Delta Plastics
Preserving Our Farmland

Irrigating With Poly-Pipe

Phil Tacker - Irrigation Specialist

Charlie Wood – Sales and Service

Delta Plastics
Preserving Our Farmland

- Polytubing Sizes
- Polytubing Performance Characteristics CFS GPM*
- Polytubing Accessories
- Irrigation Methods; Furrow, Border, Levee
- Rice Irrigation
- Soybean Irrigation
- Polytubing Installation Guidelines
- Polytubing Issues and Tips
- Phaucet Program For Designing Furrow Irrigation Systems
- Estimating Flow from Holes in Polytubing CFM GPM
- Irrigation Scheduling
- Estimating Irrigation Set Times CFS GPM
- PVC Underground Irrigation Pipe Sizing
- Estimating and Comparing Pumping Costs
- Estimating Irrigation Costs
- Polytubing Recycling

* CFS: Cubic Feet per Second, GPM: Gallons per Minute, CFM: Cubic Feet per Minute

Characteristics and Flow Capacity For Irrigation Tubing

Gallons per Minute (GPM)

Delta Plastics of the South - 10801 Executive Center Dr, Suite 201, Little Rock, AR 72211 - 501-217-4009 www.deltapl.com

Diameter (inches)	Thickness (mil)	*Flow Capacity (gallons per minute)	Roll Length (feet)	Rolls on Pallet
5	6	**135** (+/-25)	500	48
6	9	**165** (+/-25)	1320	8
7	7	**200** (+/-25)	1320	8
7	10	**250** (+/-25)	1320	8
9	7	**400** (+/-50)	1320	8
9	10	**500** (+/-50)	1320	8
10	7	**535** (+/-50)	1320	8
10	9	**625** (+/-50)	1320	8
10	10	**650** (+/-50)	1320	8
12	6	**800** (+/-100)	1320	8
12	7	**850** (+/-100)	1320	8
12	9	**1000** (+/-100)	1320	8
12	10	**1050** (+/-100)	1320	8

Diameter (inches)	Thickness (mil)	*Flow Capacity (gallons per minute)	Roll Length (feet)	Rolls on Pallet
15	6	**1450** (+/-175)	1320	8
15	7	**1550** (+/-175)	1320	8
15	9	**1800** (+/-175)	1320	8
15	10	**1900** (+/-175)	1320	8
18	9	**2900** (+/-250)	1320	4
18	10	**3000** (+/-250)	1320	4
22	10	**4900** (+/-250)	1320	4
--- Transfer Polytubing ---				
12	**Trans	**1900** (+/-100)	660	8
15	**Trans	**3450** (+/-175)	660	8
18	**Trans	**5500** (+/-250)	660	4

** Trans indicates tubing thickness of approximately 15 mil. The flow capacity is for a 660 ft or less run on flat ground and used as a supply line with no water outlets or splices in the tubing.

* Flow Capacity is based on a full roll length run on flat ground and used as a supply line with no water outlets or splices in tubing. Flow Capacity may vary depending on the conditions the tubing is subjected to. If the tubing is running down slope as a supply line or if holes are punched in the tubing along its length then its flow capacity could be increased. If the tubing is running up a slope as a supply line or if air pockets form in the tubing then its flow capacity could be decreased.

Prepared by: **Phil Tacker**, Delta Plastics Irrigation Specialist

Diameter (inches)	Thickness (mil)	*Flow Capacity (gallons per minute)	Roll Length (feet)	Rolls on Pallet
15	6	**1450** (+/- 175)	1320	8
15	7	**1550** (+/- 175)	1320	8
15	9	**1800** (+/- 175)	1320	8
15	10	**1900** (+/- 175)	1320	8

Diameter in - (cm)	Thickness mil	*Flow Capacity cubic ft per sec	Roll Length ft - (m)	Rolls on Pallet
15 - (38)	6	**3.22** (+/- 0.4)	1320 - (402)	8
15 - (38)	7	**3.44** (+/- 0.4)	1320 - (402)	8
15 - (38)	9	**4.00** (+/- 0.4)	1320 - (402)	8
15 - (38)	10	**4.22** (+/- 0.4)	1320 - (402)	8

Table For Estimating Acres Irrigated in Different Amounts of Time
Gallons Per Minute (GPM)

Delta Plastics of the South - 10801 Executive Center Dr, Suite 201, Little Rock, AR 72211 - 501-217-4009 www.deltapl.com

Acres Covered with Furrow Irrigation Based on Gallons Per Minute (GPM) Flow, Gross Inches Applied and Hours of Pumping

	Hours Pumped											
	12 Hours			18 Hours			24 Hours			36 Hours		
	Gross Inches Applied			Gross Inches Applied			Gross Inches Applied			Gross Inches Applied		
	2	3	4	2	3	4	2	3	4	2	3	4
GPM	Estimated Acres Covered											
400	5	4	3	8	5	4	11	7	5	16	11	8
600	8	5	4	12	8	6	16	11	8	24	16	12
800	11	7	5	16	11	8	21	14	11	32	21	16
1000	13	9	7	20	13	10	27	18	13	40	27	20
1200	16	11	8	24	16	12	32	21	16	48	32	24
1400	19	12	9	28	19	14	37	25	19	56	37	28
1600	21	14	11	32	21	16	43	28	21	64	43	32
1800	24	16	12	36	24	18	48	32	24	72	48	36
2000	27	18	13	40	27	20	53	36	27	80	53	40
2200	29	20	15	44	29	22	59	39	29	88	59	44
2400	32	21	16	48	32	24	64	43	32	96	64	48
2600	35	23	17	52	35	26	69	46	35	104	69	52
2800	37	25	19	56	37	28	75	50	37	112	75	56
3000	40	27	20	60	40	30	80	53	40	120	80	60

Note:	The Gross Inches Applied is an estimate based on soil conditions - 3 inches is a good average for most soil conditions; If the soil is a tight silt loam and/or is sealed over then it will probably take less than 3 inches to cover the field; If the soil is sandy or is a cracking clay then it will probably take more than 3 inches to cover the field.
Example:	A 2200 gpm flow will apply 3 inches of water to 20 acres in approximately 12 hrs but if it takes 4 inches to cover the field only 15 acres can be covered in approximately 12 hrs but 2 inches could be applied to 29 acres in approximately 12 hrs .

Prepared by: **Phil Tacker**, Delta Plastics Irrigation Specialist

Table-acres inches GPM hrs-120909.xls

	12 Hours		
	Gross Inches Applied		
	2	3	4
GPM			
400	5	4	3
600	8	5	4
800	11	7	5
1000	13	9	7
1200	16	11	8
1400	19	12	9
1600	21	14	11
1800	24	16	12
2000	27	18	13
2200	29	20	15
2400	32	21	16
2600	35	23	17
2800	37	25	19
3000	40	27	20

EXAMPLE:
1600 gpm
covers
14 acres
with
3 inches
in
12 hours

Protect Poly-Pipe From Start to Finish

-**Keep roll in box until at field and maybe even when rolling it out.**

-**Protect it from anything that can nick or tear it, especially the edge or sides of the roll.**

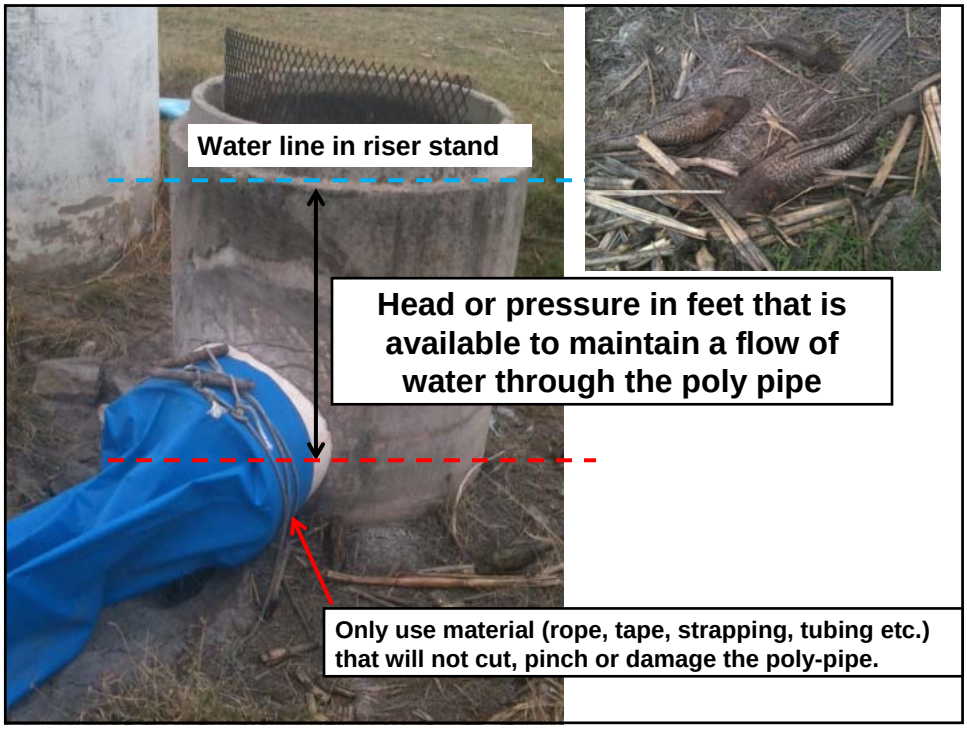
- **Make sure trench is clear of stalks, sharp clods or anything that can puncture it.**

- **If walk on poly-pipe, make sure soles of shoes or boots don't have anything sharp on them.**

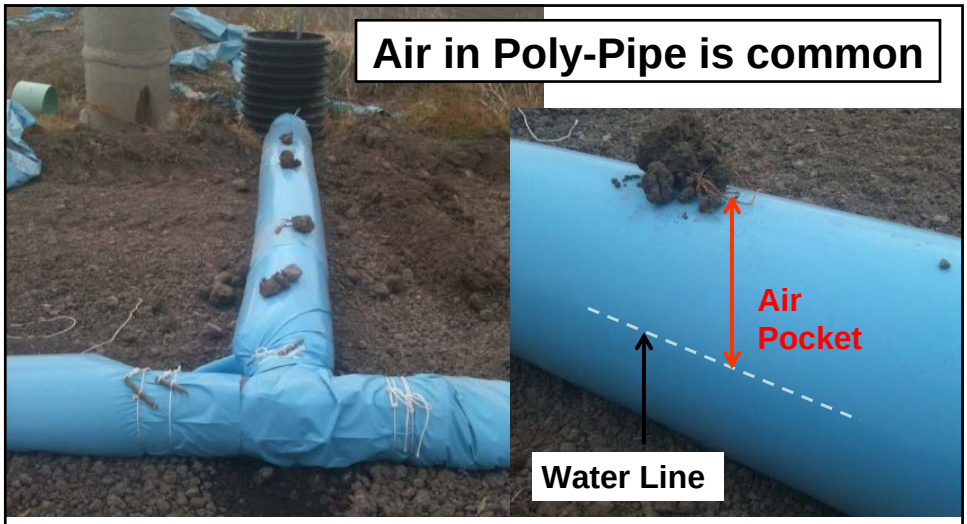
- **Keep poly-pipe tight when rolling it out to avoid slack, wrinkles and kinks and keep seam parallel with the ground.**

- **Leave the end of the poly-pipe open and placed over barrel, mound of dirt etc. but if you tie it off wait until it is filled with water.**

- **Don't put poly-pipe in field unless it can be at least partially filled with water to help hold it in place.**

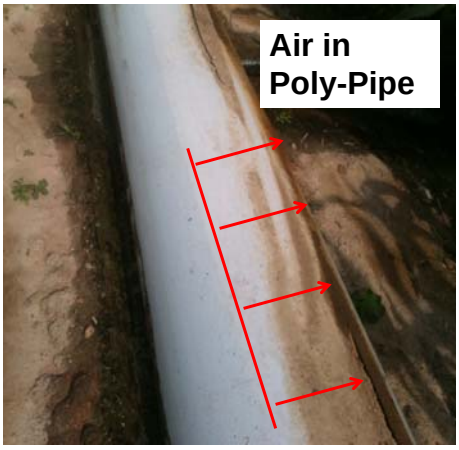


If more head or pressure is desired to increase the flow into the poly pipe then the height of the riser stand could be increased since it is supplied by a taller stand pipe.



Air In Poly-Pipe Causes Problems

- Restricts water flow
- Gets hotter



-Punch approx. 1/8 inch diameter hole in air pockets with a pen, pencil or some other round object that will not slice the poly-pipe…..DON'T USE POCKET KNIFE!!

- Air pockets can reform in different places and original holes can stop up so checking for air pockets should be done more than once.

Punching Holes for Furrow Irrigation

Flow Estimates for Holes In Irrigation Tubing*

Pressure in Feet (See Below)	Hole Size - Inches								
	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
	Flow in Gallons Per Minute (G								
0.5	0.6	0.9	1.3	1.7	2.3	2.9	3.5	4.3	5.1
1.0	0.8	1.2	1.8	2.4	3.2	4.0	5.0	6.0	7.2
1.5	1.0	1.5	2.2	3.0	3.9	4.9	6.1	7.4	8.8
2.0	1.1	1.8	2.5	3.5	4.5	5.7	7.1	8.5	10.2
2.5	1.3	2.0	2.8	3.9	5.0	6.4	7.9	9.5	11.4
3.0	1.4	2.2	3.1	4.2	5.5	7.0	8.6	10.4	12.4

Visual Guide: (Pressure in Feet)

Tubing at 0.5 to 1.5 feet of pressure is still oval shaped

Tubing at 1.5 to 3.0 feet of pressure is pretty round and tight

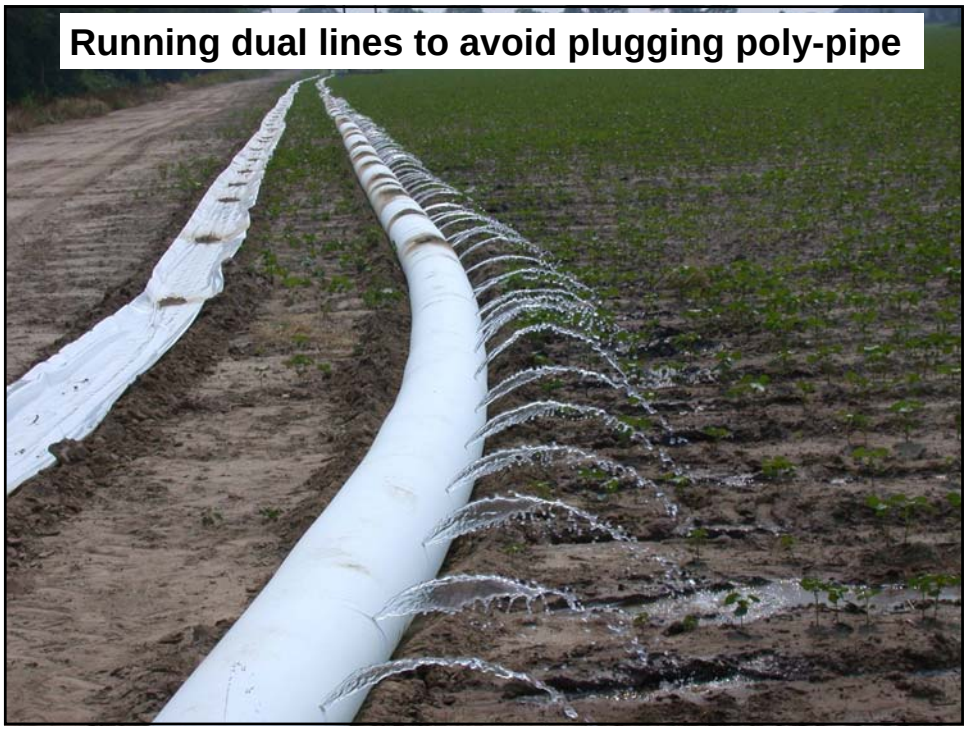
Tubing at 3.0 + feet of pressure is probably blown up or close to it!

Prepared by: **Phil Tacker**, Delta Plastics Irrigation Specialist

Flow Est Holes GPM-120909.xls

Plugging Holes for Irrigation Set Changes

Running dual lines to avoid plugging poly-pipe




Adjustable Gates for
Irrigation Set Changes


Excess runoff has to be avoided

Computer Program For Furrow Irrigation

- Helps determine size of holes to punch in tubing
- Calculates pressure change along the tubing
- Can help address different row lengths in the same set
- May increase number of rows irrigated in a set
- Should help rows water out more evenly
- Can help reduce runoff and irrigation time

Experience is showing 25% average reduction in irrigation time

Information Needed

- Field size
- Flow rate, best to measure with flow meter if possible
- How many hours can irrigate in one set and not have problems
- Row lengths, not all rows but long and short
- Length and slope of poly-pipe turnrow
- Row spacing
- Preference on every row or every other row

Punching holes in Layflat Pipe

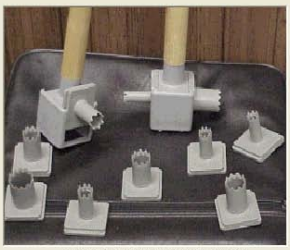
Burch Programming

WPHAUCET

Pipe Hole and Universal Crown Evaluation Tool

WIN NT, 2000, XP, Vista

Version 4.0.0 April 2009



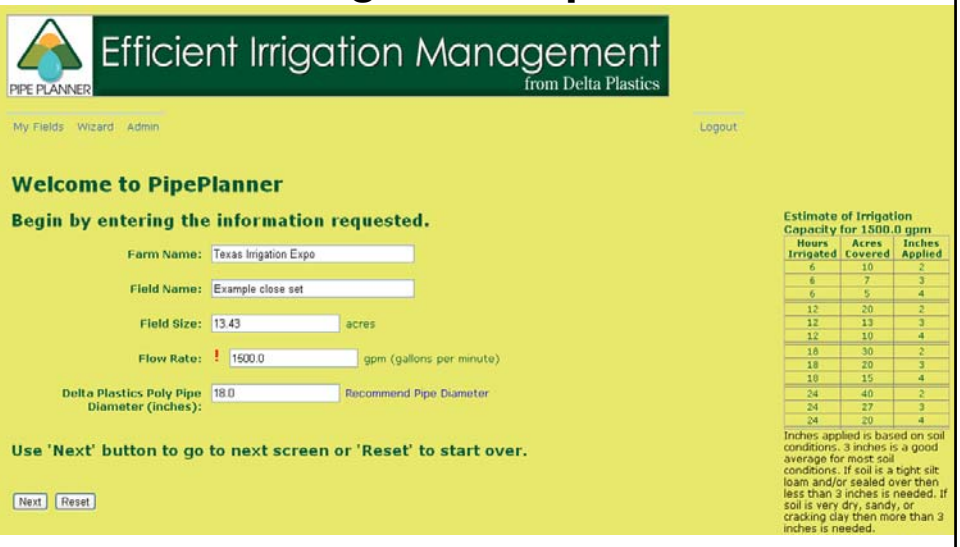
Various size Plastic Hole Punchers

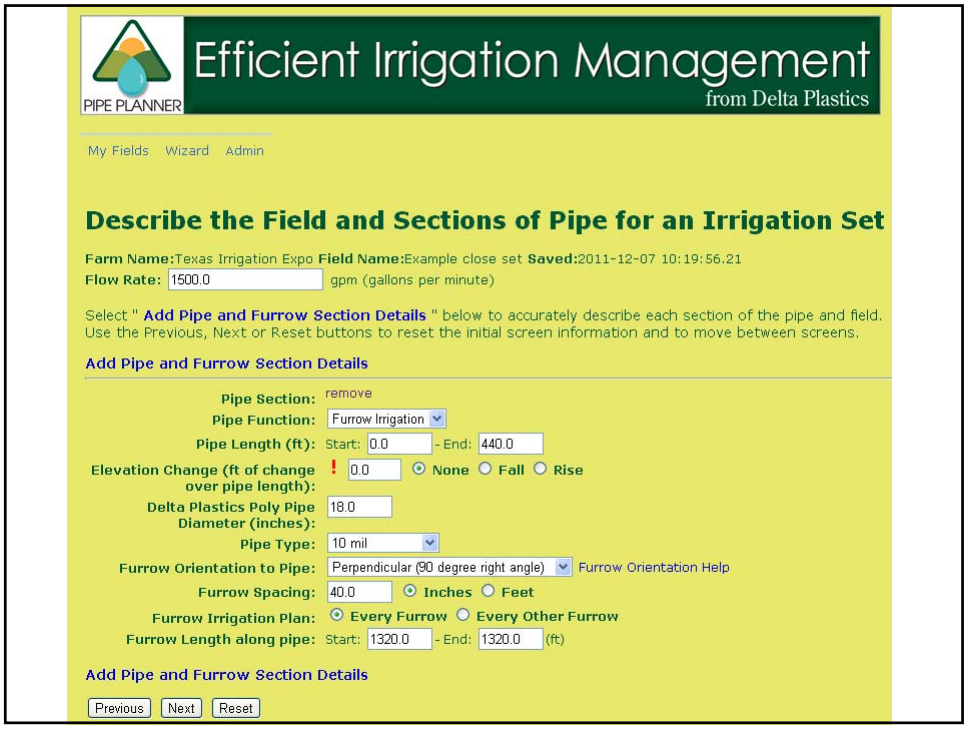
This program was developed to improve Distribution Uniformity in Layflat pipe
Distribution Uniformity can be improved using PHAUCET two ways.
1. Selecting correct hole diameters for head pressure.
2. Designing correct slope where layflat pipe is installed to offset head pressure.

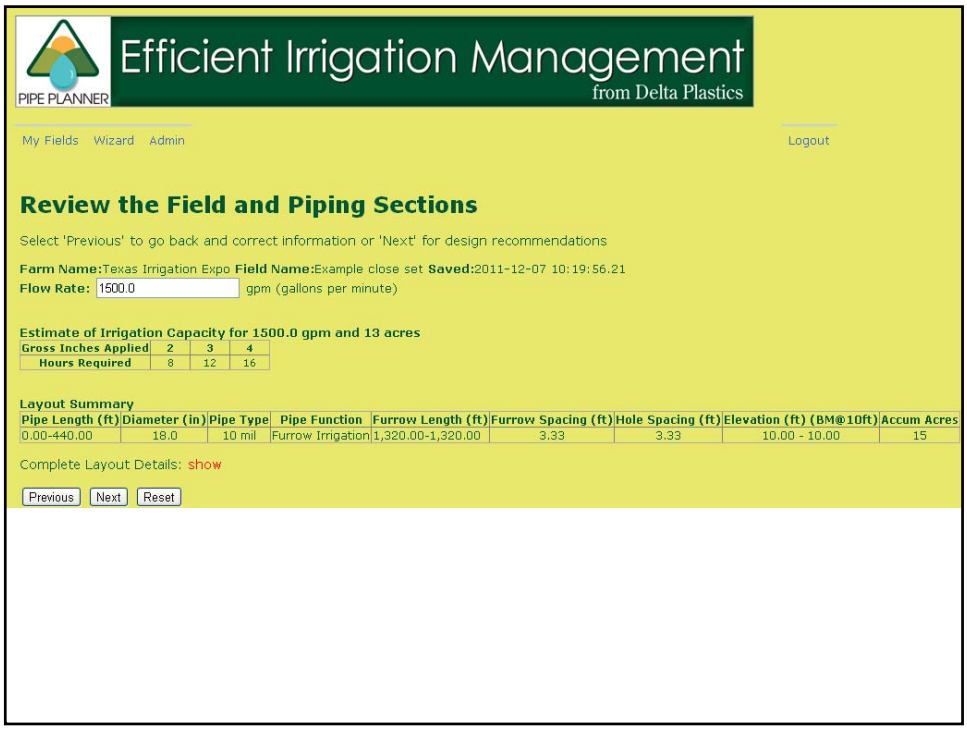
Programmed by Doyle Burch

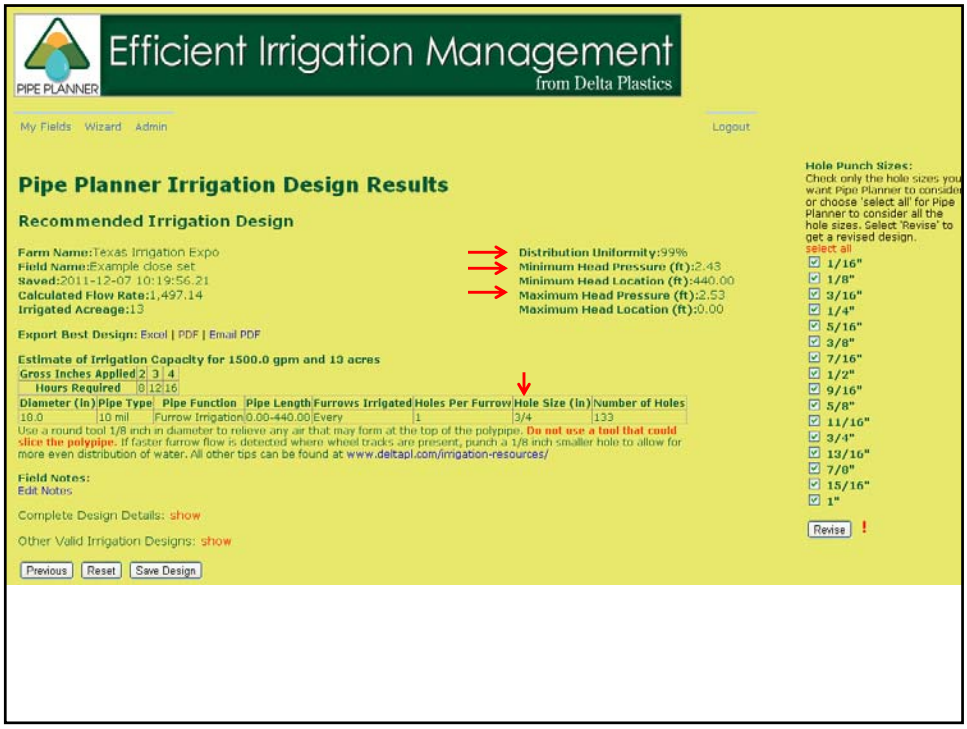
Although PHAUCET program has been tested by its developers, NO warranty, expressed or implied, is made as to the accuracy and functionality of the program and related program material nor shall the fact of distribution constitute any such warranty, and NO responsibility is assumed by the developers in connection therewith.

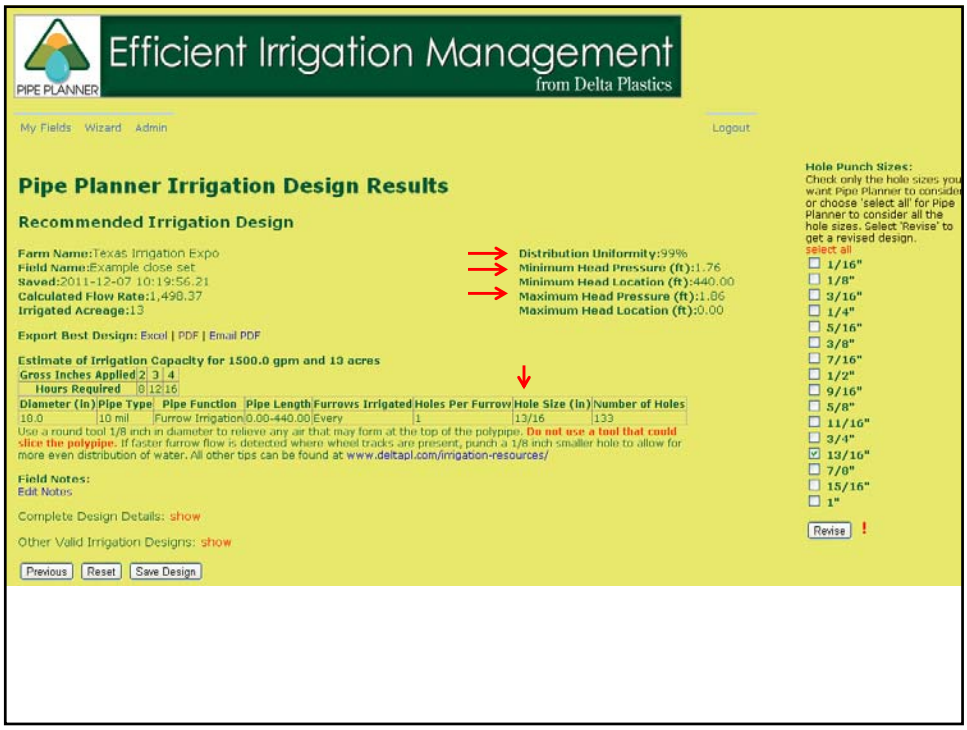
New Program – PipePlanner




PIPE PLANNER
Efficient Irrigation Management
from Delta Plastics
My Fields Wizard Admin
Describe the Field and Sections of Pipe for an Irrigation Set
Farm Name:Texas Irrigation Expo Field Name:Example close set Saved:2011-12-07 10:19:56.21
Flow Rate: 1500.0 gpm (gallons per minute)
Select " Add Pipe and Furrow Section Details " below to accurately describe each section of the pipe and field.
Use the Previous, Next or Reset buttons to reset the initial screen information and to move between screens.
Add Pipe and Furrow Section Details
Pipe Section: remove
Pipe Function: Furrow Irrigation
Pipe Length (ft): Start: 0.0 - End: 440.0
Elevation Change (ft of change over pipe length): ! 0.0 None Fall Rise
Delta Plastics Poly Pipe Diameter (inches): 18.0
Pipe Type: 10 mil
Furrow Orientation to Pipe: Perpendicular (90 degree right angle) Furrow Orientation Help
Furrow Spacing: 40.0 Inches Feet
Furrow Irrigation Plan: Every Furrow Every Other Furrow
Furrow Length along pipe: Start: 1320.0 - End: 1320.0 (ft)
Add Pipe and Furrow Section Details
Previous Next Reset


PIPE PLANNER
Efficient Irrigation Management
from Delta Plastics
My Fields Wizard Admin
Logout
Review the Field and Piping Sections
Select 'Previous' to go back and correct information or 'Next' for design recommendations
Farm Name:Texas Irrigation Expo Field Name:Example close set Saved:2011-12-07 10:19:56.21
Flow Rate: 1500.0 gpm (gallons per minute)
Estimate of Irrigation Capacity for 1500.0 gpm and 13 acres
Gross Inches Applied 2 3 4
Hours Required 8 12 16
Layout Summary
Pipe Length (ft) Diameter (in) Pipe Type Pipe Function Furrow Length (ft) Furrow Spacing (ft) Hole Spacing (ft) Elevation (ft) (BM@10ft) Accum Acres
0.00-440.00 18.0 10 mil Furrow Irrigation 1,320.00-1,320.00 3.33 3.33 10.00 - 10.00 15
Complete Layout Details: show
Previous Next Reset


Efficient Irrigation Management
from Delta Plastics
PIPE PLANNER
My Fields Wizard Admin
Logout
Pipe Planner Irrigation Design Results
Recommended Irrigation Design
Farm Name:Texas Irrigation Expo
Field Name:Example close set
Saved:2011-12-07 10:19:56.21
Calculated Flow Rate:1,497.14
Irrigated Acreage:13
Distribution Uniformity:99%
Minimum Head Pressure (ft):2.43
Minimum Head Location (ft):440.00
Maximum Head Pressure (ft):2.53
Maximum Head Location (ft):0.00
Export Best Design: Excel | PDF | Email PDF
Estimate of Irrigation Capacity for 1500.0 gpm and 13 acres
Gross Inches Applied 2 3 4
Hours Required 8 12 16
Diameter (in) Pipe Type Pipe Function Pipe Length Furrows Irrigated Holes Per Furrow Hole Size (in) Number of Holes
10.0 10 mil Furrow Irrigation 0.00-440.00 Every 1 3/4 133
Use a round tool 1/8 inch in diameter to relieve any air that may form at the top of the polypipe. Do not use a tool that could slice the polypipe. If faster furrow flow is detected where wheel tracks are present, punch a 1/8 inch smaller hole to allow for more even distribution of water. All other tips can be found at www.deltapl.com/irrigation-resources/
Field Notes:
Edit Notes
Complete Design Details: show
Other Valid Irrigation Designs: show
Previous Reset Save Design
Hole Punch Sizes:
Check only the hole sizes you want Pipe Planner to consider or choose 'select all' for Pipe Planner to consider all the hole sizes. Select 'Revise' to get a revised design.
select all
1/16"
1/8"
3/16"
1/4"
5/16"
3/8"
7/16"
1/2"
9/16"
5/8"
11/16"
3/4"
13/16"
7/8"
15/16"
1"
Revise !


Efficient Irrigation Management
from Delta Plastics
PIPE PLANNER
My Fields Wizard Admin
Logout
Pipe Planner Irrigation Design Results
Recommended Irrigation Design
Farm Name:Texas Irrigation Expo
Field Name:Example close set
Saved:2011-12-07 10:19:56.21
Calculated Flow Rate:1,498.37
Irrigated Acreage:13
Distribution Uniformity:99%
Minimum Head Pressure (ft):1.76
Minimum Head Location (ft):440.00
Maximum Head Pressure (ft):1.86
Maximum Head Location (ft):0.00
Export Best Design: Excel | PDF | Email PDF
Estimate of Irrigation Capacity for 1500.0 gpm and 13 acres
Gross Inches Applied 2 3 4
Hours Required 8 12 16
Diameter (in) Pipe Type Pipe Function Pipe Length Furrows Irrigated Holes Per Furrow Hole Size (in) Number of Holes
10.0 10 mil Furrow Irrigation 0.00-440.00 Every 1 13/16 133
Use a round tool 1/8 inch in diameter to relieve any air that may form at the top of the polypipe. Do not use a tool that could slice the polypipe. If faster furrow flow is detected where wheel tracks are present, punch a 1/8 inch smaller hole to allow for more even distribution of water. All other tips can be found at www.deltapl.com/irrigation-resources/
Field Notes:
Edit Notes
Complete Design Details: show
Other Valid Irrigation Designs: show
Previous Reset Save Design
Hole Punch Sizes:
Check only the hole sizes you want Pipe Planner to consider or choose 'select all' for Pipe Planner to consider all the hole sizes. Select 'Revise' to get a revised design.
select all
1/16"
1/8"
3/16"
1/4"
5/16"
3/8"
7/16"
1/2"
9/16"
5/8"
11/16"
3/4"
13/16"
7/8"
15/16"
1"
Revise !

PIPE PLANNER

Efficient Irrigation Management

from Delta Plastics

Pipe Planner Irrigation Design Results

Farm Name:	Texas Irrigation Expo	Distribution Uniformity:	99%
Field Name:	Example close set	Minimum Head Pressure(ft):	1.76
Saved:	Wed Dec 07 10:19:56 CST 2011	Minimum Head Location(ft):	440.00
Flow Rate:	1498.37	Maximum Head Pressure(ft):	1.86
Irrigated Acreage:	13	Maximum Head Location(ft):	0.00

Gross Inches Applied	2	3	4
Hours Required	8	12	16

Diameter (in)	Pipe Type	Pipe Function	Pipe Length Begin	Pipe Length End	Furrows Irrigated	Holes Per Furrow	Hole Size (in)	Number of Holes
18.0	10 mil	Furrow Irrigation	0.00	440.00	Every	1	13/16	133

Use a round tool 1/8 inch in diameter to relieve any air that may form at the top of the polypipe. Do not use a tool that could slice the polypipe. If faster furrow flow is detected where wheel tracks are present, punch a 1/8 inch smaller hole to allow for more even distribution of water. All other tips can be found at www.deltapl.com/irrigation-resources/

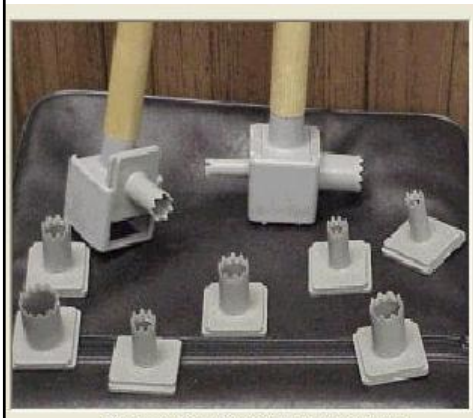
Design Notes: This is the 440 ft of rows closest to the water source

What if wheel track middles always get out sooner than other middles?

You can punch a hole in the wheel track middles that is 1/8 inch smaller than the size that is recommended and all middles should get out closer to the same time

Commercial hole punch

12 diameters
5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 11/16, 3/4, 13/16, 7/8, 15/16, 1”



Various size Plastic Hole Punchers

Shop built punch for small holes

Potential Impact

Assumptions:
1500 gpm (3.35 cfs), 40 acres
48 hrs to irrigate
4 irrigations per season
25% less irrigation, 12 hrs less per irrigation

Water savings:

- **1.08 mill gallons (144,385 ft^3) per irrigation**
- **4.32 mill gallons (577,540 ft^3) for season**
- **4 inches over 40 acres; 13.3 acre-feet**