中国华电集团有限公司
CHINA HUADIAN CORPORATION LTD.
中国华电科工集团有限公司
CHINA HUADIAN ENGINEERING CO., LTD.

巴厘通用能源公司
PT GENERAL ENERGY BALI

巴厘通用能源公司

PT.GENERAL ENERGY BALI

码头区域水深测量服务项目技术规范书

Technical Specification for Wharf Area Bathymetric Survey Service Project

批准(APPROVE)：_____

审核(VERIFY)　：_____

编制（Prepared by）：_____

2026 年 10 月 22 日

码头区域水深测量服务项目技术规范书

Technical Specification for Wharf Area Bathymetric Survey Service Project

1. 总则 General Requirements

1.1 适用范围 Scope of application

本技术规范书适用于巴厘通用能源公司 Celukan Bawang 电厂 30000DWT 煤炭进口码头水深测量外委项目，明确承包方在技术、质量、安全、环保、人员设备、责任及义务等方面的要求，获取码头港池基线水深水下地形数据，为船舶靠泊安全、港池淤积监测、码头运维提供可靠技术依据，确保测量作业安全、高效、合规开展。

This technical specification is applicable to the outsourced bathymetric survey project for 30000 DWT coal-imported wharf of Celukan Bawang Power Plant, PT. General Energy Bali. It clearly defines the contractor's requirements on technology, quality, safety, environmental protection, personnel & equipment, responsibilities and obligations. Baseline bathymetric underwater topographic data shall be obtained for vessel berthing safety, wharf basin siltation monitoring and wharf operation-maintenance, to ensure safe, efficient and compliant survey operations.

1.2 编制依据 Preparation basis

相关法规与国际标准 Relevant laws, regulations & international standards

1. 印尼《2008 年航运法》 Law of the Republic of Indonesia No.17/2008 on Shipping
2. 印尼《2021 年第 51 号部长条例》 Ministerial Regulation No. 51 of 2021 of Indonesia
3. IHO S-44 国际海道测量精度标准 IHO S-44 Standard for Hydrographic Surveys
4. 国际海事组织《国际船舶和港口设施保安规则》ISPS Code

企业标准及管理要求 Enterprise management requirements

1. 巴厘通用能源公司外委工程与外协用工安全管理标准 Safety Management Standards for Outsourced Projects and External Labor Employment of Bali General Energy Company
2. 码头总平面布置图纸（Jetty Layout）、码头设计水深文件

1.3 技术规范的解释权 Right of interpretation

本技术规范书由巴厘通用能源公司发电部编制并解释，未尽事宜由甲乙双方协商确定。

This technical specification is compiled and interpreted by the Power Generation Department of Bali General Energy Company. Matters not covered herein shall be determined through negotiation between Party A and Party B.

2. 工作范围 Working scope

2.1 项目概述 Project Overview

2.1.1 项目名称 Project Name

2.1.1.1 30000DWT 煤炭进口码头港池水深测量项目 Bathymetric Survey Project for 30000 DWT Coal-imported Wharf Basin

2.1.2 项目地点 Project Location

2.1.2.1 巴厘通用能源公司 Celukan Bawang 电厂自用煤炭码头 Private coal-imported wharf of Celukan Bawang Power Plant, PT.General Energy Bali

2.1.3 项目背景及目的 Project Background and Purpose

2.1.3.1 为获取码头港池现状水深基线数据，掌握港池水下地形与淤积现状，保障 30000DWT 散货煤船安全靠泊，对外委托开展码头水域水深测量作业。承包方负责水域水深外业采集、陆域永久大地基准点布设、潮位观测、数据处理、水深成图及全套技术报告编制交付。

To obtain baseline bathymetric data of wharf basin, understand underwater topography and siltation status, and guarantee safe berthing for 30000 DWT bulk coal carriers, bathymetric survey is outsourced. The contractor shall be responsible for field hydrographic data acquisition, permanent geodetic benchmark installation on land, tide observation, data processing, bathymetric mapping and delivery of complete technical reports.

2.1.4 外委工作内容 Outsourcing work content

2.1.4.1 码头港池水域水深测量（单波束测深）； Bathymetric survey of wharf basin waters (single-beam echosounder);

2.1.4.2 陆域永久水准基点 Benchmark（BM）布设、控制点联测； Installation of permanent land Benchmark (BM) and connection survey to existing control points;

2.1.4.3 现场潮位尺安装与全过程潮位观测； Installation of tide staff and full- process tidal observation during survey;

2.1.4.4 水下地形数据处理、水深地形图编制； Underwater topographic data processing and bathymetric mapping;

2.1.4.5 全套测量成果报告编制、资料归档移交。 Preparation of full- set survey deliverables, document filing and hand- over.

3. 技术要求 Technical requirements

3.1 主要技术指标 Main technical indicators

3.1.1 公司资质和人员资质要求 Requirements for company qualifications and personnel qualifications

3.1.1.1 投标 / 承包公司须为依据印尼法律正式注册成立的法人实体，具备有效的商业登记证书，经营范围包含水文测量、海洋测绘、港口勘测相关业务，具备合法开展水域测量作业的经营资格。

The bidding / contracting company shall be a legal entity duly registered under Indonesian law with valid business registration certificate; business scope shall cover hydrographic survey, marine surveying & mapping and port survey services to legally perform water- borne survey works.

3.1.1.2 承包方应持有印尼相关主管部门认可的测绘、水文勘测作业许可；作业船舶具备水上作业合法航行资质。

Contractor shall hold valid hydrographic survey permit issued by relevant Indonesian authorities; survey vessel shall possess valid navigation certificate for offshore operation.

3.1.1.3 项目团队须配备专职首席测量师 / 水文测绘工程师（Chief Surveyor / Hydrographer），具备港口水深测量相关工作经验；配备仪器操作员、船舶操作人员、专职 K3L 安全官。

Project team shall assign full- time Chief Surveyor / Hydrographer with proven experience in port bathymetry; instrument operators, vessel crew and dedicated K3L safety officer shall be assigned.

3.1.1.4 所有进场作业人员必须完成电厂安全培训；水上作业人员具备水上作业安全相关培训记录。

All site personnel shall complete Safety Induction training organized by power plant; water- borne operators shall hold valid safety training records for marine work.

3.1.1.5 承包方开工前完成技术文件研读，熟悉码头总布置图纸 Jetty Layout、设计水深参数、既有控制点资料。

Prior to commencement, contractor shall review technical documents including jetty layout drawing, design depth parameters and existing control point data.

3.1.1.6 提前办理电厂厂区作业许可及水上作业相关审批手续。

Apply in advance for plant site access permit and marine operation approvals.

3.1.1.7 设备进场后开展测深仪 Bar- Check 比对校验，校验记录留存归档，测深成果满足 IHO S- 44 精度标准。

Perform Bar- Check calibration for echosounder after mobilization; calibration records shall be filed; bathymetric results shall comply with IHO S- 44 accuracy requirements.

3.1.1.8 在电厂陆域布设永久性 BM 水准基点，完成与厂区已有控制点联测，提交点之记（坐标、高程、点位照片、位置描述）。

Install permanent BM benchmark on plant land area, perform connection survey to existing control points; submit benchmark documentation including coordinates, elevation, site photos and position description.

3.1.1.9 在码头合适位置安装潮位尺 Tide Staff；水深测量全过程连续观测潮位，记录时间与水位读数，用于原始水深潮位改正。

Install tide staff at proper wharf location; continuously record tide level and timestamp throughout survey for tide correction of raw sounding data.

3.1.1.10 水深测量范围完整覆盖：30000DWT 煤炭进口码头港池、C1A/B、C2A/B 皮带输送机栈桥周边水域、L1、L3 报警灯浮标、码头航标灯周边水域；布设主测线与交叉检查线，船舶沿测线低速航行，测深仪与 GNSS- RTK 定位严格时间同步。

Survey coverage shall fully include: 30000 DWT coal- imported wharf basin, waters around C1A/B & C2A/B belt conveyor trestle, vicinity of L1, L3 alarm light buoy and wharf light beacon. Main sounding lines and cross check lines shall be planned; survey vessel shall navigate at low speed along lines; echosounder shall be strictly time- synchronized with GNSS- RTK positioning.

3.1.1.11 作业过程实时监控水深曲线；出现水深跳变、气泡噪声等异常，标记位置，必要时现场复测；风浪过大、水体气泡严重影响测深质量时停止水上测量。

Monitor sounding profile in real- time during survey. Mark abnormal points caused by noise or air bubbles and re- survey on- site if necessary. Stop marine survey when rough sea and heavy air bubbles degrade data quality.

3.1.1.12 内业处理完成潮位改正，生成带等高线的基线水深地形图，输出水下地形测点成果、纵横断面成果。

Perform tide correction in office data processing, generate baseline bathymetric contour map, output underwater topographic point data and cross- section / longitudinal- section drawings.

3.1.1.13 建立测量质量自检制度，开展数据 QC 质量检查，形成质量检查记录；对不合格数据区域应安排补测。

Implement internal quality self- check system, perform QC inspection and keep inspection records. Re- survey shall be arranged for areas with unsatisfactory data quality.

3.1.1.14 完整保存全部原始外业资料：水深原始记录、GNSS- RTK 轨迹、潮位观测记录、Bar- Check 校验记录、控制点观测记录，资料保存期限不少于 5 年。

All raw field data including sounding logs, GNSS- RTK track files, tide observation records, Bar- Check reports and control point survey records shall be properly filed for no less than 5 years.

3.2 质量要求 Quality requirements

3.2.1 承包方需满足的质量标准 Quality standards that contractors must meet

3.2.1.1 承包方应建立完善的测量质量管理体系，水深测量成果满足 IHO S- 44 国际海道测量标准；控制点布设、潮位观测、数据处理、成图输出满足本技术规范书要求。作业人员熟悉印尼港口作业相关法规、水文测量作业流程，能够及时处置测量作业异常情况。

The contractor shall establish sound survey quality management system. Bathymetric results shall comply with IHO S- 44 standards. Benchmark installation, tide observation, data processing and mapping shall satisfy this specification. Survey personnel shall be familiar with Indonesian port regulations and hydrographic workflow and handle abnormal conditions timely.

3.2.2 质量验收标准及方法 Quality acceptance standards and methods

3.2.2.1 依据 IHO S-44 标准、本技术规范书及合同约定开展验收；核查测量覆盖范围完整性、控制点成果、潮位记录、校验记录、图纸报告完整性。成果不满足要求，承包方须无偿返工复测。

Acceptance shall be performed in accordance with IHO S-44, this specification and contract requirements. Verify survey coverage completeness, control point results, tide records, calibration documents and full set of drawings & reports. Contractor shall perform re-survey free of charge if deliverables fail acceptance criteria.

4. 进度要求 Progress requirements

4.1 总工期要求 Total construction period requirements

4.1.1 自签发工作指令 SPK 并且完成电厂现场安全培训之日起，总工期为 9 个工作日，包含设备动员、外业测量、内业处理及全套成果报告编制交付。

Total project duration shall be 9 working days counted from issuance of SPK (Surat Perintah Kerja) and completion of site Safety Induction, including mobilization, field survey, office processing and full deliverable submission.

4.1.2 承包方应合理安排海上作业窗口期，受海况天气影响无法作业时应及时向甲方书面报备，说明延误原因及调整后的交付计划。

Contractor shall arrange marine survey within suitable weather windows. In case operation cannot be performed due to sea state, written notification shall be submitted to Party A with cause and revised delivery schedule.

5. 安全及环保要求 HSE requirements

5.1 安全管理 Safety Management

5.1.1 作业安全管理要求 Construction safety management requirements

5.1.1.1 承包方对作业人员开展严格日常管理，遵守电厂安全规章制度，按操作规程开展水上、陆域测量作业；督促人员正确佩戴个人防护用品；严禁酒后上岗、疲劳作业。

Contractor shall strictly manage survey personnel, enforce plant safety rules and survey operating procedures for both land and marine work. Ensure proper usage of PPE. Prohibit working under alcohol influence or fatigue status.

5.1.1.2 发包方定期对承包方作业人员、设备开展安全监督检查；发现违规立即制止，要求承包方落实整改教育。

Party A shall conduct regular safety inspection for contractor personnel and equipment. Any violation shall be stopped immediately and rectification & re- education shall be required.

5.1.1.3 承包方投入使用的测量设备、作业船舶进场前向甲方报备；仪器设备定期检查维护；计量类设备保持在校验有效期内。

Survey instruments and survey vessel shall be reported to Party A prior to site mobilization. Equipment shall be inspected and maintained periodically; metrological instruments shall be within valid calibration period.

5.1.1.4 承包方建立现场安全自查制度，每日开展现场安全自查自纠，排查人员、船舶、设备、环境隐患，做好隐患排查整改记录。

Contractor shall implement daily site safety self- inspection, identify hazards on personnel, vessel, equipment and environment, and keep hazard identification & rectification records.

5.1.1.5 发包方可组织全面安全检查以及不定期抽查；对发现隐患下达书面整改通知，明确整改期限，跟踪复查整改闭环。

Party A may perform regular comprehensive safety inspection and random spot- checks. Written rectification notice shall be issued for identified hazards with clear deadline; follow- up verification shall be performed until closure.

5.1.1.6 水上测量作业前收集气象、水文实况；风力达到 6 级及以上、能见度低于 500 米、泊位水域流速大于 1.5 m/s 时，应停止水上测量作业。

Obtain real- time meteorological and hydrological data before marine survey. Stop marine survey when wind force ≥ Beaufort 6, visibility <500 m or current velocity >1.5 m/s within survey area.

5.1.1.7 所有临水、登船作业人员必须穿戴符合印尼 SNI 标准救生衣；厂区陆域作业佩戴安全帽、安全鞋、反光背心；禁止穿戴宽松衣物、易勾挂饰品。

All personnel working waterside or on survey vessel shall wear SNI- compliant life jacket. On- plant land personnel shall wear safety helmet, safety shoes and reflective vest. Loose clothing and snag- prone accessories are prohibited.

5.1.1.8 作业船舶应配备救生圈、消防设备、通讯设备；水上作业设置瞭望人员，避让进出港通航船舶。

Survey vessel shall be equipped with lifebuoys, fire-fighting equipment and communication devices. Look-out shall be assigned to avoid navigating vessels.

5.1.1.9 承包方必须配置专职 K3L 安全官，全程监督现场安全；危险作业环节安排专人现场监护。

Contractor shall assign dedicated K3L safety officer for full-time site safety supervision. Dedicated watchman shall be arranged for high-risk operations.

5.1.1.10 发生落水、设备损坏等安全事件，承包方第一时间开展现场应急处置，保护现场，并按印尼当地法规及电厂要求及时上报。

In case of safety incidents such as man-over-board or equipment damage, contractor shall perform immediate emergency response, preserve incident scene and report to relevant authority and plant per Indonesian regulations.

5.1.2 服务人员资质及培训要求 Construction personnel qualifications and training requirements

5.1.2.1 水文测量、船舶操作人员具备相应岗位从业资质；所有作业人员完成电厂 Safety Induction；安全相关年度培训不得少于 24 学时，涵盖水上应急救援、船舶作业安全等内容。

Hydrographic surveyors and vessel crew shall hold valid occupational qualifications. All personnel shall complete plant Safety Induction. Annual safety training shall be no less than 24 class-hours covering marine emergency rescue and vessel operation safety.

5.1.3 防范措施及应急预案 Preventive measures and emergency plans

5.1.3.1 承包方结合水深测量水上作业特点编制专项应急预案，明确应急组织机构、岗位职责、响应流程、救援物资，针对人员落水、船舶故障、设备失效制定处置措施。

Contractor shall prepare dedicated emergency response plan for bathymetric survey marine work, defining emergency organization, responsibility, response procedure and rescue equipment, with specific countermeasures for man-over-board, vessel breakdown and instrument failure.

5.2 环保要求 Environmental requirements

5.2.1 项目现场环保管理措施 Environmental protection management measures at construction sites

5.2.1.1 作业船舶垃圾、废油、废弃物不得向码头水域排放；船舶垃圾、废液收集上岸合规处置。

Survey vessel garbage, waste oil and waste shall not be discharged into wharf waters. All waste shall be collected ashore for proper disposal.

5.2.1.2 测量作业不得扰动码头护底、护岸结构；不得随意抛洒、丢弃设备耗材。

Survey activities shall not damage wharf bed protection or revetment structures. Instrument consumables shall not be discarded into water.

6. 违约责任 Liability for breach of contract

6.1 进度违约责任 Liability for progress breach

6.1.1 若承包方未按照合同约定工期完成全部测量工作及成果交付，应承担相应违约责任，按合同约定支付违约金。

In case the contractor fails to complete survey works and deliverables within agreed duration, corresponding liability for breach shall be borne including liquidated damages as per contract.

6.2 质量违约责任 Liability for quality breach

6.2.1 若承包方测量成果不满足本技术规范及 IHO S-44 标准，造成水深、水下地形数据失真，承包方应无偿返工复测，并承担由此带来的全部直接损失。

If survey deliverables fail this specification and IHO S-44 criteria resulting in distorted water depth or underwater topographic data, contractor shall perform re-survey free of charge and bear all resulting direct losses.

6.3 争议解决 Dispute Resolution

6.3.1 双方在履行合同过程中发生争议，可通过协商、调解、仲裁或诉讼等方式解决，管辖归属根据主合同约定执行。

If disputes arise between two parties during contract performance, disputes shall be settled by negotiation, mediation, arbitration or litigation. Jurisdiction shall follow main contract provisions.

附件：码头信息和图纸

Attachments: Wharf / Pier Information and Drawings

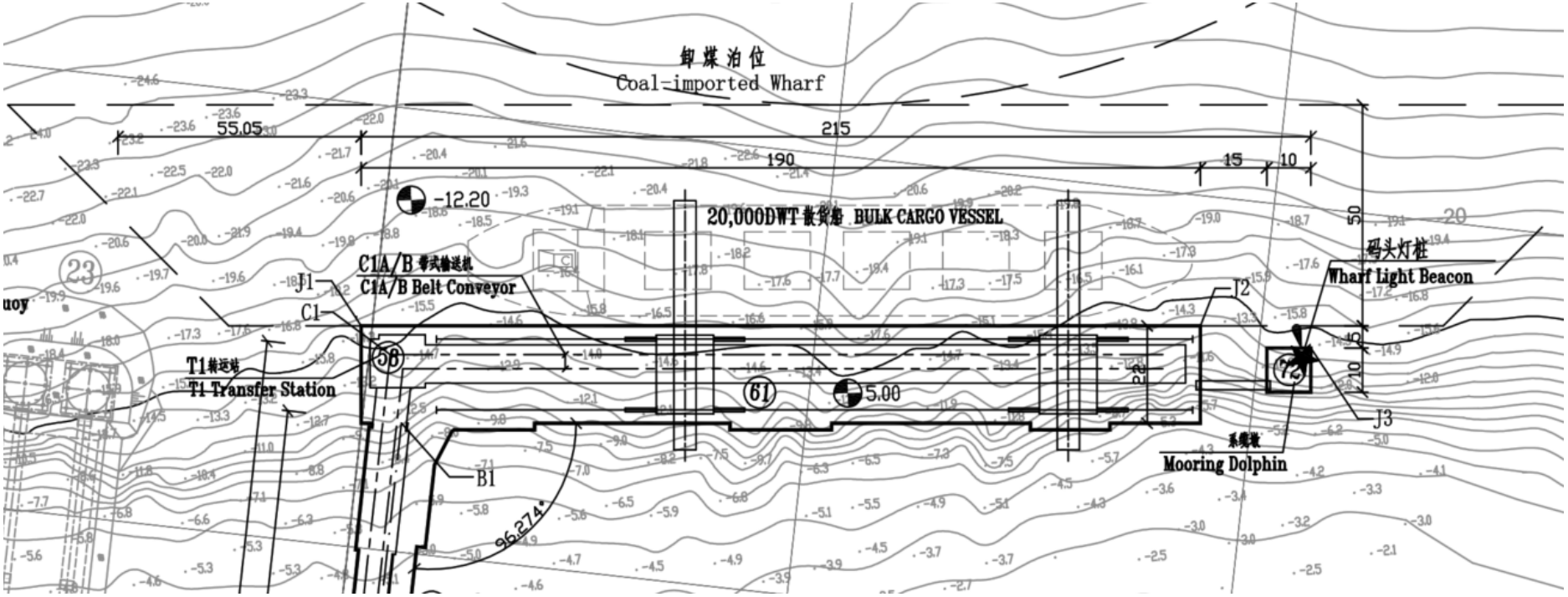
一、一般信息 / General Information

项目 / Item	中文说明	English Description
设施名称 / Facility Name	哲鲁坎巴旺发电厂码头	Jetty PLTU Celukan Bawang
位置 / Location	巴厘岛省布勒冷县格罗格甘镇哲鲁坎巴旺村	Desa Celukan Bawang, Kec. Gerokgak, Kab. Buleleng, Bali
地理坐标 / Geographical Coordinates	南纬 08°11′39″ / 东经 114°51′18″	08°11′39″ S / 114°51′18″ E
运营管理方 / Operator & Manager	PT. General Energy Bali（巴厘通用能源公司）	PT. General Energy Bali
主要功能 / Main Function	煤炭卸船作业	Coal Unloading

二、技术参数 / Technical Data

参数 / Parameter	中文说明	English Specification
类型 Type	码头	Jetty
结构形式 Construction	钢桩基础 + 混凝土面板	Steel Pile with Concrete Deck
码头长度 Dock Length	215 米	215 m
码头宽度 Dock Width	22 米	22 m
引桥 Trestle	122 × 13 平方米	122 × 13 m²
系船墩（长×宽） Mooring Dolphin (L × W)	10 × 10 平方米	10 × 10 m²
水深（低潮位） Draft Depth (LWS)	低潮位下 -12 米	−12 m LWS (Low Water Springs)
航道长度 Channel Length	550 米	550 m
航道宽度 Channel Width	660 米	660 m
流速	0.72 公里/小时	0.72 km/h

Current		
风速 **Wind**	北风，4 – 40 公里/小时	North, 04 – 40 km/h
潮差 **Tidal Range**	Z_0 130（1.30 米）	Z_0 130 (1.30 m)
靠泊能力（载重吨） **Berthing Capacity (DWT)**	设计最大可停靠 20,000 载重吨船舶/驳船	Designed for vessels/barges up to 20,000 DWT
系泊系统 **Mooring System**	系船柱，承载力 1500 千牛	Bollard (Capacity: 1500 kN)
护舷系统 **Fender System**	锥形橡胶护舷 / 超级拱形护舷	Cone Rubber Fender / Super Arch Fender


卸煤泊位
Coal-imported Wharf
55.05
215
190
15
10
-12.20
20,000DWT 散货船 BULK CARGO VESSEL
50
码头灯桩
Wharf Light Beacon
C1A/B 带式输送机
C1A/B Belt Conveyor
J1
C1
T2
T1转运站
T1 Transfer Station
58
61
5.00
72
J3
B1
96.27.4°
系缆墩
Mooring Dolphin