Residential Street Lighting Study

City of Anchorage
Residential Street Lighting Study
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Inspiration for Study

- Reduce street lighting energy use
- Address any street lighting quality issues
- Explore reducing light pollution or sky glow

Inspiration for Study

Energy $$ Snapshot

- 16,500 Street Lights
- Existing: 150W to 400W HPS
- Hours of Operation: 4,380 hours per year

- $500 per hour
- $2,200,000 per year

Inspiration for Study

Energy Reduction Options

- Reduce load or wattage
- Dim street lighting (curfew and seasonal)
- Reduce equipment quantities
- Combine options

Inspiration for Study

Lighting Quality

- Lighting levels
- Brightness or glare
- Uniformity

Inspiration for Study

Reducing Skyglow

Inspiration for Study

Community Impact and Expectations

- Safety
- Aesthetics
- Environmental (wildlife and people)

Community Impact and Expectations

Safety

- Neighborhoods
- Children walking on street in winter
- Meeting Lighting Standards

Community Impact and Expectations

Environmental Impact

- People (minimize light trespass)
- Nocturnal animals
- Sky glow – Northern Lights

Community Impact and Expectations

Meeting standards and providing Guidelines

Design Discussion

IESNA Requirements

2008 Table 147-A IESNA Guideline Recommendation Citations

T24 Lighting Application	Recommended LPD and Criteria per Lighting Zone			
	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Hardscape for automotive vehicular use, including parking lots, driveways, and site roads	RP-20 NO VERTICAL (.2 hfc min)	RP-20 Basic (.2 hfc min, .1 vfc)	RP-20 Enhanced (.5 hfc min, .25 vfc)	RP-20 Enhanced Security/Retail (1.0 hfc min, .25 vfc)
Hardscape for pedestrian use, including plazas, sidewalks, walkways, and bikeways	DG-5 Sidewalk along Street - Residential (0.2 fc ave. 10:1 ave:min)	DG-5 Sidewalk along Street - Intermediate (0.5 fc ave. 4:1 ave:min)	DG-5 Sidewalk along Street - Commercial (1.0 fc ave. 4:1 ave:min)	DG-5 Sidewalk along Street - Commercial Special Conditions (2.0 fc ave. vertical 5:1 ave:min)
Hardscape for driveways, side roads, sidewalks, walkways, and bikeways	RP-8 Walkway/Bikeway Mixed use - Pedestrian Low Conflict (.5 fc)	RP-8 Walkway/Bikeway Mixed use - Pedestrian Medium Conflict (1 fc)	RP-8 Walkway/Bikeway Mixed use - Pedestrian High Conflict (2 fc)	DG-5 Sidewalk along Street Commercial Special Conditions (2.0 fc ave. vertical 5:1 ave:min)
Building Entrances (without canopy)	DG-5 Sidewalk along Street - Commercial (1.0 fc ave. 4:1 ave:min)	RP-2 Seasonal Outdoor Merchandise Circulation Low (5 hfc)	RP-2 Seasonal Outdoor Merchandise Circulation Medium (7 hfc)	RP-2 Seasonal Outdoor Merchandise Circulation High (10 hfc)
Outdoor Sales Lot	RP-33 Secondary Business District General Display (5 hfc, 10:1 max:min)	RP-2 Auto Retail Lot Low Level (20 hfc)	RP-2 Auto Retail Lot Medium Level (30 hfc)	RP-2 Auto Retail Lot High Level (50 hfc)

Design Discussion

Minimize operation and maintenance

- Reduce energy! (30% to 50%)
- Long life lamps (100,000 hrs vs. 20,000 hrs)
- Quality equipment

Design Discussion

Study Specifics

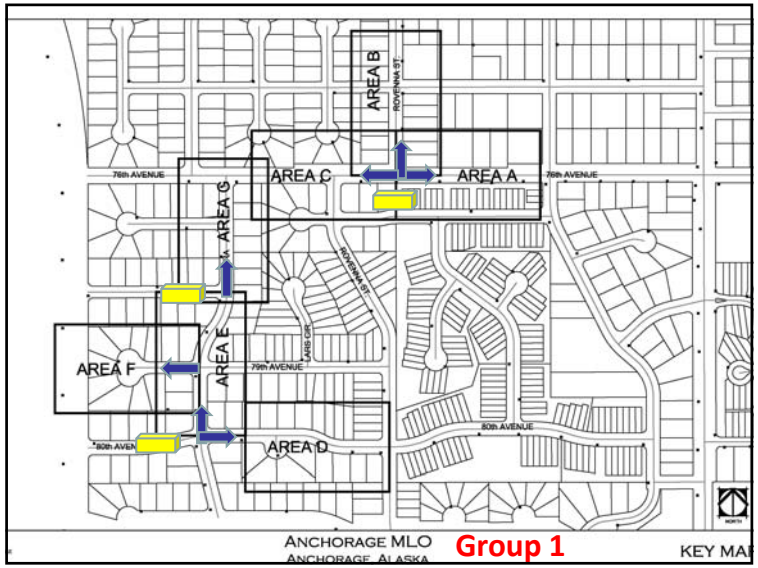
- Selected and installed quality equipment
- Set up Six Test Street Lighting Systems plus one control
- Community Subjective Evaluation
- Review results

Study Specifics

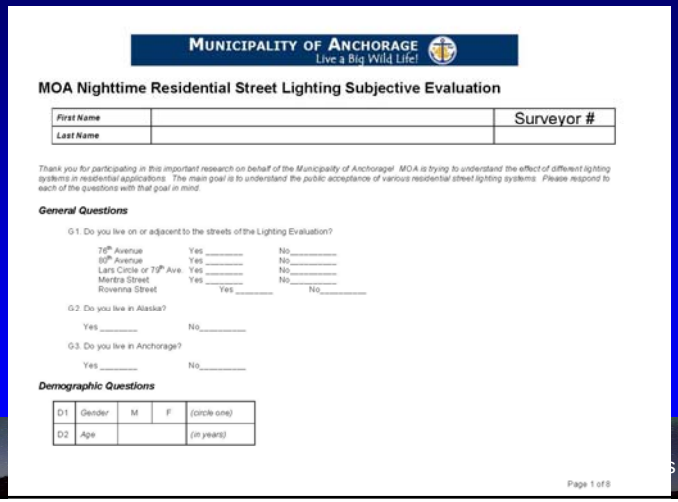
Lighting Equipment

- HPS (250 watts – control)
- LED (81 watts, 108 watts)
- Induction (85 watts and 165 watts)

Study Specifics



Community Subjective Evaluation



MUNICIPALITY OF ANCHORAGE
Live a Big Wild Life!

MOA Nighttime Residential Street Lighting Subjective Evaluation

First Name		Surveyor #
Last Name		

Thank you for participating in this important research on behalf of the Municipality of Anchorage! MOA is trying to understand the effect of different lighting systems in residential applications. The main goal is to understand the public acceptance of various residential street lighting systems. Please respond to each of the questions with that goal in mind.

General Questions

G1. Do you live on or adjacent to the streets of the Lighting Evaluation?

76th Avenue	Yes _____	No_____
80th Avenue	Yes _____	No_____
Lars Circle or 79th Ave.	Yes _____	No_____
Meritra Street	Yes _____	No_____
Rovenna Street	Yes _____	No_____

G2. Do you live in Alaska?

Yes _____ No_____

G3. Do you live in Anchorage?

Yes _____ No_____

Demographic Questions

D1	Gender	M	F	(circle one)
D2	Age			(in years)

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Community Subjective Evaluation

MOA Nighttime Residential Street Lighting Subjective Evaluation **AREA A**

Surveyor #	Circle the Area Visit Order for this evaluation	1	2	3	4	5	6

S1. Weather conditions --- Clear_____ Cloudy_____ Snow _____ Rain_____

S2. Ground conditions --- Streets Clear & Dry _____ Streets Clear & Wet_____ Streets Snow-covered_____ Snow in Yards_____

All of the statements in the table below (**except #1**) refer to the lighting of the immediate area around you, ***during darkness***. Please rate your level of agreement with each of the following statements about the lighting, on a 1 to 5 scale, with 1 being 'strongly disagree' and 5 being 'strongly agree'.

	Rate Statements	Strongly Disagree ..... Neutral ..... Strongly Agree					Don't Know
1	*It would be safe to walk here, alone, **during daylight hours.***	1	2	3	4	5	DK
2	*It would be safe to walk here, alone, during darkness hours.*	1	2	3	4	5	DK
3	*The lighting is comfortable.*	1	2	3	4	5	DK
4	*This is a good example of residential street lighting.*	1	2	3	4	5	DK
5	*The lighting is too bright.*	1	2	3	4	5	DK
6	*The lighting is too dark.*	1	2	3	4	5	DK
7	*The lighting is uneven (patchy).*	1	2	3	4	5	DK
8	*The lighting is glaring.*	1	2	3	4	5	DK
9	*The lighting is too limited in area.*	1	2	3	4	5	DK
10	*The lighting is poorly matched to the neighborhood.*	1	2	3	4	5	DK
11	*I **cannot** tell the colors of things due to the lighting.*	1	2	3	4	5	DK
12	*The lighting permits safe navigation.*	1	2	3	4	5	DK
13	*The lighting is obtrusive onto the houses.*	1	2	3	4	5	DK
14	*I like the color of the light.*	1	2	3	4	5	DK
15	*I can rapidly locate the light-colored cones on the street.*	1	2	3	4	5	DK
16	*I can rapidly locate the dark-colored cones on the street.*	1	2	3	4	5	DK
17	*I would like this style lighting on my residential street.*	1	2	3	4	5	DK

18. How does the lighting in this area compare with the lighting of similar residential streets at night?

Much worse Worse About the same Better Much Better

19. Write additional comments below.

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Hopeful Results

- Reduce energy by at least 30% to 50%
- Greatly reduce operation and maintenance costs

Potential Results

Community Results (48 respondents)

- Preferred lower wattage white light sources (85 watt induction, 3 and 4 bar LED)
- 165 watt induction was not preferred (too bright)
- HPS (twice the lighting level was the big loser!)

Study Results

"Experts" Results (72 respondents)

- Much harsher on evaluating the LED glare
- Brutal on the HPS system
- 85 watt induction big winner

Observations

Continuing the work

- Commercial Street Lighting Study
- Gathering similar data from other cities
- Develop a process that is similar so results can be shared

Observations

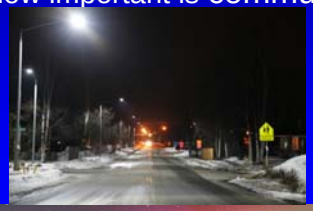
IESNA Guidelines

- At times, streets are overlighted
- Little guidance on spectral differences
- Glare metrics

Observations

Unanswered Questions

- What effect is spectral distribution on street and area lighting?
- Do we have the correct Glare metrics?
- Are there clear adaptive standards?
- How important is community feedback?



Reason for symposium