



THE CENTER FOR
CONSTRUCTION
R E S E A R C H
A N D T R A I N I N G

Ergonomics Training Program

Instructor Guide



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BACKGROUND

The construction industry has one of the highest rates of nonfatal injuries of any industry, but a large proportion of these injuries (27% annually) are soft tissue injuries, also referred to as musculoskeletal disorders (MSDs), which develop over time. These injuries are caused by the high physical demands of construction work. It is important for workers to be trained on how to protect themselves from experiencing these injuries during their construction careers.

This ergonomic training program is designed to provide instructors with the information needed to raise worker awareness of soft tissue injuries and ways to prevent them, including safe lifting practices and proper body mechanics. It includes both classroom and hands-on components, and materials to use with each. This Instructor Guide includes information on how to conduct the training and use the materials.

There are several ways to use the materials. For example, if you have time and access to space for the hands-on part as well as access to equipment for the computer/app-based training, you could complete the full training following the order of Part 1-A, Part 2, Part 3, and Part 1-B. Part 4 would be done as part of a future class as a refresher. However, if you do not have the time or resources to complete the training program in one session, you can use the parts at different times and adapt them to your needs.

The program is broken down into four parts:

Part 1 – Ergonomics Basics: Reducing the Risks for Soft Tissue Injuries – Classroom Training – This module is divided into two sections:

- **Part 1-A** – is designed to provide workers with a basic understanding of the cause of soft tissue injuries, how to recognize the hazards related to these injuries, and proper lifting practices to use to reduce the risk of injuries from handling materials on the job site.
- **Part 1-B** – includes an exercise to test what was learned in Part 1-A, addresses the value of selected stretching exercises, provides basic information about the connection between these types of injuries and the risk for opioid dependence, and reviews available online and app-based resources that reinforce what was learned.

Parts 1-A and 1-B can be combined and used for one session, or if you plan to also do Part 2 and/or Part 3, the sessions can be conducted separately.

The estimated time for conducting Parts 1-A and 1-B as a single session is 60 minutes.

The PowerPoint presentation includes slides with notes to guide the presentation.

Part 2 – Proper Lifting Methods: Hands-On Demonstration Stations – This module includes a series of five short hands-on exercises designed to reinforce and apply lessons learned in Part 1-A about safe lifting practices and proper body mechanics. The types of materials and related information an instructor will need to carry out the exercises are listed in this guide. The materials required for each station can be tailored for a specific trade. The length of time to devote to this module will depend on the size of the class and the number of demonstration stations. When used with 100 apprentices, for example, the full group was broken down into six smaller ones that cycled through each of the stations. Each station took an individual group roughly 15 to 20 minutes to complete.

This module can be conducted in-between Part 1-A and Part 1-B, or incorporated into other safety and health training modules or hands-on skills training programs.

Part 3 – Interactive Resources to Reduce Manual Material Handling Risks:

Computer/App-Based Training – This module covers the interactive online training resources (available for use on a PC, or as an app for a tablet or smartphone) and the smartphone games that are part of the Best Built Plans program. These resources can be used to introduce trainees to or reinforce the importance of 1) planning for how materials will be lifted and moved, and 2) using safe lifting techniques (including equipment and team lifts) and practices. They can be used as: another hands-on demonstration station (Part 2) if your trainees have access to PCs, tablets or smartphones; a presentation in a class to test trainees' knowledge of what they learned in the early parts of this training program; or a presentation to introduce them to safe practices if you don't have the time or ability to do the hands-on workstations. These resources can also be used as a refresher during a later class to remind trainees of safe practices and assess their retention, and by trainees on their own.

The estimated time for the computer station or in-class stand-alone presentation is 15 to 20 minutes.

Part 4 – Ergonomics Refresher: Classroom Training – This module is intended to be used with a more advanced class or as a refresher for workers who have already received the basic ergonomics training. The estimated time for this portion of the training is 15 to 30 minutes.

Each module is designed to allow you to tailor your training program to:

- 1) The amount of time you have available;
- 2) If you will be conducting classroom training, hands-on training, or both;
- 3) If your trainees will have access to computers, tablets, or smartphones; and
- 4) Whether the classroom training will be conducted in one session or split over two sessions.

At a minimum, we recommend conducting Parts 1-A and 1-B for apprentices and other workers who have not already been through an ergonomics training module. We recommend conducting the refresher module (Part 4) for all workers who have already been through a basic ergonomics

training program, and for working in the lessons from this program into skills and other safety training programs. The bottom line is that construction workers rely on their physical health to stay employed and to live pain free in retirement. This program can provide them with the knowledge and techniques to help them protect their physical health.

This Instructor Guide includes “**INSTRUCTOR NOTES**” to help you tailor the program to the time, space, and resources you have available. It includes notes for each slide in the PowerPoint presentation, instructions and signage for hands-on exercises, suggested handouts, and materials needed to conduct each part of the program. You can substitute photos in the presentation and materials used for the lifting hands-on exercises, if needed, to tailor the program for your trades.

As a first step, instructors should review the materials and decide which components they will be using given the time and resources available. To access additional training materials to supplement this program and learn more about preventing strain and sprain injuries, visit: <https://www.cpwr.com/research/research-practice-library/construction-ergonomic-research-solutions>.

PART 1 – ERGONOMICS BASICS: REDUCING THE RISKS FOR SOFT TISSUE INJURIES – CLASSROOM TRAINING

Preparation and Setup

Set up an LCD projector and computer. You may need a connector device or adapter to hook up the computer and screen.

Click through the PowerPoint to ensure equipment is working properly.

(NOTE: if this class is being conducted as part of an OSHA 10- or 30-hour program, these items may already be in place)

Teaching materials:

- PowerPoint slides – notes are included for each slide and referenced in this Guide.
- Handouts (referenced in presentation and available in Appendix A):
 1. NIOSH Lifting Equation App
 2. Ergonomic Training Exercises
 3. Physicians' Alert – Pain Management for Construction Workers
 4. Hazard Alert Card – Opioid Deaths in Construction*
 5. Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games
 6. Hazard Alert Card – Back Injuries*
 7. Ergonomic Tips Cards – optional
 8. Exercise Instructions for Best Built Plans Training and Coaching Resources

** For pocket sized versions of the Hazard Alert Cards email cpwr-r2p@cpwr.com or call 301-578-8500*

- To keep track of trainees' comments, you will need a flip chart or whiteboard and markers, extra sheets of flip chart paper and tape (or self-sticking paper).

NOTE: You can tailor the program as needed for your trade(s) by substituting photos and materials.

Suggestion for time management:

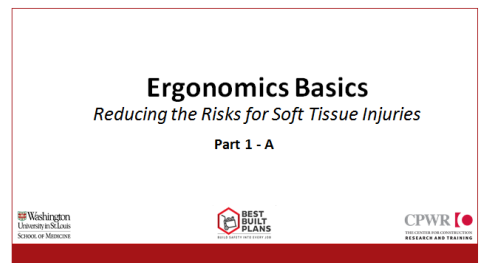
Part 1 (both A & B) are estimated to take up to 60 minutes. You could also use portions of all the modules to tailor a program that works for your audience.

PART 1-A: LESSON PLAN (SLIDES 1 – 39)

Ergonomics Basics: Reducing the Risks for Soft Tissue Injuries

NOTES FOR SLIDE 1

The purpose of this presentation is to provide training on basic ergonomic concepts and practices to raise awareness of the risks and how to reduce them to prevent soft tissue injuries.



Why Did You Decide to Work in Construction?

INSTRUCTOR NOTE:

Only show the title of the PowerPoint slide “Why did you decide to work in construction?”

NOTES FOR SLIDE 2

Ask the class:

Why did you decide to work in construction?

After a brief discussion, click to show the examples and risks listed on the slide.

Tell the class:

There are many reasons – such as the ones mentioned and the ones on this slide:

- It’s a good career for individuals who enjoy working with their hands;
- You get to see what you helped build;
- You can solve problems;
- There is strong camaraderie with coworkers; and
- The potential to make a good income.

But there are also risks associated with this work that can cause injuries, so it’s important to learn how to protect yourself from these risks.

Today, we’re **not** going to be talking about traumatic and fatal injuries.

Instead, we are going to talk about the injuries that result from the physical work done every day.

Why Did You Decide to Work in Construction?

Reasons:

- Enjoy working with your hands
- Opportunity to “see” what you built
- Solve problems with each new project
- Work as a team
- Make a good income

Risks:

- Work can be physically demanding
- Injuries can be common and are often higher among new workers

Without safe work practices, this work can break down a worker's body over time, result in a disability, and force a worker to leave the industry or retire early.

You may not think this will happen to you, but if talk to anyone who's been in the industry for many years, particularly middle-aged or older construction workers, they will tell you these injuries are common in construction.

Ergonomic Training Goal and Learning Objectives

INSTRUCTOR NOTE:

This slide includes all of the learning objectives for Parts 1-A and 1-B. If you do not plan to do Part 1-B during the same training session, you should let your trainees know and tell them that you will be covering objectives 1-3 in this first session. You should also let them know when objectives 4-6 will be covered.

Ergonomic Training Goal and Learning Objectives

GOAL:

- Provide training to identify the causes of sprains, strains, and soft tissue injuries, understand the risks, and know the steps to take to prevent them.

LEARNING OBJECTIVES:

- Identify the ergonomic hazards
- Review the basic ergonomic controls for hazards to prevent injuries
- Describe the proper body mechanics for lifting tasks to prevent injuries
- Describe the risks of using prescription opioids and self-treatment for pain management
- Identify the benefits of doing stretching exercises
- Demonstrate at least one safe lifting practice

NOTES FOR SLIDE 3

Today's goal is to provide training to identify the causes of sprains, strains, and soft tissue injuries, understand the risks, and know the steps to take to prevent them.

By the end of today's training, you should be able to:

1. Identify the ergonomic hazards
2. Review the basic ergonomic controls for hazards to prevent injuries
3. Describe the proper body mechanics for lifting tasks to prevent injuries
4. Describe the risks of using prescription opioids and self-treatment for pain management
5. Identify the benefits of doing stretching exercises
6. Demonstrate at least one safe lifting practice

Sprains, Strains, and Other Soft Tissue Injuries Are Common

NOTES FOR SLIDE 4

Let's start with why it's critical to reduce sprains, strains, and other soft tissue injuries.

First, they are very common, causing more than one-fourth of nonfatal injuries suffered by construction workers every year.

About 21% of construction workers experience these injuries based on what's reported, but we know that many more will suffer from chronic or persistent pain.

Sprains, Strains, and Other Soft Tissue Injuries Are Common

- Sprains and strains account for 27.3% of all nonfatal injuries in construction each year.
- Lifetime risk of overexertion injuries is 21% for all construction trades, although many more suffer chronic pain.
- Most overexertion injuries are related to handling heavy building materials.
- Construction workers suffer from the highest number of lost days of work from low back injuries.

- It is **IMPORTANT** that you learn how to protect your body from damage.

One type of sprain or strain is caused by overexertion of the body from handling building materials and equipment – particularly heavy or awkward materials or equipment. This often results in low back injuries.

Since you only get one body in your lifetime, it's important that you learn how to properly handle materials as early as possible in your career and use safe lifting practices every day to protect your body from damage.

The “Wear and Tear” of Tissues of the Body

NOTES FOR SLIDE 5

To understand how to prevent an injury, it's important to understand what's happening to your body.

The tissues of your body respond to stress similar to other materials, such as metal, concrete, and wood.

As materials are exposed to physical stress – weight – and environmental exposures – weather, heat, cold, and rain – they break down.

This slide shows examples of this happening. Back in 1951, the Duplessis Bridge collapsed into the St. Maurice River in Alberta, Canada. Even though the bridge was only three years old, it could not stand up against the extreme cold and heavy loads that travelled over it every day.

Just like that bridge, the tissues of your body respond to stress and heavy loads, causing them to gradually breakdown. The bottom right photo of the foot shows an Achilles (“a-kill-ees”) tendon tear from overexertion.

INSTRUCTOR NOTE:

If you would like to include more information on the bridge collapse in your discussion, click on this link: <http://anengineersaspect.blogspot.com/2013/04/the-duplessis-bridge-collapse-january.html>

The “Wear and Tear” of Tissues of the Body

- All materials become damaged when stressed.
 - Metal/concrete ages with weather, degrades, eventually collapses
- Highly stressful activities for long periods of time will result in **damage** to materials.
- Our body responds in the same way with damage to the body tissues.



1951 Duplessis Bridge, Alberta, Canada

Achilles tendon rupture – a tear from overexertion

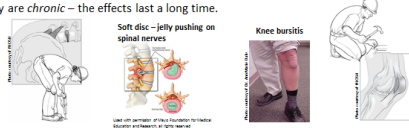
Sprains, Strains, and Other Soft Tissue Injuries or Musculoskeletal Disorders (MSDs)

NOTES FOR SLIDE 6

In the medical world, sprains, strains, and other soft tissue injuries are called musculoskeletal (“musk-u-low-skel-e-tall”) disorders or MSDs.

Sprains, Strains, and Other Soft Tissue Injuries or Musculoskeletal Disorders (MSDs)

- 1) Damage to the *musculoskeletal system* – muscles, nerves, tendons, ligaments, joints, cartilage and spinal discs.
- 2) They are *cumulative* – as opposed to accidents, they happen gradually.
- 3) They are *chronic* – the effects last a long time.



Soft disc – jelly pushing on spinal nerves

Knee bursitis

They include damage to the different soft tissues of your body, your muscles, nerves, bones, and connecting tissues like tendons and ligaments.

The damage is cumulative. It develops over time, not usually from a sudden accident, and may become chronic or persistent. In other words, the damage and pain could last for a long time, possibly the rest of your life.

The photos at the bottom on the left show the structure of your low back – the most common body part injured. The soft disc is a cushion between each bone, but the center “jelly” (in green) may push on the spinal nerves (orange tubes) when the body bends forward. One way to think of it is like a jelly doughnut being compressed.

The back is complex. Once the tissues “wear and tear,” it is very hard to get them to heal.

The bottom right photo shows a worker with knee bursitis caused by kneeling on a hard floor often without the benefit of padding against the floor. His doctor recommended a knee joint replacement. Once you have this procedure, it is difficult to kneel. So, this worker could not go back to doing the same type of work, unless the work could be done in a different way without kneeling.

Development of Sprain, Strain, Soft Tissue Injuries (Mild Symptoms Develop over Several Weeks or Months)

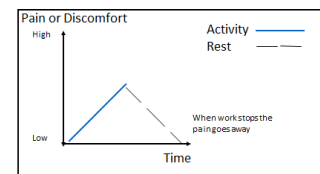
NOTES FOR SLIDE 7

As mentioned, soft tissue injuries do not happen suddenly. They develop slowly over time.

This diagram shows that as a worker performs hard physical activity over the course of a day (horizontal axis), the worker may experience a gradual increase in pain or discomfort (vertical axis) – the blue line that is increasing.

But at the end of the day, when the worker stops doing the work, the pain and discomfort go back down or go away. These “mild symptoms” improve as the tissues of the body heal.

Development of Sprain, Strain, Soft Tissue Injuries
(Mild Symptoms Develop over Several Weeks or Months)



Development of Sprain, Strain, Soft Tissue Injuries (Moderate-Severe Symptoms Develop over Many Months to Years)

NOTES FOR SLIDE 8

However, as time goes by a worker's body may not have enough time to heal between new episodes of work.

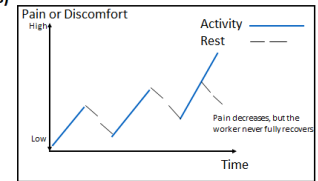
This slide shows what happens to the worker when there is not enough time to heal the tissues between each episode of work, even with a long period of rest (such as over a weekend).

The blue line shows increasing pain or discomfort when a worker is performing an activity. The dotted line shows the pain decreasing when the activity stops and during rest.

But as time goes on, the worker never fully recovers and gets all the way back to normal before having to begin the activity again.

Oftentimes, workers experience moderate to severe symptoms that develop over many months or years.

Development of Sprain, Strain, Soft Tissue Injuries (Moderate-Severe Symptoms Develop over Many Months to Years)



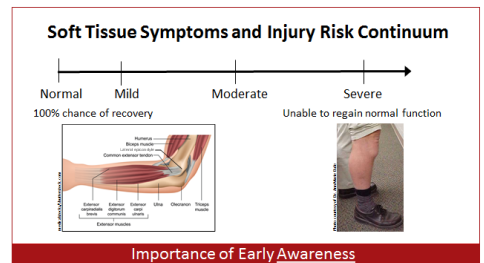
Soft Tissue Symptoms and Injury Risk Continuum

NOTES FOR SLIDE 9

This diagram shows the progression from normal “no symptoms” through developing mild, moderate, or severe symptoms. It underscores why early awareness of what’s happening to your body is important.

Early on, the body can heal to get back to normal – there’s a 100% chance of recovery.

As the worker has moderate to more severe symptoms, even with a lot of rest the body cannot recover completely and the worker is unable to regain normal function.



Importance of Early Awareness

Treatment and Progression – Don't IGNORE Early Symptoms!

NOTES FOR SLIDE 10

That's why it's important not to ignore early symptoms and to seek treatment early when you have the greatest chance of recovery.

Construction workers, just like professional athletes, need to take care of their physical health to have a long career and stay employed.

Treatment and Progression – Don't IGNORE Early Symptoms!

- Early symptoms, pain with movement: kneel, stoop, walk— CHANGE how you are working or your work tasks
- If symptoms don't improve, consider medical treatment
 - ✓ Early stage:
 - Use Rest, Ice, Compression, Elevation (RICE)
 - See a physician who may prescribe medications (anti-inflammatories), therapy, or other treatments
 - ✓ Late stage: surgery of back, knee, shoulder, hand

Early symptoms include pain when you kneel, bend over, and walk. When you notice pain and discomfort, change how you are doing your work or your work tasks.

If the symptoms don't improve, see a physician.

If you wait too long to get medical help, you may require surgery in order to get better.

What is Ergonomics?

INSTRUCTOR NOTE:

Only show the title of the PowerPoint slide “What is ergonomics?”

NOTES FOR SLIDE 11

Ask the class:

What is ergonomics?

On a whiteboard or flip chart, write down the various descriptions given by the trainees.

Once everyone is done giving a description, advance the PowerPoint slide to show the definition provided.

Tell the class:

Everyone's body has different abilities in terms of strength, flexibility, and tolerance.

Ergonomics is the way to prevent injuries by setting up the work environment and tools to make the job fit the physical abilities of the worker.

Work should be designed so most workers can do it without tearing down the tissues of the body to get the job done.

Examples are all around you, such as the shape of a tool handle or an extra handle to hold onto.

By working within the physical limits of your body, you will eliminate the risk of overexertion, sprain, and strain injuries.

What is Ergonomics?

Ergonomics is the way to prevent injuries:

- Fit the tasks, tools, and environment to the physical abilities of the worker

Goal: to reduce or eliminate risk of injuries



Overhead drill press developed as a CPWR research project. Photo courtesy of Dr. David Rempel.

Prevention: Identify Ergonomic Hazards

NOTES FOR SLIDE 12

There are 6 ergonomic hazards:

1. High **Force**
2. Poor **Postures**
3. Fast or prolonged **Repetition**
4. Stress from body **Contact**
5. Hand or body **Vibration**
6. And a cold **Environment**

While all exist in construction, the most common hazards are high force and poor postures, which are the focus of this training.

Prevention: Identify Ergonomic Hazards

1. High **Force***
2. Poor **Postures***
3. Fast/prolonged **Repetition**
4. Stress from body **Contact**
5. Hand or body **Vibration**
6. Environment (**Cold**)

Force is the Physical Power Needed to Move an Object

Can everyone lift the same amount of weight safely?
How do you know when someone is lifting something that is too heavy for them?



Force is the Physical Power Needed to Move an Object

NOTES FOR SLIDE 13

The first ergonomic hazard, force, is the effort needed to move an object, such as lifting a pipe, moving a bag of mortar, or pushing a cart.

Ask the class:

Can everyone lift the same amount of weight safely?

Pause briefly to let one or two people respond.

Ask the class:

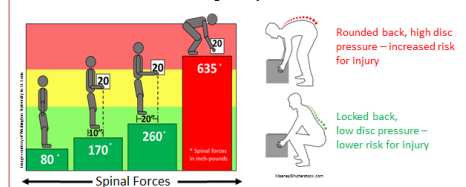
How do you know when someone is lifting something that is too heavy for them?

On a whiteboard or flip chart, write down the various descriptions given by the trainees.

Once everyone is done giving an answer, review the examples below.

- Jerk to get the movement started
- Load falling over time
- Frequent rest breaks

Risk of Injury: Low Back (Spinal) Forces and Lifting: Effect of Load and Positioning on Spinal Forces



*Risk of Injury: Low Back (Spinal) Forces and Lifting:
Effect of Load and Positioning on Spinal Forces*

NOTES FOR SLIDE 14

The weight of the load affects the low back.

The weight can be measured through spinal forces in the joints of your low back.

In the diagram on the left, the first figure is standing upright with no load. The spinal force from gravity on his low back is 80 inch-pounds.

The second figure is holding a 20-pound load close to their body – 10 inches from the hands to the low back. This is an **IDEAL posture** to carry a load. The spinal force goes up to 170 inch-pounds.

If the load is moved away from the body to a distance of 20 inches, the spinal forces increase significantly to 260 inch-pounds. So how close you hold an object makes a BIG difference to your low back forces.

The last figure shows the large increase in spinal forces from lifting an object from the floor. The distance to the box is larger and the body is not upright. The spinal forces have more than tripled from the IDEAL figure of 170 inch-pounds to 635 inch-pounds.

The two figures on the right side of the slide show a curved back posture on the top, a poor posture which causes high spinal disc pressure. The bottom figure shows a “locked” back straight posture. By keeping your back locked in a straight position while lifting, your spinal forces stay low.

Poor (Awkward) Postures: Near Floor or Overhead

NOTES FOR SLIDE 15

The second ergonomic hazard is poor postures, often called “awkward postures.”

Many workers will work at the floor level using a forward bent back posture. Working in a bent back posture causes increased spinal forces.

Other workers will kneel to work on the floor. This may cause a contact stress between the hard ground surface and your knee. It is helpful to use knee pads or other cushion to eliminate contact stress.



The photo on the far right shows a worker doing overhead work. Anytime your hand is positioned above your head height, there is high stress on your shoulder. Work that is at or below your head height is much easier on your shoulder.

Other Ergonomic Hazards

NOTES FOR SLIDE 16

Other ergonomic hazards include highly repetitive work, contact stress (other than knee contact with the floor when kneeling), vibration of the hand, which is common when using power tools like a jack hammer, and vibration of the body if operating powered equipment while sitting.



Solutions are being developed. For example, through CPWR's research the overhead drill press shown earlier was developed to reduce overhead work, and a lateral drill rig was developed that reduces vibration risks.

INSTRUCTOR NOTE:

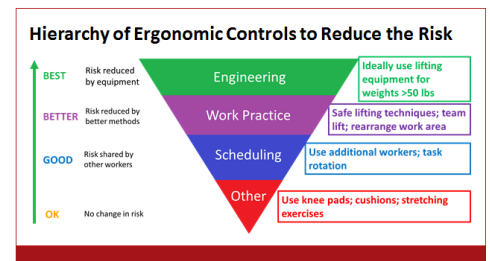
To learn more about these solutions: see <http://www.choosehandsafety.org> for information on how to select hand tools, or visit <https://www.cpwr.com/research/research-practice-library/construction-ergonomic-research-solutions> for other resources.

Hierarchy of Ergonomic Controls to Reduce the Risk

NOTES FOR SLIDE 17

There are a number of solutions or controls that reduce the risk of ergonomic hazards.

Some controls reduce the risk better than others.



This figure shows the hierarchy of ergonomic controls. The types of controls at the top of the triangle are “BEST” while the controls at the bottom are just “OK.”

Engineering controls generally use equipment to reduce the risk. An example is to use equipment to lift and move heavy objects. I'll show you some examples on the next slide.

Work practice controls use the best methods to perform the task. Examples include using safe lifting techniques or team lifts.

Scheduling, or what is more commonly called administrative controls, shares the work between workers. Usually your foreman or superintendent must authorize using this solution.

“Other” is the lowest control that offers the smallest benefit. Examples include knee pads or stretching exercises. If you have no other option, stretching exercises may be helpful.

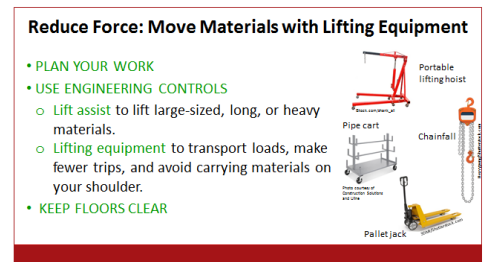
Reduce Force: Move Materials with Lifting Equipment

NOTES FOR SLIDE 18

To reduce force and prevent injuries, the first step is to “plan your work.” You must think through how you are going to do the work and what equipment will be needed for a safe lift – the engineering controls.

Your employer should provide you with lifting equipment for the heavier loads and train you on how to use it. This slide shows several examples of lifting equipment.

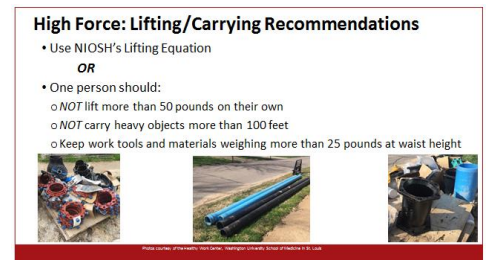
Since many of these tools are on wheels, it is important to keep the work area clear of obstacles and debris – in other words, engage in good housekeeping practices.



High Force: Lifting/Carrying Recommendations

INSTRUCTOR NOTE:

A detailed explanation of the NIOSH Lifting Equation and example of how to use the related app is included in Part 4 since it may be too complex for an introductory class. If you feel your class would benefit from learning about it you can use Slides 17 and 18 from Part 4 at this point in the presentation.



NOTES FOR SLIDE 19

When planning your work, you should also consider safe work practices.

NIOSH's lifting equation can help you or your employer determine what a safe weight is for you.

Since using the equation may not always be an option, one person should not lift objects weighing more than 50 pounds on their own and should not carry heavy objects long distances of more than 100 feet.

And work involving tools, equipment, or materials that weigh more than 25 pounds should be handled at waist height – not overhead or on the ground.

Location, Location, Location: Prime Real Estate

NOTES FOR SLIDE 20

This slide shows the zone that you should try to work within.

Ideally, work should be located close to your body.

This diagram of your “prime real estate” shows that usual work should be in the green zone – between your wrist and body.

Overhead work is close to head height, lower work is just below your waist.

Occasional work may be done outside of that area (in the orange zone).

The red zone is going to put your body in an awkward position. This is the work zone where you have the greatest risk for injury.

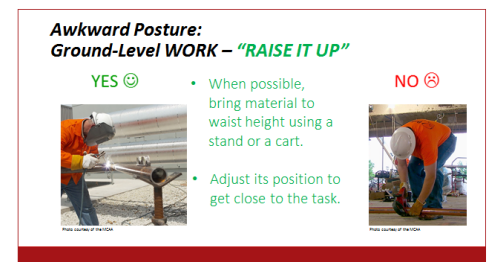
If you reach forward to the red zone, you can cause shoulder and low back pain.



Awkward Postures: Ground-Level Work – “RAISE IT UP”

NOTES FOR SLIDE 21

Set up your work area so you can avoid working from the floor or ground, by raising the work up. Use a cart or stand to assemble materials. On this slide, a jig or pipe stand on a tripod is being used so the worker can work at waist level.

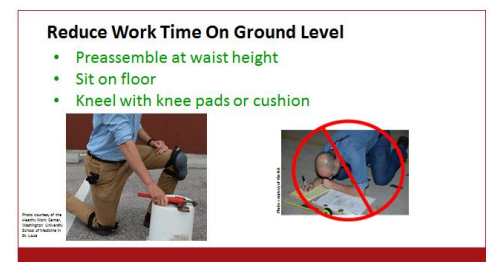


Reduce Work Time on Ground Level

NOTES FOR SLIDE 22

If you must work on the ground, limit the time you spend on the ground. Do part of the work at your waist height.

If you kneel, use knee pads or other cushions.



Awkward Posture: Overhead Work

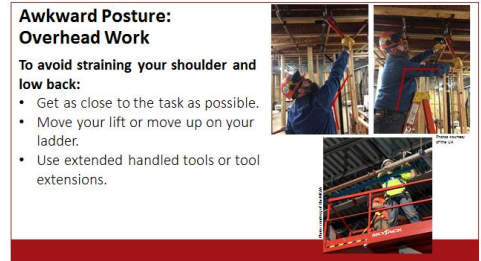
NOTES FOR SLIDE 23

Reaching up overhead to perform a task puts extra strain on your shoulders and low back.

If you work overhead, use a device such as a lift or ladder to raise you up. Position the equipment so the work is at or near your head height.

The top photo shows a worker reaching overhead. The shoulder angle is greater than 90 degrees. This worker could use a taller ladder or a scissor lift to get closer to the work.

Tools with longer handles or extensions can also reduce overhead reaching.



Proper Body Mechanics for Lifting Tasks

INSTRUCTOR NOTE:

Slides 24 – 39 cover safe lifting practices and online resources that reinforce these practices. This information can be used with or without the activities in Parts 2 and 3. However, if you have the time and space, we encourage you to use both the slides in this presentation and the hands-on exercises since they reinforce each other and help with retention. If you cannot do both, consider using the portion you could not do during your initial training as a refresher during a future class.

Proper Body Mechanics for Lifting Tasks

- One-person heft test, “straight” and “power” lift of box
- One-person lift of lightweight, long object
- One-person lift of heavyweight, long object (Method I & II)
- Two-person lift of heavyweight, long object (Method I & II)
- One-person lift of heavyweight, small object
- Push versus pull objects – wheeled cart and pipe wrench
- Interactive PC- and App-based resources

NOTES FOR SLIDE 24

As mentioned at the start of this presentation, the most common ergonomic hazard is lifting objects, equipment, or materials. It is important that you learn how to lift objects using “proper body mechanics.”

We’re going to review different ways you can lift objects, including:

- Several one-person lifts, including one for testing the weight of an object – called the heft test, different methods for lifting lightweight and heavyweight long objects, and one for lifting a heavyweight small object;
- Two-person or team lifts; and
- When you should push versus pull objects.

I’m also going to introduce some interactive online resources that you can use on your own as refreshers on safe practices.

IF YOU WILL BE DOING PART 2 “PROPER LIFTING METHODS: HANDS-ON DEMONSTRATION STATIONS” AS PART OF THE CURRENT CLASS – TELL THE CLASS:

Listen carefully as you will be expected to demonstrate these lifts.

IF YOU WILL BE DOING PART 3 “INTERACTIVE RESOURCES TO REDUCE MANUAL MATERIAL HANDLING RISKS: COMPUTER/APP-BASED TRAINING” – TELL THE CLASS:

We’re also going to have a computer station set up so that you can try out some interactive online resources that let you try out safe lifting practices and stretching exercises, and provide a refresher on the materials covered in this training program.

IF YOU WILL NOT BE DOING DEMONSTRATION WORKSTATIONS AS PART OF THE CURRENT CLASS AND DOING IT AT A FUTURE CLASS – TELL THE CLASS:

Listen carefully because in one of our future classes you will be expected to demonstrate these lifts.

Plan Your Lift: Select the Best Method to Lift an Object

NOTES FOR SLIDE 25

Before we get into the lifting methods, as mentioned earlier, prior to doing any lift, it’s important to plan how you will safely perform the lifting task.

You’ll need to determine the weight of the object, its size, how far you will have to move it, and whether the path is clear of obstacles. Then you need to choose the best lifting method. As a reminder:

- A one-person lift is ok for an object that weighs 50 pounds or less
- And you need to make sure the carrying distance is acceptable – usually less than 100 feet – and free of obstacles that could create a trip or slip hazard
- If it weighs more than 50 pounds, you should use a two-person lift team and make sure the carrying distance is acceptable and free of obstacles

Now we’re going to review several safe lifting methods.

Plan Your Lift: Select the Best Method to Lift an Object

- Plan task
 - Assess weight of object
 - Assess size of object
 - Assess distance and obstacles in the path to the destination
- Choose best method to lift and move object
 - One-person lift
 - ✓ Weight is 50 pounds or less
 - ✓ Distance is acceptable and without obstacles
 - Two-person lift
 - ✓ Weight is more than 50 pounds (a reasonable weight for two people)
 - ✓ Distance is acceptable and without obstacles

One Person Lifting a Box – Ground to Waist: Heft Test (Check Weight Before Lifting)

NOTES FOR SLIDE 26

The heft test is the method used to check the weight of an object before performing the full lift. The idea is to position yourself as if you are going to conduct the lift, but only lift the object about 1 inch off the floor.

This allows you to assess the weight of the object and test your ability to lift it without risk of injury. If you have to jerk the object to raise it off the ground, you need to get help.

There are three steps in the heft test:

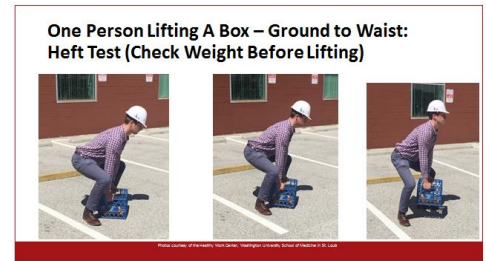
- First, approach the object from the front, with your feet shoulder-width apart, and move close to the object;
- Then, bend your knees and hips, “lock” your back, and lift the box ONLY 1” up from the ground – as shown in the middle photo – and set the object back down;
- If the weight is acceptable to lift, use the straight or power lift to lift box – as shown in the final image.

Remember:

- Avoid letting your knees extend beyond your feet, don’t just squat down to lift something, and always keep your core tight.
- When you lower the object down, lock your back and move smoothly, bending your knees and hips only.

INSTRUCTOR NOTE:

The interactive training and coaching resources and games for smartphones/tablets described in Part 3 and introduced at the end of the module include information on putting materials down.

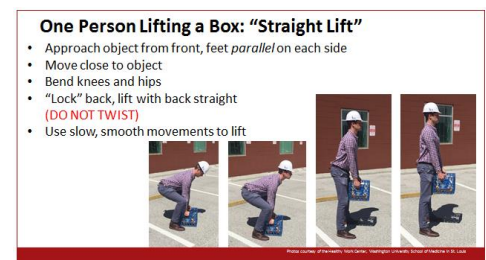


One Person Lifting a Box: “Straight Lift”

NOTES FOR SLIDE 27

The straight lift is used for rigid objects located in a confined area or against a wall. For this lift, you need to:

- Approach the object from the front with your feet shoulder-width apart and parallel to the object;
- Move close to the object, and bend your knees and hips;
- “Lock” your back, and lift with your back straight – DO NOT TWIST;



- Then use slow, smooth movements to lift the object.

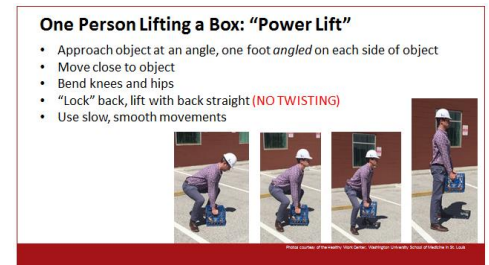
One Person Lifting a Box: “Power Lift”

NOTES FOR SLIDE 28

A power lift is used for a rigid object located in an open area. So unlike the straight lift, which you would use in a confined space because you have less room to move, for this lift you can angle your feet AND get close to the object.

For a power lift you would:

- Approach the object from the front, with your feet on each side or at an angle;
- Move close to the object, and bend your knees and hips;
- “Lock” your back, and lift with your back straight – no twisting;
- Then use slow, smooth movements to lift the object.



One Person Lifting a Lightweight Object: “Golfer’s Lift”

NOTES FOR SLIDE 29

This one-person lift, also called a Golfer’s lift, is ideal for picking up lightweight objects. If you play or watch golf, you’ll notice that experienced golfers use this technique because it reduces the spinal forces when bending forward to reach the floor.

To use a golfer’s lift, you would:

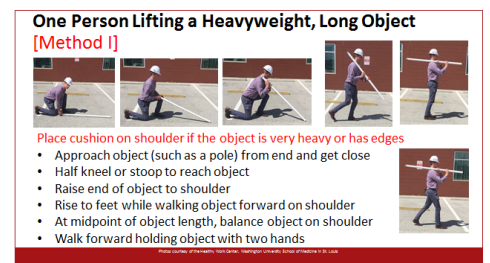
- Approach the object from one end;
- Bend forward at your waist on one leg, lift opposite foot off the floor; and
- Grasp the object and lift, lowering your foot to the floor as you use slow, smooth movements to lift the object.



One Person Lifting a Heavyweight, Long Object [Method I]

NOTES FOR SLIDE 30

This slide and the next one show two common methods for lifting a heavyweight, long object. While the pole in the images is shorter than the one commonly used for this technique, it will give you a sense of the steps involved in the lift.



For both methods you should check before you start to make sure that no one could be hit by the object during the lift. You may also want to place a cushion on your shoulder if an object is very heavy or has edges.

This first example shows one person lifting a heavyweight, long object.


- First, approach the object from the end and get close;
- Then, half kneel or stoop to reach the object and raise the end of the object to your shoulder;
- Rise to your feet while walking the object forward on your shoulder, and at the midpoint of the object's length, balance it on your shoulder;
- Walk forward holding the object with two hands, while avoiding hitting other workers or objects with the front or back end of the object.

One Person Lifting a Heavyweight, Long Object [Method II]

NOTES FOR SLIDE 31

This slide shows another method for a one-person lift of a heavyweight, long object. This method is often used to carry a heavier object – such as a heavy pipe, but CAUTION should be used to lift the pipe at the midpoint to avoid the weight of the pipe causing your back to bend backward. Like the other example, you may also want to place a cushion on your shoulder if an object is very heavy or has edges.

One Person Lifting a Heavyweight, Long Object [Method II]



Place cushion on shoulder if the object is very heavy or has edges

- Half kneel or stoop to reach pole
- Raise end of pole to shoulder
- Rise to feet while walking pole forward on shoulder
- At midpoint of pole length, balance pole on shoulder
- Walk forward holding pole with two hands

For this lift:

- Approach the object from the end and get close;
- Half kneel or stoop to reach the object, rise up to your feet, and stand the object upright (on end);
- Stoop down, “lock” your back, place your shoulder near the midpoint of the object, and tilt the object toward your shoulder. Grasp the object to balance it and stand it upright;
- Then, with the object balanced on your shoulder, walk facing forward (no twisting), and avoid hitting other workers or objects with the front or back end of the object.

Two-Person Lift: Heavyweight Long Object [Method I]

NOTES FOR SLIDE 32

The next few slides describe using a two-person lift method to lift a heavyweight long object.

This method is good for carrying one very long object or a shorter one that is too heavy for one person to handle.

Two-Person Lift: Heavyweight Long Object [Method I]

- Two workers discuss to plan for lift
- Each approach object from end and move close to object
- Bend knees and hips
- “Lock” back
- Communicate – “one, two, three lift,” lift with back straight (NO TWISTING)
- Use slow, smooth movements
- Hold pole at waist, front person move to other side
- May lift to shoulder (optional)
- Walk forward in the direction of travel

When two people are involved with a lift, they should first discuss how they plan to do the lift.

- For this lift, each worker approaches the object from an end and moves close to the object, feet shoulder-width apart;
- Next, both workers should “lock” their backs and bend their knees and hips;
- Then communicating – “one, two, three lift” – lift with backs straight with no twisting, using slow, smooth movements to complete the lift to waist height;
- Then the person in front should move around to the side of the object, and they should both walk forward in the direction of where they need to deliver the object.

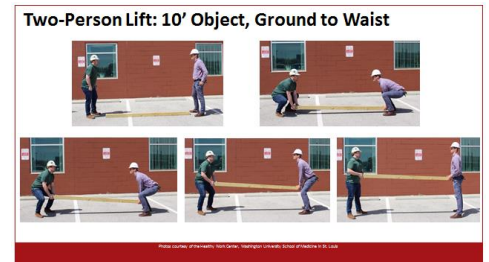
Two-Person Lift: 10' Object, Ground to Waist

NOTES FOR SLIDE 33

This slide shows two workers using the method just described with a 10-foot object.

The two workers start by planning how they will carry out the lift.

- Once they've done that, they each approach the object from the ends and move close to the object, feet shoulder-width apart, with their backs “locked” and knees and hips bent;
- They communicate – “one, two, three lift” – and then lift with backs straight with no twisting, using slow, smooth movements;
- They hold the object at their waist, with the front person moving to the side before they start moving forward.

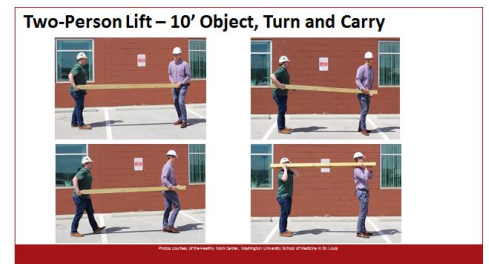


Two-Person Lift: 10' Object, Turn and Carry

NOTES FOR SLIDE 34

For a situation involving a two-person lift that requires both people to turn and carry an object, the front person must step to the side of the object, facing forward.

Like the earlier example, both workers would need to plan the lift and follow commands to lift the object to their shoulder: “One, two, three lift,” and use verbal cues to begin walking forward in the direction of travel.



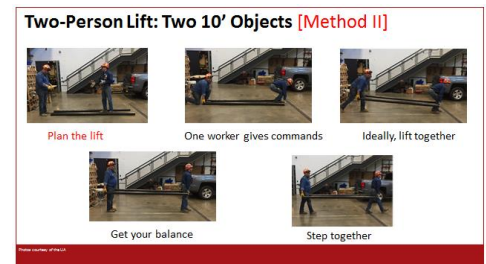
Two-Person Lift: Two 10' Objects [Method II]

NOTES FOR SLIDE 35

A two-person lift is also a good method for carrying two heavyweight long objects, as long as the combined weight is an acceptable load for the workers, since it may provide better balance across the body than carrying one object.

This slide shows the steps involved. Like the earlier lifts, the two workers should discuss their plan for the lift first.

- Then, each approaches the ends of the objects and the front person turns toward the direction of travel;
- They each “lock” their back, bend their knees and hips, grasp the objects from the ends, and communicate – “one, two, three lift”;
- They use slow, smooth movements to lift with their backs straight with no twisting. They then hold the objects at each end and walk forward.



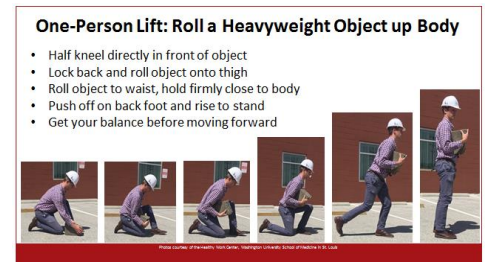
One-Person Lift: Roll Heavyweight Object up Body

NOTES FOR SLIDE 36

A good one-person lift method for small, heavy objects or non-rigid objects, such as a sack of materials, involves rolling a heavyweight object up the body.

To use this lifting method, a worker would:

- Half kneel directly in front of the object;
- “Lock” their back and roll the object onto their thigh;
- Roll the object to their waist, holding it firmly close to their body; and
- Push off on their back foot to rise to a stand;
- Once the worker gets their balance they would move forward.

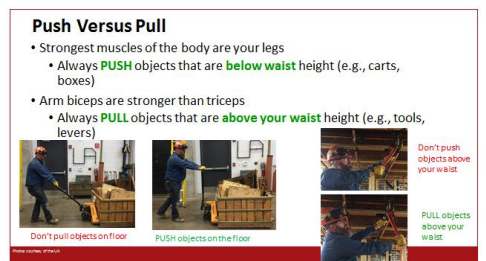


Push Versus Pull

NOTES FOR SLIDE 37

In addition to safe lifting practices, there are other safe practices that can be used.

As this slide shows, since the strongest muscles of the body are your legs, you should always PUSH using your leg muscles to



move objects that are located below your waist, and you should select carts or other devices that will allow you to push objects located on the floor.

To move objects that are located above your waist, you should PULL since your biceps are stronger than your triceps.

When engaging in this practice, position your body so you can pull objects located above your waist toward you.

If the object is tall and you cannot see over it, you should have a coworker assist with moving the object so either:

- 1) One pushes and the other guides the object; or
- 2) Both stand in back on either side of the object, so they have a clear view in front of the object, and push.

Other Lifting and Carrying Practices

NOTES FOR SLIDE 38

When lifting and carrying materials with handles, consider using gloves with rubber dots to increase grip stability, and using padding or a clamp-on handle to make bucket or pail handles easier to grasp.

Other Lifting and Carrying Practices

- Use gloves with rubber dots to increase grip stability
- Add padding or a clamp-on handle to bucket or pail handles
- Alternating the hand or shoulder used to carry materials
- Use padding on your shoulder



Alternating the hand or shoulder you use to carry materials, and as mentioned earlier, using padding on your shoulder can also help.

INSTRUCTOR NOTE:

Additional examples can be found in NIOSH's "Ergonomic Guidelines for Manual Material Handling." While this document is not specific to construction, it offers ideas for engineering and work practice controls that may be application to your trade:

www.cdc.gov/niosh/docs/2007-131/pdfs/2007-131.pdf

Interactive Training & Coaching Resources and Games @ www.bestbuiltplans.org

NOTES FOR SLIDE 39

While the lifting practices we've just reviewed are important, I want to emphasize that whenever possible it's best to follow the hierarchy of controls.

As discussed earlier, to prevent strain and sprain injuries the best option would be to use lifting equipment to reduce the risk.

Interactive Training & Coaching Resources and Games @ www.bestbuiltplans.org

Free resources for **everyone** – from the apprentice to the contractor – to help reduce the risk for injury.

Training & Coaching –

- Learn about importance of planning, try out safe lifting practices, and stretching exercises
- For use on a PC or as an app for tablets/smartphones.

Games –

- Play the games to practice what you learned.
- Available for Apple and Android smartphones.

The image shows three mobile application screens. The first is titled 'BEST BUILT PLANNING' and shows a checklist or planning interface. The second is titled 'LIFT COACH' and shows a 3D model of a person lifting a box. The third is also titled 'LIFT COACH' and shows a different view of the lifting simulation.

If that's not an option, then use the lifting practices we've just reviewed.

These two options would be followed by administrative controls, such as rotating the work so you're not always lifting and moving materials, and at the bottom of the list, using knee and other types of padding to reduce contact stress, or stretching exercises.

The interactive training and coaching resources and games reinforce the hierarchy of controls and the importance of planning for how materials will be lifted and moved. They also introduce equipment options, and let you try out different movements and test your knowledge of the risks and safe practices.

INSTRUCTOR NOTE:

If you plan to do Parts 1-A and 1-B as a single session, you would continue on to Part 1-B. You may also use Part 3 as an in-class presentation or demonstration of the interactive training and coaching resources and games before moving on to Part 1-B.

If you plan to use the hands-on exercises in Part 2 and/or use Part 3 as a computer lab, you would stop here, divide the group up (if needed) so that each group starts at a different station, and cycle through all of the stations. Then you would reconvene to do Part 1-B.

PART 1-B: LESSON PLAN (SLIDES 1 – 11)

INSTRUCTOR NOTE:

If you don't have the time, space, or equipment available to do hands-on demonstrations, you would treat Parts 1-A and 1-B as one session.

Ergonomics Basics – Reducing the Risks for Soft Tissue Injuries – Part 1-B

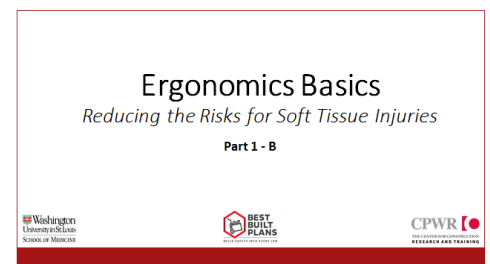
INSTRUCTOR NOTE:

If you conducted the demonstration workstations and/or the computer station, this is a good opportunity to learn about ways to improve the demonstration stations.

You may want to write trainees' questions and/or suggestions on a flip chart or whiteboard so you can use them to improve future training sessions.

If you did not conduct the demonstration workstations and/or the computer station you can skip this slide and proceed to Slide 2.

NOTES FOR SLIDE 1



Ask the class:

Before we begin the last part of this course, does anyone have any questions or comments about the demonstration workstations/computer station?

Ergonomic Training Learning Objectives

NOTES FOR SLIDE 2

Earlier, we covered the first three objectives. The goal of this part of the training is to review what's been learned so far and to focus on the remaining learning objectives.

By the end of this portion of the training, you should be able to:

- Describe the risks of using prescription opioids and self-treatment for pain management;
- Identify the benefits of doing stretching exercises; and
- Demonstrate at least one safe lifting practice.

INSTRUCTOR NOTE:

Give all trainees a copy of handout #2 – Ergonomic Training Exercises (located in Appendix A)

Before we introduce new information, let's start with a review of what's been learned so far.

I'm going to pass out a brief quiz so that you can self-assess what you've learned so far, and I can find out what areas I may need to focus on more in future classes.

I'm going to have you pass them in after we've reviewed the correct answers, but you don't need to put your name on it.

Give students 5-10 minutes to complete the quiz. Then use Slides 3 & 4 to review the correct answers.

Ergonomic Training Exercises – Answers

INSTRUCTOR NOTE:

Appendix B contains the quiz shown on these slides with the correct answers marked. Once you've reviewed the questions and answers, collect the quizzes. If there are questions that students struggled with, you should plan to cover the information they did not understand at a later class.

Ergonomic Training Learning Objectives

1. Identify the ergonomic hazards
 2. Review the basic ergonomic controls for hazards to prevent injuries
 3. Describe the proper body mechanics for lifting tasks to prevent injuries
 4. Describe the risks of using prescription opioids and self-treatment for pain management
 5. Identify the benefits of doing stretching exercises
 6. Demonstrate how to perform at least one stretching exercise
- * Ergonomic Training Exercise – test your knowledge

Ergonomic Training Exercises – Answers

1. Ergonomics is the science that tries to put a task in the physical abilities of the worker. None
a. None
b. None
c. None
2. Which body part is at greatest risk of developing an injury from "high beam"? (Circle the BEST answer)
 The neck
 The back
 The hand
3. Which of the following tasks best requires high physical fitness? (Circle All that apply)
 Lifting 200 lbs from one side to the back
 Lifting 200 lbs under the table in a home
 Lifting and moving a machine
 Lifting bags from a pallet
4. Which of the following methods on the lift will reduce or eliminate force in lifting? (Circle All that apply)
 Use a pallet jack or crane to lift heavy load that you are moving
 Use a lift truck
 Use a hoist
 Use a hoist with a spreader bar that is 10 pounds
5. Which of the most common (ergonomic) hazards that cause injuries in your hands? (Circle three (3))
 Repetitive motion (egging)
 Lifting with hands before your knee bend (don't forward back)
 Working on uneven surface
 Working with your hands above your head (overhead)
6. Which of the best ways to use the principles of proper lifting? (Circle All that apply)
 The feet should be shoulder width apart
 The feet should be shoulder width apart
 The feet should be shoulder width apart
 The feet should be shoulder width apart
7. A lift task is: (Circle the BEST answer)
 The vertical or horizontal
 The vertical or horizontal
 The vertical or horizontal
 The vertical or horizontal

NOTES FOR SLIDES 3 & 4

Now let's review the answers.

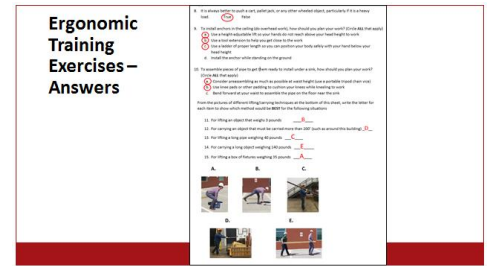
As you go through each question ask the class how many got the correct answer.

After going through all the answers, ask:

How many did you answer correctly? How many of you got them all right? How many got more than half right?

OR at the end ask them:

Based on the quiz you took earlier, are there any areas that it would be helpful to cover at a later class?



Treatment and Progression – Don't IGNORE Early Symptoms!

NOTES FOR SLIDE 5

Earlier we talked about why it's important to understand how an injury progresses and the symptoms.

As this slide shows, when the symptoms are mild you have a 100% chance of recovery, but if they get worse, you may reach a point where it becomes too painful to do basic things like kneel, stoop, or walk.

Early recognition of the symptoms and treatment such as rest, ice, compression, and elevation – or RICE for short – is important.

Your doctor might prescribe medication such as anti-inflammatories, therapy, or a splint.

If the symptoms are more severe, you may need surgery.

Treatment and Progression – Don't IGNORE Early Symptoms!

- Painful to move: kneel, stoop, walk
- Treatment
 - Early:
 - ✓ Rest, Ice, Compression, Elevation (RICE)
 - ✓ Physician prescribed medications (anti-inflammatories), therapy, splint
 - Late: surgery of back, knee, shoulder, hand

Risk of Opioid Dependence

NOTES FOR SLIDE 6

That leads to this slide. Because construction workers are at risk for painful injuries, opioids are commonly prescribed for pain relief. As a result, opioid dependence has become a serious issue for construction workers and the industry.

Risk of Opioid Dependence

- Construction work can result in painful injuries; many are treated with prescription opioids (i.e., codeine, morphine, hydrocodone, hydromorphone, oxycodone).
- 1 out of 4 people prescribed opioids for long-term pain become addicted.*

Actions:

- Opioids are addictive and should be the last option to treat your pain.
- If you are injured, talk to your doctor about non-addictive medications or physical therapy to treat the pain.
- **DO NOT** take opioids for more than 30 days without consulting with your doctor.

*Centers for Disease Control and Prevention. Promoting Safer and More Effective Pain Management. <https://www.cdc.gov/od/oc/opioids>

According to the Centers for Disease Control and Prevention, 1 out of 4 people prescribed opioids for long-term pain become addicted.

The goal of this program is to provide you with information on how to prevent the injuries and pain up front so that you never need pain medication.

But, if you do get injured it's important to remember that opioids are strong, addictive medications so they should only be used if they are prescribed by a doctor and determined to be the best option to manage the pain.

Misuse of opioids prescriptions, including taking more than the dose prescribed, taking someone else's prescription, taking multiple opioid medications, or taking high doses for long periods of time, can all lead to opioid dependency and addiction.

Before taking prescription opioids, FIRST ask your doctor for information on ALL available treatments for pain. There may be non-addictive medications or treatments available.

Remember, only take opioids if they are the best option, and follow the dosage prescribed. **DO NOT** take opioids for long periods of time (more than 30 days) without consulting with your physician.

INSTRUCTOR NOTE:

At this point, or before the class ends, distribute handout #3 the Physicians' Alert – Pain Management for Construction Workers, and handout #4 the Hazard Alert Card – Opioid Deaths in Construction (located in Appendix A). Copies of the pocket size version of the card can be ordered by emailing cpwr-r2p@cpwr.com.

If you would like additional training resources focused on preventing opioid dependence, including training materials developed by CPWR and the NIEHS, contact CPWR's Training Department at training@cpwr.com.

Stretching Exercises (Slides 7 – 9)

NOTES FOR SLIDE 7

To prevent an injury and the need for pain medicine, as we discussed earlier, you need to be aware of the hazards, use lifting equipment and safe lifting practices, and get early treatment if injured.

Stretching Exercises

- **Stretching Benefits:** Improves flexibility, movement, and posture. **Do stretches throughout the day to relieve tightness.**
- **CAUTION – Avoid pain while stretching.** Use slow, smooth movements, hold the posture for 15 seconds.
- Exercises in the "Coaching" section of Best Built Plans can help.



Stretching exercises can also help and are recommended to improve flexibility, movement, and posture, and relieve muscle and joint tightness. But they only help if you do them properly.

You should ALWAYS use caution when stretching so you do not feel pain. And always use slow, smooth movements, and hold the posture for about 15 seconds when you stretch.

The Coaching section of the interactive resources mentioned earlier walks you through different stretches, lets you try them out on your computer, tablet, or smartphone, and shows you what you are doing right and wrong.

INSTRUCTOR NOTE FOR SLIDES 8 & 9:

Describe each exercise and then have the class stand up and try them as you describe the steps.

NOTES FOR SLIDE 8

The following two slides show a few examples that we can try today. I'm going to briefly describe each one and then we'll try them out.

The low back stretch is a good "reverse" stretch, particularly if you've been working in a forward bent back position, such as working at floor level.

Ask the class to do the stretch as you tell them the steps:

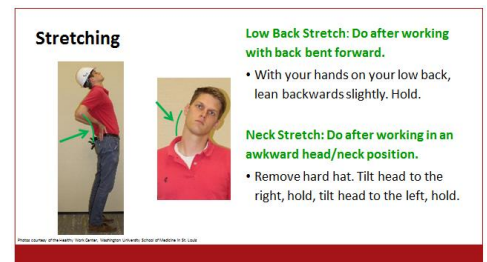
To do the stretch, put your hands on your low back, and gently lean backwards slightly. Hold.

Tell the class:

A neck stretch is a good stretch if you've been working in an awkward head/neck position.

Ask the class to do the stretch as you tell them the steps:

Tilt your head gently to the right and hold. Then gently tilt your head to the left and hold.



NOTES FOR SLIDE 9

Shoulder rolls are good to release tension in your head, neck, and upper back, particularly if you've been working with your hands overhead or reaching with your arms away from your body for a period of time.

Ask the class to do the stretch as you tell them the steps:

Slowly, roll your shoulders up and back and around. Repeat 10 times.

Tell the class:

Another good stretch is the forearm stretch.



Ask the class to do the stretch as you tell them the steps:

Reach your right arm out, and with your elbow straight, gently pull your hand back – hold. Then bend your wrist down and pull your hand toward your body.

Now, let’s do it with the left arm. Reach your left arm out, and with your elbow straight, gently pull your hand back – hold. Then bend your wrist down and pull your hand toward your body.

Tell the class:

Most of us have tightness in our hamstring and calf muscles.

Ask the class to do the stretch as you tell them the steps:

To stretch your hamstrings, extend one leg forward with your heel on the floor and your toes pointed up – hold. Let’s repeat with the other leg.

Now let’s stretch your calf – extend one leg back with your foot flat on the ground. Then gently bend your front knee. Feel the stretch on the calf of your back leg – hold. Let’s repeat with the other leg.

Best Built Plans: Interactive Resources

INSTRUCTOR NOTE:

If you used Part 3 as a computer station or as part of your presentation, you can use this slide to remind trainees of the resources available and why they should use them.

If you did not use Part 3 as a computer station or as part of your presentation, then you can use the in-class portion of Part 3 at this point if there is time or use this slide to introduce them to the resources. If you only use this slide, make sure to provide them with the handouts for Part 3 – handout #5 – Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games, and handout #8 – Exercise Instructions for Best Built Plans Training and Coaching Resources (located in Appendix A).



NOTES FOR SLIDE 10

The Best Built Plans program has interactive training and coaching resources that you can use on a PC or by downloading the app to learn more about 1) planning for how materials will be lifted and moved and 2) using the safe lifting methods and stretching exercises we covered in this training program. There are also smartphone games that you can play to test your knowledge of how to plan for and conduct a safe lift.

INSTRUCTOR NOTE:

Additional handouts located in Appendix A that you may want to give out:

- Handout #6 Hazard Alert Card – Back Injuries
- Handout #7 Ergonomic Tips Cards (optional)

See Appendix E for instructions on how to make handout #7 into small cards that can be clipped together and attached to a lunch box or tool bag. Contact cpwr-r2p@cpwr.com for an editable version of the handout that you can tailor to your trade.

NOTES FOR SLIDE 11

Any final questions before we end?

If not, then I have some more handouts to use as reminders of what we learned.

Questions?

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PART 2 – PROPER LIFTING METHODS: HANDS-ON DEMONSTRATION STATIONS

Preparation and Setup

Materials for each station: Each workstation requires one or more props for the trainees to use for training purposes. Ideally, the props are materials or equipment that the trainees would typically use in their work. The following types of items will be needed for each station:

- **Station #1:** Box or milk crate with weight of less than 50 pounds for the “Heft Test,” “Straight Lift,” and “Power Lift.”
- **Station #2:** A lightweight (less than 50 pounds) long object – such as a pole, PVC pipe, or 10’ 2”x4” for the “One-person lift of a lightweight object – the Golfer’s lift”; and one long heavyweight object such as a 10’ pipe or 4x4.
- **Station #3:** Two heavyweight and long objects – such as a 10’ pipe or 4x4 for the “Two-person lift of a heavyweight, long object.”
- **Station #4:** Small bag of materials, heavy fitting, or small weight (approx. 1’x1’) weighing roughly 50 pounds for the “One-person lift of a heavyweight small object.”
- **Station #5:** Wheeled cart or pallet jack; large pipe wrench to remove nut for demonstrating pushing versus pulling an object.

The following are tips for setting up the demonstration stations and photos showing examples of setups:

- 1) **Signage:** In addition to the materials, it is helpful to post signs at each station that identify the lifting method(s) and how to perform the lifts. If you can, poster size versions of the signs work best. If not, you can display them as shown in the photos. Appendix C contains the signage to use at each station. You can use the photos in existing signs or insert ones of your own as long as they follow the same steps and recommended practices.
- 2) Have the props laid out ahead of time and make sure you have adequate space for the demonstrations and for the trainees to practice.



Instructions for Conducting the Hands-On Demonstration Stations

The signage for each of the **FIVE** demonstration stations include written and visual instructions for using the proper lift methods (introduced in Part 1-A). If trainees have access to computers, tablets, or smartphones, you can use Part 3 as a sixth demonstration station.

The time required for this part of the training program will depend on the number of trainees in your class and how you structure the demonstrations. The following are key steps to prepare for the demonstration stations:

1. Divide your students into small groups so you have roughly an equal number for each station (i.e., if you have 30 trainees and 5 work stations, you will have 6 trainees in each group; if you do 6 stations, you will have 5 in each group).
2. At each workstation, post the appropriate signage that lists the steps to be followed to perform the lifting method and images of the process. The content for these signs can be found in Appendix C.
3. Assign an instructor to staff each station. You may need to adjust the size and number of groups depending on whether you are doing this activity on your own or have help.
4. Plan to have each trainee rotate through the stations, demonstrate the proper technique provided in the instruction materials, and receive a check-off on completion.

Alternatively, if you have a small class, you may want to set up one station that includes all the signage and props.

To conduct the training at each station, the instructor should:

1. Review the steps required to do the lift properly following the photos and steps on the informational card.
2. Demonstrate the proper lift for the students, saying the instructions out loud.

3. Have each trainee demonstrate the lift. Be sure to provide positive comments and suggestions for improvement.

The Five Hands-On Demonstration Stations:

Station 1 – One person:

1a. Heft test (checking the weight of the box)

1. Approach object from front, feet shoulder-width apart
2. Move close to object
3. Bend knees and hips
4. “Lock” back
5. Lift box ONLY 1” up from ground and set back down
6. If weight is acceptable to lift, use straight or power lift to lift box

1b. Straight lift

1. Approach object from front, feet shoulder-width apart and *parallel to object* on each side
2. Move close to object
3. Bend knees and hips
4. “Lock” back, lift with back straight (DO NOT TWIST)
5. Use slow, smooth movements

1c. Power lift

1. Approach object from front, one foot *angled* on each side of object
2. Move close to object
3. Bend knees and hips
4. “Lock” back, lift with back straight (NO TWISTING)
5. Use slow, smooth movements

1a. Heft Test (checking object weight before lift)



Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

1b. One Person Lifting Box: “Straight lift”



Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

1c. One Person Lifting Box: “Power lift”



Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

Station 2 – One person:

2a. Lifting lightweight object: Golfer's lift

1. Approach object from end
2. Bend forward at waist on one leg, lift opposite foot off floor
3. Grasp object and lift, lowering foot to floor
4. Use slow, smooth movements

2b. Lifting a heavyweight, long object (Method I)

1. Approach object (such as a pole) from end and get close
2. Half kneel or stoop to reach object
3. Raise end of object to shoulder
4. Rise to feet while walking object forward on shoulder
5. At midpoint of object length, balance object on shoulder
6. Walk forward holding the object with two hands

Note: Place cushion on shoulder if the object is very heavy or has edges.

2c. Lifting a heavyweight, long object (Method II)

1. Approach object (such as a pipe) from end and get close
2. Half kneel or stoop to reach object
3. Rise up to feet and stand object upright (on end)
4. Stoop down with back straight and shoulder near midpoint of object
5. Tilt object toward shoulder, grasp to balance, and stand upright
6. With object balanced on shoulder, walk facing forward (NO TWISTING)

Note: Place cushion on shoulder if the object is very heavy or has edges.

2a. One Person Lifting **Lightweight** Object: "Golfer's Lift"

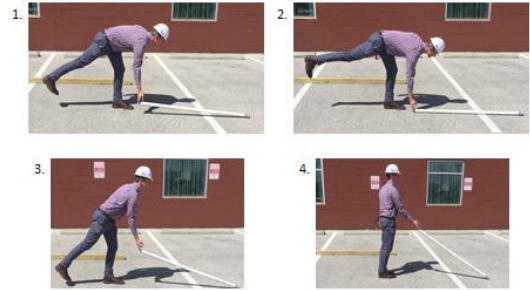


Photo courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

2b. One-Person Lift: **Heavyweight**, Long Object (Method I)



Photo courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

2c. One-Person Lift: **Heavyweight**, Long Object (Method II)



Photo courtesy of the UK

Station 3 – Two person:

3a. Lifting heavyweight, long object (Method I)

1. Two workers discuss a plan for their lift
2. Each approach object (such as a pole) from the end and move close to object
3. “Lock” back and bend knees and hips
4. Communicate – “one, two, three lift,” lift with back straight (NO TWISTING)
5. Use slow, smooth movements
6. Hold object at waist, front person moves to other side
7. Communicate to lift object to shoulder at the same time
8. When ready, walk forward in the direction of travel

3b. Lifting heavyweight, long objects (Method II)

1. Two workers discuss a plan for their lift
2. Each approaches ends of objects (such as two pipes), front person turns toward direction of travel
3. Workers bend knees and hips, grasp objects from end
4. “Lock” back
5. Communicate – “one, two, three lift”
6. Use slow, smooth movements to lift with back straight (NO TWISTING)
7. Holding objects at the ends, walk forward in the direction of travel

3a. Two-Person Lift: Heavyweight, Long Object (Method I)



Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

3a. (Continued) Two-Person Lift: Heavyweight, Long Object – Turn And Carry



Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

3b. Two-Person Lift: Heavyweight, Long Objects (Method II)

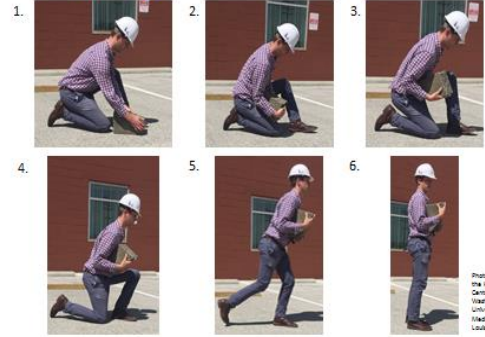


Photos courtesy of the UK

Station 4 – One-person lift: Roll a heavyweight small object up body

1. Half kneel directly in front of object
2. “Lock” back and roll object onto thigh
3. Roll object to waist, hold close to body firmly
4. Push off on back foot and rise to a stand
5. Get your balance before moving forward

4. One-Person Lift: Roll a Heavyweight Small Object up Body



Station 5 – Push vs. Pull

1. Strongest muscles of the body are your legs
 - Always **PUSH** objects that are **below waist** height (e.g., carts, boxes)
2. Arm biceps are stronger than triceps
 - Always **PULL** objects that are **above your waist** height (e.g., pipe wrench)

5. Push Versus Pull

- Strongest muscles of the body are your legs
 - Always **PUSH** objects that are **below waist** height (e.g., carts, boxes)
- Arm biceps are stronger than triceps
 - Always **PULL** objects that are **above your waist** height (e.g., pipe wrench)



Don't pull objects on floor



PUSH objects on the floor



Don't push objects above your waist



PULL objects above your waist

Photos courtesy of AT&T

PART 3 – INTERACTIVE RESOURCES TO REDUCE MANUAL MATERIAL HANDLING RISKS: COMPUTER/APP-BASED TRAINING

Best Built Plans Interactive Training and Coaching Resources & Games to Reduce Manual Material Handling Risks

INSTRUCTOR NOTES:

In addition to the hands-on workstations, the Best Built Plans program has **interactive** training resources available for use on a PC, or as an app for a tablet or smartphone, and smartphone games that reinforce safe lifting practices. These resources reinforce the importance of 1) planning for how materials will be lifted and moved, and 2) using safe lifting techniques and lifting equipment, including the lifting techniques presented in Parts 1-A and 2. The resources include:

- **Training Resources:** introduces the concept of planning for how materials will be lifted, stored, and moved (lifting equipment, and proper lifting techniques and work practices).
- **Coaching Resources:** introduces warm up exercises, and the fundamentals of proper lifting with a focus on safe foot and body positioning.
- **Smartphone Games:** There are two games that reinforce the information presented in this training program on the risks and the importance of planning and using safe lifting practices. Like other types of games played on smartphones and tablets, the user gets points and advances for making the right selections and loses if they do not. In each of these games there is a meter that shows if the selections made resulted in an injury or increases the risk for one.
 - **Plan Your Lift** – reinforces the safe lifting practices.
 - **Plan Your Route** – applies the lessons learned in Parts 1-A and 2 to a job site by requiring the player to make decisions about how they will lift and move a material. As the player advances, the job site becomes more complex.

These interactive resources can be downloaded and used in different ways based on the time, space, and classroom resources you have available. They can be used as:

- A computer demonstration station as part of this overall training program if you have access to computers, tablets, or smartphones for your trainees;
- A presentation in a class to test trainees knowledge of what they learned in Part 1-A and/or Part 2 of this training program or to introduce them to safe practices if you don't have the time or ability to do the hands-on demonstration stations (Part 2);

- A refresher during a later class to remind trainees of safe practices and assess their retention; or
- By trainees on their own.

The following instructions present two options for using these interactive training and coaching resources and games.

OPTION 1: USE IN A COMPUTER LAB AS A DEMONSTRATION STATION (HANDS-ON EXERCISE)

Preparation and Setup

The following are instructions for using the resources as a workstation (hands-on exercise).

- Computers, tablets, or smartphones should be available for use by each trainee (or for teams of two trainees).
- If you will be showing the exercises on a projection screen and having the class follow along, you will need an LCD projector, screen, and the correct cord/adaptor to connect the projector to the computer or tablet/smartphone.

IN PREPARATION FOR THE CLASS, TEST OUT THE EXERCISE SO YOU'RE FAMILIAR WITH IT AND PREPARED TO ANSWER QUESTIONS.

Before class:

- Download either the PC or App versions of the **Training and Coaching Resources** from www.bestbuiltplans.org and test ahead of time on the equipment you will be using (computer, tablet, or smartphone). If you have any problems, Appendix D contains detailed instructions or contact cpwr-r2p@cpwr.com for help.

- The PC version can be accessed directly by clicking on this link:

<https://www.cpwr.com/wp-content/uploads/publications/BestBuiltPlans.zip>.

- The app is available on Google Play, iTunes, or Amazon and can be accessed by clicking on the links below:

Google Play:

<https://play.google.com/store/apps/details?id=com.simcoachgames.MMHTool>

Amazon: <https://www.amazon.com/Simcoach-Games-Best-Built-Plans/dp/B07SBK3SNQ>

iTunes: <https://itunes.apple.com/us/app/best-built-plans/id1457992967?ls=1&mt=8>

- Turn off the sound on each computer or tablet/smartphone. There is a voiceover for these resources that is intended for use by an individual on their own.
- Make sure each computer mouse or tablet/smartphone touchscreen is working.
- The games are only available as an app. If you plan to demonstrate them, you will need to download them onto your tablet or smartphone (and have the appropriate cords to connect to the projector) and/or download the games on each tablet/smartphone trainees will use.
- Provide each trainee with the following handouts:
 - *Handout #5* – Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games
 - *Handout #8* – Exercise Instructions for Best Built Plans Training and Coaching Resources
- This computer demonstration will take between 15 and 30 minutes depending on the size of your class and trainees' experience using computers and apps.

Screens That Will Be Accessed During the Exercise and Instructor Notes

Screen 1 – Best Built Plans

NOTES FOR SCREENS USED FOR THE EXERCISE

Welcome everyone.

This computer workstation will introduce you to the interactive training and coaching resources that are part of CPWR's overall Best Built Plans program. The site planning portion of the program is designed to help contractors make sure they include in their project plans the resources – equipment and staff time – to ensure that safe material handling practices are used on the job.

The program also includes training resources that demonstrate and reinforce safe lifting practices.

Today, we want to give you a chance to try them out.

INSTRUCTOR NOTE:

Hand out the exercise instructions (Handout #8) and the instructions for downloading the materials (Handout #5).

The first handout [**hold up handout #8**] is an instruction sheet that walks you through a few quick exercises to introduce you to the program.



The second handout **[hold up handout #5]** includes instructions for how you can access this program and the two games that you can play on your smartphones on your own.

We'll be using the first handout for this exercise. Your computers should all be set up with the home screen, which is shown on the instructions **[hold up handout #8]**. If it's not, or you run into any problems, I'm here to help.

Once everyone is ready...

Before we get started, I want to mention that throughout the program there's text providing instructions and explanations about the safe practices, and if the sound is on, a narrator reading the text. Today, we're not going to use the voiceover and we're going to click through the screens with text, but I'd encourage you to go back and read or listen to the narration when you try the program on your own.

Screen 2 – Introduction

NOTES FOR SCREENS USED FOR THE EXERCISE

Let's get started.

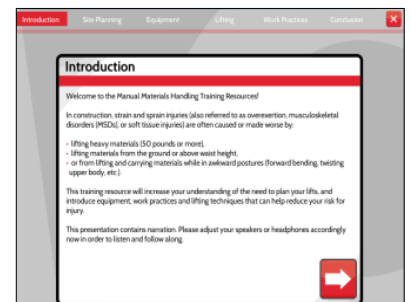
Click on the box that says: "Training Resources."

You should see the **Introduction** screen.

INSTRUCTOR NOTE:

If they do not land on this page, instruct them to click on the **Introduction** tab on the top menu.

Click on the red box with the arrow in the corner to continue.

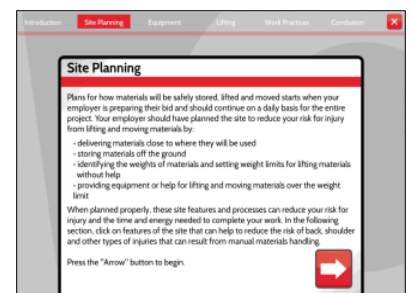


Screen 3 – Site Planning

NOTES FOR SCREENS USED FOR THE EXERCISE

This will take you to the **Site Planning** screen. Click on the arrow again to continue.

You are now in the **Site Planning** section – there's a menu on top that lets you know where you are in the program. In this section, you can click on an item on the screen and it will explain why it's important for reducing injuries.

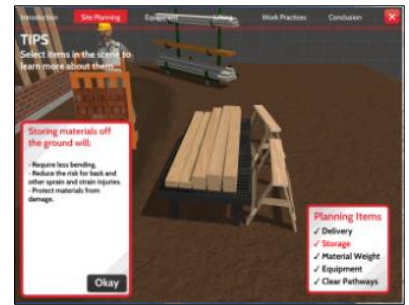


Screen 4 – Lumber

NOTES FOR SCREENS USED FOR THE EXERCISE

Let's click on the stack of wood. You will see a screen pop up that explains why it's important to store materials – in this case lumber – off the ground.

Click the **Okay** button in the box to continue.

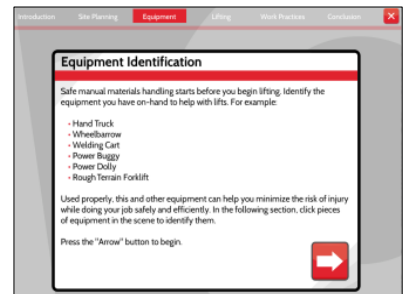


Screen 5 – Equipment

NOTES FOR SCREENS USED FOR THE EXERCISE

Now let's go to the menu on the top of the screen and click on **Equipment**. This will take you to the **Equipment Identification** screen. This section provides you with information on how to safely use common lifting equipment.

On this screen click on the arrow to continue.



Screen 6 – Equipment

NOTES FOR SCREENS USED FOR THE EXERCISE

You should now be on a screen that shows different types of equipment.

Let's click on the wheelbarrow. As you can see, a box pops up that explains how to use it properly. Now click **Okay**.



Screen 7 – Lifting

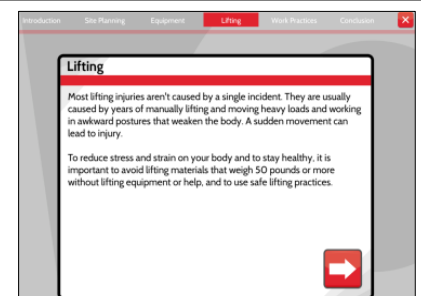
NOTES FOR SCREENS USED FOR THE EXERCISE

Let's go to the top of your screen and click on **Lifting**.

On the **Lifting** screen, click on the red box with the arrow to continue.

As I mentioned earlier, we're not reading all of the text today, but when you have time, you should go back and read the four practices that are key to safe lifting. Today, we're just going to click through them by clicking on the right arrows.

- You'll see the "Lifting Stance" screen;



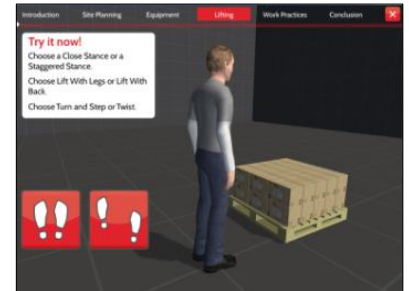
- b. Click on the arrow to the “Bend at the Knees” screens;
- c. Click again to “Get It Close”;
- d. Click again to “Move Your Feet First”;
- e. Click again to see a summary of the four practices; and
- f. Click again to advance to the interactive part

Screen 8 – Try it Now!

NOTES FOR SCREENS USED FOR THE EXERCISE

You should be on a screen that says **Try it now!**

In this section, you are prompted to choose the best practice for lifting. If you don’t select the right option, a screen will pop up that reminds you about the better option.



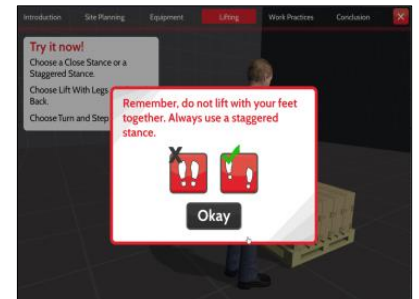
Screen 9 – Positioning Your Feet

NOTES FOR SCREENS USED FOR THE EXERCISE

You should be on a screen that shows two options for positioning your feet. Click on the button with the feet close together – the **close stance** button.

The figure will demonstrate the practice, and then a screen will pop up reminding you to always use a staggered stance.

Click **Okay** and your screen will automatically advance to the next exercise.



Screen 10 – Positioning Your Body

NOTES FOR SCREENS USED FOR THE EXERCISE

Click on the button with the person **bending at their knees**. Notice that the button is highlighted in green, meaning you chose the best practice.

Click on the button with the person **twisting their body**.

Click **Okay** and a screen will pop up advancing you to the next type of exercises in this section. Click on the red box with the arrow to continue.



Screen 11 – Timed Exercise

NOTES FOR SCREENS USED FOR THE EXERCISE

In this section, you must complete the exercises in the time allotted. If you don't choose the right options, it will show up on the fatigue bar at the bottom, which indicates the risk for injury. If you're injured or time out, you'll need to go back and try again.

Click on the **close stance** button, then the button with the **person lifting with their back**, and finally the **step and turn** button.

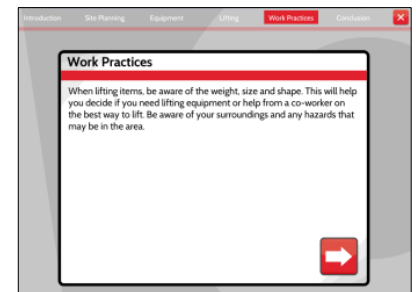


Screen 12 – Work Practice

NOTES FOR SCREENS USED FOR THE EXERCISE

Go to the menu at the top of your screen and click on **Work Practices**. This section builds on what you learned in the Lifting section and starts off by introducing safe work practices.

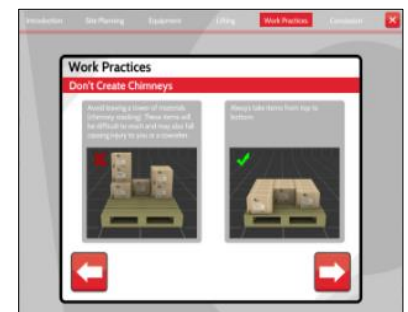
Click on the arrow to advance to “Don't Create Chimneys.”



Screen 13 – Work Practice – Don't Create Chimneys

NOTES FOR SCREENS USED FOR THE EXERCISE

The other work practices and screens in this section cover “Position,” “Build a Bridge,” “Use Two Hands,” “Use a Team Lift,” and a summary of good work practices. Since the exercises in this section are very similar to the ones in the previous section, we are going to skip them today.

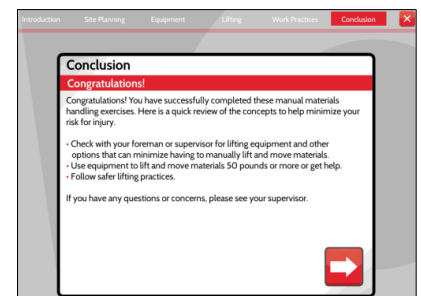


Screen 14 – Conclusion

NOTES FOR SCREENS USED FOR THE EXERCISE

At the menu on the top of your screen, click on **Conclusion**.

On the **Conclusion** screen, click the arrow to continue, and then click the arrow again on the next screen.



Screen 15 – Best Built Plans Home

NOTES FOR SCREENS USED FOR THE EXERCISE

You should now be back to the home screen.

Click on **Coaching**.

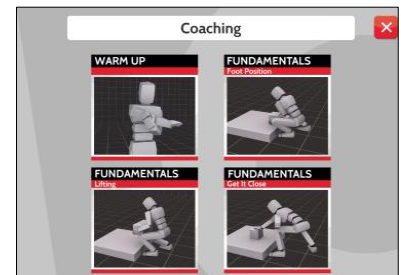


Screen 16 – Coaching Resources – Warm Up

NOTES FOR SCREENS USED FOR THE EXERCISE

The Coaching section focuses on what's happening with your body during warm up stretches and lifting.

Click on **Warm Up**.



Screen 17 – Shoulder

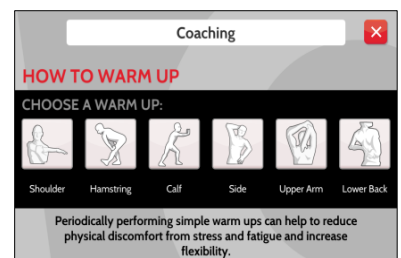
NOTES FOR SCREENS USED FOR THE EXERCISE

And then click on **Shoulder**.

INSTRUCTOR NOTE:

There will be a 30 second demonstration of the warm up.

Let's watch the 30 second demonstration. At the end, a screen will pop up that summarizes the key steps to safely warming up your shoulder.

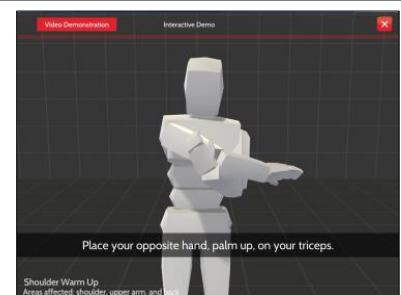


Screen 18 – Retry

NOTES FOR SCREENS USED FOR THE EXERCISE

There are two options on the bottom to click on, Retry or Menu. Menu takes you back to the main menu in this section.

We're going to click on **Retry** and then click on the **Interactive Demo** option at the top of the screen.

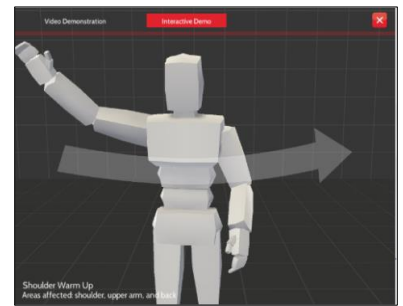


Screen 19 – Interactive Demo

NOTES FOR SCREENS USED FOR THE EXERCISE

On the **Interactive Demo** screen, click the arrow to continue.

You should be on a screen that shows a figure with a grey arrow across the front. Put your cursor [or finger, if they have a **touchscreen**] on the figure's outstretched arm – then using your cursor, left click and hold while you move the figure's arm.



Your results will pop up after you let go of the cursor or if you hold the position for too long. They let you know if you didn't hold the position long enough or held it too long, reached too far or not far enough, or did it too fast.

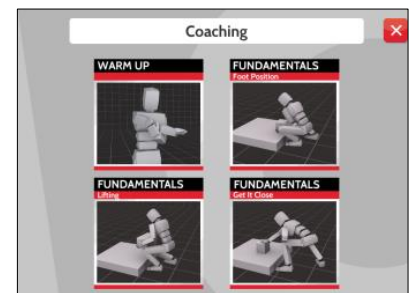
Now let's click on the **Menu** button on the results screen.

Then click on the **X** in the top right-hand corner of the screen.

Screen 20 – Coaching – Fundamentals: Foot Position

NOTES FOR SCREENS USED FOR THE EXERCISE

You should be back on the main coaching screen that has four boxes. Click on **Fundamentals: Foot Position**. These exercises show you how different lifting practices affect your body.



Screen 21 – Coaching – Foot Positions

NOTES FOR SCREENS USED FOR THE EXERCISE

You should be on a screen that shows two different foot positions. The figure starts out using a **staggered stance**. The color on the figure's back is yellow – indicating no strain. Now we will see how this changes when we use a close stance.



Screen 22 – Close Stance

NOTES FOR SCREENS USED FOR THE EXERCISE

Click on the foot position button for a **close stance** on the left of your screen to see how this practice negatively affects your body – the red area on the figure's back shows sign of strain and potential injury.

To exit from this section, click on the **X** in the top right-hand corner of the screen.

On the **Coaching** screen, click on the **X** in the top right-hand corner of the screen to return to the home screen.



Screen 23 – Best Built Plans

INSTRUCTOR NOTE:

If you have more time and have a tablet or smartphone connected to the projector to demonstrate the games, you can skip the closing comments and continue to the next section that explains how to download and play the games. If you do not have more time, you can end the class here.

NOTES FOR SCREENS USED FOR THE EXERCISE

That was a quick overview of the training and coaching resources. Please use the rest of the time in this session to go back through and try more of the exercises.

If you open the Training section and your computer takes you directly to the conclusion, use the menu at the top to go to the section you want to try.

And remember to take your handouts with you so that you can try these and the smartphone games when you have more time as a refresher on using safe practices.



Game Screens and Notes

INSTRUCTOR NOTE:

If you have a projector and screen in the computer lab and you plan on showing the games on the screen, you will need to connect your smartphone or tablet to the projector now.

That was a quick overview of the training and coaching resources. Now I am going to introduce you to two free games you can play on your smartphone or tablet that are not only fun to play, but reinforce and let you test yourselves on what you've learned through this training program.

This handout [**hold up handout #5**] includes instructions for how you can access these games. They are available in both English and Spanish for Android and iOS users.

Screen 1 – Plan Your Lift

NOTES FOR SCREENS USED FOR THE EXERCISE

The first game I am going to introduce you to is called **Lift Coach: Plan Your Lift**. In this game, you must correct the on-screen character's actions as they lift and move materials. The goal is to avoid actions that can increase your injury risk. You need to pay attention to avoid building up too much strain and getting hurt. Each level becomes more challenging.



Screen 2 – Tutorial

NOTES FOR SCREENS USED FOR THE EXERCISE

I am going to walk you through the tutorial so you can see how to play.

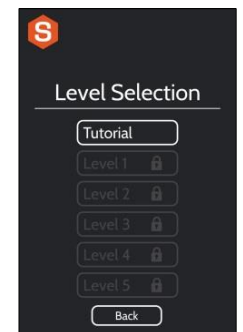
Click Start.

You need to start with the tutorial in order to unlock Level 1.

Click on Tutorial and then click Start.

On the “Welcome!” screen, we’ll click **Next** until we reach the “Time to Practice” screen.

And then we’ll click **Start**.



Screens – For Playing

INSTRUCTOR NOTE:

There are some steps in the tutorial that do not always appear in the same order (where this occurs is indicated below), so you will need to follow the directions on screen. It is important to have gone through the tutorials and tried playing the games before introducing them to the class.

NOTES FOR SCREENS USED FOR THE EXERCISE

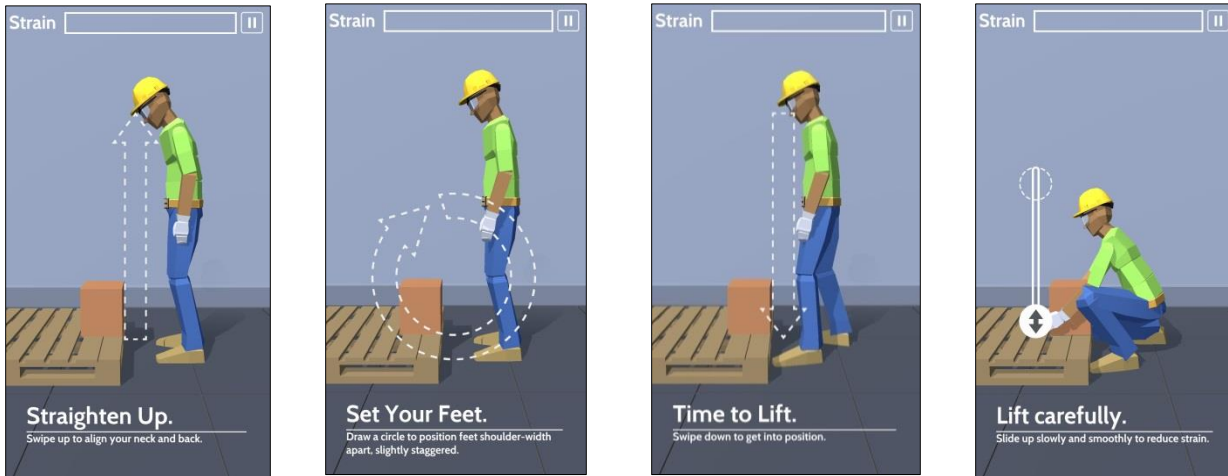
We will be following the directions on screen to move the figure through different lifting and carrying activities. If you do it wrong, the bar at the top will register the strain that's resulting.

Start by swiping up to straighten your back.

Next, draw a circle to position your feet shoulder-width apart.

Swipe down to get into position.

Then slide the arrow up slowly and smoothly to reduce strain.

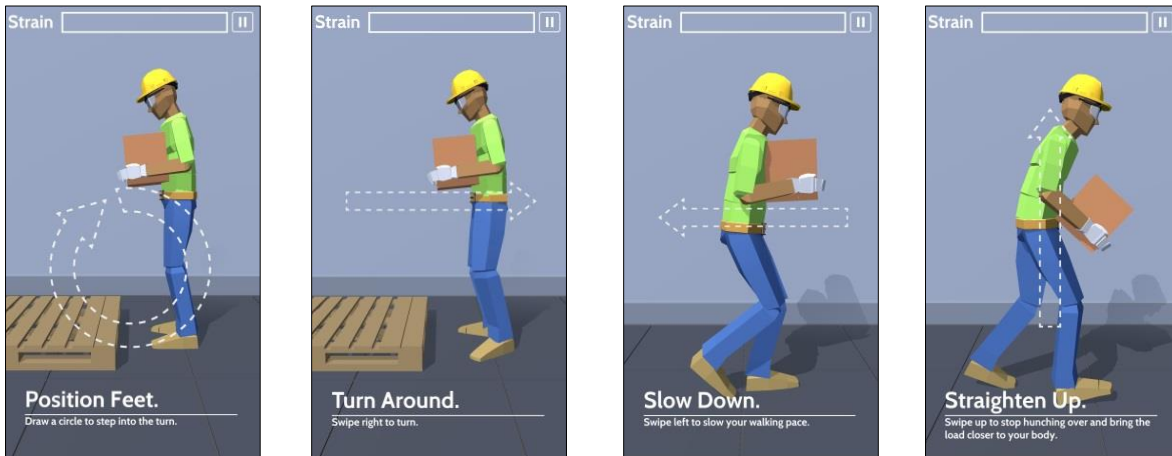


Next, draw a circle to position your feet.

Swipe right to turn around.

Swipe left to slow down. **[This step does not always appear in this order]**

Swipe up to straighten your back and bring the load closer to your body. **[This step does not always appear in this order]**



Click on the thought bubble to focus. **[This step does not always appear in this order]**

Swipe up to straighten your back.

Draw a circle to position your feet.

Finally, slide the arrow down slowly and smoothly to reduce strain.

At the end it will show you whether you would have gotten injured or not.



Screen 1 – Plan Your Route

NOTES FOR SCREENS USED FOR THE EXERCISE

The second game I am going to introduce you to is called **Lift Coach: Plan Your Route**. In this game, you must plan for how you will lift and move materials on a job site. Your risk of a strain or sprain injury changes depending on the decisions you make. The job site will become larger and more complex as you advance through the game.



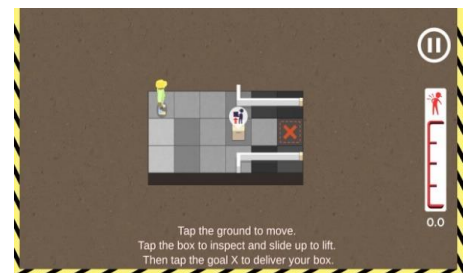
This game also has a tutorial that I am going to walk you through now.

Screen 2 – Tutorial

NOTES FOR SCREENS USED FOR THE EXERCISE

To begin, click on **How to Play**.

There are instructions on the screen to guide you. Click on the box to move the figure towards it and to see how much it weighs.



Screen 3 – Moving the Person and Lifting the Object

NOTES FOR SCREENS USED FOR THE EXERCISE

Slide the red bar up to pick up the box.

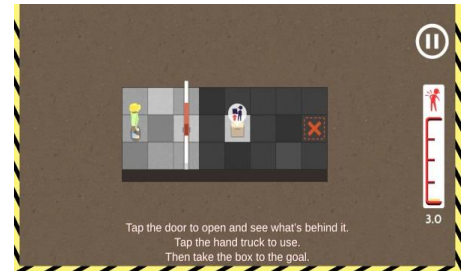
Then click on the red X to deliver the box.

On the next screen, click on the door to open it.

Click on the hand truck, and then click on the box.

It will tell you how much it weighs. Slide the red bar up to pick up the box.

Then click on the red X to deliver the box using the hand truck.



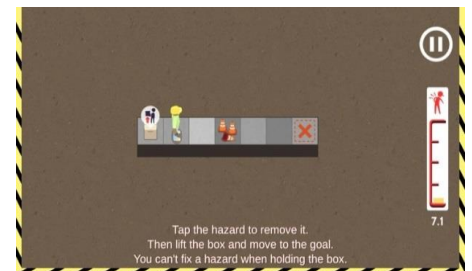
Screen 4 – Cones Blocking Your Move

NOTES FOR SCREENS USED FOR THE EXERCISE

On the next screen, you will notice that there are orange cones blocking your path to the X. You must remove the hazards blocking your path before you can move the box.

Click on the cones to remove them.

Click on the box, slide the red bar up to pick it up, and click on the X.



Screen 5 – Box Blocking Your Move

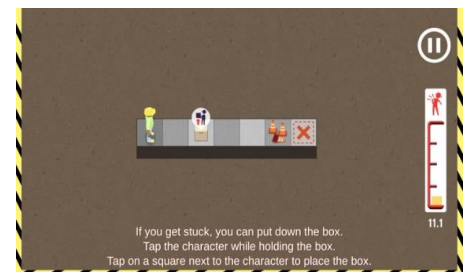
NOTES FOR SCREENS USED FOR THE EXERCISE

On the next screen, the box blocks your path to removing the orange cones. You cannot remove a hazard while carrying the box.

Click on the box, slide the red bar up to pick it up, and place it out of your way. You can do this by clicking on the figure. Options for where to place the box should flash in red. Place the box behind the figure.

Next, remove the cones by clicking on them.

Click on the box again, slide the red bar up, and click on the X.



Screen 6 – Object Blocking Your Move

NOTES FOR SCREENS USED FOR THE EXERCISE

In the next scene you will notice black squares. These squares contain hazards that are not readily apparent unless you click on them. Just like on a real job you should look ahead and remove hazards before moving materials.

Click on one of the black squares in the right-hand corner of your screen. You will see a hand truck and an electrical cord. Click on the hand truck and then click on the electrical cord to put it away.

Then click on the box, slide the red bar up to pick up the box, and click on the X.

As you move through the game you'll be told if you do something that results in an injury. The meter on the side shows how your decisions are impacting your body. At the end you'll see how you did.



OPTION 2: USE IN A CLASSROOM SETTING AS A PRESENTATION

Preparation and Setup

INSTRUCTOR NOTE:

The materials can be used in a classroom setting as either a live demonstration or using the PowerPoint presentation slides and notes below.

For both approaches, you will need:

- A computer, tablet, or smartphone (if doing a live demonstration).
- A projection screen, LCD projector, and the correct cord/adaptor to connect the projector to the computer or tablet/smartphone (if doing a live demonstration).
- Handouts #5 and #8 (to distribute before starting the demonstration/presentation).

If you are doing a live demonstration, download the program and the games (if you are using a tablet or smartphone) onto the computer, tablet, or smartphone you will be using, and use the demonstration slides and notes from Option 1 (above). Before class:

- Download either the PC or App versions of the **Training and Coaching Resources** from www.bestbuiltplans.org and test ahead of time on the equipment you will be using

(computer, tablet, or smartphone). If you have any problems, Appendix D contains detailed instructions or contact cpwr-r2p@cpwr.com for help.

- The PC version can be accessed directly by clicking on this link:
<https://www.cpwr.com/wp-content/uploads/publications/BestBuiltPlans.zip>.
- The app is available on Google Play, iTunes, or Amazon and can be accessed by clicking on the links below:

Google Play:

<https://play.google.com/store/apps/details?id=com.simcoachgames.MMHTool>

Amazon: <https://www.amazon.com/Simcoach-Games-Best-Built-Plans/dp/B07SBK3SNQ>

iTunes: <https://itunes.apple.com/us/app/best-built-plans/id1457992967?ls=1&mt=8>

- Turn off the sound on the computer or tablet/smartphone. There is a voiceover for these resources that is intended for use by an individual on their own.
- Make sure the computer mouse or tablet/smartphone touchscreen is working.
- The games are only available as an app. If you plan to demonstrate them, you will need to download them onto your tablet or smartphone (and have the appropriate cords to connect to the projector).

IN PREPARATION FOR THE CLASS, TEST OUT THE EXERCISE SO YOU'RE FAMILIAR WITH IT AND PREPARED TO ANSWER QUESTIONS.

If you are doing a presentation, use the presentation slides and notes for Part 3.

The demonstration/presentation will take between 15 and 30 minutes.

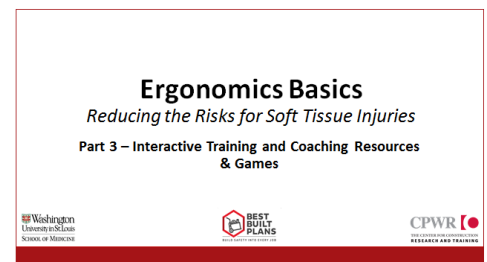
Presentation Slides and Notes

Part 3 – Ergonomics Basics...

NOTES FOR SLIDE 1

This presentation will introduce you to the interactive training and coaching resources that are available through CPWR's Best Built Plans program.

You should each have two items in front of you. The first [**hold up Handout #8**] is an instruction sheet that walks you through a few quick exercises to introduce you to the program.



The second one [hold up Handout #5] includes instructions for how you can access this program on your own and two games that you can play on your smartphones.

I'd encourage you to use the information in the handouts to download these resources and try them out on your own. They're not only fun to use, but they also are good reminders of safe practices and how they can prevent injuries.

Best Built Plans (Homepage)

NOTES FOR SLIDE 2

This slide shows the homepage. The two clickable boxes we're going to focus on are the Training Resources and Coaching.

We'll start with what you'll find if you click on **Training Resources**.

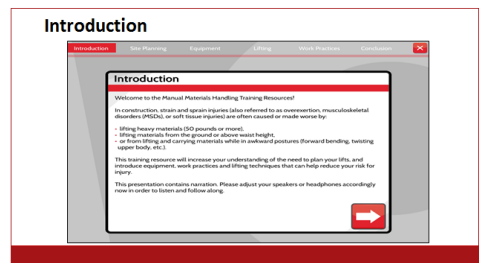


Introduction

NOTES FOR SLIDE 3

Before we get started, I want to mention that there are notes throughout the interactive resources that provide instructions on how to use the resources and explanations of the safe practices. There's also a narrator reading the text.

As noted on this slide, this training resource is intended to increase the user's understanding of the need to plan lifts, and introduces equipment, work practices, and lifting techniques that can help reduce the risk for injury.



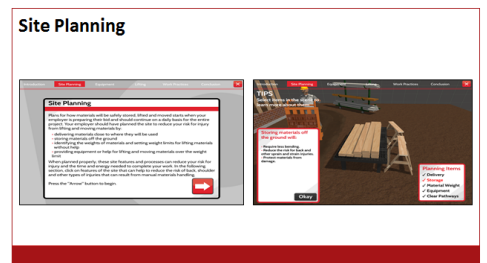
Site Planning

NOTES FOR SLIDE 4

The first section is **Site Planning**, which explains why it's important to think through and plan for how materials will be delivered, stored, and moved on the job site.

To move through this section, you would click on the arrow in the corner to continue.

In this section, you can click on an item on the screen and it will explain why it's important for reducing injuries. There's a menu on top that lets you know where you are in the program.



If you clicked on the stack of wood, for example, a screen pops up that explains why it's important to store materials – in this case lumber – off the ground.

You would then click on the Okay button in the box to continue.

Equipment

NOTES FOR SLIDE 5

If we click on **Equipment** on the menu bar at the top – it's in red on this screen – it takes us to the **Equipment Identification** screen which explains why using lifting equipment can help. When you click on the arrow in the corner, you're taken to a screen that shows different types of equipment, and information on how to safely use common lifting equipment.

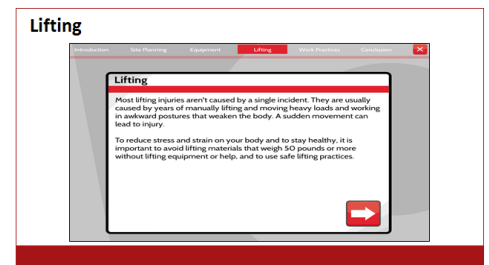


If you click on the wheelbarrow, for example, a box pops up explaining how to use it for safe lifting.

Lifting

NOTES FOR SLIDE 6

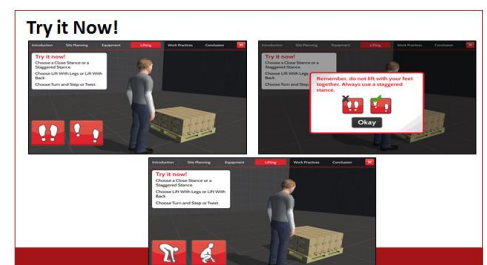
When you click on the **Lifting** tab on the menu bar there are a series of screens that provide a refresher on safe lifting practices [we covered these in Part 1-A and/or the Demonstration Stations] including ones that focus on the proper lifting stance, the need to bend at the knees, get close to the material, and move your feet first.



Try it Now!

NOTES FOR SLIDE 7

Once you've gone through the quick refresher, you end up in a section that lets you try out what you learned. In this section, you are prompted to choose the best practice for lifting. If you don't select the right option, a screen will pop up that reminds you about the safer option.

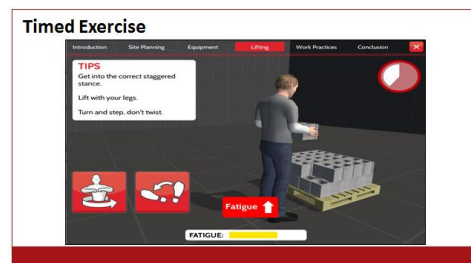


For example, on the first screen, you're given the option of two different ways to position your feet for a lift. When you select an option, the figure demonstrates the practice, and then a screen pops up telling you that you made the right selection or reminding you of the safer practices. When you click Okay the screen will automatically advance to the next exercise, which focuses on the proper stance for lifting.

Timed Exercise

NOTES FOR SLIDE 8

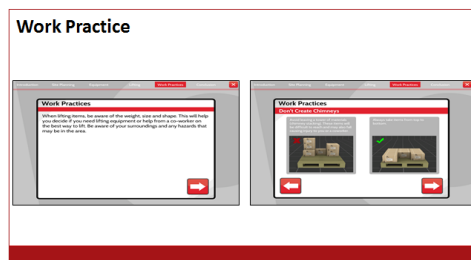
Once you've gone through the refresher exercises, you get to test your knowledge and see how your decisions impact your risk for injury – which is measured by the fatigue bar at the bottom of the screen.



Work Practice

NOTES FOR SLIDE 9

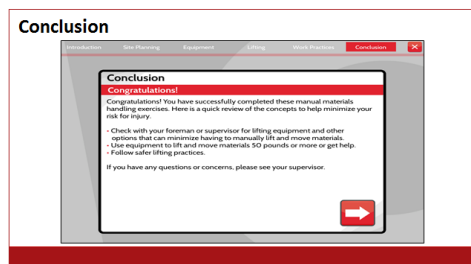
The final interactive exercise in this section is the **Work Practice** menu item on the top bar. This section builds on what we learned about safe lifting techniques and applies them to different practices, such as the one shown on this slide about the risks associated with how materials are stored, the position of the materials and your body, the benefits of using two hands to lift, and introduces team lifts.



Conclusion

NOTES FOR SLIDE 10

The final menu item in the training resources is the **Conclusion** congratulating you on completing the section and providing a few additional reminders for when you're moving materials on the job.



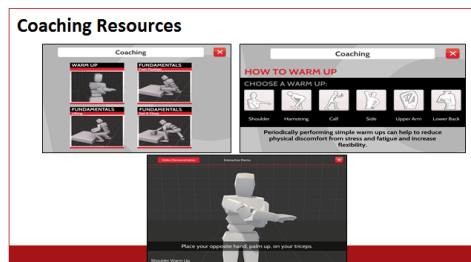
When you click on the red X you're taken back to the main menu where you can select the **Coaching** interactive activities.

Coaching Resources

NOTES FOR SLIDE 11

The **Coaching** section focuses on what's happening with your body during warm up stretches and lifting.

If you click on the **Warm Up** option, you can select different types of warm up stretches. If we selected the Shoulder, for example, you'd be taken to a screen with two options – the first shows you a 30 second demonstration of how to do the stretch safely.

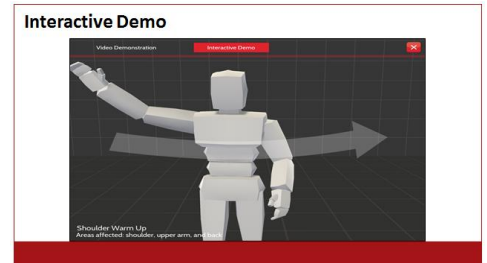


Interactive Demo

NOTES FOR SLIDE 12

Then you can try doing it yourself using a mouse, touchpad or the touchscreen on your device.

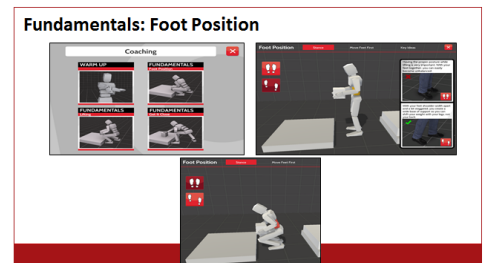
When you're done, your results will pop up and let you know if you held the position too long or not long enough, or reached too far or not far enough.



Fundamentals: Foot Position

NOTES FOR SLIDE 13

The other three coaching options show the lifting techniques we learned about earlier and use the figure to show the impact on your body. If we clicked on the Foot Position option, for example, the figure starts out using a staggered stance, and the color on the figures back is yellow – indicating no strain. If you select the close stance foot position, you can see how it impacts the figures back – turning it from yellow to red – the sign of back strain and increased risk for injury.



Games

INSTRUCTOR NOTE:

If do not have additional time or the ability to demonstrate the games, you can end this presentation now and just remind the class that they have instructions for using the interactive training and coaching resources and the games available for their smartphones or tablets in the handouts.

NOTES FOR SLIDE 14

That was a quick overview of the training and coaching resources.

Please remember to take your handouts with you so that you can try these and the smartphone games on your own. As we've discussed, preventing these injuries is important for both your personal and professional health.

INSTRUCTOR NOTE:



If you have more time in the class, you can introduce the games. You will need to connect your smartphone or tablet to the projector now to show the games on screen.

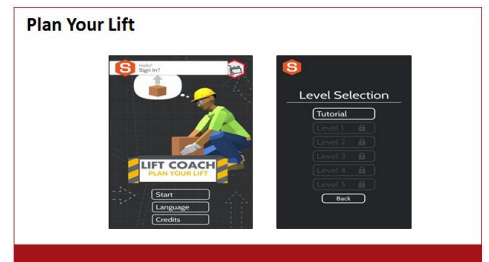
That was a quick overview of the training and coaching resources. Now I am going to introduce you to two free games you can play on your smartphone or tablet that are fun to play and also reinforce the safe work practices that you learned about today.

This handout [hold up handout #5] includes instruction for how you can access these games. They are available in both English and Spanish for Android and iOS users.

Plan Your Lift

NOTES FOR SLIDE 15

The first game I am going to introduce you to is called **Lift Coach: Plan Your Lift**. In this game, you must correct the on-screen character's actions as they lift and move materials. The goal is to avoid actions that can increase your risk of injury. You need to pay attention to avoid building up too much strain and getting hurt. Each level will increase in difficulty. There's a tutorial that you can go through to learn how to play.



Plan Your Lift (continued)

NOTES FOR SLIDE 16

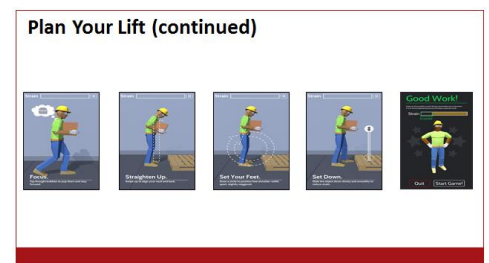
The tutorial introduces the different lifting and moving actions used in the game and how to move the figure.



Plan Your Lift (continued)

NOTES FOR SLIDE 17

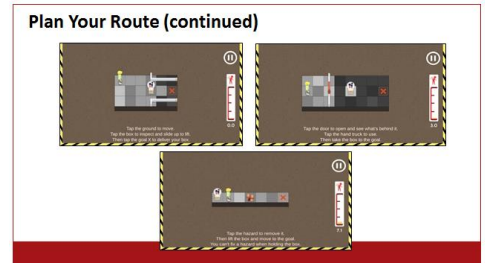
It also addresses what to keep in mind once you've lifted a material, begin to move while carrying the material, and when you put it down. At the end you'll receive your score and find out if the actions you took increased or decreased your risk for an injury.



Plan Your Route

NOTES FOR SLIDE 18

The second game I'm going to introduce you to is called **Lift Coach: Plan Your Route**. In this game, you must plan for how you'll lift and move materials on a job site. Your risk of strain/sprain injury changes depending on the decisions you make. The job site becomes larger and more complex as you advance through the game.



Plan Your Route (continued)

NOTES FOR SLIDE 19

This game also has a tutorial that introduces the different features and commands you'll use to play the game. For example, you need to click on the box to move the figure toward it and find out how much it weighs. There are instructions for how you get help with a lift from a co-worker or a piece of equipment, as well as how to clear a path.

As you move through the game you'll be told if you do something that results in an injury. The meter on the side shows how your decisions are impacting your body. At the end you'll see how you did.

Questions

NOTES FOR SLIDE 20

Any questions? I'd encourage you to use the information in your handouts to download and play the games as well as the interactive training and coaching resources that we reviewed. As we've discussed, preventing these injuries is important for both your personal and professional health.



PART 4 – ERGONOMICS REFRESHER: CLASSROOM TRAINING

INSTRUCTOR NOTE:

This module is intended for workers who have been through a basic ergonomics training program and have experience working on a job site in their trade.

Preparation and Setup

Set up an LCD projector and computer. You may need a connector device or adapter to hook up the computer and screen.

Click through the PowerPoint to ensure equipment is working properly.

Teaching materials:

- PowerPoint slides – notes for each slide are included with each slide and referenced in this Guide.
- Handouts (referenced in presentation and available in Appendix A):
 - #3 Physicians' Alert – Pain Management for Construction Workers
 - #4 Hazard Alert Card – Opioid Deaths in Construction
 - #5 Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games

** For pocket sized versions of the Hazard Alert Cards email cpwr-r2p@cpwr.com or call 301-578-8500*

- To keep track of trainees' comments, you will need a flip chart or whiteboard and markers, extra sheets of flip chart paper and tape (or self-sticking paper).

NOTE: You can tailor the program as needed for your trade(s) by substituting photos and materials.

Suggestion for time management:

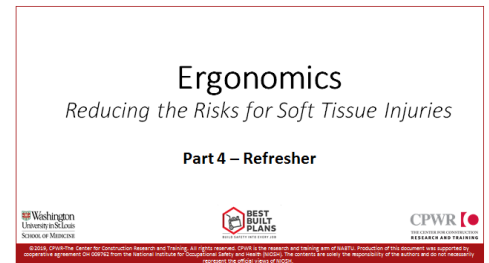
This refresher should take roughly 30 minutes. However, it may take longer depending on the level of discussion and trainees' retention of information provided through the Basic Ergonomics training.

PART 4: LESSON PLAN

Ergonomics: Reducing the Risks... Refresher

NOTES FOR SLIDE 1

This presentation is intended as a refresher and to introduce more advanced information on preventing soft tissue injuries.



Objectives

NOTES FOR SLIDE 2

During your basic ergonomics training we talked about why ergonomics training is important, types of ergonomic hazards in construction, proper lifting methods, and online resources that can be used as reminders or to reinforce what you learned.

The objectives for this training are to review:

- How to recognize an ergonomic hazard;
- How to assess and control these hazards;
- How to incorporate best practices when you plan your work; and
- How to identify early symptoms and obtain appropriate treatment, including risks of opioid use associated with ergonomic injuries and medical management.

Objectives:

- Review ergonomic hazards
- Assess and control them
- Incorporate safe practices when planning work
- Identify early symptoms and appropriate treatment (risks from opioids and medical management)

Sprains, Strains, and Other Soft Tissue Injuries Are Common

NOTES FOR SLIDE 3

Let's start by revisiting why it's critical to reduce sprain and strain injuries to the body's soft tissues.

First, they are very common among construction workers, causing more than one-fourth of nonfatal injuries every year.

About 21% of construction workers experience these injuries over their career based on what's reported, but we know that many more will suffer from chronic or persistent pain.

Sprains, Strains, and Other Soft Tissue Injuries Are Common

- Sprains and strains account for about 1 out of 4 of all nonfatal injuries in construction each year.
- Lifetime risk of overexertion injuries is 21% for all construction trades, although many more suffer chronic pain.
- Most overexertion injuries are related to handling heavy building materials.
- Construction workers suffer from the highest number of lost days of work from low back injuries.
- It is **IMPORTANT** that you learn how to protect your body from damage.

One type of sprain or strain is caused by overexertion of the body from handling building materials and equipment – particularly heavy or awkward materials or equipment. This often results in low back injuries.

Since you only get one body, it’s important that you learn how to properly handle materials as early as possible in your career and use safe lifting practices every day to protect your body from damage.

Sprains, Strains, and Other Soft Tissue Injuries or Musculoskeletal Disorders (MSDs)

NOTES FOR SLIDE 4

In the medical world, sprains, strains, and other soft tissue injuries are called musculoskeletal (“musk-u-low-skel-e-tall”) disorders or MSDs.

They include damage to the different soft tissues of your body – your muscles, nerves, bones, and connecting tissues like tendons and ligaments.

The damage is cumulative. It develops over time, not usually from a sudden accident, and may become chronic or persistent. In other words, the damage and pain could last for a long time, possibly the rest of your life.

The photos at the bottom on the left show the structure of your low back – the most common body part injured. The soft disc is a cushion between each bone but the center “jelly” (in green) may push on the spinal nerves (orange tubes) when the body bends forward. The back is complex. Once the tissues “wear and tear,” it is very hard to get them to heal.

The bottom right photo shows a worker with knee bursitis caused by kneeling on a hard floor most days without the benefit of padding. His doctor recommended a knee replacement. What does that mean for the worker? Once he had this procedure, he would have difficulty kneeling and could not go back to doing the same type of work – at least the way he used to work, by kneeling.

Sprains, Strains, and Other Soft Tissue Injuries or Musculoskeletal Disorders (MSDs)

- 1) Damage to the *musculoskeletal system* – muscles, nerves, tendons, ligaments, joints, cartilage and spinal discs.
- 2) They are *cumulative* – they happen gradually, as opposed to accidents.
- 3) They are *chronic* – the effects last a long time.

Soft disc – jelly pushing on spinal nerves

Knee bursitis

Soft Tissue Symptoms and Injury Risk Continuum

NOTES FOR SLIDE 5

This diagram shows the progression from normal “no symptoms” through developing mild, moderate, or severe symptoms.

In the lower levels of the continuum, the body can heal to get back to normal – there’s a 100% chance of recovery.

Soft Tissue Symptoms and Injury Risk Continuum

Normal Mild Moderate Severe

100% chance of recovery

Unable to regain normal function

Importance of Early Awareness

In the higher levels, the body has moderate to more severe symptoms.

At this stage, even with a lot of rest, the body cannot recovery completely and a worker will be unable to regain normal function.

What is Ergonomics?

INSTRUCTOR NOTE:

Only show the title of the PowerPoint slide “What is Ergonomics?”

NOTES FOR SLIDE 6

Ask the class:

What is ergonomics?

On a whiteboard or flip chart write down the various descriptions given by the trainees.

Once everyone is done giving a description, advance the PowerPoint to show the examples provided.

Tell the class:

Examples are all around you – you see it in how chairs are designed, the shape of a computer mouse, and in construction with the shape of tool handles.

Ask the class:

What are some examples of ergonomically designed tools you might use on the job?

On a whiteboard or flip chart write down the various tools given by the trainees.

INSTRUCTOR NOTE:

If trainees are unable to identify any tools, be prepared to list ergonomically designed tools and equipment used by the individuals in the class on a typical project.

Tell the class:

Ergonomics is setting up the environment and tools to make the job fit the physical abilities of the worker. This means the worker is not tearing down the tissues of the body to get the job done.

By working within the physical limits of your body, you eliminate the risk of soft tissue injuries and overexertion, sprain, and strain injuries.

What is Ergonomics?

Ergonomics is the way to prevent injuries:

- Fit the tasks, tools, and environment to the physical abilities of the worker

Goal: to reduce or eliminate risk of injuries



Photo courtesy of © iStockphoto.com

Everyone's body has different abilities: strength, flexibility, and tolerance. Work should be designed so most workers can do the job.

The goal of ergonomics is to reduce or eliminate the risk of injuries.

Review: Identify Ergonomic Hazards

NOTES FOR SLIDE 7

There are 6 ergonomic hazards:

Force is the physical effort needed to move a load.

Poor posture is the position of the body that is not in alignment – in other words upright.

Repetition is repeatedly moving a part of the body to perform a task.

Stress from contact occurs when your body comes in contact with an object, such as kneeling on a hard surface, pushing a tool into the palm of your hand, or using your hand as a hammer to bang something in place. The soft tissues of your body are vulnerable to damage and injury by pushing or applying external pressure to the body.

Hand vibration is common when using a power tool, like a hammer drill, and body vibration is common when operating powered equipment while sitting.

Environment - cold temperatures causes muscles to tighten and feel stiff. In cold conditions, workers need to wear warm clothes and to warm up and stretch muscles before work.

A construction task may include one or more of these hazards.

The most common hazards in construction are high force and poor postures.

We will focus on these two hazards in this training.

Review: Identify Ergonomic Hazards

1. High **Force**
2. Poor **Posture**
3. Fast/prolonged **Repetition**
4. Stress from body **Contact**
5. Hand or body **Vibration**
6. Environment (**cold**)

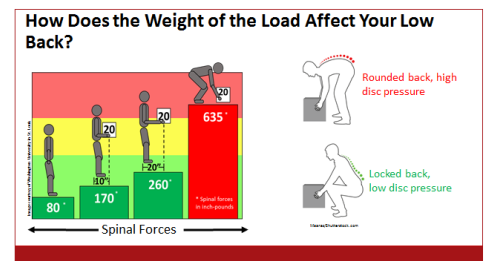
How Does the Weight of the Load Affect Your Low Back?

INSTRUCTOR NOTE:

Only show the title of the PowerPoint slide “How Does the Weight of the Load Affect Your Low Back?”

NOTES FOR SLIDE 8

Ask the class:



How does the weight of the load affect your low back?

On a whiteboard or flip chart write down the various responses given by the trainees.

Once you have responses, advance the PowerPoint to show images.

Tell the class:

Lifting loads – or materials and equipment – is the most common ergonomic hazard in construction.

Working with the back bent forward is the second most common ergonomic hazard.

As this slide shows, the weight can be measured through spinal forces in the joints of your low back.

In the colorful diagram, the figure to the left is standing upright with no load. The spinal forces from gravity on his low back are 80 inch-pounds.

The second figure is holding a 20-pound load close – 10 inches from the hands to the low back. This is an **IDEAL posture** to carry a load. The spinal force goes up to 170 inch-pounds.

If the load is moved away from the body to a distance of 20 inches, the spinal forces increase significantly to 260 inch-pounds. SO how close you hold an object makes a BIG difference to your low back forces.

The last figure shows the large increase in spinal forces from lifting an object from the floor. The distance to the object is larger and the body is not upright. The spinal forces have more than tripled from the IDEAL figure – 170 inch-pounds to 635 inch-pounds.

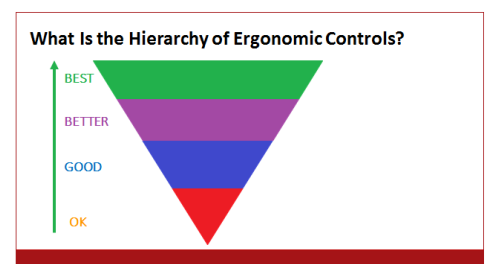
The two figures on the right side of the slide show a curved back posture on the top which causes high spinal disc pressure – this is POOR posture. The bottom figure shows a “locked” back straight posture. By keeping your back locked in a straight position while lifting, your spinal forces stay low.

What Is the Hierarchy of Ergonomic Controls?

NOTES FOR SLIDE 9

Ask the class:

Let's fill in this inverted pyramid – what is the hierarchy of ergonomic controls?



On a whiteboard or flip chart write down the various responses given by the trainees.

Once you have responses, continue to the next slide to show images.

Hierarchy of Ergonomic Controls to Reduce the Risk

NOTES FOR SLIDE 10

When planning how you will lift and move materials, you should follow the Hierarchy of Ergonomic Controls to select the best practice.

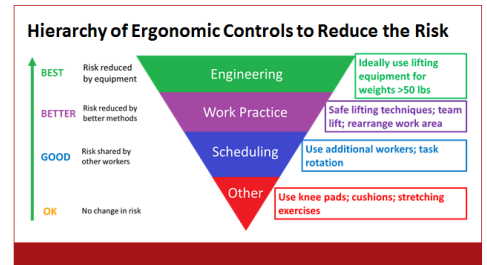
If possible, always choose a higher-level control – an engineering or work practice control over other lower level controls to reduce risk.

Ask the class:

Can you give examples of engineering or work practice controls for ergonomic hazards on your job sites?

On a whiteboard or flip chart write down the various examples given by the trainees.

Once everyone is done giving responses, continue to the next slide.



Reduce Force: Move Materials with Lifting Equipment

NOTES FOR SLIDE 11

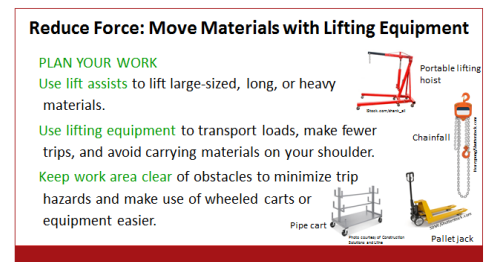
The first step in “planning your work” is to think through how you are going to move the materials. For heavy or large loads, this ideally includes the use of lifting equipment.

This slide shows a few examples.

Whether or not lifting equipment is available depends on how well the employer planned for safe lifting on the job. Your foreman should know what lifting equipment is available on the project and be able to show you how to use it. If you don't know how to use equipment, you should ask.

You should also look for and make suggestions to your foreman on methods that will make it easier to move loads or equipment. Oftentimes, making a move easier also leads to better productivity.

In addition to selecting lifting equipment, since many of these tools are on wheels, it is important to keep the work area clear of obstacles and debris – in other words, maintain good housekeeping.



Ground-Level Tasks

NOTES FOR SLIDE 12

In addition to the risks associated with lifting and moving, the second ergonomic hazard is Poor Postures, often called “awkward postures.”

Many workers will work at the floor level using forward bent back postures (not shown in any of these photos). Working in a bent back posture causes increased spinal forces.

Other workers will kneel to work on the floor. This may cause a contact stress between the hard ground surface and your knee. It is helpful to use knee pads or other cushions to eliminate contact stress.

You can improve work postures and reduce contact stress by:

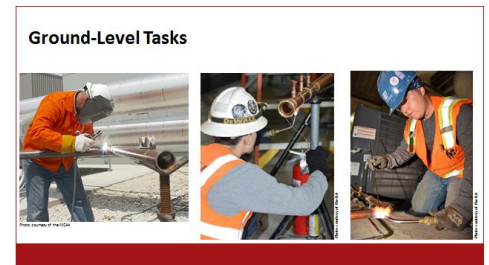
- Raising work to waist height;
- Preassembling work at work height before installing it at the floor level or overhead; or
- Wearing knee pads to cushion your knees while kneeling, or gloves to cushion your hands for some tools.

Ask the class:

Can you think of examples of ergonomic controls to help with work postures?

On a whiteboard or flip chart write down the various examples given by the trainees.

Once everyone is done giving responses, continue to the next slide.



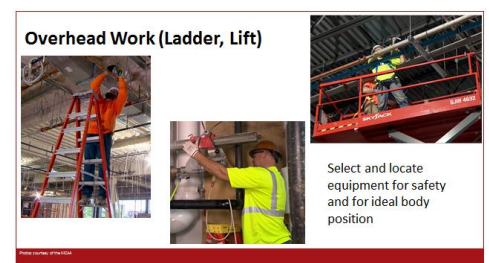
Overhead Work (Ladder, Lift)

NOTES FOR SLIDE 13

There are also risks associated with doing overhead work. Anytime your hand is positioned above your head height, there is high stress on your shoulder. Work that is at or below your head height is much easier on your shoulder.

Ask the class:

Look at the three pictures on the slide and identify the good practices and the bad practices being done. What are some good and bad practices being done?



On a whiteboard or flip chart write down the good and bad practices identified by the trainees.

Once everyone is done giving responses, continue to the next slide.

INSTRUCTOR NOTE:

There are both good and bad practices shown in the three pictures:

Photo 1 – problem with hands positioned above the head; ladder positioned poorly (for safety); reposition ladder and have worker step up to get closer to the work; may improve the position by using a lift.

Photo 2 – good height on the ladder; good reach posture; gloves may improve tool-hand interface.

Photo 3 – lift allows worker to position above the pipe in a good posture.

Best Practice Matrix: Hierarchy of Ergonomic Controls

NOTES FOR SLIDE 14

This “best practice matrix” lists common tasks or risks in each column and ways to control the risk for each level of the hierarchy of ergonomic controls.

Best Practice Matrix: Hierarchy of Ergonomic Controls

Hierarchy of Controls (HOC) level	Ergonomic Hazards		
	Manual material handling	Work below knee	Arms overhead
BEST Engineering	Use mechanical assist	Preassemble at shop/in/first	Mechanical assist: scissor lift, hoist
BETTER Work Practices	Position material close	Raise height of work	Assemble at ground level
GOOD Administrative	Assign more workers	Rotate workers	Rotate workers
OK PPE	Stretch after task	Knee pads, stretch after task	

For example, engineering controls could be specific mechanical lifting/transporting devices, equipment to raise work to waist height – like a pipe stand – and tools with extension handles to reach overhead.

Work practices could be a two-person lifting team for specific items, or preassembling work before installing it.

How Would You Fill in This Table?

NOTES FOR SLIDE 15

Now let’s think about your job sites.

Ask the class:

How would you fill in this table?

How Would You Fill in This Table?

Hierarchy of Controls (HOC) level	Ergonomic Hazards		
	Manual material handling	Work below knee	Arms overhead
BEST Engineering			
BETTER Work Practices			
GOOD Administrative			
OK PPE			

On a whiteboard or flip chart write down ideas for each box on this chart.

Once everyone is done giving responses, continue to the next slide.

Sample Job Hazard Assessment with Ergonomics

NOTES FOR SLIDE 16

Some contractors require job hazard assessments before work begins. If you have the opportunity to be involved in this process, it's important to consider ergonomic hazards. This slide shows an example of tasks, ergonomic hazards, and prevention methods.

Sample Job Hazard Assessment with Ergonomics		
Task to be performed	Potential hazards	Prevention methods
Install pipe fabrication and hangers at height	Awkward body position	Position body, whether in boom lift or on ladder, not to put your body in strained position. If lifting heavy object, get help.
Unloading trucks/material handling	Manual lifting	Use good housekeeping, know where material will be staged, have a clear path.
Manual lifting	Muscle strains/pulls/tears/fatigue	Lift with your legs, not your back; get help; stretch prior to heavy lifting; utilize cranes, forklifts, chainfalls, or any other kind of lifting equipment whenever possible.

Ask the class:

Can you think of examples of other tasks, hazards, and prevention methods?

On a whiteboard or flip chart write down the various descriptions given by the trainees.

Once the class has had time to respond, continue to the next slide.

NIOSH Lifting Equation

NOTES FOR SLIDE 17

The NIOSH Lifting Equation provides guidelines for evaluating the risk of injury associated with two-handed manual lifting tasks.

It calculates a recommended weight limit (**RWL**) for a load that nearly all healthy workers could lift over an 8-hour day without increasing their risk of developing lower back pain.

The equation (**$RWL = LC \times HM \times VM \times DM \times AM \times FM \times CM$**) always uses a load constant (**LC**) of 51 pounds, because it represents the maximum recommended load weight to be lifted under ideal conditions.

It also includes six task variables (**H, V, D, A, F, and C**) that are expressed as multipliers (in the equation, **M** = multiplier). As these variables deviate from the ideal, the amount of weight that can safely be lifted by an employee decreases.

To use the equation to determine the recommended weight limit, you will need to measure the following six task variables in order to calculate the multipliers used in the equation:

H = Horizontal location of the object relative to the body (i.e., the distance the object is from the body)

V = Vertical location of the object relative to the floor (i.e., the height of the object from the floor)

NIOSH Lifting Equation

- Calculates recommended weight limit (RWL) for a load that nearly all healthy workers could lift over an 8-hour day without increasing their risk of developing low back pain.
$$RWL = LC (51) \times HM \times VM \times DM \times AM \times FM \times CM$$

LC = Load constant (always 51 lbs)
HM = Distance the object is from the body
VM = Height of the object from the floor
DM = Vertical distance between the start (origin) and the end (destination) of the lift
AM = The degree to which the body is required to twist or turn during the lifting task
FM = Frequency and duration of lifting activity
CM = Quality of the worker's grip on the object
- Calculates a lifting index (LI), which is an estimate of the physical stress and injury risk associated with a manual lifting job.
$$LI = \text{Load weight} / RWL$$

> 1.0 = High risk of injury
< 1.0 = Very small risk of injury

The goal is to design all lifting tasks to have an LI of less than 1.0

- D** = Vertical distance between the origin and the destination of the lift
- A** = The degree to which the body is required to twist or turn during the lifting task
- F** = Frequency and duration of lifting activity
- C** = Quality of the worker's grip on the object (rated as good, fair, or poor)

The NIOSH Lifting Equation also calculates the lifting index (**LI**), which provides an estimate of the physical stress and injury risk associated with a manual lifting job. To calculate it, you take the load weight of what you are lifting and divide it by the recommended weight limit you calculated (**LI = Load weight/RWL**).

If the value is greater than 1.0, then there is a high risk of low back injury. If the value is less than 1.0, there is only a small risk of injury. The goal is to design all lifting tasks to have an LI of less than 1.0!

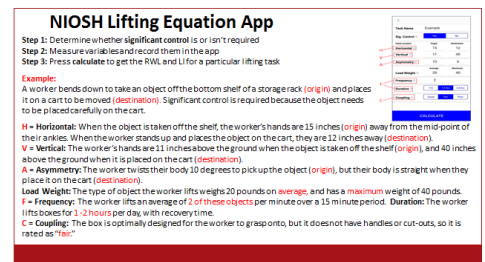
NIOSH Lifting Equation App

INSTRUCTOR NOTE:

Distribute copies of handout #1 – The NIOSH Lifting Equation App (located in Appendix A).

NOTES FOR SLIDE 18

This handout includes all of the information shown on this slide for the NIOSH Lifting Equation App. This app allows you to plug in selected task variables for a particular lifting task into the calculator, and it will automatically calculate the recommended weight limit, or RWL, and the Lifting Index, or LI, for you.



INSTRUCTOR NOTE:

The calculator does not show the load constant (**LC**) or the vertical distance between the start (**origin**) and the end (**destination**) of the lift (**D**) because these variables are already included or are calculated automatically.

To use the app, you can download it for free. Next, you will need to determine whether significant control of the object being lifted or lowered is required at the destination of the lift. In other words, does the task require precision placement of the load at the destination of the lift? Significant control is needed when, for example, an object is fragile and careful placement is needed to protect the object from damage. Or, the worker needs to change grip or hold or guide the object when lifting or lowering it to its destination.

If significant control at the destination is required, then you will need to collect the task variables **H**, **V**, and **A** at the start and end of the lift to determine the RWL. If significant control is not required, the only measurement you will need at the destination is the vertical location (**V**) to

determine the vertical travel distance (**D**) from the origin of the lifting task. You will also need the task variables **F** and **C**, and the average and maximum load weights of the object you are lifting.

Once you have inputted all of the variables into the calculator, you can press the **Calculate** button, and you will get the RWL and LI. You will also get recommendations for how to improve the design of the lift based on the individual variables you entered. You can then use the LI to compare the injury risk of two or more job designs and to help prioritize ergonomic redesign efforts.

Let's walk through an example of how to use the app:

INSTRUCTOR NOTE:

This example is shown in the image on the screen.

Say a worker bends down to take a box off the bottom shelf of a storage rack (the origin) and places it on a cart to be moved (the destination). Because significant control is required (the box needs to be placed carefully on the cart) we are going to select the **"Yes"** button in the app.

- When the box is taken off the shelf, the worker's hands are 15 inches away from the midpoint of their ankles. When the worker stands up and places the box on the cart, they are 12 inches away. This is the **horizontal** location.
- The worker's hands are 11 inches above the ground when the box is taken off the shelf, and 40 inches above the ground when it is placed on the cart. This is the **vertical** location.
- The worker twists their body 10 degrees to pick up the box, but their body is straight when they place the box on the cart, so we put 0 in the destination column. This is known as **asymmetry**.
- For the **load weight**, the worker lifts boxes that weigh 20 pounds on average, and have a maximum weight of 40 pounds.
- For the **frequency**, the worker lifts an average of 2 boxes per minute over a 15 minute period.
- For the **duration**, the worker lifts boxes for 1-2 hours per day, with recovery time.
- The box is optimally designed for the worker to grasp onto, but it does not have handles or cut-outs, so we classify it as **"fair."** This is known as **coupling**.

INSTRUCTOR NOTE:

If you would like more information on how to measure these variables, visit:

<https://www.cdc.gov/niosh/docs/94-110/pdfs/94-110.pdf?id=10.26616/NIOSH PUB94110>.

Review of Safe Lift Training Methods

NOTES FOR SLIDE 19

In addition to following the hierarchy of controls, as you learned in the basic training, it's also important to use safe lifting methods.

Let's quickly review them. This slide shows the "heft test," which involves checking the object's weight before lifting.

To do this lift:

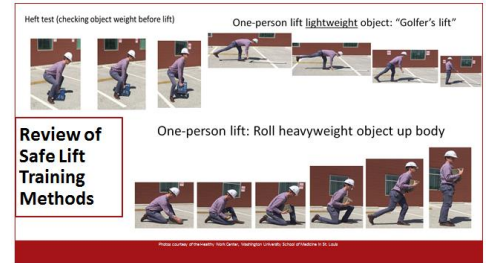
- Approach the object from the front, with your feet shoulder-width apart;
- Next, move close to the object;
- Bend your knees and hips, "Lock" your back, and lift box ONLY 1" up from the ground – then set the object back down;
- If the weight is acceptable to lift, use straight or power lift to lift object.

The "golfer's lift" for lightweight objects involves:

- Approaching the object from the end;
- Bending forward at your waist on one leg, lifting the opposite foot off floor; and
- Grasping the object and lowering your foot to the floor as you use slow, smooth movements to lift the object.

For the one-person roll up for a small heavyweight object, you:

- Half kneel directly in front of the object;
- "Lock" your back and roll the object onto your thigh;
- Roll the object to your waist, hold it firmly close to your body; and
- Push off on your back foot to rise to stand;
- Once you're balanced, move forward.



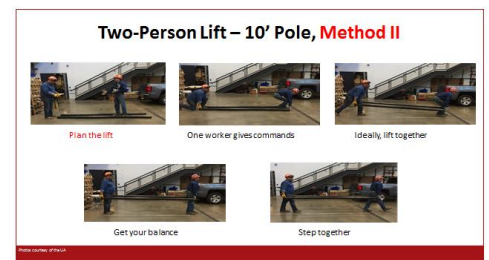
Two-Person Lift – 10' Pole, Method II

NOTES FOR SLIDE 20

This slide shows two workers using a two-person lift method with a 10-foot pole.

The two workers start by planning how they will conduct the lift.

Once they've done that, they each approach the pole from the ends and move close to the object, feet shoulder-width apart, with their backs "locked" and knees and hips bent. The front person turns toward the direction of travel.



They communicate – “one, two, three lift,” and lift with backs straight (no twisting), using slow, smooth movements.

They hold the pole at their waist and walk forward.

Interactive Training and Coaching Resources to Reduce Manual Material Handling Risks

INSTRUCTOR NOTE:

The following slides provide a brief review of the interactive resources for workers available through the Best Built Plans program.

If you have not already used the materials in Part 3 as a hand-on demonstration station or separate in-class presentation, and have additional time (15 to 30 minutes), you may want to do a more detailed presentation on these materials at this juncture using the in-class presentation from Part 3.

If you do not have the time, proceed to Slide 22.

NOTES FOR SLIDE 21

Since everyone from the apprentice to the contractor has a role to play in preventing the risk for injuries, CPWR’s Best Built Plans Program includes materials that contractors can use to plan for how materials will be safely lifted and moved on job sites, and interactive training and coaching resources that you can use on your own to practice or as a refresher. These materials are designed to reinforce the importance of 1) planning for how materials will be lifted and moved, and 2) using safe lifting techniques (including equipment and team lifts) and practices.

You can download them to your PC or use the app available for Android and Apple smartphones and tablets.



Interactive Training & Coaching Resources

NOTES FOR SLIDE 22

The interactive Training Resources have a voiceover that allows you to click on items to learn more about planning and selecting equipment to lift and store materials.

The Lifting and Work Practice sections of the Training Resources walks you through a refresher of safe lifting practices and then lets you use a mouse or



touchscreen to move a figure through different lifts. The Fundamentals part of the Coaching section lets you move the figure during different lifts and shows you what happens to the body when the lifts are done right and wrong.

Coaching

NOTES FOR SLIDE 23

The Coaching section also includes a Warm Up section that lets you try different stretching exercises that can help prevent an injury. Like the other interactive exercises, you can see what happens to the body when they're done right and wrong.



Games to Play on Smartphones

NOTES FOR SLIDE 24

There are also two games that you can play on your smartphones to test what you learned. We know they're not for everyone, but they're a fun way to test your knowledge. You advance through the games by making safe decisions.



You can get to the games directly through the app stores or by scanning the QR code on the hazard alert.

The first game raises awareness of the impact on your body of lifting from an awkward position or lifting heavy materials without assistance.

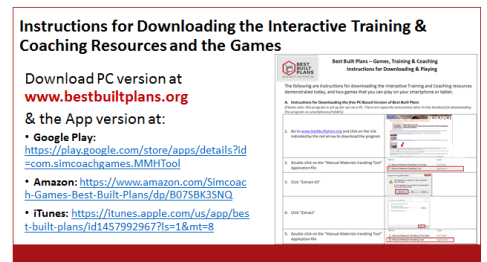
And the second game focuses on the job site and the importance of planning how you'll lift and move materials, what equipment or help you may need, and if your pathway is clear. As this game advances, the construction site becomes more complex and injuries are tracked on the strain bars.

Instructions for Downloading the Interactive Training & Coaching Resources and the Games

INSTRUCTOR NOTE:

Give all attendees a copy of handout #5 – “Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games”

NOTES FOR SLIDE 25



You have a handout with instructions on how to download and use these resources.

I'd encourage you to try them out.

Why Is It Important to Always Follow Safe Lifting Practices?

INSTRUCTOR NOTE:

Only show the title of the PowerPoint slide “Why Is It important to Always Follow Safe Lifting Practices?”

NOTES FOR SLIDE 26

Ask the class:

Why is it important to always follow safe lifting practices?

On a whiteboard or flip chart write down trainees' answers.

Once everyone is done giving responses, continue to the next slide.

Tell the class:

Those are all good reasons. But the one I want to focus on now is how preventing pain upfront, you can avoid pain medications – such as opioids, which may lead to addiction.

While opioids are commonly prescribed for pain relief by physicians, they are strong, addictive medications, so they should only be used if they are the best option to manage pain.

Misuse of opioids prescriptions, including taking more than a prescribed dose, taking someone else's prescription, taking multiple opioid medications, or taking high doses for long periods of time can all lead to opioid dependency and addiction.

Think about the risk – 1 out of 4 people prescribed opioids for long-term pain become addicted.

Thousands of people die from overdoses each year. In 2017 alone, more than 49,000 people died from an opioid overdose, and overdose deaths on the job are on the rise.

Why Is It Important to Always Follow Safe Lifting Practices?

Prescription opioids MAY lead to prescription drug abuse

- Opioids are addictive medications
- Taking more pills than prescribed, someone else's medication, or high doses of medication for long periods of time will likely lead to dependency and addiction
- FIRST ask your doctor for information on all available treatments for pain
- ONLY take opioids if it is the best option, and follow the dosage prescribed by your doctor

Don't be a statistic. Protect yourself from an opioid overdose.

Overdoses work too much to painful injuries that are often treated with prescription opioids. Opioids are addictive and should be the last option to treat your pain. Ask your doctor about your addictive medications.

REMEMBER: Addiction is a disease that can be treated. Call your doctor for more information.

1-800-487-3333

1 out of 4 people prescribed opioids for long-term pain become addicted.

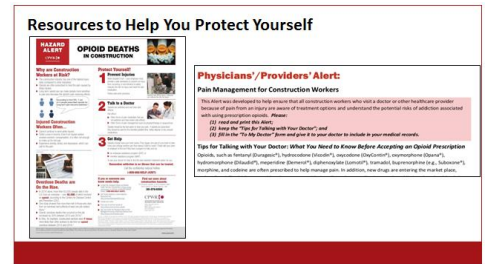
In 2017 alone, more than 49,000 people died from an opioid overdose.

Overdose deaths on the job are on the rise.

Resources to Help You Protect Yourself

INSTRUCTOR NOTE:

Give all trainees a copy of the handouts: **Physicians' Alert – Pain Management for Construction Workers (Handout #3)** and **Hazard Alert Card – Opioid Deaths in Construction (Handout #4)**



NOTES FOR SLIDE 27

Before taking prescription opioids, it's important that you **FIRST** ask your doctor for information on all available treatments for pain.

And then only take opioids if they are the best option, and follow the dosage prescribed.

DO NOT take opioids for long periods of time (more than 30 days) without consulting with your doctor.

CPWR has developed several resources to help you understand the risk and get proper treatment if you are injured and in pain.

This slide shows the online version of the Hazard Alert Card and a Physicians' Alert.

The Hazard Alert card covers some of the statistics I just covered, as well as steps you can take to prevent addiction or get help.

The Physicians' Alert has two parts. The first part provides information for you on the risk and how to talk to your doctor about treating your pain.

The second part is to give to your doctor so they can better treat you. It includes information on, for example, how some jobs require drug testing and the drugs workers are commonly tested for.

Questions?

NOTES FOR SLIDE 28

Any questions?



APPENDIX A – HANDOUTS

1. NIOSH Lifting Equation App
2. Ergonomic Training Exercises
3. Physicians' Alert – Pain Management for Construction Workers
4. Hazard Alert Card – Opioid Deaths in Construction*
5. Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games
6. Hazard Alert Card – Back Injuries*
7. Ergonomic Tips Cards – optional
8. Exercise Instructions for Best Built Plans Training and Coaching Resources

** For pocket sized versions of the Hazard Alert Cards email cpwr-r2p@cpwr.com or call 301-578-8500*

HANDOUT #1
NIOSH Lifting Equation App

NIOSH Lifting Equation App

Step 1: Download the [NIOSH Lifting Equation App](#)

Step 2: Determine whether **significant control** is or isn't required

Step 3: Measure variables and record them in the app

Step 4: Press **calculate** to get the RWL and LI for a particular lifting task

The screenshot shows the NIOSH Lifting Equation App interface. At the top, there is a back arrow and a title bar. Below that, the 'Task Name' field is labeled 'Example'. The 'Sig. Control' field has a dropdown menu with 'Yes' selected. The 'Hand Location' section has three rows: 'Horizontal' (15 inches origin, 12 inches destination), 'Vertical' (11 inches origin, 40 inches destination), and 'Asymmetry' (10 degrees origin, 0 degrees destination). The 'Load Weight' section has two columns: 'Average' (20 pounds) and 'Maximum' (40 pounds). The 'Frequency' field has a dropdown menu with '2' selected. The 'Duration' field has three radio buttons: '1 hr', '1-2 hrs' (selected), and '2-8 hrs'. The 'Coupling' field has three radio buttons: 'Good', 'Fair' (selected), and 'Poor'. At the bottom, there is a large blue 'CALCULATE' button. Red lines with letters H, V, A, F, and C point to the 'Horizontal', 'Vertical', 'Asymmetry', 'Frequency', and 'Coupling' fields respectively.

Hand Location	Origin	Destination
Horizontal	15	12
Vertical	11	40
Asymmetry	10	0

Load Weight	Average	Maximum
	20	40

Frequency	Duration	Coupling
2	1-2 hrs	Fair

Example:

A worker bends down to take an object off the bottom shelf of a storage rack (**origin**) and places it on a cart to be moved (**destination**). Significant control is required because the object needs to be placed carefully on the cart.

H = Horizontal: When the object is taken off the shelf, the worker's hands are 15 inches (**origin**) away from the mid-point of their ankles. When the worker stands up and places the object on the cart, they are 12 inches away (**destination**).

V = Vertical: The worker's hands are 11 inches above the ground when the object is taken off the shelf (**origin**), and 40 inches above the ground when it is placed on the cart (**destination**).

A = Asymmetry: The worker twists their body 10 degrees to pick up the object (**origin**), but their body is straight when they place it on the cart (**destination**).

Load Weight: The type of object the worker lifts weighs 20 pounds on **average**, and has a **maximum** weight of 40 pounds.

F = Frequency: The worker lifts an average of **2 of these objects** per minute over a 15 minute period. **Duration:** The worker lifts boxes for **1-2 hours** per day, with recovery time.

C = Coupling: The box is optimally designed for the worker to grasp onto, but it does not have handles or cut-outs, so it is rated as "**fair**."

HANDOUT #2
Ergonomic Training Exercises

Ergonomic Training Exercises

For each of the following questions, select the best answer.

1. Ergonomics is the science that fits the job or task to the physical abilities of the worker.
True False
2. Which body part is at greatest risk of developing an injury from high force? (Circle the **BEST** answer)
 - a. Hand
 - b. Elbow
 - c. Knee
 - d. Low back
3. Which of the following tasks MAY require high physical force? (Circle **ALL** that apply)
 - a. Unloading 10' cast iron pipe from the truck
 - b. Installing PVC pipe under the sink in a home
 - c. Installing cast iron pipe in a building
 - d. Carrying bags/boxes of supplies
4. Which of the following methods are the BEST ways to reduce or eliminate force in lifting? (Circle **ALL** that apply)
 - a. Use a chainfall or crane to lift/carry cast iron pipe
 - b. Use stretching exercises
 - c. Wearing kneepads
 - d. Team lift for objects weighing more than 50 pounds
5. What are the most common ergonomic hazards that cause injuries in your trade? (Circle three (3))
 - a. Lifting/carrying heavy objects
 - b. Working with hands below your knee level (bent forward back)
 - c. Working on uneven surfaces
 - d. Working with your hands above your head (overhead)
6. When is it best to use a two-person lift (team lift)? (Circle **ALL** that apply)
 - a. The load weighs more than 50 pounds
 - b. The load is small (1'x1')
 - c. The load is a long pipe (10' long)
 - d. The load must be carried 200'
7. A heft test is: (Circle the **BEST** answer)
 - a. The name of a math test
 - b. A process of checking the weight of an object by lifting it slightly off the ground before lifting
 - c. The way to carry heavy bags
 - d. The name of a two-person carry
8. It is always better to push a cart, pallet jack, or any other wheeled object, particularly if it is a heavy load.
True False

9. To install anchors in the ceiling (do overhead work), how should you plan your work? (Circle **ALL** that apply)
- Use a height-adjustable lift so your hands do not reach above your head height to work
 - Use a tool extension to help you get close to the work
 - Use a ladder of proper length so you can position your body safely with your hand below your head height
 - Install the anchor while standing on the ground
10. To assemble pieces of pipe to get them ready to install under a sink, how should you plan your work? (Circle **ALL** that apply)
- Consider preassembling as much as possible at waist height (use a portable tripod chain vice)
 - Use knee pads or other padding to cushion your knees while kneeling to work
 - Bend forward at your waist to assemble the pipe on the floor near the sink

From the pictures of different lifting/carrying techniques at the bottom of this sheet, write the letter for each item to show which method would be **BEST** for the following situations

- For lifting an object that weighs 3 pounds _____
- For carrying an object that must be carried more than 200' (such as around this building) _____
- For lifting a long pipe weighing 40 pounds _____
- For carrying a long pipe weighing 140 pounds _____
- For lifting a box of fixtures weighing 35 pounds _____

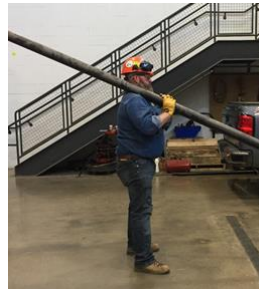
A.



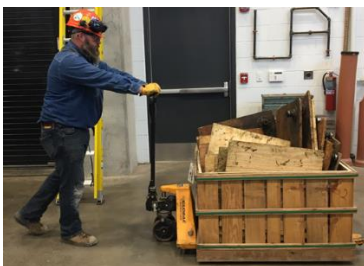
B.



C.



D.



E.



HANDOUT #3

Physicians' Alert – Pain Management for Construction Workers

Download copies of the Physicians' Alert by clicking here: [Physicians' Alert: Pain Management for Construction Workers](#) (Click here for [Spanish](#))

Physicians'/Providers' Alert:

Pain Management for Construction Workers

This Alert was developed to help ensure that all construction workers who visit a doctor or other healthcare provider because of pain from an injury are aware of treatment options and understand the potential risks of addiction associated with using prescription opioids. *Please:*

- (1) read and print this Alert;
- (2) keep the "Tips for Talking with Your Doctor"; and
- (3) fill in the "To My Doctor" form and give it to your doctor to include in your medical records.

Tips for Talking with Your Doctor: *What You Need to Know Before Accepting an Opioid Prescription*

Opioids, such as fentanyl (Duragesic®), hydrocodone (Vicodin®), oxycodone (OxyContin®), oxymorphone (Opana®), hydromorphone (Dilaudid®), meperidine (Demerol®), diphenoxylate (Lomotil®), tramadol, buprenorphine (e.g., Suboxone®), morphine, and codeine are often prescribed to help manage pain. In addition, new drugs are entering the market place, such as Dsuvia™, which are considered even more addictive. Since these medications can be addictive, they should only be used if other treatment options are not effective. When prescribed, they should be used for the shortest time possible, be closely monitored, and include counseling.

Talk to your doctor about treatment options and how the medication may affect you. Remember to tell your doctor:

- ✓ If you have been or are being treated for another health issue or have been prescribed other medications by another doctor.
- ✓ If you have a history of addiction to tobacco, alcohol or drugs, or if there is a history of addiction in your family.
- ✓ About your work environment. Let your doctor know that 1) taking opioids on the job can be a safety hazard because they can make you drowsy, and 2) testing positive for some drugs, even when prescribed for pain, can negatively impact employment opportunities. Some employers have expanded panels of drugs they test employees for, which are regularly reviewed and updated. The Department of Transportation's drug test panel, for example, includes:¹
 - Opioids (codeine, morphine, 6-AM (heroin), hydrocodone, hydromorphone, oxycodone, oxymorphone)
 - Phencyclidine
 - Marijuana (THC)
 - Cocaine
 - Amphetamines (amphetamine, methamphetamine, MDMA, MDA)

Before accepting a prescription for one of the medications listed earlier or another opioid, ask your doctor/healthcare provider:

1. Can my condition be effectively treated without opioid medication? If yes, what would the treatment involve?
2. [If prescribed an opioid and are taking other medications] Will the opioid medication interfere with other medications that I'm currently taking?
3. Are there potential side effects from the opioid medication prescribed? If yes, how can I reduce the risk of side effects?

Remember:

NEVER share medications or store medications where others will have access.

ALWAYS safely dispose of medications. Look for a medicine disposal center near you (often at your local pharmacy).

To learn more visit:

- CPWR Opioid Resources website <https://www.cpw.com/research/opioid-resources>
- Substance Abuse and Mental Health Services Administration (SAMHSA) <https://www.samhsa.gov/> or call their confidential national hotline 1-800-662-HELP (4357)
- Facing Addiction's online Addiction Resource Hub <https://resources.facingaddiction.org/>

¹ Source: U.S. Department of Transportation. (2018). DOT 5 panel notice. https://www.transportation.gov/odapc/DOT_5_Panel_Notice_2018

Physicians’/Providers’ Alert:

To My Doctor Form

Pain Management for Construction Workers

To My Doctor/Healthcare Provider: I am a construction worker who performs physically demanding work that can result in sprain and strain injuries and chronic pain. Please keep this information for reference to aid in injury evaluations and pain management.

This document should be filed in the medical records of (patient’s full name):

Date of Birth: _____ / _____ / _____
 Month Day Year

Your patient is a construction worker who engages in physically demanding work that can lead to sprains, strains, and other types of injuries.

When treating new or chronic pain in a construction worker, it may be useful to bear in mind the following factors.

- ✓ Construction workers have one of the highest rates of sprain and strain injuries due to the physically demanding nature of their work. Use of opioids to manage pain has been a common practice and resulted in high rates of addiction and overdoses among this segment of the workforce.¹ Construction workers encounter a variety of hazards from the specific work they perform, as well as from work being performed by other workers around them including: equipment hazards, falls from heights, confined spaces, and heavy lifting. To work safely, they must be mentally alert. Your patient may have concerns about specific hazardous working conditions as they manage pain.
- ✓ Construction workers rarely have sick leave and paid sick leave benefits. As a result, they are under financial pressure to stay on the job even when in pain and go back to work before they are fully healed and free of pain. Workers who obtain workers’ compensation may have access to payment for physical therapy or other chronic pain management alternatives; however, many construction workers injured on the job do not file a workers’ compensation claim, and many of those who file do not receive compensation.² Job and wage insecurity, anxiety, depression, and stress related to the compensation process can impact pain management.
- ✓ Construction work is highly mobile and transient. Many construction workers commute long distances for work or rely on temporary housing near jobsites that are far from their families and support systems. Return to work recommendations should consider the work tasks required as well as the location of the work. For instance, while they are recovering are there other less demanding jobs they can perform?
- ✓ The “tough-guy” culture within the industry can make workers reticent to discuss topics that may be perceived as a weakness, such as pain, depression, and addiction. This culture may complicate the management of both acute and chronic pain.
- ✓ Due to the hazardous nature of the job, many construction employers require drug testing and some have panels of drugs they test for, which are regularly reviewed and updated. As of January 2018, the Department of Transportation’s 5-panel drug test, for example, added some prescription opioids.³ Testing positive for these drugs, even when prescribed for pain, could result in a construction worker not being hired or losing their job, which would affect their ability to provide for their family.

Sources

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- (2) Grabell, M., Berkes, H. "The Demolition of Workers' Comp." *ProPublica and NPR*, March 4, 2015
<https://www.propublica.org/article/the-demolition-of-workers-compensation>
- (3) U.S. Department of Transportation (DOT) 5 panel drug testing notice
https://www.transportation.gov/odapc/DOT_5_Panel_Notice_2018

Helpful resources

- CPWR Opioid Resources website <https://www.cpwrr.com/research/opioid-resources>
- Munzing T. Physician Guide to Appropriate Opioid Prescribing for Noncancer Pain. *The Permanente Journal*. 2017;21:16-169. doi:10.7812/TPP/16-169. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5424587/>
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HANDOUT #4

Hazard Alert Card – Opioid Deaths in Construction

Download copies of the Hazard Alert by clicking here: [Opioid Deaths in Construction](#) (Click here for [Spanish](#))

HAZARD ALERT

CPWR [●]

OPIOID DEATHS IN CONSTRUCTION



Why are construction workers at risk?

- ▶ The construction industry has one of the highest injury rates compared to other industries.¹
- ▶ Opioids are often prescribed to treat the pain caused by these injuries.
- ▶ Long-term opioid use can make people more sensitive to pain and decrease the opioid's pain-reducing effects.



According to the CDC, 1 out of 4 people prescribed opioids for long-term pain become addicted.²

Injured construction workers often...

- ▶ Cannot continue to work while injured.
- ▶ Suffer a loss in income. Even if an injured worker receives workers' compensation, it is often not enough to make up for lost pay.³
- ▶ Experience anxiety, stress, and depression, which can add to the pain.

³Source: The Demolition of Workers' Comp. <https://www.propublica.org/article/the-demolition-of-workers-compensation>



Overdose deaths are on the rise.

- ▶ In 2016 alone, more than 63,000 people died in the U.S. from an overdose – over **42,000** of which involved an **opioid**, according to the Centers for Disease Control and Prevention (CDC).
- ▶ One study showed that more than half of those who died from an overdose had suffered at least one job-related injury.³
- ▶ Overall, overdose deaths that occurred on the job increased by 30% between 2015 and 2016.⁴
- ▶ In Ohio, for example, construction workers were **7 times** more likely than other workers to die from an **opioid** overdose between 2010 and 2016.⁵

Protect Yourself!

1 Prevent Injuries

Work shouldn't hurt – your employer must provide a safe workplace to prevent an injury from occurring. A commitment to safety reduces the risk for injury and need for pain medication.

Follow safe work practices.



Getting help lifting heavy materials can reduce the risk for injury.

2 Talk to a Doctor

Opioids are addictive and can have side effects.

Ask about:

- ▶ Other forms of pain medication that are not addictive and have fewer side effects.
- ▶ Other forms of pain management such as physical therapy or acupuncture.

Opioids should be the last option to treat your pain. If opioids are prescribed they should be used for the shortest possible time. Safely dispose of any unused medications.



ISTOCK.COM/ALBRIGHTS

3 Get Help

Opioids change how your brain works. They trigger one part “that motivates a person to take more” and another part that makes it hard to stop.⁶ Check with your employer or union to find out if they have a program to help, such as:

- ▶ an employee assistance program (EAP); or
- ▶ member assistance program (MAP).

Or ask your doctor for help to find the best addiction treatment option for you.

Remember addiction is an illness that can be treated.

Call this confidential national hotline:

1-800-662-HELP (4357)

If you or someone you know needs help:

- ▶ Contact the Substance Abuse and Mental Health Services Administration at <https://www.samhsa.gov/> or call their confidential national hotline: **1-800-662-HELP (4357)**.
- ▶ Contact your union.
- ▶ Visit CPWR's opioid resource page to find a “Physicians' Alert on Pain Management for Construction Workers” and more: <https://cpwr.com/research/opioid-resources>



Sources: 1) CPWR, The Construction Chart Book, 2018, Chart 38a. 2) Centers for Disease Control and Prevention, Promoting Safer and More Effective Pain Management. https://www.cdc.gov/drugoverdose/pdf/Guidelines_Factsheet-Patients-a.pdf 3) Chang et al. Comparison of Opioid-Related Deaths by Work-Related Injury. *American Journal of Industrial Medicine* 55:308-316, 2013. <https://www.ncbi.nlm.nih.gov/pubmed/23143851> 4) Bureau of Labor Statistics, Census of Fatal Occupational Injuries, News Release, 2016. <https://www.bls.gov/news.release/cfoi.no.htm> 5) Opioid overdose deaths: Which jobs are at risk? http://www.cleveland.com/metro/index.ssf/2017/11/opioid_overdose_deaths_which_.html 6) National Institute on Drug Abuse for Teens, Out of Control: Opioids and the Brain, 2018. <https://teens.drugabuse.gov/blog/post/out-control-opioids-and-brain>

Find out more about construction hazards.

To receive copies of this Hazard Alert and cards on other topics, call

301-578-8500



THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING
8484 Georgia Avenue
Suite 1000
Silver Spring, MD 20910
301-578-8500
www.cpwr.com

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COVER PHOTO: ISTOCK.COM/DARVINERANDIS

www.cpwr.com

HANDOUT #5

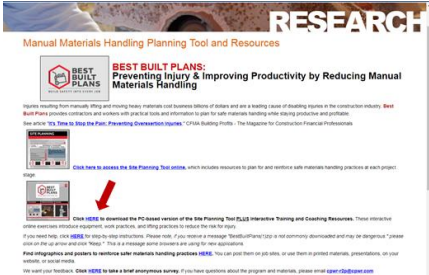
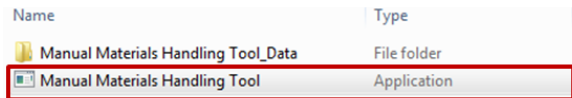

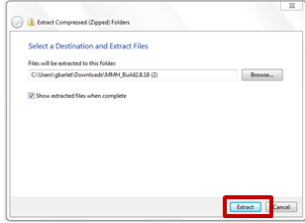
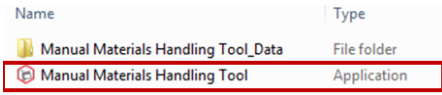
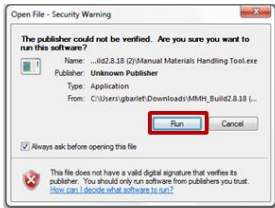
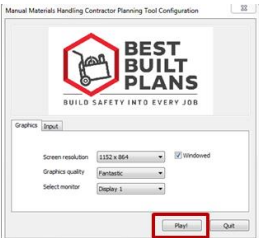
Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games

Instructions for Downloading the Best Built Plans Training & Coaching Resources and Playing the Games


The following are instructions for downloading the interactive Training and Coaching resources and two games that you can play on your smartphone or tablet.

A. Instructions for Downloading the free PC-Based Version of *Best Built Plans*

(Please note: this program is set up for use on a PC. There are separate instructions later in this handout for downloading the program on smartphones/tablets)



<p>1. Go to www.bestbuiltplans.org and click on the link indicated by the red arrow to download the program</p>	
<p>2. Double-click on the “Manual Materials Handling Tool” Application file</p>	
<p>3. Click “Extract All”</p>	
<p>4. Click “Extract”</p>	
<p>5. Double-click on the “Manual Materials Handling Tool” Application file</p>	
<p>6. Click “Run”</p>	
<p>7. Click “Play!”</p>	

B. Instructions for Downloading the Free App Version of *Best Built Plans (Android and iOS)*

<p><i>Best Built Plans - Manual Materials Handling Contractor Planning Tool & Training-Coaching Resources</i></p> 	<p><u>Please note:</u> If you don't have a pre-installed app on your device that lets you view Microsoft documents and spreadsheets, you may need to download the Microsoft Word and Excel apps. They are available through Google Play or iTunes.</p>	<p>Google Play: https://play.google.com/store/apps/details?id=com.simcoachgames.MMHTool</p> <p>Amazon: https://www.amazon.com/Simcoach-Games-Best-Built-Plans/dp/B07SBK3SNQ</p> <p>iTunes: https://itunes.apple.com/us/app/best-built-plans/id1457992967?ls=1&mt=8</p>
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C. Instructions for Downloading the Free Smartphone Games

(These games are available in both English and Spanish for Android and iOS users)

	<p><i>Lift Coach: Plan Your Route</i> – In this game, you must plan for how you will lift and move a material on a job site. Your risk of strain/sprain injury increases or decreases depending on the decisions you make. The job site will become larger and more complex as you advance through the game.</p>	<p>Google Play: https://play.google.com/store/apps/details?id=com.simcoachgames.liftplanning</p> <p>Amazon: https://www.amazon.com/dp/B0769Z71JD/</p> <p>iTunes: https://itunes.apple.com/us/app/lift-coach-plan-your-route/id1249442413?mt=8</p>
	<p><i>Lift Coach: Plan Your Lift</i> – In this game, you must correct the on-screen character's actions as they lift and move materials. The goal is to avoid actions that can increase the risk of injury. You need to pay attention to avoid building up too much strain and getting hurt. Each level increases in difficulty.</p>	<p>Google Play: https://play.google.com/store/apps/details?id=com.simcoachgames.liftcoach</p> <p>Amazon: https://www.amazon.com/dp/B076FFL8CJ/</p> <p>iTunes: https://itunes.apple.com/us/app/lift-coach-plan-your-lift/id1293760724?mt=8</p>

HANDOUT #6

Hazard Alert Card – Back Injuries

Download copies of the Hazard Alert Card by clicking here: [Back Injuries](#) (Click here for [Spanish](#))

HAZARD ALERT

CPWR
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BACK INJURIES

YOU ARE AT RISK



Does your back hurt?

Back injuries are the most common injury in construction.*

- ▶ Construction workers **report back pain in higher numbers** than all other industries combined.
- ▶ Back injuries are the **major cause of disability** in middle-age construction workers.
- ▶ Long recovery times and chronic back problems can mean you will **no longer be able to work in construction.**

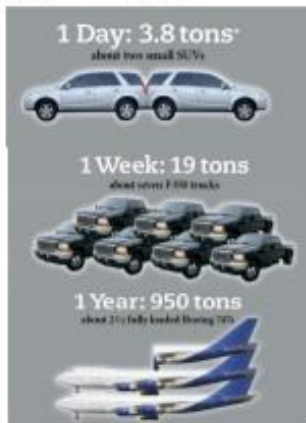
*The Construction Chart Book, 2013



Most back injuries are from:

- ▶ Lifting
- ▶ Bending at the waist
- ▶ Carrying
- ▶ Pushing and pulling

A bricklayer lifting an average of 200 blocks – each 38 lbs – per day lifts:



What do YOU lift in a day?

Learn more about preventing strain and sprain injuries at

www.bestbuiltplans.org

Play the games:

- ▶ Lift coach: Plan your route
- ▶ Lift coach: Plan your lift



To prevent back injuries ...



1 Let tools do the work

If materials **weigh more than 80 pounds, do not lift them by yourself.** Use carts, dollies, forklifts, and hoists to move materials – not your back. Get another worker to help lift heavy materials.



2 Change your work routine

Re-position your body so that you are not contorted or repeating a motion. **Raise your work to waist level.** Have materials delivered near your work. Take rest breaks. When you are tired, you can get injured more easily.



Workers use the two-man lift technique to reduce stress of lifting and twisting.

3 Think before you move

Lifting while bending and twisting will cause injury. You can prevent a serious back injury if you **step instead of twist.** Turn your whole body rather than twisting. Lift and lower in a smooth, steady way. Try to handle materials between your knees and chest.

Back injuries have consequences

- ▶ Reduced income
- ▶ Medical bills
- ▶ Lost work time
- ▶ Reduced work life
- ▶ Chronic pain

Work with your employer and union rep to prevent back injuries.

Back pain doesn't stop when you leave work.

You take it home!

If you think you are in danger:

Contact your supervisor. Contact your union.

Call OSHA

1-800-321-OSHA



Last Tip: Housekeeping!

Make sure floors and walkways are clear and dry. Slips and trips are a big cause of back injuries.

HANDOUT #7
Ergonomic Tips Cards – Optional

Ergonomic Tips Cards

Contact cpwr-r2p@cpwr.com for an editable version of these tip cards that you can tailor to your trade. For instruction on how to make the handout shown in this image, please see Appendix E.



Ergonomic TIPS **WHAT IS ERGONOMICS?**

Ergonomics is defined as fitting the job to the worker. The goal of ergonomics is to reduce the risk of sprains, strains, and other soft tissue injuries (aka MSDs).

Musculoskeletal disorders (MSDs) are injuries to the muscles, tendons, and nerves caused by too much physical stress causing tissue break down (i.e., tendonitis, back strain).

Phases of MSD and Chance of Recovery

Photo courtesy of NIOSH

CPWR

HIERARCHY OF ERGONOMIC CONTROLS

Photo courtesy of NIOSH

Ergonomics TIPS **MOVE MATERIALS WITH LIFT ASSIST**

PLAN YOUR WORK

Use a cart or other lifting device to transport loads, make fewer trips, and avoid carrying materials on your shoulder.

Get a co-worker to help lift large-sized or heavy materials when a device is not available.

Keep floors clear of obstacles to minimize trip hazards and make it easier to use wheeled carts or equipment easier.

CPWR

Photo courtesy of Construction Solutions and Uline

Photo courtesy of heavyjorg/Shutterstock.com

Photo courtesy of iStock.com/shank_all

Photo courtesy of 3DM/Shutterstock.com

*Not an endorsement of any particular product.

○ Ergonomics TIPS

FLOOR WORK

NO ☹️



Photo courtesy of the UA

YES 😊



Photo courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

On the Ground: Reduce work on floor.
Preassemble at waist height;
Sit on floor;
Kneel with knee pads or cushion

CPWR



Washington University in St. Louis School of Medicine

NO ☹️



YES 😊



When possible, bring material to waist height
using a stand or a cart.
Position materials close to the task.

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

○ Ergonomics TIPS

REACH AND POSITIONING



Image courtesy of Washington University in St. Louis

Green – Keep the work close (between shoulder and wrist).
Orange – Occasional reach to your fingertips.
Red – Do NOT reach beyond your fingertips (can cause shoulder and low back pain).

Bring it close: Bring work close to you or your body close to the task.

CPWR



Washington University in St. Louis School of Medicine

Overhead: Move your lift or move up on ladder to get as close to the task as possible.
Reaching out adds extra strain to your shoulder and lower back.



Photo courtesy of the UA

Use extended handled tools or tool extensions

○ Ergonomics TIPS

LIFT SMART



Locked back, low disc pressure

Maanaz/Shutterstock.com



Rounded back, high disc pressure



Photo courtesy of the MCAA

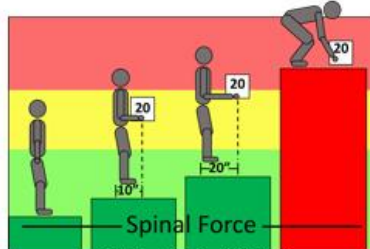


Image courtesy of Washington University in St. Louis

CPWR



Washington University in St. Louis School of Medicine



Bend knees, lock back, smooth movements

Keep the load close:
Reaching stresses the lower back



10 lbs at 25" = 250 lbs force on low back



10 lbs at 10" = 100 lbs force on low back

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

○ Ergonomics TIPS

STRETCHING

Stretching Benefits: Improves flexibility, movement, and posture. Do stretches daily to relieve tightness.

CAUTION – Avoid pain while stretching. Use slow, smooth movements, hold the posture for 15 seconds.



Low Back Stretch: With your hands on your low back, lean backwards slightly, hold. Do stretch after working with back bent forward.

Neck Stretch: Remove hard hat. Tilt head slowly and gently to the right, hold. Tilt head to the left, hold.

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

CPWR [●]



Washington University in St. Louis School of Medicine



Shoulder Rolls: Slowly roll shoulders up and backwards. Repeat.



Forearm Stretch: With arm straight and hand up, gently pull palm back toward body, hold. Turn hand over and pull back of hand toward body.




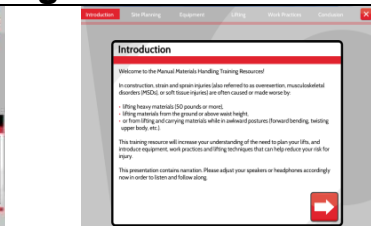
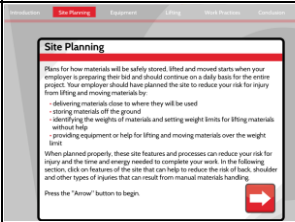
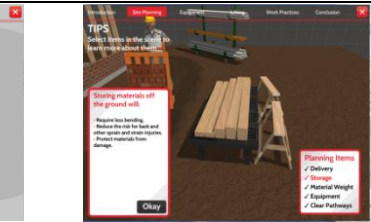
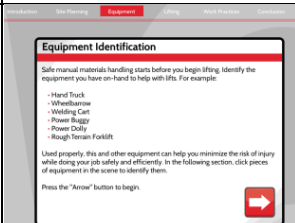

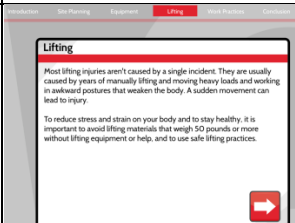

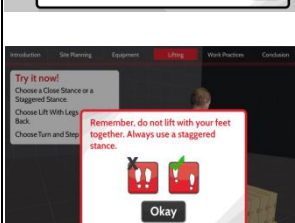
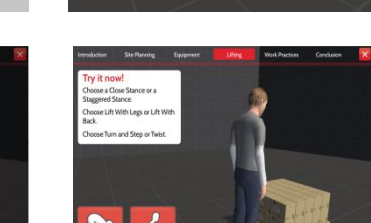


Hamstring & Calf Stretch: Extend one leg forward, with heel on floor, point toes up. Extend one leg back with foot on ground. Bend front knee to stretch calf of back leg.

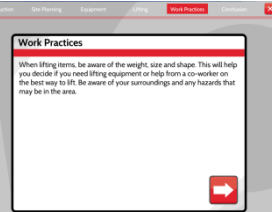
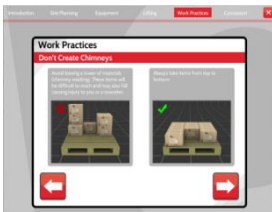
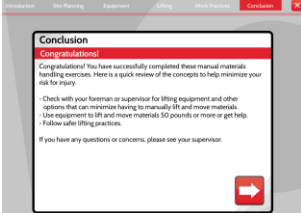


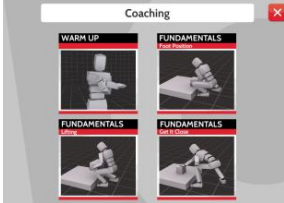



Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

HANDOUT #8

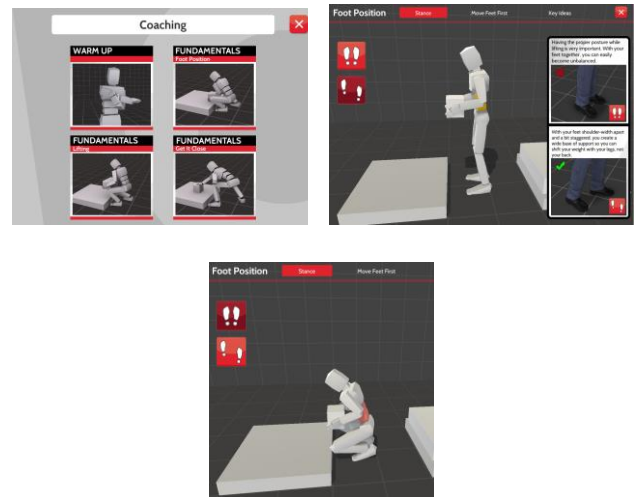
Exercise Instructions for Best Built Plans Training and Coaching Resources

Exercise Instructions for Best Built Plans Training and Coaching Resources

<ol style="list-style-type: none"> 1. Start on Home Screen 2. Click on the box Training Resources 3. Start on Introduction (see menu across the top) 4. Click on arrow to go to Site Planning section 	 
<ol style="list-style-type: none"> 5. Click on arrow in Site Planning 6. Click on Stack of Wood 7. Click the Okay button in the box to continue 	 
<ol style="list-style-type: none"> 8. Click on Equipment on top menu bar 9. Click on arrow in Equipment Identification 10. Click on the Wheelbarrow 11. Click Okay 	 
<ol style="list-style-type: none"> 12. Click on Lifting on top menu bar 13. Click on arrow in Lifting 14. Use the arrow keys to click through – <ol style="list-style-type: none"> 1) Lifting Stance; 2) Bend at the Knees; 3) Get It Close; 4) Move Your Feet First; and 5) Summary of good lifting practices 15. Try it now! Click on the button with the feet close together – the close stance 16. Click Okay 17. Click on the button with the person bending at their knees 18. Click on the button with the person twisting their body 19. Click Okay, and then click on the arrow 20. Click on the close stance button, then the person lifting with their back, and finally step and turn 	     

<p>21. Click on Work Practices on top menu bar</p> <p>22. Click on the arrow to advance to “Don’t Create Chimneys.” There will also be “Positions,” “Build a Bridge,” “Use Two Hands,” “Use a Team Lift,” and a summary of good work practices</p>	 
<p>23. Click on Conclusion on top menu bar</p> <p>24. Click the arrow to advance to the final screen and back to the Home Screen</p> <p>25. Click on Coaching</p>	  
<p>26. Click on Warm Up</p> <p>27. Click on Shoulder, watch the 30 second demonstration</p> <p>28. Click on Retry</p> <p>29. Click on Interactive Demo on the top menu bar and the arrow to continue</p> <p>30. Put your cursor/finger on the figure’s outstretched arm, then using your cursor, left click and hold while you move the figure’s arm</p> <p>31. Click on Menu</p> <p>32. Click on the X in the top right-hand corner of the screen to return to main coaching page</p>	   

33. Click on **Fundamentals: Foot Position**
34. Watch the example of a **staggered stance** – notice the yellow area of the back indicates no strain
35. Click on the foot position button for a **close stance** – notice the red area of the back indicates strain



36. Click on the **X** in the top right-hand corner of the screen to return to main coaching page
37. Click on the **X** in top right-hand corner of the screen to return to the **Home Screen**



APPENDIX B – ERGONOMIC TRAINING EXERCISES – ANSWERS

Ergonomic Training Exercises – Answer Sheet

For each of the following questions, select the best answer.

1. Ergonomics is the science that fits the job or task to the physical abilities of the worker. True False
2. Which body part is at greatest risk of developing an injury from high force? (Circle the **BEST** answer)
 - a. Hand
 - b. Elbow
 - c. Knee
 - d. Low back
3. Which of the following tasks MAY require high physical force? (Circle **ALL** that apply)
 - a. Unloading 10' cast iron pipe from the truck
 - b. Installing PVC pipe under the sink in a home
 - c. Installing cast iron pipe in a building
 - d. Carrying bags/boxes of supplies
4. Which of the following methods are the BEST way to reduce or eliminate force in lifting? (Circle **ALL** that apply)
 - a. Use a chainfall or crane to lift/carry cast iron pipe
 - b. Use stretching exercises
 - c. Wearing kneepads
 - d. Team lift for objects weighing more than 50 pounds
5. What are the most common ergonomic hazards that cause injuries in your trade? (Circle three (3))
 - a. Lifting/carrying heavy objects
 - b. Working with hands below your knee level (bent forward back)
 - c. Working on uneven surfaces
 - d. Working with your hands above your head (overhead)
6. When is it best to use a two-person lift (team lift)? (Circle **ALL** that apply)
 - a. The load weighs more than 50 pounds
 - b. The load is small (1'x1')
 - c. The load is a long cast iron pipe (10' long)
 - d. The load must be carried 200'
7. A heft test is: (Circle the **BEST** answer)
 - a. The name of a math test
 - b. A process of checking the weight of an object by lifting it slightly off the ground before lifting
 - c. The way to carry heavy bags
 - d. The name of a two-person carry

8. It is always better to push a cart, pallet jack, or any other wheeled object, particularly if it is a heavy load. True False
9. To install anchors in the ceiling (do overhead work), how should you plan your work? (Circle **ALL** that apply)
- a. Use a height-adjustable lift so your hands do not reach above your head height to work
 - b. Use a tool extension to help you get close to the work
 - c. Use a ladder of proper length so you can position your body safely with your hand below your head height
 - d. Install the anchor while standing on the ground
10. To assemble pieces of pipe to get them ready to install under a sink, how should you plan your work? (Circle **ALL** that apply)
- a. Consider preassembling as much as possible at waist height (use a portable tripod chain vice)
 - b. Use knee pads or other padding to cushion your knees while kneeling to work
 - c. Bend forward at your waist to assemble the pipe on the floor near the sink

From the pictures of different lifting/carrying techniques at the bottom of this sheet, write the letter for each item to show which method would be **BEST** for the following situations

11. For lifting an object that weighs 3 pounds _____ **B** _____
12. For carrying an object that must be carried more than 200' (such as around this building) **D**
13. For lifting a long pipe weighing 40 pounds _____ **C** _____
14. For carrying a long object weighing 140 pounds _____ **E** _____
15. For lifting a box of fixtures weighing 35 pounds _____ **A** _____

A.



B.



C.



D.



E.



THE SIGNAGE IS INCLUDED AS A SEPARATE POWERPOINT FILE TO ENABLE USERS TO MODIFY AND BLOW UP AS NEEDED.

APPENDIX D – INSTRUCTIONS FOR DOWNLOADING SITE PLANNING TOOL AND INTERACTIVE TRAINING AND COACHING RESOURCES TO A PC FOR INSTRUCTORS

How to Download and Install the Site Planning Tool and Interactive Training and Coaching Resources Application on Your PC

(Note: This is a PC-based tool and will not work on MACs. The online version of the Site Planning Tool and other training resources will work with both MACs and Windows)

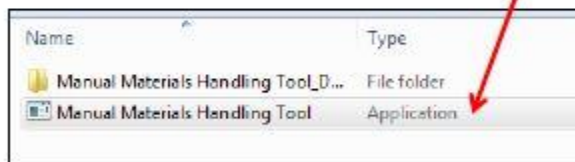
1. After clicking the download link, a notification of download will appear on the bottom of your screen.



Depending on your computer's settings, the folder will either automatically open once the download is complete, or you will have to click on the downloaded notification to open the folder. **If you receive the following message, click on the up arrow – two options will appear – click on "Keep."**



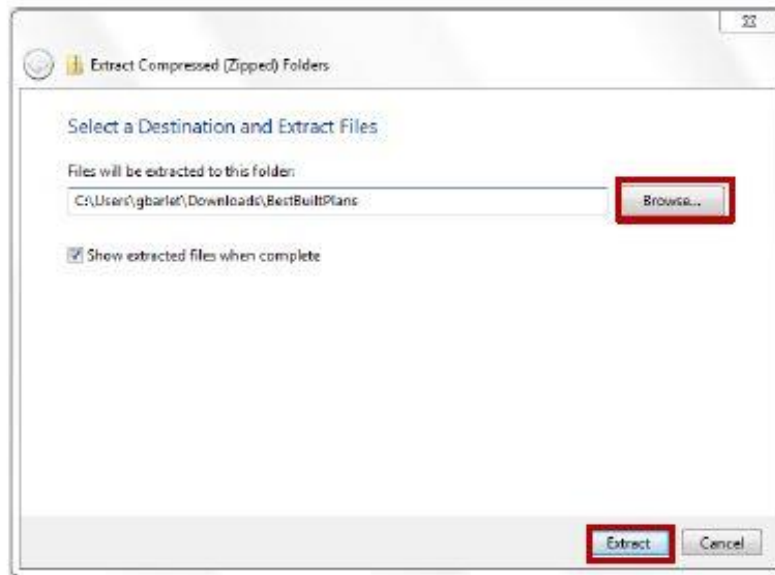
2. Because the download file is compressed (in a .zip file), you must extract the file's contents before setup can begin.
 - a) Double-click the Manual Materials Handling Tool application and follow the instructions to complete the installation.



- b) Click Extract All



- c) Select a place on your machine that you'd like the content extracted to by clicking Browse, and then click Extract.

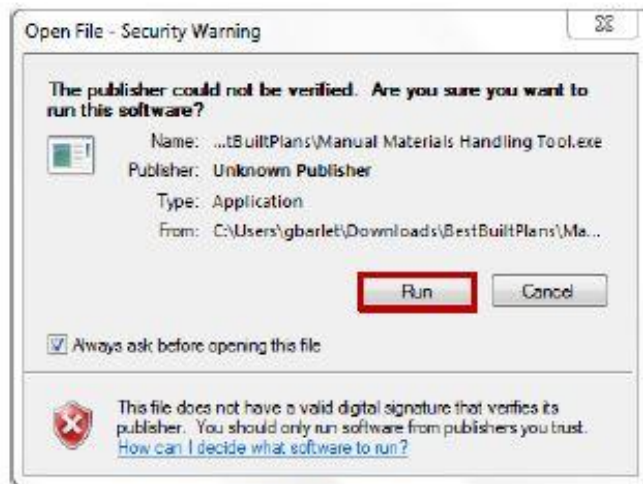


3. Once the files are extracted, a new window will appear.

- a) Double-click on the Manual Materials Handling Tool application.

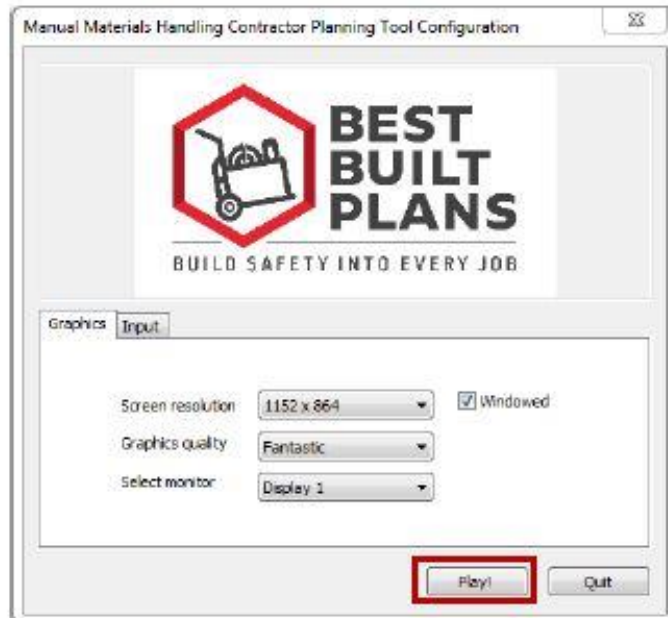
Name	Type
Manual Materials Handling Tool_Data	File folder
Manual Materials Handling Tool	Application

- b) Select Run



4. A pop-up box will appear asking you to select Play! or Quit.

a) Click Play!



5. The Manual Materials Handling Contractor Planning Tool should appear as shown below.



APPENDIX E – INSTRUCTIONS FOR MAKING ERGONOMIC TIPS CARDS

If you would like an editable version of these tips cards to tailor to your trade, contact cpwr-r2p@cpwr.com.

Directions for making Tip Cards:

- 1) Print out color copies of this sheet
- 2) **Cut** along the **dotted** lines
- 3) **Fold** each strip of cards in **half** (back to back)
- 4) **Place** folded cards in laminating pouch & slide through laminating machine (6 folded cards will fit in 1 pouch)
- 5) **Cut out cards & punch a hole** in the circle (top left corner)
- 6) **Place tip cards on a spring clip** (small carabiner) to keep the series of cards together.

Ergonomic TIPS **WHAT IS ERGONOMICS?**
Ergonomics is defined as fitting the job to the worker. The goal of ergonomics is to reduce the risk of sprains, strains, and other soft tissue injuries (aka MSDs).
Musculoskeletal disorders (MSDs) are injuries to the muscles, tendons, and nerves, caused by too much physical stress causing tissue break down (i.e., tendonitis, back strain).
Phases of MSD and Chance of Recovery

Photo courtesy of NIOSH

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HIERARCHY OF ERGONOMIC CONTROLS

- BEST: Engineering** - Ideally use lifting equipment for weights >50 lbs
- BETTER: Work Practice** - Safe lifting techniques; team lift; rearrange work area
- GOOD: Scheduling** - Use additional workers; task rotation
- OK: Other** - Use knee pads; cushions; stretching exercises

Ergonomics TIPS **MOVE MATERIALS WITH LIFT ASSIST**
PLAN YOUR WORK
Use a cart or other lifting device to transport loads, make fewer trips, and avoid carrying materials on your shoulder.
Get a co-worker to help lift large-sized or heavy materials when a device is not available.
Keep floors clear of obstacles to minimize trip hazards and make it easier to use wheeled carts or equipment easier.

CPWR **Washington University School of Medicine**

Photo courtesy of Construction Solutions and Utilite

*Not an endorsement of any particular product.

Ergonomics TIPS **FLOOR WORK**

NO

Photo courtesy of the IIA

YES

Photo courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

On the Ground: Reduce work on floor.
Preassemble at waist height; Sit on floor; Kneel with knee pads or cushion

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NO

YES

When possible, bring material to waist height using a stand or a cart.
Position materials close to the task.

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

○ Ergonomics TIPS **REACH AND POSITIONING**



Green – Keep the work close (between shoulder and wrist).
Orange – Occasional reach to your fingertips.
Red – Do NOT reach beyond your fingertips (can cause shoulder and low back pain).

Bring it close: Bring work close to you or your body close to the task.

Image courtesy of Washington University in St. Louis

Overhead: Move your lift or move up on ladder to get as close to the task as possible.
Reaching out adds extra strain to your shoulder and lower back.



Photo courtesy of the UA

Use extended handled tools or tool extensions

○ Ergonomics TIPS **LIFT SMART**



Locked back, low disc pressure



Rounded back, high disc pressure

Maanas/Shutterstock.com



Photo courtesy of the MCAA

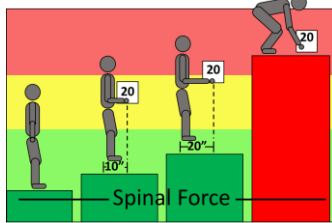


Image courtesy of Washington University in St. Louis



Bend knees, lock back, smooth movements

Keep the load close:
Reaching stresses the lower back



10 lbs at 25" = 250 lbs force on low back



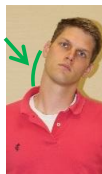
10 lbs at 10" = 100 lbs force on low back

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

○ Ergonomics TIPS **STRETCHING**

Stretching Benefits: Improves flexibility, movement, and posture. Do the stretches that relieve tightness.

CAUTION – Avoid pain while stretching. Use slow, smooth movements, hold the posture for 15 seconds.



Low Back Stretch: With your hands on your low back, lean backwards slightly, hold. Do stretch after working with back bent forward.

Neck Stretch: Remove hard hat. Tilt head slowly and gently to the right, hold. Tilt head to the left, hold.

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis



Shoulder Rolls: Slowly roll shoulders up and backwards. Repeat.



Forearm Stretch: With arm straight and hand up, gently pull palm back



toward body, hold. Turn hand over and pull back of hand toward body.



Hamstring & Calf Stretch: Extend one leg forward, with heel on floor, point toes up. Extend one leg back with foot on ground. Bend front knee to stretch calf of back leg.

Photos courtesy of the Healthy Work Center, Washington University School of Medicine in St. Louis

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