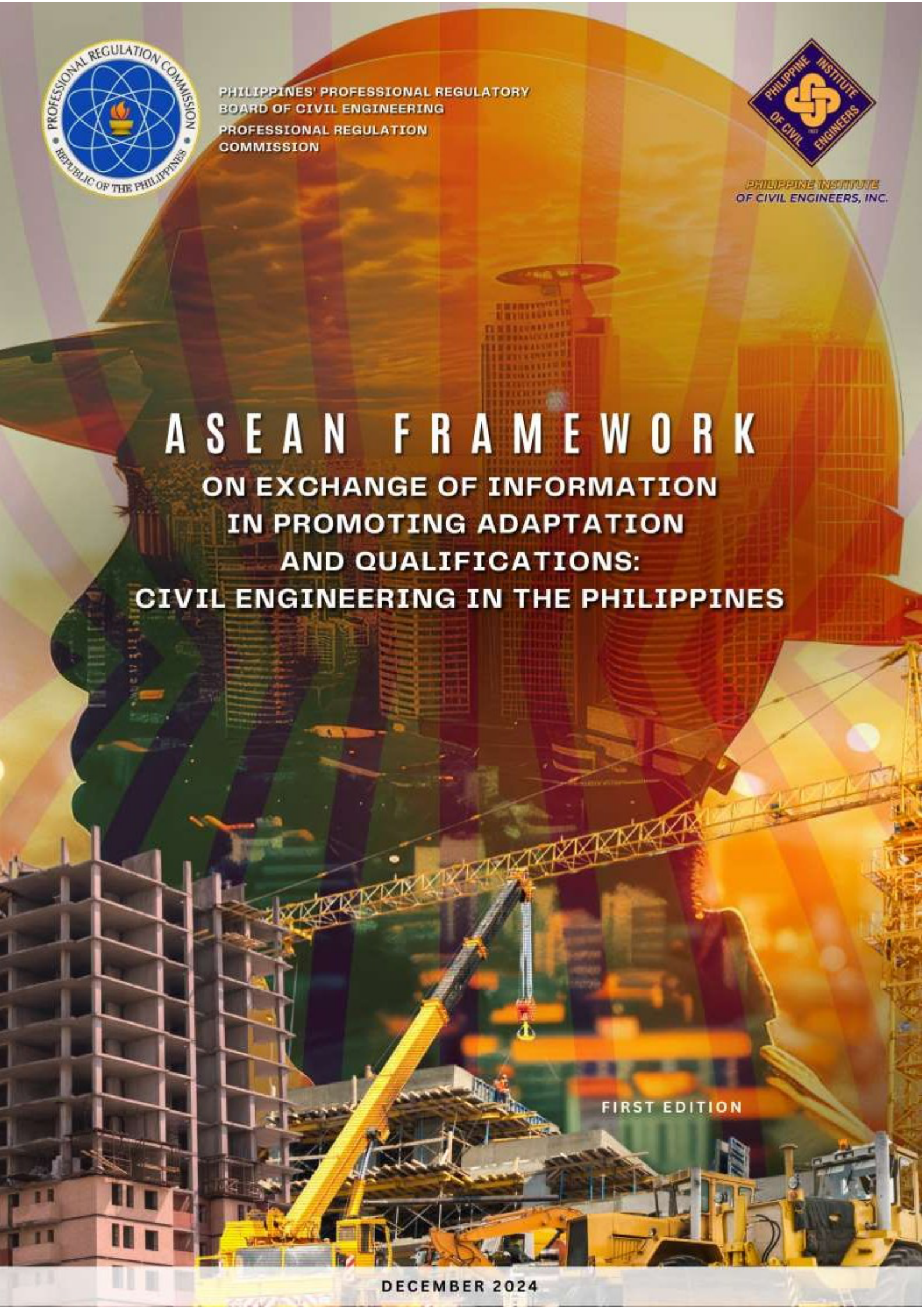

PHILIPPINES' PROFESSIONAL REGULATORY BOARD OF CIVIL ENGINEERING

PROFESSIONAL REGULATION COMMISSION

PHILIPPINE INSTITUTE OF CIVIL ENGINEERS, INC.

ASEAN FRAMEWORK

ON EXCHANGE OF INFORMATION IN PROMOTING ADAPTATION AND QUALIFICATIONS: CIVIL ENGINEERING IN THE PHILIPPINES

FIRST EDITION

DECEMBER 2024

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FOREWORD

In consonance with the exchange of information in promoting and adaptation of best practices, standards and qualifications within the ASEAN Region, the Philippines through the Professional Regulation Commission and the Philippine Institute of Civil Engineers have compiled documents which can be used as a reference material by professionals, engineering practitioners, and the academe in their respective fields of work of our Asian neighbors.

This document contain excerpts of the Philippines' Civil Engineering Law, the Bachelor of Science in Civil Engineering Curriculum, the Manual of Civil engineering Specializations, Codes and Standards, Requirements for Building Permit Application, the Construction Industry, a sample Project Management Case Study, and other related information.

Information is a vital resource for comparative analysis, research work, regional data Bank, report preparation, policy formulation and the like.

The access, significance and enormous benefits derived from this documentation will bring about multitude effects in the construction industry and in Public governance.

PRAXEDES P. BERNARDO
Chair, Civil Engineering Board
Professional Regulation Commission

EMIL K. SADAIN, CE, SE
President
Philippine Institute of Civil Engineers

1.0 CIVIL ENGINEERING LAW

EXCERPTS FROM
REPUBLIC ACT NO. 544 – CIVIL ENGINEERING LAW
(As Amended by R.A. 1582)

An Act to Regulate the Practice of Civil Engineering in the Philippines

The term "civil engineer" as used in this act shall mean a person duly registered with the Board for Civil Engineers in the manner as provided in the law.

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1. Scope of Practice

Civil Engineering practice constitutes services in the form of consultation, design, preparation of plans, specifications, estimates, erection, installation and supervision of the construction of the following:

- *streets, bridges, highways, railroads, airports and hangars, port works, canals, river and shore improvements, lighthouses, and dry docks;*
- *buildings, fixed structures for irrigation, flood protection, drainage, water supply and sewerage works;*
- *demolition of permanent structures; and tunnels.*

The enumeration of any work in this section shall not be construed as excluding any other work requiring civil engineering knowledge and application. An example is retrofitting.

2. Core Competency Standards

Licensure Requirements

- *All applicants for registration for the practice of civil engineering shall be required to pass a technical examination given by the Board for Civil Engineers, administered and conducted by the Professional Regulation Commission (PRC) in accordance with RA No. 544 and RA No. 8981.*
- Qualifications for Examination
  - *Be at least twenty-one years of age;*
  - *Be a citizen of the Philippines;*
  - *Be of good reputation and moral character; and*
  - *Be a graduate of a four-year course in civil engineering from a school, institute, college or university recognized by the Government or the State wherein it is established.*

MARKET CONDITIONS AND TRENDS

Number of Registered Civil Engineers *(as of December 2024)*	214,975
Number in Active Practice *(license renewed within 3 years)*	141,805
Number of Schools Offering the C.E. Program *(as of December 2024)*	277

2.0 BACHELOR OF SCIENCE IN CIVIL ENGINEERING

(CURRICULUM OVERVIEW)

Technical Courses 1		
A. Mathematics	*B. Natural / Physical Sciences*	*C. Allied Courses*
• *Calculus 1* • *Calculus 2* • *Differential Equations* • *Engineering Data Analysis* • *Numerical Solutions to C.E. Problems*	• *Chemistry for Engineers* • *Physics for Engineers (Calculus-Based)* • *Geology for Civil Engineers*	• *Engineering Utilities 1* • *Engineering Utilities 2*

Technical Courses 2	
D. Basic Engineering Sciences	
• *Civil Engineering Orientation* • *Engineering Drawing and Plans* • *Computer Fundamentals and Programming* • *Computer Aided Drafting* • *Technopreneurship 1*	• *Statics of Rigid Bodies* • *Dynamics of Rigid Bodies* • *Mechanics of Deformable Bodies* • *Engineering Economics* • *Engineering Management*

Technical Courses 3	
E. Professional Common Courses	
• *Fundamentals of Surveying* • *Highway and Railroad Engineering* • *Principles of Transportation Engineering* • *Building Systems Design* • *Principles of Steel Design* • *Quantity Surveying* • *Construction Materials and Testing* • *Construction Methods and Project Management* • *CE Project 1*	• *Geotechnical Engineering / Soil Mechanics* • *Structural Theory* • *Hydraulics* • *Hydrology* • *Principles of Reinforced/Prestressed Concrete* • *CE Law, Ethics, and Contracts* • *CE Project 2*

Technical Courses 4
F. Professional Courses – Specialized *The Higher Educational Institution (HEI) shall offer a minimum of four Professional Courses – Specialized in each area/track of chosen specialization among the following:*
• *Construction Engineering and Management* • *Geotechnical Engineering* • *Structural Engineering* • *Transportation Engineering* • *Water Resources Engineering* • *The HEI shall offer at least one track of Professional Courses – Specialized. Other tracks shall be developed and offered by the HEIs as the need arises.*

Technical Courses 5
G. On-the-Job Training (OJT - minimum of 240 hours)
• *The OJT program enables the students' immersion in work environments relevant to their area of study. The students gain valuable experience which could level up their technical skills, knowledge, attitude, and respect towards work. The program also gives them the opportunity to find a firm grip on the industry and choose the path they want to pursue.*

Professional Courses for the Specialized Track

1. Construction Engineering and Management

- *Project Construction and Management*
- *Advanced Construction Methods and Equipment*
- *Construction Cost Engineering*
- *Database Management in Construction*
- *Construction Occupational Safety and Health*

2. Geotechnical Engineering

- *Geotechnical Engineering (Rock Mechanics)*
- *Foundation Engineering*
- *Geotechnical Earthquake Engineering*
- *Ground Improvement*

3. Structural Engineering

- *Earthquake Engineering*
- *Design of Steel Structures*
- *Reinforced Concrete Design*
- *Prestressed Concrete Design*
- *Structural Design of Towers and Other Vertical Structures*
- *Bridge Engineering*
- *Foundation and Retaining Wall Design*

4. Transportation Engineering

- *Transportation Systems Planning and Design*
- *Highway Engineering*
- *Airport Design*
- *Ports and Harbors*
- *Railway Engineering*

5. Water Resources Engineering

- *Water Resources Engineering*
- *Flood Control and Drainage Design*
- *Irrigation Engineering*
- *Water Supply Planning and Development*
- *Coastal Engineering*
- *River Engineering*
- *Ground Water Flow Modelling*

Master's Level and Doctorate Level Degree Programs

According to the CHED Data (Commission on Higher Education) of A.Y. 2021-2022 Higher Education Institutions Offering Engineering Programs in the Philippines, following are some of the degree programs at Master's level:

- Master in Engineering (Civil Engineering*)
- Master in Engineering (Environmental and Sanitary Engineering)
- Master in Engineering (Water Resources Engineering)
- Master in Environmental Engineering
- Master of Civil Engineering*
- Master of Engineering (Civil Engineering*)
- Master of Engineering (Structural Engineering)
- Master of Engineering (Environmental and Sanitary Engineering)
- Master of Engineering in Civil Engineering*
- Master of Engineering in Energy and Environment
- Master of Engineering in Rural Infrastructure Engineering
- Master of Engineering Management with Specialization in Construction and Project Management
- Master of Science (Civil Engineering*)
- Master of Science in Civil Engineering*
- Master of Science in Construction Engineering and Management
- Master of Science in Engineering (Water Resources Engineering)
- Master of Science in Environmental Engineering
- Master of Science in Environmental Engineering and Management
- Master of Science in Structural Engineering
- Master of Science in Water and Wastewater Engineering
- Professional Science Master in Energy Engineering
- Professional Science Master in Power Systems Engineering

Following are some of the degree programs at Doctorate level:

- Doctor of Engineering (Environmental and Sanitary Engineering)
- Doctor of Philosophy in Civil Engineering*
- Doctor of Philosophy in Environmental Engineering

*with various fields of specialized study

3.0 CIVIL ENGINEERING SPECIALIZATIONS

*The **PRC Accredited Professional Organization of Civil Engineers (APO)**, the **Philippine Institute of Civil Engineers (PICE)** through their Inter Specialty Groups (ISG), developed a **Manual of Civil Engineering Specializations** in order to encourage specialization in the various Specialty Fields of the Civil Engineering Profession. The various Specialty Disciplines aim to nurture and enhance their respective fields of specialization to further encourage professional development and the technical capabilities of its members, thereby enhancing the delivery of quality professional Civil Engineering services.*

The Institute shall have seven (7) Specialty divisions in the areas of Structural Engineering, Transportation Engineering, Water Engineering, Geotechnical Engineering, Project Management and Construction Engineering, Environmental and Energy Engineering and Civil Engineering Education which shall serve as the technical arms of the Institute at the national level.

The Board may create other specialty divisions as the need arises. Each division shall be headed by a Fellow, duly appointed by the Board upon the recommendation of the PICE President. Membership in any of the divisions is open to any life member in good standing. Activities of the Specialty Divisions shall include but not limited to:

(a) periodic assessment of the quality of practice;
(b) setting of standards and practices;
(c) preparations of CPE programs for direct implementation and/or implementation by the various chapters;
(d) administration of technical sessions during national conventions, conferences and seminars;
(e) identification of recipients of PRC certificate of Recognition. (f) evaluate and act on PICE specialist applications within 30 days upon receipt of the application by the respective specialty division and shall recommend to the National Board for approval; and
(g) shall spearhead the Institute's career progression and specialization program for all the members

Membership of the Philippine Institute of Civil Engineers
(PRC Accredited Professional Organization of Civil Engineers)
As of December 2024

Chapters (Professionals)	107 Local 13 International
Members	
• Associate	1,911
• Regular	89,211
• Life	11,104
• Fellow	251
• Honorary Member	8
Chapters (Student)	232
• Members	25,615

The advent of new qualifications based on emerging knowledge and skills requirements as a consequence of technological changes and local as well as global labor market restructuring will ensue. At present, PICE ISG Groups focus on the following fields of specialization.

Specialization 1
Civil Engineering Education

CIVIL ENGINEERING EDUCATION is the practice by registered and licensed Civil Engineers, usually with Master's and/or Doctoral degree, to engage with higher education institutions either full-time or part-time for the teaching, research, extension or outreach, and administration of Civil Engineering programs from Bachelor to Master's or Doctoral degree.
On account of the comprehensive nature of Civil Engineering programs in higher education institutions, specialists in CE Education are usually specialists also in another CE field/area/track, particularly when engaged with Graduate Programs.

The **CIVIL ENGINEERING EDUCATION** Specialty Division was instituted by PICE in the Amended By-Laws of 2021. Among other typical activities of Divisions, for the CE Education Specialty Division are: setting of standards and practices for Bachelor, Master's, and Doctoral programs in CE; and, preparation of education programs for the general public about the scope and nature of Civil Engineering.

Civil Engineering Education		
Bachelor	***Graduate (Master's and Doctoral)***	***Overall***
• *Learning Resources* • *Assessment Methods and Tools* • *Continuous Quality Improvement* • *Capstone Projects (Design and Research)* • *On-the-Job Training*	• *Futures of Infrastructure and Governance*	• *Policies, Standards and Guidelines* • *Outcomes-Based Education* • *Institutional Sustainability Assessment* • *Teaching and Learning Activities* • *Curriculum* • *Lifelong Learning*

Specialization	**Specialty Society**
Project Management and Construction Engineering	*Organization of Specialist Construction Engineers of the Philippines Inc. (OSCEPI)*
Environmental and Energy Engineering	*Environmental and Energy Engineering Group*
Geotechnical Engineering	*Philippine Society for Soil Mechanics and Geotechnical Engineering*
Structural Engineering	*Association of Structural Engineers of the Philippines (ASEP)* *Institution of Specialist Structural Engineers of the Philippines (ISSEP*
Transportation Engineering	*Transportation Engineering Group*
Water Engineering	*Institute of Water Engineering Specialists of the Philippines (IWESP)*
Civil Engineering Education	*Specialist Union for Creative Civil Engineering Education in the Philippines (SUCCEED)*

Specialization 2
Environmental and Energy Engineering

ENERGY *and* ***ENVIRONMENTAL ENGINEERING*** applies civil engineering principles, processes and procedures to improve or remediate the land, air and water environment, and/or to convert, produce, transfer, distribute, use, or conserve energy with the most positive impact and/or least negative impact on the environment, including natural or environmental disaster risk management and mitigate greenhouse gas emissions and adaptation of infrastructure to a changing climate.

Complex problems such as energy efficiency of buildings, environmentally informed design of transportation systems, embodied energy of construction materials, electricity from renewable sources, and biofuels are analyzed from engineering, environmental, economic, and management perspectives.

Environmental "civil" engineers focus on hydrology, water resources management, bioremediation, and water treatment plant design.

Environmental and Energy Engineering

Environmental Engineering	***Energy Engineering***
Environmental Impact Assessment and Mitigation covers • identification and evaluation process to assess the potential impacts of a proposed project , plans, programs, policies, or legislative actions upon the physical-chemical, biological, cultural, and socioeconomic components on environmental conditions; • application of scientific and engineering principles to evaluate if there are likely to be any adverse impacts to water quality, air quality, habitat quality, flora and fauna, agricultural capacity, traffic impacts, social impacts, ecological impacts, noise impacts, visual (landscape) impacts, etc. • formulation of mitigation measures • Water control and management • Water and wastewater treatment • Solid and hazardous waste management • Geo-environmental engineering • Disaster risk reduction and management • Environmental Impact Assessment and Mitigation • Life cycle analysis of materials and processes • Sustainable buildings • Air quality management • Policy and management	• It covers civil engineering aspects that are either directly related to, or can ultimately contribute to, the production, distribution, and storage of energy. (ASCE) • Resource assessment • Renewable energy resources • Demand-side management • Energy audit, conversion, and efficiency • Green buildings • Transportations systems • Life-cycle analysis • Energy and environmental markets • Decision-support systems • Integrated assessment models • Policy and management •

Specialization 3
Geotechnical Engineering

GEOTECHNICAL ENGINEERING deals with the Earth as the ultimate structure to support loads and manmade structures. The Principles of Soil Mechanics, Rock Mechanics and empirical observations are used to understand the subsurface soil/rock conditions and determine their physical, chemical and mechanical properties, predict their behavior using mechanistic principles or empirical knowledge. It is used to evaluate the stability of natural and man-made slopes, assess risks posed by site conditions, design earthworks slopes, assess risks posed by site conditions, and monitor site conditions and performance of foundations.

<table>
<tr><th colspan="3">Geotechnical Engineering</th></tr>
<tr><th>Geo Mechanics</th><th>Geo Structures</th><th>Geo Dynamics</th></tr>
<tr>
<td>• Constitutive behavior of geomaterials
• Computational Methods in Geomechanics
• Soil/Rock Testing Methods using advanced (stress path/ unsaturated soils) and Conventional insitu and laboratory soil testing methods in the Field and laboratory for determining the Physical, chemical and mechanical properties of Soil and Rock
• Advanced Geotechnical & Geophysical in-situ testing technique.</td>
<td>• Foundations Engineering
• Earth Structures
• Tunnels and Underground structures such as tanks and Subway tunnels
• Retaining Systems</td>
<td>• Dynamic Testing of Soil and Rock
• Geotechnical Aspects of Earthquake Engineering
• In situ and laboratory testing of soil elastic properties (Poisson’s ratio, Shake Table, Dynamic shear Modulus, Seismic shear wave velocity) and their means of propagation
• Dynamics of Debris Flows</td>
</tr>
<tr><th colspan="2">Geo Environmental</th><th>Geo Modification</th></tr>
<tr>
<td colspan="2">• Pollutant Transport Phenomena and fate modelling.
• Geotechnical Aspects of MSW Landfill Design including liner technology and testing.</td>
<td>• Ground Improvement Technologies
• Ground Reinforcement with the use and application of Geosynthetics and other reinforcing materials.</td>
</tr>
</table>

Specialization 4
Project Management and Construction Engineering
(with Quantity Survey and Cost Estimating)

PROJECT MANAGEMENT is the discipline, art, and skill of planning, controlling, and managing of resources to bring about the successful completion of specific goals and objectives of civil engineering projects. It relates to the provision of tools and techniques that enable the project team to successfully attain its objectives.

CONSTRUCTION ENGINEERING is the discipline, art, skill, and profession of acquiring and applying scientific, mathematical, economic, managerial, and practical knowledge in order to develop, design, build, and operate safe structures, systems, materials, and process that ultimately improve the quality of lives of people.

QUANTITY SURVEY is the process of identifying the various work items of a certain project, quantifying them, and posting the corresponding units of measurements.

COST ESTIMATING is the process of determining the cost per work item by multiplying the quantities and the unit costs to derive the cost per work item; then adding the Overheads and contractor's margin or OCM; and summing up the total cost of a project being estimated.

Project Management		
Management	***Resources***	***Consulting Services***
• *Planning and Scheduling* • *Organization* • *Staffing* • *Directing and Supervising* • *Controlling* • *Reporting* • *Monitoring and Evaluation* • *Coordinating and Controlling* • *Reviewing*	• *Money/Funds* • *Materials* • *Manpower/Labor* • *Equipment/Machineries* • *Methods/Technologies* • *Information*	• *Type of Services* • *Procurement Services*

Construction Engineering and Management		
Planning and Scheduling	***Coordination and Control***	***Project Safety***
• *Project Site Analysis* • *Bar Chart and S-Curve* • *Quantity Survey and Cost Estimating* • *Manning Schedule* • *Equipment Schedule* • *Budgeting*	• *Coordination with all disciplines (Architectural, Civil Structural, Sanitary, Electrical and Mechanical)* • *Coordination among Owner, Contractor, Suppliers, Laborers, etc.* • *Project Control*	• *Safety Policies* • *Resources* • *Standards* • *Procedures* • *Research and Development*
Project Organization and Staffing	*Monitoring and Evaluation*	*Digital Construction Management*
Direction and Supervision	*Reporting and Documentation*	*Financial Management*
Procurement	*Contract Administration* *Quality Management System*	*Project Completion, Acceptance and Turnover*
	Risk Management	

Quantity Survey and Cost Estimating	
Project Cost Development	
• *Material Cost* • *Equipment Cost* • *Labor Cost* • *Sub-contract Cost* • *Other Costs*	• *Quantity Take Off* • *Overheads, Contingencies, Miscellaneous (OCM)* • *Contractor's Profit* • *VAT* • *Project Cost Estimate*

Specialization 5
Structural Engineering

STRUCTURAL ENGINEERING deals with the creative manipulation of materials and forms and the underlying mathematical and scientific principles to achieve an end which fulfils its functional requirements and is structurally safe when subjected to all the loads it could reasonably be expected to experience, while being economical and practical to construct.

Advances in structural engineering focus on multi-hazard structural sustainability, innovations in design approaches to enhance safety and resilience, exploring novel systems that withstand various hazards, investigating materials for durability, strength, and environmental impact, and application of smart materials in today's technological advancements.

Structural Engineering		
Buildings and Other Vertical Structures	***Retaining Confinement and Underground Structure***	***Structural Materials and Technology***
• *Buildings* • *Bridges* • *Towers and Antennas* • *Domes and Gymnasiums* • *Plates and Shells* • *Ports and Harbor Facilities* • *Piers, Dolphins, Groins* • *Offshore Platforms* • *Machine Foundations* • *Piles and Caissons* • *Grandstand and Stadium*	• *Dams and Reservoirs* • *Retaining Walls* • *Breakwaters* • *Bins and Silos* • *Flood Control and Drainage Structures* • *Tanks, Bunkers* • *Dikes* • *Pipes and Tunnels* • *Slope Protections* • *Underground/ Underwater Facilities*	• *Timber and Wood* • *Stone and Masonry* • *Steel and Metals* • *Concrete, Reinforced and Prestressed Concrete* • *Composite and Carbon Fiber Reinforced Polymers* • *Dampers and Isolators* • *Development of Non-Traditional Building Materials, Smart and Intelligent Materials for Sustainable Concrete Construction*

Specialization 6
Transportation Engineering

TRANSPORTATION ENGINEERING deals with the planning, functional design, operation, and management of facilities for any mode of transportation in order to provide for the safe, rapid, comfortable, convenient, economical, and environmentally compatible movement of people and goods. Transportation Planning, Traffic Engineering, Highway Engineering, Railway Engineering, Water Transportation Engineering, and Air Transportation Engineering are its branches.

Transportation Planning encompasses the relationship of land use to travel patterns and travel demands; the planning, evaluation, and programming of transportation facilities, including roadways, transit, terminals, parking, pedestrian facilities, bikeways, and good movement as defined by the Institute of Transportation Engineers.

Traffic Engineering pertains to the planning, geometric design, and traffic operations of roads, street and highways, their networks, terminals, abutting lands, and relationships with other modes of transportation (Evans, 1950).

Highway Engineering deals with the planning, design, and operations of roads and bridges and related facilities.

Railway Engineering deals with the planning, design and operation of railways and related facilities.

Water Transportation Engineering includes the planning, design and operation of water transportation facilities such as ports, navigational systems and related facilities.

Air Transportation Engineering deals with the planning, design and operation of air transportation facilities such as airports, navigational systems and related facilities.

Transportation Engineering		
Transportation Planning	***Traffic Engineering***	***Highway Engineering***
• *Urban travel characteristics* • *Freight transportation* • *Planning studies* • *Public transport* • *Transportation Terminals* • *Parking facilities* • *Non-motorized transport* • *Transportation models* • *Financial & economic considerations* • *Environmental & energy considerations* • *Institutional issues*	• *Traffic flow fundamentals* • *Traffic studies* • *Traffic management* • *Geometric design of highways* • *Intersection design & control* • *Road safety & traffic accident analysis* • *Travel demand forecasting* • *Intelligent transportation system*	• *Highway planning* • *Geometric design of highways* • *Pavement design* • *Traffic control devices and other accessories* • *Road safety & traffic accident analysis*

Railway Engineering	***Water Transportation Engineering***	***Air Transportation***
• *Railway transport planning* • *Planning & design of railway tracks* • *Traffic control devices* • *Station planning & design* • *Cargo handling*	• *Port & terminal operations* • *Inland operations* • *Port design & maintenance* • *Container terminal planning & design* • *Intermodal & logistics* • *Port policies & management* • *Port economics* • *Port safety & security* • *Navigational systems*	• *System planning* • *Airfield design* • *Design of terminal buildings* • *Ground access and distribution* • *Communication and navigation systems* • *Air traffic management* • *Institutional Issues*

Specialization 7
Water Engineering

WATER ENGINEERING deals with conceptualization, planning, design, operation and maintenance of facilities to control, utilize and manage water resources and water-related facilities.

It requires knowledge on meteorology, hydrology, hydrogeology, geology, fluid mechanics, hydraulics, coastal processes, oceanography and estuarine hydrodynamics. Combined, they provide complete quantitative and qualitative picture of physical, chemical and biological properties of water; and possible extremes of water both as a natural resource and as a medium of transport.

Water Engineering		
Irrigation Engineering	***Hydropower Engineering***	***Waterworks and Sewerage***
• *Hydrology and Hydrogeology* • *Hydraulic structures – diversion dams, intakes and headworks, pumping stations, canals, distribution facilities, sprinkler systems, drip irrigation*	• *Hydrology, Lake Studies, Coastal Engineering, Tidal studies* • *Hydraulic Structures – Dams, reservoirs, headworks, penstocks, headrace, surge tanks/ chambers, desanders, tailrace structures, gates; unit selection*	• *Water source hydrology and hydrogeology (springs, wells, surface water and rainwater harvesting)* • *Water, wastewater and solid waste management systems Hydraulic structures – source facilities, transmission lines, controls and valves, distribution network, storage facilities, individual connections* • *Demand projections, operational rules, institutional and legal framework, management models* • *Water recycling, re-use*

Coastal and Waterways Engineering	*Flood Mitigation and Drainage*	*Water Resources Development and Management*
• *Wave theory, processes and propagation in the near shore* • *Beach and sediment transport* • *Nearshore processes and shore stabilization* • *Coastal Hazards (storm surge, high waves, coastal flooding, tsunami)s* • *Ports and harbors, coastal protection works*	• *Hydro-meteorological studies* • *Rainfall-run-off relationships* • *Watershed characteristics* • *River morphology* • *Hydraulic structures – channels, culverts, protection works, pumping stations, scours and sedimentation, bridge hydraulics*	• *Groundwater Management (available safe yield, groundwater mining, radius of influence, static water levels, pumping water levels, salinity levels, site remediation)* • *River Basin Management (tributaries and main river channels, backwater effects, saline intrusion)* • *Integrated Water Resources Management (IWRM)* • *Flood Plain Management, Coastal Resources Management*

Pursuant to Board Resolution No. 05 series of 2023, obtaining a specialization recommended by the respective specialty division, duly approved and conferred by the PICE National Board is among the requirements necessary before an applicant is endorsed for registration as an Advanced Level Engineer, such as APEC Eng, ASEAN Eng and ACPE.

Professional Networking and Associations **Affiliate/Fraternal Societies**	
Asian Civil Engineering Coordinating Council (ACECC)	*Road Engineering Association of the Philippines*
ARISE Philippines – Private Sector Alliance for Disaster Resilient Societies	*Association of Structural Engineers of the Philippines*
ASEAN Federation of Engineering Organizations	*Institution of Specialist Structural Engineers of the Philippines*
Association of Accredited Consultant Civil Engineers of the Philippines (AACCEP)	*Institute of Water Engineering Specialists of the Philippines*
City and Municipal Engineers of the Philippines	*Filipino Planning Engineers Association*
District Engineers League of the Philippines	*Structural Engineers Association of Davao, Inc.*
Philippine Association of Building Officials	*Organization of Specialist Construction Engineers of the Philippines*
Provincial Engineers Association of the Philippines	*Specialist Union for Creative Civil Engineering Education in the Philippines*
Philippine Accredited Materials Engineers Association	

Professional Networking and Associations Collaborations (MOU, MOA, Partnerships)	
The Asian Civil Engineering Coordinating Council (ACECC), was established on September 27, 1999, in Tokyo, with five civil engineering societies/institutes present, namely:	
• *American Society of Civil Engineers* • *Japan Society of Civil Engineers* • *Philippine Institute of Civil Engineers*	• *Chinese Institute of Civil and Hydraulic Engineering* • *Korean Society of Civil Engineers*
Current membership has increased to 17 with the inclusion of the following:	
• *Vietnam Federation of Civil Engineering Associations* • *Indonesian Society of Civil and Hydraulic Engineers* • *The Institution of Civil Engineers, India* • *The Institution of Engineers, Bangladesh* • *The Institution of Engineers, Pakistan* • *Moscow Department Russian Society of Civil Engineers*	• *Engineers Australia* • *Engineering New Zealand* • *Nepal engineers Association* • *Mongolian Association of Civil Engineers* • *Institution of Engineers, Sri Lanka* • *Federation of Myanmar Engineering Societies*

Professional Networking and Associations Objectives

The Asian Civil Engineering Coordinating Council (ACECC) was created to promote the acquisition and transfer of civil engineering knowledge for advancing the design and construction practices that ultimately improve the quality of life of all citizens from these ACECC member countries.

Further Objectives:

1) *To promote and advance the science and practice of civil engineering and related professions for sustainable development in the Asian region.*
2) *To encourage communication between persons in charge of scientific and technical responsibility for any field of civil engineering.*
3) *To improve, extend and enhance such activities as infrastructure construction and management, preservation of the precious environment and natural disaster prevention.*
4) *To foster exchange of ideas among the member societies/institutions.*
5) *To cooperate with any regional, national and international organizations to support their work, as the ACECC deems necessary.*
6) *To provide advice to member societies/institutions to strengthen their domestic activities.*
7) *To conduct Civil Engineering Conference in the Asian Region (CECAR) on a triennial basis as the main activity*

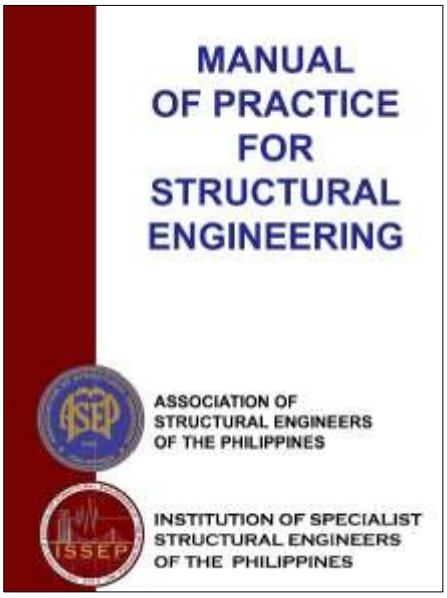
PICE is currently chair in two technical committees - Gender and Development in infrastructure and Interdisciplinary Strategic Foresight for Infrastructure

4.0 CODES AND STANDARDS

Professional Networking and Associations
Codes Development

The Philippine Society for Soil Mechanics and Geotechnical Engineering is in discussion with partner societies in ASEAN Region (Singapore, Indonesia, Thailand, Taiwan, and Hong Kong) in geotechnical code enactment and/or improvement.

CODES AND STANDARDS	
• *Department of Public Works and Highways DESIGN GUIDELINES, CRITERIA, and STANDARDS (DGCS)* - *Vol. 1: Introduction* - *Vol. 2A: Geohazard Assessment* - *Vol. 2B: Engineering Surveys* - *Vol. 2C: Geological and Geotechnical Investigation* - *Vol. 3: Water Engineering Projects* - *Vol. 4: Highway Design* - *Vol. 5: Bridge Design* - *Vol. 6: Public Buildings and Other related Structures* • *Bridge Design Standard and Specifications (BSDS)* • *Japan Roadway Association Guide Vols 4 and 5* • *AASHTO LRFD Design Code* • *AASHTO for testing standards* • *The Philippine National Standards of Drinking Water (PNSDW) of 2017* • *National Building Code of the Philippines* • *Philippine National Standards* • *National Structural Code of the Philippines*	• *Institute of Transportation Engineers (USA) Standards* • *Federal Highways Administration (USA) Standards* • *American Society of Civil Engineers Standard* • *American Concrete Institute Code* • *American Institute for Steel Construction* • *American Iron and Steel Institute* • *American National Standard Institute* • *American Society for Testing and Materials Standards* • *Uniform Building Code* • *International Building Code* • *DPWH Philippine Green Building Code* • *DENR Administrative Order (DAO) 2013-22 Revised Procedures and Standards for the Management of Hazardous Wastes* • *DAO 2016-08 Water Quality Guidelines and General Effluent Standards of 2016* • *DAO 2021-19 Updated Water Quality Guidelines (WQG) and General Effluent Standards (GES) for Selected Parameters*



- *Classifies and categorizes Structural Engineers into three (3) levels: Level 6, Level 7, and Level 8*
- *Levels are rated based on character, responsibilities, skills, competence, education, licensure, and experience acquired and achieved throughout the duration of the professional's practice*
- *Level assignment considers the capacity, capability, and qualifications of the Structural Engineer to undertake the most varied, most innovative, and most complex ranges of projects*
- ***LEVELS** determine the eligibility of the professional to perform the tasks of designing structures under various classifications*
- *recommends, depending on the nature of occupancy, complexity, and importance of use of structures, the **LEVEL** of the structural engineering professional to be tasked with providing the full structural engineering design service*

5.0 BUILDING PERMIT APPLICATION PROCESS

Republic of the Philippines
Quezon City
DEPARTMENT OF THE BUILDING OFFICIAL

ONE-STOP SHOP
DOCUMENTARY REQUIREMENTS FOR BUILDING PERMIT

Applicant Name : ccu, ccu — Date of Application : September 17, 2024

Address : diliman Central QUEZON CITY

LEGAL DOCUMENTS

I. Mandatory Documents (1 set fastened in folder)

GENERAL REQUIREMENTS

1. Transfer Certificate of Title, certified true copy in LRA paper

BUILDING PLANS

III. Building Plans at minimum scale 1:100 (signed by the owner, signed & sealed by the professionals) 3 Sets

GENERAL REQUIREMENTS

1. Architectural Plans (with site Development Plan)
2. Cover Sheet (with Vicinity Map and/or Site Development Plan)

OBO

1. Mechanical Plans
2. Sanitary/Plumbing Plans
3. Electrical Plans
4. Electronic Plans
5. Structural Plans

ZAU

1. Geodetic Plan / Lot Plan

BFP

1. Fire Protection Plans

BUILDING PERMIT APPLICATION PROCESS

Application Forms Provided

II. Application Forms Provided (1 set fastened in folder)

GENERAL REQUIREMENTS

1. Unified Application Form
2. Mechanical Permit Application Form
3. Mechanical Permit Application Form for Fire Protection System
4. Sanitary/Plumbing Permit Application Form
5. Electrical Permit Application Form
6. Electronics Permit Application Form

TECHNICAL DOCUMENTS

IV. Supporting Documents (signed & sealed) 1 Set

GENERAL REQUIREMENTS

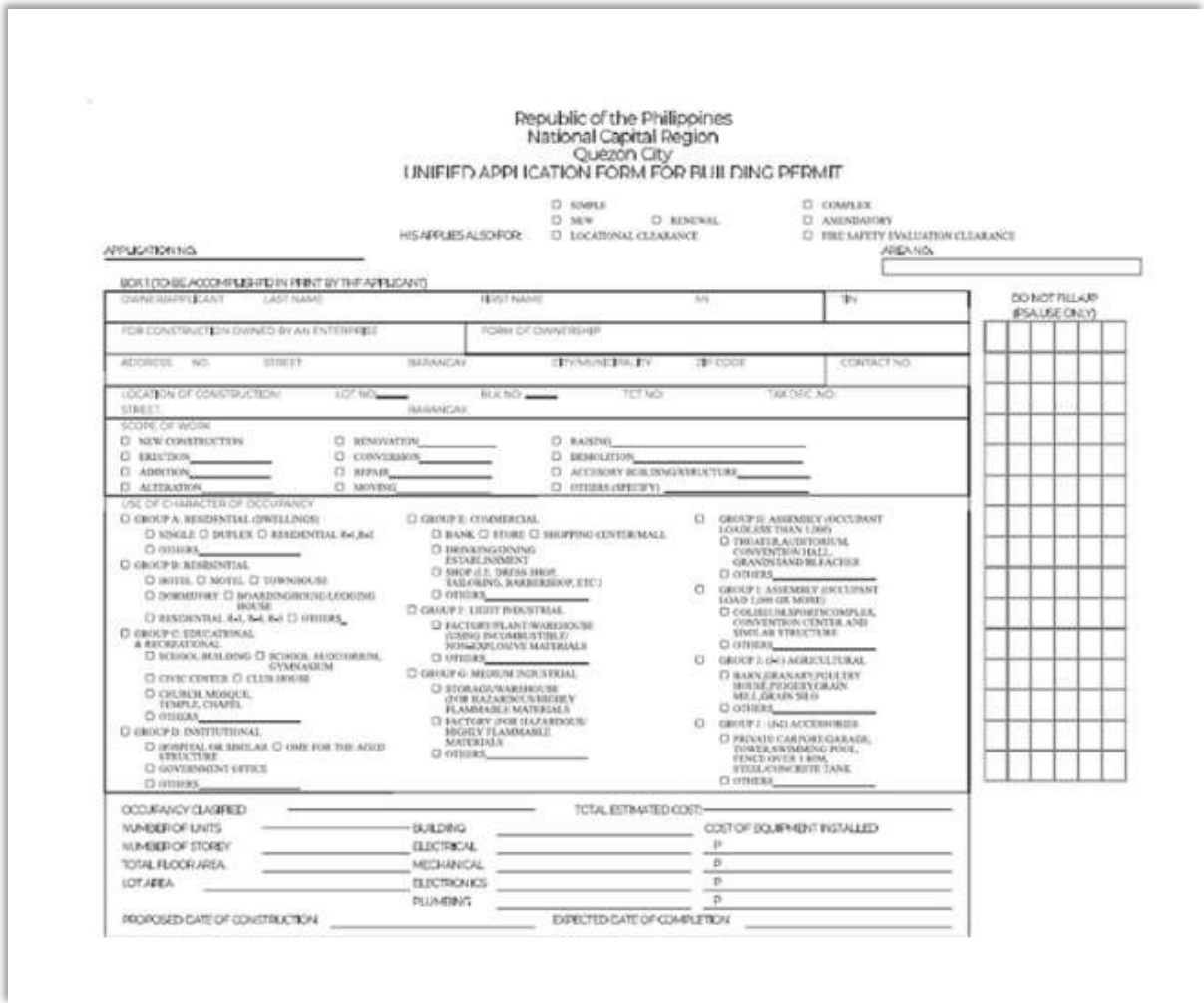
1. Cost Estimate/BOE of Materials
2. Project Specifications
3. Structural Analysis and Design Computation

Question and Answer Summary

1. Applicant's Last Name? Ccu
2. Applicant's First Name? Ccu
3. Applicant's Telephone? 09329721426
4. Form of Ownership? Individual
5. Are you the registered owner of the land? Yes
6. Are you the co-owner? No
7. Type of Activity? NewConstruction
8. Is your property adjacent to waterways? No
9. Is the location of the property adjacent or fronting to highway / major thoroughfare (National Road)? No
10. Is your project location near the fault line? No
11. Are there any installation of mechanical equipments? Yes
12. Are there any sanitary/plumbing installations involved? Yes
13. Are there any electrical installations involved? Yes
14. Are there any electronics installation or works involved? Yes
15. Are there any fire protection equipment installation or works involved? Yes
16. Are there existing/affected structures that will be subjected for demolitions? No
17. Does the project posts health hazards (e.g. cell site towers)? No

****THIS CHECKLIST IS CREATED FROM THE ONLINE GENERATOR****

5.1 UNIFIED APPLICATION FORM FOR BUILDING PERMIT



Republic of the Philippines
National Capital Region
Quezon City
UNIFIED APPLICATION FORM FOR BUILDING PERMIT

☐ SIMPLE ☐ COMPLEX
☐ NEW ☐ RENEWAL ☐ AMENDATORY
HIS APPLIES ALSO FOR: ☐ LOCATIONAL CLEARANCE ☐ FIRE SAFETY EVALUATION CLEARANCE

APPLICATION NO. _____ AREA NO. _____

BOX 1 (TO BE ACCOMPLISHED IN PRINT BY THE APPLICANT)

OWNER/APPLICANT | LAST NAME | FIRST NAME | MI | TIN

FOR CONSTRUCTION OWNED BY AN ENTERPRISE | FORM OF OWNERSHIP

ADDRESS: NO. | STREET | BARANGAY | CITY/MUNICIPALITY | ZIP CODE | CONTACT NO.

LOCATION OF CONSTRUCTION/ LOT NO. ____ BLK NO. ____ TCT NO. | TAX DEC. NO.
STREET | BARANGAY

SCOPE OF WORK
☐ NEW CONSTRUCTION ☐ RENOVATION ☐ RAISING
☐ ERECTION ☐ CONVERSION ☐ DEMOLITION
☐ ADDITION ☐ REPAIR ☐ ACCESSORY BUILDING/STRUCTURE
☐ ALTERATION ☐ MOVING ☐ OTHERS (SPECIFY)

USE OR CHARACTER OF OCCUPANCY
☐ GROUP A: RESIDENTIAL (DWELLINGS)
☐ SINGLE ☐ DUPLEX ☐ RESIDENTIAL 4+1,8+2
☐ OTHERS
☐ GROUP B: RESIDENTIAL
☐ HOTEL ☐ MOTEL ☐ TOWNHOUSE
☐ DORMITORY ☐ BOARDINGHOUSE/LODGING HOUSE
☐ RESIDENTIAL 8+1, 8+4, 8+5 ☐ OTHERS
☐ GROUP C: EDUCATIONAL & RECREATIONAL
☐ SCHOOL BUILDING ☐ SCHOOL AUDITORIUM, GYMNASIUM
☐ CIVIC CENTER ☐ CLUB HOUSE
☐ CHURCH, MOSQUE, TEMPLE, CHAPEL
☐ OTHERS
☐ GROUP D: INSTITUTIONAL
☐ HOSPITAL OR SIMILAR ☐ ONE FOR THE AGED STRUCTURE
☐ GOVERNMENT OFFICE
☐ OTHERS
☐ GROUP E: COMMERCIAL
☐ BANK ☐ STORE ☐ SHOPPING CENTER/MALL
☐ DRINKING/DINING ESTABLISHMENT
☐ SHOP (I.E. DRESS SHOP, TAILORING, BARBERSHOP, ETC.)
☐ OTHERS
☐ GROUP F: LIGHT INDUSTRIAL
☐ FACTORY/PLANT/WAREHOUSE (USING INCOMBUSTIBLE/ NONEXPLOSIVE MATERIALS
☐ OTHERS
☐ GROUP G: MEDIUM INDUSTRIAL
☐ STORAGE/WAREHOUSE (FOR HAZARDOUS/HIGHLY FLAMMABLE MATERIALS
☐ FACTORY (FOR HAZARDOUS/ HIGHLY FLAMMABLE MATERIALS
☐ OTHERS
☐ GROUP H: ASSEMBLY (OCCUPANT LOAD LESS THAN 1,000)
☐ THEATER, AUDITORIUM, CONVENTION HALL, GRANDSTAND/BLEACHER
☐ OTHERS
☐ GROUP I: ASSEMBLY (OCCUPANT LOAD 1,000 OR MORE)
☐ COLISEUM/SPORTS COMPLEX, CONVENTION CENTER AND SIMILAR STRUCTURE
☐ OTHERS
☐ GROUP J: (J-1) AGRICULTURAL
☐ BARN/GRANARY/POULTRY HOUSE/PIGGERY/GRAIN MILL/GRAIN SILO
☐ OTHERS
☐ GROUP J: (J-2) ACCESSORIES
☐ PRIVATE CARPORT/GARAGE, TOWER/SWIMMING POOL, FENCE OVER 1.80M, STEEL/CONCRETE TANK
☐ OTHERS

DO NOT FILL-UP (BFP/LGU USE ONLY)

OCCUPANCY CLASSIFIED _____ TOTAL ESTIMATED COST: _____
NUMBER OF UNITS _____ BUILDING _____ COST OF EQUIPMENT INSTALLED
NUMBER OF STOREY _____ ELECTRICAL _____ P _____
TOTAL FLOOR AREA _____ MECHANICAL _____ P _____
LOT AREA _____ ELECTRONICS _____ P _____
PLUMBING _____ P _____
PROPOSED DATE OF CONSTRUCTION _____ EXPECTED DATE OF COMPLETION _____

BOX 2

FULL-TIME INSPECTOR AND SUPERVISOR OF CONSTRUCTION/WORKS (REPRESENTING THE OWNER)

Address

_____
ARCHITECT OR CIVIL ENGINEER
Signed and Sealed Over Printed Name
Date _____

PTR NO:	Validity:
PRC NO:	Date Issued:
Issued at:	TIN

BOX 3

APPLICANT:
_____ Date _____
(Signature Over Printed Name)

Address

Govt. Issued ID No. | Date Issued | Place Issued

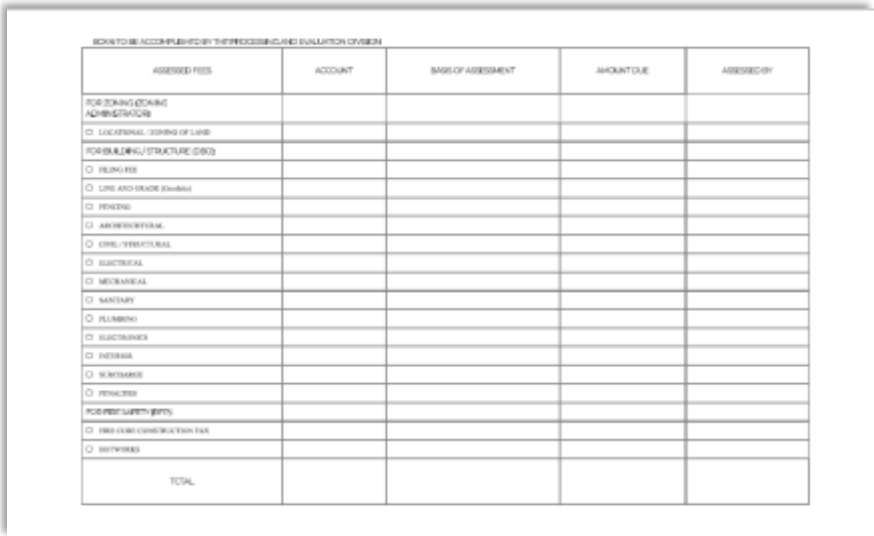
BOX 4

WITH MY CONSENT: LOT OWNER / AUTHORIZED REPRESENTATIVE
_____ Date _____
(Signature Over Printed Name)

Address

Govt. Issued ID No. | Date Issued | Place Issued

UNIFIED APPLICATION FORM FOR BUILDING PERMIT

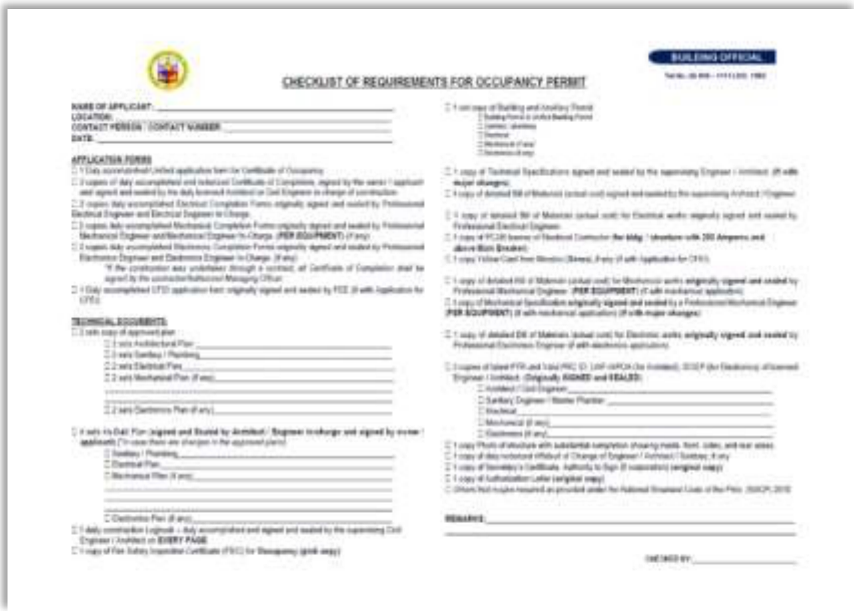


BOXES TO BE ACCOMPLISHED BY THE PROCESSING AND EVALUATION DIVISION

ASSESSED FEES	ACCOUNT	BASIS OF ASSESSMENT	AMOUNT DUE	ASSESSED BY
FOR ZONING (ZONING ADMINISTRATOR)				
☐ LOCATIONAL / ZONING OF LAND				
FOR BUILDING / STRUCTURE (DBO)				
☐ FILING FEE				
☐ LINE AND GRADE (Geodetic)				
☐ FENCING				
☐ ARCHITECTURAL				
☐ CIVIL / STRUCTURAL				
☐ ELECTRICAL				
☐ MECHANICAL				
☐ SANITARY				
☐ PLUMBING				
☐ ELECTRONICS				
☐ INTEREST				
☐ SURCHARGE				
☐ PENALTIES				
FOR FIRE SAFETY (BFP)				
☐ FIRE CODE CONSTRUCTION TAX				
☐ HOTWORKS				
TOTAL				

UNIFIED APPLICATION FORM FOR BUILDING PERMIT

5.2 CHECKLIST OF REQUIREMENTS FOR OCCUPANCY PERMIT



BUILDING OFFICIAL

CHECKLIST OF REQUIREMENTS FOR OCCUPANCY PERMIT

NAME OF APPLICANT: ______

LOCATION: ______

CONTACT PERSON / CONTACT NUMBER: ______

DATE: ______

APPLICATION FORMS

5.3 CHECKLIST OF REQUIREMENTS FOR BUILDING PERMIT WITH PREVIOUSLY ISSUED OCCUPANCY PERMIT

BUILDING OFFICIAL

Tel.No. (0) 845 – 1111 LOC. 1982

CHECKLIST OF REQUIREMENTS FOR BUILDING PERMIT

(FIT-OUT WITHIN A MALL OR COMMERCIAL BUILDING WITH PREVIOUSLY ISSUED OCCUPANCY PERMIT)

NAME OF APPLICANT: _____
LOCATION: _____
DATE: _____
CONTACT PERSON / CONTACT NUMBER: _____

TECHNICAL DOCUMENTS:
☐ 1 set duly accomplished application forms completely and properly filled-out –
☐ 4 copies Unified Building Permit (notarized) _____
☐ 4 copies Sanitary / Plumbing Permit (if applicable) _____
☐ 4 sets of complete plan with key plan, location map and vicinity map duly signed and sealed by a licensed Engineer and Architect and signed by the owner / applicant.
☐ 1 copy of Bill of materials signed and sealed by an Engineer / Architect.
☐ 1 set Material Specification signed and sealed by an Engineer / Architect.
☐ 1 copy of latest PTR and Valid PRC ID and IAP / IAPOA (for Architect) of Licensed Engineers / Architect. **(Originally SIGNED and SEALED)**
☐ Architect / Civil Engineer _____
☐ Sanitary Engineer / Master Plumber (if applicable) _____

REMARKS: _____

CLEARANCES / CERTIFICATION:
☐ 1 copy of Fire Safety Evaluation Clearance (FSEC) **(blue copy)** with checklist
☐ 1 copy of DOLE Clearance
☐ 1 copy CEDULA (Residence Certificate) **(Xerox copy)**
☐ 1 copy Barangay Clearance for Renovation **(Original copy)**
☐ 1 copy of Secretary's Certificate, Authority to Sign (if corporation) **(original copy)**
☐ 1 copy of Authorization Letter **(original copy)**
☐ 1 copy of Occupancy Permit of Building **(Xerox only)**
REMARKS: _____

PROOF OF OWNERSHIP
☐ 1 copy of Certified True Copy of Condominium Title covering the subject unit - within the **last 4 MONTHS**
If in case the applicant is not the registered owner of the said unit, in addition to Condominium Title, the following documents must be attached whichever is applicable:
☐ *1 copy of duly notarized Deed of Absolute Sale*
☐ *1 copy duly notarized affidavit of consent from the Unit Owner*

☐ 1 copy of Tax Declaration of the Unit **(Certified true copy)**
☐ 1 copy of latest Tax Receipt of the Unit **(Xerox)**
☐ 1 copy of Lease Contract (if leased) **(Xerox)**

REMARKS:
_____

CHECKED BY: _____

5.4 ENVIRONMENTAL REGULATIONS

The Environmental Management Bureau of the Department of Environment and Natural Resources (DENR-EMB) is mandated to implement on a nationwide scale the six (6) major environmental laws:

- PD 1586 (Environmental Impact Statement System)
- RA 9003 (Ecological Solid Waste Management Act of 2000)
- RA 11898 (Extended Producer Responsibility Act of 2022) – amended the RA 9003 to incorporate EPR on plastic packaging
- RA 6969 (Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990)
- RA 9275 (Philippine Clean Water Act of 2004)
- RA 8749 (Clean Air Act of 1999)
- RA 9512 (Environmental Awareness and Education Act of 2008)

Environmental Impact Assessment (EIA)

A process that involves predicting and evaluating the likely impacts of a project (including cumulative impacts) on the environment during construction, commissioning, operation and abandonment. It also includes designing appropriate preventive, mitigating and enhancement measures addressing these consequences to protect the environment and the community's welfare. (Source: PD 1586)

6.0 ENVIRONMENTAL IMPACT ASSESSMENT (EIA)FLOWCHART PROCESS

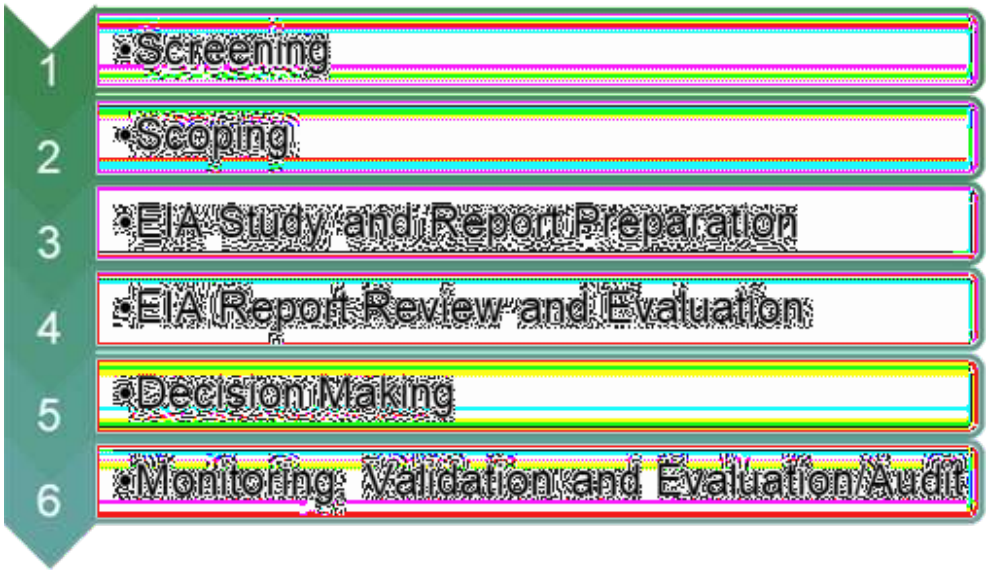
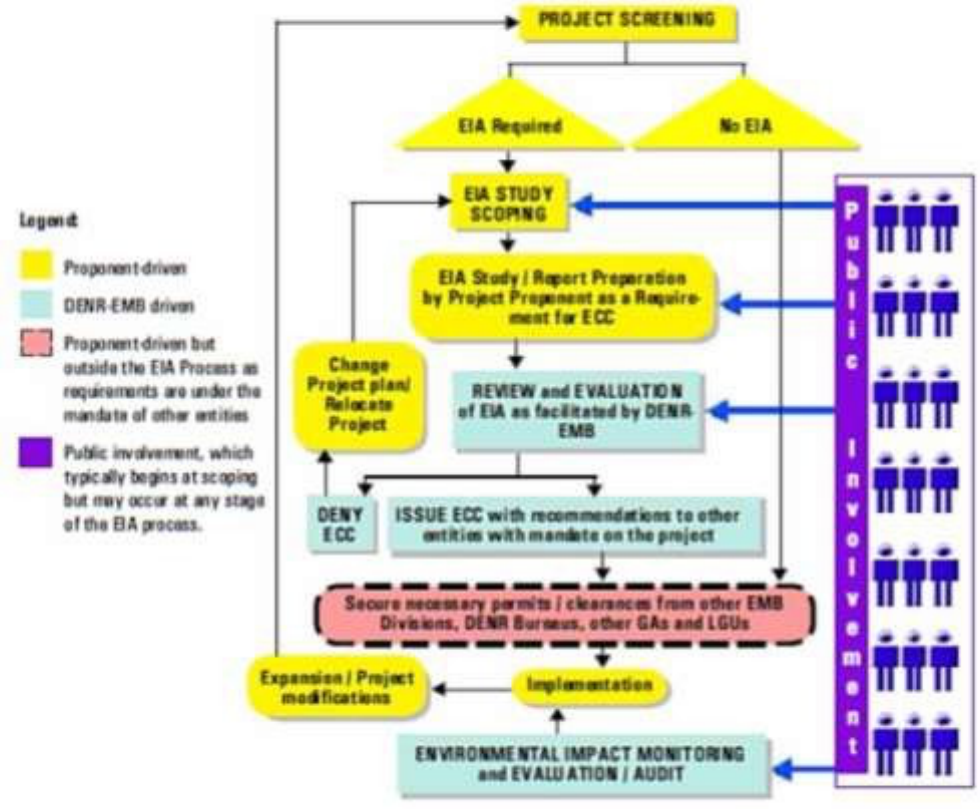


Figure 1. Screening Procedure and Community Participation in Environmental Impact Assessment



Source: Initiatives to Streaming the PEISS: A Brief Guide for LGUs. 2007. Environmental Management Bureau

7.0 CONSTRUCTION LICENSING

- *Presidential Decree No. 1746 (November 28, 1980) created the **CONSTRUCTION INDUSTRY AUTHORITY OF THE PHILIPPINES (CIAP)** to promote, accelerate, and regulate the growth and development of the construction industry in conformity with national goals.*

- *One of CIAP's Implementing Boards is the **PHILIPPINE CONTRACTORS ACCREDITATION BOARD (PCAB)**.*

7.1 PCAB'S MANDATE

To Issue, Suspend or Revoke Contractors License

Purpose:
- *To ensure, for the safety of the public, that only qualified and reliable contractors are allowed to undertake construction in the country*
- *To promote, for the benefit of the public and private sectors and for the national interest, the orderly growth of the contracting sector and the upgrading of construction capability*

7.2 SUBJECT OF THE CONTRACTOR'S LICENSE

Construction Contractor
- Undertakes or offers to undertake or purports to have the capacity to undertake, or submits a bid to, or does himself or by through others
- Construct, alter, repair, add to, subtract from, improve, move, wreck or demolish any building, highway, road, railroad, excavation or other structure, projects, development or improvement, or any part thereof, including erection of scaffolding or other structures or works in connection therewith.

Note: The term "contractor" is synonymous with the term "builder". A contractor may be an individual, firm, partnership, corporations, association or other organization or any combination thereof. It includes the principal contractor, subcontractor and specialty contractor.

7.3 LICENSE RENEWAL

Section 38 (RA 11711)
- *Not earlier than ninety (90) Days but not later than thirty (30) before the expiration of the license*
  - ✓ *Below 10 years – Valid for 1 year from date of Issuance*
  - ✓ *10 years–24 years – Valid for 2 years from date of Issuance*
  - ✓ *25 years and above – Valid for 3 years from date of Issuance*

Types of Licenses

1. *Regular License*
   - *Proprietorship*
   - *Corporation / Partnership /One Person Corporation (OPC) Min. Filipino equity of 60 %; Max. Foreign equity of 40%*

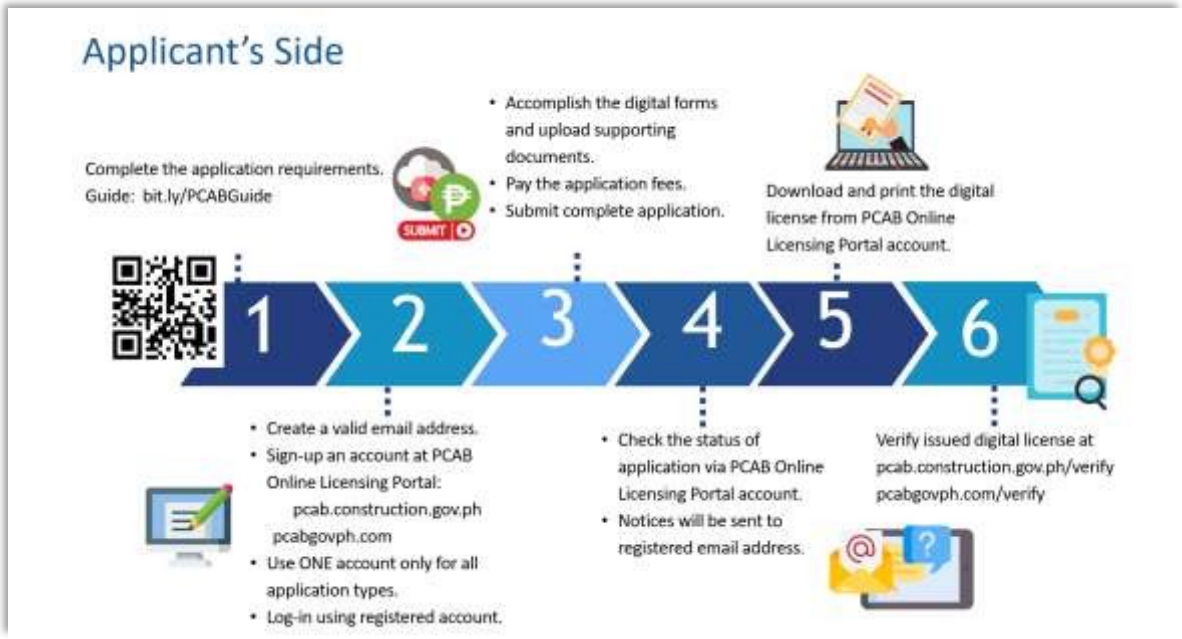
   1.1 Regular License with Annotation (AAAA)
   - *Proprietorship*
   - *Corporation / Partnership / One Person Corporation (OPC)*
   - *No minimum Filipino equity*

   1.2 Pakyaw License
   - *Proprietorship*

2. *Special License*
    - *Foreign Contractor*
    - *Joint Venture*
    - *Consortium*
    - *Project Owner*

7.4 LICENSE & REGISTRATION CRITERIA

1. ***Managerial Qualification*** *- The Authorized Managing Officer (AMO) shall meet minimum experience requirement; nominated by the firm and possessing managerial powers*
2. ***Financial Qualification*** *- Shall meet the minimum networth requirement of the applied category*
3. ***Technical Qualification -*** *Employment of regular and full-time Sustaining Technical Employee(s) or STEs with adequate relevant experience in applied classifications and category*
4. ***Over-all Credit Points*** *- Meets the minimum technical, financial & overall credit points of the applied category*
5. ***Integrity*** *- Compliance to other statutory requirements*



7.5 TECHNOLOGY AND INNOVATION: DIGITAL TRANSFORMATION
OVERVIEW OF EMERGING TECHNOLOGIES IN CIVIL ENGINEERING

Geotechnical Engineering

- *Conduct of SPT Hammer Energy Calibration.*
- *Conduct of Downhole Shear Wave Tests (DSWT)*
- *Routine conduct of pile testing for deep foundations, including bi-directional (static) testing*

Structural Engineering

- *Seismic Base Isolation*
- *Smart Technology*

8.0 CONTINUING PROFESSIONAL DEVELOPMENT

Continuing Professional Development (CPD)
As part of the CPD and to attain the objectives of the Career Progression and Specialization Program, PICE conducts technical sessions in all the seven (7) fields of specialization during regional and national conventions and technical conferences.

Philippine Institute of Civil Engineers, Inc.
Technical Conferences

The Regional Technical Conferences (RTCs) are conducted in all 17 regions in the Philippines (Region 1, 2, 3, 4A, 4B, 5, 6, 7, 8, 9, 10, 11, 12, 13, NCR, CAR, and BARMM) and 1 international region. It is conducted by the various national and international chapters of PICE.

The Conference includes topics related to the seven (7) specializations of CE and 4 other topics related to Ethics, Disaster Risk Reduction, Gender and Development, and Career Progression and Specialization.

During PICE's 50th National Convention and Technical Conference, scheduled on October 29-31, 2024, the participating civil engineer can choose the technical session track that he wants to attend.

SPECIAL LECTURE 1 Road Pavement Technology (Reclaimed Asphalt Pavement) Author and Presenter: **DR. TOSHIAKI HIRATO,** Managing Director, Technical Research Institute, TOA Road Corporation
SPECIAL LECTURE 2 Cutting-Edge Technologies in the Operations & Maintenance (O&M) of Tunnels in Japan Author and Presenter: **MR. YU KOIZUMI,** Senior Researcher, Public Works Research Institute, National Research and Development Agency (Japan)
SPECIAL LECTURE 3 Introducing the Integrated Management System for Cable-Supported Sea-Crossing Bridges Author and Presenter: **MR. YANG KIJAE,** Project Manager, Korea Authority of Land & Infrastructure Safety (KALIS)
SPECIAL LECTURE 4 Detailed Engineering Design (DED) of the Cebu-Mactan (4th) Bridge and Coastal Road Construction Project Author and Presenter: **DR. HARUKAZU OHASHI,** Project Manager, Oriental Consultants Global
SPECIAL LECTURE 5 Japanese SMART Construction Technology for Infrastructure using Artificial Intelligence (AI) Author and Presenter: **MR. DAISUKE TAJIRI,** CEO, DataLabs Inc.
SPECIAL LECTURE 6 Technologies for Railway Infrastructures (The Shinkansen) Author and Presenter: **DR. HITOSHI ASAMI,** Senior Director for International Affairs Department, Japan Railway Construction Transport and Technology Agency
SPECIAL LECTURE 7 Case Study on Countermeasures for Slope Protection Applying Unique Japanese Technology Author and Presenter: **MR. RYO NAKANO,** Chief Representative, Manila Representative Office, Nittoc Construction Co. Ltd.
SPECIAL LECTURE 8 Ground Convergence and Settlement during Tunnel Construction of Davao City Bypass Author and Presenter: **MR. WAKO NOTO,** Resident Engineer, Katahira & Engineers International / Nippon Engineering Consultants Co. Ltd. (JV)

TECHNICAL SESSION - TRACK A	TECHNICAL SESSION - TRACK B	TECHNICAL SESSION - TRACK C
WATER ENGINEERING SPECIALTY DIVISION (WE) **Moderator: DR. DOLORES CLEOFAS,** Member, Water Engineering Specialty Division	**STRUCTURAL ENGINEERING SPECIALTY DIVISION (STE)** **Moderator: ENGR. JUANITO D. CUNANAN,** Chair, Structural Engineering Specialty Division	**PROJECT MANAGEMENT AND CONSTRUCTION ENGINEERING SPECIALTY DIVISION (PMCE)** **Moderator: DR. JOSEPHINE M. LIMETA,** Vice Chair, Project Management and Construction Engineering Specialty Division
Topic 1: Proposed LID Sensitive Building and Land Use Policies for Towns and Cities in the Philippines Authors: ENGR. RONALD L. ORALE AND ENGR. DORIS B. MONTECASTRO Presenter: **ENGR. RONALD L. ORALE,** Professor, Civil Engineering and Technology Management, Samar State University, Samar	Topic 1: Development of an Image-Based Severe Wind & Storm Surge Damage Assessment Framework for Lowrise Masonry Houses Authors: ENGR. MARIA ERICA P. GOMEZ, ENGR. LIEZL RAISSA E. TAN, AND ENGR. IMEE BREN O. VILLALBA Presenter: **ENGR. MARIA ERICA P. GOMEZ,** Research Engineer, University of the Philippines Diliman Institute of Civil Engineering	Topic 1: Applicability of Unmanned Aerial Vehicle (UAV) Technology in the Civil Infrastructure Industry: A Construction Phase Study for Cavite-Laguna Expressway (CALAx) Project - Cavite Segment Authors: ENGR. REXTER B. RETANA AND ENGR. MARIO I. DUMANGAS JR. Presenter: **ENGR. MARIO I. DUMANGAS, JR.** Engineering Manager, Leighton Contractors (Asia) Limited
CIVIL ENGINEERING EDUCATION SPECIALTY DIVISION (CEEd) **Moderator: DR. BENITO M. PACHECO**, Chair, Civil Engineering Education Specialty Division	**GEOTECHNICAL ENGINEERING SPECIALTY** **Moderator: DR. MARK ALBERT H. ZARCO,** Chair, Geotechnical Engineering Specialty Division	**ENVIRONMENTAL AND ENERGY ENGINEERING SPECIALTY DIVISION (EEE)** **Moderator: DR. MARIA ANTONIA N. TANCHULING**, Chair, Environmental and Energy Engineering Specialty Division
Topic 2: Introduction in Civil Engineering Education of Lessons Learned from Historical Failures of Suspension Bridges Worldwide Authors: ENGR. MICHIO SAITOH AND ENGR. NOZOMU TANIGUCHI Presenter: **MR. MICHIO SAITOH,** Bansei Gakkan Co.,Ltd., Shima City, Japan	Topic 2: The Importance of Unimpeded Concrete Overflow in Bored Piles Authors: ENGR. RICHARD C. TAN, ENGR. JUSTIN EDWARD TAN, DR. SUNSHINE PETAL TAN, ENGR. MAUREEN MACAPINLAC, AND DR. MARK ALBERT ZARCO Presenter: **ENGR. RICHARD C. TAN,** Geotechnical and Pile Testing Consultant	Topic 2: Environmental Sustainability Assessment of Utilizing Fly Ash and Slag in Mass Concrete Using Endpoint Impact Analysis: Impacts of Import and Long-distance Land Transport Authors: ENGR. CHRISTIAN R. OROZCO, ENGR. SANDHYA BABEL, ENGR. SOMNUK TANGTERMSIRIKUL, AND ENGR. TAKAFUMI SUGIYAMA Presenter: **ENGR. CHRISTIAN R. OROZCO,** Assistant Professor, Institute of Civil Engineering, University of The Philippines Diliman
GEOTECHNICAL ENGINEERING SPECIALTY DIVISION (GTE) **Moderator: DR. MARK ALBERT H. ZARCO,** Chair, Geotechnical Engineering Specialty Division	**PROJECT MANAGEMENT AND CONSTRUCTION ENGINEERING SPECIALTY DIVISION (PMCE)** **Moderator: ENGR. EDUARDO B. LERON, JR.,** Member, Project Management and Construction Engineering Specialty Division	**TRANSPORTATION ENGINEERING SPECIALTY DEIVISION (TRE)** **Moderator: DR. ALEXIS M. FILLONE,** Chair, Transportation Engineering Specialty Division
Topic 3: Causation Events: Sheet Pile Wall Installation in Singapore Author and Presenter: **ENGR. ALFONSO R. SINCIOCO, JR.** Senior Resident Engineer and Closed Out Manager	Topic 3: Applications of Digital Construction Management Authors: DR. FLORENCIO F. PADERNAL, ENGR. EDUARDO B. LERON, JR. AND ENGR. DANIA H. BUKLASAN Presenter: **ENGR. DANIA H. BUKLASAN,** Associate Civil Engineer, Test Consultants Inc.	Topic 3: Modeling Route Choice for Road Freight Transport in Bataan: A Socio-Demographic and Trip-Based Analysis of Toll Road Utilization Authors: ENGR. MARYROSE M. VALLEJOS AND DR. ALEXIS M. FILLONE Presenter: **ENGR. MARYROSE M. VALLEJOS**, Assistant Professor, Bataan Peninsula State University and Phd Candidate, De La Salle University, DOST-ERDT Scholar

PROJECT MANAGEMENT AND CONSTRUCTION ENGINEERING SPECIALTY DIVISION (PMCE) **Moderator: DR. JOSEPHINE M. LIMETA,** Vice Chair, Project Management and Construction Engineering Specialty Division	**ENVIRONMENTAL AND ENERGY ENGINEERING SPECIALTY DIVISION (EEE)** **Moderator: DR. MARIA ANTONIA N. TANCHULING,** Chair, Environmental and Energy Engineering Specialty Division	**CIVIL ENGINEERING EDUCATION SPECIALTY DIVISION (CEE)** **Moderator: DR. BENITO M. PACHECO,** Chair, Civil Engineering Education Specialty Division
Topic 4: Management and Practice of Hong Kong-Zhuhai-Macau Bridge Project Author & Presenter: **MR. XIE HONGBING,** China Railway Major Bridge Engineering Group Co. Ltd.	Topic 4: Use of LCA to Evaluate Sustainability of Construction Materials for Residential Buildings in the Philippines Author and Presenter: **ENGR. RALPH ALDEN B. MANZANO,** Environmental Management Specialist	Topic 4: Bridging the Gap: Barriers to Research Collaboration between Civil Engineering Practitioners and Academia Authors: ENGR. JEROME JORDAN F. FAMADICO AND ENGR. FLORANTE D. POSO, JR. Presenter: **ENGR. JEROME JORDAN F. FAMADICO,** Adamson University, Manila, Philippines
STRUCTURAL ENGINEERING SPECIALTY DIVISION (STE) **Moderator: ENGR. JUANITO D. CUNANAN,** Chair, Structural Engineering Specialty Division	**TRANSPORTATION ENGINEERING SPECIALTY DIVISION (TRE)** **Moderator: DR. ALEXIS M. FILLONE,** Chair, Transportation Engineering Specialty Division	**WATER ENGINEERING SPECIALTY DIVISION (WE)** **Moderator: ENGR. NOEL M. ORTIGAS,** Vice Chair, Water Engineering Specialty Division
Topic 5: Biomimetics: Reinforced Concrete Column Design Inspired by the Lattice Pattern of Euplectella aspergillum (Venus Flower Basket) Authors: ENGR. KENNETH CARL R. MILLEZA, ENGR. JOEMAR V. SEROT, ENGR. MA. CHRYSLER D. CORDOVA, ENGR. NIXON P. SALANAP Presenter: **ENGR. KENNETH CARL R. MILLEZA,** Project In-Charge, Enecon Ph	Topic 5: Evaluation of Structural Condition of Roxas Boulevard Using Backcalculation Method Authors: ENGR. STEPHANIE JOY B. CARAG, ENGR. LORENZO R. TESORO, AND ENGR. LEA B. BRONUELA-AMBROCIO Presenter: **ENGR. STEPHANIE JOY B. CARAG,** Teaching Associate, University of the Philippines Diliman	Topic 5: "Detention Tanks for a Changing Climate: Singapore's Success and its Global Adaptability" Author and Presenter: **ENGR. JUNIFER P. OMANITO,** Project Manager, CPC Construction Pte Ltd., Singapore
TRANSPORTATION ENGINEERING SPECIALTY DIVISION (TRE) **Moderator: DR. ALEXIS M. FILLONE,** Chair, Transportation Engineering Specialty Division	**WATER ENGINEERING SPECIALTY DIVISION (WE)** **Moderator: DR. DOLORES CLEOFAS,** Member, Water Engineering Specialty Division	**STRUCTURAL ENGINEERING SPECIALTY DIVISION (STE)** **Moderator: ENGR. JUANITO D. CUNANAN,** Chair, Structural Engineering Specialty Division
Topic 6: Aerial Ropeway Transit (ART) as a mode of mass transport in highly urbanized Philippine cities Authors: ENGR. FORTUNATO O. SANCHEZ JR AND ENGR. KIM R. SANCHEZ Presenter: **ENGR. FORTUNATO O. SANCHEZ, JR.** Sales Representative, Doppelmayr SRO Philippines	Topic 6: Machine Learning-based Sensitivity Analysis of Groundwater Vulnerability Parameters using the DRASTIC Method and Garson's Algorithm Author and Presenter: **DR. KEVIN LAWRENCE M. DE JESUS,** Chair, Education and Student Affairs, PICE - North Metro Manila Chapter	Topic 6: Development of Bridge Maintenance Support Tool by XR Technology Authors: ENGR MOHAMMAD ALI T. TABAO AND ENGR. MASAYUKI TAI Presenter: **ENGR MOHAMMAD ALI T. TABAO**, Department of Public Works and Highways (DPWH) – Zamboanga Sibugay 2nd District Engineering Office, Region IX.
ENVIRONMENTAL AND ENERGY ENGINEERING SPECIALTY DIVISION (EEE) **Moderator: DR. MARIA ANTONIA N. TANCHULING**, Chair, Environmental and Energy Engineering Specialty Division	**CIVIL ENGINEERING EDUCATION SPECIALTY DIVISION (CEE)** **Moderator: DR. BENITO M. PACHECO,** Chair, Civil Engineering Education Specialty Division	**GEOTECHNICAL ENGINEERING SPECIALTY DIVISION (GTE)** **Moderator: DR. MARK ALBERT H. ZARCO,** Chair, Geotechnical Engineering Specialty Division
Topic 7: GIS-Based Analytic Hierarchy Process (AHP) for Solar Power Suitability Analysis Authors: DR. CRIS EDWARD F. MONJARDIN, ENGR. JEROME G. GACU, ENGR. EDDIE G. FETALVERO, AND ENGR. MERIAN P. CATAJAY-MANI Presenter: **DR. CRIS EDWARD F. MONJARDIN,** School of Civil, Environmental, and Geological Engineering, Mapua University, Manila Philippines	Topic 7: Investigation of LMS Activity Indicators as Predictors of Students' Final Grades in an Online Undergraduate Civil Engineering Course Authors: ENGR. JESSICA M. JUNIO-JIMENEZ, ENGR. MAXELL P. LUMBERA, ENGR. MATTHEW TRAVIS M. ALCANTARA, ENGR. JUSTIN JESSE L. SERANILLA, AND ENGR. JOHN PAUL T. DACANAY Presenter: **ENGR. JESSICA M. JUNIO-JIMENEZ,** Assistant Professor, Institute of Civil Engineering, University of the Philippines Diliman	Topic 7: Advancing Geotechnical Investigation Accuracy: SPT Energy Calibration and Advanced Borehole Logging Technologies (HRAT and Hi-OpTV) Authors: ENGR. MARC ARTHUR GO, ENGR. LESTELLE V. TORIO-KAIMO, AND ENGR. REUEL CORSINO JR. Presenter: **ENGR. MARC ARTHUR Z. GO,** Vice President, Geotechnics Philippines, Inc., and Director - Council of Engineering Consultants of the Philippines (CECOPHIL) Future Leaders Group (FLG)

9.0 SUPPORT AND RESOURCES

PICE VCAMP

- *PICE is currently developing an online resource and training platform for members, the PICE Virtual Coaching, Advising, and Mentoring Program (VCAMP).*
- *Online courses will be available to PICE members. While still under final development, the midyear and national convention and regional technical conferences when uploaded in this platform, for those members, who attended, they can rewatch their chosen conference.*

PICE Journal

- *PICE publications are also available for download in the website.*
- *Lectures presented during the midyear and national conventions are screened and reviewed.*
- *Selected presentations will undergo an open review before being published in the PICE Journal.*

For Students

- *The PICE Virtual Internship of Students via Mentoring or Apprenticeship (VISMA) program is an alternative learning activity and a substitute to the conventional practicum or OJT course in the civil engineering curriculum during the time of pandemic. PICE VISMA Program is expanded to include other learning activities that can be extended to the graduating civil engineering students such as but not limited to practicum, OJT, capstone design project, advising on research projects, etc.*
- *The PICE VISMA program which is currently on hold will be revived after some modifications.*

10.0 OVERALL STATISTICS FOR THE VARIOUS PROFESSIONS UNDER THE ENGINEERING CLUSTERS

As of December 2024

NO.	PROFESSION	REGISTERED	WITH VALID PROFESSIONAL IDENTIFICATION CARD
1	AERONAUTICAL ENGINEER	3,224	1,736
2	AGRICULTURAL AND BIOSYSTEMS ENGINEER	12,889	6,591
3	CERTIFIED PLANT MECHANIC	10,859	870
4	CHEMICAL ENGINEER	38,341	12,615
5	CIVIL ENGINEER	214,975	143,534
6	ELECTRONICS ENGINEER	58,656	21,083
7	ELECTRONICS TECHNICIAN	29,311	9,090
8	GEODETIC ENGINEER	13,290	7,503
9	MECHANICAL ENGINEER	126,502	55,926
10	METALLURGICAL ENGINEER	1,377	589
11	MINING ENGINEER	5,165	2,571
12	PROFESSIONAL ELECTRICAL ENGINEER	5,404	2,951
13	PROFESSIONAL ELECTRONICS ENGINEER	1,587	1,272
14	PROFESSIONAL MECHANICAL ENGINEER	6,400	2,966
15	REGISTERED ELECTRICAL ENGINEER	93,381	51,959
16	REGISTERED MASTER ELECTRICIAN	64,081	23,889
17	SANITARY ENGINEER	4,557	2,874
TOTAL		**689,999**	**348,019**

Today's civil engineers will need to transform themselves to meet the challenges of tomorrow. They must stay abreast of changing technologies, market trends, and business developments. Civil engineers need to develop and implement new methods and products that are sustainable and sensitive to the environment. Moreover, they must cultivate the new technologies, direct the market, and develop new business practices to lead the transformation into tomorrow. (ASCE Summit).

PANGUIL BAY BRIDGE PROJECT: A CASE STUDY

EMIL K. SADAIN
FLORENCIO F. PADERNAL

INTRODUCTION

The present mode of transportation within the PANGUIL Bay is through Ferry Service. The Bay has a total length of about 41 kilometers. To cross the Bay via ferry service from Tangub City in MISAMIS Occidental to Tubod in LANAO del NORTE and vice versa will take around 2 hours and 30 minutes each way.

With the operation of the PANGUIL Bay Bridge Project (Project), travel time through roll-on, roll-off (RORO) vessels will be reduced to 7 minutes. PANGUIL Bay Bridge is the longest bridge in Mindanao with a length of 3.17 kilometers. This landmark infrastructure project connects the city of Tangub and the municipality of Tubod.

Presented in the Figure 1 is the Bridge Location Map.

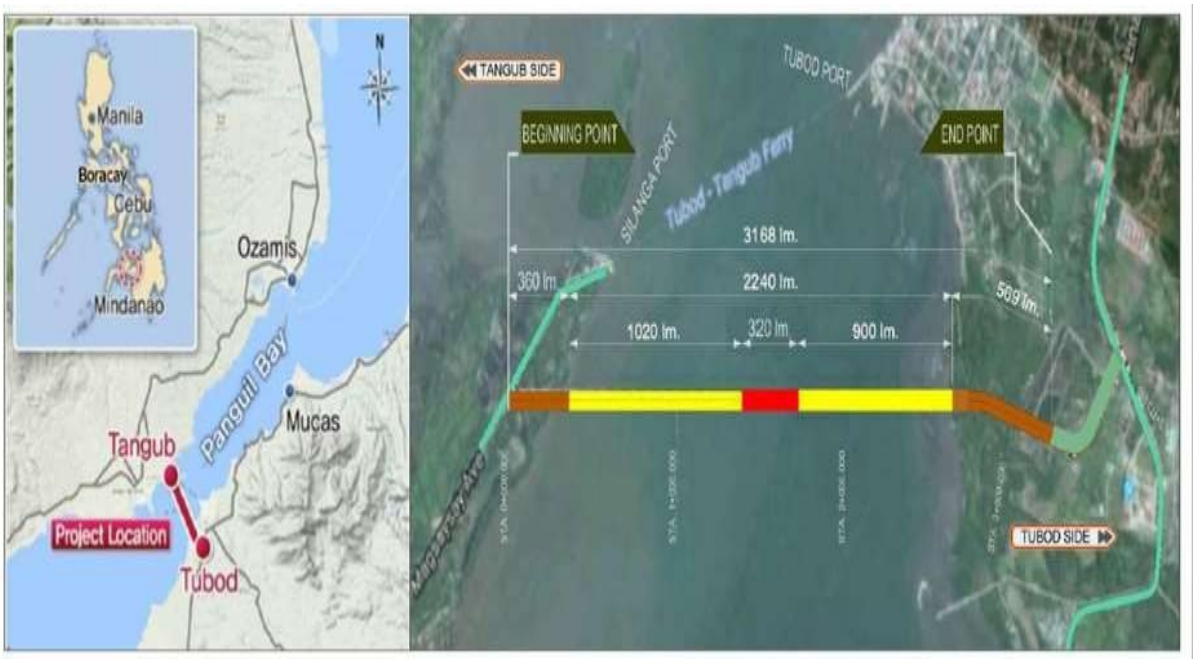


Figure 1. BRIDGE LOCATION MAP

Construction of the bridge commenced during the Covid pandemic period in February 2020 and completed in October 2024.

The total project cost is ₱8.026 Billion financed through a ₱ 5.098 Billion loan from the KOREA Export- Import Bank for Economic Development Cooperation Fund (KEDCF) and the Philippine government's counterpart funds amounting to ₱ 2.928 Billion.

PROJECT DESCRIPTION

This Project is comprised of the following major components:

- 360 meters approach road (Tangub side)
- 1, 020 meters approached bridge (Tangub side)
- 569 meters approach road
- 900 meters approached bridge (Tubod side)
- 320 meters center span of the main bridge
- 2 pylons anchored by 6 cable stays
- 2 observatory bays positioned on both sides of Tangub and Tubod
- Deck slab
- Metal guardrails
- Ancillary structures
- Electrical lighting system
- Aesthetic Lighting System at Pylons
- Road signages

The perspective View of the Panguil Bay Bridge is shown in the Figure 2.

Figure 2. PERSPECTIVE VIEW OF THE PANGUIL BAY BRIDGE

PROJECT PREPARATION STAGE

The conceptualization of the Panguil Bay Bridge Project started way back in 1998 with a Pre-Feasibility Study, setting the foundation for a transformative infrastructure project that would link the provinces of Lanao Del Norte and Misamis Occidental in Northern Mindanao.

In March 2003, a comprehensive Feasibility Study was completed that address crucial aspects such as engineering requirements, environmental impact, and socio-economic benefits.

In March 2004, a detailed project evaluation report was crafted that highlighted the potential of the bridge project to facilitate transformation and trade not only between the provinces of Lanao Del Norte and Misamis Occidental but also the entire Northern Mindanao and Southern Mindanao. The updated implementation program was established in March 2006, reflecting the government's commitment thru the Department of Public Works and Highways (DPWH) to make this dream project a reality.

In November 2008, the proposed project drew interest from international funding institutions, along with an information memorandum for possible toll road initiative under the partnership in economic governance reform between the Philippines and Australia. However, the path to realization faced obstacles and was ultimately shelved.

For another 5 years, the proposed Panguil Bay Bridge was in limbo until finally in April 2013, a South Korean Civil Engineering Firm, Sambo Engineering, proposed a comprehensive business case study. This study eventually led to approval from the National Economic and Development Authority – Investment Coordination Committee (NEDA-ICC) in November 2014. By May 2015, the DPWH obtained the NEDA Board approval under Korean Financing, reinforcing the commitment to this major project.

Project funding was secured with a loan signing in April 2016 between the Philippine Government and the Export-Import Bank of Korea, giving the DPWH the financial resources needed to move forward.

By 2018, the DPWH was deep into the procurement phase for the Design-Build Project, with bids evaluated and contract signed in November 2019.

Actual work on the design and build of Panguil Bay Bridge began on February 28, 2020. The engineering design for this ambitious project was based on extensive Geotechnical Surveys and Bathymetric Data to ensure it is built on a solid foundation with a high strength-to-weight This is a Design and Build Project. The detailed design of the Project was prepared by the Korean Project Management Consultants, Yooshin-Pyungwa and Kukdong, and Korean Contractor a Joint Venture of Namkwang- Kukdong- Gumgwang.

The computer programs (softwares) utilized for the bridge and road designs are as follows:

	Software	Design Application
BRIDGE	MIDAS/CIVIL	Construction & completion stage analysis Detailed Analysis Heat of hydration analysis P-Δ analysis Strunt-tie analysis Seismic analysist (Approach bridges)
	MIDAS/FEA	Detailed Analysis Heat of hydration analysis
	MIDAS/UMD	Design of Unit Members Pier design (Main & Approach bridge)
	DMbix	Pier design (Main Bridge)
FOUNDATION	SAP2000	Seismic analysist (Main bridge)
	L-Pile	Single pile lateral displacement
	Group	Group pile lateral displacement
	FB-PIER	Protruding cast-in-place pile analysis
	SLOPILE	Lateral flow analysis in abutment
	PLAXIS	Finite element analysis for ground and pile
	SLOPE/W	Limit equilibrium analysis

ACTIVITY	COMPUTER PROGRAM
Piles	Midas Civil, RC Mania
Column/Pier	RC Mania
Road Design	Road Project

CONSTRUCTION STAGE

The modern structure features a foundation made of 54 bored piles for the 32 piers, two abutments, and two pylons of the main bridge that will allow marine vessels to pass underneath. The bridge incorporates open box-shaped pre-cast concrete assemblies or pre-fabricated pre-stressed concrete (PC) house 15 meters by 21 meters by three (3) meters height as foundations for the pylons, each supported by six piles.

Each bored pile, three (3) meters in diameter and ranging from 30 to 50 meters deep, was constructed using advanced techniques using reverse circulation drilling machines on barges to prepare the bore holes followed by the launching of 23-milimeter-thick permanent steel casing using revolving crane barges and vibro pile hammers, two (2) land and sea-based batching plants supplied ready-mixed concrete for the project.

The completed bridge includes a 360-meter approach road leading to a 1,020-meter approach bridge on the Tangub City side, alongside a 569-meter approach road connecting to a 900-meter approach bridge on the Tubod side. Both approaches were built using pre-stressed concrete box girders through an Incremental Launching Method.

At the heart of the project is the Extra-Dosed Main Bridge, featuring a 320-meter Central Span supported by two (2) Pylons standing 20 meters tall. Each pylon, 1.4 meter in thickness and six (6) meters width from at the bottom to four (4) meters at the top, is anchored by six (6) cable stays, providing structural support and aesthetic appeal. The bridge was constructed using a free-cantilever method.

To ensure regular maintenance and structural integrity, two (2) observatory bays are positioned on either side of the pylons.

The lighting system includes 120 lamp posts and advanced fixtures, featuring aesthetic lights for the pylons to enhance visibility and create a safer environment for nighttime travel.

This two (2)-lane two (2) way bridge measuring 15.5 meters in width will significantly enhance inter-island travel by reducing land travel time to and from cities of Ozamis and Tangub in Misamis Occidental to Tubod, Lanao Del Norte to just seven (7) minutes through the Panguil Bay Bridge from two (2) to two (2) and a half hour over a total length of 100 kilometers via the routes of Tangub-Molave-Tubod Road or Tangub-Kapatagan-Tubod Road or via the Roll-On-Roll-Off (RORO) vessels operating daytime from Ozamis to Mucas.

Construction of the Project was likewise done by the Joint Venture Namkwang-Kukdong-Gumgwang while construction supervision was undertaken by the Project Management Consultant Yooshin Engineering Corporation.

Various Construction Methods were applied in the construction of the following bridge structures of the Project:

a. PSC Box Girder Prestressing and Grouting Works
b. PSC Box Girder Launching Works
c. PSC Box Girder Production and Construction
d. Steel Casing Fabrication
e. Mock-up Test for Grouting System
f. Duct Site Fabrication
g. ILM Launching Nose Site Assembly
h. Backfilling Behind Abutment
I. ILM Bored Pile Construction at Tubod Side
j. PY1 and PY2 PILE CAP
k. Installation Plan of Lateral Pile Load Test Equipment
l. Abutment Construction for Tangub & Tubod

m. Bored PSC Pile Installation at Tangub Side
n. Sheet Piling and Dredging
o. Abutment and ILM Temporary Piers and Casting Bed Construction for Tangub & Tubod Site
p. ILM Fabrication Yard in Tangub & Tubod Side
q. Jig Jacket Fabrication and Installation
r. Rebar Cage Fabrication for Bored Piles
s. Bored Pile Works by Reverse Circulation Drilling

The computer programs (softwares) used during the construction stage are:

ACTIVITY	COMPUTER PROGRAM
Work Program	MS Project
Camber Control	MS Excel

Presented in Figure 3 is the Bridge Cross-Section that depicts the multiple piles installed at varying depths and the various components comprising the bridge. Shown in Figure 4 are the Details of the Pier, Approach and the Main Bridge.

This Project was undertaken during the 2-year COVID 19 pandemic and post pandemic period. Many challenges occurred during construction like compliance to physical distances among workers, limited workers, delayed materials deliveries, limitation of direct contacts among Project participants (e.g. conduct of coordination meetings, supervision), restrictions on travels and movements, lockdowns, shortage of workers, uncertainties of some workers living off-site to arrive in the Project site to perform their tasks, unexpected rise in costs of materials and petroleum products, and inclement weather condition. These conditions have passed the manual pace of implementation.

In view of the difficulties experienced during project implementation, reasonable project extension was factored into the contract of the contractor.

BEST CIVIL ENGINEERING PRACTICES

Project Organization was spearheaded by the DPWH UPMO thru the UPMO Roads Management Cluster II (RMC II) [for Multilateral agency financed projects] in cooperation with all concerned stakeholders. Refer to Figure 5 for the Organization Chart of the Project. Such Project required a strong leadership of the UPMO to aptly network with the lending institution and the various government agencies (e.g. Department of Finance, National Economic Development Authority and the line offices of the DPWH), as well as the joint venture among Namkwang Engineering and Construction Corporation-Kukdong-Gumgwang (Contractor), and the Yooshin Engineering Corporation, the project consultants.

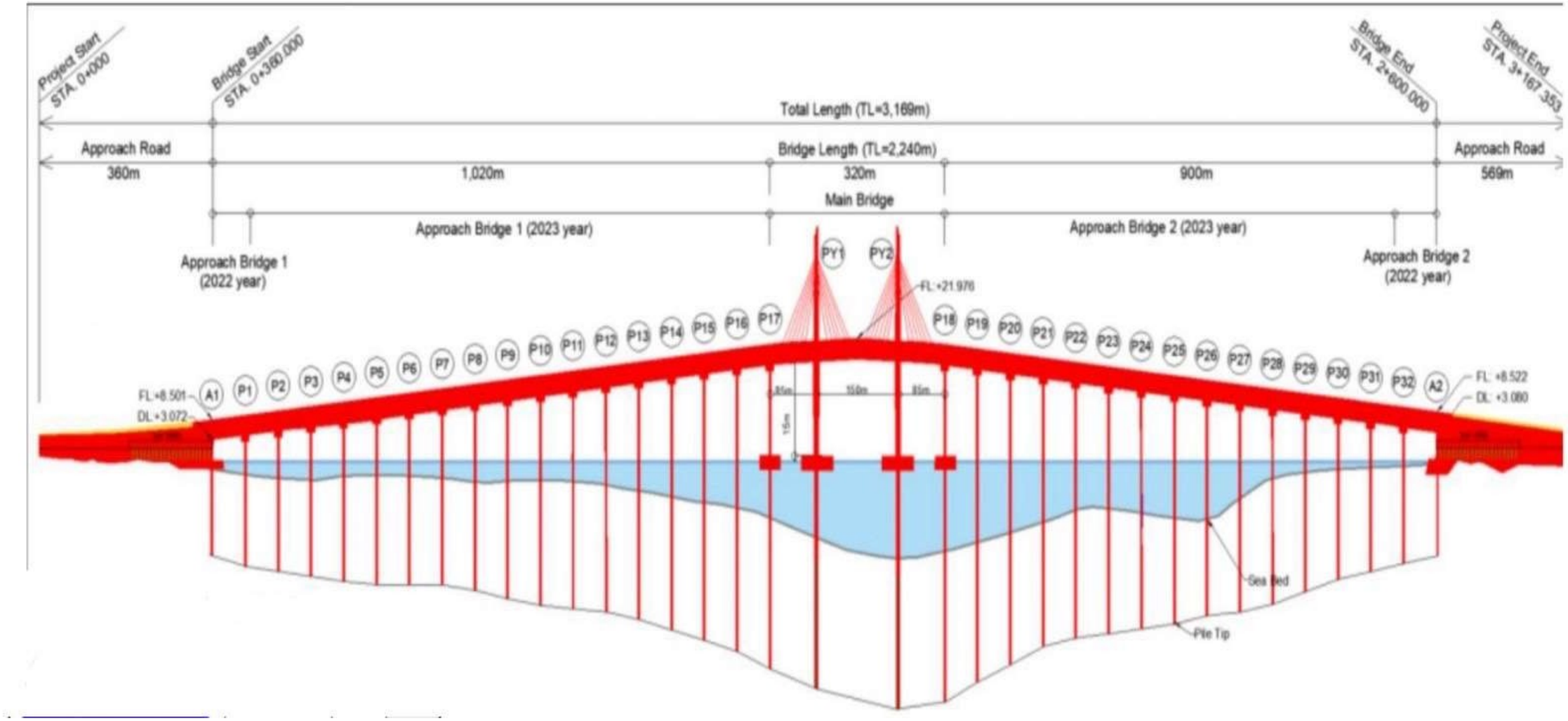
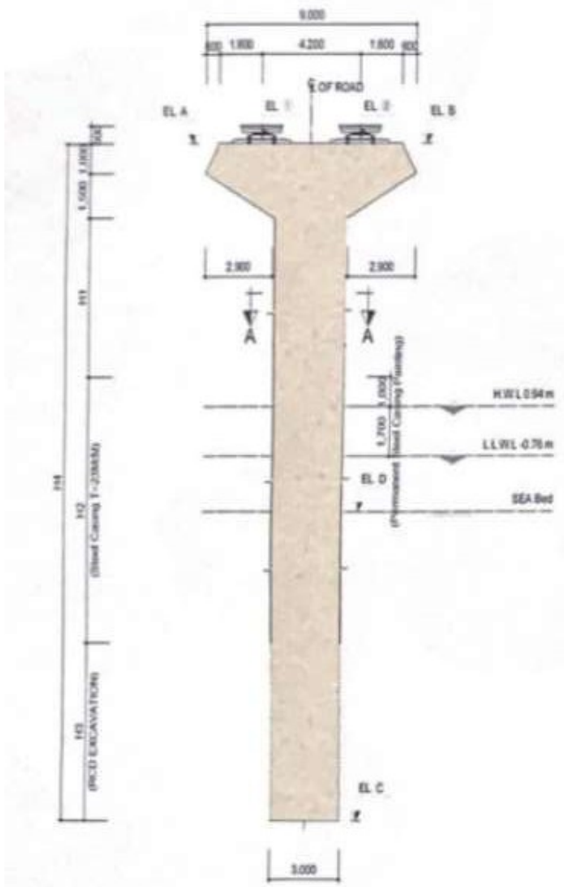
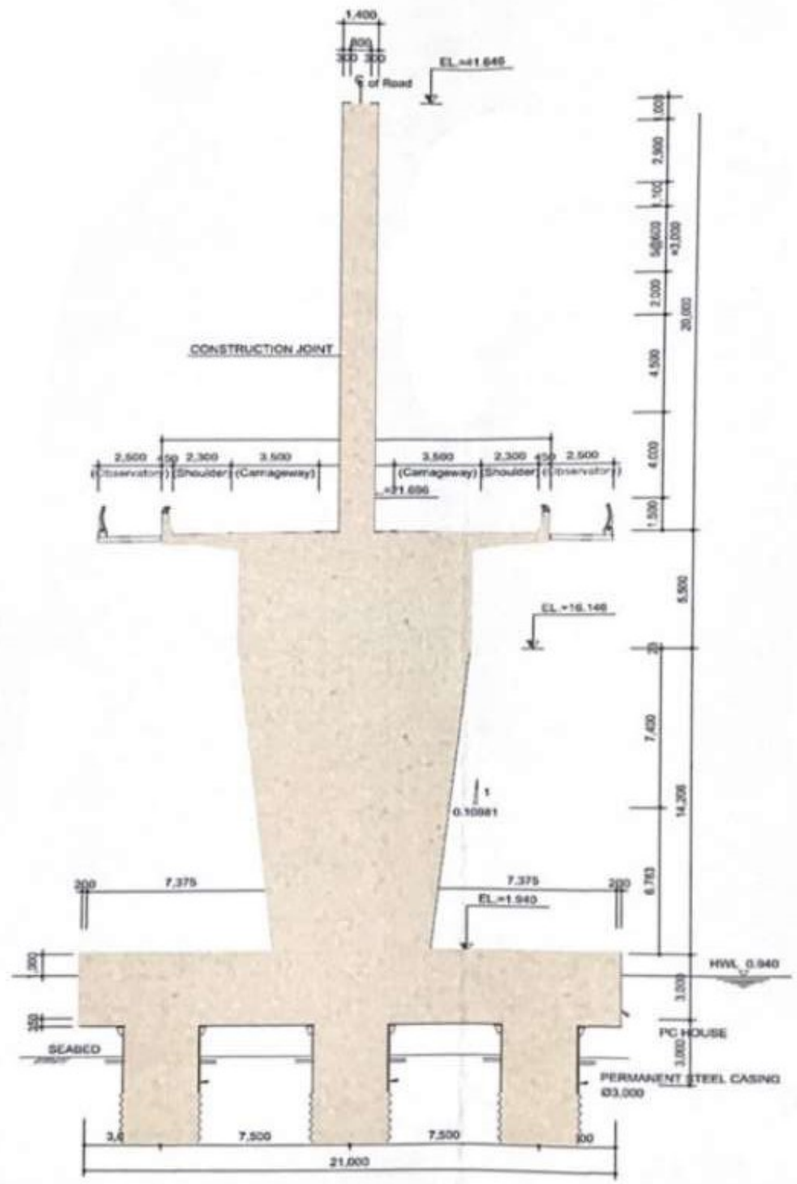


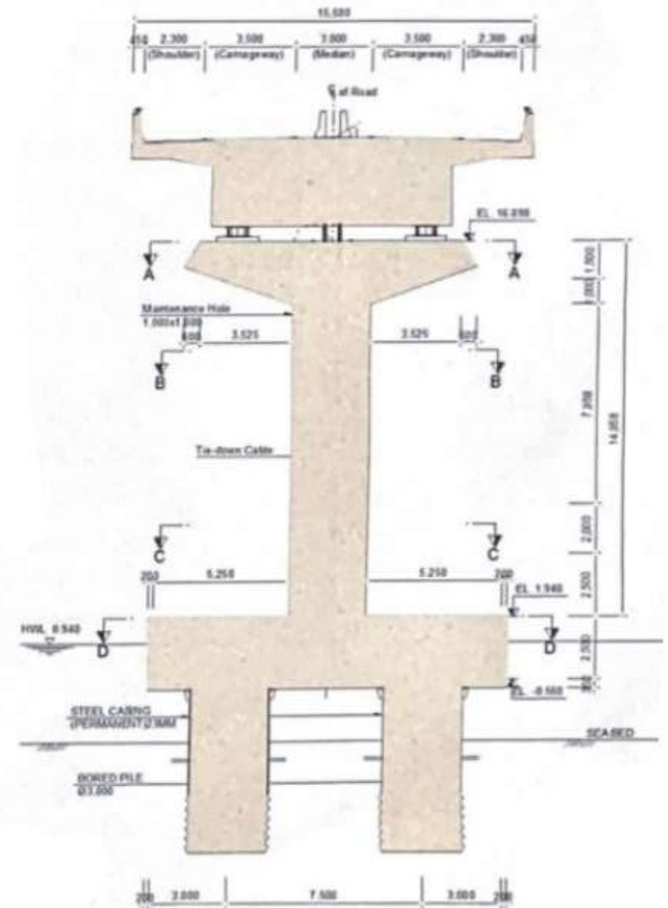
Figure 3. BRIDGE CROSS-SECTION



APPROACH BRIDGE MONOPILE



MAIN BRIDGE



MAIN BRIDGE

Figure 4. DETAILS OF THE PIER/APPROACH/MAIN BRIDGE

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
CENTRAL OFFICE
Manila

DESIGN-BUILD FOR THE CONSTRUCTION OF THE PANGUIL BAY BRIDGE PROJECT
KOREAN EXPORT-IMPORT BANK (KEXIM) LOAN AGREEMENT NO. PHL-18

ORGANIZATIONAL CHART

Figure 5. ORGANIZATIONAL CHART

The detailed design was reviewed by the RMC II and approved by the Bureau of Design of DPWH. Cost estimates were approved by the Bureau of Construction. Supplemental pay items were approved by the Bureau of Research and Standards. Project Safety Program was approved by the Bureau of Quality and Safety. Environmental matters were approved by the ESSD. Construction supervision was undertaken by RMC II staff of the total workforce, 85% were composed of Filipino workers and engineers.

Proactive plans and actions were developed and implemented to resolve construction challenges as previously mentioned. For example, multiple local suppliers of aggregates and other materials were sourced out. Turning to Information and Communications Technologies (ICT) and digital approaches (i.e. Digital Construction Management) in handling coordination meetings, supervision, reporting, monitoring and evaluation and data management were done.

Despite the COVID 19 pandemic, the Project started, and work progressed well under such condition gives the creative approaches in construction engineering and management. Government regulations on COVID 19 pandemic were complied but with difficulties.

Various softwares and technologies were applied in the design and in construction management of the Project. Digital Construction Management was applied.

This project demonstrates effective transport and infrastructure planning as journey between Tangub and Tubod will be reduced from the present travel time of 2 hours and 30 minutes to 7 minutes only. With the operation of the Panguil bridge, traffic congestion in the affected areas will be reduced, thus, ensuring and sustaining efficient mobility of commuters and agriculture products, and goods.

The Project is expected to spur economic growth in these areas and improve the quality of life of the people within Tangub, Tubod and their environs. Riding convenience and comfort of the residents will be experienced through shorter travel time. Agricultural products will be easily transported and faster. Transport of goods will no longer be loaded and unloaded twice or thrice but will only be done once.

Design and construction challenges were experienced. However, given the vast experiences of the Designers, Contractors, Construction Project Consultants, and the DPWH UPMO, these challenges were properly addressed. The harmonious relationship and quick decision making among the Project participants orchestrated by UPMO has proven to be an effective approach to expeditious project implementation and earlier completion.

EMIL K. SADAIN is both a civil engineer and sanitary engineer. He is the President of the Philippine Institute of Civil Engineers (PICE) and the Senior Undersecretary of the Department of Public Works and Highways.

FLORENCIO F. PADERNAL is a civil engineer and a doctor in public administration. He is the Chairman / CEO of Padernal Construction Co. Inc.