

# Irrigation Technologist Skill Standards Template B

## **A1. DETERMINE CROP OR CROPPING SEQUENCE**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- All crops grown in area are considered.
- Market viability of all potential crops is accurately assessed.
- Recommendation is made to client based on market analysis and individual field conditions.
- Final cropping decision is made by client.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of growing conditions and growing requirements of local crops.
- Knowledge of access to local agricultural markets.
- Ability to match crops with area conditions.
- Ability to assess field conditions.
- Ability to assist client in cropping decision.
- Ability to convert numerical data.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to generate and evaluate alternative solutions and predict outcomes based on experience/prior knowledge.
- Ability to recognize and respond to client needs.
- Ability to demonstrate commitment to client.
- Ability to present basic information and concepts to client.

## **A2. ASSESS SOIL, TOPOGRAPHY, WEATHER & WATER AVAILABILITY**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- All water rights are processed and documented.
- Climatologically evaluation is complete and accurate.
- Sources to evaluate soil and topography are compiled and cross checked.
- Field inspections verify gathered information is accurate.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of soils' water holding capacity and infiltration rates.
- Knowledge of topography.
- Knowledge of area weather patterns and ability to gather weather data.
- Ability to evaluate properties for future crops.
- Ability to research water rights.
- Ability to recognize possible field obstacles and interferences.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to obtain, analyzes, and integrates multiple items of relevant data.
- Ability to use logic to draw conclusions.

- Ability to follow rules and procedures.

### **A3. SELECT IRRIGATION SYSTEM**

#### **PERFORMANCE INDICATORS**

*How do we know when the task is performed well?*

- All viable irrigation systems are evaluated.
- All cropping practices are included in decision making process.
- System recommendation and/or options presented to client are in client's best interest.
- Client makes final system selection.

#### **TECHNICAL KNOWLEDGE**

*Skills, Abilities, Tools*

- Knowledge of crops and cropping practices.
- Knowledge of irrigation systems.
- Ability to determine best system for client's farming practices.

#### **EMPLOYABILITY SKILLS**

*Academic & SCANS Skills and Personal Qualities*

- Ability to recognize and respond to client needs.
- Ability to demonstrate commitment to client.
- Ability to present basic information and concepts to client.
- Ability to evaluate alternative solutions.
- Knowledge of hydraulics.

### **A4. DEVELOP IRRIGATION SYSTEM LAYOUT**

#### **PERFORMANCE INDICATORS**

*How do we know when the task is performed well?*

- Sprinkler/emitter spacing is done according to industry standards for the crop and region.
- Lateral layout matches sprinkler/emitter spacing.
- Main line is located and sized to supply optimum water to laterals.
- Pumps and valves are located to supply water to main lines and laterals at appropriate time, pressure, and volume.
- An accurate and scaled as built blueprint of system layout is provided to client.

#### **TECHNICAL KNOWLEDGE**

*Skills, Abilities, Tools*

- Knowledge of irrigation systems.
- Ability to match up components to create a complete system.
- Ability to calculate pump, valve and pipe sizes.
- Ability to apply irrigation design principles

#### **EMPLOYABILITY SKILLS**

*Academic & SCANS Skills and Personal Qualities*

- Ability to analyze/assess/evaluate numerical data.
- Ability to formulate new ideas/plans/approaches.
- Ability to apply creative solutions to new situations.
- Ability to generate and evaluate alternative solutions.
- Ability to create original documents.
- Knowledge of hydraulics.

## **B1. PERFORM PRECONSTRUCTION WALK-THROUGH**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- All plans are consolidated and cross-referenced.
- Site is inspected and all potential problems, concerns, and scheduling factors are correctly identified.
- Installation schedule and procedures are established and contractor and client agreement are obtained.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of irrigation installation procedures.
- Knowledge of site inspection procedures.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Knowledge of topography.
- Ability to read blueprints.
- Ability to prepare and organize multiple schedules.
- Ability to coordinate and work with various service providers.
- Analyzes situation.
- Analyzes and distributes work assignments.

## **B2. MARK FIELD LOCATION OF ALL SYSTEM COMPONENTS**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Field location marks are placed in accordance to engineering plans.
- System fits the property as designed.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Ability to utilize survey equipment to establish property boundaries and irrigation equipment locations.
- Knowledge of irrigation systems and components.
- Ability to locate property boundaries.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to follow set of instructions.
- Ability to read and interpret blueprints.
- Ability to operate technical equipment.

### **B3. STAGE THE JOB**

#### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Effective delivery schedules for components are established and delivery of components is documented as they arrive on-site.
- Sub-contractors are effectively scheduled.

#### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of irrigation components.
- Knowledge of heavy equipment operation.
- Knowledge of vendors and the services they provide.

#### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to generate installation plan.
- Ability to set realistic goals.
- Ability to monitor safe and efficient utilization of materials.
- Ability to coordinate, acquisition, storage and distribution of materials.
- Ability to communicate clearly with vendors.
- Ability to manage timelines.

### **B4. INSTALL WATER SUPPLY**

#### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- The development of water supply is monitored and compliance with government regulations and design parameters is verified.
- The building of pumping platform is properly monitored to verify that construction meets industry standards.
- The installation of pump(s), valve(s), and necessary electrical equipment is properly monitored to verify that installation meets industry standards.
- All work is performed in a timely manner in accordance with the installation schedule.

#### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of water sources.
- Knowledge of pumps.
- Knowledge of electricity.
- Knowledge of government regulations.
- Ability to use hand tools safely and correctly.

#### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to present basic ideas and information.
- Ability to apply principles to situation.
- Ability to formulate plan of action.
- Ability to monitor work performance.

- Ability to read blueprints.
- Ability to manage timeline.
- Knowledge of hydraulic principles.

## **B5. INSTALL UNDERGROUND EQUIPMENT**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Installation of pipe, valves, and wire is properly monitored to verify that installation is at proper location and depth.
- Pipe, valves, and wire are in proper operating condition in accordance with industry and government standards.
- All work is performed in a timely manner in accordance with the installation schedule.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of government specifications.
- Knowledge of and ability to locate manufacturers' specifications.
- Knowledge of safe construction/excavating equipment operation.
- Knowledge of irrigation components.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to present basic ideas and information.
- Ability to apply principles to situations.
- Ability to formulate plan of action.
- Ability to read blueprints.
- Ability to monitor work performance.
- Ability to manage timeline.
- Ability to follow set of instructions.

## **B6. ASSEMBLE OR INSTALL ABOVE GROUND EQUIPMENT**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Installation of pipe, valves, electrical controls and sprinklers is monitored to verify that installation is in the proper location.
- Pipe, valves, electrical controls and sprinklers are in proper operating condition in accordance to industry and government standards.
- All work is performed in a timely manner in accordance with the installation schedule.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of government specifications.
- Knowledge of and ability to locate manufacturers' specifications.
- Knowledge of safe construction equipment operation.
- Knowledge of irrigation components.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to present basic ideas and information.
- Ability to apply principles to situation.
- Ability to formulate plan of action.
- Ability to monitor work performance.
- Ability to read blueprints.
- Ability to manage timeline.
- Ability to follow set of instructions.

## **B7. TEST SYSTEM**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Electrical system operates at proper voltage and amperage.
- Valves and controls operate to manufacturers' specifications.
- All piping has structural integrity and delivers water at proper flow and pressure.
- All sprinklers perform to manufacturers' specifications.
- Equipment is operated safely and in proper sequence.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of electricity.
- Knowledge of water hydraulics.
- Knowledge of irrigation components.
- Knowledge of start-up procedures.
- Ability to safely use irrigation testing equipment.
- Ability to interpret technical manuals.
- Ability to operate irrigation equipment.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to interpret information and data.
- Ability to visually analyze relationship between parts and the whole.
- Ability to use logic to draw conclusions.
- Ability to monitor system performance.

## **C1. OPERATE SYSTEM**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Correct operating procedures are adhered to according to manufacturers' specifications.
- The system is operated safely.
- Irrigation schedule is properly followed.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of irrigation systems and their components.
- Knowledge of electricity.
- Knowledge of crop water demands.
- Ability to locate reliable and current sources of information.

- Understanding of safety issues and precautions necessary for operating irrigation systems.
- Ability to recognize when system is operating as designed.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to select appropriate sources of information and follow set of instructions.
- Ability to monitor system performance.
- Ability to understand system operations and judge system effectiveness/efficiency.
- Knowledge of water hydraulics.

## **C2. MONITOR CROPS AND SOIL**

#### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- Appropriate procedures for gathering crop and soil samples are followed.
- Moisture level of samples is accurately evaluated.
- Information is accurately recorded in a timely manner.

#### TECHNICAL KNOWLEDGE

##### *Skills, Abilities, Tools*

- Knowledge of soil moisture and crop monitoring.
- Understanding of soil moisture and crop monitoring techniques.
- Ability to use various instruments and methods to measure soil and crop moistures.
- Knowledge of technical terms and industry jargon.
- Ability to observe factors that may affect accurate sample collecting.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to work cooperatively with others.
- Ability to record numerical data.
- Ability to examine information for relevance and accuracy.
- Ability to pay attention to details.
- Ability to prepare and organize multiple schedules.
- Ability to record information accurately.

## **C3. ADJUST IRRIGATION SCHEDULE**

#### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- Current weather conditions and soil and crop moisture levels are considered to determine appropriate irrigation schedule.
- Course of action is accurately determined to maintain optimum soil moisture content.
- Irrigation schedule is accurately adjusted to maintain optimum crop growth.
- Water is used to maximum efficiency.
- Information is accurately recorded in a timely manner.

#### TECHNICAL KNOWLEDGE

##### *Skills, Abilities, Tools*

- Ability to utilize customized computer software for the input, retrieval and evaluation of moisture data.

- Knowledge of system precipitation rates.
- Knowledge of weather station data.
- Ability to calculate consumptive use.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to monitor and evaluate system.
- Ability to calculate mathematical data.
- Ability to evaluate/adjust plan of action.
- Ability to interpret and analyze information.
- Ability to prepare and organize multiple schedules.
- Ability to pay attention to details.
- Ability to ensure work quality.
- Ability to record information accurately.

#### **C4. ADJUST IRRIGATION EQUIPMENT**

##### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- Appropriate reference material is selected for the adjustment.
- Adjustments are within the parameters of the system.
- Adjustments result in equipment operating as desired.
- Adjustments are performed safely and meet government regulations for safety.
- Information is accurately recorded in a timely manner.

##### TECHNICAL KNOWLEDGE

##### *Skills, Abilities, Tools*

- Knowledge of irrigation system components.
- Knowledge of irrigation system operation.
- Knowledge of plant-water-soil demands.
- Ability to use hand tools safely and correctly.
- Ability to follow proper procedures for adjusting equipment.
- Ability to use meters and gauges to determine proper adjustment levels.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to determine system components to be modified or improved.
- Ability to calculate mathematical data.
- Ability to evaluate/adjust equipment.
- Ability to interpret and analyze information.
- Ability to pay attention to details.
- Ability to ensure work quality.
- Ability to record information accurately.
- Ability to use materials in a safe and efficient manner.



## **C5. APPLY CHEMICALS**

### **PERFORMANCE INDICATORS**

*How do we know when the task is performed well?*

- Chemical solutions are properly mixed and injected.
- Application of chemicals is monitored for accuracy.
- All established safety procedures are followed.
- System is properly cleaned following application.
- Chemicals are properly stored/disposed of according to government regulations.
- Information is accurately recorded in a timely manner.

### **TECHNICAL KNOWLEDGE**

*Skills, Abilities, Tools*

- Knowledge of various chemicals for compatibility and crop related use.
- Ability to safely mix chemicals into the desired concentration levels.
- Knowledge of hazardous materials regulations.
- Ability to use various chemical injection methods.
- Ability to completely flush chemicals from system.
- Ability to maintain system integrity from corrosion and plugging.

### **EMPLOYABILITY SKILLS**

*Academic & SCANS Skills and Personal Qualities*

- Ability to select appropriate information and follow set of instructions.
- Ability to perform basic computations.
- Ability to pay attention to detail.
- Ability to follow rules, policies, and procedures.
- Ability to record information accurately.
- Ability to monitor safe and efficient utilization of materials.
- Ability to monitor system performance.

## **D1. MANAGE INVENTORY**

### **PERFORMANCE INDICATORS**

*How do we know when the task is performed well?*

- Inventory of parts needed to keep system in operation is maintained.
- Parts purchased for inventory are of desired quality.
- Service is available for components in inventory.
- Warranty items are handled according to manufacturer's instructions.
- Inventory records are accurate and up-to-date.

### **TECHNICAL KNOWLEDGE**

*Skills, Abilities, Tools*

- Knowledge of vendor quality and service.
- Ability to evaluate used parts and components for wear.
- Knowledge of irrigation components.
- Ability to utilize computer database and parts ordering software.

### **EMPLOYABILITY SKILLS**

*Academic & SCANS Skills and Personal Qualities*

- Ability to record information accurately.
- Ability to write warranty documents.
- Ability to identify relevant components.
- Ability to communicate appropriate verbal information.
- Ability to translate blueprints/drawings/diagrams.
- Ability to establish rapport with co-workers and clients.
- Ability to perform routine record keeping and maintain balanced accounts.
- Ability to identify future material needs.
- Ability to perform data entry and understand computer operation.

## **D2. PERFORM PREVENTIVE MAINTENANCE**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- Maintenance schedule is developed and followed.
- Maintenance tasks are performed according to industry standards.
- Hazardous materials are stored/disposed of properly.
- Maintenance work is properly documented.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of irrigation components used in a system.
- Knowledge of system operations.
- Ability to use hand tools safely and correctly.
- Knowledge of hazardous material regulations.

### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to follow set of instructions.
- Ability to perform a given set of tasks.
- Ability to read technical manuals.
- Ability to use materials in a safe and efficient manner.
- Ability to complete record forms.

## **D3. PERFORM ANNUAL SYSTEM START-UP**

### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- System is started according to established procedures.
- All components are inspected and evaluated.
- Any necessary repairs are made to the system.

### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Ability to locate appropriate reference material.
- Knowledge of irrigation components.
- Knowledge of irrigation system layout.
- Ability to evaluate irrigation components.
- Ability to use meters and gauges to determine proper adjustment levels.

- Ability to use hand tools safely and correctly.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to follow a set of instructions.
- Ability to understand the operation of the system.
- Ability to perform an assigned task.
- Knowledge of water hydraulics.

#### **D4. REBUILD SYSTEM COMPONENTS**

##### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- Repairs are completed according to manufacturers' specifications.
- Parts are re-built to like-new condition.
- Parts are tested and perform as designed.

##### TECHNICAL KNOWLEDGE

##### *Skills, Abilities, Tools*

- Basic understanding of electrical, hydraulic, and mechanical components.
- Ability to test components and evaluate condition.
- Knowledge of safety procedures.
- Ability to use hand tools safely and correctly.
- Ability to replace parts in an irrigation system.
- Ability to locate appropriate reference material.
- Ability to recognize wear, damage and failure of components.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to follow technical manual guidelines.
- Ability to follow safety procedures.
- Ability to analyze component wear, damage and failure and determine cause.
- Ability to determine repair procedures.
- Ability to correct malfunction.

#### **D5. WINTERIZE SYSTEM**

##### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- System is winterized according to established procedures.
- All components are inspected and evaluated.
- Any necessary repairs are made to the system.

##### TECHNICAL KNOWLEDGE

##### *Skills, Abilities, Tools*

- Ability to locate appropriate reference material.
- Knowledge of irrigation components.
- Knowledge of water hydraulics.
- Knowledge of irrigation system layout.
- Ability to evaluate irrigation components.

- Ability to use hand tools safely and correctly.
- Ability to operate air compressor.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to follow a set of instructions.
- Ability to understand the operation of the system.
- Ability to perform an assigned task.

### **D6. UPDATE SYSTEM**

#### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- System improvements are identified and defined.
- Costs are documented and return on investment evaluated.
- Update plan is presented to client in a professional manner.
- System updates are performed according to client's preference and function according to plan.

#### TECHNICAL KNOWLEDGE

##### *Skills, Abilities, Tools*

- Knowledge of irrigation system design and components.
- Ability to evaluate cost in respect to benefits.
- Ability to operate the system.
- Ability to communicate professionally.

#### EMPLOYABILITY SKILLS

##### *Academic & SCANS Skills and Personal Qualities*

- Ability to ask relevant questions.
- Ability to present technical information clearly.
- Ability to analyze equipment.
- Ability to create recommendations.
- Ability to forecast quantitative results.
- Ability to value differences of opinion.
- Ability to implement plan of action.
- Ability to forecast project costs.
- Ability to adapt and implement new technology.
- Knowledge of water hydraulics.

### **E1. TROUBLESHOOT MECHANICAL EQUIPMENT FAILURES**

#### PERFORMANCE INDICATORS

##### *How do we know when the task is performed well?*

- System is completely evaluated and cause of failure is accurately isolated.
- Components are inspected for failure, and all necessary components are replaced.
- System is correctly reassembled and verification is obtained that operating condition meets manufacturers' specifications.

## TECHNICAL KNOWLEDGE

### *Skills, Abilities, Tools*

- Knowledge of mechanical systems, their components and their relationship to each other.
- Ability to test components and evaluate condition.
- Knowledge of safety procedures.
- Ability to use hand tools safely and correctly.
- Ability to replace parts in a mechanical system.
- Ability to locate and utilize appropriate reference material.

## EMPLOYABILITY SKILLS

### *Academic & SCANS Skills and Personal Qualities*

- Ability to gain information through research.
- Ability to perform measurements.
- Ability to make connections between old and new.
- Ability to analyze possible failures.
- Ability to analyze information and solutions.
- Ability to perform technological solutions.

## **E2. TROUBLESHOOT ELECTRICAL EQUIPMENT FAILURES**

### PERFORMANCE INDICATORS

#### *How do we know when the task is performed well?*

- System is completely evaluated and cause of failure accurately isolated.
- Components are inspected for failure and all necessary components are replaced.
- System is reassembled and verification is obtained to ensure that operating condition meets manufacturers' specifications.

## TECHNICAL KNOWLEDGE

### *Skills, Abilities, Tools*

- Knowledge of electrical systems, their components and their relationship to each other.
- Knowledge of single phase and three phase electric power.
- Ability to test components and evaluate condition.
- Knowledge of safety procedures.
- Ability to safely and correctly use hand tools and electrical test equipment.
- Ability to replace parts in an electrical system.
- Ability to locate and utilize appropriate reference material.

## EMPLOYABILITY SKILLS

### *Academic & SCANS Skills and Personal Qualities*

- Ability to gain information through research.
- Ability to perform measurements.
- Ability to make connections between old and new.
- Ability to analyze possible failures.
- Ability to analyze information and solutions.
- Ability to perform technological solutions.

### **E3. TROUBLESHOOT COMPUTER EQUIPMENT FAILURES**

#### PERFORMANCE INDICATORS

*How do we know when the task is performed well?*

- System is completely evaluated and cause of failure is accurately isolated.
- Components are inspected for failure and necessary components are replaced.
- System is reassembled and verification is obtained to ensure that operating condition meets manufacturers' specifications.

#### TECHNICAL KNOWLEDGE

*Skills, Abilities, Tools*

- Knowledge of computerized systems, their components and their relationship to the irrigation system.
- Knowledge of basic program input.
- Ability to test components and evaluate condition.
- Knowledge of safety procedures.
- Ability to use electrical test equipment safely and correctly.
- Ability to replace parts in a computer system.
- Ability to locate and utilize appropriate reference material.

#### EMPLOYABILITY SKILLS

*Academic & SCANS Skills and Personal Qualities*

- Ability to gain information through research.
- Ability to perform measurements.
- Ability to make connections between old and new.
- Ability to analyze possible failures.
- Ability to analyze information and solutions.
- Ability to perform technological solutions.