



Rodney Hunt
A ZURN Company
Tainter Gates

Tainter

Gates



Tainter Gates



- Spillway Flow Control
- Open Channel Flow Control
- All Components Field Adjustable
- One Source: Design, Build, Actuate
- Manual or Power Operation

Tainter/Radial Gates: for wide, unobstructed openings.

Rodney Hunt tainter gates are normally used to control the flow of water or wastewater over a dam or drainage structure to provide a wide and unobstructed opening. These gates, which are sometimes very large, are sturdily designed for long life and low maintenance in difficult conditions, but also incorporate a number of "designed-in," installation, and field adjustment features.

Design Features

The disc, or movable part of the gate, is a flat steel plate accurately curved on the required radius. Vertical T ribs support the curved plate and are backed by wide flanged beam supports that span the complete width of the opening. The radial arms attach to these horizontal supports and extend back to the trunnion. J-seals are mounted across the bottom and up both sides of the tainter gate disc. Steel or stainless steel plates are embedded across the invert and up both sides of the gate to provide a tight seal when the gate is closed.

The radial arms are angled toward the center of the gate so that they intersect the horizontal supports at a point that under normal design is approximately one-sixth of the way in from each side. This provides better support for the gate and helps to resist any lateral thrust. The trunnions and trunnion base plates are steel supported by steel structures embedded in the concrete walls or by a beam that spans the opening. The hinge pin is stainless steel, supported in bronze bearings with fittings for lubrication provided.

Installation

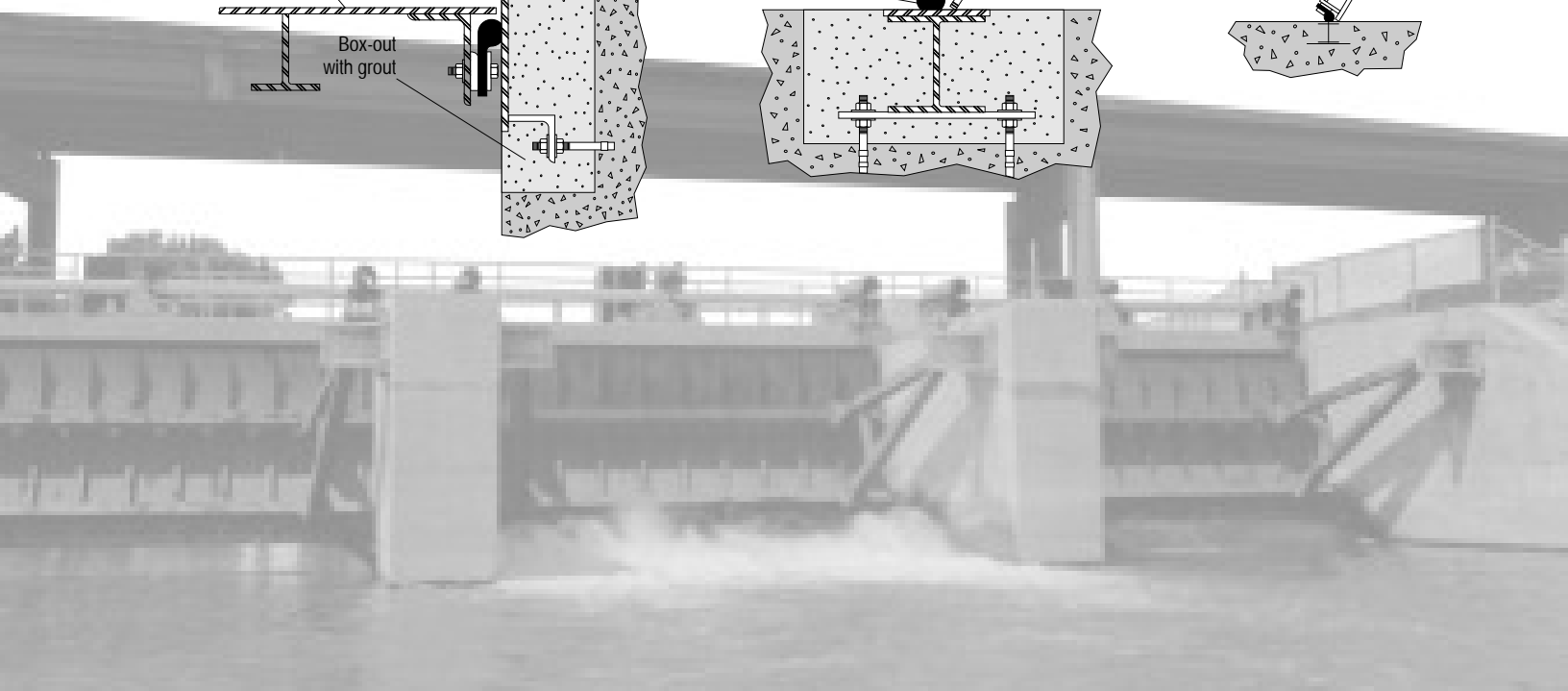
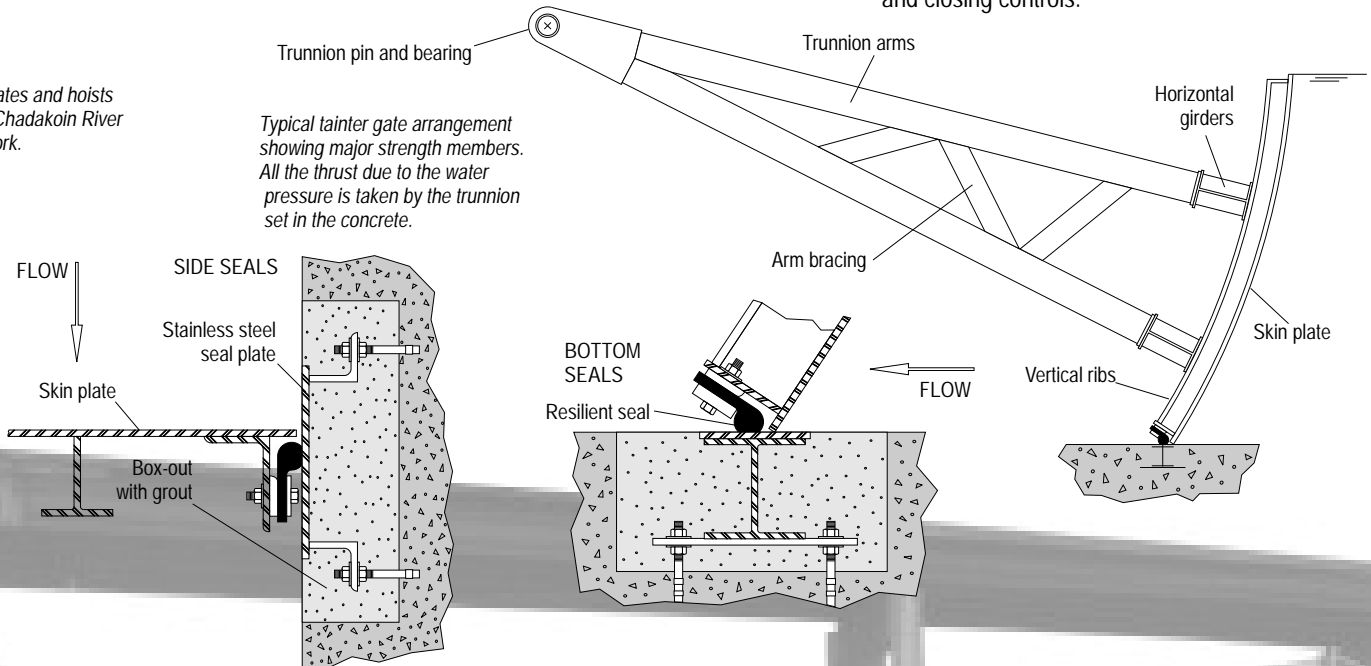
In order to ensure proper installation and a tight seal in the closed position, all parts of the gate are field adjustable. The seal on the disc can be moved so that proper interference with the side and invert seal plates is obtained. The invert seal plate and both side plates are installed in box-outs in the concrete and are completely adjustable to provide accurate seating of the gate. The trunnion supports are adjustable with adjusting bolts and lock nuts so that precise location of the hinge pins can be obtained.

Operation

Operation of the tainter gate is achieved in the open direction by means of cable drum hoists or hydraulic actuation units designed and manufactured at Rodney Hunt. Cable drum hoists are electrically driven and utilize fully enclosed gear reduction units, protected and interconnected shafting with flexible couplings, grooved drums, and steel or stainless steel cables. Worm gears are provided and are self locking to hold the gate in position without the use of a motor break.

Hoisting units can also incorporate position indicators, limit switches, and automatic opening and closing controls.

Below: These tainter gates and hoists control the flow of the Chadakoin River at Jamestown, New York.



Tainter Gate Specifications



1. GENERAL

This specification relates to the design, materials of construction, fabrication and furnishing of the tainter gate with appurtenant seals, side seal plates, sill, hoist and accessories required for complete and proper operation of the gate. The tainter gate and hoist will be as manufactured by Rodney Hunt Company or approved equal. Manufacturers shall have a minimum of 10 years experience in the design and manufacture of equipment of this type. Manufacturer shall submit as a minimum a list of 10 projects with tainter gate installations. The list shall include project name, contact, telephone number, years of service, size and method of operation.

2. MATERIALS

All component parts will be of the type of material shown and conform to the standards designated in this section.

Plate or Structural Steel:

ASTM A36, A242, A441 or A588

Stainless Steel:

ASTM A167 or A276, Type 302 or 304

Component Item	ASTM Standard
1. Gate Disc Skin Plate	Steel Plate
2. Gate Disc	
Frame Members	Structural Steel
3. Seals	J-type, Rubber ASTM D2000
4. Retainer Bars and	
Fasteners for Seals.	Stainless Steel
5. Fasteners (Studs, Anchors	
and Assembly Bolts)	Stainless Steel
6. Metal Contact Surfaces	
for Bottom Side Seals	Stainless Steel
7. Trunnion Assemblies:	
a) Arm.	Structural Steel
b) Bearing.	Self-lubricating, Sleeve Type
c) Trunnion Shaft.	Stainless Steel A564630, 1075
8. Embedded Side	
Seal Plates	Stainless Steel
9. Hoist Base Plate.	Structural Steel
10. Cables	Type 302 S/S IWRC
11. Cable Drums.	ASTM A126 Cast Iron or Fabricated Steel
12. Shafts.	Forged Steel ASTM A668 Class F

3. DESIGN REQUIREMENTS

A. Gate Disc/Arms

The gate disc shall consist of a curved steel skin plate with the center of curvature concentric with the centerline of the trunnion pins. The curved plate will be reinforced with structural members to transmit the hydraulic thrust to the trunnion arms. The gate shall be designed to safely withstand the loads without exceeding 40% of the yield strength or 25% of the ultimate strength of the material used. The disc deflection shall not exceed 1/360 of the nominal gate width. The bolts connecting the trunnion arms to the disc shall not be placed in shear. The unsupported length of the trunnion arms will not exceed an L/r ratio of 120.

B. Seals

Resilient seals shall be placed along the bottom and both sides of the gate to prevent leakage. The seal attaching hardware will be stainless steel and attached in a manner to permit replacement of the seals. The side and bottom seals will be of the "J" type. The seals will be assembled to the gate disc in the manufacturer's shop. Provisions shall be made to allow for lateral seal adjustment.

C. Trunnions

The trunnions shall be cast or fabricated steel and welded to the trunnion arms. The trunnion arms shall be equipped with bronze sleeve bearings. Lubrication fittings shall be provided for lubricating the trunnion bearings. The trunnion assembly shall be designed to be supported by a beam extending across the opening or brackets anchored into the abutments. Provision shall be made for field adjustment of the trunnion pins after placement of the gate.

D. Side Seal Plates, Sill

The side and bottom seal plates will be stainless steel having a maximum roughness of 125 microinch rms and be supported by anchor bolts in a box-out in the side wall and gate invert. The seal plates will be adjustable on double nuts at the time of installation and grouted in place after final alignment.

E. Cable Drum Hoist

Operation of the gate shall be by means of a cable drum hoist using twin interconnected drums mounted on a fabricated steel base plate. The hoist shall consist of an electric motor drive geared to interconnecting shafts, cable drums and cables. The electric motor drive will be self-contained, complete with a weatherproof motor having Class B insulation, limit and torque switches, integral reversing controls and pushbutton control transformers. The hand-wheel shall not rotate during motor operation nor will a locked motor prevent manual operation.

The gear reducer shall be of the totally enclosed worm gear type directly coupled to the electric motor drive. Worm gears will be self-locking to hold the gate in position without the use of a motor brake. Interconnecting shafts will be forged steel. Flexible couplings will be provided and will be of the gear type. Cable drums shall be fabricated steel or cast iron with helical grooves machined in the drums for the cable. The pitch diameter of the drum shall be a minimum of 24 rope diameters. Hoisting cables will be stainless steel wire rope. The wire rope will be selected using a safety factor of 5 with respect to the breaking strength of the wire during normal operation and a safety factor of 2 for stalled motor conditions. A minimum of two wraps of wire rope shall remain in the drum when the gate is in the lowest position.

4. PAINTING

The gate disc and all exposed steel surfaces shall be blasted to SSPC SP6.

Hoisting Equipment

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

Finish: One (1) coat of Amercoat 450HS, color gray

Immersed Equipment

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

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

5. WELDING

All welding will be done in accordance with AWS D1.1.

6. DRAWINGS

Drawings showing dimensions and essential details required to locate and install the gate, hoist and accessories shall be submitted for the engineer's approval. In addition, calculations shall be furnished in detail, including but not limited to: structural sizing of skin plate, trunnion arms, arm bracing, vertical ribs and horizontal girders; maximum loads for hoist sizing; and corrosion and metallurgical data verifying the manufacturer's design of the gates furnished.

Drawings and calculations shall be sealed by an engineer registered in the state where the gate will be manufactured.

7. INSTALLATION

The handling, storage and installation of all parts shall be done by the construction contractor in accordance with detailed technical installation procedures supplied by the manufacturer and approved by the engineer.