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**In the Matter of:** )  
**Approval of the 2024-2025** )  
**Rural Building Costs Manual** )

**NOTICE OF DECISION**

***Appearances***

Cheryl Erskine, Coordinator of Assessment Standards, appeared on behalf of the Department of Taxation.

***Summary***

The matter of the approval of the 2024-2025 Rural Building Costs Manual came before the Nevada Tax Commission (Commission) for hearing in Reno, Nevada, on March 6, 2023. The Commission reviewed the Rural Building Costs Manual and the report of the Department.

**DECISION**

The Commission, having considered all evidence and testimony pertaining to the matter, hereby adopts the 2024-2025 Rural Building Costs Manual listing costs as reported by the Department for use by county assessors pursuant to NAC 361.128(2).

BY THE NEVADA TAX COMMISSION THIS 6TH DAY OF MARCH, 2023.

  
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Shellie Hughes, Executive Director

cc: County Assessors



NEVADA DEPARTMENT OF TAXATION  
Division of Excise & Local Government Services

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2024-2025  
RURAL BUILDING COSTS  
MANUAL

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DATE OF VALUATION JANUARY 1, 2023

Approved by NTC 3/6/2023  
Published

## INSTRUCTIONS FOR USE

The Rural Building Costs Manual is divided into four parts. These sections are intended to be an assessment tool to standardize and streamline improvement valuations for the types of properties identified in each part.

Real estate is defined in NRS 361.035, and includes land, houses, buildings, fences, ditches, structures, erections, railroads, other improvements, and property rights. Real property is further defined in NAC 361.11715 as land, fixtures, improvements, on-site enhancements, and any rights, interests, benefits and privileges belonging to or attached to the land.

NAC 361.1127 defines a fixture as an item, other than a trade fixture, that was originally personal property which has been installed or attached to land or an improvement in a permanent manner. By reference, this incorporates Appendix E of the Personal Property Manual into this manual to determine whether fixtures are real or personal property.

Most costs contained in this manual are based on costs extracted from the Marshall and Swift Costing Service Manual. Nevada multipliers have not been added to all costs so the local multiplier for the appropriate area must be applied to the costs of the tables with that indication.

Based on current construction practices, all costs found in the Marshall and Swift Cost Manual are absent of any adjustments for unskilled farm labor. As such, assessors will not adjust values upward by 33 percent as authorized by NAC 361.128 paragraph 3(b). However, to account for the use of unskilled farm labor in the construction of improvements, assessors may make downward adjustments of 25 percent when appropriate.

All photos contained in this 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 this section.

If the sections of this manual or the Marshall Swift Cost Manuals do not contain costs for a particular kind of structure or improvement, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services per NAC 361.128(4).

### **Section A – Rural Building Costs**

Section A is intended for use on rural properties and provides a broad listing of structures and improvements which are customarily found in such areas. It includes photos and descriptions which may be useful to assessors when classifying improvement quality or computing segregated costs.

There is an assumption that the installation of some yard improvements on a rural property would be in a much higher quantity than on a residential lot property; therefore, costs contained in this section include the maximum size adjustment allowed. If smaller quantities are being appraised, the appropriate costs from the Marshall and Swift Commercial or Residential Manuals should be used.

Concrete flatwork costs contained in this section are specific to concrete being poured as a concrete floor during construction of farm buildings or other farm improvements and should be used only when additional concrete flatwork was constructed at the same time (i.e., around feed troughs, horse

barns, etc.). For other concrete flatwork, please refer to the Marshall & Swift Commercial Manual (S66P2 – Yard Improvements) or the Marshall & Swift Residential Manual (C-5 – Yard Improvements) for more appropriate costs.

### **Section B – Alternate Costs**

Section B provides improvement valuations for items more typically requested by the assessors because they cannot be found in the Marshall and Swift Costing Service Manuals. The costs provided have been researched and developed utilizing multiple sources.

### **Section C**

Section C is reserved for future publication.

### **Section D – Assessors' Alternate Cost Approvals**

Section D provides the Executive Director's list of requested and approved alternate costs as required by NAC 361.128(4).

2024-2025

PART A

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RURAL BUILDING COSTS

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PART A

2024-2025 RURAL BUILDING COSTS

Section 1

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**BASIC FARM BUILDINGS**

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METAL BARN



LOW QUALITY



AVERAGE QUALITY



GOOD QUALITY

PHOTOS COURTESY OF CHURCHILL COUNTY ASSESSOR

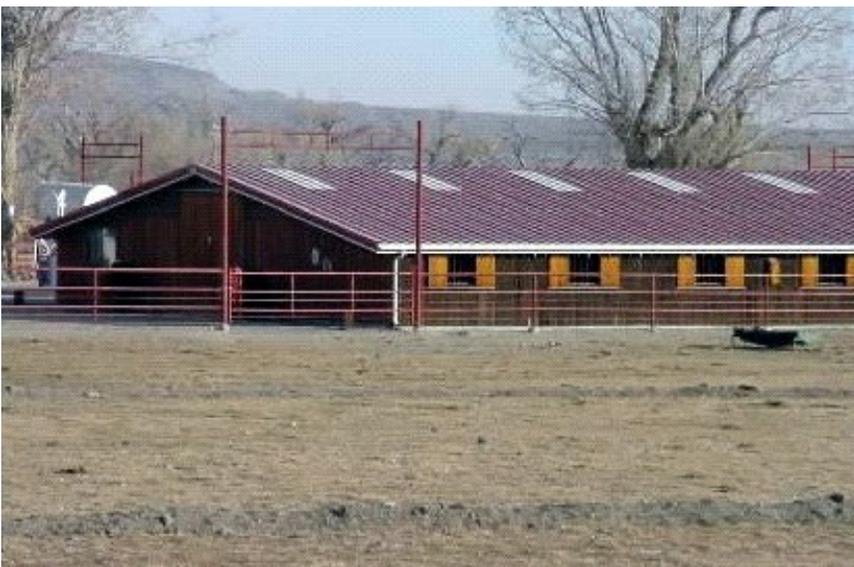
WOOD BARN



LOW QUALITY



AVERAGE QUALITY



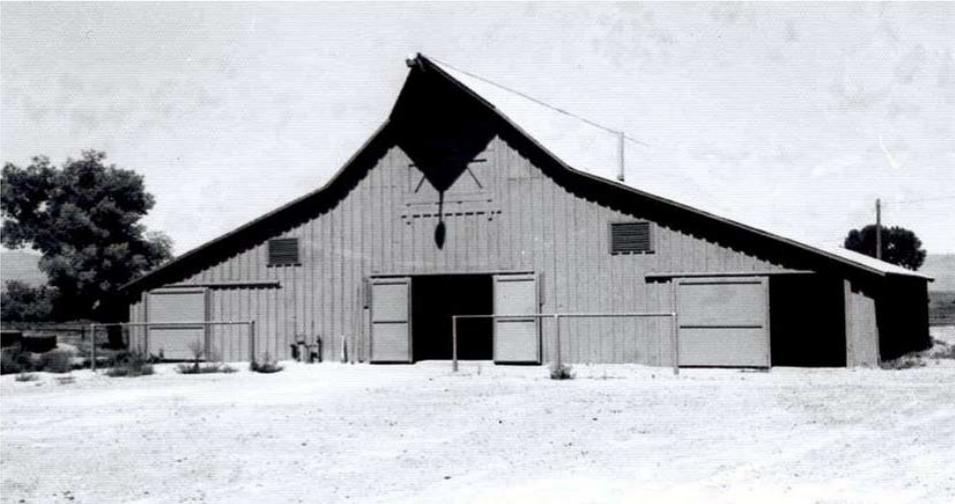
GOOD QUALITY

PHOTOS COURTESY OF CHURCHILL COUNTY ASSESSOR

GENERAL PURPOSE BARN



LOW QUALITY



AVERAGE QUALITY



GOOD QUALITY

**GENERAL PURPOSE BARNs**

General purpose barns are multipurpose buildings that may include livestock stalls, grooming areas, hay/grain storage, supply rooms, equipment maintenance or other specialized areas.

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"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
<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"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
<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

Includes normal stalls commensurate with quality class.

CLASS	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000
<b>1</b>	\$ 36.19	30.23	27.78	26.54	25.80	25.31	24.92	24.25	23.81	23.32	22.75
<b>2</b>	52.16	43.17	39.25	37.37	36.25	35.56	35.01	34.03	33.24	32.40	31.68
<b>3</b>	65.31	57.89	53.98	51.89	50.83	50.01	49.51	48.49	47.68	46.81	46.20

**ADD** Concrete or wood floors, or concrete flatwork per square foot: \$ 6.17

Lofts per square foot of floor area  
 Low Quality: \$ 7.72  
 Average Quality: 10.14  
 Good Quality: 13.31

**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 25 percent relative to the quality of the finished product.

HAY STORAGE BARN



AVERAGE QUALITY



GOOD QUALITY

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	\$ 33.59	27.58	25.15	23.89	23.27	22.62	22.34	21.62	21.18	20.69	20.38
2	47.26	37.84	33.49	31.68	30.45	29.00	28.63	27.44	26.50	25.44	24.94
3	64.81	52.35	47.12	43.97	42.80	41.37	40.56	39.04	37.97	36.49	35.58

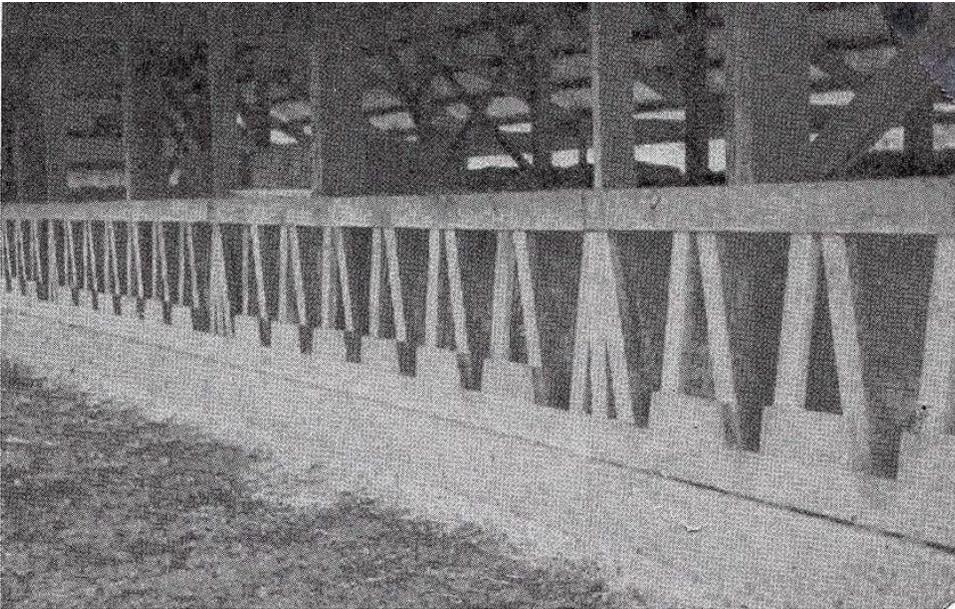
ADD	Concrete or wood floors, or concrete flatwork per square foot:	\$	6.17
	Lofts per square foot of floor area	Low Quality: \$	7.72
		Average Quality:	10.14
		Good Quality:	13.31

**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 25 percent relative to the quality of the finished product.

FEED BARN



AVERAGE QUALITY



INTERIOR DETAIL



GOOD QUALITY

**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"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
<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

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	\$ 22.68	21.02	20.12	19.53	19.30	19.17	19.04	18.93	18.83	18.70	18.68
2	27.62	26.06	25.01	24.18	23.67	23.45	23.27	23.12	22.98	22.87	22.83
3	36.80	35.33	34.11	33.14	32.28	31.77	31.51	31.36	31.26	30.95	30.80

**ADD** Concrete or wood floors, or concrete flatwork per square foot: \$ 6.17

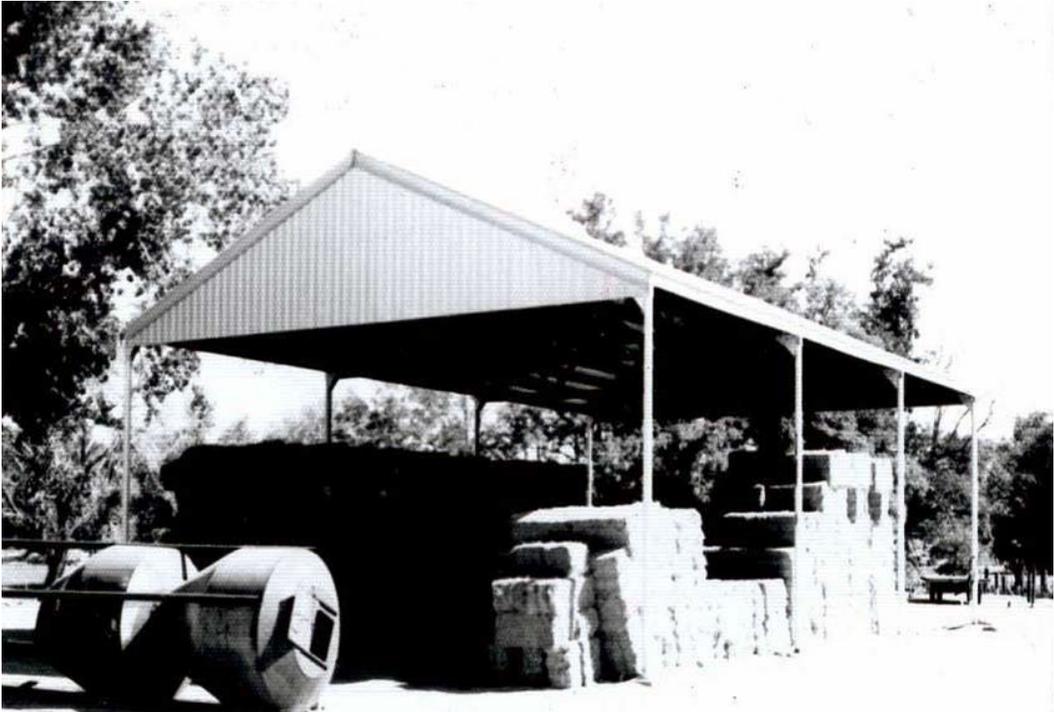
Lofts per square foot of floor area  
 Low Quality: \$ 7.72  
 Average Quality: 10.14  
 Good Quality: 13.31

**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 25 percent relative to the quality of the finished product.

POLE BARN



**AVERAGE QUALITY – ALL SIDES OPEN  
WOODEN POLES – WOOD FRAME**



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

**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 2 sides
<b>Walls</b>	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'	\$ 18.69	18.11	17.56	17.07	17.07	16.44	16.44	16.44	16.44	16.44
25'	17.56	17.07	16.44	15.98	15.42	15.42	15.42	15.42	15.42	15.42
30'	16.73	16.39	15.98	15.35	14.89	14.89	14.89	14.89	14.89	14.89
35'	16.44	15.91	15.39	14.86	14.30	14.30	14.30	14.30	14.30	14.30
40'	16.34	15.88	15.27	14.81	14.27	14.27	14.27	14.27	14.27	14.27
45'	16.27	15.68	15.15	13.60	13.55	13.55	13.55	13.55	13.55	13.55
50'	16.22	15.64	15.01	13.46	13.26	11.34	11.34	11.34	11.34	11.34
60'	16.18	15.59	14.76	12.89	12.85	11.13	11.13	11.13	11.13	11.13
70'	15.88	15.35	14.18	12.43	12.17	10.88	10.88	10.88	10.88	10.88
80'	15.88	15.35	13.60	12.17	11.71	10.62	10.62	10.62	10.62	10.62

**ADD** Concrete or wood floors, or concrete flatwork per square foot : \$ 6.17

**QUALITY MULTIPLIERS** Good Quality: 1.26  
Low Quality: 0.69

**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 25 percent relative to the quality of the finished product.

**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'	\$ 27.10	24.71	23.47	22.84	22.33	21.87	21.62	21.58	21.53	21.24
25'	25.05	22.84	21.53	20.83	20.49	19.69	19.52	19.23	19.08	18.98
30'	23.88	21.58	20.49	19.61	19.28	18.91	18.65	18.31	18.19	18.11
35'	23.08	20.61	19.52	18.69	18.31	18.16	17.65	17.60	17.56	17.48
40'	22.54	20.03	18.94	18.19	18.06	17.56	17.07	17.02	16.94	16.80
45'	22.25	19.57	18.35	17.60	17.14	16.80	16.44	16.39	16.34	16.27
50'	21.99	19.08	18.28	16.97	16.80	16.39	16.05	15.98	15.81	15.73
60'	21.50	18.94	17.48	16.48	16.34	15.98	15.68	15.52	15.30	15.22
70'	21.19	18.52	16.97	16.39	16.05	15.73	15.30	15.22	15.10	15.06
80'	20.61	18.23	16.39	16.14	15.73	15.22	15.01	14.96	14.89	14.76

**ADD** Concrete or wood floors, or concrete flatwork per square foot : \$ 6.17

**QUALITY MULTIPLIERS** Good Quality: 1.26  
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'	\$ 30.74	28.56	27.35	26.64	26.38	25.97	25.75	25.67	25.63	25.43
25'	27.64	25.63	24.42	23.76	23.33	23.00	22.87	22.50	21.92	21.62
30'	25.97	23.20	22.16	21.33	21.04	20.53	20.32	20.15	20.12	19.98
35'	24.51	21.96	21.33	20.41	20.24	19.66	19.49	19.44	19.11	19.08
40'	23.76	21.45	20.36	19.69	19.52	19.03	18.91	18.52	18.35	18.28
45'	23.00	20.61	19.52	19.03	18.35	18.16	17.89	17.69	17.65	17.60
50'	22.33	20.12	18.74	18.52	18.31	17.65	17.60	17.56	17.36	17.23
60'	21.53	19.44	18.11	17.26	17.10	16.56	16.44	16.22	16.10	15.98
70'	21.04	18.91	17.69	17.02	16.51	16.18	15.88	15.85	15.68	15.64
80'	20.29	18.19	17.02	16.34	15.88	15.42	15.35	15.18	15.06	14.84

**ADD** Concrete or wood floors, or concrete flatwork per square foot: \$ 6.17

**QUALITY MULTIPLIERS** Good Quality: 1.26  
Low Quality: 0.69

**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 25 percent relative to the quality of the finished product.

**SIDE SHEDS - AVERAGE QUALITY**

<b>Structure</b>	1 row of poles 15' to 20' on center, 1 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 1 side
<b>Walls</b>	14' to 16' wall height, light wood frame with corrugated iron covering

**SQUARE FOOT COSTS**

	WITH OPEN SIDES: \$	10.97	TO	\$	14.43
	WITH ENCLOSED SIDES:	15.36	TO		20.05
<b>ADD</b>	Concrete or wood floors, or concrete flatwork per square foot: \$				6.17

**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 25 percent relative to the quality of the finished product.

SHOPS



AVERAGE QUALITY



GOOD QUALITY



GOOD QUALITY – CLASS S

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 the width	Square or rectangular length between 1 and 2 times the width	Square or rectangular length between 1 and 2 times the 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	\$ 38.28	35.77	33.49	32.11	31.02	30.25	29.12	28.19	27.65	26.94
2	56.02	49.60	43.59	42.28	39.70	38.43	36.79	35.69	34.59	33.57
3	71.54	58.84	57.92	54.48	52.14	50.18	47.56	46.31	44.68	43.15

ADD

For interior finish -

Class 1: \$ 2.58 per square foot of floor area  
 Class 2: 3.18 per square foot of floor area  
 Class 3: 3.91 per square foot of floor area

**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 25 percent relative to the quality of the finished product.

**MACHINERY & EQUIPMENT SHEDS**



**AVERAGE QUALITY**



**AVE. QUALITY – 1 SIDE OPEN**



**GOOD QUALITY**



**GOOD QUALITY – 1 SIDE OPEN**

**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"x 4", 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	2 outlets per 1,000 square foot	4 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

**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	\$ 28.89	23.26	21.40	20.48	20.07	18.62	18.56	18.11	17.93	17.76	17.57
2	37.11	30.45	28.48	27.40	26.83	25.07	24.90	24.50	24.24	24.15	23.90
3	52.66	44.50	42.03	40.72	40.13	37.86	37.49	37.15	36.81	36.69	36.23

**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	\$ 23.29	18.63	17.11	16.25	15.72	14.82	14.70	14.37	14.15	14.12	13.93
2	30.85	25.52	23.55	22.53	21.97	21.05	20.70	20.44	20.09	20.04	19.78
3	45.71	38.13	35.60	35.25	34.50	33.18	32.76	32.43	31.87	31.69	31.37

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

\$ 6.17

**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 25 percent relative to the quality of the finished product.

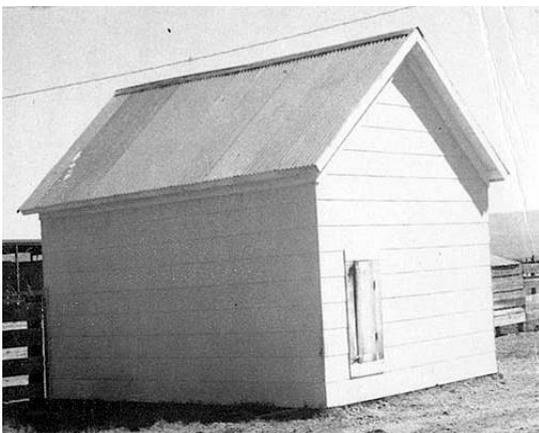
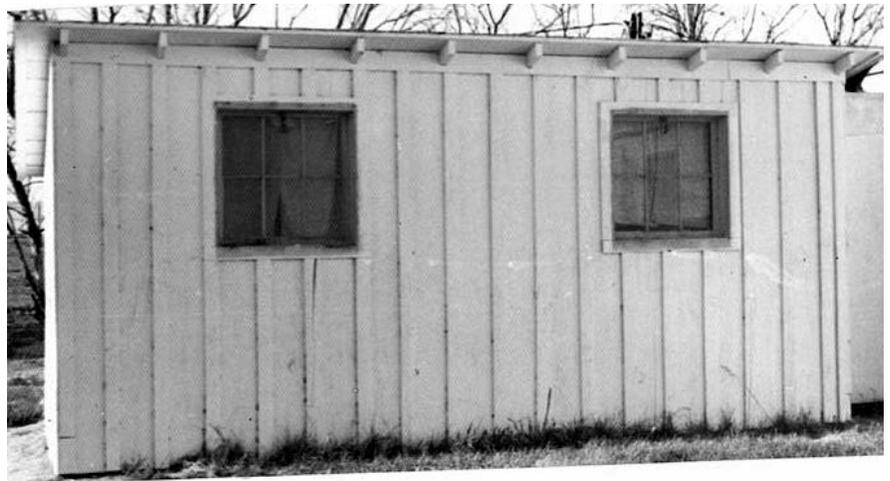
SMALL SHEDS AND PUMP HOUSES



LOW QUALITY



AVERAGE QUALITY



GOOD QUALITY



**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"x 4" on center, 8' eave height	Good 2"x 6", 24" on center, or 2"x 4", 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

**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.

**SQUARE FOOT COSTS**

**TYPE I (ALL SIDES CLOSED)**

CLASS	30	50	60	80	100	120	150	200	250	300	400	500
1	\$ 34.39	28.59	27.76	24.91	23.21	22.13	20.97	19.14	18.41	17.63	16.51	15.85
2	45.36	40.47	37.84	34.67	32.76	31.53	30.17	28.23	27.32	26.42	25.19	24.48
3	69.93	56.99	54.93	49.81	45.02	42.62	40.07	37.08	34.40	32.68	30.23	28.69

**TYPE II (ONE SIDE OPEN)**

CLASS	30	50	60	80	100	120	150	200	250	300	400	500
1	\$ 28.62	23.32	21.57	20.19	19.33	18.30	17.17	16.40	15.85	15.17	14.47	13.84
2	40.90	34.97	33.69	29.78	27.32	25.11	24.26	22.87	22.54	20.79	19.73	18.74
3	54.00	48.67	44.68	39.73	36.70	34.02	32.95	31.37	29.82	28.24	26.97	25.80

**ADD**

Concrete or wood floors, or concrete flatwork per square foot: \$ 6.17  
 Fiberglass Roll or Batt Insulation: 1.19  
 Gypsum Board Interior: 2.61

**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 25 percent relative to the quality of the finished product.

**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.

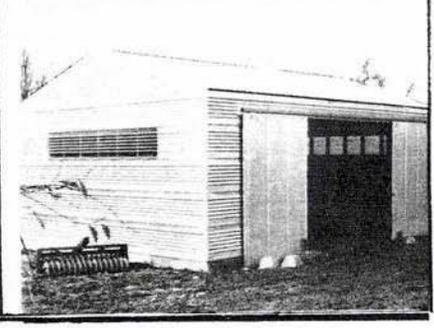
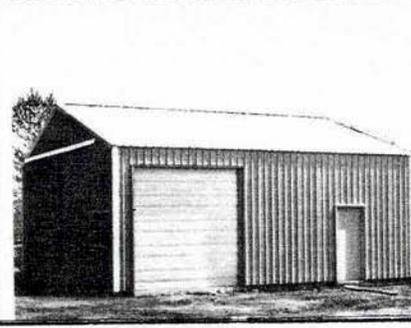
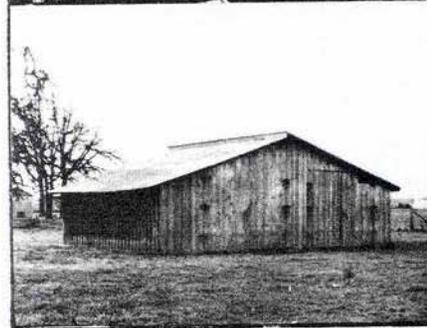
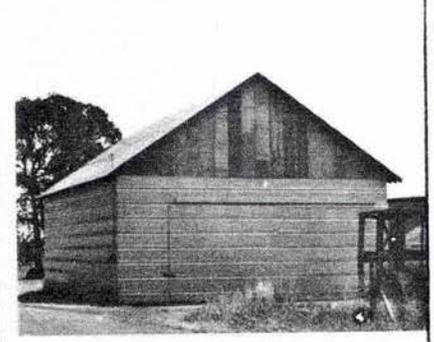
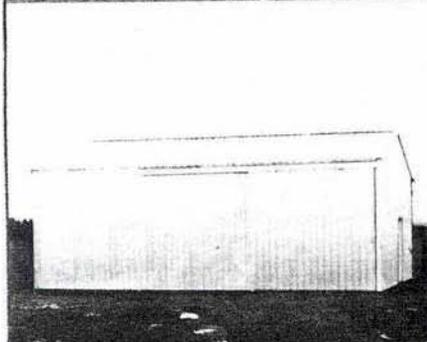
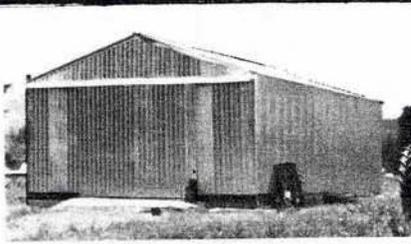
General purpose buildings typically employ simple designs that emphasize maximum utility at minimum cost.

**CLASS ILLUSTRATIONS**

**LOW QUALITY**

**AVERAGE QUALITY**

**GOOD QUALITY**



**GENERAL PURPOSE BUILDINGS**

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

**SQUARE FOOT COSTS**

CLASS	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500
1	\$ 22.55	19.28	18.40	17.40	17.00	16.37	15.95	15.75	15.58
2	31.36	27.60	26.49	25.27	24.82	24.08	23.58	23.34	23.10
3	39.69	35.21	33.95	33.51	32.02	31.13	30.52	30.22	30.05

**ADD** For interior finish - Class 1: \$ 2.73 per square foot of floor area  
 Class 2: 2.94 per square foot of floor area  
 Class 3: 3.14 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.

**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 25 percent relative to the quality 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

**SQUARE FOOT COSTS**

CLASS	100	200	300	400	500	600	1,000	1,500	2,000	2,500
1	\$ 29.32	26.68	25.39	24.75	24.30	23.97	23.64	23.31	23.05	22.98
2	40.71	35.60	34.10	32.80	32.12	31.88	30.42	29.63	29.15	28.78
3	100.42	81.86	70.32	63.99	60.41	58.58	51.97	47.96	45.22	43.32

**NOTE:** Above costs include sod roof covering.  
**ADD** For corrugated metals, light composition or wood shingles;

Class 1: \$ 4.74 per square foot of floor area  
 Class 2: 5.70 per square foot of floor area  
 Class 3: 6.84 per square foot of floor area

**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 25 percent relative to the quality of the finished product.

**COLD STORAGE WALK-IN BOXES**

TYPE	50 sq ft	100'	150'	200'	300'	400'	500'
COOL BOX	23,791	34,046	41,566	48,266	59,478	68,707	76,911
FREEZE BOX	27,155	38,319	46,386	61,323	72,535	81,765	89,968

Wall deduction per linear foot of wall: \$ 187

**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
\$	20.17	19.54	18.52	17.86	16.47	15.16

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'	28.65	-	-	-
36'	27.29	-	-	-
48'	25.47	23.42	-	-
60'	24.11	21.97	20.88	-
72'	23.20	20.97	20.06	19.24
84'	22.29	20.29	19.19	18.60

LENGTH	WIDTH			
	30'	40'	60'	70'
96'	21.42	19.56	18.60	17.92
108'	20.83	19.06	17.97	17.47
120'	20.29	18.56	17.56	16.92
160'	19.01	17.28	16.19	15.69
200'	-	16.19	15.37	14.96
240'	-	15.51	14.74	14.37

OPTIONS:

<b>Electrical</b>	Minimal Service, add per square foot of floor area:	\$	0.34
<b>Plumbing</b>	Minimal Service, add per square foot of floor area:		0.25
<b>Insulation</b>	If 2" thick foamglass is sprayed on walls and ceiling (or equivalent), add per square foot of insulated area:		7.09
<b>Interior Construction</b>	If potato storage area has bins and interior partitions, add per square foot of floor area:		2.70
<b>Concrete</b> (or concrete flatwork)	Add per square foot of concreted area:		6.17

**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 25 percent relative to the quality of the finished product.

**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
<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, 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.
<b>Interior Construction</b>	See options	See options
<b>Ceiling</b>	Open	Open
<b>Plumbing</b>	Entry service, 2 hose bibs	Entry service, 2 hose bibs
<b>Electrical</b>	Entry service, 3 outlets	Entry service, 3 outlets
<b>Insulation</b>	2-inch thick cellulose sprayed walls and ceiling or equivalent	2-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

**SQUARE FOOT COSTS**

	5,000	7,000	10,000	15,000	20,000	25,000	30,000	40,000
<b>AVG</b>	\$ 37.15	35.41	33.66	31.02	28.91	27.90	26.90	25.64
<b>GOOD</b>	50.68	47.94	44.45	40.14	37.10	35.17	33.75	32.23

**OPTIONS:**

**Interior Construction**

If potato storage area has bins and interior partitions,  
 add for average quality per square foot: \$ 7.37  
 add for good quality per square foot: 14.35

**Exterior Construction**

Painted metal exterior walls, add per square foot: \$ 1.09  
 Concrete or concrete flatwork per square foot: 6.17

**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 25 percent depending on the quality of the finished building. See the following page for other additional features.

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
\$	5.68	5.50	5.27	5.05	4.87	4.73	4.64	4.46

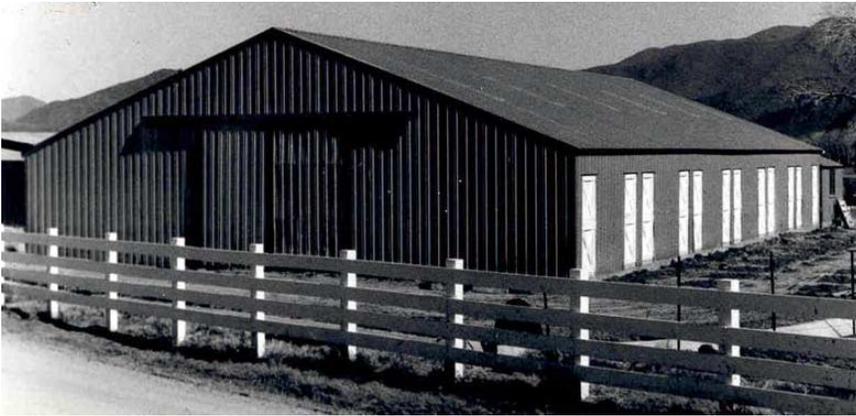
AIR CONDITIONING

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
\$	12.35	11.96	11.47	10.98	10.58	10.29	10.09	9.70

**STEEL BUILDINGS – FARM & RANCH**



**METAL HORSE BARN**



**METAL SHOP– SLANT WALL**



**QUONSET BUILDING**

**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

LENGTH	WIDTH			
	30'	40'	60'	70'
30'	40.93	-	-	-
36'	38.99	-	-	-
48'	36.39	33.46	-	-
60'	34.44	31.38	29.82	-
72'	33.14	29.95	28.65	27.48
84'	31.84	28.98	27.42	26.57

LENGTH	WIDTH			
	30'	40'	60'	70'
96'	30.60	27.94	26.57	25.60
108'	29.76	27.22	25.67	24.95
120'	28.98	26.51	25.08	24.17
160'	27.16	24.69	23.13	22.42
200'	-	23.13	21.96	21.38
240'	-	22.16	21.05	20.53

**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**

WIDTH	EAVE HEIGHT	LENGTH TO WIDTH RATIO					
		1.0	1.5	2.0	3.0	4.0	5.0
20'	10'	\$ 36.75	34.78	33.45	31.67	30.39	29.49
30'	12'	31.54	30.10	29.36	27.73	26.88	26.24
40'	14'	32.01	29.99	28.72	26.94	25.69	24.81
50'	14'	28.37	27.31	26.59	25.61	24.91	24.41
60'	14'	25.87	25.02	24.46	23.72	23.21	22.97
80'	16'	26.46	25.53	24.89	24.04	23.19	22.79
100'	16'	25.87	24.81	24.04	23.05	22.44	21.86
140'	16'	22.97	22.28	21.67	21.03	20.47	20.16
160'	18'	22.73	22.07	21.59	20.90	20.45	20.10
200'	18'	21.38	20.82	20.45	19.94	19.54	19.28

See following pages for additional features.

**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 25 percent relative to the quality of the finished product.

**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.

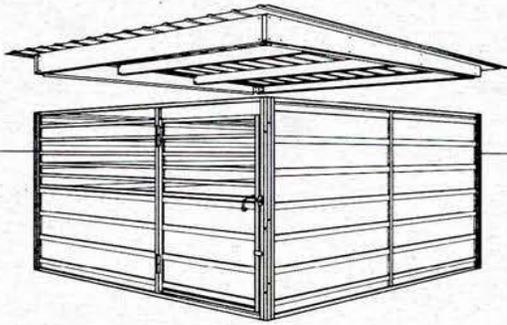
**SLANT WALL BUILDINGS:** deduct 5 percent to 15 percent.

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

COSTS PER SQUARE FOOT		LOW	AVG	GOOD
<b>FLOOR:</b>				
	Asphalt:	\$ 3.09	\$ 3.92	\$ 4.95
	Concrete:	5.09	6.17	7.52
<b>LIGHTING:</b>		0.37	1.04	2.03
<b>INSULATION:</b> (per square foot of insulated wall area)				
	Wall:	\$ 1.10	\$ 1.36	\$ 1.63
	Roof:	1.43	2.21	3.36
<b>PLUMBING:</b>		0.33	0.91	1.86
<b>HEATING:</b> (suspended space heaters):		1.58	2.13	2.92

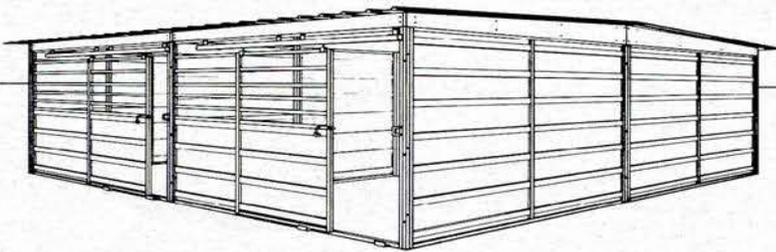
**NOTE:** Above costs are based on professional construction labor supervised by a contractor or his job foreman. For farm labor with no professional supervision, costs should be adjusted downward by 25 percent relative to the quality of the finished product.

**PREFABRICATED METAL HORSE STABLES**



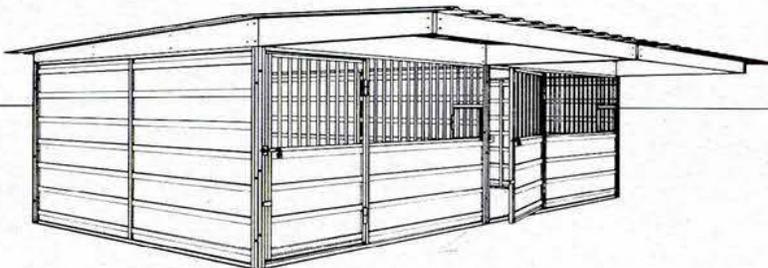
**AVERAGE QUALITY**

**SINGLE STALL**



**AVERAGE QUALITY**

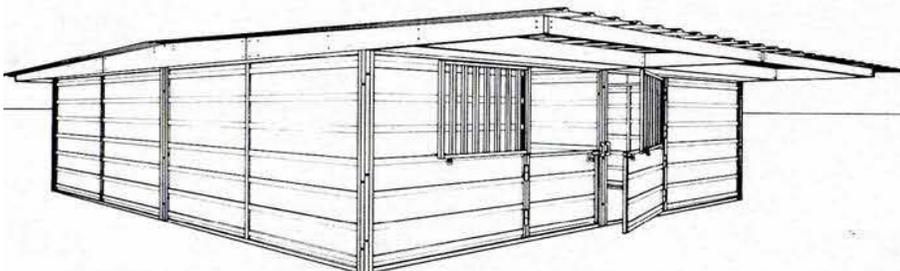
**QUADRUPLE STALL**



**AVERAGE QUALITY**

**DOUBLE STALL**

**WITH PATIO ROOF  
OR OVERHANG**



**AVERAGE QUALITY**

**QUADRUPLE STALL**

**WITH PATIO ROOF  
OR OVERHANG**

**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

**SQUARE FOOT COSTS**

<b>CLASS</b>	<b>ONE STABLE 144 SF</b>	<b>TWO STABLES 288 SF</b>	<b>FOUR STABLES 576 SF</b>
<b>1</b>	\$ 30.23	\$ 27.72	\$ 25.40
<b>2</b>	40.25	37.00	34.00
<b>3</b>	53.67	49.45	45.60

**ADD** per square foot of patio roof or overhang:

<b>LOW</b>	<b>AVG</b>	<b>GOOD</b>
\$ 6.89	\$ 9.65	\$ 13.54

**ADD** Concrete or concrete flatwork per square foot: \$ 6.17

**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 25 percent relative to the quality of the finished product.

**LIGHT METAL-FRAMED BUILDINGS**

These buildings are typically purchased as do-it-yourself kits with pre-engineered components that fit together. They consist of hollow galvanized steel tubing with sheet panel walls and roof. Add for paved or concrete floors, overhead doors, man doors, windows, electrical and insulation.



**BASIC FARM BUILDINGS**

**LIGHT FRAMED METAL BUILDINGS (CARPORTS, GARAGES)**

<b>SINGLE-CAR CARPORT (12X20), 3:12 roof pitch, 7' wall height, 15 gauge frame, 29 gauge roof, anchors incl., fair qual.</b>		
CARPORT	\$	1,634.63
ADD FOR TWO WALLS	\$	630.00
ADD FOR THREE WALLS	\$	1,310.00
ADD FOR GABLE KIT	\$	1,106.00
<b>DOUBLE-CAR CARPORT (20X20), 3:12 roof pitch, 7' wall height, 15 gauge frame, 29 gauge roof, anchors incl., fair qual</b>		
CARPORT	\$	2,838.67
ADD FOR TWO WALLS	\$	658.00
ADD FOR THREE WALLS	\$	1,649.00
ADD FOR GABLE KIT	\$	1,273.00
<b>TRIPLE-CAR CARPORT (24X20), 3:12 roof pitc, 7' wall height, 15 gauge frame, 29 gauge roof, anchors incl., fair qual.</b>		
CARPORT	\$	3,625.71
ADD FOR TWO WALLS	\$	168.00
ADD FOR THREE WALLS	\$	1,784.00
ADD FOR GABLE KIT	\$	1,781.00
<b>RV CARPORT (16'X42'), 3:12 roof pitch, 14' wall height, 15 gauge frame, 29 gauge roof, anchors incl., fair qual.</b>		
CARPORT	\$	5,142.00
ADD FOR TWO WALLS	\$	2,534.00
ADD FOR THREE WALLS	\$	3,844.00
ADD FOR GABLE KIT	\$	1,196.00
<b>SINGLE-CAR CAPPORT (14X21), 3:12 roof pitch, 7' wall height, 15 gauge frame, 29 gauge roof, anchors incl., good qual.</b>		
CARPORT	\$	2,823.00
ADD FOR TWO WALLS	\$	1,235.00
ADD FOR THREE WALLS	\$	1,878.00
ADD FOR PARTIAL WALL KIT	\$	881.00
ADD FOR GABLE KIT	\$	1,159.00
<b>DOUBLE-CAR CARPORT (24X21), 3:12 roof pitch, 7' wall height, 15 gauge frame, 29 gauge roof, anchors incl., good qual.</b>		
CARPORT	\$	3,671.00
ADD FOR TWO WALLS	\$	1,236.00
ADD FOR THREE WALLS	\$	2,119.00
ADD FOR PARTIAL WALL KIT	\$	881.00
ADD FOR GABLE KIT	\$	1,332.00
<b>TRIPLE-CAR CARPORT (24X21), 3:12 roof pitch, 9' wall height, 15 gauge frame, 29 gauge roof, anchors incl., good qual.</b>		
CARPORT	\$	4,365.00
ADD FOR TWO WALLS	\$	1,343.00
ADD FOR THREE WALLS	\$	2,438.00
ADD FOR PARTIAL WALL KIT	\$	881.00
ADD FOR GABLE KIT	\$	1,627.00
<b>RV CARPORT (16'X42'), 3:12 roof pitch, 14' wall height, 15 gauge frame, 29 gauge roof, anchors incl., good qual.</b>		
CARPORT	\$	9,136.00
ADD FOR TWO WALLS	\$	3,839.00
ADD FOR THREE WALLS	\$	5,010.00
ADD FOR GABLE KIT	\$	1,207.00

<b>EXTRAS:</b>		
ADD FOR CONCRETE FLOOR PER SQ FT OF FLOOR AREA	\$	6.17
ADD FOR ASPHALT PAVED FLOOR PER SQ FT OF FLOOR AREA	\$	3.92
ADD FOR OVERHEAD DOOR, MANUAL, PER SQ FT OF OPENING	\$	24.22
ADD FOR OVERHEAD DOOR, ELECTRIC, PER INSTALLATION	\$	2,853.25
ADD FOR EACH MAN DOOR, PER SQ FT OF OPENING	\$	32.49
ADD FOR EACH WINDOW, DOUBLE HUNG, PER SQ FT OF OPENING	\$	25.71
ADD FOR ELECTRICITY PER SQ FT OF BUILDING	\$	0.26
ADD FOR INSULATION PER SQ FT OF BUILDING	\$	0.95

**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 25 percent relative to the quality of the finished product.

PART A

2024-2025 RURAL BUILDING COSTS

Section 2

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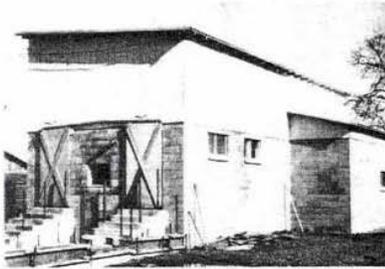
DAIRY BARNS

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PHOTOS COURTESY OF CHURCHILL COUNTY ASSESSOR

LOW QUALITY



AVERAGE QUALITY



GOOD QUALITY

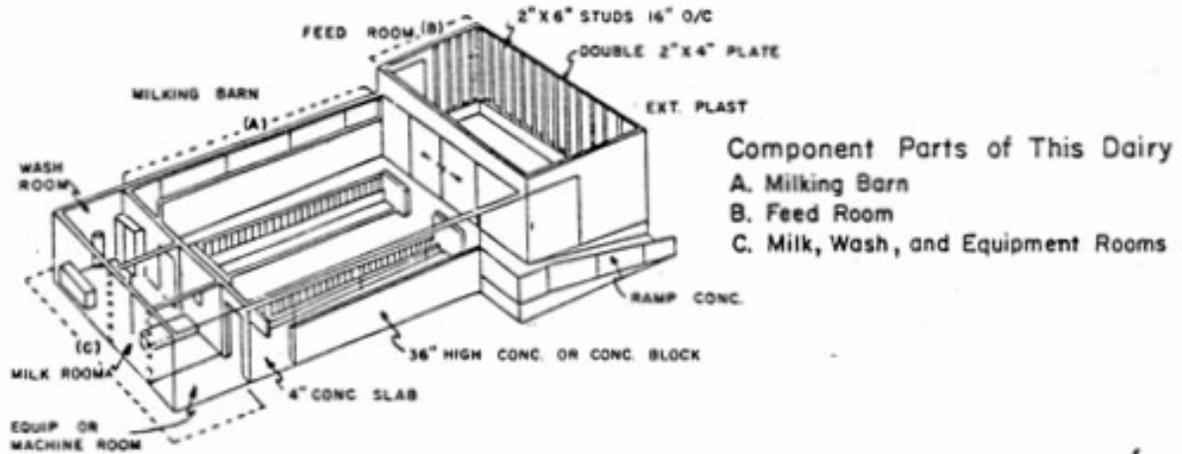


VERY GOOD QUALITY



# DAIRY BARNS

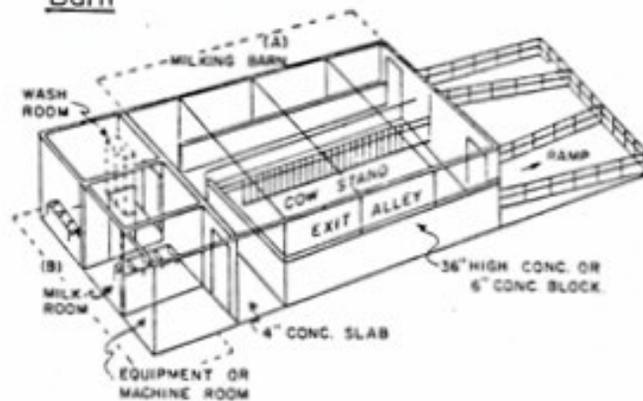
## Stanchion Barn



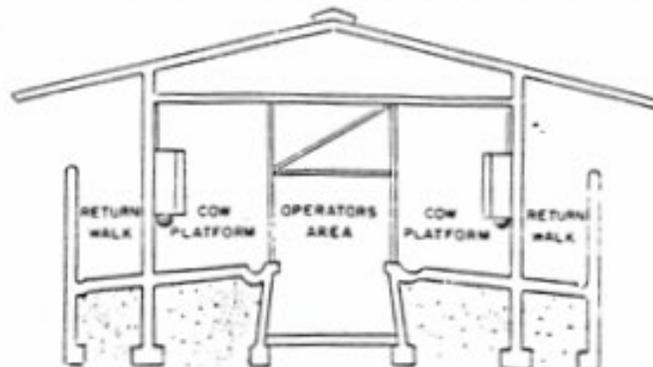
## Typical Walk-Through Barn

Component Parts of This Dairy

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



## Cross Section Modern Herrington-Type Dairy Barn



Section 2

**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. Neither 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>	8" concrete block, bearing walls or reinforced concrete 36-inch high with 2" x 6" stud framing – 16" 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.

**SQUARE FOOT COST**

QUALITY			
LOW	AVERAGE	GOOD	VERY GOOD
\$ 89.18	\$ 110.72	\$ 139.14	\$ 176.43

**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 25 percent relative to the quality of the finished product.

**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
<b>CEILING</b> (Gypsum board - taped and painted):	\$ 3.08	3.41	3.76	4.17
<b>INSULATION</b>				
Walls:	\$ 1.05	1.29	1.55	1.89
Roof:	1.36	2.11	3.20	4.80
<b>WALL ORNAMENTATION</b> (*apply only to ornamented area):				
	LOW	AVERAGE	GOOD	VERY GOOD
<b>CERAMIC TILE</b> (*cost based on square foot of area covered):	20.49	25.23	29.98	34.72
<b>ROOF COVER</b> (Wood shingle):	7.78	9.68	12.05	15.01
<b>AUTOMATIC GATES</b> (*based on cost per stall):	\$ 1,909	\$ 2,033	\$ 2,158	\$ 2,282
<b>AUTOMATIC FEED EQUIPMENT</b> (*based on cost per stall):	\$ 1,380	1,507	1,633	1,760
			FOR AUGER ADD: \$	1,380

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

**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 25 percent relative to the quality of the finished product.

**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, washbasins, water closet, and 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>	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.

**SQUARE FOOT COSTS**

QUALITY

LOW	AVERAGE	GOOD	VERY GOOD
\$ 41.32	\$ 57.11	\$ 99.44	\$ 130.31

**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 25 percent relative to the quality of the finished product.

MILKING STORAGE, WASH AND EQUIPMENT ROOMS

ADDITIONAL FEATURES

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

FEATURE	LOW	QUALITY		
		AVERAGE	GOOD	VERY GOOD
<b>INSULATION</b>				
Walls:	1.05	1.29	1.55	1.89
Roof:	1.36	2.11	3.20	4.80
<b>WALL ORNAMENTATION</b> (*apply only to ornamented area):				
<b>CERAMIC TILE</b> (*cost based on square foot of area covered):				
	20.49	25.23	29.98	34.72
<b>ROOF COVER</b> (Wood shingle):				
	7.78	9.68	12.05	15.01

**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 25 percent relative to the quality of the finished product.



**FEEDER FENCE w HEADLOCK**

**WASH PEN AND HOLDING AREA**

<b>FLOOR OR RAMP</b>	Sloping concrete slab rough finish 6" thick.
<b>WALLS</b>	Concrete block 8" - height 5'.
<b>FENCING</b>	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 3/4".
<b>GATES</b>	Metal gates (2 usually) 12 linear feet each, 5-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.

**WASH PEN AND HOLDING AREA**

QUALITY			
LOW	AVERAGE	GOOD	VERY GOOD
\$ 27.79	\$ 32.15	\$ 36.17	\$ 40.31

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

QUALITY			
LOW	AVERAGE	GOOD	VERY GOOD
\$ 11.24	\$ 14.41	\$ 18.54	\$ 23.90

**METAL RAIL FENCE  
WELDED IRON RAILS**

Iron pipe post 2-1/2" to 4" in diameter - 7' to 10' on center in concrete:  
\$ 25.66 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: \$ 20.29 per linear foot.  
4-Cable: \$ 22.97 per linear foot.

**METAL GATES**

54" to 64" high - welded iron rails or pipe with bracing:  
30.58 per linear foot of gate width.

**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 25 percent relative to the quality of the finished product.

**DAIRY EQUIPMENT**

**STAINLESS STEEL REFRIGERATED HOLDING TANKS**

<b>SIZE GALLONS</b>		<b>TANK ONLY</b>		<b>COMPLETE SYSTEM</b>
500	\$	13,275	\$	24,122
1,000		24,953		34,465
1,250		29,193		39,569
1,500		32,635		42,995
2,000		40,318		52,438
2,500		46,403		63,721
3,000		50,890		75,006
4,000		61,461		93,051
5,000		68,837		110,282

**VACUUM PUMP SYSTEMS**

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

\$ 1,185

**REFRIGERATION COMPRESSORS**

<b>HORSE POWER</b>		<b>COST</b>
3.0	\$	13,581
4.0		19,831
5.0		26,081
7.5		32,331
10.0		38,581
15.0		44,832

**FEED FENCING w HEADLOCKS**

<b>TYPE</b>	<b>COST</b>
STEEL	\$ 42.42 per LF
LOCKABLE STEEL	63.69 per LF
SELF-LOCKING STEEL	120.16 EACH

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

**DAIRY EQUIPMENT  
PLATE COOLERS**

**NUMBER OF STALLS**

<b>6</b>	<b>8</b>	<b>12</b>	<b>20</b>	<b>24</b>
\$ 6,899	10,246	13,593	16,939	20,286

**HERRINGBONE STALLS**

<b>SIZE</b>	<b>STALLS</b>	<b>COST</b>
DOUBLE 3	6	\$ 17,116
DOUBLE 4	8	20,435
DOUBLE 6	12	30,652
DOUBLE 10	20	51,087
DOUBLE 12	24	54,145

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

**MILK TRANSFER LINES**

<b>TYPE</b>	<b>SIZE</b>	<b>COST PER LF</b>
STAINLESS STEEL	18 GAUGE - 1.5"	\$ 11.46
STAINLESS STEEL	18 GAUGE - 2.0"	14.54
STAINLESS STEEL	16 GAUGE - 2.0"	18.94
STAINLESS STEEL	16 GAUGE - 2.5"	26.30
STAINLESS STEEL	16 GAUGE - 3.0"	31.78
GLASS PIPE	1.5"	88.56
GLASS PIPE	2.0"	109.72

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

**Electric pulsator or hydropulsator;**

Manual on & off: \$ 775 to \$ 1,242 EACH  
Automatic off, add: \$ 1,296 to \$ 3,878

PART A

2024-2025 RURAL BUILDING COSTS

Section 3

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**BUNK HOUSES**

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**BUNK HOUSES**



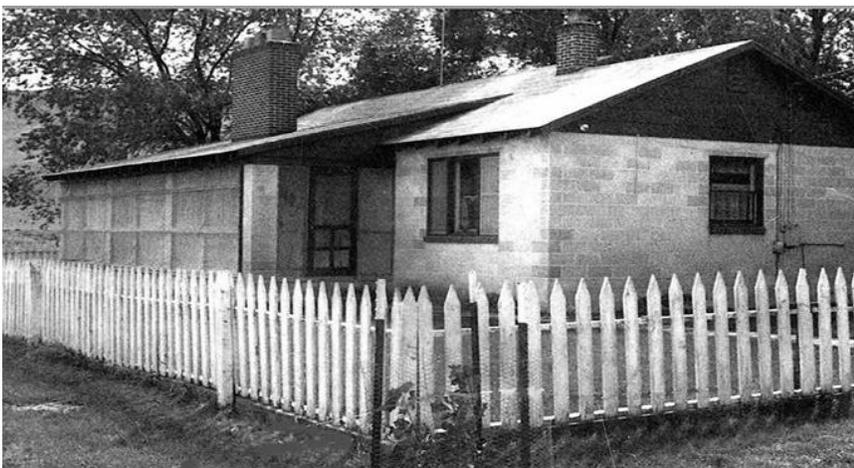
**CLASS I  
LOW QUALITY**



**CLASS 2  
AVERAGE QUALITY**



**CLASS 3  
GOOD QUALITY**



**CLASS 4  
VERY GOOD QUALITY**

**BUNK HOUSES**

<b>COMPONENT</b>	<b>CLASS 1 LOW QUALITY</b>	<b>CLASS 2 AVERAGE QUALITY</b>	<b>CLASS 3 GOOD QUALITY</b>	<b>CLASS 4 VERY GOOD QUALITY</b>
<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
<b>Heating &amp; Cooling</b>	None	None	None	None

# BUNK HOUSES

SQUARE FEET									
CLASS	400	600	800	1,000	1,200	1,500	2,000	2,500	3,000
1	\$ 36.56	34.55	33.55	32.44	32.04	31.06	30.36	29.75	29.49
2	48.97	46.35	45.17	43.73	43.19	41.97	41.02	40.29	39.98
3	66.42	63.10	61.50	59.72	59.04	57.45	56.28	55.35	54.86
4	125.74	116.53	112.26	106.88	105.19	100.59	97.33	94.53	93.29

1. Utility hook-up costs included.

2. Interior plumbing not included

Add for Class 1:	\$	1,298	per fixture
Class 2:		1,984	per fixture
Class 3:		3,028	per fixture
Class 4:		4,699	per fixture

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

4. Floor covering not included.

Add asphalt tile or linoleum:	\$	8.02	per sq ft
Add installed carpet:		8.14	per sq ft

5. Cooling systems not included.

Add window units:	\$	-	per sq ft
Add for evaporative coolers, roof or wall units only:		4.39	per sq ft

6 Heating systems not included.

Add floor or wall furnace:		2.52	per sq ft
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7 Insulation not included.

Add for			
	Roof:	2.21	per sq ft
	Walls:	1.36	per sq ft

**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 25 percent relative to the quality of the finished product.

PART A

2024-2025 RURAL BUILDING COSTS

Section 4

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**UTILITIES**

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**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.

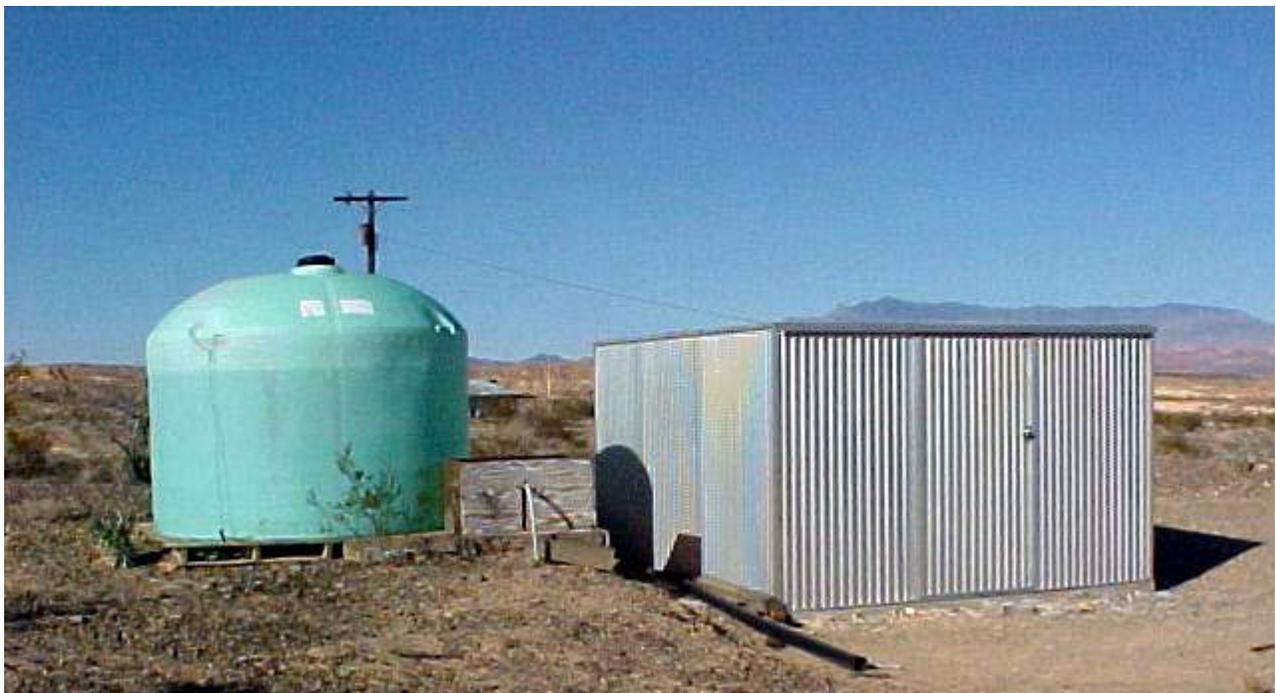
Residence and bunkhouse costs already include utility hookups. Mobile home hookup costs appear on Page 3 of this section.

**PRESSURE TANK SIZES**

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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

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**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	<b>1,951</b>	<b>2,294</b>	2,712	2,824	3,234	3,845	
80	2,052	2,396	<b>2,813</b>	<b>2,925</b>	3,335	3,947	
120	2,255	2,598	3,016	3,128	<b>3,538</b>	<b>4,150</b>	
220	2,967	3,310	3,728	3,839	4,250	4,861	
315	3,392	3,735	4,153	4,264	4,675	5,286	
525	4,018	4,361	4,779	4,891	5,301	5,913	

EXAMPLE:	3/4 HP & 80 GAL TANK	\$	2,813
	6" WELL AT 60' DEPTH		3,660
	TOTAL COST	\$	6,473

**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	<b>1,896</b>	2,288	2,716	3,164	3,872	4,767	5,133	8,220		
80	1,997	<b>2,390</b>	<b>2,818</b>	3,265	3,974	4,869	5,234	8,322		
120	2,200	2,592	3,020	<b>3,468</b>	4,176	5,071	5,403	8,490		
220	2,912	3,304	3,732	4,179	<b>4,888</b>	<b>5,783</b>	6,074	9,161		
315	3,337	3,729	4,157	4,605	5,313	6,208	<b>6,394</b>	9,482		
525	3,963	4,355	4,784	5,231	5,940	6,835	7,096	<b>10,183</b>		

EXAMPLE:	1 HP PUMP & 120 GAL TANK	\$	3,468
	8" WELL AT 100' DEPTH.		9,200
	TOTAL COST	\$	12,668

**WELL DRILLING**

Drilling & casing costs per foot of well depth  
(includes gravel and concrete packing)

4" - 6" WELL: \$ 61 per foot  
8" - 10" WELL: 92 per foot

**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 25 percent relative to the quality of the finished product.

**SEPTIC TANKS**

This table contains costs derived from the current Marshall Swift Commercial Manual without any adjustment 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.

**SEPTIC TANK COSTS  
CAPACITY (GAL)**

QUALITY	LOW	AVG	GOOD
1000 GAL	\$ 2,372	2,916	3,461
1250 GAL	3,207	3,711	4,214
1500 GAL	3,766	4,457	5,146
LEACH LINES (per ft)	17.15	22.27	27.37
DRAINFIELD MULT.	1.25	1.25	1.25
PLASTIC PIPE 4"-6" (per ft)	10.34	13.75	17.15

**MOBILE HOME HOOKUPS**

TYPE	LOW	AVG	GOOD
Water	\$ 848	1139	1,602
Electric	1,270	1827	2,646
Sewer	955	1400	1,780
Gas	402	611	973

**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: to

PART A

2024-2025 RURAL BUILDING COSTS

Section 5

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**CORRALS AND FENCES**

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**CORRALS AND FENCES**



**RAILROAD TIE POSTS  
10' OC  
POLE RAIL FENCE  
AVERAGE QUALITY  
LESS 15 %**

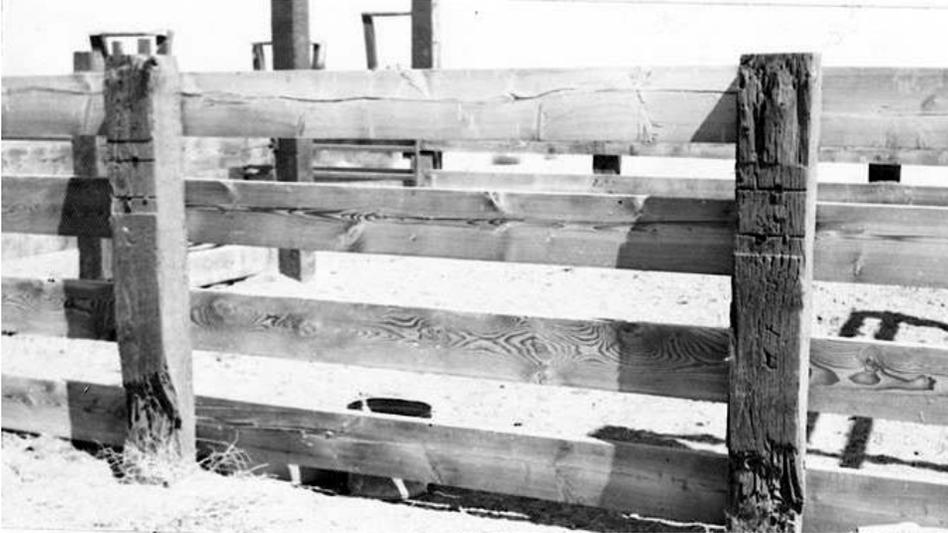


**RAILROAD TIE POSTS  
POLE RAIL FENCE  
WITH FEED TROUGH  
AVERAGE QUALITY**



**RAILROAD TIE POSTS  
CABLE FENCE  
WITH FEED TROUGH  
AVERAGE QUALITY**

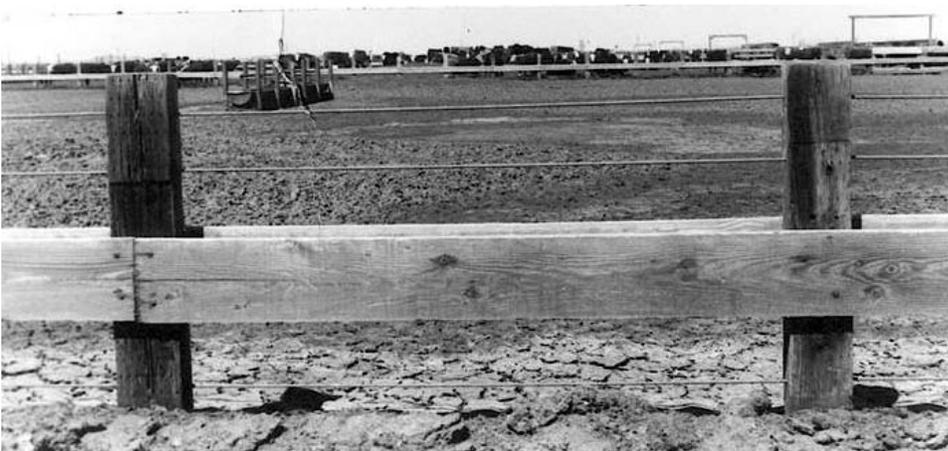
**CORRALS AND FENCES**



**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**

**CORRAL FENCING  
COST PER LINEAR FOOT**

TYPE	LOW	FAIR	AVG	GOOD
WOOD	\$ 13.72	\$ 16.51	\$ 19.94	\$ 23.98

<b>Examples</b>	4-4"	4-6"	5-6"	7-6"
<b>of Rails</b>	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 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	\$ 4.94	\$ 5.59	\$ 6.25	\$ 6.90

<b>Examples:</b>	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)
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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	\$ 20.29	20.93	21.58
4" PIPE, 2" PIPE RAILS	25.88	26.70	27.52

**WOODEN FEED TROUGHS**

TYPE	LOW	FAIR	AVG	GOOD
W/O FENCE	\$ 10.67	\$ 14.10	18.07	25.49
WITH FENCE	\$ 15.02	19.48	23.82	31.03

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

**CONCRETE**

In-place cost for flatwork per square foot: \$ 6.17 to \$ 7.52  
 Cost per square foot of wall area: \$ 29.56

**METAL FENCING AND GATES**



**5' CHAIN LINK FENCE  
NO TOP RAIL**



**COMMERCIALY  
MANUFACTURED GATE  
GOOD QUALITY**



**EXPANDED TUBE  
STEEL GATE**



**IRON PIPE CORRAL  
AND HOLDING PEN**

**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	\$ 18.25	26.48	34.87	42.73	50.33
ADD FOR RAILS	3.00	3.00	3.25	3.25	3.25
ADD FOR PRIVACY SLATS	9.10	13.84	18.67	23.86	28.58
ADD FOR 3 STRAND BARBED WIRE	3.89	3.89	4.36	4.36	4.36

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	\$ 10.49	\$ 16.70	\$ 22.30	\$ 32.35

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

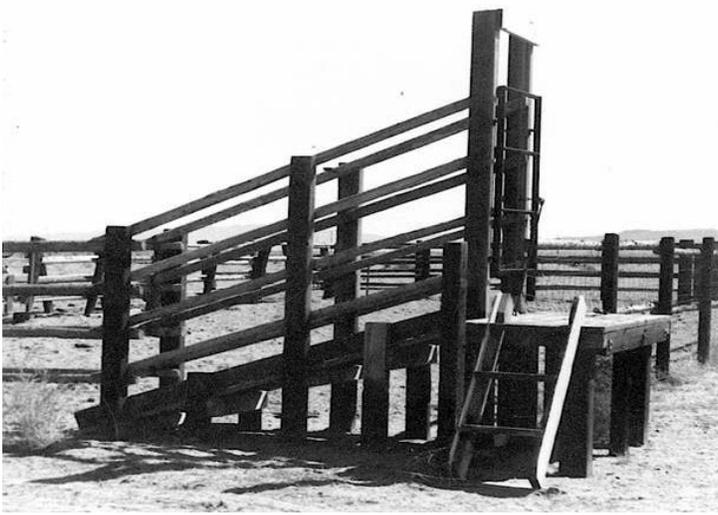
**PLASTIC FENCING**

TYPE	COST
POLYMER GRID, 5', 2" * 6" TOP RAIL	\$ 19.13
VINYL FENCE, 5" * 5" POSTS, 3 - 2" * 6" RAILS	27.30

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

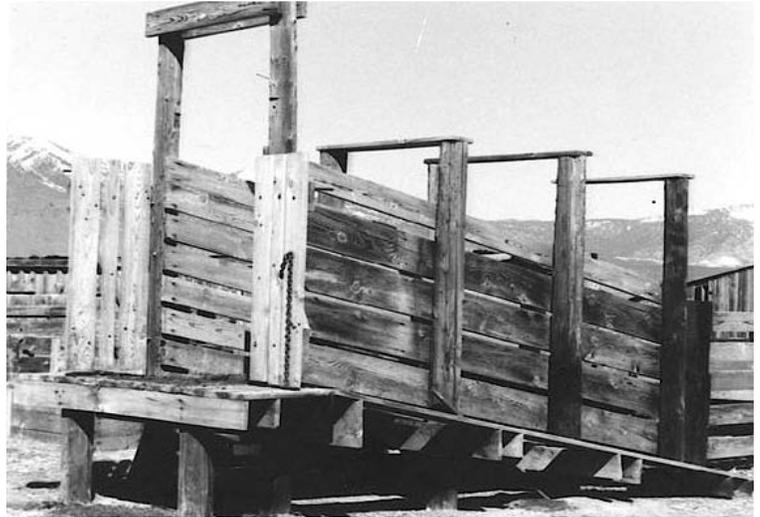
**NOTE:** Above costs are based on professional construction labor supervised by a contractor or his job foreman. For farm labor with no professional supervision, costs should be adjusted downward by 25 percent relative to the quality of the finished product.

**CORRAL LOADING CHUTES**



**LIGHT SPACED CHUTE**

**HEAVY SPACED CHUTE**



**HEAVY SOLID CHUTE**

**CORRAL LOADING CHUTE**  
**COST PER LINEAR FOOT INCLUDING BOTH SIDES**

SPACED	LIGHT CHUTE	\$ 102.09 per lf
	HEAVY CHUTE (INCLUDES PLATFORM)	108.76
SOLID	LIGHT CHUTE	115.42
	HEAVY CHUTE (INCLUDES PLATFORM)	122.09

**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** **\$ 7,007**

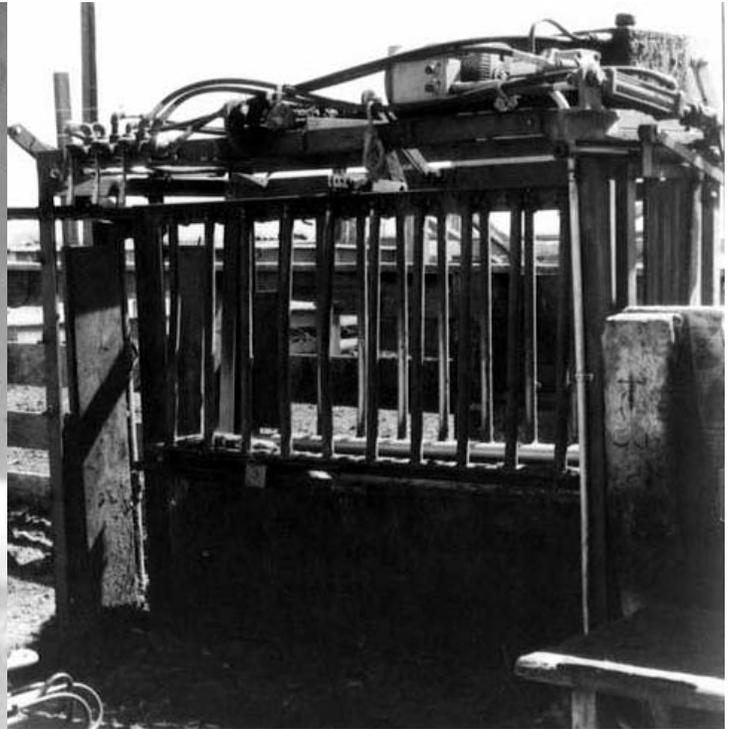


**CALF TABLE**

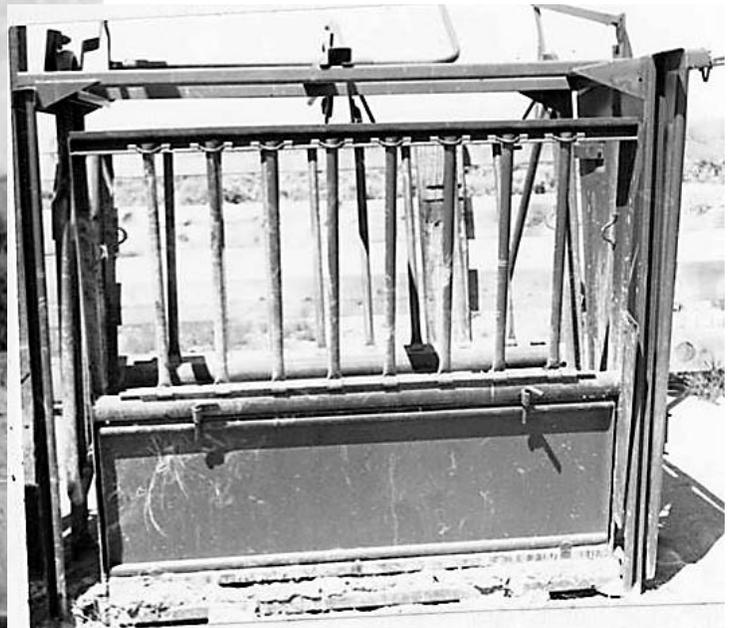
**WINDMILLS & CATTLE SQUEEZES**



**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'
\$ 2,938	\$ 3,974	\$ 5,010	\$ 6,046

### CATTLE SQUEEZE

STATIONARY MODEL, LIGHT	\$ 2,951
STATIONARY MODEL, HEAVY	4,172
HEAVY DUTY, HYDRAULIC	13,180
CALF TABLE	1,855



**HEAVY STATIONARY SQUEEZE**

### WINDMILLS AND STEEL TOWERS

FAN		TOWER		INSTALLATION		TOTAL COST
6'	\$ 3,198	21'	\$ 3,385		\$ 3,411	\$ 9,994
6'	3,198	27'	4,391		3,299	10,889
6'	3,198	33'	5,440		3,667	12,306
8'	4,122	21'	3,385		3,158	10,665
8'	4,122	27'	4,391		2,674	11,187
8'	4,122	33'	5,440		3,042	12,604
10'	6,581	27'	4,391		3,123	14,096
10'	6,581	33'	5,440		4,386	16,408
12'	11,256	27'	4,391		5,235	20,882
12'	11,256	33'	5,440		5,678	22,374
14'	17,979	27'	4,391		7,313	29,683
14'	17,979	33'	5,440		9,396	32,815
16'	24,231	33'	5,440		10,453	40,124

Includes complete steel wheel, tower and installation excluding well.

**CATTLE AND HORSE WATERING TANKS**

**ROUND BOTTOMLESS STOCK TANKS**

**25.5" Deep, Galvanized Corrugated**

PER FOOT OF DIAMETER - 22 GAUGE METAL \$ 49.06  
 12 GAUGE METAL \$ 81.80

**ADD:** 10 GAUGE METAL 25%  
 PER SQUARE FOOT OF CONCRETE SLAB \$ 6.17

**COMMERCIALY MANUFACTURED METAL WATER TANKS**

**GALVANIZED WITH BOTTOM 25.5" TO 27" DEEP**

PER FOOT OF DIAMETER - 22 GAUGE METAL \$ 61.33  
 12 GAUGE METAL \$ 105.68

**ADD:** 10 GAUGE METAL 25%

**COMMERCIALY MANUFACTURED AUTOMATIC WATERERS WITH HEATERS**

LEN	WDTH	HGHT	GAL	HEAD	COST
20	18	25	3	30 50	\$ 861
30	24	25	9	80 120	861
32	28	25	13	100 200	861
42	28	25	20	200 300	942
66	28	25	35	300 400	1,011
84	24	16	40	350 450	1,050
90	28	25	50	400 550	1,129
90	36	25	120	500 700	1,257

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

GALLONS			
175	300	500	900
\$ 274	\$ 376	\$ 498	\$ 753

**ALL OTHER WATER TROUGHS**

1 cubic foot = 7.5 gallons

VOLUME	COST /	GAL	Cu Ft
LESS THAN 100 GALLONS	\$	4.79	\$ 35.87
100 TO 175 GALLONS		4.37	32.78
176 TO 300 GALLONS		3.96	29.68
301 TO 500 GALLONS		3.55	26.59
OVER 500 GALLONS		3.13	23.49

**CORRALS AND FENCES**

**COMMERCIALLY MANUFACTURED FENCE PANELS**

Portable or stationary, not including posts. For wooden posts (RR Ties)

Add \$ 15.93 to \$ 31.88 EACH

64" HEIGHT, 5 RAIL MEDIUM DUTY	6'	\$ 194
	8'	242
	10'	268
	12'	315
	14'	357
	16'	415

64" HEIGHT, 5 RAIL EXTRA HEAVY DUTY	6'	\$ 311
	8'	352
	10'	404
	12'	454
	14'	509
	16'	577

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

**COMMERCIALLY MANUFACTURED METAL GATES WITH LEVER LATCH**

WIDTH			
6 FOOT	8 FOOT	12 FOOT	16 FOOT
\$ 303	\$ 364	\$ 427	\$ 591

**COMMERCIALLY MANUFACTURED  
PROFESSIONAL ROPING AND DOGGING CHUTE**

FIRST SECTION WITH RELEASE GATE	\$ 3,402
SECOND SECTION	2,150
STRIPPING CHUTE	1,689

**COMMERCIALLY MANUFACTURED BUCKING CHUTE**

FIRST SECTION	\$ 9,354
ADDITIONAL SECTIONS, EACH	7,979

## CORRALS AND FENCES

### COMMERCIALLY MANUFACTURED CROWDING ALLEYS

24' x 60" INCLUDES FRAMES & HEADGATE w STAND	\$ 8,814
24' x 60" ADD-ON SECTION	2,797
ALLEY STOPS ADD	445
10' CUTOUT GATE INCLUDING FRAME AND 10' PANEL	3,305

### CURVED CROWDING ALLEYS

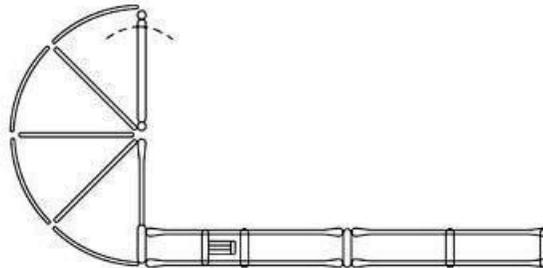
180 DEGREE SWEEP, 10' GATE & 24' ADJUSTABLE ALLEY WITH A1 CAGE & 10' X 20' LEAD-UP	\$ 22,353
180 DEGREE SWEEP, 10' GATE & 24' ADJUSTABLE ALLEY BLOCKING DOOR ADD	18,336
ADJUSTABLE ALLEY BOW	1,300
	344

### COMMERCIALLY MANUFACTURED FEEDER PANEL

SIZE	EACH
6' x 64"	\$ 859
8' x 64"	1,034
10' x 64"	1,103
12' x 64"	1,266
16' x 64"	1,519

### HEADGATES

SELF CATCH HEAVY DUTY	\$ 2,083
SELF CATCH LIGHT DUTY	1,229



**180' SWEEP w CROWDING ALLEY**

## PART A

### 2024-2025 RURAL BUILDING COSTS

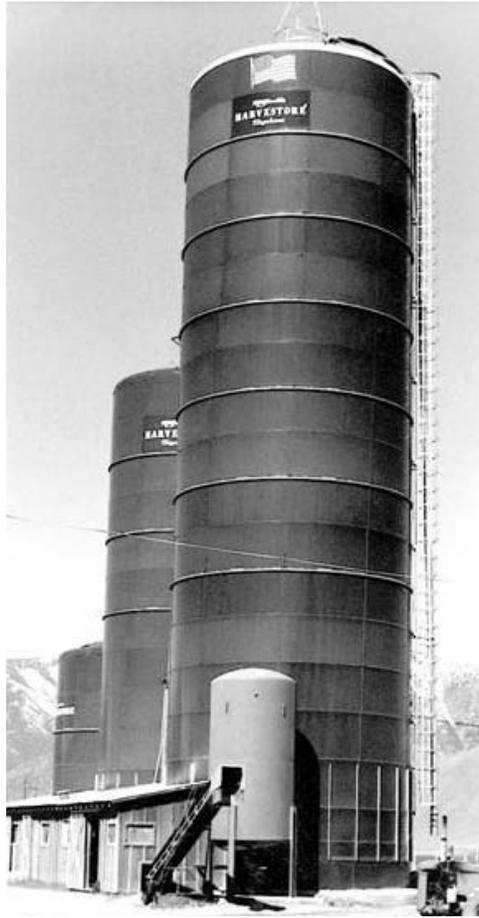
#### Section 6

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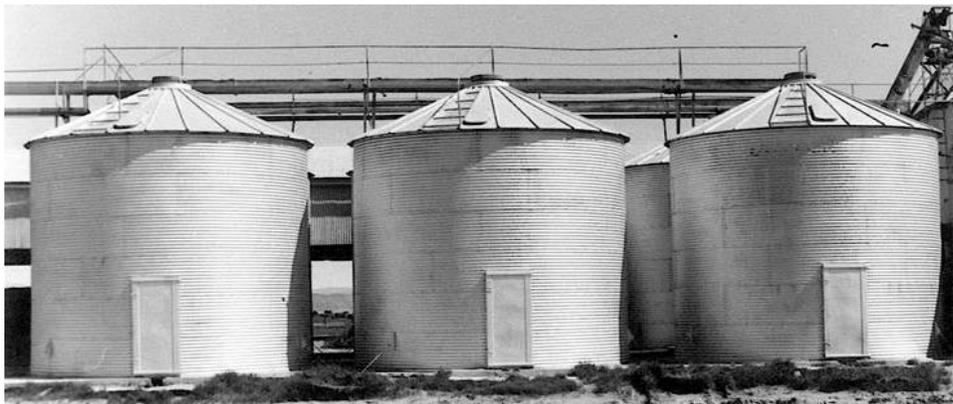
## MISCELLANEOUS COSTS

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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.

DIAMETER	TOTAL COST								
	HEIGHT 30'	35'	40'	45'	50'	60'	70'	80'	90'
12'	\$ 18,700	22,000	25,300	28,394	31,488	37,538	-	-	-
14'	21,725	25,438	29,150	32,588	36,025	43,175	50,188	-	-
16'	22,550	26,263	29,975	33,688	37,400	44,688	52,113	59,538	-
18'	24,200	28,188	32,175	36,300	40,425	48,400	56,375	64,213	72,188
20'	27,088	31,556	36,025	40,631	45,238	54,313	63,113	72,188	81,125
22'	31,763	36,919	42,075	47,163	52,250	62,975	73,219	83,531	93,844
24'	-	-	-	-	60,363	72,188	84,219	95,563	107,938
30'	-	-	-	-	-	97,969	114,469	130,281	145,750

No chute, deduct per vertical foot of height \$ -  
 Flat roof, deduct per square foot of floor area \$ 8.98  
 No roof, deduct per square foot of floor area \$ 16.91

**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'
\$ 14,850	15,675	16,500	17,325	18,425	19,250	20,213	N/A	N/A	21,450

**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 25 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	HGHT	CAPACITY (BUSHELS)	COST W/O DRY BIN	COST WITH DRY BIN	SLAB FLOOR
15	7	1,257		\$ 8,278	\$ 12,007 \$ 1,156
15	11	1,792		10,814	15,960 1,260
15	15	2,329		12,902	18,943 1,447
15	18	2,864		14,692	21,181 1,671
18	11	2,647		12,007	17,452 1,551
18	15	3,422		14,916	21,628 1,611
18	18	4,189		17,004	24,611 1,671
21	11	3,693		13,275	19,242 2,133
21	15	4,753		17,004	24,611 2,193
21	18	5,813		20,584	29,981 2,282
24	11	4,949		16,258	23,716 2,700
24	15	6,344		19,838	29,235 2,819
24	18	7,739		24,761	35,948 2,938
27	11	6,409		19,242	28,340 3,461
27	15	8,182		23,866	34,456 3,625
30	15	10,278		29,086	41,765 3,990
30	18	12,473		34,158	49,521 4,214
30	22	14,668		39,229	- 4,400
30	26	16,863		43,704	- 4,848
36	15	15,297		40,721	59,067 5,892
36	18	18,473		46,240	67,271 6,265
36	22	21,648		53,847	- 6,526

**ADD:**

PER SQUARE FOOT OF CONCRETE SLAB \$ 6.17

LADDERS	\$ 116	PLUS	\$ 16.56	PER LINEAR FOOT
SAFETY CAGES	32.22	TO	39.90	PER FOOT INSTALLED
AUGER AND DRIVE	689	PLUS	74.21	PER FOOT OF TANK DIAMETER
SPREADERS	1,342	TO	2,014	EACH
STIRRATORS	313.24	TO	477.31	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 25 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 (BUSHEL)	CAPACITY (TONS)	COST
6	10'	120	3.0	\$ 3,073
6'	16'	240	6.0	4,363
6'	21'	360	9.0	4,960
6'	25'	480	12.0	5,594
6'	28'	600	15.0	6,153
7'	11'	157	4.0	4,214
7'	14'	239	6.0	4,549
7'	16'	321	8.0	4,922
7'	19'	403	10.0	5,258
9'	14'	300	7.8	6,339
9'	17'	450	11.3	7,607
9'	20'	590	14.8	8,278
9'	25'	855	21.4	9,546
9'	28'	1,000	25.0	10,068
9'	31'	1,130	28.5	10,441
12'	20'	870	21.8	14,245
12'	25'	1,345	33.6	16,109
12'	31'	1,825	45.6	18,347
12'	36'	2,300	57.5	19,838
12'	42'	2,780	69.5	21,628

ADD:

PER SQUARE FOOT OF HEAVY DUTY CONCRETE SLAB \$ 7.52

**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 25 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 25 percent, depending on the quality of workmanship.

**GRAIN LOADING AND UNLOADING SYSTEMS  
CONVEYOR**

AUGER-TYPE		
DIAM	COST/LIN FT	
6"	\$	121
8"		164
10"		216
12"		292
14"		340
16"		424

BELT-TYPE		
WIDTH	COST/LIN FT	
12"	\$	207
18"		321
24"		376
30"		433
36"		461
48"		592



**FEED MILL and COMPONENTS**

MISCELLANEOUS COSTS

ELECTRIC POWER PLANTS

HOME GENERATOR SETS

RATING - KW	GASOLINE	DIESEL
3.0	\$ 4,956	\$ 5,947
4.0	\$ 6,022	\$ 7,227
5.0	\$ 7,160	\$ 8,592
7.0	\$ 9,602	\$ 11,523

COMMERCIAL INDUSTRIAL GENERATORS

RATING - KW	GASOLINE	DIESEL
10.0	\$ 22,807	\$ 28,314
12.5	\$ 26,908	\$ 33,237
15.0	\$ 30,041	\$ 36,996
20.0	\$ 34,926	\$ 43,407
25.0	\$ 37,201	\$ 44,047
30.0	\$ 39,476	\$ 44,686
40.0	\$ 47,395	\$ 53,961
50.0	\$ 52,143	\$ 59,926
60.0	\$ 68,135	\$ 78,882
100.0	\$ 84,126	\$ 97,838
150.0	\$ 112,840	\$ 133,263

For Air Cooling, Deduct: 15%  
 For natural or LP gas fuel systems, Add per KW: \$ 39.11  
 For remote control starting, gasoline fuel, Add: \$ 149.90

**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

ALTERNATING CURRENT LOAD CONTROL SWITCHBOARD				AUTOMATIC EMERGENCY SWITCHBOARD FOR GASOLINE PLANT			
RATING KW	AMPS	VOLTAGE	COST EACH	RATING KW	AMPS	VOLTAGE	COST EACH
15	130	240; 230/400	\$ 2,372	15	130	120/240	\$ 925
20	170	120/240; 240	3,365	20	170	120/240	2,678
25	210	240; 120/240	4,358	25	210	120/240	4,432
30	250	240; 120/240	5,351	30	250	120/240	6,186
40	330	120/240; 240	6,344	40	330	120/240	7,940
50	420	480; 240	7,337	50	420	120/240	9,693
60	500	480; 240	8,330	60	500	120/240	11,447
100	830	480; 240	9,323	100	830	120/240	13,201

ADD FOR DIESEL POWERED PLANTS: \$ 287  
 FOR CIRCUIT BREAKERS: \$ 955 TO \$ 5,444

**SCALES**



**LIVESTOCK SCALE with WOOD CAGE**

**LIVESTOCK SCALES**

BEAM TYPE	SIZE	CAPACITY	COST
FULL CAPACITY	14' X 8'	5 TON	\$ 24,015
FULL CAPACITY	16' X 8'	10 TON	\$ 31,622
FULL CAPACITY	22' X 10'	15 TON	\$ 45,046

**SCALE CAGES**

SIZE	METAL		WOOD	
	SIZE	COST	SIZE	COST
14'		\$ 2,609	14' X 8'	\$ 1,345
16'		2,932	16' X 8'	\$ 1,382
22'		4,048	22' X 10'	\$ 1,716
24'		4,410	24' X 10'	\$ 1,782

FOR TYPE REGISTERING BEAM, ADD. \$ 1,164  
 FOR PRINTER, ADD 1,611  
 FOR ELECTRONIC DIGITAL SCALE, ADD. 7,756

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 fully 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	\$ 59,067
30 TONS	\$ 68,912
40 TONS	\$ 64,139
50 TONS	\$ 89,496
60 TONS	\$ 101,056
70 TONS	\$ 116,345

FOR WOOD PLATFORM, DEDUCT: 6%  
 FOR STEEL PLATE, ADD: 5%  
 FOR AUTOMATIC DIAL MODEL, ADD: \$ 3,804  
 FOR REMOTE READER-PRINTER, ADD: 14,916  
 FOR CARD PRINTER, ADD: 3,431



VINYARDS

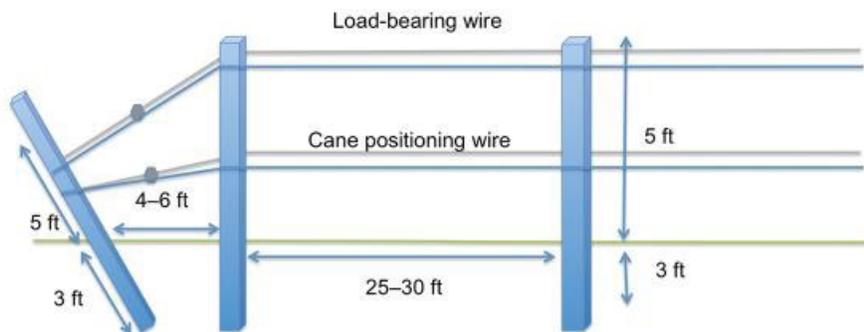
Vine Training Systems

Vine Training Systems are instrumental in good canopy management and productivity of the grape vines. The costs shown here include the T-posts, wire clips, two rows of trellis wire, and pencil rod stakes.

VINYARD STAKE & TRELLIS SYSTEM	EACH VINE	PER ACRE
4X7 (VINES 4' APART; ROWS 7' APART); EVERY VINE (7' T POST WITH WIRE CLIPS, STAKES, 2 ROWS OF WIRE FOR TRELLIS)	\$ 6.67	\$ 10,382.76



I-Trellis with End Post Configuration



5

PART A

2024-2025 RURAL BUILDING COSTS

Section 7

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COMPUTATIONAL TABLES

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## MEASUREMENT PRINCIPLES

<b>PLANE FIGURE</b>	A plane surface bounded by either straight or curved lines having no thickness.
<b>SOLID</b>	A body, such as a barrel, building, etc.
<b>SQUARE MEASURE</b>	Area calculation requiring only two dimensions, length and width.
<b>CUBIC MEASURE</b>	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 or 36 inches
1 rod	5 1/2 yards or 16 1/2 feet or 25 links
1 furlong	40 rods or 220 yards or 660 feet
1 mile	8 furlongs or 320 rods or 1,760 yards or 5,280 feet

### SURVEYOR'S LINEAR MEASURE

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

**WEIGHTS AND MEASURES****SQUARE MEASURE**

1 square foot	144 square inches
1 square yard	9 square feet or 1,296 square inches
1 square rod	1 pole or perch or 30 1/4 square yards or 272 1/4 square feet
1 rood	40 square rods or 1,210 square yards or 1/4 acre
1 acre	160 square rods or 4,840 square yards or 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 or 7.481 gallons
1 cubic yard	27 cubic feet
1 cord foot	16 cubic feet
1 cord of wood	8 cord feet or 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 or 1 quadrant
1 circumference	360 degrees or 4 quadrants

**BOARD MEASURE**

1 board foot	length in feet times width in feet times thickness in inches
--------------	--

## AREAS

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

<u>REGULAR SHAPED</u>	<u>NUMBER OF SIDES</u>	<u>FACTOR</u>
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
hendecagon	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 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 ( $31 \frac{1}{2}$ ) 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.
- 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	CIRCUMFERENCE	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 times 0.1399 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

### -----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.

2024-2025

PART B

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ALTERNATE COSTS

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PART B

2024-2025 ALTERNATE COSTS

Section 1

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TELECOM/COMMUNICATIONS

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TELECOM / COMMUNICATION EQUIPMENT SHELTERS



LOW QUALITY



AVERAGE QUALITY



GOOD QUALITY

**TELECOM/COMMUNICATIONS**

**PREFABRICATED TELECOM / COMMUNICATION EQUIPMENT SHELTERS**

Costs are for complete installation of small prefabricated modular buildings used for weather- and vandal-resistant equipment storage. Costs include a foundation and all wall, roof, and floor panels. Steel wall vents and entry door, and minimum electrical. Air conditioning and equipment power panel and wiring are not included.

**TELECOM / COMMUNICATION EQUIPMENT SHELTERS  
SQUARE FOOT COSTS**

<b>CLASS</b>	<b>100</b>	<b>150</b>	<b>200</b>	<b>300</b>	<b>500</b>	<b>750</b>
<b>1</b>	\$ 184.10	\$ 157.78	\$ 143.99	\$ 123.93	\$ 103.25	\$ 90.09
<b>2</b>	\$ 224.29	\$ 187.94	\$ 171.64	\$ 146.57	\$ 120.62	\$ 103.08
<b>3</b>	\$ 264.01	\$ 217.63	\$ 198.83	\$ 168.74	\$ 137.40	\$ 115.47

**NOTE:** For very low-quality metal or fiberglass structures, reduce Class 3 costs by 55%.

PART B

2024-2025 ALTERNATE COSTS

Section 2

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FUELING COSTS

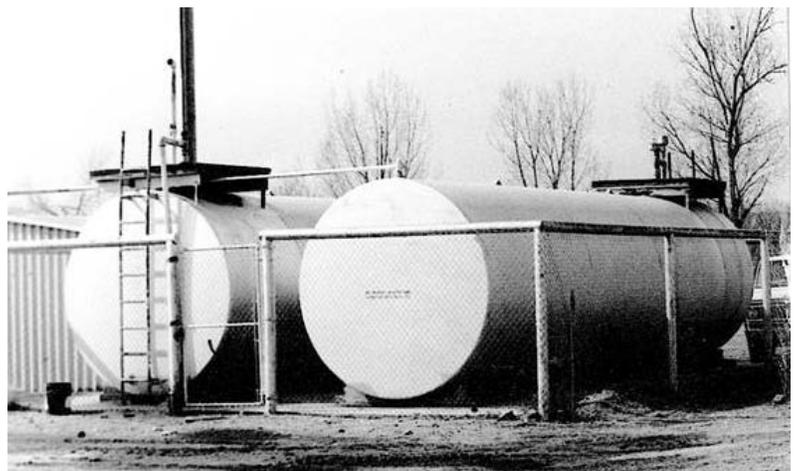
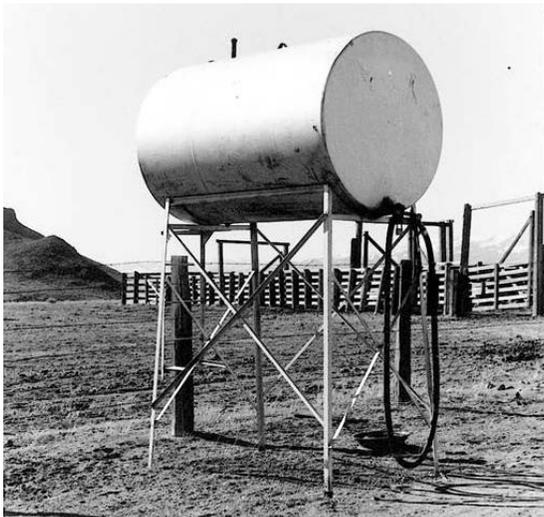
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**BULK FUEL TANKS**

**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 3 in this section for pumps/dispenser costs.

ABOVE GROUND FUEL STORAGE			
GALLONS	COST	GALLONS	COST
200	\$ 5,556	3,000	\$ 11,526
350	5,867	4,000	13,485
550	6,293	5,000	15,675
1,000	7,377	7,500	21,093
2,000	9,336	10,000	26,395



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

$$\text{Volume in gallons} = \text{Pi} \times \text{radius squared} \times \text{length} \times 7.5.$$

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

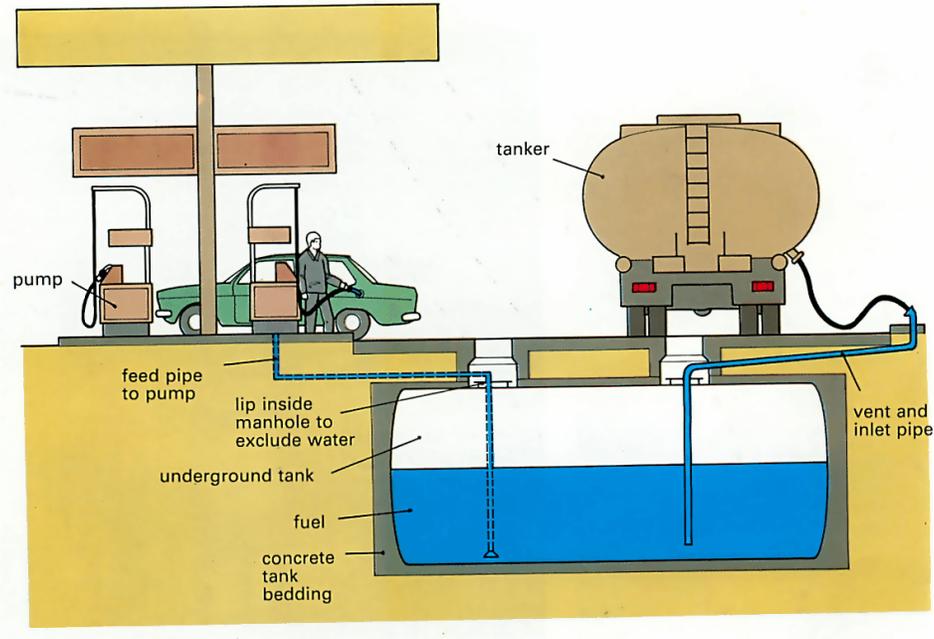
Radius (one-half of diameter) equals 2.5 feet:  $3.1416 \times 2.5 \text{ squared} \times 14 \text{ feet} \times 7.5 = 2,062$  gallons.

**UNDERGROUND FUEL STORAGE**

Costs are for complete installation and 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 25 percent relative to the quality of the finished product. For multiple installation, two or more tanks in one hole, deduct 7 percent for each extra tank, consider the largest tank as the base. Costs do not include electric pumps. See following page 8 in this section for pump costs.

**UNDERGROUND FUEL STORAGE**

GALLONS	COST	GALLONS	COST
300	\$ 10,028	4,000	\$ 25,818
550	11,526	5,000	29,622
1,000	15,099	6,000	34,809
2,000	19,709	8,000	39,304
3,000	22,130	10,000	47,372



PUMPS/DISPENSERS

ELECTRONIC FUEL DISPENSERS

<b>TYPE I</b>				
WITHOUT METER	\$	373	TO	\$ 1,416
WITH METER		618	TO	1,414
<b>TYPE II</b>				
WITHOUT METER	\$	575	TO	\$ 1,154
WITH METER		946	TO	1,520
<b>TYPE III</b>				
	\$	1,304	TO	\$ 1,957
<b>TYPE IV</b>				
	\$	1,907	TO	\$ 3,794
<b>TYPE V</b>				
	\$	4,798	TO	\$ 6,209



TYPE I—NO METER



TYPE I METER



TYPE II—WITH METER



TYPE III



TYPE IV



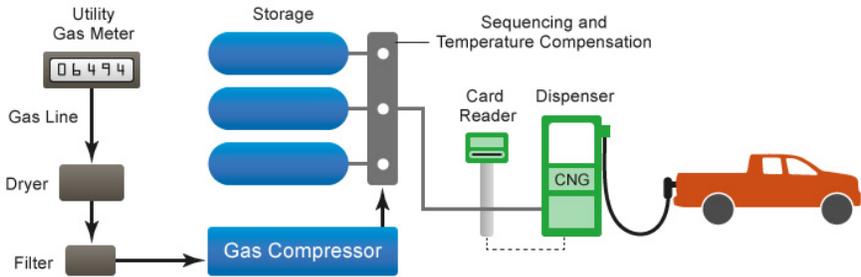
TYPE V

**COMPRESSED NATURAL GAS FILLING STATIONS**

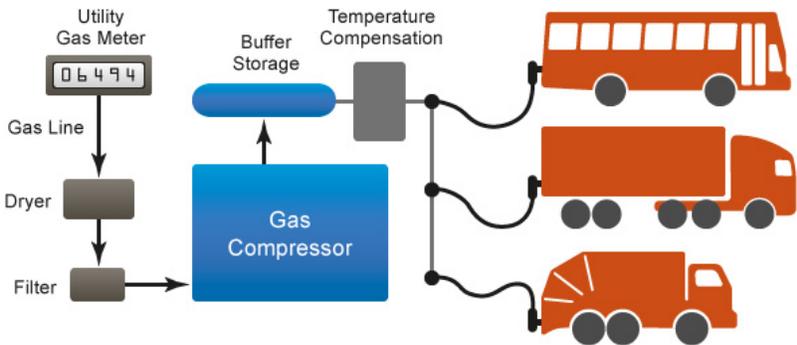
Costs are for complete installation of a compressed natural gas fueling station. Costs include compressor, gas inlet, dispenser, installation and other costs identified below.

<p><b>SMALL FAST-FILL STATION</b>                  1-4 vehicles/day                  fueling cycle: 70% of fuel dispensed 2 hrs                  2 times a day</p>	<p>Includes: 8 scfm compressor, 2-5 psi inlet gas pressure, 3,780 scf storage, 1 single-hose dispenser, installation at 65% of equipment costs, priority panel, credit card reader and gas dryer</p>	<p>\$ 67,800</p>
<p><b>MEDIUM TIME-FILL STATION</b>                  75-80 light/medium-duty vehicles/day                  fueling cycle: 1 time/day for 10 hrs</p>	<p>Includes: 100-175 scfm compressor, 30 psi inlet gas pressure, 10-40 dual-hose posts, 1 time-fill panel; 10hr fueling window, installation at 65% of equipment costs</p>	<p>\$ 791,000</p>

**Fast-Fill Station**



**Time-Fill Station**



**ELECTRIC CAR CHARGERS**

**Residential (Small – 1-2 Kw)** - Costs include car charger, electrical work and installation costs. Level 1 is standard for home charging and consists of a 120V wall plug and charger.

Level 2 chargers supply alternating current (AC) from the electric grid, which has to be converted by the electric car’s battery to direct current (DC) since EV batteries can only accept DC current. This conversion makes Level 2 chargers much slower than DC fast charger.

The costs in this table include a pedestal and electricity to the pedestal.

**ELECTRIC CAR CHARGERS (RESIDENTIAL)**

30-AMP 120v ELECTRIC CAR CHARGER	SINGLE UNIT	\$	5,448
30-AMP 120vELECTRIC CAR CHARGER	DOUBLE UNIT	\$	6,678



**FUELING COSTS**

**Commercial (Large)** – There are two categories of commercial car charging stations:

Level 2 chargers (240 volts – 3-20 kW – 8-10 hrs)

Level 2 chargers supply alternating current (AC) from the electric grid, which has to be converted by the electric car’s battery to direct current (DC) since EV batteries can only accept DC current. This conversion makes Level 2 chargers much slower than DC fast charger.

DC Fast chargers (480+ volts – 25-50Kw – 1 hr)

Costs in this table include car charger, electrical work and installation costs.

LEVEL I, 62.5 Kw, 120-V, SINGLE UNIT	\$ 9,719
LEVEL I, 62.5 Kw, 120-V, DOUBLE UNIT	\$ 13,537
LEVEL II, 240-V, DOUBLE UNIT	\$ 47,835
LEVEL III, 480-V, DC FAST CHARGER UNIT	\$ 349,542



PART B

2024-2025 ALTERNATE COSTS MANUAL

Section 3

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MUNICIPAL UTILITY PLANTS

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**WASTE-WATER TREATMENT PLANTS**

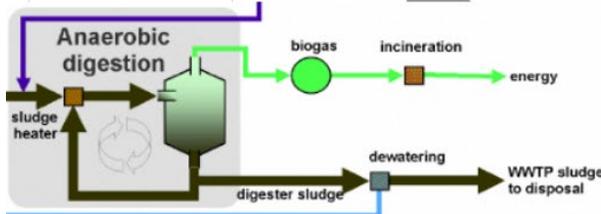
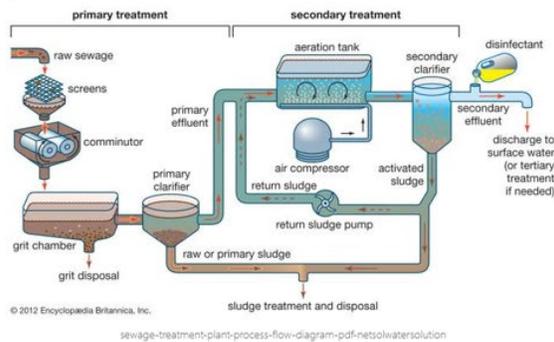
Municipal waste water treatment plants speed up the natural process of water filtration from homes, businesses and industries to produce effluents suitable for discharge into surface waters.

The following sections provide information and each of the process and also offers suggested cost locations in the Marshall & Swift Commercial Costing Manual and the Department's Personal Property Manual for these facilities' real property improvements and/or fixtures and personal property business equipment.

Municipal wastewater treatment plants allow for the collection and treatment of industrial and domestic sewage and wastewater before discharging it into water bodies, onto the land or reusing it.

## Treatment Process

- 1 Pretreatment/Screening  
The raw sewage is passed through screening equipment to remove foreign objects such as plastic, rags, wood fragments, and grease (coarse solids). The coarse solids material is disposed of in a landfill. The screened wastewater is pumped into the activation tank for grit removal.
- 2 Communitor  
The screened wastewater is pumped into the communitor to cut up solids in the raw sewage.
- 3 Grit Removal  
Heavy material such as sand and gravel (grit) is removed from the wastewater. This material is disposed of in a landfill. The wastewater is sent to the primary clarifier.
- 4 Primary Clarifier  
The material that settles at a slower rate than material in grit removal, is taken out using clarifier tanks. The settled material, called primary sludge, is pumped off the bottom and sent to sludge treatment and disposal. The wastewater exits the tank from the top as primary effluent. Floating debris such as grease, is skimmed off the top and sent with the settled material to digesters. Chemicals are also added to remove phosphorus.
- 5 Aeration/Activated Sludge  
The wastewater receives most of its treatment in this stage. Through biological degradation, the pollutants are consumed by microorganisms and transformed into cell tissue, water, and nitrogen. The wastewater is sent to the secondary clarifier.
- 6 Secondary Clarifier  
Secondary clarifiers allow treated wastewater to separate from the biologically treated material in the aeration tanks. This yields secondary effluent. The activated sludge is pumped from the bottom of the clarifier and is returned to the aeration Clarified effluent is filtered. The material captured on the disc filters is backwashed and returned to pretreatment/screening.
- 7 Filtration  
Ultraviolet/chemical disinfection is used after the filtration step to assure the treated wastewater is free of bacteria.
- 8 Disinfection  
The treated water is aerated if necessary to bring the dissolved oxygen levels up and the water is released back into the water supply.
- 9 Oxygen Uptake
- 10 Sludge Treatment/Disposal  
The primary sludge pumped from the primary clarifiers along with the activated sludge must be treated to reduce volume and produce a usable end product (if needed).
- 11 Air Floatation Thickening  
Activated sludge is removed by attaching the biological solids to minute bubbles of air. The floating mass is then removed using surface skimmers. The water that is removed is sent back to screening and pumping for treatment.
- 12 Anaerobic Digestion  
The activated sludge is pumped into the primary digester where it is heated and mixed. Anaerobic bacteria is used for treatment. The pollutants are digested and converted to cell mass, water, methane gas, and carbon dioxide gas.
- 13 Gravity Belt Thickening  
After digestion, sludge is pumped to the gravity belt thickener to be thickened. Polymer is added to the sludge as it is pumped from the digester to allow the water to drain away from the solids. The polymer treated sludge is directed to a porous, traveling belt where the water (filtrate) drains through the belt and into a collection basin. It is very high in ammonia and is pumped to a holding tank where it is metered back to the beginning for further treatment. The thickened sludge is pumped into storage and used later for agricultural.



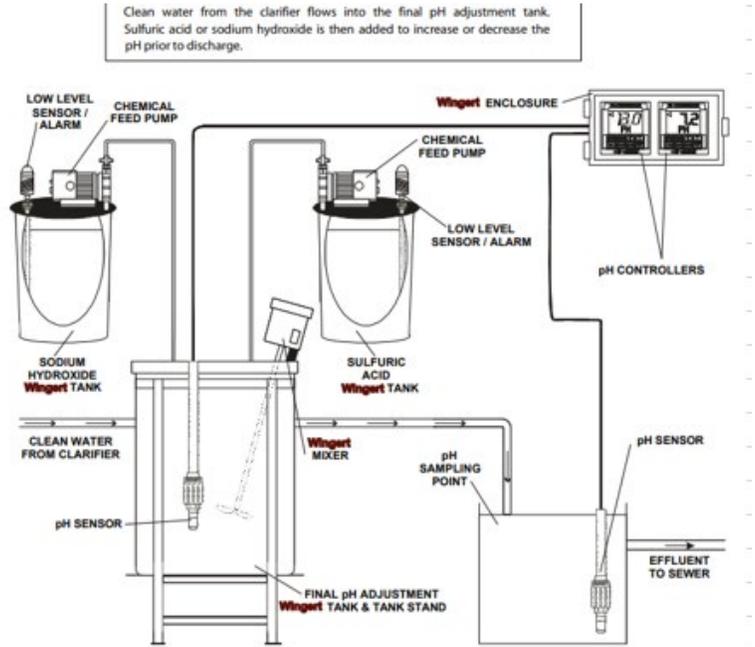
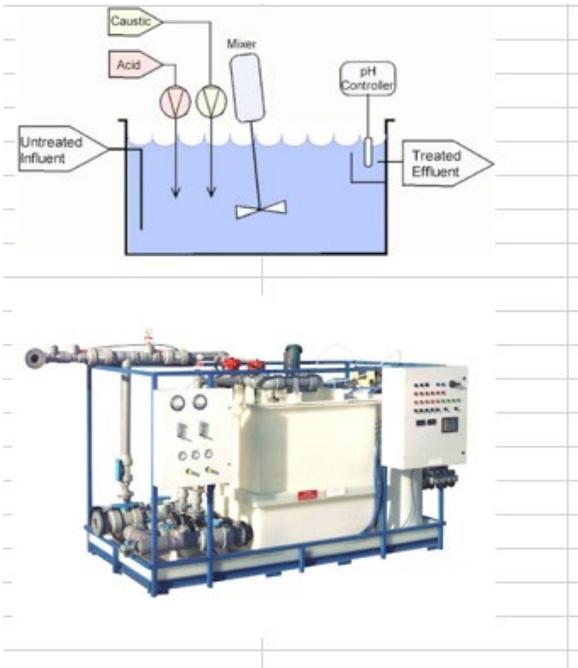
## MUNICIPAL UTILITY PLANTS

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
<b>Real Property Improvements, Fixtures</b>					
<b>Land</b>	Fee simple ownership	The amount of land necessary to support the treatment of water	Market		
<b>Site Preparation, Land Enhancements</b>	Construction Survey				
	Grading			M & S, Sec. 51	Earthwork
	Drainage Features			M&S, Sec. 66, p. 1	Public Utilities
	Erosion Protection features			M&S, Sec. 66, p. 1	Public Utilities
	Diversion Channels			M&S, Sec. 66, p. 1	Public Utilities
	Detention Ponds			M&S, Sec. 66, p. 1	Public Utilities
	Culverts for road crossings			M&S, Sec. 66, p. 1	Public Utilities
	Containment berms/dikes			M&S, Sec. 66, p. 1	Public Utilities
	Firebreak			M&S, Sec. 51	Earthwork
<b>Buildings</b>	Operations and Maintenance Building		RCNLD	M&S, Sec. 14, p.15	Heavy industrial
<b>Access</b>	Facility Access Roads	Paved or gravel surfaced	RCNLD	M&S, Sec. 66, p. 1	Residential street improvements
<b>Concrete Flatwork</b>	Tank foundations/sidewalks		RCNLD	M&S, Sec. 66, p.2	
<b>Ponds</b>	Treatment and holding		RCNLD	M&S, Sec. 66, p. 1	Catch Basins
<b>Outside Area Lighting</b>	Provides operations and maintenance personnel with illumination.		RCNLD	M&S, Sec. 66, P.5; also Sec. 54, P.5	
<b>Fencing/Gates</b>	Chain link fencing	Chainlink metal fabric security fencing, 8 foot tall with one-foot barbed wire or razor wire on top	RCNLD	M&S, Sec. 66, pp. 4-5	
	Controlled access gates		RCNLD	M&S, Sec. 66, pp. 4-5	

# MUNICIPAL UTILITY PLANTS

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
pH Neutralization	Tanks			Acquisition	
	Tank Stands			Acquisition	
	Chemical Feed Pumps			Acquisition	
	Programmable Controllers			Acquisition	
	Controller Enclosures			Acquisition	
	Low Level Sensor/Alarms			Acquisition	
	pH Sensors			Acquisition	
	Mixers			Acquisition	
Piping			Acquisition		

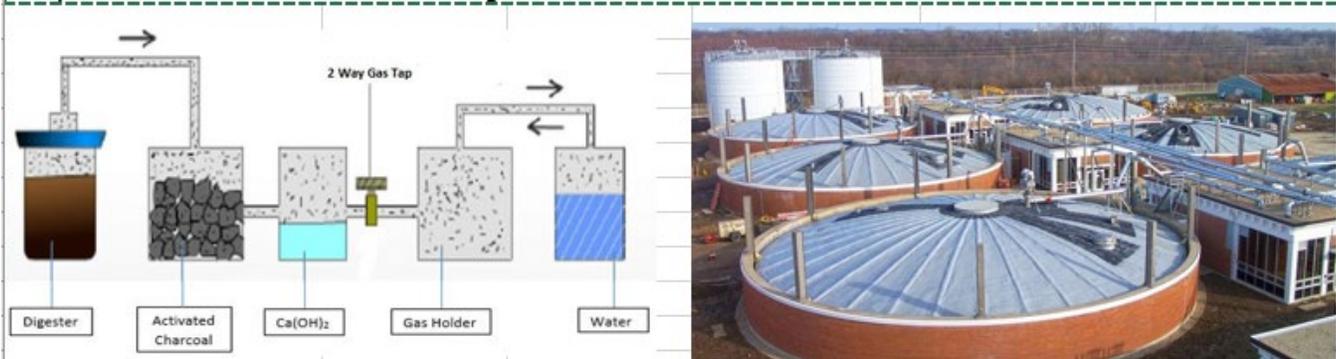
pH neutralization systems are used to neutralize high acidic or high alkaline wastewater.



# MUNICIPAL UTILITY PLANTS

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Anaerobic Digestion System	Pumps		RCNLD	M&S, Sec. 62, p. 1	Industrial Pumps
	Digester		Acquisition		
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	Piping
	Tank		RCNLD	M&S, Sec. 61	
	Tank Cover				Incl. in M/S Tank Cost

Anaerobic digestion is a sequence of processes using microorganisms to break down biodegradable material in the absence of oxygen. This process reduces the emission of landfill gas.



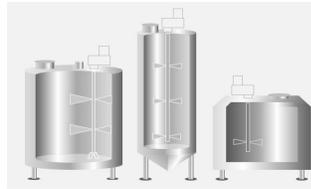
Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Tanks	Double-Wall Tank		RCNLD	M&S, Sec. 61	
	Stainless Steel Tank		RCNLD	M&S, Sec. 61	
	Prestressed Concrete Tank		RCNLD	M&S, Sec. 61	
	Mix Tank		RCNLD	M&S, Sec. 61	
	Storage Tanks		RCNLD	M&S, Sec. 61	
	Rolled, Tapered Panel Bolted Tank		RCNLD	M&S, Sec. 61	
	Folding Frame Tank		Acquisition		
	Portable Storage Tank		Acquisition		



Rolled, Tapered Panel Bolted Tank



Folding Frame Tank



Mix Tanks



Double Wall Tanks

# MUNICIPAL UTILITY PLANTS

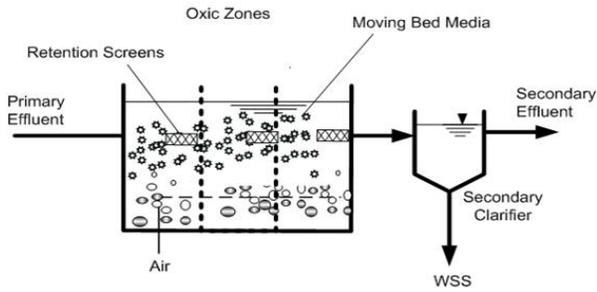
Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Moving Bed Bioreactor	Screens		Acquisition		
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	Piping
	Tanks		RCNLD	M&S, Sec. 61	

The process takes place in an aeration tank where influent enters. The tanks are open at the top, exposing the water to open air for aerobic filtration to take place.

The basin is full of thousands of small plastic chips, called media or carriers. This allows biofilm to grow on them. The carriers mimic the density of water, allowing them to mix throughout the fluid. The biofilm that is created are microroganisms that consume the waste in the water, leaving it cleaner.

An aeration grid is essentially a fan located at the bottom of the aeration tank. It helps keep carriers on the move so they can come into contact with all the waste present and efficiently decompose it. It also introduces more oxygen into the tank.

There is a sieve, or mesh material, which allows water to pass through but keeps the plastic carriers inside the basin allowing the filtered water to move to the next phase in the filtration process.



Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Sump/Sewage Pump	Sump Pump		RCNLD	M&S Sect 53, Pg 9	



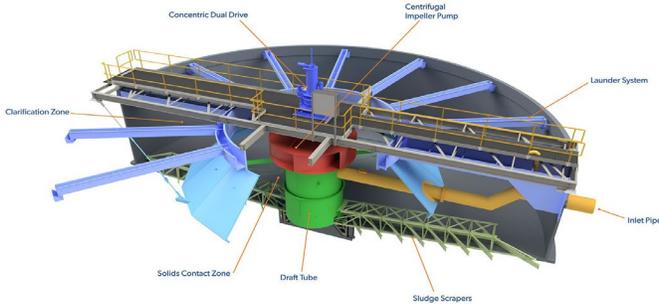
Large sump pumps are used to transfer liquid and solid waste from one place to another.

# MUNICIPAL UTILITY PLANTS

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Clarifiers/Components	Container Filter		Acquisition		
	Microsand Filter		Acquisition		
Solids-Contact Clarifier	Drive Unit		RCNLD	M&S Sect 53, Pg 11	
	Centrifugal Pump		RCNLD	M&S Sect 53, Pg 11	
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	
	Sludge Scrapers		Acquisition		
	Draft Tube		Acquisition		

Clarifiers are settling tanks built with mechanical means for continuous removal of solids being deposited by sedimentation. It is used to remove solid particulates or suspended solids from wastewater for clarification and/or thickening. Solid contaminants (sludge) settle at the bottom of the tank where it is collected by a scraper mechanism.

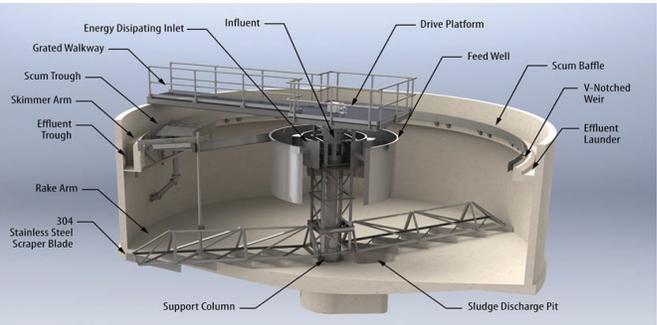
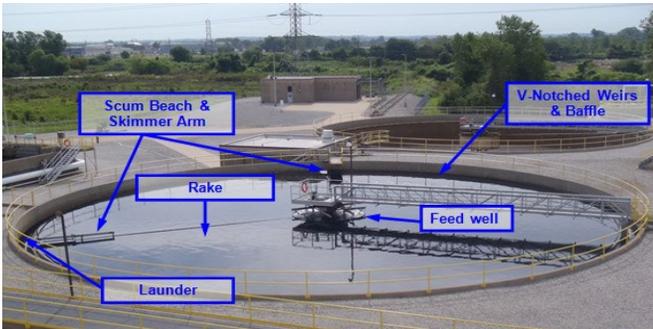
Solids CONTACT CLARIFIER™



Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Skimming Tank	Tank		RCNLD	M&S, Sec. 61	
	Skimmer		Acquisition		
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	

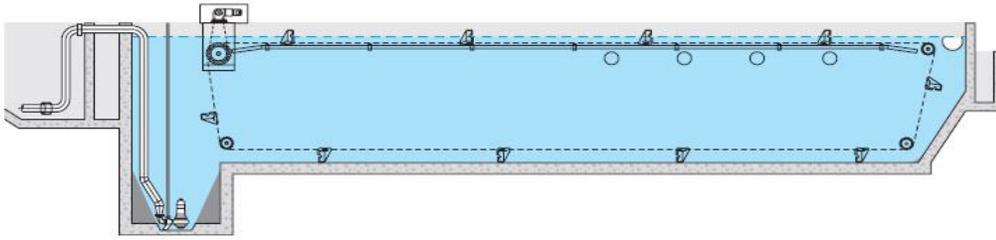
A skimming tank is a chamber that has floating matter like oil, fat, grease, etc. which rises and remains on the surface of the waste water until it is removed. The liquid flow out from partitions in the bottom of the tank.

The floating matter (scum) is removed with skimmer arms which sweep the scum to the scum trough.



# MUNICIPAL UTILITY PLANTS

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Sludge Removal System	Tank		RCNLD	M&S, Sec. 61	
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	
	Scraper System		Acquisition		



## 4-shaft scraper (collecting bottom and floating sludge)

How it works: Chain and flight scrapers convey the bottom sludge into a hopper and the floating sludge into the scum pipe.

Application: e. g. municipal and industrial wastewater treatment plants.

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
Anaerobic Digester	Tank		RCNLD	M&S, Sec. 61	
	Tank Cover			Incl. in M/S Tank Cost	
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	
Aerobic Digester	Tank		RCNLD	M&S, Sec. 61	
	Bioreactor		Acquisition		
	Piping		RCNLD	M&S, Sec. 62, pp. 2-3	
Grit Separator			Acquisition		

**Anaerobic System**

**Aerobic System**

**Grit Separator**

Asset Group	Item	Description	Valuation Method	Cost Source	Comment
	Grating		Acquisition		
	Safety Rails		Acquisition		
	Stairs		Acquisition		
	Ladders		Acquisition		



2024-2025 ALTERNATE COSTS MANUAL

Section 4

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MISCELLANEOUS COSTS

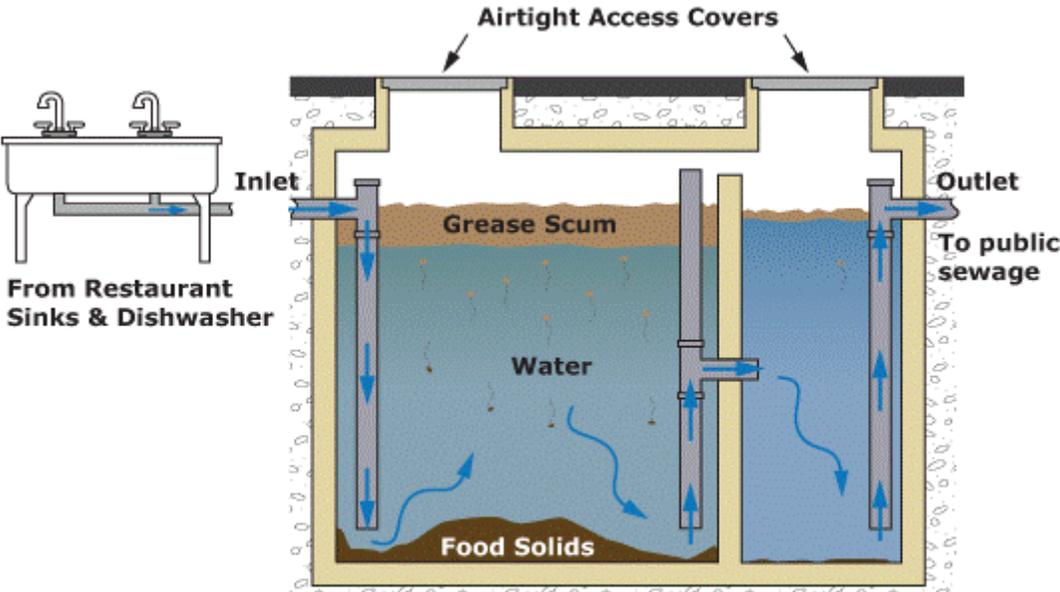
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**GREASE INTERCEPTORS**

Gravity grease interceptors are in-ground tanks designed to reduce the amount of animal and vegetable fats, oils and greases in wastewater from institutional and commercial food handling establishments. This table indicates complete costs for the tank installation.

**PRECAST CONCRETE GREASE INTERCEPTOR**

750 GAL	\$	12,563
1000 GAL	\$	15,053
1500 GAL	\$	17,505
2500 GAL	\$	24,159
3000 GAL	\$	29,532
5000 GAL	\$	42,922



**Typical Underground Grease Interceptor / Grease Trap**

### SAND/OIL INTERCEPTORS

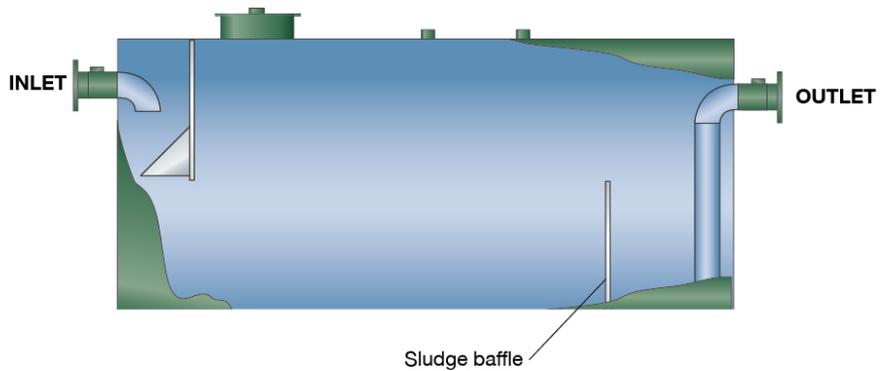
Sand/oil interceptors are in-ground tanks designed to capture dirt, sand, sweepings, minor petroleum spills, etc. from car washes and vehicle maintenance facilities to keep these substances out of our wastewater system.

#### PRECAST CONCRETE OIL & SAND INTERCEPTOR

750 GAL	\$	10,509
1000 GAL	\$	12,630
1200 GAL	\$	13,782
1500 GAL	\$	14,707

### Single-Basin Oil/Sand Interceptor

Simple oil/sand "knock-out" design.



Single Basin Interceptors have a single collection chamber and sludge baffle to remove sand, grit, grease and free oil.

2024-2025

PART C

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RESERVED FOR FUTURE  
INFORMATION

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2024-2025

PART D

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ASSESSORS' ALTERNATE COST  
APPROVALS

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# TABLE OF CONTENTS

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## 2024-2025 – PART D ASSESSORS’ ALTERNATE COST APPROVALS

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**INTRODUCTION**

Per NAC 361.128(4), county assessors may apply to the Executive Director for permission to use alternative recognized costs manuals, cost determinations or subscription services when no publication or manual provided for their use applies to improvements of a particular occupancy or construction type.

The Department must respond within 30 days after receiving such an application and notify each county assessor of that approval.

The Executive Director shall submit to the Commission annually a list of the alternative recognized cost manuals, cost determinations and subscription services that he/she has approved for use.

The following pages are the requests and approvals for the 2024-2025 cost year.

**OFFICE OF THE CHURCHILL COUNTY ASSESSOR**  
DENISE L. MONDHINK-FELTON, ASSESSOR  
155 N. Taylor St., Suite 200  
Fallon, NV 89406-2783  
Phone: 775-423-6584 Fax: 775-423-2429  
[www.churchillcounty.org](http://www.churchillcounty.org)



January 4, 2023

Jeffrey Mitchell  
Deputy Director  
Department of Taxation  
1550 E. College Parkway Ste 115  
Carson City, NV 89706-7937

**RE: Alternative Rural Cost**

Dear Mr. Mitchell:

The Churchill County Assessor's Office uses Marshall & Swift for most of our costing, but we respectfully request approval to use some of the rural costs within the California Assessor's Handbook Sections 531 Residential Building Costs and 534 Rural Building Costs. We feel that the costs in the listed sections of this manual, when adjusted with Nevada local multipliers, work well for our local applications. The entire manual can be found online at <http://www.boe.ca.gov/proptaxes/ahcont.htm>.

Solar Heating & Cooling	AH 531.40	Pages 10-11
Vineyard Stakes & Trellises	AH 534.77	Pages 1-29
Wine Tanks – Redwood, Stainless Steel & Oak	AH 534.79	Pages 7 & 8

Respectfully submitted,

Denise L. Mondhink-Felton  
Churchill County Assessor

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 Governor  
 TONY WREN  
 Chair, Nevada Tax Commission  
 SHELLIE HUGHES  
 Executive Director

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 1550 College Parkway, Suite 115  
 Carson City, Nevada 89706-7937  
 Phone: (775) 684-2000  
 Fax: (775) 684-2020

RENO OFFICE  
 4600 Kietzke Lane, Suite L235  
 Reno, NV 89502  
 Phone: (775) 687-9999  
 Fax: (775) 688-1303

February 6, 2023

Denise L. Mondhink-Felton  
 Churchill County Assessor  
 155 N. Taylor St., #200  
 Fallon, NV 89406-2783

Subject: Alternate Costs – FY 2023-24

Dear Denise:

The Department has received your request dated January 4, 2023 to use the California Assessors' Handbook, Sections 531 and 534, for certain costs of rural buildings and/or improvements not otherwise found in the Rural Building Manual adopted by the Nevada Tax Commission. Pursuant to NAC 361.128(4), county assessors are required to use costs in the Rural Building Manual but may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services.

You have specifically requested to use the following costs from the California Assessors' Handbook, Sections 531 and 534:

Solar Heating & Cooling	AH 531.40	Pages 10-11
Vineyard Stakes & Trellises	AH 534.77	Pages 1-29
Wine Tanks – Redwood, Stainless Steel & Oak	AH 534.79	Pages 7 & 8

The Department finds the sections noted above provide suitable costs for improvements not otherwise available in the Nevada Rural Building Manual or the Marshall and Swift Cost Manuals. However, the costs contained in the California Assessors' Handbook must be adjusted for the Nevada Local Multiplier, as follows:

**CAL AG MANUAL AH 534 NEVADA LOCAL MULTIPLIER 2022-23**

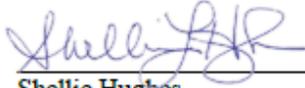
	A	B	C	D	S
CALIFORNIA	1.23	1.23	1.23	1.23	1.23
NEVADA	1.09	1.10	1.10	1.09	1.13
MULTIPLIER	0.8862	0.8943	0.8943	.8862	.9187

\*Calculated by dividing Nevada multiplier by California multiplier to account for the percentage of the California multiplier that the Nevada multiplier represents. Source: Jan 2023 M&S Costing Service, Sec. 99

Page 2

The limited use of the California Assessors' Handbook, Sections 531 & 534 as identified above, with the adjustments in the local multiplier, is hereby approved for use.

A copy of this approval is being sent to all county assessors.



---

Shellie Hughes  
Executive Director, Department of Taxation

# Humboldt County Assessor's Office

Andy Heiser ♦ Assessor ♦ Andy.Heiser@humboldtcountynv.gov  
Office: (775) 623-6316 Fax: (775) 623-6311

---

November 9, 2022

Shellie Hughes, Executive Director  
Nevada Department of Taxation  
1550 College Pkwy STE 115  
Carson City, NV 89706

\*\*\*SENT VIA EMAIL\*\*\*

RE: Battle Mountain Solar Project

Dear Ms. Hughes,

The Battle Mountain Solar Project is a 101 MW photovoltaic power plant with battery storage located in Humboldt County just west of Battle Mountain. Because the power generation equipment and transmission line connecting to the NV Energy grid are located entirely within Humboldt County, this facility is defined as "Locally Assessed" pursuant to NRS 361.320(7).

In developing an improvement value, the assessor is required to develop a replacement cost new using the Marshall Valuation Service as stated in NAC 361.128 (1)(b)(1). We have again reviewed the Marshall Valuation Service commercial manual and found no replacement costs for utility-scale power plants of any type.

NAC 361.128(4) states:

"If no publication or manual required to be used pursuant to the provisions of this section applies to improvements of a particular occupancy or construction type, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services...."

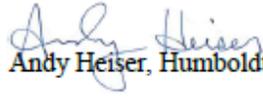
NAC 361.310 and 361.421 allow for the use of historic cost and gross book cost, the latter being typically based on historic cost, to develop assessments of intercounty utilities. These assessments would include other power generating facilities in the State of Nevada.

Lacking no other credible methodology to develop a replacement cost, the Humboldt County Assessor's Office hereby requests that the Trended Historic Cost, or if not available, the Trended Gross Book Cost be approved for use in the appraisal of the Battle Mountain Solar Project. Your office has previously approved this methodology for our office and this project. This request is made for the 2023-24 tax year.

---

50 W 5<sup>th</sup> Street Winnemucca, NV 89445 ♦ Phone: (775) 623-6310 Fax: (775) 623-6311

Respectfully Submitted,



Andy Heiser, Humboldt County Assessor

CC: Jeffery Mitchell, Deputy Director, Nevada State Department of Taxation;  
Shannon Silva, Supervisor of Locally Assessed Properties, Nevada State Department of Taxation



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TONY WREN  
*Chair, Nevada Tax Commission*  
SHELLIE HUGHES  
*Executive Director*

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Carson City, Nevada 89706-7937  
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Fax: (775) 684-2020

RENO OFFICE  
4600 Kietzke Lane, Suite L235  
Reno, NV 89502  
Phone: (775) 687-9999  
Fax: (775) 688-1303

November 14, 2022

Andy Heiser, Assessor  
Humboldt County Assessor  
50 W. Fifth Street  
Winnemucca, NV 89445

Dear Sir:

Pursuant to NAC 361.128(4), county assessors may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services when no publication or manual applies to improvements of a particular occupancy or construction type. The Department has received your request dated November 9, 2022, to use alternative costs for a 101-MW alternating current photovoltaic solar facility and ancillary facilities, including solar arrays and battery storage for FY 2023-2024.

The Department finds the use of the Trended Historic Cost or Trended Gross Book Cost is applicable in this case. This cost, as described above, is hereby approved for use for the 2023-2024 fiscal year. This needs to be applied for and analyzed annually to see if more applicable costs are available.

Please contact Cheryl Erskine at 775-684-2038, if you have any questions. A copy of this approval is being sent to all county assessors.

Sincerely,



Shellie Hughes  
Executive Director, Department of Taxation



*Kevin Chisum*  
Mineral County Assessor

*Mineral County is an Equal Opportunity Provider & Employer*



November 15, 2021

Shellie Hughes, Executive Director  
Nevada Department of Taxation  
1550 College Pkwy STE 115  
Carson City, NV 89706

\*\*\*SENT VIA EMAIL\*\*\*

RE: Luning Solar

Dear Ms. Hughes,

Luning Solar is a 50 MW photovoltaic power plant located in Mineral County just outside of the town of Luning. Because the power generation equipment and transmission line connecting to the NV Energy grid are located entirely within Mineral County, this facility is defined as "Locally Assessed" pursuant to NRS 361.320(7).

Luning Solar is located on 584 acres of land leased from the Bureau of Land Management (BLM). Because this is a Possessory Interest Property, it is Real Property assessed on the Unsecured Tax Roll pursuant to NRS 361.157(3). We are currently working towards finalizing the 2022-23 valuation for this property.

In developing an improvement value, the assessor is required to develop a replacement cost new using the Marshall Valuation Service as stated in NAC 361.128 (1)(b)(1). We have again reviewed the Marshall Valuation Service commercial manual and found no replacement costs for utility-scale power plants of any type.

NAC 361.128(4) states:

"If no publication or manual required to be used pursuant to the provisions of this section applies to improvements of a particular occupancy or construction type, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services...."

NAC 361.310 and 361.421 allow for the use of historic cost and gross book cost, the latter being typically based on historic cost, to develop assessments of intercounty utilities. These assessments would of course include other power generating facilities in the State of Nevada.

PO Box 400  
Office: 775-945-3684

105 South "A" Street, Suite 3  
[kchisum@mineralcountynv.org](mailto:kchisum@mineralcountynv.org)

Hawthorne, NV 89415  
Fax: 775-945-0717



*Kevin Chisum*  
Mineral County Assessor

*Mineral County is an Equal Opportunity Provider & Employer*



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Lacking no other credible methodology to develop a replacement cost, the Mineral County Assessor's Office hereby requests that the Trended Historic Cost, or if not available, the Trended Gross Book Cost be approved for use in the appraisal of the Luning Solar Power Plant. Your office has previously approved this methodology for this property. As stated above, this request applies to the 2022-23 tax year.

Respectfully Submitted,

Kevin Chisum, Mineral County Assessor

CC: Jeffery Mitchell, Deputy Director, Nevada State Department of Taxation;  
Cheryl Erskine, Coordinator of Assessment Standards, Nevada State Department of Taxation



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Fax: (775) 688-1303

November 16, 2022

Kevin Chisum  
Mineral County Assessor  
PO Box 400  
Hawthorne, NV 89415

Dear Sir:

Pursuant to NAC 361.128(4), county assessors may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services when no publication or manual applies to improvements of a particular occupancy or construction type. The Department has received your request dated November 15, 2022 to use alternative costs for a 50-MW photovoltaic solar facility for FY 2023-2024.

The Department finds the use of the Trended Historic Cost or Trended Gross Book Cost is applicable in this case. This cost, as described above, is hereby approved for use for the 2023-2024 fiscal year. This needs to be applied for and analyzed annually to see if more applicable costs are available.

Please contact Cheryl Erskine at (775)684-2038, if you have any questions. A copy of this approval is being sent to all county assessors.

Sincerely,

\_\_\_\_\_  
Shellie Hughes  
Executive Director  
Nevada Department of Taxation

PAHRUMP OFFICE  
775.751.7060  
160 N Floyd Dr  
Pahrump, Nevada 89060

**SHEREE STRINGER**  
**NYE COUNTY ASSESSOR**



TONOPAH OFFICE  
775.482.8174  
P O Box 271 - 101 Radar Rd.  
Tonopah, Nevada 89049

November 21, 2022

Shellie Hughes, Executive Director  
Nevada Department of Taxation  
1550 College Pkwy STE 115  
Carson City, NV 89706

RE: Crescent Dunes Solar Energy Plant

Dear Ms. Hughes,

The Crescent Dunes project is a 110-megawatt concentrated solar energy power plant. It is the first utility-scale concentrated solar power plant in the United States to be fully integrated with energy storage technology. The plant is located in northern Nye County NW of Tonopah. Because the power generation equipment and transmission line connecting to the NV Energy grid are located entirely within Nye County, this facility is defined as "Locally Assessed" pursuant to NRS 361.320(7).

In developing an improvement value, the assessor is required to develop a replacement cost new using the Marshall Valuation Service as stated in NAC 361.128 (1)(b)(1). We have again reviewed the Marshall Valuation Service commercial manual and found no replacement costs for utility-scale power plants of any type. NAC 361.128(4) states:

"If no publication or manual required to be used pursuant to the provisions of this section applies to improvements of a particular occupancy or construction type, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services...."

NAC 361.310 and 361.421 allow for the use of historic cost and gross book cost, the latter being typically based on historic cost, to develop assessments of intercounty utilities. These assessments would include other power generating facilities in the State of Nevada.

Lacking other credible methodology to develop a replacement cost, the Nye County Assessor's Office hereby requests that the Trended Historic Cost, or if not available, the Trended Gross Book Cost be approved for use in the appraisal of the Crescent Dunes Solar Energy Plant. This request is made for the 2023-24 tax year.

Sincerely,

A handwritten signature in blue ink, appearing to read "Sheree Stringer".

Sheree Stringer  
Nye County Assessor



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SHELLIE HUGHES  
*Executive Director*

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RENO OFFICE  
4600 Kietzke Lane, Suite L235  
Reno, NV 89502  
Phone: (775) 687-9999  
Fax: (775) 688-1303

November 29, 2022

Sheree Stringer  
Nye County Assessor  
160 N. Floyd Dr.  
Pahrump NV 89060

Dear Ms. Stringer:

Pursuant to NAC 361.128(4), county assessors may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services when no publication or manual applies to improvements of a particular occupancy or construction type. The Department has received your request dated November 21, 2022 to use alternative costs for the 110-MW concentrated solar energy project known as the Crescent Dunes Facility for FY 2023-2024.

The Department finds the use of the Trended Historic Cost or Trended Gross Book Cost is applicable in this case. This cost, as described above, is hereby approved for use for the 2023-2024 fiscal year. This needs to be applied for and analyzed annually to see if more applicable costs are available.

Please contact Cheryl Erskine at (775)684-2038, if you have any questions. A copy of this approval is being sent to all county assessors.

Sincerely,

\_\_\_\_\_  
Shellie Hughes  
Executive Director, Department of Taxation



Pershing County

NEVADA

Assessor's Office

PO Box 89  
Lovelock, NV 89419



November 10, 2022

Shellie Hughes, Executive Director  
Nevada Department of Taxation  
1550 College Pkwy STE 115  
Carson City, NV 89706

\*\*\*SENT VIA USPS & EMAIL\*\*\*

RE: Star Peak Geothermal

Dear Ms. Hughes,

The Star Peak Geothermal Project is a utility-scale, geothermal power plant located along Interstate 80 in eastern Pershing County. The project was formally known as the Rye Patch Geothermal Plant previously rated at a 12.5 MW output. After significant deconstruction, the property has been redeveloped by Open Mountain Energy. To our knowledge, the project is not yet connected to the NV Energy grid for the distribution of power. In this assumed state, it is not property of an interstate or intercounty nature. Therefore, it is locally-assessed pursuant to NRS 361.320(7).

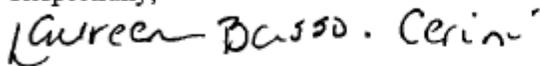
In developing an improvement value, the assessor is required to calculate a replacement cost new using the Marshall Valuation Service as stated in NAC 361.128 (1)(b)(1). We can find no replacement costs for utility-scale power plants of any type in the Marshall Valuation Service commercial manual. It is my understanding that other assessors in our state appraising renewable energy projects have had to overcome this same situation.

NAC 361.128(4) states:

"If no publication or manual required to be used pursuant to the provisions of this section applies to improvements of a particular occupancy or construction type, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services...."

NAC 361.310 and 361.421 allow for the use of historic cost and gross book cost, the latter being typically based on historic cost, to develop assessments of intercounty utilities. These assessments would of course include other power generating facilities in the State of Nevada. Lacking no other credible methodology to develop a replacement cost, the Pershing County Assessor's Office hereby requests that the Trended Historic Cost, or if not available, the Trended Gross Book Cost be approved for use in the appraisal of the Luning Solar Power Plant. This request is made for the 2023-24 fiscal year.

Respectfully,



Laureen E. Basso-Cerini, Pershing County Assessor

CC: Jeffery Mitchell, Deputy Director, Nevada State Department of Taxation;  
Shannon Silva, Supervisor of Locally Assessed Properties, Nevada State Department of Taxation



STATE OF NEVADA  
DEPARTMENT OF TAXATION  
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700 E. Warm Springs Rd. Suite 200  
Las Vegas, Nevada 89119  
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STEVE SISOLAK  
*Governor*  
TONY WREN  
*Chair, Nevada Tax Commission*  
SHELLIE HUGHES  
*Executive Director*

CARSON CITY OFFICE  
1550 College Parkway, Suite 115  
Carson City, Nevada 89706-7937  
Phone: (775) 684-2000  
Fax: (775) 684-2020

RENO OFFICE  
4600 Kietzke Lane, Suite 1.235  
Reno, NV 89502  
Phone (775) 687-9999  
Fax: (775) 688-1303

November 14, 2022

Lauren Basso-Cerini, Assessor  
Pershing County Assessor  
PO Box 89  
Lovelock, NV 89419

Dear Ms. Basso-Cerini:

Pursuant to NAC 361.128(4), county assessors may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services when no publication or manual applies to improvements of a particular occupancy or construction type. The Department has received your request dated November 10, 2022, to use alternative costs for the Star Peak Geothermal Plant which is currently not in operation and not qualified for appraisal by the LGS Centrally Assessed Section for FY 2023-2024.

The Department finds the use of the Trended Historic Cost or Trended Gross Book Cost is applicable in this case. This cost, as described above, is hereby approved for use for the 2023-2024 fiscal year. This needs to be applied for and analyzed annually to see if more applicable costs are available.

Please contact Cheryl Erskine at 775-684-2038, if you have any questions. A copy of this approval is being sent to all county assessors.

Sincerely,

  
\_\_\_\_\_  
Shellie Hughes  
Executive Director, Department of Taxation



**WASHOE COUNTY ASSESSOR**

Michael E. Clark

Rigo Lopez  
Chief Deputy Assessor

Lora Zimmer  
Assessment Services Coordinator

November 22, 2022

Shellie Hughes, Executive Director  
Nevada Department of Taxation  
1550 College Pkwy STE 115  
Carson City, NV 89706

\*\*\*SENT VIA USPS & EMAIL\*\*\*

Washoe County Solar Projects

Dear Ms. Hughes,

Washoe County has three individual solar projects: The Fish Springs Solar Project, The Dodge Flat Solar Project, and the Turquoise Solar Project.

The Fish Springs Solar project is a 230 MW photovoltaic power plant with battery storage located in Washoe County just west of Pyramid Lake. The power generation equipment and transmission line are connected to the NV Energy grid entirely within Washoe County and therefore, this facility is defined as "Locally Assessed" pursuant to NRS 361.320(7).

The Dodge Flat Solar project is a 270 MW photovoltaic power plant with battery storage located in Washoe County just west of Wadsworth. The power generation equipment and transmission line are connected to the NV Energy grid entirely within Washoe County and therefore, this facility is defined as "Locally Assessed" pursuant to NRS 361.320(7).

The Turquoise Solar project is a 60 MW photovoltaic power plant with battery storage located in Washoe County, East of Reno off I-80 E. The power generation equipment and transmission line are connected to the NV Energy grid entirely within Washoe County and therefore, this facility is defined as "Locally Assessed" pursuant to NRS 361.320(7).

In developing an improvement value, the assessor's office is required to develop a replacement cost new by utilizing the Marshall Valuation Service as stated in NAC 361.128 (1)(b)(1). After review of the Marshall valuation Service commercial manual, it was determined that there were not any replacement costs found for solar power plants or utility-scale power plants of any type.

NAC 361.128(4) states:

“If no publication or manual required to be used pursuant to the provisions of this section applies to improvements of a particular occupancy or construction type, the county assessor may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services...”

NAC 361.310 and 361.421 allow for the use of historic cost and gross book cost, the latter being typically based on historic cost, in order to develop assessments of intercounty utilities. These assessments would include other power generating facilities in Nevada.

Absent of any other credible methodology to develop a replacement cost for utility-scale power plants, the Washoe County Assessor's Office hereby requests the trended historic cost, or the trended gross book cost be approved for use in the appraisal of the Fish Springs Solar Project, The Dodge Flat Solar Project and the Turquoise Solar Project for the 2023/2024 tax year.

Respectfully Submitted,



Sean Moses  
Appraiser III | Washoe County Assessor  
[SMoses@washoecounty.us](mailto:SMoses@washoecounty.us) | Office: 775-328-2250  
1001 East Ninth Street, Reno, NV 89520  
<http://www.washoecountv.us/assessor>



CC: Jeffery Mitchell, Deputy Director, Nevada State Department of Taxation;  
Cheryl Erskine, Coordinator of Assessment Standards, Nevada State Department of Taxation



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Chair, Nevada Tax Commission  
SHELLIE HUGHES  
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Fax: (775) 684-2020

RENO OFFICE  
4600 Kietzke Lane, Suite L235  
Reno, NV 89502  
Phone: (775) 687-9999  
Fax: (775) 688-1303

November 29, 2022

Michael E. Clark  
Washoe County Assessor  
1001 E. Ninth St Bldg D-100  
Reno, NV 89512

Dear Mr. Clark:

Pursuant to NAC 361.128(4), county assessors may apply to the Executive Director for permission to use alternative recognized cost manuals, cost determinations or subscription services when no publication or manual applies to improvements of a particular occupancy or construction type. The Department has received your request dated November 22, 2022 to use alternative costs for FY 2023-24 for:

- the Fish Springs Solar Project, a 230 MW Photovoltaic power plant with battery storage;
- the Dodge Flat Solar Project, a 270 MW photovoltaic power plant with battery storage; and
- the Turquoise Solar Project, a 60 MW photovoltaic power plant with battery storage.

The Department finds the use of the Trended Historic Cost or Trended Gross Book Cost is applicable in these cases. The costs, as described above, are hereby approved for use for the 2023-2024 fiscal year. This needs to be applied for and analyzed annually to see if more applicable costs are available.

Please contact Cheryl Erskine at 775-684-2038, if you have any questions. A copy of this approval is being sent to all county assessors.

Sincerely,

Shellie Hughes  
Executive Director, Department of Taxation