The General Trade Knowledge portion of the examination is administered daily in Computer Based Testing (CBT) format. It will consist of 80 equally weighted questions.

The examination will have questions relating to the following content areas and necessary knowledge for each area includes:

- reading and interpreting plans and specifications
- reading and interpreting codes
- basic mathematics (addition, subtraction, multiplication, division, calculations of area and volume, fractions, decimals, percentages, calculating the sides of triangles, square roots, powers of numbers, and solving simple algebraic equations for unknown variables)

You should be prepared to respond to examination questions on any of the content areas listed. Questions asked and content areas tested on previous examinations should not be assumed to be the only possible questions to be asked or content areas to be tested on this examination.

The percentage of questions shown for each content area may vary by as much as plus or minus three (3) percent. Please refer to the Candidate Information Brochure and the Reference List for additional information.

Content Area A 20%

Pre-Installation

1. Performing a visual inspection of site and equipment
   - knowledge of equipment needed for site work
   - ability to identify obstructions and access points
   - knowledge of removal of site debris
   - knowledge of types of equipment
   - knowledge of figuring quantity of materials

2. Review plans and specifications and recommend changes
   - knowledge of construction techniques
   - knowledge of local utility specifications
   - knowledge of plans and materials specifications
   - knowledge of latest pipe technologies
   - knowledge of estimating

3. Preparing shop drawings
   - knowledge of standards (e.g., ASTM, AWWA)
   - knowledge of materials specifications and products
   - ability to organize, read, and understand specifications and plans

4. Reviewing federal, state, and local codes and ordinances
   - knowledge of pre-installation requirements
   - knowledge of local code requirements and jurisdictions of utility districts
   - knowledge of references, sources of codes and ordinances
   - knowledge of MSDS’s
   - knowledge of SWPPP (Storm Water Pollution Prevention Plan)

5. Determining location of excavations
   - knowledge of invert elevations
   - knowledge of basic surveying and layout techniques
   - knowledge of safety requirements
   - knowledge of recording pre-existing job conditions (e.g., location of existing utilities)
   - knowledge of sub-surface ground conditions

6. Digging test holes to determine water levels
   - knowledge of drilling equipment and practices
   - knowledge of existing utilities
   - knowledge of seasonal variations

7. Coordinating and directing soil preparation and testing soil and ground water
   - knowledge of excavating and soil composition
   - knowledge of soil and water testing procedures
   - knowledge of potentially contaminated soils
8. Determining burial depth and slope
   - knowledge of excavation
   - knowledge of surveying and leveling techniques

9. Locating existing utilities and underground obstructions
   - knowledge of where to find information
   - knowledge of when and how to notify the appropriate authority
   - knowledge of permissible working conditions

10. Complying with erosion control guidelines
    - knowledge of erosion control guidelines
    - knowledge of turbidity and testing

11. Unloading, lifting and transporting pipes
    - knowledge of weight capacity of front end loaders
    - knowledge of cabling and rigging or other material
    - knowledge of handling equipment

12. Stacking and storing pipes
    - knowledge of dividers
    - knowledge of appropriate conditions for stacking and storing pipes

13. Reading plans and specifications
    - knowledge of plan scales and symbols
    - knowledge of cross sections and profiles
    - knowledge of geotechnical reports

**Content Area B**

**Traffic Control**

1. Complying with traffic control laws and contract requirements
   - knowledge of traffic codes and regulations
   - ability to communicate with emergency services
   - knowledge of current MOT requirements

2. Erecting and positioning road signs, cones, barricades and detours
   - knowledge of traffic codes and regulations

3. Applying temporary pavement markings
   - knowledge of traffic codes and regulations

4. Managing and coordinating flaggers
   - knowledge of traffic codes and regulations
   - knowledge of location of stockpiled material along right-of-way

**Content Area C**

**Excavating, Backfill, and Compaction**

20%

1. Constructing trenches
   - knowledge of pipe layout
   - knowledge of appropriate widths for different pipes
   - knowledge of surveying techniques
   - knowledge of shoring techniques
   - knowledge of soil types
   - knowledge of OSHA requirements (e.g., competent person on job site)

2. Calculating excavation and backfill
   - knowledge of effects of compaction
   - knowledge of soil properties

3. Removing trees, shrubs, and fences
   - knowledge of excavation equipment
   - knowledge of demolition

4. Cutting and replacing pavement
   - knowledge of safety
   - knowledge of local specifications and regulations
   - knowledge of asphalt types

5. Performing dewatering
   - knowledge of pumping techniques
   - knowledge of well points
   - knowledge of piping hook-up
   - knowledge of soil permeability and drainage
   - knowledge of water table
   - knowledge of drawdown
   - knowledge of sock drains
   - knowledge of turbidity and testing

6. Installing sheet piling and reinforcing requirements
   - knowledge of angles of repose
   - knowledge of stress supports
   - knowledge of wood piling
   - knowledge of metal piling
   - knowledge of OSHA regulations

7. Utilizing trench boxes and shields
   - knowledge of excavating
   - knowledge of soil properties
   - knowledge of OSHA regulations

8. Installing tunnels
   - knowledge of drilling
   - knowledge of excavating
   - knowledge of bracing
knowledge of surveying techniques
knowledge of ventilation
knowledge of safety requirements
knowledge of dewatering
knowledge of pumps

9. Jack and bore casings
knowledge of hydraulic jacking and boring equipment
knowledge of hydraulic jacking and boring procedures

10. Trenching in non-cohesive soil or sand
knowledge of digging devices
knowledge of sheet piling
knowledge of soil properties
knowledge of angle of repose

11. Installing pipe bedding
knowledge of appropriate types
knowledge of determining depth or thickness needed
knowledge of grading

12. Replacing finish surfaces (e.g., asphalt, concrete)
knowledge of appropriate asphalt and concrete types
knowledge of testing
ability to layout and calculate volume and area (square footage, cubic yards)
knowledge of grade and compaction
knowledge of curing periods
knowledge of local and state codes and regulations

13. Installing filter fabrics and backfill migration preventers
knowledge of soils
knowledge of water tables
knowledge of filter fabric

14. Checking for required finish grade and invert elevation
knowledge of reading levels
knowledge of leveling and surveying techniques

15. Proper sloping

16. Installing backfill material for pipes and structures
knowledge of different types of backfill materials

knowledge of correct grade surveying equipment
knowledge of grade and compaction
knowledge of proper backfill to support existing utilities after digging

Content Area D 15%
Pipe Installation and Repairs

1. Installing, replacing and repairing pressure pipes
knowledge of types and application
knowledge of placement
knowledge of associated fittings
knowledge of elevations
knowledge of laser grade beams
knowledge of survey instruments
knowledge of testing
knowledge of OSHA regulations
knowledge of local and state codes and regulations

2. Installing, replacing and repairing gravity sewer pipes
knowledge of piping materials
knowledge of equipment
knowledge of pipe laser equipment
knowledge of survey instruments and techniques
knowledge of ground water
knowledge of pipe slopes and grades
knowledge of bedding requirements and placement of bedding
knowledge of air testing
knowledge of proper compaction
knowledge of OSHA regulations
knowledge of assembly
knowledge of sealants
knowledge of preventing and testing for pipe deflection
knowledge of trenchless installation procedures
knowledge of local and state codes and regulations

3. Installing piping for pumps
knowledge of capacity of different size pumps
knowledge of fittings and valves

4. Installing manholes, lift stations and catch basins
knowledge of cutting and sizing of materials
knowledge of form work
knowledge of concrete mixtures
knowledge of concrete placement
knowledge of brick masonry
knowledge of surveying techniques
knowledge of drop connections
knowledge of handling
knowledge of working in confined spaces

5. Placing grout
knowledge of mixtures
knowledge of properties
knowledge of setting time
knowledge of chemical grouting
knowledge of health risks involved
knowledge of applications of chemical grouting
knowledge of when and what type to use

6. Removing asbestos cement pipe
knowledge of health risks
knowledge of federal and state laws
knowledge of proper disposal of broken cement asbestos pipe
knowledge of license restrictions

7. Using hydraulic cement
knowledge of properties
knowledge of setting time
knowledge of health risks and safety precautions

8. Installing two or more pipes in one excavation
knowledge of spacing requirements
knowledge of backfill requirements

9. Installing piers
knowledge of concrete mixtures
knowledge of reinforcing
knowledge of form work
knowledge of precast piers
knowledge of anchoring

10. Installing a slip liner
knowledge of materials and procedures used for slip liners

11. Installing pipe by directional boring
knowledge of pipe and slurry
knowledge of equipment and procedures

Content Area E 15%
Piping, Valves and Fittings

1. Layout and determining pipes, valves, fittings and related components
knowledge of installation
knowledge of replacement

knowledge of monitoring
knowledge of appropriate use of pipes of various materials
knowledge of appropriate use of valves, fittings, and related components of various materials

2. Installing pump stations
knowledge of basic mechanics of pumps
knowledge of slabs
knowledge of foundations
knowledge of walls
knowledge of working in confined spaces

3. Installing fittings
knowledge of types and application for use

4. Installing backflow prevention devices, flow regulators and meters
knowledge of how flow regulators operate
knowledge of how to set a flow regulator
knowledge of meter types
knowledge of meter installation
knowledge of regulations governing backflow prevention

5. Installing pumps and motors
knowledge of anchoring
knowledge of piers and foundations

6. Installing metal cathodic protection
knowledge of installation
knowledge of coatings
knowledge of local and state codes and regulations

7. Installing fire hydrants
knowledge of types and placement

8. Installing restraining mechanisms
knowledge of thrust blocks and placement
knowledge of straps
knowledge of tie downs and tie rods
knowledge of megalugs and bell restraints
knowledge of restraining schedules’
knowledge of forces acting on pipes

9. Installing main line and service taps
knowledge of tapping saddles
knowledge of pressure taps
knowledge of equipment for tapping and materials
10. Piping through walls (structures, lift-stations, manholes, valve pits)
   knowledge of structures
   knowledge of lift-stations
   knowledge of manholes
   knowledge of valve pits and sleeves
   knowledge of sealing methods

11. Installing pipes underwater
    knowledge of piping material and material limitations
    knowledge of anchoring
    knowledge of pipe connection techniques (cutting, welding, brazing, chemical bonding)
    knowledge of mechanical connections (threaded connections)
    knowledge of leak detection
    knowledge of hangers and supports
    knowledge of pressure testing
    knowledge of measurement
    knowledge calculating and fitting
    knowledge of thrust blocks
    knowledge of drying procedures
    knowledge of OSHA and other safety requirements

12. Installing pipe supports
    knowledge of straps and hangers
    knowledge of concrete or other cradles

Content Area F 10%
Testing, Disinfecting and Job Close Out

1. Preparing as-built drawings

2. Testing gravity pipes
   knowledge of calculations for infiltration and exfiltration
   knowledge of required equipment
   knowledge of mandrel testing
   knowledge of lamping procedures
   knowledge of low pressure air testing
   knowledge of TV testing procedures

3. Testing Pressure pipes
   knowledge of test pumps
   knowledge of reading pressure gauges
   knowledge of air test charts
   knowledge of calculating for hydrostatic head over top of pipe
   knowledge of duration time of tests

4. Flushing pipes before disinfecting
   knowledge of time requirements
   knowledge of safety requirements

5. Injecting chlorine or disinfectant into pipes
   knowledge of safety requirements
   knowledge of application of chlorine or disinfectant
   knowledge of storage and handling of chlorine

6. Pulling bacteriological samples
   knowledge of sampling procedures
   knowledge of D.E.P. requirements

7. Flushing pipes after disinfecting
   knowledge of time requirements
   knowledge of safety requirements

8. Assemble Operating and Maintenance Manuals
   Knowledge of equipment and materials specifications
   Knowledge of equipment operations
   Knowledge of documentation

9. Perform Close Out Procedures
   Knowledge of sign-off requirements
   Knowledge of document submission requirements

Content Area G 5%
Drainage Systems

1. Installing, repairing, and replacing storm drainage systems
   knowledge of appropriate types
   knowledge of drainage requirements
   knowledge of connecting to existing systems
   knowledge of coring
   knowledge of support bedding

2. Installing oversize culverts
   knowledge of appropriate types and applications
   knowledge of materials (e.g., structural plates, corrugated pipe)
   knowledge of associated fittings
   knowledge of placement
   knowledge of safety requirements
2. Installing standard CMP
   knowledge of how to place
   knowledge of assembly
   knowledge of installation

3. Installing retention or detention systems
   knowledge of excavation
   knowledge of lining
   knowledge of shaping

4. Installing perforated and underdrain pipes
   knowledge of appropriate types and applications
   knowledge of associated fittings
   knowledge of safety requirements
   knowledge of placement

5. Cleaning storm sewers
   knowledge of proper cleaning procedures
   knowledge of pipe protection techniques
   knowledge of OSHA regulations

Content Area H 10%
Equipment

1. Digging with backhoes, trenchers and tractors
   knowledge of safety requirements
   knowledge of traffic regulations
   knowledge of rigging
   knowledge of equipment maintenance
   ability to determine lifting capacities of equipment used

2. Using overhead hoists and cranes
   knowledge of safety requirements
   knowledge of weights

3. Using ventilation devices
   knowledge of safety requirements
   knowledge of toxic materials
   knowledge of proper uses of equipment
   knowledge of sewer gas trapped in existing manholes
   knowledge of air monitoring devices

4. Using lasers
   knowledge of safety requirements
   knowledge of surveying techniques
   knowledge of equipment protection
   knowledge of proper setup
   knowledge of calculating percentage of grade

5. Using surveying and engineering levels
   knowledge of surveying techniques
   knowledge of surveying equipment
   knowledge to run levels

6. Using dewatering equipment
   knowledge of equipment, capacity, and installation of hydraulic, gas and electric pumps
   knowledge of well points and sock drain systems
   knowledge of soil types
   knowledge of rules of water management
   knowledge of dewatering alternatives

7. Using compaction equipment
   knowledge of compaction equipment
   knowledge of static and vibratory compaction
   knowledge of density requirements