Yachiyo Engineering Co., Ltd.

A 50-Year Development Path

2012
Project to improve electricity generation system at Palau International Airport

2011
Project to reconstruct facilities and prevent future tsunami disasters

2006
Project to improve teaching and learning facilities in Nigeria

2000
Sabo project to prevent debris flow and control sediments

1997
Project for introduction of clean energy by a solar electricity generation system

1991
Project to improve Omrania West Water Supply and Sewer System in Giza, Egypt

1986
Design and construction management of structures and facilities with JT

1980
New town project nearby Sarir’s oil plant

1975
Structural design and technical advice

1965
Soil investigations, dam-grout examinations, and shear strength tests of rock piles

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We offer to the world the highest quality engineering Services using Japanese technology

International Consulting
We contribute to the world with our high-quality engineering

- Complete consulting services from planning to implementation
- Highest quality services at every level
  - Master Plan
  - Feasibility Study
  - Survey and Design
  - Tender Assistance
  - Construction Supervision
  - Technical Assistance
  - Capacity Building
  - Project Management

Group

International Division
- Water Resources and Sabo/Sediment Control
- Power Energy
- Water and Sewage, Waste, Environment
- Broadcasting and Telecommunications
- Transportation and Traffic
- Urban / Regional Development, Architecture and New Business Areas

Social Planning Group
- People, City, and Culture
- PPP - PFI
- Architecture
- Disaster Prevention

Environmental Group
- Environment
- Geological Conditions and Grounds
- Groundwater
- Solid Waste

Road and Railway Group
- Transportation
- Railway
- Roads and Tunnels
- Maintenance and Earthquake Resistance
- Bridges
- Infrastructure Development

River and Water Resources Group
- Rivers
- Machinery, Electrical and Information Communications Sections
- Dams
- Sabo/Sediment Control
- Ports and Airports

Research and Development Group
- Renewable Energy
- Infrastructure Management
- Local Management and Economic Analysis
- Information
- Design
## Water Resources / Disaster Risk Management

### Water Resources
- Technology transfer projects and development studies in the fields of water resources investigation
- Water resources management and development plans
- 3D (Three-dimensional) water resources analysis
- Investigations into ways of using reclaimed sewage

### Flood Control
- Technology transfer projects in the fields of river improvement and flood control plans
- Climate change simulation
- Flood analysis
- Investigation of structural measures against floods (e.g., dams, reservoirs, and revetments)
- Non-structural measures (e.g., early warning systems)

### Disaster Risk Management
- Feasibility Study and demand surveys through disaster prevention information systems to improve the capability of disaster prediction
- Flood forecasting systems
- Installation of early warning systems
- Public awareness activities for disaster prevention in communities
- Enhancement of disaster management
- Risk assessment and development guidelines for each disaster risk management plan

### Sabo / Sediment Control
- Technology Transfer projects related to structural measures (Sabo-dam: sediment control dam)
- Non-structural measures (Early warning and evacuation systems)
- Restoration of damaged infrastructure
- Decrease in reservoir capacity due to harmful sedimentation
- Comprehensively river basin sediment management plan for reservoir sedimentation
- Reduction plan
- Sediment disaster mitigation plan

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## Water Supply and Sewerage

### Urban and Rural Water Supply
yecc has more than 40 years of experience in the planning, design, and construction supervision of urban and rural water supply facilities in more than 30 countries.

#### Engineering Service
- Planning, design, and supervising (network analysis, earthquake resistant structure design, treatment process design, mechanical and electrical design, and project management)
- Large-scale urban water treatment plant
- Rural water supply development

#### Advisory Service and Technical Support
- Non-revenue water (NRW) and leakage reduction
- Establishment of standard operation procedures (SOPs) and revision of piping and instrument diagrams (P&ID)
- Water saving programs and education
- Financial improvement

### Sewerage and Urban Drainage
yecc provides cutting edge advisory and consulting services in sewerage and urban drainage, in all the planning, design, construction, and O&M phases.

#### Engineering Service
- Planning, design, and supervision of wastewater treatment plants, drainage pump stations, and network systems
- Trenchless technology (shield and pipe jacking technology)
- Advanced treatment systems (MBR, etc.)

#### Advisory Service and Technical Support
- Training and capacity development
- SCADA system
- Public awareness campaign and environmental education program
- Detection of unknown water inflow into sewer network

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### Tributary of Benue River: Project for Review and Update of Nigeria National Water Resources Master Plan (Nigeria)

### Flood in Jakarta: Urban Flood Control System Improvement in Selected Cities (Indonesia)

### Installation of EWS in a Community: Strengthening Community Disaster Risk Management Project in the Pacific Region (Pacific Region)

### Tributary of Benue River: Project for Review and Update of Nigeria National Water Resources Master Plan (Nigeria)

### Flood in Jakarta: Urban Flood Control System Improvement in Selected Cities (Indonesia)

### Installation of EWS in a Community: Strengthening Community Disaster Risk Management Project in the Pacific Region (Pacific Region)

### Sabo/Sediment Control Dam: Urgent Disaster Reduction Project in Mt. Bawanaaeng (Indonesia)

### Shield & Pipe Jacking : Denpasar Sewerage Development Project (II) (Indonesia)

### Rehabilitation of Pluit Pump Station: Project for Urgent Reconstruction of East Pump Station of Pluit in Jakarta (Indonesia)
Solid Waste Management

Rapid urbanization and mass production or consumption social systems have created serious environmental issues, such as deterioration of the living environment, exhaustion of natural resources, and destruction of the natural environment. YEC tackles these issues and actively contributes to the realization of a sound material-cycle society from every aspect of solid waste management. YEC can provide effective and efficient solutions through its rich experience to achieve sound material-cycle societies.

Our Comprehensive Experiences

<table>
<thead>
<tr>
<th>Collection</th>
<th>Intermediate Treatment</th>
<th>Final Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Transportation (including Transfer Station)</td>
<td>• Recycling plant (composting)</td>
<td>• Sanitary landfill</td>
</tr>
<tr>
<td>• Public campaign</td>
<td>• Incinerator</td>
<td>• Safety closure</td>
</tr>
</tbody>
</table>

We provide cutting-edge advisory and consulting services for master plan studies, feasibility studies (including financial schemes), in design, construction supervision, and O&M phases.

Electric Power System and Plant

Generation

- Securing a stable power supply by designing Projects for diesel engine generators.
- Designing Projects for Micro-Grid system to install a large proportion of renewable energy into a small grid.

Power House Image (right): Project for Enhancing Power Generation Capacity in the Urban Area (Palau)
Micro-Grid system (left): Project for Introduction of a Micro-Grid system with Renewable Energy for the Tonga Energy Road Map (Tonga)

Transmission

- Reinforcing and extending the transmission lines and distribution networks.
- Improving the quality and reliability of power supply.

132kV Transmission Line: Project for Reinforcement of Transmission and Distribution Facilities in Oyster Bay Substation (Phase I) (Tanzania)

Distribution (Rural Electrification)

- Designing substations and distribution lines in rural areas in order to stabilize the supply of electricity.
- Implementing rural electrification by utilizing solar energy.

Rural Electrification (right): Project for Rural Electrification (Ghana)
Street Lights with Solar Panels (left): The Master Plan Study for Utilization of Solar Energy (Nigeria)

Substation

- Reinforcing Substations.
- Designing distribution lines for new, existing, and expanded substations.

Ilala Substation (right) /33 KV Distribution Line (left): Project for Reinforcement of Power Distribution in Dar es Salaam (Tanzania)
Broadcasting and Communication

Policy Assistance

**yec** has executed technical cooperation project in Nepal to promote peace building and democratization by improving the capacity of state-owned Radio Nepal. Working with the Ministry of Information and Communications, **yec** prepared draft of media related policies and bills, strengthened the independence of the broadcasting station as a public broadcasting institution, and enhanced the capacity of the local staff to create programs. **yec** has been conducting technical cooperation projects in various areas of this sector to provide knowledge services all over the world.

Radio and TV Broadcasting

**yec** has been conducting projects both in radio and television broadcasting, not only by providing equipment and facilities through creating studios and transmitting networks, but also by providing solutions to the social and economic issues using the media such as bridging the digital divide, providing access to education and emergency information.

Digital Terrestrial TV Broadcasting

**yec** has been active in the area of digital terrestrial television broadcasting since ISDB-T has been adopted in South America. **yec** has been conducting projects all over the world to examine appropriate schemes to support smooth and efficient digital migration with the proposal of the formulation of platform and all other items necessary.

Urban Development / Regional Development

Urban Development

- Urban Space and Structure Planning
- Formulation of Regional Development Vision and Strategy
- Transportation Planning
- Introduction of Energy-Saving and Environmentally Friendly Technology

System Image: Study of the Environmentally Friendly Smart Community in Phnom Penh (Cambodia)

Regional Development

- Promotion of the One Village One Product Program
- Promotion of export of Japanese Infrastructure and Systems
- Integrated Community Development through Community Participation
- Establishment of Community Development Method

Product Selection: Technical Cooperation for Development Planning on the One Local Government One Product Program to Revitalize the Rural Economy (Nigeria)

Dates Farm: Project on Regional Development Planning of the South Region (Tunisia)
International Division

Architecture

yeo provides planning, designing, tender support, construction supervision, and capacity development services in technical design, quality control, and maintenance and operation of public building facilities such as primary and secondary schools, higher education institutions, health center and cyclone shelters.

• Class Room: Project for the Enhancement of Training Capabilities of Construction Machinery Training Institute (Pakistan)
• Primary School in Ica: Project for Reconstruction for the Areas Affected by the Earthquake in Ica Region (Peru)
• Cyclone Shelter in Primary Schools: Program for Construction of Multipurpose Cyclone Shelters in the Area Affected by the Cyclone Sidr (Bangladesh)

PPP / Industrial Development and Promotion

• Development of project for management - public-private partnerships (PPP)
• Commercialization of inclusive businesses

Road / Bridge / Transport / Highway / Railways

yeo provides services in development of master plans, feasibility studies, basic and detailed design, and supervision of various roads, including bridges from arterial to local roads and railways around the world.

Road and Bridge

Construction supervision with detailed design for 4 flyovers, one of which is more than 2km in length with 2 at-grade intersections in the central district of Kolkata city, West Bengal.

Flyover Bridge in Kolkata: Consulting Services for the Calcutta Transport Infrastructure Development Project (India)

Transport

Feasibility study for a trunk bus corridor, including the construction of bus lanes of 27.1km length, new terminals and 28 bus stops in the Belem metropolitan area, which has been proposed by a previous JICA study in Brazil.

Completion Image: Feasibility Study on the Improvement of the Transport System in the Metropolitan Area of Belém (Brazil)

Highway

Detailed Design and Construction Supervision for 12km access toll road to the international Sea Port of Tanjung Priok with a Master Plan for Intelligent Transportation System.

Toll Gate: Detailed Design and Construction Supervision of the Tanjung Priok Access Road Construction Project (Indonesia)

Railways

Construction Supervision with Detailed Design of subway in Chennai city of approximately 45km in length, 20km (16 stations) underground, 25km (16 stations) elevated, 2 depots, and 4 stations.

Underground Section: Consulting Services for Chennai Subway Construction Project (India)
Yachiyo Engineering Co., Ltd. carries out business activities in full compliance with the national and international business operation laws under a transparent management system.

**Sound Corporate Activities**
- Compliance with Laws
- Adherence of Neutrality and Independence
- Creation of Transparent Relationship
- Creation of Relationship of Trust with Business Partners
- Proper Information Management

**Contribution to Society**
- Promotion of Social Action Program
- Establishment of Accountability
- Creation of Favorable Relationship with Stakeholders and Local Society
- Respect of World Culture and Customs

**Respect for Humanity**
- Prohibition of Discrimination
- Prevention against Harassment
- Creation of Healthy Working Environment
- Respect of Individual Right

**Conservation of Global Environment**
- Mitigation of Negative Impacts on Global Environment
- Continuous Implementation of ISO14001

**Domestic Engineering Division**

We are a consulting company providing high-quality services in civil engineering

- **Social Planning**
  City and town in communication with tender heart

- **Environment**
  Earth and humanity
  Sustainable society

- **Roads and Railway**
  To connect people, connect towns
  To link people / towns safety

- **River and Dam**
  To utilize water resources
  To live with water

- **Research and Development**
  To provide, maintain, and protect necessary infrastructures
Domestic Engineering Division

People, City, and Culture | Casting Our Thoughts into Shape

Anticipating the needs of the age, yec aims to build a welcoming city from the standpoint of a new public service in which every resident can pursue their dreams.

Kirara Expo Memorial Park (Basic and detailed design for infrastructure) <Inagi City>

Kamegawa Station development <Beppu City>

Kochi Station development <Kochi City>

Evaluating the level of user friendliness of stations (Basic design, implementation design, and supervision) <Fukuoka Prefecture>

Kamishiba district complex facility (kirara Kamishiba) <Fukaya City>

Architecture | People Living Together with Architecture

yec has a track record of successfully completing the design, supervision, seismic diagnosis, and PFI of buildings ranging from government buildings, recycling facilities, station buildings, parking, and welfare facilities to high-rise buildings that are part of urban redevelopment schemes. Based on our large database and accumulated technology, we create living architecture as a part of the lifeline that fuses civil engineering with architecture.

Station building for the Okinawa urban monorail (Basic design, implementation design, and supervision) <Okinawa Development Agency, Okinawa Prefecture>

High-rise housing (Basic design, implementation design, and supervision)

Disaster Prevention | Critical Preparation that Meets the Characteristics of Each Region

We offer comprehensive management of disaster-related businesses including those for people, cities, and disaster prevention systems.

PPP • PFI | Provide Better Public Services

To improve society, we are constantly seeking to provide high-quality public services that respond appropriately to the needs of the new low-cost era by examining the appropriate division of roles between the public and private sectors.
Environment | Building a More Beautiful Earth for Our Children

YEC provides a broad range of technical services that help its clients apply appropriate environmentally conscious actions to all phases of concept, planning, designing, constructing, servicing, and maintaining projects in fields such as roads, rivers, ports, and urban and regional planning. We have been actively involved in emerging environmental issues by leveraging our track record in the environment and our comprehensive technical capabilities through collaboration involving our technical experts across a broad range of fields.

- Protect Water - Water Risk Assessment -
  Water is one of the most vital resources for human security. It is also home to diverse organisms, and it acts as a lifestyle to stabilize the Earth’s climate. We have conducted predictive assessments of water risk by numerical simulations, examined the measures to be taken, and made water conservation plans through collaboration with residents so that we can constantly deliver safe water.
  We make predictions of the SS inflow of flood water and the water level situation based on the integrated analysis model of two-dimensional vertical water quality prediction and riverbed variation calculation.

- Symbiosis with Nature - Supporting Biodiversity Conservation -
  Traditional satoyama (rural landscapes) and satoumi (rural marine areas) have been built in such a way that people can maintain a balance with nature. However, the balance has begun to break down. We have helped build rich urban areas in which a variety of organisms exist and people connect mutually, based on our achievements in realizing satoyama conservation plans, examining the conservation methods for rare species, and putting together information about preservation activities.

Groundwater | Forever Keep Regional Treasures that Nurture Life

In the 21st century, known as the century of water, we have increasingly focused on groundwater, also referred to as Blue Gold. As a general civil engineering consultant, YEC has participated in conserving, reclaiming, and developing groundwater resources, taking advantage of its comprehensive technical skills in such fields as geology, groundwater, rivers, and the environment.

Geological Conditions and Grounds
Interacting with the Earth and Disaster Prevention

Approximately 70% of the land of Japan is mountainous. Sediment-related disasters such as debris flow and landslides are frequent. Our departments of Geological Conditions and Grounds have existed since our founding, and we have researched and analyzed large-scale construction, disaster prevention, sand erosion control, and subsurface environments. The departments have an excellent reputation for their expertise.

- Main technical services
  - Geological research and analysis related to large-scale constructions (dams, tunnels, roads, bridges, and final disposal sites for waste)
  - Disaster prevention
    - Geological research and analysis related to erosion control / landslides, collapse / river embankments
  - Ground analysis
    - Analysis related to stability assessment for earth structures and foundation, analysis related to the impact assessment for adjacent structures, analysis related to the regulation of actual behavior of ground, and research and analysis related to liquefaction of ground subsurface environment
    - Contamination of soil and groundwater and leachate from waste disposal sites

Waste | Build a Recycling-Oriented Society, a Low-Carbon Society, and an Efficient Waste Treatment System

Today, humankind has an issue regarding global climate change, and must therefore build a recycling-oriented society by implementing 3R policies and a low-carbon society by reducing greenhouse gases generated by waste disposal. In addition, in an age of economic challenges, waste disposal must be managed efficiently. With advanced technical support for the planning, designing, and other assistance in relation to waste, YEC aims to help build a recycling-oriented society, prevent global warming, and construct a waste treatment system that increases business efficiency.

YEC will also try to eliminate the negative legacy related to the environment, for example, eliminating pollution caused by illegal dumping. In addition, we facilitate proper disposal and recycling of disaster waste, and the proper disposal of radioactive pollution and decontamination waste.
Transportation | Bringing Safety, Security, and Smoothness to Our Community

To improve the continuity, comfort, and safety of public spaces, including roads, we have worked on traffic plans for a wide range of areas such as road maintenance planning, project evaluation, smoother transportation, traffic accident measures, public transportation, bicycle zones, pedestrian zones, and ITS’s to meet the characteristics of each region.

Main technical services

- Road development planning
  - Traffic volume estimation, road network planning, and the impact of development
  - Space planning for bicycles and pedestrians
  - Smart IC, etc.

- Road management
  - Business evaluation, road maintenance program
  - Promotion utilization of highways
  - Measures for smoother transportation, TDM, and tourism traffic
  - Traffic control, ITS, ITSVP, etc.

- Public transport
  - Urban transport strategies, public transport integration plans
  - LRT, BRT, DMV, community buses
  - Accelerating railways and ferries, and restructuring buses
  - Transportation on demand, Special Transport Service (STS), EST, mobility management, etc.

- Traffic analysis
  - Analysis of origin and destination points for transportation
  - Traffic congestion, environment improvement
  - Traffic flow analysis (micro- and macro-models)
  - Analysis of traffic accidents and study of preventive measures

- Social experiments, planning, and operation for traffic

A Preparation Workshop [National Route 17 Development Plan in Kumagaya City]

Regarding the roads centered on National Route 17 near Kumagaya Station, we created a draft development plan to provide a network that helps cyclists and pedestrians travel safely. We held a workshop on this plan in which local people participated, exchanged opinions, and provided their evaluations after they traveled on a bike path on the roads and on the sidewalks.

Roads and Tunnels | Establish a Community Network

Roads are vital for people and goods to be transferred and exchanged. Jec has planned and designed highway roads, mountain roads, bike paths, and pedestrian streets in consideration of the convenience and safety of the resident, the environment, and the landscape.

Mountain tunnels are an essential road structure in Japan, given that approximately two-thirds of the country is mountainous. In addition, more tunnels have recently been constructed in urban areas to overcome site and other constraints. Tunnels are constructions created inside the ground. Therefore, they are strongly influenced by the landforms, nature of the soil, groundwater, faults, and other factors, while they may cause ground subsidence and changes in the groundwater environment. When planning and designing a tunnel, in full consideration of the above issues, we focus on maintenance of the surrounding environment, safety at the time of construction, and stability after completion.

In addition to building new roads, from now on, we need to deal with the challenge of how we maintain and manage them, ensure the safety of traffic, and utilize the roads effectively. Jec has examined better road management systems, such as managing roads more efficiently on a daily basis, and better accident and congestion measures, such as the level of control of the pavements.

To use highways more effectively, Jec has also planned a smart interchange and examined the measures regarding expressway tolls, including offering free expressway travel.

Infrastructure Development | Offering Safe and Secure Lifelines to Everyone

During the era of high economic growth, infrastructure development projects were intended for new, large urban development and to create a good living environment. Today, we are entering an era of maintaining and updating our existing assets. We are now in a critical age where we need to promote business related to mass transfer that resulted from the Great East Japan Earthquake. Jec has been working as an adviser for roads, land forming, and water and sewage design, and has quickly presented advanced technical proposals and know-how to customers in infrastructure development projects and transfer business.

Ken-ō Expressway Chiba
(Designing the main road, interchanges, rest areas, and construction roads and designing the exchange scheme) <Ministry of Land, Infrastructure, Transport and Tourism>

Design for bike paths on National Route 50
(Building bike paths by redesigning the existing sidewalk width) <Ministry of Land, Infrastructure, Transport and Tourism>

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Kunjima water treatment plant
(Design the implementation of a distribution reservoir) <Osaka City>

Conducting research and planning for social experiments at Kurakake smart interchange on the Tokai circular road

Examining, improving, and designing signs on National Route 16
Ensuring proper guidance by combining road marking and labeling

Examining and designing measures for safety on National Route 17
Installing dotted lines as measures to prevent motorcycle accidents involving left turning vehicles
We offer advanced comprehensive technologies for constructing bridges through collaboration among technical engineers from roads, rivers, environment, and geology departments, who aim to improve planning skills, improve the ability of evaluating performance, and make better technical proposals.

**Principal Long-Span Bridges (Road Bridges)**

**Tsunoshima Bridge**
- (Detailed design)<br> *Bizen City, Okayama Prefecture>*
- A PC4 span continuous extradosed bridge
- This is a bridge connecting a chain of islands and built inside the Seto Inland Sea National Park. In consideration of harmony with the landscape and its symbolic value as a tourist attraction, we adopted a PC continuous box girder bridge style with an extradosed precasting section.

**Warenagawa Bridge**
- (Detailed design)<br> *Okayama Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism>*
- A steel cable-stayed bridge type built across the training wall on the Mizunashi River during disaster-relief work after the Unzen volcanic eruption.

**Ashitagawa Bridge**
- (Detailed design)<br> *Hirosima Prefecture>*
- A five-span continuous steel cable-stayed bridge crossing the Ashitagawa River.
- We adopted the steel cable-stayed bridge type so as to preserve the area of the Aoshima River racing course, which is acknowledged internationally and is a landmark of the surrounding area.

**New Takamatsu Expressway Omi Otori Bridge**
- (Basic design, detailed design)<br> *West Nippon Expressway Co., Ltd.*
- A PC4 span continuous waveform extradosed bridge
- won the Prestressed Concrete Technology Association’s Technology Development Award 2001.

**New Toyota Expressway Toyota Arrow Bridge**
- (Outline design, detailed design and landscape design)<br> *Central Nippon Expressway Co., Ltd.*
- A steel concrete composite four-span continuous cable-stayed bridge
- The main tower is 188 m in height, Japan’s largest-scale SRC (defined) structure
- Won the Japan Society of Civil Engineers Tanaka Award 2006.

**Kitagunma Bridge**
- (Periodic inspection by the bridge inspection car)<br> *Gunma Prefecture>*
- A five-span PC continuous extradosed rigid-frame bridge
- The world’s first structure, which combined a corrugated steel web box girder with a hanger structure (extradosed structure)
- won the Prestressed Concrete Technology Association Award 2007.

**A Bridge Using Advanced Technology to Build a City and Carry a Dream**

We evaluated the structural features of an extradosed bridge with an oblique angle by 3-D FEM analysis and 3-D non-linear dynamic analysis.

**Create a Safe and Comfortable Underground System**

We ensured a large open space with no central pillars on the platform by adopting an arch structure for the roof of the subway station building.

**Maintenance and Earthquake Resistance For a Safe and Secure Future**

A vast number of civil structures, such as bridges and tunnels, have been built. However, in recent years, the aging structures have become problematic. To use civil engineering structures safely for a long period of time, appropriate and planned improvement and maintenance are required.

**A Transportation System to Enhance the Potential of the Region**

We evaluate the balance between costs and benefits resulting from the introduction of new systems (LRT, BRT, or small monorail) that will realize a more attractive region and more convenient public transportation.

**An image of the station showing the bright future of the 21st century by bringing natural daylight through the glass covering the station.**

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Rivers | River Development Leading to a Better Future

Flood control measures are the basics of building safe and secure rivers. JEC has researched, planned, and designed tangible and intangible measures from its own unique perspectives. Among tangible measures, we have built dams, flood control basins, and pumping stations, and conducted river improvement work as measures to help prevent disasters from occurring. For intangible measures, we have worked on flood forecasting and flood information systems as disaster mitigation measures.

JEC has also committed itself to maintaining, repairing, and reinforcing river management facilities to continuously maintain their functions after construction, while we have worked on neo-natural river reconstruction and nature restoration to ensure the safety of flood control, and conserve and regenerate the natural environment.

Flood Control

In July 2004, heavy rain caused flood damage along the Kariyada and Igarashi Rivers. As restoration measures, we planned and designed the flood control basin development of the Kariyada River, dam improvement, river channel development, and river channel widening of the Igarashi River, and embankment maintenance.

When heavy rain occurred again in July 2011, the restoration measures were able to suppress the occurrence of damage in the city section.

Disaster Prevention

In the Ina River basin, where inland water damage occurs because of “guerrilla rainstorms,” we have established the Ina River Flood Messenger to share flooding information reported by the residents in the area on the Web by the use of mobile devices.

In addition to creating and updating the maintenance management plan of the Arakawa River downstream office and the Yodogawa River office, we have conducted river patrol support, forest management, sediment management, and life extension planning for the river structures.

Maintenance

We have conducted the model tests, analysis, manual preparation support, seismic performance verification of each office, and seismic design strengthening by helping a customer prepare the guidelines for comparing and verifying the seismic performance of river structures and associated facilities.

Environment

Ensuring flood control safety is important. On the other hand, the natural appearance of rivers can be ruined. For the regeneration of nature in the Onga River, Nakaizumi, we ran workshops on spawning a variety of flora and fauna, and restoring, planning, designing, and utilizing wetlands to ensure their survival.

Dams | Transmission of Dam Design Technologies that Support the Country

To help customers construct new dams and redevelop dams, JEC has planned and designed dams and undertaken construction planning. In addition, we have conducted consultation activities on dams and peripheral structures by creating small hydro projects. These are driven by a small amount of water, which harnesses running water and uses the energy from dropping water, to build a system for maintaining and managing existing dams. This system verifies the seismic adequacy of dams in the case of a large-scale earthquake.

Dams in the management stage are evaluated through dam follow-ups and overall dam checks as well as administrative checks based on data that is accumulated daily. It is important that the maintenance and management of dams are repeatedly conducted in the cycle of monitoring → evaluation → determination → improvement. This enables the following:

- Understand when dams need to be maintained or updated
- Give feedback for appropriate budgetary actions and maintenance plans
- Help improve the efficiency of inspection and reduce the total cost by classifying some dam facilities as those for corrective maintenance so as to exclude them from the inspection items or reduce the inspection frequency.
- Maintain and manage dams in an economically effective way

Small hydropower generation harnesses water drops, which can be seen everywhere. JEC has leveraged not only existing dams but also erosion control dam facilities, the power of the flow of rivers, the drop in agricultural irrigation channels, and the pipes of water purification facilities. These technologies were then brought to our local-driven, distributed energy development plans based on local production for local consumption.

Our customers for dam maintenance and management are: Ministry of Land, Infrastructure, Transport and Tourism Yamanashi, Miyagi, Niigata, Kanagawa, Yamashita, Nagano, Okayama, and Okinawa prefectures.

Seismic Performance Verification

Focusing on large-scale ground motions that are expected to occur, and based on ground motions that occurred in the past near dam sites, active faults, and plate boundaries, we conduct simulations that introduce motions to the linear dynamic analysis model that represents the dam body and the foundation rocks. After damage is observed in the dam body, we analyze the progression of damage caused by the earthquake with a non-linear analysis to evaluate the stability of the dam body.

Our customers for small hydropower projects are: Ministry of Land, Infrastructure, Transport and Tourism Yamanashi, Miyagi, Niigata, Kanagawa, Yamashita, Nagano, Okayama, and Okinawa prefectures, Water Agency and New Energy Foundation in Germany, and so on.

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Flood control measures are the basics of building safe and secure rivers. JEC has researched, planned, and designed tangible and intangible measures from its own unique perspectives. Among tangible measures, we have built dams, flood control basins, and pumping stations, and conducted river improvement work as measures to help prevent disasters from occurring. For intangible measures, we have worked on flood forecasting and flood information systems as disaster mitigation measures.

JEC has also committed itself to maintaining, repairing, and reinforcing river management facilities to continuously maintain their functions after construction, while we have worked on neo-natural river reconstruction and nature restoration to ensure the safety of flood control, and conserve and regenerate the natural environment.

Flood Control

In July 2004, heavy rain caused flood damage along the Kariyada and Igarashi Rivers. As restoration measures, we planned and designed the flood control basin development of the Kariyada River, dam improvement, river channel development, and river channel widening of the Igarashi River, and embankment maintenance.

When heavy rain occurred again in July 2011, the restoration measures were able to suppress the occurrence of damage in the city section.

Disaster Prevention

In the Ina River basin, where inland water damage occurs because of “guerrilla rainstorms,” we have established the Ina River Flood Messenger to share flooding information reported by the residents in the area on the Web by the use of mobile devices.

In addition to creating and updating the maintenance management plan of the Arakawa River downstream office and the Yodogawa River office, we have conducted river patrol support, forest management, sediment management, and life extension planning for the river structures.

Maintenance

We have conducted the model tests, analysis, manual preparation support, seismic performance verification of each office, and seismic design strengthening by helping a customer prepare the guidelines for comparing and verifying the seismic performance of river structures and associated facilities.

Environment

Ensuring flood control safety is important. On the other hand, the natural appearance of rivers can be ruined. For the regeneration of nature in the Onga River, Nakaizumi, we ran workshops on spawning a variety of flora and fauna, and restoring, planning, designing, and utilizing wetlands to ensure their survival.

Dams | Transmission of Dam Design Technologies that Support the Country

To help customers construct new dams and redevelop dams, JEC has planned and designed dams and undertaken construction planning. In addition, we have conducted consultation activities on dams and peripheral structures by creating small hydro projects. These are driven by a small amount of water, which harnesses running water and uses the energy from dropping water, to build a system for maintaining and managing existing dams. This system verifies the seismic adequacy of dams in the case of a large-scale earthquake.

Dams in the management stage are evaluated through dam follow-ups and overall dam checks as well as administrative checks based on data that is accumulated daily. It is important that the maintenance and management of dams are repeatedly conducted in the cycle of monitoring → evaluation → determination → improvement. This enables the following:

- Understand when dams need to be maintained or updated
- Give feedback for appropriate budgetary actions and maintenance plans
- Help improve the efficiency of inspection and reduce the total cost by classifying some dam facilities as those for corrective maintenance so as to exclude them from the inspection items or reduce the inspection frequency.
- Maintain and manage dams in an economically effective way

Small hydropower generation harnesses water drops, which can be seen everywhere. JEC has leveraged not only existing dams but also erosion control dam facilities, the power of the flow of rivers, the drop in agricultural irrigation channels, and the pipes of water purification facilities. These technologies were then brought to our local-driven, distributed energy development plans based on local production for local consumption.

Our customers for dam maintenance and management are: Ministry of Land, Infrastructure, Transport and Tourism Yamanashi, Miyagi, Niigata, Kanagawa, Yamashita, Nagano, Okayama, and Okinawa prefectures.

Seismic Performance Verification

Focusing on large-scale ground motions that are expected to occur, and based on ground motions that occurred in the past near dam sites, active faults, and plate boundaries, we conduct simulations that introduce motions to the linear dynamic analysis model that represents the dam body and the foundation rocks. After damage is observed in the dam body, we analyze the progression of damage caused by the earthquake with a non-linear analysis to evaluate the stability of the dam body.

Our customers for small hydropower projects are: Ministry of Land, Infrastructure, Transport and Tourism Yamanashi, Miyagi, Niigata, Kanagawa, Yamashita, Nagano, Okayama, and Okinawa prefectures, Water Agency and New Energy Foundation in Germany, and so on.
Erosion Control | Dealing With The Threat of Sediment Disaster

yeC is continuously engaged in consulting, not only seeking to protect the lives and properties of local residents from landslides, but also focusing on the balance of the environment, landscape, and cost.

New Construction

- Kawasawa erosion control dam
  (A non-permeable erosion control dam/detailed design)
  <Yamanashi Prefecture>
- Katozakani No. 1 erosion control dam
  (A permeable erosion control dam/detailed design)
  <Chubu Regional Development Bureau>

Improvement

We provide various proposals for safety improvement to respond to sediment-related disasters, such as for checking the degree of obsolescence of existing erosion-control dams, assessing the current safety level, and making an improvement plan by effectively utilizing existing assets.

Overall Plan

- Subcontracting for examining the construction plan of the Ura River upstream erosion control facility
  (A water erosion control plan) <Hokuriku Regional Development Bureau>
- Examining the Taruma volcanic erosion control plan
  (A volcanic erosion control plan) <Hokkaido Regional Development Bureau>

Ports and Airports | From the Perspective of the Facility as a Source of National Strength

In Japan, more than 99% of food and fuel is imported and exported via ports; therefore, ports and airports need to be enhanced as the foundation that supports Japan’s international competitiveness. In addition, coastal areas are places with large populations; so Japan has to be prepared for a massive earthquake that could occur in the Nankai Trough, by learning from the Great East Japan Earthquake that caused unprecedented damage. To realize the above, yeC has provided the technology for planning, facility designing, and environmental assessment as a total coordinator.

- Yokohama Hakkeijima
  <Yokohama City>
  Blue carbon demonstration (CO2 fixation by marine organisms)
- Odawara fishing port
  <Odawara fishery association>
  (Development planning of the fishing port facility site and designing the fishing port facility)
- Shimakko Boat Park, Nagoya Port
  <Nagoya Port management association>
  (Designing a pleasure boat mooring facility)

Machinery, Electrical and Information Communications Sections

Professionals Who Play an Active Part Across Engineering Sections

The machinery, electrical, and information communication sections in yeC helps customers build all the machinery, electrical, and information communication facilities needed for various social capital, such as rivers, dams, ports, water and sewage systems, roads, tunnels, environment, and waste disposal. yeC has participated in a broad range of projects.

- Kinosaki Drainage Pumping Station
  <Kinki Regional Development Bureau, Transport and Tourism>

Kinosaki Drainage Pumping Station

The Kinosaki drainage pumping station is located in Kinosaki-cho, Toyooka, Hyogo Prefecture, and was built for the drainage system behind the levee of the Otani River. However, typhoon No. 23 made landfall in the Kinki region in 2004 and brought heavy rain to the Maruyama River basin, causing extensive damage. In response, MLIT developed a special emergency project to handle the situation and decided to increase the drainage capacity of the pump station from 15 m³/s to 23 m³/s. In addition to the facilities themselves, yeC also helps with the maintenance and updating of drainage pumping stations.

- Special emergency projects - Special emergency projects for the control of severe river disasters
Domestic Engineering Division

**YeC’s New Management Business to Help Build a Low-Carbon Society and Reduce the Cost of Public Works Projects**

Half a century has passed since Japan’s era of high economic growth. During this period, Japan has built a remarkably advanced information society and is now approaching a new phase of low birth rates, an aging society, and a deteriorating global environment. The target areas for public works projects have significantly expanded from the tangible to the intangible, so we are required to manage our businesses effectively with limited money and time.

YeC has developed a management business based on the expertise and experience it has developed over the years that helps clients to respond quickly and accurately to the trends of the era of low-carbon and cost structure reforms.

**Renewable Energy | Think About the Future Environment for Our Children**

There are needs for future urban development from the perspectives of disaster prevention, local production for local consumption, and global warming measures as well as local revitalization. YeC focuses on renewable energy, which can help overcome challenges across these areas, bringing together the technology that has been developed in each department, to examine and deploy solar power, biomass energy, and geothermal heat pump systems.

**Information | Improving Services for People through Advanced Information Technology**

We offer both IT-driven technology and technology utilizing IT, meeting your objectives for desired quality of information in various fields. We deliver the technologies to collect and analyze information, construct systems for infrastructure development, develop a wide range of applications, and deliver clear, shapely, and accurate services utilizing IT.

**Infrastructure Management | Aiming at Efficient Maintenance and Management**

Much of the social infrastructure that was built during the high-growth period now needs to be updated. However, the authorities may not be able to ensure the financial resources to meet the requirements due to the overlap of their update periods. As a result, they find it difficult to maintain the functions of existing resources. To respond to the demands of this age, YeC helps its customers make a plan for checking, diagnosis, maintenance and management, and considering PPP / PFI and long-term comprehensive contracts for each facility to be maintained and managed.

**Local Management and Economic Analysis | Aiming for a Better Life for Regions**

YeC integrates its many years of knowledge and experience in the business planning of individual projects in diverse areas, support for public participation processes, and business assessment. It also offers measures to promote administrative management and regional management, which lead to administrative and financial reform and NPM (New Public Management).

**Design | Landscape Design Pursuing Nature and PR Design Connecting People and Information, by Casting Our Thoughts into Shape**

YeC has pursued the design of nature for the development of rich spaces, focusing on functionality and fusion with nature as well as the beauty of materials, and supported two-way communication using various ideas to mutually understand the human touch in each design.
Based on our 50 years of experience in civil engineering technologies, we will continue to contribute to Japan and the world.

Yachiyo Engineering Co., Ltd. (yec) has been contributing to the global society for over 50 years, as one of the leading civil engineering consulting firms in planning, design, and project management for social infrastructure development. As the socioeconomic environment changes dramatically, we have taken steps to improve our technical capabilities and research, and develop new engineering skills. We have accumulated extensive experience in water resource engineering and plant engineering since the early establishment of our company. We have also developed high-quality engineering using Japanese technology. We have built a corporate culture that values sincerity and responsibility. It is our honor to contribute, through our work over generations, to Japan and the world.

Norio Hanaoka, President
Yachiyo Engineering Co., Ltd.