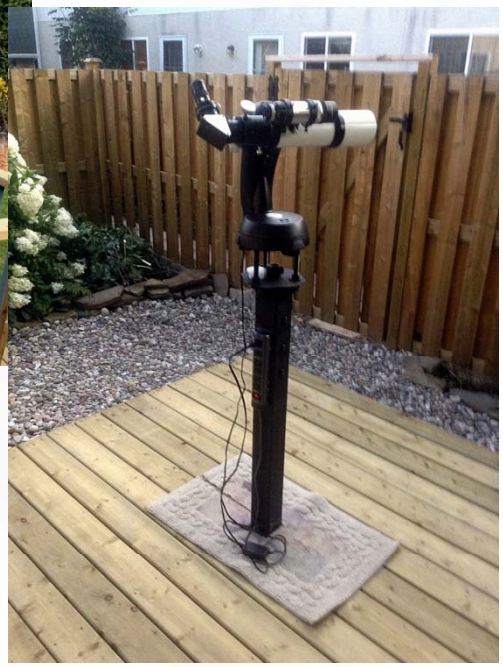
DIY Micro and Mini OBSERVATORIES

The GSO, Ottawa, ON
Simon Hanmer

The GDO, Greely, ON
Rob Lavoie



The MDO, Ottawa, ON
Moe Charlebois

GSO … Garden Shed Observatory

A weekend job …

7’x4’ floor frame

½” plywood floor

Crushed stone

Vinyl panels + spars

Slides together

GSO … observatory? I see no observatory!

Green beans

Trellises

Flower pot

… it's a garden shed!

GSO … no astronomy here!

This really is a garden shed

GSO … opened up

Footprint - 7’x 4’

Height - variable

Sliding roof

Aperture - good

Crushed stone

GSO … the wiring system – and view from without

External jacks

Extension chord

Control cables for …

- Scope
- Handbox
- Cameras

GSO … cabling - plus support/decoration?

Electrical power

Buried control cables

Recycled bricks

GSO … observing aperture

Double Tongue & Groove

Sliders are built-in

No modification required

GSO … roof “mechanics” - the principal modification

Two metal plates

Central roof spar

Handle

GSO … telescope installed!

LX-200 GPS 10” on wedge on tripod

It fits …

… but only just!

Pier wouldn’t make a difference … unless hydraulic

GSO … telescope installed!

LX-200 GPS 10” on wedge on tripod

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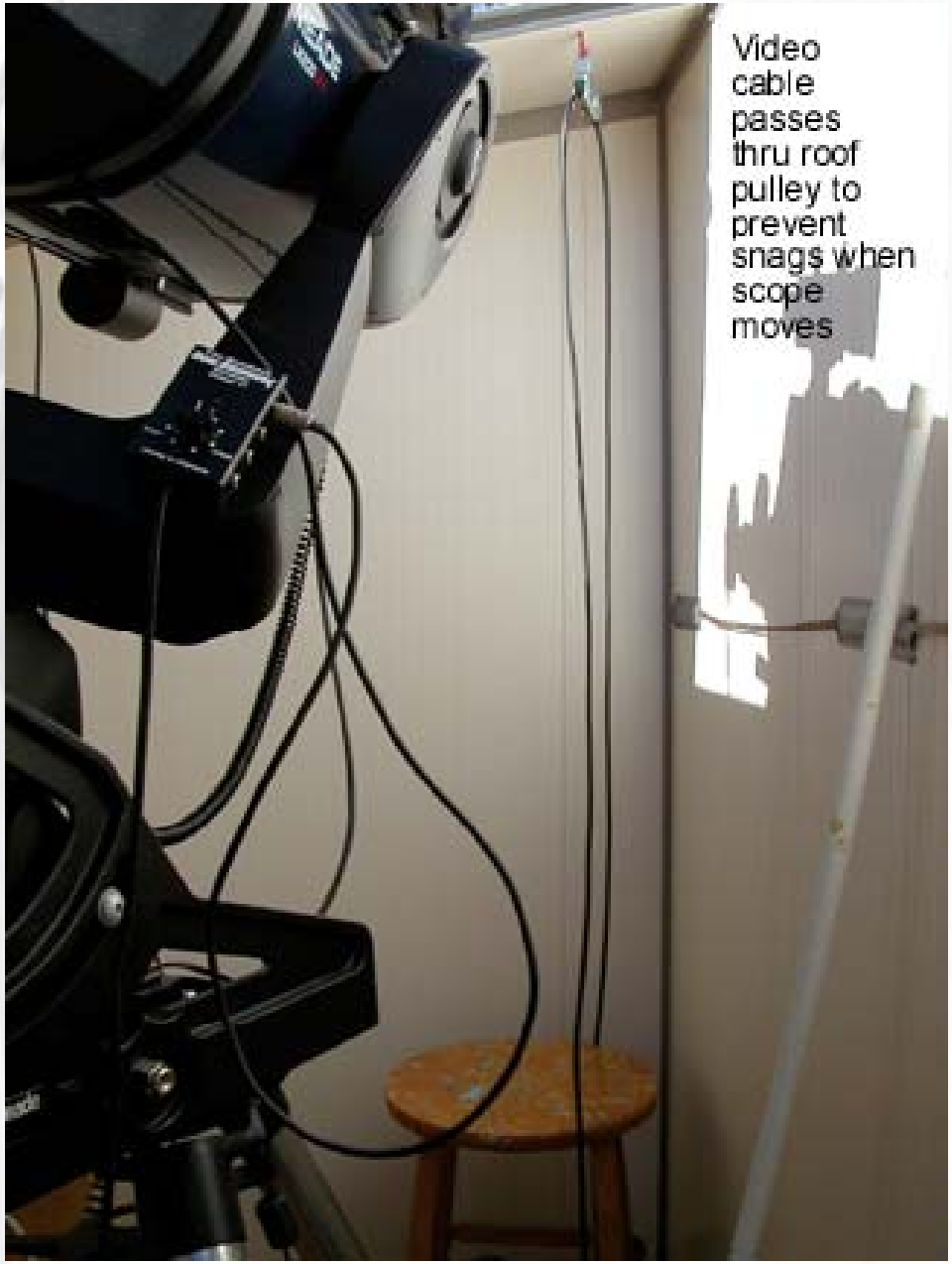
GSO … minimal gadgets

Monitor for MallinCam

Lamp and timer

Mini heater for roof

GSO … anti-snag system for MallinCam video camera



Hook and pulley for multiple video cables

GSO … anti-snag system

Pat. Pending !

GSO … anti-static system – required in a vinyl observatory

Copper strapping

Copper wire

Earth

Duct tape

GSO … vibration suppression system

Holes cut in floor

Post footings + 4x4 blocks

GSO … water tight - well … almost!

Slot just behind door

I don't understand why …

… but it works!

GSO … a really tight fit

LX-200 GPS 10”

Scope clearance - 1cm

Strategic stool

Essential broom

GSO … clearance at the business end

LX-200 GPS 10”

Motorised focuser

Camera

GSO … clearance at the business end

LX-200 GPS 10”

Motorised focuser

Camera

GSO … it's really snug in there

I can just about slide in and out without nudging the scope

GSO … zero clearance

Problem …

Classical guide-scope in rings stands too high to close the roof

Required alignment everytime I mount it !!

GSO … zero clearance

Solution…

Mini guide-scope on custom mount

20 seconds to install … no alignment required

GSO … zero clearance

Solution…

Mini guide-scope on custom mount

20 seconds to install … no alignment required

GSO … even in winter

All dug out

Roof easy to clear

Ready to open up

Might need de-icer

GSO … winter-proofing the roof

Vinyl tarp

Bungie chords

5 second snow/ice removal

GSO … single light-bulb takes edge off cold inside

Note the thinned snow directly above the location of the light bulb

GSO … winter observing

2 minutes for shut down and closing roof …

… then straight to bed !

GSO … warm room (aka : the house)

Protection from cold, bugs, humidity etc etc

GSO … what did it cost to build?

$450 for the shed

$50 for lumber

$50 for delivery

Domestic harmony

Priceless!

The GDO

Greely Deck Observatory

The GDO

The Scenario:

- **Semi rural ½ acre lot on the southern edge of Ottawa, On.**
- **Two story home with south facing back yard. Deck off back of house has served as an observing stage for 27 years. Additionally a 'guest astronomer's pad' was constructed to accommodate visiting astro observers.**
- **Well tended gardens is the pride of my spouse, hence any 'additions' must be approved.**
- **Quite reasonable skies, house shields Ottawa light dome.**

The GDO

An actual
Guest
Astronomer


New Telescope
at the
GDO
(Greely Deck Observatory)
150mm f/5
Imaging Newtonian

The GDO

Considerations

- **Heavy dew when observing off the deck on lawn.**
- **Vibrations when observing on the deck makes astro imaging challenging.**
- **Observing on the deck takes better advantage of the house blocking the Ottawa light dome.**
- **Needs to blend in and have a small footprint.**
- **Mosquitoes in summer, snow in winter – take advantage of the screen house and proximity to patio door / kitchen nook**
- **Setting up and polar aligning is time consuming and wearing.**

Typical set up
In the early days

The GDO

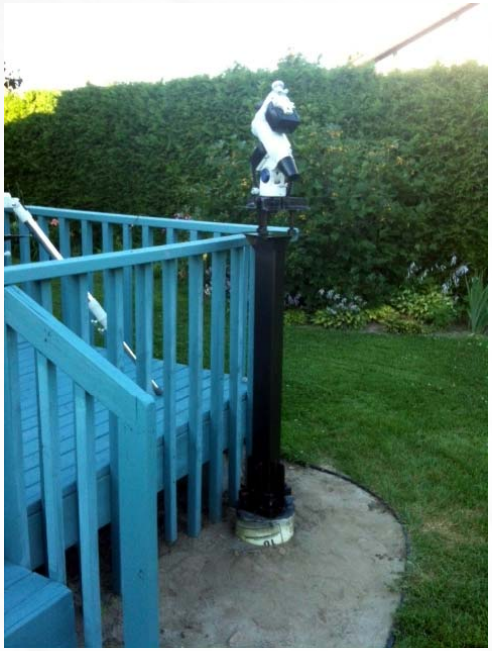
A few more things to consider

- **Soil Type: In my case, I'm on the shores of the ancient Champlain Sea sitting on top of 65 feet of sand. Digging a 4 foot hole with a post hole digger was almost effortless. Clay soils are much more challenging and prone to frost heaves in the winter, and surface water in heavy rains.**
- **Need to consider site drainage … how rain and snow melt drain in the area of interest. I rose the top of the cement base 6 inches above grade so the base of the metal pier would never be under water in the spring (one reason why using the Guest Astronomer pad would have been less advantageous).**
- **Need to be out of the ambient lighting as much as possible. In an urban neighbourhood, consideration must be given to lights from adjacent backyards, street lights, and in my case …. lights from landing airplanes. Additionally, urban observatories are subjected to heavy light pollution. In Greely, the light dome of the city is in the north. I deliberately positioned the GDO so that I can take a bearing on Polaris for alignments, however the house blocks out 90% of the Ottawa light dome.**
- **Access to electrical power. If separated from the house, care must be afforded to safe electrical arrangements.**
- **Access to the fridge, microwave, coffee pot, popcorn maker and wifi.**

The GDO

Solution:

- **Dig a hole below the frost line (4 feet deep required in my case)**
- **Pour a concrete foundation 4' below grade. It's great to have friends when mixing cement. They love to sit on the deck and point out that you are sweating profusely and must need another drink.**
- **Fabricate a steel pier that can be polar aligned and leveled and can accommodate my Meade LXD75 mount. Welding is a hobby of mine, and my Lincoln 135SP MIG welder made it an easy job (actually, I used flux core welding wire... a little more spatter, but nobody can see it in the dark.**



The GDO

Extend deck around pier (Thank you Moe!!)

Construct cabinet with casters

Rodent/weather plate

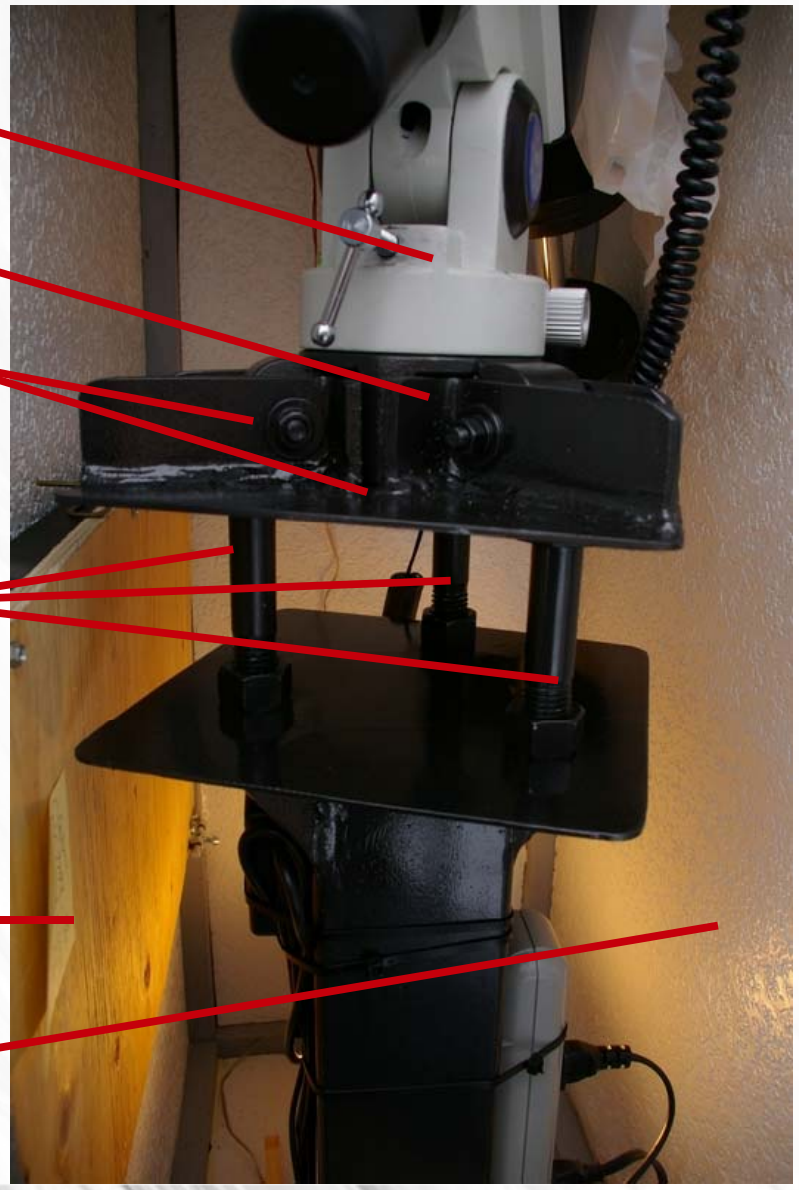
1/4-20 knob locks cabinet to pier

Add insulation, power bar, 60W light bulb heater, mouse proofing, flip up work shelf

The GDO

A few details:

- **Meade LXD75 mount**
- **Base from tripod top**
- **Top plate fabricated to secure base**
- **5/8” bolts allow leveling and access to knob which secures the Meade mount**
- **Flip up table**
- **Insulation (fiber glass ceiling panels)**



The GDO

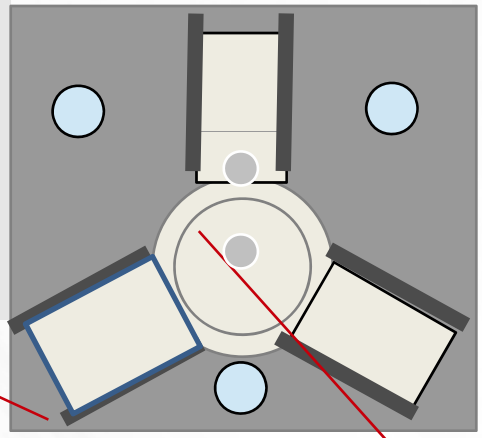
A few more details:

- **Vents with 12v fan for cooling in summer**

Snow shovel for winter access

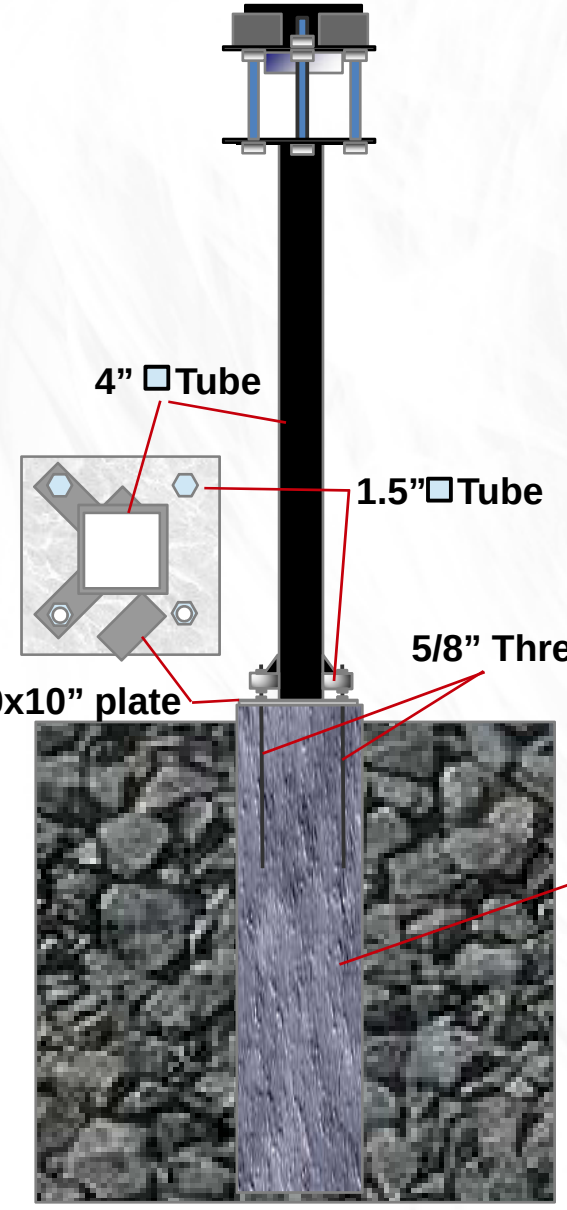
The GDO

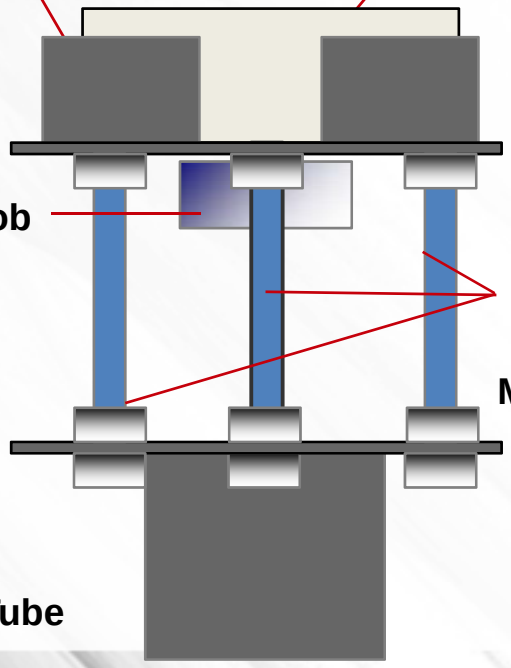
Details on the Pier



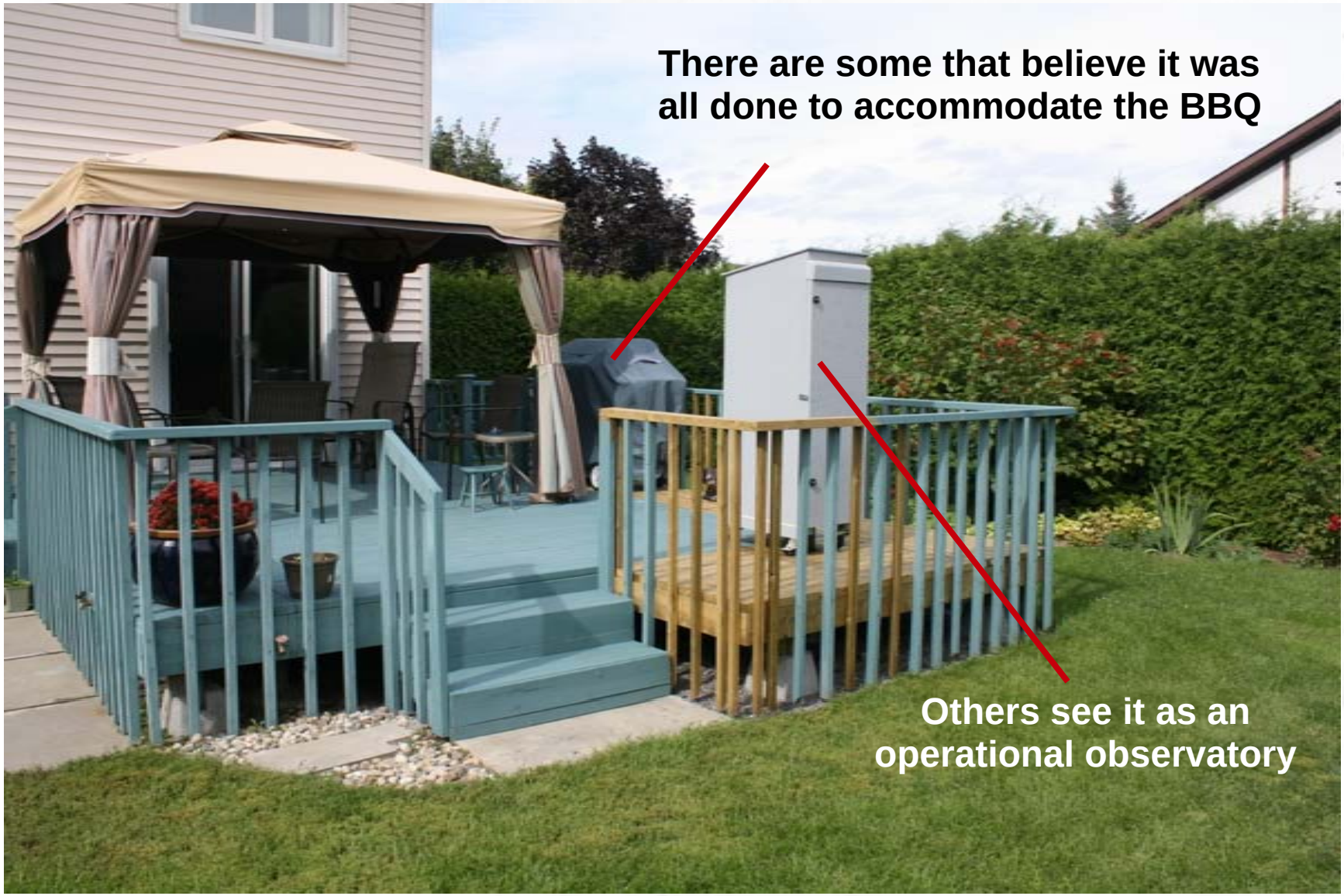
Mounting Gussets

Tripod Head adapter





The GDO


There are some that believe it was all done to accommodate the BBQ
Others see it as an operational observatory

The GDO

$85 for metal bits

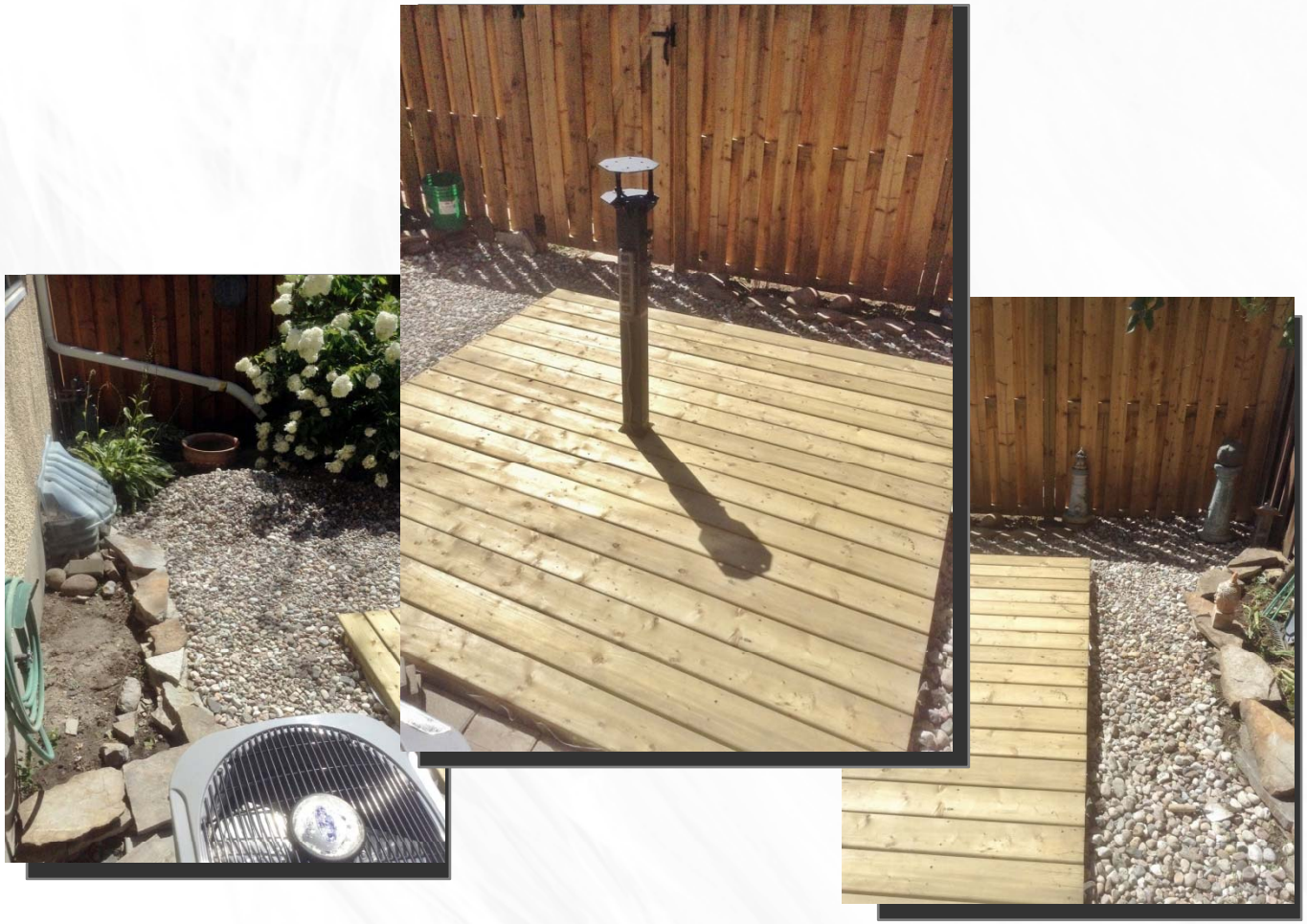
$200 for lumber, screws and deck supports.

$? for all the scrap parts I had lying about the garage... including the plywood for the roll off cabinet, castors donated from the MDO, various bits of hardware and stuff

Yes!!! A paint job is scheduled for Spring 2014 after the PT lumber cures

MDO

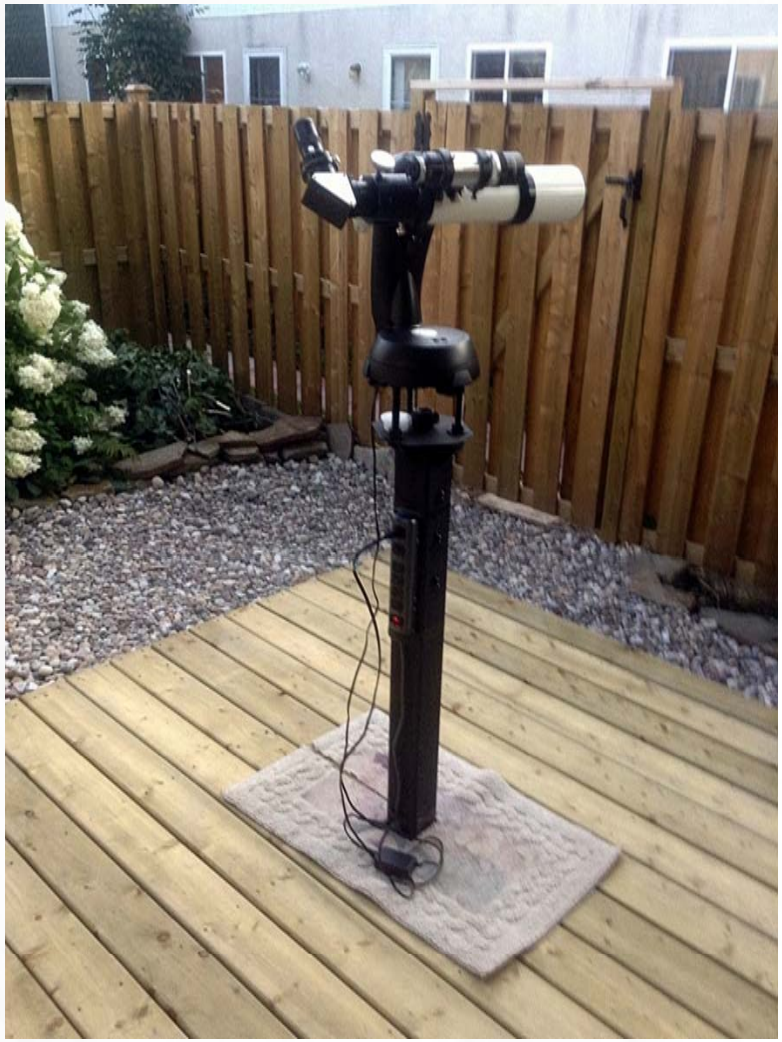
Moe's Deck Observatory, Ottawa, Ontario



MDO

The Scenario:

- **Garden Home Condo in Orleans, On.**
- **North facing back yard with good exposure to the western sky.**
- **Light Pollutions is an issue necessitating the use of a MallinCam for most objects,**
- **The pier will be used for several telescope mounts**
- **Clay soil, making digging below the frost line an arduous task.**



MDO

The Solution

Construct a 4x3 foot crib and fill with cement....

Fabricate a 10x10in. Plate to serve as a template for the 5/8in mounting bolts.

Insert and level the bolts and plate into the cement while curing

MDO

The Solution

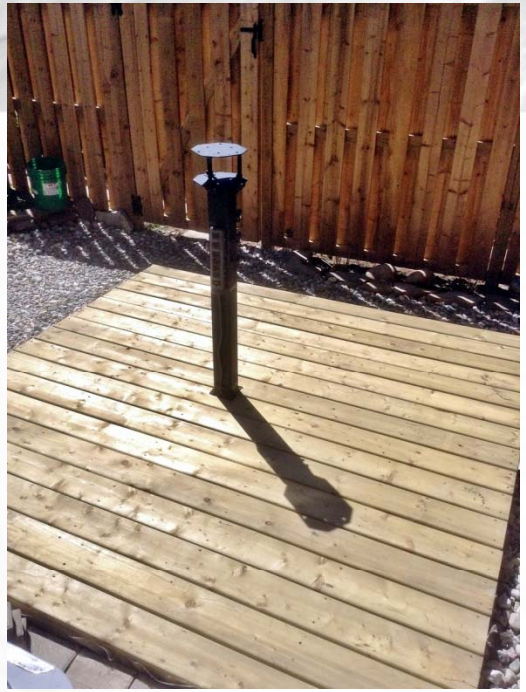
Fabricate a 4x4in. square tube pier assembly (based on GDO design) then mount on the 5/8” bolt and plate assembly

Fabricate a top plate assembly with mounting holes for a Celestron SE mount and a Meade LS mount and allow for level adjustments.

Make arrangements to store mounting bolts on the pier

MDO

Construct a wooden deck over the cement base and add river stone surround



Enjoy observing with either the Celestron SE mount

or....

….the Meade 6” ACF LS