

# Overview on different types of irrigation systems

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# Disclaimer

- The mention of a specific company, images showing a specific company or otherwise discussion of a company does not constitute endorsement of that company or product by the University of Georgia or Virginia Tech University.

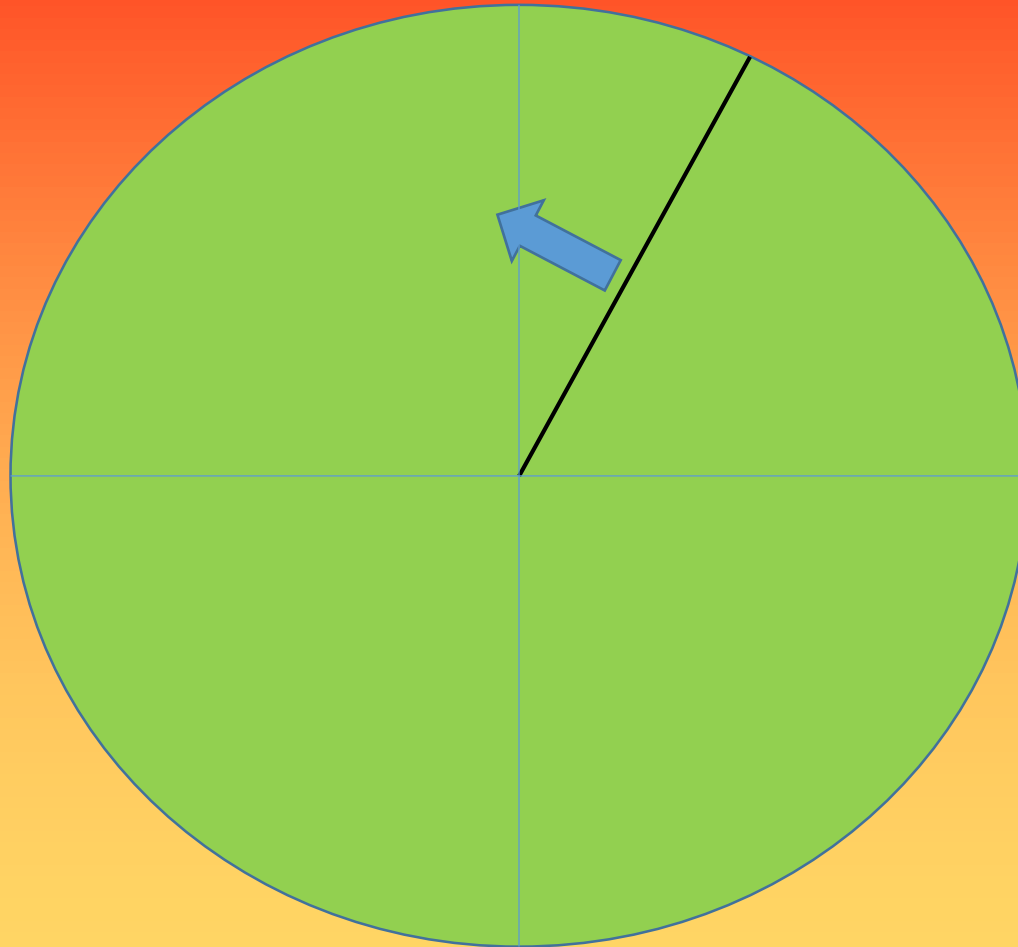
# Types of irrigation

- Center Pivot
  - Impacts on top
  - Sprinklers on drops
  - Lateral move
- Hard hose
- Drip systems
  - Drip Tape
  - Drip Tube
  - Micro-jets

# Basics of an Irrigation System

- There are a few basics that every irrigation system needs:
  - Water source
    - Pond, creek, lake, groundwater
  - Pump and Size
    - Surface, Submersible
    - Size based on flow and head pressure
  - Filter
    - Sand media filter, screen filter, disk filter
  - Pipe to get water from pump to plant
    - PVC, layflat, oval hose, aluminum pipe, drip, ?
  - Sprinklers, emitters
  - Pressure

# Center Pivot Systems



# 1. PIVOT POINT

The pivot point anchors the machine to a permanent location in the field. It also houses a system of subcomponents that contribute to the overall functionality of the pivot.

## 1. PIVOT LEGS

Four pivot legs are bolted or chained to a concrete pivot pad, providing support.

## 2. RISER PIPE

Water supply enters the pivot through this pipe.

## 3. PIVOT SWIVEL

An elbow-shaped fitting that connects the riser pipe to the first span.



## 4. CONTROL PANEL

The panel is the command center of the pivot.

## 5. J-PIPE

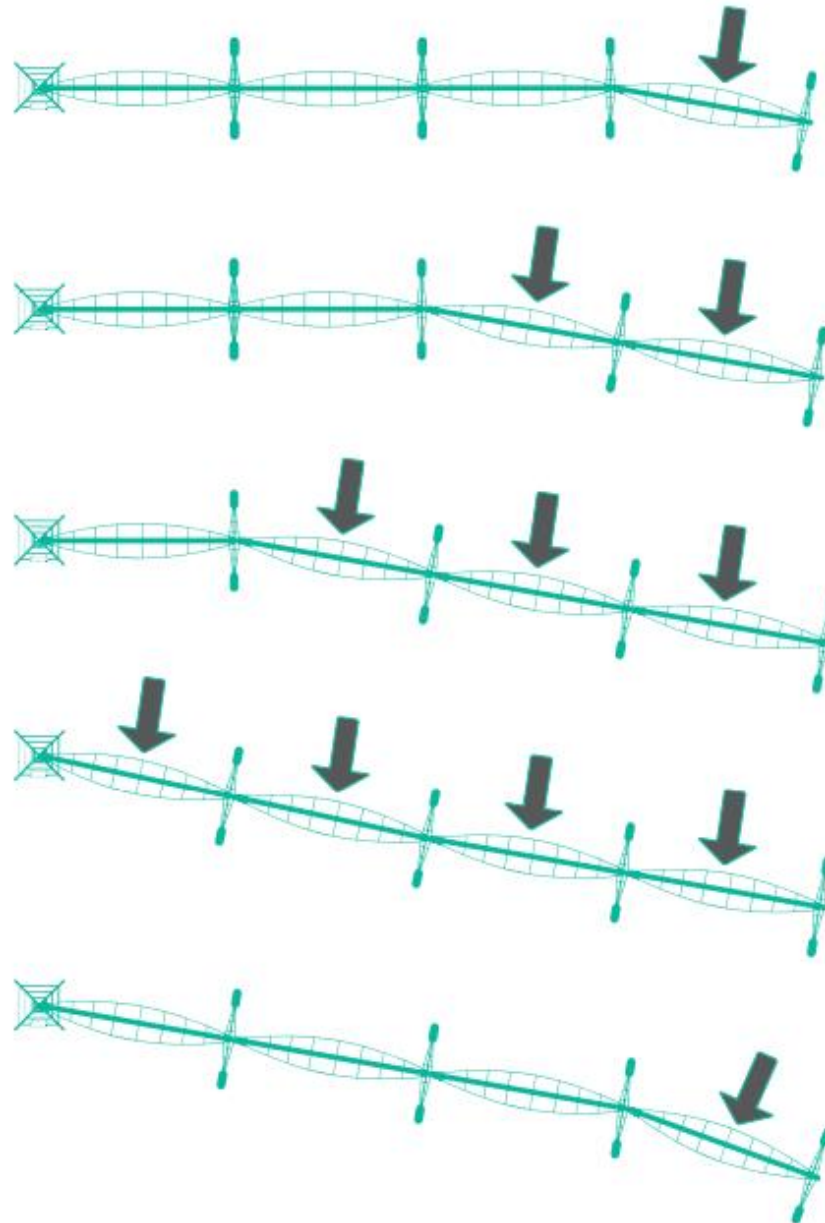
Power and control circuit wires travel through the J-pipe to the collector ring assembly.

## 6. COLLECTOR RING

Contact brushes rotate around stationary brass rings to provide a continuous flow of electricity to the pivot.



# MOVEMENT IS A CHAIN REACTION



- <https://www.youtube.com/watch?v=6YpC1jQaDbM>

<http://web.irrigation.education/how-center-pivots-work-guide?submissionGuid=3542bb28-a72e-43d5-ae7b-a9675609db66>

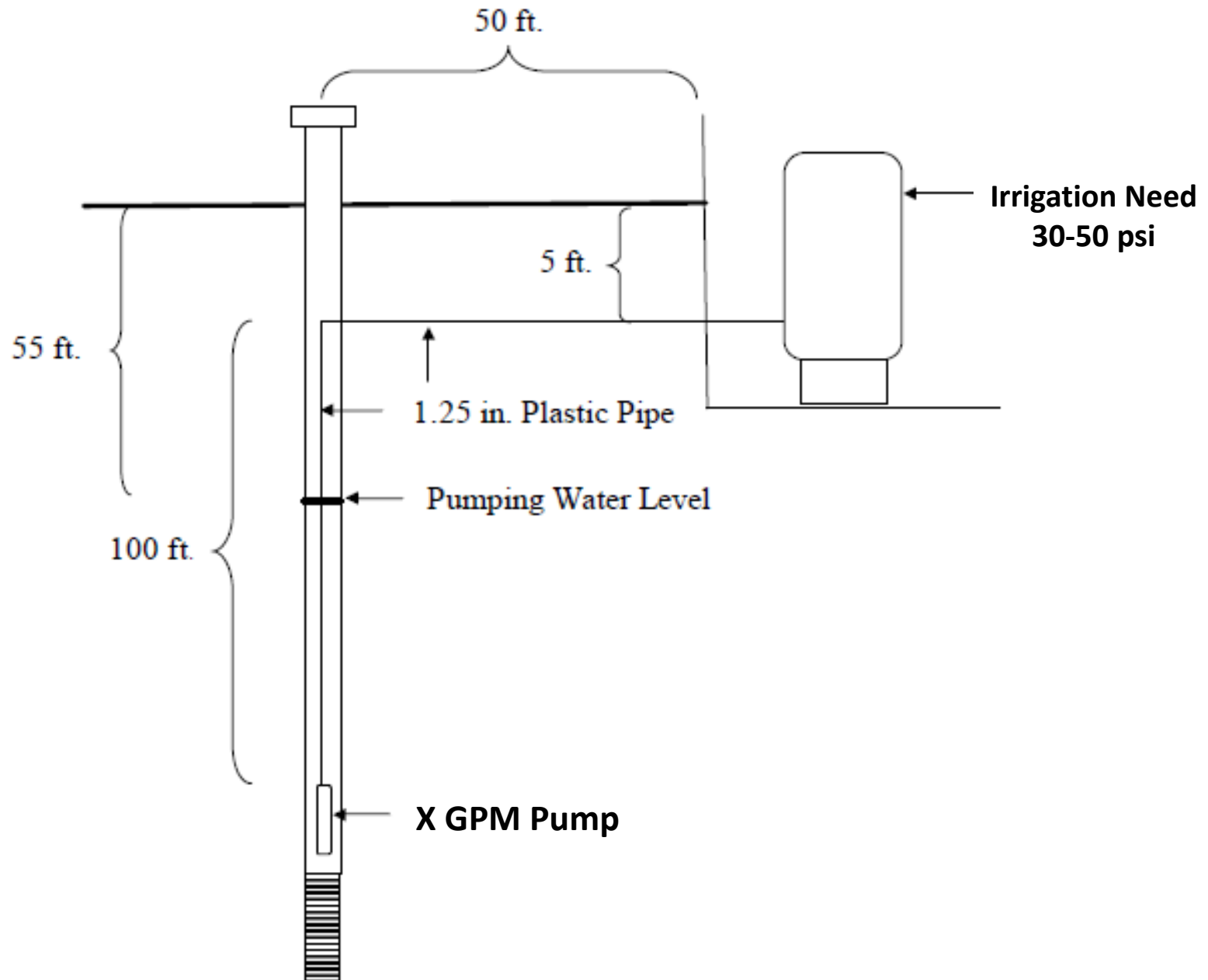


# Pump(s)

- The pump should be designed to get water to the sprinkler and then to the ground
- Center pivot installer will help design the pump
- Account for Total Dynamic Head or the equivalent of how high does the water have to be pumped. This accounts for elevation, length, pipe size and flow.

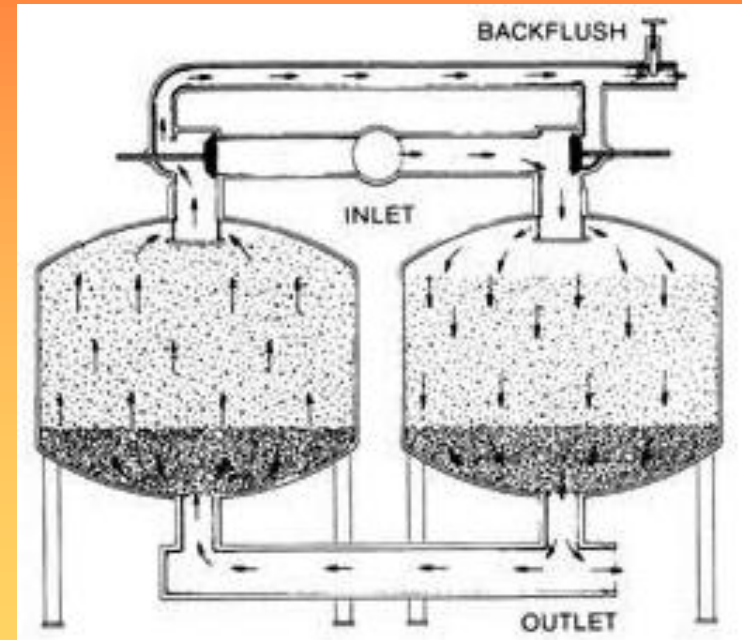
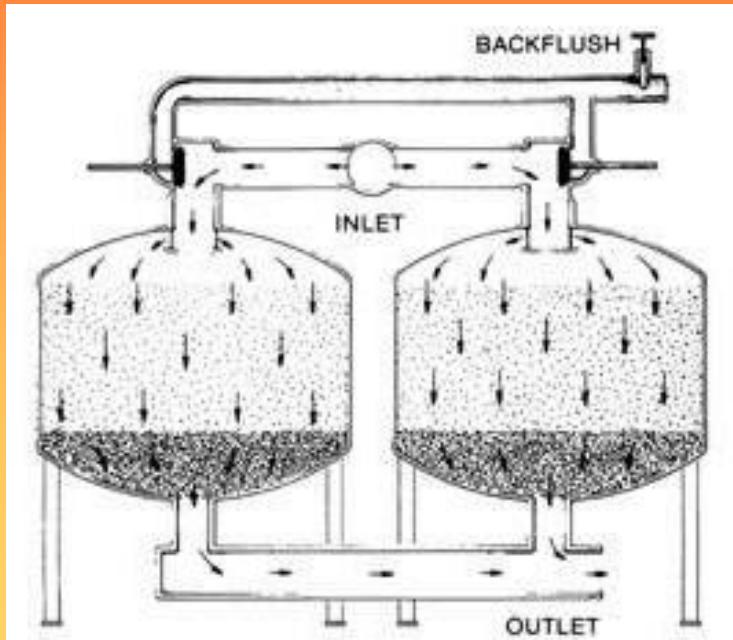


# TOTAL DYNAMIC HEAD PROBLEM #1



# Water Source/Filter(s)

- Depending on water source a filter may or may not be needed.
  - Ponds, streams, lakes --- any surface water would require a filter





RainBird Sand Media Filter

Yardney Centrifugal Sand Separators



# Why use a filter?

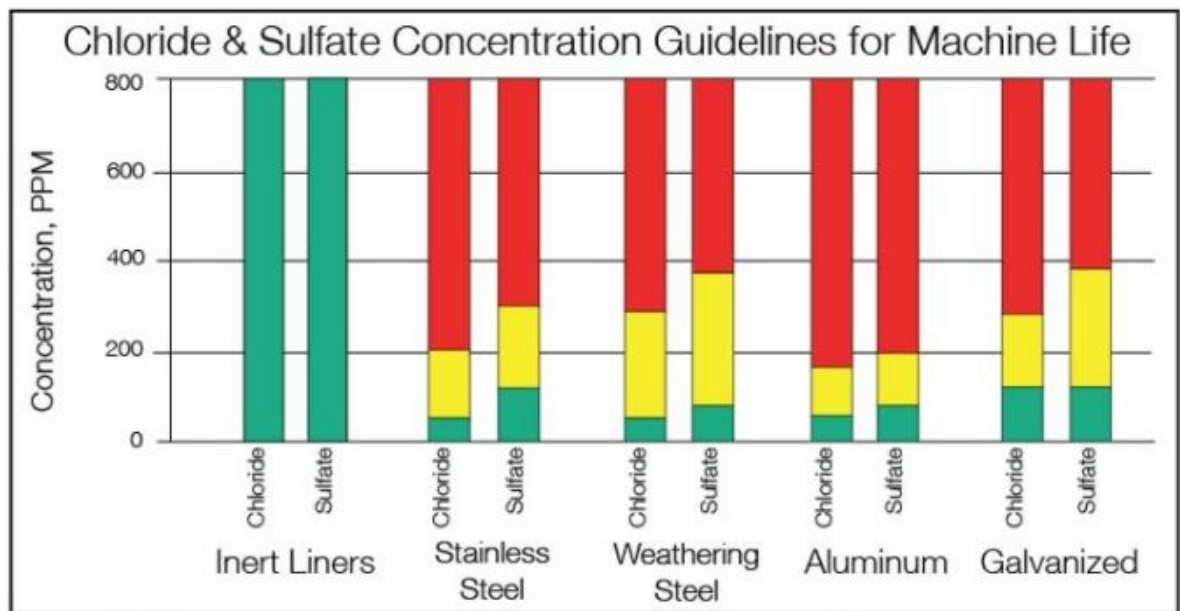
- Remove items that could clog the center pivot pipes and sprinklers
- Remove sand and abrasive items that could wear nozzles
- If applying wastewater a filter is more than likely not going to be used

# Sprinklers

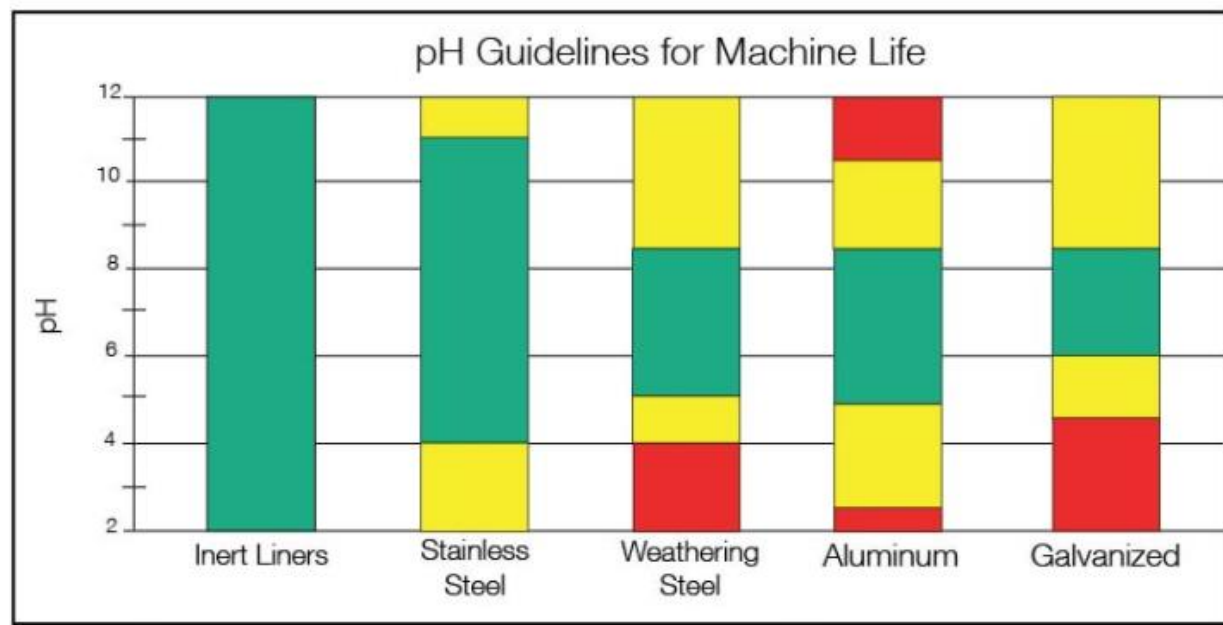
- When purchasing a center pivot the dealer will ask what sprinkler package you would like. What is the purpose of your irrigation system can help decide on what sprinkler you would want. Are you growing peanuts, vegetable, corn, other crops.
- Do you want sprinklers on top or on drops?

# Pipe

- Make sure the pipe you use meets the needs of the pressure of the water being pumped
- Water quality can affect the longevity of the pipe
- Have water tested annually



■ Normal Life 
 ■ Shortened Life 
 ■ Minimal Life



■ Normal Life 
 ■ Shortened Life 
 ■ Minimal Life



# Sprinklers



PIVOT WOBBLERS



PIVOT SPRAY NOZZLES

Senninger®



PIVOT IMPACT SPRINKLERS



LEPA

ROTATOR®



ORBITOR



SPINNER



ACCELERATOR



SPRAYHEAD



PART CIRCLE ROTATOR



PART CIRCLE SPINNER



PART CIRCLE  
SPRAYHEAD



TRASHBUSTER



# Hard Hose - Towable





# Parameters of Hard Hose

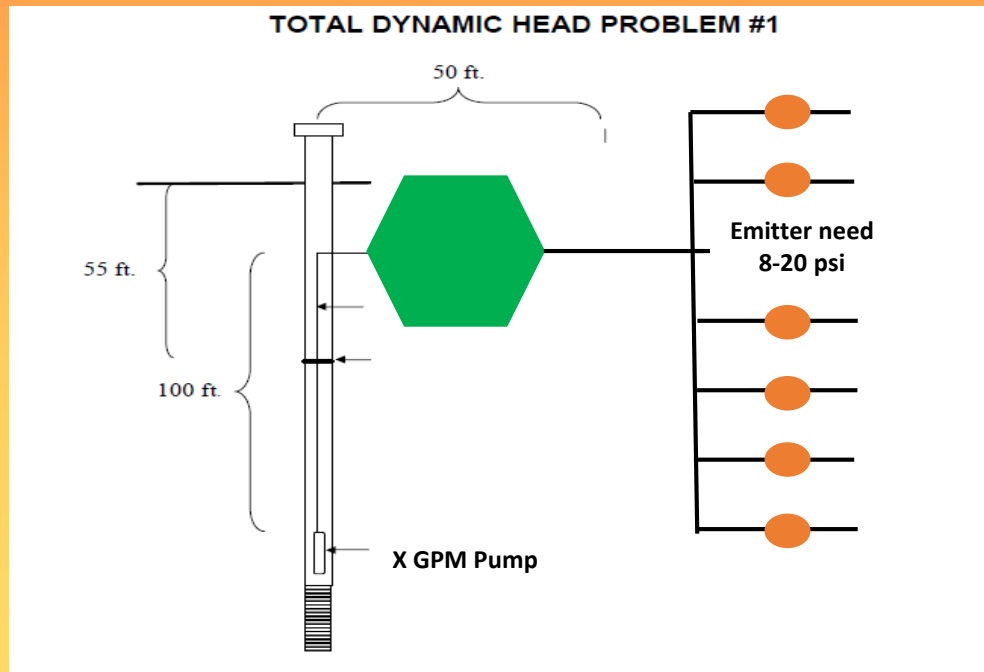
- Pipe
- Filter
- Water Quality
- Sprinkler – an End Gun

**Nelson Big Guns**



# Drip Systems

- Water source
  - If surface water --- a filter will be needed
  - If groundwater -- a filter would be protection
- Pump and Size
  - Based on the total dynamic head
    - Includes emitters and pressure regulator as well



# Drip Systems

- Filter will be based on the emitter size and type
  - Screen usually 150 or smaller
  - Sand media with backflush
- Pipe
- Sprinklers
  - In-line tube, drip tape, micro-sprinklers

## Products



Drip Tape and Dripline



Hose and Dripline Fittings



Emission Devices



Injectors



Valves



Controllers



Filtration



Fittings



# Pressure

- The pressure of system is based on:
  - Nozzle
  - Use (on top verses drops)
  - Higher pressure smaller drops
  - Lower pressure larger drops
  - Impacts pressure (35-60 psi)
  - Drops on center pivot (20-30 psi)
  - Drip requires low pressure (8-15 psi)

# Pressure



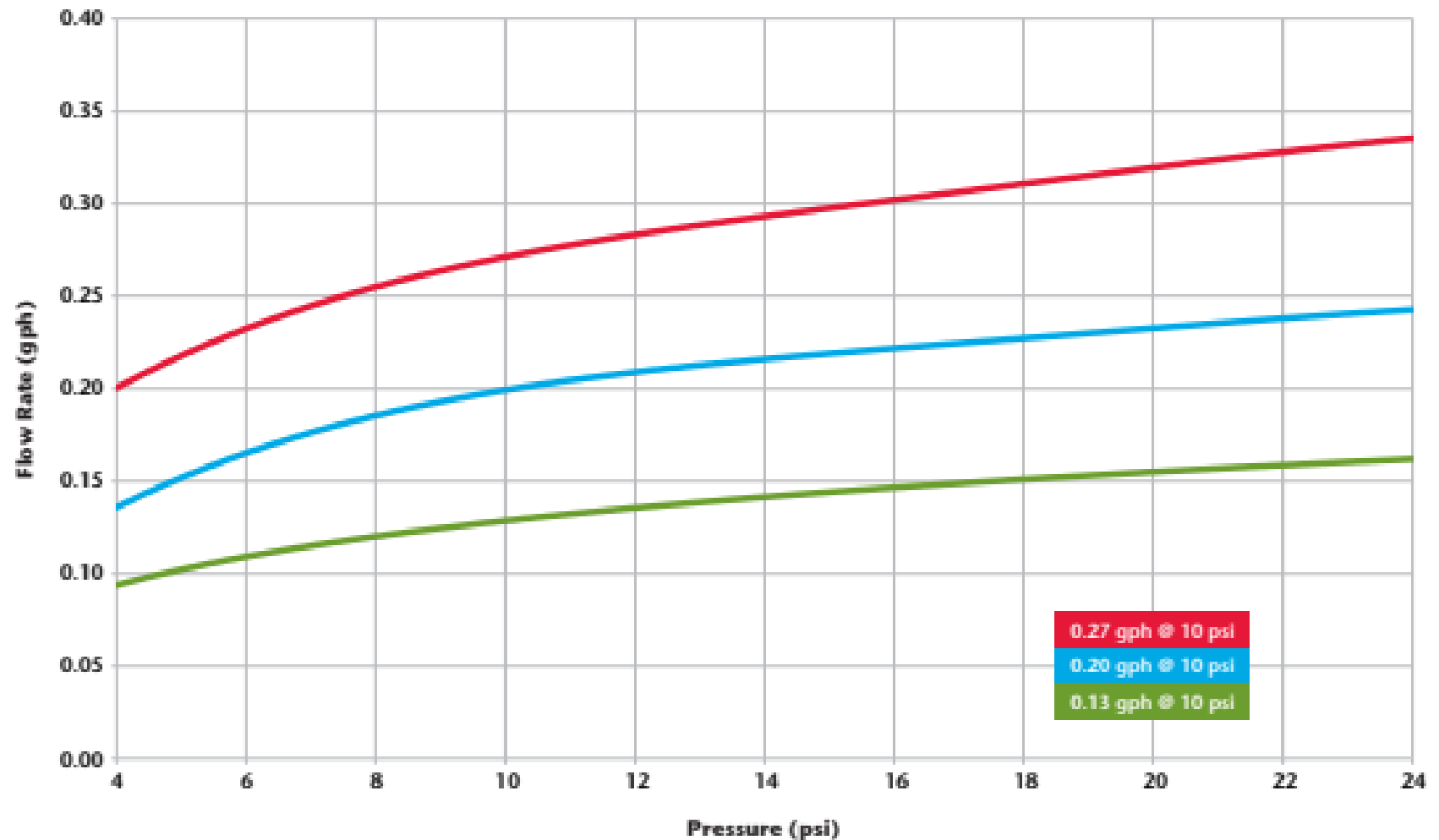
Tabor Bore Nozzle										
Noz PSI	NOZZLE .31" 8 MM		NOZZLE .39" 10 MM		NOZZLE .47" 12 MM		NOZZLE .55" 14 MM		NOZZLE .63" 16 MM	
	GPM	DIA	GPM	DIA	GPM	DIA	GPM	DIA	GPM	DIA
40	26	141	35	154	47	167	61	175	77	182
50	29	151	39	165	53	179	68	188	86	197
60	32	159	43	177	58	190	75	200	94	210
70	34	165	46	185	62	198	81	208	101	218
80	36	173	50	193	67	208	87	216	109	224

# Pressure

## AQUA-TRAXX® FLOW RATES

Emitter Flow Part Number	Outlet Spacing		Emitter Flow Rate				Q-100				Emitter Exponent	Filtration Requirement
			gph		lph		gpm/100 ft		lph/1 meter			
	<i>in</i>	<i>cm</i>	<i>@ 8 psi</i>	<i>@ 10 psi</i>	<i>@ 0.55 bar</i>	<i>@ 0.7 bar</i>	<i>@ 8 psi</i>	<i>@ 10 psi</i>	<i>@ 0.55 bar</i>	<i>@ 0.7 bar</i>		
0.07 gph emitter												
EAXxx0817	8	20	0.07	0.08	0.26	0.30	0.17	0.20	1.30	1.47	0.55	200 (74)
EAXxx1609	16	40	0.07	0.08	0.26	0.30	0.09	0.10	0.65	0.74		
0.09 gph emitter												
EAXxx0822	8	20	0.09	0.10	0.34	0.38	0.22	0.25	1.66	1.88	0.55	200 (74)
EAXxx1611	16	40	0.09	0.10	0.34	0.38	0.11	0.13	0.83	0.94		
0.10 gph emitter												
EAXxx0825	8	20	0.10	0.11	0.38	0.43	0.25	0.28	1.86	2.11	0.55	200 (74)
EAXxx1613	16	40	0.10	0.11	0.38	0.43	0.13	0.14	0.93	1.05		
0.13 gph emitter												
EAXxx0467	4	10	0.13	0.15	0.51	0.57	0.67	0.75	4.99	5.58	0.5	140 (105)
EAXxx0644	6	15	0.13	0.15	0.51	0.57	0.44	0.50	3.33	3.72		
EAXxx0834	8	20	0.13	0.15	0.51	0.57	0.34	0.37	2.50	2.79		
EAXxx1222	12	30	0.13	0.15	0.51	0.57	0.22	0.25	1.66	1.86		
EAXxx1617	16	40	0.13	0.15	0.51	0.57	0.17	0.19	1.25	1.40		
EAXxx1814	18	45	0.13	0.15	0.51	0.57	0.14	0.17	1.11	1.24		
EAXxx2411	24	60	0.13	0.15	0.51	0.57	0.11	0.12	0.83	0.93		
0.15 gph emitter												
EAXxx0650	6	15	0.15	0.17	0.57	0.63	0.50	0.56	3.73	4.17	0.5	140 (105)
EAXxx1225	12	30	0.15	0.17	0.57	0.63	0.25	0.28	1.86	2.08		
EAXxx1817	18	45	0.15	0.17	0.57	0.63	0.17	0.19	1.24	1.39		

## Emitter Flow vs Pressure



# *Conclusion!*

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# Thanks and Questions?

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# References of images for slides

- First slide references
- Micro-jet: <https://www.ebay.co.uk/itm/Micro-Irrigation-Garden-Adjustable-Dripper-Sprinkler-on-Stake-0-40-LPH-Antelco-/281953307945>
- Drip: <https://www.indiamart.com/proddetail/drip-irrigation-system-2109818433.html>
- Impact on top :  
<http://www.nelsonirrigation.com/media-gallery/photographs/category/pivot>
- Hard hose:  
<http://cadmanpower.com/irrigation/travellers.html>

- Slide 6 and 7
  - Drawings: Irrigation.education
- Slide 10
  - Rainbird:  
<http://www.rainbird.com/landscape/products/filtration/SandMediaFilter.htm>
  - Yardney:  
[https://www.yardneyfilters.com/centrifugal\\_sand\\_separators.aspx](https://www.yardneyfilters.com/centrifugal_sand_separators.aspx)

- Slide 13
  - <http://www.senninger.com/product-line/mechanized-irrigation>
- Slide 14
  - <http://www.nelsonirrigation.com/products/family/pivot-sprinklers>
- Slide 16
  - <http://blog.irrigation.education/blog/do-your-pivots-last-as-long-as-they-should>
- Slide 20
  - <https://www.toro.com/en/agriculture>

- Slide 22

- <https://www.rainfloirrigation.com/irrigation/sprinklers/big-guns>

- Slide 23 and 24

- [https://cdn2.toro.com/en/-/media/Files/Toro/Agriculture/drip-tape-and-dripline/ALT230 FamilyBrochure ENG WEB 170410.aspx](https://cdn2.toro.com/en/-/media/Files/Toro/Agriculture/drip-tape-and-dripline/ALT230%20FamilyBrochure%20ENG%20WEB%20170410.aspx)