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- Transportation Analysis
- Logistics Network Optimization
- Material Handling and Facility Design
- Systems & Process Integration
- Supply Chain Systems and Technologies
- Supply Chain Security
- Lean Services
- Carbon Footprint Analysis
- Simulation & Analytical Modeling

Contact us today to learn how our experience can enhance your supply chain.

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Rules of Thumb
ONLINE
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Rules of Thumb
WAREHOUSING & DISTRIBUTION GUIDELINES

*TranSystems acquired Gross & Associates in 2008
and is proud to continue the tradition of the Rules of Thumb.*

Rules of Thumb

Warehousing & Distribution Guidelines

Table of Contents

Introduction	i
Using Rules of Thumb	1
Picking Technologies	2
Security Equipment	3
Handling Equipment	4
Storage Equipment	8
Dock Equipment	12
Workstations	13
General Facility Related	13
Decibel Sound Levels	15
Typical Office Space Requirements	16
Pallet Storage Space Estimates	16
Lighting Level Recommendations	17
Operating Rates	18
Project Elapsed Time Estimates	19
About TranSystems	20
Index	21
Our Locations	24
Special Thanks	25
Notes	26

Introduction

TranSystems is pleased to provide the 11th Edition of the Rules of Thumb. This publication was originally created by Gross & Associates, which was acquired by TranSystems in 2008. TranSystems is a supply chain and transportation consulting company providing services in the areas of architecture and engineering, planning, management and supply chain consulting, and real estate and security consulting.

We've expanded this 11th edition to include categories not previously addressed in prior editions of the Rules of Thumb, including Security and Warehouse Technologies.

Be sure to check out the TranSystems Rules of Thumb on-line. If you are just looking up a few small items or don't have access to the web, the hard copy booklet is your fastest bet. If you have web access, Rules of Thumb on-line is a quick and easy way to receive a summary of costs/items via e-mail. Visit www.transystems.com/rules today to try it!

We've made some changes to this latest edition of the Rules of Thumb. Tell us what you think – we'd love to hear from you:

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TranSystems Rules of Thumb

Warehousing & Distribution Guidelines

11th Edition

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Using Rules of Thumb

Warehousing & Distribution Guidelines

This pocket guide is a practical tool for estimation of capital equipment costs associated with alternative layouts, operating systems, equipment applications, security, warehouse technologies and other general guidelines.

To establish cost guidelines, information from a wide variety of sources has been researched in an effort to provide reasonable value ranges. These figures are high-level budget estimates only and are intended for rough calculation purposes. Actual costs may vary significantly from those listed depending on your specific application.

All cost estimates include delivery and installation (if applicable) based on typical transportation and labor rates.

We recommend that you use the high price range when considering small quantities, heavy-duty or complex applications. Conversely, it is suggested that you use the lower end of the price spectrum when large quantities, light-duty or simple applications are being explored.

The volatility in the worldwide steel market has caused suppliers to add a steel surcharge on raw materials. This surcharge makes it difficult to predict the cost of components at any given time. This guide attempts to provide a large enough range to cover the additional cost – for the most up-to-date price estimates you can use our interactive Rules of Thumb on-line (as of the date of publish for this edition, this tool can be found on both www.grossassociates.com and www.transystems.com).

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PICKING TECHNOLOGIES

Pick-To-Light

Base System (includes software)	\$ 100,000	
Full Function Slot Display (each display)	\$ 100 - \$	150

Put-To-Light

Base System (includes software)	\$ 125,000	
Full Function Slot Display (each display)	\$ 100 - \$	150

Voice Directed Software

Small Site with 10 to 20 concurrent users	\$ 40,000 - \$	65,000
Medium Site with 21 to 50 concurrent users	\$ 65,000 - \$	120,000
Large Site with 51 to 100 concurrent users	\$ 120,000 - \$	200,000

Multimodal Voice Terminal With Scanner/Imager

\$ 1,800 - \$ 2,800

Industrial Voice Recognition Headset

\$ 200 - \$ 300

RF Picking

Base System	\$ 100,000	
Hand Held RF/Scanning Device	\$ 500 - \$	1,500
Wrist Mounted RF/Scanning Device	\$ 800 - \$	1,500

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SECURITY EQUIPMENT

Video System Equipment

Interior Fixed Camera Assembly (1.3 megapixel)	\$ 1,200 - \$	1,400
Exterior Fixed Camera Assembly (1.3 megapixel)	\$ 1,900 - \$	2,400
Interior PTZ Camera Assembly (5 megapixel)	\$ 2,500 - \$	2,700
Exterior PTZ Camera Assembly (5 megapixel)	\$ 3,200 - \$	4,200
22" LCD Desk Top Monitor	\$ 150 - \$	325
42" LCD Wall Mounted Monitor	\$ 1,550 - \$	2,500
Network Video Recorder w/Software & 1 TB Storage	\$ 12,500 - \$	13,500

Access Control Equipment

Access Control System (small 1-16 readers)	\$ 6,000 - \$	8,000
Access Control System (mid-size 16-64 readers)	\$ 10,000 - \$	15,000
Access Control System (large-size 64-128 readers)	\$ 30,000 - \$	80,000
Access Control System (enterprise)	\$ 150,000 - \$	225,000
Electric Lock	\$ 450 - \$	800
Card Reader	\$ 325 - \$	500
Access Control Cards (per card)	\$ 2 - \$	3

Physical Barriers

Chain Link (per foot)	\$ 10 - \$	15
Decorative Fence (per foot)	\$ 30 - \$	48
High Security Mesh (heavy gauge) (per foot)	\$ 40 - \$	60
Jersey Barrier (12' x 32" standard)	\$ 625 - \$	850
Fixed Bollard	\$ 200 - \$	325
Movable Bollard	\$ 1,200 - \$	1,500
Large Vehicle Barrier	\$ 85,000 - \$	125,000

Intrusion Detection Systems

Burglar Alarm System	\$ 2,500 - \$	3,500
Motion Detectors	\$ 100 - \$	150
Door Position Sensor	\$ 8 - \$	12
Sounders	\$ 25 - \$	40
Duress Buttons	\$ 18 - \$	25
Glass Breakage Device	\$ 65 - \$	80

Screening Equipment

Walk Through Magnetometer	\$ 3,200 - \$	4,100
X-ray small (personal hand carried items)	\$ 21,000 - \$	31,000
X-ray medium (conveyor belt type)	\$ 175,000 - \$	280,000
X-ray large (cargo containers)	\$ 500,000 - \$	875,000

HANDLING EQUIPMENT

Electric Lift Trucks (with battery & charger)

By Type and Capacities

Walkie Pallet Jack - 48" Forks

4,000 lb.	\$ 3,500	- \$	5,500
6,000 lb.	\$ 6,500	- \$	8,500

Rider Pallet Jacks - 48" Forks

6,000 lb.	\$ 9,000	- \$	11,000
8,000 lb.	\$ 9,500	- \$	13,000

Rider Pallet Jacks - 96" Forks

6,000 lb.	\$ 9,000	- \$	12,000
8,000 lb.	\$ 9,500	- \$	13,000

Low Level Order Picker Truck

\$12,000	- \$	20,000
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Tugger

\$ 8,000	- \$	12,000
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Walkie Straddle Stacker

3,000 lb.	\$12,000	- \$	16,000
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Walkie Reach Truck

3,000 lb.	\$16,000	- \$	20,000
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Counterbalanced Lift Truck

3,000 lb.	\$23,000	- \$	28,000
4,000 lb.	\$24,000	- \$	29,000
5,000 lb.	\$26,000	- \$	30,000
6,000 lb.	\$29,000	- \$	33,000

Narrow-Aisle Reach Truck

3,000 lb.	\$25,000	- \$	31,000
4,000 lb.	\$27,000	- \$	34,000
4,500 lb.	\$28,000	- \$	37,000

Narrow-Aisle Deep Reach Truck

2,500 lb.	\$26,000	- \$	34,000
3,200 lb.	\$27,000	- \$	35,000

Side Loader Truck

6,000 lb.	\$90,000	- \$	100,000
10,000 lb.	\$95,000	- \$	120,000

Four Directional Truck

4,500 lb.	\$45,000	- \$	60,000
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Order Picker Truck

3,000 lb.	\$23,000	- \$	39,000
	\$ 6,500	- \$	8,500

Wire Guidance Package

Turret Truck - Operator Up

w/Wire Guidance	3,000 lb.	\$80,000	- \$	110,000
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Swing Mast Truck

w/Wire Guidance	4,000 lb.	\$50,000	- \$	85,000
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Narrow Aisle Articulating Truck

4,000 lb.	\$55,000	- \$	75,000
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Manual Pallet Trucks (pallet jacks)

Standard Steel (48" L x 27" W)	\$ 300	- \$	1,000
Stainless Steel (for FDA/USDA)	\$ 1,000	- \$	3,000

HANDLING EQUIPMENT: CONTINUED

Truck Guidance

Wire Guidance Cost Per Foot Installed	\$ 3	- \$	5
Rail Guidance Cost Per Foot Installed	\$ 12	- \$	17

Battery Changing/Charging Systems

Charging System Base Price	\$25,000	- \$	40,000
Additional Cost for Each Battery Position	\$ 450	- \$	850

Propane Counterbalanced Lift Trucks

3,000 lb.	\$18,000	- \$	21,000
4,000 lb.	\$20,000	- \$	26,000
5,000 lb.	\$21,000	- \$	27,000
6,000 lb.	\$24,000	- \$	29,000

Lift Truck Options

Carton Clamp	\$ 8,000	- \$	13,000
Paper Roll Clamp	\$ 9,000	- \$	18,000
Claw Clamp to Pick Layers of Cartons	\$18,000	- \$	31,000
Ship Sheet-Push/Pull	\$ 7,000	- \$	12,000
Side-Shifter	\$ 1,500	- \$	2,500
Drum Handler (single non-hydraulic)	\$ 1,500	- \$	2,000
Drum Handler (double non-hydraulic)	\$ 2,500	- \$	4,000
Drum Handler (single hydraulic)	\$ 6,000	- \$	9,000
Drum Handler (double hydraulic)	\$ 7,000	- \$	10,000
Lift Height Sensors	\$ 500	- \$	2,000
Mast Camera Monitors	\$ 3,000	- \$	4,000
Truck Mounted Scales	\$ 500	- \$	6,000

Automatic Guided Vehicles (AGV's)

AGV Unit-Load Carrier with Roller Deck (includes AGV controller, wireless or wired path, batteries, chargers, etc.)	\$200,000	- \$	300,000
AGV Tow Vehicle (includes AGV controller, wireless or wired path, batteries, chargers, etc.)	\$150,000	- \$	200,000
AGV Tow Trailer Without Roller Bed	\$ 3,000	- \$	5,000
AGV Tow Trailer With Non-Powered Roller Bed	\$ 12,000	- \$	16,000
AGV Tow Trailer With Powered Roller Bed	\$ 20,000	- \$	25,000
AGV With Mast and Forks (Outrigger Type)	\$250,000	- \$	350,000
AGV Pick-Up & Delivery (P&D) Stations	\$ 9,000	- \$	15,000

AGV Pallet Jack Style (single to double fork length)

First Vehicle	\$ 95,000	- \$	125,000
Additional Vehicle	\$ 50,000	- \$	100,000

HANDLING EQUIPMENT: CONTINUED**Trailer Switching Tractors**

Yard Use Only	\$ 85,000	-	\$ 95,000
Public Road and Yard Use	\$ 95,000	-	\$ 105,000

Conveyor

Powered Roller (per linear foot)	\$ 210	-	\$ 310
Zero Pressure Accumulation (per linear foot)	\$ 250	-	\$ 360
Belt (per linear foot)	\$ 155	-	\$ 280
Trash (per linear foot)	\$ 125	-	\$ 330
Gravity Roller/Skate (linear foot)	\$ 35	-	\$ 100
Flexible Skate Wheel (Linear foot extended. Collapsed length is approximately 1/4 of extended length.)	\$ 75	-	\$ 175

Sorters (Cartons)**Pop-Up Wheel Sorter**

Pricing per linear foot	\$ 415		
Pricing for each divert	\$ 2,100	-	\$ 5,100

Pusher Sorter

Pricing per linear foot	\$ 365		
Pricing for each divert	\$ 3,100	-	\$ 5,200

Shoe Sorter

Pricing per linear foot	\$ 3,600		
Pricing for each divert	\$ 2,600	-	\$ 5,200

Sorters (Unit)**Cross-Belt Sorter (per linear foot)**

Pricing per linear foot	\$ 4,000	-	\$ 6,000
Pricing for each divert	\$ 3,400	-	\$ 6,500

Tilt-Tray Sorter (per linear foot)

Pricing per linear foot	\$ 3,300	-	\$ 6,000
Pricing for each divert	\$ 2,000	-	\$ 6,500

Induction/Output (for above listed sorters)

Induction Points for Cross-belt or Tilt-Tray (each). Minimum of one (1) induction point per system.	\$ 85,000	-	\$ 100,000
Sort Chutes (per destination)	\$ 3,500	-	\$ 15,000

Accumulator, Metering Belt, Induction Belt, Scanners

(required for all types of sortation systems)

Low Speed (40 - 60 CPM)	\$ 20,500	-	\$ 73,000
Medium Speed (70 - 90 CPM)	\$ 42,000	-	\$ 100,000
High Speed (100 - 120 CPM)	\$ 75,000	-	\$ 135,000

HANDLING EQUIPMENT: CONTINUED**Sortation Control System & PLC's**

(needed for all types of sortation systems)

Low Complexity	\$ 25,000	-	\$ 60,000
Medium Complexity	\$ 35,000	-	\$ 65,000
High Complexity	\$ 80,000	-	\$ 300,000

Conveyor Systems Project Cost Breakdown

(estimates for complex systems integration projects)

Controls Engineering (% of total)	5	%
Mechanical Engineering (% of total)	6	%
Project Management (% of total)	4	%
Electrical Installation (% of total)	11	%
Control Hardware (% of total)	13	%
Mechanical Systems (% of total)	9	%
Mechanical Installation (% of total)	14	%
Mechanical Hardware (% of total)	38	%
TOTAL	100	%

Hanging Garment Equipment:

Storage Rail (per linear foot)	\$ 16	-	\$ 22
Traffic Rail (non-powered, per linear foot)	\$ 24	-	\$ 36
Traffic Rail (powered, per linear foot)	\$ 130	-	\$ 165
Trolleys (36" long, per unit)	\$ 33	-	\$ 50

Miscellaneous Handling Equipment

Chain Hoists (1/4 HP/500 lbs. to 2 HP/4,000 lbs.)	\$ 1,400	-	\$ 5,000
Gantry Cranes (steel-12' to 15'ht./7' to 10' I-beam) (above price includes I-beam trolley, chain hoist not included)	\$ 1,500	-	\$ 4,500
Jib Crane - Floor Mounted (500 to 2,000 lbs.) (chain hoist and concrete footings not included)	\$ 1,600	-	\$ 4,000
Jib Crane - Floor Mounted (2,000 to 6,000 lbs.) (chain hoist and concrete footings not included)	\$ 1,600	-	\$ 4,000
Drum Dollies Plastic (30 to 55 gallon)	\$ 30	-	\$ 200
Drum Dollies Metal (30 to 55 gallon)	\$ 60	-	\$ 170
Drum Dumper (750 to 1,500 lbs. cap./36" to 60" dump ht.)	\$ 3,000	-	\$ 4,000

HANDLING EQUIPMENT: CONTINUED**Miscellaneous Handling Equipment: continued**

Drum Dumper	\$	150	-	\$	2,000
Fork Lift Attachment					
Drum Hand Truck Steel (55 gallon)	\$	150	-	\$	700
Drum Hand Truck Aluminum (55 gallon)	\$	500	-	\$	1,000
Hand Trucks Steel (48" - 52" H x 16" - 18" W)	\$	100	-	\$	575
Hand Trucks Aluminum (48" - 52" H x 16" - 18" W)	\$	180	-	\$	650
Platform Trucks (24" W x 36" L to 36" W x 72" L)	\$	110	-	\$	950
Platform Trucks Narrow Aisle (16" to 24" W x 60" L)	\$	160	-	\$	360
Picking Carts - Two Shelf (24" W x 36" L to 36" W x 72" L)	\$	80	-	\$	500
Stock Picking Cart w/Spring-Loaded Step Ladder	\$	600	-	\$	900
Roller Safety Ladders w/Handrails (2 - 4 steps)	\$	165	-	\$	475
Roller Safety Ladders w/Handrails (5 - 10 steps)	\$	300	-	\$	2,500
Roller Safety Ladders w/Handrails (11 - 16 steps)	\$	600	-	\$	2,600
Scissor Lifts/Pallet Positioners	\$	2,000	-	\$	4,500
Self Dumping Hoppers (1 to 5 cubic yards)	\$	600	-	\$	3,250
Tilt Trucks Waste (0.5 to 2.5 cubic yards)	\$	500	-	\$	3,200

STORAGE EQUIPMENT**Pallet Rack**

(Rack priced per pallet position including floor positions assumption of 4-5 pallet levels high/standard 48" x 40" pallets with maximum load of 2,500# per pallet/structural or roll formed steel)

Standard Selective Pallet Rack	\$	50	-	\$	75
Double Deep Pallet Rack	\$	65	-	\$	90
Drive-In Pallet Rack (2 Deep)	\$	80	-	\$	105
Drive-In Pallet Rack (3 Deep)	\$	75	-	\$	105
Drive-In Pallet Rack (4+Deep)	\$	75	-	\$	100
Drive-Thru Pallet Rack (2 Deep)	\$	80	-	\$	120
Drive-Thru Pallet Rack (3 Deep)	\$	80	-	\$	115
Drive-Thru Pallet Rack (4+ Deep)	\$	80	-	\$	110

STORAGE EQUIPMENT: CONTINUED**Pallet Rack: continued**

Push Back Pallet Rack (2 deep)	\$	110	-	\$	140
Push Back Pallet Rack (3 deep)	\$	130	-	\$	170
Push Back Pallet Rack (4 deep)	\$	155	-	\$	200
Push Back Pallet Rack (5 deep)	\$	175	-	\$	220
Gravity Flow Pallet Rack (2 deep)	\$	135	-	\$	260
Gravity Flow Pallet Rack (3 + deep)	\$	250	-	\$	400

Note of Caution - Steel pricing volatility can dramatically affect rack & shelving pricing

Stacking Frames

(2,500# per frame, to stack 5 high)

Frames for Wood Pallets	\$	85	-	\$	100
With Steel "Pallet" Bases	\$	125	-	\$	160

Pallet Rack Options

Wire Deck Sections (each pallet)	\$	15	-	\$	45
Pallet Supports (per pair)	\$	10	-	\$	25
Upright Post Guard (each)	\$	15	-	\$	50
End-of-Aisle Rack Protectors (one at the end of each row of racks)	\$	100	-	\$	300

Plastic Pallets

48" x 40" Thermoformed, Rotationally Molded, or Injection Molded, Each (for USDA or FDA approved pallets, use higher end of the price spectrum)

2,200 lbs capacity	\$	90	-	\$	140
4,000 lbs. capacity	\$	125	-	\$	270

Cantilever Rack (pipe/tube/bar lumber)

(heavy duty cantilever rack priced per 8'0" wide bay x the heights listed below)

8'- 0" Height

Single - Sided Cantilever (four sets of arms)	\$	465	-	\$	750
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Double - Sided Cantilever (eight sets of arms)	\$	610	-	\$	950
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12'- 0" Height

Single - Sided Cantilever (6 sets of arms)	\$	550	-	\$	900
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Double - Sided Cantilever (12 sets of arms)	\$	950	-	\$	1,400
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16'- 0" Height

Single - Sided Cantilever (8 sets of arms)	\$	1,000	-	\$	1,500
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Double - Sided Cantilever (16 sets of arms)	\$	1,600	-	\$	2,200
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STORAGE EQUIPMENT: CONTINUED**Drum Stacking Racks**

(stacking frames for horizontal floor storage)

2 Drum Stacking Rack Unit (55 gallon)	\$ 45	- \$	100
3 Drum Stacking Rack Unit (55 gallon) (13" H x 48" W x 30" D)	\$ 80	- \$	110

Wide Span Storage Rack

(typically used for hand-loaded static carton storage, i.e., pick-pack or archives-priced per bay) (96" W x 96" H x 24" - 36" D w/4 shelves)

Wide Span Unit) (particle board deck)	\$ 300	- \$	500
Wide Span Unit (corrugated steel deck)	\$ 450	- \$	700
Wide Span Unit (wire deck)	\$ 500	- \$	650

Carton Flow Rack

Carton Flow Unit (8' D x 8' W x 8' H - 4 shelves w/6 lanes each priced per bay)	\$ 1,050	- \$	2,500
Carton Flow Unit (8' D x 5' W x 8' H - 5 shelves w/4 lanes each priced per bay)	\$ 900	- \$	1,500

Gravity-Flow Deck Rack

32" to 54" Track (span one rack section beam-to-beam)	\$ 40	- \$	50
84" to 120" Track (span back-to-back rack sections)	\$ 60	- \$	80
Select Deck Multiple Rollers (no guides - maximum flexibility 8' x 8')	\$ 300	- \$	500

Open Type Shelving(Steel-Clip Type or Nut & Bolt Shelving Units
36" - 48" W x 12" - 24" D x 72" - 96" H with six shelves per unit)

Light to Medium Duty (20 - 22 gauge)	\$ 175	- \$	350
Heavy Duty (18 gauge)	\$ 175	- \$	350
16' High Open Shelving	\$ 725	- \$	875

Closed Type Shelving(Steel-Clip Type or Nut & Bolt Shelving Units
36" - 48" W x 12" - 24" D x 72" - 96" H with six shelves per unit)

Light to Medium Duty (20 - 22 gauge)	\$ 180	- \$	400
Heavy Duty (18 gauge)			

STORAGE EQUIPMENT: CONTINUED**Open Welded Wire Shelving**

Chrome Plated or Epoxy Coated Welded Steel Wire 60" - 84" H x 14" - 24" D x 36" - 48" W w/4 - 5 shelves each unit	\$ 375	- \$	650
Stainless Steel Welded Wire 60" - 84" H x 14" - 24" D x 36" - 48" W w/4 - 5 shelves each unit	\$ 1,060	- \$	1,565

Storage Cabinets

36" - 48" W x 18" - 24" D x 72" - 84" H with 4 - 6 adjustable steel shelves

Plastic	\$ 175	- \$	400
Light to Medium Duty	\$ 340	- \$	560
Heavy Duty	\$ 800	- \$	1,300

Flammable Liquid Storage Cabinets

Full-Size w/Standard Doors (60" - 72" H x 36" - 48" W x 18" - 36" D)	\$ 1,000	- \$	2,000
Full-Size w/Self-Closing Doors (60" - 72" H x 36" - 48" W x 18" - 36" D)	\$ 2,000	- \$	2,300
Standard-Size w/Standard Doors (36" - 48" H x 36" - 48" W x 18" - 24" D)	\$ 800	- \$	1,000
Standard-Size w/Self-Closing Doors (36" - 48" H x 36" - 48" W x 18" - 24" D)	\$ 900	- \$	1,200

High-Density Storage Drawer Modules

Bench Height (33" H w/4 - 8 drawers) (30" W x 28" D)	\$ 900	- \$	2,000
Counter Height (45" H w/6 - 12 drawers) (30" W x 28" D)	\$ 1,100	- \$	2,600
Full Height (60" H) (30" W x 28" D)	\$ 1,600	- \$	4,000

Drawer Divider Kits (Priced Per Drawer)

4 to 9 Compartments	\$ 20	- \$	65
12 to 48 Compartments	\$ 25	- \$	105

Steel Lockers

Single-Tier Lockers (one opening per unit) (60" - 72" H x 12" - 15" W x 12" - 18" D)	\$ 150	- \$	300
Double-Tier Lockers (two openings per unit) (60" - 72" H x 12" - 15" W x 12" - 18" D)	\$ 200	- \$	500
Six-Tier Lockers (six openings per unit) (9" - 15" H x 15" - 20" W x 20" - 28" L)	\$ 300	- \$	1,000

DOCK EQUIPMENT

(priced each unit)

Dock Levelers

Dock Levelers	\$ 3,500 - \$ 7,000
Mechanical Pit Leveler	
Dock Levelers	\$ 4,500 - \$ 8,000
Pneumatic Pit Leveler	
Dock Levelers	\$ 6,000 - \$ 20,000
Hydraulic Pit Leveler	
Dock Leveler	\$ 600 - \$ 2,100
Edge of Dock Leveler - Manual	
Dock Leveler	\$ 4,500 - \$ 5,500
Surface Mounted Manually Operated Dock Plate	

Dock Boards/Plates

Aluminum Board (to 5,000 lbs. cap. with welded curbs)	\$ 400 - \$ 1,200
Aluminum Board (to 10,000 lbs. cap. with welded curbs)	\$ 800 - \$ 1,500
Aluminum Plate (to 5,000 lbs. cap. with no curbs)	\$ 600 - \$ 1,800
Steel Board (to 10,000 lbs. cap. with welded curbs)	\$ 700 - \$ 2,000

Seals, Shelters, Restraints & Screen Doors

Standard Door Seal	\$ 700 - \$ 1,500
Standard Door Shelter	\$ 1,200 - \$ 4,500
Vehicle Restraint Systems (wide range due to potential for complex wiring, interlocks to the dock levelers, door openers, etc.)	\$ 200 - \$ 10,000
Bug Screen Door for Freight Door	\$ 1,200 - \$ 2,000
Dock Bumpers (per unit)	\$ 50 - \$ 150

Dock Lights & Fans

Adjustable Arm-Mounted Dock Lights (low end of price scale for incandescent/ high end for halogen)	\$ 100 - \$ 400
Adjustable Arm-Mounted Dock Lights (LED)	\$ 300 - \$ 450
Adjustable Arm-Mounted Dock Fan (18" 3 speed/10,000 CFM)	\$ 220 - \$ 650
Adjustable Arm-Mounted Dock Light and Fan Package	\$ 270 - \$ 700

WORKSTATIONS

Benches and Tables

Work Benches (30" to 36" D x 48" to 72" W)	\$ 200 - \$ 800
Electronic or Assembly Work Benches (30" to 36" D x 48" to 72" W)	\$ 500 - \$ 2,100
Packing Tables (30" to 36" D x 48" to 72" W)	\$ 900 - \$ 2,100
Production Tables (30" to 36" D x 72" to 120" W)	\$ 300 - \$ 800

Industrial Seating

Bench Chairs (seat ht. 19" to 37")	\$ 200 - \$ 500
Bench Stools (seat ht. 19" to 37")	\$ 150 - \$ 500

GENERAL FACILITY RELATED

Painting & Sealing

Costs can be affected by many factors; age and condition of the surfaces, equipment to be moved, off-hours work, etc.

Walls (per square foot)

Masonry Block

Filler	\$ 1.10 - \$ 1.40
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Finish (2 coats)

Latex	\$ 1.20 - \$ 1.65
Oil	\$ 1.20 - \$ 1.50
Epoxy	\$ 1.25 - \$ 2.10

Sheet Rock (prime - 2 coats)

Latex	\$ 0.50 - \$ 0.85
Oil	\$ 1.10 - \$ 1.40
Epoxy	\$ 1.10 - \$ 1.50

Ceilings (per square foot)

Open Joists Sprayed - 1 Coat	\$ 0.55 - \$ 0.95
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Floors (per square foot)

Preparation-Shot Blasting	\$ 0.95 - \$ 1.20
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Paint

Enamel - 1 Coat	\$ 1.10 - \$ 1.65
Epoxy	\$ 6.65 - \$ 7.75
Non-Skid Epoxy	\$ 8.70 - \$ 11.90
Sealer - Dust Control	\$ 0.45 - \$ 1.10
Lines (per linear foot 4" wide)	\$ 0.65 - \$ 0.90

Pre-Engineered Structural Steel Systems

8' under clearance, 9' deck height, 150-200 psf capacity, priced per square foot. Price includes handrail, toe guard and one stairway. Low end of range for standard spans, high end of range for wide spans between columns.

Mezzanine (Per Sq. Ft.) (3/4" tongue & groove plywood over corrugated steel roof deck)	\$ 17 - \$ 40
Resin Impregnated Wood Deck-Add	\$ 5 - \$ 8
Mezzanine (per sq.ft.) (perforated steel plank deck)	\$ 18 - \$ 41
Mezzanine (per sq.ft.) (solid steel plank deck)	\$ 17 - \$ 40
Additional Stair & Landing (ea.)	\$ 3,000 - \$ 5,500

Prefabrication In-Plant Structures

3" Thick 4' x 8' Wall Panel System	\$ 75 - \$ 85
Corrugated Steel Roof Deck & Acoustical Tile Ceiling/Grid (sq.ft.)	\$ 7 - \$ 9
Doors (steel or solid core wood)	\$ 475 - \$ 800
Windows (factory glazed)	\$ 110 - \$ 165

Wire Security Partitions

(priced per linear foot-without doors or roof)

8' High Wire Partition	\$ 28 - \$ 85
10' High Wire Partition	\$ 32 - \$ 120
12' High Wire Partition	\$ 40 - \$ 150

Wire Partition Options

Wire Roof (per sq.ft.)	\$ 4 - \$ 8
Single Swing Doors (each)	\$ 300 - \$ 500
Double Swing Doors (each set)	\$ 500 - \$ 1,000
Slide Door (each)	\$ 500 - \$ 750

Mezzanine Edge Safety Gates

Single Pallet Width	\$ 3,500 - \$ 4,500
Dual Pallet Width Side Access	\$ 4,000 - \$ 5,500

Barrier Rail Systems

(Typically used to protect pedestrian paths and equipment from lift-truck impact, priced per linear foot)

48" High Protective "Highway Type" Barrier Rail System w/3 Rails	\$ 70 - \$ 130
48" High Protective "Highway Type" Barrier Rail System w/2 Rails	\$ 70 - \$ 135
18" High Protective "Highway Type" Barrier Rail System w/1 Rail	\$ 35 - \$ 55

Construction Costs: (per square foot) Excludes Site Work

General Warehouse

22' - 26' Clear	\$ 65 - \$ 85
Up to 50'	\$ 87 - \$ 114
Refrigerated-Add	\$ 100 - \$ 120
Office Building (basic)	\$ 100 - \$ 130

Maintenance Platforms/Lifts

Safety Platform-Mounts to Fork Lifts	\$ 500 - \$ 1,100
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High Platform Maintenance Lift

(powered lift, non-powered horizontal travel)

Platform Height 15'	\$ 5,500 - \$ 6,500
Platform Height 20'	\$ 6,800 - \$ 7,500
Platform Height 24'	\$ 7,800 - \$ 9,000
Platform Height 28'	\$ 8,700 - \$ 11,000

Stretch Wrapping

Robotic Pallet Wrapper-Mobile	\$ 12,000 - \$ 14,000
Semi-Automatic Turn-Table	\$ 6,000 - \$ 13,000

Ceiling Mounted Air Circulation Fans

24' Diameter, covers 20,000 sq.ft.	\$ 4,500 - \$ 5,100
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DECIBEL SOUND LEVELS

Note: OSHA recommends ear protection for sound levels at and above 90 decibels, depending on duration - visit www.osha.gov for more detailed information. We've included a list below to give you an idea of the decibel levels of various common sounds and noises:

Decibel Levels	Example Sound Level
50	Light traffic, normal conversations, quiet office
60	Air conditioners at 20 feet, sewing machine
70	Vacuum cleaner, hair dryer, noisy restaurant
80	Average city traffic, garbage disposal, alarm clock at 2 feet

The Following Noises Can Be Dangerous Under Constant Exposure

90	Subway, motorcycle, truck traffic, lawn mower
100	Garbage truck, chain saw, pneumatic drill
120	Rock band concert in front of speakers, thunderclap
140	Gunshot blast, jet plane
180	Rocket launching pad

TYPICAL OFFICE SPACE REQUIREMENTS

Square Feet

Offices

President	250 - 400
Vice President	150 - 250
Manager/Executive Assistant	100 - 150
Clerical Manager/Supervisor	50 - 100

Per Person (includes aisles)

Clerical Pool	80 - 100
Secretary/Clerk	50 - 100
Reception Room	125 - 250
Library (4-6 seats)	175 - 450
Conference Room (per person)	25 - 30
Dining Area (per person)	15 - 20

PALLET STORAGE SPACE ESTIMATES

Expressed in Square Feet Per Pallet Position

Pallet Stack Height 3 4 5 6 7

Counter Balance Trucks (12' Aisles)

Selective Rack	16.9	12.7	-	-	-
3 Deep Floor Stacks Or Drive-In	11.3	8.4	-	-	-
4 Deep Floor Stacks Or Drive-In	10.4	7.8	-	-	-
5 Deep Floor Stacks Or Drive-In	9.8	7.4	-	-	-
6 Deep Floor Stacks Or Drive-In	9.5	7.1	-	-	-

Narrow Aisle Reach Trucks (9'- 6" Aisles)

Selective Rack	14.9	11.1	8.9	7.4	-
2 Deep Push-Back	10.9	8.2	6.6	5.5	-
3 Deep Push-Back	9.6	7.2	5.8	4.8	-
4 Deep Push-Back	9.0	6.7	5.4	4.5	-

Narrow Aisle Deep Reach Trucks (10' Aisles)

Double Deep Rack	11.1	8.4	6.7	5.6	-
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Vna Turret Truck (6' Aisles)

Selective Rack	12.5	9.3	7.5	6.2	5.3
2 Deep Push-Back	9.9	7.4	5.9	4.9	4.2
3 Deep Push-Back	9.0	6.8	5.4	4.5	3.9

Note: Space estimates include access & cross aisles; pallet storage utilization not included

LIGHTING LEVEL RECOMMENDATIONS

Use the Following Light Levels
(In Foot Candles @ 5' Above Floor)

Type of Space	2-5	10	20	30	50	100	150	200	300	500	1000
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Office

Stairs, Elevator, Corridors	X	X	X								
Conference Rooms			X	X	X						
Office, General			X	X							
Office, Accounting			X	X	X	X					
Office, Engineering, Technical				X	X	X	X	X			

Manufacturing

Bench Work			X	X	X	X					
Assembly, Coarse					X	X	X	X			
Assembly, Fine								X	X	X	

Machine Work

General			X	X	X						
Fine								X	X	X	X

Warehousing

Picking, Sorting			X	X	X						
Pallet Handling		X	X								
Loading/Unloading Trucks		X	X								

Inspection

General			X	X	X	X					
Detailed						X	X	X	X	X	
Value Added			X	X	X	X					
Services											

Outdoor

Parking Lots	X										
Storage Yards, Active			X								
Dock Areas		X	X								

Notes:

Lighting Adjustments Based on Age:

Under 40 - Lower Range

40 - 55 Middle Range

Over 55 - Upper Range

OPERATING RATES

Note: These rates are broad estimates based on experience in a wide variety of applications. There are many variables that must be considered, such as; product slotting, travel distances, case weight, the use of paper, RF or voice, training, opportunity to dual cycle, carry multiple pallets in a move, etc.

Fork Truck Pallet Movement

	Lower Range	Upper Range	Units
Counter-Balance	10	15	pallets/hour
Narrow Aisle Reach	8	20	pallets/hour
Man-Up Turret	12	20	pallets/hour
Man-Down Turret	15	25	pallets/hour

Narrow Aisle

Articulating	8	15	pallets/hour
Stacker Crane	24	30	pallets/hour

Order Picking (Cases)

Pick-to-Cart	25	60	cases/hour
Pick-To-Order-Picker Truck	30	125	cases/hour
Pick-to-Powered Pallet Jack	50	180	cases/hour
Case Pick-to-Conveyor	250	450	cases/hour

Order Picking (Pieces)

Pallet to Container/Conveyor	60	150	cases/hour
Pallet to Container/Cart	30	100	cases/hour
Carousel-to-Container	200	400	lines/hour
Flow Rack-to-Container	100	200	lines/hour
Bin-Shelves-to-Container	60	150	lines/hour

Truck Load/Unload

Unload Floor To Conveyor	350	400	cartons/hour
Handstack Into Trailers	150	300	cartons/hour
Palletizing From Conveyor	300	350	cartons/hour

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PROJECT ELAPSED TIME ESTIMATES

Note: The following guidelines are averages based upon a wide variety of projects - small, medium and large. Actual timing will depend upon the size and complexity of the solution.

ASRS

	Weeks
Vendor Bid Response	3 - 4
Management Decision	4 - 5
Preliminary Engineering/Approval Drawings	4 - 5
Detail Design and Fabrication	10 - 12
Transport and Consolidation of Materials	4 - 5
Installation	12 - 15
Total	37 - 46

Pallet Racks (nominal 20,000 pallet positions)

Vendor Bid Response	2 - 3
Management Decision	4 - 5
Engineering Calculations and Approval	5 - 7
Township Approval	4 - 5
Installation	5 - 6
Total	20 - 26

Note: West Coast projects typically take longer.

Lift Trucks

Vendor Bid Response	2 - 3
Management Decision	4 - 5
Supplier Lead Time & Delivery	10 - 16
Training	1 - 2
Total	17 - 26

Note: Lift Truck options could add 4 to 6 weeks.

Conveyor System

Vendor Bid Response	3 - 4
Management Decision	4 - 5
Electrical & Mechanical Engineering	2 - 3
Equipment Fabrication	6 - 8
Equipment Delivery	1 - 2
Installation	4 - 6
System Testing, Training & Acceptance	1 - 3
Total	21 - 31

TranSystems is a leading professional services consulting firm, focused exclusively on developing solutions for clients that optimize supply chain and transportation performance.

We are driven to provide the highest level of client satisfaction, while enhancing the infrastructure that moves people and products most efficiently and cost-effectively.

As experienced professionals dealing daily with the art and science pertaining to the movement, storage and control of goods and information within the supply chain, we strive to achieve these fundamental goals for our clients:

- **Reduced operating costs**
- **Increased productivity and control**
- **Improved customer service levels**



Index:

Accumulation Conveyor.....	6
Automated Guided Vehicles (AGV's).....	5
Barrier Rail Systems.....	14
Battery Charging.....	5
Benches, Assembly.....	13
Benches, Packing.....	13
Benches, Production.....	13
Cabinets.....	11
Cabinets, Flammable Storage.....	11
Cantilever Rack.....	9
Carton Flow Rack.....	10
Carts, Picking.....	8
Carts, Stocking.....	8
Chairs.....	13
Closed Type Shelving.....	10
Construction Costs.....	15
Conveyor System Cost Breakdown.....	7
Conveyor, Carton.....	6,7
Conveyor, Trash.....	6,7
Crane, Jib.....	7
Cranes, Gantry.....	7
Decibel Sound Levels.....	15
Dividers, Drawer.....	11
Dock Boards.....	12
Dock Equipment.....	12
Dock Fans.....	12
Dock Levelers.....	12
Dock Lights.....	12
Dock Plates.....	12
Dock Seals.....	12
Dock Shelters.....	12
Doors.....	14
Double Deep Rack.....	8
Drawer Dividers.....	11
Drawers, High Density.....	11
Drive-In Rack.....	8
Drive-Thru Rack.....	8
Drum Dollies.....	7
Drum Dumper.....	7,8
Drum Hand Truck.....	8
Electric Trucks.....	4
Flammable Storage Cabinets.....	11
Garment Rail.....	7
General Facility.....	13-15
Gravity Conveyor.....	6
Gravity-Flow Deck Track.....	10
Handling Equipment.....	4-8
Hanging Garment Equipment.....	7
High Density Drawers.....	11
Hoists.....	7

Index continued:

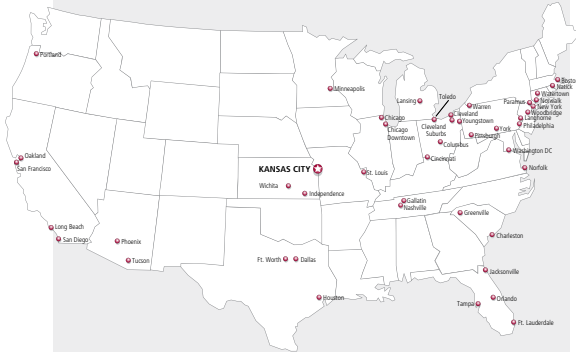
Industrial Seating.....	13
Ladders, Rolling.....	8
Lift Truck Options.....	5
Lift Trucks, Electric.....	4
Lift Trucks, Propane.....	5
Lift, Maintenance.....	15
Lighting Level Recommendations.....	17
Lockers.....	11
Metering Belts.....	6
Mezzanine.....	14
Mezzanine Safety Gates.....	14
Misc. Handling Equipment.....	7,8
Office Space Requirements.....	16
Open Type Shelving.....	10
Open Welded Wire Shelving.....	11
Operating Rates.....	18
Packing Tables.....	13
Painting.....	13
Pallet Flow Rack.....	9
Pallet Jacks, Electric.....	4
Pallet Jacks, Manual.....	4
Pallet Lifts.....	8
Pallet Positioners.....	8
Pallet Rack.....	8,9
Pallet Rack Options.....	9
Pallet Storage Space Estimates.....	16
Pallet Support Bars.....	9
Pallet Trucks, Electric.....	4
Pallet Trucks, Manual.....	4
Pallet Trucks, Propane.....	4
Pallets, Plastic.....	9
Picking Technologies.....	2
Picking, RF.....	2
Pick-to-Light.....	2
Platform Trucks.....	8
PLCs.....	7
Pre-Engineered Implant Structured.....	14
Project Elapsed Time Guidelines.....	19
Propane Trucks.....	5
Push Back Rack.....	9
Put-to-Light.....	2
Rack, Cantilever.....	9
Rack, Carton Flow.....	10
Rack, Double Deep.....	8
Rack, Drive-In.....	8
Rack, Drive-Thru.....	8
Rack, Push Back.....	9
Rack, Selective.....	8
Rack, Wide Span.....	10
Racks, Drum Stacking.....	10
Rail Guidance.....	5

Index continued:

Rail, Barrier.....	14
Rates, Operating.....	18
Safety Gates, Mezzanine.....	14
Scales.....	5
Scissor Lifts.....	8
Sealing.....	13
Seals, Dock.....	12
Security Equipment.....	3
Security, Access Control.....	3
Security, Intrusion Detection.....	3
Security Partitions.....	14
Security, Physical Barriers.....	3
Security, Screening.....	3
Security, Video System.....	3
Selective Rack.....	8
Shelters, Dock.....	12
Sorter Control Systems.....	7
Sorter Induction Points.....	6
Sorters, Carton.....	6
Sorters, Unit.....	6
Stacking Frames.....	9
Steel Lockers.....	11
Stock Carts w/Ladder.....	8
Stools.....	13
Storage Equipment.....	8- 11
Tables, Assembly.....	13
Tables, Packing.....	13
Time Guidelines.....	19
Traffic Rail.....	7
Trailer Switching Tractors.....	6
Trolleys.....	7
Vehicle Restraint Systems.....	12
Voice Directed Software.....	2
Voice, Multimodal Terminal.....	2
Voice, Recognition Headset.....	2
Wide Span Rack.....	10
Windows.....	14
Wire Guidance.....	5
Wire Partitions.....	14
Workstations.....	13
Zero Pressure Conveyor.....	6

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Our special thanks to the following organizations for their contributions to this publication.

- AJ Jersey
- Alternative Technologies
- Atlantic Handling Systems
- Autoquip
- Century Conveyor
- Cisco-Eagle
- Custom Industrial Products
- Dematic
- Diamond Phoenix (now System Logistics)
- Intelligrated
- Jersey State Equipment
- Kardex Remstar
- Lucas Systems, Inc.
- Mid-Pacific Industries
- Patterson Fan Company
- Pro Pack Group
- Raymond of New Jersey
- S&S Systems
- Total Attachments
- Tri-Lift New Jersey
- Tygard Machine & Mfg Co.
- Unarco
- Westfalia Technologies

Notes:

Lined area for notes.