

Mirador Astronomy Village – Plan 1.04

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1.0 Site Characteristics

Mirador Astronomy Village should be located reasonably close to Alpine, Texas, though not so close that the lights of Alpine are directly visible or significantly pollute the sky. Alpine is the largest city in the Big Bend region of West Texas (population ~6,000) and provides all the basic necessities, including a hospital (Big Bend Regional Medical Center) and a university (Sul Ross State University). This location is recommended because the Big Bend region of West Texas enjoys an almost unique combination of dark skies, warm and dry climate (but not too hot) year round, moderately high elevation (~4,500 ft.), and a latitude even further south than all of New Mexico and Arizona.

A square or rectangular piece of land should be purchased in an intermountain plains region. Advantages include a lower purchase price, lower development cost, and no significant sky obstruction.

1.1 Protection from Natural Hazards

The site must be developed and maintained in such a way that it will be safe from wildfires and flash floods, both of which are an ever-present danger in the desert southwest. Also of concern are high winds a few times a year and the occasional dust storm. Tornado activity in the Alpine area is significantly below the Texas state average, and 78% less than the overall U.S. average (City-Data.com). Even with the low tornado risk, we should have an on-site tornado shelter. Earthquake activity is significantly above the Texas state average, but 51% smaller than the overall U.S. average (City-Data.com). Though the

earthquake risk is low, the potential for earthquakes as strong as magnitude 5.7 nearby must be kept in mind as the community is developed.

1.2 General Site Layout

The developed areas of the property should include four distinct zones or “campuses”: Visitor campus, residential campus, observatory campus, and energy campus. As much of the property as possible should be left undeveloped or minimally developed.

1.2.1 Visitor Campus

The visitor campus will be located closest to the highway, and will include a public observatory, a multipurpose science education center, public parking, and overnight lodging for our guests. On-site businesses would also be located here.

1.2.2 Residential Campus

The residential campus will be located further into the property, a reasonable distance from the visitor campus. This will be a cluster of houses or other dwellings where the residents of Mirador live. It should also include a multipurpose community center and dining facility, and an outdoor commons. One or more additional residential campuses could eventually be developed.

1.2.3 Observatory Campus

The observatory campus is a designated area set aside for astronomical observation. This will include observatories (individually or cooperatively owned, or rented), telescope pads, and a meteor watching deck. One observatory will be community owned and available to all residents of Mirador. The observatory campus will be located within easy walking distance of the residential campus.

1.2.4 Energy Campus

Most or all of the electrical power used by the community should be generated through photovoltaic solar cells and modest-sized wind generators. Solar heat collectors could also be used to generate electricity or to provide hot water. Geothermal energy resources might also be utilized. The wind turbines should be located north of the solar panels so as to not cast shadows on them. The energy campus must be sited so that the wind turbines do not obstruct the sky as seen from the observatory campus or the public observatory on the visitor campus.

1.2.5 Site Orientation

To facilitate the best, most natural orientation relative to the sky, the property and its buildings should be oriented along the four cardinal directions (north-south and east-west). Buildings should be solar oriented to maximize energy-efficiency.

1.3 Public Observatory and Science Education Center

The visitor campus will include a roll-off-roof public observatory, something like 24 x 24 ft. in size, housing an equatorially-mounted catadioptric telescope of at least 10-inch aperture. The multipurpose science education center will house a classroom, restrooms, and, eventually, a small planetarium.

1.4 Housing

Ideally, a variety of housing types will be available in the residential campus. These can include, but are not limited to, single-family homes, townhouses, condominiums, and apartments. A flex-space modular approach to housing construction could be used, where the number of modules owned or rented varies depending on the needs and financial resources of the family or individual. Each building would have several multipurpose housing modules ("rooms") that could be configured a number of different ways. All housing modules will have natural ventilation (with robust dust filtration) and daylighting in addition to air conditioning and heating, individually customizable.

1.4.1 Land Ownership

Options shall be available so that an individual or family can live at Mirador without needing to own land.

1.4.2 Rentals

Rental units shall be provided so that an individual or family can rent their home rather than owning it. In fact, many people coming to the community will probably want to rent at first, with the option to buy later. Renters could make approved improvements to their residences by paying 50% of the cost, with Mirador paying for the other 50%.

Rent-to-own is another option that should be provided, with the monthly rental fee somewhat higher than for standard rentals.

1.4.3 Cohousing

The campus approach lends itself well to a cohousing community, where private residences are supplemented by shared facilities. A key feature of Mirador will be clustered residences rather than widely-separated residences on acreages.

1.4.4 A Heathian Community?

Mirador could be completely owned by a private corporation, with all housing and land being rented to residents, and all community services being provided by the corporation. Rent would cover these services. This approach is modeled, to a degree, after the work of Spencer Heath (1876–1963), and his grandson, Spencer Heath MacCallum (1931–). It is imperative, however, that this corporation be a non-profit or a cooperative, with all profits being invested back into the community.

1.5 Roads and Trails

The roads into and within the community shall be paved, smooth, well-constructed, and well-maintained. The community shall be bicycle and pedestrian friendly. Some paved off-road trails shall be provided for bicycle and pedestrian use. Primitive hiking trails should be plentiful on the property. Road placement, berming, and natural landscape features should be used to prevent vehicle headlights from shining onto the observing sections of the property.

1.6 Building and Construction Characteristics

Local building materials and earth sheltering will be utilized as much as possible.

2.0 Lighting and Other Restrictions

No dusk-to-dawn exterior lighting will be permitted, and all exterior lighting shall be fully shielded and must be approved by the Lighting Review Committee (LRC). Alternatives to lighting, such as reflective materials, should be used wherever possible.

2.1 Night Sky Protection

The community will be deeply involved in protecting the night sky and nighttime environment in the areas surrounding the astronomy village. Alliances with other organizations such as the McDonald Observatory will strengthen these efforts.

2.1.1 White Strobe Lights on Towers Nearby

The community must work closely with local government agencies and legal resources to ensure that only red lights will be used at night on communication towers visible from the community, and that no white lights will be used on towers at night.

2.1.2 Resource Extraction Nearby

The community must work closely with local government agencies and legal resources to ensure that any present or future resource extraction activities near the community will not employ any lighting at night that would jeopardize the dark skies and natural nighttime environment cherished by the community.

2.2 Pets

Pets will be allowed though not necessarily encouraged, and under no circumstances will they be allowed to roam free. Barking dogs that become a nuisance to other residents will not be allowed.

2.3 Hunting

No hunting will be allowed at Mirador under normal circumstances. If the local population of deer, or some other species, becomes excessive and a nuisance, then the management of Mirador may decide to temporarily allow hunting to thin the herd.

2.4 Other Restrictions

The residents of the community shall adopt other rules and restrictions deemed necessary for the mutual benefit of the community. For example, sensible water use.

3.0 Educational Outreach

A key feature of the community is that it will operate a public observatory and education/retreat center, and provide regular astronomy and other science activities for community members and visitors. The community should engage in an ambitious educational outreach program, including the operation of a science resort and research station.

Our science focus will include astronomy, biology, geology, meteorology, and the natural sciences in general. Other subject areas could be taught as well, for

example workshops on agriculture, intentional community, meditation, and sustainable living.

3.1 Firsthand Astronomy

In an age of technological wonders such as digital imaging, remotely-controlled telescopes, and space-based astronomy, we recognize and celebrate the extraordinary value of “firsthand astronomy” both for ourselves and for our guests. In other words, experiencing an unpolluted night sky and a natural nighttime environment, and sharing eye-to-eyepiece telescope views, binocular views, and unaided-eye views (constellations, meteor showers, etc.) is desirable.

3.2 Pro-Am and Am-Am Collaborative Research

A favorable environment for collaborative astronomical research and data collection should be fostered, both within the community and with professional and amateur astronomers who live outside the community.

4.0 Community Attributes

A concerted effort should be made to ensure that Mirador Astronomy Village is multi-generational (older folks, middle age, young adults, and children). In order to have that balance, employment opportunities must be created within and outside the community.

4.1 Affordability

Unlike existing dark-sky communities that cater to those having a higher income, families and individuals of modest income should be able to afford to live at Mirador. Affordability can best be accomplished by a two-method approach: (1) some community activities must generate revenue from sources external to the community, and (2) reasonably high community dues (or rent) to support community infrastructure will be offset by shared community resources so that community members will not have to own and maintain everything they need or use.

4.2 Community-Owned Businesses

The day-to-day operation of the public observatory and science education center and the on-site lodging for our guests will create employment opportunities for our residents, and income for the community. Managing and maintaining the Mirador rental properties will create additional employment opportunities. Other business ventures should include a co-op store for basic

consumables, rental center, restaurant, organic community-supported agriculture (CSA), and telework center.

4.2.1 Telework Corporation

One idea for an on-site business is a “telework corporation”. Traditional teleworkers (telecommuters: contractors and consultants) work alone and independently, but a better approach for the community would be a collective effort where several people living at Mirador would go to an office on-site and work cooperatively on various telework projects. High-speed internet opens up all kinds of possibilities for non-urban employment!

For many, the synergy of working with others in the same location for remote clients would be much more satisfying than individuals having to secure all their own contracts and working in isolation.

4.3 Food Production

Site-appropriate gardens, greenhouses, and food self-sufficiency to the extent practicable will be developed.

4.3.1 Community Dining

A community dining hall will be located adjacent to the community gardens and greenhouses. Common meals will be provided to community members on a regular basis for those who wish to participate.

4.3.2 Animal Husbandry

Though a significant number of people living at Mirador will be vegetarian or vegan, some will be omnivores, and some of the omnivores will want to raise a small number of animals for milk, eggs, food, or other products. This will be allowed, with appropriate restrictions, at a separate location on the property, and will be funded only by those in the community who wish to participate.

4.4 Shared Resources

To the greatest extent possible, the community should share resources.

4.4.1 Motor Vehicles

Implementing a carshare program and community-owned shuttle van would allow a family with two cars currently to get by with a single vehicle. Some individuals in the community might choose to not even own a car.

The community may decide to restrict motor vehicles with internal combustion engines to the visitor campus and adjacent areas nearest the highway. Residents would park their vehicles in a parking structure near the highway, and use NEVs (Neighborhood Electric Vehicles) belonging to the community as needed to shuttle back and forth between the residential campus and the parking structure. This would eliminate the need for garages and car & truck parking on the residential campus.

4.4.2 Laundry

Community washers & dryers will be located on the residential campus for those who do not wish to own those appliances.

4.5 Water

A community water system shall be developed and maintained rather than individually-owned wells.

4.5.1 Rainwater Harvesting

The community will supplement its available water resources by collecting and storing rainwater for later use.

4.6 Other Utilities

High speed internet access shall be provided to all residents and guests. All utility lines shall be underground. Biological wastewater treatment and graywater recycling would be desirable.

5.0 Broadening the Appeal

The appeal, viability, and vitality of the community will be greatly enhanced by accommodating and encouraging other lifestyle interests that are not incompatible with astronomy. For example, the community could be designed in such a way that makes it wonderfully bicycle friendly. Another example is amateur radio. Many enthusiasts have significant restrictions on radio antennas where they currently live, but perhaps the community could allow larger radio antennas and arrays that could be shared by interested members of the community, sited away from the living and observing areas.

5.1 Natural World In and Around the Community

The natural world in and around the community will be rich in geology, flora, and fauna. To be family-and-visitor-friendly, the community should consider the kind of philosophy that the Children and Nature Network (cnaturenet.org)

advocates. See also Rich Louv's "Leave No Child Inside" in the March/April 2007 issue of [Orion](#) magazine. For the eight-year olds in all of us, there's *always* something to learn outdoors at any time of day or night.

6.0 Sky Tours

Sky Tours will be available every evening for guests and local visitors. Programs will generally begin indoors 30 minutes prior to the half-hour nearest the end of astronomical twilight. A 30-minute indoor presentation will be followed by 90 minutes of outdoor observing activities, weather permitting, for a total program duration of 2 hours. On cloudy nights, the indoor presentation will be lengthened from 30 minutes to 1 hour.

Outdoor observing activities will consist of unaided eye viewing (e.g. constellation, star, and planet identification using a green laser pointer), binocular viewing (e.g. 15 x 70 binoculars on a binocular mount), and telescopic viewing.

6.1 Facilities and Equipment Needs

A classroom will be needed in the science education center for indoor presentations consisting of a projection screen, LCD projector, marker board, and comfortable seating. The science education center should be constructed so that a planetarium dome (the Star Theater) can be easily added when a high-quality used planetarium projector becomes available. In addition to the evening Sky Tour presentations, the classroom should also be used for a variety of daytime presentations and classes.

A green laser pointer is the only equipment needed for constellation identification and identifying other objects in the night sky.

15 x 70 Fujinon binoculars or equivalent "big binoculars" shall be mounted on a parallelogram binocular mount permanently mounted on a pier. When not in use, the binoculars, mount, and pier will be enclosed in a removable weatherproof cover.

A roll-off-roof observatory shall house a 10-inch to 16-inch catadioptric telescope on an equatorial fork mount. The telescope will be optimized for visual observing, have accurate go-to capability, and be mounted on a permanent pier.

All these facilities shall be handicap-accessible.

6.2 Fees

On clear nights, the Sky Tour fee will be \$10 per individual and \$20 per family for a 2-hour program. On cloudy or mostly-cloudy nights, the Sky Tour fee will be reduced to \$5 per individual and \$10 per family for a 1-hour indoor program.

6.3 Critter Deterrent

To keep rattlesnakes and other undesirable “critters” out of the public observing area, a rattlesnake-proof fence, at least three feet high, shall be erected around the observing area. The science education center and planetarium shall be located along the north side of the perimeter fence, with a door leading into the observing area. This will normally be the only way to enter and exit the observing area. An emergency exit on the south side of the perimeter fence will be installed.

6.4 Additional Structures

Two additional structures would be very nice to have: an elevated deck for meteor watching (reclining lawn chairs included!), and a circular observing bench (see Figures 1a & 1b).

6.5 Advanced Observational Astronomy Activities

Advanced star tours could also be offered to small groups of 1-4 people at an additional cost. These hands-on astronomy sessions might include learning to use a Dobsonian telescope, CCD astronomy, and advanced constellation identification, to name a few.

7.0 Development Phases

Phase One will focus on the development of the Visitor Campus (section 1.2.1), to provide income early in the project that will be used to help develop the rest of Mirador Astronomy Village.

8.0 Acknowledgements

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Figure 1a: Circular Observing Bench



Figure 1b: Circular Observing Bench with Observer

