

# Memo

**To:** Trustee Messer  
**From:** Robert Kosin  
**CC:** Board of Trustees, Village President  
**Date:** June 24, 2011  
**Re:** Building Code Equine Reference

HORSE FACILITIES HANDBOOK is a product of twelve years of dedicated research from the agricultural departments of two Universities: Iowa State University and the University of Illinois. It is proposed that this is a reference to be added to those in the Building Code. An Ordinance to this effect has been drafted for consideration by the Board of Trustees.

Wheeler, Eileen; Koenig, Bill; Harmon, Jay; Murphy, Pat; Freeman, David.  
Horse Facilities Handbook. Copyright 2005, MidWest Plan Service.  
ISBN 0-89373-098-X

# HORSE FACILITIES HANDBOOK

**Your guide to**

**Site Planning**

**Stables**

**Pastures**

**Paddocks**

**Arenas**

**Outdoor Facilities**

**Breeding Facilities**

**Feed Storage**

**Bedding**

**Fencing**

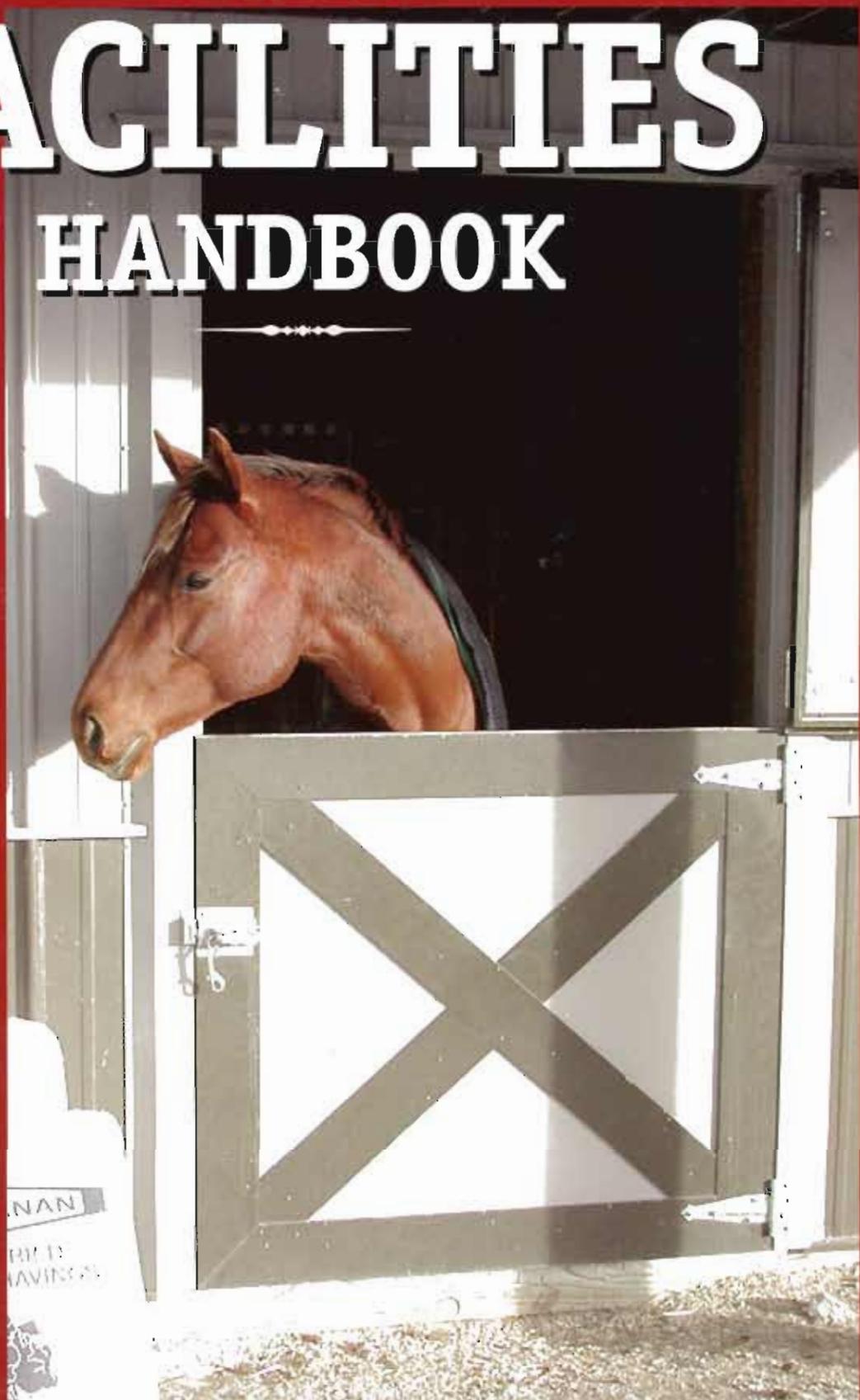
**Environmental Control**

**Manure Management**

**Utilities**

**Fire Protection**

**Emergency Response**



**Eileen Wheeler • Bill Koenig • Jay Harmon • Pat Murphy • David Freeman**

Copyright© 2005, MidWest Plan Service

All rights reserved. First edition.

This book may not be reproduced, in whole or in part, including illustrations, in any form without permission from the publishers.

Designed by Kathy J. Walker

MidWest Plan Service

122 Davidson Hall

Iowa State University, Ames, Iowa 50011-3080

For additional copies of this publication and a free catalog of other agricultural publications, call 1-800-562-3618 or visit our website at: [www.mwpsHQ.org](http://www.mwpsHQ.org)

Library of Congress

Cataloging-in-Publication Data

Horse facilities handbook / [Eileen Wheeler ... et al.].

p. cm.

Includes bibliographical references and index.

ISBN 0-89373-098-X

1. Stables—Design and construction—Handbooks, manuals, etc.

2. Horses—Housing—Handbooks, manuals, etc.

I. Wheeler, Eileen.

TH4930.H67 2005

636.1'0831—dc22 2004061036

CIP

#### Final Author Committee

Eileen Wheeler (Chair), Associate Professor and Extension Engineer, Penn State University  
Bill Koenig, MWPS Engineer  
Jay Harmon, Associate Professor and Extension Engineer, Iowa State University  
Pat Murphy, Professor and Extension Engineer, Kansas State University  
David Freeman, Professor and State Equine Specialist, Oklahoma State University

#### Special Acknowledgement

This book has gone through drafts over a more than 15 year period. MWPS would like to acknowledge the following individuals for their significant contributions to the many drafts of this book:

Raymond Huhnke, Agricultural Engineer, Oklahoma State University  
Mike Brugger, Agricultural Engineer, the Ohio State University  
Larry Turner, Agricultural Engineer, University of Kentucky  
John Leech, former Livingston County District Equine Agent, Michigan State University  
Eldridge Collins, Agricultural Engineer, Virginia Tech (retired)  
Howard Person, Agricultural Engineer, Michigan State University (retired)  
Mark Russell, Professor, Animal Science, Purdue University  
Craig Wood, Professor, Animal Science, University of Kentucky

MWPS would like to thank the following equine facilities for allowing us to take or use photographs of their facilities:

Clear Creek Stables, Inc., Ames, Iowa  
Fox Creek Equestrian Center, Manhattan, Kansas  
Iowa State University Horse Farm, Ames, Iowa  
Red Horse Ranch, Ames, Iowa  
Shamrock Stables, Ames, Iowa  
Timber Ridge Stables, Boone, Iowa

#### Reviewers

Michael Brugger, Associate Professor of Agricultural Engineering, The Ohio State University  
Bob Coleman, Animal Scientist and Extension Horse Specialist, University of Kentucky  
Ted Funk, Associate Professor and Extension Engineer, University of Illinois  
Debra Hagstrom, Associate Professor of Animal Science, University of Illinois  
Jay Solomon, Extension Educator of Engineering Technology, University of Illinois

...And Justice for All.

MidWest Plan Service does not discriminate on the basis of race, color, age, religion, national origin, sexual orientation, sex, marital status, disability, or status as a U.S. Vietnam Era Veteran. Any persons having inquiries concerning this may contact the Director of Equal Opportunity and diversity, 515 294-7612.

# C O N T E N T S

<b>Preface</b>	<b>v</b>	<b>4. Pastures, Paddocks, Pens, and Shelters</b>	<b>67</b>
<b>Chapter</b>		Pastures and Paddocks	67
<b>1. Quick Reference</b>	<b>1</b>	<i>Selecting Grasses and Legumes</i>	68
Influence of Horse Behavior on Design	1	<i>Sizing and Laying Out the Pasture</i>	68
Horse Size Estimation	2	<i>Managing the Pasture</i>	69
Data Tables	3	Pens	70
		Free-Choice Shelter	70
<b>2. Site Planning</b>	<b>5</b>	<i>Buildings</i>	71
Site Selection	6	<i>Sunshade</i>	74
Site Layout	7	<i>Windbreak Fences</i>	77
<i>Separation Distances</i>	8		
<i>Zone Planning</i>	8	<b>5. Arenas and Training Facilities</b>	<b>81</b>
<i>Locating Buildings and Activity Areas</i>	10	Arena Design	81
<i>Vehicle Access and Parking Areas</i>	12	<i>Outdoor Training Areas</i>	81
<i>Snow Removal</i>	18	<i>Indoor Arenas</i>	82
Landscaping	19	<i>Round Pens</i>	84
Wind and Snow Control	20	Surfaces	85
<i>Accounting for Prevailing Winds</i>	20	<i>General Surface Design</i>	85
<i>Shelterbelts</i>	20	<i>Types of Floor Surfaces</i>	88
Exterior Lighting	22	<i>Less Desirable Footing Materials</i>	90
		<i>Dust Management</i>	90
<b>3. Stables</b>	<b>23</b>	<i>Surface Maintenance</i>	91
Basic Planning	23		
<i>Floor Plan Options</i>	25	<b>6. Breeding and Foaling Facilities</b>	<b>93</b>
<i>Building Framing Styles</i>	26	Design Considerations	93
<i>Roof Covering Options</i>	30	Teasing Systems	93
<i>Construction Materials</i>	30	<i>Hand Teasing</i>	94
General Interior Design	33	<i>Group Teasing Methods</i>	94
<i>Stalls</i>	33	Breeding Shed	96
<i>Mangers, Grain Boxes, and Hayracks</i>	40	<i>Phantom Mare</i>	97
<i>Drinking Water Supply</i>	42	<i>Breeding Stocks</i>	98
<i>Interior Construction</i>	42	<i>Wash Area</i>	99
<i>Specialty Areas</i>	47	Breeding Laboratory	100
Floors and Drainage	56	Specifications for Foaling Stalls	102
<i>Floor Types</i>	57		
<i>Floor Construction and Drainage</i>	62		

<b>7. Environmental Control</b>	<b>103</b>	<b>11. Utilities</b>	<b>169</b>
Ventilation Basics	103	Electrical	169
<i>Environmental Comfort Zones</i>	104	<i>Wiring</i>	169
<i>Airborne Contaminants</i>	105	<i>Lighting</i>	172
Ventilation Systems	106	<i>Electric Motors</i>	175
<i>Natural Ventilation</i>	107	<i>Lightning Protection</i>	175
<i>Mechanical Ventilation</i>	115	<i>Electrical Safety</i>	176
Cold Weather Temperature Control	121	<i>Grounding</i>	176
<i>Insulation</i>	121	<i>Standby Power</i>	177
<i>Supplemental Heating</i>	126	Alarm Systems	179
		Water	179
<b>8. Manure Management</b>	<b>129</b>	<i>Water Quality</i>	179
Manure Characteristics	130	<i>Quantity and Storage</i>	181
<i>Excretions</i>	130	<i>Distribution</i>	182
<i>Bedding</i>	130	Heating Devices	187
<i>Waste Materials</i>	132	<i>Heating Source</i>	188
Handling	132	<i>Venting Heaters</i>	188
Storage	133	<i>Heater Safety</i>	190
<i>Siting and Managing the</i>		Wastewater Treatment	190
<i>Manure Storage</i>	134		
<i>Sizing</i>	135	<b>12. Fire Protection</b>	<b>193</b>
<i>Construction of the Manure Storage</i>	135	Fire Causes	194
Manure Utilization	136	Fire Prevention and Planning	195
<i>Nutrient Management Plan</i>	137	<i>Site Layout</i>	196
<i>Land Application</i>	138	<i>Buildings</i>	197
<i>Contract or Commercial Haulers</i>	139	<i>Housekeeping</i>	198
<i>Pasture or Field-kept Horses</i>	139	<i>Special Fire Safety Design Features</i>	198
Composting Treatment	139	Fire Detection	200
<i>Composting Management Basics</i>	140	Fire Suppression	201
<i>Composter Designs</i>	142	<i>Fire Extinguishers</i>	201
		<i>Sprinklers</i>	202
<b>9. Bulk Feed and Bedding Storage</b>	<b>147</b>	Fire Protection Quick Summary	203
Bulk Feed	147		
Forages	148	<b>13. Emergency Response Planning</b>	<b>205</b>
Hay and Bedding	148	Preventing Emergencies	205
		Preparing for Emergencies	206
<b>10. Fences</b>	<b>153</b>	<i>Emergency Action Plans</i>	206
Planning	153	<i>Emergency Kits</i>	207
<i>Selecting and sizing a pasture or</i>		Taking Action During and Emergency	210
<i>Paddock</i>	155	Reviewing Actions and Procedures	
<i>Basic Design Guidelines</i>	156	after Emergencies	210
<i>Managing Fenced Areas</i>	156		
Fence Types	156	<b>Appendix</b>	
<i>Wood</i>	157	<b>A. Common Fly Species Found</b>	
<i>Wire and Metal Fencing</i>	159	<b>in Stables</b>	<b>211</b>
<i>Non-metal Synthetic Fences</i>	163	<b>B. General Construction Plans</b>	<b>213</b>
Fences to Avoid	165	<b>C. Wood Preservatives</b>	<b>221</b>
Wood Posts	165	<b>References and Resources</b>	<b>227</b>
Gates, Passages and Latches	167	<b>Index</b>	<b>229</b>

# P R E F A C E

This handbook has been developed to help engineers, designers, and horse owners, and enthusiasts who are developing new facilities, remodeling existing facilities, making plans for a future project, or doing research about facilities so that their horse will receive the best care as they make a decision on where to board their horse. This book is a revision of and replaces the book titled *Horse Handbook: Housing and Equipment*, MWPS-15, first edition, 1971.

Like the first edition, this book still has a wealth of great construction details, but now has vastly expanded discussions and information on:

- Site selection and site layout,
- Building and stable designs and layouts,
- Manure handling and treatment,
- Ventilation and environmental control, and
- Fire safety.

In addition to the expanded discussions, this handbook now includes detailed information on:

- Roadways that will allow for easy and safe entry to the farmstead,
- Parking and turn-around areas for cars, trucks, trucks and trailers, and semi-trailers,

- Pastures, paddocks, and outdoor facilities,
- Arenas and training facilities,
- Breeding facilities,
- Bulk feed and bedding storage,
- Fencing,
- Water, electrical, and domestic waste designs, and
- Emergency response planning.

People using this handbook will gain knowledge on many design and safety issues including:

- How horse behavior affects design,
- How to design pastures so that a dominant horse will not injure a less dominant horse,
- What are the keys to successfully ventilate a stable and to keep it cool or warm,
- How farmstead and stable layout can increase labor efficiency,
- What to do with the manure that accumulates,
- How to avoid drainage problems, and
- What can be done to minimize the negative effects of an emergency situation such as fire or severe weather.