

ECVET Earth Building	<b>From Raw Material to Mix</b>	<b>Unit M</b>
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<b>Learning outcomes</b>		<b>Levels 3+4</b>
<b>KNOWLEDGE</b>	<b>SKILLS</b>	
<ul style="list-style-type: none"> <li>- Sources of information about local raw materials: using a soil map, existing buildings, site investigation, reports, landscape observation, local knowledge</li> <li>- Legal and environmental controls of earth extraction</li> <li>- Constituents and properties of earth: cohesion, grain size distribution, plasticity, Optimum Moisture Content OMC, colour</li> <li>- Different clay minerals and their properties</li> <li>- Field and/or Laboratory identification tests for earth</li> <li>- Relation between mix composition (particle size distribution, cohesion) and finished wall or plaster (technique, strength, durability, surface)</li> <li>- Principles of stabilisation: physical and chemical</li> <li>- Role of the fibres in earth structure</li> <li>- Use of manufactured products</li> <li>- Extraction process to ensure homogenous uncontaminated mix</li> <li>- Methods for ensuring mix proportions: samples, test wall</li> <li>- Effect of order and timing on extraction, storage, mixing</li> <li>- Effect of storage conditions on raw materials and mix: weather, moisture content, workability, fibre degradation</li> <li>- Tools, machinery and equipment</li> <li>- Mixing techniques, manual and mechanical</li> <li>- Relevant codes of practice and current standards for quality of work and materials</li> <li>- Current legislative workplace requirements</li> <li>- Health and safety regulations</li> </ul>	<p><b>Raw material sourcing, testing and processing, recipe</b></p> <ul style="list-style-type: none"> <li>- Take representative soil samples</li> <li>- Ensure a continuous control of extraction</li> <li>- Make field tests</li> <li>- Make samples: mortars samples, test walls or cubes to determine appropriate mix</li> <li>- Assess the strength of the samples</li> <li>- Calculate the materials (quantities, volumes, proportions)</li> <li>- Prepare raw materials (dry, grind, sieve, soften in water, store, transport...)</li> </ul> <p><b>Mix production</b></p> <ul style="list-style-type: none"> <li>- Assess and choose the mixing techniques</li> <li>- Mix to achieve even distribution of all materials</li> <li>- Monitor and control moisture content of the mix</li> <li>- Avoid disaggregation during transport and mixing</li> <li>- Modify the composition of the mix, according to a required task, weather conditions and equipment</li> </ul> <p><b>Organisation</b></p> <ul style="list-style-type: none"> <li>- Order the tasks involved in preparing the earth</li> <li>- Organise the earth extraction, preparation and production site (protection, storage, access, facilities)</li> <li>- Select and use the correct tools and machines for extraction, transport, preparation and mixing of materials</li> <li>- Clean, maintain and store mixer and other equipment</li> </ul>	

COMPETENCE	Level 3
<b>Decision making process</b> <ul style="list-style-type: none"> <li>- Select components and choose which mixes to test both from raw materials or manufactured products</li> <li>- Interpret the tests for the correct mix in respect of the situation and technique</li> </ul> <b>Planning and organising for own work</b> <ul style="list-style-type: none"> <li>- Plan and organise supply and processing according to instructions</li> </ul> <b>Execution, quality control and coordination within the earth building team</b> <ul style="list-style-type: none"> <li>- Work in accordance with the schedule of works, adjust to general work process on site, instruct L1 + L2 workers of the EB team</li> <li>- Check if all the steps involved conform to the specification and program</li> <li>- Identify problems and report</li> <li>- Implement quality control of materials at each step of processing</li> </ul> <b>Communication beyond the earth building team</b> <ul style="list-style-type: none"> <li>- Instruct non-specialist plant operatives in homogenous extraction and non-contamination of subsoil, on or off-site</li> <li>- Liaise with non earth-building specialists on specificity of earthen raw material, processing and mixing</li> </ul>	

COMPETENCE	Level 4
<b>Decision making process</b> <ul style="list-style-type: none"> <li>- Advise on components, mixing techniques and tests in the decision making process</li> <li>- Determine recipes for different mixes both from raw materials or manufactured products in respect of the situation and technique</li> </ul> <b>Planning and organising for team work</b> <ul style="list-style-type: none"> <li>- Sequence the tasks involved in sourcing, supply, testing and processing the earth, recipe</li> <li>- Plan and organise all the steps from raw material sourcing to mixing processing</li> </ul> <b>Execution, quality control and coordination within the earth building team</b> <ul style="list-style-type: none"> <li>- Supervise and coordinate the entire work of the earth building team according to the specifications and program</li> <li>- Report mix composition and production progress</li> <li>- Identify significant problems and intervene</li> <li>- Put in place quality control for each step of raw material sourcing, supply and processing</li> <li>- Put in place quality control for the mixing process</li> </ul> <b>Communication beyond the earth building team</b> <ul style="list-style-type: none"> <li>- Instruct non-specialist plant operatives in homogenous extraction and non-contamination of subsoil, on or off-site</li> <li>- Liaise with supervision and design team</li> <li>- Liaise with other trades and professionals, coordinate and sequence earth works within the general schedule</li> <li>- Liaise with non earth building specialists on specificity of earthen raw material, processing and mixing</li> </ul>	

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<b>Criteria and Indicators for the Assessment of Skills</b>		<b>Levels 3+4</b>
Criteria	Indicators	
Quality of the earth / soil before mixing	<ul style="list-style-type: none"> <li>- Soil field tests are appropriate and correctly executed</li> <li>- Choice of raw material fits the requirements</li> <li>- Choice and use of equipment for extraction and processing is appropriate</li> <li>- Contamination is prevented</li> <li>- After processing, the raw materials are appropriate for use in the mix: <ul style="list-style-type: none"> <li>o grain and fibre size</li> <li>o moisture content</li> <li>o consistency</li> </ul> </li> <li>- Storage ensures the quality of processed raw material is preserved</li> </ul>	
Recipe, Testing	<ul style="list-style-type: none"> <li>- The testing procedure is appropriate to determine the recipe</li> <li>- The chosen recipe is appropriate for <ul style="list-style-type: none"> <li>o the earth building technique and the site conditions</li> <li>o the desired surface quality and finish</li> </ul> </li> <li>- The quantity of the different components are calculated according to the test results and the chosen recipe</li> <li>- Test samples are logically ordered, have a clear, permanent key</li> <li>- Samples for marketing are prepared accordingly (quality, transport,...)</li> <li>- The chosen recipe is clearly written down and can be repeated</li> </ul>	
Quality of the Mix	<ul style="list-style-type: none"> <li>- Choice of equipment and mixing technique is correct</li> <li>- There's no disaggregation during mixing and after transport</li> <li>- The moisture content of the mix is controlled and mastered</li> <li>- Each mixing cycle follows the recipe</li> <li>- The mix is homogenous (grain size, fibres and humidity)</li> </ul>	
Workability	<ul style="list-style-type: none"> <li>- The consistency is appropriate for the technique</li> <li>- The grain / fibre size are appropriate for the technique</li> </ul>	

Ensure that standards of work and materials comply with relevant codes of practice and to current standards.