THE NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING

OCCUPATIONAL STANDARDS

OCCUPATION: WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER

LEVEL: NTA LEVEL 8

FEBRUARY 2024

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ABBREVIATIONS

CAD	Computer-aided Design
CASS	Topographic/Cadastral Mapping Software (Developed by South Digital Technology Co., Ltd.)
CBET	Competency Based Education and Training
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial Knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks - essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service).
Occupational Standards:	Specific requirements of competences for personnel in a particular occupational area, including knowledge and relevant attitudes. They also act as performance tools of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.
Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	A set of statements, which, if proved true under working conditions, means that an individual is meeting an expected level and type of performance.

Task Analysis:	The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance criteria, tools and materials needed, as well as safety concerns required for the employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to products, service, or decisions.
Underpinning Knowledge:	Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the working conditions.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status, with a high level of human development. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical and Vocational Education and Training (NACTVET) has begun the job of drafting Occupational Standards (OS) that will eventually be adopted as National Occupational Standards (NOS) for use in the delivery of TET that meets the needs of the labour market and the country's economic agenda.

Occupational Standards (OS) are performance criteria that are matched with labour market demands. Each of them describes the functions, performance standards, and understanding or knowledge underpinning a given occupation. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruitment, supervision, and appraisal, as well as TET Standards. They are also helpful for benchmarking and harmonizing job qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in application across all public and private institutions.

However, it must be noted that Occupational Standards are different from Training /Education Standards. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical circuits, performs troubleshooting in electrical circuits, etc.), and are usually defined by Employers following procedures as agreed upon by all the stakeholders. On the other hand, Training and Education Standards are developed from the activities defined in the occupational standards, and they specify learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him/her to function at an agreed level in an occupation. Training and Education Standards are used to define curricula in training institutions. It is critical, however, to establish a direct link between the occupational standards and the training standards for both of them to respond collaboratively to the demands of the labour market.

For the purpose of TET delivery, Tanzania has adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. Therefore, it is quite pertinent for TET institutions to use the relevant occupational standards as a benchmark for formulating their curricula.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training.

The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The process of developing these Occupational Standards involved both local and international expertise. The process began with an examination of major documents that guide Tanzanian skills development including the *10-year National Skills Development Strategy (2016-2026).* NACTVET labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a team of experts in consultation with practitioners developed draft occupational standards. The draft document was used to develop an occupational profile for each occupation (DACUM Chart), which is attached as an **Appendix** to every Occupational Standard.

The occupational standards were validated during the stakeholders' forum held on 22nd and 23rd February 2024 at Morogoro. The information from the stakeholders' forum provides insight from the workplaces, professional bodies, regulatory bodies and sector ministries regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEERS

The standards cover a broad range of duties and tasks that can be performed by a Water Conservancy and Hydropower Engineering Engineer. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Water Conservancy and Hydropower Engineering Engineer may perform tasks in a number of key areas of the Occupational Standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

Working in coordination with other engineers, the Water Conservancy and Hydropower Engineer completes the survey, planning, design, construction and operation and maintenance management of hydraulic hub projects. At the construction site of water conservancy projects, Water Conservancy and Hydropower Engineering Engineers can guide and organize technicians to complete various construction tasks, from the composition of water conservancy hubs, the design of various parts of

the building size to the drawing of engineering drawings, the construction organization and design work such as construction scheme preparation and schedule development according to the design documents, and finally the organization and management work at the site to ensure the quality, schedule, cost and safety of water conservancy construction projects to achieve the objectives. Generally, the Water Conservancy and Hydropower Engineering Engineer performs the following duties:

a) Water conservancy engineering construction

b) Water conservancy project management

c) Safety monitoring of hydraulic structure

d) Design of small and medium sized hydraulic projects

e) Water Project O&M Management

f) Safety monitoring of hydraulic structure

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA 7 and 8.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1. OCCUPATIONAL STANDARDS FOR WATER CONSERVANCY ENGINEERING ENGINEER – NTA LEVEL 8

<table>
<tr><td>OCCUPATION</td><td>WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER</td><td>OCCUPATION CODE</td><td></td></tr>
<tr><td>DUTY TITLE</td><td>CONSTRUCT WATER CONSERVANCY</td><td>DUTY NO.</td><td>801</td></tr>
<tr><td>TASK TITLE</td><td>PREPARE THE CONSTRUCTION ORGANIZATION AND DESIGN OF FARMLAND WATER CONSERVANCY AND WATER-SAVING IRRIGATION PROJECTS</td><td>TASK NO.</td><td>8011</td></tr>
<tr><td>PERFORMANCE CRITERIA</td><td colspan="3">The person performing this task must be able to prepare the construction organization and design documents of farmland water conservancy and water-saving irrigation projects in accordance with the requirements of relevant technical standards, design documents and project contracts.</td></tr>
<tr><td>RANGE STATEMENT</td><td colspan="3">The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include:
1. Computer and office operating system;
2. Design documents of the water-saving irrigation project;
3. Water-saving irrigation simulation software;
4. Manual of construction machinery performance for earthwork, concrete engineering, pipeline engineering, electromechanical installation engineering, etc.
5. Safety gear</td></tr>
<tr><td colspan="4">EVIDENCE REQUIREMENT</td></tr>
<tr><td colspan="2">PRACTICAL PERFORMANCE</td><td colspan="2">UNDERPINNING KNOWLEDGE</td></tr>
<tr><td colspan="2">The person performing this task must be able to do the following:
1. Analyse construction conditions;
2. Prepare construction technology and site;
3. Determine the engineering construction scheme of water source projects;
4. Determine the engineering construction engineering construction scheme of water pipe network projects;
5. Determine the engineering construction scheme of equipment installation;
6. Prepare the construction schedule;
7. Prepare the layout of the construction site;
8. Determine technical organization guarantee measures;
9. Prepare resource requirements plans;
10. Summarize and prepare engineering</td><td colspan="2">Detailed knowledge about:
1.0 Methods
The person performing this task must be able to explain how to:
1.1 Choose the construction technology of farmland water-saving irrigation;
1.2 Determine the construction technology of water pipeline;
1.3 Determine the technologies of irrigation channel construction and anti-seepage;
1.4 Determine the construction technology of sprinkler irrigation;
1.5 Prepare construction organization design documents.

2.0 Principles</td></tr>
</table>

construction organization design documents for farmland water conservancy and water-saving irrigation projects. 11. Observe health, occupational and environmental safety rules and regulations.	The person performing this task must be able to explain the following principles: 2.1 Principles of canal seepage control technology; 2.2 Basic principles of sprinkler irrigation technology. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Balance theory of irrigation water supply and demand; 3.2 Theory of high standard farmland construction; 3.3 Theory of construction organization design. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills; 4.6 Report writing skills; 4.7 Skills of reading and making drawings.
DESCRIPTION OF THE END PRODUCT / SERVICE	The construction organization design of farmland water conservancy and water-saving irrigation project is prepared in accordance with its design objectives and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Concrete structure engineering construction technology; 2. Mechanical equipment installation engineering construction technology; 3. Electrical device installation technology.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CONSTRUCT WATER CONSERVANCY	**DUTY NO.**	801
TASK TITLE	PREPARE THE CONSTRUCTION ORGANIZATION AND DESIGN OF ROCK FILL DAM WITH FACE SLABS	**TASK NO.**	8012
PERFORMANCE CRITERIA	The person performing this task must be able to prepare construction organization and design documents for rock fill dams with face slabs in accordance with the requirements of the relevant technical standards, design documents and works contracts.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Information on the topography, hydrology, meteorology, geology and other construction conditions of the project site; 3. Engineering design documents of rock fill dam with face slabs; 4. Manual of construction machinery performance for earthwork, concrete engineering, pipeline engineering, electromechanical installation engineering, etc. 5. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyse construction conditions; 2. Prepare construction technology and site; 3. Select construction diversion methods and carry out the design of diversion buildings; 4. Determine the construction scheme for foundation treatment; 5. Determine the filling construction scheme of rockfill area; 6. Determine the construction scheme of cushion area and face slabs; 7. Determine the flood interception plan; 8. Divide the construction tasks of the rock fill dam with face slabs, determine the duration of the tasks, and arrange the logical relationship of the tasks; 9. Plan the zoning of construction and design the scale and composition of construction factory facilities and the layout of the construction site; 10. Prepare target assurance measures for quality, safety and schedule;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine construction diversion options; 1.2 Determine the construction scheme of rock fill dam with face slabs 1.3 Prepare construction schedule plans; 1.4 Prepare the layout of the construction site; 1.5 Prepare construction organization design documents. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of hydraulics; 2.2 Principles of geotechnics and engineering geology; 2.3 Basic principles of concrete structures; 2.4 Principles of reservoir flood regulation

11. Prepare resource requirements plans; 12. Compile and prepare engineering construction organization design documents for rock fill dam with face slabs. 13. Observe health, occupational and environmental safety rules and regulations.	algorithms. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Theory of schedule control; 3.2 Theory of construction site layout; 3.3 Theory of value engineering; 3.4 Theory of construction organization design. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills; 4.6 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The construction organization and design for rock fill dams with face slabs are made in accordance with the design objectives and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Structural composition of rock fill dams with face slabs; 2. Quality assessment and acceptance standards for the engineering construction of water conservancy projects; 3. Characteristics of commonly-used building materials.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CONSTRUCT WATER CONSERVANCY	**DUTY NO.**	801
TASK TITLE	CARRY OUT THE CONSTRUCTION ORGANIZATION AND DESIGN OF CONCRETE DAMS	**TASK NO.**	8013
PERFORMANCE CRITERIA	The person performing this task must be able to carry out the construction organization and design of concrete dams in accordance with the design documents, contracts, relevant standards and specifications.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Information on the topography, hydrology, meteorology, geology and other construction conditions of the project site; 3. Design documents of concrete dam engineering; 4. Manual of construction machinery performance for earthwork, concrete engineering, pipeline engineering, electromechanical installation engineering, etc. 5. Safety gear		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Analyse construction conditions; 2. Prepare construction technology and site; 3. Select construction diversion methods and carry out the design of diversion buildings; 4. Determine the construction scheme for foundation treatment; 5. Determine the type and quantity of concrete mixing machinery; 6. Determine the concrete transportation mode and transportation machinery; 7. Determine the methods and related machinery for concrete warehousing, paving, closing, vibrating and curing; 8. Determine the flood interception plan; 9. Divide the construction tasks of the concrete dam, determine the duration of the tasks, and arrange the logical relationship of the tasks; 10. Plan the zoning of construction, design construction factory facilities scale and composition, and arrange the construction site;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine construction diversion options; 1.2 Determine the construction scheme of concrete mixing, transportation, pouring and maintenance; 1.3 Prepare construction schedule plans; 1.4 Prepare the layout of the construction site; 1.5 Prepare construction organization design documents. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of hydraulics; 2.2 Basic principles of concrete structures; 2.3 Principles of reservoir flood regulation algorithms. **3.0 Theories**

11. Prepare target assurance measures for quality, safety and schedule; 12. Prepare resource requirements plans; 13. Summarize and prepare the construction organization design documents of the concrete dam. 14. Observe health, occupational and environmental safety rules and regulations.	The person performing this task must be able to explain the following: 3.1 Theory of schedule control; 3.2 Theory of construction site layout; 3.3 Theory of value engineering; 3.4 Concrete temperature control theory; 3.5 Construction organization design theory. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.3 Equipment operation skills; 4.4 Teamwork skills; 4.5 Report writing skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The construction organization and design for concrete dams are carried out according to the concrete dam design objectives and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Concrete mechanical performance indicator parameters; 2. Design principle of concrete mix ratio; 3. Classification and engineering characteristics of concrete dams.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT PROJECT MANAGEMENT	**DUTY NO.**	802
TASK TITLE	ESTABLISH A PROJECT QUALITY CONTROL SYSTEM	**TASK NO.**	8021
PERFORMANCE CRITERIA	The person performing this task must be able to establish a quality control system for the project in accordance with the quality assessment and acceptance standards of the water conservancy project, in combination with the quality control requirements of engineering construction, organize the implementation according to the corresponding quality management plan, and continuously supervise and improve during the project construction to ensure the realization of the quality objectives in the project construction.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Quality testing instrument; 3. Statistical tools for quality data. 4. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Formulate quality policy and quality objectives, establish a quality control system, and ensure the effective operation of the system in the enterprise (organization); 2. Prepare relevant internal quality control systems of the enterprise (organization); 3. Prepare a quality plan and organize quality and technical disclosure; 4. Organize the construction of water conservancy construction projects with good quality and quantity on site; 5. Organize quality supervision and inspection, and collate and analyse the collected quality data; 6. Investigate and deal with potential quality hazards; 7. Prepare emergency plan for quality assurance and organize relevant accident treatment;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Establish a quality control system; 1.2 Make a quality plan and implement, inspect and adjust it; 1.3 Prepare and implement quality assurance measures. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Target control principles; 2.2 System engineering principles; 2.3 Principles of life cycle management of water conservancy projects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Continuous improvement theory; 3.2 Standardization theory; 3.3 Quality statistics and analysis theory;

8. Prepare quality assurance measures for water conservancy construction and organize implementation, supervision, inspection and improvement. 9. Observe health, occupational and environmental safety rules and regulations.	3.4 Total quality control theory. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Interdisciplinary learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills. **5.0 Mathematical Skills** 5.1 Mathematical statistics and analysis
DESCRIPTION OF THE END PRODUCT / SERVICE	A project quality control system is established in accordance with the quality objectives of the project construction.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. The process and content of the whole life cycle of water conservancy project construction; 2. Quality inspection technology of water conservancy projects; 3. Engineering construction technology of water conservancy projects.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT PROJECT MANAGEMENT	**DUTY NO.**	802
TASK TITLE	ESTABLISH A PROJECT INVESTMENT MANAGEMENT SYSTEM	**TASK NO.**	8022
PERFORMANCE CRITERIA	The person performing this task must be able to establish a project investment management system in accordance with the requirements of water conservancy project construction investment management, organize the implementation according to the corresponding investment control measures, and continuously supervise and improve during the construction to ensure the realization of its investment management objectives.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Investment management software 3. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Demonstrate and analyse investment objectives; 2. Divide investment objectives; 3. Formulate the workflow of investment control; 4. Conduct risk analysis of investment objectives; 5. Formulate the system of investment control; 6. Conduct investment control in the design and preparation stage; 7. Conduct investment control in the engineering design stage; 8. Conduct investment control in the engineering construction stage; 9. Conduct investment control in the completion, inspection and acceptance stage of the project; 10. Conduct investment control in the warranty stage of the project. 11. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the investment cost of water conservancy projects; 1.2 Formulate the investment control work plan during the implementation of the project; 1.3 Investment control in the whole process of water conservancy project construction. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Dynamic control principle 2.2 Stage control principle; 2.3 Principles of life cycle management of water conservancy projects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Continuous improvement theory; 3.2 System theory; 3.3 Risk control theory.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Interdisciplinary learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The project investment management system is established in accordance with the bidding objectives of water conservancy project construction.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about**: 1. Preparation of water conservancy project cost documents; 2. Time value of funds; 3. Project management mode of water conservancy project construction; 4. Cost composition of water conservancy project.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT PROJECT MANAGEMENT	**DUTY NO.**	802
TASK TITLE	ESTABLISH A PROJECT SCHEDULE CONTROL SYSTEM	**TASK NO.**	8023
PERFORMANCE CRITERIA	The person performing this task must be able to establish a project schedule control system in accordance with the requirements of water conservancy project construction schedule control, organize the implementation according to the corresponding schedule control measures, and continuously supervise and improve during the construction to ensure the realization of its schedule control objectives.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Schedule control software. 3. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Establish a schedule control system and ensure the effective operation of the system; 2. Prepare relevant internal schedule control systems of the enterprise (organization); 3. Divide the work tasks in the process of water conservancy project construction, determine the duration of each task, and clarify the logical relationship between each task; 4. Initially draw up the project schedule and optimize it; 5. Organize the supervision and inspection of the schedule; 6. Analyse the causes and effects of schedule deviation; 7. Deal with schedule deviation, and eliminate or reduce its influence; 8. Adjust the follow-up project schedule. 9. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Make a schedule plan and implement, inspect and adjust it; 1.2 Organize schedule control; 1.3 Prepare and implement schedule assurance measures. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Target control principles; 2.2 System engineering principles; 2.3 Principles of life cycle management of water conservancy projects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Continuous improvement theory; 3.2 Theory of schedule control; 3.3 Optimization theory.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Interdisciplinary learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	A project schedule control system is established in accordance with the schedule objectives of water conservancy project construction.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Estimation of work duration; 2. Technical and economic comparison methods of schemes; 3. Basic procedures for water conservancy project construction.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT PROJECT MANAGEMENT	**DUTY NO.**	802
TASK TITLE	ESTABLISH A PROJECT CONTRACT MANAGEMENT SYSTEM	**TASK NO.**	8024
PERFORMANCE CRITERIA	The person performing this task must be able to establish a project contract management system in accordance with the requirements of water conservancy project construction contract management, organize the implementation according to the contract performance plan, and continuously supervise and improve during the construction to ensure the realization of its contract objectives.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Contract management system; 3. FIDIC conditions of contract. 4. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Implement the national Contract Law and relevant laws and regulations on engineering construction contract management, and protect the legitimate rights and interests of the enterprise (organization) according to law; 2. Formulate and revise the contract management system and methods of the enterprise (organization), and organize the work of implementation of contract management; 3. Sign, change and contact relevant engineering contracts according to law; 4. Strictly examine the relevant contract documents of engineering construction to prevent imperfect and illegal contracts from appearing; 5. Assist the contract contractor to sign the contract and participate in the negotiation and signing of the contract; 6. Take charge of contract statistics, filing and storage; 7. Supervise and inspect the signing and performance of contracts; 8. Handle contract disputes reasonably.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Negotiate contracts and promote the signing of contracts; 1.2 Promote the implementation of contracts; 1.3 Respond to the change of contracts; 1.4 File the contract files. **2.0 Principle** The person performing this task must be able to explain the following principles: 2.1 Target control principles; 2.2 System engineering principles; 2.3 Principles of life cycle management of water conservancy projects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Continuous improvement theory; 3.2 Standardization theory; 3.3 Risk control theory.

9. Observe health, occupational and environmental safety rules and regulations.	**4.0 Essential Skills** 4.1 Communication skills; 4.2 Interdisciplinary learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills; 4.6 Risk identification and control skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	A project contract management system is established in accordance with the contract objectives of water conservancy project construction.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Responsibilities, obligations and requirements of all parties involved in the construction of the project; 2. Measurement methods of engineering quantity; 3. Terms of payment for the project.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	CARRY OUT PROJECT MANAGEMENT	**DUTY NO.**	802
TASK TITLE	ESTABLISH AN OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM	**TASK NO.**	8025
PERFORMANCE CRITERIA	The person performing this task must be able to establish the Occupational health, safety and environment management system according to the needs of occupational health, safety and environment management in water conservancy project construction, organize and implement it according to corresponding safety and environmental standard planning measures, and continuously supervise and improve it during project construction to ensure the realization of its safety and environmental management objectives.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Safety hazard identification tools; 3. Construction environment detection equipment for water conservancy project construction; 4. Safety and environmental monitoring system.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Formulate safety management and environmental management policies and objectives; 2. Establish an occupational health and safety management system and environmental management system, and ensure the effective operation of the system; 3. Prepare relevant internal safety and environmental control systems of the enterprise (organization); 4. Prepare technical measures for construction safety and organize safety technical disclosure; 5. Organize the supervision and inspection of work safety and environmental protection; 6. Investigate and deal with potential safety hazards; 7. Prepare emergency plans for production safety accidents and organize relevant accident treatment;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Establish occupational health and safety management system and environmental management system; 1.2 Formulate and implement safety management and environmental management plans; 1.3 Identify and deal with hazard sources; 1.4 Prevent and deal with quality problems and environmental problems. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Target control principles; 2.2 System engineering principles; 2.3 Principles of life cycle management of

8. Organize civilized construction on the construction site; 9. Prepare environmental protection measures for water conservancy construction projects and organize their implementation, supervision, inspection and improvement.	water conservancy projects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Continuous improvement theory; 3.2 Standardization theory; 3.3 Risk control theory. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Interdisciplinary learning skills; 4.3 Management skills; 4.4 Skills for operating computer software; 4.5 Teamwork skills; 4.6 Risk identification and control skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The occupational health, safety and environment management system is established in accordance with the safety and environmental management objectives of water conservancy project construction.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Safety technology of water conservancy project engineering construction; 2. Environmental protection requirements of construction projects.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	OCCUPATION CODE	
DUTY TITLE	CARRY OUT PROJECT MANAGEMENT	DUTY NO.	802
TASK TITLE	MANAGE THE PROJECT INFORMATION ACCESS CONTROL	TASK NO.	8026
PERFORMANCE CRITERIA	The person performing this task must be able to manage the project information access control in accordance with the quality, schedule, safety and other target requirements of water conservancy project management, with the help of the information processing platform based on the Internet, so as to improve the efficiency and accuracy of sharing and transmitting different classified information within the organization and among all parties involved in the construction, and improve the quality of project management.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and office operating system; 2. Project management software; 3. Project management information portal platform. 4. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Prepare the information management manual, make necessary amendments and supplements to it during the project implementation, and inspect and supervise its implementation; 2. Coordinate and organize the information processing work of each working department of the project management organization; 3. Establish and operate the maintenance information processing platform; 4. Cooperate with other departments to collect and process information, and to form various statements and reports reflecting project progress and project target control; 5. Use information technology to manage engineering files. 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Classify, code and process engineering project information; 1.2 Use and maintain project management information system; 1.3 Use and maintain the project information portal. **2.0 Principle** The person performing this task must be able to explain the following principles: 2.1 Principles of value engineering; 2.2 Principles of life cycle management of water conservancy projects. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Information resource management theory;

	3.2 Target control theory; 3.3 Histography. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Interdisciplinary learning skills; 4.3 Management and organization skills; 4.4 Data information collection and processing skills; 4.5 Teamwork skills; 4.6 Skills of reading and making drawings.
DESCRIPTION OF THE END PRODUCT / SERVICE	The project information access control is managed in accordance with the existing information access control laws and regulations and other technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Engineering project file management; 2. Basic computer operation skills.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DESIGN SMALL AND MEDIUM SIZED HYDRAULIC PROJECTS	**DUTY NO.**	803
TASK TITLE	DESIGN THE EARTH-ROCK DAM	**TASK NO.**	8031
PERFORMANCE CRITERIA	The person performing this task must be able to design the earth-rock dam scheme according to the requirements of earth-rock dam construction task, in combination with topography, hydrology and geological conditions, considering economy and safety, and in accordance with technical requirements.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and its operating system; 2. CAD design drawing software; 3. Geotechnical calculation software; 4. Structural calculation software. 5. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select the dam site of earth-rock dam; 2. Arrange pivot projects; 3. Select dam type and the design of earth-rock dam; 4. Analysis earth-rock dam seepage; 5. Analysis earth-rock dam stability; 6. Select the model of spillway and design the layout; 7. Carry out hydraulic design and structural design of spillway; 8. Design the foundation treatment of earth-rock dam, spillway foundation and slope treatment. 9. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Design the section of the earth-rock dam; 1.2 Calculate the overflow capacity of the spillway; 1.3 Analyse and check the stability of dam body; 1.4 Stress analysis of dam body; 1.5 Treat the foundation and slope. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of soil mechanics; 2.2 Principles of hydraulics; 2.3 Principles of load combination under different working conditions; 2.4 Energy dissipation principles of water flow. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Anti-sliding stability theory; 3.2 Strength theory of stress analysis; 3.3 Weir flow calculation theory.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Operation skills of CAD design drawing software; 4.5 Operation skills of geotechnical calculation software; 4.6 Operational skills of structural calculation software; 4.7 Teamwork skills; 4.8 Report writing skills; 4.9 Skills of reading and making drawings.
DESCRIPTION OF THE END PRODUCT / SERVICE	The earth-rock dam is designed in accordance with the requirements of the engineering construction task in combination with topography, geology and hydrological conditions.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Material characteristics and mechanical properties of earth and stone 2. Methods for mining, excavation, loading and transportation of earth and stone materials in the stockyard, laying and levelling soil on the dam surface and rolling. 3. Standards and methods for foundation treatment of hydraulic structures.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DESIGN SMALL AND MEDIUM SIZED HYDRAULIC PROJECTS	**DUTY NO.**	803
TASK TITLE	DESIGN THE FARMLAND WATER CONSERVANCY AND WATER-SAVING IRRIGATION PROJECT	**TASK NO.**	8032
PERFORMANCE CRITERIA	The person performing this task must be able to design the farmland water conservancy and water saving irrigation project according to the construction requirements of water-saving irrigation projects, in combination with topography and landform conditions, considering economy and safety, and in accordance with the technical requirements.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and its operating system; 2. CAD design drawing software; 3. Surveying and mapping software; 4. Geographic information software. 5. Safety gear		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Choose reasonable water intake methods according to water source conditions; 2. Carry out hydraulic calculation of the water diversion project; 3. Plan the layout of the irrigation system in irrigation area; 4. Carry out flow calculation and vertical/cross section design of the irrigation system; 5. Design the layout and planning of micro sprinkler irrigation, drip irrigation and infiltration irrigation system. 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Design a ground irrigation system and micro-irrigation system; 1.2 Design a field irrigation network; 1.3 Design a vertical/cross section of an irrigation channel; 1.4 Calculate the design flow of an irrigation channel. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Principles of soil water movement; 2.2 Principles of farmland water balance. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Irrigation water source selection theory in irrigation area; 3.2 Planning and layout theory of field engineering and field irrigation network;

	3.3 Field engineering design theory. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Operation skills of CAD design drawing software; 4.5 Operation skills of surveying and mapping software; 4.6 Operation skills of geographic information software; 4.7 Teamwork skills; 4.8 Report writing skills; 4.9 Skills of reading and making drawings.
DESCRIPTION OF THE END PRODUCT / SERVICE	The farmland water conservancy and water saving irrigation project is designed in accordance with the construction requirements of water-saving irrigation project.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Types, characteristics and application conditions of irrigation methods; 2. Planning and layout of irrigation system in irrigation area; 3. Hydraulic calculation of channel section.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DESIGN SMALL AND MEDIUM SIZED HYDRAULIC PROJECTS	**DUTY NO.**	803
TASK TITLE	DESIGN THE ROCK FILL DAM WITH FACE SLABS	**TASK NO.**	8033
PERFORMANCE CRITERIA	The person performing this task must be able to design the rock fill dam with face slabs according to the requirements of the construction task of rock fill dam with face slabs, in combination with topography, hydrology and geological conditions, considering economy and safety, and in accordance with technical requirements.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and its operating system; 2. CAD design drawing software; 3. Geotechnical calculation software; 4. Structural calculation software. 5. Safety gear		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select suitable dam building materials according to filling standards; 2. Reasonably design the layout and zoning of dam body; 3. Carry out structural design of primary and secondary rockfill areas, dam slope, cushion area and transition layer of dam body; 4. Carry out structural design of concrete toe slab and face slab of dam body; 5. Design the detailed structure of the dam body; 5. Design the dam foundation treatment; 6. Design the connection between dam body and dam foundation, bank slope and other buildings; 7. Calculate the seepage, seepage stability and dam slope stability of the dam. 8. Observe health, occupational and environmental safety rules and	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Determine the dam material filling standard; 1.2 Design the structure of the dam crest and the dam slope; 1.3 Analyse the stability and stress and strain of the dam body. 1.4 Design the anti-seepage structure of the dam body; 1.5 Carry out seismic design of the dam body; 1.6 Perform dam foundation treatment. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Compression consolidation principles; 2.2 Seepage principles; 2.3 Principles of load combination under different working conditions. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Limit equilibrium theory of slope stability;

regulations.	3.2 Seismic design theory; 3.3 Hydraulic design theory. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Operation skills of CAD design drawing software; 4.5 Operation skills of geotechnical calculation software; 4.6 Operational skills of structural calculation software; 4.7 Teamwork skills; 4.8 Report writing skills; 4.9 Skills of reading and making drawings.
DESCRIPTION OF THE END PRODUCT / SERVICE	The rock fill dam with face slabs is designed in accordance with the requirements of the engineering construction task in combination with topography, geology and hydrological conditions.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Classification of water conservancy and hydropower engineering classes and hydraulic structure classes; 2. Determination of flood standards for permanent hydraulic structures and temporary hydraulic structures; 3. Engineering application of basic intensity and seismic fortification intensity of engineering site; 4. Structural characteristics of reinforced concrete; 5. Classification and engineering characteristics of earthwork; 6. Standards and methods for foundation treatment of hydraulic structures.

OCCUPATION	WATER CONSERVANCY AND HYDROPOWER ENGINEERING ENGINEER	**OCCUPATION CODE**	
DUTY TITLE	DESIGN SMALL AND MEDIUM SIZED HYDRAULIC PROJECTS	**DUTY NO.**	803
TASK TITLE	DESIGN THE CONCRETE DAM	**TASK NO.**	8034
PERFORMANCE CRITERIA	The person performing this task must be able design the concrete dam according to the requirements of gravity dam construction task, in combination with topography, hydrology and geological conditions, considering economy and safety, and in accordance with technical requirements.		
RANGE STATEMENT	The task can be performed in the office or construction site under the supervision of the senior engineer of water conservancy and hydropower engineering. The tools and equipment to be used include: 1. Computer and its operating system; 2. CAD design drawing software; 3. Geotechnical calculation software; 4. Structural calculation software. 5. Safety gear		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Select the dam site of the concrete dam; 2. Arrange pivot projects; 3. Design the section of non-overflow dam section and overflow dam section of the concrete dam; 4. Design the flood discharge and energy dissipation structure of the concrete dam; 5. Calculate the anti-sliding stability and stress of the concrete dam; 6. Design the internal structure of the dam; 7. Carry out anti-seepage and reinforcement design of the dam foundation. 8. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Design the section of the concrete dam body; 1.2 Calculate the overflow capacity of the overflow dam; 1.3 Analyse and check the stability of the dam body; 1.4 Analyse the stress of the dam body; 1.5 Treat the dam foundation. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Design principles of concrete structures; 2.2 Principles of hydraulics; 2.3 Principles of load combination under different working conditions; 2.4 Energy dissipation principles of water flow. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Anti-sliding stability theory; 3.2 Strength theory of stress analysis; 3.3 Weir flow calculation theory.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Learning skills; 4.3 Management skills; 4.4 Operation skills of CAD design drawing software; 4.5 Operation skills of geotechnical calculation software; 4.6 Operational skills of structural calculation software; 4.7 Teamwork skills; 4.8 Report writing skills; 4.9 Skills of reading and making drawings.
DESCRIPTION OF THE END PRODUCT / SERVICE	The concrete dam is designed in accordance with the requirements of the engineering construction task in combination with topography, geology and hydrological conditions.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Material characteristics and mechanical properties of concrete; 2. Mixing, transportation, construction and maintenance methods of concrete; 3. Standards and methods for foundation treatment of hydraulic structures.

APPENDIX: DACUM CHARTS FOR WATER CONSERVANCY AND HYDROPOWER ENGINEER - NTA LEVEL 8

DUTIES	TASKS	ENABLERS
1.0 Construct Water conservancy	1.1 Prepare the construction organization and design of farmland water conservancy and water-saving irrigation projects. 1.2 Prepare the construction organization and design of rock fill dam with face slabs. 1.3 Carry out the construction organization and design of a concrete dams.	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings. · Office software operation skills **Tools and equipment** · Computer and its operating system · Handbook of construction machinery performance · CAD drawing software **Materials** · Basic engineering data and drawings · Technical requirements and technical standard document for water conservancy engineering construction **Requirements for employees** · Teamwork spirit · Scientific spirit and rigor · Quality consciousness · Time consciousness · Safety consciousness
2.0 Carry out project management	2.1 Establish a project quality control system. 2.2 Establish a project investment management system. 2.3 Establish a project schedule control system. 2.4 Establish a project contract management system. 2.5 Establish an occupational health, safety and environment management	**General skills and knowledge** · Communication skills · Learning skills · Management skills · Software operation skills · Teamwork skills · Report writing skills · Skills of reading and making drawings. · Office software operation skills

DUTIES	TASKS	ENABLERS
	system.	**Tools and equipment** · Computer and its operating system · Project management software · CAD or BIM related software · Quality testing instrument **Materials** · Standardization work guide specification document · Industry project management specification, regulation and standard document · FIDIC contract conditions document **Requirements for employees** · Teamwork spirit · Honesty and trustworthiness · Scientific spirit and rigor · Safety consciousness · Environmental protection awareness · Big-picture awareness
	2.6 Manage the project information access control.	
3.0 Design small and medium sized hydraulic projects	3.1 Design the earth-rock dam .	**General skills and knowledge** · Skills of reading and making drawings · Software operation skills · Teamwork skills · Report writing skills **Tools and equipment** · Computer and its operating system · Printer, calculator · Engineering drawing software · Structural calculation software · Geotechnical calculation software **Materials** · Specification documents for design of hydraulic structures · Basic engineering data and drawings **Requirements for employees**
	3.2 Design the Farmland water conservancy and water-saving irrigation project design.	
	3.3 Design the rock fill dam with face slabs.	
	3.4 Design the concrete dam.	

DUTIES	TASKS	ENABLERS
		· Teamwork spirit · Pursuit of excellence · Carefulness and conscientiousness