the Skyscraper

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AMATEUR ASTRONOMICAL SOCIETY OF RHODE ISLAND ⋆ 47 PEEPTOAD ROAD ⋆ NORTH SCITUATE, RHODE ISLAND 02857 ⋆ WWW.THESKYSCRAPERS.ORG

In This Issue:

Skyscrapers Board Meeting

Saturday, January 11, 2pm at Ladd Observatory
All Members Welcome

Saturday, January 4, 6:00pm
at North Scituate Community House

Meteorite Show & Tell · Bring your meteorites!

Skyscrapers member Jeff Padell will be bringing his collection of meteorites to display at our meeting and will be providing some details on meteorite collection and the types that he has.

Members are encouraged to bring their own meteorites to display.

In addition, Jeff will have some samples of 3 different meteorites that will be available for sale at the incredible price of $5 each.

Note earlier start time.

Meeting will start at 6pm with a bit of social time, presentation to start shortly thereafter. The meeting will be at the North Scituate Community Center

Jeff Padell is Skyscrapers' Trustee and Astronomical League Correspondent (ALCor). He specializes in solar observing and image processing. His images can be found at www.solarhead.net.

Phases of the Moon

First Quarter Moon
January 3 04:45

Full Wolf Moon
January 10 19:23

Last Quarter Moon
January 17 12:58

New Moon
January 24 21:42

President's Message

by Steve Hubbard

At the end of the year, it's common for most of us to spend some time reflecting on the year past. I've been doing some of that recently.

For Skyscrapers, there was the usual mixed bag of good and bad weather though the conditions for Astroassembly this year were the best I can remember in a long time.

We had a very successful fund-raising drive in 2019 and I wish to again thank the members of Skyscrapers for their generosity. We raised a good amount of money, much of which has already gone into very needed repairs and update, with more to be done when the warm weather returns in the spring.

The Trustees and their helpers accomplished a lot in 2019 with some major projects done. Some of the highlights are:

The roof on both sides of the twin roll off building was fully replaced.

Grab bars for better accessibility have been placed in many areas.

Many windows that had started to rot in the meeting hall were repaired.

Work was done on the slit in the Clark building along with a new system to allow for opening and closing of the door on the dome without having to climb up a lot of ladder stairs.

There's more, but these highlights give you some idea of all that has been accomplished. We owe the Trustees and their team a debt of gratitude for keeping our grounds and property in such tip top shape!

To all of our members and to the friends of Skyscrapers, I wish to thank everyone for their support and hope that 2020 is a great year for us!

Seagrave Observatory on December 10

The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are held monthly, usually on the first or second Friday or Saturday of the month. Seagrave Memorial Observatory is open every Saturday night, weather permitting.

Directions
Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

Submissions
Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **January 15** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

E-mail subscriptions
To receive The Skyscraper by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

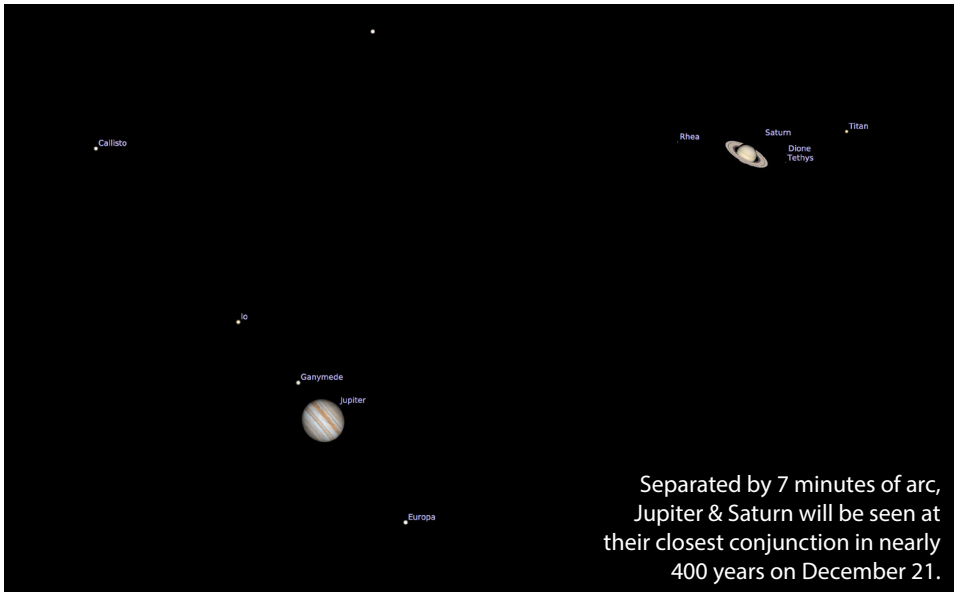
Astronomical Highlights for 2020

by Dave Huestis

Happy New Year everyone. Yet another year has passed into the history books, and I am once again presenting some of the astronomical highlights upcoming in 2020. While there are a couple of impressive upcoming events, any time the skies are clear and transparent many stargazers are enticed out under the vault of the heavens to explore our beautiful universe.

The winter months around Southern New England can be quite cold, and I for one need some incentive to spend much time outdoors observing the sky. Fortunately, the sky gods provide the Quadrantid meteor shower which peaks on the night of January 3-4. While this shooting star display can produce up to 100 meteors per hour during peak, a more modest 60 meteors per hour is likely under a moon-less sky. This shower also sports a very narrow peak of activity, only several hours in duration, that can easily be missed. However, if you have the time and can tolerate the usual cold temperatures, the Quadrantids don't disappoint the well-prepared observer.

The fast-moving Quadrantids blaze across the sky at 25.5 miles per second. These blue meteors can appear anywhere in the sky, but their radiant point (the area of sky from where the meteors appear to originate) is not far from the end star, Alkaid, of the Big Dipper's handle. From midnight till dawn, this area of sky will rise higher and higher above the northeast horizon. By 4:00 a.m. the radiant will be almost at zenith (directly overhead). You'll know you've spotted a Quadrantid meteor if its dust train through the sky points back to the radiant point. A First Quarter Moon will set just after midnight, so it will not interfere with observing as many shooting stars as possible between then and dawn's early light.



Separated by 7 minutes of arc, Jupiter & Saturn will be seen at their closest conjunction in nearly 400 years on December 21.

Despite being wintertime, I still recommend that you get comfortable in a lounge chair to conduct your observing session. Snuggle up in a well-insulated sleeping bag and keep your head and hands warm. Just don't get too comfortable and fall asleep like I did many moons ago!

Speaking of moons. There are four supermoons in 2020. While the term supermoon is not an astronomical term, it has been widely used in recent years to describe a Full Moon's closest approach (perigee) to the Earth. However, the caveat is, to be called a supermoon the moon has to be within 90 percent of its closest distance to the Earth. Following this arbitrarily assigned criteria there are supermoons on February 9, March 9, April 7 and May 7. The April 7 Full Moon is the closest one for the year and may appear slightly larger and brighter than usual.

The most interesting highlight for 2020 will be a close encounter with Mars. Every 26 months the "Red Planet" is in opposition. That means when the Sun sets Mars will rise. October 13 is the date of opposition. The close approach of our two worlds occurs a week earlier on October 6 when our planetary neighbor will be only 38.6 million miles away. That distance is just a little farther away than Mars was at its last close approach on July 31, 2018. Also, in 2020 Mars will rise much higher into our much less hazy October sky. A telescope should reveal much detail on the Martian surface.

However, just before the July 2018 close approach a global dust storm completely enshrouded Mars making it impossible to view any surface details. And it could happen again, since circumstances will once again favor the formation of dust storms. Should observing conditions on Mars evolve in our favor, the local observatories will certainly focus their attention on this fascinating world. Barring any major dust storms, I will present an observing guide to help identify large-scale features with a telescope.

An interesting celestial dance of Jupiter and Saturn will commence for most casual stargazers on May 12 when both plan-

Meteor Shower Prospects for 2020

Month	Shower	Date	Moon Phase
January	Quadrantids	3-4	First Quarter
April	Lyrids	22-23	New
May	Eta Aquarids	6-7	Full
July	Delta Aquarids	28-29	First Quarter
July	Capricornids	29-30	Waxing Gibbous
August	Perseids	12-13	Last Quarter
October	Orionids	21-22	Waxing Crescent
November	Leonids	17-18	Waxing Crescent
December	Geminids	13-14	New

ets will sit just above the eastern horizon around midnight. A waning gibbous Moon will also join the pair. From this date forward these two worlds will appear to move closer to one another from our perspective. On December 21 they will be so close that they will appear as one object to the naked-eye just after sunset 15 degrees above the horizon. This "Great Conjunction" will be the closest these two worlds have been since 1623.

To observe this event, you'll need to find an observing location that commands an unobstructed view towards the southwest. If you have a telescope by all means use it to focus in on this beautiful sight. Use medium to high-power and you'll observe both worlds in their glory in the same field of view. Hopefully the weather will cooperate, as the next Jupiter/Saturn conjunction on November 5, 2040 won't be as "Great." This December 21st event is really something special to note on your calendar.

In addition, 2020 provides two penumbral lunar eclipses for our location Unfortunately, the Moon does not move into the Earth's dark shadow. In fact, for the July 5 event only about one-third of the lunar surface will slide into the lighter penumbral shadow. Even at its maximum I doubt whether any shadow will be detectable. For the November 30 penumbral lunar eclipse roughly three-quarters of the lunar surface will pass through the lighter shadow, but will still not be close to the dark umbra. A keen-eyed observer knowing what to look for may detect a slight shading of the top portion of the lunar disk. Good luck.

In conclusion, please remember, weather permitting, the local observatories remain open during the winter months to share beautiful views of the heavens. Snow, ice or below freezing temperatures can force closures, so please check the respective websites for any cancellation notices and observing schedules before venturing out for a visit. Seagrave Memorial Observatory (http://www.theskyscrapers.org) in North Scituate is open every clear Saturday night. Ladd Observatory (http://www.brown.edu/Departments/Physics/Ladd/) in Providence is open every clear Tuesday night. The Margaret M. Jacoby Observatory at the CCRI Knight Campus in Warwick (http://www.ccri.edu/physics/observatory.htm) is open every clear Wednesday night. Frosty Drew Observatory (http://www.frostydrew.org/) in Charlestown is open every clear Friday night.

Some of the topics highlighted in this column may be covered in depth as an event date approaches.

Please clip and save the following chart showing the observing prospects for the 2020 meteor showers. These displays of shooting stars only require your eyes, dark skies, and patience to enjoy.

Keep your eyes to the skies for 2020 and always.

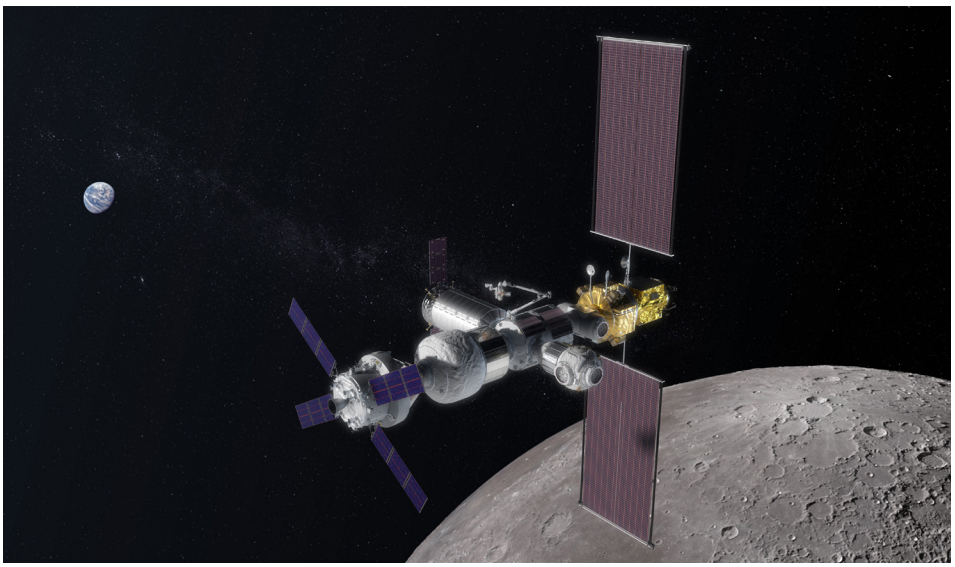
Dave Huestis is Skyscrapers Historian and has been contributing monthly columns to local newspapers for nearly 40 years. See more at http://theskyscrapers.org/dave-huestis

Returning to the Moon in the New Decade

by Francine Jackson

We're now in 2020, past the year that celebrated the first footprints on the Moon. It has been close to fifty years since that last man observed Earth from our nearest neighbor, and, at present, there are no firm dates to walk on its surface. Of course, there are many scheduled launches toward there, both orbiters and landers, from many more countries than ever before.

Apparently, within the next several years, there are dozens of planned craft aimed toward the Moon, from such countries as Russia, China, Japan, India, and others, in addition to the U.S. Some have already launched and been successful, either orbiting or landing, although unfortunately there have been failures. Some of you might recall the Google Lunar XPRIZE, which seemed to go on forever, where a private organization was to design, build, launch, land, and roll hundreds of feet away from the lander. Sadly, although there were several extensions to the deadline, the prize was never awarded. Again, though, these were all unmanned efforts -- perhaps thankfully.



But, are we really ready to return persons to the Moon? It seemed so easy in science fiction movies, yet it took years for our first volunteers to touch down; also, the actual missions have not been continued, so going back will have to involve an almost starting from scratch effort. We do understand there are astronauts working toward the effort, but there are still a few years before once again there will be another set of footprints moving through the lunar regolith.

Many of us who were part of the generation that watched the real landing July 20, 1969, believed this was the first of a very diligent effort for the rest of us to possibly have our turn to see the Earth from this unbelievable viewpoint. Hopefully, some of you, eventually, will actually have the chance.

Francine Jackson is a NASA Solar System Ambassador, writes the weekly newsletter for Ladd Observatory and teaches astronomy at the Community College of Rhode Island. See more at http://theskyscrapers.org/francine-jackson

NASA Night Sky Notes:

Spot the Young Stars of the Hyades and Pleiades

By David Prosper

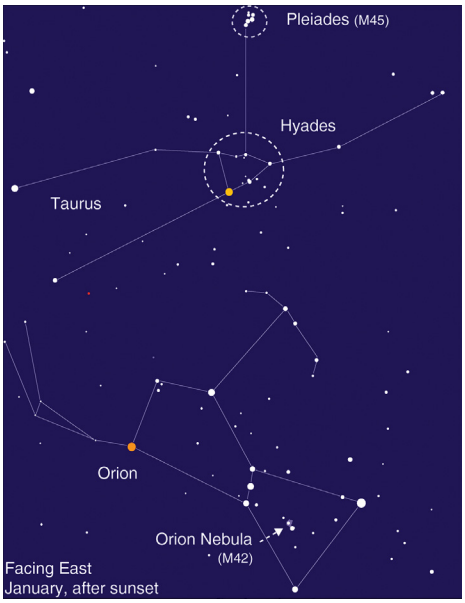
Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.

As discussed in last month's Notes, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "protostars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V' shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.

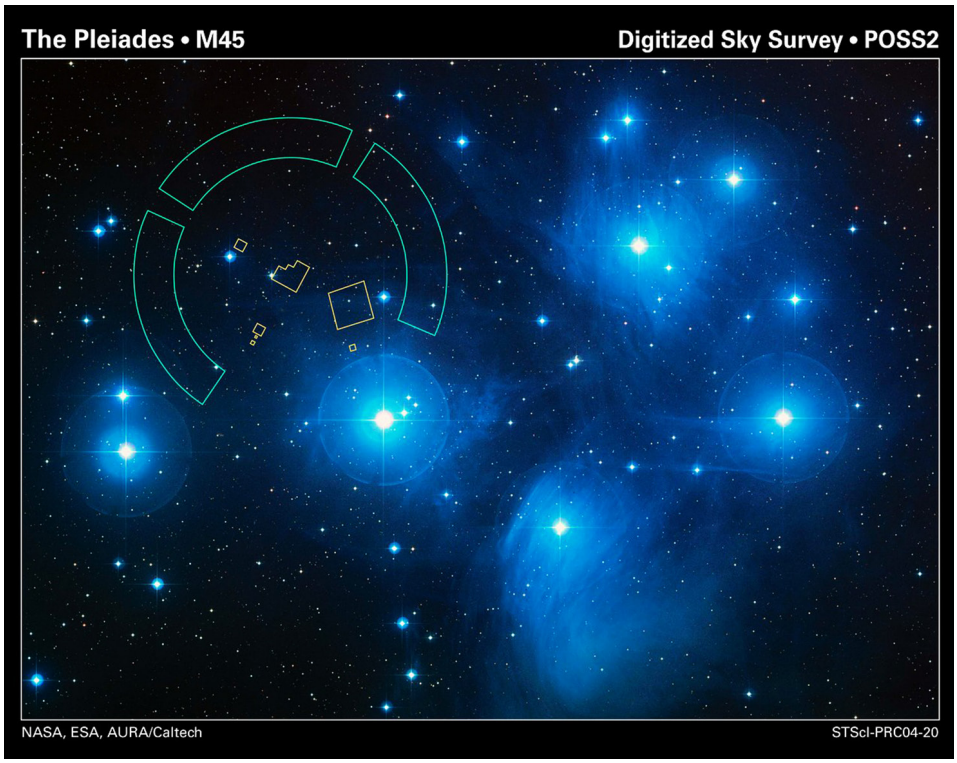
Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392 light years away, around 43 light years closer than previous estimates. However, subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.

You can learn more about the Pleiades in the Universe Discovery Guide at bit.ly/UDGMarch, and find out about missions helping to measure our universe at nasa.gov.

This article is distributed by NASA Night Sky Network. The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!



Locate Orion rising in the east after sunset to find the Orion Nebula in the "Sword," below the famous "Belt" of three bright stars. Then, look above Orion to find both the Hyades and the Pleiades. Binoculars will bring out lots of extra stars and details in all three objects, but you can even spot them with your unaided eye!



Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Credit: NASA, ESA and AURA/Caltech)

Reflection Nebula in Orion: NGC 1999

by Glenn Chaple for LVAS

Mag: 9.5; Size: 2′ X 2′

This month's Observer's Challenge takes us to a nebula in Orion – not the Orion Nebula (M42), but one located a little over a degree further south. This "other Orion Nebula" is NGC 1999. Unlike M42, which is an emission nebula that produces its own light, NGC 1999 is a reflection nebula whose light source is the embedded variable star V380 Orionis.

NGC 1999 was discovered by William Herschel in 1785. He categorized it as a Class IV object (Planetary Nebulae) and assigned it the Herschel Catalog designation H.IV-33. What makes NGC 1999 so remarkable is a dark area just west of V380 Orionis. It's not an obscuring patch of unilluminated gas and dust, but an actual hole in the nebula. The mechanism for this anomaly is unknown but may be a result of outward-pushing radiation from V380 Orionis.

When viewed with my 4.5-inch f/7.9 reflector at 88X, NGC 1999 looked like a fuzzy star. A switch to a 10-inch f/5 reflector and boost to a magnification of 250X failed to reveal the hole, but I was able to detect a very faint surrounding nebulosity that spanned several arc-minutes.

At a distance of some 1500 light years, NGC 1999 is about 0.3 light years in diameter

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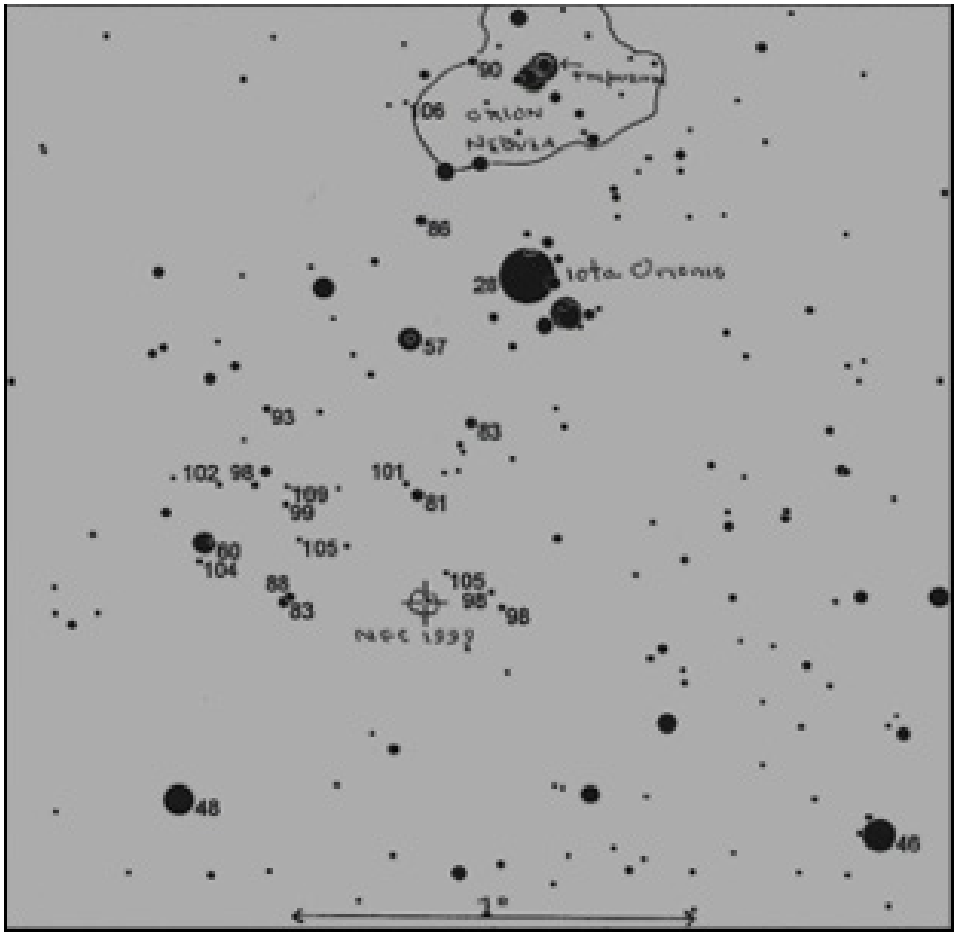
The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either Roger Ivester (rogerivester@me.com) or Fred Rayworth (queex@embarqmail.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to rogerivester.com/category/observers-challenge-reports-complete.



NGC 1999 finder chart, adapted by Glenn Chaple from AAVSO Variable Star Plotter (VSP). Numbers indicate star magnitudes (decimals omitted). North is up.

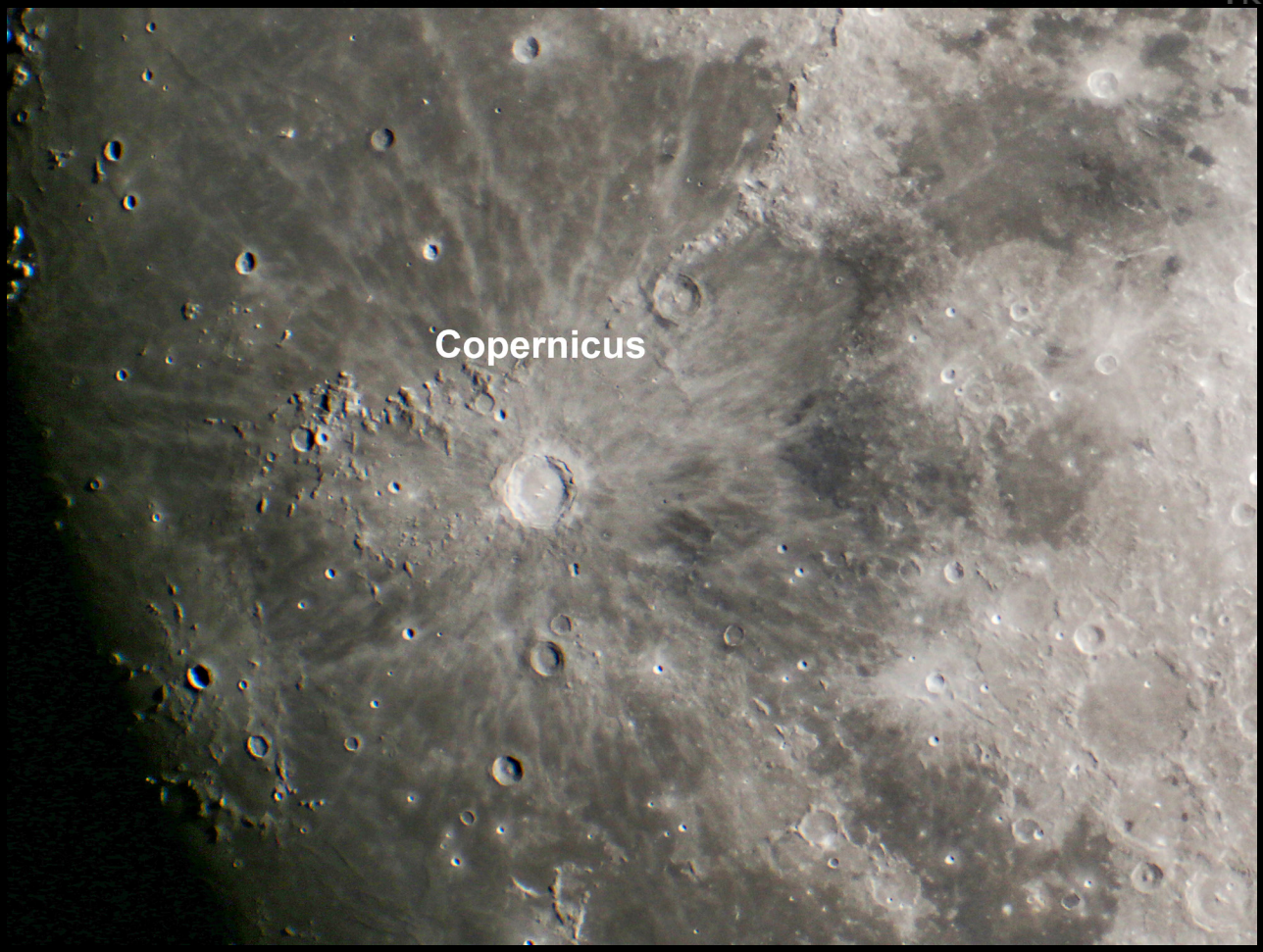
Image by Doug Paul (ATMoB) Stock Canon 80D, 400mm f/2.8 lens, ISO200, 104 subs X 15 sec = 26 min, FOV: 25.5X20.4 arcmin. North is up.

The Sun, Moon & Planets in January

This table contains the ephemeris of the objects in the Solar System for each Saturday night in January 2020. Times in Eastern Standard Time (UTC-5). Ephemeris times are for Seagrave Observatory (41.845N, 71.590W).

Object	Date	RA	Dec	Const	Mag	Size	Elong	Phase(%)	Dist(S)	Dist(E)	Rise	Transit	Set
Sun	**4**	18 56.8	-22 47.8	Sgr	-26.8	1951.9	-	-	-	0.98	07:13	11:51	16:28
	11	19 27.4	-21 55.1	Sgr	-26.8	1951.7	-	-	-	0.98	07:12	11:54	16:35
	18	19 57.6	-20 41.5	Sgr	-26.8	1950.9	-	-	-	0.98	07:09	11:56	16:43
	25	20 27.2	-19 08.7	Cap	-26.8	1949.7	-	-	-	0.98	07:05	11:58	16:52
Moon	**4**	1 28.0	3 10.1	Psc	-11.9	1807.3	99° E	58	-	-	12:26	19:03	01:49
	11	7 42.2	22 15.9	Gem	-12.7	1949.3	177° W	100	-	-	17:39	01:17	08:47
	18	14 11.5	-8 39.5	Vir	-11.8	1897.2	84° W	45	-	-	00:56	06:33	12:01
	25	20 31.3	-21 42.5	Cap	-4.4	1802.6	3° E	0	-	-	07:47	12:40	17:39
Mercury	**4**	18 40.2	-24 38.2	Sgr	-0.7	4.7	4° W	99	0.46	1.44	07:09	11:36	16:03
	11	19 29.6	-23 48.3	Sgr	-0.8	4.7	2° E	100	0.45	1.43	07:26	11:58	16:30
	18	20 19.3	-21 44.6	Cap	-0.9	4.9	5° E	99	0.42	1.39	07:39	12:20	17:02
	25	21 08.4	-18 25.7	Cap	-0.9	5.1	10° E	95	0.38	1.31	07:46	12:41	17:38
Venus	**4**	21 24.4	-17 07.8	Cap	-3.9	13.4	35° E	81	0.73	1.26	09:18	14:19	19:20
	11	21 57.8	-14 13.3	Cap	-3.9	13.9	36° E	80	0.73	1.22	09:12	14:24	19:37
	18	22 30.0	-11 01.0	Aqr	-3.9	14.4	38° E	78	0.72	1.18	09:05	14:29	19:54
	25	23 01.3	-7 35.4	Aqr	-3.9	14.9	39° E	76	0.72	1.13	08:56	14:32	20:10
Mars	**4**	15 53.3	-19 54.5	Lib	1.6	4.3	43° W	95	1.59	2.16	03:59	08:46	13:33
	11	16 13.0	-20 53.9	Sco	1.5	4.4	45° W	95	1.58	2.11	03:55	08:38	13:21
	18	16 33.0	-21 44.9	Oph	1.5	4.5	47° W	94	1.57	2.06	03:51	08:31	13:10
	25	16 53.3	-22 27.2	Oph	1.4	4.7	50° W	94	1.56	2.00	03:47	08:24	13:00
1 Ceres	**4**	19 25.3	-26 06.3	Sgr	8.9	0.3	7° E	100	2.92	3.89	07:58	12:17	16:37
	11	19 37.7	-25 49.4	Sgr	8.8	0.3	5° E	100	2.92	3.90	07:41	12:02	16:23
	18	19 50.0	-25 29.5	Sgr	8.8	0.3	5° W	100	2.92	3.90	07:25	11:47	16:09
	25	20 02.2	-25 06.8	Sgr	8.9	0.3	8° W	100	2.93	3.90	07:07	11:31	15:56
Jupiter	**4**	18 32.0	-23 08.9	Sgr	-1.7	31.7	6° W	100	5.23	6.20	06:51	11:24	15:57
	11	18 39.0	-23 03.6	Sgr	-1.7	31.8	11° W	100	5.22	6.18	06:30	11:03	15:36
	18	18 45.9	-22 57.3	Sgr	-1.7	32.0	17° W	100	5.22	6.16	06:08	10:42	15:16
	25	18 52.7	-22 49.9	Sgr	-1.7	32.2	22° W	100	5.22	6.12	05:47	10:22	14:56
Saturn	**4**	19 34.0	-21 38.0	Sgr	0.6	15.0	9° E	100	10.03	11.00	07:45	12:25	17:05
	11	19 37.5	-21 30.4	Sgr	0.6	15.0	2° E	100	10.03	11.02	07:21	12:01	16:41
	18	19 41.0	-21 22.6	Sgr	0.6	15.0	4° W	100	10.03	11.01	06:56	11:37	16:18
	25	19 44.5	-21 14.6	Sgr	0.6	15.1	10° W	100	10.03	11.00	06:32	11:13	15:54
Uranus	**4**	2 02.6	11 56.1	Ari	5.8	3.6	110° E	100	19.82	19.47	12:07	18:52	01:38
	11	2 02.5	11 55.9	Ari	5.8	3.6	102° E	100	19.82	19.58	11:39	18:25	01:10
	18	2 02.6	11 56.5	Ari	5.8	3.6	95° E	100	19.82	19.70	11:11	17:57	00:43
	25	2 02.8	11 58.1	Ari	5.8	3.6	88° E	100	19.82	19.82	10:44	17:30	00:16
Neptune	**4**	23 11.3	-6 20.4	Aqr	7.9	2.2	63° E	100	29.93	30.36	10:22	16:01	21:41
	11	23 11.8	-6 16.6	Aqr	7.9	2.2	56° E	100	29.93	30.47	09:55	15:35	21:14
	18	23 12.5	-6 12.3	Aqr	7.9	2.2	49° E	100	29.93	30.56	09:28	15:08	20:47
	25	23 13.2	-6 07.5	Aqr	7.9	2.2	42° E	100	29.93	30.65	09:01	14:41	20:21
Pluto	**4**	19 37.6	-22 12.6	Sgr	14.4	0.2	9° E	100	33.95	34.92	07:51	12:28	17:05
	11	19 38.6	-22 10.8	Sgr	14.4	0.2	3° E	100	33.96	34.94	07:25	12:02	16:39
	18	19 39.6	-22 09.1	Sgr	14.4	0.2	4° W	100	33.96	34.94	06:58	11:35	16:13
	25	19 40.6	-22 07.4	Sgr	14.4	0.2	11° W	100	33.97	34.93	06:31	11:09	15:46

Astrophoto Gallery



William Weber 12/21/2019

I have not been around much but I remain active. The image shown is a 9 panel mosaic of the Cygnus Loop that I made using imagery from Slooh's Canary Island T3 scope (an 11" Celestron RASA equipped with a Nightscape Model 83 OSC) and processed with PixInsight 1.8. The imaging plan was prepared using a synthetic sky (made using the PI Catalog Star Generator script) and the PI Mosaic Planner Script. Each panel was prepared from two exposures that were deBayered, registered, and then added using PI's pixel math function as at least three images are needed for PI's integration process (my Slooh subscription limits me to at most two imaging runs a day so acquiring the amount of data I have took about 20 days). Next, the combined images were flattened using the dynamic background extraction process with division correction (to reduce vignetting) followed by removal of the remaining gradients using dynamic background extraction with subtraction correction. The mosaic was assembled using the synthetic sky registration and merge process described at https://www.lightvortexastronomy.com/tutorial-preparing-a-mosaic.html#Section3. The assembled mosaic is still linear so processing was completed by stretching to non-linear followed by MultiScale Image Transformation with an inverse mask to reduce noise and then adjusting the black point and color saturation with the Curves Transformation process. Final processing to jpg and png files was with the ICCProfile Transformation process, followed by the Crop process to add the black footer, the Annotation process to add text, and the image insert script to add the Slooh logo.

Plate solving the final image gave the following data: Resolution: 3.165 arcsec/px; Rotation: 0.036 deg; Field of view: 3d 33' 22.3" x 2d 48' 16.2"; Image center: RA: 20 51 44.462 Dec: +31 24 26.48; Image bounds: top-left RA: 21 00 12.073 Dec: +32 47 25.64; top-right RA: 20 43 17.316 Dec: +32 47 33.14; bottom-left RA: 20 59 56.677 Dec: +29 59; 18.69; bottom-right RA: 20 43 31.773 Dec: +29 59 25.97

Obviously, the effort would have benefited by having more exposures for each panel to bring up the Veils better, but this was a great learning exercise for me and my first mosaic image of any kind.

Clear skies
William D. Weber

Here are my images of Jupiter (29 JUL 2019) and Saturn (21 AUG 2019). They were taken with a ZWO 178MC planetary camera on a Celestron C6 SCT. Imaged with FireCapture, 33 msec exposures, 900 frames; stacked with AutoStackkert; then processed with RegiStax. By Bob Janus.

Observing with NASA

by Tracy Prell

I've been working with the NASA MicroObservatory JS94L software.

This is my second image I've worked on where I've combined several images of the Lagoon Nebula taken by the Hubble Space Telescope over three days to create this image.

Here's a link to the Observing with NASA website:
https://mo-www.cfa.harvard.edu/OWN/index.html

Quest for the Northern Lights

6 Nights • October 11 - 17, 2020

Presented by Skyscrapers Inc.

Package Inclusions:

- Roundtrip air from Boston
- Arrival & departure transfers in Iceland
- 5-night hotel accommodations
- 12 Meals: 6 breakfasts, 2 lunches & 4 dinners
- Local guide and sightseeing as scheduled
- Multiple Northern Lights excursions
- Services of a AAA Host^

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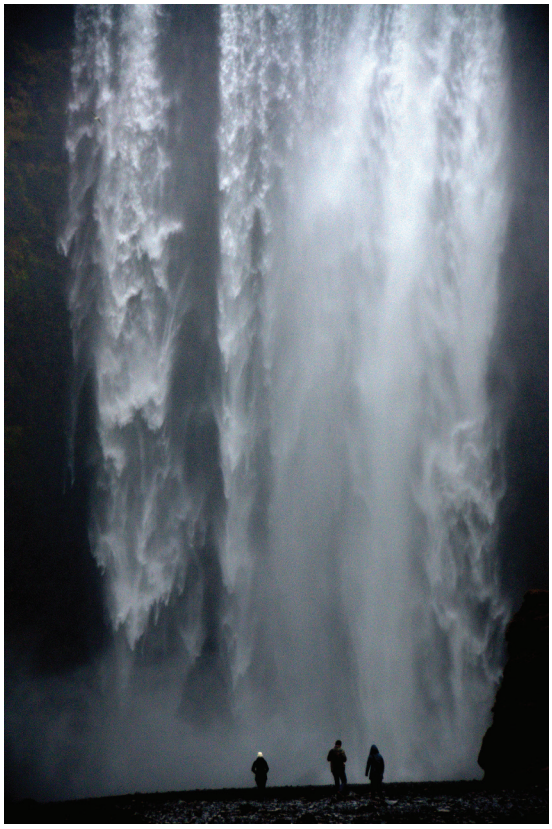

RESERVE YOUR SPOT TODAY!

Melissa Mennella
401-868-2000 ext. 2662
MMennella@AAANortheast.com

Itinerary:

B = Breakfast, L = Lunch, D = Dinner

Day 1: October 11, 2020 - Overnight Flight to Reykjavik

Day 2: October 12, 2020 - Get ready for a full day of exploring as you are introduced to the amazing country of Iceland. You'll be greeted by our tour guide who will lead us to our private motor coach. The first stop is breakfast and then we're off to the capital to begin touring. Take in all the city's major attractions, including: Parliament, National Museum, Höfði house and much more. Then we will visit the Aurora Museum where we learn about this phenomenon and how other countries around the world connect with it. This evening we dine together, followed by a Northern lights cruise, if weather permits. **B, D**

Day 3: October 13, 2020 - Enjoy breakfast before an independent visit to the Reykjavik Museum of Photography. The museum features a collection of approximately six million photographs with some dating back as early as 1860. In the afternoon, we will rejoin our guide and visit the National Museum. This evening brings us to Perlan - Wonders of Iceland, where visitors can experience Iceland's many natural wonders all in one place. Later, venture to the top floor of Perlan and dine under a glass dome while enjoying an incredible 360° view. **B, D**

Day 4: October 14, 2020 - The day is yours to create your own Icelandic story. This evening, join the local astronomy society for a visit at their observatory in Grotta. **B**

Day 5: October 15, 2020 - After breakfast, we drive through the fertile farmlands of Southern Iceland toward its majestic mountains and beautiful waterfalls. Visit the Lava Centre to experience a high-tech educational exhibit depicting volcanic activity, earthquakes and the creation of Iceland. The famous Iceland Lava show is also included during our visit. This evening we will enjoy dinner at the hotel before heading out for a Northern Lights hunt on foot with our guide. Included Meals: **B, L, D**

Day 6: October 16, 2020 - We'll enjoy a full-day tour of southwest Iceland today, which includes three of Iceland's best-known attractions: Gullfoss, one of the most impressive waterfalls in Europe, with its icy water thundering majestically into a deep canyon; the Geysir Hot Springs, featuring a numerous geysers, including the 30-meter spouting world-known Strokkur; and a visit with lunch at Friðheimar tomato greenhouse. We will also get to see a demonstra-tion of the famed five gaits unique to the Icelandic horse. Dinner is included this evening before we head out for one last attempt to see the Northern Lights. Included Meals: **B, L, D**

Day 7: October 17, 2020 - This morning we travel back to the airport but not before a visit to the famous Blue lagoon. The lagoon is a unique formation with pleasantly warm, mineral-rich geothermal water in the middle of a black lava field. Enjoy a swim with an included silica mask during your visit before departing to Keflavík International Airport for your flight home. Included Meals: **B**

*Rate is per person, based on double occupancy for October 11, 2020 departure including roundtrip air from Boston and includes government-imposed fees and taxes which are subject to change without notice. Additional airline restrictions, including, but not limited to baggage fees (See iflybags.com for specific details). Please contact the airline directly for details and questions. Fuel surcharges and any other applicable vendor surcharges are additional. Rate shown is current at time of print, capacity controlled, subject to availability and valid on new bookings only. AAA reserves the right to change or cancel itineraries whenever it is deemed necessary. If any changes occur, every effort will be made to offer other comparable package components. Trip Cancellation Insurance is strongly recommended. A valid U.S. passport with a validity date at least 6 months after return date is required for U.S. Citizens traveling outside the United States. AAA does not assume responsibility for any errors or omissions in the content of the offers displayed. Other restrictions and conditions may apply.

AAA Northeast Reservation Form

Group Name: **Rhode Island Skyscrapers** Tour Name: **Iceland's Northern Lights** Travel Dates: **October 11- 17, 2020**

FOR RESERVATIONS PLEASE CONTACT

Melissa Mennella, Group Sales and Product Operations (401) 868 –2000 x 2662 mmennella@aaanortheast.com
AAA Northeast 110 Royal Little Drive Providence, RI 02904

TRIP COST

$3329 per person double occupancy // $3979 per person single occupancy
Reservations booked and deposited by December 15, 2019 will receive a $50 per person early booking discount.

DEPOSIT AND FINAL PAYMENT

Deposit: $250 per person // Final payment: Due by June 13, 2020

Please complete the form below and mail it, along with a copy of your passport to the address above. Names **MUST** be listed in full exactly as they appear on your passport. If the name on your reservation does not **EXACTLY** match the name on your passport, you will not be allowed to proceed through TSA. Name changes and/or modifications will result in a fee.

YOUR INFORMATION

First / Middle/ Last Name ____

DOB ______ /______/______Address ____

Phone______________________ Email Address______________________________

Rooming with ____

Emergency contact name______________________________ Phone ____________________

TRAVEL PROTECTION

☐ Yes, I would like to purchase travel protection (**$226** per person based on double occupancy, **$254** per person based on single occupancy)
☐ No, I decline travel protection

**Please note that if you choose not to purchase travel protection, you will incur penalties for changes and/or cancellations. To ensure preexisting conditions are covered, the travel protection is due with your initial deposit. Price of insurance varies based upon age, state of residence and package price. Please call for an insurance quote.*

SPECIAL NOTES

Please use this area to note any special requests, dietary restrictions, food allergies, or medical restrictions:

____

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NOTES

*All US citizens traveling outside of the United States are required to carry a valid passport. Passports must be valid for at least six months from the date of your return to the US. For up to date international travel documentation, visit www.travel.state.gov well in advance of your travel.

- -

PAYMENT INFORMATION

Method of Payment Check ☐ *Please make all checks payable to: **AAA Northeast*** Deposit Total ____________________

Credit Card ☐ AMEX ___ VISA ___ DISCOVER ___ MASTERCARD ___

Credit Card #______________________________ Exp. Date ________ /________ CVV______________

Signature______________________________________Date ________ / ________ / ________

**Cash deposits are not accepted*

Directions to Seagrave Memorial Observatory

www.theSkyscrapers.org

From the Providence area:
Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:
Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:
Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:
Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:
• Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.
• or • Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:
Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

SKYSCRAPERS INC.

47 Peeptoad Road
North Scituate, Rhode Island 02857