

RIIMPO402D

APPLY THE PRINCIPLES OF EARTHWORKS CONSTRUCTION

THEORY EXAM

Participant name	
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FOR THE PARTICIPANT

Instructions

- You will complete written questions as outlined on the following pages. You must attempt all questions and provide enough detail in your response to demonstrate your knowledge.
- It is anticipated that you should complete this assessment within two (2) hours, but additional time may be allowed upon negotiation with the Assessor.
- You must complete all questions unaided 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.
- An oral examination may be allowed under certain circumstances, whereby your answers will be documented by another party.
- Any written questions that are incomplete, or not answered satisfactorily will need to be completed again after further training support.
- 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).

Resources required

Pen

FOR THE ASSESSOR

Instructions

- Where oral examination has occurred, ensure that this is acknowledged in writing (e.g. FT001 and Assessor Comments)
- All questions must be satisfactorily demonstrated by the Participant for a Satisfactory determination (indicated by an Assessor tick to the right of the question).
- Assessors are to complete marking in pen of a different colour to the Participant.
- If the Participant verbally modifies their response, write in the modified response verbatim and put your initials next to the written change.

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. What information can you obtain by reading the project plans, surveys, drawings and specifications during planning for earthworks?

Answer

Should reflect but is not limited to:



Site Plan: provides details of orientation of the site, boundaries surrounding infrastructure and structures, easements and utilities. site plan notes include information relating to standards for technical aspects.

Topographic survey is prepared by a surveyor or engineer, showing accurate land measurements, the contours of the land, permanent physical features in detail, both natural and man-made, such as vegetation, buildings, and roads elevations, road names, waterways, levels and drainage features

Engineering survey sets out extensive calculations about quantities and volumes, specifications for the project.

Specifications: technical specifications set out requirements for earthworks to meet standards (Australian Standards and Industry/company standards) relating to materials, testing, sampling and tolerances.

Q2. Why is project site hydrological data important to earthworks planning and where this can be accessed?

Answer

Should reflect but is not limited to: Hydrological data describes the ground and surface water relevant to the site including the location of water sources, flood zones, historical flood records, water levels, water quality, water tables and water management.



Hydrological data can be sourced by reading: catchment flood management plans; local council catchment information and can assist in risk management activities. Hydrological information relating to ground water must be read to avoid a negative impact on local eco-systems occurring due to earthworks.

Q3. What is the purpose and procedure for conducting a proof roll test to the subgrade?

Answer

Should reflect but is not limited to: Proof roll tests will be applied according to the work specifications and must be applied to determine or confirm compaction of the subgrade is ready for construction of subsequent pavement layers. Undertaken at completion of earthworks to subgrade level to test for perceptible surface deformation.

Generally conducted using a smooth-drum roller although a fully-laden water truck with a single axle may also be used. A visual assessment is made to the surface the roller has travelled over to determine if there is any visible deformation or weak areas that require rectification.



Q4. What is the purpose of geotechnical investigation reports and how they inform earthworks planning?

Answer

Should reflect but is not limited to: Performed by geotechnical engineers or engineering geologists to obtain information on the physical properties of soil earthworks and foundations for proposed structures. This report will specify the physical properties of the soil on the site including the chemical composition of the soil, the stability of natural slopes, possible fault distributions and other necessary details of the construction site. It includes location and surface conditions for a specific site, surface coverings, elevation and drainage. It contains subsurface exploration data, soil profiles, lab or in-situ test results, ground water conditions and an interpretation of the data collected. The information provided assists project managers and engineers to establish suitable environment controls, determine drainage and fill requirements for the site.



Q5. What information would you expect to see in a job plan?**Answer**

Should reflect but is not limited to:

Resources required:

- Human resources including sub-contractors; scheduling
- plant and machinery (hiring, in house)
- materials including delivery
- environmental protection
- communication systems – barriers, signage, traffic management; worker awareness training, safety
- earthworks construction activities

Monitoring activities and actions

- worker performance
- schedule, milestones, testing and quality
- safety

Reporting requirements

- milestones, issues, continuous improvement, incident

Q6. How would you identify if any drainage or dewatering issues need to be addressed at the site and how you would promptly and effectively manage these once identified?**Answer**

Should reflect but is not limited to: Interpreted requirements from engineers specifications, technical specifications, plans showing contours and low lying area drainage. Manage by organising dewatering and drainage to construction area as part of work schedule, to keep excavation bottom dry, increase the stability of the soil and support safety. Implementation includes the positioning and installation of sedimentation controls, positioning and construction of sumps, sump pumps and hoses, trenches and pits to remove surface water. Certain situation require the installation of wellpoints.

Q7. What is the importance of understanding the relationship between the different areas of civil work when planning and sequencing work tasks, providing examples?

Answer

Should reflect but is not limited to: It is important to understand the relevance of precedence relations between activities, these signify that the activities must take place in a particular sequence. When planning it is also important to consider activities which may not be able to start for several days after the completion of another activity (e.g. after concreting, allowance for curing). When sequencing work tasks in the schedule, you must consider the preceding tasks as well as any lag following the task. Different types of precedence relationships have different implications for the schedule of activities. Some activities have a necessary technical or physical relationship that cannot be superseded. (e.g. concrete pours cannot proceed before formwork and reinforcement are in place). Some activities have a necessary precedence relationship over a continuous space rather than as work task relationships. (e.g. formwork may be placed in the first part of an excavation trench even as the excavation equipment continues to work further along in the trench, these two activities can be started and stopped independently within this constraint.) Some "precedence relationships" are not technically necessary but are imposed due to implicit decisions within the construction plan (e.g. two activities may require the same piece of equipment so a precedence relationship might be defined between them to avoid scheduling for the same time period.)



Q8. Before commencing a project, what would you estimate to effectively determine resource and sequencing requirements?

Answer

Should reflect but is not limited to: Estimates of material quantities including area for excavation, volume of material to be excavated, fill requirements, estimate of number of trucks needed to remove/deliver materials. Estimates of resource consumption and supply rates

Estimates of human resources required to achieve the tasks including hours of work and estimate of tasks achievement within scheduled timeframes.

Estimate of costing including cost of human resources, imported material, hire plant and or equipment.



Q9. What is the definition of the following material properties and test results that are applicable to earthworks?

Answer

Test	Definition
Compaction test	In field testing with a nuclear gauge that has two radioactive isotopes and sensors that detect how much of the radiation makes it back to the machine. One of the sources is for detecting the hydrogen content, which is a direct correlation with the moisture content. The other source is for detecting the wet density. Samples are taken in the field and sent to the lab. A standard Proctor Test is used to determine the optimum moisture content at the maximum dry density.
Soil density/ moisture	Bulk density is the weight of dry soil divided by the total soil volume. Often used as a measure of soil compaction but is also used to calculate soil properties per unit area. Closely related to moisture content as the optimum moisture content (OMC) is the level to be achieved.
Plasticity	The plastic state is when the moisture content of the soil begins to hold together and offer some resistance to deformation. The Plasticity Index (PI) is a measure of the plasticity of a soil. The PI is the difference between the Liquid Limit and the Plastic Limit ($PI = LL - PL$). Soils with a high PI tend to be clays, those with a lower PI tend to be silts and those with a PI of 0 (non-plastic) tend towards sands with little or no clay or silt. Testing is conducted in a lab.
Particle size distribution	The particle size distribution of aggregates is a determining factor for the wearing behaviour of asphalts. Hydrometer is used for this measurement.



Q10. What resources must you confirm are available before the job plan can be implemented?

Answer

Should reflect but is not limited to: Human resources must be scheduled and can be confirmed using rosters. The availability of sub-contractors and plant operators can also be confirmed via HR departments and in the case of small operators by contacting the sub-contractors.

Plant equipment and tools needed for excavation, clearing, grubbing, grading, dewatering etc.

Material supply vehicles – trucks to transport materials to site at required times. Trucks and plant to move material from construction area.

Material including the need for fill.



Q11. Outline the information you will be discussing with the work team during the pre-start meeting.

Answer

Should reflect but is not limited to: Site rules and individual responsibilities, safety, task requirements from job plan, planning sequence and responsibilities, SWMS, risk management, exclusion zones and applicable signage. work times and environmental management.



Q12. What methods can you apply to confirm instructions provided have been understood?

Answer

Should reflect but is not limited to: Signing of understand the SWMS, ask for questions, remain open to differing opinions, monitor body language, listening carefully during discussion, respond to questions clearly. Monitor the work for compliance.



Q13. What would you do if you come across conflict between sub-contractors?

Answer

Should reflect but is not limited to: speak with each individually, remind contractors that the focus is on the task.

☐

Q14. Discuss what you would do if you noticed a client walking onto the site with no PPE and they haven't signed in.

Answer

Should reflect but is not limited to: Meet the client and gently explain they are not permitted on site and the safety factors. Guide the client off the site and forward concerns to the appropriate person.

☐

Q15. Discuss the importance of accurate setting out of offsets.

Answer

Should reflect but is not limited to: Setting out must be accurate to guide the workers as they begin construction. Also vital to ensure the construction remains within the legal boundary. Construction pegs will be located at fixed offsets from their design positions to avoid disturbance from machinery and to ensure compaction to the road edge. The offset distance shall be set by the project engineer and must be adhered to for accuracy.

☐

Q16. You have noticed a worker who is assisting during setting out, doesn't seem to know what they are doing. How will you respond to this situation?

Answer

Should reflect but is not limited to: Take note, speak with the individual separately and organise additional mentoring and/or training.

☐

Q17. After speaking with the worker from the previous question, you establish that this worker has difficulty calculating percentage of slope, as well as other things. Provide a simple equation you can provide to assist the workers learning.

Answer

Should reflect but is not limited to: Road grade percentage - Percent of slope is determined by dividing the amount of elevation change by the amount of horizontal distance covered (sometimes referred to as "the rise divided by the run"), and then multiplying the result by 100.

☐

Q18. What tool and equipment maintenance would direct the team about before setting out the site?

Answer

Should reflect but is not limited to: All tools and equipment should be checked for serviceability, including calibration of leveling equipment. If calibration certificate is not current, the item must be booked for calibration and the supervisor (or self) must be informed. All issues with tools and equipment must be brought to the attention of supervisor to ensure sufficient tools and equipment are available for the work to be undertaken.

☐

Q19. Describe how you ensure all workers understand the communication methods used on site and all appropriate equipment before beginning work tasks.

Answer

Should reflect but is not limited to: Discuss during daily pre-start meeting, ensure all workers know which UHF frequency to work from and also understand how to respond in an emergency situation. Confirm all have attended training (induction, toolbox)



Q20. Calculate the amount of road base required for an area of 200m in length, 12.4m in width and a depth of 250mm. Answer using cubic metres (m³). Allow an extra 20% for compaction.

Answer

Should reflect:

$$200 \times 12.4 \times 25 = 620\text{m}^3 + 20\%$$

$$620\text{m}^3 + 124\text{m}^3$$

$$744\text{m}^3$$



Q21. Calculate the following to determine the percentage of grade. A rise of 820 millimetres and a run of 60 metres (Round up to two (2) decimal points).

Answer

Should reflect:

$$820 \div 60 \times 100 = 1.366666667\%$$

$$= 1.37\%$$



Q22. How do supervisors know that they are working according to client and organisational requirements when conducting excavation work?

Answer

Should reflect: confirm use of the most current version of plans, drawings and specifications for the site and project. Complete accurate work, measuring and checking continuously, to ensure tasks meet project plan requirements and where there are issues or questions, clarifying these with site management.



Q23. Briefly describe two (2) situations that would require supervisors to make changes to the work practices or job plan.

Answer

1. Should reflect but is not limited to discussion regarding two (2) of: the weather or other changed conditions; a lack of resources; gaps in the process identified and rectified.



2.

Q24. What are two (2) types of reports an organisation could use to record how installation against required outcomes is progressing and identify opportunities for improvement in relation to safety, efficiency, and effectiveness.

Answer

- 1.** Should reflect but is not limited to clear description of two (2) of:
- Status reports on activities and projects – comparison against goals, objectives and KPIs, review of any issues
- KPI reports – review against achievement of KPIs and areas for improvement
- Corrective Action Reports – root cause analysis of problems determines Preventative Actions so they don't happen again in future
- 2.** Safety risk registers, incident reports, hazard reports – identifies areas for improvement in safety, can be monitored over time to see if any systemic hazards
- Staff performance reports – pick up any areas requiring improvement individually such as new skills required or behaviour requires improving
- Issues register – captures issues requiring to be corrected – determines activities for improvement – can be monitored over time



Q25. Why should written information be clearly expressed?

Answer

Should reflect but is not limited to: to ensure there is no confusion and that written information is clear. So that the communication achieves its purpose. So that even those with lesser literacy can understand the information.



Q26. What is the purpose of levelling equipment and why is routine inspection, proper handling and regular calibration important?

Answer

Should reflect but is not limited to: used to meet specified requirements of levels for the project. must handle according to manufacturer instructions and require regular calibration according to manufacturer instructions. Calibration certificate must be checked as part of routine inspection. If calibration is not current, the equipment must be sent for calibration. Equipment that is not correctly calibrated can cause issues with measurements and cause incorrect set out and consequently incorrect work to be undertaken. Documented records inform all others using the equipment of routine inspections undertaken and results.



RIIMPO402D

APPLY THE PRINCIPLES OF EARTHWORKS CONSTRUCTION

PRACTICAL ASSESSMENT

Participant name	
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FOR THE PARTICIPANT

Instructions

- 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.
- The timeframe for these tasks will be established by your Assessor/Observer in consideration of location conditions and industry requirements.
- You must complete all tasks assisted by the Assessor or other personnel, unless the supervisor notes assistance.
- You must attempt all tasks (and itemised steps) for a 'Satisfactory' assessment outcome to be achieved.
 - For an observation conducted that is incomplete, or without satisfactory performance, the observation will need to be completed again after further training support.

FOR THE ASSESSOR/OBSERVER

Instructions

- 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.
 - For each occasion, indicate the task performed and whether it was a simulation or workplace-based task.
 - Any simulated assessment must ensure the Participant still performs under workplace conditions which reflect industry standards.
 - 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).
- 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).
 - 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.
 - If after three (3) attempts the Assessor determines that the Participant cannot demonstrate the required steps, a 'Not Satisfactory' outcome is to be determined.

TASK OUTCOME					
Task	Date	Task Type (Tick)	Location	Task outcome (Tick)	
				Satisfactory	Not Satisfactory
Task 1 (Occasion 1)		☐ Workplace ☐ Simulation		☐	☐
Task 1 (Occasion 2)		☐ Workplace ☐ Simulation		☐	☐

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 (✓) documents read and confirmed: ☐ Plans/ Drawings/Maps ☐ Specifications ☐ TMP ☐ EMP ☐ Site Safety Plan ☐ SWMS ☐ Engineering survey data ☐ Site cultural and heritage information ☐ Sources of material ☐ Labour resources required, including sub-contractors ☐ Schedule ☐ Costing requirements ☐ Other (please specify):
1.1B.	Specify (✓) specifications clarified: ☐ Scheduling requirements ☐ Milestones ☐ Testing requirements ☐ Materials ☐ Site soil/rock and geological data ☐ Other (please specify):
1.1D.	Specify (✓) job plan inclusions: ☐ HR requirements ☐ Plant and machinery requirements ☐ Construction materials requirements ☐ Sub-contractor support requirements ☐ Waste disposal requirements ☐ Coordination requirements ☐ Activity scheduling ☐ Materials delivery scheduling ☐ Risk assessment and management requirements ☐ WHS requirements ☐ Quality management requirements, including testing scheduling requirements ☐ Traffic management requirements ☐ Environmental requirements ☐ Task monitoring requirements ☐ Task performance monitoring requirements ☐ Communication requirements ☐ Reporting requirements ☐ Other (please specify):
1.2K.	Specify (✓) test results read and correctly understood: ☐ Compaction test results ☐ Soil/ density/ moisture relationship ☐ Plasticity index ☐ Particle size distribution ☐ Other (please specify):

ASSESSOR COMMENTS: PRACTICAL TASK 1: OCCASION 1

1.3B.	Specify adjustments made: e.g. adjust schedule to accommodate rock breaker
1.4B.	Specify recommendations made: e.g. modifications to procedures due to new equipment

ASSESSOR COMMENTS: PRACTICAL TASK 1: OCCASION 2

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

Task	Details
1.1A.	Specify (✓) documents read and confirmed: ☐ Plans/ Drawings/Maps ☐ Specifications ☐ TMP ☐ EMP ☐ Site Safety Plan ☐ SWMS ☐ Engineering survey data ☐ Site cultural and heritage information ☐ Sources of material ☐ Labour resources required, including sub-contractors ☐ Schedule ☐ Costing requirements ☐ Other (please specify):
1.1B.	Specify (✓) specifications clarified: ☐ Scheduling requirements ☐ Milestones ☐ Testing requirements ☐ Materials ☐ Site soil/rock and geological data ☐ Other (please specify):
1.1D.	Specify (✓) job plan inclusions: ☐ HR requirements ☐ Plant and machinery requirements ☐ Construction materials requirements ☐ Sub-contractor support requirements ☐ Waste disposal requirements ☐ Coordination requirements ☐ Activity scheduling ☐ Materials delivery scheduling ☐ Risk assessment and management requirements ☐ WHS requirements ☐ Quality management requirements, including testing scheduling requirements ☐ Traffic management requirements ☐ Environmental requirements ☐ Task monitoring requirements ☐ Task performance monitoring requirements ☐ Communication requirements ☐ Reporting requirements ☐ Other (please specify):
1.2K.	Specify (✓) test results read and correctly understood: ☐ Compaction test results ☐ Soil/ density/ moisture relationship ☐ Plasticity index ☐ Particle size distribution ☐ Other (please specify):
1.3B.	Specify adjustments made: e.g. adjust schedule to allow for inclement weather situation
1.4B.	Specify recommendations made: e.g. improvement to processes to avoid overlap of resource requirements