



UNDERGROUND UTILITY CONTRACTORS GENERAL TRADE KNOWLEDGE EXAMINATION CONTENT INFORMATION

Revised March 2009

The General Trade Knowledge examination will be administered in one session on the morning of the first day of the examination administration. 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
knowledge of removal of site debris
knowledge of types of equipment
knowledge of figuring quantity of materials and equipment needed

2. Recommending changes to plans and specifications

knowledge of construction techniques
knowledge of local utility specifications
knowledge of plans and materials specifications
recognition of contaminated soils
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
knowledge of drafting
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

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. Staking out location of excavations

knowledge of invert elevations
knowledge of surveying and layout techniques

7. Digging test holes to determine water levels

knowledge of drilling equipment and practices
knowledge of existing utilities
knowledge of seasonal variations

8. **Coordinating and directing soil preparation and testing soil and ground water**
knowledge of excavating and soil composition
knowledge of soil and water testing procedures
9. **Determining burial depth and slope**
knowledge of excavation
knowledge of surveying and leveling techniques
10. **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
11. **Complying with erosion control guidelines**
knowledge of erosion control guidelines
knowledge of turbidity and testing
12. **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
13. **Stacking and storing pipes**
knowledge of dividers
knowledge of appropriate conditions for stacking and storing pipes
14. **Reading plans and specifications**
knowledge of plan scales and symbols
knowledge of X-sections and profiles

Content Area B **5%**
Traffic Control

1. **Complying with traffic control laws and contract requirements**
knowledge of traffic codes and regulations
ability to communicate with emergency services
2. **Erecting and positioning road signs and cones**
knowledge of traffic codes and regulations
3. **Erecting barricades and detours**
knowledge of traffic codes and regulations

4. **Applying temporary pavement markings**
knowledge of traffic codes and regulations
5. **Managing and coordinating flaggers**
knowledge of traffic codes and regulations
knowledge of location of stockpiled material along right-of-way

Content Area C **20%**
Excavating, Backfill, and Compaction

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
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
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. Measuring pipe deflection**
 knowledge of determining grade
 knowledge of surveying techniques and equipment
- 13. 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

- 14. Installing filter fabrics and backfill migration preventers**
 knowledge of soils
 knowledge of water tables
 knowledge of filter fabric
- 15. Checking for required finish grade and invert elevation**
 knowledge of reading levels
 knowledge of leveling and surveying techniques
- 16. Proper sloping**
- 17. 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 gas pipes**
 knowledge of cutting, welding and fusion
 knowledge of coating
 knowledge of pipe type
 knowledge of local and state codes and regulations
 knowledge of materials requirements
 knowledge of installation and testing methods
 knowledge of excavation equipment
- 2. Installing, replacing and repairing pressure and non-pressure pipes**
 knowledge of types and application
 knowledge of gas piping
 knowledge of placement
 knowledge of associated fittings
 knowledge of elevations
 knowledge of laser grade beams
 knowledge of survey instruments
 knowledge of testing

3. Installing gravity sewer pipes

knowledge of piping materials
knowledge of equipment
knowledge of 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

4. Installing piping for pumps

knowledge of capacity of different size pumps
knowledge of fittings and valves

5. Installing manholes 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

6. Placing grout

knowledge of mixtures
knowledge of properties
knowledge of setting time
knowledge of chemical grouting

7. Using chemical grouting

knowledge of health risks involved
knowledge of applications of chemical grouting
knowledge of when and what type to use

8. 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

9. Replacing broken pipes

ability to calculate excavation
knowledge of soil types and compaction
knowledge of water tables
knowledge of sealants for PVC and concrete
knowledge of coupling
knowledge of welding
knowledge of safety procedures and requirements

10. Using hydraulic cement

knowledge of properties
knowledge of setting time

11. Installing two or more pipes in one excavation

knowledge of spacing requirements
knowledge of backfill requirements

12. Installing piers

knowledge of concrete mixtures
knowledge of reinforcing
knowledge of form work
knowledge of precast piers
knowledge of anchoring

13. Installing a slip liner

knowledge of materials and procedures used for slip liners

14. Determining properties of gravity sewer piping

knowledge of assembly
knowledge of sealants

15. 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
- 3. Installing fittings**
 knowledge of types and application for use
- 4. Installing flow regulators and meters**
 knowledge of how regulators operate
 knowledge of how to set a regulator
 knowledge of meter types
 knowledge of meter maintenance and repair
- 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 thrust blocks**
 knowledge of the need for thrust blocks
 knowledge of concrete and placement
- 9. Installing restrained joints**
 knowledge of thrust blocks
 knowledge of straps
 knowledge of tie downs
 knowledge of megalugs and bell restraints
- 10. Using tie rods**
 knowledge of forces acting on pipes
- 11. Installing service taps**
 knowledge of equipment for tapping and materials
- 12. Installing wet main line taps**
 knowledge of tapping saddles
 knowledge of pressure taps

- 13. 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
- 14. 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
- 15. Installing pipe supports**
 knowledge of straps and hangers
 knowledge of concrete or other cradles
- 16. Pulling bacteriological samples**
 knowledge of sampling procedures
 knowledge of D.E.P. requirements

Content Area F **10%**
Testing and Disinfecting

- 1. Preparing as-built drawings**
- 2. Low pressure air testing (infiltration and exfiltration)**
 knowledge of calculations for infiltration and exfiltration
 knowledge of compressors

- 3. Pressure testing 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
 knowledge of calculating the mandrel size for deflection testing
 knowledge of compaction amount required in pipe zone

- 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. Flushing pipes after disinfecting**
 knowledge of time requirements
 knowledge of safety 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 structural plate pipes (e.g., drainage, oversize culverts)**
 knowledge of appropriate types and applications
 knowledge of associated fittings
 knowledge of placement
 knowledge of safety requirements
- 3. Installing standard CMP band connectors**
 knowledge of how to place
 knowledge of assembly
 knowledge of installation
- 4. Installing recharge wells**

- 5. Installing retention or detention systems**
 knowledge of excavation
 knowledge of lining
 knowledge of shaping

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

- 7. Calculating infiltration and exfiltration**
 knowledge of techniques for determining infiltration and exfiltration

- 8. 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
- 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 transits

knowledge of safety requirements
knowledge of surveying techniques

6. Using surveying and engineering levels

knowledge of surveying techniques
knowledge of surveying equipment
knowledge to run levels

7. 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

8. Using compaction equipment

knowledge of compacting with dozers,
compactors, rollers, and tamps
knowledge of static and vibratory compaction
knowledge of density requirements