

ERGONOMICS DEMONSTRATION PROJECT

Landscaping Industry

December 2001



AN ERGONOMICS RULE DEMONSTRATION PROJECT IN THE LANDSCAPING INDUSTRY

*Washington State Department of Labor and Industries
December 2001*

Conducted in Collaboration with Classic Nursery and Landscaping Inc.
Redmond, Washington

///Introduction

As part of the implementation plan of the new Washington State Ergonomics Rule, the Department of Labor and Industries established demonstration projects through voluntary partnerships with businesses and labor. This report is a product of a demonstration project in the landscaping industry. The objective of this document is to help businesses in the landscaping and horticultural services prepare for the new rule. Working with a nursery and landscaping company in Redmond, WA, potential hazardous exposures to musculoskeletal risk factors were identified in a variety of jobs the company performs. Additionally, examples of reducing these hazardous levels were identified. By using the tables provided in this document employers will receive guidance in identifying activities performed in jobs or a combination of jobs that pose a hazard for work-related musculoskeletal disorders as described in the Ergonomics Rule.

///The Washington State Ergonomics Rule and the Landscaping Industry

On May 26, 2000 the Washington State Department of Labor and Industries (L&I) adopted the Ergonomics Rule, WAC 296-62-051, to reduce exposure to specific workplace hazards that can cause or aggravate work-related musculoskeletal disorders (WMSDs). WMSDs most often occur when the physical demands of work cause wear and tear on the body. Work-related musculoskeletal disorders involve the soft tissues of the body such as muscles, tendons, ligaments, joint, blood vessels and nerves. WMSDs can include muscle strains, ligament sprains, joint and tendon inflammation, pinched nerves, carpal tunnel syndrome and tendinitis.

The Rule requires that those employers with “caution zone jobs” – jobs where the employee’s typical work includes sufficient exposure to physical risk factors specified in the rule – must ensure that all employees working in these jobs and their supervisors receive ergonomics-awareness education. Additionally, employers must analyze each “caution zone job” to determine if an employee’s typical exposure to the risk factors is great enough to represent a WMSD hazard. If the exposure is great enough, as specified in the Rule, the employer must reduce the exposure below the hazardous level or to a level that is technologically and economically feasible.

The date businesses must comply with the new Ergonomics Rules is spread over a 5-year period, depending on the type of industry the business is in and the size of the business. The first to comply will be the larger employers in twelve industries identified as having the highest risk of WMSDs. The landscaping industry is one of these twelve industries. For those landscaping businesses with 50 or more full-time employees, ergonomics-awareness education and hazard analysis of caution zone jobs must be completed by July 1, 2002. Hazard

reduction must be completed by July 1, 2003. For those landscaping businesses with fewer than 50 full time employees, the compliance dates are one year later.

///Musculoskeletal Disorders and the Landscaping Industry

Landscaping and Horticultural Services is an industry that encompasses many different jobs. Most landscaping businesses offer services in different areas, landscaping, hardscaping, landscape maintenance and irrigation. Hardscaping includes the construction of retaining walls, pathways, and water features such as ponds and patios. Landscaping includes landscape installation – bed creation, planting, terracing, landscape maintenance such as tree service, lawn maintenance, seasonal cleanup and gardening. The work is physically demanding, often involving material handling such as lifting and carrying. Frequent injuries include sprains to the back, neck and shoulders from lifting sacks, bags, garbage cans or vegetation and from using non-powered tools. Based on a combination of numbers and rates of injuries, it is not surprising that Landscape and Horticultural Services ranks eleventh among all industries in Washington State for ergonomic-related injuries that lead to time-loss Workers' Compensation claims (workers being off the job for more than three days).

An examination of Washington State's Workers' Compensation claims between 1992-1998 found employers paid 1,243 time-loss claims for ergonomic-related injuries. This industry had a WMSD claims rate of 308 claims per 10,000 full-time equivalents (FTE). In comparison, the average WMSD claims rate for all state insured businesses was 129 claims per 10,000 FTE.

///The Landscaping Industry Ergonomics Demonstration Project

In the spring of 2001, a nursery and landscaping company in Redmond, WA, Classic Nursery and Landscaping Inc, was contacted by the Department of Labor and Industries and agreed to participate in a demonstration project. An employer/employee group was formed consisting of the owner, two members of the safety committee and a manager. The group identified the various landscaping services that they offer and then, with no previous ergonomic training, used their experience and knowledge of the jobs to identify potential musculoskeletal hazards that may exist in each of the landscaping services. An ergonomist from the Department of Labor and Industries reviewed and discussed the group's hazard identification and used field observations to verify their findings. The group's effort was directed towards WMSD hazard identification rather than "caution zone job" identification. This allowed the employer/employee group to focus their efforts on identifying jobs that would be required to change under the Ergonomics Rule. Following the hazard identification, examples of hazard controls were identified.

///The Musculoskeletal Hazard Tables and their Use


The following are two series of tables describing the potential musculoskeletal (WMSD) hazards that were identified by the employer/employee group. These tables are intended to provide guidance to an employer or employee in determining which jobs and activities, if performed long enough, are considered musculoskeletal hazards. The tables were created as a tool and not as the sole determinant in the hazard analysis. Although an attempt was made to analyze the most frequently performed jobs of the landscaping company this is not an exhaustive list of jobs for the landscaping industry. Some companies may find jobs and activities missing from the tables. In addition, it was not possible to confirm the presence of WMSD hazards in all the jobs identified by the employer/employee group through field observation due to the seasonal nature of some of the jobs. Observations were limited to the types of jobs the participating company was hired to do during the demonstration project period. However, a WMSD hazard determination was made based on the employer/employee group's expertise and knowledge of the jobs.

In the first series of tables, the identified WMSD hazards are sorted by the job. These tables identify activities in various landscaping jobs that, if performed long enough by themselves, pose a musculoskeletal hazard. It is recognized that landscaping involves a great deal of manual material handling: for example, lifting and the amount lifted can vary immensely. Using the lifting calculator of Appendix B of the Ergonomics Rule and commonly viewed characteristics of the lift, the maximum allowable weight to be lifted was determined and included in the tables. Often the maximum weight will not be reached but it was important to include this information in the tables for those rare cases.

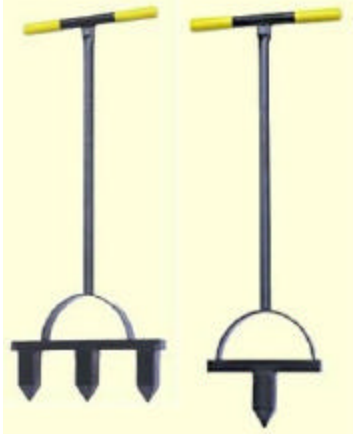
Under the Ergonomics Rule, duration of exposure to musculoskeletal hazards is calculated over the entire day and not by the time exposed in each individual job done during the day. The second series of tables uses the same information as the first series of tables; however, jobs and their corresponding activities are grouped by common risk factors. In some cases these activities alone may not pose a WMSD hazard, but when performed with other activities with common risk factors, the total exposure over the course of the day may create a WMSD hazard.

MUSCULOSKELETAL HAZARD TABLES SERIES ONE: SORTED BY JOB

CAUTION: While the following tables describe potential WMSD hazards that can occur in each activity, the final determination is based on CUMULATIVE EXPOSURE OVER THE ENTIRE WORK DAY and the total time across all task performed must be considered.

JOB: PLANTING <i>Considerations: size and number of plants handled, size of beds</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Unloading plants	Unloading plants off truck and moving to planting site	Heavy, Frequent Lifting: lifting zone: waist-shoulder, close to body duration: more than 1 hour frequency: 1 lift/minute MAX ALLOWABLE WEIGHT LIFTED: 67 lbs	<ul style="list-style-type: none"> •Use 2 workers to lift plants •Use tree carts or tree caddies if terrain will allow
Planting	Using a shovel to dig a hole	Awkward Postures: Working with back bent more than 45° for more than 2 hours	<ul style="list-style-type: none"> •Use hole digger instead of shovel 
	Setting bedding plants	Awkward Postures: Kneeling for more than 4 hours	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue •Change positions frequently between kneeling, squatting and bending forward

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		Awkward Postures: Squatting for more than 4 hours	bending forward •Use a garden stool, if space allows
		Awkward Postures: Working with back bent more than 45° for more than 2 hours	•Use hole digger to make holes for plants
			 <p>•Use knee pads (<i>These will not eliminate or reduce hazard but will provide cushioning</i>)</p>

Example of Job Hazard:



Job: Planting
Activity: Setting bedding plants

WMSD HAZARD
Awkward Postures, squatting for more than 4 hours

JOB: GRADING/RAKING			
<i>Considerations: type of materials, size of area, grad of land</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Grading area	Using grading rake to distribute material	Awkward Posture: Bending back greater than 45° for more than 2 hours	•Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue

JOB: TREE AND BRUSH CLEARING

Considerations: size and slope of area, type of brush cleared, soil conditions


ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Clearing area	Using chainsaw to cut branches	Hand-Arm Vibration: Based on an 8-hour equivalent vibration level of 5 m/s ²	<ul style="list-style-type: none"> •Rotate workers through this activity •As older chainsaws are replaced, choose models with vibration reducing features
	Using handsaw and/or axe to clear area	High Hand Force AND Highly Repetitive Motion: Gripping with a force of 10 lbs or more per hand or more AND using the same motion with little or no variation every few seconds for more than 3 hours/day	<ul style="list-style-type: none"> •Use motorized brush cutters when conditions will allow •Rotate workers through the activity

JOB: DEMOLITION

ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Breaking material	Using jack hammer	Hand-Arm Vibration: Based on an 8-hour equivalent vibration level of 5 m/s ²	<ul style="list-style-type: none"> •Rotate workers through this activity •Use equipment with vibration reducing features, reducing vibration levels below 5 m/s² •Use jackhammer attachment on bobcat if available
	Using sledge hammer	High Hand Force AND Highly Repetitive Motion: Gripping unsupported object that weighs 10 lbs or more per hand OR with a force of 10 lbs or more per hand AND using the same motion with little or no variation every few seconds for more than 3 hours	<ul style="list-style-type: none"> •Rotate workers through this activity •Use mechanized tools with vibration levels below 5 m/s²
	Using bobcat	No WMSD hazards	No controls required

JOB: PRUNING, HEDGE TRIMMING AND LEAF PICK UP

Considerations: type and size of tree/shrub, dumping site

ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
	Using secateurs and loppers	<p>Highly Repetitive Motion AND High Hand Force AND Awkward Postures: Using the same motion with little or no variation every few seconds AND wrists bent in 30° or more flexion/45° or more extension/30° or more ulnar deviation AND gripping with 10 lbs or more per hand force for more than 2 hours/day</p> <p>Awkward Postures: Working with hand(s) above the head for more than 4 hrs/day</p>	<ul style="list-style-type: none"> •Reduce high hand force by using the right tool for the job. Different sizes of branches require different sized loppers, pruners, secateurs •Maintain tools; prevent rust, keep blades sharp •Reduce hand force by using ratcheting or geared tools •Use saws for thicker branches
	Using chainsaw to cut branches	<p>Hand-Arm Vibration: Based on an 8-hour equivalent vibration level of 5 m/s²</p>	<ul style="list-style-type: none"> •Rotate workers through this activity •As older chainsaws are replaced, choose models with vibration reducing features
	Using manual hedge shears	<p>Highly Repetitive Motion AND High Hand Force AND Awkward Postures: Using the same motion with little or no variation every few seconds AND wrists bent in 30° or more flexion/45° or more extension/30° or more ulnar deviation AND gripping with 10 lbs or more per hand force for more than 2 hours/day</p>	<ul style="list-style-type: none"> •Use motorized hedge trimmers, pneumatic shears •Maintain tools; prevent rust, keep blades sharp
		<p>Awkward Postures: Working with hand(s) above the head for more than 4 hrs/day</p>	<ul style="list-style-type: none"> •Use tools with longer handles for higher branches •Use ladders to reach higher branches
	Using motorized hedge trimmers	<p>High Hand Force: Gripping unsupported object that weighs 10 lbs or more per hand</p>	<ul style="list-style-type: none"> •Use shoulder strap to help support the weight of the tool •Rotate workers through this activity

Example of Job Hazard




Job: Pruning and Leaf Pick Up
Activity: Using Pruning Shears

WMSD HAZARD

Awkward Posture: Working with hand(s) above the head for more than 4 hours

JOB: SOD LAYING			
<i>Considerations: size of area, grade of land, proximity of unload area to work area,</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Unloading sod	Unloading sod from truck	No WMSD Hazards, if weight under 60 lbs. MAX ALLOWABLE WEIGHT LIFTED: 60 lbs	
	Unloading sod from pallet to wheelbarrow	No WMSD Hazards, if weight under 60 lbs. MAX ALLOWABLE WEIGHT LIFTED: 60 lbs	<i>Heavy, Frequent Lifting: lifting zone: below knee duration: 1-2 hours frequency: 2-3 lifts/minute</i>
	Using wheelbarrow to move sod to work area	Heavy, Frequent Lifting: lifting zone: knee-waist, close to body duration: 1-2 hours frequency: 1 lift/2-5 mins MAX ALLOWABLE WEIGHT LIFTED: 86 lbs	<ul style="list-style-type: none"> •Reduce the number of rolls of sod loaded into the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
Laying sod	Spreading sod on to ground in strips	Awkward Postures: kneeling for more than 4 hours	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use knee pads (<i>These will not eliminate or reduce hazard but will provide cushioning</i>)
		Awkward Postures: Squatting for more than 4 hours	
		Awkward Postures: Bending forward more than 45° for more than 2 hours	
Edging sod	Using sod edger	No WMSD hazards	No controls required

JOB: IRRIGATION INSTALLATION <i>Considerations: length and depth of ditch, soil conditions</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Digging ditch	Using ditching shovel	High Hand Force: Gripping with a force of 10 lbs or more per hand for more than 4 hours/day Awkward Postures: Back bent greater than 45° for two or more hours	<ul style="list-style-type: none"> •Rotate workers through this activity •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue 
	Using walk-behind trencher	High Hand Force: Gripping an object with a force of 10 lbs or more per hand for more than 4 hours	<ul style="list-style-type: none"> •Rotate workers through this activity
Unloading material	Unload pipes from trucks	No WMSD hazards	No controls required
Laying pipes	Laying pipe into the ditches and connecting system	Awkward Postures: Kneeling for more than 4 hours	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows •Use knee pads (<i>These will not eliminate or reduce hazard but will provide cushioning</i>)
		Awkward Postures: Squatting for more than 4 hours	
		Awkward Postures: Working with back bent more than 45° for more than 2 hours	
Replacing soil into ditch	Using shovel	Awkward Postures: Bending back more than 45° for more than 2 hours	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue

JOB: MATERIAL MOVING			
<i>Considerations: type and quantity of material, distance to move, grade of land</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Move material	Using shovel to load wheelbarrow	High Hand Force: Gripping an object with a force of 10 lbs or more per hand for more than 4 hours	
		Awkward Posture: Bending back greater than 45° for more than 2 hours	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
		Heavy, Frequent Lifting: lifting zone: knee-waist, mid-range distance duration: 1-2 hours frequency: 4-5 lifts/min MAX ALLOWABLE WEIGHT LIFTED: 38 lbs	<ul style="list-style-type: none"> •Reduce size of load in the shovel •Use more than one worker to move material
	Heavy, Frequent Lifting with Twisting : lifting zone: knee-waist, mid-range distance with twisting duration: 1-2 hours frequency: 4-5 lifts/min MAX ALLOWABLE WEIGHT LIFTED: 33 lbs	<ul style="list-style-type: none"> •Position wheelbarrow more to the front than to the side of the worker •Reduce size of load in the shovel •Use more than one worker to move material 	
	Using wheelbarrow to move material to work area	Heavy, Frequent Lifting: lifting zone: knee-waist, close to body duration: 1-2 hours frequency: 1 lift/2-5 mins MAX ALLOWABLE WEIGHT LIFTED: 86 lbs	<ul style="list-style-type: none"> •Reduce the size of load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
	Using bobcat or large equipment like a tractor	No WMSD hazard	No controls required



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Grading area	Using grading rake to distribute material	High Hand Force: Gripping an object with a force of 10 lbs or more per hand for more than 4 hours	
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Example of Job Hazard:



Job: Material Moving
Activity: Using shovel to load wheelbarrow

WMSD HAZARD
 High hand force: gripping with a force of 10 lbs or more per hand for more than 4 hours

Example of Job Hazard:



Job: Material Moving
Activity: Using wheelbarrow to move material to work area

WMSD HAZARD
 Heavy, Frequent Lifting: maximum allowable weight lifted is 86 lbs

JOB: ROCK WALL BUILDING

Considerations: height and length of rock wall, proximity of unload area to work area

ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Unload rocks	Moving rocks to work area with a wheelbarrow	Heavy, Frequent Lifting (from ground or from truck): lifting zone: below knee, close to body duration: 1-2 hours frequency: 2-3 lifts/min MAX ALLOWABLE WEIGHT LIFTED: 60 lbs	<ul style="list-style-type: none"> •Limit the size of stone chosen for wall •Use two workers to move stone •Use mechanized material movers
	Using bobcat to move material	No WMSD hazards	No controls required
Build wall	Layering rocks to form wall	Awkward Postures: Kneeling for more than 4 hours	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use knee pads (<i>These will not eliminate or reduce hazard but will provide cushioning</i>)
		Awkward Postures: Squatting for more than 4 hours	
		Awkward Postures: Bending forward more than 45° for more than 2 hours	
		Heavy, Frequent Lifting (from ground): lifting zone: below knee, close to body duration: 2 hrs or more frequency: 2-3 lifts/min MAX ALLOWABLE WEIGHT LIFTED: 46 lbs	<ul style="list-style-type: none"> •Limit the size of stone chosen for wall •Use two workers to move stone

Example of Job Hazard:



Job: Rock Wall Building
Activity: Build Wall

WMSD HAZARD

Awkward Posture: Bending forward more than 45° for more than 2 hours

JOB: BUILDING PATHWAYS			
<i>Considerations: length of pathway, soil conditions</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Excavate area	Using pick and shovel to form pathway	Awkward Postures: Bending forward more than 45° for more than 2 hours	•Attach a handle to the shaft of the shovel to improve leverage, posture and reduce fatigue
		High Hand Force: Gripping unsupported object that weighs 10 lbs or more per hand OR with a force of 10 lbs or more per hand for more than 4 hours	•Use motorized tiller to loosen and break up the ground
Install edging	Laying edging into ditch	No WMSD hazard	No controls required
	Securing edging using stakes and hammer	No WMSD hazard	No controls required
Install weed barrier	Laying weed barrier onto pathway	No WMSD hazard	No controls required
Cover pathway with material	Using shovel to move material to area and spread	High Hand Force: Gripping an object with a force of 10 lbs or more per hand for more than 4 hours	
		Awkward Posture : Bending back greater than 45° for more than 2 hours	•Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
		Heavy, Frequent Lifting: lifting zone: knee-waist, mid-range distance with twisting duration: 1-2 hours frequency: 4-5 lifts/min MAX ALLOWABLE WEIGHT LIFTED: 33 lbs	•Reduce size of load in the shovel •Use more than one worker to move material
	Using wheelbarrow to move material to area	Heavy, Frequent Lifting: lifting zone: knee-waist, close to body duration: 1-2 hours frequency: 1 lift/2-5 mins MAX ALLOWABLE WEIGHT LIFTED: 86 lbs	•Reduce the size of the load in wheelbarrow •Use a 4-wheeled wheelbarrow to transport material

JOB: PAVERS AND PATIOS

Considerations: size of patio, size of paver selection, proximity of unload area to work area

ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Excavate area	Using shovel and/or pick to clear area	Awkward Posture: Bending forward greater 45° for more than 2 hours	•Attach a handle to the shaft of the shovel to improve leverage, posture and reduce fatigue
		High Hand Force: Gripping an object with a force of 10 lbs more per hand for more than 4 hours	•Use motorized tiller to loosen and break up the ground
	Using bobcat	No WMSD hazards	No controls required
Grade area	Moving grading material (sand, gravel) to work area using a wheelbarrow	Heavy, Frequent Lifting: lifting zone: knee-waist duration: 1-2 hours frequency: 1 lift/ 2-5 min MAX ALLOWABLE WEIGHT LIFTED: 86 lbs	•Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
	Using shovel to distribute gravel over area	Awkward Posture: Bending forward greater than 45° for more than 2 hours	•Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
	Using grading rake to distribute sand over area	Awkward Posture: Bending forward greater than 45° for more than 2 hours	•Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
	Using motorized compactor/tamper	Hand-Arm Vibration, if equipment not self-supporting: Based on an 8-hour equivalent vibration level of 5 m/s ²	•Rotate workers through this job •Use compactors with vibration-reducing features •Use compactors that are self-standing so workers do not support its weight
Move pavers to area	Using a wheelbarrow to move materials to work area	Heavy, Frequent Lifting: lifting zone: knee-waist duration: 1-2 hours frequency: 1 lift/ 2-5 min MAX ALLOWABLE WEIGHT LIFTED: 86 lbs	•Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material •Use mechanized material movers
Lay pavers out	Spreading pavers over graded area	Awkward Posture: Kneeling for more than 4 hours	•Change positions frequently between kneeling, squatting and bending forward •Use knee pads (<i>These will not eliminate or reduce hazard but will increase comfort</i>)
		Awkward Posture: Squatting for more than 4 hours	
		Awkward Postures: Bending forward more than 45° for more than 2 hours	

		<p>Heavy, Frequent Lifting: lifting zone: below the knee, with twisting duration: more than 2 hrs frequency: 2-3 lifts/min MAX ALLOWABLE WEIGHT LIFTED: 39 lbs</p>	<ul style="list-style-type: none"> •Use two workers to move pavers •Use mechanized material movers (check website for name)
Fill gaps with sand	Using compactors to pack sand	<p>Hand-Arm Vibration, if equipment not self-supporting: Based on an 8-hour equivalent vibration level of 5 m/s²</p>	<ul style="list-style-type: none"> •Rotate workers through this job •Use compactors with vibration-reducing features •Use compactors that are self-standing so workers do not support its weight

Example of Job Hazard:



Job: Pavers and Patios
Activity: Lay pavers out

WMSD HAZARD

Worker on the left,
Awkward Posture: Bending forward more than 45° for more than 2 hours

Worker on the right,
Awkward Posture: Kneeling for more than 4 hours

JOB: POND BUILDING AND INSTALLATION

Considerations: size of pond, soil conditions, slope/grade of area, access to area

ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Excavate area	Digging hole for liner with shovel and/or pick	Awkward Postures: Bending back greater than 45° for more than 2 hours	•Attach a handle to the shaft of the shovel to improve leverage, posture and reduce fatigue
		High Hand Force: Gripping unsupported object that weighs 10 lbs or more per hand OR with 10 lbs or more of force per hand for more than 4 hours	•Use motorized tiller to loosen and break up the soil
	Using bobcat to dig hole	No WMSD hazards	No controls required
Finishing	Moving rocks to area with wheelbarrow	Heavy, Frequent Lifting: lifting zone: knee-waist duration: 1-2 hours frequency: 1 lift/ 2-5 min MAX ALLOWABLE WEIGHT LIFTED: 86 lbs	•Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
		Setting rocks around pond area	Awkward Postures: Bending back greater than 45° for more than 2 hours
		Awkward Posture: Kneeling for more than 4 hours	
		Awkward Posture: Squatting for more than 4 hours	


Example of Job Hazard:



Job: Pond Building and Installation
Activity: Finishing, Setting rocks around pond area

WMSD HAZARD

Awkward Posture: Squatting for more than 4 hours

JOB: YARD MAINTENANCE			
<i>Considerations:</i>			
ACTIVITY	DESCRIPTION	POTENTIAL HAZARD	HAZARD CONTROL EXAMPLES
Mowing	Controlling mower with hand brakes	High Hand Force: Gripping an object with a force of 10 lbs or more per hand for more than 4 hours	•Rotate workers through this activity
	Using hand held motorized trimmers/edgers	High Hand Force: Gripping an object weighing 10 lbs or more or gripping with a force of 10 lbs or more per hand for more than 4 hours	•Use shoulder strap to distribute weight
Weeding	Picking weeds from beds	Awkward Postures: Kneeling for more than 4 hours	•Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows •Use knee pads (<i>These will not eliminate or reduce hazard but will provide cushioning</i>)
		Awkward Postures: Squatting for more than 4 hours	
		Awkward Postures: Bending forward more than 45° for more than 2 hours	
	Using lawn rake	High Hand Force: Gripping unsupported object that weighs 10 lbs or more per hand OR with a force of 10 lbs or more per hand for more than 4 hours	•Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
			
	Using scufflehoe	High Hand Force: Gripping unsupported object that weighs 10 lbs or more per hand OR with a force of 10 lbs or more per hand for more than 4 hours	•Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue •Use motorized tiller to loosen dirt
Debris Blowing	Holding hose to blow debris from area	No WMSD hazard, if shoulder strap or back pack is used	No controls required
Fertilizing	Spreading fertilizer on lawn	No WMSD hazards	No controls required
	Spreading fertilizer on plants	No WMSD hazards	No controls required

Example of Job Hazard:



Job: Yard Maintenance
Activity: Mowing

WMSD HAZARD

High Hand Force: Gripping an object weighing 10 lbs or more or gripping an object with a force of 10 lbs or more per hand

MUSCULOSKELETAL HAZARD TABLES SERIES TWO: SORTED BY WMSD HAZARD

WMSD Hazard: Awkward Postures, Working with back bent more than 45° for more than 2 hours			
JOB	ACTIVITY	DESCRIPTION	HAZARD CONTROL EXAMPLES
Planting	Planting	Using shovel to dig hole	<ul style="list-style-type: none"> •Use hole digger instead of shovel •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
		Setting bedding plants	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows
Irrigation Installation	Digging ditches	Using ditching shovel	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
	Laying pipes	Laying pipe into the ditches and connection system	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward
	Replacing soil into ditch	Using a shovel	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
Material Moving	Move material	Using a shovel	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
Grading/Raking	Grading area	Using grading rake and/or shovel to distribute material	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
Sod Laying	Laying sod	Spreading sod onto ground	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward
Rock Wall Building	Build wall	Layering rocks to form wall	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward
Building Pathways	Excavate area	Using shovel to form pathway	<ul style="list-style-type: none"> •Attach a handle to the shaft of the shovel to improve leverage, posture and reduce fatigue
	Cover pathway with material	Using shovel to move material to area and spread	<ul style="list-style-type: none"> •Attach a handle to the shaft of the shovel to improve leverage, posture and reduce fatigue
Pavers and Patios	Excavate area	Using shovel to clear area	<ul style="list-style-type: none"> •Attach a handle to the shaft of the shovel to improve leverage, posture and reduce fatigue
	Grade area	Using shovel to distribute gravel over area	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue

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		Use grading rake to distribute sand over area	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
	Lay pavers out	Spreading pavers over graded area	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward
Pond Building and Installation	Excavate area	Digging hole for liner with shovel	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
	Finishing	Setting Rocks around pond area	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward
Yard Maintenance	Weeding	Picking weeds from beds	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows

WMSD Hazard: Awkward Postures, Working with hand(s) above the head for more than 4 hours

JOB	ACTIVITY	DESCRIPTION	HAZARD CONTROL EXAMPLES
Pruning, Hedge Trimming and Leaf Pick Up	Pruning	Using secateurs and loppers	<ul style="list-style-type: none"> •Use loppers with longer handles for higher branches •Use ladder to reach higher branches
	Hedge Trimming	Using manual hedge shears	<ul style="list-style-type: none"> •Use tools with longer handles for higher branches •Use ladders to reach higher branches

WMSD Hazard: Awkward Postures, Kneeling for more than 4 hours Awkward Postures, Squatting for more than 4 hours			
JOB	ACTIVITY	DESCRIPTION	HAZARD CONTROL EXAMPLES
Planting	Planting	Setting bedding plants	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>
Irrigation Installation	Laying pipes	Laying pipe into the ditches and connecting system	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>
Sod Laying	Laying sod	Spreading sod over the ground	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>
Rock Wall Building	Build wall	Layering rocks to form wall	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>
Pavers and Patios	Lay pavers out	Spreading pavers over graded area	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>
Pond Building and Installation	Finishing	Setting rocks around pond area	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>
Yard Maintenance	Weeding	Picking weeds from bend	<ul style="list-style-type: none"> •Change positions frequently between kneeling, squatting and bending forward •Use a garden stool, if space allows •Use knee pads <i>(These will not eliminate or reduce hazard but will provide cushioning)</i>

WMSD Hazard: Heavy, Frequent, Awkward Lifting			
JOB	ACTIVITY	DESCRIPTION	HAZARD CONTROL EXAMPLES
Planting	Unloading plants	Unload plants off truck and move to planting site: Maximum lift allowed: 67 lbs	<ul style="list-style-type: none"> •Use 2 workers to lift plants •Use tree cars or tree caddies, if terrain will allow
Material Moving	Move material	Using shovel to load wheelbarrow Maximum lift allowed: 38 lbs	<ul style="list-style-type: none"> •Reduce size of load in the shovel •use more than one worker to move material
		Twisting while using shovel to load wheelbarrow Maximum lift allowed: 33 lbs	<ul style="list-style-type: none"> •Position wheelbarrow more to the front than the side of the worker •Reduce size of load in the shovel •Use more than one worker to move material
		Using wheelbarrow to move material to work area Maximum lift allowed: 86 lbs	<ul style="list-style-type: none"> •Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
Sod Laying	Unloading sod	Unloading sod from truck Maximum lift allowed: 60 lbs	No WMSD hazard if weight under 60 lbs
		Unloading sode from pallet to wheelbarrow Maximum lift allowed: 60 lbs	No WMSD hazard if weight under 60 lbs
		Using wheelbarrow to move sod to work area Maximum lift allowed:86 lbs	<ul style="list-style-type: none"> •Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
Rock Wall Building	Unload rocks	Moving rocks to work area with a wheelbarrow Maximum lift allowed: 60 lbs	<ul style="list-style-type: none"> •Limit the size of stone chosen for wall •Use two workers to move rocks •use mechanized material movers
	Build wall	Layering rocks to form wall Maximum lift allowed: 46 lbs	<ul style="list-style-type: none"> •Limit the size of stone chosen for wall •Use two workers to move stone
Building Pathways	Cover pathway with material	Using shovel to move material to area and spread Maximum lift allowed: 33 lbs	<ul style="list-style-type: none"> •Reduce size of load in the shovel •Use more than one worker to move material
		Using wheelbarrow to move material to area Maximum lift allowed: 86 lbs	<ul style="list-style-type: none"> •Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material

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Pavers and Patios	Grade area	Moving grading material (sand, gravel) to work area using a wheelbarrow Maximum lift allowed: 86 lbs	<ul style="list-style-type: none"> •Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
	Move pavers to area	Using a wheelbarrow to move materials to work area Maximum lift allowed: 86 lbs	<ul style="list-style-type: none"> •Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material
	Lay pavers out	Spreading pavers over graded area Maximum lift allowed: 39 lbs	<ul style="list-style-type: none"> •Use two workers to move pavers •Use mechanized material movers
Pond Building and Installation	Finishing	Moving rocks to area with wheelbarrow Maximum lift allowed: 86 lbs	<ul style="list-style-type: none"> •Reduce the size of the load in the wheelbarrow •Use a 4-wheeled wheelbarrow to transport material

WMSD Hazard: High Hand Force

Gripping unsupported object weighing 10 lbs or more per hand or gripping with a force of 10 lbs or more per hand for more than 4 hours

WMSD Hazard: High Hand Force with Awkward Postures and/or Repetitive Motions

Gripping unsupported object weighing 10 lbs or more per hand or gripping with a force of 10 lbs or more per hand for more with awkward postures or repetitive motion for more than 3 hours

JOB	ACTIVITY	DESCRIPTION	WMSD HAZARD	HAZARD CONTROL EXAMPLES
Tree and Brush Clearing	Clearing area	Using handsaw and/or axe to clear area	High Hand Force, Highly Repetitive Motions	<ul style="list-style-type: none"> •Use motorized brush cutters when conditions will allow •Rotate workers through this activity
Pruning, Hedge Trimming and Leaf Pick Up	Pruning	Using secateurs and loppers	High Hand Force, Highly Repetitive Motions, Awkward Postures	<ul style="list-style-type: none"> •Reduce hand force by using the right tool for the job: different sizes of branches require different sized shears •Maintain tools; prevent rust, keep blades sharp •Reduce hand force by using ratcheting or geared pruners •Use saws for thicker branches
	Hedge Trimming	Using manual hedge shears	High Hand Force, Highly Repetitive Motions, Awkward Postures	<ul style="list-style-type: none"> •Use motorized hedge trimmers, pneumatic shears •Maintain tools; prevent rust, keep blades sharp
		Using motorized hedge trimmers	High Hand Force	<ul style="list-style-type: none"> •Use shoulder strap to help support the weight of the tool •Rotate workers through this activity
Irrigation Installation	Digging ditch	Using ditching shovel	High Hand Force	•Rotate workers through this activity
		<i>Using walk-behind trencher</i>	High Hand Force	•Rotate workers through this activity
Material Moving	Move material	Using shovel to load wheelbarrow	High Hand Force	
	Grading area	Using grading rake to distribute material	High Hand Force	
Demolition	Breaking material	Using sledge hammer	High Hand Force, Highly Repetitive Motions	<ul style="list-style-type: none"> •Rotate workers through this activity •Use mechanized tools with vibrations levels below 5 m/s² •Use jackhammer attachment on bobcat, if available

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Building Pathways	Excavate area	Using pick and shovel to form pathway	High Hand Force	
	Cover pathway with material	Using shovel to move material to area and spread	High Hand Force	
Pavers and Patios	Excavate area	Using shovel and/or pick to clear area	High Hand Force	
Pond Building and Installation	Excavate area	Digging hole for liner with shovel and/or pick	High Hand Force	<ul style="list-style-type: none"> •Use motorized tiller to loosen and break up the soil
Yard Maintenance	Mowing	Controlling mower with hand brakes	High Hand Force	<ul style="list-style-type: none"> •Rotate workers through this activity
		Using hand held trimmers/edgers	High Hand Force	<ul style="list-style-type: none"> •Use shoulder strap to distribute weight
	Weeding	Using lawn rake	High Hand Force	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
		Using scuffle hoe	High Hand Force	<ul style="list-style-type: none"> •Attach a handle to the shaft of the tool to improve leverage, posture and reduce fatigue
	Debris Blowing	Holding hose to blow debris from area	No WMSD hazard, if shoulder strap or back pack is used	

WMSD Hazard: Hand-Arm Vibration (Based on an 8-hour equivalent vibration level of 5 m/s²)			
JOB	ACTIVITY	DESCRIPTION	HAZARD CONTROL EXAMPLES
Tree and Brush Clearing	Clearing area	Using chainsaw to cut branches	<ul style="list-style-type: none"> •Rotate workers through this activity •As older chainsaws are replaced, choose models with vibration reducing features
Pruning and Leaf Pick Up	Pruning	Using chainsaw to cut branches	<ul style="list-style-type: none"> •Rotate workers through this activity •As older chainsaws are replaced, choose models with vibration reducing features
Demolition	Breaking material	Using jack hammer	<ul style="list-style-type: none"> •Rotate workers through this activity •Use equipment with vibration reducing features, reducing vibration levels below 5 m/s²
Pavers and Patios	Grade area	Using motorized compactor/tamper, if not self-supporting	<ul style="list-style-type: none"> •Rotate workers through this activity •Use compactors with vibration-reducing features •Use compactors that are self-standing so workers do not support its weight
	Fill gaps with sand to set pavers	Using motorized compactor/tamper to pack sand	<ul style="list-style-type: none"> •Rotate workers through this activity •Use compactors with vibration-reducing features •Use compactors that are self-standing so workers do not support its weight

///Further Suggestions for WMSD Hazard Reduction

In addition to the identification of WMSD hazards, the Ergonomics Rule also mandates that the hazards must be eliminated or reduced to the extent technologically and economically feasible. In the previous tables, hazard control examples were given. These included both engineering controls and work practices. In addition, advanced planning about where and how jobs will be performed can be used to reduce hazards. Within the limitations of the delivery equipment, work sites can be examined prior to materials being delivered to determine the area that is closest and/or provides the easiest access between delivery site and work area. If outside contractors are being used to carry the material, delivery instructions should specify the dumping site. Additionally, a contract will usually consist of a variety of jobs. When possible, consideration should be given to scheduling these jobs to allow workers to rotate through a variety of jobs that use different postures through the day.

At the work site, it is important for workers to use the right tool for each job although tool selection is generally not an issue under the Ergonomics Rule. For example, square-pointed shovels are traditionally used as scoops for gravel, soil and small piles of debris and leveling areas for patios or walkways. This tool is not meant for digging holes or creating trenches. Round-pointed shovels can also be used to scoop or shovel but are also designed to dig. An irrigation shovel is the same basic design as a round-point shovel but has a straighter shank that is useful for making planting holes and ditches.

Finally, landscapers may consider renting equipment for more difficult or larger jobs such as excavating or land clearing. The cost of the rental is often offset by the reduced time spent to complete the job, the reduction in labor needed and the reduced risk of injury to the worker.

///For More Information about the Washington State Ergonomics Rule

Additional information and educational material about ergonomics and the Ergonomics Rule can be obtained by contacting the Department of Labor and Industries or by visiting their website at www.lni.wa.gov/wisha/ergo.