Model,” which is designed to offer operational flexibility and separate regulatory matters from day-to-day operations. Under this model, each agency within the RTA, led by a CEO who sits on the Executive Board, governs and makes strategic decisions for their respective sector. In the case of this project, it was managed by the Traffic and Roads Agency, which falls under the purview of the RTA.



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Improvements of Al Shindagha Corridor

Introduction

The corridor is of great historical significance as it is located near the entrance of Dubai Creek.

Stretching from Sheikh Rashid Road in the south to Cairo Street in the north and from the waterfront in the west to Al Rasheed Street and Mankhool Street in the east, this corridor serves as a vital transportation link along Dubai's coastline.

As Dubai continues to experience growth, the Al Shindagha Corridor faces unique challenges and opportunities. One of its key functions is to provide a crucial crossing point over Dubai Creek, connecting the districts of Bur Dubai and Deira. This connection plays a pivotal role in supporting the city's ongoing development and expansion.

The Program is divided into twelve separate packages, namely:

01. Sana Junction
02. Improvements of Sheikh Rashid st
03. Infinity Bridge Ramp Bur Dubai
04. Falcon Intersection
05. Entrance to Rashid Port
06. Infinity Bridge
07. Corniche Road
08. Deira Island Bridge Abu Bakr
09. Al Khaleej St. Improvement
10. Al Khaleej St. Tunnel
11. Deira Island Bridge Rashid Port
12. Improvement of Cairo St.

Background and Purpose

The purpose of the project is to improve the transportation network in Dubai by providing a new crossing over the Dubai Creek.

The project aims to reduce traffic congestion and improve connectivity between different parts of the city. Besides, the objectives of the preliminary study included assessing the current traffic conditions, developing options for the project, and assessing the feasibility of each option.

The project aims to attain the following Benefits and Results:

01. The Shindagha Crossing “Infinity Bridge” has a high capacity, reducing the average travel time from 104 minutes in 2030 to 16 minutes. The total travel savings is around 45 billion dirhams in 20 years.

02. Increase the total capacity on bridges at the intersections in all directions to about 24,000 vehicles/hour on the Infinity Bridge.

04. Achieve smooth traffic flow along the corridor by providing a continuous free-flow movement across the corridor.

05. The Shindagha Corridor provides access to a number of large development projects surrounding the corridor, such as Deira Islands, Dubai Waterfront, Dubai Maritime City, and Port Rashid.

06. Enhance the traffic level of service and safety along the corridor and at the intersections.

Project Scope

New Creek Crossing (Infinity Bridge) with six lanes in each direction, 2.4 KM in length

Two New Access Bridges to Deira Islands

Four at-grade Intersections

Modifications to existing roads, utility diversions, stormwater drainage, street lighting, etc

Direct Access to Port Rashid Development

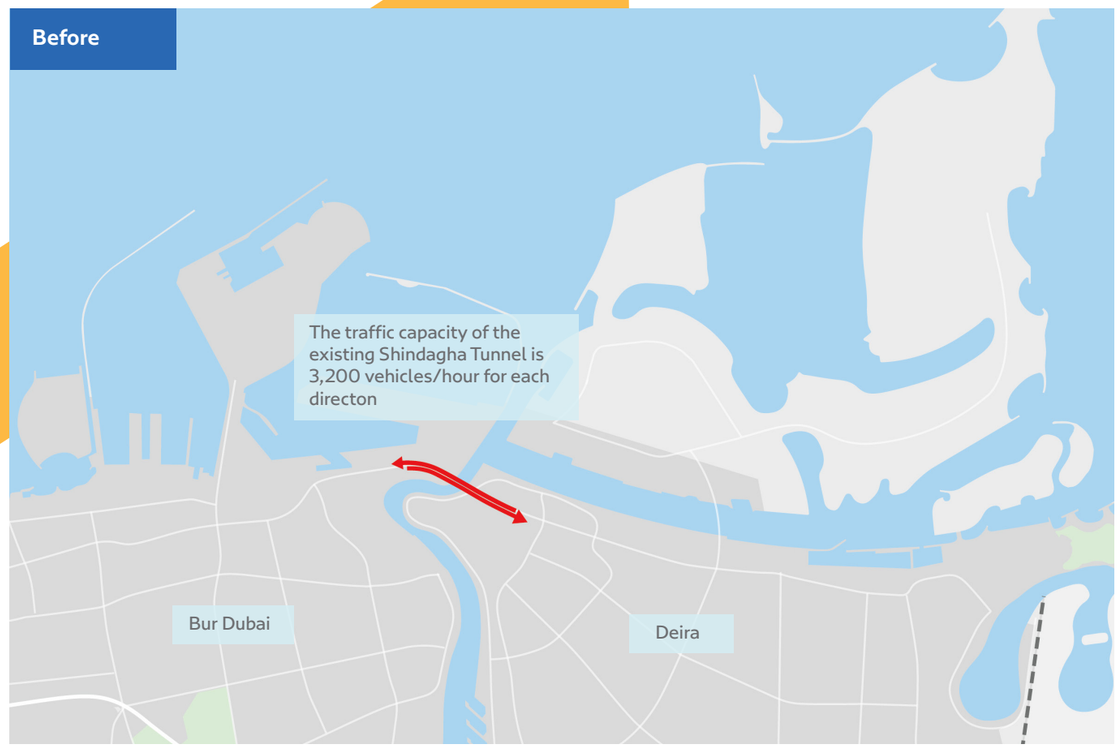
Eight Grade Separated Intersections

Old vs New Shindagha Corridor

The project scope includes the construction of 41.6 km of roads, 29.3 km of bridges, 7.4 km of tunnels and a total of 22 at grade junctions, besides a new bridge over the Dubai Creek (The Infinity Bridge), as well as the reconfiguration of the surrounding road network.

The project portrays the current traffic conditions in the area and provides an assessment of the current network performance. The study also includes the development of a strategic travel demand model for future years and the assessment of mitigation options for improving traffic operations.

Before



After

Shindagha Corridor Population

Project Implementation

Package/Year	Budget/M	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
		Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4
• Sana Junction	611														
• Deira Island Bridge Abu Bakr	447														
• Infinity Bridge	394														
• Corniche Road	707														
• Al Khaleej st Improvement	230														
• Infinity Bridge Ramp Bur Dubai	255														
• Falcon Intersection	443														
• Improvements of Shaik Rashid st	760														
• Al Khaleej st Tunnel	859														
• Dubai Island Bridge Rashid Port	756														
• Improvement of Cairo st	720														
• Entrance of Rashid Port	90														

Completed Work Planned Work

03

Main Challenges

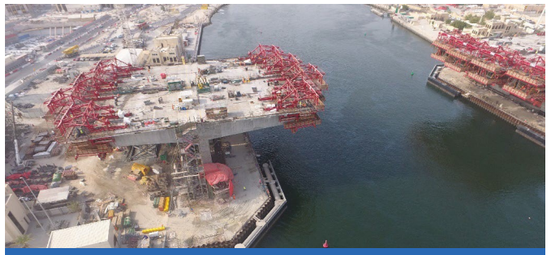
Providing Multilane Highways Within the Central Business District (CBD)

This challenge identified in the need for providing efficient transportation within the areas of Deira and Bur Dubai, avoiding any impacts on the World Heritage Site, and addressing the potential site obstruction and expropriation issues. Besides, the challenges related to the coordination of utilities and the structural elements and construction of the Infinity bridge over the Creek.

Grade Separated Junctions.

High Bridge with a Navigational Clearance Envelope of 15.5m in Height

The crossing is a high bridge with a navigational clearance envelope of 15.5m in height to cater for the live marine traffic on the creek. The iconic Infinity Arch comprises two steel arches diagonally positioned over the bridge deck with a span length of 135m.



Construction of Infinity Bridge.

Ensuring a Safe Environment for the Public and Workers

A traffic management plan encompasses the strategic organization and regulation of the flow of people and goods within a designated area. This includes managing both stationary and moving traffic, as well as pedestrians, cyclists, and various types of vehicles. The primary objective of traffic management is to maintain an organized and efficient flow of these elements, reducing workplace risks.

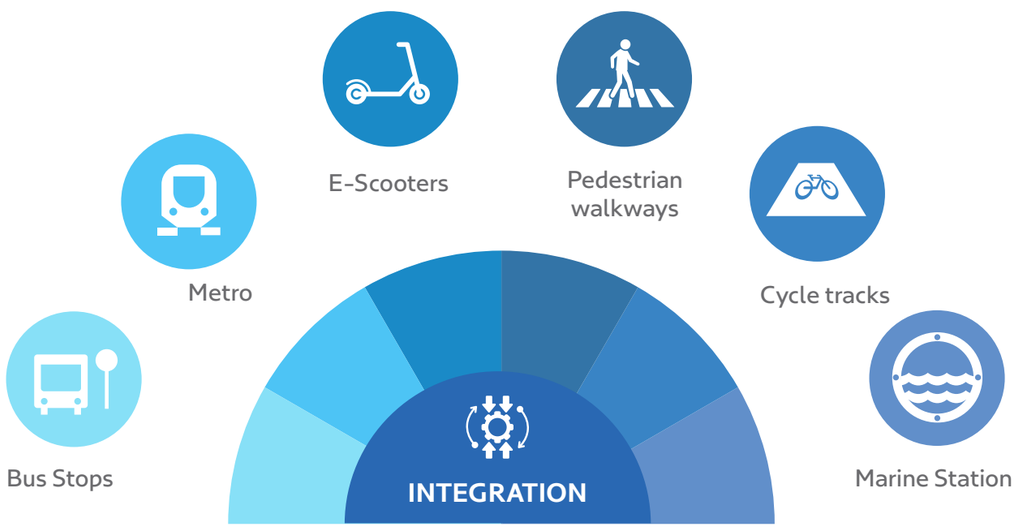
Traffic diversions are implemented to ensure the safety of both workers and the equipment used in road construction. These diversions are required to facilitate the secure and efficient movement of traffic through or around work zones while safeguarding those involved in the construction process.

Traffic Management along Cornish Street during the construction of Infinity bridge double deck.

Integration Plan

In Dubai, the Roads and Transport Authority (RTA) is spearheading soft mobility integration, a pivotal concept in modern urban planning and transportation. This integration seamlessly connects sustainable transportation modes such as:

Pedestrian pathways, 13 Km of cycling lanes, 15 cycle racks, 30 bus stops and shared micro-mobility options like e-scooters with Dubai's renowned public transport systems.



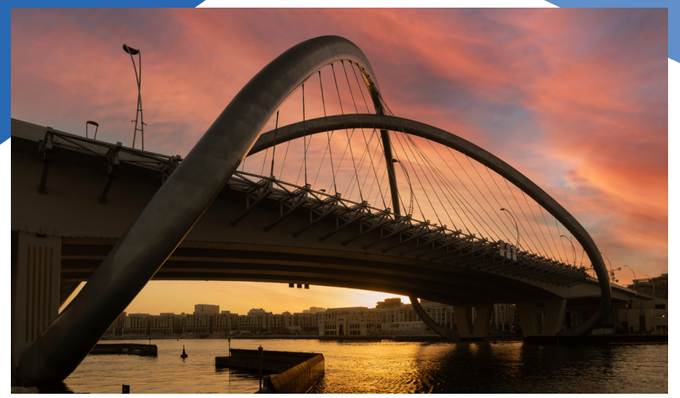
Sustainability

As part of the road pavement strategy, recycled materials were utilized, contributing to sustainable practices and reducing environmental impact. By incorporating recycled materials into the road construction process, the project aimed to minimize the use of virgin resources and decrease waste generation.

One notable outcome of the project was the significant reduction in journey time. The travel duration was reduced from 104 minutes to just 16 minutes, resulting in improved efficiency and convenience for road users. This reduction in journey time also had positive environmental implications. The shorter travel duration led to a decrease in carbon dioxide emissions, as vehicles spent less time on the road and consumed less fuel. This reduction in carbon emissions aligned with the project's sustainability goals and contributed to a greener and more eco-friendly transportation system.

By utilizing recycled materials for road pavement and achieving a substantial reduction in journey time, the project successfully promoted sustainability, reduced waste, and mitigated future carbon emissions.

Challenges Mitigation Measures



The challenges were mitigated by the following actions:

01
Preparation of specific Execution Plans, Logistics plans, Risk Plans, Environmental assessing plans, and construction method statements.

02
Develop a comprehensive transportation plan that optimizes traffic flow, reduces congestion, and improves accessibility.

03
Provide sufficient capacity of the road network to cater to the traffic demand generated by the public and surrounding developments.

04
Apply a special method of construction (Balanced Cantilever) using form travellers to build the bridge over the creek at a high level without affecting the navigation channel.

05
RTA management team provided constant support and monitoring during bridge construction works.

06
Appoint specialist engineering firms to ensure completion of the project on time with the highest quality level.

07
A process of risk management has been undertaken with the objective of assessing the potential risks and developing and implementing mitigation strategies to overcome them during the course of design, procurement, and construction of the project.

08
Establishing a comprehensive traffic management plan provides a Safe Environment for the Public and Workers by implementing traffic control measures, conducting training for workers, supplying special gear (PPE), considering reduced summer working hours, providing on-site safety supervision personnel and conducting regular inspections.

04

Lessons Learnt

Flexibility

The proposed design grants flexibility to modify the road network based on the actual traffic demand in future with minimal effort.

Providing shared soft mobility track for pedestrians, E-scooters and cyclists going through the entire corridor.

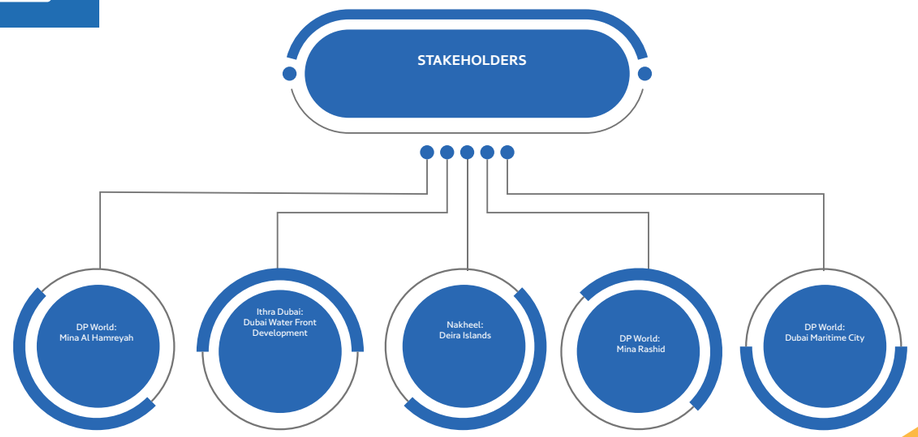
Collaboration of Stakeholders

The project emphasizes the importance of collaboration among stakeholders, including government agencies, utilities, and the public. The study includes a review of the local access and parking, public transport, and rail systems and provides recommendations for improving network performance. The report also outlines the engagement process with stakeholders, including public consultations and meetings with government agencies.

The project scope of work is divided into 12 packages (post-contract), which are constructed in phases based on an efficient construction staging plan.

Regular forum meetings were conducted involving senior management from the RTA, the consultant team, and the contractors to evaluate the progress of the project. These meetings served as a platform for making important strategic decisions related to budget, schedule, design changes, and traffic management. Ultimately, these decisions positively impacted the interests of all stakeholders involved.

RTA assisted the contractors in obtaining necessary approvals and No Objection Certificates (NOCs) from various government entities within critical timelines.



Reacting to COVID-19 Pandemic

The ability to adapt project execution plans was crucial in effectively managing project risks amidst the constraints imposed by the COVID-19 pandemic.

Operating in accordance with the regulations and guidelines set by the UAE Government, as well as navigating global restrictions, the project team demonstrated flexibility by making necessary adjustments to their work schedule. These adjustments encompassed the following:

01

In response to social distancing guidelines and travel restrictions that limited the number of individuals per vehicle within the UAE, the Project Execution Plan was modified. The original plan, which involved a single shift per day, was revised to include multiple shifts. This adjustment allowed for the continued engagement of planned resources while ensuring compliance with COVID-19 guidelines.

02

To take advantage of the decreased traffic volumes experienced during the COVID-19 pandemic, adjustments were made to the traffic management plans. These modifications allowed for multiple and simultaneous traffic diversions and larger work zone areas than what is typically implemented in normal circumstances. This proactive approach helped mitigate the delays caused by COVID-19 restrictions.

Close Coordination with all Services Authorities

Continuous coordination with service authorities, starting from the design phase until project handover, allowed for the mitigation of potential risks related to possible delays in service authorities' approvals. This was achieved via continuous early coordination and involvement of relevant service authorities, for example:

During the design phase, all requirements were timely incorporated during the final design in coordination in advance with all relevant service authorities. During the construction phase, all execution drawings and shutdown dates for utilities were coordinated and agreed upon in advance by relevant service authorities, which minimized the disruption to construction activities.

Project Cost Saving Resulted from Value Engineering

Project cost savings were achieved during both the design and construction phases of the project, and an approximate reduction of 10% was achieved.

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The following represents some examples of the value engineering efforts:

01

Reduced number of Structural Elements: Implementing measures to decrease the number of cells in the box girders and the number of piles in the pile caps.

02

Double Decking of Corniche Street: To maximize the efficiency of land use, RTA introduced a double-decking concept along Corniche Street. This innovative approach optimizes valuable CBD (Central Business District) space. The lower level is designated for shop access, facilitating easier access to residential buildings and businesses.

03

LED Lighting: We adopted sustainable LED lighting solutions due to their efficiency, long lifespan, low power consumption, and minimal maintenance requirements.

04

Pavement Structure Layer Optimization: Optimizing the layers of the pavement and the asphalt mix.

05

Non-Disruptive Road Crossing (NDRC) Method Implementation: The use of the NDRC method minimized disruptions to existing assets and public traffic during construction.

06

Utility Protection Over Land Expropriation: Optimizing the available space within the right of way, avoiding impacts on private plots, reducing costs and minimizing environmental impact.

Keys to Success

The following represents the key factors that contributed to project success:

- Effective Project Management
- Quality Assurance and Project Control
- Robust Risk Management
- Environmental Sustainability
- Safety First
- Skilled Workforce
- The attention of Higher Management
- Traffic Management
- Stakeholder Engagement and Collaboration
- Addressing Issues Effectively