

# CPCCBC4018

## APPLY SITE SURVEYS AND SET-OUT PROCEDURES TO BUILDING AND CONSTRUCTION PROJECTS

### ASSESSMENT SUMMARY

The assessment activities for *CPCCBC4018 Apply site surveys and set-out procedures to building and construction projects* cover all aspects of the unit of competency. For Apprentices/Trainees, this includes supervisor completion of the Apprentice/Trainee Record (ATR).

Participants must read all the information given before starting any assessment task. The assessment tasks are intended to be fair, flexible, valid and reliable. If a Participant has any questions or requires alternative arrangements to be made such requests should be directed to their Trainer/Assessor, who should note such arrangements in the 'Assessor Comments' on the affected assessment. If a Participant feels they are not yet ready to be assessed, they should discuss their options with their Trainer/Assessor.

To satisfactorily complete the assessment, the Participant is required to answer all questions correctly and demonstrate their skills to industry standards. If a Participant does not answer all questions or perform all tasks, they will be deemed 'Not Satisfactory' for the task and 'Not Yet Competent' for the unit of competency.

The Trainer/Assessor can provide the Participant with additional information on interpreting the assessment outcomes and guide the Participant's options. If a Participant is still deemed 'Not Satisfactory' they will have the opportunity to undertake a supplementary assessment or appeal the result as per the process in the Student Handbook.

By signing below, the Participant acknowledges:

- They understand the assessment instructions and requirements, and consent to being assessed.
- The work submitted is to be their own work – with the work of/with others needing to be clearly acknowledged and documented.
- They consent to any photo/video recording of their work that occurs during assessment.

|                       |                                                                                     |
|-----------------------|-------------------------------------------------------------------------------------|
| Participant name      | Rex Henderson                                                                       |
| Participant signature |  |

#### Pre-requisite unit(s) to be achieved and authenticated prior to undertaking assessment

☒ Not applicable

| Task                          | Date completed | Assessment Results                        |                                                   |
|-------------------------------|----------------|-------------------------------------------|---------------------------------------------------|
| Theory Exam                   | Select Date.   | <input type="checkbox"/> Satisfactory     | <input type="checkbox"/> Not Satisfactory         |
| Workbook                      | Select Date.   | <input type="checkbox"/> Satisfactory     | <input type="checkbox"/> Not Satisfactory         |
| Practical Assessment          | Select Date.   | <input type="checkbox"/> Satisfactory     | <input type="checkbox"/> Not Satisfactory         |
| <b>Outcome for CPCCBC4018</b> | Select Date.   | <input type="checkbox"/> <b>Competent</b> | <input type="checkbox"/> <b>Not Yet Competent</b> |

#### Evidence requirements checklist (ticked by assessor and evidence supplied to RTO)

- |                                                                           |                                                                                                                                                                                                              |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Theory Exam<br><input type="checkbox"/> Workbook | <input type="checkbox"/> Practical Assessment<br><input type="checkbox"/> Booking sheet<br><input type="checkbox"/> Topographic contour plan from grid lines<br><input type="checkbox"/> Calculations sheets |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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| Assessor name      |                                                                                      |
| Assessor signature |  |



# **CPCCBC4018**

## **APPLY SITE SURVEYS AND SET-OUT PROCEDURES TO BUILDING AND CONSTRUCTION PROJECTS**

### **THEORY EXAM**

|                  |               |
|------------------|---------------|
| Participant name | Rex Henderson |
|------------------|---------------|

| <b>FOR THE PARTICIPANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instructions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul style="list-style-type: none"><li>• You will complete written questions as outlined on the following pages. You must attempt all questions and provide enough detail in your responses to demonstrate your knowledge.</li><li>• It is anticipated that you should complete this assessment within two (2) hours, but additional time may be allowed upon negotiation with the Assessor.</li><li>• You must complete all questions unassisted by the Assessor or other personnel but may refer to reference material as needed. All questions must be answered correctly for a 'Satisfactory' assessment outcome to be awarded.<ul style="list-style-type: none"><li>○ An oral examination may be allowed under certain circumstances, whereby your answers will be documented by another party.</li><li>○ Any written questions that are incomplete, or not answered satisfactorily will need to be completed again after further training support.<ul style="list-style-type: none"><li>▪ If you answer a question incorrectly but modify your response, put your initials next to the written change (or the Assessor must initial a verbal change).</li></ul></li></ul></li></ul> |
| <b>Resources required</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Pen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| <b>FOR THE ASSESSOR</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instructions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul style="list-style-type: none"><li>• Where oral examination has occurred, ensure that this is acknowledged in writing (e.g. FT001 and Assessor Comments)</li><li>• All questions must be satisfactorily demonstrated by the Participant for a Satisfactory determination (indicated by an Assessor tick to the right of the question).</li><li>• Assessors are to complete marking in pen of a different colour to the Participant.</li><li>• If the Participant verbally modifies their response, write in the modified response verbatim and put your initials next to the written change.</li></ul> |

**ASSESSOR COMMENTS**

**As necessary, outline:**

- Details on reattempts, alternative arrangements or reasonable adjustments made.
- Where a Participant is deemed 'Not Satisfactory', provide recommendations for future training.

**Q1. Explain why we should determine the orientation of the building according to the plans.**

**Answer**

Determining the orientation of a building according to the plans is a fundamental step in the design and construction process. It plays a crucial role in maximizing natural resources, improving energy efficiency, enhancing aesthetics, and ensuring compliance with regulatory requirements. By carefully considering orientation, builders can create functional, sustainable, and comfortable spaces that meet the needs of occupants and the environment.



**Q2. Discuss the information you can source from the specifications.**

**Answer**

Material Requirements, Workmanship Standards, Construction Methods, Performance Criteria, Codes and Standards Compliance, Site Requirements, Safety and Health Requirements, Schedule and Sequence of Work, Testing and Inspection Requirements, Warranties and Guarantees, Change Management Procedures, Specifications serve as a comprehensive guide for all parties involved in the construction process, including architects, engineers, contractors, and subcontractors. They provide essential information needed to ensure that the project meets design intent, quality standards, and regulatory requirements. Properly understanding and utilizing the information contained in specifications is crucial for successful project execution and management.



**Q3. The construction project must comply with the National Construction Code (NCC). What does this mean.**

**Answer**

Compliance with the National Construction Code is essential for ensuring that construction projects are safe, sustainable, and fit for their intended purpose. It sets the framework for building quality and performance across Australia, influencing everything from design and materials to safety and environmental impact. Builders, designers, and stakeholders must have a thorough understanding of the NCC to successfully navigate the regulatory landscape and deliver projects that meet legal and community expectations.



**Q4. Describe the principles of establishing control during set-out surveys.**

**Answer**

Establishment of Control Points, Accurate Measurement Techniques Redundancy and Verification, Geometric Configuration, Site Conditions Consideration, Establishing a Datum, Documentation and Record Keeping, Continuity of Control, Use of Technology.

Establishing control during set-out surveys involves a series of principles focused on accuracy, reliability, and verification. By following these principles, surveyors can ensure that the control points are precise and trustworthy, ultimately facilitating successful construction and project execution. The careful establishment of control points is vital for minimizing errors and ensuring that construction aligns with design specifications.



**Q5. What is linear measurement in surveying?****Answer**

Linear measurement is a fundamental component of surveying that involves determining the distances between points on the ground. The accuracy and precision of these measurements are critical for various applications, including boundary determination, construction layout, and topographical mapping. Understanding the methods, tools, and applications of linear measurement is essential for surveyors and professionals involved in land development and construction.

**Q6. Provide two (2) examples of surveying that uses linear measurements.****Answer**

1. **Boundary Surveying**  
Description: Boundary surveying involves determining the exact boundaries of a property to establish ownership and define legal property lines.
2. **Construction Layout Surveying**  
Description: Construction layout surveying involves marking the locations of structures, utilities, and other features on a construction site according to the approved plans.

**Q7. Listed below are principles of linear measurement for small surveys. Briefly explain what each principle means.****Answer**

| Principle                       | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Working from whole to the part  | In small surveys, working from whole to the part involves starting with broad measurements to establish key reference points and boundaries, then breaking down the survey area into smaller sections for detailed measurements. This method ensures accuracy and consistency in the final survey results, and helps in managing the survey process effectively. Tools such as measuring tapes, laser distance meters, optical instruments, and digital measuring devices are commonly used to achieve precise measurements at both the initial and detailed stages of the survey. |
| Form well-conditioned triangles | Forming well-conditioned triangles involves establishing control points, measuring distances and angles, and ensuring that the triangles are geometrically well-balanced. This technique enhances measurement accuracy and reliability in small surveys by leveraging the principles of triangulation. Proper use of surveying tools and trigonometric calculations is essential for achieving precise results.                                                                                                                                                                    |



|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Economy of lines | The economy of lines principle in small surveys emphasizes the efficient use of linear measurements to achieve accurate results with minimal effort. By planning strategically, using advanced technology, and focusing on essential measurements, surveyors can streamline the process, reduce redundancy, and effectively manage resources. This approach not only saves time and effort but also enhances the overall accuracy and efficiency of the survey. |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Q8. Listed below are two (2) methods of linear measurements. Briefly explain each.**

**Answer**

| Type of linear measurement | Explanation                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Direct method              | The Direct Method of linear measurement is characterized by the straightforward use of physical tools to measure distances directly from one point to another. Tools like measuring tapes, surveyor's chains, rods, and laser distance meters are commonly used for this purpose, providing immediate and direct results suitable for various applications in construction, surveying, and everyday tasks. |
| Optical method             | The Optical Method of linear measurement uses optical instruments and light-based principles to measure distances with high precision. Instruments like theodolites, total stations, laser scanners, and optical range finders utilize visual or laser technology to determine lengths and spatial data, providing valuable tools for surveying, construction, and detailed 3D modeling.                   |



**Q9. What is horizontal angular measurement in surveying?**

**Answer**

In surveying, horizontal angular measurement refers to the process of measuring the angle between two points or lines on a horizontal plane. This type of measurement is crucial for determining the direction and orientation of survey lines or boundaries relative to each other.



**Q10. Why are the linear and angular measurements necessary in surveying?**

**Answer** In surveying, both linear and angular measurements are crucial for accurately determining the positions and dimensions of features on the Earth's surface. linear measurements provide the distances needed for accurate mapping and boundary setting, while angular measurements ensure correct orientation and alignment of these distances. Together, they enable precise and reliable survey results. ☐

**Q11. Why is it relevant to have knowledge of geometry when conducting surveying activities?**

**Answer** In summary, knowledge of geometry is fundamental to surveying activities as it underpins the methods and principles used to measure, analyze, and represent spatial relationships. This knowledge ensures that surveys are accurate, efficient, and aligned with design and regulatory requirements. A strong foundation in geometry empowers surveyors to perform their tasks effectively, ultimately contributing to the success of construction and land development projects. ☐

**Q12. Why is it relevant to have knowledge of trigonometry when conducting surveying activities?**

**Answer** Knowledge of trigonometry is highly relevant in surveying for several key reasons: ☐

Distance Calculation: Surveyors often need to determine distances between points based on angular measurements and known distances. Trigonometry provides the necessary formulas and methods to calculate these distances accurately using angles and known lengths. For example, in triangulation, surveyors use trigonometric functions to find distances between points.

Elevation and Slope: Trigonometry is used to calculate elevations and slopes. By measuring angles and distances, surveyors can determine the height differences between points or the gradient of a slope. This is essential for tasks like grading, drainage design, and assessing land for construction.

Angle Measurements: Surveying involves measuring horizontal and vertical angles. Trigonometric principles help in converting these measurements into meaningful data, such as calculating the position of a point relative to a reference point.

**Map Projections and Coordinates:** Trigonometry is used in converting spherical coordinates to planar coordinates and vice versa. This is important for accurate mapping and for translating measurements from a curved surface (like the Earth) to a flat map.

**Error Correction:** Trigonometric calculations help in correcting and compensating for errors in measurements. For example, in surveying large areas, trigonometric methods are used to adjust and refine measurements to ensure accuracy.

**Surveying Techniques:** Various surveying methods, such as triangulation, traverse, and polar coordinates, rely on trigonometric principles. These methods use angles and distances to establish precise locations and boundaries.

Overall, trigonometry provides the mathematical foundation needed to interpret and apply measurement data accurately, which is crucial for the precision and reliability of surveying work.

**Q13. What components are needed when using an optical level and how are these used?**

**Answer**

**Optical Level (Leveling Instrument)**

**Function:** The optical level is the primary instrument used to measure vertical differences between points. It consists of a telescope mounted on a horizontal base.

**Usage:** The level is set up on a tripod, and the telescope is aligned with a leveling vial to ensure the instrument is perfectly horizontal. It provides a line of sight for measuring differences in height between the instrument and the leveling rod.

**2. Tripod**

**Function:** The tripod provides a stable base for the optical level.

**Usage:** The tripod is set up on a stable surface, and the optical level is mounted on it. The tripod legs can be adjusted to ensure that the level is correctly positioned and leveled.

**3. Leveling Rod (Staff)**

**Function:** The leveling rod is used to measure the height of the instrument's line of sight at various points.

**Usage:** The rod is placed on a point whose height needs to be measured. The rod has graduated markings that are read through the optical level to determine the elevation difference.

**4. Leveling Vial (Bubble Level)**

**Function:** The leveling vial is a glass tube with a bubble that ensures the optical level is perfectly horizontal.

**Usage:** The vial is used to adjust the position of the optical level so that it is accurately horizontal. The bubble should be centered in the vial to ensure accurate readings.

**5. Focusing Mechanism**

**Function:** The focusing mechanism allows the surveyor to adjust the clarity of the image seen through the telescope.

**Usage:** By turning the focusing knobs, the surveyor can sharpen the image of the leveling rod to ensure precise readings.

**6. Horizontal and Vertical Adjustment Controls**



Function: These controls allow for fine adjustments of the instrument to align it properly.  
Usage: Horizontal controls are used to sight different points, while vertical controls help in adjusting the alignment of the line of sight.

**Q14. What is the difference between a dumpy level and a theodolite?**

**Answer**

Functionality: A dumpy level is primarily for leveling and vertical height measurements, while a theodolite is used for precise angular measurements in both horizontal and vertical planes.  
Measurement Precision: Theodolites offer more precise angle measurements due to their graduated circles and often electronic features, while dumpy levels are simpler and more focused on height differences.  
Complexity: Theodolites are generally more complex and versatile, often including electronic components for advanced measurements, whereas dumpy levels are simpler and used mainly for straightforward leveling tasks.  
In essence, the choice between a dumpy level and a theodolite depends on the specific surveying needs and the level of precision required for the task.



**Q15. Describe a two-peg test.**

**Answer**

The two-peg test is a method used in surveying to check the accuracy and calibration of a leveling instrument, such as a dumpy level or an optical level. It helps ensure that the instrument is properly aligned and that the measurements it provides are accurate. Here's how the two-peg test is typically conducted:

**Purpose**

**Accuracy Check:** To verify the accuracy of the leveling instrument in measuring height differences.

**Instrument Calibration:** To ensure that the instrument is correctly calibrated and free from systematic errors.

**Procedure****Setup**

**Choose Two Points:** Select two points (A and B) on the ground that are at a known distance apart. These points should be relatively level and not subject to significant ground movement or disturbance.

**Position the Instrument:** Set up the leveling instrument at a central location where it can view both points A and B. This location should ideally be equidistant from both points to minimize errors.

**First Measurement**

**Sight the First Peg:** Position a leveling rod (or staff) at point A and take a reading through the instrument. Note the reading (e.g., the height of the instrument's line of sight relative to point A).

**Sight the Second Peg:** Move the leveling rod to point B and take another reading through the instrument. Note this reading as well.

**Move the Instrument**

**Relocate the Instrument:** Move the leveling instrument to a new position, usually near the midpoint between points A and B, but not exactly at the same location as before. Ensure that the instrument is properly leveled and aligned.

**Second Measurement**

**Sight the First Peg Again:** Position the leveling rod back at point A and take a reading through the instrument.

**Sight the Second Peg Again:** Move the rod to point B and take a reading.

**Compare Readings**

**Calculate Differences:** Compare the height differences between the two sets of readings. Ideally, the difference in the measured height should be the same in both measurements if the instrument is correctly calibrated and aligned.

**Analyze Errors:** If there is a discrepancy between the two sets of measurements, it indicates a possible error in the leveling instrument or in the setup. This could be due to instrument misalignment, leveling errors, or systematic errors.

**Results Interpretation**

**Pass:** If the height difference measured in both setups (before and after moving the instrument) is consistent, the instrument is likely calibrated correctly and is functioning properly.

**Fail:** If there is a significant discrepancy, it suggests that the instrument may need adjustment or calibration. Further investigation and corrective action may be required to ensure accurate measurements.



**Q16. Discuss benefits of using electronic distance measuring (EDM) equipment.**

**Answer** The benefits of using EDM equipment are numerous, including improved accuracy, speed, and efficiency in distance measurement. By reducing human error and enhancing data collection capabilities, EDM devices contribute significantly to the effectiveness and precision of surveying and construction projects. Their ability to integrate with other technologies and operate under various conditions further enhances their utility and value in modern measurement practices.



**Q17. Identify one operational and one functional feature for each of the levelling and surveying devices listed below.**

| Answer | Device                                    | Operational features                                                                                                                                                                                                                                   | Levelling features                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|        | Laser level:<br>manual-levelling<br>laser | <p>Laser Projection</p> <p>Description: The manual-levelling laser projects a laser beam that can be either a dot, a line, or a cross line.</p> <p>Function: Provides a clear reference line or point for aligning, leveling, and measuring tasks.</p> | <p>Manual Leveling Mechanism</p> <p>Description: The core feature of a manual-levelling laser is the need for manual adjustment to achieve level alignment. This typically involves using leveling screws or knobs.</p> <p>Function: Users must manually adjust the instrument to ensure that it is perfectly level. This is usually done by rotating the leveling screws or knobs until the laser line projects correctly according to the desired level.</p> |



|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Laser level: dot laser levels | <p><b>Laser Dot Projection</b><br/> <b>Description:</b> Dot laser levels project a visible laser dot onto surfaces. Some models project one dot, while others can project multiple dots at different angles or positions.<br/> <b>Function:</b> Provides a precise point of reference for alignment tasks, marking, and level checking. The dot(s) can be used to align objects, mark positions, or check levelness at specific points.</p> |  |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**Q18. Describe features of the water level.****Answer**

A water level is a simple yet effective tool used in surveying and construction to determine level differences between points. It operates on the principle that water in a connected tube will naturally seek the same level due to gravity. Here are the key features and aspects of a water level:

**1. Transparent Tubing**

**Description:** The water level consists of a long, flexible, transparent tube or hose filled with water. The transparency allows the surveyor to see the water level clearly.

**Function:** Enables the user to observe the water surface at different points and ensures that the level readings are accurate.

**2. Water Reservoirs**

**Description:** At each end of the tube, there are usually small reservoirs or containers to hold the water and allow easy filling and maintenance.

**Function:** Provides a stable supply of water to ensure consistent measurements and allows for the removal of air bubbles from the tube.

**3. Graduated Scale (Optional)**

**Description:** Some water levels include a graduated scale along the tube or reservoirs to allow for direct reading of height differences.

**Function:** Provides a direct measurement of elevation differences when visible through the water level.

**4. End Attachments**

**Description:** The ends of the tube may have fittings or attachments that help secure the water level in place or connect it to other surveying equipment.

**Function:** Ensures that the tube stays in position and does not move during measurement.

**5. Flexible Tubing**

**Description:** The tube is usually flexible, allowing it to be bent around obstacles and extended over various distances.

**Function:** Enables the water level to be used in different terrains and situations where a rigid tool might not be practical.

**6. Air Bubble Removal**

Description: It is important to remove air bubbles from the tube before taking measurements to ensure accuracy.

Function: Air bubbles can cause errors in the reading by making the water level appear incorrect. Proper handling and filling techniques help minimize this issue.

#### 7. Leveling Principle

Description: The water level operates based on the principle that water seeks its own level due to gravity. When the tube is held at different points, the water in the tube will be at the same height if those points are level with each other.

Function: Allows the user to determine whether two points are at the same elevation by comparing the water levels at different locations.

#### 8. Simple and Cost-Effective

Description: The water level is a relatively simple and inexpensive tool compared to more advanced surveying equipment.

Function: Provides a cost-effective solution for leveling and elevation measurement, particularly in smaller or less complex surveying tasks.

#### Applications

Construction: Used for aligning foundations, setting grade levels, and ensuring that surfaces are level.

Landscaping: Helpful for leveling areas, such as garden beds and irrigation systems.

Surveying: Used to check the level of various points in a survey area, especially in situations where high precision is not critical.

In summary, the water level is a practical and versatile tool for measuring and comparing elevations. Its simplicity and effectiveness make it valuable for various applications, especially when high-tech instruments are not required.

- Q19. You are responsible for checking levels in an excavation.  
From the drawings for the job you know the floor level is RL 12.000. The floor of the excavation is level (0% grade).**

**You find a peg, which identifies the RL as 14.50.**

**The plane of collimation measures 0.65m above the peg.**

**On what level would you set the receiver on the stave to achieve the desired FL of the excavation? Show your calculations.**

**Answer**

To determine the correct setting for the receiver on the stave to achieve the desired floor level (FL) of the excavation, you need to follow these steps:



Determine the Required Height of the Stave Receiver:

Given Information:

Desired Floor Level (RL) = 12.000 meters

Peg RL = 14.50 meters

Plane of Collimation (PC) = 0.65 meters above the peg

Calculate the Instrument's Line of Sight Relative to the Peg:

Since the plane of collimation (line of sight) is 0.65 meters above the peg, you can find the height of the plane of collimation relative to the RL of the peg:

Height of Plane of Collimation

=

Peg RL

+

Height of Plane of Collimation Above Peg

Height of Plane of Collimation = Peg RL + Height of Plane of Collimation Above Peg

Height of Plane of Collimation

=

14.50

meters

+

0.65

meters

=

15.15

meters

Height of Plane of Collimation = 14.50 meters + 0.65 meters = 15.15 meters

Calculate the Required Height of the Stave Receiver:

The floor level (FL) of the excavation needs to be at RL 12.000 meters. To determine the setting for the receiver on the stave, you need to find the difference between the height of the plane of collimation and the desired RL:

Required Receiver Height

=

Height of Plane of Collimation

-

Desired Floor Level (RL)

Required Receiver Height = Height of Plane of Collimation - Desired Floor Level (RL)

Required Receiver Height

=

15.15

meters

-

12.000

meters

=

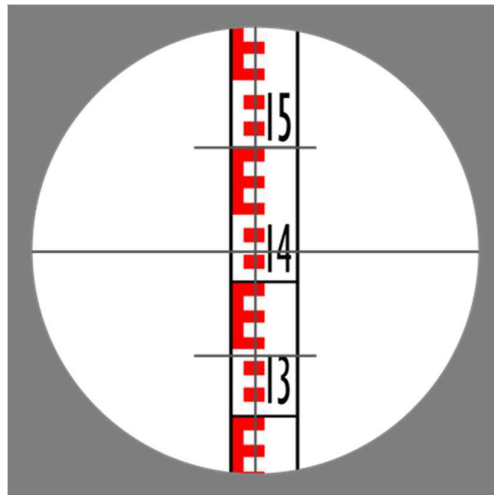
3.15

meters

Required Receiver Height = 15.15 meters - 12.000 meters = 3.15 meters

Conclusion:

To achieve the desired floor level (FL) of 12.000 meters in the excavation, you should set the receiver on the stave at a height of 3.15 meters. This ensures that when the plane of collimation is sighted through the receiver, it aligns with the desired floor level of RL 12.000 meters.

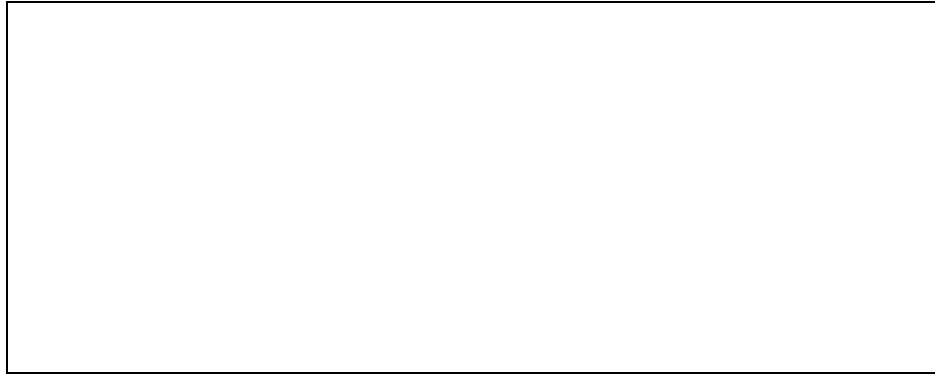


Q20. Using the picture above, what distance is the staff from the instrument?  
Show workings.

Answer

- ☐ Staff reading (height of the staff from the ground level) = SSS meters
- ☐ Instrument height (distance from the instrument to the ground) = III meters
- ☐ The difference in readings (staff reading minus instrument height) can be used to estimate distance if we assume a flat terrain and horizontal line of sight.
- ☐ **Measure the Staff Reading:**
  - Suppose the staff reading is 1.5meters.
- ☐ **Measure the Instrument Height:**
  - Suppose the instrument height is 1.2meters.
- ☐ **Calculate the Distance:**
  - Assuming a flat terrain and a horizontal line of sight, the difference between the staff reading and instrument height can help approximate the distance if the exact height difference isn't critical.





**Q21. Discuss errors in measured distances due to site characteristics and measurement methods.**

**Answer**

Errors in measured distances in surveying can arise from various site characteristics and measurement methods. These errors can significantly impact the accuracy of survey results. Terrain Variability, Weather Conditions, Geological Features, Magnetic Interference.

Measurement Methods,  
Tape or Rod Measurements, Electronic Distance Measurement (EDM), Total Stations, Laser Scanning.

Mitigating Errors  
To minimize these errors, surveyors should:  
Choose Appropriate Equipment, Calibrate Instruments, Account for Environmental Factors, Use Correct Techniques.

By understanding and addressing these potential sources of error, surveyors can improve the accuracy of their distance measurements and ensure reliable survey results.



**Q22. Discuss the purpose of setting out gridlines for the construction project.**

**Answer**

Setting out gridlines is a fundamental practice in construction and surveying, serving several critical purposes.

Establishing a Reference Framework, Facilitating Accurate Positioning, Simplifying Construction Layout, Ensuring Alignment and Symmetry, Facilitating Quality Control, Supporting Complex Design, Assisting in Future Modifications,

Implementation of Gridlines

Surveying: Gridlines are typically established by surveyors using precise measurements and instruments. They are marked on-site using pegs, stakes, or other markers.

Documentation: The grid system is documented in the construction plans and drawings, providing a reference for all involved parties.

Setting out gridlines is crucial for ensuring that construction projects are executed accurately, efficiently, and in alignment with the design specifications. They provide a systematic approach to laying out and constructing buildings, reducing the likelihood of errors and facilitating smooth coordination among different aspects of the project



**Q23. Discuss situations where you need to draw up a contour plan.**

**Answer**

A contour plan, which uses contour lines to represent the elevation and shape of the land, is a critical tool in various scenarios in surveying, engineering, and land development.

Site Planning and Design, Civil Engineering Projects, Landscape Architecture, Environmental Management, Agricultural Planning, Construction and Infrastructure, Urban Planning, Emergency Planning., contour plans are indispensable for any project that involves understanding and working with land elevation and topography. They provide critical information for design, planning, and management across a wide range of disciplines, ensuring that projects are implemented efficiently and sustainably while minimizing environmental impact..



**Q24. When do you draw longitudinal sections from RLs.**

**Answer**

Longitudinal sections are crucial in surveying and engineering to represent the profile of a project along a specific line, such as a road, railway, or pipeline. They are drawn using Reduced Levels (RLs) to accurately depict changes in elevation and to help in planning and design, Mapping and Surveying.,



**Q25. How do you determine the tolerances when determining levels and clearances from given grades for underground pipework?**

**Answer**

Determining and managing tolerances for levels and clearances in underground pipework involves understanding the project specifications, applying industry standards, and accounting for construction variability. By setting appropriate tolerances, conducting regular inspections, and documenting results, you ensure the proper installation and functionality of the pipework. This helps avoid issues like improper drainage, interference with other utilities, and difficulties in maintenance.



**Q26. How do you calculate elevation slope as a decimal or a percentage?**

**Answer**

To calculate the elevation slope, you can express it as a decimal or a percentage. Both methods involve measuring the vertical rise (elevation change) and the horizontal run (distance over which the rise occurs).

Decimal Slope: Simply the ratio of vertical rise to horizontal run.

Percentage Slope: The decimal slope multiplied by 100 to convert it into a percentage.

Both methods provide useful ways to describe the steepness of a slope, with percentages often being more intuitive for general understanding and decimals being useful for more precise calculations.



**Q27. How do you calculate elevation slope in degrees?**

**Answer**

To calculate the elevation slope in degrees, you need to find the angle of the slope relative to the horizontal. This involves using the arctangent function, which calculates the angle from the ratio of the vertical rise to the horizontal run.

Summary

Calculate the ratio of vertical rise to horizontal run.

Find the arctangent of this ratio to get the slope angle in radians.

Convert the angle from radians to degrees if necessary.

Using these steps, you can determine the slope angle in degrees, which is useful for understanding the steepness of terrain or designing slopes in various engineering and construction applications.



# CPCCBC4018

## APPLY SITE SURVEYS AND SET-OUT PROCEDURES TO BUILDING AND CONSTRUCTION PROJECTS

### WORKBOOK

|                  |               |
|------------------|---------------|
| Participant name | Rex Henderson |
|------------------|---------------|

| FOR THE PARTICIPANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instructions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <ul style="list-style-type: none"> <li>You will complete written activities as outlined on the following pages. You must attempt all questions and provide enough detail in your responses to demonstrate your knowledge.</li> <li>The timeframe for these tasks will be established by your Assessor or Training Plan, but additional time may be allowed upon negotiation with the Assessor.</li> <li>You must complete all questions unassisted by the Assessor or other personnel but may refer to reference material as needed. All questions must be answered correctly for a 'Satisfactory' assessment outcome to be awarded.               <ul style="list-style-type: none"> <li>An oral examination may be allowed under certain circumstances, whereby your answers will be documented by another party.</li> <li>Any written questions that are incomplete, or not answered satisfactorily will need to be completed again after further training support.                   <ul style="list-style-type: none"> <li>If you answer a question incorrectly but modify your response, put your initials next to the written change (or the Assessor must initial a verbal change).</li> </ul> </li> </ul> </li> </ul> |
| <b>Resources required</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Pen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| FOR THE ASSESSOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instructions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>Where oral examination has occurred, ensure that this is acknowledged in writing (e.g. FT001 and Assessor Comments)</li> <li>All questions must be satisfactorily demonstrated by the Participant for a Satisfactory determination (indicated by an Assessor tick to the right of the question).</li> <li>Assessors are to complete marking in pen of a different colour to the Participant.</li> <li>If the Participant verbally modifies their response, write in the modified response verbatim and put your initials next to the written change.</li> </ul> |

| ASSESSOR COMMENTS                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>As necessary, outline:</b></p> <ul style="list-style-type: none"><li>• Details on reattempts, alternative arrangements or reasonable adjustments made.</li><li>• Where a Participant is deemed 'Not Satisfactory', provide recommendations for future training.</li></ul> |
| <div></div>                                                                                                                                                                                                                                                                     |

### NOTE

At times, you will be provided with a specific context to which you must respond, otherwise it is anticipated that you will use a workplace of your choosing (your own, or hypothetical) to provide the context to the task.

At all times, the responses in your assessment must reference **Australian** (Queensland or Federal) documentation, including legislation, regulations, codes of practice, standards and guidance publications.

### ACTIVITY 1

Access and review the working drawings and specifications contained in the project plan below:

[Case Study: Curtin, Australian Capital Territory](#)

Answer the following questions:

- What is the size of the land?
- What is the size of the house, excluding the garage and laundry?
- How many bedrooms does the house have on the ground floor?
- Based on the working drawings, in which cardinal direction is the terrace oriented?
- What was used to replace bricks that were removed?

#### a) What is the size of the land?

Size of land: 825m<sup>2</sup>

#### b) What is the size of the house, excluding the garage and laundry?

Size: 228m<sup>2</sup>; 185m<sup>2</sup> excluding garage and laundry

#### c) How many bedrooms does the house have on the ground floor?

2 bedrooms on ground floor

#### d) Based on the working drawings, in which cardinal direction is the terrace oriented?

Facing North East

#### e) What was used to replace bricks that were removed?

In parts where bricks were removed, reconstituted timber weatherboards have been used as cladding. Timber cladding has low embodied energy and generally low environmental impact.

**Satisfactory  
Outcome**



## ACTIVITY 2

Review the plans and elevations linked below and answer the questions that follow.

[YourHome Design For Place - 3BR + Study All plans and elevations](#)

*For the purpose of this assessment, this case study scenario is based in your state/territory.*

- What is the building classification for this project?
- In which volume of the NCC 2019 can you find the building codes and standards for this building classification?
- What climate zone is applicable to your work area according to the NCC? Specify your state/territory for your assessor's reference.
- List state/territory laws used in your state/territory as reference in determining the additions to these building codes.

### a) What is the building classification for this project?

A Class 1a building is a single dwelling being a detached house;

### b) In which volume of the NCC 2019 can you find the building codes and standards for this building classification?

Volume 1!

### c) What climate zone is applicable to your work area according to the NCC? Specify your state/territory for your assessor's reference.

Zone 1: Tropical Zone 2: Subtropical Zone 3: Hot arid Zone 5: Warm temperate

### d) List state/territory laws used in your state/territory as reference in determining the additions to these building codes.

Building Act 1975 (Queensland), Building Regulation 2021 (Queensland), Queensland Development Code (QDC), Planning Act 2016 (Queensland) Plumbing and Drainage Act 2018 (Queensland Sustainable Planning Act 2009 (Queensland)), Work Health and Safety Act 2011 (Queensland), Queensland Fire and Emergency Services Act 1990, National Construction Code (NCC), Local Government Regulations

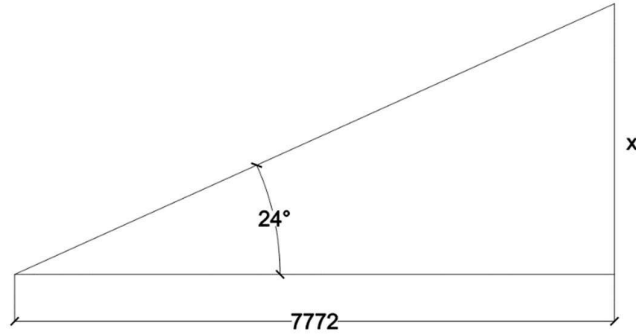
**Satisfactory  
Outcome**



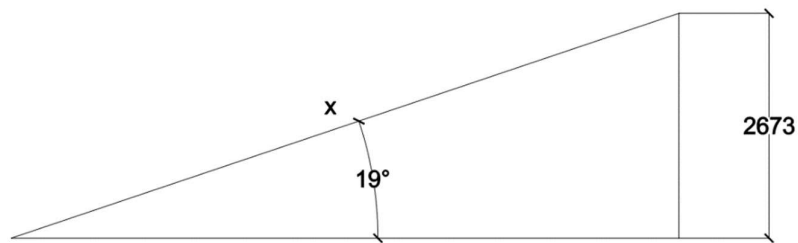
### ACTIVITY 3

Determine the value of  $x$  in each of the following trigonometric problems. Calculators are permitted.

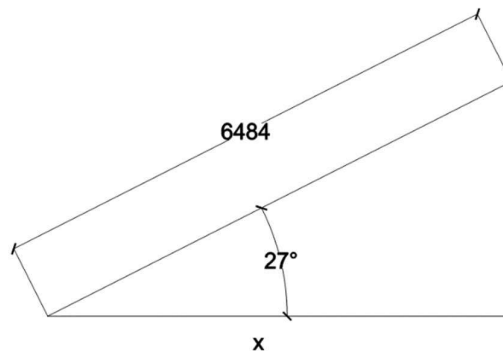
a) **Answer:**  $x$  is approximately 3454.94



b) **Answer:**  $x$  is approximately 8217.48



c) **Answer:**  $x$  is approximately 5778.84



Satisfactory  
Outcome



## Show all working out and calculations.

Given:

Angle = 24 degrees

Adjacent = 7772

Let X be the length of the opposite side. The formula becomes:

$\tan(24^\circ) = \frac{X}{7772}$

To solve X, rearrange the formula:

$X = 7772 \times \tan(24^\circ)$

Now calculate  $\tan(24^\circ)$  using a calculator.

$\tan(24^\circ) = 0.4452$

Substitute this value into the formula;

$X = 7772 \times 0.4452 \approx 3454.94$ .

So value of X is approx. 3454.94

Given;

Angle = 19 degrees

Opposite = 2673

Rearrange to solve for X (hypotenuse)

$X = \frac{2673}{\sin(19^\circ)}$

Calculate  $\sin(19^\circ)$

$\sin(19^\circ) \approx 0.3256$

Now substitute this value;

$X = \frac{2673}{0.3256} \approx 8217.48$

So X is approx. 8217.48.

Given:

Angle = 27 degrees

Hypotenuse = 6484

Rearrange to solve for X (adjacent):

$X = \cos(27^\circ) \times 6484$

Calculate  $\cos(27^\circ)$ :

$\cos(27^\circ) \approx 0.8910$

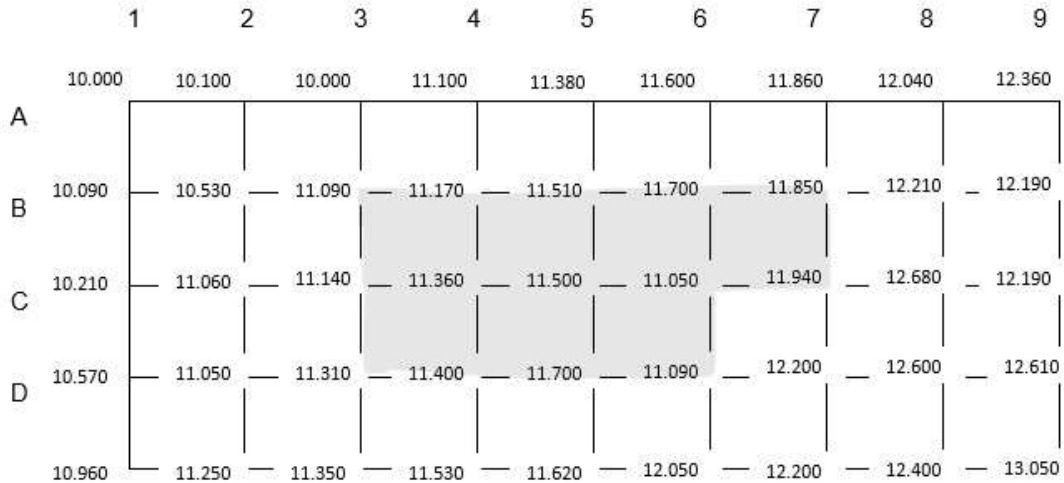
Now substitute this value:

$X = 0.8910 \times 6484 \approx 5778.84$

So the value of X is approx. 5778.84

#### ACTIVITY 4

- a) Using the grid pattern below, complete the table to calculate how much soil is needed to be removed from the highlighted section of the grid (*represents the intended building*) to a given RL of 11.000. Grid measurements = 5m x 5m. (*first row has been completed for you*)
- b) Suggest a new RL for the site that will require no spoil removal, only cut and fill.



| Volume of excavation- Grid method |                                 | Formation level RL           | RL =11.000    |
|-----------------------------------|---------------------------------|------------------------------|---------------|
| Ground level                      | Corner Height "H"               | No. of Squares occurring "N" | Product H & N |
| B3                                | 11.009 -11.000 = 0.090          | 1                            | 0.090         |
| B4                                | 11.170-11.170-11.000            | 1                            | 0.170         |
| B5                                | 11.510-11.510-11.000            | 1                            | 0.510         |
| B6                                | 11.700-11.700-11.000            | 1                            | 0.700         |
| C3                                | 11.140-11.140-11.000            | 1                            | 0.140         |
| C4                                | 11.360-11.360-11.000            | 1                            | 0.360         |
| C5                                | 11.500-11.500-11.000            | 1                            | 0.500         |
| C6                                | 11.050-11.050-11.000            | 1                            | 0.050         |
| D4                                | 11.400-11.400-11.000            | 1                            | 0.400         |
| D5                                | 11.700-11.700-11.000            | 1                            | 0.700         |
| D6                                | 11.090-11.090-11.000            | 1                            | 0.090         |
|                                   |                                 |                              |               |
|                                   |                                 |                              |               |
|                                   |                                 |                              |               |
|                                   |                                 |                              |               |
| Volume =                          | Grid x Grid x Total Product ÷ 4 |                              |               |
|                                   |                                 |                              |               |
|                                   |                                 |                              |               |
|                                   |                                 |                              |               |
|                                   |                                 |                              |               |

**a) Calculate how much soil is needed to be removed from the highlighted section of the grid (represents the intended building) to a given RL of 11.000. Original grid measurements = 5m x 5m.**

Volume =

Grid x Grid x Total Product ÷ 4

B3 0.090m × 25m<sup>2</sup> 2.25m<sup>3</sup>

B4 0.170m × 25m<sup>2</sup> 4.25m<sup>3</sup>

B5 0.510m × 25m<sup>2</sup> 12.75m<sup>3</sup>

B6 0.700m × 25m<sup>2</sup> 17.5m<sup>3</sup>

C3 0.140m × 25m<sup>2</sup> 3.5m<sup>3</sup>

C4 0.360m × 25m<sup>2</sup> 9.0m<sup>3</sup>

C5 0.500m × 25m<sup>2</sup> 12.5m<sup>3</sup>

C6 0.050m × 25m<sup>2</sup> 1.25m<sup>3</sup>

D4 0.400m × 25m<sup>2</sup> 10.0m<sup>3</sup>

D5 0.700m × 25m<sup>2</sup> 17.5m<sup>3</sup>

D6 0.090m × 25m<sup>2</sup> 2.25m<sup>3</sup>

TOTAL VOLUME = 92.75m<sup>3</sup>

**b) Suggest a new RL for the site that will require no spoil removal, only cut and fill.**

A new RL of 11.35 would result in minimal spoil removal, allowing for balancing the cut and fill across the site.

**Satisfactory  
Outcome**





# **CPCCBC4018**

## **APPLY SITE SURVEYS AND SET-OUT PROCEDURES TO BUILDING AND CONSTRUCTION PROJECTS**

### **PRACTICAL ASSESSMENT**

|                  |               |
|------------------|---------------|
| Participant name | Rex Henderson |
|------------------|---------------|

| FOR THE PARTICIPANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instructions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"><li>• The tasks outlined on the following pages will require performance of normal workplace activities, as a result of a structured activity set by an Observer in the workplace or a simulated activity set by your Assessor/Observer.</li><li>• The timeframe for these tasks will be established by your Assessor/Observer, in consideration of location conditions and industry requirements.</li><li>• You must complete all tasks unassisted by the Assessor or other personnel, unless the steps note this assistance.</li><li>• You must attempt all tasks (and itemised steps) for a 'Satisfactory' assessment outcome to be awarded.<ul style="list-style-type: none"><li>○ For any observation conducted that is incomplete, or without satisfactory performance, the observation will need to be completed again after further training support.</li></ul></li></ul> |

| FOR THE ASSESSOR/OBSERVER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Instructions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"><li>• The following observation record should be used to judge and record your observations of the Participant as they complete the task(s) set. You must record your observations of the Participant's performance.<ul style="list-style-type: none"><li>○ For each occasion, indicate the task performed and whether it was a simulation or workplace-based task.<ul style="list-style-type: none"><li>▪ Any simulated assessment must ensure the Participant still performs under workplace conditions which reflect industry standards.</li></ul></li><li>○ In the comments, provide clear detail regarding the task that the Participant was required to do (e.g. PPE used, materials handled, attachments connected, plant types).</li></ul></li><li>• All steps must be satisfactorily demonstrated by the Participant for a 'Satisfactory' determination (indicated by an Assessor tick to the right of each itemised step, or an Observer tick to the right of each itemised step, and confirmation by an Assessor in the Assessor Comments).<ul style="list-style-type: none"><li>○ Where you have determined that one or more task steps have not been satisfactorily demonstrated, provide the Participant with additional support and outline details of such assistance in the Assessor/Observer Comments. Allow the Participant two (2) further opportunities to demonstrate the task again to allow an opportunity for a 'Satisfactory' assessment outcome to be achieved.</li><li>○ If after three (3) attempts the Assessor determines that the Participant cannot demonstrate the required steps, a 'Not Satisfactory' outcome is to be determined.</li></ul></li></ul> |

| TASK OUTCOME           |              |                                                                           |          |                          |                          |
|------------------------|--------------|---------------------------------------------------------------------------|----------|--------------------------|--------------------------|
| Task                   | Date         | Task Type (Tick)                                                          | Location | Task outcome (Tick)      |                          |
|                        |              |                                                                           |          | Satisfactory             | Not Satisfactory         |
| Task 1<br>(Occasion 1) | Select Date. | <input type="checkbox"/> Workplace<br><input type="checkbox"/> Simulation |          | <input type="checkbox"/> | <input type="checkbox"/> |

#### ASSESSOR COMMENTS: GENERAL

##### As necessary, outline:

- Details on reattempts, alternative arrangements or reasonable adjustments made.
- Where a Participant is deemed 'Not Satisfactory', provide recommendations for future training.

#### ASSESSOR COMMENTS: PRACTICAL TASK 1: OCCASION 1

- ☐ Individual student (as named on cover page)
- ☐ Multiple students [☐ All from Attendance Report, ☐ Specific students involved – identify students]

| Task                                      | Provide detail                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.1A.                                     | Specify how participant identified current plans:                                                                                                                                                                                                                                                                                                                                                                               |
| 1.1B.                                     | Specify(✓) surveying device collected and operated:<br><input type="checkbox"/> Electronic distance measuring (EDM) equipment <input type="checkbox"/> Laser level: manual-levelling laser<br><input type="checkbox"/> Laser level: dot laser level <input type="checkbox"/> Optical (Dumpy) level <input type="checkbox"/> Water level <input type="checkbox"/> Theodolite <input type="checkbox"/> Other<br>(please specify): |
| 1.1B.                                     | Specify(✓) levelling device collected and operated:<br><input type="checkbox"/> Electronic distance measuring (EDM) equipment <input type="checkbox"/> Laser level: manual-levelling laser<br><input type="checkbox"/> Laser level: dot laser level <input type="checkbox"/> Optical (Dumpy) level <input type="checkbox"/> Water level <input type="checkbox"/> Theodolite <input type="checkbox"/> Other<br>(please specify): |
| 1.1D.<br>1.1E.<br>1.1F.                   | Specify site RL calculations were made:                                                                                                                                                                                                                                                                                                                                                                                         |
| 1.1G.                                     | Specify errors explained due to site characteristics:                                                                                                                                                                                                                                                                                                                                                                           |
| 1.1H.                                     | Specify(✓) digital tools operated to communicate with others:<br><input type="checkbox"/> Mobile phone <input type="checkbox"/> UHF/ 2-way <input type="checkbox"/> PC via intranet <input type="checkbox"/> PC or mobile for email<br><input type="checkbox"/> Other (please specify):                                                                                                                                         |
| 1.3A.<br>1.3B.<br>1.3C.<br>1.3D.<br>1.3E. | Specify drainage and pipeline situations where calculations were made to determine grades.                                                                                                                                                                                                                                                                                                                                      |

## CPCCBC4018

### APPLY SITE SURVEYS AND SET-OUT PROCEDURES TO BUILDING AND CONSTRUCTION PROJECTS

#### Practical Task 1

##### Description of task:

This assessment applies to National Construction Code (NCC) classifications:

- Residential - Class 1 and 10 buildings, maximum two storeys
- Commercial - Class 2 to 9, Type C only constructions

The participant must demonstrate the skills and knowledge to correctly apply site surveys and set-out procedures to a residential or commercial building on site. Demonstration must include:

- Prepare for and conduct site set-out.
  - Locate, read and adhere to the current plans and site set-out procedures.
  - Select and operate one surveying and one levelling device in accordance with SOPs (*copy of booking sheet required as evidence*).
  - Check accuracy of instrument by conducting a 'two peg test'.
  - Carry out reduction in a closed level run by rise and fall method (*copy of booking sheet required as evidence*).
  - Carry out reduction in a closed level run by height of plane collimation (HPC) method (*copy of booking sheet required as evidence*).
  - Calculate accurate staff readings to enable a specific reduced level (RL) set-out.
  - Identify and explain errors in measured distances due to site characteristics and measurement methods.
  - Use digital tools to communicate with others.
- Develop a contour grid.
  - Determine set-out grid and levels.
  - Prepare a topographic contour plan from grid levels to specified tolerances and stated contour intervals (*copy required as evidence*).
  - Determine surface area being levelled and calculate cut and fill volumes.
  - Calculate and record trigonometric and geometric calculations commonly used with grid lines, off sets and right-angle triangles without error (*copy of calculations required as evidence*).
  - Calculate cut and fill quantities including: (*copy of calculations required as evidence*).
    - area and volume of land to be levelled.
    - area of land to be filled.
    - volume of fill required.
- Determine grades and levels
  - Draw longitudinal sections from RLs.
  - Determine levels and clearances from given grades and distances to specified tolerances.
  - Express calculation angles, percentages and run ratios in grades.
  - Determine calculations for batter levels from grades and distances.
  - Construct longitudinal sections and determine associated grades and levels in typical drainage and pipeline situations.

These tasks may be simulated or real. The Participant is to gather evidence of how they have completed each component of the Practical Task, which is to be submitted with this Practical Assessment sheet. The Observer is to provide detailed comments on the tasks completed by the Participant (on the Observer Comments, overleaf). The Assessor is to verify the Observer's comments, noting their findings in the Assessor Comments (on the back of the Practical Assessment cover page) and provide the assessment outcome.

##### Resources required:

Work site, plans, procedures, one surveying device, one levelling device, access to computer and software, booking sheet, grid paper, pencil, calculator, communication equipment.

| Practical Task 1                                  |                                                                                   |
|---------------------------------------------------|-----------------------------------------------------------------------------------|
| Observer details                                  |                                                                                   |
| Name of observer:                                 | Adrian Wyatt                                                                      |
| Role of observer<br>(Confirm suitability to sign) | Site manager                                                                      |
| Email address of observer                         | adrian.wyatt@mcnab.net.au                                                         |
| Signature of observer:                            |  |
| Date:                                             | Select Date. 07/11/2024                                                           |

| When completing the task, did the Participant:                                                                                                                                                                                                                        | Tick if satisfactorily completed.<br>Provide comments if left unticked. |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>1 Prepare for and conduct site set-out.</b>                                                                                                                                                                                                                        |                                                                         |
| 1.1A. Locate, read and adhere to the current plans and site set-out procedures.                                                                                                                                                                                       | <input checked="" type="checkbox"/>                                     |
| 1.1B. Select and operate one surveying and one levelling device in accordance with SOPs ( <i>copy of booking sheet required as evidence</i> ).                                                                                                                        | <input checked="" type="checkbox"/>                                     |
| 1.1C. Check accuracy of instrument by conducting a 'two peg test'.                                                                                                                                                                                                    | <input checked="" type="checkbox"/>                                     |
| 1.1D. Carry out reduction in a closed level run by rise and fall method ( <i>copy of booking sheet required as evidence</i> ).                                                                                                                                        | <input checked="" type="checkbox"/>                                     |
| 1.1E. Carry out reduction in a closed level run by height of plane collimation (HPC) method ( <i>copy of booking sheet required as evidence</i> ).                                                                                                                    | <input checked="" type="checkbox"/>                                     |
| 1.1F. Calculate accurate staff readings to enable a specific reduced level (RL) set-out.                                                                                                                                                                              | <input checked="" type="checkbox"/>                                     |
| 1.1G. Identify and explain errors in measured distances due to site characteristics and measurement methods.                                                                                                                                                          | <input checked="" type="checkbox"/>                                     |
| 1.1H. Use digital tools to communicate with others.                                                                                                                                                                                                                   | <input checked="" type="checkbox"/>                                     |
| 1.1I. Use equipment software to collect information and develop relevant documentation.                                                                                                                                                                               | <input checked="" type="checkbox"/>                                     |
| <b>2 Develop a contour grid.</b>                                                                                                                                                                                                                                      |                                                                         |
| 1.2A. Determine set-out grid and levels.                                                                                                                                                                                                                              | <input checked="" type="checkbox"/>                                     |
| 1.2B. Prepare a topographic contour plan from grid levels to specified tolerances and stated contour intervals ( <i>copy required as evidence</i> ).                                                                                                                  | <input checked="" type="checkbox"/>                                     |
| 1.2C. Determine surface area being levelled and calculate cut and fill volumes.                                                                                                                                                                                       | <input checked="" type="checkbox"/>                                     |
| 1.2D. Calculate and record trigonometric and geometric calculations commonly used with grid lines, off sets and right-angle triangles without error ( <i>copy of calculations required as evidence</i> ).                                                             | <input checked="" type="checkbox"/>                                     |
| 1.2E. Calculate cut and fill quantities including: ( <i>copy of calculations required as evidence</i> ).<br><ul style="list-style-type: none"> <li>area and volume of land to be levelled.</li> <li>area of land to be filled and volume of fill required.</li> </ul> | <input checked="" type="checkbox"/>                                     |
| <b>3 Determine grades and levels.</b>                                                                                                                                                                                                                                 |                                                                         |
| 1.3A. Draw longitudinal sections from RLs.                                                                                                                                                                                                                            | <input checked="" type="checkbox"/>                                     |
| 1.3B. Determine levels and clearances from given grades and distances to specified tolerances.                                                                                                                                                                        | <input checked="" type="checkbox"/>                                     |

A large, empty rectangular box with a black border, intended for a drawing or illustration. The box occupies the majority of the page below the text. It is a simple rectangle with a thin black line for its border.