Residential Cistern Project
Low Volume Irrigation & Non-Potable Usage
Pasco County, Florida
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Getting Started

- Learn about rainwater collection
  - Cistern Workshops
  - Rainwater Harvesting Guides & Manuals
    - Florida Rainwater Harvesting Initiative
    - Arizona
    - Oregon
    - Texas
    - Virginia
Assessing Capabilities

- **Catchment Area**
  - Tile Roof of 3100 square feet (~1900 ft² for collection)
  - No overhead trees, so water relatively “clean”

- **Storage Capacity**
  - Tank of 1550 gallons (due to space limitations)

- **Water Usage Target**
  - 3 weeks low volume irrigation usage @ twice per week

- Project to be performed by one person
Project Considerations

- Storage tank placement
- Rainwater collection abilities
- Rainwater distribution & pumping
- Other interdependencies
  - Full utilization of catchment area
    - French drains (140’) for remaining catchment area (~1200 ft²)
  - Low volume irrigation requirements
    - 1000 feet of ¾” poly-tubing for 3 zones
    - 600 feet of 1/8” emitter tubing for emitters & drip
    - Automatic controller with rain sensor
Conceptual Design

- Gutters
- 4” Downspout Filter
- 4” First Flush Diverter
- 4” Diverter Chamber
- 4” French Drain
- 4” Calming “J”
- 4” Overflow w/P-trap
- 2” Floating Strainer Pickup w/ Foot valve
- Cistern
  - 1550 gal
  - 95”D x 58”H
- Gravel Foundation
- Centrifugal Pump (1/2 hp)
- Pressure Tank
- Faucet
- Irrigation Valves to ¾” poly-pipe
- Ground level
Storage Tank Placement

- Consider final aesthetics
- Take advantage of existing gutters
- Minimized visibility to neighbors
  - Excavated “34 below grade
- Installation involved:
  - Watering dry sandy soil to stabilize excavation & minimize collapse (excavation diameter was ~12” > tank)
  - Leveling & placing two inches of ½” river rock as tank foundation
  - Verifying lower tank outlet is sealed
  - Orienting hatch for ease of access
  - “Tipping” tank into place (roll ~half of tank over hole & tip into place)
Rainwater Collection

- Consider final aesthetics
- Clean rainwater **before** the tank
  - Downspout leaf filter with insect screen
  - First flush diverter (~2.5 gallon)
- Inlet “J” to reduce tank turbidity
- Overflow “p-trap” to inhibit insects & prevent entry by rodents
- Installation involved:
  - Determining gutter & pipe angles to assure adequate “fall”
  - Fabricating 4” bulkhead fittings from toilet flanges to save $$$
  - “Dry-fitting” pipes **before** gluing
Rainwater Distribution

• Consider final aesthetics
• ½ HP centrifugal pump w/ 5 gallon pressure tank
• Used 1-1/2” flexible marine hose w/ foot valve & toilet floats as pump inlet
• Installed 200 mesh screen filter to assure low volume emitters stay clean
• Installation involved:
  • Placing 180’ of ¾” pipe for three hose bibs
  • Check valve inserted before irrigation components to prevent fertilizer backflow
  • Venturi fertilizer injector
  • Three low volume irrigation zones
Other Considerations

• 4” French drains were placed in areas on opposite side of house not utilized for catchment
• Provides supplemental irrigation and completely eliminates property run-off into nearby water bodies
• Plant beds were placed in areas without gutters or french drains
• Installation involved:
  • Digging 140’ of trench from ~12-18” deep
  • Used drain sleeves to reduce sand infiltration near down spouts
Results & Lessons Learned

- Storage tank will completely fill with 1-2” of rainfall
- Tank size matches irrigation needs
  - Needed to supplement tank water manually for new landscaping
- Redesigned pump inlet, changing hose type & strainer, to eliminate irregular pressure switch cycling
- Extended french drain 20’ when six inch rainfall event caused erosion
- Was glad tank overflow was sized correctly after heavy rain event
- Investment with shipping:
  - Tank/plumbing: $1175
  - Pump/distribution: $600
  - Irrigation system: $475