1 Inspect Carts Prior to Use

Hazard:

When heavily used, material carts deteriorate quickly and develop structural problems. The use of aged carts greatly increase the risk of injury and decrease productivity.

POORLY MAINTAINED CART

SAFETY PERFORMANCE

4 out of 10 workers* can safely handle this cart (500-lb load)

WELL MAINTAINED CART

8 out of 10 workers* can safely handle this cart (500-lb load)

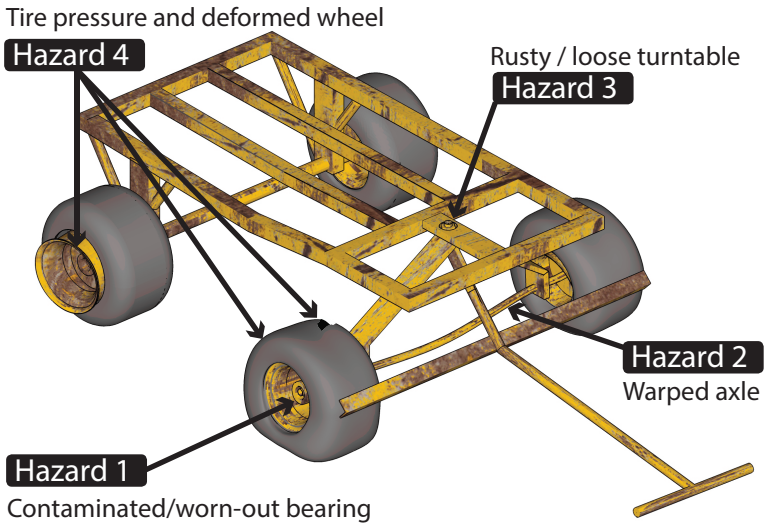
PRODUCTIVITY PERFORMANCE

A well-maintained cart moves 35% faster than an aged cart does

* The percentiles are based on the population of general industrial workers. Although everyone's chance of developing soft tissue injury is different, poorly maintained carts present significant hazards that can wear anybody out. Cart maintenance can easily eliminate this extra hazard.

Control Measures:

- Avoid leaving loaded cart stationary overnight.
- Inspect carts prior to use and carry out maintenance as needed. Report to supervisor immediately when carts are not in good repair.



1. Inspect all bearings to check if they are dirty or worn out. A humming/grinding noise is a warning sign. Also, a wheel with a worn-out bearing is sticky when you give it a spin with your hand. Grease and clean bearings routinely.
2. Inspect if the axle is warped. Wobble in tire is a revealing sign. The tilted tire would rub against cart frame in the most extreme situation.
3. Inspect if turntable is rusty or loose. Grease turntable routinely.
4. Inspect tires for pressure and wheel deformation. Rid wheels of materials and stones prior to use.

Using a cart in good condition is a good start. Please refer to the following pages for other ergonomic hazards which can cause overexertion during cart handling.

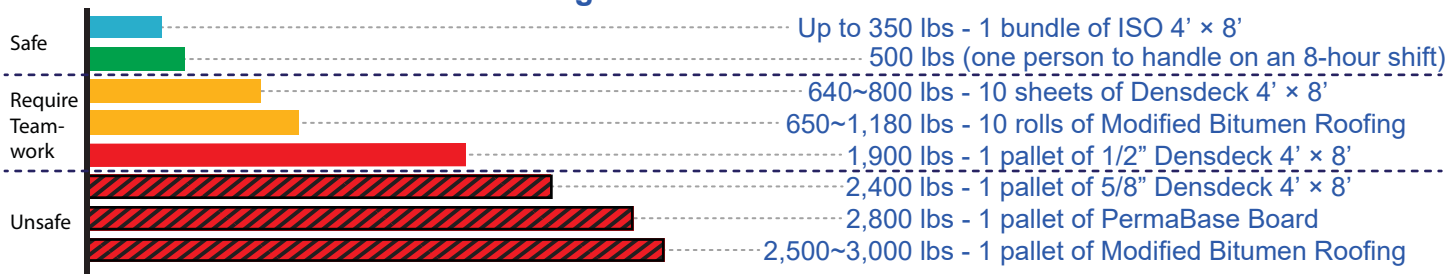
Contact the SHARE Lab: SHARELab@uw.edu
Contact Dr. Ken-Yu Lin: 206-616-1915

2 Teamwork and Job Rotation

Hazard:

8 out of 10 workers can handle a 500-lb cart load during an 8-hour shift without becoming unusually tired. However, most bundled materials exceed this load capacity. If teamwork and job rotation are used, there is a lower chance for a worker to get hurt.

Weights of Material Loads

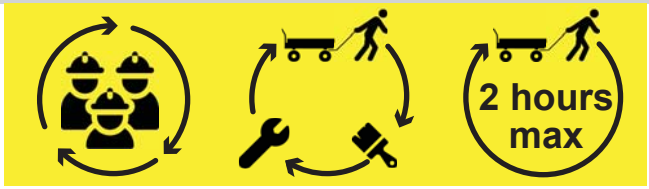


WARNING: Avoid moving the whole pallet when it is heavier than 2000 lbs. This will overload the cart, damage the roofing system you are installing, and wear yourself out.

Control Measures:

- Perform job rotation so pushing/pulling is no more than 2 hours per day.

  Keep in mind that job rotation allows workers to develop different skill set and help them become more productive.



- Perform 2-person, 3-person or 4-person pushing/pulling as suggested by the table below.

  Keep in mind that teamwork can encourage workers to watch out for each other, build a habit of reaching out for help, and develop a sense of unity as they go towards the same goal.

Materials	Flat Surface	Ramp or Space with constraint
 10 rolls of Modified Bitumen Roofing  10 sheets of Densdeck  2 bundles* of ISO * *Stacking bundles creates falling-object and struck-by hazard.*	 **2-person**	 **3-person**
 1 pallet of Perma Board  1 pallet of Modified Bitumen Roofing  1 pallet of Densdeck	 **3-person**	 **4-person**

- Team leader to signal start and stop to minimize exertion and maintain control of heavy loads.
- Arrange loads evenly and balance the loads. If load obstructs view, use a spotter.
- Face the cart and use both hands to get it moving. Do not walk backwards unless going up ramps.
- Keep your back straight. Do not twist your body while pulling/pushing.

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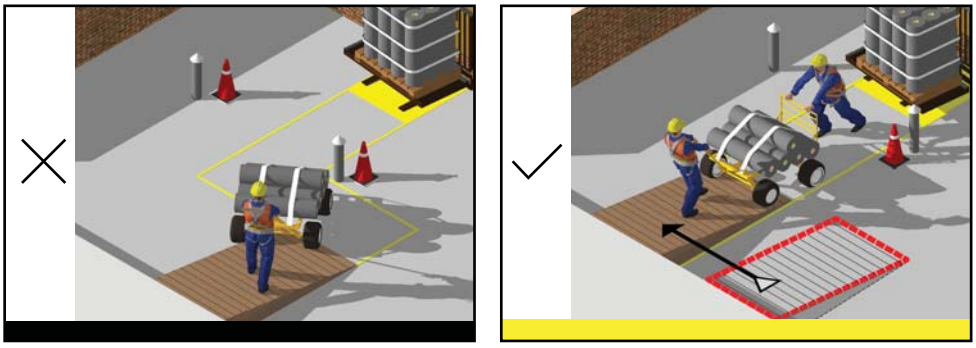
3 Site Planning & Housekeeping

Hazard:

Space constraints could come from physical restrictions of the site or bad workspace setups. Pulling a cart in a tight space requires higher precision and will increase the risk of overexertion. Poor material handling can also result in other type of injuries such as falling from height.

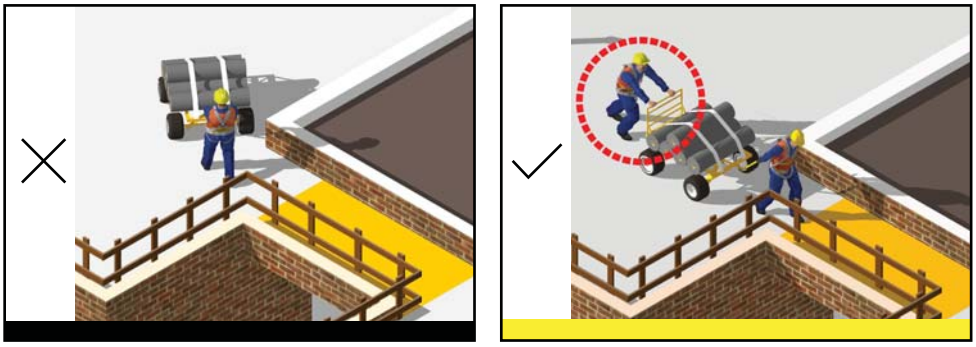
Setup workspace

Plan the workspace setup and select the best possible path of movement to avoid space constraints.



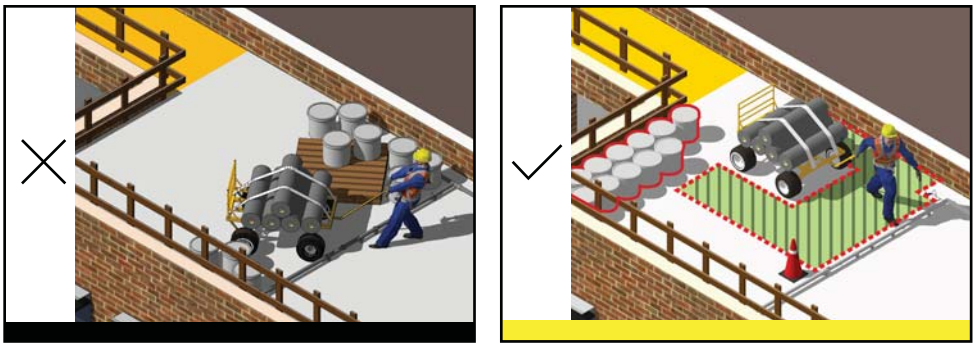
Narrow passage

Add one more worker to team when the space is tight.



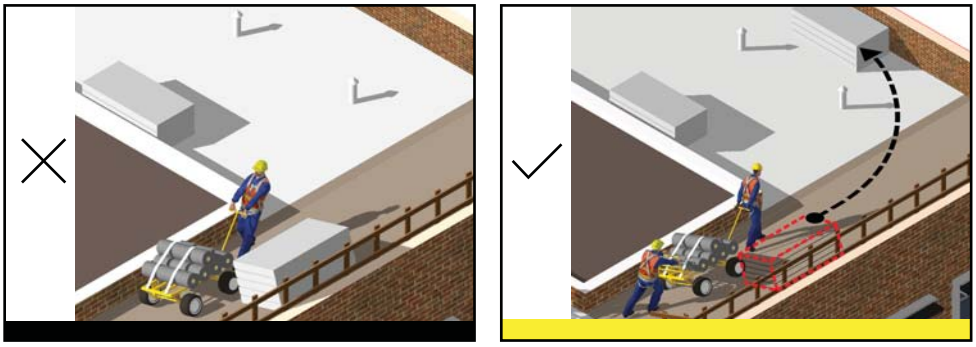
Housekeeping

Keep good housekeeping when space is tight.
Allow at least 2 feet of run before rolling up an incline or over an obstacle.



Stored materials

Avoid space congestion by keeping hallways and passages clear of materials



Reminder for foreman: Please share photo examples with crew!

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4 Reduce Obstacles

Expansion/Control joint

Hazards:
Expansion/Control joints are a common obstacle for cart movement.

Control measures:

- Cut expansion/control joint to ensure cart pathway is free of obstacles.
- When an obstacle is immovable, set up a ramp to bridge the gap created by the obstacle.

Old roofs

Hazards:
Old roofs create obstacles for cart movement.

Control measures:

- Ensure cart pathway is clean and free of debris.
- Keep an open workspace to allow at least 2 feet of run before rolling over an obstacle. In a tight space, operators cannot depend on cart momentum to overcome an obstacle.

Poorly set-up ramp

Hazards:
Poorly set-up ramps create obstacles which are ergonomic hazards and can result in slip/trip incidents.

Uneven running slope built with DensDeck and ISO

Loose or unsecured ramp materials create gaps

Uneven bottom landing

Control measures:

- Ramps should be stable with a smooth running slope and landings. Even a 3/4" obstacle could stop a cart especially when the tires are small.

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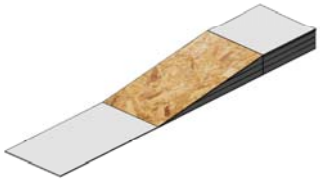
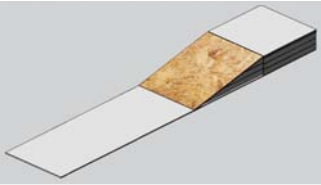
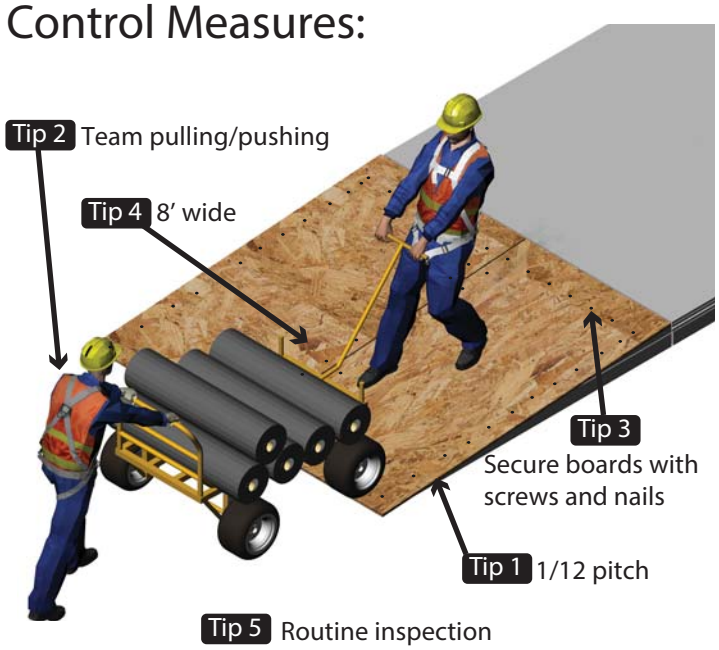
5 Properly Set Up Ramps

Hazard:

A 1/12 pitch ramp presents little additional risk compared to a flat surface, but a ramp soon becomes a hazard when it reaches 2/12 pitch or higher. A steeper ramp will slow you down. In addition, poorly set up ramps often come with gaps, obstacles, and ridges that could cause slip/trip incidents and strain injuries.

RAMP		SAFETY PERFORMANCE	
Flat floor		8 out of 10 workers can safely handle it with a 500-lb load	
1:12 pitch		7 out of 10	
2:12 pitch		3 out of 10	
3:12 pitch		None	

Control Measures:



1. Extend ramp length or lower ramp rise, so the slope is less than 1/12 pitch.
2. When a steeper ramp is inevitable, add one more worker or reduce the cart load. A buddy system can also prevent a struck-by incident when the cart rolls down the ramp.
3. Plan ahead and get sufficient materials to build a ramp. Secure plywood boards with screws or nails to stabilize the ramp. Remove gaps, obstacles, and ridges to make a smooth running slope and landings.
4. Ramp should be at least 8' wide.
5. Check the ramp routinely for debris, wear, or damage to remove slip/trip hazards.

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