

REFRIGERATED BUILDINGS THAT LAST

When deciding what kind of construction is best for a large refrigerated building, keep in mind that only a quality structure will deliver reliable performance for the many years your building will be in service.

With many thousands of refrigerated building installations to our credit, Bally is the manufacturer you can rely on. When you choose one of our refrigerated structures for a warehouse, distribution, processing or manufacturing application, you get the benefit of that experience. Expect design help, on-time delivery, quick assembly, inherent panel strength, attractive appearance, versatility and long life – it's all part of your Bally building.

We use the latest design techniques to plan our structures for maximum economy, convenience and strength. This is only part of our comprehensive engineering service to architects, contractors, and end users. It also includes guideline drawing detailing slabs, structural steel and roofs, and complete installation instructions. And it's supported by an experienced in-house team of engineers, estimators and designers.

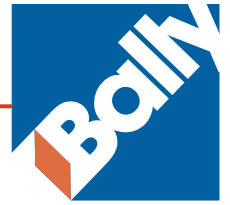
Added support comes from Bally's expert design-build field representatives, people who've dealt with almost any situation imaginable in refrigerated building construction.

As a result of all these efforts, buyers can expect a warehouse that's installed fast – without a hitch – and cuts maintenance and operating costs for years to come.



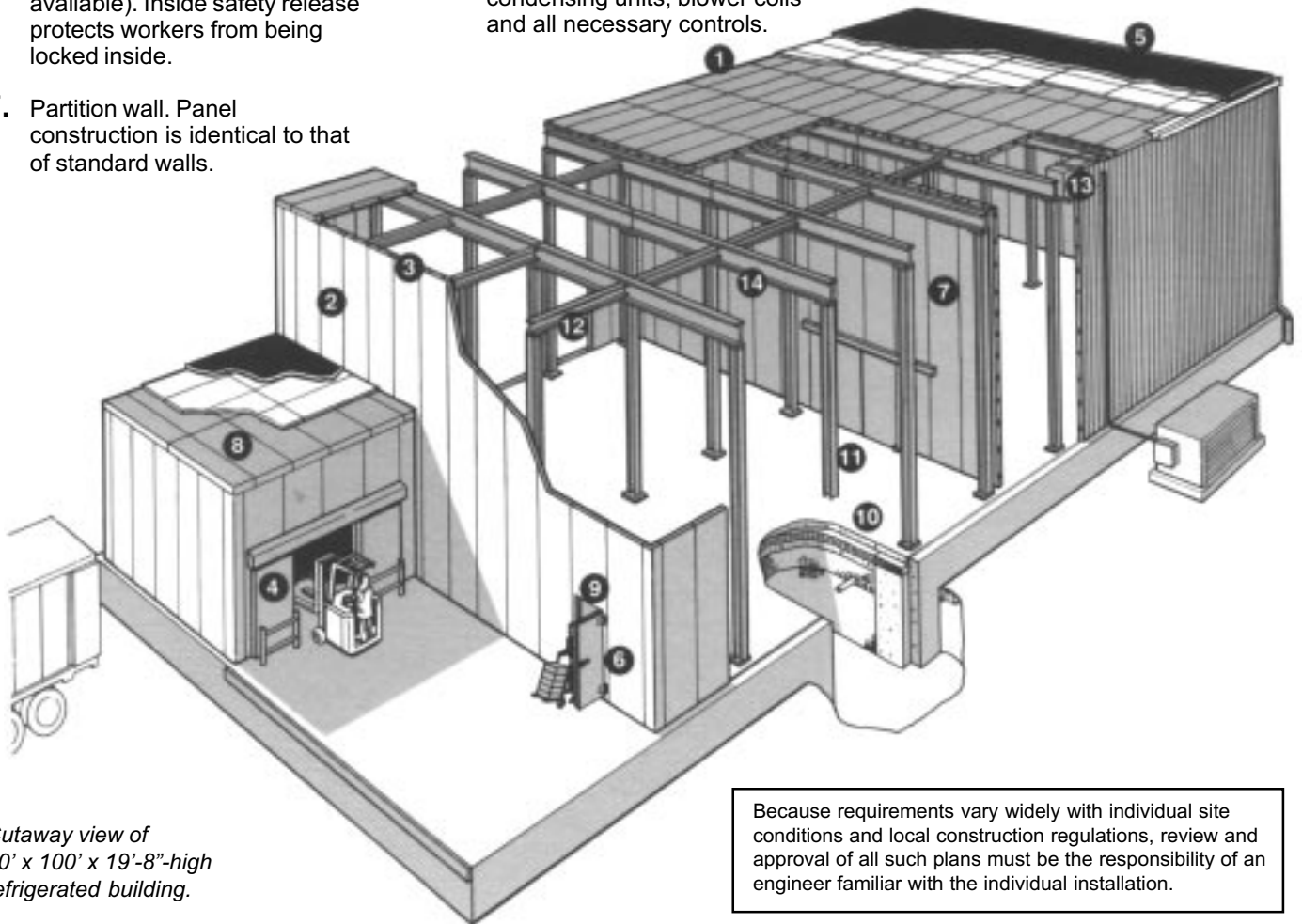


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DESIGN FEATURES

1. Bally standard-size, pre-engineered panels.
2. Metal interior and exterior skins. See Section 1 for available finishes.
3. 4" -thick (optional 5" - or 6" - thick) urethane insulation foamed-in-place.
4. Manual or power-operated sliding entrance door.
5. Built-up insulated roof by others. Also available for sizes up to 34'7" x 34'7" – Bally-supplied membrane roof. See Section 4 for details.
6. Hinged 36' x 78" self-closing entrance door (other sizes available). Inside safety release protects workers from being locked inside.
7. Partition wall. Panel construction is identical to that of standard walls.
8. Vestibules, when required, are assembled from standard panels.
9. Anti-condensate heaters concealed beneath doorjamb prevent condensation or frost formation.
10. For installations requiring a built-in floor, recommended insulation is slab urethane.
11. Columns support load-bearing beams.
12. Lateral bracing.
13. Remote refrigeration system. Top- and side-mounted self-contained types are also available. Systems include condensing units, blower coils and all necessary controls.
14. Type and amount of steel support in roofs and walls varies widely according to site conditions and local construction regulations. Review and approval of steel must be the responsibility of an engineer familiar with the installation. All buildings must account for local wind and snow conditions as applicable.

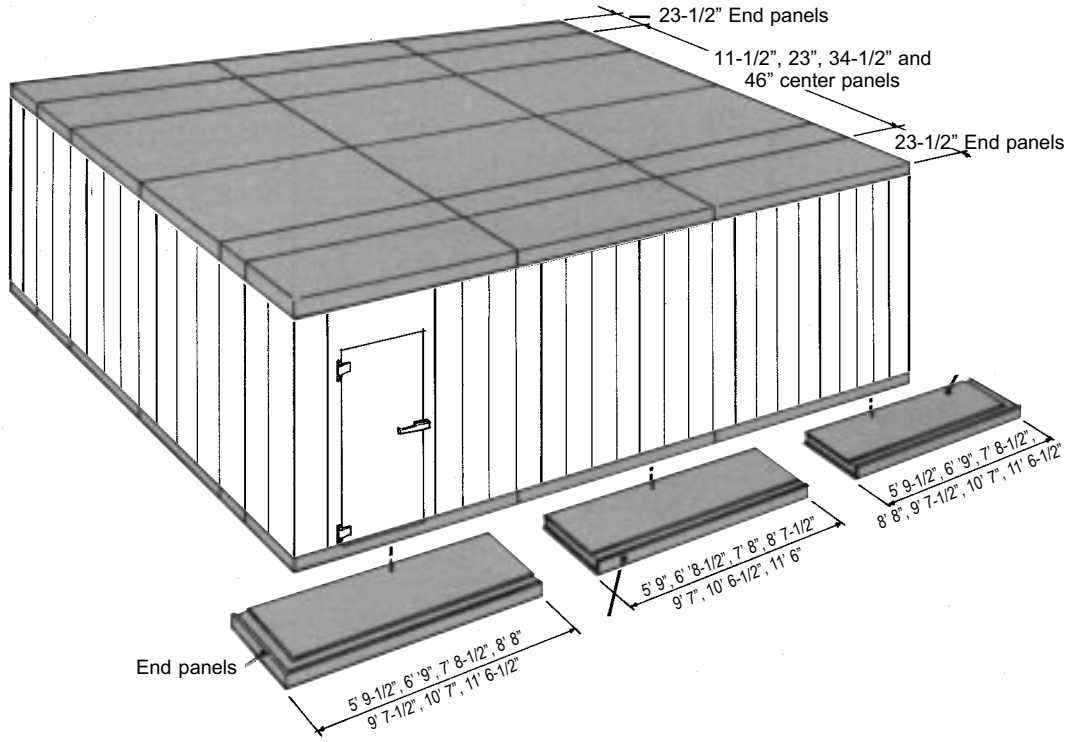


Cutaway view of 50' x 100' x 19'-8"-high refrigerated building.

Because requirements vary widely with individual site conditions and local construction regulations, review and approval of all such plans must be the responsibility of an engineer familiar with the individual installation.

DESIGN FEATURES - CONTINUED

When the width and length of refrigerated buildings exceed 18' indoors or 12' outdoors (18' single span reinforced ceiling panels are available for 20 lb. per sq. ft. snow load areas), multi-span ceiling and floor panels are required. They are made in 23", 34-1/2" and 46" widths. Lengths are as indicated in the illustration below.



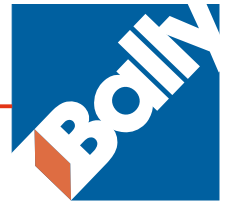
Available Heights*

Panel Finish	Location	Single Panel Heights **																							
		5'10"	6'10"	7'10"	8'10"	9'10"	10'0"	11'4"	12'4"	13'4"	14'4"	15'4"	16'4"	17'4"	18'4"	19'4"	19'8"	20'8"	21'8"	22'8"	23'8"	24'8"	25'8"	26'8"	27'8"
Aluminium																									
Patterned or White Embossed	Indoor	X																							
	Outdoor	X																							
Steel																									
Embossed Galvalume	Indoor	X																							
	Outdoor	X																							
Stainless	Indoor	X																							
	Outdoor	X																							
Smooth White Poly or Embossed White Profile	Indoor	X																							
	Outdoor	X																							
190 White Embossed	Indoor	X																							
	Outdoor	X																							

* Other warehouse heights available by "stacking" various height panels (consult factory for details).

** Heights shown are for vertical panel only, for overall height add thickness of appropriate floor and ceiling panels

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TOTAL ALLOWABLE UNIFORM LOAD* (LB/FT²) FOR STANDARD BALLY VERTICAL AND CEILING PANELS AND SPECIAL REINFORCED CEILINGS

Wall Panel Length	.026" Steel			.038" Aluminum		
	4"	5"	6"	4"	5"	6"
6'10"	72	92	112	64	84	104
7'10"	60	78	95	53	70	87
8'10"	52	67	82	44	59	73
9'10"	45	58	72	37	50	63
10'10"	39	51	63	31	43	54
11'4"	36	48	57	29	40	51
12'4"	32	42	48	25	34	45
13'4"	28	37	41	21	30	38
14'4"	25	32	35	19	26	34
15'4"	22	28	31	16	23	30
16'4"	20	25	27	14	20	26
17'4"	18	22	24	12	18	24
18'4"	16	20	22	11	16	21
19'4"	14	18	19	10	14	19

Ceiling Panel Length	.026" Steel			.038" Aluminum		
	4"	5"	6"	4"	5"	6"
5'10"	69	88	107	64	83	102
6'9-1/2"	57	73	89	52	67	83
7'9"	48	62	77	42	56	69
8'8-1/2"	41	53	66	35	47	59
9'8"	36	47	57	29	39	50
10'7-1/2"	31	41	51	25	34	43
11'7"	28	36	43	21	29	37

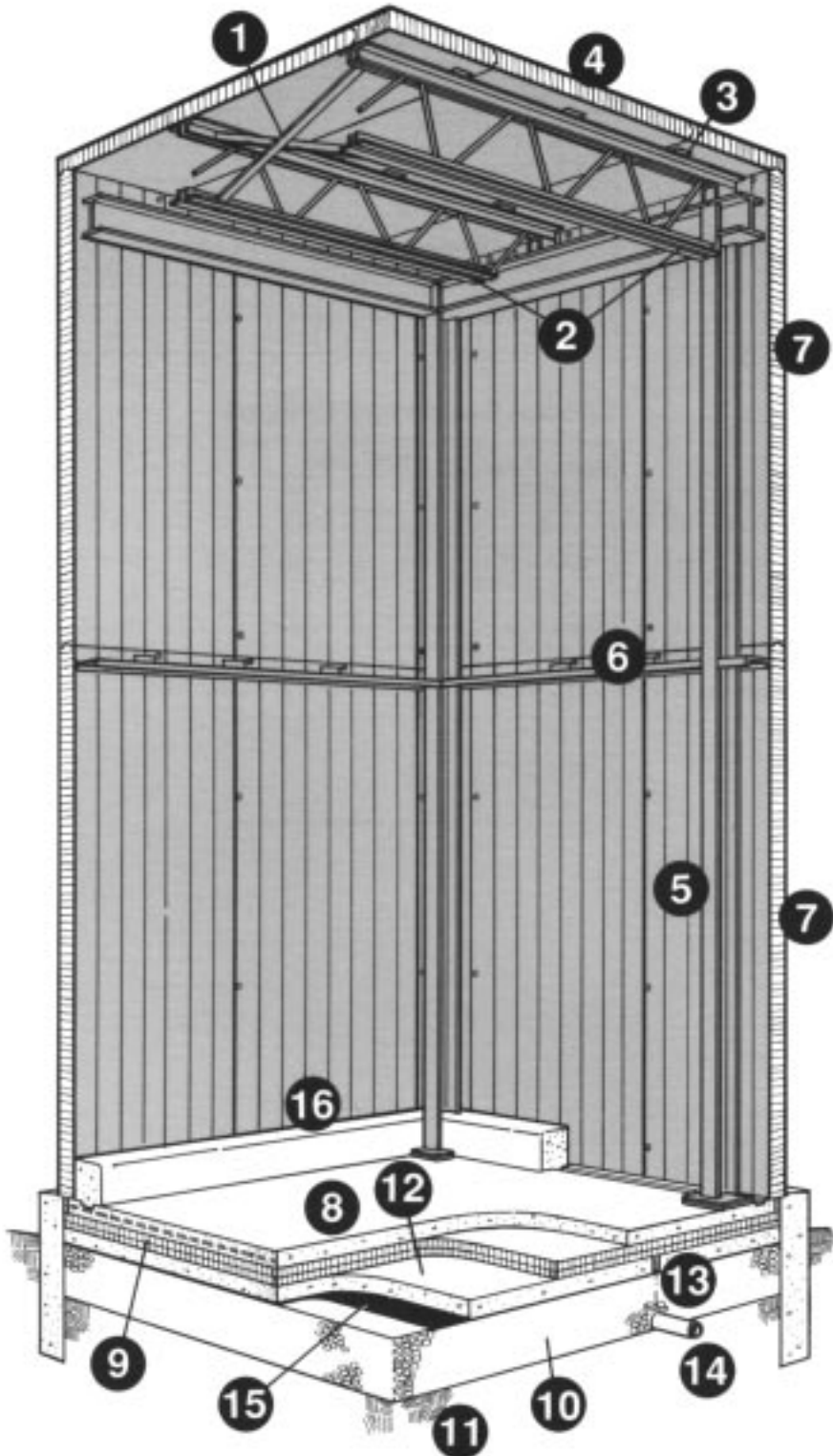
Special Reinforced Ceilings

Ceiling Panel Length	.026" Steel	
	5"	6"
9'8"	102	196
10'7-1/2"	84	150
11'7"	70	114
12'6-1/2"	60	90
13'6"	52	72
14'5-1/2"	44	61
15'5"	38	49
16'4-1/2"	34	42
17'4"	30	37

* Allowable load based on the following criteria:
 (1) Skin buckling with a safety factor of 2.25
 (2) Deflection of L/240 for ceiling panels or L/180 for vertical panels
 (3) or, Core Shear with a safety factor of 3.0

DESIGN FEATURES - CONTINUED

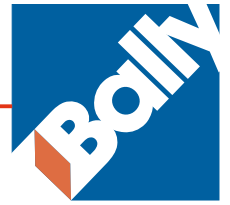
CUTAWAY VIEW SHOWING TYPICAL BUILDING CONSTRUCTION



1. Lateral bracing as required.
2. Web joists in required size.
3. Ceiling anchors located at all joints.
4. Ceiling panels (with exterior access holes where steel is required).
5. Supporting columns.
6. Horizontal steel girts when required.
7. Vertical panels (single span or multi-tier).
8. 4" -thick reinforced concrete wearing floor.
9. Two layers of 2" -thick, built-in sheet urethane. Staggered joints.
10. 2" rock aggregate, 15" deep. Freezers only.
11. Hard-tamped earth.
12. 4" -thick concrete sub-slab (piers and footings required if installed outdoors).
13. 1" drain holes for water seepage.
14. 4" or 6" dia. perforated drain and ventilation pipes spaced on 6' centers, running the entire length of the refrigerated warehouse floor. See Section 3, Page 4.
15. Watertight seal formed by asphalt paper or 6 mil polyethylene sheets. Sealed joints.
16. Optional concrete-reinforced curb poured after building installation is complete.

Bally refrigerated building with built-in floor insulation. Because individual site requirements vary, all floor details must be reviewed by an engineer familiar with the specific installation.

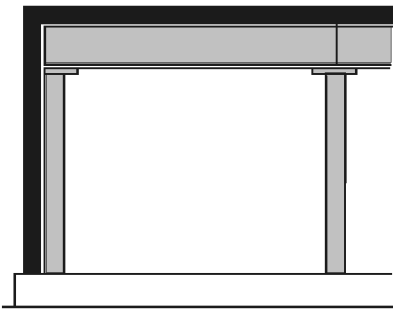
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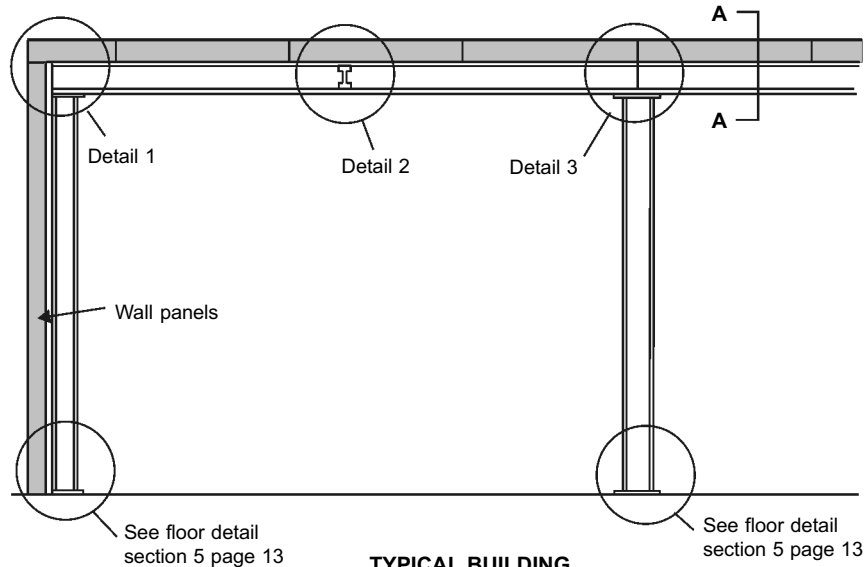
STRUCTURAL SUPPORT

Refrigerated buildings requiring structural steel must be approved by state or local building authorities as to type, size and weight of steel recommended by Bally. Recommendations are based on (a) building dimensions, (b) location, (c) contemplated use of building. Four methods of ceiling panel support are shown. "method 1" uses "I" beams. "Method 2" uses open-web steel. "Method 3" employs support from overhead structures. "Method 4" features self-supporting ceilings.

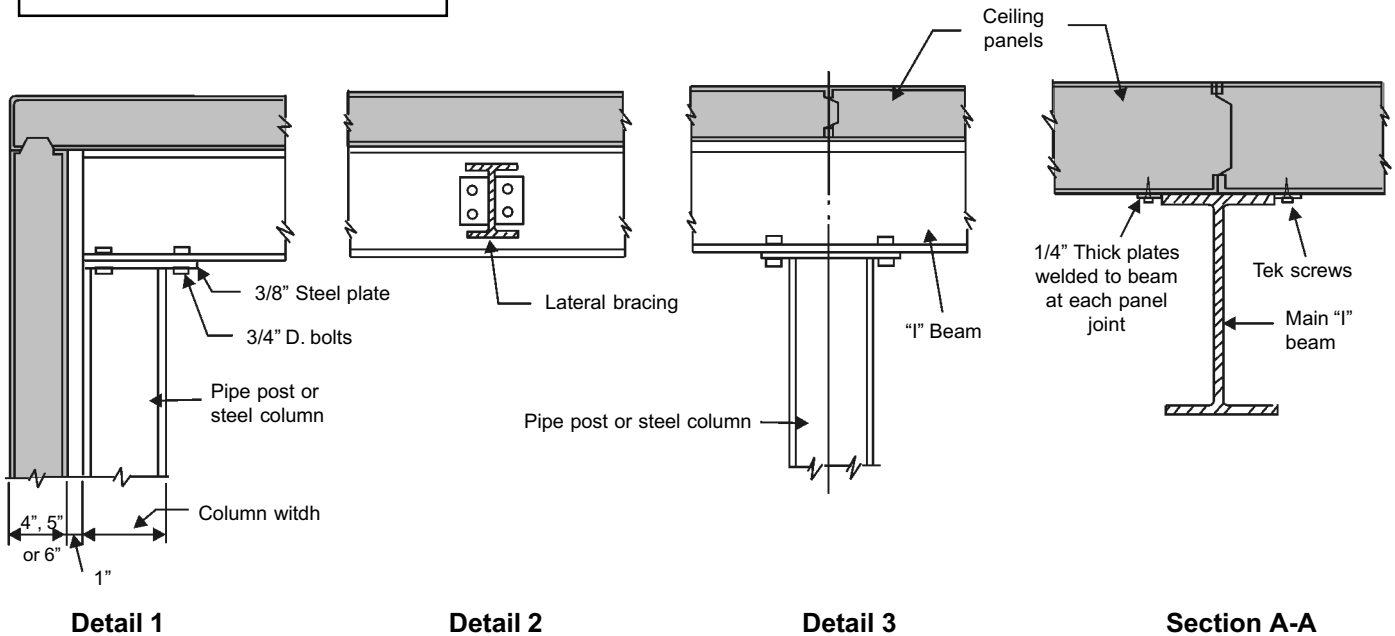
Method 1 - "I" Beam Type (Indoors or Outdoors)



Ceiling panels are supported by conventional structural steel which may be designed to meet local conditions.

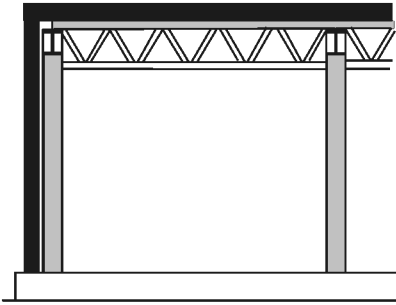


Exterior ceiling panel Speed-lok® access holes must be specified for this type of construction.



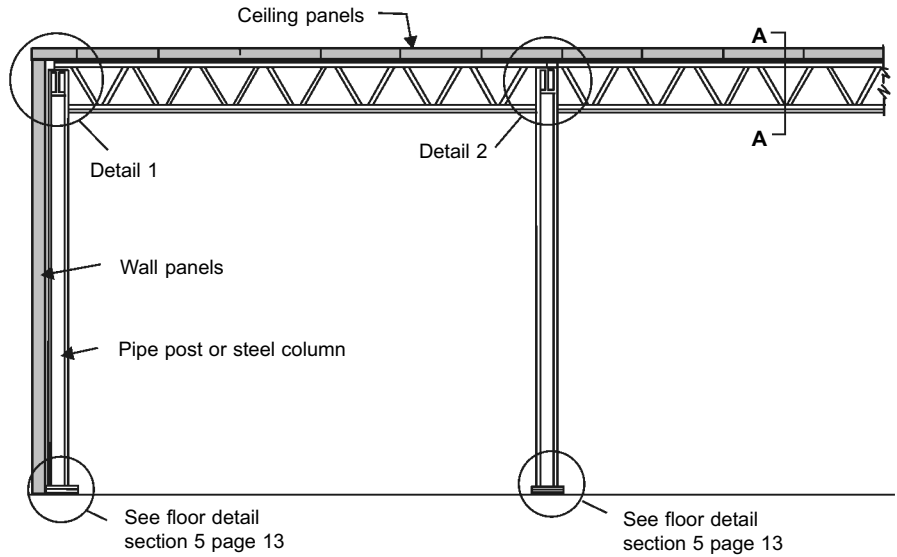
STRUCTURAL SUPPORT - CONTINUED

Method 2 - Open Web Type (Indoors or Outdoors)

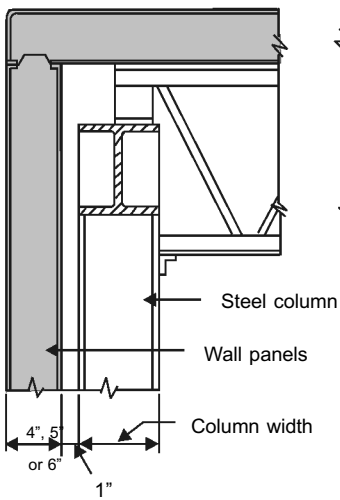


Ceiling panels are supported by conventional structural steel which may be designed to meet local conditions.

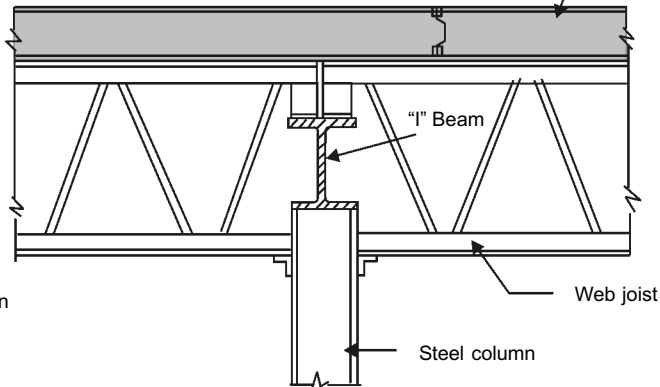
Exterior ceiling panel Speed-lok® access holes must be specified for this type of construction



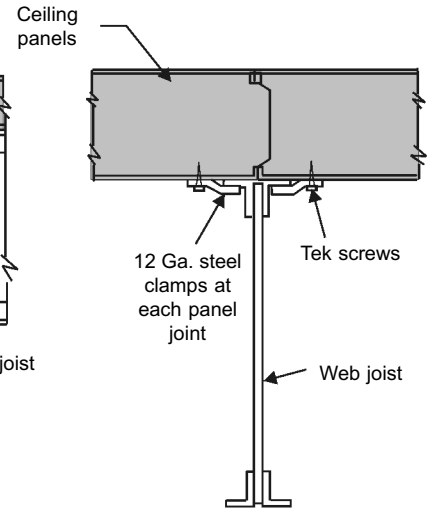
TYPICAL BUILDING SECTION VIEW



Detail 1

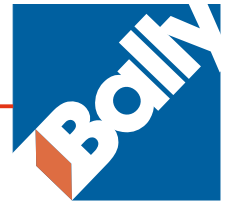


Detail 2



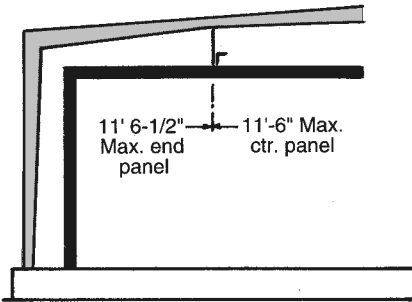
Section A-A

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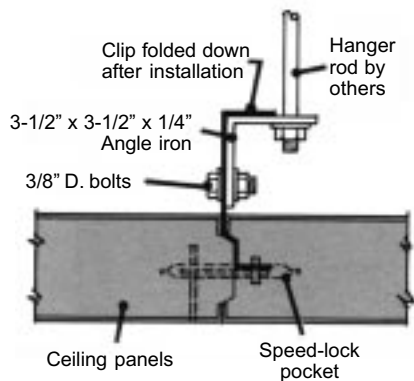


STRUCTURAL SUPPORT - CONTINUED

Method 3 – Suspended Ceilings – Indoors Only



Ceiling panels of refrigerated buildings installed indoors can sometimes be supported from overhead structural steel. This provides a column-free interior. (Existing building steel must be reviewed for adequate support.)

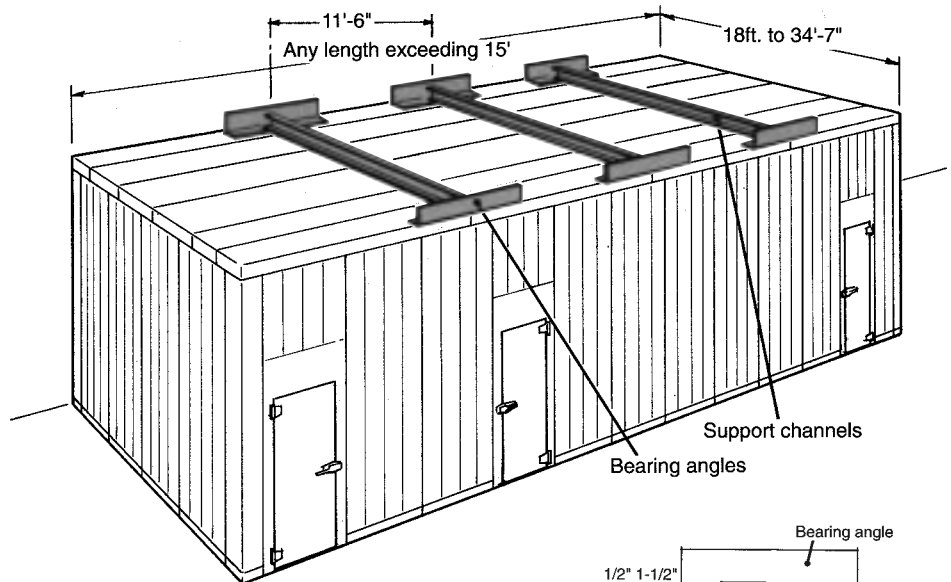


DETAIL SHOWING SUSPENDED CEILING PANELS FROM BUILDING STRUCTURE

Method 4 – Self-supporting Ceilings – Indoors Only

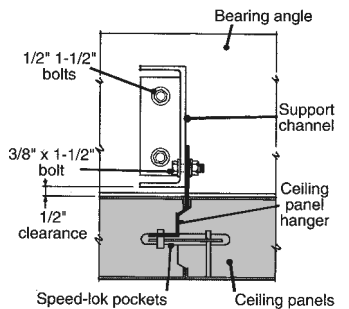
Channels are placed directly over ceiling panel joints, and ceiling panels are suspended from these channels by “hangers” spaced every 23” and secured with 3/8” D x 1 – 1/2” bolts. The channels transmit the weight of the ceiling to the wall panels where it is distributed evenly by load-bearing angles. Temporary supports inside the building must be provided when this supporting system is being installed.

This type of construction is designed to support the ceiling panels only. Evaporator coils cannot be suspended from these channels. Traffic on the ceiling panels must be kept to a minimum during installation, and merchandise cannot be stored on top of the refrigerated buildings.

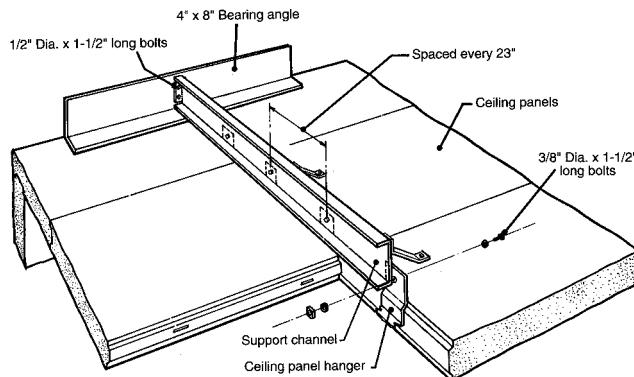


PERSPECTIVE VIEW

SECTION VIEW



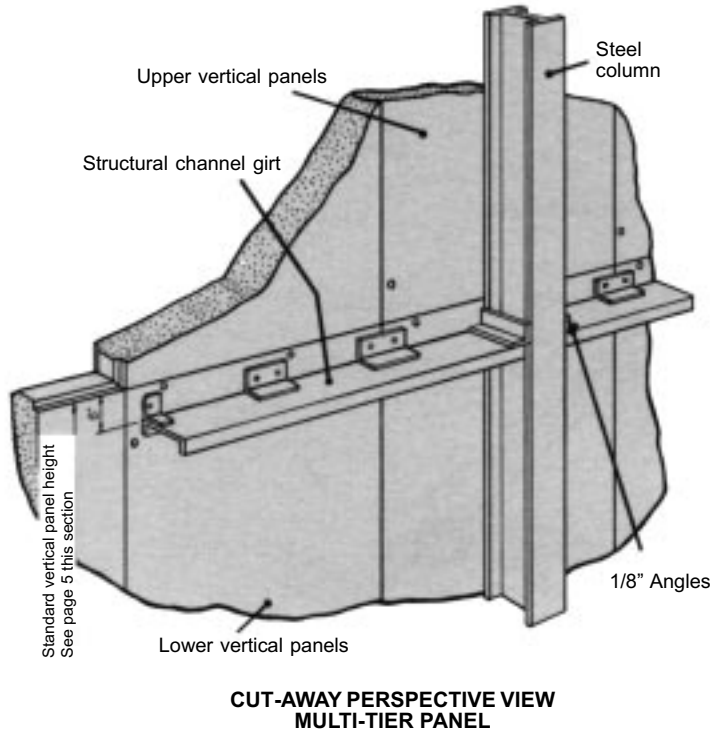
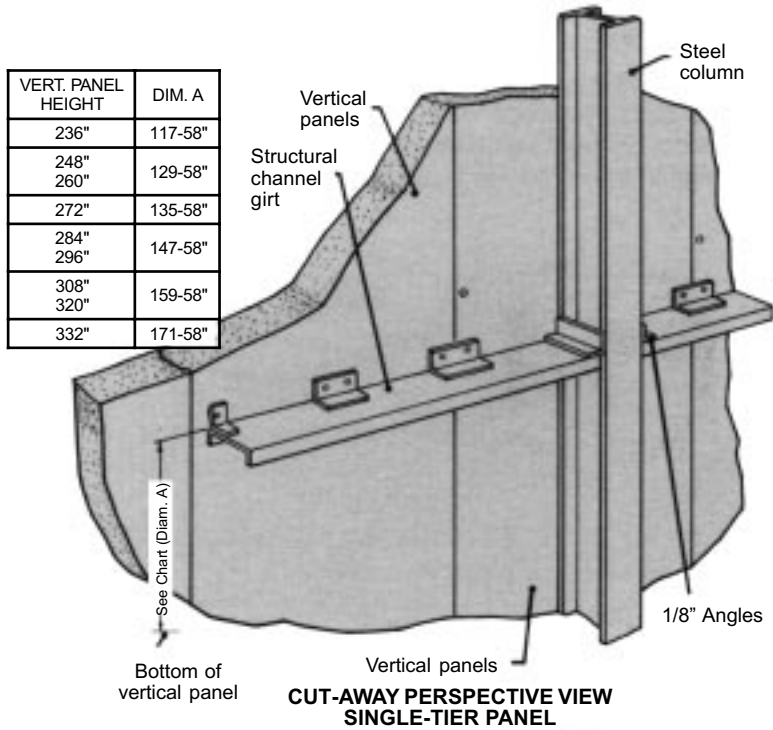
CUTAWAY PERSPECTIVE VIEW



STRUCTURAL SUPPORT - CONTINUED

Vertical Panel Support

When outdoor refrigerated buildings are more than 20'-high, vertical panels must be fastened to horizontal steel girts which extend from steel column to steel column. Refer to Page 4 of this section for maximum vertical panel height for various finishes.



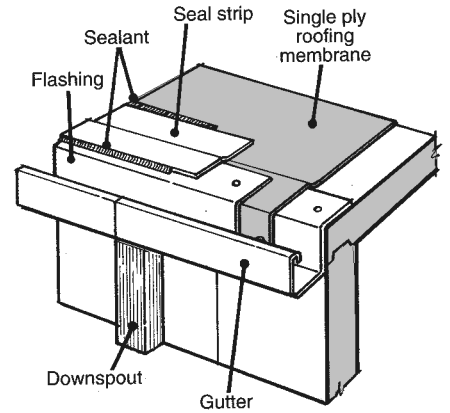
ROOFS

It is essential to provide protection against moisture leakage between ceiling panels. Some users choose wood or steel-sloped structures, which can be built on the job site to architectural specifications.

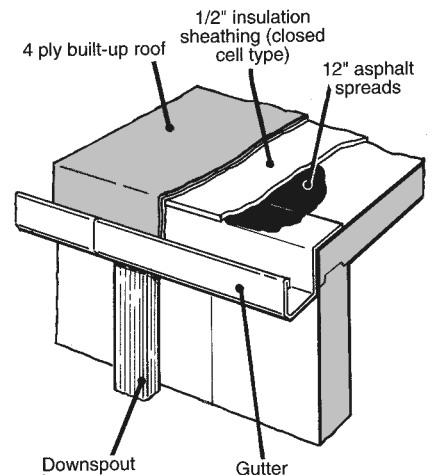
For refrigerated buildings up to 34'7" wide, in any length, a Bally pre-engineered aluminum roof (as shown in Section 4, Page 7) or a Bally membrane roof as shown below are the most economical.

For refrigerated buildings wider than 34' 7" Bally recommends a built-up roof as shown below.

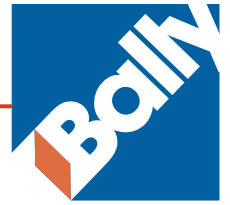
Membrane Type



Built-up Type



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ARCHITECTURAL PROFILE PANELS

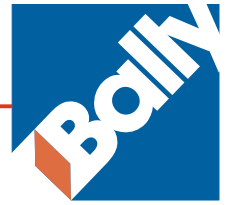
Tough, good-looking profile panels provide a unified, pre-insulated system that takes the place of conventional panels plus add-on façade.

Panels are constructed with outer skins of steel – pre-painted white and roll-formed to a distinctive ribbed configuration – and steel interior skins. This fully integrated construction provides greater strength than flat-skinned panels

Premium-baked polyester exterior finishes yield long-term freedom from maintenance. Profile ribs are 3/8" high, spaced on 5-3/4" centers. Panels are available in 4', 5' or 6" thicknesses, in 23", 34-1/2" and 46" widths and a wide selection of heights up to 27'8".



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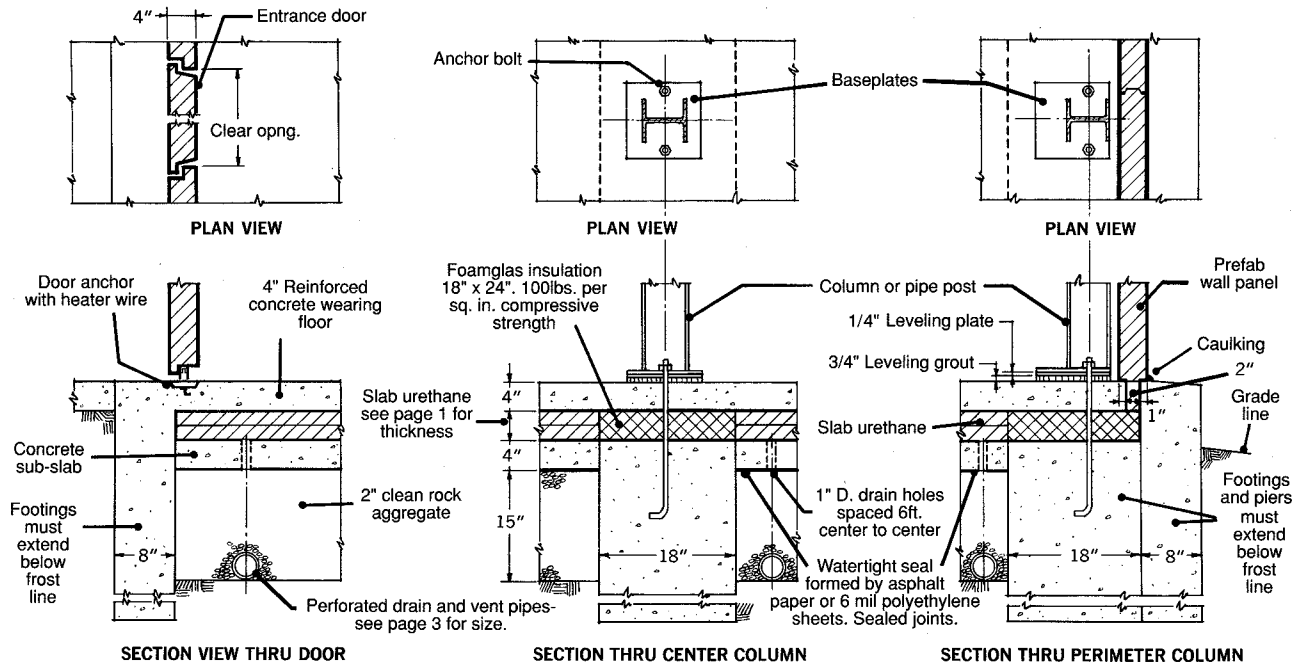


FLOOR CONSTRUCTION

Warehouse Floors

(Dimensions shown are for 4" thick panels; if 6" panels are used, adapt drawings accordingly.)

Warehouse with Built-in Insulation - Outdoor Installations



Warehouse with Built-in Insulation - Indoor Installations

