JENNMAR Specialty Products

JENNMAR
SPECIALTY PRODUCTS
A JENNMAR® AFFILIATE

559 Wardell Industrial Park Road
Cedar Bluff, VA 24609

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Equipment

Our plant is fully equipped with modern steel processing and fabricating equipment that includes:

Durma Press Brake.

Peddinghaus PCD 100 Computer Controlled Drill Line.

Koike Millennium Mastergraph Computer Controlled Burn Table.

Roundo Beam Bender.

Durma Shear.

JENNMAR® Specialty Products was created in 2007 in Cedar Bluff, VA to provide quality arch, corrugated and custom fabricated steel products for the mining, tunneling and civil construction industries. We are a full scale steel fabricator specializing in roll forming and coil processing along with structural beam bending.

JENNMAR Specialty Products staff includes civil, mechanical, and mining engineers, certified welders, quality technicians and an experienced management staff. Combined with our affiliates JM Steel and KMS (Keystone Mining Services), we can provide advanced ground control engineering and analysis to give you custom-designed, standing support products for your own specific mining, tunneling or civil construction applications.

Services

Custom Steel Fabrication

JENNMAR® Specialty Products manufacturing begins with efficient procurement of steel through our JM STEEL® facility, located on Nucor Steel's industrial campus near Charleston, South Carolina. JM STEEL's ultra-modern 120,000 ft2 facility is located next to Nucor's high quality 3 million ton per year hot and cold rolled steel mill. All types of square sets and bent arches are constructed of W sections of American Institute of Steel Construction (AISC) recommended A992 steel, which limits the yield stress to a range, rather than providing a minimum value. Steel that is specified by a minimum strength standard only can be too brittle for mining applications.

Roll Forming

Roll forming is ideal for economically producing high volumes of close tolerance parts with a broad range of geometries. The roll forming process passes a long strip of coiled metal through a series of incremental bends until a final cross-section profile is achieved.

Beam Bending

The ROUNDO Beam Bender is capable of providing customized bending of sections and beams for arches and other structural products used in mining, tunneling and civil construction projects.

Design and Engineering

Standing support design and selection ranges from direct manufacture of historically successful designs to detailed analysis of your particular conditions. KMS, JENNMAR's affiliate engineering company, has developed the Stress, Geologic and Support (SGS®) system that utilizes advanced finite element analysis to analyze and model stress, geologic conditions and support design.

The overall design steps of the SGS system are as follows:

- Evaluation of geological and stress conditions
- Square set or bent arch conceptual design
- Structural analysis
- Steel structural design using AISC method
- Moment connection design
- Numerical validation of design with Finite Element Methods
- Primary and supplemental support design (if required).

Information that is generally required from the customer is as follows:

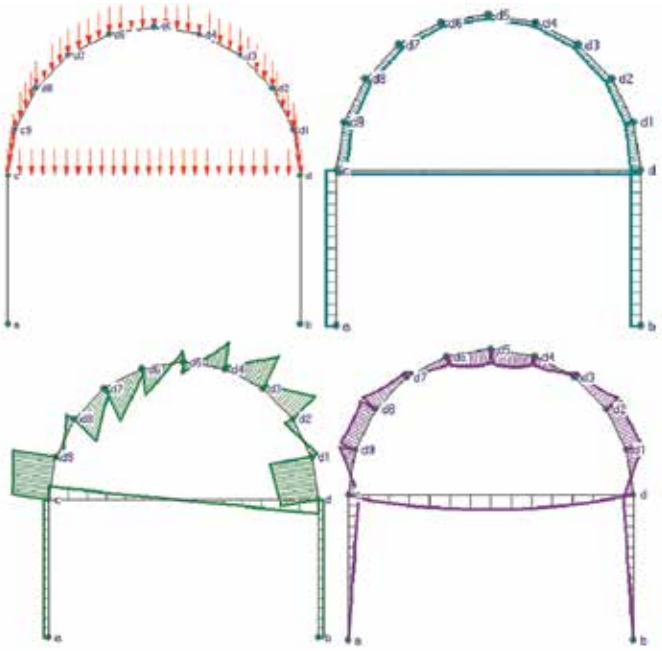
- Site location, history, adjacent mines, etc.
- Entry length, grade, orientation, size of opening
- Surface topology
- Local geologic data
- Geological structural maps
- Design expectations
- Minimum width and height of opening
- Allowable mid-point roof deflection
- Height of dead rock to be supported.

The combination of JENNMAR's unique standing support analysis methods and longstanding leadership in specialty bolt design and selection make us uniquely capable of assisting you in obtaining any necessary regulatory approvals.

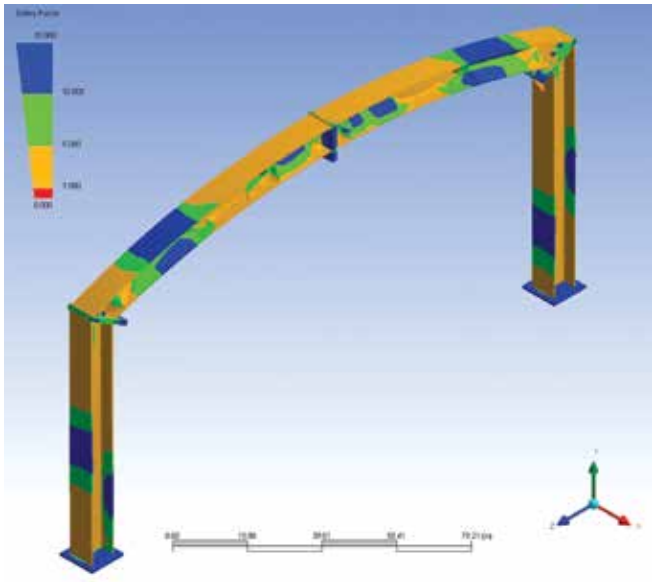
Custom fabrication of bent steel arches or square sets, including lagging, is conducted according to your required delivery schedule. Product delivery to your job site is provided on JENNMAR owned trucks. JENNMAR field representatives can help develop efficient installation procedures and provide onsite steel set installation training upon request. JENNMAR can also provide mining contractors who can install the supports for you.

Arch Support Systems

JENNMAR, in conjunction with its affiliate engineering company, Keystone Mining Services (KMS) can custom design arch support systems for most applications. Using 3-D modeling and finite element analysis enables us to dictate beam sizing and spacing as well as orientate the configuration of fasteners and butt plates.



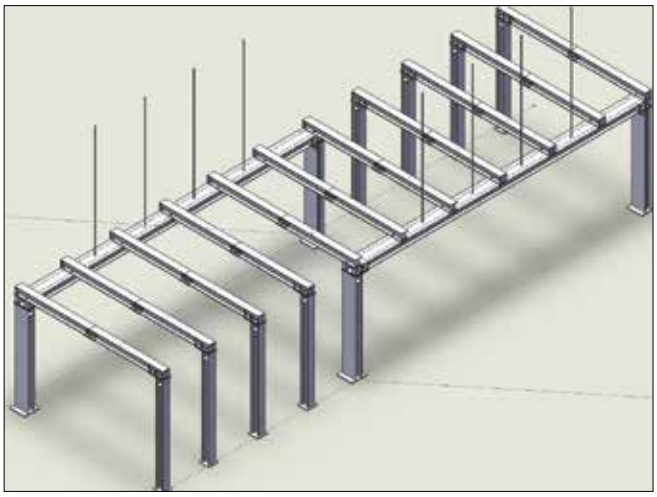
Structural Analysis



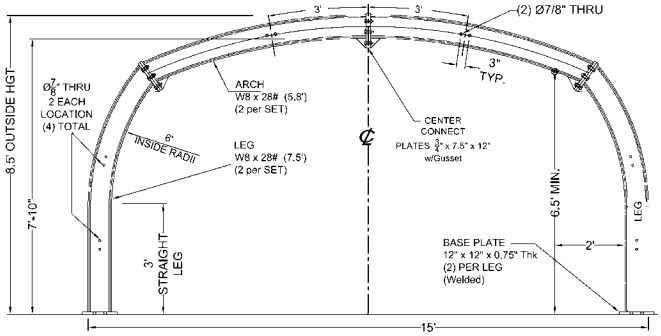
Numerical Modeling

Advantages

- Sound structural design
- Advanced steel design according to American Institute of Steel Construction (AISC) national standards
- Reliable moment connection, bolt and welding design
- Computerized steel manufacture equipment to ensure quality cutting, drilling and welding
- Complete accessories including V-decking lagging panel, tie rod, beam extension, leg extension, belt hanger, etc.
- Optimal design according to actual engineering requirements
- JENNMAR and KMS can quickly turn conceptual designs into actual products within a designated time period.
- Full technical support by KMS including design customization.
- Field installation training services.



Conceptual 3-D Modeling



Conceptual Engineering

Steel Sets and Tunnel/Shaft Rings

JENNMAR Specialty Products, in conjunction with our sister affiliate engineering company, Keystone Mining Services (KMS) can custom design arch and square set support systems as well as tunnel and shaft rings. We use 3-D modeling and finite element analysis to determine beam sizing and spacing as well as orientation and configuration of fasteners and butt plates.

Advantages

- Sound structural design
- Advanced steel design according to American Institute of Steel Construction (AISC) national standards
- Reliable moment connection, bolt and welding design
- Computerized steel manufacture equipment to ensure quality cutting, drilling and welding
- Complete accessories including V-decking lagging panel, tie rod, beam extension, leg extension, belt hanger, etc.
- Optimal design according to actual engineering requirements
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- Field installation training services

Square Sets

Square Sets consist of a straight cross member and two legs, manufactured from a W-section beam selected to meet load requirements. Square sets are shipped complete with gussets, bolts, nuts and tension rods. Our steel V-Deck lagging panels and C-Channel runners are optional.

Impact-Resistant Arch Sets

Impact Resistant Arch Sets are used for immediate roof support. We also manufacture JENNMAR's RIP® 50- and 100-ton steel props that can be used with JENNMAR's lightweight high-strength beam.

Mobile Recovery Arches

Mobile Recovery Arches are used as a mobile canopy recovery unit in the event of a mine roof fall. The recovery units are assembled outby the fall area and are pushed forward under the unsupported top to provide a pathway for workers in the unsupported area.

Long-Radius Arch Sets

Long-Radius Arches consist of a slightly bent cross member on two straight legs. Long-radius arches are shipped complete with gussets, bolts, nuts and tension rods. Steel paneled V-Deck lagging and C-Channel runners are optional.

Shaft and Tunnel Rings

Shaft and tunnel rings are used to shore large, deep vertical and horizontal excavations. The steel liner is a series of flanged plates bolted together to form a ring that provides structural support necessary to stabilize the excavation. Lagging can then be placed between the rings to hold the surround soil in place.

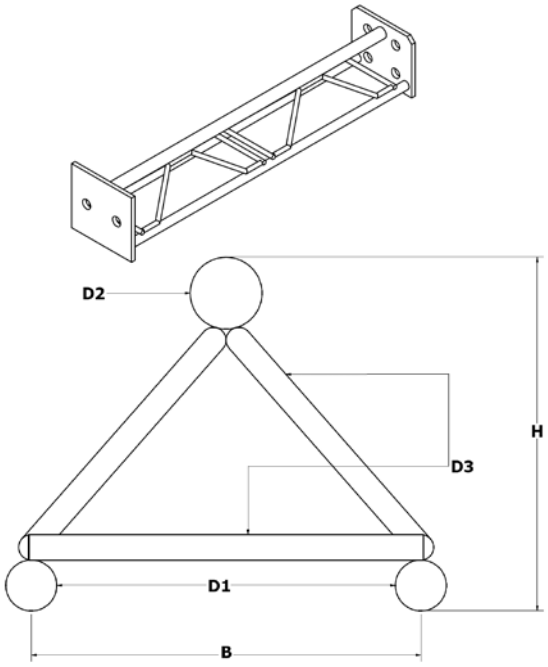
Lattice Girders

Lattice Girders are lightweight, three-dimensional steel frames that are typically fabricated of three primary bars connected by stiffening elements. The JENNMAR Lattice Girder support system achieves an excellent level of support when used in conjunction with shotcrete. This union between the lattice girder and shotcrete acts as an armor that provides balanced support and reduced consumption of shotcrete, which in turn lowers cost. This system has been designed to meet the highest mining and tunneling support requirements and the high load capacity delivers immediate support to the stabilized area.

JENNMAR employs highly skilled fabricators and welders that strive to ensure that compliancy is achieved in all aspects, i.e., gage lengths, filler metals and tolerances up to 1/8" In conjunction with JENNMAR Specialty Engineering, least cost analysis dependent upon design is achieved at the highest levels. Project management and coordination with your on-sight installation crew provide ergonomic and immediate protection from draw rock when utilized in conjunction with JENNMAR's Wire Mesh and encapsulated with shotcrete.

Advantages

- Ergonomically designed
- Geometrically designed to fit ID of any tunnel
- Immediate support for SEM tunneling
- Built with 100% American made steel and hardware
- Compliant with AWS D1.1/D1.4 for welding Structural Steel and Reinforcing Steel Welding
- A36 plate materials or higher
- ASTM A706 Gr. 60 or 80 Rebar
- ACI compliant
- LCA & Value engineering support to insure $/lb is consumer friendly
- Mitigate shadowing effect presented around rolled steel beams for tunnel supports
- Tolerances of 1/8 in.
- In-house rebar bending for all #'s of rebar used in Lattice Girders
- Aggressive FOB charges to reduce overall project overhead.



Technical Data - Lattice Girders

Types and sizes are shown for typical Lattice Girders.
Dimensions and characteristics of all JENNMAR Lattice Girders are manufactured according to customer specifications.

TYPE	D1 REBAR	D2 REBAR	D3 REBAR	H, in.	B, in.	A, in.^{2}	W, lb/ft	E, in.	I_x, in.^{4}	S_x, in.^{3}	I_y, in.^{4}	S_y, in.^{3}
50	6	8	4	3.70	3.95	1.67	6.77	2.00	3.40	1.70	2.43	1.23
	6	10	4	4.00	3.95	2.15	8.41	1.86	4.81	2.58	2.66	1.35
70	6	8	4	4.50	5.60	1.67	6.69	2.42	5.54	2.29	5.37	1.92
	6	10	4	4.80	5.60	2.15	8.33	2.19	7.64	3.48	5.60	2.00
	8	11	4	5.15	5.60	3.13	11.66	2.68	12.48	4.65	8.97	3.20
95	6	8	4	5.50	7.10	1.67	6.62	2.95	8.97	3.04	9.08	2.56
	6	10	4	5.75	7.10	2.15	8.26	2.58	11.85	4.59	9.31	2.62
	8	11	4	6.15	7.10	3.13	11.59	3.18	19.44	6.10	15.27	4.30
115	6	8	4	6.30	8.65	1.67	7.95	3.37	12.32	3.65	13.96	3.23
	6	10	4	6.55	8.65	2.15	9.59	2.91	16.13	5.54	14.19	3.28
	8	11	4	6.95	8.65	3.13	12.92	3.59	26.14	7.29	23.64	5.47
130	6	8	4	6.85	8.65	1.67	7.99	3.66	14.92	4.07	13.96	3.23
	6	10	4	7.15	8.65	2.15	9.63	3.16	19.78	6.26	14.16	3.28
	8	11	4	7.55	8.65	3.13	12.96	3.89	31.82	8.19	23.64	5.47

where: Ix = Moment of inertia of cross-section about X-X axis, Iy = Moment of inertia of cross-section about Y-Y axis, Sx = Elastic section modulus about X-X axis, Sy = Elastic section modulus about Y-Y axis.

J-SAND® Prop and J-SANDY™ Yieldable Prop

JENNMAR's J-SAND® and J-SANDY™ Props are lightweight, high capacity props that are easily installed with nominal capacities of 35–100 tons. Props are available in heights of 4 to 9 ft. with 2–3 ft. of height adjustment.

Applications

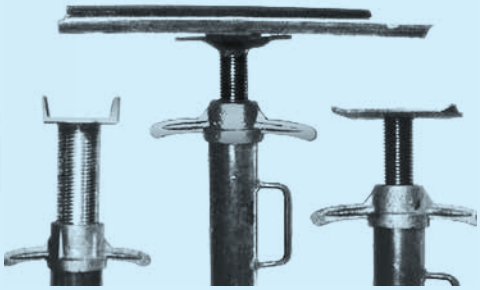
- Tailgate and bleeder support
- Cross-cut and intersection stabilization
- Belt line and headgate entry support
- Longwall shield recovery
- Longwall center entry
- CM pillar extraction
- Violation prevention

Advantages

- Requires no tools to set
- Two or three feet of height adjustment
- Light, quick and easy to install
- Cannot be over extended
- Optional header plates
- Handles provide ease of movement

J-SAND and J-SANDY props are available with the following optional head devices:

Yieldable Dish



Channel **Mini Mat** **Piranha**

Head devices shown on RIP Props.

J-SANDY™ Yieldable Prop

The J-SAND prop is also available in a yieldable configuration, the J-SANDY Prop.

Advantages

- Lightweight yielding prop yields up to 8"

Technical Data — J-SANDY Yieldable Prop

Nominal Capacity: 60 Ton (54.4 Metric ton)			
	Height, ft. (m)		Weight, lb (kg)
Size	Collapsed	Extended	
4–6	4 (1.2)	6 (1.8)	79 (36)
5–7	5 (1.5)	7 (2.1)	87 (39)
6–8	6 (1.8)	8 (2.4)	95 (43)
7–9	7 (2.1)	9 (2.7)	100 (45)
9–11	9 (2.7)	11 (3.4)	108 (49)

Technical Data — J-SAND Standard Prop

	Nominal Capacity, Ton (Metric ton)								
	35 (31.8)			60 (54.4)			100 (90.7)		
	Height, ft. (m)		Weight, lb (kg)	Height, ft. (m)		Weight, lb (kg)	Height, ft. (m)		Weight, lb (kg)
Size	Collapsed	Extended		Collapsed	Extended		Collapsed	Extended	
4–6	4 (1.2)	6 (1.8)	60 (27)	4 (1.2)	6 (1.8)	83 (38)	4 (1.2)	6 (1.8)	103 (47)
5–7	5 (1.5)	7 (2.1)	64 (29)	5 (1.5)	7 (2.1)	91 (41)	5 (1.5)	7 (2.1)	115 (52)
6–8	6 (1.8)	8 (2.4)	68 (31)	6 (1.8)	8 (2.4)	99 (45)	6 (1.8)	8 (2.4)	127 (58)
7–9	7 (2.1)	9 (2.7)	72 (33)	7 (2.1)	9 (2.7)	105 (48)	7 (2.1)	9 (2.7)	139 (63)
9–11	9 (2.7)	11 (3.4)	76 (34)	9 (2.7)	11 (3.4)	113 (51)	9 (2.7)	11 (3.4)	151 (68)

Rapid Installation Prop (RIP®)

JENNMAR's Rapid Installation Prop (RIP®) is available in 50 or 100 ton supports with the following head devices:

- Yieldable dish
- Channel
- Mini mat
- Piranha

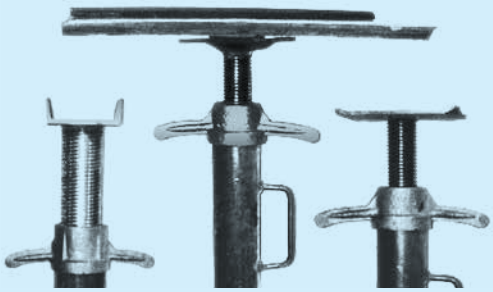
Advantages

- Single pipe, height can be modified if necessary
- Easy screw height adjustment
- Piranha top plate engages roof to prevent rotation when tightening
- Handles provide ease of movement

RIP® with Yieldable Dish Head

RIP props are available with the following optional head devices:

Yieldable Dish



Channel **Mini Mat** **Piranha**

Rapid Installation Prop RIP — Technical Data

Support, Tons (Metric ton)	Travel, in. (mm)	Pipe, Sch 80, in. (mm)	Extension Thread, in. (mm)
50 (45.35)	12 (305)	3 (76)	2.0 (51)
100 (90.70)	18 (457)	4 (102)	3.5 (89)

Impact Resistant Lagging® (IRL®)

To protect mine personnel, belts, moving vehicles and other facilities, mine operators typically install steel structures such as square or arch sets in roof fall areas. Wood lagging is usually installed between the steel sets to enclose the area and protect the entry from recurring falls. JENNMAR, along with KMS our affiliate engineering company, have designed, tested and developed the Impact Resistant Lagging® (IRL®) system to protect steel sets. Various steel sets that are protected with IRL panels have been approved by MSHA and installed in several underground roof fall rehabilitation projects.

The IRL panel consists of the following components:

V-Deck Panel

Galvanized V-Deck Panel (18 × 46" × 12 gage) is used to provide primary flexural strength. Two clips are attached to facilitate easy installation of the lagging panel to the upper flange of the beam.

Special Lagging Block (SLB)

Special Lagging Blocks are comprised of two pieces of medium-soft wood (6 × 6 × 46") that are attached to the V-deck panel. The blocks provide additional flexural strength to the system, absorb impact energy, distribute impact load over a larger area of the V-deck panel and extend the duration of impact.

Cushion Inserts

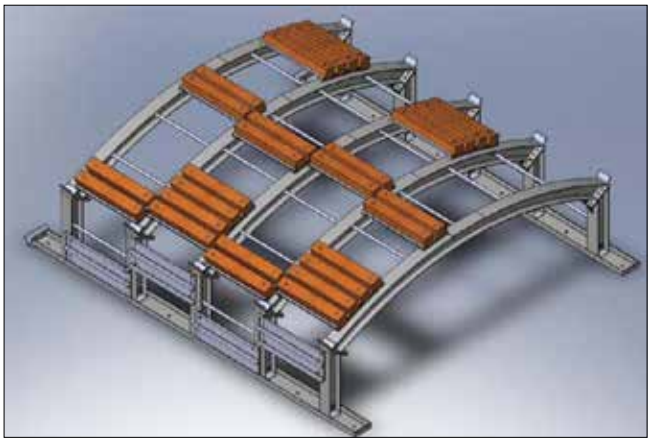
Two pieces of hard foam strip (0.5" thick) are installed between the V-deck panel and the flange of the W-beam. The foam strips act as a cushion, increase impact duration and reduce the magnitude of the instantaneous impact load on the system.

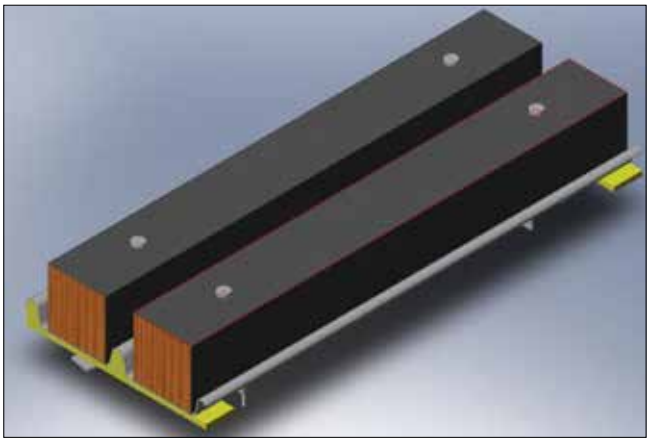
Surface Coating

A thin layer of water-proof bonding coating is applied to the surface of the Special Lagging Blocks. The tough-textured coating provides necessary protection against water, acid, chemicals, UV exposure, salt water, abrasion, fire and freeze-thaw. This coating dramatically extends the life span of the SLB when compared with plain wood blocks.

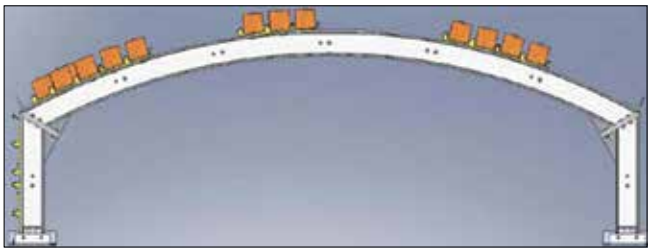
Advantages

- Provides sufficient flexural strength and acceptable cushioning effect
- Corrosion resistant
- Cost effective
- Easy material handling and installation





Impact Resistant Lagging Panel



Impact Resistant Arch Set Design for Roof Fall Rehabilitation

Overcast System

JENNMAR Overcast Systems are designed to be modular reusable structures that are used in underground high pressure situations to insure intake air is not contaminated with return air. Overcasts can be designed to be driven over with equipment such as man trips, continuous miners, bolters and/or haulage equipment.

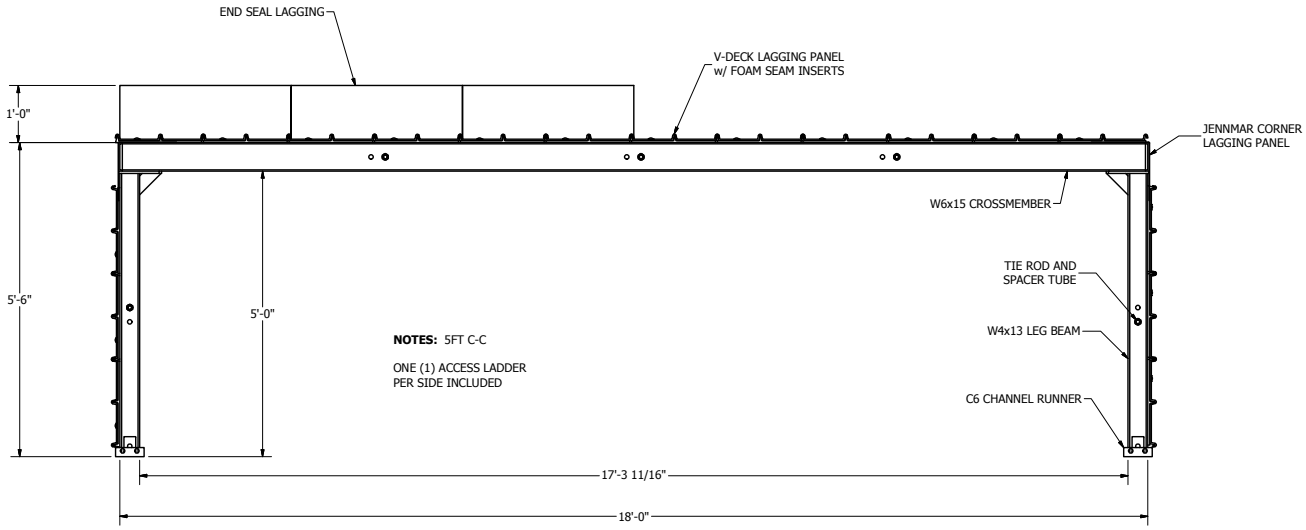
Utilization of wide flange beams and roll-formed V-Deck lagging allow for an air tight seal. Reusable lightweight materials are well suited for underground construction.

Advantages

- Lightweight and durable
- Easily transported and assembled
- Strong enough to resist rib rolls and minor roof material

JENNMAR Overcast Systems consist of the following components:

- Cross member, W6 × 15
- Leg member, W4 × 13
- Tie rods & spacer tubes
- Bolt-together assembly
- V-Deck lagging with foam
- Channel runner
- Man doors
- Overcasts can be designed and built with stairways, ladders and ramps complete with handrails to allow for travel over the top of the overcast. Access ways are constructed with 3 points of contact in mind



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