

## PACKING AND COLD STORAGE BUILDINGS



**CLASS S FRUIT PACKING BARN**



**AVERAGE CLASS C COLD STORAGE**

**OCCUPANCY DESCRIPTION:** Seed processing storage buildings are designed for bulk storage, cleaning and bagging of various grass seeds and for temporary bag storage and distribution. Costs include a heavy concrete floor and storage bins.

Fruit packing barns are for the packing and short-term storage of fresh produce.

Cold-storage buildings are designed to keep stored horticultural crops at various temperature levels. Some partitions and office areas are included in the better qualities.

**INCLUDED IN COSTS:** Built-in refrigerator rooms.

**NOT INCLUDED IN COSTS:** Heat, refrigeration or special fixtures or packing equipment.

### SEED PROCESSING STORAGE

CLASS	TYPE	COST/ SQ. FT.	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING & PLUMBING
<b>D</b>	Average	\$22.10	Heavy wood frame, studs and roof, wood siding, sliding	Heavy bins and concrete slab, cleaning area, warehouse	Rigid conduit, dustproof fixtures, water service
<b>DPOLE</b>	Average	19.45	Metal siding on pole frame, stud infill sheathing, sliding doors	Heavy bins and concrete slab, cleaning area, warehouse	Rigid conduit, dustproof fixtures, water service
<b>S</b>	Average	20.25	Steel frame and siding, some sheathing, sliding doors	Heavy bins and concrete slab, cleaning area, warehouse	Rigid conduit, dustproof fixtures, water service
<b>DS</b>	Mezzanine	7.35	Not included	Loft floor, adequate support, heavy plywood or plank flooring	Not included

### FRUIT PACKING BARNES

<b>C</b>	Average	\$23.10	Block or tilt-up, light truss, metal or built-up roof	Produce cooler, concrete slab, small finished office	Good lighting, water service
<b>D</b>	Average	20.80	Plywood on studs or box frame, metal or composition roof	Fruit cooler, concrete slab, small finished office	Good lighting, water service
<b>DPOLE</b>	Average	19.20	Metal siding on poles, no wainscot	Fruit cooler, concrete slab, small finished office	Good lighting, water service
<b>S</b>	Average	20.25	Steel siding and frame	Fruit cooler, concrete slab, small finished office	Good lighting, water service

### FARM COLD STORAGE BUILDINGS

<b>C</b>	Good	\$34.05	Steel or wood frame or bearing walls, block or tilt-up, insulated	Cooler and chilled rooms, some distribution office and finish	Adequate lighting and plumbing
	Average	24.10	Block, tilt-up, light construction, exposed ceiling insulation	Cooler storage, unfinished, few partitions, small office	Minimum lighting and plumbing
	Low cost	17.10	Block, tilt-up, very plain, light construction, exposed ceiling insulation	Cooler storage, unfinished, concrete slab	Minimum lighting and water service
<b>D</b>	Good	31.35	Good wood frame with stucco or siding, fully insulated	Cooler and chilled rooms, some distribution office and finish	Adequate lighting and plumbing
	Average	21.75	Stucco or siding on wood, exposed ceiling insulation	Cooler storage, unfinished, few partitions, small office	Minimum lighting and plumbing
	Low cost	15.10	Stucco or siding on studs or box frame, exposed insulation	Cooler storage, unfinished, concrete slab	Minimum lighting and water service
<b>DPOLE</b>	Average	20.15	Pole frame, metal siding, lined, exposed ceiling insulation	Cooler storage, unfinished, few partitions, small office	Minimum lighting and plumbing
	Low cost	14.20	Pole frame, metal siding, exposed insulation	Cooler storage, unfinished, concrete slab	Minimum lighting and water service
<b>S</b>	Good	30.00	Rigid steel frame, insulated siding or low-cost sandwich panels	Cooler and chilled rooms, some distribution office and finish	Adequate lighting and plumbing
	Average	21.05	Pre-engineered frame, metal siding, lined, exposed ceiling insulation	Cooler storage, unfinished, few partitions, small office	Minimum lighting and plumbing
	Low cost	14.80	Light frame, metal siding, exposed insulation	Cooler storage, unfinished, concrete slab	Minimum lighting and water service

# PACKING AND COLD STORAGE BUILDINGS

**REFINEMENTS:** On this page are the means of making major adjustments to the base costs on the previous page. Follow Steps 1 through 5 to attain final costs, adjusted for lump sums, heating and cooling, story height, floor area/perimeter ratio and locality.

## 1

<b>ADJUSTMENTS</b>	
Cold storage refrigeration	
freezer/sharp freezer .....	\$12.75
chiller/freezer .....	10.80
cooler/chilled air .....	9.25
cooled air only .....	7.95
Controlled atmosphere	
nonenvironmental buildings	
conditioned/ventilated air .....	3.05
cooled air .....	7.70
For dock-height floors, add the cost per square foot to the base cost of the first floor.	
Elevated on compacted fill: \$2.45 – \$4.85 per square foot. For cut and balance, use proportional cost.	
Elevated on posts and piers with cross bracing, beams and skirting: \$6.70 – \$9.10 per square foot	

## 2

<b>HEATING AND COOLING</b>	
These costs are averages of total installed cost of the entire heating or cooling installation including its prorated share of contractors' overhead and profit and architects' fees.	
Electric cable or baseboard .....	\$2.90
Electric wall heaters (inc. FWA) .....	1.25
Forced air, ducted .....	3.20
heaters or furnace, vented .....	.95
Hot water, baseboard/convactor .....	5.85
radiant floor or ceiling .....	6.05
Space heaters, with fan .....	1.60
radiant .....	1.80
Steam .....	5.05
Wall or floor furnace .....	1.45
Package heating and cooling .....	6.30
Ventilation, blower and ducts .....	.95
fans only .....	.40

## 3

<b>HEIGHT REFINEMENTS</b>	
<b>STORY HEIGHT MULTIPLIERS</b>	
Multiply base cost by following multiplier for any variation in average story height.	
Average Wall Height	Square Foot Multiplier
8	.963
9	.981
10	1.000
11	1.019
12	1.038
13	1.058
14	1.077
16	1.115
18	1.154
20	1.192
22	1.231
24	1.269
28	1.346
32	1.423
36	1.500

## 4

Average Floor Area, Sq. Ft./Story	AVERAGE PERIMETER														Average Floor Area, Sq. Ft./Story
	125	200	250	300	350	400	450	500	550	600	700	800	900	1000	
<b>1,000</b>	1.10	1.29	1.42	1.54	----	----	----	----	----	----	----	----	----	----	<b>1,000</b>
<b>2,000</b>	1.05	1.04	1.10	1.17	1.23	1.29	1.35	----	----	----	----	----	----	----	<b>2,000</b>
<b>3,000</b>	----	.96	1.00	1.04	1.08	1.12	1.17	1.21	1.25	1.29	----	----	----	----	<b>3,000</b>
<b>4,000</b>	----	----	.95	.98	1.01	1.04	1.07	1.10	1.13	1.17	1.23	1.29	----	----	<b>4,000</b>
<b>5,000</b>	----	----	.92	.94	.97	.99	1.02	1.04	1.07	1.09	1.14	1.19	1.20	----	<b>5,000</b>
<b>6,000</b>	----	----	.90	.92	.94	.96	.98	1.00	1.02	1.04	1.08	1.12	1.17	1.21	<b>6,000</b>
<b>7,000</b>	----	----	----	.90	.92	.93	.95	.97	.99	1.01	1.04	1.08	1.11	1.15	<b>7,000</b>
<b>8,000</b>	----	----	----	.88	.90	.92	.93	.95	.96	.98	1.01	1.04	1.07	1.10	<b>8,000</b>
<b>10,000</b>	----	----	----	----	.88	.89	.90	.92	.93	.94	.97	.99	1.02	1.04	<b>10,000</b>
<b>12,000</b>	----	----	----	----	----	.88	.89	.90	.91	.92	.94	.96	.98	1.00	<b>12,000</b>
<b>14,000</b>	----	----	----	----	----	----	.87	.88	.89	.90	.92	.93	.95	.97	<b>14,000</b>
<b>18,000</b>	----	----	----	----	----	----	----	.86	.87	.88	.89	.91	.93	.93	<b>18,000</b>

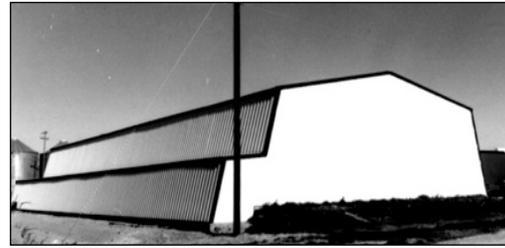
## 5

**USE COUNTY MULTIPLIERS IN MULTIPLIER SECTION.**

## FRUIT/VEGETABLE STORAGE BUILDINGS



**CHEAP CLASS D POTATO STORAGE**



**LOW-COST S ENVIRONMENTAL**

**OCCUPANCY DESCRIPTION:** Potato storage buildings are designed to provide long-term storage. The masonry structures are built below grade with heaped earth on three sides, while the wood or steel frame buildings have metal or wood siding with insulated walls and roof.

Fruit/vegetable buildings are the modern, controlled atmosphere buildings for the long-term storage of apples, potatoes, onions, etc.

**INCLUDED IN COSTS:** Architects' fees and contractors' overhead and profit. Built-in refrigerator and fan rooms.

**NOT INCLUDED IN COSTS:** No heat, refrigeration or controlled atmosphere equipment or sensors.

### POTATO STORAGE

CLASS	TYPE	COST/ SQ. FT.	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING & PLUMBING
<b>C</b>	Good	\$38.60	Block, below grade, heaped earth 3 sides, heavy insulation and roof	Partitions, bulkheads, plank floors raised over concrete, heating ducts	Adequate electrical, water service
	Average	25.90	Block, below grade, heaped earth three sides, insulation	Partitions, bulkheads, plank floors on concrete, heating ducts	Minimum lighting, no plumbing
	Low cost	17.40	Block or tile, light insulation and roof	Partitions, concrete air channels	Minimum lighting only
	Cheap	9.45	Dirt trench, block end walls only, pole rafters, straw,	Unfinished, dirt floor	Minimum electrical only
<b>D</b>	Good	35.60	Wood T&G on heavy studs, heavily insulated	Heavy partitions and bulkheads, plank floors raised	Adequate lighting outlets, water service
	Average	23.25	Plywood or siding on wood studs, good roof, moderate insulation	Partitions, bulkheads, plank floors on concrete, heating ducts	Minimum lighting, no plumbing
	Low cost	15.05	Plywood, lightly insulated roof	Partitions, concrete air channels	Minimum lighting only
	Cheap	7.50	Dirt trench, wood end walls only, pole rafters, straw, dirt cover	Unfinished, dirt floor	Minimum electrical only
<b>DPOLE</b>	Good	32.45	Pole frame, metal panels and sheathing, heavily insulated	Heavy partitions and bulkheads, plank floors raised	Adequate lighting outlets, water service
	Average	20.95	Pole frame, good metal panels, roof, moderately insulated	Partitions, bulkheads, plank floors on concrete, heating ducts	Minimum lighting, no plumbing
	Low cost	13.55	Pole frame, lightly insul. roof	Partitions, concrete air channels	Minimum lighting only
	Cheap	6.65	Dirt trench, metal end walls only, pole rafters, straw, dirt cover	Unfinished, dirt floor	Minimum electrical only
<b>D</b>	Good	33.70	Metal sandwich panels or steel and sheathing, heavily insulated	Heavy partitions and bulkheads, plank floors raised	Adequate lighting outlets, water service
	Average	22.35	Steel siding, frame, good roof, moderately insulated	Partitions, bulkheads, plank floors on concrete, heating ducts	Minimum lighting, no plumbing
	Low cost	14.85	Galv. steel, lightly insulated roof	Partitions, concrete air channels	Minimum lighting only

### FRUIT/VEGETABLE BUILDINGS – ENVIRONMENTAL

<b>C</b>	Average	\$29.45	Block, tilt-up, light construction, sealed ceiling insulation	Controlled atmosphere storage, sealed rooms, double slab	Adequate electrical and water service
<b>D</b>	Average	27.05	Stucco or siding on wood, sealed ceiling	Controlled atmosphere storage, sealed rooms, double slab	Adequate electrical and water service
<b>DPOLE</b>	Average	25.20	Pole frame, metal siding, lined, sealed ceiling insulation	Controlled atmosphere storage, sealed rooms, double slab	Adequate electrical and water service
<b>S</b>	Average	26.30	Pre-engineered frame, metal siding, lined, sealed ceiling insulation	Controlled atmosphere storage, sealed rooms, double slab	Adequate electrical and water service
<b>SSLANT WALL</b>	Good	32.55	Built-up steel sandwich envelope-cavity wall and roof, insulated	Concrete floor and plenum with catwalk, attached fan	Adequate electrical and water service
	Fair	23.25	Built-up steel sandwich envelope-cavity wall and roof, insulated	Elevated concrete floor, plenum, catwalk, attached fan room	Adequate electrical and water service
	Low cost	20.80	Built-up steel sandwich envelope-cavity wall and roof, insulated	Dirt floor, concrete center plenum, catwalk, attached fan room	Adequate electrical and water service

# FRUIT/VEGETABLE STORAGE BUILDINGS

**REFINEMENTS:** On this page are the means of making major adjustments to the base costs on the previous page. Follow Steps 1 through 5 to attain final costs, adjusted for lump sums, heating and cooling, story height, floor area/perimeter ratio and locality.

**1**

<b>ADJUSTMENTS</b>	
Controlled atmosphere	
nonenvironmental buildings	
conditioned/ventilated air . . . . .	\$ 3.05
cooled air . . . . .	7.70
environmental buildings	
fruits, conditioned and cooled air . . . . .	15.95
vegetables, high to precise humidity . . . . .	28.30
warm and cooled air . . . . .	37.60

**2**

<b>HEATING AND COOLING</b>	
These costs are averages of total installed cost of the entire heating or cooling installation including its prorated share of contractors' overhead and profit and architects' fees.	
Electric cable or baseboard . . . . .	\$2.90
Electric wall heaters (inc. FWA) . . . . .	1.25
Forced air, ducted . . . . .	3.20
heaters or furnace, vented . . . . .	.95
Hot water, baseboard/convactor . . . . .	5.85
radiant floor or ceiling . . . . .	6.05
Space heaters, with fan . . . . .	1.60
radiant . . . . .	1.80
Steam . . . . .	5.05
Wall or floor furnace . . . . .	1.45
Package heating and cooling . . . . .	6.30
Ventilation, blower and ducts . . . . .	.95
fans only . . . . .	.40

**3**

<b>HEIGHT REFINEMENTS</b>	
<b>STORY HEIGHT MULTIPLIERS</b>	
Multiply base cost by following multiplier for any variation in average story height.	
Average Wall Height	Square Foot Multiplier
7	.946
8	.963
9	.981
10	1.000
11	1.019
12	1.038
13	1.058
14	1.077
16	1.115
18	1.154
20	1.192
22	1.231
24	1.269
28	1.346
32	1.423
36	1.500

**4**

Average Floor Area, Sq. Ft./Story	AVERAGE PERIMETER														Average Floor Area, Sq. Ft./Story
	125	200	250	300	350	400	450	500	550	600	700	800	900	1000	
<b>1,000</b>	1.10	1.29	1.42	1.54	----	----	----	----	----	----	----	----	----	----	<b>1,000</b>
<b>2,000</b>	1.05	1.04	1.10	1.17	1.23	1.29	1.35	----	----	----	----	----	----	----	<b>2,000</b>
<b>3,000</b>	----	.96	1.00	1.04	1.08	1.12	1.17	1.21	1.25	1.29	----	----	----	----	<b>3,000</b>
<b>4,000</b>	----	----	.95	.98	1.01	1.04	1.07	1.10	1.13	1.17	1.23	1.29	----	----	<b>4,000</b>
<b>5,000</b>	----	----	.92	.94	.97	.99	1.02	1.04	1.07	1.09	1.14	1.19	1.20	----	<b>5,000</b>
<b>6,000</b>	----	----	.90	.92	.94	.96	.98	1.00	1.02	1.04	1.08	1.12	1.17	1.21	<b>6,000</b>
<b>7,000</b>	----	----	----	.90	.92	.93	.95	.97	.99	1.01	1.04	1.08	1.11	1.15	<b>7,000</b>
<b>8,000</b>	----	----	----	.88	.90	.92	.93	.95	.96	.98	1.01	1.04	1.07	1.10	<b>8,000</b>
<b>9,000</b>	----	----	----	----	.88	.89	.90	.93	.94	.96	.99	1.01	1.04	1.07	<b>9,000</b>
<b>10,000</b>	----	----	----	----	----	.88	.89	.92	.93	.94	.97	.99	1.02	1.04	<b>10,000</b>
<b>12,000</b>	----	----	----	----	----	----	.87	.90	.91	.92	.94	.96	.98	1.00	<b>12,000</b>
<b>14,000</b>	----	----	----	----	----	----	----	.88	.89	.90	.92	.93	.95	.97	<b>14,000</b>
<b>18,000</b>	----	----	----	----	----	----	----	.86	.87	.88	.89	.91	.92	.93	<b>18,000</b>
<b>20,000</b>	----	----	----	----	----	----	----	.85	.86	.87	.88	.90	.90	.92	<b>20,000</b>

**5**

**USE COUNTY MULTIPLIERS IN MULTIPLIER SECTION.**