



# LANDSCAPE IRRIGATION EFFICIENCY

# BACKGROUND



- Landscape irrigation is the single largest use of potable water in the U.S.
- Up to 70% of your water use is outdoors.
- As much as 50% of water used for irrigation is wasted due to evaporation, wind, and overwatering caused by inefficient irrigation methods and systems.
- Through education and planning, it is estimated that landscapes can be well maintained using 30 to 50% less water.

# IRRIGATION AND LANDSCAPE DESIGN STANDARDS



- Landscape irrigation industry lacks national or international standards for construction and installation.
- Most jurisdictions do not have strong provisions for water efficiency within their landscape codes.

# Irrigation Inefficiencies

Athol Elementary - Athol



8/2011

Athol Elementary



# Irrigation Inefficiencies

Betty Kiefer Elementary - Rathdrum

8/2011

Betty Kiefer Elementary

# Irrigation Inefficiencies

Dalton Elementary - Dalton Gardens



8/2011

Dalton Elementary

# Irrigation Inefficiencies

Woodland Middle School - Coeur d'Alene



8/2011

Woodland Middle School



# Irrigation Inefficiencies

Highlands Golf Course - Post Falls

Google Earth

8/2011

Highlands Golf Course



# Irrigation Inefficiencies

Spokane County Sheriff's Training Center - Newman Lake



8/2011

Spokane County Sheriff's Training Center



# Irrigation Inefficiencies

Liberty Lake Elementary - Liberty Lake

Google Earth

300 ft



8/2011

Liberty Lake Elementary

# Irrigation Inefficiencies

Valley Christian School - Spokane Valley



Google Earth

300 ft



8/2011

Valley Christian School

# Irrigation Inefficiencies

Whitman Elementary - Spokane



Google Earth

8/2011

Whitman Elementary

# DESIGN INEFFICIENCIES



- Proper head spacing (distance) and placement (blockage)
- Proper head height
- Proper head applications (i.e. 15' head for 6' space)
- Proper nozzle applications (fine mist, large droplets, breakup)
- Matched precipitation rates
- Mismatched heads
- Zone separation
- System pressure
- Pipe size
- Plant water requirements
- Slope, drainage and landscape contours
- Soil type, compacted soils, root zone depth
- Installation practices (sprinkler/screen plugging)
- Backflow (devices installed on the wrong side of blowout)

# MAINTENANCE INEFFICIENCIES



- Misdirected spray
- Broken risers and heads
- Leaking seals
- Plugged nozzles and screens
- Blocked spray
- **Tilted heads**
- Head height
- **Nighttime watering (not checking system regularly)**

# SYSTEM OPERATION INEFFICIENCIES



- Scheduling
  - Start up/shut down
  - Start times
  - Run times
  - Cycle soak programs
- Root zone depth
- Mow height
- Grass clippings
- New turf settings
- Rain delay
- Sensor technologies











2006

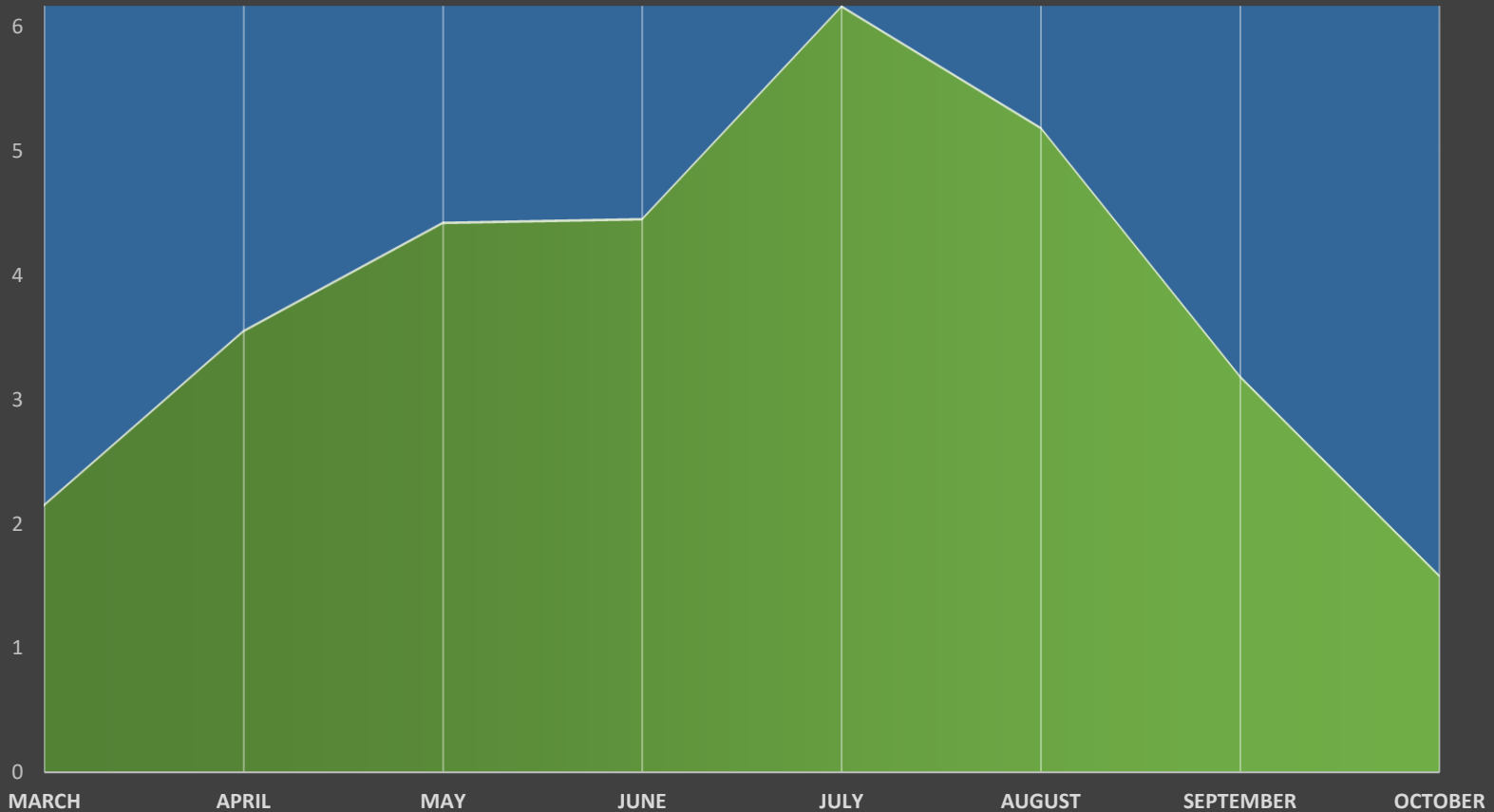




# PLANT WATER REQUIREMENTS AND IRRIGATION SCHEDULING



ET Grass (in) Liberty Lake, WA - 2020



# IMPORTANCE OF DISTRIBUTION UNIFORMITY



<b>DU %</b>	<b>Water the plant needs</b>	<b>÷</b>	<b>DU Decimal</b>	<b>=</b>	<b>Amount of water you need to keep the dry areas green</b>
30%	1 inch	÷	0.3	=	3.33 inches
50%	1 inch	÷	0.5	=	2.00 inches
70%	1 inch	÷	0.7	=	1.42 inches

DU measures how uniformly an irrigation system applies water to the landscape

<b>Excellent (Achievable)</b>	<b>Good (Expected)</b>	<b>Poor (Common)</b>
75%	60%	50%







# EFFICIENCY



- Efficiency of various irrigation methods:
  - Subsurface drip – 90%
  - Surface drip (micro) irrigation – 85%
  - Large rotors – 70%
  - Small rotors – 65%
  - Spray heads – 50%
- Matched Precipitation Rate (MPR)
  - Example: MP Rotator 70%
  - Hunter, Rainbird, Toro all offer mini rotators





VS.



## Traditional Spray Head

Flow (GPM) = 0.1 to 5.52

Example:

Traditional 1.85 X 20 min = 37 Gal

MP Rotator 0.50 X 20 min = 10 Gal

= 73% reduction

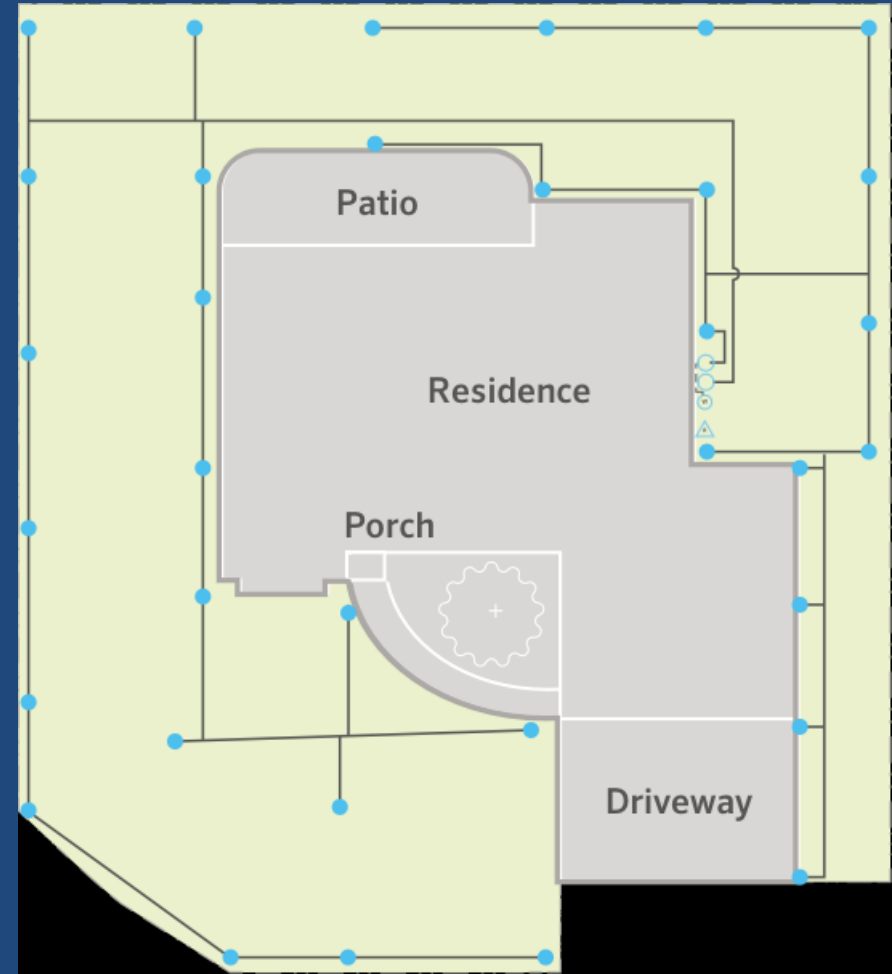
## MP Rotator

Flow (GPM) = 0.17 to 1.01

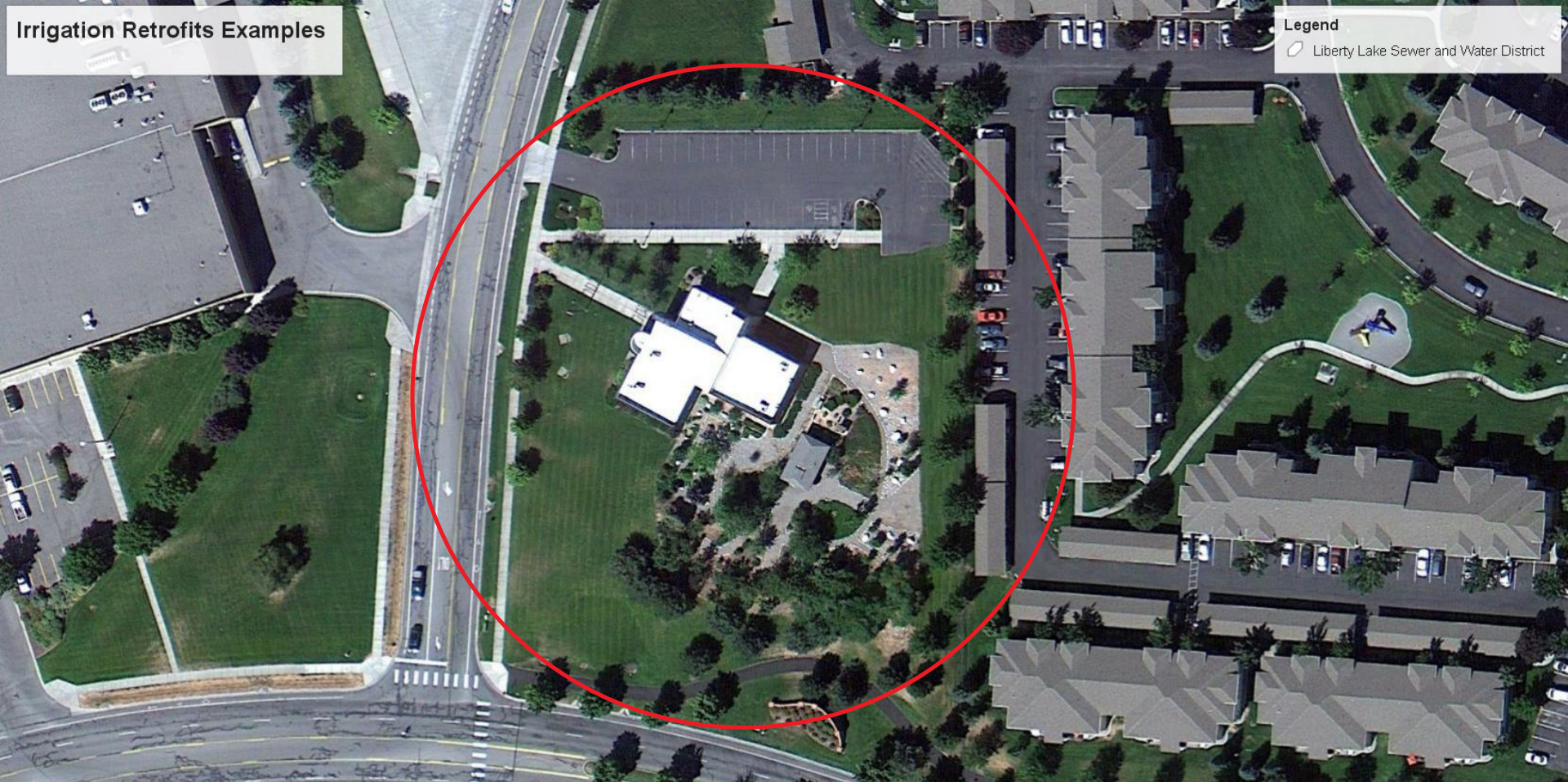
## Design Using Traditional Sprays



## Design Using MP Rotators



Having a slow precipitation rate across such a large radius range means less pressure loss throughout the zone. This allows more heads to run on one valve and simplifies the design layout (<https://www.hunterindustries.com/mp-smarter-faster-better>)

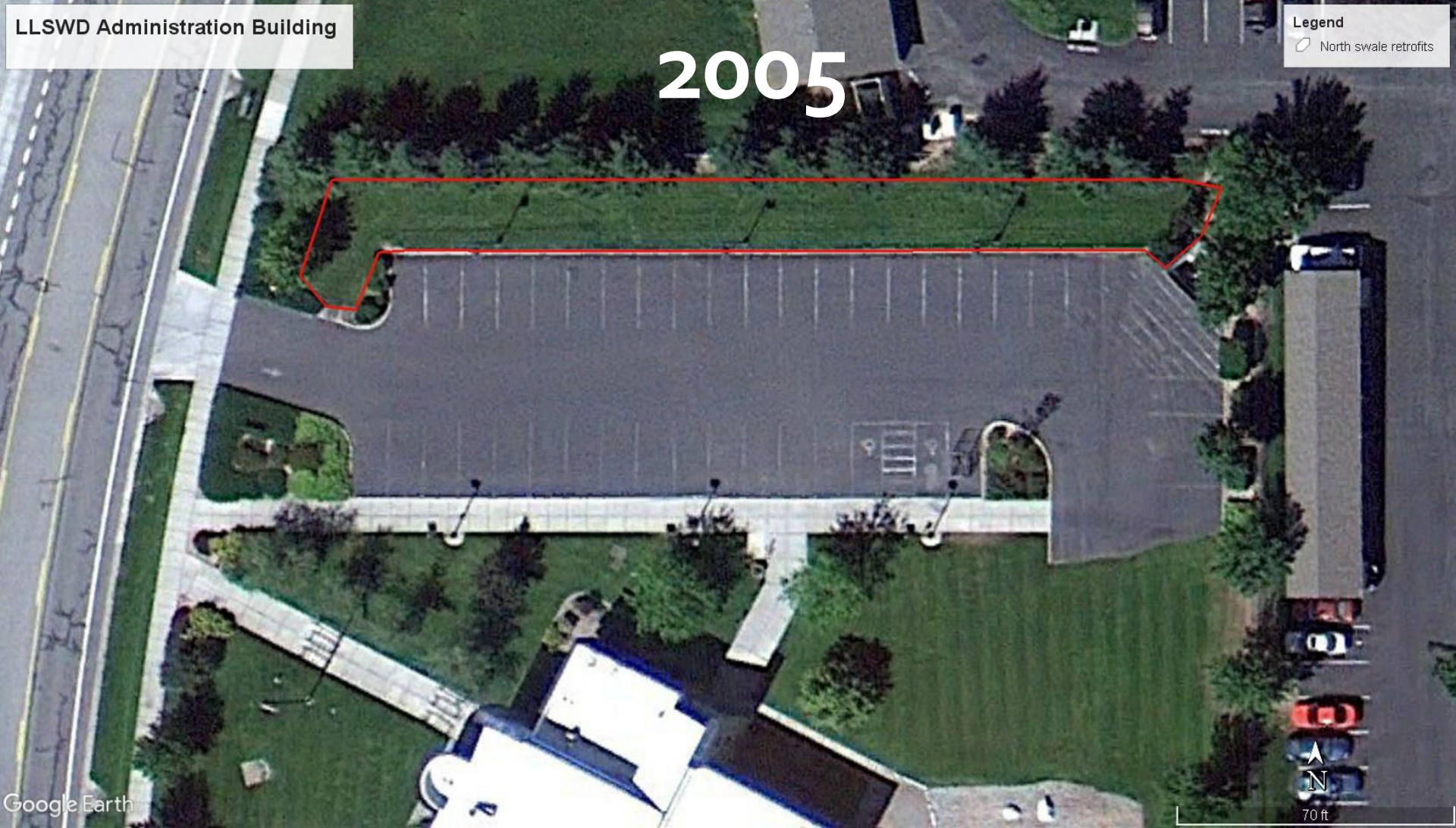


# Liberty Lake Sewer and Water District Example

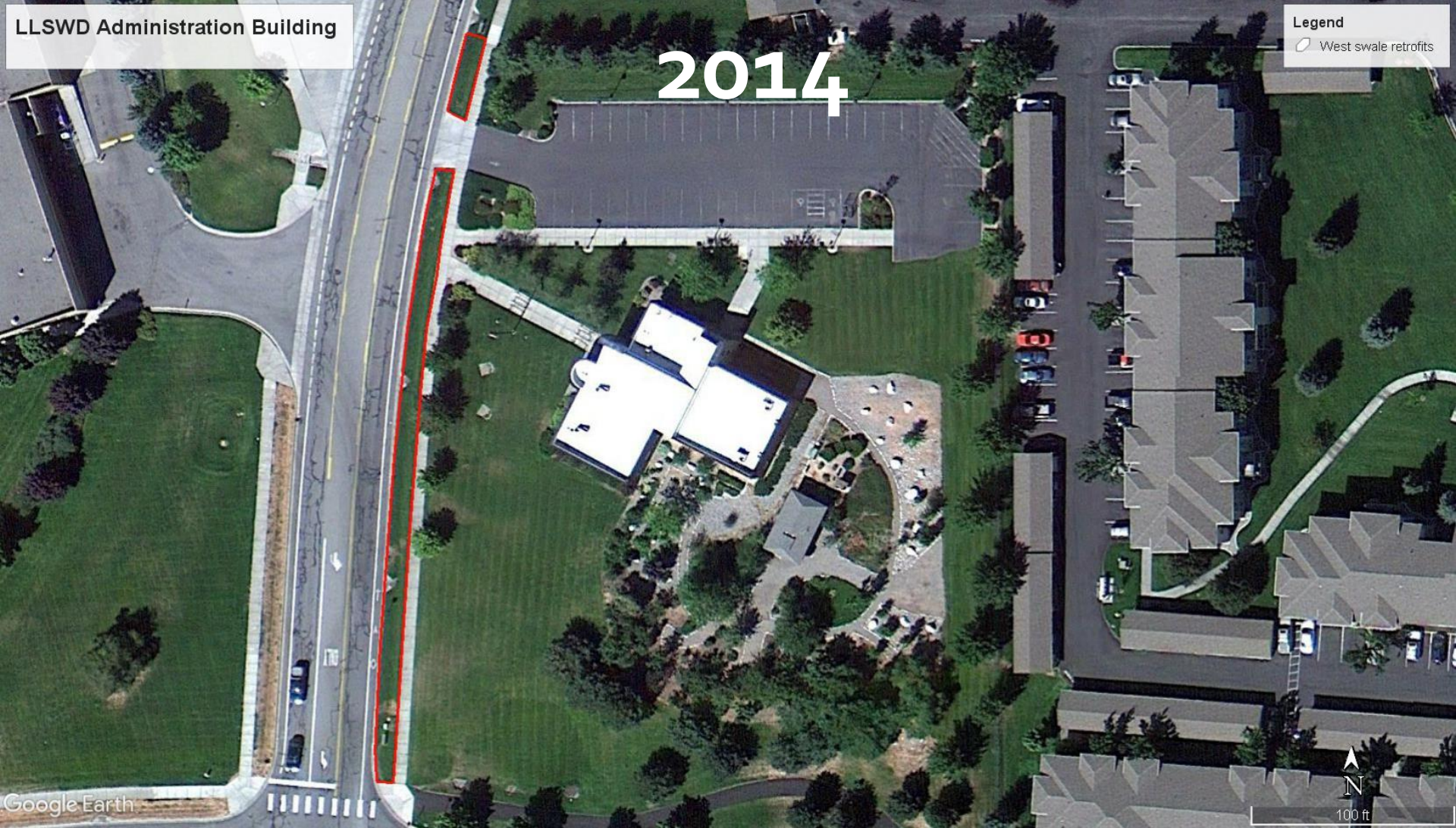
- 2.4 acres. Audited in June 2005. System efficiency (DU) was 44%
- Implemented landscape measures (pressure regulation, matched and aligned rotor heads, and installed sensor-based technology)
- Cost under \$500 (including soil sensor)
- **Reduced water by 36% the following year and improved DU to 61%**

8/2011

2005



- Retrofitted 22 spray heads to MP2000 Rotators
- Observed water savings was 2.66 GPM to 0.71 GPM per head
- **Recognized savings = 42.9 gallons per minute the system runs**



- 61 spray heads – 34 were retrofitted to MP1000 Rotators and 27 were eliminated.
- Observed water savings was 1.85 GPM to 0.50 GPM per head
- **Recognized savings = 95.85 gallons per minute the system runs**

# IWAC – EFFICIENT IRRIGATION AND LANDSCAPE DESIGN GUIDELINES



- Provide industry, local jurisdictions, agencies, and water purveyors with an understanding of the importance of designing, installing, and maintaining efficient landscapes.
- Enact water efficient irrigation and landscape requirements for new and rehabilitated landscape projects to address irrigation efficiency and design standards.
- This guide provides the recommended elements that an ordinance or design standard should include, to ensure landscapes are designed with water efficiency in mind.

<https://www.iwac.us/irrigation-and-landscape-guidelines/>

The cover of the 'Efficient Irrigation & Landscape Standards' guide features a photograph of a large, two-story house with a well-manicured garden. The garden includes various plants, flowers, and a stone border. The text 'OUR WATER. OUR FUTURE.' is overlaid on the bottom right of the image. The title 'EFFICIENT IRRIGATION & LANDSCAPE STANDARDS' is prominently displayed at the top, with the subtitle 'A MENU OF OPTIONS FOR PREPARING AND ADOPTING AN ORDINANCE OR STANDARDS' below it. The IWAC logo is in the top left corner.

<b>Setting Your Purpose</b> Goal statements that may be incorporated into a water efficient irrigation and landscape ordinance. <b>6</b>	<b>Landscape &amp; Irrigation</b> Items to require for a documentation package of landscape and irrigation plans. <b>10</b>	<b>Design Standards</b> Design criteria for reducing irrigation water use and using climate appropriate plants. <b>14</b>	Options to help implement best practices to conserve water during summer months when demand for outdoor water use can be 3-4 times higher.
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# CONTACT INFORMATION

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