Appendix A

Suggested Training Content for Four (4) hour Awareness Level Training

A. Teaching and Testing Methods

Instructors should use a combination of teaching methods including lecture and presentations with audio visual material, hands-on demonstrations, group discussions, and small group activities when teaching this course. Students must complete both a written exam and a hands-on practical exam. The hands-on practical exam should be scored using a check-list method with the following ratings:

1) Understands the material

2) Needs further supervision to understand the material

3) Cannot demonstrate an understanding – needs further training

The written exam should include questions covering all of the course topics. The practical exam should include activities representative of the skills and knowledge presented for Topics 6, 8, 9, 11, 16, 17 and 18.

B. Training Topics, Need to Know Information, and Suggested Time Frames

1) Scope and Limitations of Course

Suggested Time Frame: 15 minutes

NEED TO KNOW:

- This course does not train you to operate a mast scaffold.
- It is your employer's responsibility to train you on use of the specific mast scaffold you are asked to work on.
- This course is not intended to replace site and equipment specific (manufacturer and model) training which should be provided to you on the job whenever using a new make or model of mast scaffold or when beginning work on a new site.
- This course is not intended to replace OSHA 10-hour training.
- This course does not teach you how to erect or dismantle a mast scaffold.
- This course is intended to teach you the general principles of safe use of mast climbing work platforms.
- All machine types/models have different capacities and being trained in one model does not make you qualified to operate or use another model.

2) Training Disciplines, Frequencies and Durations

Suggested Time Frame: 15 minutes

NEED TO KNOW:

- OSHA requires that your employer provide you with training from a person qualified in the appropriate subject matter to be able to recognize and prevent hazards associated with any scaffold system you are asked to use.
- OSHA doesn't specify the duration of that training.

- CPWR-The Center for Construction Research and Training, a non-profit organization affiliated with the Building and Construction Trades Department, AFL-CIO, recommends the following minimum training for use, erection and dismantling of mast climbing work platforms (MCWPs):
  - An **awareness level user/worker course** of a minimum of 4 hours duration for anyone using or operating MCWPs (which is this course);
  - An **erector/dismantler course** of a minimum of 16 hours duration (or 12 hours with a 4 hours user/awareness class) for anyone responsible for erecting or dismantling MCWPs; the course should include a combination of hands-on, or on-site, and classroom training;
  - **Site- and model- specific training** involving the equipment in use on the job *in addition* to the training requirements listed above. (This training should be offered by your employer);
  - **Refresher training, for both the user and erector/dismantler**
    - -- Every 3 years unless a qualified instructor in the discipline in question certifies refresher training is not required; or
    - -- When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds; and
    - -- In the following situations: Where changes at the worksite present a hazard about which an employee has not been previously trained; Where changes in the types of scaffolds, fall protection, falling object protection or other equipment present a hazard about which an employee has not been previously trained.

3) Regulations and Recommendations

Suggested Time Frame: 5 minutes

NEED TO KNOW:

- OSHA has scaffold standards that your employer is required to follow by law.
- OSHA regulations may be enforced by the Federal government or by the state if you are in an OSHA "State Plan" state.
- CPWR has published recommendations for safe use of mast scaffolds.
- ANSI, the American National Standards Institute, is a national organization that publishes voluntary consensus standards. ANSI also has a standard which defines responsibilities of users, manufacturers and contractors. This standard – A92.9 is specific to mast scaffolds.
- The OSHA General Duty Clause requires employers to provide a "place of employment ...free from recognized hazards that are likely to cause death or serious physical harm to his employees". OSHA may sometimes cite an employer for not using an ANSI standard in conjunction with the General Duty Clause if compliance with the ANSI standard could have prevented or lessened the the severity of an injury.
- MCWP users and trainers should be aware of any state or local regulations that may exceed OSHA requirements.

4) MCWP History & Development of Equipment

Suggested Time Frame: 10 minutes

NEED TO KNOW:

- MCWPs were introduced in Europe as early as the late 1950s, but did not receive much use there until the late 1970s.

- MCWPS began to be used in the US in the 1980s with use increasing from the 1990s to the present.
- MCWPs are relatively new to the US, and although beneficial in many respects, several accidents resulting in multiple fatalities have occurred.

5) Manufacturers, Uses & Applications

Suggested Time Frame: 10 minutes

NEED TO KNOW:

- Manufacturers of most common MCWPs and manufacturers of equipment they are asked to use.
- There are different models made by the same manufacturer and this will affect correct and safe use.
- Manufacturer contact information should be on site and readily available.
- Manufacturers are available and should be consulted whenever needed or a question arises.
- The employer should be in communication with the dealer, supplier and/or manufacturer.
- If questions arise, consult the manufacturer's manual, utilize the employer chain of communication, or contact the manufacturer directly if necessary.
- MCWPs are used by a number of trades including bricklayers, glaziers, plasterers, sheet metal workers, and carpenters.
- Other trades, such as laborers, are involved in erection and dismantling, particularly in masonry applications.

6) Types and Components of MCWPs

Suggested Time Frame: 10 minutes

NEED TO KNOW:

- Main types of MCWPs used
  - rack and pinion
  - hydraulic
- About enclosed platforms
  - when it is enclosed
  - when it is not enclosed
- That MCWPs are designed to position personnel, their tools and materials to a desired elevation necessary to perform work; they are not intended for use as hoists
- About extension slides and planking
  - extending/retracting
  - load information
  - assembly
  - condition of planking
- Weather canopies/roofs/signs
  - how stability is affected
  - visibility issues

- How to identify and describe components including the ground frame, wheels or casters, buffers, leveling jacks, mast sections, platform modules, platform extensions, the drive unit, mast guard, control panel, tie assembly, handrails/guardrails, access gate, access steps, and top mast.
- Types of Configurations
  - single mast
  - twin mast
  - multiple mast
  - two drives on one mast

7) Common Contributors to Accidents/Case Study[7]

Suggested Time Frame: 20 minutes

NEED TO KNOW:

The following may contribute to or may cause accidents involving MCWPs:

- Removal of tie-ins
- Overloading or unbalanced loading
- Inadequate base support or cribbing
- Insufficient anchorage
- Path of travel obstructions
- Removal of planking and/or guardrails
- Access and egress problems
- Electrical hazards
- Corrosion or failure of structural components/scaffolding connections
- Not utilizing qualified engineering services
- Fall hazard spacing between the building structure and the MCWP
- Wind/enclosures
- Improper erection
- Improper dismantling procedures
- No operators instructional manual
- Maintenance deficiencies
- No competent person at site/on machine
- Falling objects
- No guardrails
- No personal fall arrest system (PFAS) utilized
- Lack of lateral anchorage at regular intervals to provide stability
- Not adhering to load table requirements
- Pinch points (e.g. between building structure and MCWP)
- Planking/decking deficiencies (improper spacing, failure to secure)

[7] *See* Case Study at the end of this document

- Improper load and force calculations
- Modifications to MCWP design or in place set-up
- Failure to secure the work area surrounding the MCWP
- Special configurations/applications (such as incline or asymmetric)
- Fire hazards
- Power cord entanglement
- Misuse (e.g. using the MCWP as a crane or personnel hoist)
- Equipment failure
- Incorrect installation of MCWP components
- Environmental conditions
- Inadequate training
- Failure to regularly inspect equipment
- Poor or lack of communication

8) Fall Hazards

Suggested Time Frame: 15 minutes

NEED TO KNOW:

- The safe and proper access and egress from a building to the work platform[8]
- Guardrails should not be removed
- Safe distances between buildings and platforms based on both OSHA regulations and recommended practice
- Distance between planking should be no greater than 1"
- How to identify improperly constructed outrigger/work platforms
- CPWR recommends the following with regard to vertical climbs:
  - Vertical climbs should be assessed using a Job Hazard Analysis.
  - MCWPs should be lowered or safe access provided to prevent vertical climbs of greater than 20'.
  - Fall protection should be provided for climbs over 10'.

9) Fire Safety

Suggested Time Frame: 5 minutes

NEED TO KNOW:

- There are flammable, combustible and electrical fire hazards.
- OSHA 29 CFR 1926.150 thru .155 address fire protection and prevention
  - 1926.150 – Fire protection

[8] CPWR recommends access and egress to the MCWPs from a building opening should only be permitted if the following conditions are met:

- Employees are not exposed to fall hazards from unguarded openings.
- Space between the scaffold and building is not more than 7 inches unless necessary for specific operations such as plastering. Where spacing exceeds 7 inches, a job hazard analysis to prevent falls, over-exertion and pinch hazards shall be conducted by the employer representative.
- Adequate fall protection for scaffold users is determined by a competent person for gaps over 8 inches.
- A reasonable effort is made to achieve level access and egress when stepping into or out of building openings (e.g windows) onto the platform. Where level access and egress is not feasible, any vertical distance greater than 15 inches has a safe method of access and egress.
- Non-slippery access and egress working surfaces are maintained before and during scaffold use.

- 1926.151 – Fire prevention
- 1926.152 – Flammable and combustible liquids
- 1926.153 – LP Gas
- 1926.154 – Temporary heating devices
- 1926.155 – Definitions

- Employers should have a fire protection program in place which includes use of an all-purpose fire extinguisher at all times.
- How to use a fire extinguisher

10) System Lock-Out and Caught Between

Suggested Time Frame: 5 minutes

NEED TO KNOW:

- OSHA requires that all nip/pinch points and moving parts be guarded from contact.
- Access to the area below the footprint of platform should be prohibited.
- Users should be familiar with manufacturer specifications for system lock-out.

11) Electrical Hazards

Suggested Time Frame: 5 minutes

NEED TO KNOW:

- It should be assumed that all overhead wires are energized at lethal voltages. Never assume that a wire is safe to touch even if it is down or appears to be insulated.
- A safe minimum distances from power lines is 10 feet for 50 volts or less and an additional 4/10 of an inch in addition to 10 feet for every 1 kilovolt over 50.
- Non-conductive wood or fiberglass ladders should be used when working near power lines.
- Never repair electrical cords or equipment unless qualified and authorized.
- Inspect electric cords and equipment to ensure that they are in good condition and free of defects, and use a ground-fault circuit interrupter (GFCI).
- Extension cords shall be kept in a manner as not to create a hazard to employees.
- No employer shall permit an employee to work in such proximity to any part of an electric power circuit that the employee could contact the electric power circuit in the course of work, unless the employee is protected against electric shock by de-energizing the circuit and grounding it or by guarding it effectively by insulation or other means.
- The contractor should ensure that only qualified persons shall change or charge batteries.
- Safety precautions should be known and used when arc welding.

SAMPLE CASE STUDY: Scaffold Too Close To Power Line

Seven employees of a masonry company were erecting a brick wall from a tubular, welded-frame scaffold approximately 24 feet high. The scaffold had been constructed only 21 horizontal inches across from a 7,620-volt power line. A laborer carried a piece of wire reinforcement (10 feet long by 8 inches wide) along the top section of the scaffold and contacted the power line with it. The laborer, who was wearing leather gloves, received an electric shock and dropped the wire reinforcement, which fell across the power line and

simultaneously contacted the metal rail of the scaffold, energizing the entire scaffold. A 20-year-old bricklayer standing on the work platform in contact with the main scaffold was electrocuted.

12) Role of Engineer, Contractor, Manufacturers and Distributors

Suggested Time Frame: 15 minutes

NEED TO KNOW:

Engineers

- An engineer should be involved in plans that govern the following:
  - the layout and design of MCWPs (e.g. where it is seated/orientation);
  - how the MCWP should be supported (footings and anchorage); and
  - the load carrying capacity of each end of the platform for both uniform loads (distributed equally on each side of the platform) or loads concentrated in a single area.

It is common for manufacturers of MCWP systems to have in their employ engineers who have established detailed design plans of the more typical configurations for the above items. As such, the manufacturer or installer may have previous engineering specifications available regarding those portions of the MCWP design plan. If in doubt of a configuration, or such design specifications are not available through consultation with the MCWP manufacturer, additional engineering to ensure safe design and use of the MCWP system is required.

If the scaffold is supported on a cantilevered base or on frames not furnished by the manufacturer, or when the support conditions of the scaffold differ substantially from the manufacture's recommendations, the base support should be evaluated and approved by a person qualified in structural engineering with due consideration of all gravity and lateral loads. Special considerations should be made when the scaffold is enclosed by tarps.

Employers/Contractors

- Employers have a general duty to provide employees with a safe worksite.
- The employer must erect, secure and load MCWPs in a method that conforms to design plans provided by the manufacturer and/or engineer.
- The employer is responsible for assigning a competent person who has the knowledge and authority to recognize and abate hazards associated with mast scaffold use.
- The employer is responsible for providing site specific training on the specific make and model of the MCWP in use on the job.
- The employer is responsible for ensuring that persons erecting and dismantling MCWPs are qualified and approved for that task.
- The employer should coordinate with the manufacturer representative and site safety personnel to conduct initial and regular inspections of the MCWP.
- The employer is responsible for ongoing safety training.
- The employer is responsible for having the MCWP operating manual on site where personnel responsible for safe use of MCWP can easily and readily locate and access.
- The employer is responsible for maintenance of records.
- The employer should make sure users don't place materials on outriggers, which are not designed to carry loads, and that they don't extend an outrigger too far.

13) Job Hazard Analysis

Suggested Time Frame: 15 minutes

NEED TO KNOW:

- A Job Hazard Analysis (JHA) is a technique used to identify potential hazards associated with specific tasks.
- OSHA has materials that walk you through how to do a JHA and provides sample forms to use when doing a JHA. (Instructors should be provided with a copy of OSHA Publication 3071, 2002 revised.)
- JHA's should be manufacturer and model specific.
- The main questions to consider when doing a JHA are:
  1. What can go wrong?
  2. What are the consequences?
  3. How could it happen?
  4. What are other contributing factors?
  5. How likely is it that the hazard will occur?
  6. How can the hazard be prevented or abated?
- For a JHA to be effective, the employer must follow up on any identified hazards by taking measures to prevent or correct them.
- A good JHA includes employee involvement.
- Someone qualified to identify mast climber hazards should be involved in a JHA.

14) Ground Conditions

Suggested Time Frame: 5 minutes

NEED TO KNOW:

- What affects stability
- Recording results
- When/how to inspect
- The employer is responsible for designating a person to check adequacy of cribbing each day.

15) Environmental/Weather Conditions

Suggested Time Frame: 20 minutes

NEED TO KNOW:

- Environmental conditions need to be considered when designing, erecting and using a MCWP.
- Tarps, wind screens, signage, and weather enclosures should be designed to withstand wind loads.
- Wind speeds should be monitored and work stopped when winds get too strong.
- Your employers should monitor wind speeds under windy conditions and establish a designated wind speed at which to stop work with MCWPs and lower and secure the platform at the lowest possible point.
- The employer should refer to the manufacture's recommendations in setting designated wind speeds for lowering the MCWP and stopping work when erecting, dismantling or using them.

- CPWR recommends that when wind speeds are not designated by the MCWP manufacturer, work should be stopped and platforms lowered when wind speeds exceed 30 miles per hour (mph).
- Rain and ice can create slippery conditions on platforms and equipment used to access platforms.
- Your employers or the individual responsible for control of the MCWP should ensure that working surfaces and access and egress surfaces (ladders, etc) are treated to prevent slip and fall hazards.

16) Anchoring & Anchorage Methods

Suggested Time Frame: 20 minutes

NEED TO KNOW:

- About anchoring
  - How to assess the anchor type required
  - Anchor installation
  - Anchor inspection/testing
  - That each MCWP make/model has a different tie-off schedule
  - Before anyone uses, accesses or operates a MCWP, the employer's competent person must verify that tie-offs are consistent with that schedule.
- Anchor Installation
  - Embedment depth
  - Clean-out
  - Where to put them
  - Torque
- Methods for anchorage and tie-ins
  - The definition of a mast tie according to ANSI
  - The importance of MCWP stability
  - Component recognition
- Tying to the structure
  - Impact of shallow holes
  - Impact of spacing
  - Impact of being close to the slab edge
  - Impact of high/low torque
  - Impact of anchor selection
  - Assessing platform loads
  - Ties may be removed by other trades and not replaced correctly
  - Ties can become loose

Additional Instructor Notes:

Objectives:

- Realization that improper anchorage (systems) has led to catastrophic failures and fatalities
- Importance of utilizing an engineer for anchoring criteria

- That anchorage systems can be complex, and sound engineering principles are required
- Discuss/demonstrate the loads forces that MCWPs may be subject to: structural, horizontal, manual, power tool usage, dynamic, wind load, erection and dismantling loads
- Show a few "unusual" or "unique" slides to depict the importance of correct anchorages (multi or twin deck, large spans, base support such as parking garage, etc.)

Power Point presentation may incorporate slides depicting:

- A captive and attached tie frame
- Several systems that are not acceptable
- Different tie frame positions
- Edge distance
- Minimum embedment
- Tie-in terminology
- Spacing requirements
- Manufacturer's tie schedule
- Manufacturer's "professional" anchorage drawing/detail
- Torque considerations

Instructor should also:

- Hand out a structural calculation – to depict that users are not engineers and what goes into design of an anchorage system
- Display/hand out fasteners that are not rated for tie-in purposes
- Discuss type of structural attachment: steel, concrete, scaffold
- Discuss the possible consequences of tying into brick, block, and timber
- Display/demonstrate methods of attachment: welding, screwed, bolted, clamped, etc

17) Limitations/Loading

Suggested Time Frame: 20 minutes

NEED TO KNOW:

- About Calculation of Load/Distribution/ Installation Method
  - Impact of shallow holes
  - Impact of distance between
  - Impact of high/low torque
  - Impact of anchor selection
  - Assessing platform loads
- Load distribution
- Where to load materials
- Bridging between towers is model/equipment specific and should be determined in consultation with the manufacturer

18) Maintenance, Inspection & Storage

Suggested Time Frame: 15 minutes

NEED TO KNOW:

- Inspections
  - When and how to inspect MCWPs
  - Necessity of recording inspection results
- Maintenance
  - What is required
  - What parts fail most often
  - Lubrication chart
  - How to record results
- Daily Inspections
  - What to inspect
  - What to look for
  - How to record
  - What to do if something is found
- Storage
  - All maintenance and inspection records for each MCWP should be safely stored.
  - Operating and safety instructions should be stored on the machine.
  - Users need to know where and how to access the operating and safety instructions as well as the last thorough inspection record.

19) OSHA 1926.454, Scaffold Training Standards

Suggested Time Frame: 15 minutes

NEED TO KNOW:

1926.454 (a) - Users

- Requires that employers have **each employee who performs work while on a scaffold trained by a person qualified** in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards;
- Requires that affected employees be trained in the nature of any electrical hazards, fall hazards and falling object hazards in the work area;
- General hazards to include access/egress, distance between the MCWP and the building, use of ladders, stair towers and planks;
- Requires that affected employees be trained in the correct procedures for protection from electrical hazards and for erecting, maintaining, and disassembling the required fall protection systems and falling object protection systems;
- Employees who are on scaffolds while working need to know how protective systems function, so that they know how to install, maintain or remove these systems, as necessary;
- Fall protection systems include consideration of tie-off points, guard rails, harness/PFAS, overhead power lines/wires, power cords, electrical storms, trailing cords, battery/battery cables, limited access zones;

- Requires that employees be trained in the proper use of the scaffold and in the proper handling of materials on the scaffold;
- Requires that employees be made aware of weight distribution, location of labels/charts indicating weight capacity and audible alarms; and
- Requires that employees be trained in the pertinent requirements of Subpart L for example: scaffold-parts/sections, load charts, operating manuals, and weather conditions.

1926.454 (b) – Erectors, Dismantlers, Movers, Operators, Repair, Maintenance, and Inspection

- Requires that the employer shall have **each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person** to recognize any hazards associated with the work in question;
- Requires that affected employees be trained in the nature of scaffold hazards, including access/egress, distance to the building, use of ladders, stair towers, planks, electrical, etc;
- Requires that affected employees be trained in the correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question;
- Training provided to an employee to construct, repair or dismantle one type of scaffold will not necessarily enable that employee to repair another type;
- Training must include how to correctly put the scaffold into operation, hazard identification (electrical, fall hazards etc), and use of a daily check list;
- Requires that affected employees be trained in the design criteria, maximum load-carrying capacity, intended use of the scaffold, as well as configuration load charts/capacity and manufacturer's instructions; and
- Requires that affected employees be trained in the pertinent requirements of subpart L.

1926.454 (c)

- Requires the employer to retrain any employee when the employer has reason to believe that the employee does not have the understanding and skill required by paragraph (a) or (b) of this section;
- Requires that employees be retrained, as necessary, to restore the requisite scaffold-related proficiency; and
- Circumstances where the provision requires retraining include, but are not limited to, the following situations: first, whenever there is a change at the worksite that presents a hazard about which the employee has not been trained (paragraph (c)(1)); second, where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which the employee has not been trained (paragraph (c)(2)); and, third, where inadequacies in an affected employee's work practices involving scaffolds indicate that the employee has not retained the requisite proficiency (paragraph (c)(3)).

20) OSHA Definitions

Suggested Time Frame: 5 minutes

NEED TO KNOW:

Need to know OSHA's definition for competent and qualified persons are as follows:

Competent person means one *who is capable of identifying existing and predictable hazards* in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees *and who has authorization to take prompt corrective measures to eliminate them.* (29 CFR 1926.450 (b))

Qualified means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project. (29 CFR 1926.450 (b))

21) OSHA Subpart L – Scaffolds

Suggested Time Frame: 10 minutes

NEED TO KNOW:

- This is the standard to use when questions arise regarding OSHA's scaffold standards.
- Which of the subpart L standards apply

22) OSHA Subpart M – Fall Protection

Suggested Time Frame: 10 minutes

NEED TO KNOW:

- This standard requires workers be trained
  - to recognize fall hazards
  - to be familiar with fall protection, PPE and its proper fit and application
  - to understand how to properly access work areas
- This is the standard to use when questions arise regarding fall hazards and fall protection requirements.

23) OSHA Subpart X – Stairs & Ladders

Suggested Time Frame: 10 minutes

NEED TO KNOW:

- This standard addresses safe access (stairways, ladders, etc.).