

{ TIDE GATES }



GH-850-R Restrained Side Hinge Tide Gate
GH-35 Self-Regulating Tide Gate
GH-37 Tide-Regulated Tide Gate*

*Manufactured exclusively by Golden Harvest, Inc.
Under GHI patent #US 6,779,947



GOLDEN HARVEST, INC.

TIDE GATES

FOR TIDAL WETLANDS PRESERVATION AND RESTORATION

- RESTORES TIDAL FLUSHING OF MARSHES WITHOUT FLOODING OF UPLAND PROPERTY BEHIND DIKES AND LEVEES
- RESTORATION OF ESTUARINE PLANTS, FISH, SHELLFISH, WATERFOWL AND WILDLIFE
- NATURAL CONTROL OF MARSHES AND ESTUARIES
- HELPS REDUCE MOSQUITO BREEDING
- MINIMIZES SHEET FLOODING OF THE MARSH



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The Tide Gate is usually mounted to an end wall or cross culvert on the tidal side of a headwall or dike. The floats are fully-adjustable to meet the required gate closure water levels on a site-specific basis. In the event of a storm surge the Tide Gate will close and latch automatically and will resume normal water control when the tide returns to normal cycles and levels. The functions of operation are solely dependent upon the goals of the water management agency.

Similar to a conventional flap gate, at low tide the Tide Gate will allow complete discharge of upland storm water runoff and creek water. Conventional flap gates, however, are forced closed by the incoming tide preventing saltwater from returning to the wetland. In contrast, the Tide Gate can be adjusted to allow flow into the culvert thereby feeding essential tide waters to the channel or marsh behind the dike. Because the Tide Gate is located on the outfall or tidal side of the headwall, its float system responds to any tidal change allowing the predetermined amount of water in and closing to incoming water when the tide reaches the design high water level. With the storm tide water elevation, the Tide Gate closes "early" thereby preserving a relatively large volume of potential water storage capacity behind the dike should it be needed for detention of upland runoff associated with the coastal storm. In this way the Tide Gate simultaneously maintains flood protection to the upland area while allowing tidal flushing of the low-lying wetlands.

MODEL GH-850-R
MODEL GH-35
MODEL GH-37

{ TIDE GATES }

MODEL GH-850-R



MODEL GH-37

MODEL GH-35



GH-850-R

MODEL GH-850-R SIDE HINGE TIDE GATE

General Design

All metal parts shall be stainless steel and shall provide adequate corrosion resistance for the environment. Gate shall be sized for the clear opening. Frame width and height shall be no larger than the outside dimensions of the Box Culvert. Gate shall include neoprene compression seals between the gate and gate frame. Provide all components shown on the Contract Drawings and those needed for proper gate actuation All 316 stainless steel mounting hardware shall be included.

Side-hinged Tidal Actuated Control Gate shall be initially opened using a hydraulic cylinder, crank arm, hydraulic lines, and hydraulic control box as shown on the Contract Drawings. Normal operation is to be controlled by differential water level. Hydraulic controls shall be housed in a locking, NEMA 4X stainless steel tamper-proof box. Upper and lower gate hinge bearings shall be Gar-Max or equal.

Side-hinged Tidal Actuated Control Gate shall include a float tube and float assembly with connection to the hydraulic control box as shown on the Contract Drawings. Gate float closure setting shall result in release of hydraulic system pressure to components such that gate closure will occur on a rising (flood) tide at the pre-set elevation. Gate hinge tube mounting shall be orientated in an offset position as shown on the Contract Drawings to facilitate gate closure when the gate hydraulic system pressure is released. Gate opening swing shall provide for a maximum gate opening angle of 70 degrees prior to hydraulic cylinder actuation.



Operating Principles

- Gate start position is fully closed (gate seated against the frame) with the float below the actuation point. In this condition the gate prevents the intrusion of salt water upstream of the closed gate.
- As water flows downstream a determined amount of differential head will initiate gate opening. The unseating head differential opens the gate regardless of tide elevation; this allows drainage during high run-off periods of a storm event even at high tide.
- The hydraulic system is designed in such manner as to prevent gate closure. This feature is independent of the degree of open position and continuously locks-out gate closure for every increment of increased opening. The mechanics of the system limits the degree of opening to a maximum of seventy degrees. This angle can be reduced by use of the adjustment system provided.
- As the tide elevation increases there is an exchange through the gate of tidal and creek (stream, river, slough etc.) water. This allows free passage of fish as well as water. This exchange continues until the tide elevation achieves the float set point. At the float set point a valve is triggered which allows back flow of hydraulic fluid. This unlocks the hydraulic cylinder and allows free movement of the gate in the closing direction. As the tide continues to rise, the head differential and flow will push the gate closed and prevent the intrusion of salt water upstream of the closed gate.



MODEL GH-35
MODEL GH-37

{ GH-35 & GH-37 }

BALSA CHICA WETLANDS, CA
MODEL GH-35



SCITUATE, MA
MODEL GH-37

BEAMFORT, SC
MODEL GH-37



GH-35

MODEL GH-35 SELF-REGULATING TIDE GATE

TYPICAL SPECIFICATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. Publications are referred to in the text by their basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 276	(1995) Standard Specification for Stainless Steel Bars and Shapes
ASTM B 209	(1993) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rod, Wires, Shapes and Tubes
ASTM B 308	Standard Specifications for Aluminum-Alloy 6061-T6 Standard Structural Shapes
ASTM F 593	(1995) Standard Specification for Stainless Steel Bolts, Hexcap Screws and Studs
ASTM F 594	(1991) Standard Specification for Stainless Steel Nuts

PART 2 PRODUCTS

2.1 SELF-REGULATING TIDE GATES

The self-regulating tide gates shall be manufactured by Golden Harvest, Inc., Burlington WA (800-338-6238), and no other will be acceptable.

2.1.1 GENERAL

The intent of the self-regulating tide gate is to allow for tidal flushing of salt marshes during normal tidal cycles, while providing flood protection for upland areas. These are utilized where traditional flapper-style tide gates, electrically operated sluice gates or other electrically powered devices will not be accepted.

Each self-regulating tide gate shall be installed such that the tide gate flap floats on the surface of the rising and falling tidal water, allowing flow through the existing culverts during normal tidal cycles. Each tide gate shall be constructed such that the tide gate flap automatically closes at the pre-designated high water elevation. The tide gate shall be provided with an appropriately sized vacuum relief vent and bypass doors to relieve air and water trapped behind the gate when the main tide gate flap closes. During storm time, the tide gate shall remain in the closed position after automatically closing on the high set point until the tide recedes and resumes normal tidal action at which point the tide gate shall automatically reopen to allow free passage of water into an out of the salt marsh area.

Each gate shall be designed with adjustable floats and float support arms to allow field adjustment of the high water closing elevation through the maximum feasible range. Each self-regulating tide gate shall be fabricated so that it a maybe adjusted utilizing normal hand tools. They shall be designed such that they can be converted to the operation mode of a standard flap-type gate.

MODEL GH-35
SELF-REGULATING TIDE GATE



TYPICAL SPECIFICATION (CONTINUED)

2.1.2 MATERIALS AND FINISH

The Contractor shall furnish and install Golden Harvest, Inc. self-regulating tide gates of the size indicated on the plans, at the locations indicated on the plans.

If provide, the body of the self-regulating tide gate shall be fabricated from tubular segments(s) of aluminum conforming to ASTM B 209 alloy 6061-T6, of rectangular cross-section, with external reinforcement of like material as required to provide structural rigidity.

The bottom interior segment of the tubular body shall be reinforced with a wear plate formed to match the bottom of the tubular body. The wear plate shall be permanently attached to the interior main body of the tide gate structure.

The body of the tide gate shall include a mounting flange, with factory drilled bolt holes. The tide gate shall be provided with a neoprene or urethane rubber gasket with factory drilled holes corresponding to the mounting flange.

The tide gate shall be provided with a neoprene molded door gasket.

The lateral bypass doors shall be hinged to open outward from the body of the tide gate.

The high-water closure floats shall consist of a polyurethane foam ball float (foam density to be determined by manufacture, sufficient to ensure proper operation of the tide gate closure mechanism) enclosed in linear low-density polyethylene or polyvinyl chloride outer casing.

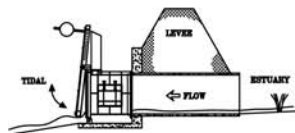
The vacuum relief vent shall be fabricated from a segment of high density polyethylene tubing of circular cross-section, or aluminum conforming to ASTM B-209 alloy 6061-T6, and shall be secured to the main body of the tide gate structure.

The tide gates shall be provided with stainless steel mounting bolts conforming to ASTM F 503 AISI 304.

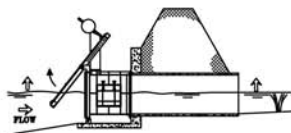
Miscellaneous hardware shall conform to ASTM F593 AISI 304 SS, ASTM F-594 AISI 304 SS, or other approved materials suitable for use in salt water.

Other components and hardware materials not specifically designated above shall be suitable for use in salt water.

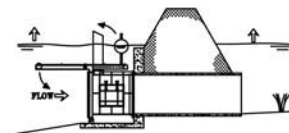
SRT In Normal Tide Sequence



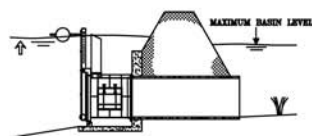
1. SRT ACTING AS NORMAL FLAP GATE ALLOWING ESTUARY DRAINAGE



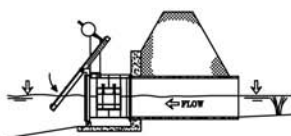
2. RISING TIDE FLOATS GATE UP ALLOWING INCOMING TIDE TO FLOOD ESTUARY BASIN



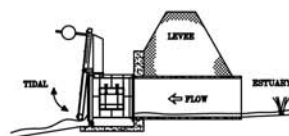
3. TIDE BEGINS TO CLOSE GATE LIMITING ESTUARY FLOOD LEVEL



4. NORMAL HIGH TIDE GATE FULLY CLOSED

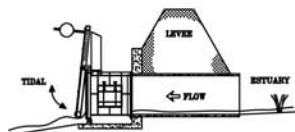


5. COVER FLOATING ON FALLING TIDE LOWERS ESTUARY FLOOD LEVEL

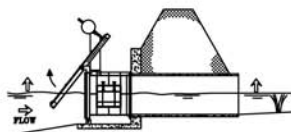


6. GATE ACTING AS NORMAL FLAP ESTUARY DRAINAGE RESUMES

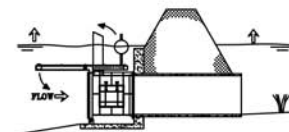
SRT In Storm Sequence



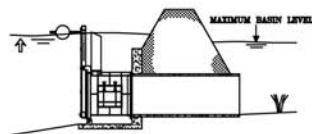
1. SRT ACTING AS NORMAL FLAP GATE ALLOWING ESTUARY DRAINAGE



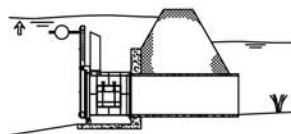
2. RISING TIDE FLOATS GATE UP ALLOWING INCOMING TIDE TO FLOOD ESTUARY BASIN



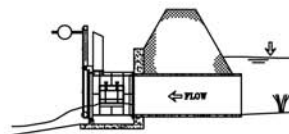
3. TIDE BEGINS TO CLOSE GATE LIMITING ESTUARY FLOOD LEVEL



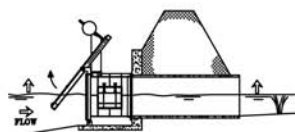
4. NORMAL HIGH TIDE GATE FULLY CLOSED



5. WHEN TIDE EXCEEDS NORMAL HIGH TIDE LEVEL, GATE LOCKS IN CLOSED POSITION TO PREVENT GATE ACTION DUE TO SURGES



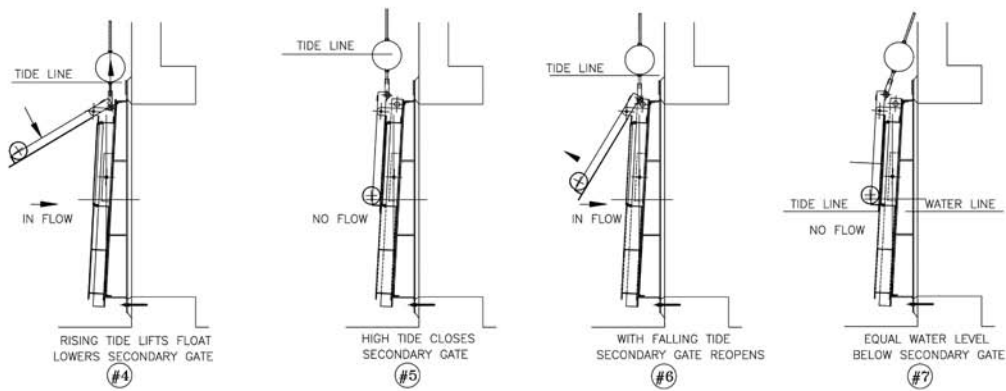
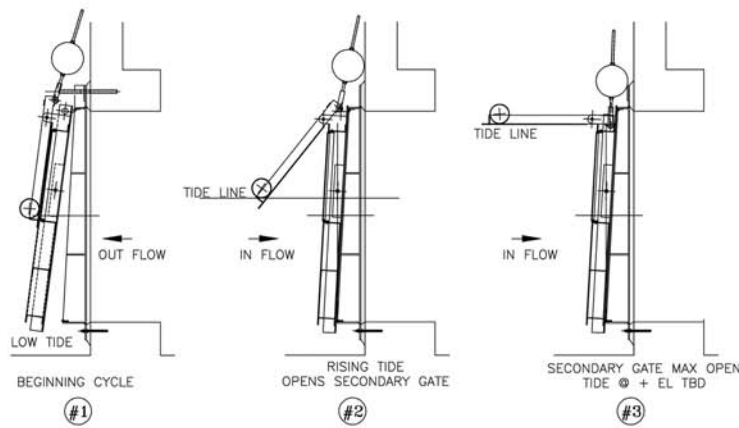
6. RECEDING TIDE - SIDE FLAPS OPEN TO ALLOW DRAINAGE OF ESTUARY - MAIN GATE COVER RESTRICTED TO PARTIALLY OPEN UNTIL NEXT TIDE



7. NEXT INCOMING TIDE - GATE UNLOCKS & RESUMES NORMAL TIDE SEQUENCE

Model GH-37 Tide-Regulated Flap Gate Sequence

Specification available upon request.



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