

# Introduction

Infrastructure is the driving force behind economic prosperity, the critically important foundation for economic growth and sustainable development. Nonetheless, developing countries and the rest of the world are facing a lack of investment funds to develop and maintain infrastructure. This could seriously hinder economic growth and development and the provision of dependable, reliable public services; therefore, it is necessary to expand the scale of infrastructure investment.

Additionally, it is now even more important for infrastructure investment to be what is known as “quality infrastructure investment.”

To achieve high quality growth in developing countries, it is important to not only meet demand for infrastructure development quantitatively, but also to consider transparency, openness, economic efficiency in terms of life cycle cost, debt sustainability, and other factors in the process of developing infrastructure. We must also look at infrastructure investment not only for the immediate future, but also over the long term, and seriously consider its impact on economies and societies.

With this in mind, Japan has been leading the global discussion on promoting quality infrastructure investment, and has actively communicated these ideas at international conferences and bilateral summits. As a result, the “G20 Principles for Quality Infrastructure Investment” were endorsed by the heads of state and government at the G20 Osaka summit (June 28–29, 2019).



Such quality infrastructure investment is also effective in Africa, where demand for infrastructure is increasing in anticipation of further economic development and urbanization in the future.

To contribute to the promotion of quality infrastructure investment in Africa, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) established the Japan-Africa Infrastructure Development Association (JAIDA), a public-private partnership council to disseminate information on the technology, experience, and other factors underpinning quality infrastructure in Japan, build relationships between the public and private sectors in partner countries, and identify and formulate infrastructure projects. JAIDA conducts many activities, for example holding Public-Private Conferences for Infrastructure in collaboration with government agencies and private companies in Japan and African countries.

# G20 Principles for Quality Infrastructure Investment

Japan defines quality infrastructure as infrastructure that is resilient against natural disasters and other risks, inclusive in the sense that no one is left behind, and sustainable in terms of social and environmental impact. The six G20 Principles for Quality Infrastructure Investment promote openness, transparency, economic efficiency, and debt sustainability, and state that, through all processes from the planning stages to construction, operation, and maintenance, quality infrastructure delivers benefits not only to governments and infrastructure users, but also to local workers and residents and many other stakeholders, and contributes substantially to economic and social development on a national and regional level.

Quality infrastructure also fully meets societal demand for consideration for the environment, financial discipline, and prevention of corruption. The quality infrastructure provided by Japan is highly appreciated and has been used and enjoyed by many people around the world.

This document presents leading examples of how infrastructure constructed all or in part by Japanese companies contributes to the "G20 Principles for Quality Infrastructure Investment".

## Principle 1 Maximizing the positive impact of infrastructure to achieve sustainable growth and development

### Creating a virtuous circle of economic activity

Quality infrastructure investment contributes to regional economic development by creating new jobs in construction, operation, and maintenance, and strengthening local economic capacity and increasing productivity through the transfer of advanced technologies and expertise.

#### < Commentary >

◆ **Creating jobs** : Quality infrastructure investment requires a variety of job types for projects, including engineers and technicians for construction, operation, and maintenance, as well as workers to transport materials and equipment, and clerical workers to handle contracts and accounting. Japanese companies create local employment opportunities by hiring local people for these important positions. In addition to the positive spillover effects of the infrastructure itself, quality infrastructure investment increases private investment, which in turn promotes regional economic development.

◆ **Technology transfer** : Quality infrastructure investment allows local people to learn directly from Japanese engineers about advanced technologies, construction techniques and skills, and expertise on contracts, quality, process management, and more through lectures and on-the-job training in the field. In some cases, Japanese companies impart cutting-edge technology that is being utilized for the first time in the partner country. Transferring Japanese technology enhances the skills of local engineers and technicians, strengthens their capacity, and increases productivity. In some cases, the construction methods utilized by Japanese companies are adopted as the standard construction method in the country, helping to improve the technical capacity of the entire country.

◆ **Skill enhancement** : People employed by Japanese companies can enhance their capacity while learning construction techniques and skills in the field. There are many examples of people who have learned techniques and skills at one place and gone on to apply their newly gained expertise somewhere else, contributing to the economic development of the partner country even after the construction work is completed.

### Sustainable growth and increasing connectivity

Quality infrastructure investment leads to sustainable development, and also contributes to long-term economic development by improving the connectivity of countries and regions.

#### < Commentary >

◆ **Sustainable development** : Quality infrastructure investment must have a positive impact on economies, the environment, society, and governance, and contribute to the achievement of the SDGs. Through quality infrastructure investment, Japanese companies aim to stimulate economies and create virtuous circles, contribute to environmental considerations and measures against global warming, and improve social cohesion and inclusiveness by making the benefits available to everyone.

◆ **Connectivity** : Connectivity is a concept under which ports, airports, roads, railroads, and other infrastructure is developed to connect cities and locations inside and outside a given country to achieve growth for the region. When the flow of people and goods increases, it results in prosperity and development of entire societies and economies. Additionally, connecting landlocked countries to the ports and harbors of other countries via air and land routes enables them to supply other countries with their products.

## Principle 2

## Raising economic efficiency in terms of life cycle cost

### Realizing Value for Money in the life cycle of infrastructure investment

Quality infrastructure investment delivers an excellent life cycle cost (including operation and maintenance (O&M)) and realizes value for money.

#### < Commentary >

◆ **Life cycle cost** : Although quality infrastructure investment may involve higher initial investments than traditional infrastructure, it is advantageous in that the total cost (including O&M) is lower given the lower frequency and cost savings of its maintenance. Japanese companies provide infrastructure with an excellent life cycle cost worldwide.

◆ **Efficient maintenance** : Streamlining and reducing the cost of maintenance are the keys to lower life cycle cost; in recent years, ICT has joined the list of tools used to streamline maintenance.

### Meeting construction deadlines and shortening construction schedules

Quality infrastructure investment meets infrastructure needs by delivering its effects earlier than other types of infrastructure investment.

#### < Commentary >

◆ **Meeting construction deadlines** : With appropriate process management (e.g. acquiring land, removing obstacles, coordinating with a wide range of stakeholders, procuring materials and labor, construction work) under quality infrastructure investment, meeting construction deadlines can reduce costs and ensure the prospect of revenue generated by the infrastructure.

Delivering the effects of infrastructure earlier than other types of infrastructure investment helps meet local infrastructure needs and stimulate local economies. Furthermore, it minimizes the impact of construction work on surrounding environments and reduces the amount of time spent on construction work, including the most hazardous tasks.

◆ **Shortening construction schedules** : Japanese companies place a priority on meeting construction deadlines. Concerted efforts of their entire teams sometimes enable them to shorten construction schedules.

## Principle 3

## Environmental considerations

### Environmental considerations

Quality infrastructure investment is considerate of the environment, including ecosystems, biodiversity, low carbon, global warming, and recycling.

#### < Commentary >

◆ **Environmentally friendly infrastructure** : Projects with quality infrastructure investment must be environmentally friendly in terms of ecosystems, biodiversity, low carbon, global warming, and recycling. As an environmentally advanced country, Japan has developed its infrastructure using superior environmental technologies.

◆ **Consideration for ecosystems** : When developing infrastructure, mitigation measures must be taken to maintain original ecosystems and biodiversity.

◆ **Environmentally friendly construction methods (e.g. measures against waste, measures against noise and air pollution)** : In recent years, measures to control waste, noise, and pollution generated during construction have come under close scrutiny.



Principle  
4

## Resilience against natural disasters and other risks

### Resilience

Quality infrastructure investment builds resilience against natural disasters and other risks.

#### < Commentary >

- ◆ **Resilience against risks** : The world is increasingly at risk of floods, landslides, and other natural disasters due to global warming and other aspects of climate change. Additionally, as population density continues to increase in cities, vulnerability to earthquakes and flooding has become a major issue.  
Quality infrastructure is resilient against these disaster risks. The resilience of infrastructure against disasters mitigates their impact on local economies and facilitates restoration and reconstruction activities.
- ◆ **Build Back Better** : With frequent major earthquakes and wind and flood damage caused by typhoons and other disasters, Japan is a disaster-prone country. The technology and expertise in disaster risk reduction we have developed in this environment can contribute substantially to the world. Japan has demonstrated time and again how a disaster-prone country can recover under the concept of Build Back Better promoted in the Sendai Framework for Disaster Risk Reduction (2015–2030) adopted at the third UN World Conference on Disaster Risk Reduction, and has provided support for similar efforts around the world.

Principle  
5

## Social considerations

### Collaborating with local communities

Part of quality infrastructure investment is considering the local communities impacted by the infrastructure.

#### < Commentary >

- ◆ **Consideration for local communities** : Sufficient discussion and opportunities to exchange opinions with communities impacted by infrastructure are essential. Delays in expropriating land and relocating powerlines, water pipes, and other obstacles may delay entire projects in addition to increasing costs. At the same time, we have learned through experience that interacting sincerely and in good faith with the communities impacted by the infrastructure allows construction to proceed smoothly and makes residents happier to have the infrastructure when the construction work is complete.
- ◆ **Inclusiveness** : Quality infrastructure investment must respect the human rights and fulfill the needs of everyone, especially those in vulnerable positions (i.e. women, children, people with disabilities, elderly people, sick or injured people, indigenous people, impoverished people, and other marginalized people).

### Safety and health

In quality infrastructure investment, we take steps to ensure safety in the workplace and the health of workers.

#### < Commentary >

- ◆ **Safety** : Safe, healthy work environments are essential for infrastructure development. Accidents and illnesses in workplaces and their surroundings due to cost-cutting on matters of safety and health can directly damage people and their lives in addition to delaying construction schedules and otherwise causing major economic loss. Protecting the safety and health of the people who work in these workplaces will also improve the skills and productivity of local personnel.  
Japanese companies involved in construction constantly prioritize thorough safety and health training as well as ensuring safe scaffolding and implementing other safety measures.
- ◆ **Accommodating traffic during construction** : During construction, consideration must be given to the local community to minimize traffic congestion, dust, noise, polluted water, and other problems. Specifically, construction in urban centers often requires work to be performed in tight spaces with minimal disruptions to traffic.  
Japanese companies have ample experience accommodating traffic during construction in their many projects in Japan, and their work outside Japan is characterized by short construction schedules and minimal disruptions to traffic.

Principle  
6

## Infrastructure governance

### Private funding

Quality infrastructure investment effectively leverages private funding.

#### < Commentary >

- ◆ **Utilization of private funding** : As demand for infrastructure increases around the world, there is a shortage of public funds available for infrastructure development. Therefore, there is a need for private funding to construct, operate, and maintain infrastructure.
- ◆ **Risk sharing by the public and private sectors** : However, it is also necessary for the public and private sectors of a given country to work together to mobilize domestic funding in order to attract private capital. PPPs do not require the private sector to assume all risks from construction to operation and maintenance; appropriate risk sharing by the public and private sectors is the key to utilizing private funding. Japan supports PPP projects through ODA, JOIN, and other investments.

### Operation and maintenance

Quality infrastructure investment requires appropriate operation and maintenance.

#### < Commentary >

- ◆ **Appropriate operation and maintenance** : Strong governance throughout infrastructure project life cycles is essential for the project to deliver the benefits envisioned at the outset. This requires explicit rules and reliable systems, as well as capacity building for personnel. No matter how well infrastructure is built, if it is not properly maintained, it will not deliver the expected effects.  
Japan actively supports the establishment of institutions and human resource development for developing and maintaining infrastructure.

### Procurement and finance

Quality infrastructure investment requires open, transparent procurement and must be financially sustainable.

#### < Commentary >

- ◆ **Open and transparent procurement** : Openness and transparency in procurement are fundamental for ensuring that infrastructure projects realize value for money. Of course, efforts must also be made to prevent corruption.
- ◆ **Financial sustainability** : Infrastructure investment has a substantial impact on the finances of entire countries and regions. Therefore, the financial sustainability of each project must be properly assessed.  
Infrastructure costs should be considered from the project formulation stage. The cost of financing, or loan interest rate, is also crucial for this process. The cost of ongoing operation and maintenance (including the loan interest rate) must be calculated to ensure that repayment is possible in terms of the life cycle cost.



## Aims of Japanese quality infrastructure investment

Quality infrastructure investment is a globally relevant concept. This booklet introduces the good practices Japanese companies implement to contribute to countries in Africa with the aim of popularizing and promoting the application of quality infrastructure investment in those countries.

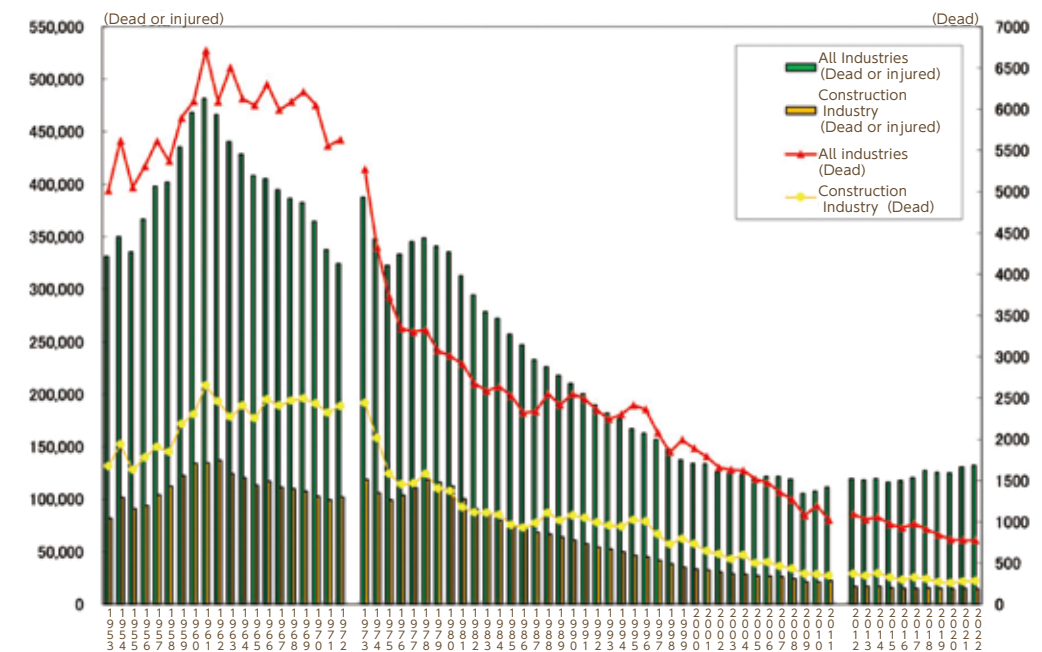
< Countries listed in alphabetical order >

Case No.	Title	Country	Field	Page
Case 1	Project for Improvement of the Southeastern Tansoba Bypass in Ouagadougou	Burkina Faso	Roads and bridges	P10
Case 2	Project of Improvement of the Marshal Bridge in Matadi	Democratic Republic of the Congo	Roads and bridges	P12
Case 3	Project for the Development of the University Hospital Center of Cocody for the Improvement of Maternal and Child Health Care Services in Greater Abidjan	Côte d' Ivoire	Medical facilities	P14
Case 4	Project for the Reinforcement of Maritime Transport Capacity at the Gulf of Tadjourah	Djibouti	Ports and harbors	P16
Case 5	Project for Rehabilitation of Trunk Road (Phase IV, 2 stages)	Ethiopia	Roads and bridges	P18
Case 6	Project for Replacement of Awash Bridge on A1 Trunk Road	Ethiopia	Roads and bridges	P20
Case 7	Project for the Construction of Advanced Research Center for Infectious Diseases at Noguchi Memorial Institute for Medical Research	Ghana	Medical facilities	P22
Case 8	Project for Improvement of Ghanaian International Corridors	Ghana	Roads and bridges	P24
Case 9	Project for the Construction of the National Institute of Public Health	Guinea	Medical facilities	P26
Case10	Mombasa Port Area Road Development Project (2) Southern Bypass	Kenya	Ports and harbors	P28
Case11	Development of a Container Terminal at the Port of Mombasa, Republic of Kenya (Phase 1 & 2)	Kenya	Ports and harbors	P30
Case12	Project for Dualing of Nairobi-Dagoretti Corner Road	Kenya	Roads and bridges	P32
Case13	Project for Reconstruction of Somalia Drive (Japan Freeway) in Monrovia (Phase 2)	Liberia	Roads and bridges	P34
Case14	Project for Rehabilitation of Irrigation System in South-West of Alaotra Lake	Madagascar	Irrigation facilities	P36
Case15	Project for Construction of Shellfish Aquaculture Technology Research Center	Morocco	Fishing industry facilities	P38
Case16	Nacala Port Development Project (Phases 1 & 2)	Mozambique	Ports and harbors	P40
Case17	Project for Rehabilitation of Irrigation Facilities in Rwamagana District	Rwanda	Irrigation facilities	P42
Case18	Project for Strengthening Nzove - Ntora Principal Water Transmission Pipeline in Kigali City	Rwanda	Water supply and sewerage	P44
Case19	Project for Rehabilitation of the Third Wharf in Dakar Autonomous Port	Senegal	Ports and harbors	P46
Case20	Project for Development of Malindi Fish Landing and Marketing Facilities in Zanzibar	Tanzania	Fishing industry facilities	P48
Case21	Project for Improvement of Tazara Intersection	Tanzania	Roads and bridges	P50
Case22	Project for Widening of New Bagamoyo Road (Phase 2)	Tanzania	Roads and bridges	P52
Case23	Radès-La Goulette Bridge Construction Project - Main Bridge (Lot 1) and North Intersection (Lot 3) in the Republic of Tunisia	Tunisia	Roads and bridges	P54
Case24	Project for Improvement of Gulu Municipal Council Roads in Northern Uganda	Uganda	Roads and bridges	P56
Case25	Construction of a New Bridge Across River Nile at Jinja	Uganda	Roads and bridges	P58
Case26	Project for Irrigation Development for Nyakomba Irrigation Scheme	Zimbabwe	Irrigation facilities	P60

## Safety education efforts by the Japanese construction industry

Japanese companies are involved in many construction projects outside Japan, and government officials often express their appreciation for the accident-free nature of Japanese construction work. Every single construction company in Japan has a “Safety First” policy.

In Japan in the 1960s, 6,000 people died each year in industrial accidents (including roughly 2,500 people in the construction industry). This resulted in the separation of the Industrial Safety and Health Act from the Labor Standards Act in 1972, and prompted concerted efforts by the public and private sectors to prevent industrial accidents. These efforts reduced the number of fatalities in the construction industry; the figure was 281 in 2023.



Source: Ministry of Health, Labor and Welfare Work Accident Statistics

In the course of efforts to prevent industrial accidents, it became clear that most accidents in the construction industry are caused by breaches of discipline, unsafe behavior, and other human factors. Therefore, various efforts have been made and are ongoing based on the belief that most industrial accidents can be prevented if individual workers can detect and avoid potential hazards in their work and at the workplace.

When work is entrusted to Japanese construction companies, partner countries can learn a high level of technology as well as expertise for safe construction developed in Japan, allowing their people to engage in construction work safely. Typical examples of these practices include morning meetings and radio calisthenics.

## Origin of morning meetings

Morning meetings became a Japanese institution during the transition from small-group to large-group school education (late 1890s–early 20th century).

At the time, school events and learning styles were changing in many ways, for example including school excursions and arts festivals as part of school education. Morning meetings are believed to have begun around that time as one of those changes. It has been said that morning meetings are effective in fostering collectivism in children who are engaging in group activity for the first time.

One effect of morning meetings is providing venues for mutual information, which allows information to be conveyed directly, speakers to confirm what was communicated to listeners, and listeners to interpret the context of the messages.

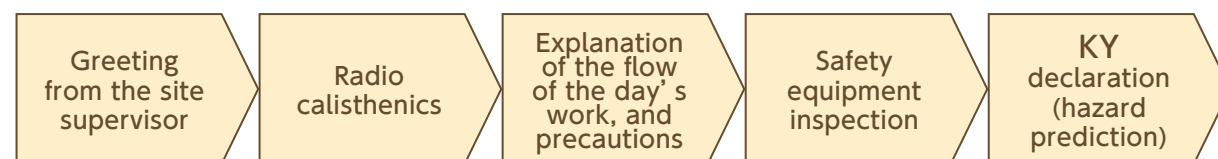
## Morning meetings at construction sites in Japan

Morning meetings are held every morning at nearly all construction sites in Japan. Keeping construction sites safe is a top priority for the construction industry. In Japan, it is believed that morning meetings are necessary to ensure that work at construction sites can be carried out safely and efficiently.

The primary objectives are as follows:

<b>Worker roll call</b>	Roll call is conducted every morning to verify that workers are onsite as the records show.
<b>Managing workers' physical condition</b>	Morning meetings allow workers to see each other, creating opportunities for them to detect if anything is amiss and counter the risk of major injuries and accidents.
<b>Conveying details of the day's work</b>	Sharing the details of the day's work in advance allows workers to engage in their work without hesitation, leading to improved safety and efficiency.
<b>Conveying precaution</b>	Reminding workers of the same precautions at daily morning meetings helps prevent lapses in concentration and equips them to work carefully in hazardous areas.
<b>Increasing safety awareness</b>	Workers' safety awareness can be constantly improved by declaring the goal of zero industrial accidents and explaining innovations at each construction site at morning meetings.

### ◆ How morning meetings are conducted (example)



### ◆ Images from morning meetings



## Origin of radio calisthenics

Radio calisthenics have a long history—100 years as of 2028. The practice originated in the USA in 1925 when fitness exercises were broadcast on the radio. In 1928, the Ministry of Communications (later the Ministry of Posts and Telecommunications) established calisthenics to promote the health of Japanese people. At the time, not every household had a radio, so the Ministry of Communications worked on various promotional activities to make calisthenics available to everyone in Japan. The moves could not be fully conveyed by commands on the radio or by diagrams alone, so postal workers around Japan practiced them to show everybody how to do them.

The most popular form of radio calisthenics today is actually the third version, and began in 1951. The motto of radio calisthenics is “Any time, Anywhere, Anyone.” The challenge is creating the proper environment for calisthenics. People gather every morning to work up a sweat through radio calisthenics and enjoy chatting with their friends. Since the gatherings occur every day, people notice when someone is missing, and may look into the reason why. Radio calisthenics is more than a form of exercise—it also plays a major role as a communication tool for entire communities.

Source: National Radio Calisthenics Federation website

## Prevalence of radio calisthenics at construction sites in Japan

Many companies in the construction industry have adopted radio calisthenics as their morning meeting program. A 2012 survey revealed that a majority (56.9%) of companies in the construction and transport industries implement some form of radio calisthenics.

The most common reason for adopting radio calisthenics (75.1%) was that it helps prevent accidents in daily life, suggesting that physical exercise through radio calisthenics helps prevent accidents.

Although the number of industrial accidents in construction is on the decline, it is still high compared to other industries; therefore, keeping construction sites safe is a top priority for the construction industry. Additionally, poor communication is often one of the causes of accidents.

Work often begins early in the morning on construction sites, and the rate of falls and other accidents tends to be high right after work starts, when the mind and body are not fully awake. To prevent as many of these accidents as possible, many construction sites incorporate radio calisthenics during their morning meetings to get workers moving before they start working.

⟨Images of radio calisthenics⟩





# Project for Improvement of the Southeastern Tansoba Bypass in Ouagadougou

## Dai Nippon Construction

Contributing to the development of international corridor nodes with swift, quality construction



Construction site : Burkina Faso

Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer)
  - Sustainable growth and increasing connectivity (Connectivity)
- ◆Principle 2 : Raising economic efficiency in terms of life cycle cost
  - Meeting construction deadlines and shortening construction schedules (Shortening construction schedules)
- ◆Principle 5 : Social considerations
  - Safety and health (Accommodating traffic during construction)



Project description

Location of construction work	Starting point: End point of East Interchange End point: Edge of intersection before Ouaga 2000 Interchange
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Overview of work	Main road widening New motorcycle lanes Road drainage facilities, etc.
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Overview
<p>This project improved a road in the city of Ouagadougou, which serves a very important function as a node in the international corridor connecting Côte d'Ivoire, Ghana, Togo, and other coastal countries with Niger, Mali, and other landlocked countries.</p> <p>The road was not fully improved, impeding the flow of traffic. The government had made repairs including partial repaving, but had yet to reach a fundamental solution.</p> <p>The total improvement and construction of new motorcycle lanes and other facilities under this project improved urban transportation and the intra-regional logistics network, helping to facilitate intra-regional trade and promote intra-regional economic integration, and improving connectivity.</p> <p>Upon completion, the government issued a letter of appreciation for the project's contributions to the mobility of Burkinabe people, quality construction, and more. Residents commend the project, praising the road as "the best in Burkina Faso."</p>

- ✓ Swiftly erecting a steel pedestrian bridge to meet local demand

As a major road with heavy traffic, it was necessary to ease traffic congestion and shorten the construction schedule during the construction work. Given this requirement, three large cranes were used to quickly install a steel walkway to ensure that the project accommodated traffic during construction.

Additionally, the steel pedestrian bridge obviated pillars in the center of the road, making the road wider and increasing motorists' visibility, thereby preventing accidents.

- ✓ Swift construction that accommodated distinct local circumstances

In pursuit of quality construction, Japanese engineers played a central role in formulation, design, manufacturing, construction, and quality testing in accordance with distinct local circumstances while providing guidance to local engineers. Local engineers were able to learn this expertise in the field, resulting in a high level of technology transfer.

Additionally, measures were taken to shorten the construction schedule, for example, two finishers steamrolled the road flat in succession as a measure to prevent cooling and maintain the speed of the work.



# Project of Improvement of the Marshal Bridge in Matadi

IHI Infrastructure Systems Co., Ltd.

Technology transfer of maintenance techniques to extend the service lives of bridges



## Project description

Overview of work	
Bridge type	3-span continuous stiffened suspension bridge
Length	722 m (longest in Africa at the time of construction)
Center span	520m
Width	11.5m

**Overview**

The Marshal Bridge in Matadi—the only bridge on the Congo River connecting the capital city of Kinshasa to ports on the Atlantic Ocean—was constructed with Japanese loan aid, and is maintained by the Organization for Equipment of Banana-Kinshasa (OEBK).

Although OEBK personnel, who were also involved in the construction work, kept the bridge in good condition by carefully performing the maintenance they had learned from Japanese companies, 30 years had passed since the construction; to further extend the life of the bridge, the decision was made to install a dry air injection system through Japanese grant aid.

Roughly 40 OEBK employees were directly employed to perform the construction work, and further **technology transfer** was implemented through instruction in monitoring and other techniques for operating and maintaining the first dry air injection system in the Democratic Republic of the Congo.

### Thorough one-on-one technical guidance

Full-time personnel were provided with one-on-one instruction for roughly one month on compiling the temperature and humidity measurement data necessary for maintaining the newly installed dry air injection system.

The system was designed with local conditions in mind, with a simple structure and easily repairable components to ensure **efficient maintenance**.

The monitoring manual is practical, reflecting the views of the OEBK personnel who take the measurements, and has contributed to **appropriate operation and maintenance** of the system, as it has been maintained in good order by OEBK personnel without outside assistance since it was installed.

### Realizing accident- and disaster-free construction

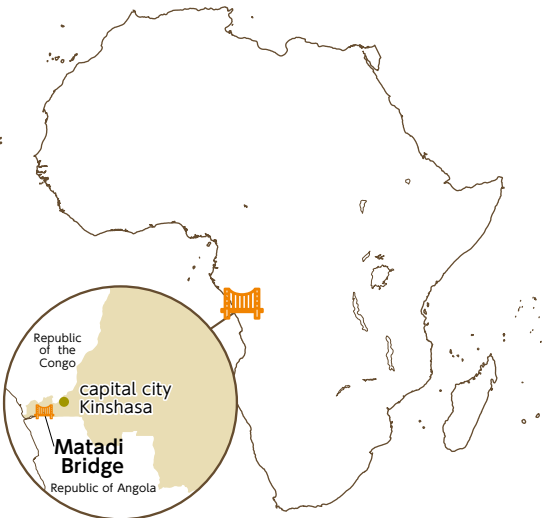
During construction, morning meetings were introduced, and safety patrols and safety drills were conducted monthly, resulting in **safety-conscious** construction work with no accidents or disasters throughout the entire construction period.

OEBK personnel also realized the effectiveness of the morning meetings, which have taken root in their daily operations even after they completed the construction work; the project helped **enhance their skills**.

## Construction site : Democratic Republic of the Congo

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Technology transfer, Skill enhancement**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Efficient maintenance**)
- ◆ Principle 5 : **Social considerations**
  - Safety and health (**Safety**)
- ◆ Principle 6 : **Infrastructure governance**
  - Operation and maintenance (**Appropriate operation and maintenance**)





# Project for the Development of the University Hospital Center of Cocody for the Improvement of Maternal and Child Health Care Services in Greater Abidjan

TODA CORPORATION, Joint venture with other company

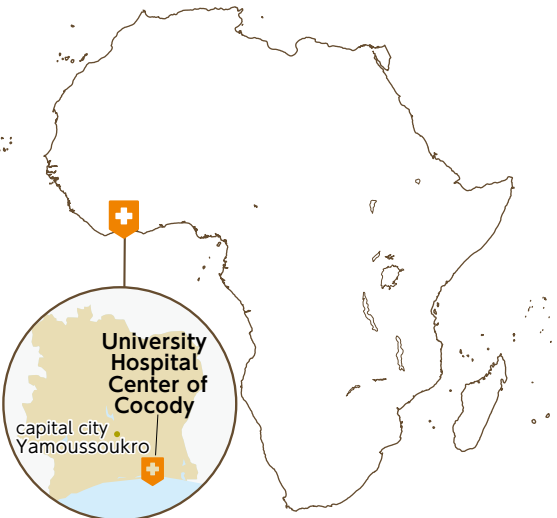
Quality hospital construction on a short schedule during the COVID-19 pandemic



## Construction site : Côte d' Ivoire

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Creating jobs**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Efficient maintenance**)
  - Meeting construction deadlines and shortening construction schedules (**Meeting construction deadlines**)
- ◆ Principle 5 : **Social considerations**
  - Safety and health (**Safety, Accommodating traffic during construction**)
  - Collaborating with local communities (**Inclusiveness**)
- ◆ Principle 6 : **Infrastructure governance**
  - Operation and maintenance (**Appropriate operation and maintenance**)



## Project description

Overview of work	
Floor area	Maternal and Child Health Care Ward (4 floors above ground) Roughly 10,375.09m <sup>2</sup>
Structure	Reinforced concrete
Overview	
This project expanded the Maternal and Child Health Care Ward and added health care equipment at the University Hospital Center of Cocody, one of the tertiary care facilities serving Greater Abidjan.	
The facility had deteriorated significantly, making it impossible to provide adequate treatment for pregnant women and newborns in need of advanced medical services, especially in the delivery department. This project provided model health care services for maternal and newborn care, addressing the needs of medical personnel and ensuring <b>inclusiveness</b> .	

### ✓ Ongoing technology transfer and careful preparation before construction

For this project, three local companies that had provided technical guidance on past projects were contracted, and roughly 400 workers were employed, helping to **create employment opportunities** in Côte d' Ivoire. Additionally, the postponement of the start of the construction work due to the COVID-19 pandemic was taken as an opportunity to work with local companies to analyze the processes and procurement of materials, and as a result, the work was completed on schedule. The Ivorian government also expressed its appreciation for completing the work on schedule despite the pandemic; the project met local infrastructure needs by **meeting construction deadlines**. Materials and equipment were selected based on how easy they were to repair locally. The exterior walls were made of readily available local materials that are resistant to deterioration due to age. For the air conditioning, a manufacturer with a distributor in Côte d' Ivoire was selected, and materials and equipment that can be **efficiently maintained** were selected. For the elevators, the importance of periodic inspections in terms of life cycle cost was emphasized, and the necessary information and guidance for conducting inspections was provided, thereby establishing a system enabling **appropriate operation and maintenance**.

### ✓ Safety awareness improvement led by local companies

Periodic safety workshops and other safety measures were initially led by Japanese staff members, but local companies were put in charge from time to time to improve safety awareness among individual workers, resulting in safety-conscious construction work. Additionally, given that the work took place during the COVID-19 pandemic, measures were taken to prevent infections, for example measuring body temperatures at entrances to the construction site. Construction vehicles were directed to drive a different route than hospital visitors to avoid congestion, meaning that the project considered the **safety** of hospital visitors and **accommodated traffic during construction**.



# Project for the Reinforcement of Maritime Transport Capacity at the Gulf of Tadjourah

PENTA-OCEAN CONSTRUCTION CO., LTD.

Utilizing local human resources to perform construction in consideration of existing port operation and the environment



## Construction site : Djibouti

### Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer)
  - Sustainable growth and increasing connectivity (Connectivity)
- ◆Principle 3 : Environmental considerations
  - Environmental considerations (Consideration for ecosystems)



## Project description

Overview of work	
Japanese company	JFE Engineering Corporation Pontoon fabrication, gangways
Location of construction work	Republic of Djibouti, Djibouti City and Tadjourah
Project overview	Improvement of ferry berthing facilities
Overview	
This port project aimed to reinforce the maritime transport capacity of Djibouti by improving port facilities at the Port of Djibouti in the capital of Djibouti City and the Port of Tadjourah located in the northern part of the country.	
The improvement of the two ports has made it possible to transport food, fuel, water, and other necessities from the capital of Djibouti City to the northern part of the country, increasing the flow of people and goods and contributing to the country's overall socioeconomic prosperity and development as well as connectivity.	

### Performing construction work with existing ports in operation

Very few contractors in Djibouti had experience in marine construction; therefore, the work was performed while sharing informations about construction methods to the local contractor. As for the actual construction work, in pursuit of time-saving, quality assurance, and education, precast components were prepared to enable the local contractor to install the moorings, thus providing technology transfer in the form of guidance on working with state-of-the-art technology being used in Djibouti for the first time. In this project, communication with the client and subcontractors was very smooth because Japanese-educated young Africans were hired as site managers.

### Pontoons made with advanced fabrication techniques

The new ferry would have a bulbous bow, making it necessary to use pontoons for the embarkation and disembarkation facilities. Additionally, in the berthing facility area, it was necessary to ensure a safe depth and account for reef-building corals in order to avoid obstructing ferry berthing during low tide. Accordingly, the embarkation and disembarkation facilities were designed as pontoons rather than filled revetments. The two pontoons were fabricated at a factory in Vietnam and transported by sea to Djibouti on a large carrier. Given the high level of manufacturing technology required for an offshore structure, quality control was carried out by experienced Japanese engineers. This made it possible to take mitigation measures to maintain the original ecosystem and biodiversity, meaning the project realized consideration for ecosystems.



# Project for Rehabilitation of Trunk Road (Phase IV, 2 stages)

KAJIMA CORPORATION



## Construction site : Ethiopia

### Applicable G20 Principles

- ◆ Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Creating jobs, Skill enhancement)
  - Sustainable growth and increasing connectivity (Sustainable development, Connectivity)
- ◆ Principle 4 : Resilience against natural disasters and other risks
  - Resilience (Resilience against risks)
- ◆ Principle 5 : Social considerations
  - Safety and health (Safety)



*Working with local people to enhance the functionality of international logistics routes under difficult geological conditions*



## Project description

Overview of work	
Road: ① Road length	39.9km
② Road width	Overall: 11.0-20.0m / Lanes: 3.5m x 2, Shoulders: 1.5-3.5m (doubling as parking strips), Pedestrian walkways: 2.5m (both sides): Residential areas
③ Pavement structure	Asphalt surface: 5cm / Asphalt base layer: 75mm, Upper roadbed: 225mm / Lower roadbed: 225 / 250mm, Upper subgrade: 20cm (where necessary)
Bridges: ① Reinforced concrete slab bridge	Nine 8 m spans
② Reinforced concrete girder bridge	Five 15m bridges / One 15m + 15m bridge
Multi-chamber reinforced concrete boxes:	5
Overview	
National Highway 3 is an arterial road that contributes to connectivity between the Ethiopian capital of Addis Ababa and the country's grain belt and neighboring Sudan. The project improved an unpaved section of the highway, improving safety and comfort, increasing travel speeds, and reducing closures during the rainy season. It also contributed to sustainable development by helping to develop economic and social infrastructure that underpins agricultural development, for example improving local residents' access to medical and educational facilities and increasing livestock transport.	

### Changing worker awareness by employing local residents

Phase 1 of this project started in 1999. Local residents were hired for each construction zone; at its peak, the project employed 1,500 Ethiopians, playing a major role in creating employment opportunities in the country. Additionally, since many of the local workers were operators who had never handled cutting-edge heavy equipment before, Japanese and third-country engineers were assigned at key points to enhance their skills and abilities through on-the-job training. Local staff members who had participated in the project from the beginning started their own businesses, demonstrating a change in their awareness of contributing to the economic development of Ethiopia. Through safety training and other efforts, the project improved local workers' awareness of safety.

### Constructing a long-lasting road by examining local geological conditions

In addition to the method of replacing existing soil with high-quality soil, creative steps such as laying impermeable sheets in areas considered prone to the risk of natural disasters were taken to resolve vulnerability to flood damage, making the work highly resilient against risks. Additionally, methods for dealing with damage to roads—namely guardrail damage and trucks overturning—and other maintenance activities were carried out to show the counterpart government how to perform maintenance and demonstrate the importance of conservation activities.



Project for Replacement of Awash Bridge  
on A1 Trunk Road

SATO KOGYO CO.,LTD

Maintenance-free bridge with the first modified asphalt  
pavement in Africa



Project description

Overview of work	
Bridge type	3-span continuous PC box girder bridge
Length	145m

Overview

This project helped enhance the functionality of logistics routes by facilitating vehicle travel and traffic (especially large trucks) through the replacement of the Awash Bridge on Ethiopian National Highway 1, which would have the greatest impact if it were to collapse.

The Awash Bridge is part of National Highway 1, a very important route connecting landlocked Ethiopia to the ports of neighboring Djibouti that handles roughly 90% of logistics transport from Djibouti. With so many large trucks traveling the route, the existing bridge was seriously deteriorated; replacing it improved **connectivity**. Additionally, the first modified asphalt pavement in Africa at the time was installed to prevent rutting on the access roads.

☒ Pursuing maintenance-free infrastructure

The quality of the concrete was carefully verified through preliminary temperature stress analysis to ascertain the properties of local cement. No compromises were made on the materials; aggregate that met Japanese standards was found and transported over a long distance. Additionally, to control the temperature of the concrete, placement began at 3:00 a.m., quite unusual compared to local norms. The hard work resulted in high-strength concrete with no abnormalities to this day many years later, helping to lower the **life cycle cost**.

☒ Thorough technology transfer with safety in mind

For the construction work, roughly 10 Ethiopian staff members were hired to handle onsite management tasks such as material arrangement, quality control, and process control, and were given the expertise needed to facilitate the work. Additionally, **technology was transferred** from Japanese professionals to roughly 70 local workers in charge of paving, framing, and earthwork. A plant specifically for the concrete was set up in the field, and technical guidance was provided from manufacturing to placement.

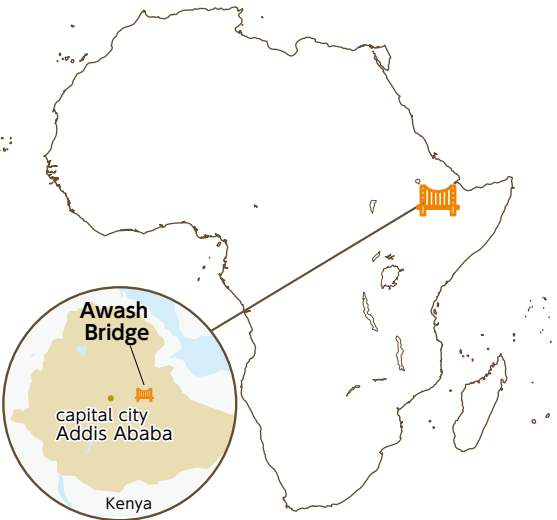
After the work was completed, the workers involved in the plant control work performed the same work on other projects, applying the skills they acquired from Japanese companies and contributing to **skill enhancement** in Ethiopia.

In addition to awareness-raising activities at morning meetings and safety conventions, protective equipment and safety checklists were also introduced to raise site workers' awareness of safety, resulting in the **safe** completion of the work.

Construction site : Ethiopia

Applicable G20 Principles

- ◆Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Technology transfer, Skill enhancement**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Life cycle cost**)
- ◆Principle 5 : **Social considerations**
  - Safety and health (**Safety**)





Project for the Construction of Advanced Research Center  
for Infectious Diseases at Noguchi Memorial Institute  
for Medical Research

SHIMIZU CORPORATION

Enhancing the functionality of important research facilities  
with young, multinational personnel



Construction site : Ghana

Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer, Skill enhancement)
- ◆Principle 2 : Raising economic efficiency in terms of life cycle cost
  - Realizing Value for Money in the life cycle of infrastructure investment (Efficient maintenance)



Project description

Overview of work	Business structure	Advanced Research Center for Infectious Diseases (3 floors, 4,597.50 m <sup>2</sup> ) West Building, North Building
	West Building	Administration, student laboratories, faculty laboratories, seminar rooms, project rooms, etc.
	North Building	Laboratories, BSL-3 laboratory, BSL-3 administrative office, washing rooms, refrigeration (freezing) rooms, warehouse, etc.
	Research equipment	Vertical high-pressure steam sterilizer (A), etc.

Overview

The Noguchi Memorial Institute for Medical Research plays a central role in the fight against infectious diseases in West Africa.

Under the project, a new BSL-3 laboratory, PCR laboratory, and laboratory for immunology, virology, and bacteriology were built at the Advanced Research Center for Infectious Diseases. The establishment of the Advanced Research Center for Infectious Diseases has improved the institute's functions for research and testing as well as education, and has contributed to strengthening the capacity of the entire West African region to combat infectious diseases, thereby meeting the needs of medical personnel.

Installation by Japanese professionals ensured rigorous checking and adjustment in a multilayered process

Japanese products were adopted, despite requiring a higher initial expense than products made in other countries. Chemical-resistant materials for walls and floors were exported from Japan, and Japanese personnel were dispatched to install the clean panels and rigorously check them and adjust air pressure in multiple steps to prevent air leaks. Adjustments were also made onsite by Japanese professionals, enabling research center personnel to use safety cabinets and autoclave sterilizers without having to modify the machines, thus achieving efficient maintenance.

Persistently explaining sophisticated requirements to local subcontractors in person

A team of young multinational personnel (including Ghanaian staff members) was formed to work with local subcontractors to construct this sophisticated research facility.

The local subcontractors had never experienced the demanding requirements for constructing an infectious disease research facility, such as high earthquake resistance. The roles expected of the research facility and the background of the demanding work requirements were carefully and persistently explained to the subcontractors' managers in person, and trusting relationships founded on shared understandings were built during the framing work, contributing to the enhancement of their skills. Center personnel were also provided with guidance on quality control expertise, supporting smooth facility operation and contributing to technology transfer, through the project for the Construction of Advanced Research Center for Infectious Diseases at Noguchi Memorial Institute for Medical Research.



# Project for Improvement of Ghanaian International Corridors

SHIMIZU CORPORATION

Using ICT to facilitate grade separation work in chronically congested areas



## Construction site : Ghana

### Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer)
  - Sustainable growth and increasing connectivity (Connectivity)
- ◆Principle 2 : Raising economic efficiency in terms of life cycle cost
  - Meeting construction deadlines and shortening construction schedules (Meeting construction deadlines)
- ◆Principle 5 : Social considerations
  - Safety and health (Safety, Accommodating traffic during construction)



## Project description

Overview of work	Length:	
	1. East-west (Main road) including box culvert (190m) and U-shaped retaining wall	2,100m
	2. North-south (Main road)	1,900m
	3. Connector roads (ramps)	7,000m
	4. Service roads	3,500m

### Overview

The Tema intersection—where traffic from the Ghanaian capital of Accra meets traffic from the Port of Tema, the country's largest—is the nexus of two international corridors: the Abidjan-Lagos Corridor linking West African coastal cities, and the Eastern Corridor linking Ghana and Burkina Faso. Chronic traffic congestion was the result of the roads' inability to handle the increasing traffic volume in recent years. In response, the country's largest underpass was constructed to create a grade-separated intersection, improving traffic congestion and contributing to better connectivity. The construction period coincided with the COVID-19 pandemic, but the project received high praise from the Ghanaian government for the transmission of technology and completion of construction on schedule through various means.

### Creating and implementing detailed detour plans and using ICT-enabled drones to share issues

Effective detour plans were made and implemented to secure the work zone for the underpass construction. This not only prevented traffic due to construction work, but also eased congestion during the detour period below the pre-construction level, contributing to accommodating traffic during construction. Additionally, the use of aerial drone video to share the progress of the work and issues (e.g. delays involving land expropriation and relocating buried pipes under the client's jurisdiction) with the client facilitated the work, contributing to meeting construction deadlines and reducing costs.

### Various initiatives for safety management guidance and technical guidance

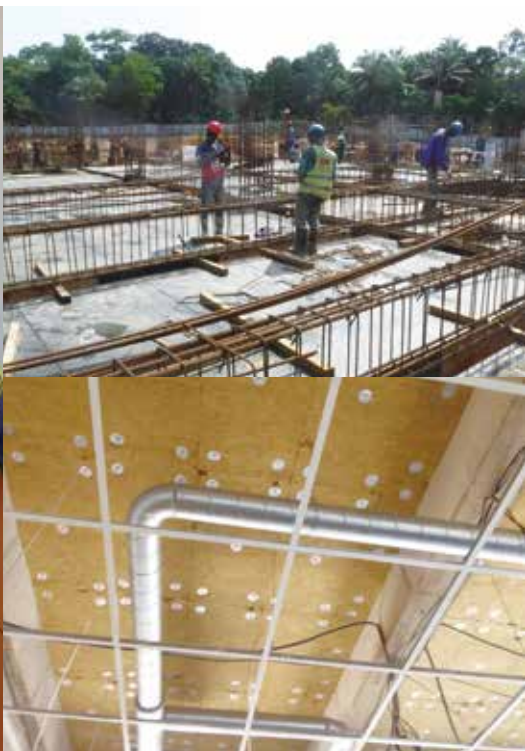
Japanese-style safety training was thoroughly implemented by simulating hazardous conditions onsite for local construction workers to improve their knowledge and awareness. To identify dangerous areas around heavy equipment, safety management guidance was provided through hands-on experience showing operators' blind spots around the equipment. Additionally, technology was transferred by providing training to impart the expertise needed for the work through classroom learning (e.g. workshops held in advance of concrete placement, lectures on fresh concrete production and management methods), onsite guidance by Japanese carpenters, and more. Furthermore, Japanese companies and technologies were conveyed and introduced to local engineers, workers, and students through lectures at local universities and other technology transfer opportunities.



# Project for the Construction of the National Institute of Public Health

TODA CORPORATION

Developing a quality laboratory to serve as the core of infectious disease control in Guinea



## Construction site : Guinea

### Applicable G20 Principles

- ◆ Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Creating jobs, Skill enhancement)
- ◆ Principle 2 : Raising economic efficiency in terms of life cycle cost
  - Realizing Value for Money in the life cycle of infrastructure investment (Life cycle cost)
- ◆ Principle 4 : Resilience against natural disasters and other risks
  - Resilience (Resilience against risks)
- ◆ Principle 5 : Social considerations
  - Collaborating with local communities (Inclusiveness)
- ◆ Principle 6 : Infrastructure governance
  - Operation and maintenance (Appropriate operation and maintenance)



## Project description

Overview of work	
Floor area	Laboratory/Training Building (2 floors above ground): 2,629.73m <sup>2</sup>
	Office Building (1 floor above ground): 877.14m <sup>2</sup>
	Others (e.g. Energy Center Building, Warehouse): 576.37m <sup>2</sup>
Structure	Reinforced concrete
Overview	
This project involved the construction of a new facility and addition of equipment at the National Institute of Public Health—the core center for infectious disease control in Guinea—to investigate and research infectious diseases.	
To fulfill these roles, a new facility was constructed to meet high quality requirements for facilities and equipment (including a Biosafety Level 2+ laboratory) and prepare for disaster risk, and the new facility is highly resilient against risks.	
The new facility has contributed to the early detection and prevention of the spread of infectious diseases in Guinea, thereby addressing the needs of medical personnel and ensuring inclusiveness.	

### ✓ Detailed technical guidance and quality control

The project employed roughly 300 local workers, helping create employment opportunities in Guinea. Staff members from Japan and third countries enhanced workers' skills by steadily promoting difficult construction work in a repeated cycle consisting of teaching work group leaders the procedures for each work process and having them divide each task into simpler ones and relaying them to the workers.

Ensuring quality was also of paramount importance; for example, regarding the use of concrete, equipment for strength testing was brought to Guinea to conduct strength tests every time concrete was installed. This distinctly Japanese detailed technical guidance and quality control made it possible to develop quality facilities.

### ✓ Considering life cycle cost

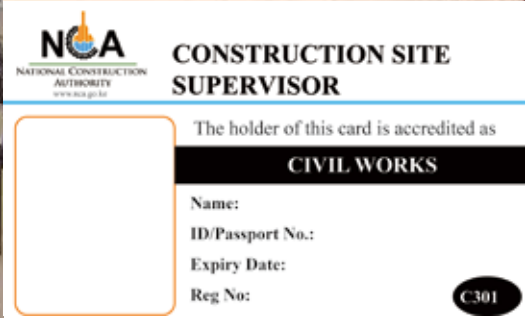
Louvers were installed to block strong sunlight while allowing air to pass through, and insulation was installed under the building's roof to prevent the temperature from rising in the laboratory, lowering maintenance costs and creating a facility with an excellent life cycle cost. Additionally, guidance was provided on how to use air conditioners to prevent condensation from forming, and facility maintenance personnel were provided with guidance on how to handle facilities and equipment to build an organization capable of appropriate operation and maintenance.



# Mombasa Port Area Road Development Project (2) Southern Bypass

Fujita Corporation

Pairing with activities to connect expressway construction work to educational opportunities



## Construction site : Kenya

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Skill enhancement**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Life cycle cost**)
- ◆ Principle 3 : **Environmental considerations**
  - Environmental considerations (**Environmentally friendly infrastructure**)
- ◆ Principle 5 : **Social considerations**
  - Collaborating with local communities (**Consideration for local communities**)
- ◆ Principle 6 : **Infrastructure governance**
  - Procurement and finance (**Financial sustainability**)



## Project description

### Overview of work

Expressway project launched amid the development of the Mombasa Special Economic Zone, which requires major transportation improvements

Mwache Jct-Mteza	(8.96km)
Mwache Bridge	(660m)
Mteza Bridge	(1,440m)
Tsunza Viaduct	(690m)

### Overview

The Port of Mombasa in Kenya—the hub of the Northern Corridor of East Africa—has seen a rapid increase in cargo handling volume in the past several years, making it an import-export hub for neighboring countries and landlocked countries. This project facilitated logistics around the Port of Mombasa by constructing a road connecting container terminals near the port to the Northern Corridor of East Africa and a bypass road to Southern Mombasa, thereby achieving economic and social development of the entire East African region and contributing to improving **connectivity**.

Additionally, the project was financed with low interest rates as a result of the application of ODA loans, which contributed substantially to **financial sustainability**. The construction work included tree planting to counter mangrove removal, as well as environmental monitoring in the form of periodic water quality surveys and noise measurements, resulting in **environmentally friendly infrastructure**. Furthermore, the adoption of steel pipes with inner ribs and a new type of expansion device (both of which were made in Japan) and more durable technology contributed to reducing the **life cycle cost** of the bridges.

### Helping locally hired engineers and workers acquire qualifications, and developing engineers

To prove that the local engineers and workers involved in this project had acquired the construction skills and techniques required to work on the site of a major infrastructure project, technical qualifications were certified in collaboration with a local certifying body after the construction work was completed.

This led to the visualization of **skill enhancement**.

### Providing traffic safety education to local residents

The area where the construction work was done had no roads previously, and its residents had little knowledge of modern traffic safety; therefore, traffic safety education was regularly provided to a total of roughly 1,200 students in the area.

This kind of **consideration for local communities** helped lay the groundwork for the residents to accept the new road once it was completed.

Additionally, safety education was provided to workers through KY (hazard prediction) activities, among others, in an effort to raise their awareness of safety.



# Development of a Container Terminal at the Port of Mombasa, Republic of Kenya (Phase 1 & 2)

TOYO CONSTRUCTION CO.,LTD.

Ensuring that Japanese concepts of safe, quality construction take root locally



## Project description

Overview of work	
Phase 1	Work completed in February 2016 Quays (3), reclamation (5,940,000m³), ground improvement (PVD: 5,400,000m), roads, construction (18 facilities), equipment
Phase 2	Work completed in May 2022 Quays (1), reclamation (3,100,000m³), ground improvement (PVD: 4,300,000m), roads, construction (18 facilities), equipment

Overview
<p>This project involved constructing a container terminal (Phase 1) and building a container yard with buildings adjacent to the terminal (Phase 2) at the Port of Mombasa, the largest international port in East Africa, using advanced port construction technology from Japan.</p> <p>The Port of Mombasa in Kenya—the hub of the Northern Corridor of East Africa—has seen a rapid increase in cargo handling volume in the past several years, but the port facilities and transport infrastructure around the port were underdeveloped, preventing logistics from being as smooth as they could be. Through this project, steps were taken to accommodate increasing demand for cargo handling and streamline port operations, helping promote trade and economic and social development of neighboring countries and the rest of the region, and contributing substantially to <b>connectivity</b>.</p>

### ✓ Innovations in construction

The steel pipe piles used for the quay foundations had a high initial cost, but also a long service life; the heavy-duty corrosion-resistant coating method—which has superb cost performance over the long term—was used to create infrastructure with an excellent **life cycle cost**.

Additionally, to construct a large container terminal on soft ground, prefabricated vertical drains and surcharge fill were used to promote consolidation and increase the strength of the soft ground, preventing the effects of future settlement and building **resilience against risks**.

### ✓ Training local workers in Phase 1 contributed to the work in Phase 2

Relatively inexperienced local workers were trained in heavy equipment operation and welding during Phase 1; in Phase 2, they were able to operate heavy equipment and perform welding work.

Even though Japanese personnel were evacuated for several months due to the COVID-19 pandemic, the local workers had gained the ability to drive piles on land by themselves, contributing to the **enhancement of their skills**.

## Construction site : Kenya

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Skill enhancement**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Life cycle cost**)
- ◆ Principle 4 : **Resilience against natural disasters and other risks**
  - Resilience (**Resilience against risks**)





# Project for Dualling of Nairobi-Dagoretti Corner Road

World Kaihatsu Kogyo Co., Ltd.

Strengthening the capacity of local companies and workers through quality road construction



Photo provided : No photographer name /JICA

## Construction site : Kenya

### Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer, Skill enhancement)
  - Sustainable growth and increasing connectivity (Connectivity)
- ◆Principle 2 : Raising economic efficiency in terms of life cycle cost
  - Meeting construction deadlines and shortening construction schedules (Shortening construction schedules)



## Project description

### Overview of work

Construction data (Phase2)	Description: Widening a road from 2 lanes to 4 lanes
	ITS traffic signals: 37
	Subgrade construction: 34,000m <sup>2</sup>
	Roadbed construction: 75,000m <sup>2</sup>
	Surface and base course: 75,000m <sup>2</sup>
	Streetlights: 168
	Waterway construction: 6,200m

### Overview

This project widened an existing road from two to four lanes, and added and improved pedestrian walkways, traffic signals, signs, and other facilities to resolve traffic congestion in the Kenyan capital of Nairobi, the transport hub of East Africa.

Nairobi-Dagoretti Corner Road—one of the arterial roads connecting the central and western parts of Nairobi—is a route that experiences traffic congestion during the peak commuting hours in the morning and evening due to the recent increase in traffic volume.

By widening Nairobi-Dagoretti Corner Road and adding incidental facilities, traffic congestion has been eased, helping to facilitate the flow of people and goods within Nairobi and enhancing connectivity.

### ✓ Guidance for local technicians on distinguishing quality

To achieve quality road construction, the construction company performed all contracted work from producing crushed stone to producing asphalt mixtures, resulting in efficient construction work and shortening the construction schedule.

The project provided local workers with hands-on experience—namely mixing and observing differences in appearance, odor, and texture of both normal and abnormal pavement mixtures—to teach them how to distinguish the quality of pavement mixtures. After the project was completed, some of these staff members were employed by local government agencies for the technical skills they had acquired, making the project a significant contributor to enhancing skills in Kenya.

### ✓ Support for maintaining ITS traffic signals

Before this project, very few ITS traffic signals—which detect congestion and alter their cycles accordingly—had been installed in Kenya. Under the project, a local maintenance company was invited to Japan to learn how ITS traffic signals work, and then participated in installing the signals in Kenya. This allowed the local company to learn maintenance expertise in addition to construction methods. The adoption of cutting-edge technology in the form of the ITS traffic signals contributed to technology transfer in Kenya.



# Project for Reconstruction of Somalia Drive (Japan Freeway) in Monrovia (Phase 2)

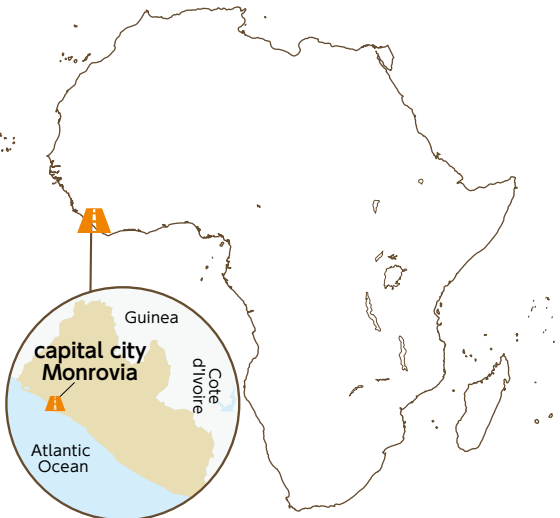
Dai Nippon Construction



## Construction site : Liberia

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Creating jobs**)
- ◆ Principle 4 : **Resilience against natural disasters and other risks**
  - Resilience (**Build Back Better**)
- ◆ Principle 5 : **Social considerations**
  - Safety and health (**Safety, Accommodating traffic during construction**)



*Japan Freeway, a quality Liberian reconstruction road constructed with no accidents*



## Project description

Overview of work	
Phase 1	Widening of existing roads
Phase 2	Upgrade of existing road to two lanes in each direction Widening of existing roads
Other	Improving intersections Installing bus stops Installing traffic signals, road signs, etc.
Overview	
This project was an emergency reconstruction of road facilities that were in danger of severe damage and collapse (bridges) due to civil war.	
Somalia Drive—one of the arterial roads connecting the eastern and western parts of Monrovia—is a route that experiences traffic congestion by trucks carrying cargo from the Port of Monrovia, and people in the surrounding communities going about their daily lives.	
The population of the surrounding area increased rapidly due to the repatriated refugees and internally displaced persons who settled along the route after the end of the civil war, and the rehabilitation and construction of the road network could not keep pace with the ensuing increase in traffic, resulting in traffic congestion all over the city.	
This project was a <b>Build Back Better</b> initiative, improving existing roads and also taking drastic measures to address structural problems, such as constructing pedestrian walkways to ensure pedestrian safety and installing drainage facilities to prevent roadbed destruction due to rainwater infiltration.	
After its completion, the road was so highly acclaimed by the Liberian government that the name was changed from "Somalia Drive" to "Japan Freeway."	

☒ **Seven years of construction work with no accidents**

The project employed roughly 300 Liberian people with limited experience in road reconstruction, contributing to **creating employment opportunities**. Under the guidance of Japanese experts, the workers received a thorough safety education and mastered basic behaviors.

Consequently, despite the high fatality rate from traffic accidents in Liberia, the project was completed with no accidents through **safety-conscious** construction work.

☒ **Raising awareness of safety among local residents**

Liberia had little experience with road reconstruction work, meaning that local residents had little awareness of safety on roads under construction; motorcycles and cars often drove into construction sites.

To address this, efforts were made to **accommodate traffic during construction**, for example thoroughly demarcating construction zones and using security guards to avoid problems.

Consequently, local residents became more aware of safety.



# Project for Rehabilitation of Irrigation System in South-West of Alaotra Lake

DAIHO CORPORATION

Developing infrastructure to create user-friendly water resource management systems for local irrigation associations



## Construction site : Madagascar

### Applicable G20 Principles

- ◆ Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Creating jobs)
  - Sustainable growth and increasing connectivity (Sustainable development)
- ◆ Principle 5 : Social considerations
  - Collaborating with local communities (Consideration for local communities, Inclusiveness)
  - Safety and health (Safety)



## Project description

### Overview of work

Work to improve a 100-km<sup>2</sup> paddy field irrigation system in the PC23 district of Alaotra-Mangoro  
Work to improve P5 headworks (179 tons of rebar, 19,880m<sup>3</sup> of formwork, 2,650m<sup>3</sup> of concrete), work to improve P5 main waterway (L = 6,209m) and secondary waterway (L = 17,409m), work to improve P1 headworks (40 tons of rebar, 2,780 m<sup>3</sup> of formwork, 370m<sup>3</sup> of concrete), work to improve P1-1 main waterway (L = 14,800m) and secondary waterway (L = 4,137m), farm road improvement, etc.

### Overview

The irrigation system in the southwest area of Lake Alaotra and upstream was difficult to maintain for structural reasons.

In this project, an abandoned irrigation system was rehabilitated based on floodgate control designed to work even in areas without electricity, enabling the stable supply of irrigation water and helping expand rice production in the target region, thereby contributing to sustainable development.

Additionally, badly damaged farm roads were repaired, improving access to national highways, and, commercially, allowing vendors to buy directly from farms now that trucks can travel on the farm roads and contributing to the local economy.

The repair of existing farm roads also contributed to inclusiveness by improving local residents' access and reducing their travel time to hospitals.

### Construction performed with local residents

During the construction period, a majority of the local farmers were unable to work, and were thus hired as construction workers. At its peak, the project created employment opportunities for 350 to 400 people. To compensate for the farmers' unfamiliarity with the construction work, four Japanese supervisors provided meticulous technical and safety guidance based on their construction experience in Japan. They confirmed the details of the work and safety measures at daily morning meetings and raised awareness by presenting awards to outstanding workers, causing local residents to steadily become more safety-conscious and reaching completion with no accidents as a result of safety-conscious construction work.

### Collaborating with local irrigation associations: Establishing relationships to regularly convey each other's needs

Monthly meetings were held with government officials, the client, local irrigation associations, and others to fully discuss matters and exchange views to give consideration for local communities. During the construction, the implementation status was reported and shared along with the project plan. After the work was completed, local residents were provided with explanations of sustainable maintenance methods to empower them to maintain the system on their own. The project helped build relationships among stakeholders for the sustainable use of the structures.



# Project for Construction of Shellfish Aquaculture Technology Research Center

IWATA CHIZAKI Inc.

*An environmentally friendly, energy-saving research facility  
that helps the fisheries industry develop*



## Construction site : Morocco

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Sustainable growth and increasing connectivity (**Sustainable development**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Efficient maintenance**)
- ◆ Principle 3 : **Environmental considerations**
  - Environmental considerations (**Environmentally friendly infrastructure**)
- ◆ Principle 5 : **Social considerations**
  - Collaborating with local communities (**Consideration for local communities**)



## Project description

Overview of work	Building construction	Administration building (RC, 1 floor above ground) Breeding research/switch room building (RC, 1 floor above ground) Elevated water tank building (RC, 1 floor below ground, 4 floors above ground)
	Civil engineering works	Submersible filtration system (2 RC intake boxes) Submarine intake pipes (Diameter: 150 mm, Length: 397 m x 2)
	Equipment provided	Research equipment Breeding equipment Mariculture equipment Marine observation equipment

### Overview

The development of shellfish aquaculture in Morocco was hindered by the difficulty of procuring natural shellfish fry domestically and issues with imported seed, namely disease outbreaks and inconsistent supply in terms of quantity. Under this project a technology research center for researching and developing shellfish aquaculture technology was constructed, equipment was provided, and a soft component (education/guidance) was implemented, improving Morocco's capacity for researching and developing the shellfish aquaculture technology and advancing research and education on aquaculture, thereby contributing to **sustainable development**.

Additionally, given that the site is a winter holiday destination for Europeans, the surrounding scenery was factored into the design of the appearance and the facilities were designed to prevent pollution of the coastal environment by rearing water and polluted effluent, resulting in **environmentally friendly infrastructure**.

### Local industry-conscious design features the first submarine intake pipes in Morocco

Construction work utilizing Japanese technology was carried out with the cooperation of a local company. To avoid impacting the tourism and local fishing industries, highly seawater-resistant intake pipes made in Japan were installed underwater.

To install the first submarine intake pipes in Morocco, Japanese expert engineers were assigned to work with a local company that owns a deck barge. Everyone impacted by the construction work was consulted, and the work proceeded smoothly with the local company while showing **consideration for the local community**.

### An integrated civil engineering and construction project to simplify maintenance and reduce operating costs

The project was undertaken as an integrated civil engineering and construction project, with solar power generation equipment and underwater filtration equipment installed, an elevated water tank constructed to build head for supplying seawater, fresh water for general use pumped from a well on the property, and other steps taken to simplify maintenance and reduce operating costs. As a result, the facility can be **efficiently maintained**, reducing future financial burdens.



# Nacala Port Development Project (Phases 1 & 2)

PENTA-OCEAN CONSTRUCTION CO., LTD./ TOA CORPORATION

Revitalizing the local economy by enhancing the functionality of the gateway to the Nacala Corridor



## Construction site : Mozambique

### Applicable G20 Principles

- ◆ Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Creating jobs, Skill enhancement)
  - Sustainable growth and increasing connectivity (Connectivity)
- ◆ Principle 3 : Environmental considerations
  - Environmental considerations (environmentally friendly construction methods)
- ◆ Principle 6 : Infrastructure governance
  - Procurement and finance (Financial sustainability)



## Project description

Overview of work	
Steel pipe sheet-pile quay	Steel pipe sheet piles (Diameter: 1,200/800mm): Roughly 730
	—Fenders (2 x 900H, 250H): 29
	—Mooring posts (1,000 kN): 15
	—Cathodic protection units: 468
	—Tie wires: 293
•Dredging •Reclamation	—Concrete work: 9,550m³
	—Dredging: 260,000m³
•Reclamation	—Reclamation: 214,600m³
Overview	
This project improved Nacala Port, the best natural port in southeastern Africa. It contributed to the development and revitalization of the Nacala Economic Corridor, which originates at Nacala Port, by expanding the port area and building a dedicated container wharf, access roads, railroads, and more, thereby improving connectivity.	
Additionally, the project was financed with low interest rates under ODA loans, which contributed substantially to financial sustainability.	

### ✓ Performing construction work with an existing port in operation

This project required major port construction work while keeping the existing port in operation, and measures to address water pollution caused by dredging.

The use of steel pipe sheet piles, which have excellent strength and design flexibility and can be used to construct cutoff walls, and made-in-Japan steel vertical impermeable walls, which are highly watertight and easy to work with, made it possible to construct quays without generating construction pollution; environmentally friendly construction methods were adopted.

### ✓ Work focused on enhancing the skills of local workers

During the five-year construction period, as many as 700 local workers were employed, helping create employment opportunities.

Given the length of the project, it was believed that experienced workers could be developed; experienced Japanese engineers went to the site and trained the local engineers on how to ensure structural stability as they worked, leaving as much construction work as possible to the local engineers in line with their skills.

Additionally, safety management, work procedures, appropriate use of equipment, and the like were repeatedly checked at morning meetings.

These efforts dramatically enhanced the skills of the local engineers.



# Project for Rehabilitation of Irrigation Facilities in Rwamagana District

TOBISHIMA CORPORATION

*Project implemented in cooperation with local residents to establish sustainable irrigation facilities*



## Construction site : Rwanda

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Creating jobs**)
  - Sustainable growth and increasing connectivity (**Sustainable development**)
- ◆ Principle 4 : **Resilience against natural disasters and other risks**
  - Resilience (**Resilience against risks**)
- ◆ Principle 5 : **Social considerations**
  - Collaborating with local communities (**Consideration for local communities**)



## Project description

Overview of work	
Earth dam construction (rebuilding and new construction)	3 locations (Dam height = 12.0-13.0m, Dam length = 141.7-301.7m, Total fill volume: 236,935m³)
Spillways	3 locations (Width = 4.0-5.5m, Height = 4.7-5.6m, Length = 89.5-130.2m)
Irrigation channels (reinforced concrete)	3 locations (Width = 0.30m, Height = 0.35m, Total length = 23.2km)

**Overview**

This construction project improved the situation in the Rwamagana District—despite the land's fertility, it could not be used as farmland because the existing irrigation facilities did not function adequately.

The improvement of the facilities expanded the area of farmland, allowing double cropping and supporting livelihoods as the main farmland of Rwanda.

This project created a virtuous circle of economic revitalization, leading to **sustainable development**.

### Employing local residents to implement construction work in cooperation with local communities

Constructing dams would cause downstream farmland to fall fallow and put many farmers out of work; therefore, local farmers were hired to excavate and backfill irrigation canals, place concrete, and perform other construction work manually.

The canal was excavated over a distance of roughly 24 km, creating work for nearly 50 to 70 people every day. Up to 400 people were employed during concrete placement. This demonstrates how the project and the local community worked together; the project contributed to **creating employment opportunities**.

Additionally, in Rwanda, the last Saturday of every month is national cleanup day; farmers who participated in the project voluntarily clean the irrigation canals they built.

### Managing permeability according to Japanese standards

In Africa, there were no standards for managing dam permeability. Evaluations of permeability can be useful for flood control measures and countermeasures for highly vulnerable areas; therefore, Japanese standards for managing permeability were introduced. This enabled appropriate management of permeability and dam safety, improved on vulnerability to flooding, and maintained **resilience against risks**.

Additionally, the project was implemented with **consideration for local communities**, for example by discussing plans for machinery installation, quality control, and safety control with local subcontractors in detail, and by holding regular local briefings to gain understanding and cooperation for the project.



# Project for Strengthening Nzove - Ntora Principal Water Transmission Pipeline in Kigali City

TOBISHIMA CORPORATION

Contributing to local water supply through safe construction work on a steep slope



Construction site : Rwanda

## Applicable G20 Principles

- ◆ Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer)
  - Sustainable growth and increasing connectivity (Sustainable development)
- ◆ Principle 5 : Social considerations
  - Safety and health (Safety)



## Project description

Overview of work	
Water transmission pipeline installation	(Diameter: 900mm, Steel pipe: 8.0km, Ductile cast iron pipe: 1.4 km)
Pipe installation on a slope	Slope: 25° -45° , L = 250m
Equipment provided	Installation of 3 transmission pumps and associated mechanical and electrical equipment and buildings

**Overview**

This construction project involved installing a water transmission pipeline, pumps, and other facilities in Rwanda, where hilly terrain makes it difficult to develop infrastructure such as water supply and distribution networks.

As for the original infrastructure, the diameter of the original transmission pipeline that connected the Nzove Water Treatment Plant to the Ntora Distributing Reservoir was too small to accommodate the entire capacity of the treatment plant, and the reservoir is located roughly 200 m above the treatment plant, requiring pressurized transmission that resulted in at least six major leaks in the past decade. This development of a water supply and distribution network and other infrastructure has improved the living environment for local residents by improving access to safe water and providing stable water supply services, thereby contributing to **sustainable development**.

### First time installing a steel pipe on a steep slope in Rwanda

The work was performed while showing the key points of construction on steep slopes to the Rwandan contractor, which had no experience in construction on steep slopes. The work of lowering the pipes was performed with safety in mind—specifically, instructions were given to the worksite from the mountaintop, where all the work could be overseen.

Thanks to this collaboration, the work was completed without a single injury, and was thoroughly **safe**. To ensure quality, pipe welding—which requires advanced technical skills—was performed by skilled welders of Pakistani nationality, whom the construction company had trained and given experience in plumbing work.

### First time implementing the jacking method in Rwanda

Given the lack of experience with the jacking method, the local contractors were taught the expertise of construction methods that can be performed onsite even without the proper equipment.

For the jacking method, it is necessary to excavate to a specific depth to bring in the hydraulic jacks. In Japan, small excavators are used for this excavation; however, few of these machines exist in Rwanda. Therefore, the excavation work was done by hand.

Additionally, the jacks were exported from Japan, and a Japanese specialist performed the work while instructing the local engineers on the jacking method, enabling the local engineers to learn the technology, skills, process management, and other aspects of the work, leading to **technology transfer**.



# Project for Rehabilitation of the Third Wharf in Dakar Autonomous Port

TOA CORPORATION

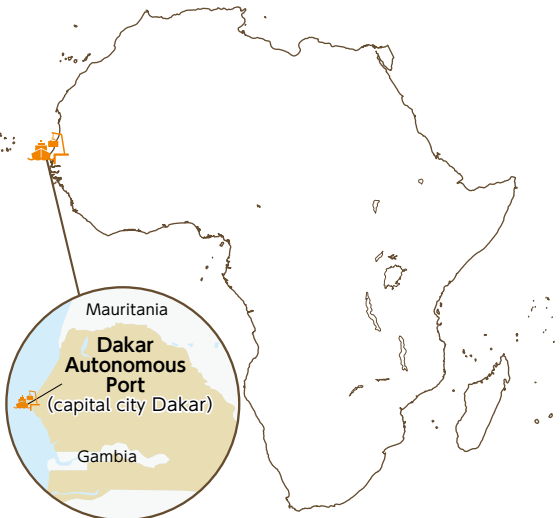
*Contributing to the economic growth of relevant countries through construction methods that minimized impact on vessel navigation and cargo handling*



## Construction site : Senegal

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Technology transfer**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Meeting construction deadlines and shortening construction schedules (**Shortening construction schedules**)
- ◆ Principle 5 : **Social considerations**
  - Safety and health (**Accommodating traffic during construction**)



## Project description

Overview of work	
Quay: Steel pipe sheet pile type,	
Length:	Roughly 360m
Water depth:	10m
Backfill:	Roughly 15,600m <sup>3</sup>
Quay superstructure:	3,030m <sup>3</sup>
Apron pavement:	5,280m <sup>2</sup>
Road pavement:	28,300m <sup>2</sup>
Other: Fenders, mooring posts, bollards, ladder attachments, etc.	

Overview
This project involved work to improve the Dakar Autonomous Port, the only international port in Senegal, using construction methods that minimized the impact on vessel navigation and cargo handling during the work.
The third wharf of Dakar Autonomous Port serves as the gateway to Mali, a landlocked country in its hinterland; however, it has deteriorated so substantially that it compromises the safety of cargo loading and unloading and the ability to install loading and unloading machinery.
In addition to the work to improve the port, the project contributed substantially to <b>connectivity</b> by increasing the depth at the existing quay to accommodate larger vessels, resulting in safer, more efficient and sanitary cargo handling and expanded logistics to Mali.

### ✓ Innovative construction method that minimized impact on vessel berthing and cargo handling

The Rotary Cutting Press-in Method, in which a press fitting machine propels itself over driven steel pipe piles while rotating and pressing them into the ground, was adopted to shorten the construction schedule compared to previous projects and allow work to be done only 10 m from the revetment.

This left a wide-open area of water in front of the construction site, minimizing the impact of the work on the safety and convenience of vessel navigation at the opposite wharf, and thus on economic efficiency, and resulting in a shorter construction schedule with minimal disruptions to navigation and **accommodating traffic during construction**.

### ✓ Technical guidance based on experience in West African countries

In this project, adopting the Rotary Cutting Press-in Method—which is distinctive to Japan—and precast blocks expedited the construction work, ensured quality, and **shortened the construction schedule**.

Additionally, the construction company's extensive experience in West Africa enabled it to impart and ensure the quality of various expertise and for Japanese engineers to provide on-the-job training in the latest technologies in close cooperation with local companies, thereby improving the productivity and enhancing the skills of local companies and leading to **technology transfer**.



# Project for Development of Malindi Fish Landing and Marketing Facilities in Zanzibar

Rinkai Nissan Construction Co., Ltd.

Seeking and realizing better construction  
using locally available materials



## Project description

Overview of work	Building facilities	Fish market building (Floor area: 2,319㎡) Water supply facilities building Auxiliary buildings, etc.
	Civil engineering facilities	Exterior pavement (Area: 1,381㎡) Slope revetment (Area: 930㎡)
	Equipment	Equipment for the market

### Overview

The fishing port—the largest fresh fish distribution center in Zanzibar—was in danger due to a collapsed landing, and the freshness of the fish was deteriorating substantially because brokering, wholesaling, auctions, retailing, and processing was all done in direct sunlight.

To address these concerns, support was provided for repairing and upgrading the landing quay, market, and other facilities and procuring relevant equipment to improve the freshness of the fishery products and contribute to the stable supply of quality fishery products, thereby contributing to **sustainable development**.

### Insisting on materials to ensure facility use over the long term

The quality of local construction materials varies widely, making it difficult to ensure the design strength of the facility; to ensure uniform quality, a batch of quality materials was secured despite the added cost. Multiple mix proportions were also tested to achieve the optimal content for mixing high quality concrete, thereby reducing the frequency of future maintenance. The plan called for a heavy-duty corrosion-resistant coating to finish the revetment; however, an examination of local conditions prompted concern that corrosion would set in if the coating were to peel even slightly. Therefore, anode technology—an electricity-free rust prevention method—was adopted and incorporated to extend the life of the revetment.

These efforts have resulted in a facility with an excellent **life cycle cost** that was regarded by government officials as “the finest building of the last 10 to 20 years.”

### Equipment consisting of a combination of local general-purpose products and Japanese components

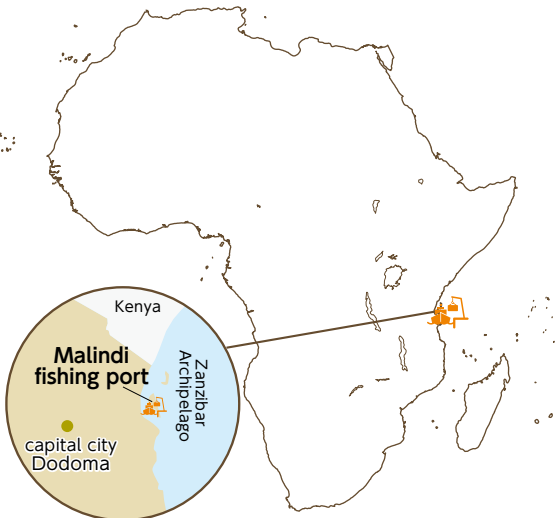
The distribution switchboard installed at the facility was designed to be user friendly and make maximum use of locally available general-purpose products.

Salt-removing filters are not available locally; therefore, exhaust fans and filters from Japan were installed to prevent chloride damage. Japanese engineers taught the managers and workers of the local management organization how to change the filters and otherwise maintain the distribution switchboard, resulting in **technology transfer** that enabled local staff members to maintain the facilities by themselves.

## Construction site : Tanzania Zanzibar

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Technology transfer**)
  - Sustainable growth and increasing connectivity (**Sustainable development**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Life cycle cost**)





# Project for Improvement of Tazara Intersection

Sumitomo Mitsui Construction Co., Ltd.

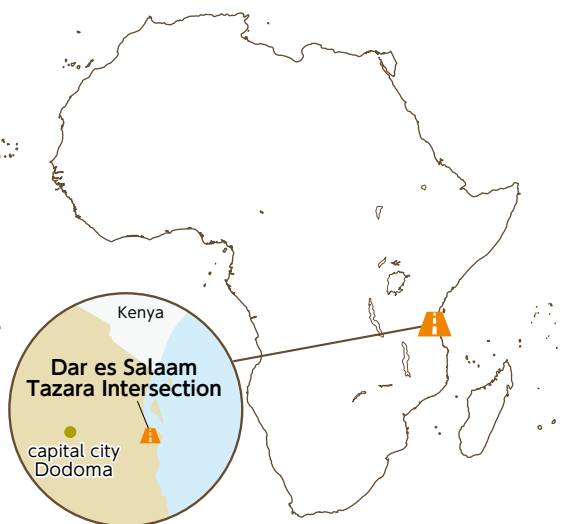
Accident-free construction of Tanzania's first flyover bridge for easing congestion



## Construction site : Tanzania

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Creating jobs, Technology transfer**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Meeting construction deadlines and shortening construction schedules (**Meeting construction deadlines**)
- ◆ Principle 5 : **Social considerations**
  - Safety and health (**Accommodating traffic during construction**)



## Project description

### Overview of work

Nyerere Road:	1,263m
Nelson Mandela Road:	262m
PC box girder bridge: Length:	310m
(155m x 2 bridges, inbound/outbound)	
Hollow slab bridge: Length:	540m
((150m + 120m) x 2 bridges, inbound/outbound)	

### Overview

With a port on the Indian Ocean, Dar es Salaam plays an important role not only as a transportation hub for Tanzania, but also as the origin of an international corridor for landlocked countries.

The Tazara Intersection—the target of this project—is the highly traveled, chronically congested intersection of Nelson Mandela and Nyerere roads.

To address these concerns, the first flyover bridge in Tanzania was constructed to facilitate traffic and logistics. This project contributed to the economic development of Tanzania as well as the surrounding region, and helped improve **connectivity**.

### Building safe, quality infrastructure with local workers

This project **created employment opportunities** in the local area by mobilizing 70 employees, 320 workers from local temp agencies, and roughly 40 workers from subcontractors. Additionally, based on a shared philosophy of "building safe, quality infrastructure," safety and technical training for the construction work was conducted through on-the-job training onsite and classroom lectures in an effort to ensure safety and **technology transfer**.

Given the difficulty of transporting concrete due to chronic traffic congestion, a batching plant was set up near the site and concrete manufacturing, transport, and quality control (including aggregate management) were performed in-house. Cost reduction measures were also implemented, for example performing tasks such as bending steel sheets, manufacturing round formwork, and casting PC hollow slabs onsite.

These efforts to shorten the construction schedule and the fact that **construction deadlines were met** minimized cost increases due to construction delays.

### Implementing measures to maintain existing traffic volume during construction

To ensure the existing traffic volume during the construction of the PC box girder bridge, traffic controls were implemented 24 hours a day in cooperation with the traffic police. During the construction period, gates facing all four directions were installed on the roads to prevent vehicles exceeding the height limit from entering the area.

Additionally, an opening was placed under the falsework beams to allow vehicles within the height limit to pass through, and roads with two lanes in each direction and a three-meter-wide pedestrian walkway on each side were secured within the intersection to facilitate traffic during construction. Local residents also commented that traffic congestion was eased even more during the construction period; the construction work was done with steps taken to **accommodate traffic during construction**.



# Project for Widening of New Bagamoyo Road (Phase 2)

NIPPO CORPORATION, Dai Nippon Construction

Transferring Japanese anti-rutting technology  
to extend the life of roads



## Construction site : Tanzania

### Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Creating jobs, Technology transfer, Skill enhancement)
  - Sustainable growth and increasing connectivity (Sustainable development, Connectivity)
- ◆Principle 2 : Raising economic efficiency in terms of life cycle cost
  - Realizing Value for Money in the life cycle of infrastructure investment (Life cycle cost)
- ◆Principle 5 : Social considerations
  - Safety and health (Safety, Accommodating traffic during construction)



## Project description

Overview of work	
Target section	Roughly 4.3km
Number of lanes	4
Width	Main road: 3.5m x 4 lanes Frontage roads: 4.0m x 2 Pedestrian walkways: 1.5m x 2 Shoulders: 0.5m x 2
Overview	
This project widened New Bagamoyo Road, a major artery with a daily traffic volume of more than 40,000 vehicles. The project widened the arterial road connecting the northern part of Dar es Salaam—with its expanding residential area—to the central part of the city in an effort to ease traffic congestion, which facilitated traffic and logistics and contributed to improving connectivity.	
New Bagamoyo Road is constantly prone to rutting due to the volume of traffic, and this project introduced semi-flexible and modified asphalt pavement—materials that are less prone to rutting—in conjunction with the widening to reduce the frequency of maintenance and contribute to a lower life cycle cost.	
Additionally, up to roughly 400 local workers were hired to perform the construction work, contributing to creating employment opportunities in Tanzania.	

### Technology transfer focused on repairs

During the construction, the core Tanzanian staff members were instructed on the key points of the technology. They were also provided with expertise on the types and mix proportions of materials for repairs using only local materials to enable local staff members to perform maintenance by themselves after completion, thereby contributing to enhancing their skills. In the two-plus years since the work was completed, the semi-flexible pavement has prevented rutting, reduced traffic congestion and supported local transport.

Additionally, briefings on comparing the new types of pavement to conventional types were held for officials of government testing organizations, knowledge on new technologies that will benefit Tanzania was provided, and other efforts were made, resulting in a high level of technology transfer to Tanzanian government agencies.

### Achieving accident-free construction through attention to safety

Safety was also emphasized, with particular energy devoted to safety training, daily meetings for each work group, and monthly safety conventions. Traffic guidance training was also provided to staff members, and traffic police and staff members guided traffic to accommodate traffic during construction. These efforts made it possible to complete the construction work without any accidents.



# Radès-La Goulette Bridge Construction Project - Main Bridge (Lot 1) and North Intersection (Lot 3) in the Republic of Tunisia

TAISEI CORPORATION

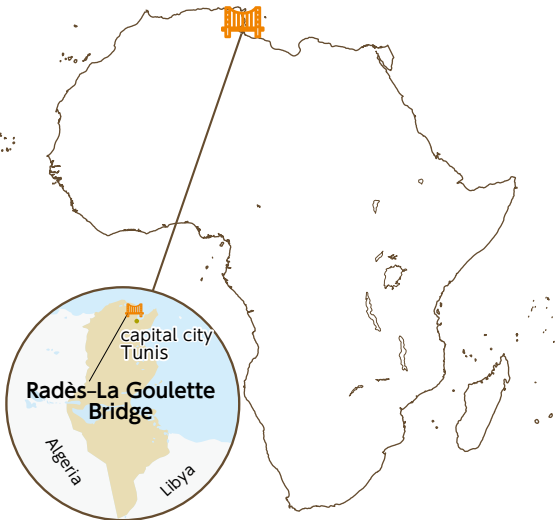
Contributing to friendly relations between Japan and Tunisia through the construction of the first large-scale bridge in Tunisia



## Construction site : Tunisia

### Applicable G20 Principles

- ◆Principle 1 : Maximizing the positive impact of infrastructure to achieve sustainable growth and development
  - Creating a virtuous circle of economic activity (Technology transfer, Skill enhancement)
  - Sustainable growth and increasing connectivity (Connectivity)
- ◆Principle 5 : Social considerations
  - Collaborating with local communities (Consideration for local communities)



## Project description

Overview of work	
Location of construction work	Tunis, Republic of Tunisia
Client	General Office of Roads and Bridges, Ministry of Equipment and Housing, Republic of Tunisia
Duration	August 2004–March 2009 (Lots 1 and 3)
Bridge type	3-span continuous extradosed bridge
Length	260m, Effective width: 20m
Overview	
This project involved constructing a large bridge spanning the canal through the Lake of Tunis in Tunisia. Some roads running through Greater Tunis had exceeded their traffic capacity, for example recording 100,000 vehicles per day. Ferries crossing the Lake of Tunis were also in service, but with a waiting time of at least 30 minutes to board, the area around the terminal was constantly congested.	
Under this project, a new major artery with a daily capacity of over 25,000 vehicles was constructed to ease traffic congestion in the target area, improving accessibility between the ports of Radès and La Goulette and contributing to regional development and industrial promotion along the coast, thereby improving connectivity.	

### Contributing to training local workers and contractors for constructing the first large bridge in Tunisia

This project involved constructing the first three-span continuous extradosed bridge in North Africa. During the construction, supervisors instructed local workers on supplying materials and equipment and planning the work, and taught construction skills and techniques onsite, leading to **skill enhancement**. The expertise in construction techniques and skills was also conveyed to local contractors under the supervisors' guidance, contributing to **technology transfer**. The project also involved accepting vocational training school students for onsite training, as well as site visits by students from an architectural university in Tunis to prepare them for technical training in Japan.

### Bridge design featured on Tunisian banknotes and stamps

The bridge was adopted as the motif for a postage stamp issued in 2006 to commemorate the 50th anniversary of the establishment of diplomatic relations between Japan and Tunisia. It was also incorporated into the design for the Tunisian 50-dinar bill after the work was completed. The fact that the bridge was built with Japanese assistance is widely known by the Tunisian public, prompting locals to nickname it "le pont japonais" (the Japanese bridge). Residents were pleased to accept the infrastructure and continue to enjoy it, demonstrating that the project showed **consideration for the local community**.



# Project for Improvement of Gulu Municipal Council Roads in Northern Uganda

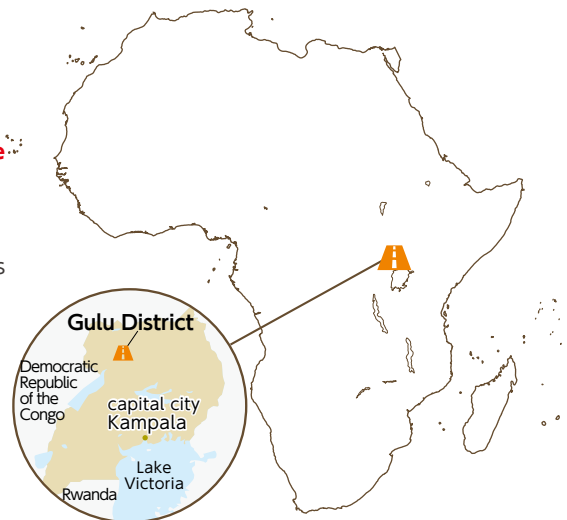
World Kaihatsu Kogyo Co., Ltd.



## Construction site : Uganda

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Skill enhancement**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Meeting construction deadlines and shortening construction schedules (**Shortening construction schedules**)
- ◆ Principle 4 : **Resilience against natural disasters and other risks**
  - Resilience (**Resilience against risks, Build Back Better**)
- ◆ Principle 5 : **Social considerations**
  - Collaborating with local communities (**Inclusiveness**)
  - Safety and health (**Accommodating traffic during construction**)



*Contributing to the development of local engineers through construction*



## Project description

Overview of work	
Number of routes	21 (within Gulu)
Construction data	Surface/base course: 78,000m <sup>2</sup> Upper roadbed: 48,000m <sup>2</sup> Lower roadbed: 48,000m <sup>2</sup> ILB: 29,000m <sup>2</sup> Gutters: 19,000m
Equipment provided	Installation of 3 transmission pumps and associated mechanical and electrical equipment and buildings

### Overview

This project involved improving arterial roads and developing ancillary facilities in Gulu, a city in northern Uganda that is the focus of civil war reconstruction and a key transportation hub on the international corridor to South Sudan.

Roads in Gulu were experiencing many problems, including pavement delamination and shoulder collapse in numerous locations. During the rainy season in particular, many parts of the city flooded, making it impossible for vehicles to travel through. The project—an embodiment of **Build Back Better**—improved arterial roads, road drainage facilities, and ancillary facilities and reduced their vulnerability to flooding and other hazards, making them more **resilient against risks**. The project also ensured smooth and safe traffic in the city and improved the living environments of residents along the roads.

### ✓ Construction as a means of training local engineers

Having lost many experienced local engineers in two civil wars, Uganda faced a severe shortage of skilled workers.

In this project, young local engineers were trained in heavy equipment operation and quality control-conscious construction methods as they performed the actual construction work, contributing to the **enhancement of their skills**.

Additionally, the construction company took on the task of manufacturing the asphalt mixtures—a task for which quality assurance is crucial—thereby **shortening the construction schedule**.

### ✓ Restoring community roads and improving the educational environment for residents along the routes

The public roads traveled by the construction vehicles were also experiencing pavement collapse and other problems that could cause accidents. Temporarily restoring collapsed areas on community roads free of charge contributed to restoring the roads for residents along the routes and **accommodated traffic during construction**.

Additionally, cement was provided free of charge to a local elementary school that asked for partial renovations to their facilities. This helped improve the educational environment for children in vulnerable situations and made the project **inclusive**.



# Construction of a New Bridge Across River Nile at Jinja

The Zenitaka Corporation

A long-awaited bridge with a service life of 120 years



## Project description

Overview of work	
Structure type	3-span continuous cable-stayed bridge
Length	525m (Spans: 135m + 290m + 100m)

Overview

This project involved constructing a cable-stayed bridge—the first in Uganda, with the largest span in East Africa—on part of the Northern Corridor, which stretches from the Port of Mombasa, Kenya to the Democratic Republic of the Congo.

The project increased the transport capacity of the Northern Corridor in Uganda and helped ensure traffic safety. The availability of transport routes to neighboring countries has also contributed to promoting trade activities with those countries, resulting in improved **connectivity**.

The opening ceremony was a grand event attended by 2,000 invited guests and over 5,000 local residents, who were pleased to accept the infrastructure and continue to enjoy it, demonstrating that the project showed **consideration for the local community**.

☒ Shortening the construction schedule with the cantilever method

The main girders are made of reinforced concrete and were constructed using the cantilever method, in which a large form traveler places the next section from the previous section. Concrete placement for the main girders was divided in two to **shorten the construction schedule** and reduce costs. The construction of the superstructure involved staff members from Uganda and 17 other countries; a total of more than 500,000 people worked on the project, with a daily maximum of roughly 700. The work was carried out in two shifts (day/night), contributing to **creating employment opportunities** in Uganda.

☒ Designing and constructing a bridge with a service life of 120 years

The target service life was set to 120 years, and various sensors for maintenance were installed to achieve this goal. Specifically, given that overloading seriously fatigues and compromises the durability of slabs and diagonal members, an automatic vehicle measurement system was installed and remains in operation.

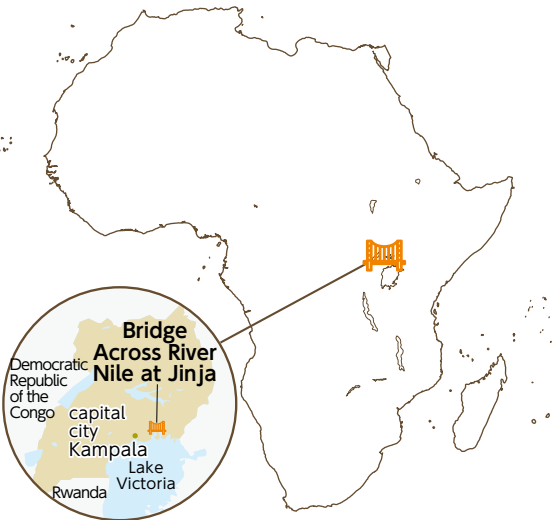
This system automatically measures vehicle weights and dimensions, sends data on violators to a computer at the administrative office, and shares it with police officers stationed before the bridge, resulting in **efficient maintenance**.

Additionally, education and training are provided to ensure that engineers engaged in maintenance understand not only how to apply monitoring methods using sensors, but also the importance of close visual inspections—the foundation of maintenance—and that maintenance is a continuous task, resulting in **appropriate operation and maintenance**.

## Construction site : Uganda

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Creating a virtuous circle of economic activity (**Creating jobs**)
  - Sustainable growth and increasing connectivity (**Connectivity**)
- ◆ Principle 2 : **Raising economic efficiency in terms of life cycle cost**
  - Realizing Value for Money in the life cycle of infrastructure investment (**Efficient maintenance**)
  - Meeting construction deadlines and shortening construction schedules (**Shortening construction schedules**)
- ◆ Principle 5 : **Social considerations**
  - Collaborating with local communities (**Consideration for local communities**)
- ◆ Principle 6 : **Infrastructure governance**
  - Operation and maintenance (**Appropriate operation and maintenance**)





# Project for Irrigation Development for Nyakomba Irrigation Scheme

KONOIKE CONSTRUCTION CO.,LTD.

*Involving client-side members in construction contributes to  
improving facility maintenance capacity*



Photo provided : No photographer name /JICA

## Construction site : Zimbabwe

### Applicable G20 Principles

- ◆ Principle 1 : **Maximizing the positive impact of infrastructure to achieve sustainable growth and development**
  - Sustainable growth and increasing connectivity (**Sustainable development**)
- ◆ Principle 5 : **Social considerations**
  - Collaborating with local communities (**Inclusiveness**)
  - Safety and health (**Safety**)
- ◆ Principle 6 : **Infrastructure governance**
  - Operation and maintenance (**Appropriate operation and maintenance**)



## Project description

### Overview of work

- Constructing new pump houses, improving existing pump houses
- Constructing irrigation facilities
- Constructing drainage channels
- Constructing flood control retaining walls
- Installing electrical equipment
- Installing pumps, etc.

### Overview

This project involved constructing and improving pumping stations, irrigation facilities, drainage channels, flood control retaining walls, and more to improve agricultural production for individual farmers.

Irrigation development is crucial in Zimbabwe because of the substantial decrease in rainfall. In Zimbabwe, industrial farmers produce and export tobacco, cotton, and other cash crops, while individual farmers produce maize, wheat, and other staples to provide a stable supply of food.

The Nyakomba Irrigation District is an area of farmland operated by individual farmers. Its productivity was declining, but under the project, irrigation facilities were developed and improved to provide a stable supply of irrigation water, contributing to improving agricultural production for individual farmers and **sustainable development**.

### ✓ Construction work performed while providing technical guidance to client-side members

Building personnel capacity was critical to the effectiveness of this project. During the improvement work, client-side members who worked at the pumping stations participated in the construction work with Japanese engineers from the installation stage. This provided them with a systematic understanding of how the equipment works. Furthermore, by providing instruction on maintenance, external cleaning methods, and more in addition to operating methods, the local engineers gained the ability to maintain all facilities in good condition even after the Japanese engineers departed.

These improvements in personnel capacity have enabled **appropriate operation and maintenance**.

### ✓ Construction with consideration for local communities and safety

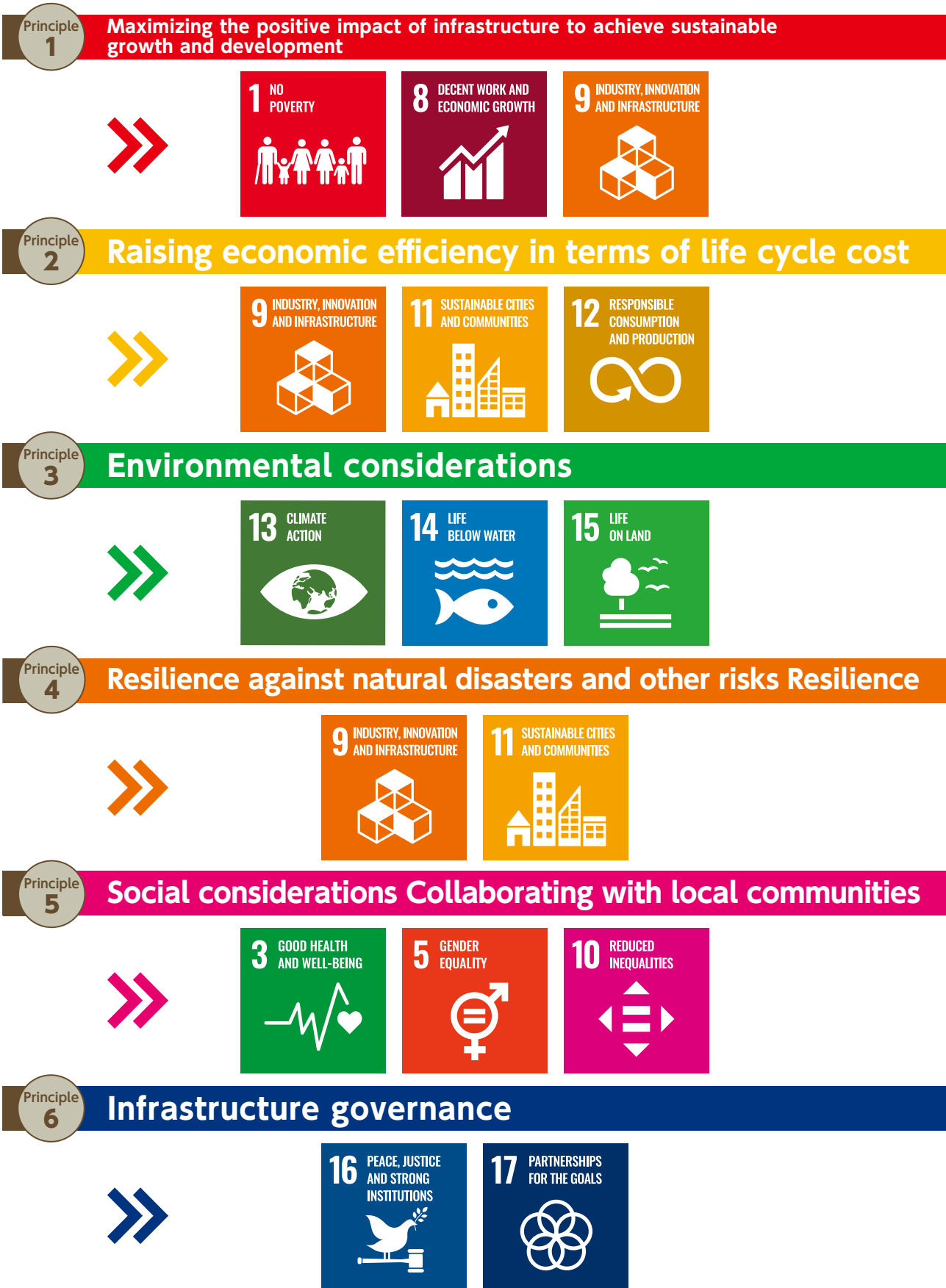
In daily operations, safety awareness was raised through morning meetings to confirm each day's work and identify hazardous areas onsite with each work group, and safety patrols were conducted to immediately correct and eliminate problem areas pointed out by the consultant, leading to **safe** construction work.

Additionally, nearby elementary school students were traveling long distances to fetch water; they needed a more efficient way to fetch water. To address this problem, plastic bottles were donated to the elementary school to create an efficient environment for fetching water, making the construction work **inclusive**.



# Relation to Sustainable Development Goals (SDGs)

Realizing the G20 Principles for Quality Infrastructure Investment has made the following contributions to achieving Sustainable Development Goals (SDGs).





# Compendium of Quality Infrastructure in Africa

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