NEVADA DEPARTMENT OF TAXATION

Division of Local Government Services

2014-2015

ASSESSOR'S HANDBOOK OF RURAL BUILDING COSTS

DATE OF VALUATION JANUARY 1, 2013

Division of Local Government Services

2014-2015

Rural Building Cost Manual

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Approved by the Nevada Tax Commission, March 11, 2013

INSTRUCTIONS FOR USE

The use of the Rural Building Manual is limited. In general, most of the sections in the Manual report costs which are lower than the Marshall and Swift Cost Manual, in order to reflect the use of unskilled farm labor in the building of the structure. If the structure was built using a professional contractor, either the Marshall Swift cost manual may be used or the costs in the Rural Building Manual may be used if they are adjusted upward by 33 percent. Section 6 of the Rural Building Manual provides costs for miscellaneous items, most of which are generally professionally installed and are rarely adjusted downward.

NAC 361.128 has been amended to clarify when the Rural Building Manual should be used. The amended NAC reads as follows:

361.128 ***2. Except as otherwise provided in subsections 3 and 4, the cost of replacement of a farm building, a shed or another rustic structure must be calculated using the manual of rural building costs adopted by the Commission if the farm building, shed or other rustic structure:***

(a) Does not conform to any applicable building code adopted by a local governmental entity; or

(b) Is constructed by a person who does not regularly perform construction work and does not earn a substantial portion of his or her income as a licensed contractor, unless the person acts only as a general contractor and the actual work is performed by a person who regularly performs construction work and earns a substantial portion of his or her income as a licensed contractor.

3. Except as otherwise provided in subsection 4, the cost of replacement of a farm building, a shed or another rustic structure constructed by a person who regularly performs construction work and earns a substantial portion of his or her income as a licensed contractor must be calculated using:

(a) The standards and modifiers of local costs published in the version of the Residential Cost Handbook, Marshall Valuation Service, Residential Estimator software or Commercial Estimator software, as appropriate, adopted by reference pursuant to section 28 of this regulation as of January 1 of the year immediately preceding the lien date for the current year; or

(b) The manual of rural building costs adopted by the Commission, except that the costs therein must be adjusted upward by 33 percent.

If the Rural Building Manual or the Marshall Swift Cost Manual does not contain the costs of a particular kind of structure, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services.

All photos contained in the Rural Building Manual are to be used as a guide to help determine quality, class and style of buildings. Photos are not to be used as a method for determination of whether a building should be valued using the Rural Building Manual. Remember the manual is to be used in a limited manner for those buildings that fall outside of the normal building standards to reflect the use of unskilled labor in the building of the structure.

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2014-2015 RURAL BUILDING COST MANUAL

Section 1

BASIC FARM BUILDINGS

Adopted by NTC, March 11, 2013

BASIC FARM BUILDINGS

METAL BARNS

LOW QUALITY

AVERAGE QUALITY

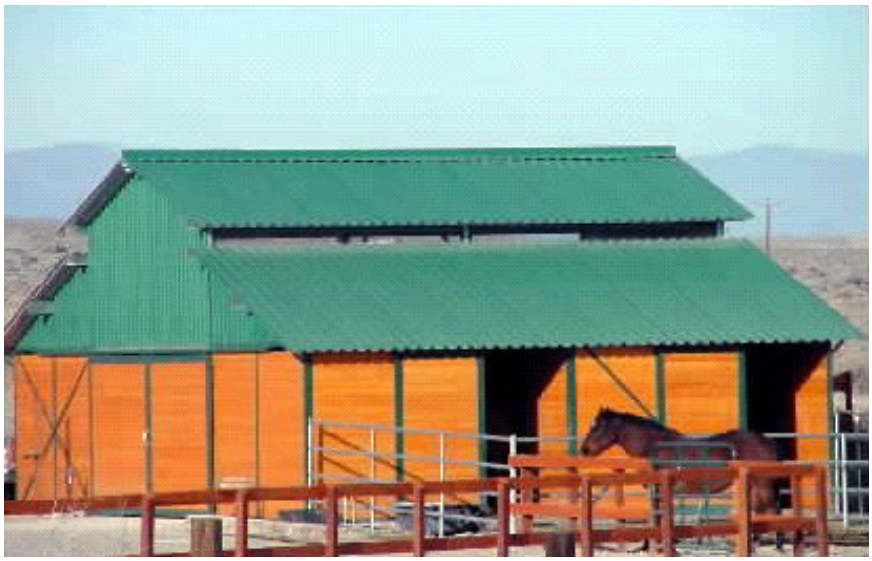
GOOD QUALITY

PHOTOS COURTESY OF CHURCHILL COUNTY ASSESSOR

BASIC FARM BUILDINGS

WOOD BARNS

LOW QUALITY



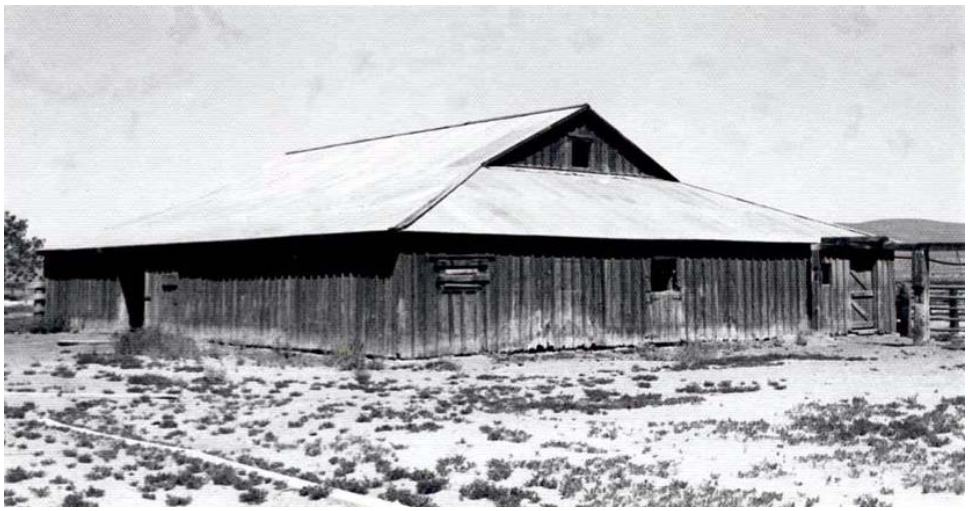
AVERAGE QUALITY

GOOD QUALITY

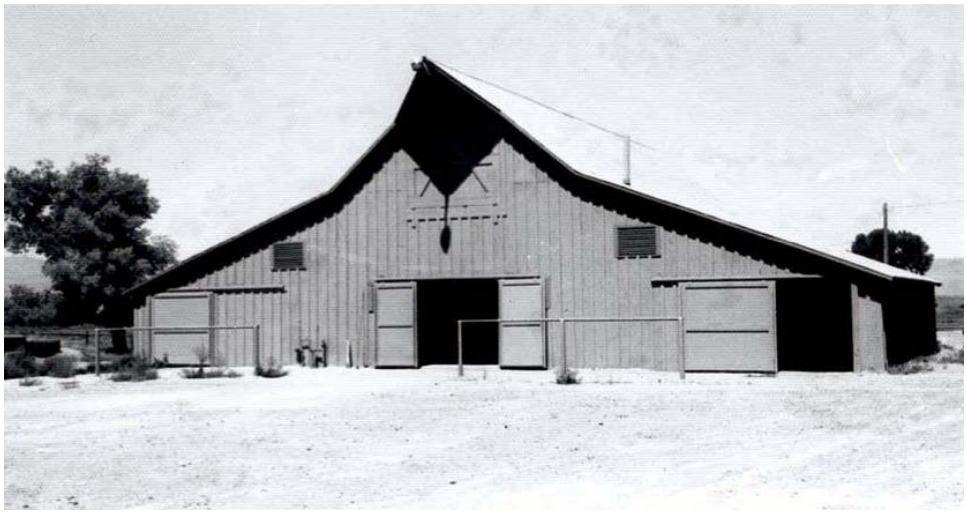
PHOTOS COURTESY OF CHURCHILL COUNTY ASSESSOR

BASIC FARM BUILDINGS

GENERAL PURPOSE BARNS



LOW QUALITY



AVERAGE QUALITY

GOOD QUALITY

BASIC FARM BUILDINGS

GENERAL PURPOSE BARNS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Perimeter concrete and column footings	Perimeter concrete and column footings	Perimeter concrete and column footings
Floor	Dirt	Dirt	Dirt
Wall Structure	Light wood boxed frame or wood posts and beams, 10' eave height	Average 2"x 4", 24" on center, 10' eave height	Concrete block or good 2"x 4", 16" on center or 2"x 6", 24" on center, 10' eave height
Exterior Wall Cover	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
Roof Construction	Medium pitch, 2"x 4" rafters 24" to 36" on center, composition decking	Medium pitch, wood joists, wood or composition decking	Medium pitch, wood joists, wood or composition decking
Roof Cover	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
Electrical	Minimal per class	Minimal per class	Minimal per class
Plumbing	Minimal per class	Minimal per class	Minimal per class

Includes normal stalls commensurate with quality class.

SQUARE FOOT COSTS

CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
1	$ 15.03	12.56	11.54	11.03	10.72	10.51	10.35	10.07	9.89	9.69	9.45
2	21.85	18.09	16.45	15.66	15.19	14.90	14.67	14.26	13.93	13.58	13.27
3	27.40	24.29	22.65	21.77	21.32	20.98	20.77	20.34	20.00	19.64	19.38

ADD Concrete or wood floors, or concrete flatwork per square foot: $ 2.76

Lofts per square foot of floor area

Low Quality:	$ 3.22
Average Quality:	4.21
Good Quality:	5.54

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

HAY STORAGE BARNS

AVERAGE QUALITY

GOOD QUALITY

BASIC FARM BUILDINGS

HAY STORAGE BARNS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Redwood or cedar mudsills	Concrete or masonry piers	Continuous concrete
Floor	Dirt	Dirt	Dirt
Wall Structure	Light wood boxed frame or wood posts and beams, 10' eave height	Average 2"x 4", 24" on center, 10' eave height	Good 2"x 4", 16" on center or 2"x 6", 24" on center, 10' eave height
Exterior Wall Cover	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
Roof Construction	Medium to high pitch 2"x 4" rafters 24" to 36" on center, or light wood trusses	Medium to high pitch, average wood trusses	Medium to high pitch, good wood trusses
Roof Cover	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
Electrical	Minimal per class	Minimal per class	Minimal per class
Plumbing	Minimal per class	Minimal per class	Minimal per class

SQUARE FOOT COSTS

CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
1	$ 13.95	11.46	10.45	9.92	9.67	9.40	9.28	8.98	8.80	8.59	8.47
2	19.80	15.85	14.03	13.27	12.76	12.15	12.00	11.50	11.10	10.66	10.45
3	27.19	21.96	19.77	18.45	17.95	17.36	17.02	16.38	15.93	15.31	14.93

ADD Concrete or wood floors, or concrete flatwork per square foot: $ 2.76

Lofts per square foot of floor area

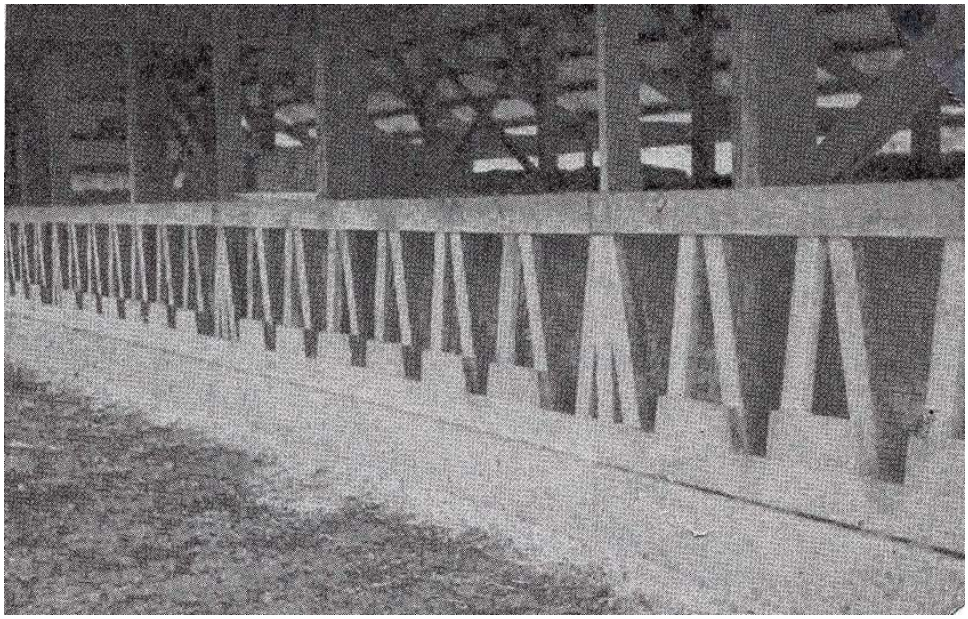
Low Quality:	$ 3.22
Average Quality:	4.21
Good Quality:	5.54

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

FEED BARNS

AVERAGE QUALITY



INTERIOR DETAIL

GOOD QUALITY

BASIC FARM BUILDINGS

FEED BARNS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Redwood or cedar mudsills	Concrete or masonry piers	Continuous concrete
Floor	Dirt	Dirt	Dirt
Wall Structure	Light wood frame, 10' eave height	Average wood frame, 10' eave height	Good wood frame, 10' eave height
Exterior Wall Cover	Closed sides and open ends	Partially open sides, standard corrugated iron or average wood siding on ends	Partially open sides, good quality siding
Roof Construction	Medium to low pitch 2"x 4" rafters 24" to 36" on center, or light wood trusses	Medium to low pitch, average wood trusses	Medium to low pitch, good wood trusses
Roof Cover	Light metal or composition shingle	Standard gauge corrugated metal	Wood shingles
Electrical	Minimal per class	Minimal per class	Minimal per class
Plumbing	Minimal per class	Minimal per class	Minimal per class

Includes normal feed stalls commensurate with quality class.

SQUARE FOOT COSTS

CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
1	$ 9.42	8.73	8.36	8.11	8.02	7.96	7.91	7.87	7.82	7.77	7.76
2	11.57	10.92	10.48	10.13	9.92	9.83	9.75	9.69	9.63	9.58	9.57
3	15.44	14.82	14.31	13.90	13.54	13.33	13.22	13.16	13.11	12.99	12.92

ADD Concrete or wood floors, or concrete flatwork per square foot: $ 2.76

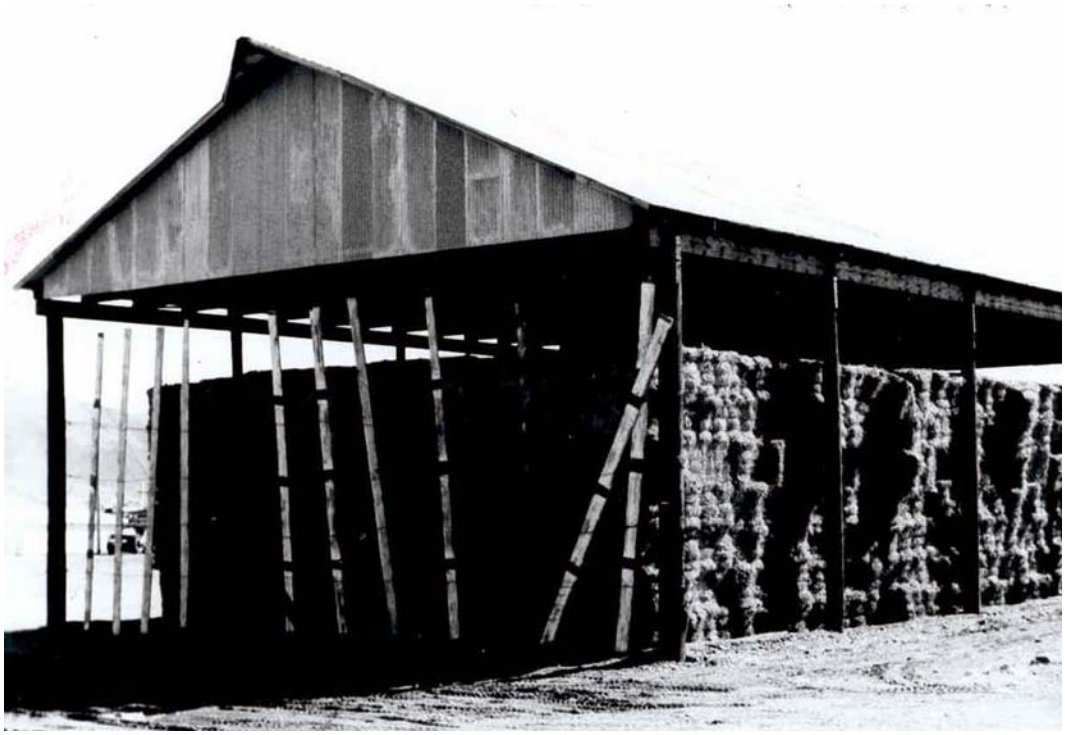
Lofts per square foot of floor area

Low Quality:	$ 3.22
Average Quality:	4.21
Good Quality:	5.54

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

POLE BARNS



AVERAGE QUALITY – ALL SIDES OPEN
WOODEN POLES – WOOD FRAME

GOOD QUALITY – ALL SIDES OPEN
STEEL POLES, STEEL TRUSS & STEEL FRAME

BASIC FARM BUILDINGS

POLE BARNS - AVERAGE QUALITY

Structure	Poles 15' to 20' on center
Floor	Dirt - use square foot additive for concrete
Roof	Average wood trusses or average steel trusses, low pitch, corrugated iron or aluminum cover, gable end enclosed, 2' overhang on 2 sides
Walls	18' 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 multiplier for good quality materials--heavy steel frame and trusses, wide span, heavy gauge roof cover. Use multiplier for low quality materials--light wood poles and frame with light wood or steel trusses and light gauge roof cover.

SQUARE FOOT COSTS

TYPE "A" (ALL SIDES OPEN)

END WIDTH	SIDE LENGTH 34'	51'	68'	85'	102'	119'	136'	153'	170'	187'
20'	$ 7.89	7.64	7.41	7.20	7.20	6.94	6.94	6.94	6.94	6.94
25'	7.41	7.20	6.94	6.74	6.51	6.51	6.51	6.51	6.51	6.51
30'	7.06	6.92	6.74	6.48	6.28	6.28	6.28	6.28	6.28	6.28
35'	6.94	6.72	6.50	6.27	6.04	6.04	6.04	6.04	6.04	6.04
40'	6.90	6.70	6.45	6.25	6.02	6.02	6.02	6.02	6.02	6.02
45'	6.87	6.62	6.39	5.74	5.72	5.72	5.72	5.72	5.72	5.72
50'	6.85	6.60	6.34	5.68	5.60	4.79	4.79	4.79	4.79	4.79
60'	6.83	6.58	6.23	5.44	5.42	4.70	4.70	4.70	4.70	4.70
70'	6.70	6.48	5.99	5.25	5.14	4.59	4.59	4.59	4.59	4.59
80'	6.70	6.48	5.74	5.14	4.94	4.48	4.48	4.48	4.48	4.48

ADD Concrete or wood floors, or concrete flatwork per square foot : $ 2.76

QUALITY MULTIPLIERS

Good Quality: 1.29
Low Quality: 0.69

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

POLE BARNS - AVERAGE QUALITY

SQUARE FOOT COSTS

TYPE "B" (ENDS AND ONE SIDE CLOSED - ONE SIDE OPEN)

END WIDTH	SIDE LENGTH 34'	51'	68'	85'	102'	119'	136'	153'	170'	187'
20'	$ 11.44	10.43	9.90	9.64	9.43	9.23	9.13	9.11	9.09	8.97
25'	10.57	9.64	9.09	8.79	8.65	8.31	8.24	8.12	8.05	8.01
30'	10.08	9.11	8.65	8.28	8.14	7.98	7.87	7.73	7.68	7.64
35'	9.74	8.70	8.24	7.89	7.73	7.66	7.45	7.43	7.41	7.38
40'	9.52	8.45	7.99	7.68	7.62	7.41	7.20	7.18	7.15	7.09
45'	9.39	8.26	7.75	7.43	7.24	7.09	6.94	6.92	6.90	6.87
50'	9.28	8.05	7.72	7.16	7.09	6.92	6.78	6.74	6.67	6.64
60'	9.08	7.99	7.38	6.96	6.90	6.74	6.62	6.55	6.46	6.43
70'	8.95	7.82	7.16	6.92	6.78	6.64	6.46	6.43	6.37	6.35
80'	8.70	7.70	6.92	6.81	6.64	6.43	6.34	6.32	6.28	6.23

ADD Concrete or wood floors, or concrete flatwork per square foot : $ 2.76

QUALITY MULTIPLIERS Good Quality: 1.29
Low Quality: 0.69

SQUARE FOOT COSTS

TYPE "C" (ALL SIDES CLOSED)

END WIDTH	SIDE LENGTH 34'	51'	68'	85'	102'	119'	136'	153'	170'	187'
20'	$ 12.98	12.06	11.54	11.25	11.14	10.96	10.87	10.84	10.82	10.73
25'	11.67	10.82	10.31	10.03	9.85	9.71	9.65	9.50	9.25	9.13
30'	10.96	9.79	9.35	9.00	8.88	8.67	8.58	8.51	8.49	8.43
35'	10.35	9.27	9.00	8.62	8.54	8.30	8.23	8.21	8.06	8.05
40'	10.03	9.06	8.60	8.31	8.24	8.03	7.98	7.82	7.75	7.72
45'	9.71	8.70	8.24	8.03	7.75	7.66	7.55	7.47	7.45	7.43
50'	9.43	8.49	7.91	7.82	7.73	7.45	7.43	7.41	7.33	7.27
60'	9.09	8.21	7.64	7.29	7.22	6.99	6.94	6.85	6.80	6.74
70'	8.88	7.98	7.47	7.18	6.97	6.83	6.70	6.69	6.62	6.60
80'	8.56	7.68	7.18	6.90	6.70	6.51	6.48	6.41	6.35	6.26

ADD Concrete or wood floors, or concrete flatwork per square foot: $ 2.76

QUALITY MULTIPLIERS Good Quality: 1.29
Low Quality: 0.69

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

SIDE SHEDS - AVERAGE QUALITY

Structure	1 row of poles 15' to 20' on center, 1 side ties into adjoining building
Floor	Dirt - Use square foot additive for concrete
Roof	Light wood trusses, low pitch, corrugated iron or aluminum cover, ends enclosed, 2' overhang on 1 side
Walls	14' to 16' wall height, light wood frame with corrugated iron covering

SQUARE FOOT COSTS

WITH OPEN SIDES:	$ 4.25	TO	$	5.56
WITH ENCLOSED SIDES:	6.62	TO		8.62

ADD Concrete or wood floors, or concrete flatwork per square foot: $ 2.76

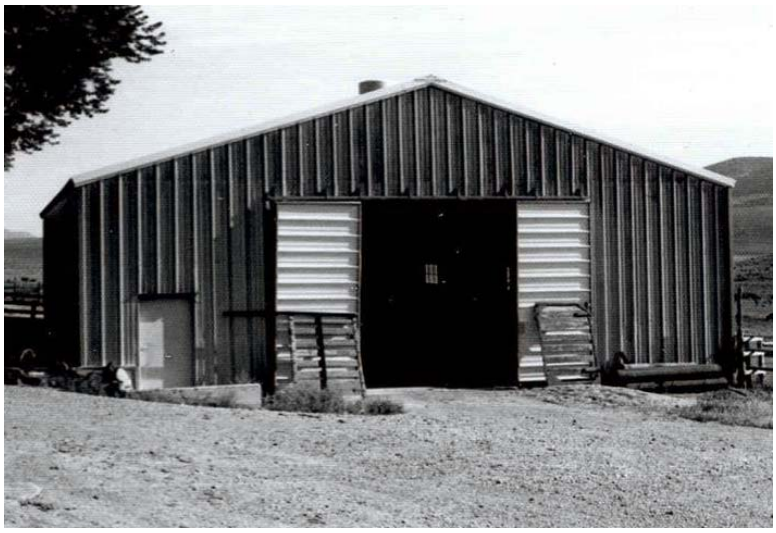
NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

SHOPS

AVERAGE QUALITY

GOOD QUALITY



GOOD QUALITY – CLASS S

BASIC FARM BUILDINGS

SHOPS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Light concrete	Standard concrete	Standard concrete
Floor	Concrete	Concrete	Concrete
Wall Structure	Light wood frame, 15' eave height	Average wood frame, 15' eave height	Good wood frame 15' eave height
Exterior Wall Cover	Light metal or low cost boards	Standard gauge corrugated metal or average wood siding	Good wood siding painted or C-block
Roof Construction	Low to medium pitch, 2"x 4" rafters 24" to 36" on center or light wood trusses	Low to medium pitch, average wood trusses	Low to medium pitch, good wood trusses
Roof Cover	Light metal	Standard gauge metal	Wood shingles
Electrical	2 outlets per 1,000 square foot	4 outlets per 1,000 square foot	4 outlets per 1,000 square foot
Plumbing	1 cold water outlet	2 cold water outlets	1 rough fixture plus 2 cold water outlets
Doors	1 light sliding or swinging door per 2,000 square foot	1 average sliding or swinging door per 2,000 square foot	1 drive through door per 1,000 square foot plus 1 walk-through door
Windows	None	None or few low cost	5 percent of wall area
Shape	Square or rectangular length between 1 and 2 times width	Square or rectangular length between 1 or 2 times width	Square or rectangular length between 1 and 2 times width

SQUARE FOOT COSTS

CLASS	500	1,000	1,500	2,000	2,500	3,000	4,000	5,000	6,000	8,000
1	$ 16.08	15.02	14.07	13.49	13.03	12.70	12.23	11.84	11.61	11.32
2	23.64	20.93	18.39	17.84	16.75	16.22	15.52	15.06	14.59	14.17
3	30.25	24.89	24.49	23.04	22.05	21.22	20.12	19.59	18.89	18.25

ADD For interior finish -

Class 1: $ 1.12 per square foot of floor area
Class 2: 1.36 per square foot of floor area
Class 3: 1.69 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, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

MACHINERY & EQUIPMENT SHEDS

AVERAGE QUALITY

AVE. QUALITY – 1 SIDE OPEN

GOOD QUALITY

GOOD QUALITY – 1 SIDE OPEN

BASIC FARM BUILDINGS

MACHINERY AND EQUIPMENT SHEDS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Light perimeter concrete	Concrete perimeter	Concrete perimeter
Floor	Dirt	Dirt or concrete*	Dirt or concrete*
Wall Structure	Light wood boxed frame or post and beam, 10' eave height	Post and beam construction, 10' eave height	Average 2"x 4", 24" on center, 10' eave height
Exterior Wall Cover	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
Roof Construction	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
Roof Cover	Corrugated metal	Corrugated metal or wood shingle	Standard gauge metal or good wood shingles
Electrical	None	2 outlets per 1,000 square foot	4 outlets per 1,000 square feet
Plumbing	None	None	None
Shape	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

SQUARE FOOT COSTS

TYPE I (ALL SIDES CLOSED)

CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	$ 12.04	9.69	8.92	8.53	8.36	7.76	7.73	7.54	7.47	7.40	7.32
2	15.55	12.76	11.94	11.48	11.24	10.50	10.43	10.27	10.16	10.12	10.01
3	21.41	18.09	17.08	16.55	16.32	15.39	15.24	15.10	14.97	14.91	14.73

TYPE II (ONE SIDE OPEN)

CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	6,000
1	$ 9.71	7.77	7.13	6.78	6.55	6.18	6.13	5.99	5.90	5.88	5.81
2	12.93	10.70	9.87	9.45	9.21	8.82	8.68	8.57	8.42	8.40	8.29
3	18.57	15.49	14.46	14.32	14.01	13.48	13.31	13.18	12.94	12.87	12.74

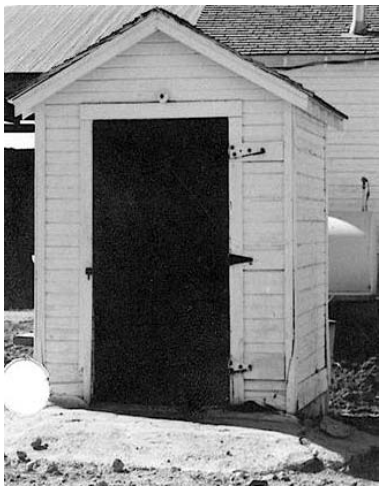
ADD Concrete or wood floors, or concrete flatwork per square foot: $ 2.76

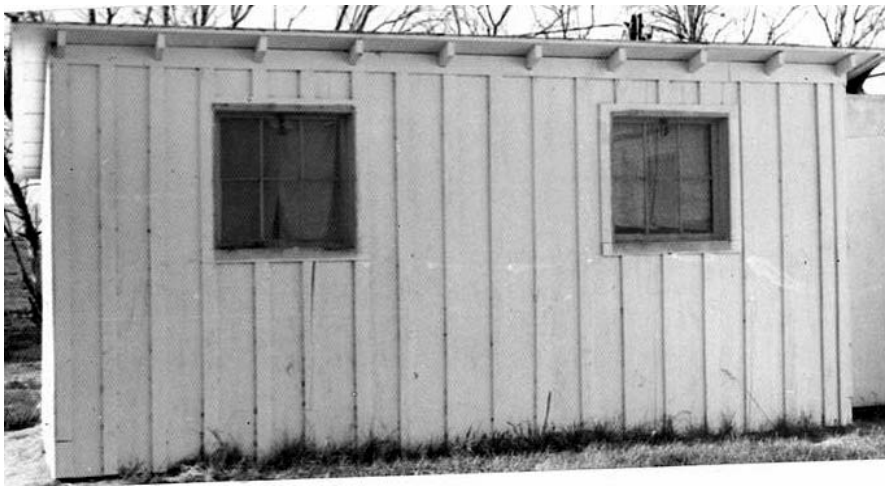
NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

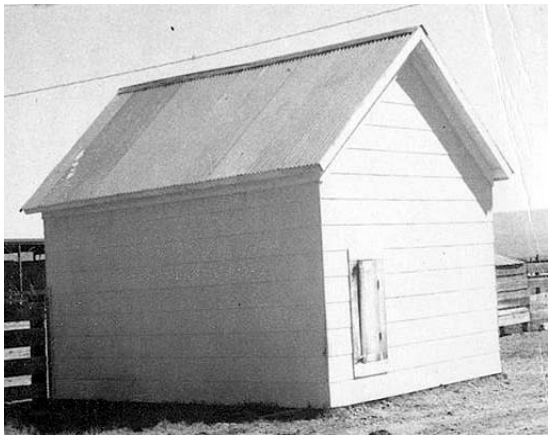
SMALL SHEDS AND PUMP HOUSES

LOW QUALITY





AVERAGE QUALITY



GOOD QUALITY

BASIC FARM BUILDINGS

SMALL SHEDS AND PUMP HOUSES

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Redwood or cedar mudsills	Concrete or masonry piers	Continuous concrete
Floor	Dirt	Dirt*	Dirt*
Wall Structure	Light wood boxed frame or wood posts and beams 8' eave height	Average 2"x 4" on center, 8' eave height	Good 2"x 6", 24" on center, or 2"x 4", 16" on center, 8' eave height
Exterior Wall Cover	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
Roof Construction	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
Roof Cover	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
Electrical	None	Minimal	Minimal
Plumbing	None	None	None

NOTE: Type II with 2 sides open; reduce cost by an additional 12 percent.
Type II with 3 sides open; reduce cost by an additional 25 percent.
Type II with 4 sides open; reduce cost by an additional 30 percent.

The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

SQUARE FOOT COSTS

TYPE I (ALL SIDES CLOSED)

CLASS	30	50	60	80	100	120	150	200	250	300	400	500
1	$ 15.20	12.64	12.27	11.01	10.26	9.78	9.27	8.46	8.14	7.80	7.30	7.01
2	18.92	16.88	15.79	14.47	13.67	13.15	12.58	11.78	11.40	11.02	10.51	10.21
3	30.22	24.63	23.74	21.52	19.46	18.42	17.32	16.02	14.86	14.12	13.07	12.40

TYPE II (ONE SIDE OPEN)

CLASS	30	50	60	80	100	120	150	200	250	300	400	500
1	$ 12.66	10.31	9.54	8.93	8.55	8.09	7.59	7.25	7.01	6.71	6.40	6.12
2	17.06	14.59	14.05	12.42	11.40	10.48	10.12	9.54	9.40	8.67	8.23	7.82
3	23.34	21.03	19.31	17.17	15.86	14.70	14.24	13.56	12.89	12.20	11.65	11.15

ADD	Concrete or wood floors, or concrete flatwork per square foot:	$ 2.76
	Fiberglass Roll or Batt Insulation:	0.51
	Gypsum Board Interior:	1.08

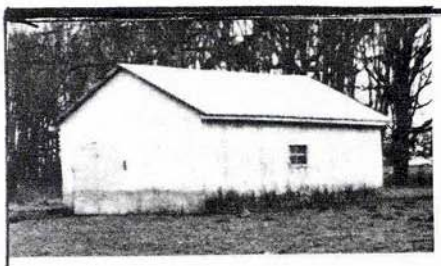
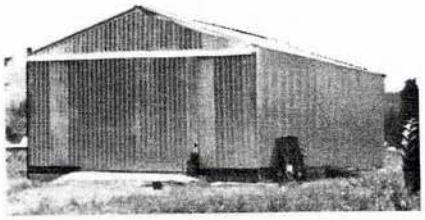
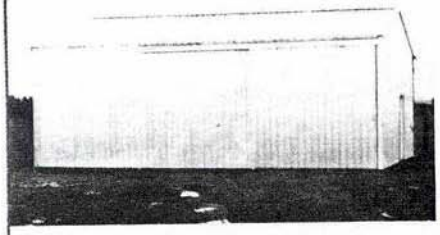
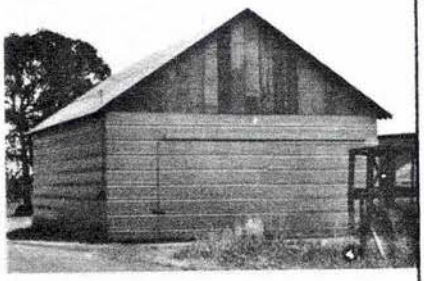
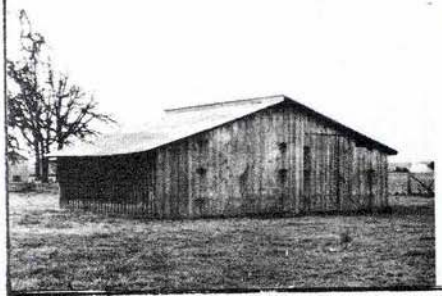
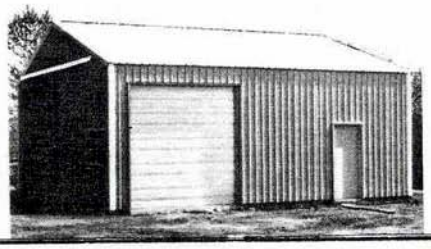
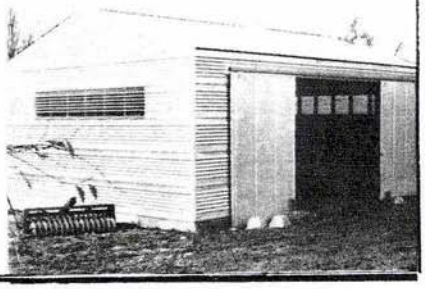
BASIC FARM BUILDINGS

GENERAL PURPOSE BUILDINGS

General purpose buildings adapt easily to many different uses, especially as garages, machine repair shops, or storage areas. General purpose buildings may also function as feed storage sheds or livestock shelters.

General purpose buildings typically employ simple designs that emphasize maximum utility at minimum cost.

CLASS ILLUSTRATIONS

LOW QUALITY	AVERAGE QUALITY	GOOD QUALITY
		
		
		

BASIC FARM BUILDINGS

GENERAL PURPOSE BUILDINGS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	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
Floor	Dirt	Concrete	Concrete
Frame and Exterior Walls	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
Interior Walls	Normally unfinished see options	Normally unfinished see options	Normally unfinished see options
Roof Structure	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
Roof Cover	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
Electrical	None	Minimal	Minimal
Plumbing	None	None	None

SQUARE FOOT COSTS

CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500
1	$ 9.13	7.81	7.45	7.05	6.88	6.63	6.46	6.38	6.31
2	13.22	11.63	11.17	10.65	10.46	10.15	9.94	9.84	9.74
3	16.74	14.85	14.32	14.13	13.50	13.13	12.87	12.74	12.67

ADD	For interior finish -	Class 1:	$ 1.15	per square foot of floor area
		Class 2:	1.26	per square foot of floor area
		Class 3:	1.37	per square foot of floor area

<u>Height adjustment:</u>

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.

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

ROOT CELLARS

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY
Foundation	Cedar or redwood mudsills or rubble	Concrete or masonry footings	Continuous concrete
Floor	Dirt	Dirt	Concrete
Wall Structure	Post and beams with wood siding	Post and beams with wood siding	Concrete block or poured concrete
Roof Construction	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
Roof Cover	Sod	Sod, or if above ground corrugated metal with inside insulation	Sod, or if above ground corrugated metal with inside insulation
Electrical	Minimal	Minimal	Minimal
Plumbing	None	None	None

SQUARE FOOT COSTS

CLASS	100	200	300	400	500	600	1,000	1,500	2,000	2,500
1	$ 12.45	11.33	10.78	10.51	10.32	10.18	10.04	9.90	9.79	9.76
2	17.65	15.43	14.78	14.22	13.93	13.82	13.19	12.85	12.64	12.48
3	43.95	35.83	30.78	28.01	26.44	25.64	22.74	20.99	19.79	18.96

NOTE: Above costs include sod roof covering.

ADD For corrugated metals, light composition or wood shingles;

Class 1: $ 2.07 per square foot of floor area
Class 2: 2.48 per square foot of floor area
Class 3: 2.97 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, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

COLD STORAGE WALK-IN BOXES

TOTAL COST

TYPE	50 sq ft	100'	150'	200'	300'	400'	500'
COOL BOX	13,104	18,673	22,932	26,536	32,760	37,892	42,370
FREEZE BOX	14,873	20,917	25,498	33,470	39,694	44,827	49,304

Wall deduction per linear foot of wall: $ 80

NOTE: Above costs represent 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 building walls form exterior wall of box, use above wall deduction. For homemade boxes using farm labor for construction, deduct 30 percent.

POTATO STORAGE

TYPE I

Costs represent low quality construction, partly below grade, performed by unskilled farm labor with minimal quality materials. These are designed for relatively short storage periods. They are commonly called "potato cellars."

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

LOW QUALITY
SQUARE FOOT COSTS

4,000	5,000	7,000	10,000	15,000	20,000
$ 8.90	8.63	8.18	7.88	7.27	6.69

BASIC FARM BUILDINGS

POTATO STORAGE WAREHOUSE

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. TYPE II buildings may have other uses.

SQUARE FOOT COSTS

LENGTH	WIDTH 30'	40'	60'	70'
30'	12.15	-	-	-
36'	11.59	-	-	-
48'	10.80	9.90	-	-
60'	10.24	9.28	8.89	-
72'	9.79	8.89	8.49	8.15
84'	9.45	8.60	8.15	7.87

LENGTH	WIDTH 30'	40'	60'	70'
96'	9.11	8.32	7.87	7.59
108'	8.83	8.10	7.65	7.42
120'	8.60	7.87	7.42	7.14
160'	8.04	7.31	6.92	6.69
200'	-	6.92	6.52	6.35
240'	-	6.58	6.24	6.13

OPTIONS:

Electrical

Minimal Service, add per square foot of floor area: $ 0.14

Plumbing

Minimal Service, add per square foot of floor area: 0.10

Insulation

If 2" thick foamglass is sprayed on walls and ceiling (or equivalent), add per square foot of insulated area: 3.05

Interior Construction

If potato storage area has bins and interior partitions, add per square foot of floor area: 1.12

Concrete (or concrete flatwork)

Add per square foot of concreted area: 2.76

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

POTATO STORAGE WAREHOUSE

TYPE III

Costs represent construction at grade level using average or good quality materials with proper supervision and skilled labor. Base wall height ordinarily equals 14 feet. Most common building size equals 50 feet by 100 feet (5,000 square feet). The maximum potato storage period depends on the magnitude of temperature and humidity control equipment; however, costs do not include environmental control. Refer to Page 24 for additional environmental control costs. TYPE III buildings may have other uses.

COMPONENT	AVERAGE QUALITY	GOOD QUALITY
Foundation	Continuous concrete	Continuous concrete
Floor	Dirt	Dirt
Frame	Heavy timber post and beam. Basic height 14 feet.	Steel frame. Basic height 14 feet.
Exterior Wall	Wood siding painted, 1 or 2 large end doors, one walk-in door.	Aluminum or steel, corrugated metal cover, unpainted. 2 large end doors. 1 or 2 walk-in doors.
Interior Construction	See options	See options
Ceiling	Open	Open
Plumbing	Entry service, 2 hose bibs	Entry service, 2 hose bibs
Electrical	Entry service, 3 outlets	Entry service, 3 outlets
Insulation	2 inch thick cellulose sprayed walls and ceiling or equivalent	2 inch thick cellulose sprayed walls and ceiling or equivalent
Roof Frame	Wood rafters, joists, sheathing	Open steel and frame for corrugated metals
Roof Cover	Asphalt or wood shingle	Galvanized metal

SQUARE FOOT COSTS

	5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
AVG	$ 20.85	19.87	18.89	17.41	16.22	15.66	15.09	14.38
GOOD	27.94	26.43	24.50	22.13	20.45	19.39	18.61	17.77

OPTIONS:

Interior Construction

If potato storage area has bins and interior partitions,

add for average quality per square foot: $ 4.08

add for good quality per square foot: 7.93

Exterior Construction

Painted metal exterior walls, add per square foot: $ 0.59

Concrete or concrete flatwork per square foot: 2.76

NOTE: Above costs for potato storage warehouse assume skilled labor and include contractor fees. For construction performed 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.

BASIC FARM BUILDINGS

POTATO STORAGE WAREHOUSE OPTIONS

TEMPERATURE AND HUMIDITY CONTROL

Air humidity control only, including fan room, louver system, humidifiers, perforated air pipe, and control panel.

SQUARE FOOT COSTS

5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
$ 3.16	3.06	2.94	2.81	2.71	2.64	2.59	2.49

AIR CONDITIONING

Includes complete refrigeration unit and controls in addition to the air and humidity system listed above.

SQUARE FOOT COSTS

5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
$ 6.81	6.59	6.32	6.05	5.84	5.68	5.57	5.35

BASIC FARM BUILDINGS

STEEL BUILDINGS – FARM & RANCH

METAL HORSE BARN

METAL SHOP– SLANT WALL

QUONSET BUILDING

BASIC FARM BUILDINGS

QUONSET BUILDINGS

Costs per square foot of floor area represent 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. Adjust low quality buildings down 30 percent and good quality buildings up 25 percent based on the quality of the finished building and extra additives. Base height equals 20 feet at the center of the arch. Add or deduct 5 percent for each foot of deviation from base.

SQUARE FOOT COSTS

	WIDTH			
LENGTH	30'	40'	60'	70'
30'	17.35	-	-	-
36'	16.55	-	-	-
48'	15.43	14.14	-	-
60'	14.62	13.26	12.69	-
72'	13.98	12.69	12.13	11.65
84'	13.50	12.29	11.65	11.25

	WIDTH			
LENGTH	30'	40'	60'	70'
96'	13.02	11.89	11.25	10.85
108'	12.61	11.57	10.93	10.60
120'	12.29	11.25	10.60	10.20
160'	11.49	10.44	9.88	9.56
200'	-	9.88	9.32	9.08
240'	-	9.40	8.92	8.76

PRE-ENGINEERED STEEL BUILDINGS

Costs per square foot of floor area represent Average Quality prefabricated galvanized steel buildings, with minimum doors, windows, and additional features erected on concrete footings without floors, lights, or heat. Multipliers appear below for other types of skin coverings. Adjust low quality buildings down 25 percent and good quality buildings upwards 25 percent based on the quality of the finished building and extra additives.

AVERAGE QUALITY

	EAVE	LENGTH TO WIDTH RATIO					
WIDTH	HEIGHT	1.0	1.5	2.0	3.0	4.0	5.0
20'	10'	$ 15.33	14.51	13.95	13.21	12.68	12.30
30'	12'	13.15	12.55	12.24	11.57	11.21	10.95
40'	14'	13.35	12.51	11.98	11.23	10.71	10.35
50'	14'	11.83	11.39	11.09	10.68	10.39	10.18
60'	14'	10.79	10.44	10.20	9.89	9.68	9.58
80'	16'	11.03	10.65	10.38	10.03	9.67	9.50
100'	16'	10.79	10.35	10.03	9.62	9.36	9.12
140'	16'	9.58	9.29	9.04	8.77	8.54	8.41
160'	18'	9.48	9.20	9.01	8.72	8.53	8.38
200'	18'	8.92	8.68	8.53	8.32	8.15	8.04

See following pages for additional features.

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

BASIC FARM BUILDINGS

PRE-ENGINEERED STEEL BUILDINGS

ADDITIONAL FEATURES

HEIGHT: add or deduct 2 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.

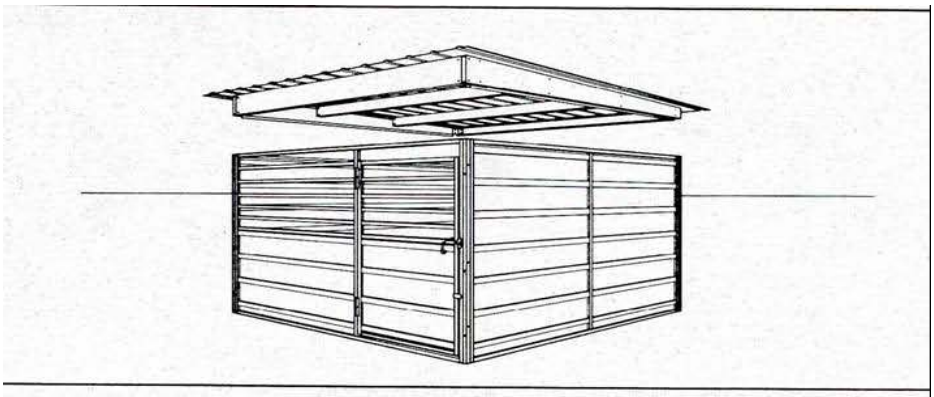
Costs based on square foot of floor area, unless otherwise noted.

COSTS PER SQUARE FOOT	LOW	AVG	GOOD
FLOOR:			
Asphalt:	$ 1.38	$ 1.74	$ 2.19
Concrete:	2.27	2.76	3.33
LIGHTING:	0.17	0.45	0.87
INSULATION: (per square foot of insulated wall area)			
Wall:	$ 0.48	$ 0.59	$ 0.71
Roof:	0.62	0.95	1.45
PLUMBING:	0.14	0.40	0.81
HEATING: (suspended space heaters):	0.66	0.90	1.19

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

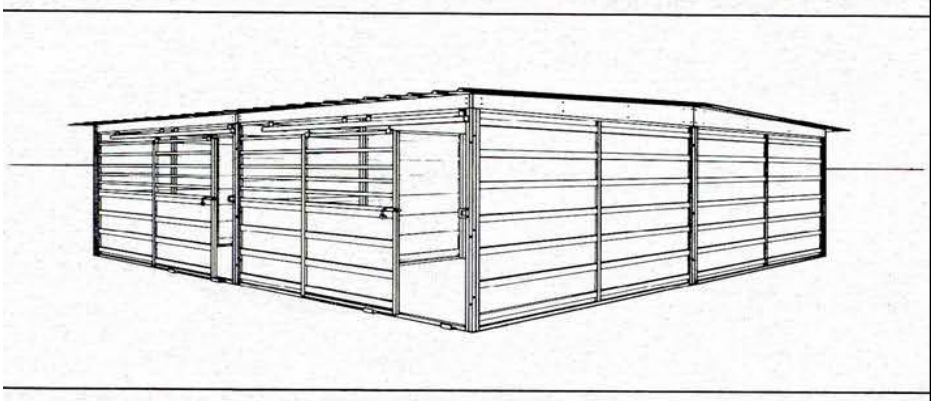
BASIC FARM BUILDINGS

PREFABRICATED METAL HORSE STABLES



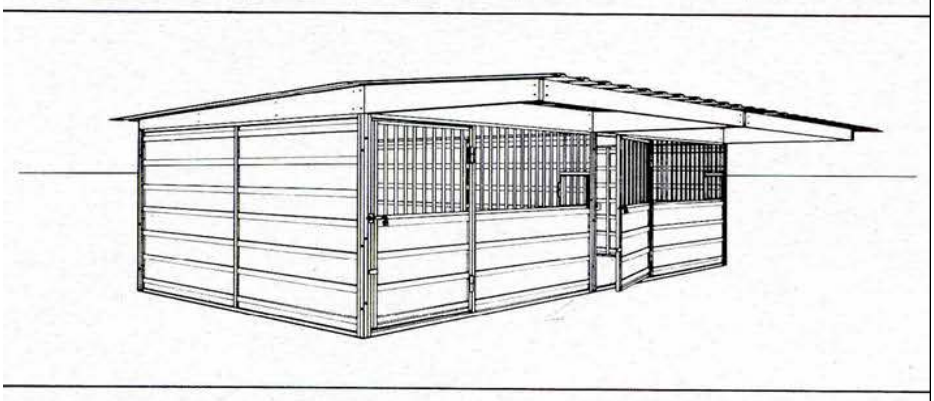
AVERAGE QUALITY

SINGLE STALL



AVERAGE QUALITY

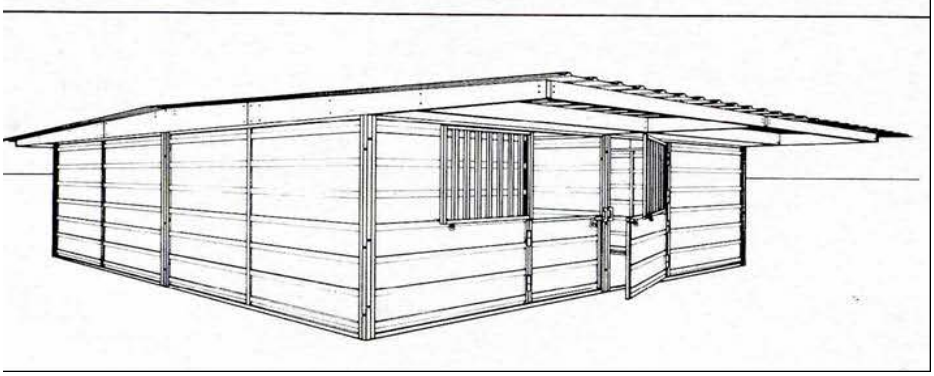
QUADRUPLE STALL



AVERAGE QUALITY

DOUBLE STALL

WITH PATIO ROOF OR OVERHANG



AVERAGE QUALITY

QUADRUPLE STALL

WITH PATIO ROOF OR OVERHANG

BASIC FARM BUILDINGS

PREFABRICATED METAL HORSE STABLES

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

SQUARE FOOT COSTS

CLASS	ONE STABLE 144 SF	TWO STABLES 288 SF	FOUR STABLES 576 SF
1	$ 12.90	$ 11.81	$ 10.79
2	16.92	15.53	14.25
3	22.17	20.41	18.80

ADD per square foot of patio roof or overhang:

LOW	AVG	GOOD
$ 2.87	$ 4.01	$ 5.65

ADD Concrete or concrete flatwork per square foot: $ 2.76

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

Section 2

DAIRY BARNS

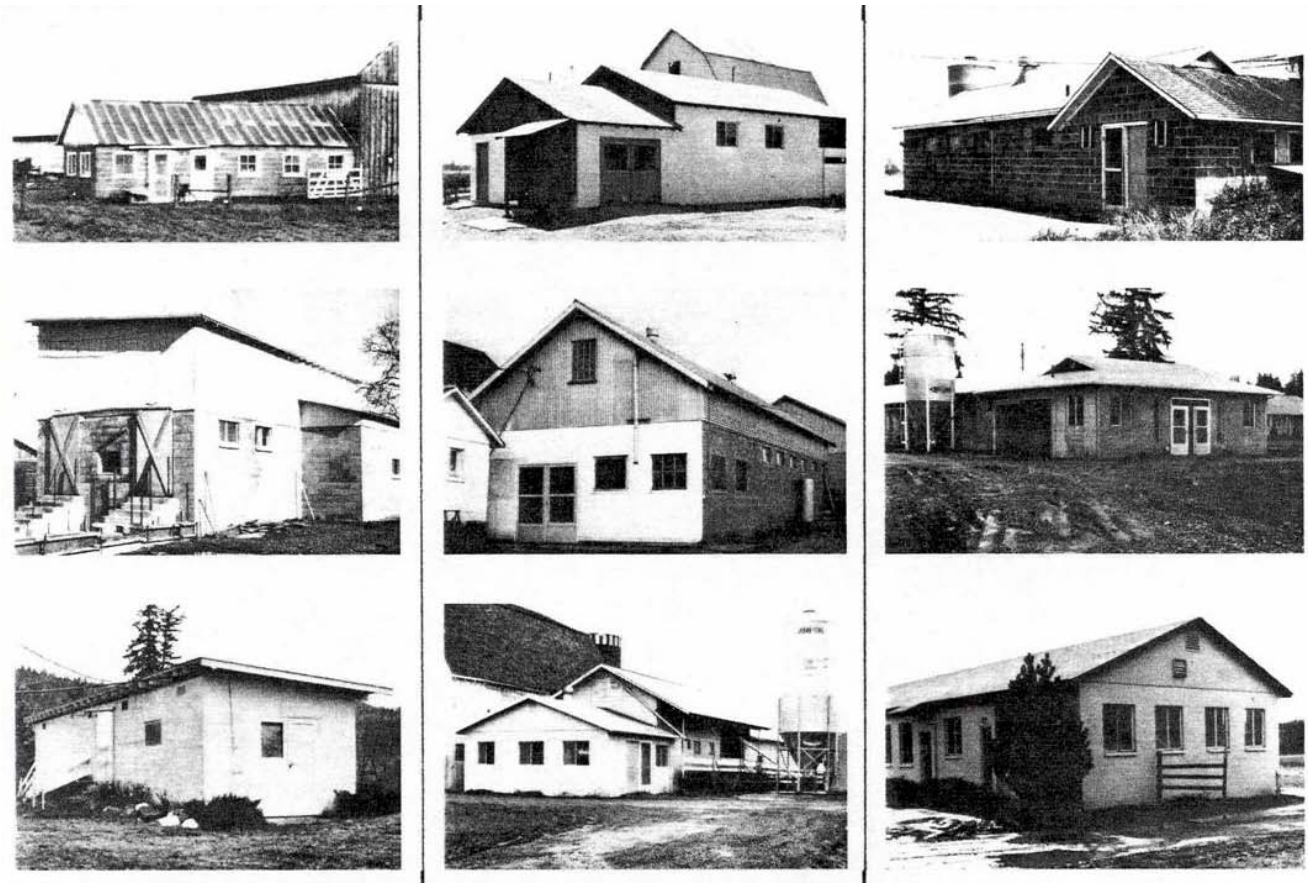
Adopted by NTC, March 11, 2013

DAIRY BARNS

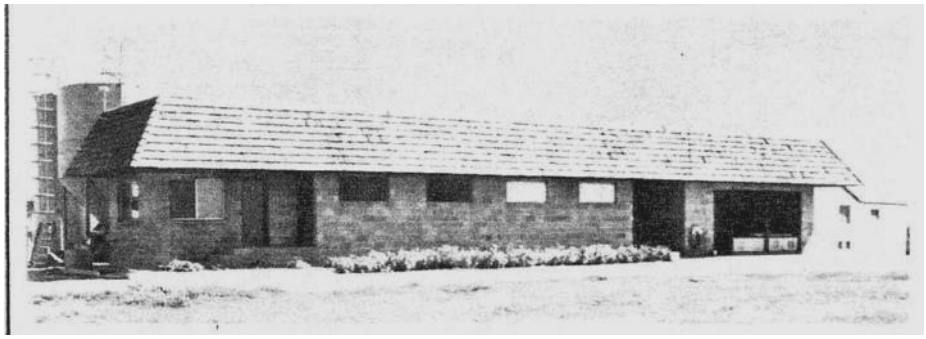
PHOTOS COURTESY OF CHURCHILL COUNTY ASSESSOR

DAIRY BARNS

LOW QUALITY | **AVERAGE QUALITY** | **GOOD QUALITY**

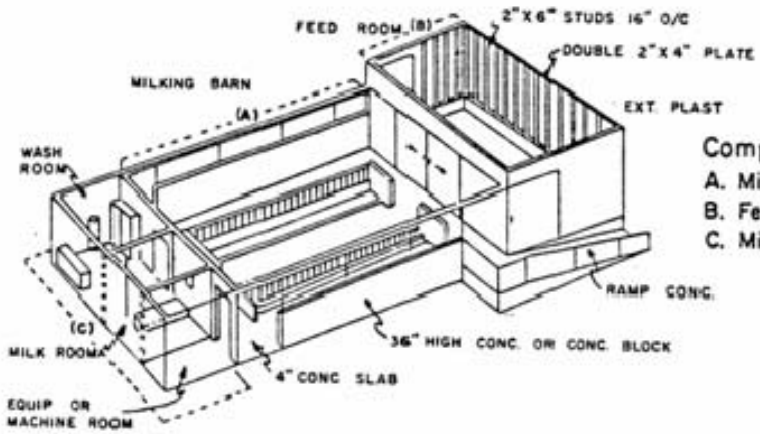


VERY GOOD QUALITY



DAIRY BARNS

Stanchion Barn

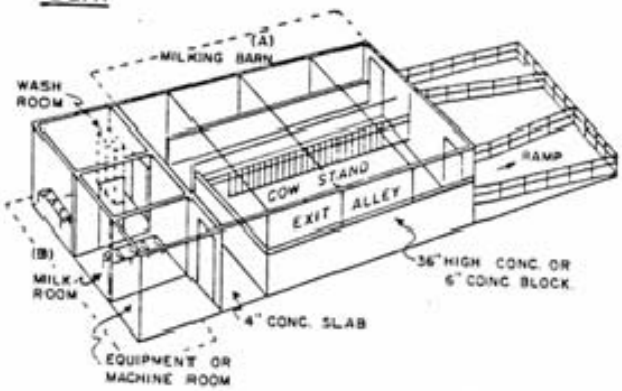


Component Parts of This Dairy
A. Milking Barn
B. Feed Room
C. Milk, Wash, and Equipment Rooms

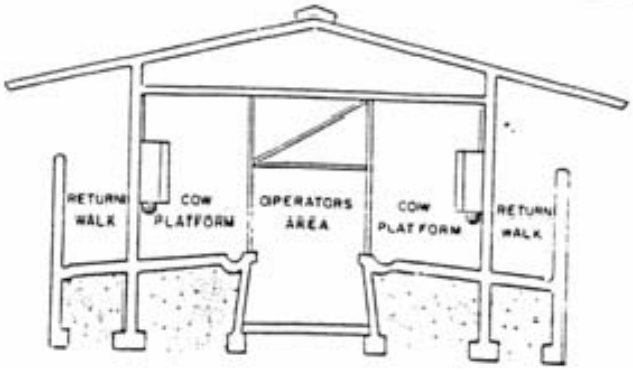
Typical Walk-Through Barn

Component Parts of This Dairy

A. Milking Barn
B. Milk, Wash, and Equipment Rooms



Cross Section Modern Herrington-Type Dairy Barn



Section 2

DAIRY BARNS

MILKING PARLORS

SITE PREPARATION	Basically level terrain, no excavation, minimum fill.
FOUNDATION	Reinforced concrete for one story height. Foundation and footings formed and poured monolithically with floor slab.
FLOORS	Concrete well formed gutters, elevated slab.
CEILING	Open unfinished, paint only, bottom of roof.
INTERIOR	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.
PLUMBING	Basic plumbing required for building, usual floor drains and hose bibs. Does not include milk piping, pumps or storage.
HEATING - COOLING	Minimum, space heaters and evaporative coolers.
ELECTRICAL LIGHTING	Basic electrical service required for dairies. Does not include machinery or equipment.
EXTERIOR WALLS	8" concrete block, bearing walls or reinforced concrete 36 inch high with 2" x 6" stud framing – 16" on center above.
ROOF STRUCTURE AND COVER	Wood joists, wood or composition deck. Asphalt shingles to 290 pounds.
COST RANGE RATING	Based on cost per square foot of floor area.

SQUARE FOOT COST

QUALITY

LOW	AVERAGE	GOOD	VERY GOOD
$ 35.23	$ 44.06	$ 54.94	$ 70.15

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

DAIRY BARNS

MILKING PARLORS

ADDITIONAL FEATURES

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

FEATURE		QUALITY LOW	AVERAGE	GOOD	VERY GOOD
CEILING					
(Gypsum board - taped and painted):	$	1.33	1.48	1.64	1.79
INSULATION					
Walls:	$	0.45	0.55	0.67	0.82
Roof:		0.59	0.90	1.37	2.07

WALL ORNAMENTATION (*apply only to ornamented area):	LOW	AVERAGE	GOOD	VERY GOOD
CERAMIC TILE (*cost based on square foot of area covered):	8.75	10.74	12.73	14.72
ROOF COVER (Wood shingle):	1.69	2.11	2.62	3.26
AUTOMATIC GATES (*based on cost per stall):	$ 1,043	$ 1,114	$ 1,185	$ 1,256
AUTOMATIC FEED EQUIPMENT (*based on cost per stall):	$ 561	616	670	FOR AUGER ADD: $ 561 725

FEED STORAGE BINS (see pages 3 & 4, section 6)

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

DAIRY BARNS

MILK STORAGE, WASH, AND EQUIPMENT ROOMS

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

SQUARE FOOT COSTS

QUALITY

LOW	AVERAGE	GOOD	VERY GOOD
$ 17.52	$ 24.38	$ 41.60	$ 54.85

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

DAIRY BARNS

MILKING STORAGE, WASH AND EQUIPMENT ROOMS

ADDITIONAL FEATURES

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

	QUALITY			
FEATURE	LOW	AVERAGE	GOOD	VERY GOOD
INSULATION				
Walls:	0.45	0.55	0.67	0.82
Roof:	0.59	0.90	1.37	2.07
WALL ORNAMENTATION (*apply only to ornamented area):				
CERAMIC TILE (*cost based on square foot of area covered):				
	8.75	10.74	12.73	14.72
ROOF COVER				
(Wood shingle):	1.69	2.11	2.62	3.26

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

FEEDER FENCE w HEADLOCK

DAIRY BARNS

WASH PEN AND HOLDING AREA

FLOOR OR RAMP	Sloping concrete slab rough finish 6” thick.
WALLS	Concrete block 8” - height 5’.
FENCING	Welded iron pipe, post 10’ on center set in concrete, pipe top rail with 3 cable strands, or, no pipe top rail with 5 cable strands, or, iron rods. Cable size 5/8” or ¾”.
GATES	Metal gates (2 usually) 12 linear feet each, 5 rail.
SPRINKLER	Hooded rainbird type or equivalent including piping and pump.
COST RANGE RATING	Based on cost per square foot of floor area.

QUALITY

LOW	AVERAGE	GOOD	VERY GOOD
$ 9.46	$ 10.35	$ 11.26	$ 12.36

ROOF COVERING: Wood or pipe post and beam, steel trusses, light metal roof cover;

QUALITY

LOW	AVERAGE	GOOD	VERY GOOD
$ 4.65	$ 5.96	$ 7.69	$ 9.89

METAL RAIL FENCE
WELDED IRON RAILS

Iron pipe post 2-1/2" to 4" in diameter - 7' to 10' on center in concrete:
$ 14.38 per linear foot.

CABLE FENCE

Iron pipe post 2-1/2" to 4" in diameter - 7' to 10' on center in concrete - iron pipe top rail;
3-Cable: $ 11.47 per linear foot.
4-Cable: $ 12.92 per linear foot.

METAL GATES

54" to 64" high - welded iron rails or pipe with bracing:
16.38 per linear 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, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

DAIRY BARNS

DAIRY EQUIPMENT

STAINLESS STEEL REFRIGERATED HOLDING TANKS

SIZE GALLONS	TANK ONLY	COMPLETE SYSTEM
500	$ 7,235	$ 15,157
1,000	13,602	21,656
1,250	15,919	24,863
1,500	17,803	27,016
2,000	22,004	32,949
2,500	25,338	40,038
3,000	27,805	47,130
4,000	33,606	58,468
5,000	37,674	69,295

VACUUM PUMP SYSTEMS

8-20 STALLS WITH 3 PHASE ELECTRIC MOTORS
PER COW STALL: $ 430

REFRIGERATION COMPRESSORS

HORSE POWER	COST
3.0	$ 4,691
4.0	6,867
5.0	9,044
7.5	11,221
10.0	13,398
15.0	15,574

FEED FENCING w HEADLOCKS

TYPE	COST
STEEL	$ 23.31 per LF
LOCKABLE STEEL	34.94 per LF
SELF-LOCKING STEEL	75.50 EACH

NOTE: See following page for listing of additional equipment.

DAIRY BARNS

DAIRY EQUIPMENT

PLATE COOLERS

NUMBER OF STALLS

6	8	12	20	24
$ 3,740	5,590	7,439	9,289	11,138

HERRINGBONE STALLS

SIZE	STALLS	COST
DOUBLE 3	6	$ 7,064
DOUBLE 4	8	8,411
DOUBLE 6	12	12,617
DOUBLE 10	20	21,028
DOUBLE 12	24	22,211

NOTE: Above costs include manually operated gates.
Larger or other sizes, use a combination of above.

MILK TRANSFER LINES

TYPE	SIZE	COST PER LF
STAINLESS STEEL	18 GAUGE - 1.5"	$ 7.20
STAINLESS STEEL	18 GAUGE - 2.0"	9.14
STAINLESS STEEL	16 GAUGE - 2.0"	11.90
STAINLESS STEEL	16 GAUGE - 2.5"	16.53
STAINLESS STEEL	16 GAUGE - 3.0"	19.97
GLASS PIPE	1.5"	55.65
GLASS PIPE	2.0"	68.94

NOTE: Flushing systems require twice the amount of pipe.

Electric pulsator or hydropulsator;

Manual on & off:	$ 487	to	$ 780	EACH
Automatic off, add:	$ 814	to	$ 2,436	

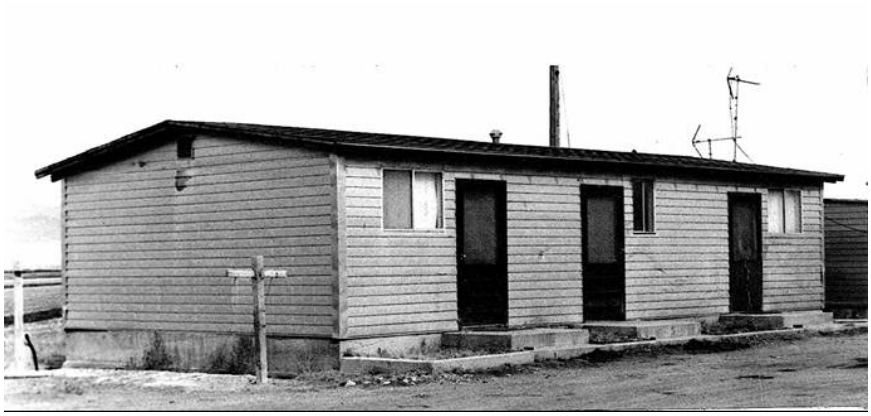
Section 3

BUNK HOUSES

Adopted by NTC, March 11, 2013

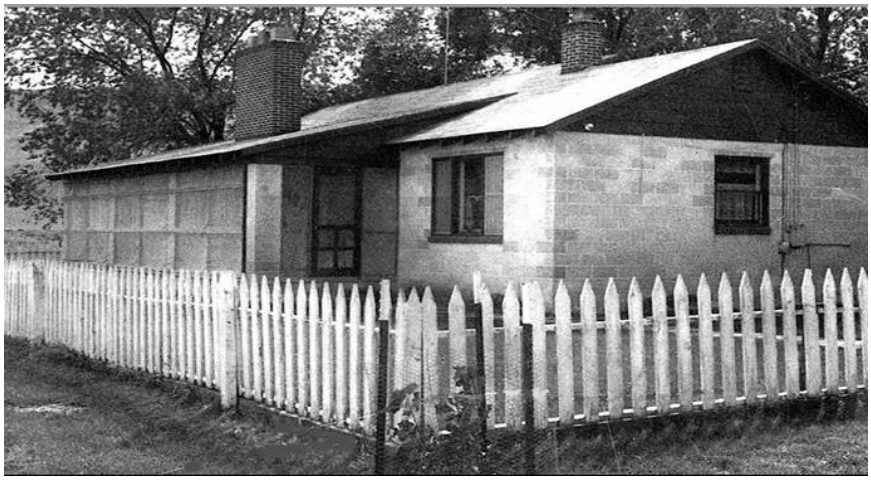
BUNK HOUSES

CLASS I
LOW QUALITY



CLASS 2
AVERAGE QUALITY

CLASS 3
GOOD QUALITY



CLASS 4
VERY GOOD QUALITY

BUNK HOUSES

COMPONENT	CLASS 1 LOW QUALITY	CLASS 2 AVERAGE QUALITY	CLASS 3 GOOD QUALITY	CLASS 4 VERY GOOD QUALITY
Foundation	Thickened slab around perimeter	Thickened slab around perimeter	Thickened slab around perimeter	Spread footing around perimeter and thickened slab at partitions
Floor	4" concrete slab	4" concrete slab	4" concrete slab	4" concrete slab
Walls	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
Exterior Cover	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
Interior Finish	None	Gypsum board or plywood partitions painted	Gypsum board or plywood partitions painted	Sheet rock finished
Roof Framing	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
Roofing	Composition or used metal sheeting	Composition or metal sheeting	Aluminum or corrugated iron or light wood shingles	Good grade composition shingles or wood shingles
Doors	Two or three cheap doors	Three or four average doors	One average door each room	One good door each room
Windows	Few and small	One window each room	One steel or aluminum window in each room	One steel sash or aluminum window in each room
Electrical	Minimum outlets	Minimum outlets	Average or better outlets	Average or better outlets adequate amount
Heating & Cooling	None	None	None	None

BUNK HOUSES

CLASS	SQUARE FEET 400	600	800	1,000	1,200	1,500	2,000	2,500	3,000
1	$ 15.44	14.59	14.16	13.70	13.53	13.12	12.82	12.56	12.45
2	20.79	19.68	19.18	18.57	18.33	17.82	17.41	17.11	16.97
3	28.18	26.77	26.09	25.34	25.05	24.37	23.87	23.48	23.27
4	53.97	50.02	48.19	45.88	45.15	43.18	41.78	40.58	40.05

1. Utility hook-up costs included.

2. Interior plumbing not included

Add for Class 1:	$	548	per fixture
Class 2:		836	per fixture
Class 3:		1,282	per fixture
Class 4:		1,971	per fixture

3. Domestic well or septic system not included. Refer to Section 4 for costs

4. Floor covering not included.

Add asphalt title or linoleum:	$	3.51	per sq ft
Add installed carpet:		3.55	per sq ft

5. Cooling systems not included.

Add window units:	$	-	per sq ft
Add for evaporative coolers, roof or wall units only:		1.80	per sq ft

6. Heating systems not included.

Add floor or wall furnace:		1.02	per sq ft

7. Insulation not included.

Add for Roof:		0.95	per sq ft
Walls:		0.59	per sq ft

NOTE: The costs given above reflect the use of unskilled farm labor. For professional labor supervised by a contractor or job foreman, consult Marshall & Swift Manual or adjust costs in the rural building manual upward by 33 percent.

2014-2015 RURAL BUILDING COST MANUAL

Section 4

UTILITIES

Adopted by NTC, March 11, 2013

UTILITIES

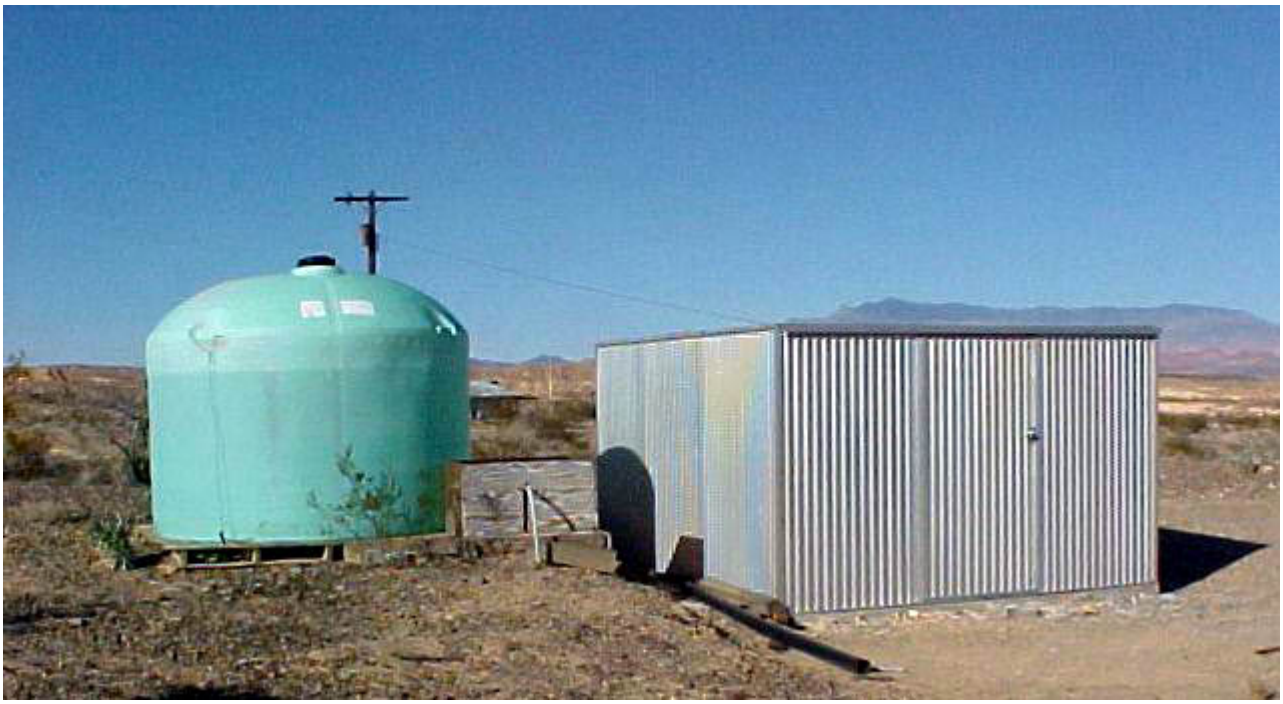
DOMESTIC WATER SYSTEMS - SEPTIC SYSTEMS - MOBILE HOME HOOKUPS

NOTE: The costs offered in this section represent general or average costs. Actual costs in specific geographic areas may vary substantially thereby requiring each assessor to substitute locally relevant cost data.

Residence and bunkhouse costs already include utility hookups. Mobile home hookup costs appear on Page 3 of this section.

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



UTILITIES
DOMESTIC WATER SYSTEMS

JET PUMPS

Includes a completely installed shallow well system package. Does not include well drilling. **Bold** cells show typical configurations.

TANK (GAL)	PUMP MOTOR (HP) 1/3	1/2	3/4	1	1 1/2	2
40	600	740	920	961	1,157	1,325
80	658	798	978	1,019	1,215	1,383
120	770	909	1,089	1,130	1,327	1,495
220	1,152	1,291	1,471	1,512	1,709	1,877
315	1,387	1,526	1,706	1,747	1,944	2,112
525	1,731	1,870	2,050	2,091	2,288	2,456

EXAMPLE:	3/4 HP & 80 GAL TANK	$	978
	6" WELL AT 60' DEPTH		2,100

	TOTAL COST	$	3,078

SUBMERSIBLE PUMPS

Includes pump, piping at well, pressure tank, and pad. Does not include well drilling. **Bold** cells show typical configurations.

TANK (GAL)	PUMP MOTOR (HP) 1/3	1/2	3/4	1	1 1/2	2	3	5
40	898	1,130	1,362	1,594	1,963	2,563	2,691	4,329
80	956	1,188	1,420	1,652	2,021	2,621	2,751	4,389
120	1,067	1,299	1,532	1,763	2,132	2,733	2,844	4,482
220	1,450	1,681	1,914	2,145	2,514	3,115	3,205	4,843
315	1,684	1,916	2,149	2,380	2,749	3,350	3,374	5,012
525	2,028	2,260	2,493	2,724	3,093	3,694	3,767	5,405

EXAMPLE:	1 HP PUMP & 120 GAL TANK	$	1,763
	8" WELL AT 100' DEPTH.		5,200

	TOTAL COST	$	6,963

WELL DRILLING

Drilling & casing costs per foot of well depth	4" - 6" WELL:	$	35	per foot
(includes gravel and concrete packing)	8" - 10" WELL:		52	per foot

UTILITIES

SEPTIC TANKS

The first table contains average septic tank costs gathered from a statewide market survey of excavating and construction companies conducted in 1991, adjusted for time. The second table contains costs derived from the current Marshall Swift Commercial Manual less 25% for farm labor. Assessors should apply their knowledge of local market conditions to select an appropriate value.

Segregated by common sizes, these costs represent septic tanks installed and connected in normal soil with leach fields and lines, but do not include hookup costs, which are included with residences or bunkhouses. For mobile homes, add the sewer hookup costs listed below.

1991 MARKET SURVEY

	CAPACITY (GAL)		
AREA	1,000	1,250	1,500
CARSON CITY	$ 3,229	3,555	3,896
RENO	3,728	4,001	4,670
ELKO	3,336	3,787	4,232
PAHRUMP	2,445	2,675	3,336
LAS VEGAS	2,280	2,726	3,286

MARSHALL SWIFT JUNE 2011

	CAPACITY (GAL)		
QUALITY	1,000	1,250	1,500
LOW	$ 1,295	1,635	1,887
AVERAGE	1,917	2,338	2,731
GOOD	2,653	3,152	3,717

MOBILE HOME HOOKUPS

TYPE	LOW	AVG	GOOD
Water	$ 659	884	1,232
Electric	986	1414	2,046
Sewer	739	1082	1,382
Gas	311	471	755

WATER hookups include trenching, pipe, and labor from unit to city main or domestic well system.

ELECTRIC hookups include pole, box, overhead wiring, and conduit for a 100 ampere system.

SEWER hookups include trenching, pipe, and labor to a city sewer main or septic system.

GAS hookups include trenching, pipe, and labor from unit to a gas main or a tank and regulator.

NOTE: Mobile home hookup costs do not include connector, service, or user fees.

Hookup costs do include combined piping for 40 linear feet of water and sewer lines.

For either water or sewer piping costs exceeding base, ADD per linear foot: 9.67 to $12.19

Section 5

CORRALS AND FENCES

Adopted by NTC, March 11, 2013

CORRALS AND FENCES

RAILROAD TIE POSTS
10' OC

POLE RAIL FENCE

AVERAGE QUALITY
LESS 15 %

RAILROAD TIE POSTS

POLE RAIL FENCE
WITH FEED TROUGH

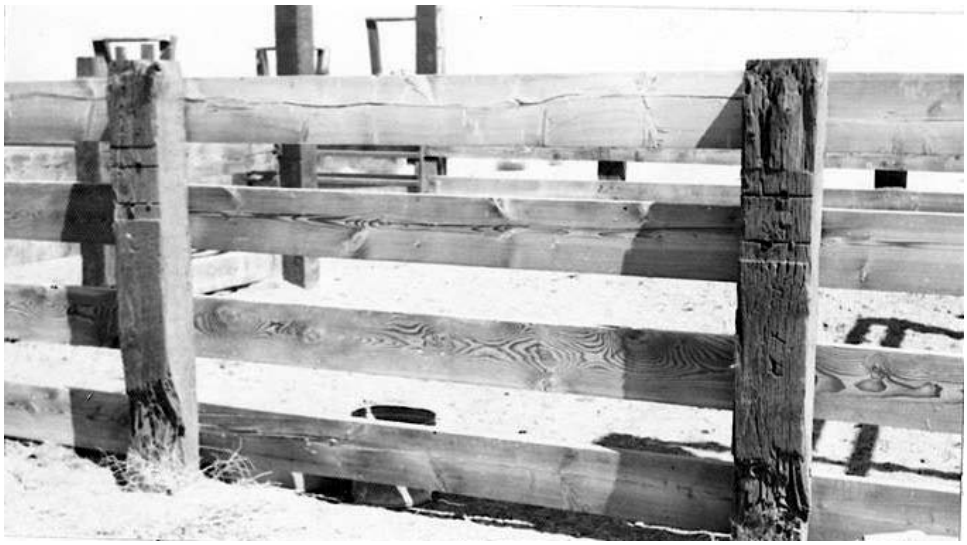
AVERAGE QUALITY

RAILROAD TIE POSTS

CABLE FENCE
WITH FEED TROUGH

AVERAGE QUALITY

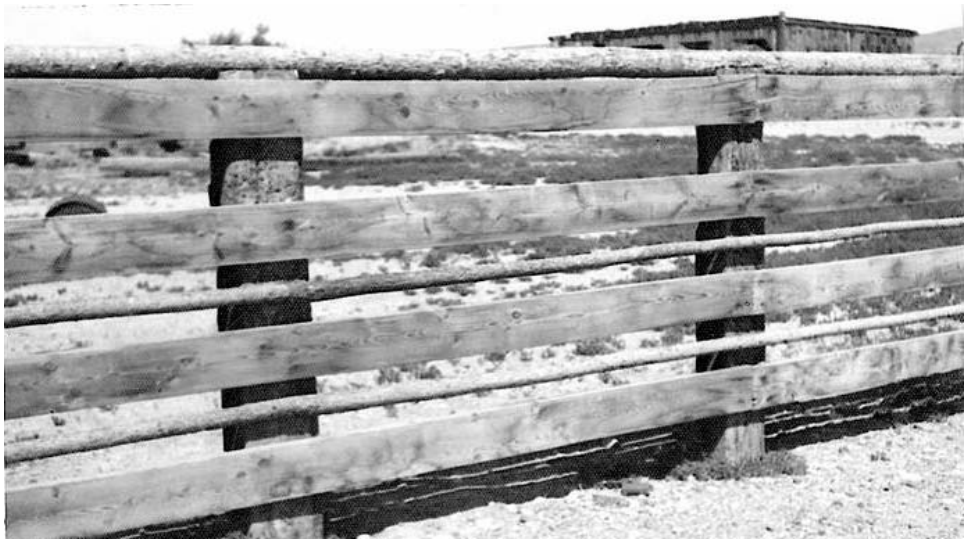
CORRALS AND FENCES



RAILROAD TIE POSTS 6' OC

2" X 8" FENCE RAILS

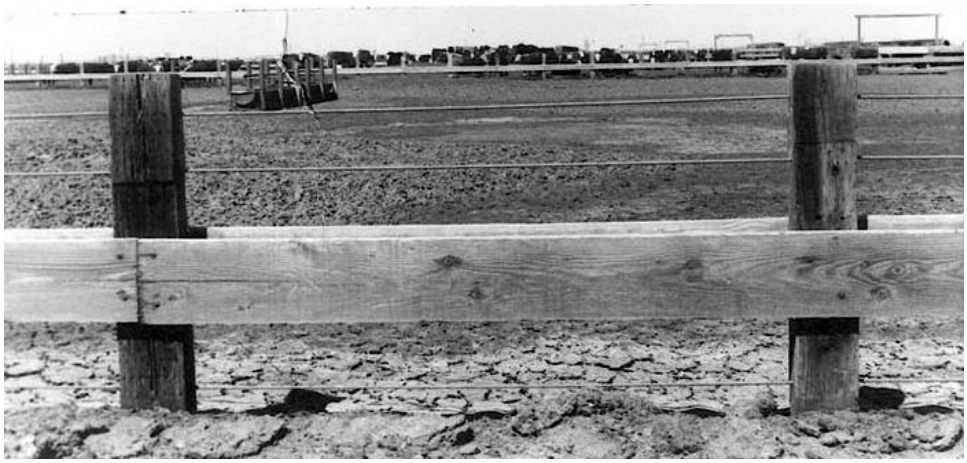
AVERAGE QUALITY PLUS 15%



RAILROAD TIE POSTS 8' OC

2" X 8" FENCE RAILS WITH POLES

GOOD QUALITY



RAILROAD TIE POSTS

CABLE FENCE WITH FEED TROUGH

AVERAGE QUALITY

CORRALS AND FENCES

CORRAL FENCING

COST PER LINEAR FOOT

TYPE	LOW	FAIR	AVG	GOOD
WOOD	$ 5.90	$ 7.11	$ 8.58	$ 10.32
Examples of Rails	4-4” 3-6” 2-10” 2 or 3 poles	4-6” 3-8” 2-12” 4 or 5 poles	5-6” 4-10” 3-12” 6 or 7 poles	7-6” 6-8” 4-12” 7 or 8 poles

Base costs include railroad tie posts eight feet on center with two inch thick rails. Reduce fair – good quality 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.

TYPE	LOW	FAIR	AVG	GOOD
WIRE	$ 2.12	$ 2.98	$ 3.84	$ 4.70
Examples:	2 or 3 strands barbed or hog/cattle fence	3 or 4 strands barbed or light grade woven or welded wire	5 or 6 strands barbed or horse fence (medium welded wire)	7 or 8 strands barbed or bull panels (heavy welded wire)

Base costs include 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.

PIPE AND CABLE FENCES

TYPE	LOW	FAIR	AVG
4" PIPE, CABLE RAILS	$ 8.39	8.67	8.94
4" PIPE, 2" PIPE RAILS	10.65	10.99	11.33

WOODEN FEED TROUGHS

TYPE	LOW		FAIR		AVG		GOOD
W/O FENCE	$ 4.62		$ 6.10		7.82		11.03
WITH FENCE	$ 6.50		8.43		10.31		13.42

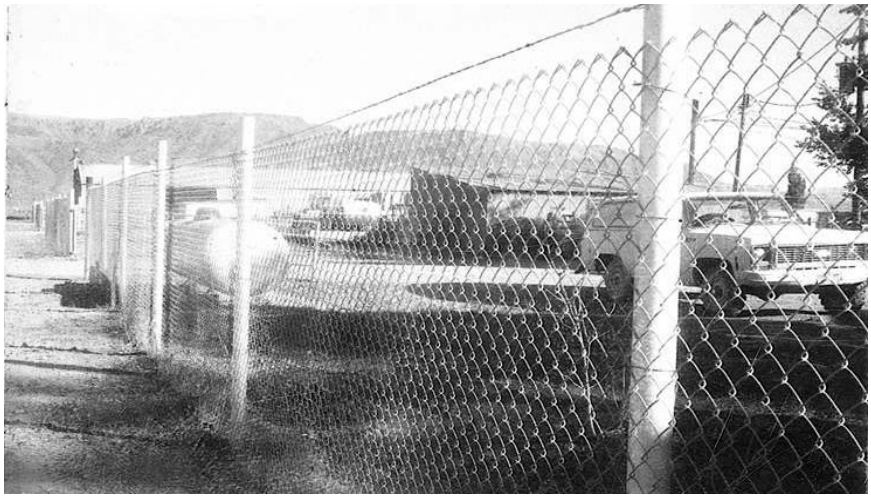
For metal troughs, add 200 percent. For concrete troughs, add 250 percent.

CONCRETE

In-place cost for flatwork per square foot: $ 2.76 to $ 3.33
Cost per square foot of wall area: $ 12.93

CORRALS AND FENCES

METAL FENCING AND GATES

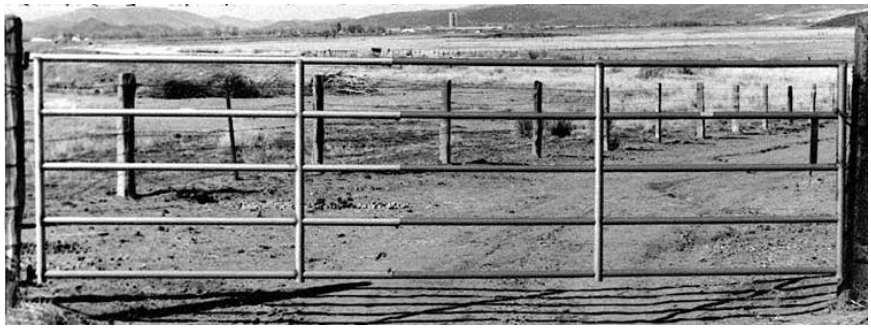


5' CHAIN LINK FENCE

NO TOP RAIL

COMMERCIALLY MANUFACTURED GATE

GOOD QUALITY



EXPANDED TUBE STEEL GATE

IRON PIPE CORRAL AND HOLDING PEN

CORRALS AND FENCES

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 center.

TYPE	HEIGHT 4'	6'	8'	10'	12'
2" INCH MESH AVERAGE QUALITY	$ 5.77	8.32	10.94	13.50	16.05
ADD FOR RAILS	1.28	1.28	1.39	1.39	1.39
ADD FOR PRIVACY SLATS	3.90	5.93	7.99	10.22	12.25
ADD FOR 3 STRAND BARBED WIRE	1.66	1.66	1.87	1.87	1.87

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

PORTABLE HORSE CORRALS & GATES

TYPE	LOW	FAIR	AVG	GOOD
METAL PIPE OR PORTABLE PANELS	$ 4.86	$ 7.74	$ 10.34	$ 14.99

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

PLASTIC FENCING

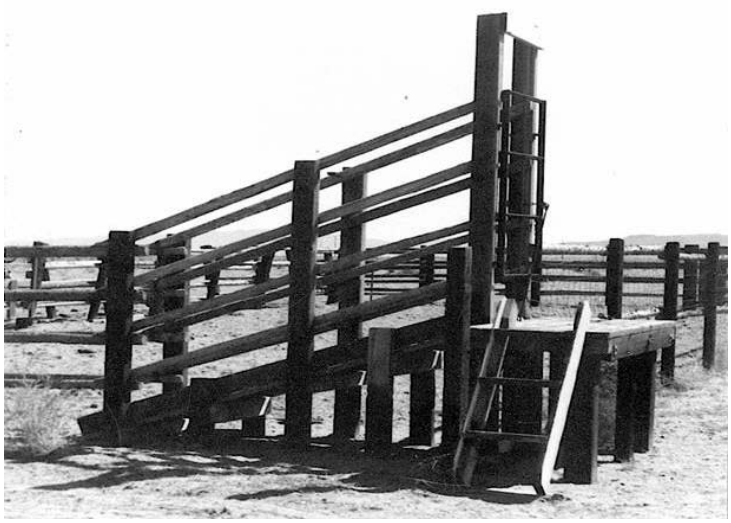
TYPE	COST
POLYMER GRID , 5', 2" * 6" TOP RAIL	$ 9.04
VINYL FENCE, 5" * 5" POSTS, 3 - 2" * 6" RAILS	11.77

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

NOTE: The costs 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.

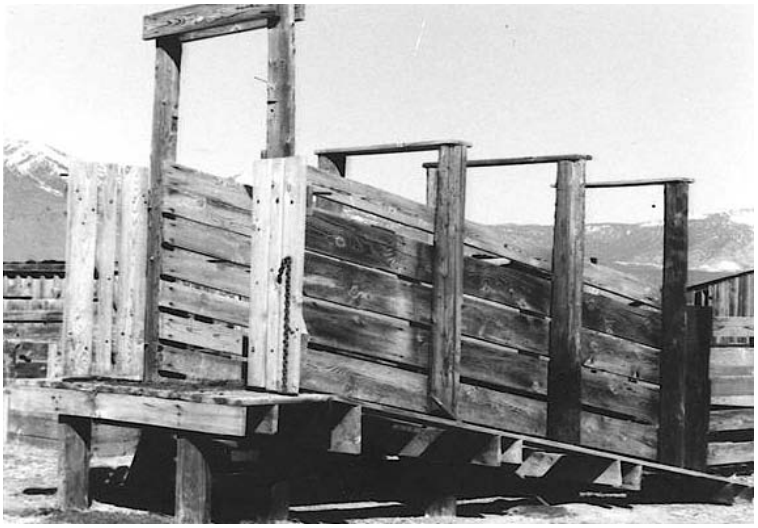
CORRALS AND FENCES

CORRAL LOADING CHUTES



LIGHT SPACED CHUTE

HEAVY SPACED CHUTE



HEAVY SOLID CHUTE

CORRALS AND FENCES

CORRAL LOADING CHUTE

COST PER LINEAR FOOT INCLUDING BOTH SIDES

SPACED	LIGHT CHUTE	$ 43.79 per lf
	HEAVY CHUTE (INCLUDES PLATFORM)	46.82
SOLID	LIGHT CHUTE	49.85
	HEAVY CHUTE (INCLUDES PLATFORM)	52.88

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.

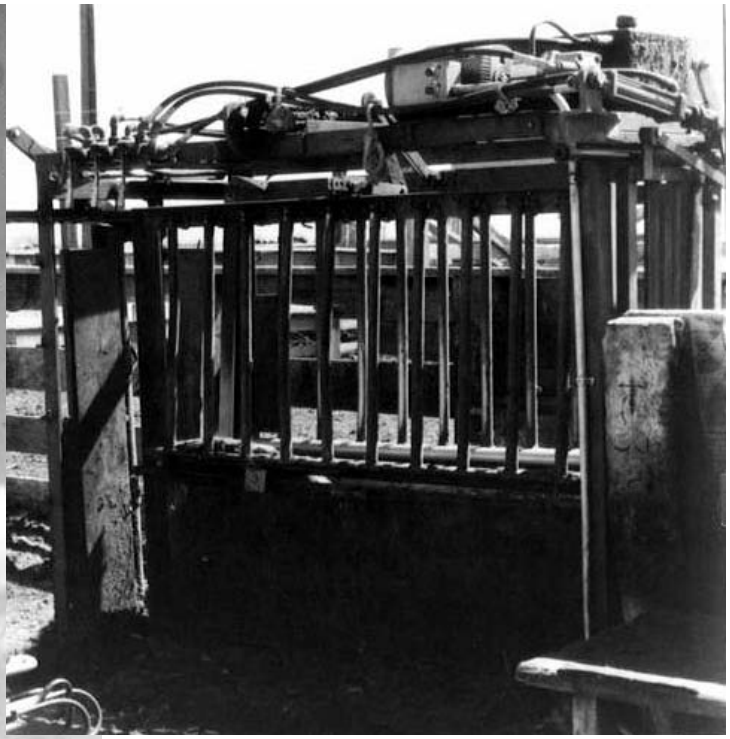
COMPLETE IN PLACE COST $ 4,471

CALF TABLE

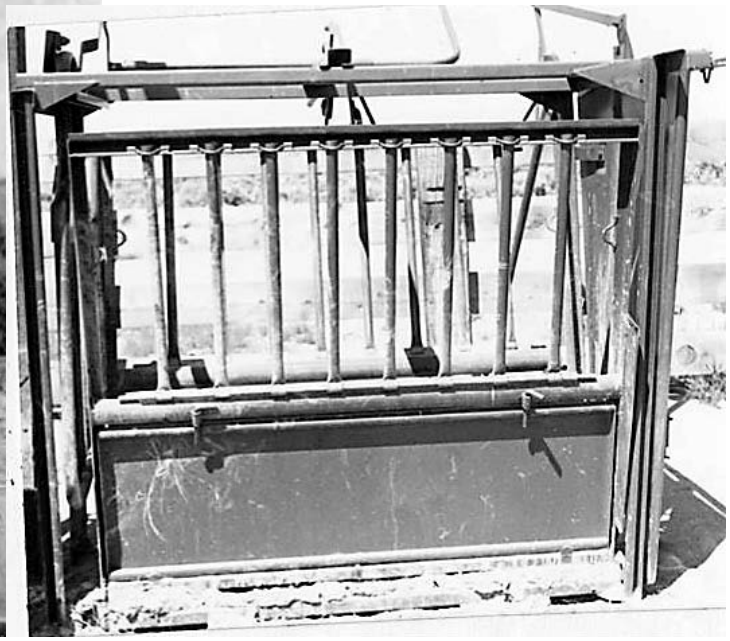
CORRALS AND FENCES

WINDMILLS & CATTLE SQUEEZES

SMALL WINDMILL



HYDRAULIC SQUEEZE



LIGHT STATIONARY SQUEEZE

CORRALS AND FENCES

COMMERCIALLY MANUFACTURED HEAVY DUTY CATTLEGUARDS

7.5' x 8'	7.5' x 10'	7.5' x 12'	7.5' x 15'
$ 2,018	$ 2,723	$ 3,429	$ 4,134

CATTLE SQUEEZE

STATIONARY MODEL, LIGHT	$ 1,616
STATIONARY MODEL, HEAVY	3,334
HEAVY DUTY, HYDRAULIC	13,546
CALF TABLE	1,144

HEAVY STATIONARY SQUEEZE

WINDMILLS AND STEEL TOWERS

FAN		TOWER		INSTALLATION	TOTAL COST
6'	$ 1,324	21'	$ 1,401	$ 1,412	$ 4,136
6'	1,324	27'	1,800	1,340	4,464
6'	1,324	33'	2,227	1,487	5,037
8'	1,678	21'	1,401	1,262	4,341
8'	1,678	27'	1,800	1,109	4,586
8'	1,678	33'	2,227	1,255	5,160
10'	2,906	27'	1,800	1,518	6,224
10'	2,906	33'	2,227	1,583	6,716
12'	4,591	27'	1,800	2,126	8,518
12'	4,591	33'	2,227	2,355	9,173
14'	7,342	27'	1,800	2,979	12,121
14'	7,342	33'	2,227	3,863	13,432
16'	9,892	33'	2,227	4,261	16,380

Includes complete steel wheel, tower and installation excluding well.

CORRALS AND FENCES

CATTLE AND HORSE WATERING TANKS

ROUND BOTTOMLESS STOCK TANKS

25.5 INCH DEEP, GALVANIZED CORRUGATED

PER FOOT OF DIAMETER - 22 GAUGE METAL	$	30.30
12 GAUGE METAL	$	51.40
ADD: 10 GAUGE METAL		25%
PER SQUARE FOOT OF CONCRETE SLAB	$	2.76

COMMERCIALLY MANUFACTURED METAL WATER TANKS

25.5" TO 27" DEEP, GALVANIZED WITH BOTTOM

PER FOOT OF DIAMETER - 22 GAUGE METAL	$	37.88
12 GAUGE METAL	$	66.40
ADD: 10 GAUGE METAL		25%
PER SQUARE FOOT OF CONCRETE BASE	$	2.76

COMMERCIALLY MANUFACTURED AUTOMATIC WATERERS WITH HEATERS

LEN	WDTH	HGHT	GAL	HEAD	COST
20	18	25	3	30 50	$ 379
30	24	25	9	80 120	477
32	28	25	13	100 200	579
42	28	25	20	200 300	692
66	28	25	35	300 400	755
84	24	16	40	350 450	808
90	28	25	50	400 550	856
90	36	25	120	500 700	945
120	28	25	60	500 700	1,009

COMMERCIALLY MANUFACTURED METAL WATER TROUGHS

(GALVANIZED TANK)

GALLONS			
175	300	500	900
$ 147	$ 207	$ 273	$ 410

ALL OTHER WATER TROUGHS

1 cubic foot = 7.5 gallons

VOLUME	COST / GAL	Cu Ft
LESS THAN 100 GALLONS	$ 2.62	$ 19.66
100 TO 175 GALLONS	2.39	17.93
176 TO 300 GALLONS	2.16	16.20
301 TO 500 GALLONS	1.93	14.47
OVER 500 GALLONS	1.70	12.74

CORRALS AND FENCES

COMMERCIALLY MANUFACTURED METAL FENCE PANELS

Portable or stationary, not including posts. For wooden posts (RR Ties)
Add $ 6.00 to $ 15.50 EACH

64" HEIGHT, 5 RAIL MEDIUM DUTY	6'	$ 109
	8'	171
	10'	178
	12'	201
	14'	228
	16'	250

64" HEIGHT, 5 RAIL EXTRA HEAVY DUTY	6'	$ 184
	8'	218
	10'	241
	12'	274
	14'	313
	16'	341

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

COMMERCIALLY MANUFACTURED METAL GATES w LEVER LATCH

WIDTH			
6 FOOT	8 FOOT	12 FOOT	16 FOOT
$ 186	$ 220	$ 276	$ 342

COMMERCIALLY MANUFACTURED PROFESSIONAL ROPING AND DOGGING CHUTE

FIRST SECTION WITH RELEASE GATE	$ 2,460
SECOND SECTION	1,736
STRIPPING CHUTE	829

COMMERCIALLY MANUFACTURED BUCKING CHUTE

FIRST SECTION	$ 4,770
ADDITIONAL SECTIONS, EACH	3,716

CORRALS AND FENCES

COMMERCIALLY MANUFACTURED CROWDING ALLEYS

24' x 60" INCLUDES FRAMES & HEADGATE w STAND	$ 2,413
24' x 60" ADD-ON SECTION	1,048
ALLEY STOPS ADD	158
10' CUTOUT GATE INCLUDING FRAME AND 10' PANEL	828

CURVED CROWDING ALLEYS

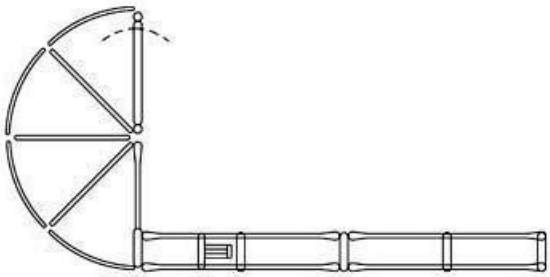
180 DEGREE SWEEP, 10' GATE & 24' ADJUSTABLE ALLEY WITH A1 CAGE & 10' X 20' LEAD-UP	$ 4,988
180 DEGREE SWEEP, 10' GATE & 24' ADJUSTABLE ALLEY	3,594
BLOCKING DOOR ADD	654
ADJUSTABLE ALLEY BOW	138

COMMERCIALLY MANUFACTURED FEEDER PANEL

SIZE	EACH
6' x 64"	$ 304
8' x 64"	422
10' x 64"	443
12' x 64"	512
16' x 64"	666

HEADGATES

SELF CATCH HEAVY DUTY	$ 1,532
SELF CATCH LIGHT DUTY	653

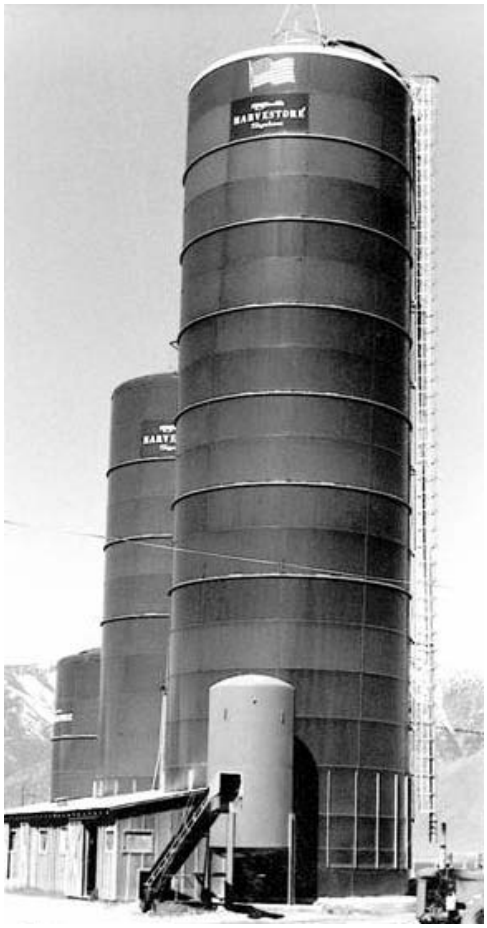


180' SWEEP w CROWDING ALLEY

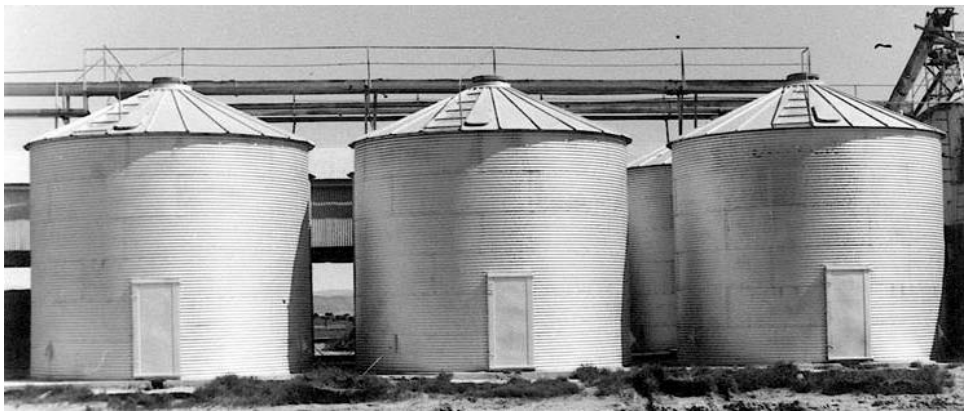
Section 6

MISCELLANEOUS COSTS

Most of the costs in this section are based on professional construction labor supervised by a contractor or his job foreman. Few of these costs should be adjusted downward for farm labor with no professional supervision, as most of these items are professionally installed with contractor supervisor.



SILO: GLASS-LINED STEEL



GRAIN STORAGE BINS with CONVEYOR

FARM SILOS

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

TOTAL COST

DIAMETER \ HEIGHT	30'	35'	40'	45'	50'	60'	70'	80'	90'
12'	$ 11,032	12,871	14,710	16,548	18,387	22,065	-	-	-
14'	12,763	14,872	16,981	19,090	21,199	25,309	29,528	-	-
16'	13,196	15,359	17,522	19,739	21,956	26,283	30,609	34,936	-
18'	14,277	16,603	18,928	21,308	23,687	28,338	33,097	37,748	42,399
20'	15,900	18,549	21,199	23,849	26,499	31,799	36,991	42,291	47,482
22'	18,495	21,578	24,660	27,689	30,717	36,883	42,940	48,996	55,162
24'	-	-	-	-	35,368	42,399	49,321	56,243	63,274
30'	-	-	-	-	-	57,595	67,059	76,523	85,987

No chute, deduct per vertical foot of height	$	-
Flat roof, deduct per square foot of floor area	$	5.25
No roof, deduct per square foot of floor area	$	9.95

NOTE: For silos constructed from other materials, multiply the costs above by these factors:

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

SILO UNLOADER

EACH

12'	14'	16'	18'	20'	22'	24'	26'	28'	30'
$ 8,707	9,085	9,680	10,221	10,924	11,249	11,898	N/A	N/A	12,655

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 adjusted downward by 33 percent relative to the quality of the finished product.

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. Height is to top of shell. Cost of ventilated floor includes floor, auger tube, and steel columns and beam supports for plenum assembly.

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

SIZE DIAM	SIZE HGHT	CAPACITY (BUSHELS)	COST W/O DRY BIN	COST WITH DRY BIN	SLAB FLOOR
15	7	1,257	$ 4,641	$ 6,770	$ 633
15	11	1,792	6,115	8,954	688
15	15	2,329	7,316	10,647	786
15	18	2,864	8,245	12,012	906
18	11	2,647	6,770	9,883	841
18	15	3,422	8,408	12,230	879
18	18	4,198	9,555	13,868	906
21	11	3,693	7,535	10,920	1,158
21	15	4,753	9,555	13,868	1,201
21	18	5,813	11,575	16,817	1,638
24	11	4,949	9,173	13,322	1,463
24	15	6,344	11,248	16,380	1,529
24	18	7,739	13,978	20,311	1,605
27	11	6,409	10,865	15,834	1,889
27	15	8,182	13,432	19,438	1,977
30	15	10,278	16,271	23,587	2,173
30	18	12,473	19,219	27,955	2,304
30	22	14,668	22,168	-	2,435
30	26	16,863	24,679	-	2,632
36	15	15,297	23,041	33,415	3,221
36	18	18,473	26,099	38,002	3,413
36	22	21,648	30,358	-	3,576

ADD: PER SQUARE FOOT OF CONCRETE SLAB $ 2.76

LADDERS	$ 66	PLUS	$ 9.28	PER LINEAR FOOT
SAFETY CAGES	18.29	TO	22.66	PER FOOT INSTALLED
AUGER AND DRIVE	388	PLUS	37.67	PER FOOT OF TANK DIAMETER
SPREADERS	759	TO	1,136	EACH
STIRRATORS	174.72	TO	267.54	PER FOOT OF TANK DIAMETER

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 adjusted downward by 33 percent relative to the quality of the finished product.

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.

DIAMETER (FEET)	HEIGHT (FEET)	CAPACITY (BUSHELS)	CAPACITY (TONS)	COST
6	10'	120	3.0	$ 1,736
6'	16'	240	6.0	2,468
6'	21'	360	9.0	2,812
6'	25'	480	12.0	3,167
6'	28'	600	15.0	3,467
7'	11'	157	4.0	2,391
7'	14'	239	6.0	2,566
7'	16'	321	8.0	2,785
7'	19'	403	10.0	2,976
9'	14'	300	7.8	3,576
9'	17'	450	11.3	4,286
9'	20'	590	14.8	4,641
9'	25'	855	21.4	5,378
9'	28'	1,000	25.0	5,678
9'	31'	1,130	28.5	5,897
12'	20'	870	21.8	7,972
12'	25'	1,345	33.6	9,064
12'	31'	1,825	45.6	10,374
12'	36'	2,300	57.5	11,248
12'	42'	2,780	69.5	12,230

ADD: PER SQUARE FOOT OF HEAVY DUTY CONCRETE SLAB $ 4.43

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 adjusted downward by 33 percent relative to the quality of the finished product.

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, adjust the costs listed downward by 33 percent, depending on the quality of workmanship.

GRAIN LOADING AND UNLOADING SYSTEMS

CONVEYOR

AUGER-TYPE

DIAM	COST/LIN FT
6"	$ 66
8"	90
10"	120
12"	158
14"	186
16"	229

BELT-TYPE

WIDTH	COST/LIN FT
12"	$ 115
18"	175
24"	207
30"	235
36"	251
48"	322

FEED MILL and COMPONENTS

ELECTRIC POWER PLANTS

HOME GENERATOR SETS

RATING - KW	GASOLINE	DIESEL
3.0	$ 2,817	$ 3,381
4.0	3,468	4,162
5.0	4,097	4,917
7.0	5,530	6,636

COMMERCIAL INDUSTRIAL GENERATORS

RATING - KW	GASOLINE	DIESEL
10.0	$ 13,056	$ 16,246
12.5	15,412	19,074
15.0	17,207	21,227
20.0	19,479	24,373
25.0	20,225	24,449
30.0	20,971	24,526
40.0	24,984	29,364
50.0	27,176	32,177
60.0	35,795	42,403
100.0	44,415	52,629
150.0	61,286	72,714

For Air Cooling, Deduct: 15%
For natural or LP gas fuel systems, Add per KW: $ 24.57
For remote control starting, gasoline fuel, Add: $ 94.19

NOTE: Above costs include minimal current load control switchboard facilities. Above costs do not include mounting pads

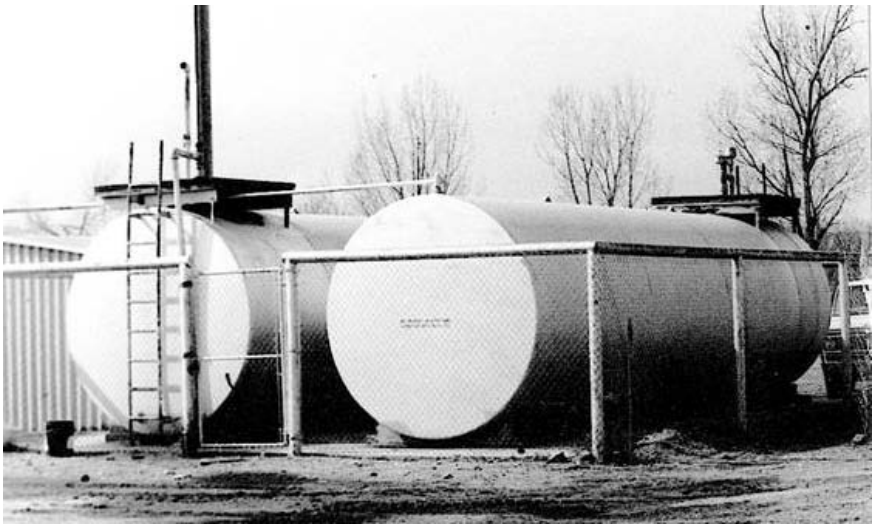
ALTERNATING CURRENT LOAD CONTROL SWITCHBOARD				AUTOMATIC EMERGENCY SWITCHBOARD FOR GASOLINE PLANT			
RATING KW	RATING AMPS	VOLTAGE	COST EACH	RATING KW	RATING AMPS	VOLTAGE	COST EACH
15	130	240; 230/400	$ 1,350	15	130	120/240	$ 645
20	170	120/240; 240	1,912	20	170	120/240	2,175
25	210	240; 120/240	2,475	25	210	120/240	3,705
30	250	240; 120/240	3,038	30	250	120/240	5,235
40	330	120/240; 240	3,601	40	330	120/240	6,765
50	420	480;240	4,164	50	420	120/240	8,295
60	500	480;240	4,726	60	500	120/240	9,825
100	830	480;240	5,289	100	830	120/240	11,355

ADD FOR DIESEL POWERED PLANTS: $ 180
FOR CIRCUIT BREAKERS: $ 573 TO $ 3,285

.

SCALES AND FUEL TANKS

LIVESTOCK SCALE with WOOD CAGE



BULK FUEL TANKS

LIVESTOCK SCALES

BEAM TYPE	SIZE	CAPACITY	COST
FULL CAPACITY	14' X 8'	5 TON	$ 13,104
FULL CAPACITY	16' X 8'	10 TON	17,363
FULL CAPACITY	22' X 10'	15 TON	24,679

SCALE CAGES

METAL		WOOD	
SIZE	COST	SIZE	COST
14'	$ 1,639	14' X 8'	$ 844
16'	1,842	16' X 8'	868
22'	2,544	22' X 10'	1,077
24'	2,771	24' X 10'	1,119

FOR TYPE REGISTERING BEAM, ADD.	$ 731
FOR PRINTER, ADD	1,365
FOR ELECTRONIC DIGITAL SCALE, ADD.	4,204

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.

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	$ 33,415
30 TONS	38,875
40 TONS	44,663
50 TONS	50,450
60 TONS	57,057
70 TONS	65,793

FOR WOOD PLATFORM, DEDUCT:	6%
FOR STEEL PLATE, ADD:	5%
FOR AUTOMATIC DIAL MODEL, ADD:	$ 2,785
FOR REMOTE READER-PRINTER, ADD:	8,081
FOR CARD PRINTER, ADD:	1,856

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 $3.50 per square foot for any concrete pad work. Costs do not include electric pumps. See following page 8 in this section for pump costs.

GALLONS	COST	GALLONS	COST
300	$ 4,057	**4,000**	$ 10,517
550	4,687	**5,000**	11,994
1,000	6,145	**6,000**	14,220
2,000	7,996	**8,000**	15,953
3,000	9,001	**10,000**	19,400

ABOVE GROUND HORIZONTAL BULK (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.

GALLONS	COST	GALLONS	COST
200	$ 2,375	**3,000**	$ 4,963
350	2,513	**4,000**	5,790
550	2,694	**5,000**	6,736
1,000	3,171	**7,500**	9,060
2,000	3,978	**10,000**	11,344

ELECTRONIC FUEL DISPENSERS

TYPE 1			
WITHOUT METER	$ 272	TO	$ 659
WITH METER	455	TO	872
TYPE II			
WITHOUT METER	$ 386	TO	$ 999
WITH METER	679	TO	1,222
TYPE III	$ 634	TO	$ 955
TYPE IV	$ 929	TO	$ 1,857
TYPE V	$ 2,068	TO	$ 2,501

NOTE: To calculate tank volume use the following formula: Volume in gallons = Pi x radius squared x length x 7.5.

EXAMPLE: A tank five feet in diameter and 14 feet in length; Pi equals 3.1416;

Radius (one half of diameter) equals 2.5 feet: 3.1416 x 2.5 squared x 14 feet x 7.5 = 2,062 gallons.

FUEL DISPENSERS

TYPE I—NO METER

TYPE I METER

TYPE II—WITH METER

TYPE III

TYPE IV

TYPE V

Section 7

COMPUTATIONAL TABLES

Adopted by NTC, March 11, 2013

MENSURATION PRINCIPLES

PLANE FIGURE	A plane surface bounded by either straight or curved lines 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, measures and other information helpful to the assessor-appraiser.

METRIC MEASURE

Millimeter	0.001 meters
Centimeter	0.01 meters
Decimeter	0.1 meters
Meter	39.3685 inches
Kilometer	1,000 meters
Kilometer	0. 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

WEIGHTS AND MEASURES

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

AREAS

Square feet of surface area equals square of one side multiplied by the given factor.

REGULAR SHAPED	NUMBER OF SIDES	FACTOR
Equilateral triangle	3	0.433
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 1/3 pounds and contains 231 cubic inches.

A cubic foot of water contains 7 1/2 gallons, 1,728 cubic inches and weighs 62 1/2 pounds.

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

To find the capacity of any size tank: 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 0.0034. (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 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.

Watts = Volts multiplied by Amps

Horsepower equals Kilowatts multiplied by 1.3405.

Kilowatts equal horsepower multiplied by 0.746.

WEIGHTS

BRICK: Common brick of the national size weigh from 4 1/2 to five pounds; pressed and paving brick, from six to seven pounds, 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 often sells on the basis of 80 pounds to the bushel or 200 pounds to the barrel of 2 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 0.036 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 0.1337 cubic feet
1 gallon equals 0.1074 bushels
1 cubic foot equals 0.8032 bushels
1 barrel (oil) equals 42 gallons
1 barrel (water) equals 31.5 gallons

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

Pressure in pounds per square inch of column of water equals 0.434 times the height of the column in feet.

A square acre measures approximately 208.7 feet on each side.

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

MISCELLANEOUS
WEIGHT AND MEASURE EQUIVALENTS

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 the 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 0.7854.

To find area of a parallelogram, base times altitude.

To find cubic inches in a ball, multiply cube of diameter by 0.5236.

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 / FOOT

DIAMETER	CIRCUMFRENCE	AREA	GALLONS		BARRELS (OIL)
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	3.50
6	18.85	28.27	212	23	5.00
7	21.99	38.48	288	31	6.80
8	25.13	50.27	376	42	9.00
9	28.27	63.62	477	51	11.30
10	31.42	78.54	587	63	14.00
11	34.56	95.03	711	76	16.90
12	37.69	113.10	846	91	20.20
13	40.84	132.73	993	107	23.70
14	43.98	153.94	1,151	124	27.40
15	47.12	176.72	1,322	142	31.50
16	50.26	201.06	1,054	162	35.80
17	53.41	226.98	1,698	182	40.40
18	56.55	254.47	1,903	204	45.30
19	59.69	283.53	2,121	228	50.50
20	62.83	314.16	2,350	252	56.00
21	65.97	346.36	2,591	278	61.70
22	69.12	380.13	2,843	305	67.70
23	72.26	415.48	3,108	334	74.00
24	75.40	452.39	3,384	364	80.60
25	78.54	490.87	3,672	394	87.40
26	81.68	530.93	3,971	427	94.60
27	84.82	572.56	4,283	460	102.00
28	87.97	615.75	4,606	495	109.70
29	91.11	660.52	4,941	531	117.60
30	94.25	706.86	5,287	568	125.80
31	97.39	754.77	5,646	606	134.40
32	100.53	804.25	6,016	646	143.20
33	103.67	855.30	6,398	687	152.30
34	106.81	907.92	6,791	730	161.60
35	109.96	962.11	7,197	773	171.30
36	113.10	1,017.88	7,614	818	181.30
37	116.24	1,075.21	8,043	864	191.50
38	119.38	1,134.11	8,483	911	202.00
39	122.52	1,194.59	8,936	960	212.70
40	125.66	1,256.64	9,400	1,010	223.80

NOTE: Capacity of cylindrical tanks standing on end.

CONVERSION TABLES

NOTES on cylindrical tanks: 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 0.785.

*To find the capacity in barrels (oil) equals diameter squared times0 .1399 times height.

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

TABLE FOR CONVERSION OF LINEAR FEET INTO BOARD FEET

2 by 4	0.667 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 linear feet equals 1,667 board feet.

CENTER PIVOT IRRIGATION SYSTEM DATA

TOTAL SYSTEM LENGTH (IN FEET) 2/	PERCENT OF WATER APPLIED IN LAST 100 FEET 1/	TOTAL ACRES OF SQUARE FIELD TWICE LENGTH OF SYSTEM	----------AREA COVERED IN ACRES ----------		
			WITH GUN 3/ SPRINKLER CORNERS USED ONLY	WITH GUN SPRINKLER USED ON ENTIRE CIRCLE 3/	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.