

STARDUST

Newsletter of the
Royal Astronomical Society of Canada
Edmonton Centre



June 2023

Volume 69 Issue 10



Smoke over Alberta has made observing difficult. Breathing too. Image by Michael Ward.

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On the web <https://edmontonrasc.com>
<https://www.facebook.com>
<https://twitter.com/EdmontonRASC>
<https://www.youtube.com/user/edmontonrasc>
<https://groups.io/g/astro>

Stardust submissions: Submit articles by email to the editor (see above). Please include STARDUST or RASC in the subject so your email doesn't end up in the spam bin. Submission deadline is the 2nd Sunday before the monthly meeting; see following page for dates. Any standard document file type is acceptable (MSOffice, OpenOffice, LibreOffice, et al.) but plain text is preferred. Do not layout and format your article. Your labour will only be discarded. Submit clearly identified images/graphics as separate files, do not embed them in the document; indicate captions and references to them within the text. Do not consider your article successfully submitted until you receive a confirmation email from the editor.

Regular Meetings are held monthly (see below) from September to June at 7:30pm in [TELUS World of Science, 11211 – 142 St.](#)
Admission is free, and everyone is welcome to attend, member or not. Follow the signs from the main entrance.

Edmonton Area Astronomy Discussions
 To subscribe, visit <https://groups.io/g/astro>

Council meetings are held monthly (see below) from September to May at 7:15 in room 5-003 of the [CCIS* Building](#) on the U of A campus. Any RASC Edmonton member may attend.

* Centennial Centre for Interdisciplinary Science

Public meetings are in-person AND on-line
as of 17 Oct 2022

See <https://edmontonrasc.com/meetings/>

MEETINGS

					
2023	Regular Mtg	Council Mtg	What's Up?	Observers Group	Astro Café
Jan	9	23	4	11	18
Feb	13	27	1	15*	8*
Mar	13	27	1	8	15 AI
Apr	17*	24	5	12	19
May	8	29*	3, 31	10	17 AI
Jun	12	—	—	7	14
Jul	—	—	5	12	19
Aug	—	—	2	9	16 AI
Sep	11	25	—	13	20
Oct	16*	23	4	11	18 AI
Nov	13	27	1, 29	8	15
Dec	11	—	—	13	20

* Indicates date bumped because of statutory holiday

AI = Astroimaging Community Café

SOUTHERN ALBERTA STAR PARTY (SASP) 10-15 September 2023

The [Medicine Hat Astronomy Club](#) would like to invite RASC Edmonton members to this year's [Southern Alberta Star Party](#), which is being held at a fantastic [Bortle 2](#) site in [Elkwater, Alberta](#). Full details are available at www.sasp.ca.

President's Report *by Jay Lavender*

Summer Solstice arrives June 21, 2023 08:58MDT! Ah yes, summertime in Alberta! The all too familiar, short-windowed predicament of warm temperatures, amazing clear, calm skies and that instinctive obstinate yearning to be out observing the sky, versus open restaurant patios, perpetual twilight, mosquitoes, and the dreadful forest fire smoke afflicting much of the North American continent. What is an astronomer to do?

To help satisfy that inclination for astronomy, we have many online services and events taking place throughout the summer. Starting with [Geoff Robertson's](#) very informative and entertaining "What's Up" happening in July and August. We also continue our Astro Café events through June, July and August, with many interesting topics, including a couple of Richard Covey's Café's on the skills of Astroimaging. In addition, we also have our Observer's Group meetings who have a variety of interesting discussions relevant to any level of observer. All these events are available virtually, and in some cases in person. Please consult the <https://edmontonrasc.com> for event topics and dates.

If your preference is to get outside, perhaps it's time to do a little solar observing and witness some of the incredible solar disc features put on display by solar cycle 25's wind-up to solar maximum. If you don't have solar observing equipment, remember the RASC Observatory at TELUS World of Science – Edmonton has several white-light filtered telescopes, and an amazing 152mm double-stacked Hydrogen-alpha telescope all available for use. I promise you will not be disappointed! And of course, we can't forget as Mark Zalcik and Bruce McCurdy have both recently reported, that Noctilucent Cloud (NLC) season is officially underway! Those fluorescent silver/blue clouds are indeed worth the effort to get out and observe. You can learn more about NLC by checking out the following RASC Handbook supplement:

https://rasc.ca/sites/default/files/Noctilucent_Clouds_2023.pdf

In preparation for what's shaping up to be a super fall line-up, I would like to give everyone advance notice of the following August and September events:

- [Northern Prairie Star Party](#) at Black Nugget Lake – September 12-17th – this is going to be an event to remember, make sure to book your campsite as soon as possible! [See here also.](#)
- [Bon Accord Harvest Days](#) – August 11th *site has no info for 2023*
- [Saskatchewan Summer Star Party](#) Cypress Hills, SK - August 16-20th
- [Beaver Hills Dark Sky Preserve](#) Milkyway Days, Elk Island Park – September 3rd
- [Lakeland Dark Sky Preserve](#) Celebration - September 23rd
- [Smoky Lake/Metis Crossing](#) Dark Sky Preserve inaugural event - September 25th

I would be remiss if I didn't also mention that our Loaner Program is once again ramping up. If you are interested in borrowing a telescope, please contact our Equipment Coordinator James McNeice at equipment@edmontonrasc.com.

I sincerely hope everyone gets the opportunity to get out and enjoy the day and night sky in whatever manner works best for you. I look forward to seeing and talking to you at all the aforementioned events over the summer. I wish you and your family a safe and astronomy-filled summer!

Clear skies everyone!

Northern Prairie Star Party 2023 *by Susan and Rick Bramm*

2023 NORTHERN PRAIRIE STAR PARTY (NPSP) UPDATE – September 12 to 17, 2023

We are looking forward to seeing you this September at the 20th Northern Prairie Star Party (NPSP) - Tuesday, September 12 to Sunday, September 17, 2023. It is being held at the Black Nugget Lake Campground located about an hour's drive from Edmonton. The campground is also the location of our Black Nugget Lake Observatory.

As we did last year, we have booked the northern part of the campground for use by our members during the star party event – for overnight dark sky observing for the five nights as well as for those who wish to come out for the Friday and Saturday programs.

For those wishing to book an overnight campsite, please email us NPSP Coordinators as soon as possible as interest has been high. All powered sites have been booked for the Friday and Saturday nights – there are still a few open for three nights, Tuesday through Thursday. There are several non-powered campsites available, including 88, 94, 95, 96, 106, 108, 112 and Tent sites #3 & #4. The link to the campground information is:

<https://www.beaver.ab.ca/tourism/campgrounds/black-nugget-lake>

... with the map of the sites posted on the Black Nugget Lake Campground site at:

<https://www.beaver.ab.ca/public/download/files/206106>

Please provide **the dates, site preferences, dimensions of the unit (RV, trailer, tent) and for powered sites, the type of power you need.** We will allocate them on a first-come, first-served basis and follow up with you later this summer regarding payment. Last year, sites used by members were paid at the rates charged to RASC-Edmonton Centre by the campground (\$36 for powered and \$30 for unpowered sites plus booking fee and GST).

Please note that if you have a larger RV unit that requires power, and would like more options, you are welcome to book a site yourself on the southern part of the campground (RASC-Edmonton Centre has not booked any sites in the southern part).

We hope to post the list of invited speakers and other program details soon on the RASC – Edmonton Centre website

soon at:

<https://edmontonrasc.com/northern-prairie-star-party/>

At the June 12, 2023, members' meeting we will have 2023 NPSP **volunteer sign-up sheets**. We invite you to add your name to one or more of the many interesting and varied planning and on-site tasks that comprise this year's star party event. We

will also be happy to answer any questions you have. You can also get in touch with us via email at: npstarfest@shaw.ca.

We look forward to hearing from you!

Rick and Susan Bramm, Coordinators
2023 Northern Prairie Star Party
RASC – Edmonton Centre

A Brief History of Black Nugget Lake Observatory, 2003-2023 by Warren Finlay

For many visual observers, the desire to observe through a bigger telescope is common. But big telescopes are heavy and large, making them difficult to transport to a dark site. As a result, most amateur astronomers own medium or small telescopes. A permanent observatory helps with this issue. With this in mind, the idea of having the RASC Edmonton Centre build its own permanently mounted large telescope at a dark sky site came to me early in the new millennium.

Armed with sky darkness satellite maps, I scoured the Alberta countryside over several years looking for a suitable dark sky site within an hour or so drive of central Edmonton (as described in "A Proposed Dark Sky Observatory Location", [Stardust 50\(7\):10-11,2005](#)). In 2003 I had chosen Black Nugget Lake campground as the site of the first Northern Prairie Star Party (NPSP), but I was initially hesitant to choose the same site for an observatory due to possible scheduling conflicts with campers during the camping season. However, despite considerable effort, I could find no better site and so I proposed the idea of building an observatory at Black Nugget Lake to RASC Council in Oct. 2004 who gave me the go ahead to approach Beaver County Council. Thus, on Feb. 16, 2005, I pitched the idea at a Beaver County Council meeting, receiving unanimous approval. On March 1, 2005, Edmonton Centre Council approved the motion "that a committee be formed to

establish a dark sky observing site at Black Nugget Lake on behalf of the RASC Edmonton Centre".

Not having the bandwidth in my life at that time to carry this further, former Edmonton Centre member Dave Robinson stepped up as Chair of the newly formed Black Nugget Lake Observatory (BNLO) committee. Joining Dave and I on this committee in summer 2005, Roman Unyk took aerial photos of the site. Negotiations began with Beaver County regarding where on the Black Nugget Lake property we could locate an observatory. Given the high cost of creating any new road access, the current site was chosen over more isolated locations on the east side of the property. In September 2006 the site was cleared and leveled by contractors (see Figure 1), with costs split 50:50 between Edmonton Centre and Beaver County. A ten year formal agreement giving Edmonton Centre primary use of the site during the camping off season (Oct. 1 – April 30) was signed on Jan. 1, 2007. The following April 2007, the site was graded and graveled and electrical power brought in, again cost shared with Beaver County. Concrete for the pit toilets was poured by contractors in 2008, courtesy of Beaver County. Roman and Dave finished building the outhouse in summer 2009.



Figure 1. Machinery preparing the BNLO site in September 2006. Photo by Rick Bramm.

Over the next four years, Edmonton Centre members brought their own telescopes to the site and enjoyed the privacy of a gated dark sky site, but no further site development occurred. In Oct. 2013, Roman, Dave and Ray Nelson constructed the metal shed (“Seacan”) to allow storage of equipment on site. But, in 2014 Dave retired to Victoria and the BNLO Committee dissolved. At that point, I had mostly relinquished my dream of having a large telescope installed at Black Nugget Lake.

But in April 2016, Luca Vanzella, then President of RASC Edmonton Centre, approached me with the idea of reconstituting the BNLO Committee. With my children now grown, I decided I had space in my life to chair this committee, with Roman, Kent Marten, Rick Bramm and Susan Bramm joining me as fellow committee members. That summer the BNLO Committee moved the Centre’s 18” f/4.33 Dobsonian telescope out to BNLO, and Roman installed wheels and wheelbarrow handles on the scope so that it could be stored fully setup in the Seacan. In Sept. 2016,

this scope was formally named the Barry Arnold Memorial Telescope (BAMT), in memory of Barry Arnold who passed away that year and had made its mirror. Bob Drew had led the building of the BAMT back in the 1980s and was keenly supportive of the BNLO dream. After discussion with the new BNLO Committee, in Nov. 2016 Bob donated his 32” f/4 ultra-low expansion Barry Arnold primary mirror to the BNLO cause (see Figure 2), along with a Barry Arnold 5.7” diagonal mirror, a 27 point welded aluminum primary mirror cell with mirror box and various optical truss tube structural components. This was followed subsequently with donations of 31mm Nagler, 13 mm Ethos and Paracorr eyepieces. With Roman agreeing to build a Newtonian telescope around these mirrors and optical tube components for installation at BNLO, a \$19,550 proposal to the Edmonton Centre from the BNLO Committee to partially fund construction of a 32” telescope was approved in Jan. 2017. Ending his term as President of RASC Edmonton Centre, that same month Luca joined the BNLO Committee.



Figure 2. Bob Drew with the 32” mirror he donated. Photo supplied by Bob Drew.

With Edmonton Centre money in hand, Roman began carefully designing and building the telescope structure, completing some of the truss frame in March 2017. Realizing that obtaining the funds to build an observatory and telescope was going to require six figure funding, the BNLO Committee was glad to accept the University of Alberta's offer to donate their Ash Dome from the Devon observatory. This dome, built in

1967, was still in good shape but was only 14 feet in diameter and too small for the 32" f/4 Newtonian scope we had in mind. Roman proposed that we switch to a folded Newtonian design (see Figure 3), which would allow the scope to fit within the dome and also drop the height at the eyepiece when pointed at the zenith from 10 feet to 7 feet off the floor.

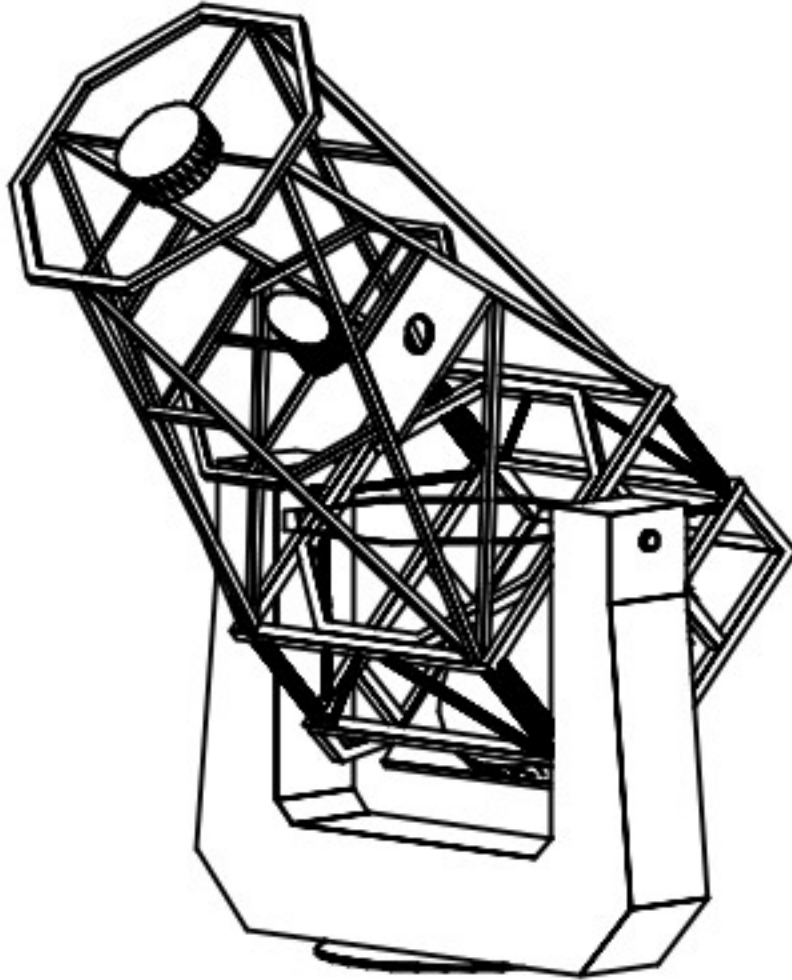


Figure 3. Perspective drawing of the final folded Newtonian design for the 32" scope. The flat secondary mirror at the top of the optical tube directs light from the bottom primary mirror onto the tertiary mirror that sits at the eyepiece height, with light entering an eyepiece via the hole seen in the trapezoidal eyepiece plate (no eyepiece is shown) on the right of the drawing.

Although the design change would increase the cost of the scope by \$15,000, it saved the larger cost of buying a dome, so the committee agreed and Roman proceeded with his new design, completing the metal fabrication of the upper ring, secondary holder, rear trusses and main mirror box by May 2017. A high quality 11.2" flat secondary mirror was purchased from Ostahowski. Meanwhile, the committee filed numerous funding applications with various companies and government agencies, all of which were rejected except for a \$2500 application to Beavery County and a \$2000 application to National RASC.

With the ten year site use agreement with Beaver County

now expiring, a renewal for another ten years was sought and approved in July 2017. Since the campground land is actually leased by Beaver County from the Government of Alberta, approval was also required from the Province. After many delays, the Province gave its blessing to the agreement in March 2018. By then, Roman had finished fabricating the front trusses and the base of the azimuth mount, and the committee had procured a second round of funding for two more years in the amount of \$58,500 from the Edmonton Centre and hired contractors to transport the donated dome onto site. Committee members and Edmonton Centre volunteers refurbished the dome in summer 2018. Along with the dome came a modular building

the committee was hoping to turn into a visitor centre. However, once it was delivered to site it was found to be mold infested and a local farmer agreed to take it off our hands, requiring the committee to begin finding an additional \$20K to purchase a replacement modular structure.

July 2018 saw Beaver County approve the committee's Building Permit, and the NDP Government of Alberta approved

a \$40,859 grant for the project. This allowed the committee to move ahead with on-site construction of the observatory. On Aug. 15, 2018, contractors broke ground for the observatory foundations. The poor soil stability on site required five screw-piles to be installed to a depth of 24 feet below ground to support the telescope pier (see Figure 4), resulting in another \$8K cost overrun.

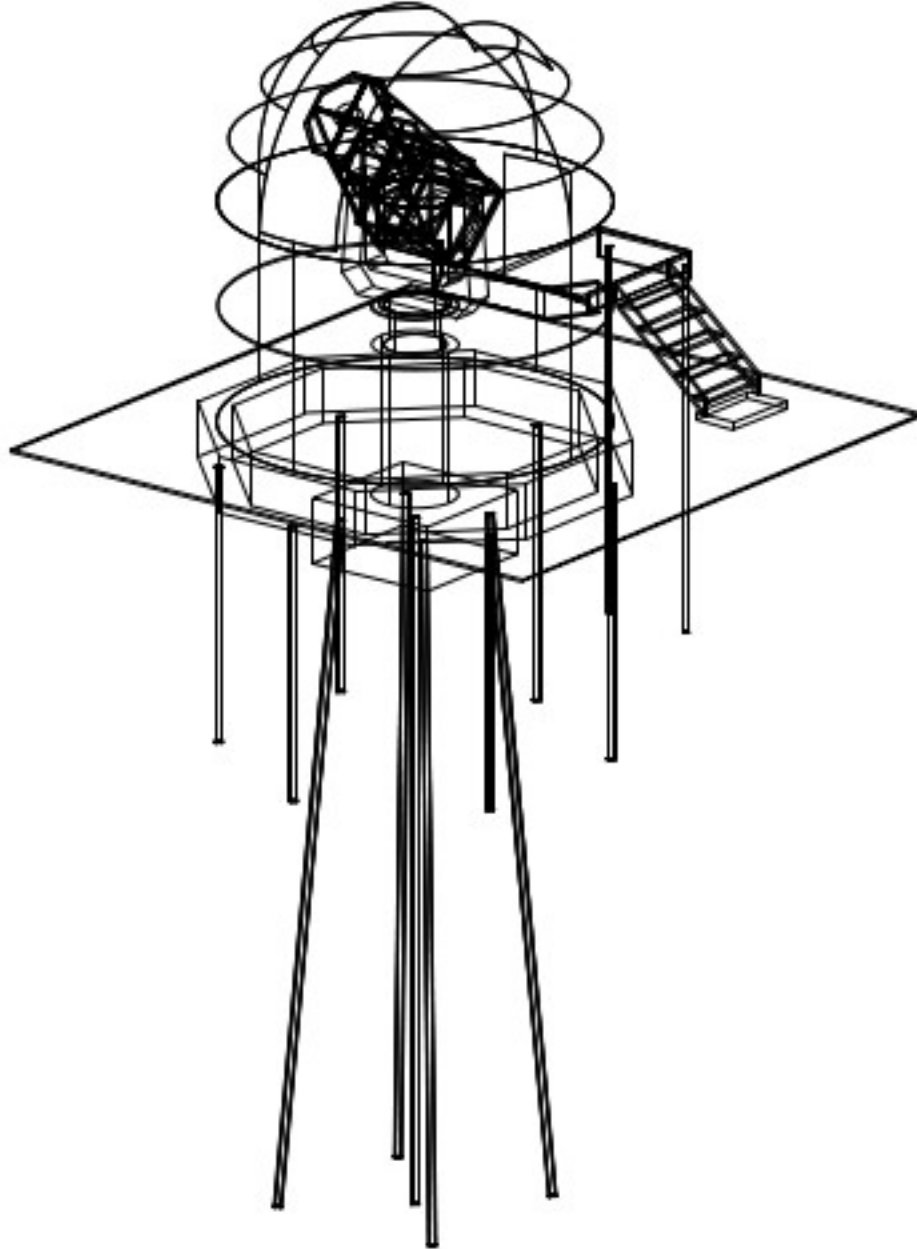


Figure 4. Scale perspective drawing of the BNLO observatory. Ground level is represented by the thin square plate and the ground below has been removed to show the piles installed below the telescope pier and dome wall foundations.

Concrete was poured on Aug. 24-26, 2018, with the scope footing and pier block weighing 6500 kg. With the concrete foundations in place, Roman led his fellow BNLO Committee members in constructing the circular walls to support the dome. Building them in modules in Edmonton, the committee, with help from fellow Edmonton Centre volunteers, lifted the wood walls and installed them on site in October, 2018. The same month, a modular building was delivered and christened the “Visitor Centre”. On Oct. 18, 2018 the metal dome was lifted into place by a crane contractor, using rigging with a high safety factor as the committee by now had invested enough time and money that seeing the observatory and dome demolished by dropping the dome was not an option!

With the dome in place, members of the BNLO Committee began working on the interior, but stopped in November 2018 when cold weather set in. By February 2019 Roman had largely completed fabrication of the fork for the telescope’s altitude mount. Both altitude and azimuth mounts were then sent for blast finishing in March 2019. Estimates for the mount bearings were several thousand dollars more than the committee had budgeted. In March 2019, Alan Hobbs, who had already volunteered considerable amounts of time on the project, was added as an official member of the BNLO committee. With the committee now clearly facing a budget shortfall, more funding applications were filed in May 2019, bringing the total to 22 such funding applications since the new BNLO Committee was struck in 2016, nine of which were successful.

In the summer of 2019, BNLO Committee members worked hard on constructing the observatory in order to achieve substantial completion of the building prior to the Building Permit expiring on July 26, 2019. Plywood floors were installed, interior stairs built and hung, the metal exterior door installed, and metal exterior siding installed, all by May 22, 2019. In June and July, 2019, the exterior stairs and railings were built and installed by the committee, allowing a Building Inspection to be scheduled for July 24, 2019. The committee was relieved to be notified the next day that we passed the inspection. An Electrical Permit was then obtained and committee members began installing electrical wiring on Aug. 15, 2019.

In September 2019, site cleanup of scrap lumber from building the observatory was completed by committee members and volunteers, who hauled 590 kg of construction debris to the Ryley dump on Sept. 18, 2019. Mouse droppings were found inside the observatory building the same day, beginning an extended battle to keep mice out of the building. A door flange was installed by Roman in an attempt to keep mice out, but mice were subsequently found in traps set inside the observatory, necessitating a hanta virus protocol cleanup to be completed on Sept. 26, 2019 by committee members and volunteers before further work could safely proceed inside the observatory. An

open house was hosted by the BNLO Committee during NPSP 2019 to showcase the substantial progress on construction of the observatory building. Electrical wiring work continued into the fall by committee members and volunteers, and by Nov. 13, 2019 we had completed enough to ask a Master electrician to do a roughed-in electrical inspection on Nov. 26, 2019, which we passed with no changes requested. By the end of December 2019, we had mostly finished the electrical wiring inside the observatory. Although excellent progress had been made to date, cost overruns required the committee to request an additional \$5,000 in funding from the Edmonton Centre, which was granted in January 2020.

On Dec. 22, 2019, Roman and Kent mounted the fork mount onto its base, but found azimuth torsional friction to be excessively high, prompting Roman to send the base back for machining to take approximately a thousandth of an inch off the azimuth base, but this did not correct the issue. After some head scratching, the bearing manufacturer discovered they had used slightly too large diameter balls in the bearing, and in Feb. 2020 they shipped a replacement azimuth bearing, which reduced the torsional friction somewhat. Roman subsequently sanded the bearing by hand, bringing friction down to an acceptable level. Also in Feb. 2020, committee members and volunteers cut the panels for the interior walls of the observatory, and painted them in the color “Mission Control”. On Feb. 21, 2020, several committee members and volunteers put in a long day (14 hours for some of us) installing the interior panel walls in the observatory.

On March 25, 2020, the corona virus pandemic caused the Province to close all facilities in Alberta parks, and on March 27 Beaver County chose to follow suit, closing all access to BNLO. With a water leak detected in the dome’s shutter during a visit the previous September, permission to access the site to fix the leaking dome shutter was obtained and the leak repaired by committee members on April 20, 2020. With the pandemic raging, Black Nugget Lake campground was closed for the summer, but Beaver County allowed the BNLO committee to continue its observatory construction work. After completing assorted minor construction tasks inside the observatory, the committee and volunteers began landscaping the exterior grounds, spreading 10 yards of washed rock on May 26, 2020. With COVID-19 wreaking havoc on the world, the committee completed a few more minor construction tasks over the summer, completing the observing building for the most part by fall 2020. By that time, the BNLO Committee alone had spent approximately 3000 hours in constructing the observatory and Roman had spent 2000 hours toward constructing the telescope.



Figure 5. Black Nugget Lake Observatory, May 30, 2020.

In October 2020, a final funding request to Edmonton Centre for an additional \$6500 was approved to cover costs necessary to bring the scope to first light, planned for 2021. However, in Jan. 2021, Roman discovered that the drive wheel and sector we had paid an outside contractor to machine were warped. His attempt to relieve the stresses by cutting out the inner portion only made the problem worse. Despite the best efforts of all involved over the next nine months, multiple attempts and approaches to straighten the drive wheel and sector were frustratingly unsuccessful.

Despite this setback, in March 2021 the BNLO Committee began preparing a detailed operations and how to manual for the BNLO facility and telescope. Meanwhile, in June 2021 a mouse had made a nest in the front door landing of the observatory, leading to several months of trying different preventative approaches to keep mice out. By September 2021, it was deemed that the mice had been successfully blocked from entering the observatory. And on September 10, 2021, Roman decided to trash the offending drive wheel and sector and try again using a different approach outlined to him by American Telescope and Optics firm DFM Engineering, using a different type of steel (AR400) they had recommended. This meant losing the sunk cost and time of building the first version of these drive components. It was now apparent that the telescope would not see first light in 2021, leading to a nadir in the spirits of those involved.

The additional time and cost of refabricating the drive wheels weighed heavily on the committee. But in a timely stroke of good fortune, Bob Drew offered to inject a \$25,000 cash donation into the project that was approved by RASCEC Council on Oct. 25, 2021. The new funds allowed Roman to quickly have

the new drive wheel and sector water jet cut and machined. And on Oct. 26, 2021, Roman deemed them to be to spec, resolving the drive component issues 10 months after they arose, allowing Roman to proceed with the telescope construction over the winter. By now, the committee had high hopes that the observatory and telescope might be ready by fall for the annual Northern Prairie Star Party in Sept. 2022. Thus, the committee arranged for the trees on site to be trimmed on Dec. 20, 2021 to reduce their obstruction near the horizons. A fence contractor was also brought in to replace the temporary fence around the compound with a permanent fence, with several gates to improve access to the site. In addition, the same contractor built and installed bollards to prevent wayward vehicles from damaging buildings, completing this work on May 20, 2022. The committee, with additional volunteers, finished landscaping the site, placing 40 sidewalk blocks on June 7, 2022.

By now, it was essentially just completion of the telescope build that remained and the committee helped Roman in as many remaining aspects of this component of the project as possible. Committee members joined Roman with painting of some of the many metal telescope structural components (see Figures 6 and 7). Telescope construction and assembly continued through the summer of 2022, but by late August it was apparent the scope would not be ready for first light in time for NPSP 2022. Instead, Roman continued building the scope with help where possible from his fellow committee members, now aiming for first light in 2023.



Figure 6. The components of the tertiary mirror holder, machined by Roman, before and after anodizing. Photo by Roman Unyk.



Figure 7. The notorious new altitude drive sector (left) and azimuth drive wheel (right) after painting in Roman's shop. Photo by Roman Unyk.

Telescope construction and assembly continued through the summer of 2022, but by late August it was apparent the scope would not be ready for first light in time for NPSP 2022. Instead,

Roman continued building the scope with help where possible from his fellow committee members, now aiming for first light in 2023.



Figure 8. The BNLO Committee at NPSP in Sept. 2022; left to right: Kent Martens, Susan Bramm, Roman Unyk, Alan Hobbs, Warren Finlay, Luca Vanzella, Rick Bramm. Photo by Colin Bramm.

On March 13, 2023, the telescope components were near enough to completion that the 32” mirror was moved from its location in storage at Edmonton Centre’s storage locker over to Roman’s shop so that final assembly of the telescope could begin. However, on March 16, 2023, Roman underwent surgery for his previously injured ankle, putting a temporary pause on scope assembly. In May, Roman was given the go ahead to begin weight bearing on his ankle, and with the help of BNLO Committee members, completion of the scope software controls and final fabrication of several telescope components occurred. At the same time, the BNLO Committee completed writing up detailed operations documents for BNLO facility and telescope operation.

As of this writing, the BNLO Committee has scheduled 12 dates in July and August to transport the telescope out to BNLO, lift it by crane and install it onto its pier, work out any kinks in its

operation and train BNLO operators on its use. The inaugural opening of the telescope is planned to occur at Northern Prairie Star Party (NPSP) in Sept. 2023. RASC members are encouraged to register for NPSP and come out to see the telescope at that time. Weather permitting, this will be the first opportunity for RASC members to have a look through this unique instrument. Those interested in volunteering and gaining access to use the telescopes at BNLO should visit <https://community.edmontonrasc.com/?q=members-area/bnlo> and follow the instructions there.

Although it has taken nearly 20 years and more than 10,000 hours of volunteer labor by the BNLO Committee and RASC members, along with \$160,000 in cash and \$348,000 of in-kind donations, the 32” telescope at Black Nugget Lake will see first light this year. A list of donors and volunteers that have made this project possible is given in Table 1.

BNLO has received generous funding and donations from:	The following volunteers contributed a total of more than ten thousand volunteer hours to the project:
Allmar Doors All-Star Telescope Andy Posthumus B2 Foundations Ltd. Beaver County Bob Drew BGK GmbH Endlosband Coal Creek Golf Course CO2 Blast Ltd. Daam Galvanizing Edmonton Fasteners Framer’s Warehouse Government of Alberta Amanda and Patrick Heinz High Strength Plates Keith Kobyłka Joann Montegary Mike Noble Northgate Industries Profire Energy Renishaw Canada Royal Astronomical Society of Canada Serv-All Mechanical Services Tackpoint LP Technical Cutting Solutions University of Alberta Vanguard Steel John Watson	The BNLO Committee (2023): Rick Bramm Susan Bramm Warren Finlay (Chair) Alan Hobbs Kent Martens Roman Unyk Luca Vanzella Additional volunteers: John Cliff Paul Finlay Marion Hobbs Bob Lawrence William Martens Ray Nelson Wade Parker Dave Robinson John Stolte Gerry Shillabeer Mike Szelewicki Kathryn Vanzella

Table 1. List of donors and volunteers that made the BNLO project possible.

While it has taken longer than I anticipated, it is amazing to see the facility that has taken shape at BNLO with the dedicated efforts of a wonderful team. The 32” telescope at BNLO is one of the largest telescopes in Canada that RASC members can view

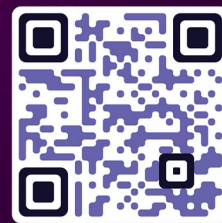
through at a dark site. Custom designed and built by RASC members, it is a legacy instrument that will thrill Albertans with views of the heavens for generations.

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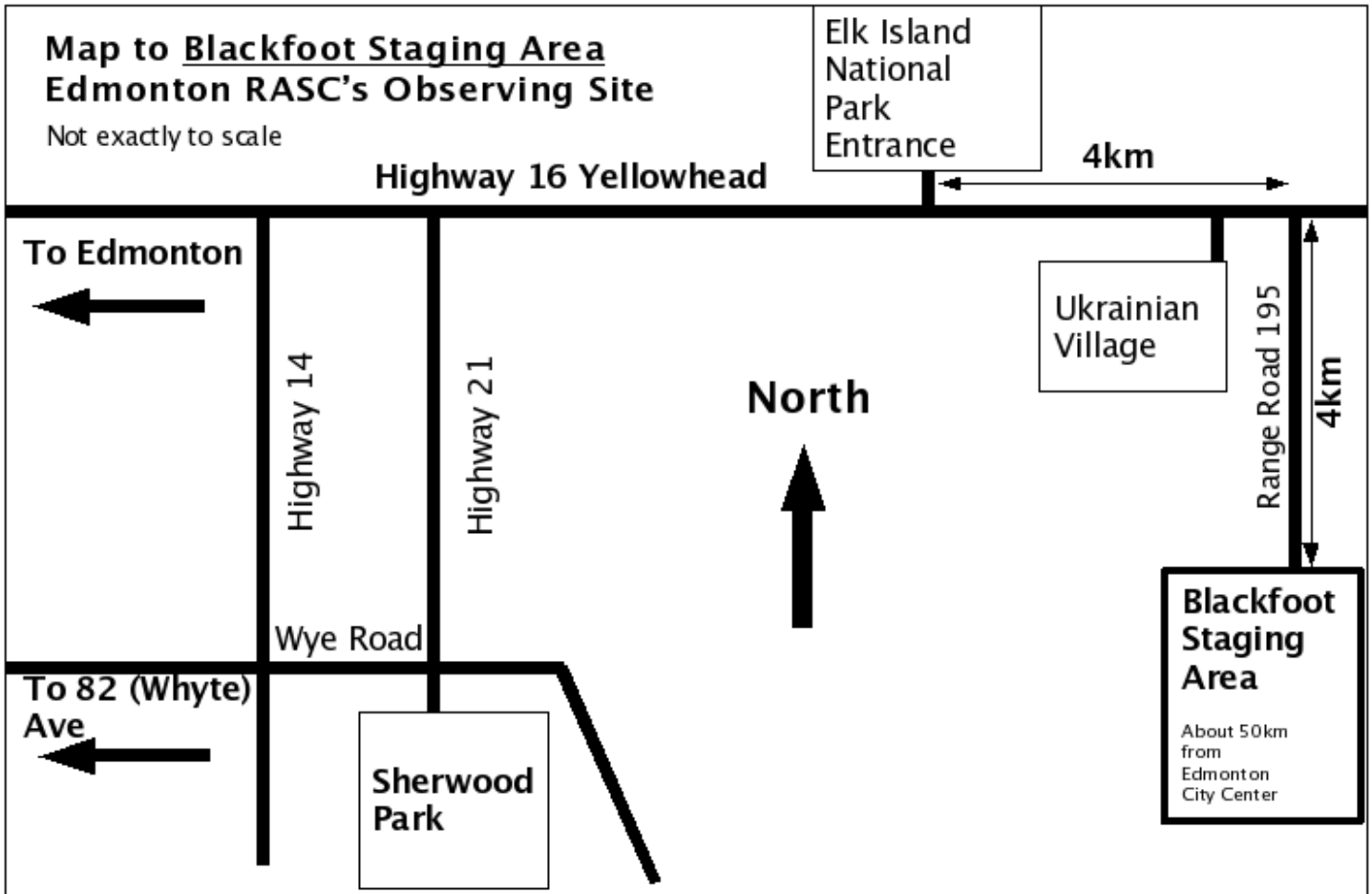
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