

Machine Operations & Concrete Sawing Syllabus

Time: 40 hours

Maximum Class Size: 12

Prerequisites: LCM Concrete and Finishing Tech 1

Course Description: This course is designed to introduce the participant to the basic skills needed to be successful on the jobsite. The LCM will be instructed on the types of concrete placement and the transporting of concrete. They will learn a variety of equipment related to the scopes of work including screeding machine pavers, slip-form machines, vibratory truss and wet screed. Basic Construction Math will be reviewed with an emphasis on how to calculate and estimate concrete quantities. Proper site preparation, soil compaction, transportation of concrete, setting forms, finishing flat floors and achieving high FF and FL numbers, curing and sawing concrete as well as all PPE and safety procedures will also be covered. Students are given ample time to practice and demonstrate proficiency in all areas of machine operations and concrete sawing.

Goals/Objectives/Student Learning Outcomes:

- Use basic math processes to solve problems involving fractions and decimals.
- Use standard math formulas to solve problems involving area and volume and common construction materials.
- Use common construction measuring equipment to identify units of measure in the US Standard System and the decimal system.
- Measure a variety of objects to within $\pm 1/8"$ using common construction measuring equipment.
- Convert measurements between the US Standard System and the decimal system.
- Identify, set-up and use horizontal and vertical measuring equipment to perform basic layout, squaring and grade measurements.
- Describe how stationing systems are used to locate distance measurements within the project.
- Demonstrate the correct set-up of a level transit, and given a set of elevation hubs, calculate each elevation to within $\pm .02'$.
- Calculate volume quantities for regular and irregular shapes to within \pm two hundredths of a cubic yard.
- Calculate the amount of concrete needed for concrete forms of certain dimensions with the yield amount included.
- List the three most common types of concrete work.

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Machine Operations & Concrete Sawing Syllabus

- Define the following terms: grade, sub-grade, foundation/footing, slab, finished grade, batter-boards, and string-line.
- Perform a site inspection and develop a rough sketch/drawing of the training area.
- Lay out a batter-board and string-line setup for slab using a leveling instrument to establish proper grade.
- Describe two types of blades used in walk behind saws, the type of cutting they are used for, and the limitations of each.
- Describe the main hazard associated with sawing/cutting concrete and the best way to control the hazard.
- Describe and demonstrate proper equipment inspection, operating procedures, and blade identification & selection for a walk behind concrete saw.
- Describe and demonstrate proper mounting, operating, and required maintenance procedures for a concrete wall saw.
- Given various types of concrete saws, demonstrate proper set-up, operation, and dismantling procedures for sawing horizontally.
- Explain at least two problems that may be caused by improperly compacted soil.
- Describe four factors that determine the amount of compaction needed.
- Demonstrate soil compaction using at least two different methods.
- Identify different types of screeding equipment.
- Describe the five types of cement.
- Describe admixtures; their uses and effects on concrete.
- Define the F Number System and how it relates to Concrete Slab finishes.
- Demonstrate the use of a Walk-Behind Trowel.
- Identify types of trowel blades and their uses.
- Identify and describe all necessary PPE, tools and equipment used for this scope of work.
- Explain methods of transporting concrete.
- Demonstrate proper site preparation, establishing grade, setting forms, reinforcement, placement sequence, lay-down procedure, power floating and finishing flat floors with a power trowel.
- Demonstrate strike-off procedure (form-to-form, wet screed)

Standards

- California Code of Regulations, Title 8, Section 1720 (4)(29) for the placement of concrete.
- OSHA 29 CFR 1926 (Construction Safety Regulations)
- OSHA 29 CFR 1926.700 Subpart Q (Concrete & Masonry Construction)

Classroom Rules and Procedures

- All classes begin at 6:30 am and end at 3:00 pm
- Upon entering classroom, all participants must sign in and be seated by 6:30 am

Machine Operations & Concrete Sawing Syllabus

- Class will consist of a combination of lecture, video, demonstration, coached group exercises, individual exercises and assessment.
- Students are required to report to class ready to work and maintain the provided PPE

Textbooks/Readings/Materials

- *Basic Construction Math*-LIUNA Training IG/PG
- *Estimating Concrete Quantities*- LIUNA Training IG/PG
- *Site Preparation for Concrete Placement*- LIUNA Training IG/PG
- *Soil Compaction*- LIUNA Training IG/PG
- *Concrete Placement and Consolidation*-LIUNA Training IG/PG
- *Sawing Concrete*-LIUNA Training IG/PG
- *Concrete Finishing & Curing*-LIUNA Training IG/PG
- *Machine Operations & Concrete Sawing* DVD
- *Soil Compaction* DVD
- *Sawing Concrete* DVD
- *Lindley Vibrastrike* DVD
- PowerPoints: *Concrete Pours & Placement, Concrete Screeding, Methods of Transporting Concrete, Producing Flat Floor, Types of Cement.*
- Hand-outs: Reading a Rule Pretest and Answers
- Hand-out: English Standard Measures
- Hand-out: Converting Decimals Hand-out: Converting Decimals Clock Method-2 pages
- Hand-out: Ruler
- Hand-out: Converting Decimals Long Term
- Hand-out: Math for Pipelayers PG p. 10-13
- Hand-out: Decimals to Inches Conversion Chart
- Hand-out: Concrete Screeding Equipment
- Hand-out: LCM Length, Area and Volume Formulas-3 pages
- Hand-outs: *Nuclear Test, Soil Compaction Methods, Vibratory Rammers, Vibratory Plates*
- Hand-outs: Types of Cement, Admixtures
- Hand-out: Section 4 Concrete Control Tests-p. 27-36
- Hand-out: Vibra Strike II
- Hand-out: Concrete Slab Finishes and the Use of the F-Number System by Matthew Stuart
- Hand-out: Producing Flat Floors
- Hand-out: Whiteman Walk-Behind Trowels packet and Trowel Blade Selection
- Hand-out: Section 7 Curing and Protection of Concrete

Machine Operations & Concrete Sawing Syllabus

Tools/Equipment/Other Materials:

- Bump cutter
- Channel float
- Check rod
- Vibratory screed
- Laser level
- Power screeds

Personal Protective Equipment

- 12 pairs of gloves
- 12 pairs of safety glasses
- 20 pairs of ear plugs
- 12 hard hats
- 12 pairs of rubber boots

Course Requirements

To receive credit for the course, participants must:

- Be present for full forty hours
- Participate in all classroom exercises
- Pass a written exam
- Pass two hands-on exams

Course Policies

- Participants must be on-time and ready to work.
- Participants must return from breaks on-time.
- Participants must participate in each exercise and assignment
- Participants who are on “light duty” are not allowed to take this course due to the physically demanding requirements.

Assessment and Grading

Participants will be assessed on the following:

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Machine Operations & Concrete Sawing Syllabus

- All written exams must be passed with a score of 80% or above.
- All hands-on exercises are graded on performance and participation. They are pass/fail and must be passed with a score of 80% or above.

Safety

Failure to maintain and use PPE may result in dismissal from the course.