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# Arizona Observatory - Executive Summary

**Mission:** Create a fully automated ASIAir-controlled observatory in Phoenix, Arizona, capable of unattended operation from sunset to sunrise.

**Approach:** Plan A (ASIAir ecosystem) with dual telescope setup plus wide-field DSLR capability.

## Current Status Assessment

### Equipment Ready for Automation ✓

* **ASIAir Plus Controller** - Perfect foundation for Plan A
* **2x ZWO EAF Focusers** - Native integration, temperature compensation
* **Telescopes** - Meade 8” SCT + William Optics Zenithstar 81 (excellent pair)
* **Cameras** - ASI533MC, ASI676MC, ASI462MC (all ASIAir native)
* **Nikon D5300** - Wide-field capability, ASIAir DSLR support confirmed
* **Wide-Field Lenses** - Rokinon 14mm, Samyang 85mm/135mm (piggyback setup)

### Critical Upgrade Required

**Mount:** Meade LX75 → **ZWO AM5N** ($2,500)

* **Why Essential:** LX75 cannot achieve unattended operation
* **AM5N Benefits:** No manual alignment, 20kg capacity, native ASIAir integration

### Observatory Infrastructure Needed

* **Dome System:** $5,000-15,000 (NexDome → ScopeDome options)
* **Automation Software:** Integrated with dome choice
* **Phoenix Considerations:** Monsoon protection critical

## Complete Budget Overview

### Phase 1: Essential Automation & Camera Upgrade

**Total: $5,548**

| Equipment | Item & Vendor | Price |
| --- | --- | --- |
| **Mount** | ZWO AM5N Mount (*High Point Scientific*) | $2,499 |
| **Mount Accessories** | Dual Telescope Platform (*ADM Accessories*) | $299 |
| **Camera Upgrade** | ASI2600MC Pro (*High Point Scientific*) | $1,800 |
| **Dew Control** | ZWO Dew Controller + Straps (*ZWO USA*) | $250 |
| **D5300 Integration** | Piggyback Mount + Cables (*William Optics*) | $200 |
| **Networking** | Ethernet + WiFi Setup (*Ubiquiti*) | $400 |
| **Cable Management** | USB Hub + Organization (*Amazon*) | $100 |
| **Software** | PixInsight + ASIAir (*Owned + Included*) | $0 |

### Phase 2: Observatory Structure (ACE SmartDome)

**Total: $8,600**

| Equipment | Item & Vendor | Price |
| --- | --- | --- |
| **Dome Structure** | Observa-Dome 8ft (*Observa-Dome*) | $5,000 |
| **Automation** | ACE SmartDome Controller (*ACE Controllers*) | $1,500 |
| **Installation** | Professional Setup (*Local Contractor*) | $1,500 |
| **Power Solutions** | 12V System + Distribution (*Pegasus Astro*) | $300 |
| **Weather Station** | Davis Vantage Vue (*Davis Instruments*) | $300 |

### Phase 3: Optional Enhancements

**Total: $1,750**

| Equipment | Item & Vendor | Price |
| --- | --- | --- |
| **Filter Wheel** | ZWO EFW 8-Position (*High Point Scientific*) | $450 |
| **Additional Filters** | LRGB Filter Set (*Optolong*) | $300 |
| **UPS Backup** | LiFePO4 Battery System (*BattleBorn*) | $400 |
| **Software Upgrades** | TheSkyX + TeamViewer (*Various*) | $600 |

### **Grand Total: $15,898**

*Complete professional-grade automated observatory with dual-band Hubble Palette capability*

## Simplified Approach Benefits

* **ASI2600MC** - Keep all color cameras, no monochrome complexity
* **Single Filter** - L-Ultimate dual-band, no filter wheel needed initially
* **ASI462MC** - Keep current planetary camera, proven performer
* **Dual-Band Processing** - Near-Hubble palette without traditional narrowband setup

## Processing Capabilities

### Current Strengths with PixInsight

* **RGB Channel Separation** - Extract R/G/B from ASI2600MC for individual processing
* **Dual-Band Processing** - Use Optolong L-Ultimate for pseudo-Hubble palette
* **Wide-Field Excellence** - D5300 + lens collection for constellation work
* **Professional Workflows** - Advanced color grading and noise reduction

### Hubble Palette Options

1. **Current Setup** - Pseudo-Hubble using dual-band filter + channel extraction
2. **Future Upgrade** - True Hubble with ASI294MM Pro + narrowband filters ($2,150-2,700)

## Observatory Configuration

### Final Automated Setup

* **Mount** - ZWO AM5N (dual telescope platform)
* **Primary Telescope** - Zenithstar 81 + ASI533MC (wide-field deep sky)
* **Secondary Telescope** - 8” SCT + ASI676MC (narrow-field deep sky)
* **Guide System** - 50mm scope + ASI462MC (proven combination)
* **Wide-Field System** - Nikon D5300 piggyback on Zenithstar
* **Control** - Single ASIAir Plus controlling all systems
* **Dome** - Automated with weather integration

### Operational Workflow

1. **Sunset** - Dome opens automatically, systems power up
2. **Evening** - ASIAir Plan Mode executes imaging sequences
3. **Night** - Unattended operation across multiple targets
4. **Dawn** - Automatic park and dome closure
5. **Processing** - PixInsight workflows for professional results

## Phoenix-Specific Advantages

### Climate Benefits

* **Excellent Seeing** - 250+ clear nights per year
* **Stable Conditions** - Minimal atmospheric turbulence
* **Winter Imaging** - Perfect conditions October-April
* **Low Humidity** - Reduced dew issues (but still need dew control)

### Challenges Addressed

* **Monsoon Season** - Dome protection July-September
* **Summer Heat** - Equipment shutdown protocols
* **Light Pollution** - Narrowband filter strategies

## Implementation Timeline

### Week 1-2: Planning

1. **Site Survey** - Optimal dome placement in yard
2. **Budget Finalization** - Confirm Phase 1 funding
3. **Vendor Research** - Get dome installation quotes

### Month 1: Essential Upgrades

1. **Order ZWO AM5N Mount** + mounting accessories
2. **Upgrade Dew Control** to ASIAir-compatible system
3. **Integrate Nikon D5300** with piggyback mounting

### Month 2-3: Observatory Structure

1. **Dome Selection & Order** (3-6 month lead time typical)
2. **Site Preparation** (concrete pad, electrical)
3. **Automation Integration** setup and testing

### Month 4+: Advanced Features

1. **Filter Wheel Addition** for automated sequences
2. **Camera Upgrades** based on experience and budget
3. **Advanced Processing** workflow development

## Success Metrics

### Phase 1 Success: Basic Automation

* Unattended imaging sessions (sunset to sunrise)
* Dual telescope operation
* Wide-field DSLR integration
* Reliable focusing and guiding

### Phase 2 Success: Observatory Automation

* Weather-responsive dome operation
* Remote monitoring and control
* Seasonal imaging scheduling
* Equipment protection during monsoons

### Phase 3 Success: Advanced Imaging

* True Hubble Palette capability
* High-resolution deep sky imaging
* Professional-grade processing workflows
* Consistent image quality and output

*Document prepared: August 3, 2025*  
*Observatory Status: Planning Phase - Ready for Phase 1 Implementation*