

Hamerschlag Hall Green Roof Project

Water Monitoring System

Plans and Specifications

Created By: David Carothers

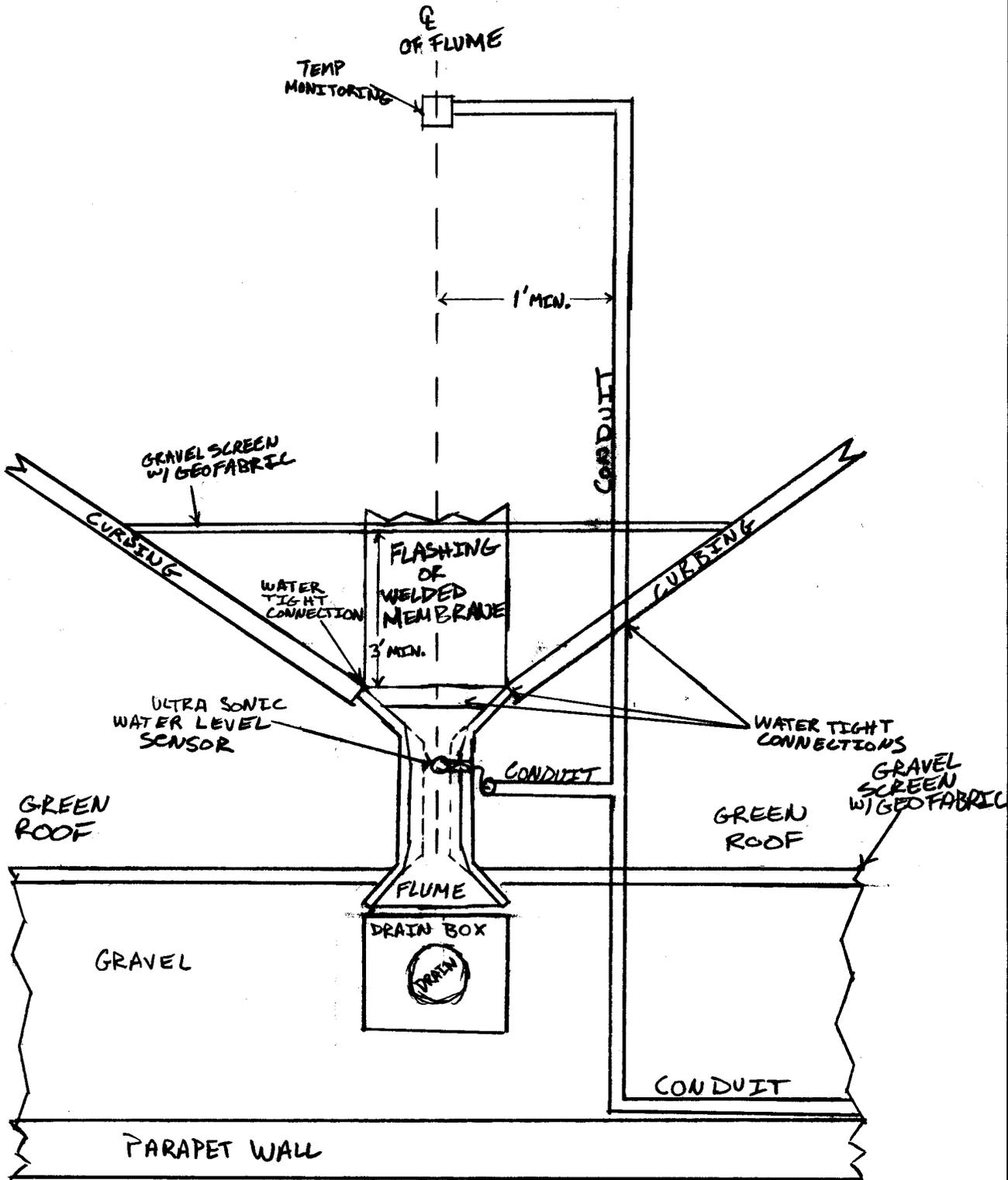
Date: 2/17/05

Hamerschlag Hall Green Roof Project
Date: 2/14/05
Created By: David Carothers

Water Monitoring, Flume, and Curbing Specifications

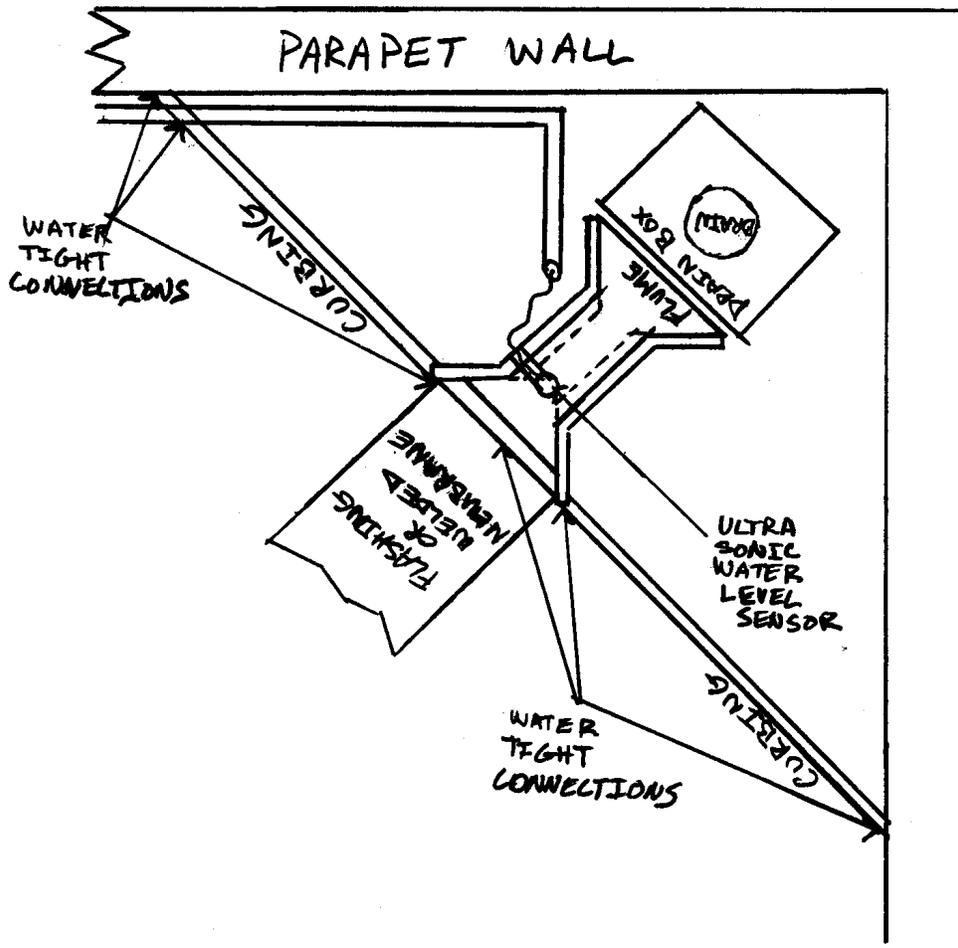
- The connection between the curbing and the flumes shall be water tight. (Figures 1&2)
- The connection between the flume and the green roof membrane shall be water tight using flashing or a welded membrane at the discretion of the roof contractor. (Figures 1&2)
- The curbing shall be water tight around the conduit where the conduit passes through the curbing. (Figures 1&2)
- Gravel screen with geo-fabric shall be a minimum of three feet from the face of the flume. (Figure 1)
- Conduit shall be offset from the centerline of the flume a minimum of one foot. (Figure 1)
- The connection between the curbing and the parapet wall on the control roof shall be water tight. (Figure 2)
- The connection between the curbing and the green roof membrane shall be water tight. (Figure 3)
- Curbing shall be a minimum of six inches or level with the top of the flume. (Figure 3)
- Curbing shall be plastic or metal at the discretion of the roof contractor and supported on both sides. (Figure 3)
- All wire splices and connections shall be water tight and made outside the conduit.
- Conduit shall be water tight where wires enter
- Each wire shall be labeled and referenced as to its source
- AC power shall be available through an outdoor 4 outlet box with GFI and an all weather cover. This box shall be placed on the north wall of the green roof located approximately 65' west of the east end of the green roof.

GREEN ROOF FLUME DETAIL



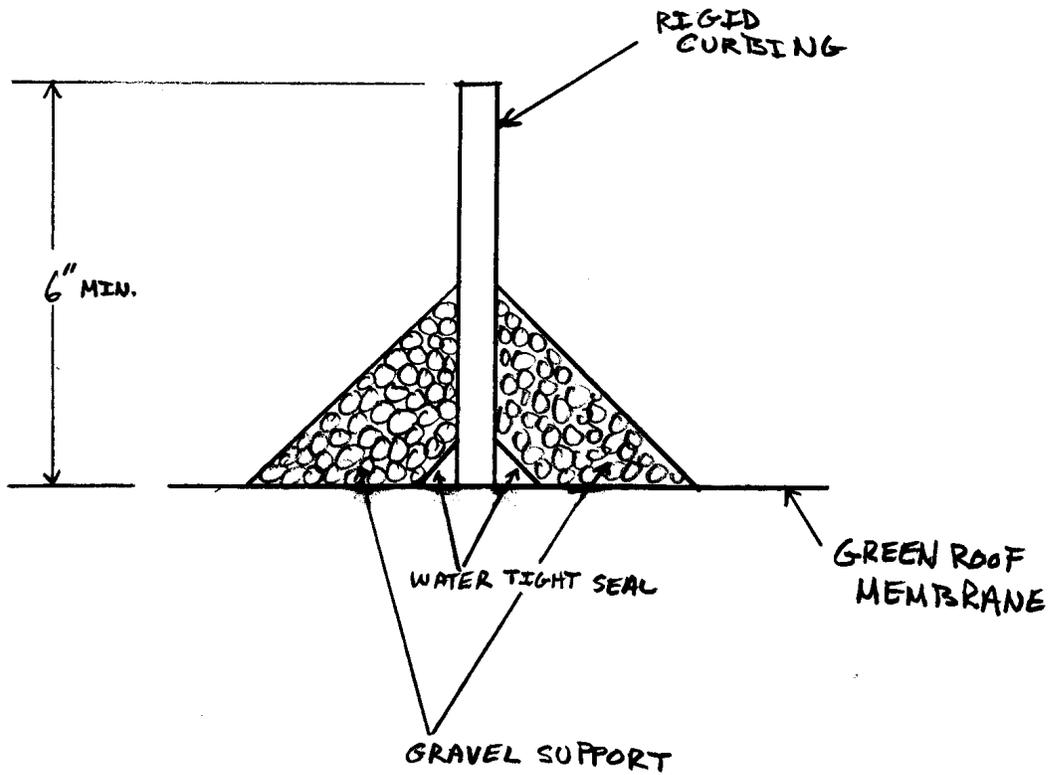
PLAN VIEW

CONTROL ROOF FLUME DETAIL

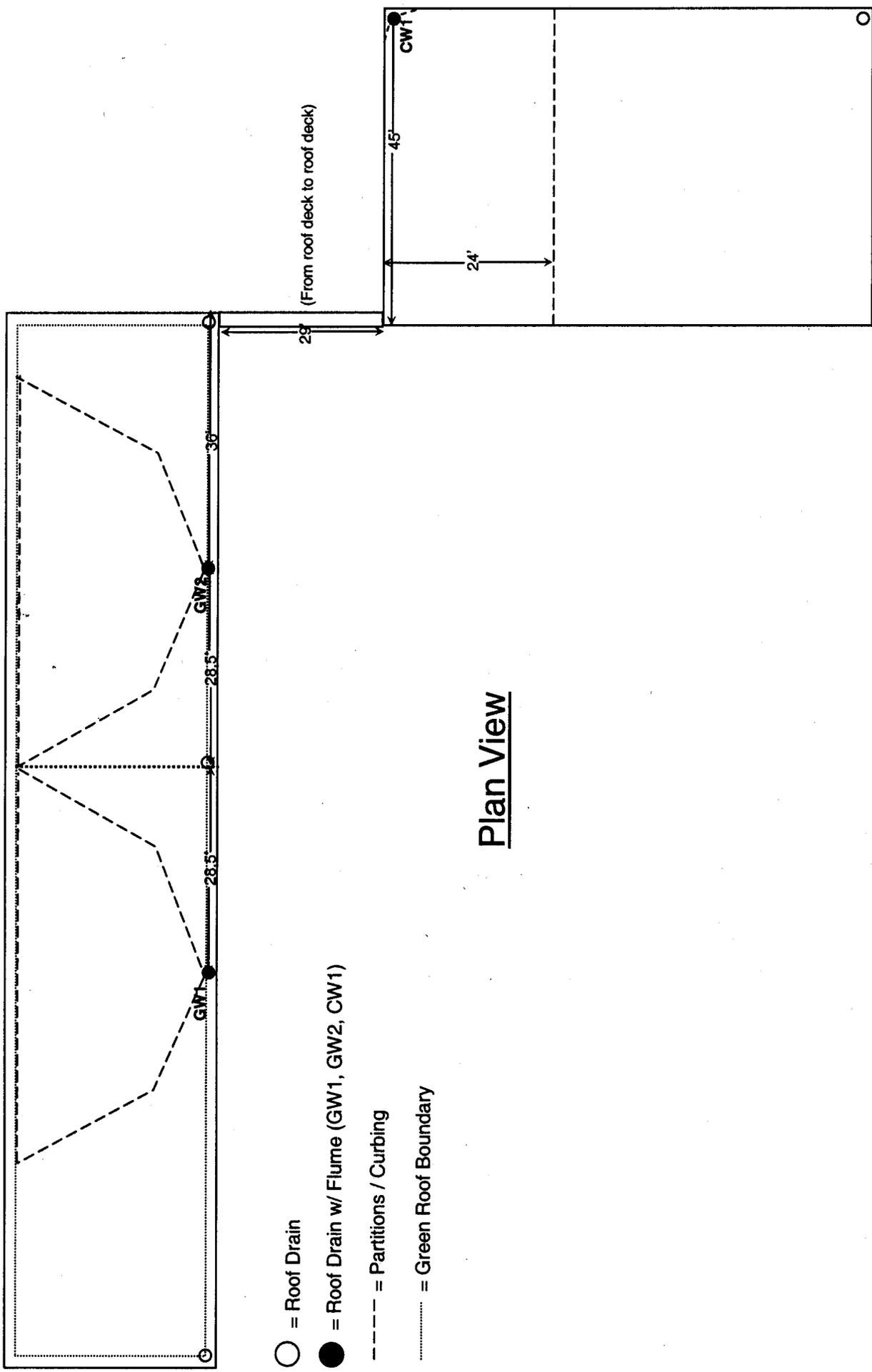


PLAN VIEW

CURBING DETAIL



CROSS SECTION



Plan View

Plan View Hammerschlag Hall South Roof and Porter Hall Control Roof
 Water Flow and Roof Temp. Monitoring Locations
 Scale: 1" ~ 20'
 Drawn By: David Carothers
 Date: 2/17/05

Fig. 4

Hammerschlag Hall Green Roof Project

Date: 2/10/05

Created By: David Carothers

Water Monitoring Equipment List

Description	Source	Number	Unit	Unit Price	Cost
Stevens STR Ultrasonic Level Sensor (part #93568)	Fondriest Catalog page 35	3	EA	\$795.00	\$2,385.00
Ultrasonic Level Sensor Mounting Bracket	Self Fabricated	3	EA	\$33.33	\$99.99
NexSens cable, 8 Conductor with PVC Jacket 24 AWG	Fondriest Environmental	350	FT	\$0.36	\$126.00
Plasti-Fab Small 60° V Trapezoidal Flume	S.M. Sawchuck Sales	3	EA	\$446.67	\$1,340.00

Total Cost \$3,950.99

Appendix A

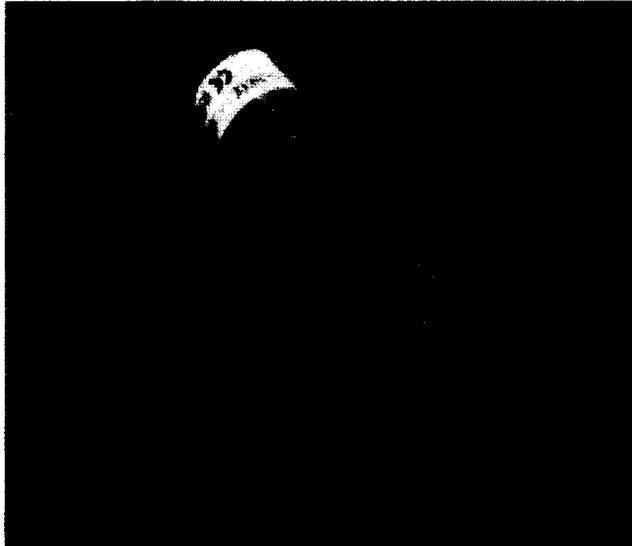
Water Flow Monitoring Equipment Specification Sheets

Stevens®

Water Monitoring Systems

NEW STR ULTRASONIC

- **Sensor span 4.7 in to 79 inches**
- **Easy push-button setup.**
- **4-20mA analog output**
- **Epoxy sealed in tough ULTEM® plastic**
- **Resistant to caustic materials and harsh environments CE Certified**



General Specifications:

Power Supply: +15 to 24 VDC @ 80mA, excluding load

Analog Output: 4 –20 mA

Response Time: 35 milliseconds

Loss-Echo Time: 1 sec.

Loss-Echo State: 4mA

Operating Temperature: 0 deg.C to 50 deg.C (32deg.F to 122deg.F)

@ 100%relative humidity

Sensing: Range: 119 to 2007 mm (4.7 to 79.0 inches)

Limit Adjustment Resolution: 0.08 mm (0.003 inch)

Sensor Angle with respect to smooth flat surface: 90 deg. +/- 10 deg.

**Repeatability: +/- 0.86 mm (0.034 inch) from smooth flat surface at
Constant air temperature**

Sensor Cable Length: 3 mtrs (9 ft) Standard

**Sensor Housing Material: Case: GE ULTEM® (Trademark of the General
Electric Co.)**

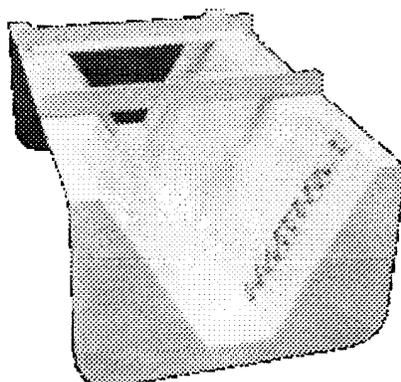
Transducer Face: Silicon rubber – gray

Corrosion Resistant Equipment for Wastewater Control

TRAPEZOIDAL FLUMES

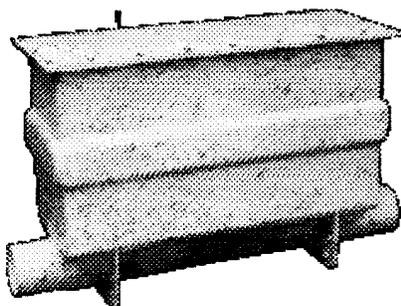
Contact Plasti-Fab for Innovative Problem Solving Solutions

Originally developed for irrigation, trapezoidal flumes have proven their effectiveness during years of use by the Soil Conservation Service and Department of Agriculture - both to monitor flows in furrows and in sloping irrigation ditches. Today their inherent advantages are making trapezoidal flumes increasingly popular for industrial and municipal applications, particularly where low flow measurement is required.



Large 60° V Trapezoidal Flume

Trapezoidal Flumes	Flow Range - GPM
Sm. 60° V	1 - 30
Lg. 60° V	1 - 120
XL 60° V	1 - 600
3.0' 60° V	2 - 6,200
2" - 45° WSC	40 - 980
12" - 45° SRCRC	100 - 2,955
18" - 45° TRAP	75 - 14,530
2.0' SRCRC	320 - 21,970



Lg. 60° Trapezoidal Flume with surge box and cover

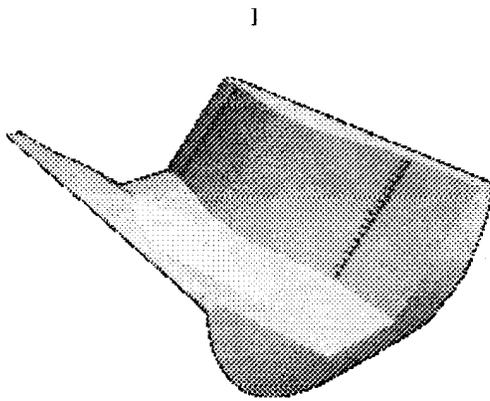
Trapezoidal flumes fall into two principal groups, 60° V-notch flumes and larger trapezoidal flumes. The 60° V flumes have a sharp V-throat section similar to a V-notch weir and produce superior resolution for accurate flow measurement down to 1 gpm. The larger trapezoidal flumes, up to the 2 ft. SRCRC flume, have flat floors and sloping sidewalls and can handle flows up to 32 MGD.

All Trapezoidal flumes exhibit similar flow characteristics, and have application advantages over other flumes and weirs.

- The bottom is flat from entrance to exit for better head conservation.
- Trapezoidal flumes do not require a free-fall discharge to operate correctly.
- The staff gage and instrument mounting brackets are located within the flume and are factory installed.
- The natural shape of the flume mimics many earthen and concrete-lined ditches. Little or no transition is required in these situations.

60°V Trapezoidal flumes provide the only practical means of obtaining good flow data on low and intermittent flow streams. This flume produces more readable head under 10 gpm than any other flume or weir. Plasti-Fab has demonstrated the flumes effectiveness in over 20 years of use by small industries, developments, parks and communities.

- Accurate flow measurement down to 1 gpm.
- Better resolution and repeatability especially below 0.2 ft. of head.
- No requirement for upstream pooling or downstream free-fall.
- Can operate up to 80 – 85 percent submergence with little or no loss of accuracy.
- The flat floor and sloping wall allows solids



2"- 45° WSC Trapezoidal Flume

to pass through the throat without being trapped.

- 60° flume sizes are available to measure flows as high as 6200 gpm.

Larger Trapezoidal flumes have a primary gage located at the H_1 location for normal free flow operation, and a downstream gage at the H_4 location for use in conjunction with submerged flow tables.

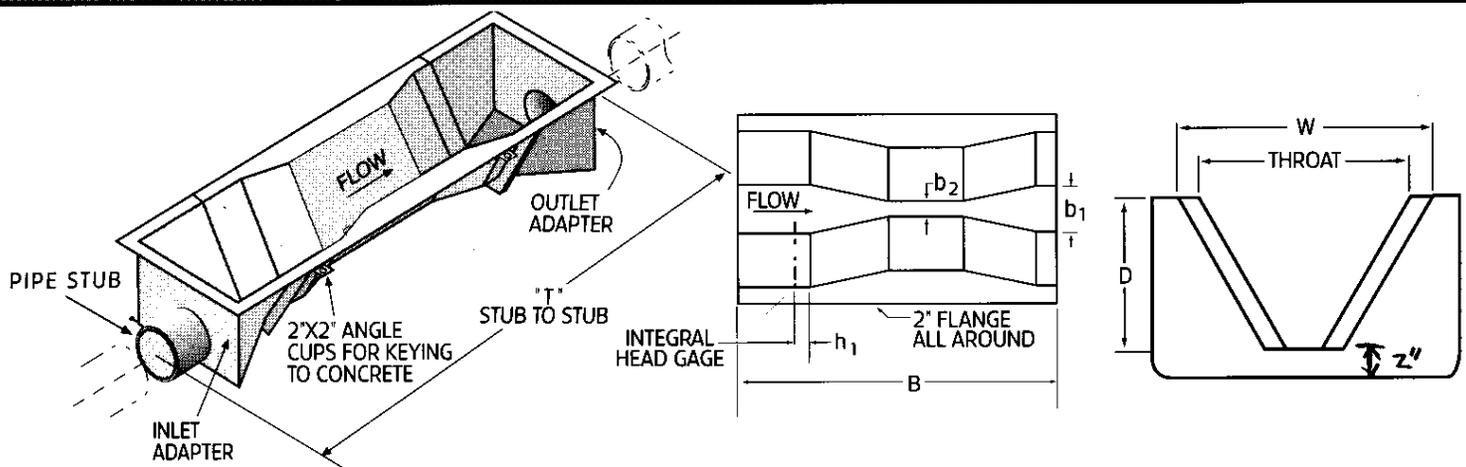
We recommend that all flumes be designed and installed for free flow operation.

Problem Solving Adaptations:

- Permanent installation in concrete or earthen channels
- Free standing flumes with wing walls, end bulkheads or adapters for larger diameter pipes and channels.
- End adapters for piped installation – Small 60° V to 3 ft. 60° V flumes.
- Packaged Metering Manholes for below grade installation – Large 60° V to 3 ft. 60° V flumes.
- Tranquilizer Racks and Energy Absorbing units to reduce velocity and turbulence.
- Surge Boxes to handle possible surcharging at in-plant and sensitive locations – Large 60° and XL 60° V trapezoidal flumes.
- FRP Grating or Odor Control Covers.

Accessories and Instrument Setups:

- Adjustable stainless steel **Support Brackets** for all types of ultrasonic transducers.
- **Molded Side Cavities and Floor Cavities** for:
 - Stainless steel **bubble pipes**
 - Stainless steel **sample pipes**
 - Pressure transducers
 - Capacitance probes and s/s **grounding plates**
- Stainless steel **Liftout Brackets** for pressure and pH probes.
- 2" threaded Tap for remote still well.
- 8" and 12" diameter attached **Still Wells**.
- Sealed **Ultrasonic Mounting Tube**.



COMMON SIZES OF PLASTI-FAB TRAPEZOIDAL FLUMES

<i>Description</i>	<i>Flow Range GPM</i>	b_1	b_2	B	W	D	h_1	T
Sm 60° V	1-35	2"	0	1'-8 ³ / ₃₂ "	6 ³ / ₄ "	4"	1"	2'-8 ³ / ₃₂ "
Lg 60° V	1-120	2"	0	2'-6 ⁷ / ₈ "	10"	6 ³ / ₄ "	1 ¹ / ₂ "	4'-6 ⁷ / ₈ "
XL 60° V	1-600	4 ¹ / ₂ "	0	3'-5 ⁷ / ₈ "	1'-6 ³ / ₈ "	12"	1 ¹ / ₂ "	6'-5 ⁷ / ₈ "
3 ft 60° V	2-6200	1'-0"	0	9'-9"	4'-10 ³ / ₄ "	3'-0"	1'-0"	15'-1"
2" - 45° WSC	13-1000	4 ⁷ / ₈ "	2"	3'-0 ¹ / ₄ "	2'-2 ¹ / ₁₆ "	10 ¹⁹ / ₃₂ "	1 ¹ / ₂ "	—
12" - 45° SRCRC	74-3,000	1'-0"	4 ¹³ / ₁₆ "	5'-7 ¹ / ₈ "	3'-8"	1'-4"	1 ³ / ₄ "	—
18" - 45° TRAP	51-14,530	1'-6"	6"	7'-0"	7'-4"	3'-0"	3"	—
2 ft SRCRC	305-21,990	2'-0"	1'-0"	10'-6"	9'-6"	3'-0"	6"	—