

An Application for Permanent
Dark-Sky Certification

as submitted to
The International Dark Sky Association
for

Observatory Park

July 2011

Board of Park Commissioners

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Geauga Park District Observatory Park Project

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Cover photo: Oberle Observatory at dusk, 7/3/11, courtesy Russ Swaney



Observatory Park was awarded provisional certification as a Silver Tier, Dark-Sky Park in October 2008. We are honored to have been the first entity to ever receive this designation prior to actual park construction.

This application for permanent certification represents Geauga Park District's continued commitment to the protection of the night skies in Geauga County.

We extend our deepest appreciation to the IDA Board of Directors for their support of the Observatory Park project.

◆
*The Board of Park Commissioners
and Staff of Geauga Park District*

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OBSERVATORY PARK: FROM THE GROUND TO THE GALAXIES

1.0 HISTORICAL CONTEXT

What began with a donation of a telescope to Geauga Park District in 2002 from a local astronomy enthusiast and furthered by the acquisition of 500 acres of land, has grown into a 1,034 acre preserve known as Observatory Park. Located in Montville Township (Geauga County), Ohio, Observatory Park is a day and night-time venue that encourages visitors to connect with the natural world, from the ground to the galaxies.

The conceptualization and development of Observatory Park was made in collaboration with education and science professionals from numerous universities, the Great Lakes Science Center (Cleveland, Ohio), the Cleveland Museum of Natural History, local astronomy organizations and school districts. The entire park is being funded by philanthropic dollars.

In October 2008, before the park was constructed, it received certification as a Silver Tier, Dark-Sky Park. Phases I and II of Observatory Park are now complete and dedication of the park is slated for August 20, 2011.

2.0 OVERVIEW

The park will be open year-round, from 6:00 a.m. to 11:00 p.m. Park hours will be extended for astronomy nights and special events. Observatory Park's epicenter is the Central Plaza which includes a Public Event Center, an Observatory, and interactive site features.

The Public Event Center includes a portable planetarium and seating for 150. It will be the site for exhibits, lectures, and presentations.

The Oberle Observatory houses a 25.5" Newtonian Reflector telescope which will be used for school and public programming.



View of the Central Plaza with Public Event Center (left) and Oberle Observatory



Seismograph and weather station viewing window (left) and lunar phase sculptures

Interactive site features located on the Central Plaza include a sundial, lunar phase and constellation sculptures. The accompanying interpretive signage will provide visitors with self-guided exploration on the planets and the moon, emphasizing human interaction with the earth. In addition, a seismograph and weather station will provide visitors with live feeds of local atmospheric conditions.

Five telescope pads with electrical outlets surround the Central Plaza and will be available to visiting astronomers. Exploration of the planets will occur along a mile-long “Planetary Path,” scheduled for completion in the fall of 2011. The path offers the adventure of an imaginary stroll across the solar system with eight planetary “stations” providing facts to convey the relative size and distance of the planets. Additional park amenities will be constructed in 2012, including a sloped grass amphitheater, hiking and jogging trails, picnic shelter and day/night gardens.

Observatory Park also includes the 280-acre site of the former Nassau Observing Station which houses a 36” research-grade telescope built in the 1950’s by the Cleveland-based Warner & Swasey Company. From 2000-2005, Nassau Observing Station was managed by Case Western Reserve University (Cleveland) and was the location of Geauga Park District’s public astronomy programming. The Observing Station was shuttered in 2005 and plans are to renovate the site in the future and open its doors once again for night-sky viewing and astronomical research.

3.0 DESIGN AND DEVELOPMENT

The heart of Geauga Park District’s mission is to preserve, conserve, and protect; therefore, less than 20% of the acreage of Observatory Park acreage was developed. The meadows and wooded areas surrounding the Park will remain undisturbed except for primitive walking trails. This is to ensure protection of identified rare species and flora on the property as well as preservation of the Cuyahoga River watershed which feeds into the Lake Erie basin.

To minimize maintenance and operating costs while also reducing the Park’s environmental impact (including the impact on the night sky), “green” building features were incorporated into the design:

- a “dry” sanitation system which uses radiant heat and wind to evaporate waste material
- a cistern to collect rain water to be used for landscaping and cleaning
- a Liveroof system (vegetated roof) on the Public Event and Observatory buildings which will reduce air conditioning costs by 25% to 50% and storm water run-off by 50% to 80%
- a wind turbine and solar panels which will decrease energy consumption
- sensors inside the buildings which automatically turn off lights when unoccupied or when adequate light is detected through skylights
- interior and exterior low-energy LED lighting



Vegetated Roof System



Ventilation System (stacks) for Waterless Sanitation System



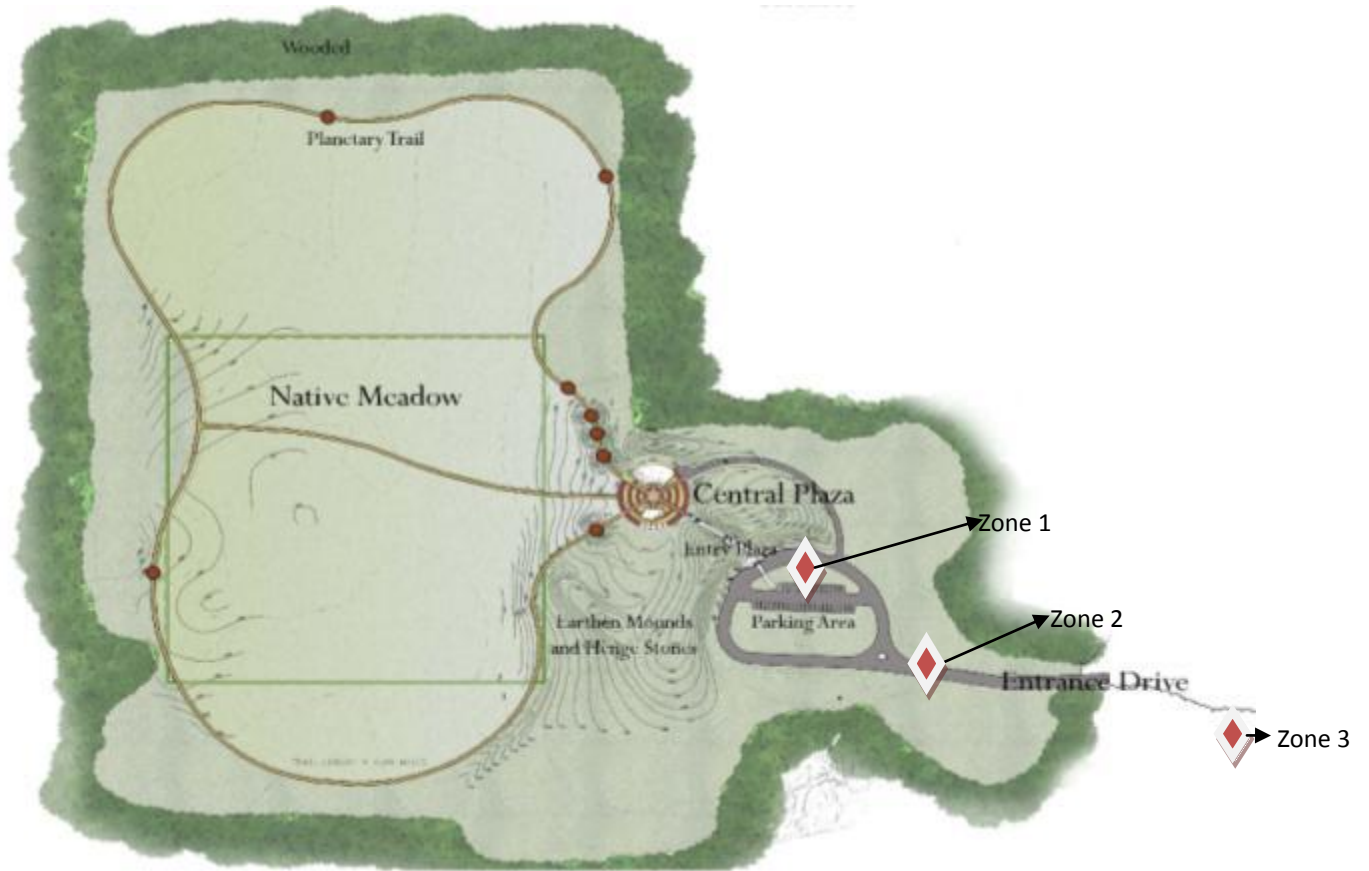
Solar Panels

3.1 LIGHTING MANAGEMENT PLAN

All lighting in the park was designed to minimize light pollution and maximize energy savings by matching lighting levels with the intended application.

A photometric study of the park was completed by the Park’s electrical engineer in consultation with Terry McGowan of the International Dark Sky Association. The lighting in the park is in accordance with the standards set forth in Section 7.02 of the “Geauga Park District Lighting Management Plan” developed in 2008 (*Appendix, Attachment 1*).

3.12 LIGHTING: ENTRANCE AND PARKING AREA

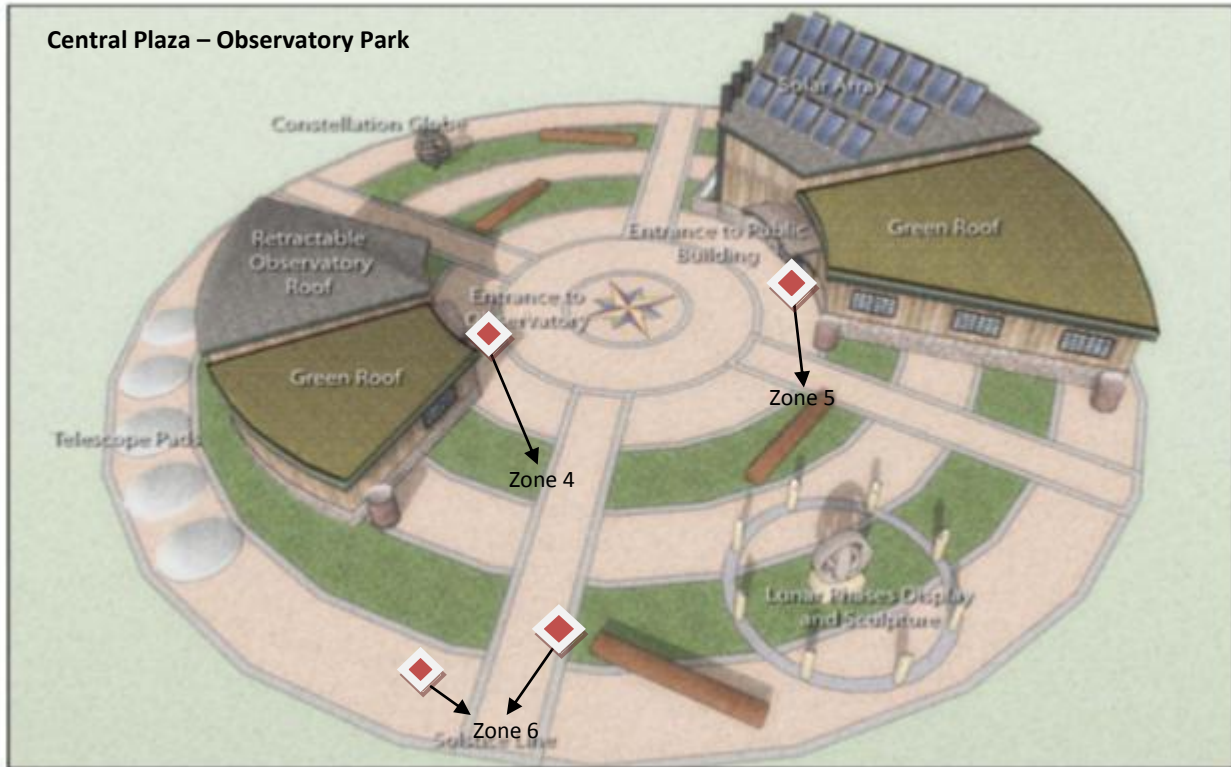


Lighting Zone	Type of Fixture	Quantity
Zone 1 – Parking Area	BETA 4-bar LED	9
Zone 2 – Entrance Drive, 2000’	None	0
Zone 3 – Entrance Sign	LED Shielded Floodlight, RAB HBLED1078	2



The parking lot lights are equipped with light sensors and adjust lighting levels automatically based on the amount of natural light detected (i.e., during a full moon, the lights will dim automatically). This creates optimum conditions for nighttime star-gazing while reducing energy usage.

3.13 LIGHTING: CENTRAL PLAZA



Lighting Zone	Type of Fixture	Quantity
Zone 4 – Central Plaza, Oberle Observatory	ECOS 1000 lumen LED	4
Zone 5 – Central Plaza, Public Event Center	ECOS 1000 lumen LED	3
Zone 6 – Central Plaza, Walkway and Perimeter	Bollards, 10w LED	23

Because red lighting is the preferred light source for astronomical sites, custom-designed red film covers the lenses of the bollard lights lining the walkway and perimeter of the Central Plaza (Zone 6).



The lights above the doors of the Oberle Observatory (Zone 4) and the Public Event Center (Zone 5) are custom-designed with red lenses. Lighting levels are controlled by photo sensors mounted on the buildings. The sensors are regulated by the amount of light, not by the time of day. The lights are also on timers which can be manually adjusted for special events.



Because the cost of LED lighting is significantly more than “traditional” lighting, the lighting for the park was presented to prospective donors as a “naming right.” This provided donors the opportunity to become intimately involved in the Park’s commitment to dark-sky preservation.

A generous donation was received from The Kelvin and Eleanor Smith Foundation of Solon, Ohio to cover the cost of the lighting. When making the donation, the Foundation noted “...*realizing the importance of the Dark-Sky designation to the Park District and Observatory Park, it was imperative to have outdoor lighting that would not – in any way - be intrusive on the overall environment or surroundings.*”

3.2 ADDITIONAL FEATURES: DARK SKY PROTECTION

Additional site features were incorporated to protect the night sky.

The perimeter of the parking lot was mounded and lined with twenty-six, 6’ pine trees to provide a natural barrier which reduces glare from incoming headlights.



In addition, the entrance path layout was angled to avoid headlight glare from the parking lot area.



4.0 RESTORING & PROTECTING THE NIGHT SKY

Believing that the night sky is the world's greatest natural resource, Geauga Park District is committed to the preservation and protection of the skies over Observatory Park and all of Geauga County. As part of Observatory Park's provisional dark-sky designation in 2008, an action plan was created to move the park from its provisional certification to permanent certification.

The following is a summary of objectives and outcomes:

4.1 AN ACTION PLAN: LEADING BY EXAMPLE

Gauga Park District will actively work toward minimizing light pollution in Geauga County by:

- conducting a lighting inventory of all Geauga Park District parks (18). Data will include park location, type of lighting, and number of light fixtures.
Status: Lighting inventory complete, January 2009.
- enlisting the assistance of a lighting engineer to review data and make recommendations for retrofitting or replacement of light fixtures to ensure that all park lighting adheres to IDA standards.
Status: 81% of the Park District lighting is now in compliance (see Appendix, Attachment 2). Target completion date for remainder of lighting – Spring 2012.
- working with officials in Montville Township (site of Observatory Park) to encourage passage of a lighting ordinance to ensure skies in area surrounding Observatory Park remain untainted.
Status: Ongoing.

- developing a park-wide Maintenance Lighting Plan which identifies standards for lighting in future park development projects.
Status: Ongoing. Target completion date - December 2011.
- disseminating information and offering assistance to local townships and villages in Geauga County to control and modify intrusive lighting.
Status: Ongoing discussions. (Appendix, Attachment 3)

4.2 AN ACTION PLAN: LEADING THROUGH EDUCATION

Geauga Park District will promote dark-sky awareness by:

- utilizing print (newsletters, newspaper) and electronic media (website) to increase public awareness of light pollution issues.
Status: Ongoing (Appendix, Attachment 4)
- developing public programming and events which conveys the importance of the night sky as part of our cultural, scientific and environmental heritage.
Status: To be implemented spring of 2012 (Appendix, Attachment 5)
- participating in dark-sky awareness programs such as Globe at Night, Earth Hour, World Wide Star Count, The Galileoscope and IYA 2009 events.
Status: Ongoing (Appendix, Attachment 6)
- providing displays and educational materials at local venues that explain the adverse affects of light pollution.
Status: Ongoing (Appendix, Attachment 7)
- developing collaborative relationships with regional science institutions and universities to promote dark-sky awareness through joint programming, exhibits and workshops.
Status: Projected implementation date – 2013.

In addition, Observatory Park will serve as a monitoring site for the SkyMonitor program. As one of 25 hosting sites around the world (the only one in the Midwest), the SkyMonitor will provide continuous long-term measurements of sky brightness. Data will be transmitted to a central location, collected, and then archived.

The SkyMonitor will be utilized as a unique educational resource at the Park and will provide much-needed baseline data on the quality of the night sky in the surrounding area.



5.0 SUMMARY

Observatory Park will provide broad-reaching and innovative educational experiences, serving as a model for “best practices” in outdoor lighting. Leading by example and through education, the Park will:

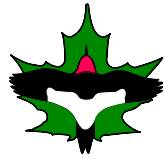
- provide school programming which focuses on the night sky to **educate** students about the importance of preserving the nocturnal landscape.
- use exhibits, electronic media, print material and presentations which will encourage local officials to **enact** lighting policies that promote efficient lighting practices.
- host astronomy nights, lectures, and other activities which will **empower** individuals and entire communities to become advocates for dark-sky preservation.

The night sky, shared by all, is part of our cultural, scientific and environmental heritage. There are few things in our lives that enable us to have this kind of connection to our distant past. Observatory Park, as a permanently certified Silver Tier, Dark-Sky Park, will ensure that this connection is not lost.



Attachment #1

- Lighting Management Plan
- Site Plan Lighting
- Lighting Plans



Geauga Park District

Lighting Management Plan

August, 2010

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7.02 Observatory Park Lighting

A photometric study at Observatory Park will be conducted by a certified lighting contractor/engineer prior to the start of Phase II construction (spring 2009). The report will measure the intensity of light, illumination levels and level of efficiency.

The photometric report will be based on the following four zones within Observatory Park:

Zone No.	Location	Area Covered	Comments
1	Entrance drive	2,200 ft.	No lighting needed
2	Parking Lot area	130,000 sq. ft.	
3	Central Plaza Area*	12,000 sq. ft.	
4	Planetary Trail and Viewing Corridors	40 acres	Landscape lighting

*includes observatory, public building and viewing area

The following standards will be in effect for all lighting zones at Observatory Park:

(a) A qualified professional, either electrical engineer or certified lighting contractor shall conduct a photometric study and report of the Observatory Park site prior to any Phase II construction. A photometric study will measure the intensity of visible light. Photometric applications include research on lighting levels, photopic and scotopic research and illumination efficiency. The study will be conducted by an engineer certified by the Illuminating Engineering Society of North America (IESNA).

(b) All lighting shall follow the standards for maximum lumens per acre output as recommended by the International Dark Sky Association or other calculation methods recommended by IDA.

(c) The qualified professional who prepares the photometric study shall inspect the installation of all lighting equipment and conduct a performance verification to measure spill light illuminance levels of all lighting after lighting installation.

(d) Upon completion of installation, inspection of installation and performance verification measurements, the qualified professional shall submit a drawing showing the final measured spill light illumination levels, along with a certification letter. This letter shall be kept on file and a copy submitted to IDA.

(e) All lighting fixtures shall be fully shielded, based on the recommended standards by International Dark Sky Association for Environmental Zone E1A lighting.

(f) The site plan for lighting shall include all lighting locations and luminaire mounting heights, all security and safety lighting structures.

(g) Tall shrubs and trees may be used as screens to reduce glare and spill light.

(h) External lighting on the face of signs, interpretive plaques or walls of structures shall be placed above the sign or wall and shielded. Sign or wall lighting shall not reflect or glare beyond the face of the sign or wall.

(i) Uplighting is prohibited, except in cases where the fixture is shielded from the sky by a roof overhang or similar structure and where the fixture does not cause light to extend beyond the structural shield.

(j) All lighting will be on timers during nighttime operating hours (dusk to 11:00 p.m.).

(k) All lighting during non-operating hours (11:00 p.m. to 6:00 a.m.) will be turned off, unless lighting is required for security reasons. In that instance, sensor activated lights are encouraged.

(l) Temporary lighting, such as that used during construction or special events, is exempt, provided that all temporary lighting shall be aimed so as to minimize glare and light trespass, turned off after 11:00 p.m. and turned off after completion of project.

(m) Light sources from computer screens and other external sources must be blocked or filtered. Flashlights must be "red light" only.

(n) A regular maintenance schedule will be implemented to keep fixtures clean from dust and dirt, as such contamination can reduce light output up to 50 percent.

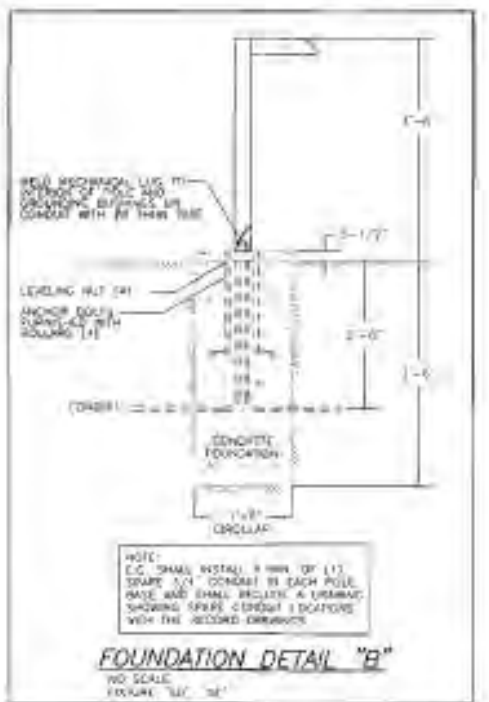
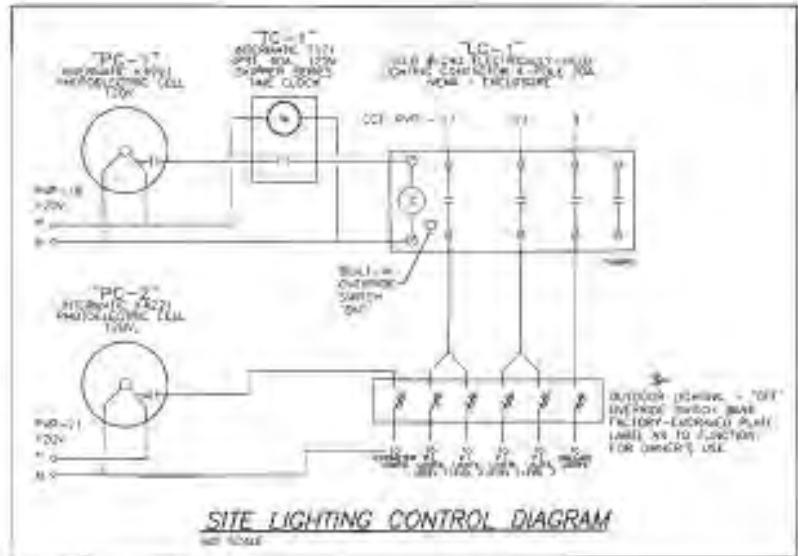
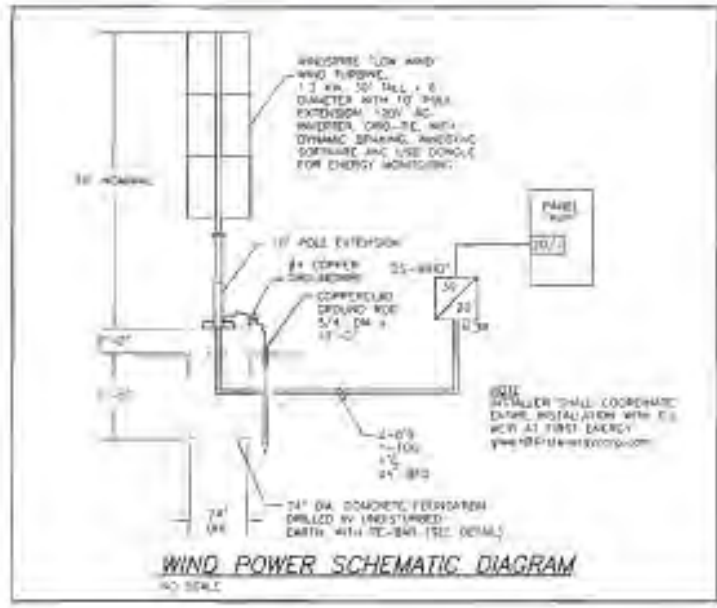
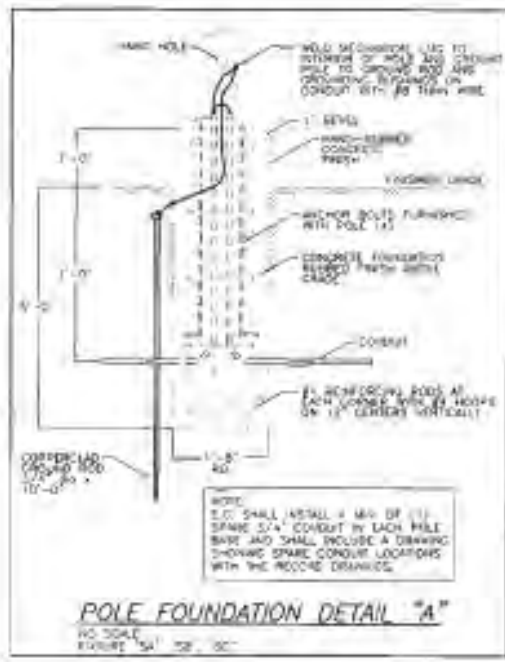
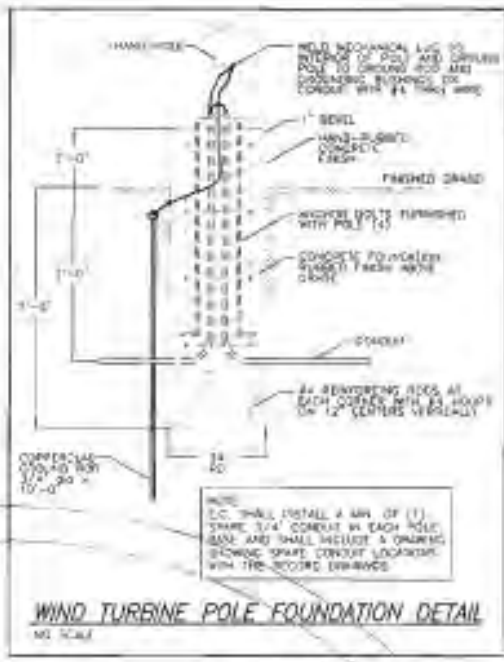
(o) Swiveled Luminaries - Because of the potential for adjustment, either inadvertently or intentionally, the installation and use of swivel-mounted floodlights is discouraged. If floodlights will be used, they must be fully-shielded, properly aimed and subject to regular maintenance and inspection.

(p) The use of laser source light or any similar high intensity light for lighting or entertainment, when projected above the horizon, is prohibited.

(q) This Lighting Management Plan is effective as of August, 2008. It will be reviewed at two-year intervals from initial approval and at five-year intervals thereafter.

Qty	MANUFACTURER & QTY. NO.	WATT	LAMPS	ADJUSTING
120	240 LED BLD-ARE-73-DK-102-LED-B-TL (BALL 11020-10) 4 LIGHT BAY TYPE B BETA EDGE 350MA WITH TWO LEVEL (175/325 W/ INTEGRATED SENSOR CONTROL) & 10'-0" ROUND STRAIGHT STEEL POLE WITH ROUND BASE COVER WITH #2000 #196-0900 RED DOROPALM CUT TO FIT BY E.C.	120	(4) 1500W LED LIGHT BAY (1500 LUMEN OUTPUT)	POLE-SEE FOUNDATION DETAIL "A"
120	240 LED BLD-ARE-74-DK-102-LED-B-TL (BALL 11020-10) 4 LIGHT BAY TYPE B BETA EDGE 350MA WITH TWO LEVEL (175/325 W/ INTEGRATED SENSOR CONTROL) & 10'-0" ROUND STRAIGHT STEEL POLE WITH ROUND BASE COVER WITH #2000 #196-0900 RED DOROPALM CUT TO FIT BY E.C.	120	(4) 1500W LED LIGHT BAY	POLE-SEE FOUNDATION DETAIL "A"
120	240 LED BLD-ARE-74-DK-102-LED-B-TL (BALL 11020-10) 4 LIGHT BAY TYPE B BETA EDGE 350MA WITH TWO LEVEL (175/325 W/ INTEGRATED SENSOR CONTROL) & 10'-0" ROUND STRAIGHT STEEL POLE WITH ROUND BASE COVER WITH #2000 #196-0900 RED DOROPALM CUT TO FIT BY E.C.	120	(4) 150W LED	BOLLARD-SEE FOUNDATION DETAIL "B"
120	240 LED BLD-ARE-74-DK-102-LED-B-TL (BALL 11020-10) 4 LIGHT BAY TYPE B BETA EDGE 350MA WITH TWO LEVEL (175/325 W/ INTEGRATED SENSOR CONTROL) & 10'-0" ROUND STRAIGHT STEEL POLE WITH ROUND BASE COVER WITH #2000 #196-0900 RED DOROPALM CUT TO FIT BY E.C.	120	(4) 150W LED (RED)	BOLLARD-SEE FOUNDATION DETAIL "B"

HEIGHT LEVEL WITH DROOP (SEE 184-187)



SITE PLAN-LIGHTING
SCALE 1/4" = 30'-0"



Geauga County Parks District
**Observatory Park
 -Phase 2**
 10610 Clay St.
 Monroeville, Ohio 44134

PROJECT NO: 19-006
 DATE: 2019.01.22

SITE PLAN-LIGHTING

E4.1

Attachment #2

- Lighting Inventory

**GEAUGA PARK DISTRICT
LIGHTING INVENTORY
6/29/2011**

PARK NAME				
BASS LAKE PRESERVE				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	RECOMMENDATION
Bass Lake Shelter/Lodge		Full cutoff under shelter	10 x 150w	Compliant - new construction - 2010
Fishing Parking area (original lights)	HPS Dusk to Dawn		2 X 250W	Needs reviewed.
Parking Lot	BETA LED - 4 bar		4	Compliant - new construction - 2010
Restroom	RAB LED wallpack, 20 w		2	Compliant - new construction - 2010
BEARTOWN RESERVATION				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
North Point parking lot	HPS on timer	full cut-off shoebox	2 X 250W	Compliant - 2009
North Point Clivus latrine	HPS on timer	shielded wallpack under eave	3 X 150W	Compliant - 2009
Minnow Pond Clivus	HPS on timer	shielded wallpack under eave	2 X 150W	Compliant -2009
BESSIE BENNER METZENBAUM				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Entrance Sign	No Lighting		N/A	Compliant - 2009
Information Board	No Lighting		N/A	Compliant - 2009
Parking lot	HPS on timer	full cut-off shoebox	1 X 250W	Compliant - 2009
Clivus latrine	HPS on timer	shielded wallpack on outside wall	1 X 150W	Compliant - 2009
Shelter	HPS	unshielded wall pack under shelter	2 X 150W	Compliant - 2009
BIG CREEK PARK				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Park entrance (Robinson Rd.)	Mercury vapor dusk to dawn	cobra-head with drop lens	1	Owned by local utility company. Contact for options
Meyer Center delivery entrance	Halogen w/ motion sensor	unshielded floodlight under eave	2 X 150W	Needs reviewed.
Meyer Center staff entrance	Traditional hanging light	shielded and under porch	60w	Needs reviewed.
Meyer center main entrance	Halogen w/ motion sensor	unshielded floodlight under eave	2 X 150W	Needs reviewed.
Meyer Center garage	Flourescent and bulbs	under roof of building	3 x 60w	Needs reviewed.
Meyer Center walkway bollards	Compact fluorescent on timer	landscaping fixtures	15 X 11W	Compliant - 2009
Meyer Center walkway pergola	HPS on timer	wallpack under roof	1 X 150W	Switch to Glarebuster
Flagpole Light	Unshielded flood		1	Waiting on recommendation.
Meyer Center parking lot	HPS on timer	full cut-off shoebox	4 X 250W	Compliant - 2009
Aspen Grove Shelter				
Maple Grove Shelter				
Deep Woods Shelter				
Aspen Grove Clivus latrine	HPS on timer	shielded wallpack	1 X 150W	Switch to Glarebuster
North Operations facility	HPS dusk to dawn	shielded wallpack	3 X 250W	Switch to Glarebuster
North Operations facility	HPS dusk to dawn	shielded wallpack	1 X 150W	Switch to Glarebuster
Amphitheater	On timer	landscaping fixtures	4 x 11W	Compliant - 2009
Amphitheater		shielded spotlight w/wallpack	2 X 150W	Waiting on recommendation.
Amphitheater/Porch area		Floodlight	1	Switch to Glarebuster
Amphitheater/Porch area		Bulb in Wire cage	1	Waiting on recommendation.
Tupelo Pond	NO LIGHTS		N/A	Compliant - 2009
Woodin Road Entrance	NO LIGHTS		N/A	Compliant - 2009
Woodine Road Bridle Trails Latrine				

**GEAUGA PARK DISTRICT
LIGHTING INVENTORY
6/29/2011**

FROHRING MEADOWS PARK				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Shelter	HPS	unshielded wall pack under shelter	4 x 100 W	Compliant - 2009
Inside Latrine	HPS	unshielded wall pack under eave	2 x 100W	Compliant - 2009
HEADWATERS PARK				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Entrance Sign	No Lighting		N/A	Compliant - 2009
Boat dock area	HPS on timer	full cut-off shoebox	1 X 250W	Waiting on recommendation.
Clivus latrine	Compact Fluorescent	fully-shielded wallpack	1 X 150W	Compliant - 2009
Storage Building	VAN3S35 HPS	unshielded wallpack on N eave	35W	Now Compliant. Replaced with Glarebuster on eave mount
Storage Building	In ceiling mounts	Incandescent bulbs	4	Now Compliant. Replaced bulbs with lower wattage.
Shelter	HPS	unshielded wallpack under shelter	8 x 150W	Compliant - 2009
MOUNTAIN RUN STATION				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Information Board	Solar panels		N/A	Compliant -2009
ORCHARD HILLS PARK				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Entrance Sign	No lighting		N/A	Compliant - new construction - 2010
Shelter		Full cutoff under shelter	10 x 150w	Compliant - new construction - 2010
SUNNYBROOK PRESERVE				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Sunnybrook Lodge		Full cutoff under shelter	10 x 150w	Compliant - 2009
Sunnybrook Lodge		Full cutoff under shelter	1 x 26w	Compliant - 2009
Parking Area, Entrance		Full cutoff	6 x 150w	Compliant - 2009
Latrine		Wallpack under eave	1 x 150w	Compliant - 2009
SWINE CREEK				
	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	NOTES/CHANGED TO
South Operations facility	HPS dusk to dawn	barn light on pole	150W	Owned by local utility company. Contact for options.
South Operations fuel tanks	Mercury vapor dusk to dawn	shielded barn light	1	Waiting on recommendation.
Lodge parking lot	HPS on timer	full cut-off shoebox	2 X 150W	Compliant - 2009
Bridge over pond	Halogen on timer	unshielded floodlight	150W (2)	Now compliant. Replaced with Glarebuster.
Woods Edge latrine	HPS on timer	unshielded RAB wallpack under roof	2 X 150W	Now compliant. Replaced with Glarebuster.
Lakeside latrine	HPS on timer	unshielded RAB wallpack under roof	2 X 150W	Now compliant. Replaced with Glarebuster.
Entrance on 15900 Hayes Road	HPS dusk to dawn	barn light on pole	150W	Owned by local utility company. Contact for options.
Back of Lodge by woodpile	Floodlight w/motion sensor	unshielded floodlight	1	Now compliant. Replaced with Glarebuster & mini-sensor
Entrance to lodge - outdoor area	HPS		1	Waiting on recommendation.
Side wall of lodge	Lantern		1	Now complaint. Replaced with Glarebuster.
Restroom by lodge	HPS on timer	unshielded wallpack	1	Now compliant. Replaced with RAB, photo cell.
Woods Edge Shelter	Ceiling "cans"	incandescent, white ceiling		Compliant - 2009
LakeSide Shelter	Ceiling "cans"	incandescent, white ceiling		Compliant - 2009
Side of lodge with cement pad	Floodlight w/motion sensor	unshielded floodlight (2)	1	Now complaint. Replaced with Glarebuster.

**GEAUGA PARK DISTRICT
LIGHTING INVENTORY
6/29/2011**

THE ROOKERY	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	CHANGE TO
Blue Heron Lodge high N wall	HPS on timer 6PM to 12PM	unshielded wallpack	1 X 250W	Now compliant. Replaced to Glarebuster
Blue Heron Lodge over N door	HPS on timer 6PM to 12PM	shielded wallpack	1 X 150W	Now compliant. Replaced with Glarebuster and photocell.
Clivus latrine	HPS on timer	unshielded wallpack	1 X 150W	Now compliant. Replaced with Glarebuster.
Entrance Sign	Compact flourescents	upward lighting	2 x 13w	Now compliant. Replaced with RAB LED floodlight - check to see if installed.
Pole at end of sidewalk (new)				Install pole with two Glarebusters. In progress.
THE WEST WOODS	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Nature Center parking lot	HPS on timer	shoebox w/ drop lens	8 X 250W	Will need replaced in future.
Nature Center rear door	Incand w/ motion sensor	unshielded floodlight	2 X 150W	Switch to Glarebuster with mini motion sensor
Green Roof Building	Incand w/ motion sensor	unshielded floodlight	2 X 150W	Switch to Glarebuster with mini motion sensor
Shelter area parking lot	HPS on timer	shoebox w/ drop lens	4 X 250W	
Clivus latrine	Compact fluor on timer	unshielded wallpack under roof	1 X 60W	Switch to Glarebuster
Affelder cottage	T4 quartz halogen on switch	unshielded floodlight	2 X 150W	Switch to Glarebuster with mini motion sensor
Entrance - 9465 Kinsman Road	Mercury dawn to dusk	cobra with drop lens	1	Owned by local utility company. Contact for options.
Entrance Sign			2	Now Compliant. Replaced with RAB mini-floodlight.
WALTER C. BEST	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Entrance Sign	No Lighting		N/A	Now compliant
Latrine	No Lighting		N/A	Now compliant
Parking Area, Entrance	Mercury Vapor	Cobra with drop lens (CEI)		Owned by local utility company - contact for options.
Shelter			N/A	Compliant - 2009
CHICKAGAMI PARK	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Entrance light to Park	Dusk to Dawn, HPS	Barn Light	1	Owned by local utility company - contact for options.
Light by Bob Mast's house	Dusk to Dawn, HPS	Barn Light	2	Waiting on recommendation.
Pine Grove Shelter		Unsheild Wallpacks, Floodlight	12	Waiting on recommendation.
Light by Pine Grove Shelter	175watt, Dusk to Dawn, HPS	Barn Light	1	Waiting on recommendation.
Latrine	RAB LED	RAB LED	1	Now compliant.
Pergola	150 watt Metal Halide w/photo cell		1	Compliant - 2009
Lighting on cabins	Floodlights		3	Owned by outside organization. Will contact to discuss.
"Order of Arrow Building"	Floodlights		1	Now compliant. Replaced with Glarebuster.
Electrical House - water pump	Nothing there			Waiting on recommendation.
Electrical House	Mercury	Barn Light		Building demolished in June 2011.

**GEAUGA PARK DISTRICT
LIGHTING INVENTORY
6/29/2011**

OBSERVATORY PARK	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	ALL FIXTURES ARE DARK SKY COMPLIANT
Public Event Center	ECOS 1000 lumen LED	Lithium with red lenses	3	Compliant - new construction - 2010/11
Observatory	ECOS 1000 lumen LED	Lithium with red lenses	4	Compliant - new construction - 2010/11
Parking Lot	BETA LED - 4 bar		9	Compliant - new construction - 2010/11
Walkway & Central Plaza perimeter	Bollards (RAB light on poles)	LED (9 dual-head, 3 single)	23	Compliant - new construction - 2010/11
Entrance Sign		LED shield floodlight, RABLED1078	2	Compliant - new construction - 2010/11
BURTON WETLANDS	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Porta-let	NO LIGHTING			Compliant - 2009
MOUNTAIN RUN STATION	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Pergola	NO LIGHTING			Compliant - 2009
WHITLAM WOODS	TYPE OF LAMP	TYPE OF FIXTURE	QUANTITY	
Latrine	NO LIGHTING			Compliant - 2009

Attachment #3 -

- PowerPoint presented to Geauga County Township, City and Village officials, February 2010.

Approximate attendance: 200

(Note: The PowerPoint was well-received. After the meeting, each official was sent a follow-up letter, along with a copy of "Guidelines for Efficient Outdoor Lighting" (developed by Geauga Park District).

- "A Dark Sky County?" News Article – 12/08



The "Great" North American Blackout

Most of us remember that hot day in mid-August 2003 when eight states and parts of Canada were plunged into darkness.

During the Blackout

While many of us were busy lighting candles, gathering our flashlights and wondering what happened...

Todd Carlson of Ontario, Canada was busy taking pictures of the night sky above his home.

Notice the abundance of stars and the clear image of the Milky Way.

Photo courtesy of Todd Carlson, Ontario, 2003

After the Blackout with Lights Restored

This is the same picture after the lights were restored.

What's missing?

The stars and Milky Way!

Photo courtesy of Todd Carlson, Ontario, 2003

Light Pollution Defined

The picture on the right demonstrates what scientists have termed **Light Pollution**.

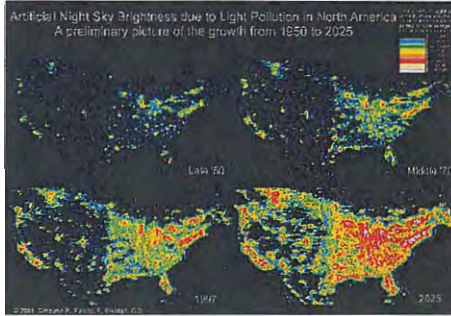
Simply put, Light Pollution is the excessive and wasteful use of outdoor lighting which creates "skyglow" or artificial brightness.

99% of the population lives in areas that scientists consider light polluted (U.S. Dept. of the Interior).

Light Pollution is a Global Crisis

Source: National Science and Space Administration, American National Archives at College Park, and the U.S. Defense Meteorological Satellite Program, 2004, 2005.

Light Pollution is Increasing



The Response to Light Pollution

Since the 1980s, the International Dark-Sky Association (IDA) based in Tucson, Arizona has been educating people about the detrimental effects of light pollution.

Here in Geauga County, a partnership between Chagrin Valley Astronomical Society and Geauga Park District led to the formation of a local IDA chapter called the Northeast Ohio International Dark-Sky Association.

Our goal is to keep Geauga County **green** by protecting one of its greatest natural resources – the night sky!



Light Pollution 101

The Northeast Ohio IDA works to shift the focus (literally!) of light that shines upward to light that shines downward, with the end result being the use of more efficient lighting.

Conscious of the need for security, **we do not advocate turning off all lights at night**, but rather redirecting the light, lowering the wattage, or replacing unshielded fixtures with "shielded" fixtures.



Light Pollution Wastes Energy

The U.S. Department of Energy has estimated that **30-60% of energy we use in outdoor lighting is unnecessary and inefficient, wasting:**

- over \$10 billion dollars a year.
- an estimated 30 million barrels of crude oil.
- up to 17.4 billion kilowatts of electricity.
- more than 14.7 tons of coal.



The use of inefficient lighting increases our country's dependence on oil, further depleting our natural resources.

Think About This...

The annual cost to light this gas station all night requires **88,000 lbs. of coal** which, in turn, produces:

- **848 lbs. of nitrogen oxide** (ground level ozone)
- **211,000 lbs. of carbon dioxide** (greenhouse gas)
- **1,390 lbs. of sulfur dioxide** (acid rain)



Light Pollution Creates Glare

Glare is light with an intensity great enough to cause annoyance, or loss of performance and visibility.

- 40% of the light emitted from standard streetlights creates glare.
- Glare causes eye pupil constriction and compromises visibility, leading to unsafe driving conditions.
- Bright glare can produce high contrast shadows. These shadows actually become corridors of darkness that can become hiding places for potential criminals.



Better Lighting = Less Glare, Less Energy

The overuse of lighting and using the wrong fixtures at this gas station is not only wasteful and unnecessary, but it creates glare which is hazardous to drivers and pedestrians.



Notice the difference? Using "flush-mounted" fixtures instead, the glare is gone, less energy is being used and there is enough light for safety and security.

The glare from this Burger King is greatly reduced simply by changing the light fixtures and lowering the wattage.



From this...



To this...



Night Lighting and Safety



This residential walkway light brightens the entire area, making it more secure.

Or does it?



The same picture, but with the light shielded and the glare controlled.

Less Glare, Just as Safe

This is a picture of General Bookbinding in Chesterland.

Notice the glare on the road created by unshielded lighting?



This picture was taken after placing shields on the light fixtures, directing the light downward.

The driveway is now glare-free and safer for drivers.

Light Pollution Endangers Wildlife

Artificial brightness disrupts the natural cycle of plants and animals that depend upon darkness throughout the night.



True night never occurs in 40% of areas in the United States and 10% of the world.

This poses a serious threat to wildlife, whose lives are regulated by the natural diurnal patterns of light and dark.



Migratory Birds...Attracted By the Light

Five million birds use the moon and stars for navigation during their bi-annual migrations through North America.

When some fly through a brightly lit area such as Cleveland, they become disoriented, crashing into brilliantly lit towers or buildings.

Other birds get trapped in the light and begin circling, only to die from exhaustion hours later.



Key Tower Building, Cleveland



The Luxor Hotel, Las Vegas (notice the bird and insect trails in the light)

Light Pollution is Hazardous to Your Health!

The World Health Organization has listed shift work that involves "circadian disruption", as a probable carcinogen. And, in June 2009, *The American Medical Association* passed a resolution stating that too much artificial light:

- disrupts circadian rhythms which regulate sleep.
- suppresses the body's immune system.
- reduces the human body's production of melatonin which promotes growth of breast tumors in women.



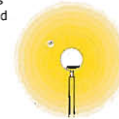
Best Practices in Outdoor Lighting



Full Cutoff lights allow no light above 90 degrees and requires a flat, horizontally-oriented lens and opaque sides, often called "shoebox" luminaire.



Semi-Cutoff lights have a non-flat lens. Sagged glass is a good indicator that the luminaire is not Full Cutoff.



A **Non-Cutoff** light has an unrestricted distribution of light at any angle.

"Dark-Sky Friendly" Lighting Samples



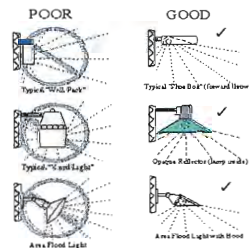
Ways to Eliminate Light Pollution

1. Put light only where it is needed. Shine the light down to reduce glare and light trespass.



(Your neighbors will thank you.)

2. Replace or retrofit existing lights with "full cut-off" shields or lights that will direct the light to where it's needed.



But What About Security?

At least 30% of the light coming out of a typical barn light or "security light" fixture is going directly into the sky, causing glare and light trespass. This does nothing to light up your property or deter criminals.

Adding a shield or retrofitting it with an LED insert will not only save energy, but will also direct light to where it is needed, allowing adequate and uniform visibility.



What Else Can You Do?

3. Replace high wattage bulbs with compact fluorescent light (CFL) or LED bulbs.



Incandescent Light Bulbs	Minimum Light Output	CFL - Energy Star Qualified Bulbs
Watts	Lumens	Watts
40	450	9-13
60	800	13-15
75	1,100	18-25
100	1,600	23-30
150	2,600	30-32

And more...

4. Turn off all unnecessary lights.



5. Install motion sensors or timers on your lights.

6. Turn your existing lights so they point downward (until you can replace the lights or buy shields).

Become An Advocate for the Night Sky

- Learn how to recognize fixtures that are well-designed, dark sky friendly and efficient. Educate others about proper lighting techniques.
- Review the current zoning laws for your community. Are they adequate for both homes and businesses? Contact the Northeast Ohio IDA for sample lighting regulations you can use in your community.
- Write a letter to the newspaper, tell a friend, or talk to your family about preserving the night sky. Remember – light pollution can be easily reversed by changing a bulb or light fixture!

Help Restore and Protect



Our Dark Skies

BOARD OF COUNTY COMMISSIONERS

Could Geauga become a Dark Sky county?

By Glen Miller

Geauga Park District Executive Director Tom Curtin came to the county commissioners Tuesday with an idea that could save people money on their lighting bills and reduce light pollution.

The idea is one way to have Geauga County designated as a "dark sky preserve" and help stop light pollution, he said.

It involves installing "down lighting," bulbs that shine down rather than out and up, installing shields over outside lights or using bulbs with lower wattage.

Last month, the park district's Observatory Park in Montville Township provisionally was named an International Dark Sky Park by the International Dark-Sky Association (IDA).

The honor was given because of the park district's proposed efforts to keep night skies dark over Observatory Park and the Nassau Observatory in Huntsburg Township. The observatory recently was purchased from Case Western Reserve University.

The provisional status is contingent on the completion of the park's outdoor lighting scheme, visitor's center and enactment of outdoor lighting ordinances in surrounding townships, Curtin said.

Several townships have changed their lighting ordinances or codes to be more dark sky friendly. Others are in the process of changing their regulations, Curtin told the commissioners.

The IDA recently asked Curtin if Geauga County might want to be given the same designation.

"There are some cities that have done this, but there hasn't been a county yet in the state that has done this. I'd like to explore this," Curtin said. "There are billions of dollars of our lighting just going up in the sky every year."

It would require replacing or retrofitting existing outdoor lights so they do not shine up into the night sky, thereby causing unwanted light pollution and making stars or planets hard to view.

The park district is in the process of changing its lights by using lower wattage bulbs or by placing shields over them, he said.

"The amount of money we can save this organization is pretty substantial. This is one of the things that's been driving us, not only because we are a conservation agency as far as natural resources go, but we've started to get into the economics of it," Curtin said.

Sheriff Dan McClelland said the new Geauga County Safety Center has down lighting which proves sufficient for security without bothering residents living across Route 44.

As townships change their lighting codes, the hope is homeowners and business will change their lighting in order to reduce light pollution and save money.

"We're being smarter, too, about how and where we place our lights, as well as cutting down our wattage and reducing our energy costs," Curtin added.

The commissioners said they will consider the idea, but cannot afford to change all county-owned lights overnight.

The IDA likes to see progress in reducing light pollution, but also is "very pragmatic in knowing things take time," Curtin said.

Chardon, Munson, Bainbridge, Russell and Chester townships have changed their outdoor lighting regulations. The change is being considered by Burton and Parkman townships. Curtin said he intends to speak to trustees in Auburn, Troy, Middlefield, Huntsburg, Claridon, Hambden, Montville and Thompson township about making the change.

The discussions will occur early next year, when council members in Burton, Middlefield and Chardon also will be approached.

"We are already known for being one of the best places to live in the country. It would nice for Geauga to be known for becoming the first dark sky county in Ohio and one of the few in the country," he said.

The International Dark Sky Park program was established in 2006 by the IDA, a Tucson based non-profit organization dedicated to preserving the nighttime environment.

The Geauga Park District's Observatory Park is the only provisional Silver Tier Park in the country. It joins Gold Tier Natural Bridges National Monument (UT) and Cherry Springs State Park (PA) as those certified by the program.

Attachment #4: Publicity

- Marketing, Publicity & Advocacy (compilation)

Observatory Park Marketing, Publicity and Advocacy Appendices

Internal Geauga Park District Publications

GPD press release; *Geauga Park District Purchases Nassau Observatory from Case Western Reserve University*; October 10, 2008

GPD program guide; *Environmental Education 2010-2011*; reference to middle school pilot programs coming to Observatory Park in 2010-2011 school year

GPD quarterly newsletter; *Voices of Nature, Summer (June) 2010 Special Four-Page Insert*; introduction of Observatory Park capital campaign to general public

GPD quarterly newsletter; *Voices of Nature, Winter (January) 2011 Special Four-Page Insert*; focus on education aspects of Observatory Park construction

GPD quarterly newsletter; *Voices of Nature, Spring (April) 2011*; includes brief update on progress of Observatory Park construction

GPD monthly e-newsletter; *OP Update*; monthly updates on the progress of Observatory Park and the capital campaign; to approximately 2,800 individuals in the GPD email database; commenced December 2010

External Media and Organizations

International Dark-Sky Association press release; *Geauga Park District Receives Provisional Status as an IDSP*; Tucson AZ; October 21, 2008

Staff, The News-Herald, *Geauga Gets Dark Sky Park Provisional Status*, November 3, 2008.

Miller, Glen; Geauga County Maple Leaf, Chardon OH; *Could Geauga become a Dark Sky County?*, December 4, 2008

Ryder, Diane; The News-Herald, *Geauga Officials Ponder Light Pollution*, December 5, 2008.

Mayhood, Kevin; The Columbus Dispatch, Columbus OH; *A Shot In the Dark - Geauga County Observatory Park Works for Coveted Dark-Sky Designation*; January 20, 2009

Kaufmann, Tina; Akron News Now, *Ohio Observatory Seeks New Chapter*, January, 2009.

NPR Radio (Kent State University) Interview, February 2009.

Mangels, John; The Plain Dealer, Cleveland OH; *Making the Stars Come Out – Really*; February 24, 2009

Frischkorn, Jeffrey L.; The News-Herald, Lake County OH; *Geauga Park Aims for the Stars*; July 3, 2009

Frischkorn, Jeffrey L.; The News-Herald, Lake County OH; *Work Going Forward for Telescope at Observatory Park*; July 15, 2009

Ryder, Diane; The News-Herald, Lake County OH; *Geauga Officials Ponder Light Pollution*; August 2009.

Demirjian, Joan; The Geauga Times Courier, Chagrin Falls OH; *Light Fight Right for Sight of Night in Township*, January 15, 2010

Miller, Glenn; Geauga County Maple Leaf; *Observatory Park Receives \$175,000 Donation*, February 11, 2010

Mangels, John; The Plain Dealer, Cleveland OH; *Observatory Park – “Whatever Happened to ...”* ongoing Plain Dealer feature; followup to February 24, 2009 article; May 17, 2010

Miller, Glen; Geauga County Maple Leaf; *Nassau Observatory to be Renovated*; July 22, 2010

National and International Media

Death Valley Works to Preserve Night Sky; reference to Geauga Park District’s dark sky designation, October 2008 to February 2009 from various sources (Arab Times, MSNBC, The New York Times, Tennessee Crossville Chronicle, Phoenix Sierra Vista Times, Sky and Telescope Magazine, Monterey (CA) Herald, New Jersey Herald, Sault Ste. Marie Star, Fort Wayne (IN) Journal, RV Star Gazer, Portland News)

Fergus, Ewan; Herald Scotland; *Forest Park Is Over the Moon at Night Sky Award*; reference to Geauga Park District as one of only three current dark sky parks in the world; November 15, 2009

Scotland Bldg Blog: Architectural Conjecture; *Dark Sky Parks*; reference to Geauga Park District as a “human-created” dark sky park; April 2009

Burns, Melinda; Miller-McCune; *Starry, Starry Skies*; reference to Geauga Park District’s dark sky park designation for Observatory Park; January 16, 2010

Keller, Andrew; St. Ignace (Michigan) News; *Mackinaw City Dark Skies Proposal Moving Forward*; reference to Geauga Park District’s dark sky park designation for Observatory Park; November 4, 2010

Forest Commission of Scotland, *Galloway Forest Park* (U.K.) brochure, reference to Geauga Park District’s dark sky designation, May 2011

Letters of Support

Collins, George W., Professor Emeritus, The Ohio State University; to the International Dark-Sky Association supporting designation of Observatory Park as a Dark Sky Park; August 5, 2008

Quisenberry, Thomas; President, The Chagrin Valley Astronomical Society; to the International Dark-Sky Association supporting designation of Observatory Park as a Dark Sky Park; August 5, 2008

Gilba, George W., SPS NASA; Maryland; to the International Dark-Sky Association supporting designation of Observatory Park as a Dark Sky Park; August 5, 2008

Hendon, PhD, Arne A.; Director, The American Association of Variable Star Observers; Cambridge MA; to the International Dark-Sky Association supporting designation of Observatory Park as a Dark Sky Park; August 5, 2008

Superintendents representing various Geauga County School Districts, 2008-2009

Gates, Dr. Evalyn; Executive Director and CEO, Cleveland Museum of Natural History; Cleveland OH; for each grant proposal package from GPD to potential foundation funders

Silver, Ed.D., Linda Abraham; Great Lakes Science Center; Cleveland OH; for each grant proposal package from GPD to potential foundation funders

Attachment #5: Public Programming

- Sample of proposed public programming

Astronomy Theme: SCOPING OUT THE NIGHT SKY

Objectives	Goals
<p>Raise astronomical awareness and aptitude by providing opportunities that:</p> <ul style="list-style-type: none"> highlight seasonal celestial events using a variety of telescopes and optics in addition to naked eye observation. instill appreciation for telescopes as an ingenious invention with ever-evolving mechanisms for exploring the cosmos. emphasize the superior visibility for night sky viewing found beyond the urban glare. 	<p>Visitors and program participants will:</p> <ul style="list-style-type: none"> become more enthused about astronomy, having viewed celestial objects through a telescope. be inspired to pursue or deepen their interest in astronomy, perhaps by building their own telescope or joining an astronomy organization. be inspired to attend future astronomy programs at the Oberle Observatory and other observatories and planetariums in the region. <p>Observatory Park will become the prime location to gather and:</p> <ul style="list-style-type: none"> experience astronomical events, rare phenomenon and become informed of the explanations and significances of such occurrences. become aware, through the Dark Skies initiative, that light pollution has a major impact on the environment, with specific emphasis on NE Ohio.
Night Sky Observation Astronomy Subthemes	
Stellar Evening Star Parties	Program Subthemes
<ul style="list-style-type: none"> “Celestial Seasons”: monthly/bi-monthly astronomy “star party” programs using Observatory telescope in combination with CVAS member telescopes to view seasonal constellations, star clusters, etc. Special edition programs which highlight rare/infrequent cosmic events such as comets, exceptional planetary views, etc. Large audience telescope image viewing in the Plaza Viewing Building with images transmitted from telescope to large viewing screen via computer. “Sirius about pet adoption”: dog walk with volunteers from local animal shelters with dogs available for adoption; focus on constellations Sirius Major and Sirius Minor as well as any other constellations with canine characters in multi-cultural lore/mythology. Dark Skies: Interpretation of the impacts of light pollution and promotion of dark sky initiatives in NE Ohio. 	<ul style="list-style-type: none"> Don’t miss the eclipse: programs timed to witness solar eclipses with experts providing commentary and naturalists interpreting scientific jargon. Comet: We’re on it! Comet watch programs with telescopes, spotting scopes, and binoculars with experts from CVAS, CMNH, etc. to interpret the significance of comets. Cheers and Fears: Planetary alignments, comets, meteors, eclipses, etc. and how they were regarded by ancient cultures with celebrations or superstition, prophecy. Space Spy-noculars: Binoculars offer a closer view than the naked eye, providing an easier and broader view. Astro-Art: Exploring the Heavens through the Arts, astrophotography, exhibition of space-themed paintings, drawings, sculpture, etc.

Astronomy Theme: PLANETS, SUN & SOLAR SYSTEM

Objectives	Goals
<p>Raise astronomical awareness and aptitude by providing opportunities that:</p> <ul style="list-style-type: none"> • build a greater awareness of the solar system as a group of satellite planets (including Earth) revolving around a star (the Sun). • focus on the astronomical aspects of the Sun. • recognize the cultural influence the Sun has had on ancient and modern societies and the early recognition of its role in our weather, seasons, etc. • increase awareness of planetary properties such as “small rocky inner planets” vs. “large outer gaseous planets” including the relative distance from each other. 	<p>Visitors and program participants will:</p> <ul style="list-style-type: none"> • greet solar events such as eclipses, Aurora borealis, sun dogs, etc. with greater appreciation and anticipation. • be more cognizant of the sun’s role in changing seasons and other effects on Earth. • be more likely to take precautions against over-exposure to the Sun. • be more aware of the relative (if not magnitude of) distance between planets in our solar system.

Planets, Sun and Solar System Subthemes

<ul style="list-style-type: none"> • The Sun: a giant nuclear reactor using hydrogen as fuel for nuclear fusion. <ul style="list-style-type: none"> ○ Nuclear Energy as an alternate to fossil fuel, but fraught with radioactive nuclear waste issues. Facilitated by panel of agency experts. ○ Fusion vs. Fission: an introduction to each of the differences between the two. Featured speaker. • The Sun is the One: Introducing the Sun as a star around which the planets of our Solar System revolve. Collaboration with Cleveland Museum of Natural History. <ul style="list-style-type: none"> ○ A consistent gravitational pull from the sun keeps planet Earth in a stable orbit making it possible for life to persist and evolve for a long period of time. ○ Not only the Earth and other planets, but asteroids, meteoroids, And comets come under the influence of the Sun’s gravitation pull as they enter our solar system. • The Sun as a Celestial Object : the rotation and revolution of the Earth puts the Sun in varying positions in the sky 	<ul style="list-style-type: none"> • Poor Pitiful Pluto: the true story of former planet #9’s fall from pantheon of planets in our solar system. • Out of this World Weather: focus on temperature and atmospheric extremes on other planets and moons in the solar system: giant red spot on Jupiter, ice caps on Mars, ice on Europa; based on findings from interplanetary probes, and observatories. • Science Fiction Festival: Martians, War of the Worlds, etc. via novels, movies, comic books, etc. Collaboration with college film societies, Geauga County Public Libraries, collector clubs, etc. Contract with movie production companies to obtain props and costumes from science fiction movies. • Space Travel within and beyond our solar system: history thus far; prospects for the future. <ul style="list-style-type: none"> ○ Partner with NASA to have models, replicas of space capsules and space probes. ○ Imaginative play area for kids providing materials for them to put together their own space ship and gear. Include temporary landscaping of “other worldly” planetary environments.
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Attachment #6: Dark-Sky Events

- IYA 2009
- “Coffee House Series”

International Year of Astronomy 2009 Programming

October 2009 – Galilean Nights – cancelled due to cloudy skies

March 2010– Globe at Night – discussion on light pollution followed by star-gazing



September 2010 – IYA: The Galileoscope – program for 5th grade students



October 2010 – World Wide Star Count – cancelled due to cloudy weather

“Dark-Sky” Events

Coffee House Series

“A Sneak Preview of Observatory Park”

- May 2011
- Attendance: 150
- Panel discussion by: Cleveland State University Astronomy Dept., Cleveland Museum of Natural History, Kent State University, and Chagrin Valley Astronomical Society.
- Focus: educational aspects of Observatory Park and the dark-sky designation.
(See attached media coverage)

Coffee House Series

“Dark Skies”

- September 22, 2011
- Panel discussion by: Terry McGowan (IDA), John Gorka (NE Ohio IDA president), student from local middle school
- Focus: using outdoor lighting efficiently

Coffee House Series (proposed) – 2012 and 2013

- Light Pollution: Effects on Wildlife
- Light Pollution: How It Affects Your Health
- Street Lighting and Energy Costs (geared toward Township officials)

The Maple Leaf
5/19/11

GEAUGA PARK DISTRICT

Astronomy conversation blasts off with panel

By Josh Echt

You can have your coffee-house conversation series and eat some cookies, too.

The Geauga Park District Foundation blasted off the first of five coffeehouse discussions about the new Observatory Park last Wednesday evening in Montville Township. The

hour-long discussion featured a discussion of panelists from the Chagrin Valley Astronomical Society, the Cleveland Museum of Natural History, the Cleveland Astronomical Society and Kent State University.

The observatory, located

See Astronomy • Page A5

Thursday, May 19, 2011

Astronomy from page A1

on Clay Street, is funded by private donations and foundation grants. It is slated for an Aug. 20 grand opening, according to Geauga Park District Development Officer Robert Keesecker.

Last week's informal discussion attracted more than 100 residents and foundation members and delineated the park's goals from the perspectives of astronomers, museum directors and educators. It also focused on the importance of reducing light pollution, which occurs when lights reflect upward and limit visibility in the night sky, as well as the park's astronomical influence.

The park contains a 36-inch deep sky Warner-Swasey telescope in a small outbuilding to the south and a 222-seat Event Center auditorium to the north. Images from the telescope can be displayed on screens in the center for large groups, according to Geauga Park District Executive Director Tom Curtin.

"The biggest national park we have is our night sky," Curtin said at the beginning of the event.

He recognized park district foundation members as well as Notre Dame Elementary School student Angelo Capito, who presented a \$600 check on behalf of fourth-grade teacher Anne Storey and her students. The check will help fund the park's development, Curtin said.

Case Western Reserve University Astronomy Department Chairman Chris Mihos moderated the discussion, which included members from both the Cleveland and Chagrin Valley astronomical societies, an adjunct physics professor and an observatory coordinator for the Cleveland Museum of Natural History.

The panel stressed the importance of astronomy and science education for educators and students in the younger generations and reflected on why they enjoyed the discipline.

"We haven't talked science since Sputnik," said George Collins, a long-time astronomy teacher with stints at both Ohio State University and Case Western, referring to Russia launching the first artificial satellite into orbit in 1957. "Science is vital to our educational future."

Members such as Charley Knox — a technical advisor at Case Western Reserve University's astronomy department — and Ian Cooper, the president of the Chagrin Valley Astronomical Society, said their love of astronomy stemmed from a young age. Knox, from Minnesota, said he grew up in a region 40 to 50 miles away from the nearest city and embraced the night sky. Cooper credited a sixth-grade teacher for his love of the science.

Even now, Knox said the astronomy bug is still part of him: He has helped coach the astronomy events for Chardon Middle School's Science Olympiad academic competition since 1998, when his son entered the school.

"Although my son has graduated, I have not escaped," he joked.

Clyde Simpson, who coordinates the observatory at the Museum of Natural History, said he enjoys being

"in the dark all day" as part of his career. He said he has spread the word around Greater Cleveland about the new park.

"I've got a reputation as 'the prince of darkness,'" he laughed and then turned serious before discussion turned to the topic of light pollution. "There's no reason to have upward light."

Mihos and Cooper said several townships in the county already have ordinances in place prohibiting light pollution.

The panel said the Montville observatory was a short drive to see night skies away from Cleveland.

"It's far enough away from Cleveland, but it's close enough so people can come back to the area without having to stay overnight in a motel," Mihos said. "On a good night, you can see all the way to the Milky Way."

Panel members also discussed some proposed features of the observatory, such as a model solar system, a series of hiking trails, a weather station exhibit and sidewalks that parallel winter and summer solstices. Although the Newtonian telescope is still being assembled, officials said it should be ready for the Aug. 20 grand opening.



The crowd is attentive as Geauga Park District Executive Director Tom Curtin responds to a question.

Attachment #7: Exhibits & Educational Materials

- Exhibit Venues
- Brochure, Observatory Park Fact Sheet, Light Pollution
(created by Geauga Park District)

**“Our Night Sky” Light Pollution Display at Gauga Park District
November through March, 2009
Estimated Attendance: 15,000**



A kiosk with a continuous loop video provided visitors with an introduction to IYA2009.



**“Light Pollution in NE Ohio” at Euclid (Ohio) Earth Day
April 2009
Estimated attendance: 250**



Educational materials were handed out to adults and children were treated to a reading of “There Once Was A Sky Full of Stars.”

**“Light Pollution & Its Effect on Migratory Birds”
Migratory Bird Day, May 2009
Cleveland MetroParks Zoo
Estimated attendance: 300**



Display highlighted light pollution’s adverse affects on wildlife, specifically on birds which travel along the Lake Erie (Ohio) shoreline during migration.



Material was provided from IDA and also from the Fatal Light Awareness Program (FLAP).

**Observatory Park - "The Stars" Donor Event
Light Pollution Display, September 2009
Estimated attendance: 150**

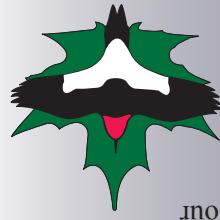


**NASA & Space Celebration
Light Pollution Display
Kingsville (Ohio) Library, November 2010**



Stars...

GEAUGA PARK DISTRICT



VOICES OF NATURE

Use your voice and join Geauga Park District in helping to *protect* our natural, nighttime environment, *conserve* energy and *connect* with nature and wish upon the stars that we see in our dark skies in Geauga County. Learn more by visiting www.darksky.org.

PROJECT • CONSERVE • CONNECT

going?

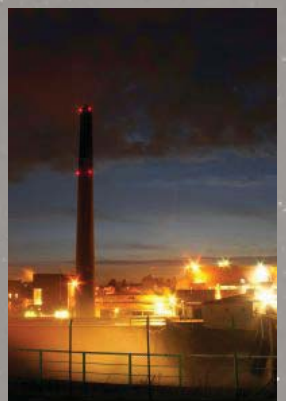
Of the 9,000 to 15,000 stars visible in a pristine sky, in most urban areas only 200 can be seen due to light pollution.

going?

99% of the population lives in an area that scientists consider light polluted.

gone?

Based on the rate at which light pollution is increasing, there will be almost no dark skies in the contiguous United States by 2025.



Light Pollution is the excessive and wasteful use of outdoor night lighting, creating “skyglow” or artificial brightness. Like any other form of pollution, excessive lighting has a number of harmful effects.

- Blocks our view of the starry sky by creating sky glow which also interferes with astronomical observatories.
- Disrupts the natural cycle of plants and animals that depend on darkness through the night.
- Wastes up to \$4.5 billion dollars a year in energy consumption and uses an estimated 30 million barrels of oil or 8 million tons of coal.
- Releases billions of tons of pollutants such as sulfur dioxide, carbon dioxide and nitrogen oxide.
- Creates a glare which blinds drivers, boaters and pedestrians and can annoy the people who live around you.

We Need Darkness



Light at night can affect the way nocturnal animals behave. Certain animals need darkness at night and light pollution disrupts their vision and even the way they find food.

Excessive outdoor lighting can affect plants and trees by disrupting growth cycles. For example, some trees lose their leaves prematurely because of nighttime lighting.

Humans also require changing of day and night to stay healthy. The body needs darkness for glands to synthesize certain hormones. Too much light can cause health risks and disrupt sleep and the immune system.

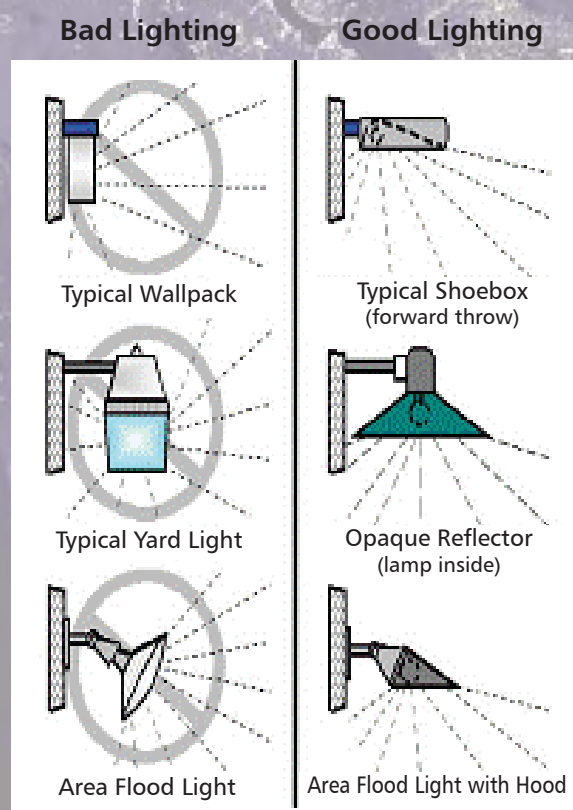
Easy and Economical Ways To Restore and Protect Our Night Skies

- Replace lights with shielding fixtures which use 1/3 the energy. (savings of over \$220 per year)
- Cut the outdoor light wattage to 45 watts or less. (a savings of \$175 per year)
- Use motion detectors instead of floodlights - the glare from floodlights creates shadows and reduces visibility, making us less secure.
- Ask your local zoning board or trustees to review lighting requirements for your community and make modifications as necessary.
- Learn more about dark sky friendly lighting by contacting the International Dark Sky Association at www.darksky.org or 520-293-3198.

What Can You Do?

Start by being a good neighbor...

Quality lighting effectively gives you the visibility you need while protecting your neighbors' views and our beautiful night sky.



Light escaping into the sky serves no purpose and wastes energy. Point lights downward where it is useful.

Shield light fixtures to prevent light from shining into the sky. Good lighting puts the right amount of light only where and when it is needed.

For more information on good vs. bad lighting and approved fixtures against light pollution go to www.darksky.org

Dark Skies goes along with Geauga Park District's mission to preserve, conserve and protect Geauga County's natural areas. We are dedicated to creating environments that honor and celebrate the natural world and to improving the quality of life and wellness of those who live in Geauga County.



Gauga Park District, in partnership with Chagrin Valley Astronomical Society, is committed to restoring and protecting the dark skies of Geauga County. If you are interested in becoming part of the Dark Skies Coalition, please contact Geauga Park District at 440-286-9516, x1104 or email khanes@geaugaparkdistrict.org for more information.

PROTECT • CONSERVE • CONNECT

VOICES OF NATURE

Wetlands at Observatory Park in Montville Township

OBSERVATORY PARK

FROM THE GROUND TO THE GALAXIES

An Educational Adventure

Fact Sheet: Observatory Park

Observatory Park is first and foremost a public, community resource like no other in the country.

Education: Natural, Scientific and Cultural

- Observatory Park focuses on the physical sciences of **astronomy** (telescopes), **geology** (seismograph station) and **meteorology** (weather station).
- Students from grade school to university, extending to well beyond Geauga County, will be offered educational opportunities from **basic sciences to advanced research**.
- A portable **planetarium** is a key component of the Public Viewing Building.
- **Outdoor educational features** will help teach the cultural history of human interaction with the earth, the planets and the stars.
- A **Teacher Advisory Committee**, comprised of Geauga County science teachers, has developed an educational curriculum for Observatory Park in collaboration with the Park's Naturalist Department.
- The **Public Events Building** has a 200-person seating capacity for media augmentations to outdoor earth and sky experience, viewing special exhibits and holding educator gatherings.
- The **Great Lakes Science Center, Cleveland Museum of Natural History, Lake Erie Science and Nature Center** and Geauga Park District look forward to enhancing their educational programs through collaboration.
- The **Armagh Observatory in Ireland** is working with Geauga Park District in the development of a **human orrery** (an interactive planetary model designed for educational purposes) for Observatory Park.
- **Nassau Observing Station** is a primary educational feature of Observatory Park. It was acquired as part of Geauga Park District's purchase of 281 acres from CWRU in October 2008.
 - The station's **Warner-Swasey deep-sky 36-inch mirror research telescope** will be refurbished for educational and research use by the public.
- A **seismograph station** will not only be an educational resource, but also an important scientific resource for the State of Ohio, as notable ground faults exist in Northeast Ohio. It will be networked into the Ohio Seismic Network and USGS National Earthquake Information Center.
- A one-mile **Planetary Trail** offers the adventure of an imaginary stroll across the solar system with planets spaced to convey relative distances from the Sun and each other. **Eight planetary stations** provide facts and depict relative size of the planets.
- An **astronomy-space science museum** will be created in Nassau Observing Station to interpret the impressive heritage of astronomical advancements in Northeast Ohio.

International Dark-Sky Park

- The International Dark-Sky Association has granted provisional status as a **Silver-Tier International Dark Sky Park** for Geauga Park District's proposed efforts to preserve a dark sky over Observatory Park and all GPD's surrounding park lands.
- Observatory Park is **one of only five parks in the country and eight in the world** to receive a Dark-Sky Park designation.

Collaboration

- The **OP Technical Advisory Group**, chaired by William Ginn, meets regularly and includes senior staff from the *Cleveland Museum of Natural History, Great Lakes Science Center, Case Western Reserve University, Kent State University and the Lake Erie Science and Nature Center*.
- Collaboration is ongoing with the **Chagrin Valley Astronomical Society** and the **Cleveland Astronomical Society**.

Natural Features

- Observatory Park helps protect the **headwaters of the Cuyahoga River**.
- Observatory Park holds a **diversity of habitats**. Some important endangered plant and animal species have been found on the property.
- Observatory Park is Geauga Park District's **largest single land-holding** at 1,117 acres.
- Observatory Park sits atop the **Defiance Moraine**, a gathering of granite boulders – glacial erratics – and will provide a focal point for programs relating the strong influence of Ice Age glaciation on the local landscape.

Facilities

- The **Oberle Observatory** will accompany the Public Events Building on the plaza. It will house the Oberle 25.5-inch mirror Newtonian Reflector telescope bequeathed to GPD.
- Park construction focuses on **“green” building principles**. Wind, solar energy and sustainability are a priority to demonstrate the harnessing of natural forces to help meet growing energy needs.
- **Other site features** include a Weather Trail, Human Sundial, Day and Night Gardens, Lunar Sculpture, Lunar Phases Display, Constellation Sculpture and a sloped grass amphitheater.

Construction and Capital Campaign

- Observatory Park is being **privately funded** by philanthropic dollars.
- **Observatory Park: From the Ground to the Galaxies** capital campaign goal is \$2.5 million, including \$450,000 for a Stewardship Endowment Fund.
- Construction and development of Observatory Park is being **implemented in phases** as fund development achievement progresses.
- The campaign has achieved **\$1.4 million as of May, 2011**.
- **Donor naming opportunities** are available for leadership gifts, including individual named endowments for the Stewardship Endowment Fund.

“There is nothing in the world which can compare to Observatory Park.”

--- Terry K. McGowan at the Phase II groundbreaking ceremony when officially presenting the International Dark-Sky Association's Provisional Silver-Tier Dark Sky Park certificate to Geauga Park District. Terry chairs the IDA Technical Task Force and serves on the IDA Education Task Force.

Observatory Park



FROM THE GROUND TO THE GALAXIES

An Educational Adventure



Observatory Park ▪ 10610 Clay Street ▪ Montville, Ohio