CCO

CANDIDATE HANDBOOK

- **MOBILE CRANE OPERATOR**
  - **Lattice Boom Cranes (LAT)**
  - **Telescopic Boom Cranes—Swing Cab (TLL)**
  - **Telescopic Boom Cranes—Fixed Cab (TSS)**
  - **Service Truck Cranes (STC)**

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Certification Policies

MOBILE CRANE OPERATOR

ELIGIBILITY

To be eligible for certification, candidates must:

- Be at least 18 years of age
- Comply with CCO's Substance Abuse Policy
- Comply with CCO's Code of Ethics
- Pass written examinations
- Pass practical examination(s)

CERTIFICATION OPTIONS

The following Mobile Crane Operator designations are available:

- Lattice Boom Crane (LAT): includes lattice boom crawler cranes and lattice boom truck cranes. (These include "friction" cranes, CCO defines a *friction* crane as a lattice boom crane on which the sole means of hoist and lower functions is through friction clutches and brakes.)
- Telescopic Boom Crane—Fixed Cab (TSS): cranes having a fixed (non-rotating) operator's station.
- Telescopic Boom Crane—Swing Cab (TLL): cranes having an operator's station that rotates with the crane's upper works or turret of the boom. (These include any cranes for which an operator stands at a control station and "walks" with the controls as they rotate with the boom structure; this definition also applies to any cranes with a rotating operator station, including walk-around, platform, and cab-operated boom trucks.)

CERTIFICATION EXAM REQUIREMENTS

WRITTEN EXAMS		PRACTICAL EXAMS	CERTIFICATION EARNED
Mobile Crane Operator Core	Lattice Boom Crane	Lattice Boom Crane	LAT
	Telescopic Boom Crane—Swing Cab	Telescopic Boom Crane—Swing Cab	TLL
	Telescopic Boom Crane—Fixed Cab	Telescopic Boom Crane—Fixed Cab	TSS

EXAMINATION FEES

For all exam and related fees, visit www.nccco.org/fees.

CCO CERTIFICATION TIME FRAMES

Candidates have 12 months after they pass their first exam to pass the corresponding exam(s) for the same designation(s). For example, a candidate passing the written exams (Core + Specialty) in the Telescopic Boom Cranes—Swing Cab (TLL) designation in December 2024 has until the end of December 2025 to pass the Telescopic Boom Cranes—Swing Cab (TLL) practical exam.

If a certified Mobile Crane Operator subsequently becomes certified in an additional Mobile Crane designation, the certification period for the additional designation expires at the same time as his/her original certification (i.e., all Mobile Crane Operator designations expire on the same date, regardless of when in the five-year certification period the candidate passed them). If the new mobile crane designation is added within the final 24 months of his/her certification period, the certificant is exempt from recertifying for the new designation after five years; after that, however, certificants must recertify for all designations during the 12 months prior to their certifications' expiration date. This ensures that all the certificant's Mobile Crane Operator designations maintain the same expiration date.

RECERTIFICATION REQUIREMENTS

CCO Mobile Crane Operator certification is valid for five years. ***Recertification candidates must complete all requirements during the 12 months prior to their certification's expiration date.*** Regardless of the date of the exams within that one-year period, the new five-year certification period begins from the date of expiration of the candidate's initial certification.

Recertificants must:

- Pass the Mobile Crane Operator written examination(s)
- Comply with CCO's Substance Abuse Policy
- Comply with CCO's Code of Ethics

Candidates who can attest to at least 1,000 hours of crane-related experience during their period of certification do not need to take the practical exam to recertify. *Crane-related experience* is defined as: operating, maintaining, inspecting, or training on cranes.

Recertification candidates who need to take the practical exam for any reason, however, must do so before their certification expires. ***There is no grace period after their certification expires.*** Candidates whose certification has lapsed must take both the written and practical examinations again to be certified again.

NOTE: Candidates who recertify more than 12 months prior to their expiration date will have their new certification period begin immediately, not from the end of their current certification period.

Written Examination Outline

CORE EXAMINATION—MOBILE CRANE OPERATOR

95 QUESTIONS/90 MINUTES (CALCULATOR NOT PERMITTED)

The Core examination portion of the CCO written examination tests the following knowledge areas relating to the operation of mobile cranes:

Domain 1: Site

- Approximately 22% of test

Domain 2: Operations

- Approximately 28% of test

Domain 3: Technical Knowledge

- Approximately 23% of test

Domain 4: Load Charts

- Approximately 27% of test

DOMAIN 1: SITE

1. Identify the elements that affect ground stability:
   a. Below surface (e.g., voids, tanks, loose fill)
   b. On surface (e.g., retaining walls, slopes, excavations, depressions)
   c. Boom position (e.g., elevation, quadrant)
2. Identify the proper use of supporting materials (e.g., mats, blocking/cribbing).
3. Recognize electric power line hazards during assembly/disassembly.
4. Recognize the requirements to travel without load.
5. Identify and evaluate hazards concerning:
   a. Access to crane set-up location
   b. Pinch/crush points
   c. Personnel
6. Identify and explain the responsibilities of the controlling entity concerning site conditions.

DOMAIN 2: OPERATIONS

1. Recognize unsafe operating conditions for a crane.
2. Describe and evaluate how to level the crane.
3. Verify information received regarding dimensions, weight, and center of gravity of the load.
4. Determine and/or verify the radius.
5. Determine electric power line hazards and how to mitigate them during:
   a. Travel
   b. Operations
   c. Assembly/disassembly
6. Recognize and verify use of wire rope:
   a. Reeving
   b. Parts of line
7. Recognize when and how to respond to different types of signals:
   a. Hand signals
   b. Voice signals
   c. Audible signals
   d. New or non-standard signals
8. Identify the requirements during specialty operations:
   a. Multi-crane lifts
   b. Suspended personnel platforms
   c. Duty cycle operations
   d. Barge operations
   e. Multi-drum operations
9. Identify the effects of lifting loads from beneath the surface of the water.
10. Identify the requirements for tag line uses.
11. Identify and define the fall zone.
12. Identify and differentiate the use/function of the following operator aids:
    a. Load moment indicator, load moment limiter, load weighing devices
    b. Anti–two block devices
    c. Boom angle indicator
    d. Wind indicator
    e. Drum rotation indicators
    f. Radius indicators
13. Identify and differentiate the alternative operating procedures when operator aids malfunction.
14. Identify the use/function of the following safety devices:
    a. Horn
    b. Level indicator
15. Identify and/or explain emergency procedures for:
    a. Electric power line contact
    b. Control malfunction
    c. Carrier or travel malfunction
    d. Two-blocking
    e. Overloading
    f. Fires

16. Identify the causes and effects of dynamic loading and/or unloading from:
    a. Shock loading
    b. Rapidly moving loads (duty cycle)
    c. Rapid loss of load
    d. Loss of backward stability
17. Identify the cause and effect of side loading.
18. Identify the causes and effects of boom deflection.
19. Identify the cause and effects of operating in various weather conditions (e.g., wind, temperature, wave action) and recommend solutions.
20. Identify and describe use of manufacturer-approved attachments and their effect on the crane's operation.
21. Recognize when the operator has the authority to stop operations.
22. Identify and describe shutdown procedures to secure the crane when leaving it unattended.

DOMAIN 3: TECHNICAL KNOWLEDGE

1. Identify current federal regulations and industry standards, including but not limited to ASME B30.5, B30.10, OSHA 1910.180, OSHA 1926 Subpart CC.
2. Recognize basic crane terminology and definitions.
3. Recognize functions and limitations of cranes and attachments.
4. Indicate and distinguish between the inspection requirements for:
    a. Shift inspections
    b. Monthly inspections
    c. Notifying supervision of inspection deficiencies
        i. Monthly inspections
        ii. Annual inspections
5. Identify the basic procedures for rigging devices and their use, such as slings, softeners, lifting beams, and shackles.
6. Identify the basic procedures for termination of wire rope.
7. Identify and describe the proper use of hook blocks and overhaul balls.
8. Describe wire rope:
    a. Types and designations of wire rope and their application
    b. Replacement criteria and inspection procedures of running ropes
    c. Maintenance and lubrication requirements
9. Describe protective measures against electrical hazards and their limitations.
10. Explain the significance of the instruments and gauge readings.
11. Identify/explain the requirements for fall protection during assembly/disassembly/maintenance.
12. Explain the requirements for access and egress of the crane.
13. Identify personnel safety requirements during crane inspections.
14. Know requirements for fall protection.
15. Know requirements for access and egress of the crane.

DOMAIN 4: LOAD CHARTS

1. Select the terminology necessary to use load charts.
2. Demonstrate basic math skills without the use of a calculator.
3. Select the appropriate load chart for the machine in its particular application.
4. Determine how to use:
    a. Rated capacity chart
    b. Range diagram
    c. Work area chart
    d. "Parts-of-line" information
    e. Maximum/minimum boom angle information
5. Optimizing configuration

Written Examination Outline

SPECIALTY EXAMINATIONS—MOBILE CRANE OPERATOR

28 QUESTIONS/60 MINUTES (CALCULATOR PERMITTED)

The Specialty examinations for the CCO Mobile Crane Operator certification program test the following knowledge areas relating to the operation of each specific crane type.

Each Specialty exam only contains questions relevant to cranes within that specialty area.

Domain 1: Site

- Approximately 23% of test

Domain 2: Operations

- Approximately 23% of test

Domain 3: Technical Knowledge

- Approximately 19% of test

Domain 4: Manufacturers' Load Charts

- Approximately 35% of test

DOMAIN 1: SITE

1. Recognize and demonstrate the proper use of supporting materials (e.g., mats, blocking/cribbing).
2. Identify and describe proper boom assembly and disassembly procedures:
   a. Lattice booms
   b. Telescopic booms
   c. Extensions/jibs
3. Select and evaluate the proper use of:
   a. Outriggers/stabilizers
   b. Crawlers
4. Recognize and distinguish the use of outrigger position indicators/sensors.

DOMAIN 2: OPERATIONS

1. Recognize, evaluate, and distinguish how to operate a crane:
   a. Stationary on rubber tires
   b. On outriggers
   c. Stationary on crawlers
2. Recognize, evaluate, and distinguish how to pick and carry:
   a. On rubber
   b. On crawlers
3. Differentiate and demonstrate how to shut down and secure the crane properly when leaving it unattended:
   a. Lattice boom cranes
   b. Telescopic boom cranes
4. Distinguish between the use/function and apply the following operator aids:
   a. Boom length indicators
   b. Boom hoist limiting devices
   c. Luffing jib limiting devices
5. Identify the use/function of the following safety devices:
   a. Boom stops
   b. Brake locks
   c. Jib stops
6. Explain and detect power flow systems.
7. Identify and explain the procedures when approaching two-blocking for:
   a. Telescopic boom cranes
   b. Lattice boom cranes

DOMAIN 3: TECHNICAL KNOWLEDGE

1. Recognize basic crane terminology and definitions specific to different crane types.
2. Recognize functions and limitations and attachments specific to different crane types.
3. Recognize and describe wire rope replacement criteria and inspection procedures (standing ropes)

DOMAIN 4: LOAD CHARTS

1. Understand different elements of load charts:
   a. Apply load chart notes
   b. Specifications
   c. Range diagram
   d. Work area diagram
   e. Boom/jib erection charts
   f. Rated capacity charts
2. Understand and apply manufacturers' load charts given various configurations:
   a. Determining maximum radius for load placement
   b. Determining gross capacity
   c. Determining net capacity
3. Differentiate between maximum line pull and safe working load of running ropes.

Practical Examination
MOBILE CRANE OPERATOR

SKILLS TESTED

The practical examination comprises six main tasks that increase progressively in the skill level tested. Skills tested are: inspecting the equipment hoisting, booming, swinging, following hand signals, and combination (multifunction) operations. Crane operation with load and without load is required.

CCO adapts the Test Site Layout (CAD) for each model of crane used for the practical examination to ensure the examination remains standardized for all candidates, wherever and whenever they may test.

The following is an outline of the practical testing procedure, as provided to candidates at the time of testing.

CANDIDATE INFORMATION AND INSTRUCTIONS

The following sections describe the specific tasks you will be performing when taking the practical examination. It is important that you understand these instructions. If there is anything you do not understand, please request clarification from the Practical Exam Proctor.

TASKS

The practical exam tasks are:

- ***Task 1: Pre-Operational (Shift) Inspection***
- ***Task 2: Place Chain in Stop Circle***
- ***Task 3: Follow Hand Signals***
- ***Task 4: Place Ball in Barrels***
- ***Task 5A: Negotiate Zigzag Corridor—Forward***
- ***Task 5A: Negotiate Zigzag Corridor—Reverse***
- ***Task 6: Safe Shutdown and Securing Procedures***

There is also a Pre-Test Briefing, a Crane Walk Around, a Pre-Test Familiarization Period, and a Pre-Task Familiarization Period (prior to the Zigzag task) with a load. You will be required to complete all phases of the test in sequence.

During the practical examination you are under the direction of the Proctor and must follow the Proctor's directions at all times.

Once you have completed all of the tests you are taking, you must leave the testing area. Only personnel involved in the administration of the test are allowed in the test area.

Task	Optimum Time	Points deducted for:
1	n/a	a. Incorrectly describing how you would conduct the inspection b. Incorrectly describing what deficiencies you would look for
2	1:30	a. Dragging chain or contacting ground outside of the circle b. Hook or ball touching ground either inside or outside of the circle c. Hook, ball, or chain contacting any part of the course d. Lifting the chain off the ground after it has made contact with the ground inside the circle e. Exceeding the optimum time
3	n/a	a. Incorrectly following hand signals
4	TSS: 3:30 TLL: 3:30 LAT: 4:00	a. Moving barrel (2 in. or more) b. Knocking over barrel c. Hook or ball touching ground d. Exceeding the optimum time
5A & 5B	TSS: 4:00 TLL: 3:00 LAT: 3:00	a. Knocking ball off pole b. Moving pole base off line c. Knocking pole over d. Chain leaving ground e. Passing poles with chain off ground f. Load touching ground g. Circumventing the course h. Exceeding the optimum time
6	n/a	a. Incorrectly applying safe shutdown procedures

OPTIMUM TIMES

For some tasks ***optimum times*** have been set. If the task is completed within this time period, you receive no time penalty. Other tasks are untimed, as noted below.

Once you exceed this time limit, however, you will lose points on a gradual basis. The optimum time for each task is stated as part of the task descriptions. At one-and-a-half times the optimum time the Proctor may end the task and move on to the next task.

PRE-TEST BRIEFING

While candidates are waiting to take their tests, they will have sufficient time to read the description of the tasks to be performed and review the operator's manual and load chart for the crane(s) they will operate. In addition, they will be informed of the make and model of the crane, the boom length, and the weight of the test load. They will also watch a short video showing all the tasks they will be required to perform during the examination.

Note that:

- The crane's LMI system (if the crane is so equipped) has been correctly programmed and will not interfere with the proper operation of the crane.
- The crane has been set up and leveled. A spirit level is available to verify that the crane is level.
- None of the target points have been placed at a radius that exceeds the crane's rated capacity.
- On telescopic boom cranes, the boom length has been pre-set. ***Telescoping will not be permitted at any time.***
- All signals used throughout the test are in accordance with the ASME B30.5 hand signals.

CIRCUMVENTING THE COURSE

Circumventing the course on CCO Mobile Crane Operator Practical Exams is defined as when:

2. Chain leaves the corridor while on or off the ground and passes more than one pole left still standing on the original string line before re-entering the corridor; you ***must*** enter the circles from inside the corridor to avoid this being marked as a deficiency
3. Chain leapfrogs from one leg of corridor to another with the chain off the ground, outside the corridor
4. Chain passes four or more poles consecutively with the chain off the ground, inside the corridor

UNSAFE ACT

If, at any time during the Pre-Test Familiarization Period or during the test, you commit an unsafe act, you will be disqualified from continuing with the test. An "unsafe act" is defined as an action by a candidate that is uncontrolled or reckless, and is sufficient to cause safety concern for persons or property damage.

The Proctor has the authority to stop the test at any time for reasons of safety. Please ask the Proctor if you have any questions. If you are disqualified due to an unsafe act, you will not be permitted to take any additional practical exams that day.

TELESCOPING DURING THE EXAM

You are not permitted to telescope during the mobile crane practical exam. In the event you telescope in or out, intentionally or otherwise, while timing continues the Proctor will give you a Stop signal, a Telescope In or Out signal as needed, and indicate that you may continue the task. Please note timing of the task continues while necessary corrections are made and until the task is complete. This is not considered a circumvention or an unsafe act.

Should you fail to respond to the Stop signal, the Proctor will stop the test and record it as an unsafe act.

WEATHER CONDITIONS AND EQUIPMENT PROBLEMS

The Proctor will use an anemometer to check the wind speed and then will record the weather conditions on the score sheet.

The Proctor has the responsibility to determine if weather conditions or equipment problems are such that a test needs to be suspended. If the test is interrupted due to weather conditions or equipment problems, the procedure for restarting is as follows:

- You will resume the test at the beginning of the task you were performing at the time of the interruption, except for Task 4, when you will go back to the beginning of either Task 4a or 4b, as appropriate.
- You will be entitled to a Pre-Test or Pre-Task Familiarization period before resuming the test.
- If testing resumes on a different machine, you must start the test over from the beginning. The first score sheet will be marked as "VOID" with an explanation and returned to CCO.
- If the testing is delayed to a different day, the test must be restarted from the beginning.

CRANE WALK AROUND

- Before you begin operations, you are allowed a couple of minutes to walk around the crane to ensure proper setup.

TASK 1: PRE-OPERATIONAL INSPECTION

- You will be asked to identify five items on the crane that are part of the pre-operational inspection.
- One at a time, you will be asked to describe how you would conduct the inspection and what deficiencies you would look for.
- You have approximately one minute per item.

PRE-TEST FAMILIARIZATION PERIOD

- You will be allowed 15 minutes to familiarize yourself with the crane and to examine anything on the crane that you feel is necessary to operate it comfortably.
- You will be allowed to get the feel of the controls and run the crane through its functions. The boom length has been preset. The brakes and other devices have been set according to the crane manufacturer's recommendation.

- You may not interfere with the test course, lift the test weight, or shadow the Zigzag Corridor or the barrels.
- You must finish the Pre-test Familiarization Period with the load hook under control and the chain on the ground at the Starting Point within the 15-minute period.
- The Proctor will notify you when there are ten, five, and one minute(s) remaining.
- If you are ready in less than 15 minutes, you may indicate this to the Proctor.
- If, at the end of the Pre-Test Familiarization Period, you feel that you are not ready to take the examination, you should notify the Proctor. You will be required to sign to that effect.

TASK 2: PLACE CHAIN IN STOP CIRCLE

Optimum time: 1: 30

- At the Proctor's indication to start, at which point timing will begin, raise the ball and chain at least 10 ft. off the ground to clear all obstacles and personnel.
- Bring it from the Starting Point to the Stop Circle.
- Once the ball and chain reaches the Stop Circle, place it there such that the chain suspended from the hook makes contact with the ground inside the circle and remains there.
- The Proctor will give you a *stop* signal once the ball and chain are under control.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Dragging chain or contacting ground outside of the circle
  b. Hook or ball touching ground either inside or outside of the circle
  c. Hook, ball, or chain contacting any part of the course
  d. Lifting the chain off the ground after it has made contact with the ground inside the circle
  e. Exceeding the optimum time

TASK 3: FOLLOW HAND SIGNALS

Untimed

- At the Proctor's direction, you will be guided back to the Starting Point using standard B30.5 hand signals.
- The Proctor will select four signals from the following:
  a. *Hoist* and *stop*
  b. *Swing* and *stop*
  c. *Lower the load* and *stop*
  d. *Lower the load slowly* and *stop*
  e. *Lower the boom, raise the load,* and *stop*
  f. *Raise the boom* and *stop*
  g. *Lower the boom* and *stop*
  h. *Raise the boom, lower the load,* and *stop*
- The Proctor may give the signals in any sequence.
- The Proctor or Assistant Proctor will remove the chain at the completion of this task.

TASK 4: PLACE BALL IN BARRELS

Optimum times:

Telescopic Boom Crane—Fixed Cab: 3:30
Telescopic Boom Crane—Swing Cab: 3:30
Lattice Boom Crane: 4:00

- At the Proctor's indication to start, at which point timing will begin, bring the overhaul ball from the Starting Point and place it into Barrel #1. (If you knock over Barrel #1, at the Proctor's indication proceed to put the ball in Barrel #2.)
- The Proctor will determine when the horizontal line around the center of the ball has dropped below the rim of Barrel #1 and will so indicate to you. At the Proctor's indication, move the ball from Barrel #1 to Barrel #2.
- The Proctor will determine when the horizontal line around the center of the ball has dropped below the rim of the barrel. Hold the ball in Barrel #2 until instructed by the Proctor to remove it.
- Timing stops when the ball is completely clear of Barrel #2 and the Proctor has given you a *stop* signal.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Moving barrel (2 in. or more)
  b. Knocking over barrel
  c. Hook or ball touching ground
  d. Exceeding the optimum time

PRE-TASK FAMILIARIZATION PERIOD (WITH TEST WEIGHT)

Untimed

- At the Proctor's indication, bring the overhaul ball over the test weight located in the Test Weight Circle.

- The load will be attached to the crane's hook by the Proctor or Assistant Proctor.
- You are allowed to bring the test weight to the designated area, where you can get the feel of the load, test the brake, etc., before beginning the Zigzag Corridor task.
- You may not swing the load outside of the designated area or shadow the Zigzag Course.
- You will be allowed a maximum of five minutes for this Pre-Task Familiarization, by the end of which period you must have placed the test weight on the ground in the Test Weight Circle with the rigging taut.
- The Proctor will notify you when there is one minute remaining.

TASKS 5A & 5B: NEGOTIATE ZIGZAG CORRIDOR —FORWARD/REVERSE

Optimum times:

Telescopic Boom Crane—Fixed Cab: 4:00 each direction
Telescopic Boom Crane—Swing Cab: 3:00 each direction
Lattice Boom Crane: 3:00 each direction

- At the Proctor's direction to start, at which point timing will begin, lift the test weight into the air and swing, boom up or down, and hoist up or down as you judge necessary to guide the load through the Zigzag Corridor without touching the ground with the test weight, raising the test weight so high that the chain leaves the ground, or knocking over any part of the PVC pole barrier.
- Points will be deducted for the following:
  a. Knocking ball off pole
  b. Moving pole base off line
  c. Knocking pole over
  d. Chain leaving ground
  e. Passing poles with chain off ground
  f. Load touching ground
  g. Circumventing the course
  h. Exceeding the optimum time
- Timing stops when you have placed the test weight on the ground in the Stop Circle and the Proctor has given you a *stop* signal. The task is not complete until the load is placed completely within the outside perimeter of the circle and the Proctor has given you a *stop* signal. If the Proctor does not give you a *stop* signal, this indicates the weight is not within the circle and the task continues to be timed.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Once you have placed the test weight in the Stop Circle and the Proctor has given you a *stop* signal, you may reposition the boom tip over the test weight if necessary. You may not lift or reposition the test weight.
- At this time the Proctor will reconstruct the corridor, as necessary.
- At the direction of the Proctor, at which point timing will begin, lift the test weight from the Stop Circle and travel through the corridor in reverse fashion.
- Timing stops when you have placed the test weight on the ground in the Test Weight Circle and the Proctor has given you a *stop* signal. The task is not complete until the load is placed completely within the outside perimeter of the circle and the Proctor has given you a *stop* signal. If the Proctor does not give you a *stop* signal, this indicates the weight is not within the circle and the task continues to be timed.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- The Proctor will then detach the test weight from the load hook.
- At the Proctor's direction, swing the hook to the Starting Point and allow the Proctor to re-attach the chain.

TASK 6: SAFE SHUTDOWN AND SECURING PROCEDURES

- Before leaving the operator station, you will be required to apply safe shutdown procedures to the crane in preparation for the next candidate.
- Once the crane is shut down, you will leave the operator station and describe to the Proctor the procedures you would follow to secure the crane at the end of the workday.

Service Truck Crane Operator

MOBILE CRANE OPERATOR

- **Program Description**
- **Written Exam Outline**
- **Practical Exam Outline**

Service Truck Crane Operator

MOBILE CRANE OPERATOR

PROGRAM DESCRIPTION

The CCO Service Truck Crane Operator certification (STC) is a subcategory of the CCO Telescopic Boom—Fixed Cab (TSS) certification and was developed specifically for the industries that use these smaller machines.

Service truck cranes are identified by their telescopic boom, where the base and mast structure is not integral to the stabilizer/outrigger system. Lifting is typically accomplished via a winch (electric or hydraulic) and its functions (rotation, elevation, telescoping) are either powered or manual. These machines tend to have relatively shorter boom lengths (10–35 ft.) and lower capacities (1–7 tons) as compared to other Telescopic Boom—Fixed Cab machines (e.g., Boom Trucks, Carry Deck cranes). Additionally, operations are usually conducted by the use of radio remote or pendant control with the operator standing on the ground following the load.

Please note that the CCO Telescopic Boom—Fixed Cab Operator (TSS) certification covers service truck cranes. Operators of service truck cranes who currently possess a TSS certification are not required to also posses the Service Truck Crane Operator certification. The reverse is not true, however. STC certification is intended only for operators of service truck cranes and not for those who operate larger Telescopic Boom—Fixed Cab. To be certified to operate all TSS cranes, candidates must achieve the full TSS certification (Core + TSS specialty written + TSS practical).

ELIGIBILITY

To be eligible for the Service Truck Crane Operator certification, candidates must:

- Be at least 18 years of age
- Comply with CCO's Substance Abuse Policy
- Comply with CCO's Code of Ethics
- Pass the STC written exam
- Pass the STC practical exam

EXAMINATION FEES

For all exam and related fees, visit www.nccco.org/fees.

CCO CERTIFICATION TIME FRAMES

Candidates must pass both the STC written and practical exams within twelve months of each other. Candidates may take their written and practical exams in either order.

RECERTIFICATION REQUIREMENTS

CCO certifications are valid for five years. Recertification requirements are detailed page 3. Candidates who can attest to at least 500 hours of crane-related experience during their period of certification do not need to take the practical exam to recertify. *Crane-related experience* is defined as: operating, maintaining, inspecting, or training on cranes.

Recertification candidates who need to take the practical exam for any reason, however, must do so before their certification expires. There is no grace period after their certification expires. Candidates whose certification has lapsed must take both the regular written and practical examinations again to be certified again.

Written Examination Outline

MOBILE CRANE OPERATOR—SERVICE TRUCK CRANES

80 QUESTIONS/90 MINUTES (CALCULATOR NOT PERMITTED)

The Service Truck Crane Operator written exam tests the following knowledge areas relating to the operation of service truck cranes:

Domain 1: Site

- Approximately 17% of test

Domain 2: Operations

- Approximately 45% of test

Domain 3: Technical Knowledge

- Approximately 21% of test

Domain 4: Manufacturers' Load Charts

- Approximately 17% of test

DOMAIN 1: SITE

1. Define the responsibilities of worksite personnel and their responsibilities concerning site conditions.
   a. Controlling entity
   b. Crane operator
2. Identify elements that affect ground stability:
   a. Below surface (e.g., voids, tanks, loose fill)
   b. On surface (e.g., retaining walls, slopes, excavations, depressions)
3. Identify and evaluate the proper use of supporting materials (e.g., mats, blocking, or cribbing).
4. Identify electric power line hazards for:
   a. Site access
   b. Setup
5. Identify and evaluate hazards concerning:
   a. Access to job site
   b. Pinch/crush points
   c. Personnel during assembly/disassembly (outrigger/stabilizer setup)
6. Demonstrate how to review lift requirements with or without site supervision.

DOMAIN 2: OPERATIONS

1. Recognize the current federal regulations and industry standards, including but not limited to:
   a. ASME B30.5
   b. OSHA 1910.180
   c. OSHA 1926 Subpart CC
   d. SAE 765A
2. Describe and/or demonstrate how to lift, swing, and place the load smoothly.
3. Identify wire rope:
   a. Reeving
   b. Parts of line
4. Identify and demonstrate types of signals:
   a. Hand signals
   b. Voice/audio signals
   c. Audible signals
   d. New or non-standard signals
5. Recognize and demonstrate how to shut down and secure the crane when leaving it unattended.
6. Recognize the limitations of operating in various weather conditions (e.g., wind, temperature).
7. Demonstrate how to obtain dimensions, weight, and center of gravity of the load.
8. Demonstrate how to verify the radius.
9. Identify basic procedures for rigging devices and their use, such as: slings, softeners, lifting beams, and shackles.
10. Identify proper use of hook blocks and downhaul weights.
11. Define proper procedures and requirements for crane inspections:
    a. Shift
    b. Monthly
    c. Annual
    d. Repaired/modified
    e. Notifying supervision of inspection deficiencies
12. Identify the use and function of operator aids, including:
    a. Load moment indicator (LMI)
    b. Anti-two block device/two-block damage prevention systems
    c. Boom angle indicator
    d. Boom length indicator
13. Indicate alternative operating procedures when operator aids malfunction.
14. Identify the use and function of safety devices, including:
    a. Horns
    b. Level indicator
    c. Holding/check valve devices
    d. Emergency stop
15. Identify the proper procedures for operating safely near energized power lines.

16. Define the requirements and procedures for when load is not in full view of the operator.
17. Define the requirements of tag lines.
18. Demonstrate how to react to:
    a. Electric power line contact
    b. Loss of stability
    c. Control malfunction
    d. Block and line twisting
    e. Personnel under the load or in the fall zone
19. Demonstrate how to properly use outriggers/stabilizers, including the use of operational assist devices, such as outrigger/stabilizer position sensor monitors.

DOMAIN 3: TECHNICAL KNOWLEDGE

1. Identify and determine basic crane terminology and definitions.
2. Indicate functions and limitations of cranes and attachments.
3. Define general maintenance and lubrication requirements and perform them.
4. Identify wire rope:
    a. Construction and classification
    b. Replacement criteria and inspection procedures
    c. Capacity and multi-part rope requirements
    d. Maintenance and lubrication
    e. Implementing proper corrective measures
5. Identify rigging devices and their use, such as:
    a. Slings
    b. Spreaders
    c. Lifting beams
    d. Wire rope fittings, such as clips, shackles, and wedge sockets
    e. Saddles (softeners)
    f. Hook blocks and overhaul balls
6. Define the relationship between line pull and safe working load.
7. Indicate the limitations of protective measures against electrical hazards.
8. Identify the significance of instruments, gauges, and machine power systems.
9. Identify the requirements of standard and optional controls.
10. Identify the emergency response procedure for:
    a. Overloading
    b. Two-blocking
11. Define power systems (e.g., hydraulic, electrical).

DOMAIN 4: MANUFACTURERS' LOAD CHARTS

1. Define terminology necessary to use load charts.
2. Demonstrate basic math.
3. Identify different elements of load charts:
    a. Apply load chart notes
    b. Rated capacity charts
    c. Stability charts
4. Identify and demonstrate how to apply manufacturer's load charts given various configurations:
    a. Determining maximum radius for load placement
    b. Determining gross capacity
    c. Determining net capacity
    d. Determining load moment
    e. Determining intermediate values on capacity charts (boom length, radius, boom angle)

Practical Examination

MOBILE CRANE OPERATOR—SERVICE TRUCK CRANES

The following is an outline of the practical testing procedure, as provided to candidates at the time of testing.

CANDIDATE INFORMATION AND INSTRUCTIONS

The following sections describe the specific tasks you will be performing when taking the practical exam. It is important that you understand these instructions. If there is anything you do not understand, please request clarification from the Proctor.

TASKS

The tasks that make up the Practical Examination are:

- Task 1: Pre-Operational Inspection
- Task 2: Chain in Circle
- Task 3: Test Weight in Pole Circle
- Task 4A: Zigzag Corridor (Forward)
- Task 4B: Zigzag Corridor (Reverse)
- Task 5: Safe Shutdown Procedures

There is also a Pre-Test Briefing, a Crane Walk Around, a Pre-Test Familiarization Period, and a Pre-Task Familiarization Period (prior to the Pole Circle task) with a load. You will be required to complete all phases of the test in sequence.

During the practical examination, you are under the direction of the Proctor and must follow the Proctor's directions at all times.

Once you have completed all of the tests you are taking, you must leave the testing area. Only personnel involved in the administration of the test are allowed in the test area.

Task	Optimum Time	Points deducted for:
1	n/a	a. Incorrectly describing how you would conduct the inspection b. Incorrectly describing what deficiencies you would look for
2	1:30	a. Dragging chain or contacting ground outside of the circle b. Hook touching the ground either inside or outside of the circle c. Chain contacting any part of the course or crane d. Hook block or chain contacting any part of the course e. Lifting the chain off the ground after it has made contact with the ground inside the circle f. Exceeding the optimum time
3	2:00	a. Load touching ground outside of designated area b. Chain contacting any part of the crane c. Knocking ball off pole d. Knocking pole over e. Exceeding the optimum time
4A	4:15	a. Knocking ball off pole b. Moving pole base off line c. Knocking pole over d. Chain leaving ground e. Passing poles with the chain off the ground f. Load touching ground outside of designated area g. Load touching the outriggers/stabilizers h. Circumventing the course i. Exceeding the optimum time
4B	4:45	a. Knocking ball off pole b. Moving pole base off line c. Knocking pole over d. Chain leaving ground e. Passing poles with the chain off the ground f. Load touching ground outside of designated area g. Load touching the outriggers/stabilizers h. Circumventing the course i. Exceeding the optimum time
5	n/a	a. Incorrectly describing safe shutdown procedures

OPTIMUM TIMES

For some tasks ***optimum time limits*** have been set. If the task is completed within this time period, you receive no time penalty. Other tasks are untimed, as noted below.

Once you exceed this time limit, however, you will lose points on a gradual basis. The optimum time for each task is stated as part of the task descriptions. At one-and-a-half times the optimum time the Proctor may end the task and move on to the next task.

PRE-TEST BRIEFING

While candidates are waiting to take their tests, they will have sufficient time to read the description of the tasks to be performed and review the operator's manual and load chart for the crane(s) they will operate. In addition, they will be informed of the make and model of the crane, the boom length, and the weight of the test load. They will also watch a short video showing all the tasks they will be required to perform during the examination.

Note that:

- The crane's LMI system (if the crane is so equipped) has been correctly programmed and will not interfere with the proper operation of the crane.
- The crane has been set up and leveled. A spirit level is available to verify that the crane is level.

- None of the target points have been placed at a radius that exceeds the crane's rated capacity.

CIRCUMVENTING THE COURSE

Circumventing the course on CCO Service Truck Crane Operator Practical Exams is defined as when:

- Chain leaves the corridor while on or off the ground and passes more than one pole left still standing on the original string line before re-entering the corridor; you ***must*** enter the circles from inside the corridor to avoid this being marked as a deficiency
- Chain leapfrogs from one leg of corridor to another with the chain off the ground, outside the corridor
- Chain passes four or more poles consecutively with the chain off the ground, inside the corridor

UNSAFE ACT

If, at any time during the Pre-Test Familiarization Period or during the test, you commit an unsafe act, you will be disqualified from continuing with the test. An "unsafe act" is defined as an action by a candidate that is uncontrolled or reckless, and is sufficient to cause safety concern for persons or property damage.

The Proctor has the authority to stop the test at any time for reasons of safety. Please ask the Proctor if you have any questions. If you are disqualified due to an unsafe act, you will not be permitted to take any additional practical exams that day.

CANDIDATE ID AND SIGNATURE

Prior to beginning the examination, the Proctor will ask you for a valid (not expired) government-issued photo identification that includes date of birth, such as a driver's license.

The Proctor will ask you if you have read the Candidate Information and Instructions and will answer any questions you may have. The Proctor will review the weather conditions and ask the candidates to sign indicating that they understand the instructions for the test and that they agree with the Proctor's assessment of the weather conditions.

WEATHER CONDITIONS AND EQUIPMENT PROBLEMS

The Proctor will use an anemometer to check the wind speed and then will record the weather conditions on the score sheet.

The Proctor has the responsibility to determine if weather conditions or equipment problems are such that a test needs to be suspended. If the test is interrupted due to weather conditions or equipment problems, the procedure for restarting is as follows:

- You will resume the test at the beginning of the task you were performing at the time of the interruption, except for Task 4A or Task 4B, when you will go back to the beginning of the task, as appropriate.
- You will be entitled to a Pre-Test or Pre-Task Familiarization period before resuming the test.
- If testing resumes on a different machine, you must start the test over from the beginning. The first score sheet will be marked as "VOID" with an explanation and returned to CCO.
- If the testing is delayed to a different day, the test must be restarted from the beginning.

CRANE WALK AROUND

- Before you begin operations, you are allowed a couple of minutes to walk around the crane to ensure proper setup.

TASK 1: PRE-OPERATIONAL INSPECTION

- You will be asked to identify five items on the crane that are part of the pre-operational inspection.
- One at a time, you will be asked to describe how you would conduct the inspection and what deficiencies you would look for.
- You have approximately one minute per item.

PRE-TEST FAMILIARIZATION PERIOD

- You will be allowed five minutes to familiarize yourself with the crane and to examine anything on the crane that you feel is necessary to operate it comfortably.
- You will be allowed to get the feel of the controls and run the crane through its functions. The brakes and other devices have been set according to the crane manufacturer's recommendation.
- You may not interfere with the test course, lift the test weight, or shadow the Zigzag Corridor.
- You must finish the Pre-test Familiarization Period with the load hook under control and the chain on the ground in Designated Area 1 within the five-minute period.
- The Proctor will notify you when there is one minute remaining.
- If you are ready in less than five minutes, you may indicate this to the Proctor.

- If, at the end of the Pre-Test Familiarization Period, you feel that you are not ready to take the examination, you should notify the Proctor. You will have, in effect, disqualified yourself from taking the examination at this time, and you will be required to sign to that effect on the Candidate Score Sheet.

TASK 2: CHAIN IN CIRCLE

Optimum time: 1:30

- At the Proctor's indication to start, at which point timing will begin, raise the chain to clear all obstacles and test personnel.
- Bring the chain from its starting position inside Designated Area 1 (DA-1) over to Designated Area 2 (DA-2), and land the chain fully inside the circle.
- Once the chain makes contact with the ground inside the circle, do not lift the chain off the ground.
- Avoid contacting anything but DA-2.
- Once the chain is under control inside the circle, the Proctor will give you a *stop* signal.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Dragging chain or contacting ground outside of the circle
  b. Hook touching the ground either inside or outside of the circle
  c. Chain contacting any part of the course or crane
  d. Hook block or chain contacting any part of the course
  e. Lifting the chain off the ground after it has made contact with the ground inside the circle
  f. Exceeding the optimum time

PRE-TASK FAMILIARIZATION PERIOD

- At the Proctor's indication, bring the hook over to the test weight located in Test Weight Area.
- The load will be attached to the crane's hook by either the Proctor or Assistant Proctor.
- You will be allowed to bring the test weight to the designated area, where you can get the feel of the load before beginning the Zigzag Corridor task.
- You may not swing the load outside the designated area or shadow the Zigzag Corridor.
- You will be allowed a maximum of five minutes for this Pre-Task Familiarization; by the end of this period you must have placed the test weight on the ground in the Test Weight Area with the rigging taut.
- The Proctor will notify you when there is one minute remaining.

TASK 3: TEST WEIGHT IN POLE CIRCLE

Optimum time: 2:00

- At the Proctor's indication to start, timing will begin. Lift the test weight from the Test Weight Area and place it in DA-3.
- Once the test weight is in DA-3, the Proctor will give you the *stop* signal.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Load touching ground outside of designated area
  b. Chain contacting any part of the crane
  c. Knocking ball off pole
  d. Knocking pole over
  e. Exceeding the optimum time

TASK 4A: ZIGZAG CORRIDOR (FORWARD)

Optimum time: 4:15

- At the Proctor's indication to start, timing will begin. Guide the test weight through the Corridor. You will be permitted to use all of the crane's functions during this task.
- Avoid contacting anything; do not lift the chain off the ground; do not let the test weight touch the ground.
- Place the test weight inside DA-2. Once the test weight is inside the Designated Area, the Proctor will give you the *stop* signal. If the test weight is not within the outside perimeter of DA-2, timing will continue.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Knocking ball off pole
  b. Moving pole base off line
  c. Knocking pole over
  d. Chain leaving ground
  e. Passing poles with the chain off the ground
  f. Load touching ground outside of designated area
  g. Load touching the outriggers/stabilizers
  h. Circumventing the course
  i. Exceeding the optimum time

TASK 4B: ZIGZAG CORRIDOR (REVERSE)

Optimum time: 4:45

- At the Proctor's indication to start, timing will begin. Guide the test weight through the Corridor. You will not be permitted to use the telescoping function during this task.
- Avoid contacting anything; do not lift he chain off the ground; do not let the test weight touch the ground.
- Place the test weight inside DA-1. Once the test weight is inside the Designated Area, the Proctor will give you the *stop* signal. If the test weight is not within the outside perimeter of DA-1, timing will continue.
- If your time exceeds one-and-a-half times the optimum time, the Proctor may stop you and move on to the next task.
- Points will be deducted for the following:
  a. Knocking ball off pole
  b. Moving pole base off line
  c. Knocking pole over
  d. Chain leaving ground
  e. Passing poles with the chain off the ground
  f. Load touching ground outside of designated area
  g. Load touching the outriggers/stabilizers
  h. Circumventing the course
  i. Exceeding the optimum time

TASK 5: SAFE SHUTDOWN PROCEDURES

- The Proctor will ask you to describe the safe shutdown procedures you would apply to the crane in preparation to leave the site.

Reference List
MOBILE CRANE OPERATOR

The most recent versions of following reference materials are used by CCO's Written Examination Management Committee to verify the accuracy of CCO test questions.

ASME B30.5 MOBILE AND LOCOMOTIVE CRANES (2021)

ASME B30.30 ROPES (2019)

www.asme.org

IHSA MOBILE CRANE MANUAL (2017)

www.ihsa.ca

AEM MOBILE CRANE SAFETY MANUAL (2014)

shop.aem.org

OSHA 1926 SUBPART CC—CRANES AND DERRICKS IN CONSTRUCTION

OSHA 1910.180—CRANES IN GENERAL INDUSTRY

www.osha.gov

IPT'S CRANE AND RIGGING HANDBOOK & MANUAL (2020)

www.iptbooks.com

CCO Policies
MOBILE CRANE OPERATOR

Code of Ethics

www.nccco.org/coe

Disciplinary Policy

www.nccco.org/discipline

Substance Abuse Policy

www.nc-cco.org/abuse

Testing Accommodations

www.nccco.org/accommodations

Test Security

www.nccco.org/security

Information Release Policy

www.nccco.org/inforelease

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