

# GIS APPLICATIONS IN TUCSON'S STREETLIGHT CONVERSION

Eric Emrich

Evari GIS Consulting

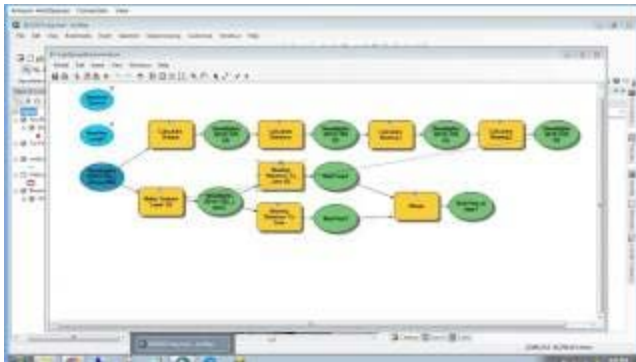
# Who are we?

- Evari GIS Consulting
  - 3060 University Ave, San Diego, CA 92113
  - [www.sdgis.com](http://www.sdgis.com)
- 5 fulltime employees, using contractors as needed
  - Eric Emrich,
    - GIS Analyst and South-west Regional Project Manager
    - [eric@sdgis.com](mailto:eric@sdgis.com)



# What we do

- Leverage GIS to streamline and help facilitate clear communication between municipalities and contractors alike.
- Develop web and mobile applications that are simple and easy to use for people without GIS experience.
- The system links data in a user friendly map interface.



# Why do a municipal street light conversion?

- Cut municipal electric bills in half
- Save on maintenance
- Implement controls
- Other functionality
  - ▣ Parking sensor
  - ▣ WiFi network
  - ▣ Gunshot sound sensors



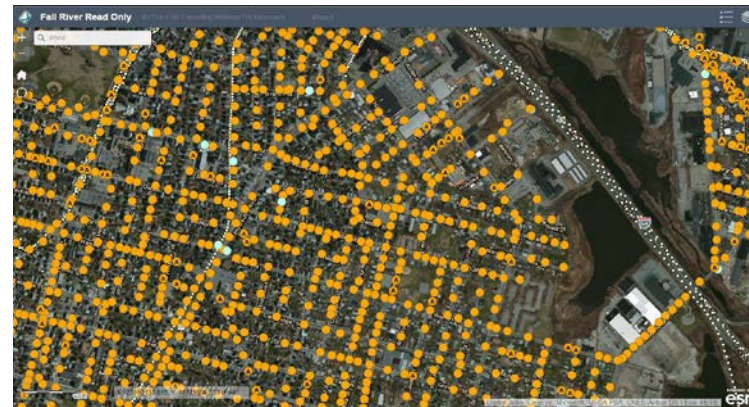
# The System (back-end)

- Utilize the ESRI Technology stack (ArcGIS) and the Amazon Web Services cloud computing platforms to implement and deploy the system.
  - ▣ SQL Server Express database
    - ArcSDE feature classes
  - ▣ ArcGIS for Server
    - Publish feature services
  - ▣ ArcMap
    - Python Models



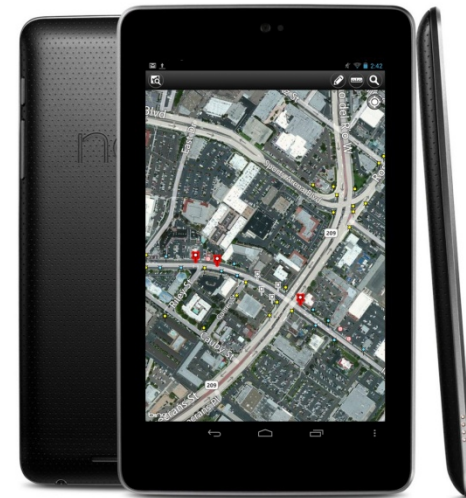
# System (front-end)

- Mobile App
  - ▣ Ipad, Mobile phone
- Read only Website
  - ▣ Javascript [map](#)
- Editable Webmap
- FTP Website



4/3/2015 10:04 PM	808678	<a href="#">20150403_2201_FallRiverReport.xlsx</a>
4/4/2015 10:04 PM	808679	<a href="#">20150404_2201_FallRiverReport.xlsx</a>
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4/15/2015 1:37 AM	879735	<a href="#">20150415_0131_FallRiverReport.xlsx</a>
4/16/2015 1:36 AM	884744	<a href="#">20150416_0131_FallRiverReport.xlsx</a>

□



# Hawaii Department Of Transportation

- Audit of over 17,000 streetlights on 4 islands
- Work was done on state owned highways



# Fall River, MA

## □ Fall River, MA

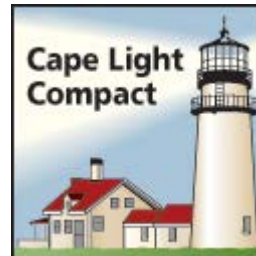
- Formatting N-Star street lighting data in excel for geocoding in ArcMap
- Walking analysis model





# Cape Light Compact

- Audit and installation of LED streetlights for 23 Municipalities.
- 15,700 lights were converted.
- Resulted in approximately 70% annual energy savings.

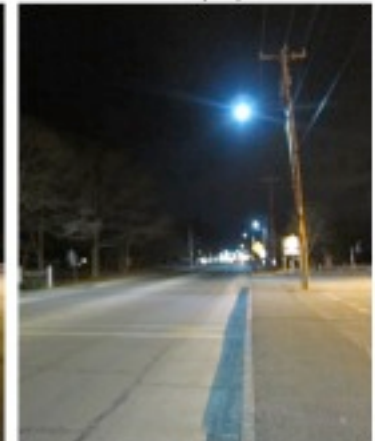


Cape Light Compact  
Municipal LED Streetlight Demonstration Project  
Rte 28 (front of State Police), Yarmouth Comparison  
looking West

BEFORE (high pressure sodium)



AFTER (LED)



# Tucson, AZ

- Audit over 23,000 streetlights for LED conversion
- Estimated energy savings after installation of almost 50% over existing HPS fixtures
- Subcontracted to Ameresco, Inc.
- Project is ongoing, currently in analysis phase.



# Audit Process

## □ Data Field-Collected:

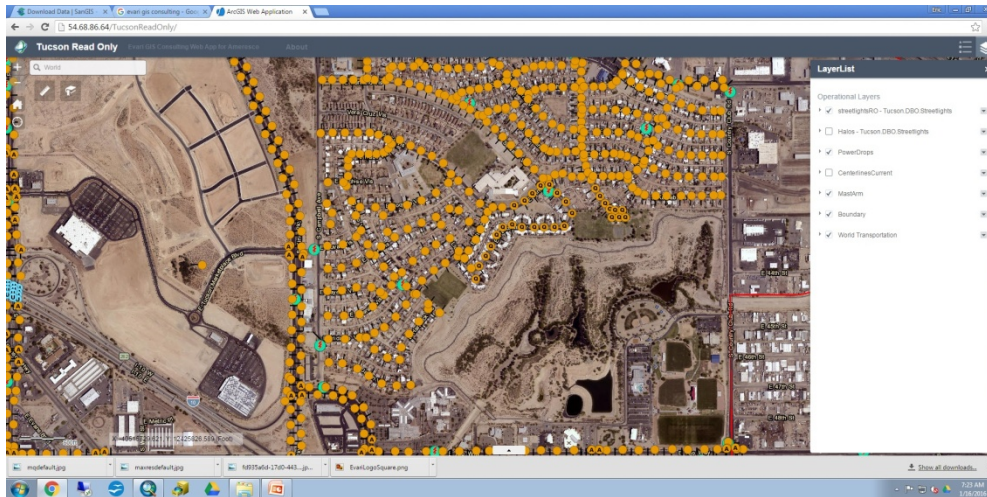
- Fixture Wattage/Model : *400w HPS, 90w LPS, 135w LED*
- Badge Number,: *#10680, #B1437, etc.*
- Pole Height/Material,: *Short, Medium, Long; Wood, Metal, Cast Iron*
- Mast Arm Length/Angle: *Small, Medium, Large; 45 degree increments*
- Lighting Obstructions/Notes: *Tree trimming needed, Pole Leaning, etc.*
- Location: *placed on map, within closest 1-3 feet.*

## □ Data Calculated In-Office

- Pole Spacing: *in feet*
- Road Classification: *Local, Collector, Major*
- Pole Configuration: *One-Sided, Staggered, Opposite, Intersection*
- Proposed New Fixture

# Tucson Fixture Details

- Mast arm angles
- Multiple fixture Types/Models/Wattages
- Special consideration for: Intersections, Streetcar Lighting, Pedestrian conflict areas, Lighting obstructions



Intersection	Model	Type	Wattage	Roadway Classification	Lane Numeration	Pole Location	Pole Spacing	Lane Feature	Proposed Fixture
NO	Cobra	--	--	Local	--	--	0-184	NO	ATBS E R2
NO	Cobra	--	--	Local	--	--	185-1000	YES	ATBS D R3
NO	Cobra	--	--	Collector	1	--	<125	NO	ATBS E R2
NO	Cobra	--	--	Collector	1	--	126<	YES	ATBS H R2
NO	Cobra	--	--	Collector	2	Staggered	--	YES	ATBM D R3
NO	Cobra	--	--	Major	1	One-Side	--	--	ATB2808 E10 R3
NO	Cobra	--	--	Major	1	Staggered	--	--	ATBS F R3
NO	Cobra	--	--	Major	2	One-Side	--	--	ATB2808 E10 R3
NO	Cobra	--	--	Major	2	Staggered	--	--	ATBM D R3
NO	Cobra	--	--	Major	2	Opposite	--	--	ATBS H R2
NO	Cobra	--	--	Major	3	Staggered	<193	--	ATBM D R3
NO	Cobra	--	--	Major	3	Staggered	194<	--	ATBM E R3
NO	Cobra	--	--	Major	3	Median Mounted	--	--	ATBS E R3
NO	Cobra	--	--	Major	4	--	--	--	ATBM D R3
YES	Cobra	HPS	230	--	--	--	--	--	Intersection 290
YES	Cobra	HPS	400	--	--	--	--	--	Intersection 400
YES	Cobra	LED	215	--	--	--	--	--	Intersection 215

Assumptions

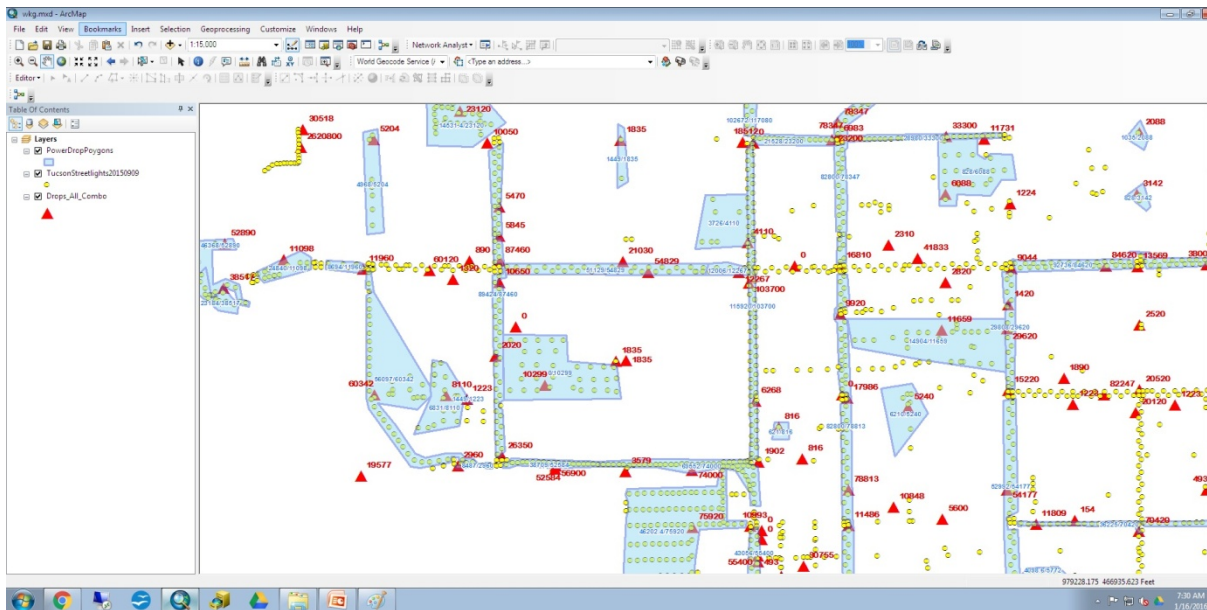
- Only fixtures being converted on intersections are Cobraheads- We are assuming all fixtures on intersections are cobraheads.
- All Locals are one-side and 1 lane- we will not be identifying- examples: 1) 2 lane locals or 2) staggered locals.
- All 1 lane collectors are one-sided
- All 4 lane roads are staggered
- All Majors have a Lane Feature
- Intersection lighting is only collector/collector, collector/major, major/major- Local/Local, Local/Collector and Local/Major are not considered intersections

# Streetlight model examples



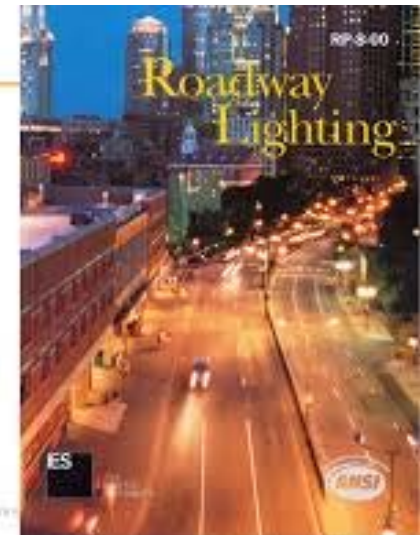
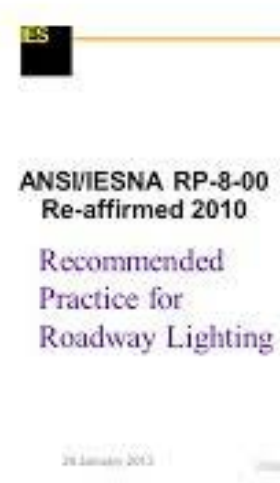
# Tucson Power-drops

- Calculated fixture to power drop associations for billing purposes
- Created a model to calculate kWh totals for areas
- Associated areas by kWh totals/Powerdrops



# RP8 “Dark Skies Initiative”

- Reduction of light pollution
- Benefits beyond energy savings
- Aesthetics: Star gazing, Tucson Observatories
- LED color temperatures



# Potential Applications

- Potential to use the technology to diversify and work on different types of projects

