Rodney Hunt

A GA Industries Company

Bascule® and
Pelican® Gates

Crest

Gates

Hinged Crest Gates

- Precise Flow and Level Control
- Fully Functional in Ice Conditions
- Proven Performance
- One Source: Design, Build, Actuate
- Long Life, Low Maintenance

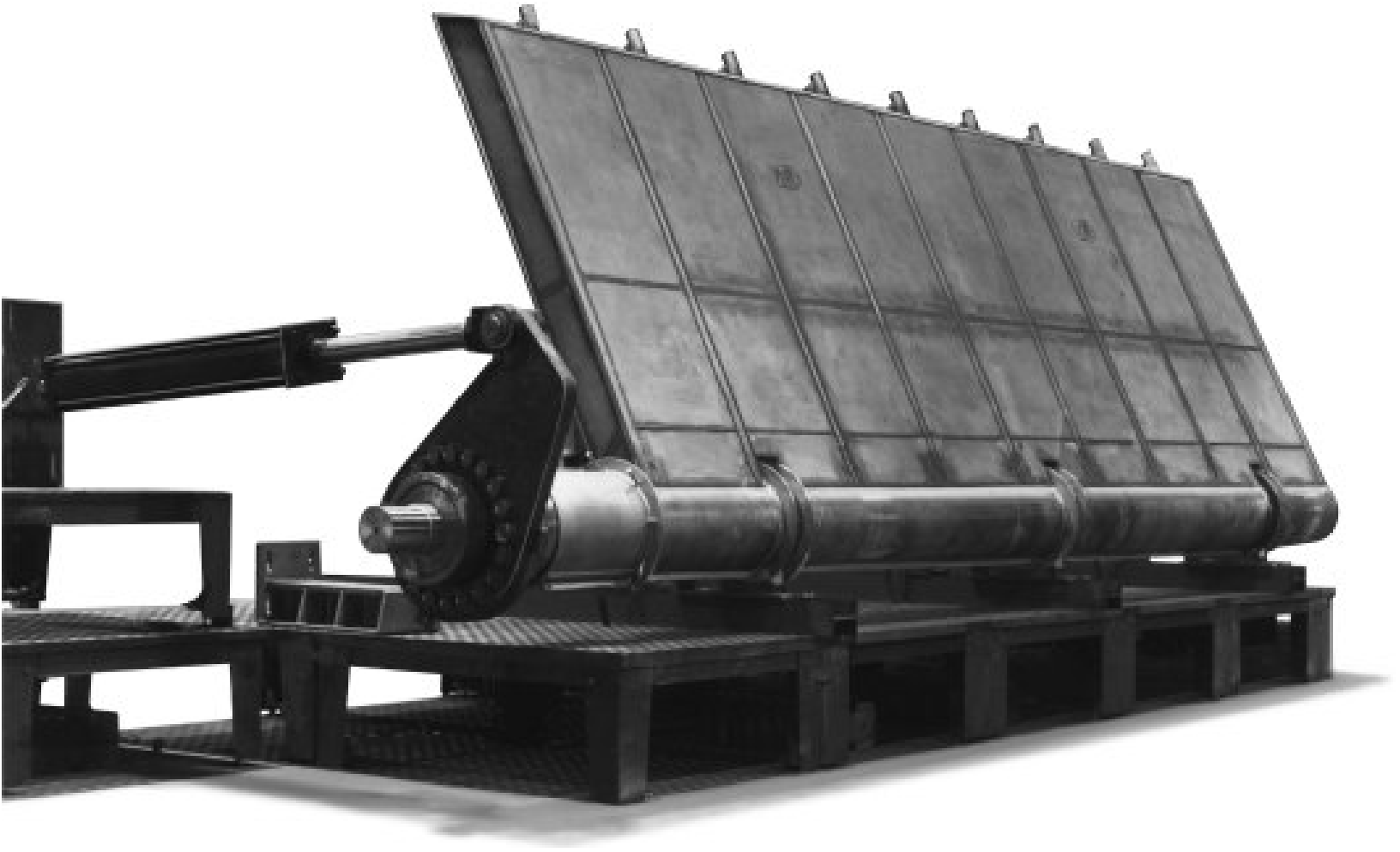
Bascule® and Pelican® gates for spillway applications

In 1990 Rodney Hunt Company acquired all product lines of AC Valve, including Bascule and Pelican technologies. The established reputation of Rodney Hunt as a designer and manufacturer of hinged crest gates, coupled with acquired Allis-Chalmers' gate technology, offers you the technical and manufacturing expertise for the most effective solution for flow control in spillway applications.

Hinged crest gates have an established reputation for long life, trouble-free service, and low maintenance for a wide range of flow control applications.

They have been used for flow, or water-level control in municipal water systems; dams for flood control, hydroelectric or recreational use; as well as a variety of industrial water supply applications.

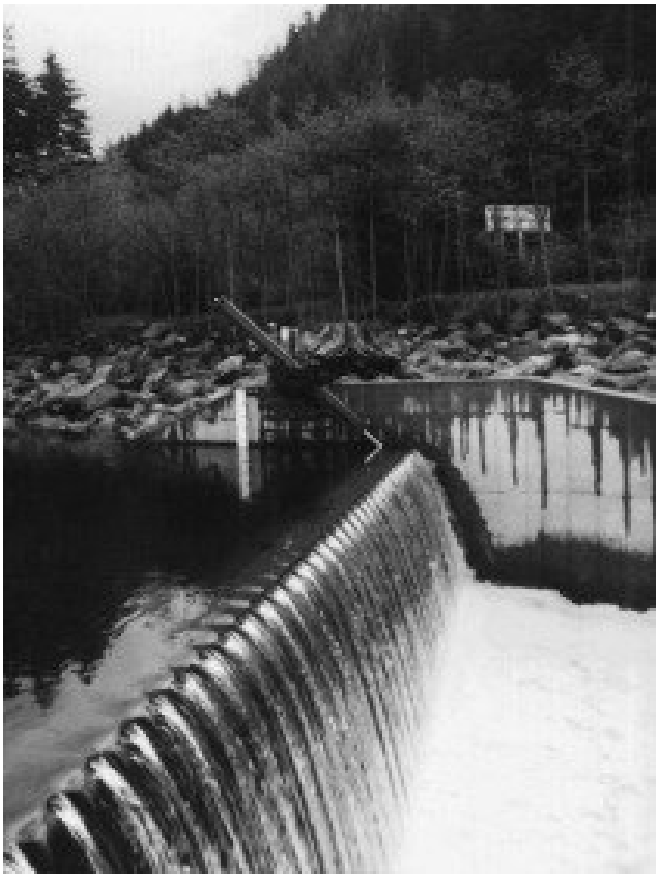
Below: *A 25' x 8' Bascule Crest Gate with hydraulic cylinder actuator for Lane City, Texas.*



Hinged Crest Gates:

Reliable, safe, low maintenance, long service life... in virtually any spillway flow control application.

A 65' x 10' high crest gate on the Snoqualmie River in North Bend, Washington. Hydraulic system consists of two top-mounted hydraulic cylinders (2000 psi).



Accurate Level Control

- Level sensing devices provide automatic control of predetermined pond levels,
- In flood control installations, gates can be lowered to increase flood handling capacity.

Ice/Debris Handling Capability

- In the event of ice or debris buildup, the gate would be lowered allowing the debris or ice to flow over the gate, and raised when the overload is past.

Ice may be easily broken up and skimmed off by alternately lowering and raising the gate.

Flow Control for Hydroelectric Installations

- Higher heads may be provided for more generating capacity.
- Flood protection
- Spillway control

Cost-Effectiveness

- Freeboard is reduced to a minimum.
- Spillway size and project civil cost can be reduced by adding crest control.

Rodney Hunt Capability of Complete Package

- Rodney Hunt hinged crest gate experience
- Hydraulic actuation design/manufacture

Bascule and Pelican Gate Design Features

Hinged crest gates are mounted on the crest of a dam and are hinged along the invert. There are several types of hinged crest gates, but they all lower to open, and raise to close. All hinged crest gates are of fabricated steel construction, and have either a straight or a curved shape, sometimes to fit the shape of the crest when the gate is in the lowered position.

Bascule Gate

The standard Bascule Gate is normally a flat plate design that is reinforced with vertical and horizontal members and is fitted with a single torque tube across the invert. Side seal plates are mounted in the abutments and resilient seals attach to the sides of the movable disc to seal against the side plates. There is a seal across the hinge or the invert of the gate in the form of a bulb or J-type seal.

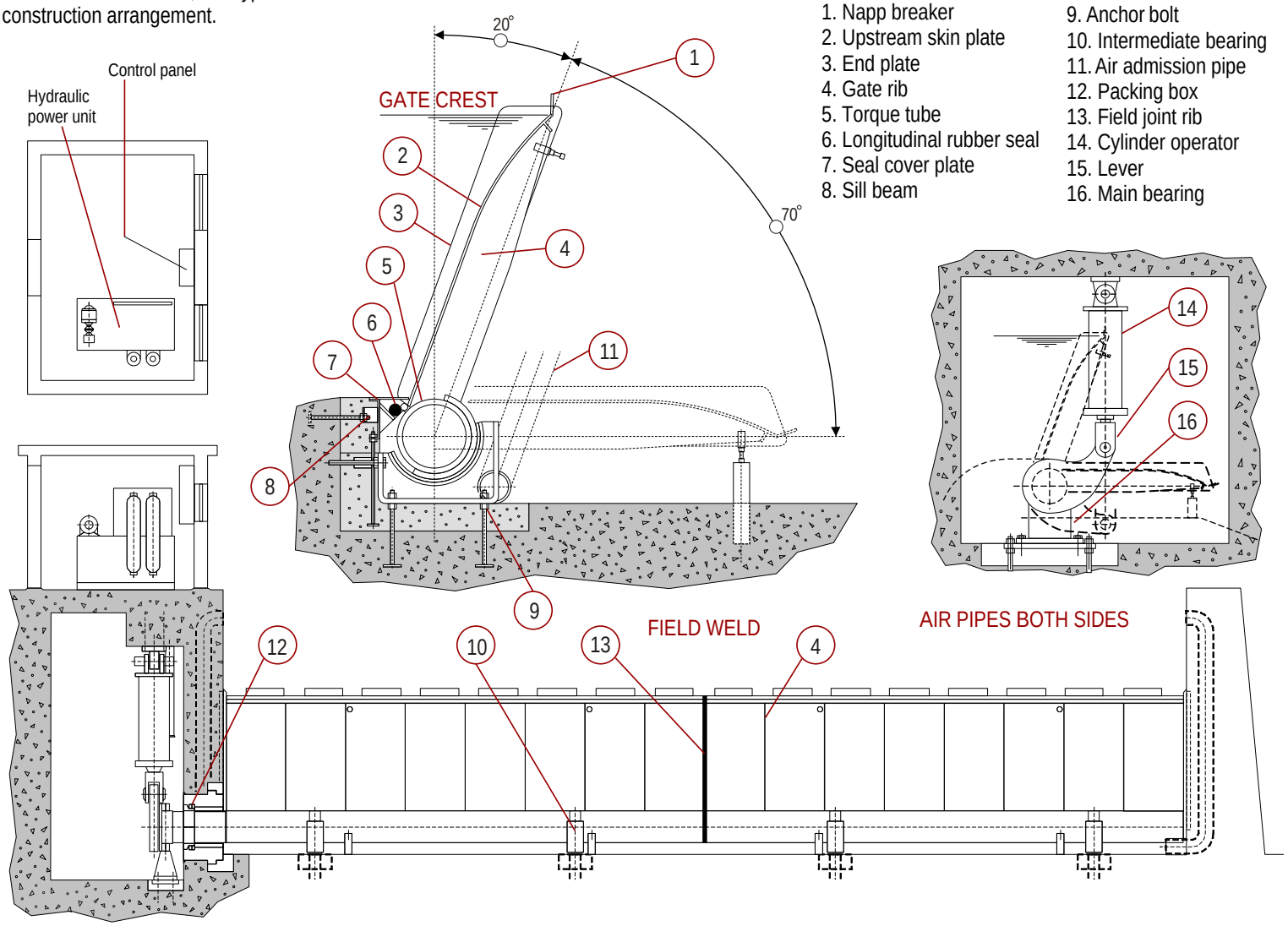
The torque tube of the Bascule Gate is supported by bearings along the invert edge of the gate. One end of the torque tube extends through the side wall into an operating space in the abutment. A stuffing box around the torque tube prevents leakage into the operating space. A hydraulic cylinder or an electric motor-driven actuator is attached to the arm of the gate with a stem, and as the actuator raises and lowers the arm, the gate is likewise raised and lowered.

The Bascule Gate, or torque tube style crest gate, is normally limited to approximately 10 feet high. This size limitation depends on several factors, including the type of actuation, the location of the gate, the application, and head.

Basic Construction

Standard Bascule Gate

The drawings presented here show a standard Bascule Gate, and typical construction arrangement.



PARTS IDENTIFICATION

1. Napp breaker
2. Upstream skin plate
3. End plate
4. Gate rib
5. Torque tube
6. Longitudinal rubber seal
7. Seal cover plate
8. Sill beam
9. Anchor bolt
10. Intermediate bearing
11. Air admission pipe
12. Packing box
13. Field joint rib
14. Cylinder operator
15. Lever
16. Main bearing

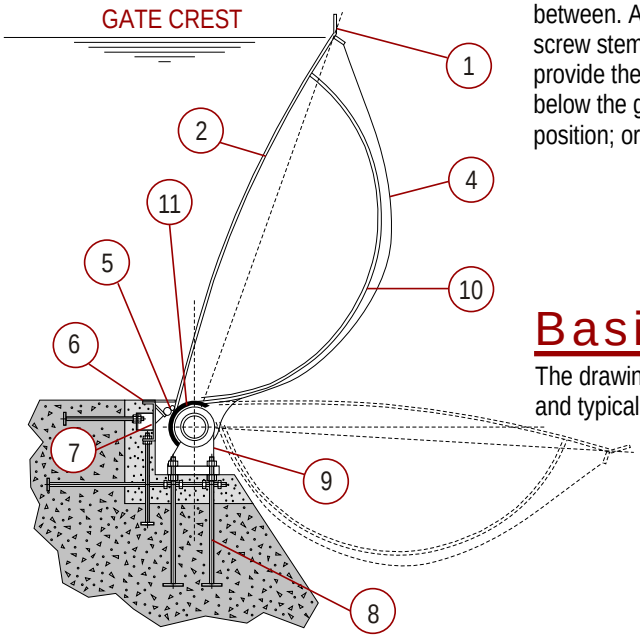
Pelican Gate

The standard Pelican Gate consists of two curved plates with internal braces and vertical ribs forming a strong closed shell structure. ' Another primary difference between the Pelican Gate and Bascule Gate is that the Pelican Gate is supported by a number of separate hinges (instead of a torque tube), which are attached to the concrete at the invert. A matching pair of hinge plates are welded to the bottom of the gate, and a stainless steel pin passes through these plates (and the trunnion) to complete the "hinge" configuration.

The Pelican Gate can be operated in a number of different ways. The gate can be raised or lowered by one or more cylinders either at the ends of the spillway or at intermediate points in between. Although crest gates can be operated by screw stem or cable drum, hydraulic cylinders provide the flexibility of being mounted either below the gate, pushing the gate "up" to the closed position; or mounted above the gate, pulling the gate "up" to the closed position.

As with the Bascule gate, side seal plates are mounted in the abutments and resilient seals attach to the sides of the disc to seal against the side plates. There is also a seal across the hinge or invert of the gate in the form of a bulb or J-type seal.

The Pelican Gate, with hydraulic cylinders mounted beneath the gate, can be fabricated in greater lengths. A drop in downstream elevation is required for mounting the hydraulic cylinders, and to lower the gate below the crest.



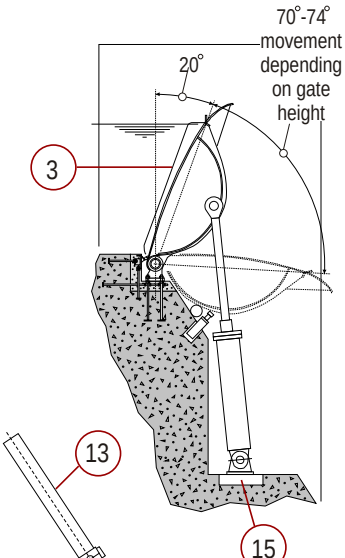
Basic Construction

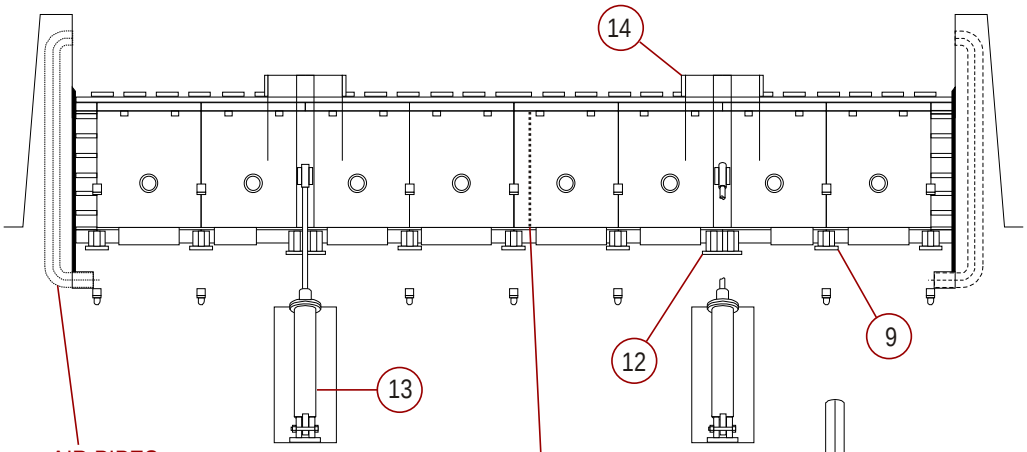
Pelican Gate

The drawings presented here show a standard Pelican Gate, and typical construction arrangement.

PARTS IDENTIFICATION

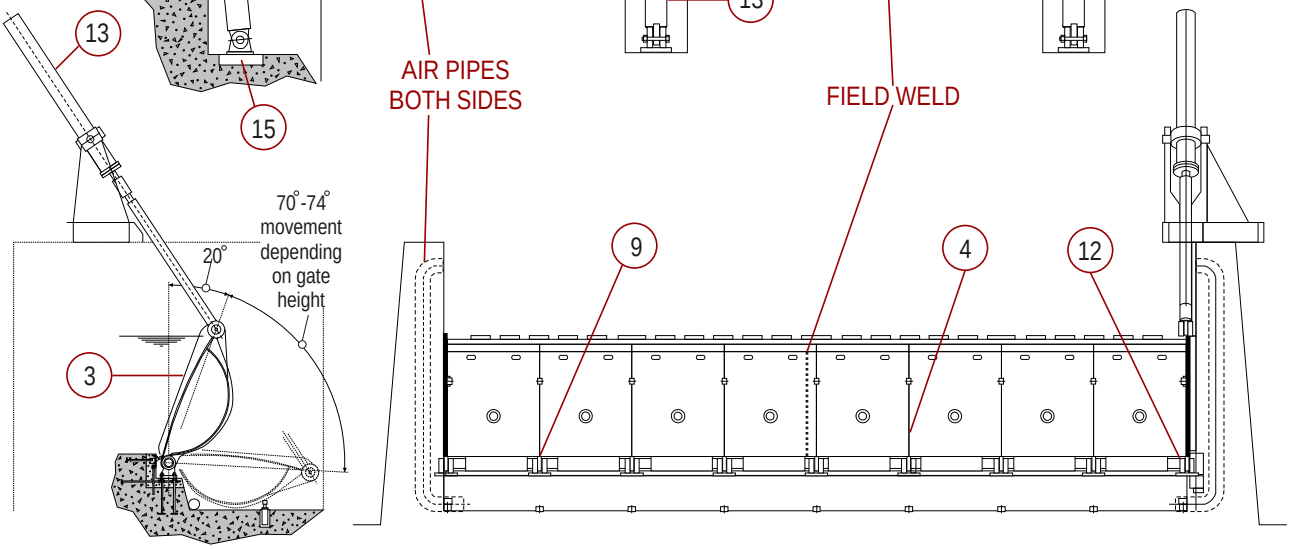
1. Napp breaker
2. Upstream skin plate
3. End plate
4. Gate rib
5. Longitudinal rubber seal
6. Seal cover plate
7. Sill beam
8. Anchor bolt
9. Intermediate bearing
10. Downstream skin plate
11. Seal contact surface (tube)
12. Main bearing
13. Cylinder operator
14. Cylinder hood
15. Cylinder base plate

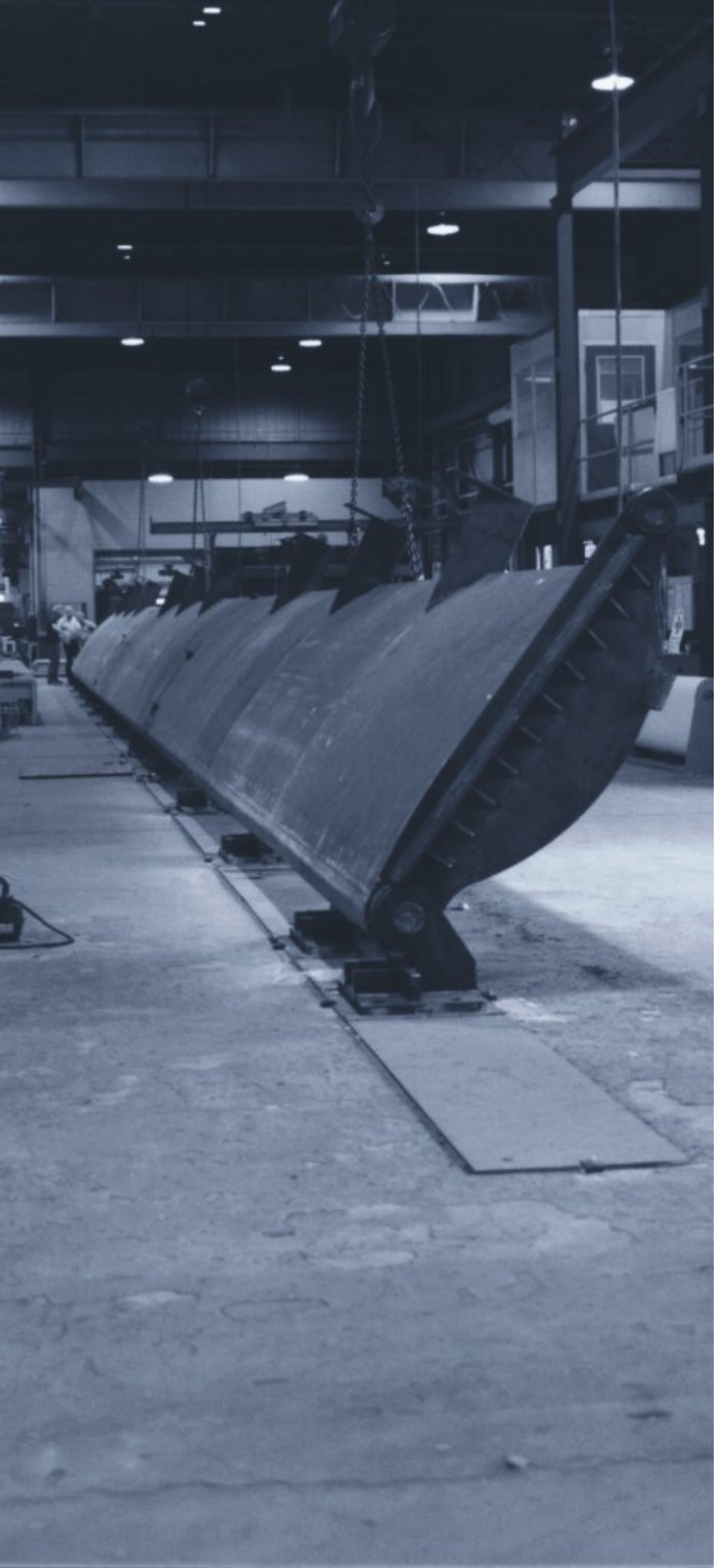




AIR PIPES BOTH SIDES

FIELD WELD





Hinged Crest Gate Specification

1. SCOPE

This specification covers the design, manufacture and supply of the hinged crest gate system.

The system shall include the gate leaf, hinges and brackets, sealing system, anchorages, hydraulic cylinders, cylinder supports, seal heaters, air vent piping (when necessary, water level sensors, hydraulic power unit, automatic controller, local control panel, gate position indicators, transportation to the site, drawings, installation procedures, and Operation & Maintenance manuals.

2. DESCRIPTION OF OPERATION

A. Automatic

The operating system shall automatically monitor the upstream water level and position the gate leaf to maintain a constant level under varying flow conditions.

B. Manual

Provisions shall be made to raise or lower the gate via manually actuated controls located on the local control panel.

3. GENERAL DESCRIPTION OF GATE

The gate shall be of the Bascule or Pelican type and arranged to lower to open. Each gate shall have a clear waterway opening of_____ft. The effective height of the leaf in the raised position shall be _____ft.

When in the fully raised position the leaf shall lean downstream approximately 20°. The gate will rotate approximately 75° from the fully raised to the fully lowered position.

This 147' x 5' high Pelican Gate- shown here on the factory floor- is destined for the south fork of the Zumbro River in Rochester, Minnesota.

4. DESIGN REQUIREMENTS

A. The gate hoisting system shall have sufficient thrust capacity to raise the leaf from the fully lowered position to the fully raised position when the upstream water level is _____ft. above the fixed crest.

B. The gate shall be structurally designed to withstand the worst combination of static and dynamic loadings at any position with the upstream water surface at a fixed level of elevation_____ . When subjected to the flood head it shall be possible to lower the leaf from the fully raised position to the fully lowered position by manually opening bypass valving at the hydraulic power unit.

5. GATE COMPONENTS

A. Leaf

The gate leaf for Pelican gates shall consist of curved upstream and downstream skin plates and flat vertical diaphragm plates arranged to form a rigid cellular type construction. For Bascule gates, the leaf shall consist of a flat plate and vertical diaphragm plates. The curved plates shall be pressure vessel quality conforming to ASTM A516, class 60 or 70. The remainder of the leaf structure will be ASTM A36 structural steel. A curved Type 304 stainless steel surface shall be provided directly above the gate hinges to mate with the horizontal J-seals. The top edge of the upstream skin plate shall form a discharge lip of a design to minimize flow induced vibrations.

B. Bearings

The standard Bascule gate will be supported by a series of intermediate saddle bearings with self-lubricating graphite plug bushings. The torque tube will extend into the operating chamber through a suitable packing box.

The Pelican gate leaf shall rotate on pin type hinges. The hinge pins shall be Type 304 stainless steel and fixed to the gate leaf. The pins will rotate in permanently lubricated bronze bushings which shall be retained in fabricated or cast steel bearing brackets. The brackets shall be anchored to the concrete structure in a manner to allow adjustment in all three planes during erection of the leaf sections.

C. Seal Support Members

The side seals shall be designed to seal in all leaf positions. The J-seal shall be attached to the ends of the leaf. The side seals shall be fluoro-carbon clad neoprene. The seal attachments shall allow for replacement of the seal without removal of the leaf. The side seal plates shall consist of a stainless steel plate with seal reinforcing on the backside.

D. Erection and Maintenance Supports.

Erection struts and associated brackets shall be provided to support the leaf in the full up position with the operator detached from the leaf.

E. Leaf Supports

When the leaf is in the fully lowered position the weight of the leaf shall be supported by adjustable gate stops contacting pads on the downstream surface of the spillway.

F. Air Vent Piping

It shall be the responsibility of the gate manufacturer to determine the necessity of air vent piping and to determine the size, location and shape of the air vent piping system. The air vent piping shall be galvanized steel or equivalent and have protective screens on both the inlets and outlets.

6. ELECTRICAL CONTROL and HYDRAULIC POWER SYSTEM

It shall be the responsibility of the gate manufacturer to design, manufacture, test and supply a complete control and hydraulic operating system to meet the performance requirements of the owner.

7. MANUFACTURE

The gates and associated components shall be fabricated in sections that are convenient for shipment and field erection: All major components shall have lifting ears, eyes and/or lugs arranged to facilitate handling during site offloading and erection.

All welding and welding procedures and qualifications, and welder qualifications shall be in accordance with the most recent revision of AWSD1.1.

Each gate leaf shall be completely assembled in the manufacturer's facility. The gate pivot bores shall be sighted to assure correct alignment of the centers. Each hinge bracket shall be assembled to the leaf at its respective location and the bracket rotated through its full range of operating swing. All mating parts shall be trial fitted. During shop assembly the gates shall be checked for dimensions for tolerances, accuracy of alignment and squareness. An operational test of the hydraulic and electric control system shall be made to demonstrate proper functioning of the system, including functioning and sequencing of all control and alarm devices. The hydraulic cylinder shall be hydrostatically tested in the cylinder manufacturer's facility, at a pressure of 150% of the hydraulic power unit design pressure.

8. PAINTING

The gate disc and all exposed steel surfaces shall be blasted to SSPC SP-6.

Prime: One (1) coat of Amerlock 4000 at 5.0 mils thick

Finish: One (1) coat of Amerlock 400 at 5.0 mils thick