

**RURAL BUILDING COST  
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## **BASIC FARM BUILDINGS**

### **SECTION 1**

### GENERAL PURPOSE BARNS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Perimeter concrete and column footings	Perimeter concrete and column footings	Perimeter concrete and column footings
<b>Floor</b>	Dirt	Dirt	Dirt
<b>Wall Structure</b>	Light wood boxed frame or wood posts and beams, 10' eave height	Average 2"x4", 24" on center, 10' eave height	Concrete block or good 2"x4", 16" on center or 2"x6", 24" on center, 10' eave height
<b>Exterior Wall Cover</b>	Light wood siding board and batten or light aluminum siding	Average wood or aluminum siding	Good wood siding painted or standard gauge corrugated iron or aluminum siding
<b>Roof Construction</b>	Medium pitch, 2"x4" rafters 24" to 36" on center, composition decking	Medium pitch, wood joists, wood or composition decking	Medium pitch, wood joists, wood or composition decking
<b>Roof Cover</b>	Composition shingle, asphalt roll paper or light wood shingles	Good wood shingles, light aluminum or corrugated iron	Standard gauge aluminum or corrugated iron or good wood shingles
<b>Electrical</b>	Minimal per class	Minimal per class	Minimal per class
<b>Plumbing</b>	Minimal per class	Minimal per class	Minimal per class

Normal stalls are included commensurate to the quality class

GENERAL PURPOSE BARNS						SQUARE FOOT COST					
SQUARE FOOT AREA											
CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
1	9.87	8.24	7.57	7.24	7.03	6.90	6.79	6.61	6.49	6.36	6.20
2	14.19	11.74	10.68	10.17	9.86	9.67	9.53	9.26	9.04	8.82	8.62
3	17.70	15.69	14.63	14.06	13.77	13.55	13.41	13.14	12.92	12.68	12.52

**ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84

Lofts per square foot of floor area:	Low Quality	\$2.11
	Average Quality	\$2.75
	Good Quality	\$3.60

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

### HAY STORAGE BARNs

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Redwood or cedar mudsills	Concrete or masonry piers	Continuous concrete
<b>Floor</b>	Dirt	Dirt	Dirt
<b>Wall Structure</b>	Light wood boxed frame or wood posts and beams, 10' eave height	Average 2"x4", 24" on center, 10' eave height	Good 2"x4", 16" on center or 2"x6", 24" on center, 10' eave height
<b>Exterior Wall Cover</b>	Light wood siding, board and batten or light aluminum siding	Average wood or aluminum siding	Good wood siding painted, standard gauge corrugated iron or aluminum siding
<b>Roof Construction</b>	Medium to high pitch 2"x4" rafters 24" to 36" on center, or light wood trusses	Medium to high pitch, average wood trusses	Medium to high pitch, good wood trusses
<b>Roof Cover</b>	Composition shingle, asphalt roll paper or light wood shingles	Good wood shingles, light aluminum or corrugated iron	Standard gauge aluminum, corrugated iron or good wood shingles
<b>Electrical</b>	Minimal per class	Minimal per class	Minimal per class
<b>Plumbing</b>	Minimal per class	Minimal per class	Minimal per class

HAY STORAGE BARNs						SQUARE FOOT COST					
SQUARE FOOT AREA											
CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
1	9.16	7.52	6.86	6.51	6.34	6.17	6.09	5.89	5.77	5.64	5.55
2	12.86	10.29	9.11	8.62	8.28	7.89	7.79	7.46	7.21	6.92	6.78
3	17.56	14.18	12.77	11.91	11.60	11.21	10.99	10.58	10.29	9.89	9.64

**ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84

Lofts per square foot of floor area:	Low Quality	\$2.11
	Average Quality	\$2.75
	Good Quality	\$3.60

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

### FEED BARN

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Redwood or cedar mudsills	Concrete or masonry piers	Continuous concrete
<b>Floor</b>	Dirt	Dirt	Dirt
<b>Wall Structure</b>	Light wood frame, 10' eave height	Average wood frame, 10' eave height	Good wood frame, 10' eave height
<b>Exterior Wall Cover</b>	Closed sides and open ends	Partially open sides, standard corrugated iron or average wood siding on ends	Partially open sides, good quality siding
<b>Roof Construction</b>	Medium to low pitch 2"x4" rafters 24" to 36" on center, or light wood trusses	Medium to low pitch, average wood trusses	Medium to low pitch, good wood trusses
<b>Roof Cover</b>	Light metal or composition shingle	Standard gauge corrugated metal	Wood shingles
<b>Electrical</b>	Minimal per class	Minimal per class	Minimal per class
<b>Plumbing</b>	Minimal per class	Minimal per class	Minimal per class

FEED BARN SQUARE FOOT COSTS											
SQUARE FOOT AREA											
CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
1	6.18	5.73	5.48	5.32	5.26	5.22	5.19	5.16	5.13	5.10	5.09
2	7.51	7.09	6.80	6.58	6.44	6.38	6.33	6.29	6.25	6.22	6.21
3	9.97	9.57	9.24	8.98	8.75	8.61	8.54	8.50	8.47	8.39	8.35

**ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84

Lofts per square foot of floor area:

Low Quality	\$2.11
Average Quality	\$2.75
Good Quality	\$3.60

Normal feed stalls are included commensurate to the quality class.

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

### POLE BARNs - AVERAGE QUALITY

<b>Structure</b>	Poles 15' to 20' on center
<b>Floor</b>	Dirt - use square foot additive for concrete
<b>Roof</b>	Average wood trusses or average steel trusses, low pitch, corrugated iron or aluminum cover, gable end enclosed, 2' overhang on two sides
<b>Walls</b>	18 foot wall height, average wood frame or average prefabricated steel frame with corrugated iron covering where called for

All costs listed are based on average quality materials. Use percent additive for good quality materials; heavy steel frame and trusses, wide span, heavy gauge roof cover. Use percent deduction for low quality materials; light wood poles and frame with light wood or steel trusses and light gauge roof cover.

#### POLE BARNs

#### SQUARE FOOT AREA COST TABLES

END WIDTH	TYPE "A" - ALL SIDES OPEN									
	SIDE LENGTH									
	34	51	68	85	102	119	136	153	170	187
20	5.05	4.90	4.75	4.61	4.61	4.44	4.44	4.44	4.44	4.44
25	4.75	4.61	4.44	4.32	4.17	4.17	4.17	4.17	4.17	4.17
30	4.52	4.43	4.32	4.15	4.02	4.02	4.02	4.02	4.02	4.02
35	4.44	4.29	4.16	4.02	3.87	3.87	3.87	3.87	3.87	3.87
40	4.42	4.30	4.13	4.00	3.86	3.86	3.86	3.86	3.86	3.86
45	4.40	4.22	4.09	3.68	3.66	3.66	3.66	3.66	3.66	3.66
50	4.39	4.24	4.06	3.64	3.58	3.07	3.07	3.07	3.07	3.07
60	4.37	4.23	3.99	3.49	3.47	3.01	3.01	3.01	3.01	3.01
70	4.29	4.15	3.83	3.36	3.29	2.94	2.94	2.94	2.94	2.94
80	4.29	4.15	3.68	3.29	3.17	2.87	2.87	2.87	2.87	2.87

END WIDTH	TYPE "B" - ENDS AND ONE SIDE CLOSED - ONE SIDE OPEN									
	SIDE LENGTH									
	34	51	68	85	102	119	136	153	170	187
20	7.33	6.68	6.34	6.17	6.04	5.91	5.85	5.83	5.82	5.74
25	6.77	6.17	5.82	5.63	5.54	5.32	5.28	5.20	5.16	5.13
30	6.46	5.83	5.54	5.30	5.21	5.11	5.04	4.95	4.92	4.90
35	6.24	5.57	5.28	5.05	4.95	4.91	4.77	4.76	4.75	4.73
40	6.09	5.41	5.12	4.92	4.88	4.75	4.61	4.60	4.58	4.54
45	6.02	5.29	4.94	4.76	4.63	4.54	4.44	4.43	4.42	4.40
50	5.95	5.16	4.96	4.59	4.54	4.43	4.34	4.32	4.27	4.25
60	5.81	5.12	4.73	4.46	4.42	4.32	4.24	4.19	4.14	4.12
70	5.73	5.01	4.59	4.43	4.34	4.25	4.14	4.12	4.08	4.07
80	5.57	4.93	4.43	4.36	4.25	4.12	4.06	4.05	4.02	3.99

**ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84

**PERCENT** Good Quality -add 27%  
**ADDITIVES** Low Quality - deduct -30%

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**POLE BARNs**

**SQUARE FOOT AREA COST TABLES**

END WIDTH	TYPE "C" - ALL SIDES CLOSED									
	SIDE LENGTH									
	34	51	68	85	102	119	136	153	170	187
20	8.31	7.72	7.39	7.20	7.13	7.02	6.96	6.94	6.93	6.87
25	7.47	6.93	6.60	6.42	6.31	6.22	6.18	6.08	5.92	5.85
30	7.02	6.27	5.99	5.77	5.69	5.55	5.49	5.45	5.44	5.40
35	6.63	5.94	5.77	5.52	5.47	5.31	5.27	5.26	5.17	5.16
40	6.42	5.80	5.51	5.32	5.28	5.14	5.11	5.01	4.96	4.94
45	6.22	5.57	5.28	5.14	4.96	4.91	4.84	4.78	4.77	4.76
50	6.04	5.44	5.07	5.01	4.95	4.77	4.76	4.75	4.69	4.66
60	5.82	5.26	4.90	4.67	4.62	4.48	4.44	4.39	4.35	4.32
70	5.69	5.49	4.78	4.60	4.46	4.37	4.29	4.29	4.24	4.23
80	5.48	4.92	4.60	4.42	4.29	4.17	4.15	4.10	4.07	4.01

**ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84

**SIDE SHEDS - AVERAGE QUALITY**

<b>Structure</b>	One row of poles 15' to 20' on center, one side ties into adjoining building
<b>Floor</b>	Dirt - Use square foot additive for concrete
<b>Roof</b>	Light wood trusses, low pitch, corrugated iron or aluminum cover, ends enclosed, 2' overhang on one side
<b>Walls</b>	14' to 16' wall height, light wood frame with corrugated iron covering

**SQUARE FOOT COSTS**

WITH OPEN SIDES	\$3.12	TO	\$3.32
WITH ENCLOSED SIDES	\$4.07	TO	\$5.34

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.



### SHOPS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Light concrete	Standard concrete	Standard concrete
<b>Floor</b>	Concrete	Concrete	Concrete
<b>Wall Structure</b>	Light wood frame, 15' eave height	Average wood frame, 15' eave height	Good wood frame 15' eave height
<b>Exterior Wall Cover</b>	Light metal or low cost boards	Standard gauge corrugated metal or average wood siding	Good wood siding painted or C-block
<b>Roof Construction</b>	Low to medium pitch, 2"x4" rafters 24" to 36" on center or light wood trusses	Low to medium pitch, average wood trusses	Low to medium pitch, good wood trusses
<b>Roof Cover</b>	Light metal	Standard gauge metal	Wood shingles
<b>Electrical</b>	Two outlets per 1,000 square foot	Four outlets per 1,000 square foot	Four outlets per 1,000 square foot
<b>Plumbing</b>	One cold water outlet	Two cold water outlets	One rough fixture plus two cold water outlets
<b>Doors</b>	One light sliding or swinging door per 2,000 square foot	One average sliding or swinging door per 2,000 square foot	One drive through door per 1,000 square foot plus one walk-through door
<b>Windows</b>	None	None or few low cost	5 percent of wall area
<b>Shape</b>	Square or rectangular length between one and two times width	Square or rectangular length between one or two times width	Square or rectangular length between and two times width

SHOPS					SQUARE FOOT COSTS					
SQUARE FOOT AREA										
CLASS	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000	6,000	8,000
1	10.47	9.78	9.16	8.78	8.48	8.27	7.96	7.71	7.56	7.37
2	15.09	13.36	11.74	11.39	10.69	10.35	9.91	9.61	9.31	9.04
3	18.93	17.01	15.33	14.42	13.80	13.28	12.59	12.26	11.82	11.42

**ADD:** For interior finish:

Class 1	\$1.03	per square foot of floor area
Class 2	\$1.26	per square foot of floor area
Class 3	\$1.54	per square foot of floor area

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

### MACHINERY AND EQUIPMENT SHEDS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Light perimeter concrete	Concrete perimeter	Concrete perimeter
<b>Floor</b>	Dirt	Dirt or concrete*	Dirt or concrete*
<b>Wall Structure</b>	Light wood boxed frame or post and beam, 10' eave height	Post and beam construction, 10' eave height	Average 2"x4", 24" on center, 10' eave height
<b>Exterior Wall Cover</b>	Light wood or metal siding on a wood frame	Average wood or metal siding on wood frame	Good wood or metal siding on wood frame
<b>Roof Construction</b>	Shed type, or low pitch open wood system for metals	Low pitch, open wood system for metals or wood shingles	Medium pitch, open wood system for metals or wood shingles
<b>Roof Cover</b>	Corrugated metal	Corrugated metal or wood shingle	Standard gauge metal or good wood shingles
<b>Electrical</b>	None	Two outlets per 1,000 square foot	Four outlets per 1,000 square feet
<b>Plumbing</b>	None	None	None
<b>Shape</b>	Usually elongated, width between 15 and 30 feet, any length	Usually elongated, width between 15 and 30 feet, any length	Usually elongated, width between 15 and 30 feet, any length

### MACHINERY AND EQUIPMENT SHEDS

TYPE I ALL SIDES CLOSED						SQUARE FOOT COSTS					
SQUARE FOOT AREA											
CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	7.29	5.87	5.40	5.17	5.07	4.70	4.68	4.57	4.53	4.48	4.43
2	9.86	8.09	7.57	7.28	7.13	6.66	6.62	6.51	6.44	6.42	6.35
3	13.27	11.22	10.59	10.26	10.11	9.54	9.45	9.36	9.28	9.25	9.13

TYPE II ONE SIDE OPEN						SQUARE FOOT COSTS					
SQUARE FOOT AREA											
CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	6.00	4.80	4.41	4.19	4.05	3.82	3.79	3.70	3.65	3.64	3.59
2	8.15	6.74	6.22	5.95	5.80	5.56	5.47	5.40	5.31	5.29	5.23
3	11.42	9.52	8.89	8.80	8.62	8.29	8.18	8.10	7.96	7.91	7.83

**\*ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

### SMALL SHEDS AND PUMP HOUSES

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Redwood or cedar mudsills	Concrete or masonry piers	Continuous concrete
<b>Floor</b>	Dirt	Dirt*	Dirt*
<b>Wall Structure</b>	Light wood boxed frame or wood posts and beams 8' eave height	Average 2"x4" on center, 8' eave height	Good 2"x6", 24" on center, or 2"x4", 16" on center, 8' eave height
<b>Exterior Wall Cover</b>	Light wood siding, board and batten or light aluminum siding	Average wood or aluminum siding	Good wood siding painted, standard gauge corrugated or aluminum siding
<b>Roof Construction</b>	Low to medium pitch, shed type, light wood framing	Low to medium pitch, gable or shed type, average wood framing	Low to medium pitch, gable or shed type, good wood framing
<b>Roof Cover</b>	Composition shingle asphalt roll paper, light wood shingles or sod	Good shingles light aluminum corrugated iron	Standard gauge, aluminum corrugated iron or good wood shakes
<b>Electrical</b>	None	Minimal	Minimal
<b>Plumbing</b>	None	None	None

### SMALL SHEDS AND PUMP HOUSES

TYPE I ALL SIDES CLOSED SQUARE FOOT COSTS											
SQUARE FOOT AREA											
CLASS	30	50	60	80	100	120	150	200	250	300	400
1	11.19	9.30	9.03	8.11	7.55	7.20	6.82	6.23	5.99	5.74	5.37
2	13.77	12.28	11.49	10.52	9.94	9.57	9.16	8.57	8.29	8.02	7.65
3	20.59	16.78	16.17	14.66	13.26	12.55	11.80	10.92	10.13	9.62	8.90

TYPE II ONE SIDE OPEN SQUARE FOOT COSTS											
SQUARE FOOT AREA											
CLASS	30	50	60	80	100	120	150	200	250	300	400
1	9.32	7.59	7.02	6.57	6.29	5.96	5.59	5.34	5.16	4.94	4.71
2	12.41	10.62	10.23	9.04	8.29	7.62	7.36	6.94	6.84	6.31	5.99
3	15.90	14.33	13.15	11.70	10.81	10.02	9.70	9.24	8.78	8.31	7.94

**\*ADD:** Concrete or wood floors, or concrete flatwork per square foot of covered area: \$1.84  
 Insulation - add 10%

**NOTE:** Type II with two sides open reduce cost by an additional 12 percent.  
 Type II with three sides open reduce cost by an additional 25 percent.  
 Type II with four sides open reduce cost by an additional 30 percent.

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

### GENERAL PURPOSE BUILDING

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Wood girder on masonry piers; or holes and backfill for pole frame	Holes and backfill for pole frame; or light perimeter foundation	Continuous concrete poured with floor
<b>Floor</b>	Dirt	Concrete	Concrete
<b>Frame and Exterior Walls</b>	Eave height 8'. Pole or box frame with metal exterior or low grade sidings	Eave height 8'. Pole or box frame with metal exterior or average grade sidings	Eave height 8'. Conventional wood stud frame with good wood or metal sidings
<b>Interior Walls</b>	Normally unfinished see options	Normally unfinished see options	Normally unfinished see options
<b>Roof Structure</b>	Low pitch wood system for metal or low cost composition roof	Low to medium pitch wood system for average cost metal or composition roof	Medium pitch wood system with composition or wood sheathing
<b>Roof Cover</b>	Aluminum or steel corrugated or crimped, low quality	Aluminum or steel corrugated or crimped, average quality	Composition shingle, good quality or average quality metal or wood shingles
<b>Electrical</b>	None	Minimal	Minimal
<b>Plumbing</b>	None	None	None

GENERAL PURPOSE BUILDINGS					SQUARE FOOT COSTS				
SQUARE FOOT AREA									
CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500
1	4.92	4.21	4.01	3.80	3.71	3.57	3.48	3.43	3.40
2	8.28	7.29	6.99	6.67	6.55	6.36	6.22	6.16	6.10
3	10.69	9.49	9.15	9.03	8.63	8.39	8.22	8.14	8.10

**ADD:** For interior finish:

Class 1	\$0.72	per square foot of floor area
Class 2	\$0.77	per square foot of floor area
Class 3	\$0.81	per square foot of floor area

Height adjustment:

Add 2 percent for each foot of average story height over 8' base height. Subtract 2 percent for each foot of average story height under 8' base height.

The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman costs should be increased up to 25 percent based on the quality of level of the finished product.

### ROOT CELLARS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
<b>Foundation</b>	Cedar or redwood mudsills or rubble	Concrete or masonry footings	Continuous concrete
<b>Floor</b>	Dirt	Dirt	Concrete
<b>Wall Structure</b>	Post and beams with wood siding	Post and beams with wood siding	Concrete block or poured concrete
<b>Roof Construction</b>	Flat or low to medium pitch gable, poles or light wood	Flat or low to medium pitch gable, lodge pole or heavier wood	Flat reinforced poured concrete
<b>Roof Cover</b>	Sod	Sod, or if above ground corrugated metal with inside insulation	Sod, or if above ground corrugated metal with inside insulation
<b>Electrical</b>	Minimal	Minimal	Minimal
<b>Plumbing</b>	None	None	None

ROOT CELLARS					SQUARE FOOT COSTS					
SQUARE FOOT AREA										
CLASS	100	200	300	400	500	600	1,000	1,500	2,000	2,500
1	8.26	7.52	7.15	6.97	6.84	6.75	6.66	6.56	6.49	6.47
2	11.47	10.03	9.61	9.25	9.05	8.99	8.57	8.35	8.22	8.11
3	25.03	20.40	17.53	15.95	15.06	14.60	12.95	11.95	11.27	10.80

**NOTE:** Above costs are for sod roof covering. For corrugated metals, light composition or wood shingles, add:

ADD FOR ROOF COVER PER SQUARE FOOT OF FLOOR AREA

Class 1	\$1.27 per square foot of floor area
Class 2	\$1.55 per square foot of floor area
Class 3	\$1.83 per square foot of floor area

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

COLD STORAGE - WALK-IN BOXES				SQUARE FOOT COSTS			
SQUARE FOOT AREA							
	50	100	150	200	300	400	500
COOL BOX	8,498	12,006	14,943	17,282	21,076	24,610	27,547
FREEZE BOX	9,693	13,539	16,684	21,959	25,754	30,175	33,201
Wall Deduction: \$54 per lineal foot of wall							

**NOTE:** Above costs are for prefabricated metal clad units, including refrigeration equipment. Deduct 10 percent for wood exterior and interior. Add 6 percent for each foot of height over 7.5 foot base height. Where walls of building form exterior wall of box use above wall deduction. For homemade boxes using farm labor for construction deduct 30 percent.

## POTATO STORAGE

### TYPE I

Low quality, partly below grade. Minimal quality materials and unskilled farm labor are utilized. Designed for relatively short storage period, referred to as a “potato cellar.”

COMPONENT	LOW QUALITY
Foundation	None
Floor	Dirt
Frame	Wood post and beams
Walls	Minimal walls and supports used in this type of potato storage usually earthen side walls
Roof Frame	Open wood system for the use of corrugated metals, or, wood rafters, joists, and sheathing
Roof Cover	Corrugated metals or composition, roll type
Interior Components	None
Insulation	Minimal, usually vapor barrier, wire netting with straw on nailing strips or equivalent
Electrical	Minimal, service entrance and two light fixtures

POTATO STORAGE						
LOW QUALITY			SQUARE FOOT COSTS			
SIZE	4,000	5,000	7,000	10,000	15,000	20,000
COST	5.74	5.56	5.27	5.09	4.69	4.32

**POTATO STORAGE WAREHOUSE  
COST PER SQUARE FOOT OF FLOOR AREA**

**TYPE II**

Quonset building - low quality prefabricated galvanized steel building with doors in end walls only, erected on concrete footings without floors, lights or plumbing.

POTATO STORAGE WAREHOUSE					SQUARE FOOT COSTS				
LENGTH FEET					LENGTH FEET				
WIDTHS					WIDTHS				
	30'	40'	60'	70'		30'	40'	60'	70'
30'	8.05	-----	-----	-----	96'	6.02	5.49	5.22	5.04
36'	7.70	-----	-----	-----	108'	5.84	5.34	5.07	4.90
48'	7.17	6.55	-----	-----	120'	5.69	5.19	4.93	4.78
60'	6.78	6.19	5.90	-----	160'	5.31	4.84	4.57	4.45
72'	6.49	5.90	5.63	5.43	200'	-----	4.57	4.34	4.19
84'	6.22	5.69	5.40	5.22	240'	-----	4.36	4.13	4.01

**OPTIONS:**

Electrical		
Minimal Service, add per square foot of floor area		\$0.08
Plumbing		
Minimal Service, add per square foot of floor area		\$0.06
Insulation		
If 2" thick foamglass is sprayed on walls and ceiling, or equivalent, add per square foot of insulated area		\$1.85
Interior Construction		
If potato storage area has bins and interior partitions, add per square foot of floor area		\$0.75
Concrete or concrete flatwork per square foot of concreted area:		\$1.84

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

## POTATO STORAGE WAREHOUSE

### TYPE III

Average and good quality materials may be used. Usually skilled labor with proper supervision is employed and construction is at grade level. The potato storage period can be quite long depending on the amount of temperature and humidity control equipment included. Base wall height commonly 14 feet. More common size 50 feet by 100 feet, 5,000 square foot building, may have other uses. No humidity control equipment included, see options.

COMPONENT	AVERAGE QUALITY	GOOD QUALITY
<b>Foundation</b>	Continuous concrete	Continuous concrete
<b>Floor</b>	Dirt	Dirt
<b>Frame</b>	Heavy timber post and beam. Basic height 14 feet	Steel frame. Basic height 14 feet
<b>Exterior Wall</b>	Wood siding painted, one or two large end doors, one walk-in door	Aluminum or steel, corrugated metal cover, unpainted. Two large end doors. One or two walk-in doors
<b>Interior Construction</b>	See options	See options
<b>Ceiling</b>	Open	Open
<b>Plumbing</b>	Entry service, two hose bibs	Entry service, two hose bibs
<b>Electrical</b>	Entry service, three outlets	Entry service, three outlets
<b>Insulation</b>	Two inch thick cellulose sprayed walls and ceiling or equivalent	Two inch thick cellulose sprayed walls and ceiling or equivalent
<b>Roof Frame</b>	Wood rafters, joists, sheathing	Open steel and frame for corrugated metals
<b>Roof Cover</b>	Asphalt or wood shingle	Galvanized metal

POTATO STORAGE WAREHOUSE TYPE III					SQUARE FOOT COSTS			
SQUARE FOOT AREA								
SIZE	5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
AVERAGE	13.38	12.75	12.13	11.18	10.41	10.05	9.69	9.23
GOOD	17.45	16.50	15.30	13.82	12.77	12.11	11.62	11.10

### OPTIONS:

#### Interior Construction

If potato storage area has bins and interior partitions,

add for average quality per square foot      \$2.71

add for good quality per square foot      \$5.21

#### Exterior Construction

Painted metal exterior walls, add per square foot      \$0.40

Concrete or concrete flatwork per square foot of concreted area:      \$1.84

**NOTE:** Above costs for potato storage warehouse are based on skilled labor and include contractor fees. Construction done by ranch or farm labor without contractor supervision, deduct 15 percent to 30 percent depending on the quality of the finished building. See the following page for other additional features.



## TEMPERATURE AND HUMIDITY CONTROL

Air humidity control only, includes fan room, louver system, humidifiers, perforated air pipe and control panel, add the following:

TEMPERATURE AND HUMIDITY CONTROL					SQUARE FOOT COSTS			
SIZE	5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
COST	2.06	2.02	1.95	1.86	1.76	1.71	1.69	1.65

## AIR CONDITIONING

Includes complete refrigeration unit and controls as well as the air and humidity system listed above.

AIR CONDITIONING					SQUARE FOOT COSTS			
SIZE	5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
COST	4.49	4.37	4.21	4.02	3.78	3.68	3.60	3.55

## QUONSET AND STEEL BUILDINGS - FARM AND RANCH AVERAGE QUALITY

Costs per square foot of floor area are for Average Quality prefabricated galvanized steel buildings with doors in end walls only and minimum additional features, erected on concrete footings, without floors, lights, or heat. Low quality building costs should be adjusted downward to 30 percent while good quality buildings should be adjusted upwards to 25 percent based on the quality of the finished building and extra additives found. Base height is 20 feet at the center of the arch. Add or deduct 5 percent for each foot of deviation from base.

QUONSET BUILDINGS										
LENGTH		WIDTHS				LENGTH		WIDTHS		
FEET	30	40	60	70		FEET	30	40	60	70
30	11.50	-----	-----	-----		96	8.59	7.84	7.46	7.20
36	11.00	-----	-----	-----		108	8.34	7.63	7.25	6.99
48	10.24	9.35	-----	-----		120	8.13	7.42	7.04	6.83
60	9.69	8.85	8.43	-----		160	7.58	6.91	6.53	6.36
72	9.27	8.43	8.05	7.75		200	-----	6.53	6.19	5.98
84	8.89	8.13	7.71	7.46		240	-----	6.24	5.90	5.73

## PRE ENGINEERED STEEL BUILDINGS

Costs per square foot of floor area are for Average Quality prefabricated galvanized steel buildings, with minimum doors, windows and additional features, erected on concrete footings, without floors, lights, or heat. Multipliers are given below for other types of skin coverings. Low quality buildings costs should be adjusted downwards 25 percent while Good Quality buildings should be adjusted upwards 25 percent based on the quality of the finished building and extra additives found.

PRE ENGINEERED STEEL BUILDINGS							
WIDTH	EAVE HEIGHT	LENGTH TO WIDTH RATIO					
		1.0	1.5	2.0	3.0	4.0	5.0
20'	10'	9.54	9.03	8.69	8.23	7.89	7.66
30'	12'	8.19	7.82	7.62	7.20	6.98	6.82
40'	14'	8.32	7.79	7.46	7.00	6.67	6.44
50'	14'	7.37	7.09	6.91	6.65	6.47	6.34
60'	14'	6.72	6.50	6.35	6.16	6.02	5.92
80'	16'	6.87	6.63	6.46	6.24	6.03	5.97
100'	16'	6.72	6.44	6.24	5.99	5.83	5.68
140'	16'	5.97	5.79	5.63	5.46	5.32	5.24
160'	18'	5.90	5.73	5.61	5.43	5.31	5.22
200'	18'	5.55	5.41	5.31	5.18	5.08	5.01

See following pages for other additional features.

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

## PRE ENGINEERED STEEL BUILDINGS

### ADDITIONAL FEATURES

HEIGHT - add or deduct 2.0 percent for each foot of deviation from base.

ALUMINUM - multiply base costs by 1.05.

ENAMELED STEEL - multiply base costs by 1.05.

SLANT WALL BUILDINGS - deduct 5 percent to 15 percent.

Costs are based on square foot of floor area, unless otherwise noted.

ADDITIONAL FEATURES COSTS	LOW	AVERAGE	GOOD
FLOOR, ASPHALT	\$ 0.90	\$ 1.15	\$ 1.45
FLOOR, CONCRETE	\$ 1.51	\$ 1.84	\$ 2.25
LIGHTING	\$ 0.09	\$ 0.28	\$ 0.54
INSULATION, PER SQUARE FOOT OF INSULATED AREA			
WALL	\$ 0.29	\$ 0.36	\$ 0.45
ROOF	\$ 0.39	\$ 0.60	\$ 0.91
PLUMBING	\$ 0.08	\$ 0.25	\$ 0.51
HEATING (SUSPENDED SPACE HEATERS)	\$ 0.45	\$ 0.61	\$ 0.84

Add or subtract 3 percent for each foot of deviation from 10 foot base height.

**NOTE:** The costs given above reflect the use of the unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**PREFABRICATED METAL HORSE STABLES**

<b>COMPONENT</b>	<b>CLASS 1 LOW QUALITY</b>	<b>CLASS 2 AVERAGE QUALITY</b>	<b>CLASS 3 GOOD QUALITY</b>
<b>Foundation</b>	Light perimeter concrete foundation	Average perimeter concrete foundation	Good perimeter concrete foundation
<b>Floor</b>	Dirt	Dirt	Dirt
<b>Wall Structure</b>	Prefabricated light metal frame	Prefabricated average weight metal frame	Prefabricated heavy duty metal frame
<b>Exterior Wall Cover</b>	Metal cover light weight	Metal cover average weight	Metal cover heavy duty
<b>Roof Construction</b>	Light open steel system for metal	Average open steel system for metal	Heavy duty open steel system for metal
<b>Roof Cover</b>	Low pitch light metal cover	Low pitch average metal cover	Low pitch heavy duty metal cover

<b>PREFABRICATED METAL HORSE STABLES SQUARE FOOT COSTS</b>			
	<b>ONE STABLE 144 SF</b>	<b>TWO STABLES 288 SF</b>	<b>FOUR STABLES 576 SF</b>
<b>CLASS</b>			
<b>1</b>	7.83	7.18	6.58
<b>2</b>	10.41	9.57	8.80
<b>3</b>	13.88	12.79	11.79
<b>ADD PER SQUARE FOOT OF PATIO ROOF OR OVERHANG</b>			
	<b>LOW</b>	<b>AVERAGE</b>	<b>GOOD</b>
	1.82	2.54	3.56

Concrete or concrete flatwork per square foot of concreted area: \$1.84

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

## **DAIRY BARNS**

### **SECTION 2**

## DAIRY BARNS MILKING PARLORS

<b>SITE PREPARATION</b>	Basically level terrain, no excavation, minimum fill.
<b>FOUNDATION</b>	Reinforced concrete for one story height. Foundation and footings formed and poured monolithically with floor slab.
<b>FLOORS</b>	Concrete well formed gutters, elevated slab.
<b>CEILING</b>	Open unfinished, paint only, bottom of roof.
<b>INTERIOR</b>	Type found in dairies and milking parlors, smooth plaster or epoxy paints. Minimum cow stanchions and stalls conforming to the quality of the building. No equipment nor machinery is included.
<b>PLUMBING</b>	Basic plumbing required for building, usual floor drains and hose bibs. Does not include milk piping, pumps or storage.
<b>HEATING - COOLING</b>	Minimum, space heaters and evaporative coolers.
<b>ELECTRICAL LIGHTING</b>	Basic electrical service required for dairies. Does not include machinery or equipment.
<b>EXTERIOR WALLS</b>	Eight inch (8") concrete block, bearing walls or reinforced concrete 36 inch high with two by six stud framing - 16 inches on center above.
<b>ROOF STRUCTURE AND COVER</b>	Wood joists, wood or composition deck. Asphalt shingles to 290 pounds.
<b>COST RANGE RATING</b>	Based on cost per square foot of floor area.

DAIRY BARNS				MILKING PARLORS			
SQUARE FOOT COST							
LOW QUALITY		AVERAGE QUALITY		GOOD QUALITY		VERY GOOD QUALITY	
	23.28		28.94		36.36		46.18

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**DAIRY BARNs**  
**MILKING PARLORS** (Continued)  
**ADDITIONAL FEATURES**

**COST RANGE RATING** Based on cost per square foot of floor area unless otherwise noted.\*

ADDITIONAL FEATURES	DAIRY BARNs	MILKING PARLORS		
	LOW QUALITY	AVERAGE QUALITY	GOOD QUALITY	VERY GOOD QUALITY
CEILING				
GYPSUM BOARD - TAPED AND PAINTED	0.84	0.93	1.04	1.17
INSULATION				
WALLS	0.29	0.36	0.45	0.55
ROOF	0.39	0.60	0.91	1.37
WALL ORNAMENTATION (*Apply only to ornamented area.)				
CERAMIC TILE (*Cost based on square foot of area covered.)	6.03	7.33	8.63	9.91
ROOF COVER				
WOOD SHINGLE	0.44	0.47	0.43	0.41
AUTOMATIC GATES				
BASED ON COST PER STALL	712	739	770	828
AUTOMATIC FEED EQUIPMENT				
BASED ON COST PER STALL	192	236	279	322

**FEED STORAGE BINS** (see pages 2 & 3, section 6)

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**DAIRY BARNS**  
**MILK STORAGE, WASH, AND EQUIPMENT ROOMS**

<b>SITE PREPARATION</b>	Basically level terrain, no excavation, minimum fill.
<b>FOUNDATION</b>	Reinforced concrete for one story height. Foundation and footings formed and poured monolithically with floor slab.
<b>FLOORS</b>	Concrete at grade level, may include some gutters and drains.
<b>CEILING</b>	Gypsum board, taped and painted.
<b>INTERIOR</b>	Type found in dairies and milking parlors, smooth plaster or epoxy paints. No equipment or machinery is included.
<b>PLUMBING</b>	Basic plumbing required for building, wash basins, water closet, lavatory. Does not include milk piping, pumps or storage.
<b>HEATING - COOLING</b>	Minimum, space heaters and evaporative coolers.
<b>ELECTRICAL LIGHTING</b>	Basic electrical lighting service required for building.
<b>EXTERIOR WALLS</b>	Eight inch (8") concrete block, bearing walls for good and very good quality, plywood, boards, or wood siding on wood frame, interior sheathing finished for low and average quality.
<b>ROOF STRUCTURE AND COVER</b>	Wood joists and sheathing, asphalt shingle cover.
<b>COST RANGE RATING</b>	Based on cost per square foot of floor area.

<b>DAIRY BARNS</b>	<b>MILK STORAGE, WASH, AND EQUIPMENT ROOMS</b>		
<b>LOW QUALITY</b>	<b>AVERAGE QUALITY</b>	<b>GOOD QUALITY</b>	<b>VERY GOOD QUALITY</b>
10.98	15.20	27.50	36.16

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.



**DAIRY BARNS**  
**MILKING STORAGE, WASH AND EQUIPMENT ROOMS** (Continued)  
**ADDITIONAL FEATURES**

**COST RANGE RATING**                      Based on cost per square foot of floor area.

DAIRY BARNS		MILK STORAGE, WASH, AND EQUIPMENT ROOMS			
ADDITIONAL FEATURES		LOW QUALITY	AVERAGE QUALITY	GOOD QUALITY	VERY GOOD QUALITY
INSULATION					
WALLS		0.29	0.36	0.45	0.55
ROOF		0.39	0.60	0.91	1.37
WALL ORNAMENTATION COST BASED ON SQ. FT. OF WALL AREA COVERED (CERAMIC TILES)		6.03	7.33	8.63	9.91
ROOF COVERING	WOOD SHINGLE	0.44	0.47	0.43	0.41

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**DAIRY BARNS**  
**WASH PEN AND HOLDING AREA**

<b>FLOOR OR RAMP</b>	Sloping concrete slab rough finish six inches thick.
<b>WALLS</b>	Concrete block 8 inches - height 5 feet.
<b>FENCING</b>	Welded iron pipe, post 10 feet on center set in concrete, pipe top rail with three cable strands, or, no pipe top rail with five cable strands, or, iron rods. Cable size 5/8 inches or 3/4 inches.
<b>GATES</b>	Metal gates (2) usually 12 linear feet each, five rail.
<b>SPRINKLER</b>	Hooded rainbird type or equivalent including piping and pump.
<b>COST RANGE RATING</b>	Based on cost per square foot of floor area.

**DAIRY BARNS**  
**WASH PEN AND HOLDING AREA**

<b>LOW QUALITY</b>	<b>AVERAGE QUALITY</b>	<b>GOOD QUALITY</b>	<b>VERY GOOD QUALITY</b>
6.62	7.31	7.95	8.76

ROOF COVERING  
ADD PER SQUARE  
FOOT OF COVERED  
AREA

WOOD OR PIPE POST AND BEAM, STEEL TRUSSES, LIGHT METAL COVER.

<b>LOW QUALITY</b>	<b>AVERAGE QUALITY</b>	<b>GOOD QUALITY</b>	<b>VERY GOOD QUALITY</b>
2.97	3.79	4.83	6.15

METAL RAIL FENCE IRON PIPE POST 2-1/2" TO 4" DIAMETER - 7' TO 10' O.C. IN CONCRETE.  
WELDED IRON RAIL 10.49 PER LINEAL FOOT.

CABLE FENCE IRON PIPE POST 2-1/2" TO 4" DIAMETER - 7' TO 10' O.C. IN CONCRETE.  
IRON PIPE TOP RAIL.  
3 CABLE 7.45 PER LINEAL FOOT.  
4 CABLE- 8.12 PER LINEAL FOOT.

METAL GATES 54" TO 64" HIGH - WELDED IRON RAILS OR PIPE WITH BRACING -  
0.00 PER LINEAL FOOT OF GATE WIDTH.

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**DAIRY BARNS**  
**DAIRY EQUIPMENT**  
**STAINLESS STEEL REFRIGERATED HOLDING TANKS**

<b>SIZE</b>	<b>COST</b>
500 GALLONS	9,658
1,000 GALLONS	13,800
1,250 GALLONS	15,844
1,500 GALLONS	17,215
2,000 GALLONS	20,996
2,500 GALLONS	25,514
3,000 GALLONS	30,033
4,000 GALLONS	37,258
5,000 GALLONS	44,157

**VACUUM PUMP SYSTEMS**

Includes 3 phase electric motors eight through 20 cow stall systems, use per cow stall \$ 323

<b>REFRIGERATION COMPRESSORS</b>	
<b>SIZE</b>	<b>COST</b>
3 HORSE POWER	2,760
4 HORSE POWER	3,862
5 HORSE POWER	4,416
7.5 HORSE POWER	5,519
10 HORSE POWER	7,244
15 HORSE POWER	11,730

<b>HEAD STANCHIONS</b>	
<b>TYPE</b>	<b>COST</b>
STEEL STANCHIONS	12.85 PER LINEAL FOOT.
STEEL LOCKABLE STANCHIONS	17.45 PER LINEAL FOOT.
STEEL SELF LOCKING STANCHIONS	48.11 EACH STANCHION

**NOTE:** See following page for listing of additional equipment.

**DAIRY EQUIPMENT (Continued)**

**PLATE COOLER**

<b>NUMBER OF STALLS</b>	<b>COST</b>	<b>NUMBER OF STALLS</b>	<b>COST</b>
6	1,845	20	5,865
8	2,346	24	7,038
12	3,520		

**HERRINGBONE STALLS**

<b>SIZE</b>	<b>NUMBER OF STALLS</b>	<b>COST</b>
DOUBLE 3	6	2,331
DOUBLE 4	8	2,703
DOUBLE 6	12	3,455
DOUBLE 10	20	9,552
DOUBLE 12	24	11,050

Larger or other sizes use a combination of above. Above costs include manual operated gates.

**MILK TRANSFER LINES**

<b>TYPE</b>	<b>SIZE</b>	<b>COST PER LINEAL FOOT</b>
STAINLESS STEEL	18 GAUGE - 1 1/2"	4.59
STAINLESS STEEL	18 GAUGE - 2"	5.82
STAINLESS STEEL	16 GAUGE - 2"	7.58
STAINLESS STEEL	16 GAUGE - 2 1/2"	10.53
STAINLESS STEEL	16 GAUGE - 3"	12.72
GLASS PIPE	1 1/2"	35.46
GLASS PIPE	2"	43.93

**NOTE:** Flushing systems require twice the amount of pipe.

**MILKER UNITS**

(IN PLACE COST)

Electric pulsator or hydropulsator.

Manual on and off - price range per unit.

To automate unit for automatic off, add:

\$ 310	to	\$ 497
\$ 519	to	\$ 1,553

## **BUNK HOUSES**

### **SECTION 3**

# BUNKHOUSES

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY	CLASS 4 VERY GOOD QUALITY
<b>Foundation</b>	Thickened slab around perimeter	Thickened slab around perimeter	Thickened slab around perimeter	Spread footing around perimeter and thickened slab at partitions
<b>Floor</b>	4" concrete slab	4" concrete slab	4" concrete slab	4" concrete slab
<b>Walls</b>	Box construction 2"x4" at 48" on center	Box construction 4"x4" at 48" on center	2"x4" studs at 24" on center, 2"x4" stud partitions at 24" on center	Masonry exterior walls wood frame interior partitions and ceiling
<b>Exterior Cover</b>	Cheap grade redwood or Douglas fir vertical or horizontal	Average grade of redwood, Douglas fir, B and B or horizontal board	Average or better grade of redwood B and B or horizontal siding or stucco finish	Natural blocks
<b>Interior Finish</b>	None	Gypsum board or plywood partitions painted	Gypsum board or plywood partitions painted	Sheet rock finished
<b>Roof Framing</b>	Rafters and tie at plate line	Very simple truss	Rafters, collar beams and ceiling joists or good trusses	Rafters, collar beams and ceiling joists or good trusses
<b>Roofing</b>	Composition or used metal sheeting	Composition or metal sheeting	Aluminum or corrugated iron or light wood shingles	Good grade composition shingles or wood shingles
<b>Doors</b>	Two or three cheap doors	Three or four average doors	One average door each room	One good door each room
<b>Windows</b>	Few and small	One window each room	One steel or aluminum window in each room	One steel sash or aluminum window in each room
<b>Electrical</b>	Minimum outlets	Minimum outlets	Average or better outlets	Average or better outlets adequate amount

## BUNKHOUSES

SQUARE FOOT COST TABLE									
CLASS	400	600	800	1,000	1,200	1,500	2,000	2,500	3,000
1	9.90	9.35	9.08	8.78	8.67	8.41	8.22	8.05	7.98
2	13.24	12.53	12.21	11.82	11.68	11.35	11.09	10.90	10.81
3	17.88	16.99	16.56	16.08	15.90	15.47	15.15	14.90	14.77
4	32.16	29.81	28.72	27.34	26.91	25.73	24.90	24.18	23.86

1. Hook up costs for utilities are included.
2. Costs do not include any interior plumbing. Add for :
  - Class 1           \$259 per fixture.
  - Class 2           \$398 per fixture.
  - Class 3           \$614 per fixture.
  - Class 4           \$946 per fixture.
3. Costs do not include domestic well or septic system when required.  
See section 4 of Rural Manual for these additional costs.
4. Asphalt tile or linoleum floor cov       \$2.15 per square foot.
5. Installed carpet, add                       \$2.27 per square foot.
6. Cooling systems not included. Add for evaporative coolers, roof or       \$0.80  
per square foot. Do ~~not~~ add for window units.
7. Heating systems not included - furnace, floor or wall type, add per s       \$0.69
8. Costs do not include insulation. Addition per square foot       \$0.60  
Addition per square foot of wall insulation is                       \$0.36

**NOTE:** The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

## **UTILITIES**

### **SECTION 4**



**UTILITIES**  
**SECTION 4**

**DOMESTIC WATER SYSTEMS - SEPTIC SYSTEMS - MOBILE HOME HOOKUPS**

**NOTE:** The costs offered in this manual for this section are general or average costs. Specific areas may vary substantially indicating that these costs need modification. It may be necessary for each assessor to substitute cost data more applicable for his area.

In the case of a residence or a bunkhouse, hookup costs are already included with the building's cost figure and it is not necessary to add hookup costs. Mobile home hookup costs are listed on Page 2 of this section.

## PUMPS

### DOMESTIC WATER SYSTEMS

Includes submersible pump, piping at well, pressure tank and pad, does not include drilling well.

DOMESTIC WATER SYSTEMS							
MOTOR	1/2 HP	3/4 HP	1 HP	1 1/2 HP	2 HP	3 HP	5 HP
TANK	82 GAL	82 GAL	120 GAL	220 GAL	220 GAL	315 GAL	525 GAL
COST	1,718	1,731	1,849	2,114	2,372	2,433	2,496

Drilling and casing costs per foot of depth:      4"-6" WELL                      \$21 per foot.

Includes gravel and concrete packing.              8"-10" WELL                      \$33 per foot.

EXAMPLE                      \$1,849 = 1 HORSEPOWER MOTOR AND PUMP  
    \$2,100 = 6 INCH WELL AT 100 FOOT DEPTH.

-----  
    \$3,949 TOTAL COST

### DOMESTIC WATER SYSTEMS

Jet pump - complete shallow well package installed, does not include drilling well.

JET PUMP	1/2 HP	3/4 HP	1 HP	1 1/2 HP	2 HP
TANK	42 GAL	82 GAL	82 GAL	120 GAL	220 GAL
COST	793	862	930	1,059	1,186

EXAMPLE      \$862 = 3/4 HORSEPOWER MOTOR AND PUMP  
                          \$1,260 = 6 INCH WELL AT 60 FOOT DEPTH

-----  
    \$2,122 TOTAL COST

### PRESSURE TANK SIZES

42 gallons	16 inch diameter	x	48 height	50 inch circumference
82 gallons	20 inch diameter	x	60 height	63 inch circumference
120 gallons	24 inch diameter	x	60 height	75 inch circumference
220 gallons	30 inch diameter	x	72 height	94 inch circumference
315 gallons	36 inch diameter	x	72 height	113 inch circumference
525 gallons	36 inch diameter	x	120 height	113 inch circumference

### SEPTIC TANK COSTS

Average septic tank costs were secured from excavating and construction companies across the state. The costs are broken down by the most common sizes. The costs listed below do include leach field costs, they do not include hookup costs as they are not necessary for residences or bunkhouses. For mobile home hookups use hookup costs listed below.

SEPTIC TANK COSTS			
AREA	1,000 GALLONS	1,250 GALLONS	1,500 GALLONS
CARSON CITY	1,984	2,184	2,394
RENO	2,291	2,458	2,869
ELKO	2,050	2,327	2,600
PAHRUMP	1,502	1,644	2,050
LAS VEGAS	1,400	1,675	2,019

MOBILE HOME HOOKUP COSTS	
Water	\$ 274
Electric	\$ 807
Sewer	\$ 341
Gas	\$ 196

Water hookup includes trenching, pipe and labor from unit to city main or domestic well system.

Electric hookup includes pole, box, overhead wiring, and conduit for a 100 ampere system.

Sewer hookup includes trenching, pipe and labor to a city sewer main or to a septic system.

Gas hookup includes trenching, pipe and labor from unit to tank and regulator or to main.

**NOTE:** The above mobile home hookup costs do not include connector, service, or user fees. The above costs include a combined piping cost of 40 lineal feet of water and sewer lines. If longer piping costs are encountered use \$8.54 per lineal foot for either water or sewer lines.

## **CORRAL AND FENCES**

### **SECTION 5**

**CORRAL FENCING**  
**COSTS ARE PER LINEAR FOOT**

TYPE QUALITY	LOW	FAIR	AVERAGE	GOOD
<b>WOOD</b>	3.92	4.72	5.70	6.86
<b>Examples of rails</b>	4-4"	4-6"	5-6"	7-6"
	3-6"	3-8"	4-10"	6-8"
	2-10"	2-12"	3-12"	4-12"
	2 or 3 poles	4 or 5 poles	6 or 7 poles	7 or 8 poles

Base costs are for railroad tie posts eight feet on center with two inch thick rails. Reduce base by one class for lighter wood posts or one inch thick rails. (Reduce low quality by 20 percent.) Adjust base cost plus or minus 7.5 percent for each foot of deviation from base of eight feet on center. Less than eight feet, increase costs, more than eight feet, reduce costs. For solid wood fence of two inch thick rails add 35 percent to good quality. Do not adjust base cost overall more or less than 50 percent.

**PIPE AND CABLE FENCES**

QUALITY	LOW	FAIR	AVERAGE
4" PIPE, CABLE RAILS	6.10	6.39	6.69
4" PIPE, 2" PIPE RAILS	7.76	8.05	8.35

TYPE QUALITY	LOW	FAIR	AVERAGE	GOOD
<b>Wire</b>	1.98	2.49	2.80	3.21
<b>Examples: Barbed wire</b>	2 or 3 strands or hog/cattle fence	3 or 4 strands or light grade woven or welded wire	5 or 6 strands or horse fence medium grade welded wire	7 or 8 strands or bull panels heavy welded wire

Base costs are for railroad tie posts eight feet on center. Adjusted cost plus or minus 7.5 percent for each foot of deviation from base. Reduce one class for lighter wood posts, reduce two classes for metal "T" posts. Reduce low quality by 30 percent for light wood posts or 50 percent for metal "T" posts. Do not adjust base cost overall more or less than 50 percent.

FEED TROUGHS					
TYPE	QUALITY	LOW	FAIR	AVERAGE	GOOD
<b>WOOD WITHOUT FENCE</b>		3.01	3.98	5.10	7.19
<b>WITH FENCE</b>		4.24	5.49	6.72	8.75

For metal troughs, add 200 percent. For concrete troughs, add 250 percent.

**CONCRETE**

The in place cost of concrete for flatwork is	\$1.84	to	\$2.25
per square foot and cost per square foot of wall area is			\$6.90

## CHAIN LINK FENCING

Average cost per linear foot, including complete installation on two inch round or "H" posts set in concrete, 8 to 12 feet on centers.

TYPE	HEIGHT				
	4'	6'	8'	10'	12'
2" INCH MESH AVERAGE QUALITY	3.51	5.07	6.67	8.23	9.77
ADD FOR RAILS	0.81	0.81	0.85	0.85	0.85
ADD FOR PRIVACY SLATS	2.38	3.63	4.88	6.23	7.48
ADD FOR 3 STRAND BARBED WIRE	1.00	1.00	1.16	1.16	1.16

Add 5 percent to 15 percent for aluminum or vinyl covered wire.

## GATES

Gates may be included in linear footage of fencing, commensurate to quality class, height, etc.

TYPE	QUALITY	LOW	FAIR	AVERAGE	GOOD
METAL PIPE OR					
PORTABLE PANELS		6.14	9.79	13.07	18.95

PLASTIC FENCING	
POLYMER GRID , 5', 2" * 6" TOP RAIL	6.06
VINYL FENCE, 5" * 5" POSTS, 3 - 2" * 6" RAILS	7.72

**For other types of plastic fence, see the Marshall & Swift Commercial Manual, Section 66 Page 5**

**NOTE:** The cost given above reflect the cost of unskilled farm labor. For professional labor supervised by a contractor or job foreman, costs should be increased up to 25 percent based on the quality level of the finished product.

**CORRAL LOADING CHUTE**  
**COST PER LINEAR FOOT AND INCLUDES BOTH SIDES**

SPACED	LIGHT CHUTE	33.42	per linear foot
SPACED	HEAVY CHUTE (INCLUDES PLATFORM	41.77	per linear foot
SOLID	LIGHT CHUTE	51.98	per linear foot
SOLID	HEAVY CHUTE (INCLUDES PLATFORM	64.97	per linear foot

**CONCRETE DIPPING VAT**

**USUALLY COMPOSED OF:**

Six inch electric welded fabric, reinforced concrete wade in dipping vat.

Three foot six inches wide by 30 feet long and four feet deep with two inch supply and drain lines included.

Pump and valve not included.

**COMPLETE IN PLACE COST   \$   2,802**

## COMMERCIALLY MANUFACTURED HEAVY DUTY CATTLE GUARDS

CORRALS AND FENCES			
COMMERCIALLY MANUFACTURED HEAVY DUTY CATTLE GUARDS			
7.5' x 8'	7.5' x 10'	7.5' x 12'	7.5' x 15'
\$1,050	\$1,680	\$2,363	\$2,888

CATTLE SQUEEZE	
STATIONARY MODEL, LIGHT	\$893
STATIONARY MODEL, HEAVY	\$1,680
HEAVY DUTY, HYDRAULIC	\$5,240
CALF TABLE	\$799

FAN SIZE		WINDMILLS AND STEEL TOWERS			TOTAL COST
		TOWERS		INSTALLATION	
6'	\$974	21'	\$1,031	\$1,039	\$3,045
6'	\$974	27'	\$1,321	\$980	\$3,276
6'	\$974	33'	\$1,634	\$1,088	\$3,696
8'	\$1,226	21'	\$1,031	\$914	\$3,171
8'	\$1,226	27'	\$1,321	\$834	\$3,381
8'	\$1,226	33'	\$1,634	\$920	\$3,780
10'	\$2,128	27'	\$1,321	\$1,108	\$4,557
10'	\$2,128	33'	\$1,634	\$1,131	\$4,893
12'	\$3,350	27'	\$1,321	\$1,544	\$6,216
12'	\$3,350	33'	\$1,634	\$1,736	\$6,720
14'	\$5,342	27'	\$1,321	\$2,157	\$8,820
14'	\$5,342	33'	\$1,634	\$2,831	\$9,807
16'	\$7,241	33'	\$1,634	\$3,116	\$11,991



**CATTLE AND HORSE WATERING TANKS**  
**ROUND BOTTOMLESS STOCK TANKS**  
**25.5 INCH DEEP, GALVANIZED CORRUGATED METAL**

32.75 PER FOOT OF DIAMETER - 12 GAUGE METAL - ADD 25 PERCENT FOR 10 GAUGE METAL

ADD \$1.84 PER SQUARE FOOT FOR CONCRETE SLAB

**COMMERCIALLY MANUFACTURED METAL WATER TROUGHS**  
(GALVANIZED TANK)

175 GAL	300 GAL	500 GAL
\$268	\$420	\$483

COMMERCIALLY MANUFACTURED AUTOMATIC WATERERS WITH HEAD			
LENGTH	WIDTH	HEIGHT	COST
21"	14"	24"	\$429
16"	18"	28"	\$443
16"	26"	28"	\$526
47"	14"	24"	\$652
47"	26"	24"	\$690
74"	14"	24"	\$755
74"	26"	24"	\$807
94"	14"	24"	\$843
120"	14"	24"	\$1,006

**COMMERCIALLY MANUFACTURED METAL WATER TANKS**  
**GALVANIZED WITH BOTTOM 25.5" TO 27" DEEP**

\$42.31 PER FOOT OF DIAMETER - 12 GAUGE METAL - ADD 25 PERCENT FOR 10 GAUGE METAL

ADD \$1.84 PER SQUARE FOOT FOR CONCRETE BASE

### ALL OTHER WATER TROUGHS

1 cubic foot = 7.5 gallons

<b>VOLUME</b>	<b>COST PER GALLON</b>
<b>ALL OTHER WATER TROUGHS</b> 1 cubic foot = 7.5 gallons	
LESS THAN 100 GALLONS	2.16
100 TO 175 GALLONS	1.73
176 TO 300 GALLONS	1.41
301 TO 500 GALLONS	0.99
OVER 500 GALLONS	0.86

<b>COMMERCIALLY MANUFACTURED PROFESSIONAL ROPING AND DOGGING</b>	
FIRST SECTION WITH RELEASE GATE	\$1,100
SECOND SECTION	\$732
THIRD SECTION	\$713

<b>COMMERCIALLY MANUFACTURED BUCKING CHUTE</b>	
FIRST SECTION	\$2,108
ADDITIONAL SECTIONS, EACH	\$1,445

### COMMERCIALLY MANUFACTURED METAL FENCE PANELS

Portable or stationary, no post costs are included, for post costs see corral fencing costs page 1 section 5.

6' x62" HEIGHT, 7 RAIL MEDIUM DUTY	\$71
8'	\$79
10'	\$87
12'	\$105
14'	\$110
16	\$115
6' x62" HEIGHT, 7 RAIL EXTRA HEAVY DUTY	\$85
8'	\$96
10'	\$114
12'	\$137
14'	\$143
16	\$148

For extra heavy duty panels with solid steel sections increase cost 100%.

<b>COMMERCIALLY MANUFACTURED CROWDING ALLEYS</b>	
24' x 60" HEIGHT INCLUDES FRAMES AND HEADGATE WITH STAND	\$921
24' x 60" HEIGHT (ADD-ON SECTION)	\$370
ALLEY STOPS	\$87
10' CUTOUT GATE INCLUDING FRAME AND 10' PANEL	\$488

<b>CURVED CROWDING ALLEYS</b>	
30' x 74" SWEEP INC 5' GATE & 24' ADJUSTABLE ALLEY, A1 CAGE & 10' X 20' LEAD-UP	\$4,854
30' x 74" SWEEP INC 5' GATE & 20' ADJUSTABLE ALLEY	\$2,134
30' x 74" SWEEP INC 5' GATE & 20' ADJUSTABLE ALLEY WITH BLOCKING DOOR	\$2,388
ADJUSTABLE ALLEY BOW	\$131

<b>COMMERCIALLY MANUFACTURED FEEDER PANEL</b>	
8' x 64" (HEIGHT)	\$108
10' x 64" (HEIGHT)	\$128
12' x 64" (HEIGHT)	\$152
14' x 64" (HEIGHT)	\$160
16' x 64" (HEIGHT)	\$168

<b>HEAD GATES</b>	
SELF CATCH HEAVY DUTY	\$590
SELF CATCH LIGHT DUTY	\$330

## **MISCELLANEOUS COSTS**

### **SECTION 6**

## MISCELLANEOUS COSTS

### FARM SILOS

Costs of concrete stave silo, complete. For other construction material, see factors listed below.

MISCELLANEOUS COSTS					FARM SILOS				
DIAMETER	HEIGHT								
	30'	35'	40'	45'	50'	60'	70'	80'	90'
12'	9,364	10,465	11,842	13,219	14,321	16,524	0	0	0
14'	10,190	11,567	13,219	14,596	15,973	19,003	21,481	0	0
16'	11,016	12,944	14,872	16,249	18,176	21,206	24,511	27,815	0
18'	12,393	14,321	16,249	18,452	20,380	24,235	28,091	31,946	36,077
20'	13,495	15,698	18,452	20,380	22,858	27,540	32,222	36,628	41,861
22'	14,596	17,626	20,380	23,134	25,612	31,120	36,904	42,136	48,195
24'	15,973	19,278	22,858	25,612	28,917	35,251	41,861	48,470	55,355
26'	0	21,206	25,061	28,642	32,497	39,933	47,920	55,355	63,893
28'	0	0	28,091	32,222	36,628	45,166	54,529	63,893	73,532
30'	0	0	0	35,802	40,759	51,500	62,240	73,256	84,823

**NOTE:** For silos of other construction materials, multiply the above appropriate size costs by the following factors.

Brick masonry	1.75	Glass lined steel	2.15
Reinforced concrete	1.60	Steel	1.80
Concrete block	1.20	Wood	1.10

For no chute, deduct \$12.94 per vertical foot of height.

For flat roof, deduct 4.08 per square foot of floor area;  
for no roof, deduct 7.60 per square foot.

SILO UNLOADER									
FOR SILO UNLOADER, ADD PER FOOT OF DIAMETER OF SILO:									
DIAMETER									
12'	14'	16'	18'	20'	22'	24'	26'	28'	30'
622	556	501	457	424	397	369	347	330	314

**NOTE:** Above costs are based on professional construction labor supervised by a contractor or his job foreman. For farm labor with no professional supervision costs should be reduced up to 25 percent relative to the quality of the finished product.

## MISCELLANEOUS COSTS

### STEEL GRAIN BINS

Costs are averages for utility type storage bins usually found on farms and ranches. Costs of standard bins are for tank with door and manhole, erected on buyer's slab. For concrete slab, add \$1.79 per square foot of concrete. Height is to top of shell. Cost of ventilated floor includes floor, auger tube, and steel columns and beam supports for plenum assembly.

MISCELLANEOUS COSTS			STEEL GRAIN BINS		
SIZE		COST		ADD FOR	
DIAMETER	CAPACITY	WITHOUT	STEEL	VENTILATED	FAN AND
X HEIGHT	(BUSHELS)	FLOOR	FLOOR	FLOOR	HEAT
15 X 8	1,125 BU	2,494	315	1,129	2,284
15 X 13	1,850 BU	3,176	315	1,129	2,284
15 X 16	2,275 BU	3,570	315	1,129	2,284
18 X 13	2,650 BU	3,570	394	1,496	2,441
18 X 16	3,275 BU	4,384	394	1,549	2,441
21 X 13	3,625 BU	4,436	551	2,074	2,546
18 X 21	4,300 BU	5,723	394	1,549	2,441
21 X 16	4,450 BU	5,303	551	2,074	2,546
24 X 16	5,825 BU	6,116	683	2,651	2,625
21 X 24	6,675 BU	7,560	551	2,074	2,546
24 X 19	6,900 BU	7,114	683	2,651	2,625
24 X 24	8,725 BU	8,715	683	2,651	2,625
27 X 24	11,025 BU	10,605	840	3,334	2,756
30 X 24	13,625 BU	12,049	1,024	4,095	2,835
27 X 32	14,725 BU	14,831	840	3,334	2,756
33 X 24	16,475 BU	14,884	1,208	4,883	2,888
30 X 32	18,175 BU	17,036	1,024	4,095	2,835
36 X 24	19,625 BU	16,118	1,418	5,775	2,940
33 X 32	21,975 BU	20,974	1,208	4,883	2,888
36 X 27	22,075 BU	18,139	1,418	5,775	2,940
36 X 32	26,150 BU	22,549	1,418	5,775	2,940
36 X 40	32,700 BU	24,570	1,418	5,775	2,940

**NOTE:** To calculate capacity in bushels, diameter squared x height x .63.

<b>LADDERS</b>	48.30	PLUS	6.83	PER LINEAR FOOT
<b>SAFETY CAGES</b>	13.13	TO	16.54	PER FOOT INSTALLED
<b>AUGER AND DRIVE</b>	252.00	PLUS	24.94	PER FOOT OF TANK DIAMETER
<b>SPREADERS</b>	498.75	TO	735.00	
<b>STIRRATORS</b>	131.25	TO	199.50	PER FOOT OF TANK DIAMETER

**NOTE:** Above costs are based on professional construction labor supervised by a contractor or his job foreman. For labor with no professional supervision costs should be reduced up to 25 percent relative to the quality of the finished product.

## MISCELLANEOUS COSTS

### FEED TANKS

Costs are averages of typical farm hoppers with roof, manhole, and ladder including necessary steel structural supports and concrete footings. Height is overall from ground level to top of tank. Capacity in tons is figured at 50 pounds per bushel.

MISCELLANEOUS COSTS			FEED TANKS	
DIAMETER (FEET)	HEIGHT (FEET)	CAPACITY (BUSHELS)	CAPACITY (TONS)	COST
6	10	120	3.0	1,103
6	16	240	6.0	1,496
6	21	360	9.0	1,733
6	25	480	12.0	1,943
6	28	600	15.0	2,153
9	14	300	7.8	2,205
9	17	450	11.3	2,520
9	20	590	14.8	2,809
9	25	855	21.4	3,281
9	28	1,000	25.0	3,491
9	31	1,130	28.5	3,649
12	20	870	21.8	4,331
12	25	1,345	33.6	5,355
12	31	1,825	45.6	6,169
12	36	2,300	57.5	6,930
12	42	2,780	69.5	7,586
15	36	4,150	103.8	8,794
15	42	4,900	122.5	10,815
18	36	5,500	137.5	11,576

**NOTE:** Above costs are based on professional construction labor supervised by a contractor or his job foreman. For farm labor with no professional supervision costs should be reduced up to 25 percent relative to the quality of the finished product.

**ADD:**

\$3.00 PER SQUARE FOOT OF HEAVY DUTY CONCRETE SLAB WORK.

**MISCELLANEOUS COSTS**  
**GRAIN HANDLING SYSTEMS**

Cost of handling equipment only does not include grain storage bins. Most grain handling systems are professionally installed with contractor supervision. In cases where unsupervised nonprofessional help such as farm labor is used, reduce the costs listed up to 25 percent, depending on the quality of workmanship.

DISCHARGE HEIGHT FEET	COSTS ARE BASED ON DISCHARGE HEIGHT AND CAPACITY								
	CAPACITY IN BUSHELS PER HOUR								
	500	750	1,000	1,500	2,000	3,000	5,000	7,500	10,000
30	21,263	21,788	22,575	24,150	25,200	27,825	33,075	0	0
40	22,050	22,838	23,363	24,938	26,250	29,138	34,650	41,738	0
50	23,100	24,150	24,938	26,250	27,825	30,975	37,013	44,888	52,500
60	24,150	24,938	25,725	27,300	28,875	32,550	39,113	47,513	55,913
80	0	0	28,875	30,975	32,813	36,488	43,838	53,550	63,000
100	0	0	33,338	35,175	37,275	41,475	49,350	59,588	69,563
120	0	0	37,800	39,900	42,000	46,200	54,600	65,363	75,863
140	0	0	41,475	43,575	46,200	50,663	59,850	71,138	82,688
160	0	0	45,413	47,775	50,138	55,125	64,575	76,913	88,988



**MISCELLANEOUS COSTS**  
**ELECTRIC POWER PLANTS**

<b>RATING</b>	<b>COOLING</b>	<b>FUEL</b>	<b>COST</b>
3 KILOWATTS	AIR	GASOLINE	2,080
4 KILOWATTS	AIR	GASOLINE	2,889
5 KILOWATTS	AIR	GASOLINE	3,858
6.5 KILOWATTS	AIR	GASOLINE	4,167
10 KILOWATTS	AIR	GASOLINE	6,755
15 KILOWATTS	AIR	GASOLINE	7,938
7.5 KILOWATTS	LIQUID	GASOLINE	5,541
12.5 KILOWATTS	LIQUID	GASOLINE	9,009
20 KILOWATTS	LIQUID	GASOLINE	9,787
4 KILOWATTS	AIR	DIESEL	5,332
8.5 KILOWATTS	AIR	DIESEL	8,363
12 KILOWATTS	AIR	DIESEL	9,065
10 KILOWATTS	LIQUID	DIESEL	8,693
12.5 KILOWATTS	LIQUID	DIESEL	9,189
20 KILOWATTS	LIQUID	DIESEL	11,173
30 KILOWATTS	LIQUID	DIESEL	13,777
45 KILOWATTS	LIQUID	DIESEL	17,331
60 KILOWATTS	LIQUID	DIESEL	17,455
100 KILOWATTS	LIQUID	DIESEL	22,305

Above costs included minimal current load control switchboard facilities.

Above costs do not include mounting pads.

Add                   \$15.66 per kilowatt for natural gas or LP gas fuel systems.

For remote control starting, all gasoline fuel, add                   \$60.02

Add to the plant cost, as determined from above tables, for the following extras.

<b>ALTERNATING CURRENT LOAD CONTROL SWITCHBOARD</b>			<b>AUTOMATIC EMERGENCY SWITCHBOARDS FOR GASOLINE PLANT</b>		
<b>RATING</b>	<b>VOLTAGE</b>	<b>COST EACH</b>	<b>RATING</b>	<b>VOLTAGE</b>	<b>COST EACH*</b>
15 KILOWATTS	240; 230/400	856	15 KILOWATTS	120/240	2,134
20 KILOWATTS	120/240; 240	856	20 KILOWATTS	120/240	2,478
25 KILOWATTS	240; 120/240	856	25 KILOWATTS	120/240	3,442
30 KILOWATTS	240; 120/240	1,902	30 KILOWATTS	120/240	3,855
40 KILOWATTS	120/240; 240	1,902	40 KILOWATTS	120/240	4,337
50 KILOWATTS	480; 240	1,902	50 KILOWATTS	120/240	4,748
60 KILOWATTS	480; 240	2,106	60 KILOWATTS	120/240	7,158
100 KILOWATTS	480; 240	2,106	100 KILOWATTS	120/240	10,394
*FOR DIESEL POWERED PLANTS ADD					118.94

## MISCELLANEOUS COSTS

### LIVESTOCK SCALES

TYPE	SIZE OF PLATFORM	CAPACITY	IN PLACE COST
FULL CAPACITY BEAM	14' X 8'	5 TON	7,875
FULL CAPACITY BEAM	16' X 8'	10 TON	8,190
FULL CAPACITY BEAM	22' X 10'	10 TON	11,466

### SCALE CAGES

METAL		WOOD	
SIZE	COST	SIZE	COST
14'	1,045	14' X 8'	535
16'	1,174	16' X 8'	551
22'	1,621	22' X 10'	683
24'	1,766	24' X 10'	710

Scale pit 4 inch concrete walls and slab poured in place. May be poured in or on top of ground. If on top, compacted ramps and steps to scale beam included.

ADD \$466 FOR TYPE REGISTERING BEAM.  
ADD \$1,465 FOR DIAL FACE  
ADD \$2,862 FOR ELECTRONIC DIGITAL SCALE.

### MOTOR TRUCK SCALES

#### SPECIFICATIONS

Reinforced concrete pit and platform. All steel structure and scale mechanism.

Motor truck scales are of two general types: the beam type (either manual or type registering) and the full automatic dial type. The construction of both, insofar as the weight carrying mechanism is concerned, is very similar. The method of recording the weights makes the difference.

CAPACITY	TOTAL COST
20 TONS	23,363
30 TONS	27,038
40 TONS	31,238
50 TONS	35,963
60 TONS	41,475
70 TONS	47,775

FOR WOOD PLATFORM DEDUCT	6%
FOR STEEL PLATE ADD	5%
FOR AUTOMATIC DIAL MODEL ADD	\$26,775
FOR REMOTE READER-PRINTER ADD	\$5,250

**MISCELLANEOUS COSTS**  
**UNDERGROUND FUEL STORAGE**

Costs are for complete installation. For multiple installation, two or more tanks in one hole, deduct 7 percent for each extra tank, consider the largest tank as the base. Add \$1.73 per square foot for any concrete pad work. Costs do not include electric pumps. See following page 8 in this section for pump costs.

<b>CAPACITY GALLONS</b>	<b>COST</b>	<b>CAPACITY GALLONS</b>	<b>COST</b>
<b>280</b>	1,871	4,000	4,954
<b>550</b>	2,318	5,000	5,358
<b>1,000</b>	2,785	6,000	6,251
<b>2,000</b>	3,934	8,000	7,463
<b>3,000</b>	4,380	10,000	8,760

**ABOVE GROUND FUEL STORAGE**

Costs are for complete installation. Includes holding stand, discharge hose and valve. Does not include any electric pumps. See following Page 8 in this section for pump costs.

<b>ABOVEGROUND STORAGE</b>			
<b>CAPACITY GALLONS</b>	<b>COST</b>	<b>CAPACITY GALLONS</b>	<b>COST</b>
200	553	2,000	1,687
350	769	3,000	2,104
550	864	4,000	2,461
1,000	1,349	5,000	2,858

**NOTE:** To calculate tank volume use the following formula.

Pi times (radius) squared times length times 7.5 equals volume in gallons.

**EXAMPLE:** A tank five feet in diameter and 14 feet in length.

Pi equals 3.1416.

Radius - one half of diameter, 2.5 feet therefore.

3.1416 times (2.5) squared times 14 feet times 7.5 equals 2,062 gallons

TYPE II

TYPE III

TYPE I

TYPE IV

TYPE V

ELECTRIC FUEL PUMP COSTS			
TYPE I	COST		
WITHOUT METER	370	TO	425
WITH METER	502	TO	557
TYPE II			
WITHOUT METER	532	TO	683
WITH METER	594	TO	881
TYPE III	527	TO	1,015
TYPE IV	651	TO	1,253
TYPE V	1,446	TO	1,786

## **COMPUTATION TABLES**

### **SECTION 7**

## **MENSURATION PRINCIPLES**

### **PLANE FIGURE**

A plane surface bounded by either straight or curved lines and having no thickness.

### **SOLID**

A body, such as a barrel, building, etc.

### **SQUARE MEASURE**

Area calculation requiring only two dimensions, length and width.

### **CUBIC MEASURE**

Cubic or cubage means volume and gives size in terms of its bulk. Calculation requires three dimensions: length times width times depth or height or thickness.

## WEIGHTS AND MEASURES

Tables of weights and measures and other information which may be helpful to the assessor-appraiser.

### METRIC MEASURE

Millimeter	0.001 meter
Centimeter	0.01 meter
Decimeter	0.1 meter
Meter	39.3685 inches
Kilometer	1,000 meters
Kilometer	.62137 miles
Meter	1.0935 yards
Meter	3.2807 feet
1 foot	0.30480 meter
1 foot	30.48 centimeters
1 inch	2.54 centimeters

### LINEAR MEASURE

1 foot	12 inches
1 yard	3 feet, 36 inches
1 rod	5 1/2 yards, 16 1/2 feet, 25 links
1 furlong	40 rods, 220 yards, 660 feet
1 mile	8 furlongs, 320 rods, 1,760 yards, 5,280 feet

### SURVEYOR'S LINEAR MEASURE

1 link	7.92 inches
1 rod	25 links
1 chain	4 rods, 100 links, 66 feet
1 furlong	10 chains
1 mile	8 furlongs, 80 chains

### SQUARE MEASURE

1 square foot	144 square inches
1 square yard	9 square feet, 1,296 square inches
1 square rod	1 pole or perch, 30 1/4 square yards, 272 1/4 square feet
1 rood	40 square rods, 1,210 square yards, 1/4 acre
1 acre	160 square rods, 4,840 square yards, 43,560 square feet
1 square mile	640 acres

## **SURVEYOR'S SQUARE MEASURE**

1 square rod	625 square links
1 square chain	16 square rods
1 acre	10 square chains
1 square mile	640 acres

## **CUBIC MEASURE**

1 cubic foot	1,728 cubic inches, 7.481 gallons
1 cubic yard	27 cubic feet
1 cord foot	16 cubic feet
1 cord of wood	8 cord feet, 128 cubic feet
1 perch of masonry	24 3/4 cubic feet
1 bushel	1.2445 cubic feet

## **ANGLES AND ARCS**

1 minute	60 seconds
1 degree	60 minutes
1 right angle	90 degrees, 1 quadrant
1 circumference	360 degrees, 4 quadrants

## **BOARD MEASURE**

1 board foot	length in feet times width in feet times thickness in inches
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## **AREAS**

Square foot area of surface equals square of one side multiplied by factors shown.

<b><u>REGULAR SHAPED</u></b>	<b><u>NUMBER OF SIDES</u></b>	<b><u>FACTOR</u></b>
Equilateral triangle	3	.433
Pentagon	5	1.721
Hexagon	6	2.598
Heptagon	7	3.634
Octagon	8	4.828
Nonagon	9	6.182
Decagon	10	7.694
Undecagon	11	9.366
Dodecagon	12	11.196



## MEASURES AND THEIR EQUIVALENTS

A gallon of water (U. S. Standard) weighs  $8 \frac{1}{3}$  pounds and contains 231 cubic inches.

A cubic foot of water contains  $7 \frac{1}{2}$  gallons, 1,728 cubic inches and weighs  $62 \frac{1}{2}$  pounds.

Doubling the diameter of a pipe increases its capacity four times.

To find the capacity of tanks any size, given the dimensions of a cylinder in inches, to find its capacity in U. S. gallons; square the diameter, multiply by the length and by .0034. (Note: See table on tank capacities.)

Rectangular tanks: multiply the length by the width by the depth (all in inches) and divide the result by 231. The answer is the capacity in gallons.

Thirty one and one half ( $31 \frac{1}{2}$ ) gallons water equals one barrel by weight.

British Thermal Unit (BTU) is the amount of the heat required to raise one pound of water one degree Fahrenheit.

A ton of refrigeration is measured by the displacement of the amount of heat required to melt a ton of ice in 24 hours. One motor horsepower of an electrically powered unit is normally required to produce one ton of refrigeration. Twelve thousand British Thermal Units (12,000 BTU) equals one ton.

Kilowatts multiplied by 1.3405 equal horsepower.

Kilowatts equals .746 multiplied by the horsepower.

## WEIGHTS

**BRICK:** Common brick of the national size weigh from  $4 \frac{1}{2}$  to five pounds; pressed and paving, from six to seven, depending upon clay, burning and size.

**LIME:** On the basis of 53 pounds to the cubic foot, lime weighs about 66 pounds to the bushel, but in bulk it is often sold on the basis of 80 pounds or 200 pounds to the barrel of  $2 \frac{1}{4}$  bushels.

**MISCELLANEOUS  
WEIGHT AND MEASURE EQUIVALENTS**

1 cubic inch of cast iron weighs 0.26 pounds  
1 cubic inch of wrought iron weighs 0.28 pounds  
1 cubic inch of water weighs .036 pounds  
1 cubic foot of water weighs 62.321 pounds  
1 United States gallon weighs 8.34 pounds  
1 Imperial gallon weighs 10.00 pounds  
1 United States gallon equals 231.01 cubic inches  
1 Imperial gallon equals 277.274 cubic inches  
1 cubic foot of water equals 7.48 U. S. gallons

1 gallon (water) weighs 8.34 pounds  
1 gallon equals .1337 cubic feet  
1 gallon equals .1074 bushels  
1 cubic foot equals .8032 bushels  
1 barrel (oil) equals 42 gallons  
1 barrel (water) equals 31.5 gallons

A span is 9 inches  
A hand, horse measurement, is 4 inches  
A knot, nautical, is 6,080.27 feet  
A fathom, nautical, is 6 feet  
A stone is 14 pounds

Pressure in pounds per square inch of column of water equals .434 times the height of the column in feet.

A square acre is approximately 208.7 feet on each side.

1 acre is about 8 rods by 20 rods, or any two combinations of rods whose product is 160.

To convert bushels to tons, multiply number of bushels by 60 and divide the product by 2,000 (average maximum weight of commodities 60 pounds per bushel).

To convert gallons to bushels, divide gallons by 9.35. Answer in bushels.

To convert cubic measure into bushels, multiply by 0.8035.

## AREAS AND MEASUREMENTS

To find the circumference of a circle, multiply the diameter by 3.1416.

To find the diameter, multiply circumference by 0.3183 or divide circumference by 3.1416.

To find the radius, multiply circumference by 0.15915.

To find the side of an inscribed square, multiply the diameter by 0.07071 or multiply the circumference by 0.2251.

To find the side of an equal square, multiply the diameter by 0.8863 or multiply the circumference by 0.2821.

**SQUARE:** A side multiplied by 1.4142 equals the diameter of its circumscribing circle.

A side multiplied by 4.443 equals the circumference of its circumscribing circle.

A side multiplied by 1.126 equals the diameter of an equal circle.

A side multiplied by 3.547 equals circumference of an equal circle.

To find the area of a circle, multiply the circumference by one-quarter of the diameter or multiply the square of the diameter by 0.7854 or multiply the square of the circumference by 0.07958 or multiply the square of one-half of the diameter by 3.1416.

To find the surface of a sphere or globe, multiply the diameter by the circumference or multiply the square of the diameter by 3.1416 or multiply four times the square of the radius by 3.1416.

To find tank capacities, diameter square times .0034 equals gallons per inch of height - Base 42 gallons per barrel.

To find area of a triangle, multiply base by 1/2 perpendicular height.

To find area of an ellipse, product of both diameters times .7854.

To find area of a parallelogram, base times altitude.

To find cubic inches in a ball, multiply cube of diameter by .5236.

To find cubic contents of a cone, multiply area of base by one third the altitude.

Area of rectangle equals length multiplied by width.

Surface of frustum of cone or pyramid equals sum of circumference of both ends times 1/2 slant height plus area both ends.

Contents of frustum of cone or pyramid: multiply area of two ends and get square root, add the two areas and times 1/3 altitude.

# CONVERSION TABLES

## TABLE FOR AREA AND CAPACITY OF CIRCULAR TANKS

DIAMETER		SQUARE			BARRELS
3	9.42	7.07	53	6	1.26
4	12.57	12.57	94	10	2.24
5	15.71	19.63	147	16	3.5
6	18.85	28.27	212	23	5.0
7	21.99	38.48	288	31	6.8
8	25.13	50.27	376	42	9.0
9	28.27	63.62	477	51	11.3
10	31.42	78.54	587	63	14.0
11	34.56	95.03	711	76	16.9
12	37.69	113.10	846	91	20.2
13	40.84	132.73	993	107	23.7
14	43.98	153.94	1,151	124	27.4
15	47.12	176.72	1,322	142	31.5
16	50.26	201.06	1,054	162	35.8
17	53.41	226.98	1,698	182	40.4
18	56.55	254.47	1,903	204	45.3
19	59.69	283.53	2,121	228	50.5
20	62.83	314.16	2,350	252	56.0
21	65.97	346.36	2,591	278	61.7
22	69.12	380.13	2,843	305	67.7
23	72.26	415.48	3,108	334	74.0
24	75.40	452.39	3,384	364	80.6
25	78.54	490.87	3,672	394	87.4
26	81.68	530.93	3,971	427	94.6
27	84.82	572.56	4,283	460	102.0
28	87.97	615.75	4,606	495	109.7
29	91.11	660.52	4,941	531	117.6
30	94.25	706.86	5,287	568	125.8
31	97.39	754.77	5,646	606	134.4
32	100.53	804.25	6,016	646	143.2
33	103.67	855.30	6,398	687	152.3
34	106.81	907.92	6,791	730	161.6
35	109.96	962.11	7,197	773	171.3
36	113.10	1,017.88	7,614	818	181.3
37	116.24	1,075.21	8,043	864	191.5
38	119.38	1,134.11	8,483	911	202.0
39	122.52	1,194.59	8,936	960	212.7
40	125.66	1,256.64	9,400	1,010	223.8

Notes on next page.

To find capacity of cylindrical tanks standing on end. To find the capacity in cubic feet of a round tank or cistern, multiply the square of the average diameter by the depth and multiply the product by .785.

\*To find the capacity in barrels (oil) equals diameter squared times .1399 times height.

\*\* To find the capacity in gallons equals diameter squared times 5.8748 times height.

**CONVERSION TABLES**  
**TABLE FOR CONVERSION OF LINEAL FEET INTO BOARD FEET**

2 by 4	.667 board feet
3 by 4	1.000 board feet
2 by 6	1.000 board feet
2 by 8	1.333 board feet
2 by 10	1.667 board feet
2 by 12	2.000 board feet
2 by 14	2.333 board feet
2 by 16	2.667 board feet
3 by 6	1.500 board feet
4 by 6	2.000 board feet
4 by 10	3.333 board feet
4 by 12	4.000 board feet
6 by 6	3.000 board feet
6 by 8	4.000 board feet
10 by 12	10.000 board feet
12 by 12	12.000 board feet

**BOARD MEASURE**

Multiply thickness in inches by width in inches, divide product by 12 and multiply result by the length in feet. The result is board measure content.

**EXAMPLE**

Two inches times 10 inches equal 20 square inches divided by 12 equals 1.667 board feet times 1,000 lineal feet equals 1,667 board feet.

# CENTER PIVOT IRRIGATION SYSTEM DATA

-----AREA COVERED IN ACRES-----

TOTAL SYSTEM LENGTH (IN FEET) <u>2/</u>	PERCENT OF WATER APPLIED IN LAST 100 FEET <u>1/</u>	TOTAL ACRES OF SQUARE FIELD TWICE LENGTH OF SYSTEM	WITH GUN <u>3/</u> SPRINKLER CORNERS USED ONLY	WITH GUN SPRINKLER USED ON ENTIRE CIRCLE <u>3/</u>	WITHOUT END GUN
600	30.6	33.1	30.8	35.3	26.0
650	28.4	38.8	36.0	40.6	30.5
700	26.5	45.0	41.5	46.2	35.3
750	24.9	51.7	47.3	52.1	40.6
800	23.4	58.8	53.4	58.4	46.2
850	22.1	66.3	59.8	65.1	52.1
900	21.0	74.4	66.5	72.1	58.4
960	19.9	82.9	73.6	79.5	65.1
1,000	19.0	91.8	81.1	87.3	72.1
1,050	18.1	101.2	89.0	95.4	79.5
1,100	17.4	111.1	97.3	103.8	87.3
1,150	16.6	121.4	106.0	112.7	95.4
1,200	16.0	132.2	115.1	121.9	103.9
1,250	15.4	143.5	124.6	131.4	112.7
1,300	14.8	155.2	134.5	141.4	121.9
1,320	14.6	16.0	138.5	145.4	125.7
1,350	14.3	167.4	144.7	151.6	131.4
1,400	13.8	180.0	155.4	162.3	141.4
1,450	13.3	193.1	166.5	173.3	151.6
1,500	12.9	206.6	178.0	184.6	162.3

1/ Less volume of end gun when used.

2/ Generally outside drive wheel is approximately 50 feet from end.

3/ Based on 100 feet gun coverage.

**EXAMPLE:** System is 900 feet long. Then 21 percent of water is applied in last 100 feet; 66.5 acres are covered with gun used in corners only.