

# **Review of Museum of Nature and Science Master Plan**

## Museum of Nature & Science (MoNaS) Relocation Project Timeline Summary

**1983:** Museum of Natural History founded by local volunteers as a satellite / outreach site for the New Mexico Museum of Natural History in Albuquerque. Museum was originally & is currently located in the Mesilla Valley Mall.

**2010:** *Current Cost of Rental Space in MV Mall: \$ 5,059.87 (Month); \$ 60,718.44 (Annual)*

**5/26/1986:** City of Las Cruces assumes operation of the museum.

**1998:** State Legislature authorizes funding for a *Museum Expansion Feasibility Study*.

**2000:** Feasibility Study completed by Rohde-May-Keller-McNamara Architects & Logic Inc.  
Cost: \$ 20,502.35

### Main Recommendations:

1. "Cultural co-location with other related institutions at a favorable location." (pg. 29)
2. 7 potential sites rated; the 4 top rated sites are downtown. (pg. 42)
3. Recommended annual operating budget in 2000: \$ 667,000
  - Actual annual operating budget in 2009-2010: \$ 391,791
4. 2000 staffing level recommendations: 10 F/T staff, 3 P/T staff (pg. 43)
  - 2010 actual staffing levels: 4 F/T staff
5. Project cost estimation in 2000: \$ 2,400,000 - \$ 4,000,000 (pg.85)  
Project cost adjusted to 2010: \$ 3,000,000 - \$ 5,000,000

Museum Attendance in 2000: 75,000 visitors; est. (pg. 1)

Museum Attendance in 2006: 130,696 (Baseline)

Museum Attendance in 2007: 144,231 (Up 10%)

Museum Attendance in 2008: 158,097 (Up 9.61%)

Museum Attendance in 2009: 169,126 (Up 6.9%)

**2004:** Search for acceptable property begun.

**2007:** Spring: 411 N. Main identified as ideal museum property and negotiations begun.

**2007:** Summer: Stakeholder meetings re: property acquisition, held in June, July & August at T.B. Memorial Library, Branigan Cultural Center, and Rio Grande Theatre.

*Primary stakeholders: Foundation for Las Cruces Museums; Paleozoic Trackways Foundation; Southern New Mexico Natural History Foundation; Dona Ana Arts Council; Las Cruces Downtown; Bureau of Land Management*

**8/20/2007:** City Council authorizes land swap for museum property. City closes on the property in early February, 2008.

**3/2008:** Museum planning team established: 7 members meet monthly through 2009. In 2010 the planning team meets primarily within the consultant planning process.

**4/7/2008:** City Council authorizes new museum mission, logo & name change to Museum of Nature & Science (MoNaS)

**6/16/2008:** City Council work session examines LEED issues with proposed new museum: directive given to pursue energy efficiency as a model and an educational mission.

- 2/2009:** February – April: Preliminary Space Usage Plan developed by Steve Newby Architects & Logic Inc. Cost: \$44,400. Remaining balance of Capital Outlay = \$ 55,600. Reversion Date: 6/20/2011.
- 3/3/2009:** Stakeholders meeting: 6 - 7:30 PM, Railroad Museum (*Museum Foundations*)
- 3/4/2009:** Stakeholders meeting: 6 – 7:30 PM, RR Museum (*Trackways Foundation, BLM, LCDT*)
- 5/11/2009:** City Council adopts Preliminary Space Usage Plan.
- 8/2009:** Museum conducts random visitor surveys: *Desired Science Topics & Programs – Stage 1:* 305 surveys received.
- 9/2009:** Museum conducts random visitor surveys: *Desired Science Topics & Programs – Stage 2:* Based on refined results from Stage 1 survey. 95 surveys received.
- 9/21/2009:** City Council approves Master Plan development contract through Riech+Petch Design International. Cost: \$ 187,523.00 (Capital Outlay)
- 10/21/2009:** SHPO (State Historic Preservation Officer) issues an opinion approving rehab of 411 N. Main, as a building of "...no significant historical value".
- 10/28/2009:** Stakeholders meeting with planners: 6 – 7:30 PM, Railroad Museum
- 11/2009 – 4/2010:** *Formal planning process stopped due to state recall of project funding.*
- 12/2009 – 3/2010:** Museum conducts random visitor surveys: *Bilingual Preferences in Labels & Graphics.* 457 surveys received.
- 4/12/2010:** Planning resumes with meeting at New Mexico Museum of Natural History & Science in Albuquerque. Attending: R+P Design Intl., City Museums, BLM, re: Trackways elements.
- 5/26/2010:** Public input meeting to review Master Plan draft at City Council Chambers: 6 – 7:30 PM.
- 6/14/2010:** City Council reviews and comments on Master Plan draft at Work Session.
- 7/6/2010:** *Master Plan to be presented to City Council for adoption.*

**Tentative Construction Schedule:**

- 6/2010:** RFP for Design of Bldg. (A, E & M) to SAC in June 2010.  
RFP for Design, Fabricate, & Install of museum exhibit components to SAC in June 2010
- 7/2010:** RFPs issued
- 8/2010:** SAC review
- 9/2010:** City Council consideration of contracts
- 9 – 12 – 2010:** Contracting: Sept – Dec.
- 1 – 3 – 2011:** Construction Drawings developed: Jan.- Mar.
- 3 - 4/2011:** Start date for building rehab. & refit.
- 8/2012** Museum Opening

## MoNaS Funding Timeline:

### Project Funding:

General budget:

State Legislative Allotments:	\$ 330,000
HUD/BEDI Grant:	\$ 2,000,000
HUD/BEDI Loan:	\$ 2,000,000
DOE/ARRA Grant:	\$ 800,000 (Net after administrative charges of \$88,000 deducted.)

Total funds received:	\$ 5,130,000
Value of property:	<u>540,000</u>

Total project projection: \$ 5,670,000

Potential contribution by Bureau of Land Management: \$ 200,000 (2010) + \$ 150,000 (2011) exclusively for Trackways exhibit and interpretation use.

General estimate of total budget division for project:

60% - Building rehab = approx.: \$ 3,000,000

40% - Exhibit components = approx.: \$2,000,000

### BEDI/HUD Funding Process & Timeline:

- 3/17/ 2009:** Public hearing at the Museum of Art (6PM – 7PM) on the Section 108 Loan Amendment to the City's Consolidated Plan and the project
- 4/20/ 2009:** Resolution 09-237 passed by the City Council, authorizes several things:
1. Amends the HUD-approved, City Consolidated Plan to utilize the Section 108 program,
  2. Approves and authorizes the submission of a Section 108 Loan application specific to the Museum project,
  3. Authorizes staff to develop and submit a BEDI grant application, when issued by HUD, for the Museum project, ,
  4. Designates the Mayor as the official representative of the City to both the loan documents and the BEDI Grant submission, and
  5. Authorizes the Mayor to sign the necessary documents as the official representative subject to necessary Council approvals (i.e. any future loan agreements or grant agreements)
- 6/9/ 2009** BEDI Grant and HUD 108 Loan application submitted to HUD
- 8/24/ 2009:** Official HUD notice on the BEDI Grant Award
- 8/25/ 2009:** Mayor signs preliminary award notice/acceptance per resolution 09-237 for the BEDI Grant award (essentially a reservation of the grant funds)
- 5/17/ 2010:** HUD 108 Loan acceptance Ordinance #2576 – 1<sup>st</sup> reading; City Council
- 5/24/ 2010:** HUD 108 Loan acceptance Ordinance #2576 – final adoption by City Council
- 5/26/ 2010:** Mayor signs loan documents per Ordinance #2576
- 7/6/ 2010:** *Resolution for acceptance of BEDI Grant to be presented to City Council*

**Dept. of Energy / ARRA Funding Process & Timeline:**

- 2/2009:** Museums advised that DOE/ARRA funding is available for an energy program at MoNaS.
- 2 – 3 - 4/ 2009:** Numerous planning sessions with CLC staff & NMSU Depts.
- 4/16/ 2009:** *"Energy Efficiency & Conservation Strategy for Units of Local Govt. & Indian Tribes"* submitted to Dept. of Energy prior to award.
- 6/19/ 2009:** EPA: NEPA Environmental Questionnaire submitted.
- 9/8/ 2009:** City Manager signs DOE/ARRA application for submittal.
- 9/21/ 2009:** City Council approves DOE/ARRA award acceptance.
- 2/ 2010:** Roof work at MoNaS underway to meet DOE start deadline.

**State Legislative Outlay Summary:**

- 1998:** \$ 20,000 for Natural History Museum Exp. Feasibility Study. (Grant # Unknown)
- 2007:** \$ 100,000 for Trackways Exhibit, Plan, Design Construct.  
(Balance = \$ 55,600; reversion date: 6/2011 (07-5207))
- 2007:** \$ 30,000 for Museum signage and security. Balance: - 0 - (07-526)  
(Balance = \$ 728.80 reverted to state during freeze, 2009-2010)
- 2008/2009:** \$ 180,000 for Museum of Nature & Science, Plan, Design, Construct:  
(Balance = - 0 - ) (Orig. # 08-4289, converted to # 09-3878)  
Reversion date: 6/2013
- \$ 330,000 total

DRAFT

MUSEUMS



City of Las Cruces



MASTER PLAN REPORT – JUNE 14, 2010

# LAS CRUCES MUSEUM OF NATURE AND SCIENCE



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## DIRECTOR'S FOREWORD

The Las Cruces Museum of Natural History, founded in the mid-eighties by a passionate and dedicated group of citizen volunteers, became part of the City's Museum System a few years later. The Museum, located in a small retailing space in a shopping mall, now attracts an average of 150,000 visitors per year.

In 2000, a feasibility study concluded there was considerable public support for expanding the museum, and relocating it downtown in Las Cruces. The process of finding a suitable location culminated in 2007 with the acquisition of an existing building next to the Museum of Art and the Branigan Cultural Center on a redeveloping Main Street. This new property will allow an expansion from the current 3,900 square feet in the mall to a planned 8,900 square feet. After a successful funding campaign, a preliminary plan was developed in early 2009; this Museum Master Plan is the logical next step.

Although the museum is called a natural history museum, in fact it has always been more of a nature center, concentrating on the display of living animals. In response to the needs of local schoolchildren, the emphasis has gradually expanded to increase the presentation of science topics. As a result of this change, the museum has adopted a new name

and a new mission. The new museum will be called the Museum of Nature & Science, or MoNaS. The mission of MoNaS is to...

*...inspire curiosity about the sciences, facilitate life-long learning, and promote stewardship of the natural environment of the Chihuahuan Desert and southern New Mexico.*

This mission is the guiding principle behind all our exhibits, collections, and programming. The ultimate goal is to provide an integrated museum experience that enables visitors not only to gain an appreciation of the interrelationship between the sciences and the environment, but also to become inspired by a passion to preserve the Chihuahuan Desert and the natural world. The science and nature topics presented in the museum will be focused on, or directly related to our local environment—the desert.

The museum building is being developed in accordance with the latest, environmentally sound “green” principles. These green elements will be interpreted within the museum, making the building itself an exhibit and living laboratory.



The new museum will illustrate the ease of living in harmony with our environment, and will place this institution at the forefront of environmental education, sustainability, and stewardship in the Southwest.

This Master Plan presents a vision for exhibits and programming that will lead us to the successful development of a new state-of-the-art museum for Las Cruces, and the achievement of our mission.

**Will Ticknor**  
 Director of Museums  
 City of Las Cruces



## EXECUTIVE SUMMARY

The new Museum of Nature and Science will occupy a renovated building in downtown Las Cruces.

The 8,900 square foot facility will include workspaces for Museum staff, programming spaces (Discovery Center and Classroom) and 5,220 square feet of exhibition area. Here visitors will be able to encounter exciting displays on topics such as global processes, astronomy, the Chihuahuan Desert, principles of physical and environmental science, and the Permian Trackways.

In the first phase of the renovation, the Main Street side of the building will be enlarged, and a new linking structure built to provide essential shared facilities (shop, loading dock, café) for both MoNaS and the adjacent Museum of Art. In the second phase, a 1,500 square foot changing exhibits gallery will be added, allowing both institutions to share a large changing exhibits space.



## PROJECT GOALS

### Institutional goals:

- Provide visitors to the new MoNaS facility with a rich and engaging experience
- Attract new and repeat visitors to substantially increase attendance
- Provide teachers and their students with experiences that complement science elements in the local curriculum
- Forge partnerships with other institutions and groups with common interests

### Content goals:

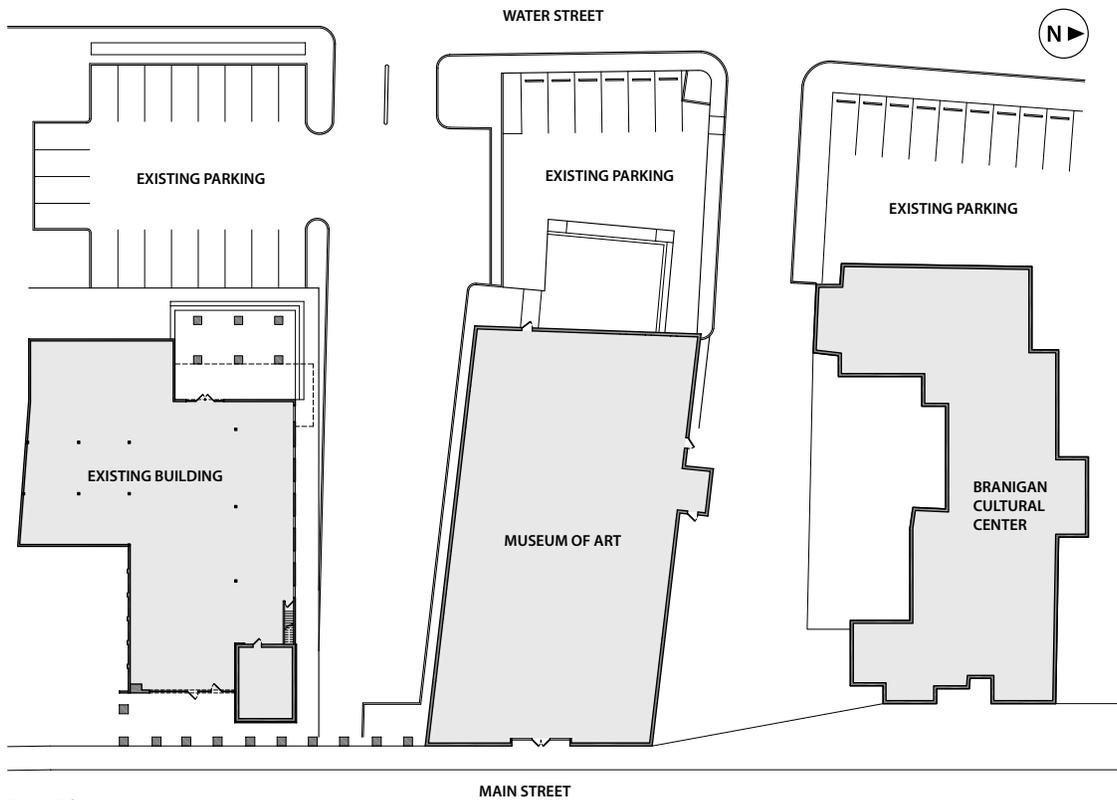
- Introduce the visitor to the variety and complexity of life in the Chihuahuan Desert
- Communicate the excitement and significance of the Permian trackways found near Las Cruces in the Robledo Mountains
- Offer visitors a chance to see typical and unique living animals from the Chihuahuan Desert
- Convey basic concepts in the physical sciences
- Communicate the importance of Southern New Mexico in the development of space science





## BUILDING ANALYSIS

The Museum of Nature and Science (MoNaS) is part of a cultural complex of three buildings, along with the Las Cruces Museum of Art, and the Branigan Cultural Center. Together these institutions will play an important part of the redevelopment of Main Street, and the revitalization of downtown Las Cruces. A link between the MoNaS and Museum of Art buildings (to be undertaken in phases) will create both cultural critical mass, and an improved visual presence on Main Street.

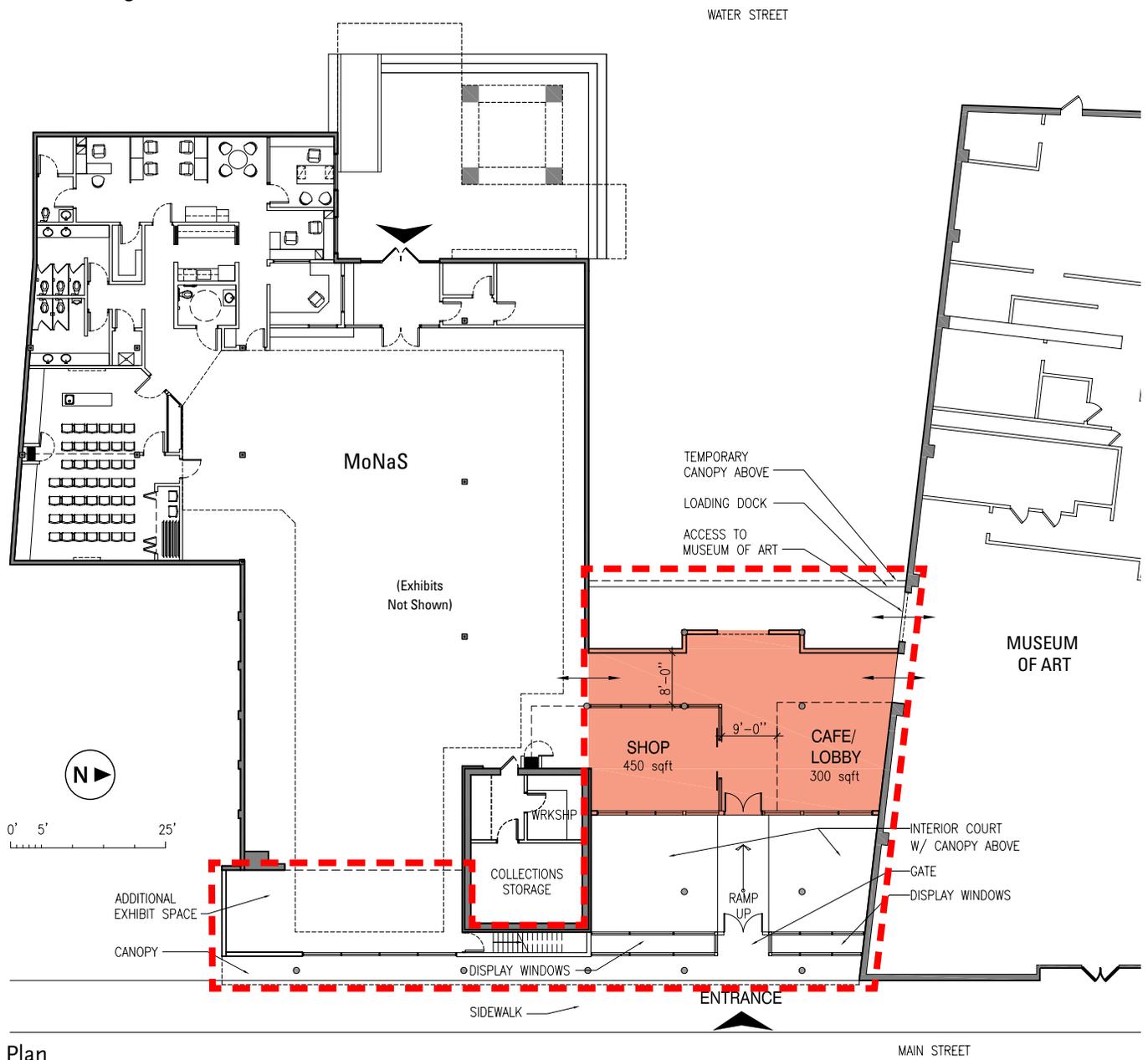


Site Plan

### ADDING SPACE: PHASE 1

Several schemes for adding space to the current building footprint were examined, but filling in the vacant space between MoNaS and Museum of Art has the most potential. New-built central space will provide the two institutions with new, shared facilities—in Phase 1 a shop on Main Street, a café/lobby and a loading dock, with a connecting corridor providing a new visitor entrance to each building.

KEY	
	Space to be added in Phase 1

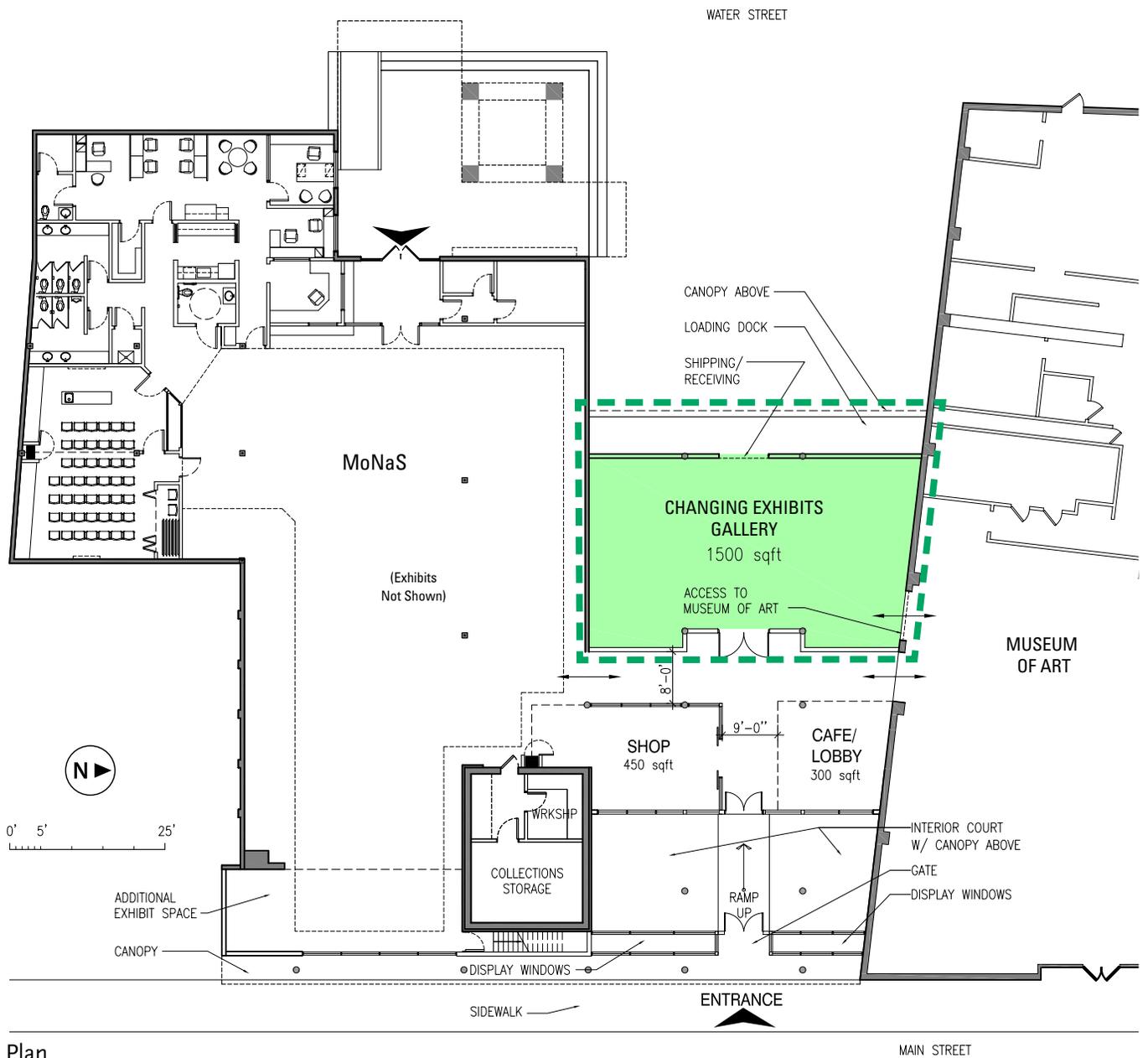


Plan

ADDING SPACE: PHASE 2

Eventually the connecting corridor will provide access to a new 1,500 square foot temporary exhibit hall built between the buildings. By combining this space with the adjacent temporary exhibition space in the Museum of Art, the two institutions will be able to accommodate large traveling exhibits requiring up to 5,000 square feet.

KEY	
	Space to be added in Phase 2



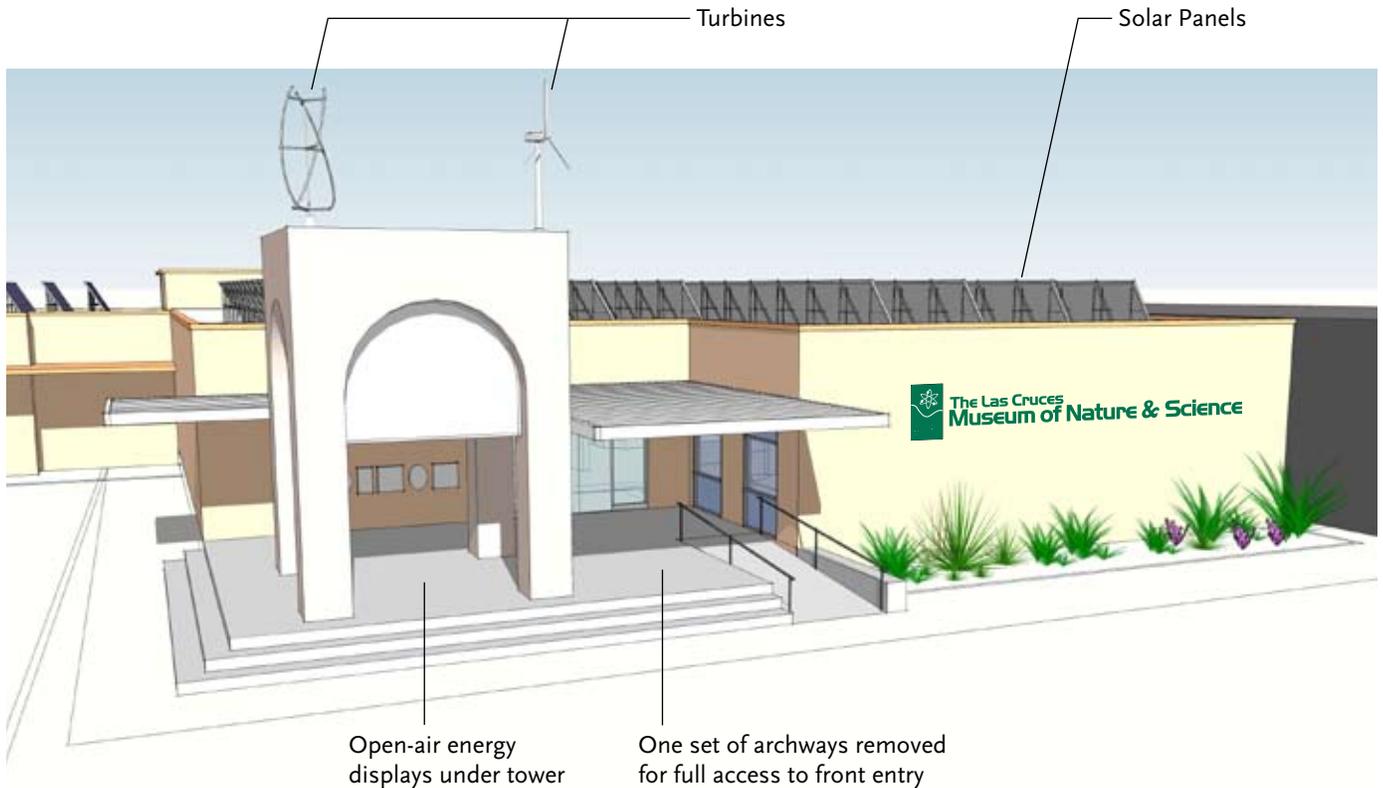
Plan

## EXTERIOR IMPROVEMENTS: WATER STREET

The Water Street frontage will be modified to improve access to the entrance and relocate the ramp nearer to designated handicapped parking spaces. The entrance is to be given prominence by adapting one of the two existing archways to become a free-standing tower. An expanded canopy will create more shade; underneath the tower, exhibits will deal with how the energy use of the building demonstrates principles of sustainability.



Existing Water Street Elevation



New Water Street Elevation

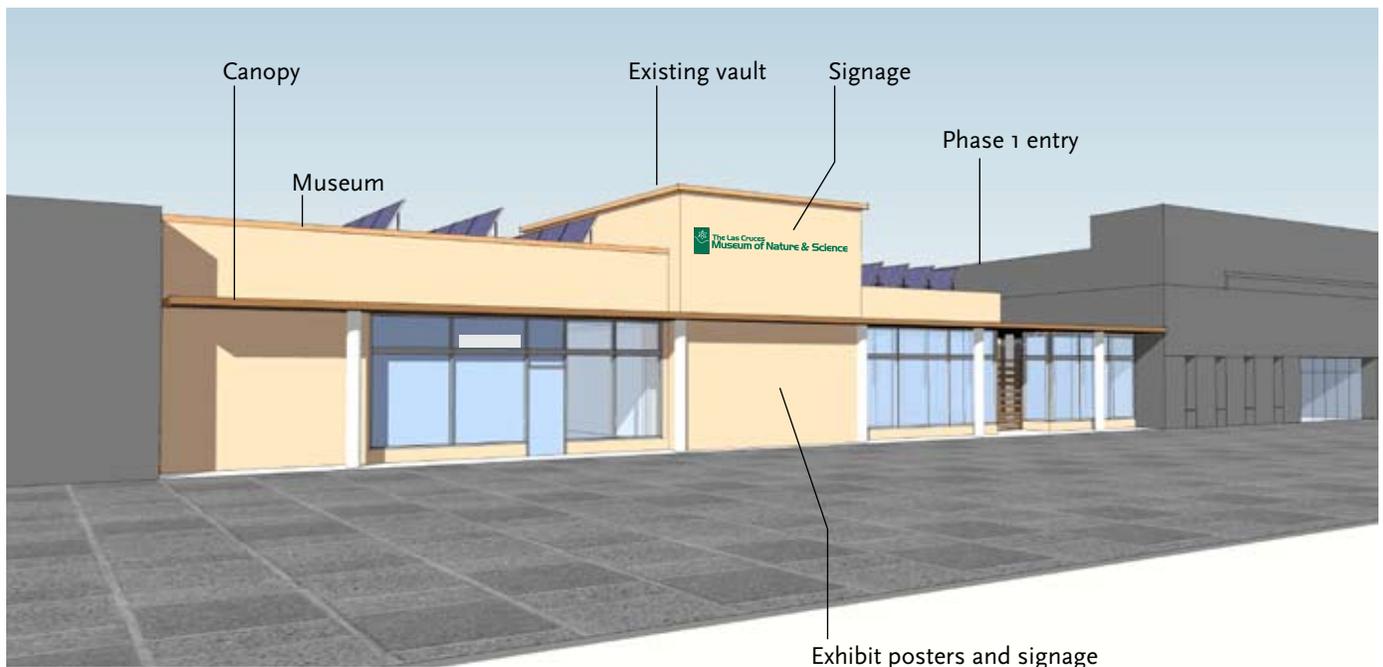
## EXTERIOR IMPROVEMENTS: MAIN STREET

The Main street façade is to be modified to be more visually sympathetic to the retail environment and streetscape of which it is part, by the addition of canopies, retail display windows and signage.

The existing arches are removed to provide a new appearance to the Main Street facade, one that is more in keeping with a modern museum and more closely related to the Museum of Art.



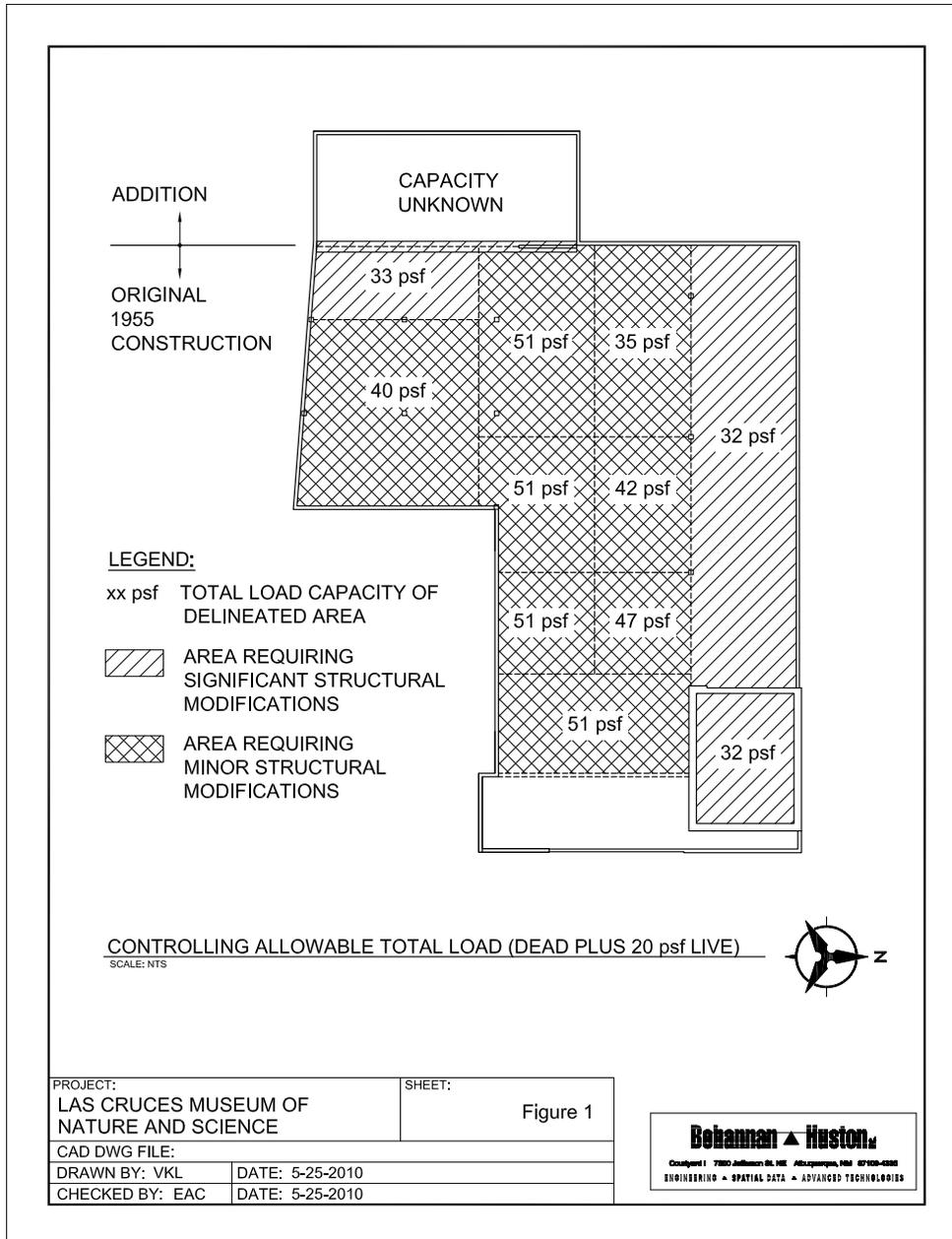
Existing Main Street Elevation



New Main Street Elevation

## STRUCTURAL, MECHANICAL, ELECTRICAL AND ROOF PLANS

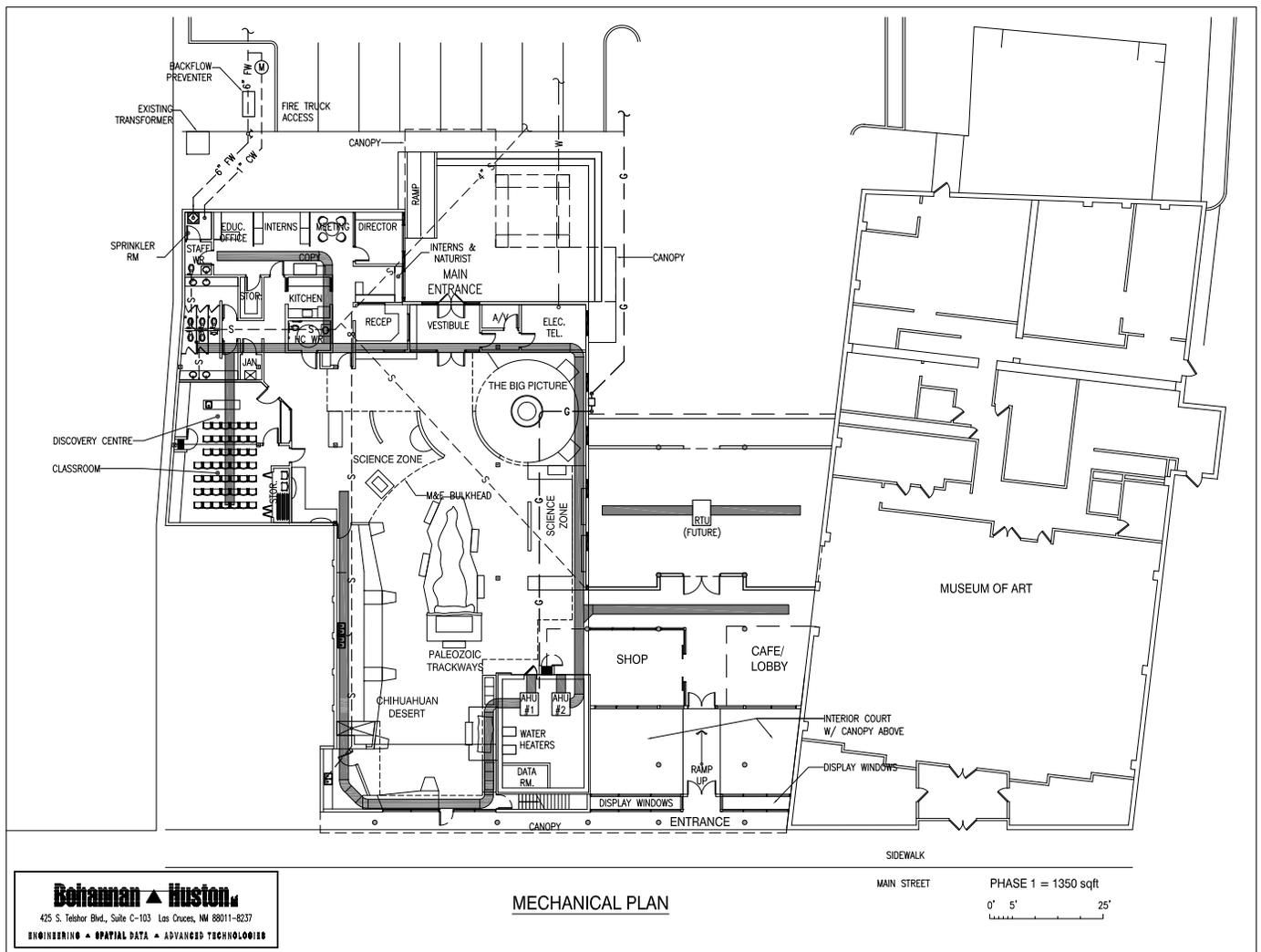
**Structural Plan:** The existing building shell and roof structure is retained with new openings cleared for circulation and access. Some roof areas will be reinforced to accomodate increased loading and equipment.



## STRUCTURAL, MECHANICAL, ELECTRICAL AND ROOF PLANS

**Mechanical Plan:** A natural gas-fired hot water system will provide heating supply, air, and 20 tons of cooling load, will provide air-conditioning by perimeter duct work to all areas of the building.

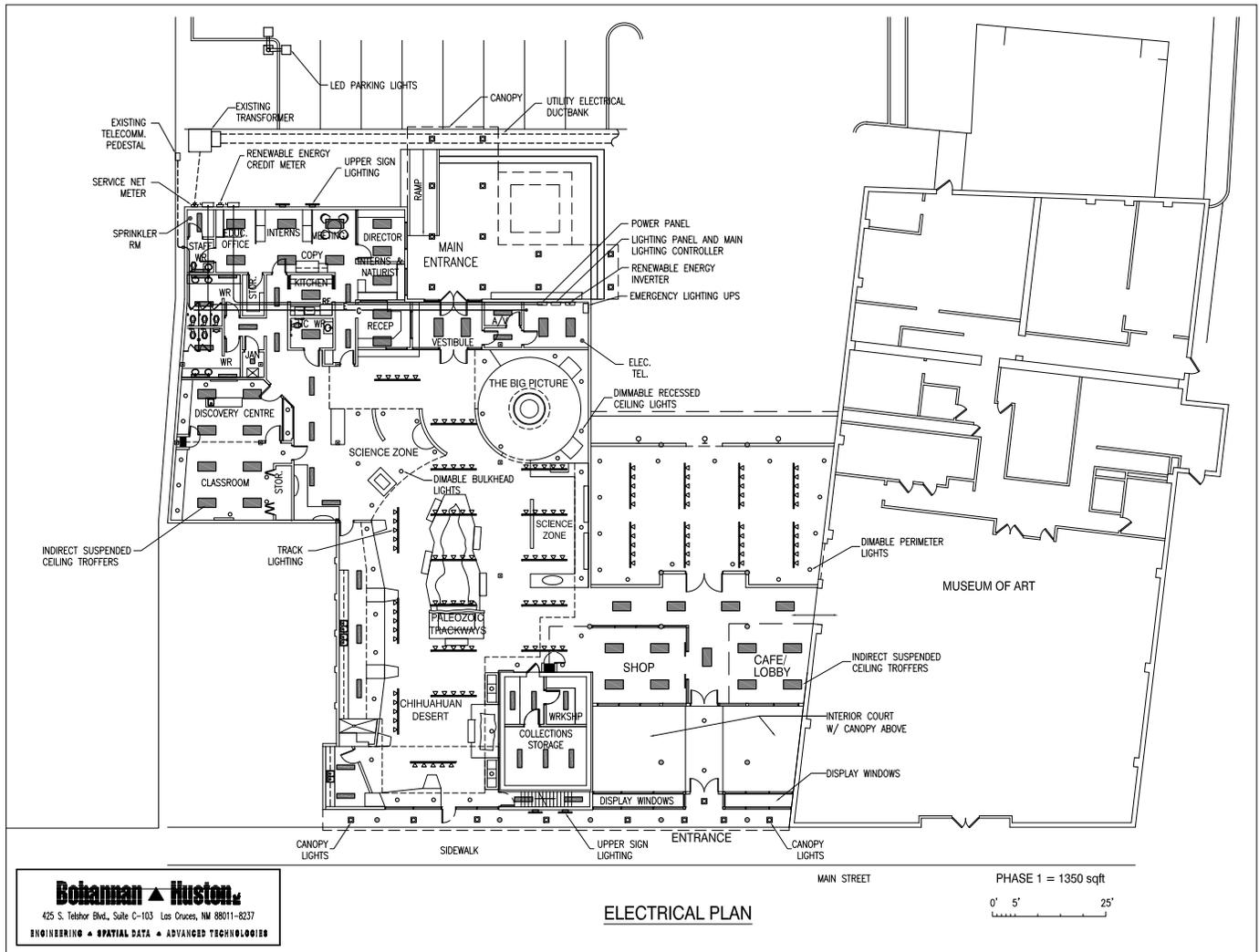
The building will be provided with a sprinkler system network with fire alarm system. New sewer piping under the floor will serve the new washrooms and back-of-house service areas.



## STRUCTURAL, MECHANICAL, ELECTRICAL AND ROOF PLANS

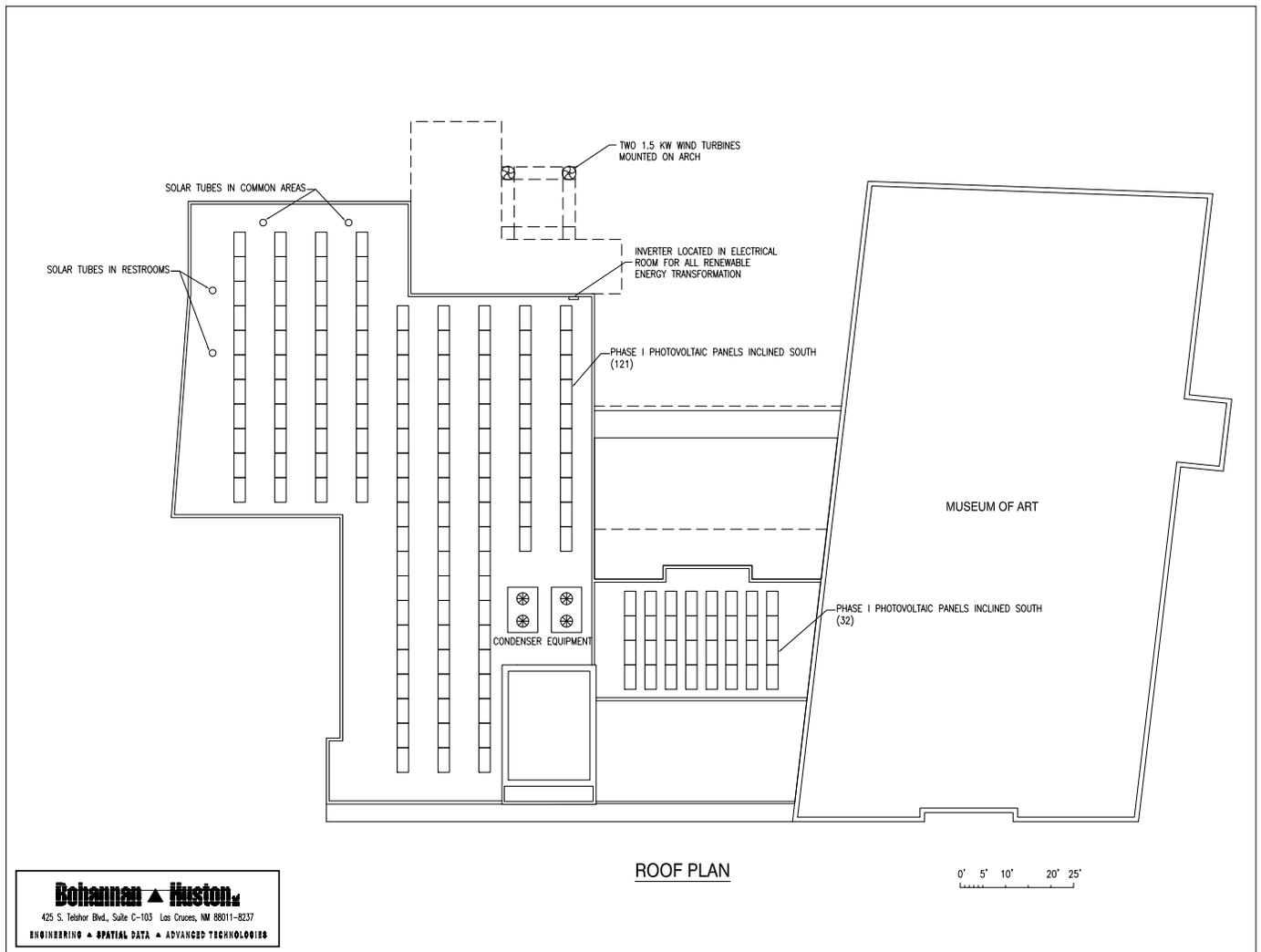
**Electrical Plan:** A new 600 amp service will provide power to the new building via a new electrical room located in the northwest corner of the building.

The existing 300 KVA transformer will be maintained. There will be new lighting for offices and exhibits throughout utilizing energy-efficient lighting to reduce loads and heat.



## STRUCTURAL, MECHANICAL, ELECTRICAL AND ROOF PLANS

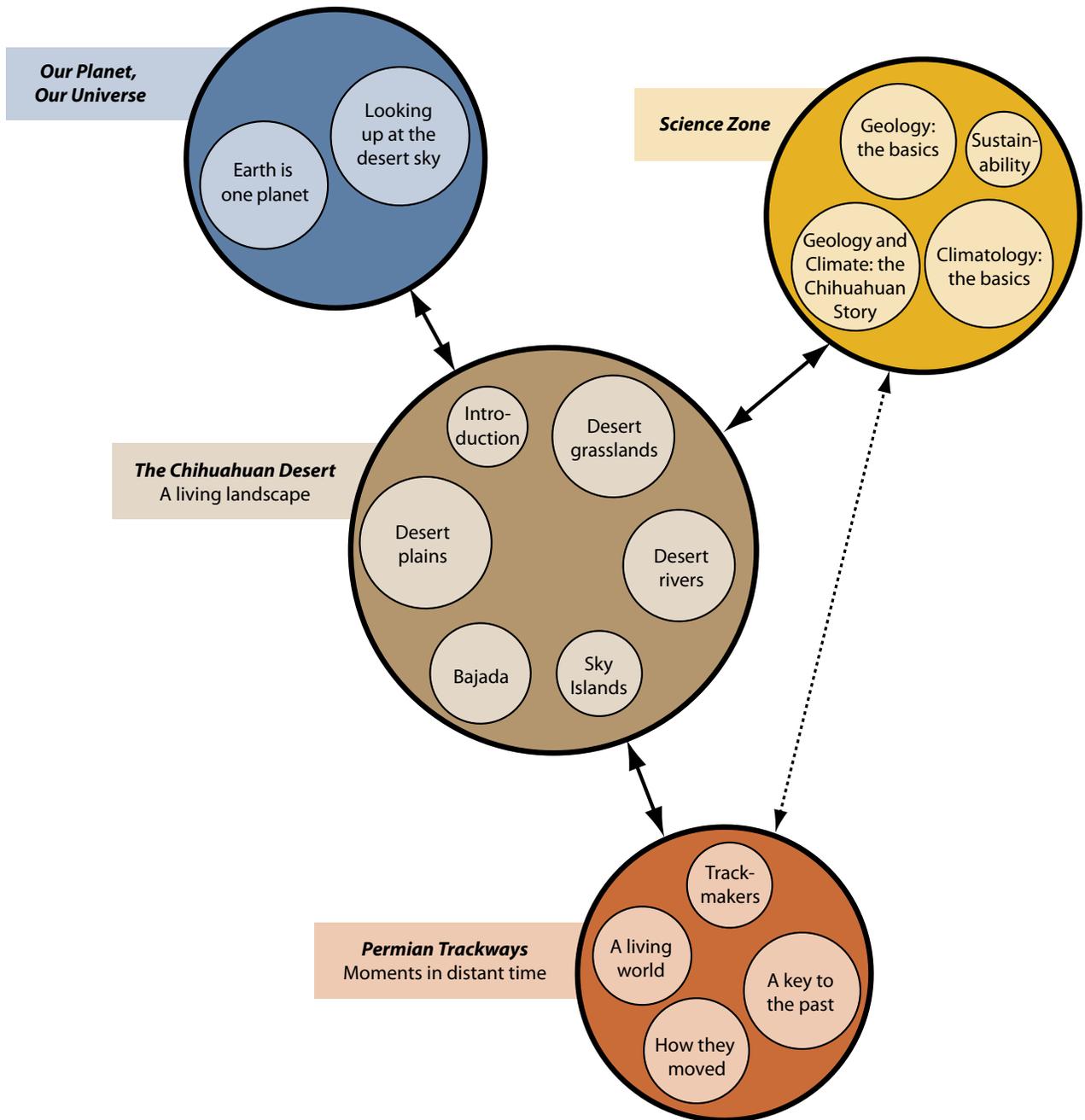
**Roof Plan:** The renovation and refurbishment of the building is intended to create a LEED-qualified facility, using the available funds to the best effect. A detailed analysis of the possible structural, mechanical and electrical changes by Bohannan Huston has identified areas where renovations can improve the building for its new purpose as a museum, and gain credits needed for LEED certification. The resulting operational benefits would improve energy performance by 20%, use renewable energy from photovoltaic cells to generate 11% of the building's total energy requirements, and reduce water usage by 30%.



**Bohannan Huston**  
 425 S. Telator Blvd., Suite C-103 Los Cruces, NM 88011-8237  
 ENGINEERING • SPATIAL DATA • ADVANCED TECHNOLOGIES

## CONCEPTUAL ORGANIZATION

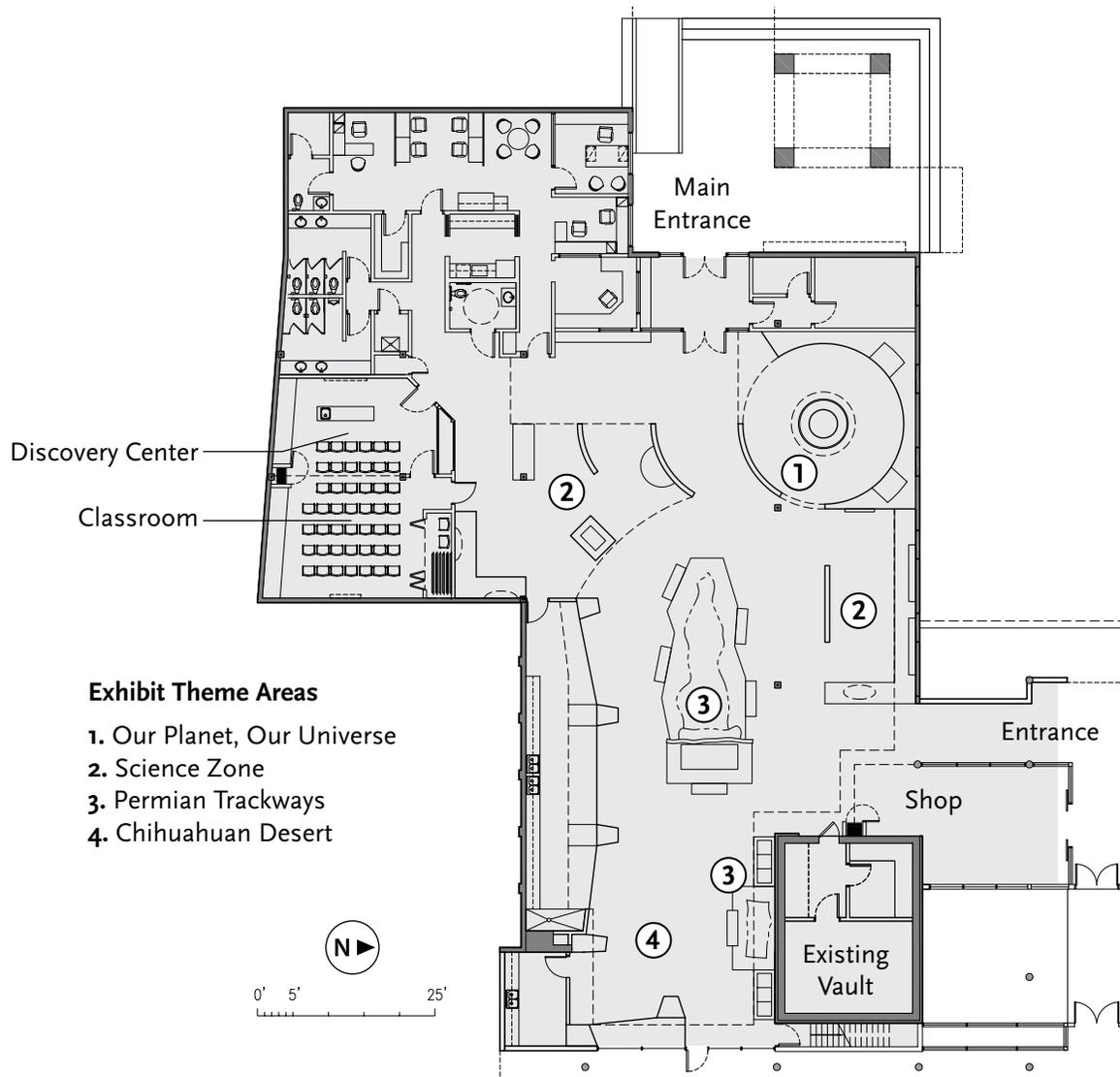
This diagram expresses the relationship between ideas to be communicated in the MoNaS exhibits. There are four big ideas, each divided into sub-messages—the diagram shows that these ideas are not intended to be encountered in a particular sequence, but can be seen in any order. The Communications Plan in this document outlines the messages for each bubble.





## EXHIBIT DESIGN

The Exhibit Hall is an open plan, flexible display space, so that visitors are always aware of where they are in relation to where they entered. Visitors can enter the exhibit hall from two entrances, and visit the four theme areas (Our Planet, Our Universe, Science Zone, Chihuahuan Desert, and Permian Trackways) in any order they wish. All the exhibits will conform to the requirements of the Americans With Disabilities Act (ADA), offering access to visitors with physical, visual and hearing disabilities.



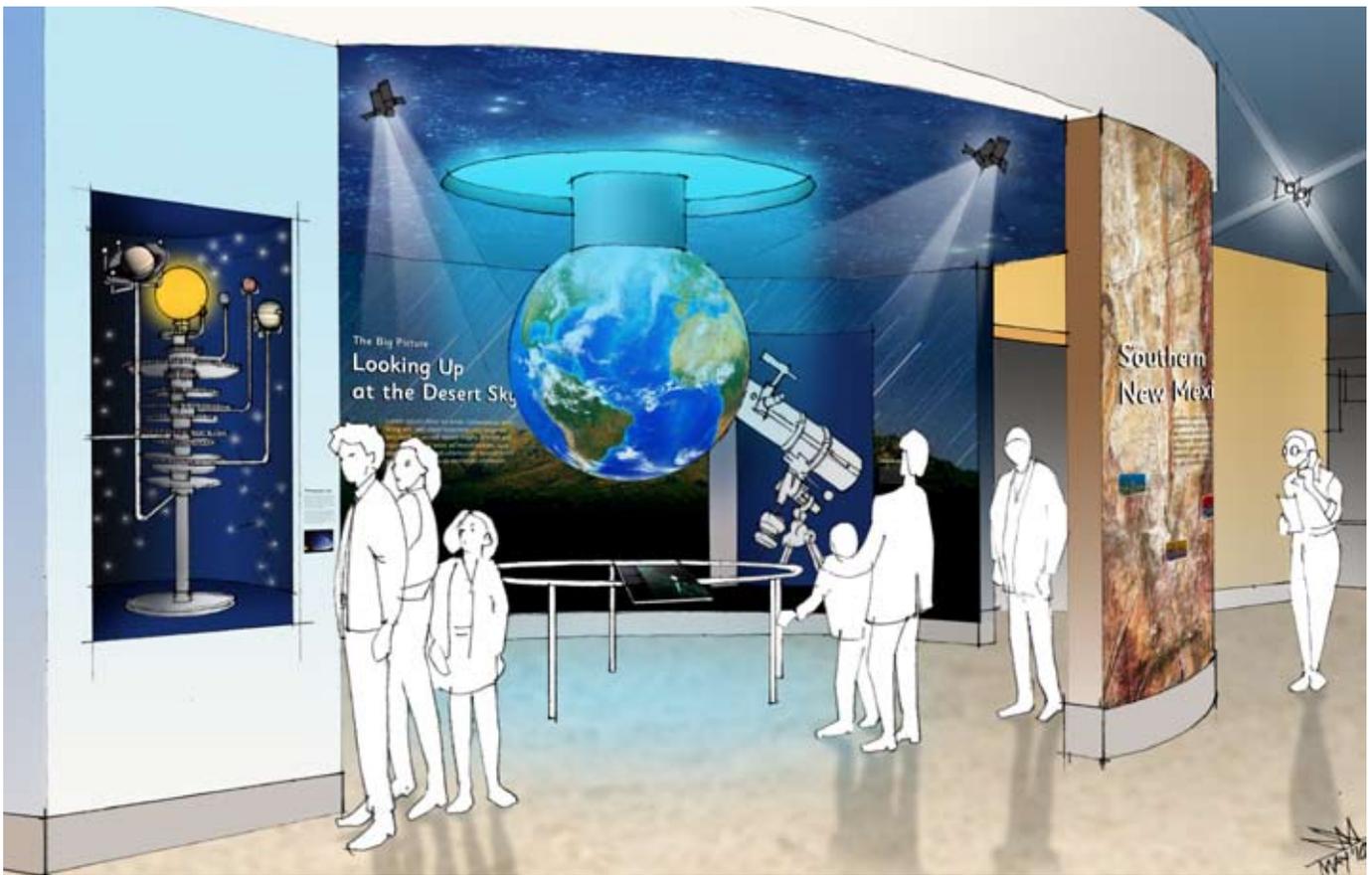
- Exhibit Theme Areas**
1. Our Planet, Our Universe
  2. Science Zone
  3. Permian Trackways
  4. Chihuahuan Desert

Plan



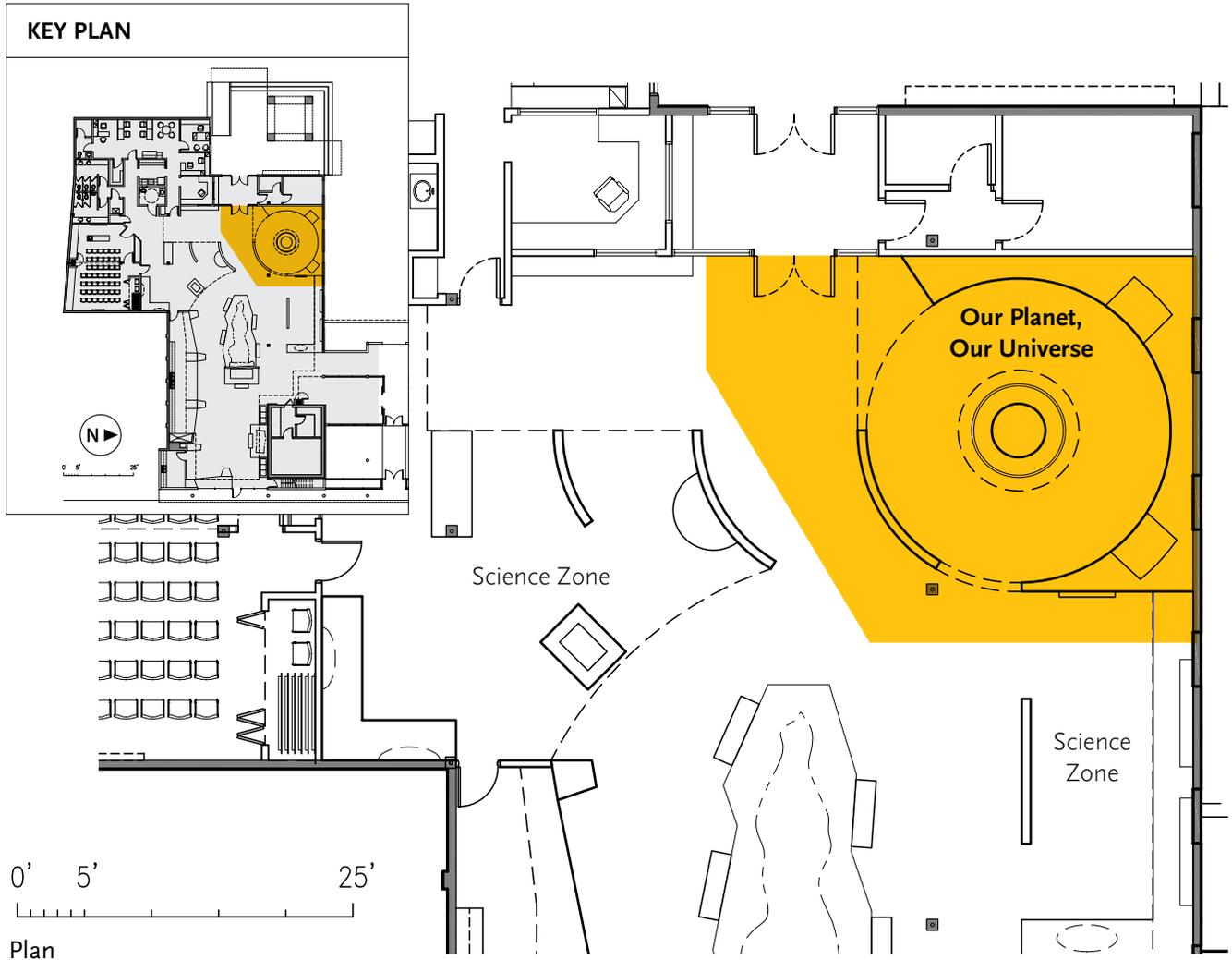
## OUR PLANET, OUR UNIVERSE

**Visitor Experience:** For most visitors this area will be the first exhibit experience in the Museum. Here they encounter a floating interactive sphere that shows how global processes operate on Earth—processes such as plate tectonics and climate change. The area surrounding the globe explores the ways humans have looked up to the sky, from early Amerindian sky-watchers to astronomers past and present, including local hero Clyde Tombaugh.



Suspended projection globe with surrounding exhibits

OUR PLANET, OUR UNIVERSE



**Education links**

The exhibits in this area will address two key New Mexico curriculum benchmarks in Earth and Space Science: *Know the structure and formation of Earth and its atmosphere and the processes that shape them, and Know the structure of the solar system and the objects in the universe.*

**Program opportunities**

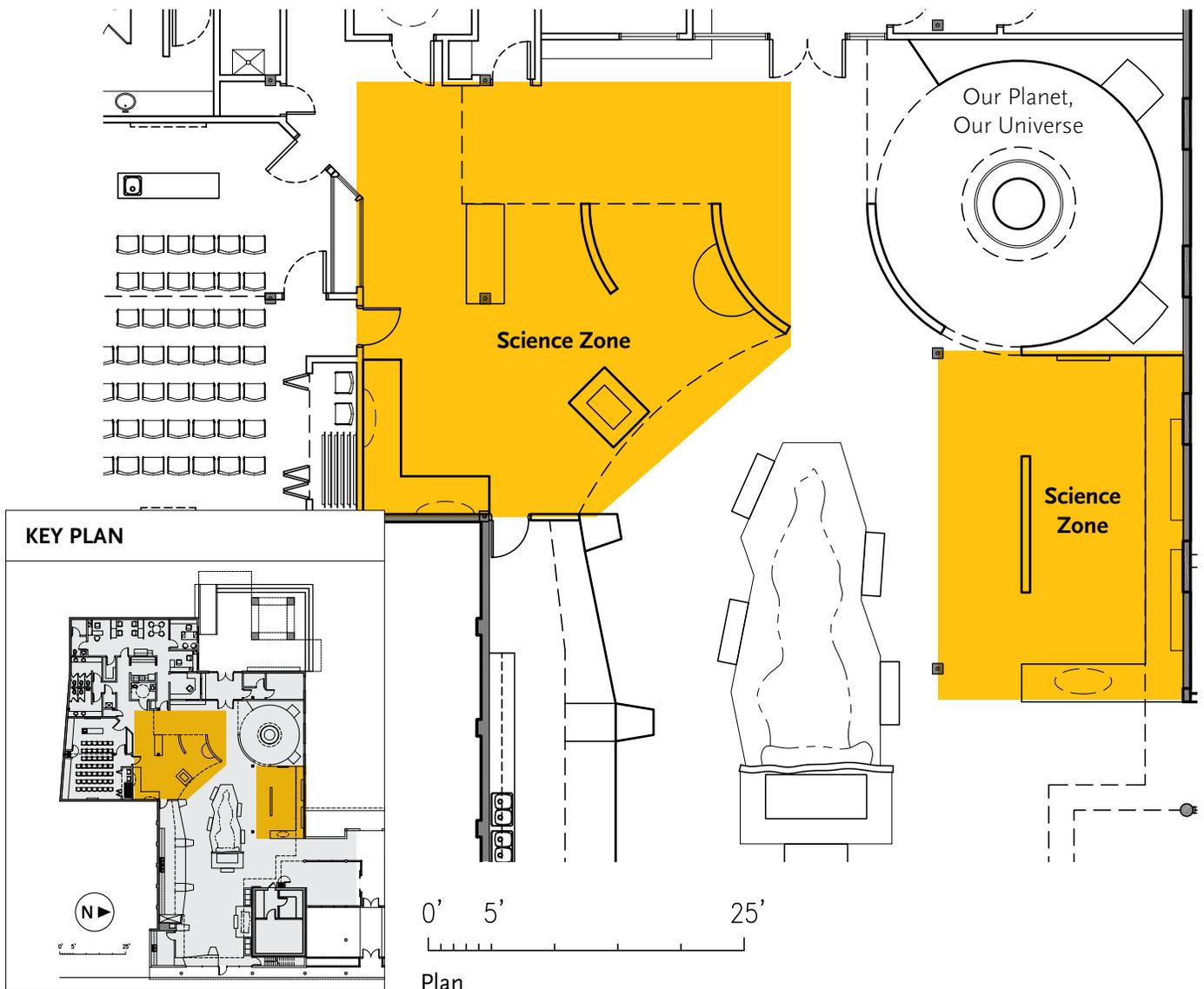
School groups will be able to access curriculum-related material for the digital globe—for instance programs that show the effects of a rise in sea level due to climate change, or that even transform the sphere into other planets to tour the solar system. Other programs related to Our Planet, Our Universe will focus on special astronomical events (eclipses, meteor showers), and demonstrate how individuals can participate in astronomy and space science (offered in partnership with other organizations such as NMSU and NASA).

**OUR PLANET, OUR UNIVERSE – COMMUNICATIONS PLAN**

KEY IDEA	SECONDARY IDEAS	POSSIBLE INTERPRETIVE MEDIA
<b>Our Planet, Our Universe</b>		
<p><i>Earth is one planet</i></p> <p>The processes that have shaped (and continue to shape) southern New Mexico are global in scope.</p>	<ul style="list-style-type: none"> <li>• Plate tectonics (the movement of the continents across the globe over geological time) has created the complex geology of this area.</li> <li>• Today's earthquakes and volcanoes are evidence of the processes that move the continents.</li> <li>• Over the last 300 million years, the earth's climate has changed repeatedly, sometimes triggering mass extinctions.</li> <li>• Atmospheric changes (global warming) are starting to change the climate of some areas of the world.</li> </ul>	<p>Large digital spherical display with animations/simulations of Earth from space</p>
<p><i>Looking up at the desert sky</i></p> <p>Because New Mexico offers exceptional conditions for sky-watching, people have long looked at the sky to understand its patterns and movements.</p>	<ul style="list-style-type: none"> <li>• New Mexico's combination of dry climate, low light pollution, and relatively high elevation make it suitable for astronomy.</li> </ul>	<p>Large image evoking New Mexico skies at night</p>
	<ul style="list-style-type: none"> <li>• Early inhabitants of New Mexico such as the Ancient Pueblo people observed and measured the movements of the Sun, Moon and stars.</li> </ul>	
	<ul style="list-style-type: none"> <li>• To understand the universe, past astronomers such as Clyde Tombaugh used simple optical telescopes to capture light from planets and stars.</li> </ul>	<p>Astronomical object from Tombaugh collection</p> <p>Working model of solar system</p>
	<ul style="list-style-type: none"> <li>• Today astronomers use high-tech telescopes to collect light from the most distant parts of the universe, taking us back in time to its origins.</li> </ul>	<p>NASA Viewspace feed</p>
	<ul style="list-style-type: none"> <li>• Giant desert arrays capture radio waves and microwaves, providing scientists with whole new categories of information about the universe.</li> </ul>	<p>Something relating to Very Large Array; model with mirrors?</p>
	<ul style="list-style-type: none"> <li>• The same characteristics that have made New Mexico suitable for astronomy also make it a good place to develop and launch spacecraft. These include Virgin Galactic's SpaceShipTwo, to be launched from Spaceport America.</li> </ul>	<p>Models of spacecraft</p>
	<ul style="list-style-type: none"> <li>• You too can see amazing things in the sky just by looking up with a simple telescope or a pair of binoculars.</li> </ul>	

## SCIENCE ZONE

**Visitor experience:** The two areas of the Science Zone will introduce visitors to basic principles of geology and climatology as they operate in southern New Mexico. After interacting with these top-of-the-line science center interactives, children will be able to explain to their parents how dunes form, or why rivers meander. School groups will find clear connections to their classroom lessons in these hands-on exhibits.



## SCIENCE ZONE

### Education links

While the idea that science is a process of discovery will be evident throughout the exhibits and programs, the Science Zone is specifically intended to engage students in scientific explorations and experiences designed to develop these critical thinking processes. The relevant New Mexico curriculum benchmark requires students to: *Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.*



## SCIENCE ZONE – Sustainability

**Visitor experience:** Converted from an earlier use as a bank, the building will demonstrate the idea of sustainability, with an exterior exhibit with meters and gauges where visitors can monitor building functions such as energy production and use, water use, light, and air flow. Visitors will learn how wind turbines and photovoltaic cells provide energy for building operations, contributing to its status as a certified LEED (Leadership in Energy and Environmental Design) structure.



### Education links

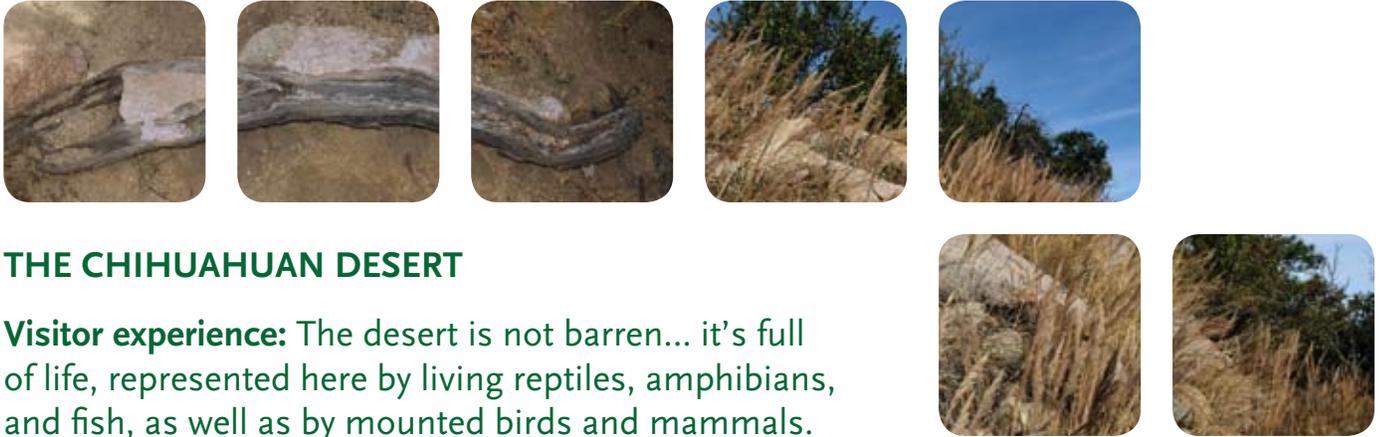
Sustainability exhibits relate directly to a curriculum benchmark in the Science and Society Strand: *Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by individuals and societies.*

SCIENCE ZONE – COMMUNICATIONS PLAN

KEY IDEA	SECONDARY IDEAS	POSSIBLE INTERPRETIVE MEDIA
<b>Science Zone</b>		
<p><i>Geology: the basics</i></p> <p>The landscape we live on is the product of powerful forces operating over vast periods of time.</p>	<ul style="list-style-type: none"> <li>• This apparently solid earth is a dynamic system, moving and changing over time.</li> <li>• The amounts of time involved are immense...some rock in New Mexico is over half a billion years old.</li> <li>• Rock is produced by three processes: vulcanism, transformation, and deposition.</li> <li>• Some types of rock are harder than others; these survive the forces of weathering and erosion longer.</li> <li>• Because of the way it is produced, sedimentary rock can record the evidence of past life as fossils.</li> </ul>	<p>Hands-on interactives such as:</p> <ul style="list-style-type: none"> <li>• Braided streams interactive</li> <li>• Rift zone interactive</li> <li>• Tectonic basin interactive</li> </ul>
<p><i>Geology and climate: the Chihuahuan story</i></p> <p>Las Cruces sits at the northern edge of the Chihuahuan Desert, one of the major ecosystems of North America. From space, the fundamental patterns in the Chihuahuan Desert are visible: the shape of the land, movement of water and growth of vegetation.</p>	<ul style="list-style-type: none"> <li>• The desert is created and defined by its low and infrequent precipitation.</li> <li>• This is due to the mountains that enclose the desert to east and west, limiting rainfall originating from the Pacific and the Gulf of Mexico.</li> <li>• This pattern of parallel ranges defines the Basin and Range Province, covering a wide area of the West.</li> <li>• The Chihuahuan Desert is at a higher elevation than other North American desert, and this affects its climate.</li> <li>• Winter temperatures are lower, and rainfall is mostly in the summer.</li> <li>• The Rio Grande is the source of most of the available water in this area.</li> <li>• Here it runs in an ancient rift valley that has filled with sediment.</li> <li>• The rocks that compose the mountains are hundreds of millions of years old.</li> <li>• However, the material that created the gypsum dunes of White Sands, a unique NM environment, was only laid down quite recently.</li> </ul>	<ul style="list-style-type: none"> <li>• Use images from earth-orbit satellites to show landforms and underlying geology</li> </ul>

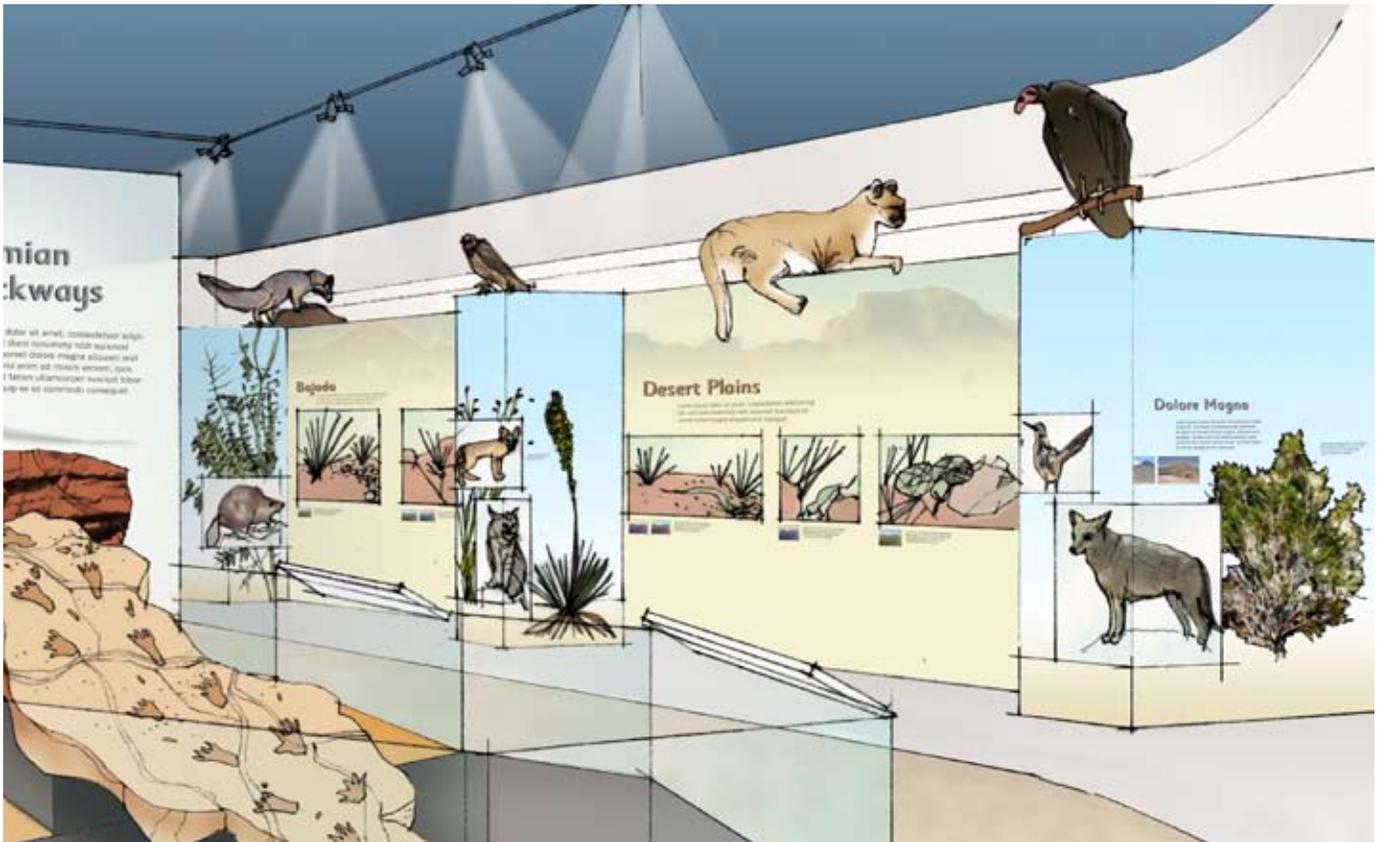
SCIENCE ZONE – COMMUNICATIONS PLAN

KEY IDEA	SECONDARY IDEAS	POSSIBLE INTERPRETIVE MEDIA
<p><i>Climate: the basics</i></p>	<ul style="list-style-type: none"> <li>• Climate is the sum of the weather patterns over long periods.</li> <li>• Most climatic processes (winds, ocean currents, precipitation patterns and temperature fluctuations) are driven by the energy from the sun.</li> <li>• Where you are on earth makes a big difference to the climate: the closer to the equator, the more solar energy is received per square foot, and so the hotter it is.</li> <li>• Long ago when the trackways were made, New Mexico was close to the equator, so the climate was tropical.</li> <li>• Altitude also affects climate: higher generally means cooler and damper.</li> </ul>	<ul style="list-style-type: none"> <li>• Show images of same area (southern NM) using different kinds of sensors</li> </ul> <p>Hands-on interactives such as:</p> <ul style="list-style-type: none"> <li>• Aeolian landscape interactive</li> <li>• Blue Sky interactive</li> </ul>
<p><i>Sustainability</i></p>	<ul style="list-style-type: none"> <li>• Today, people are attempting to live their lives in ways that support rather than damage the earth’s natural processes— an approach called sustainability.</li> <li>• New Mexico is a good location for using alternative energy sources such as solar and wind energy.</li> <li>• This building, built before the idea of sustainability was current, has been refitted around these principles.</li> <li>• Structural and operational changes have helped reduce use of fossil fuel-based energy, while providing a comfortable working environment.</li> <li>• As a result, the updated building will receive LEED certification, a measure of environmental efficiency.</li> </ul>	<ul style="list-style-type: none"> <li>• Heliostat interactive</li> <li>• Two different types of wind turbines on the Water Street tower</li> <li>• Photovoltaic solar panels on the roof</li> <li>• “Dashboard” of read-outs indicating the flow of energy in and out of the building</li> </ul>



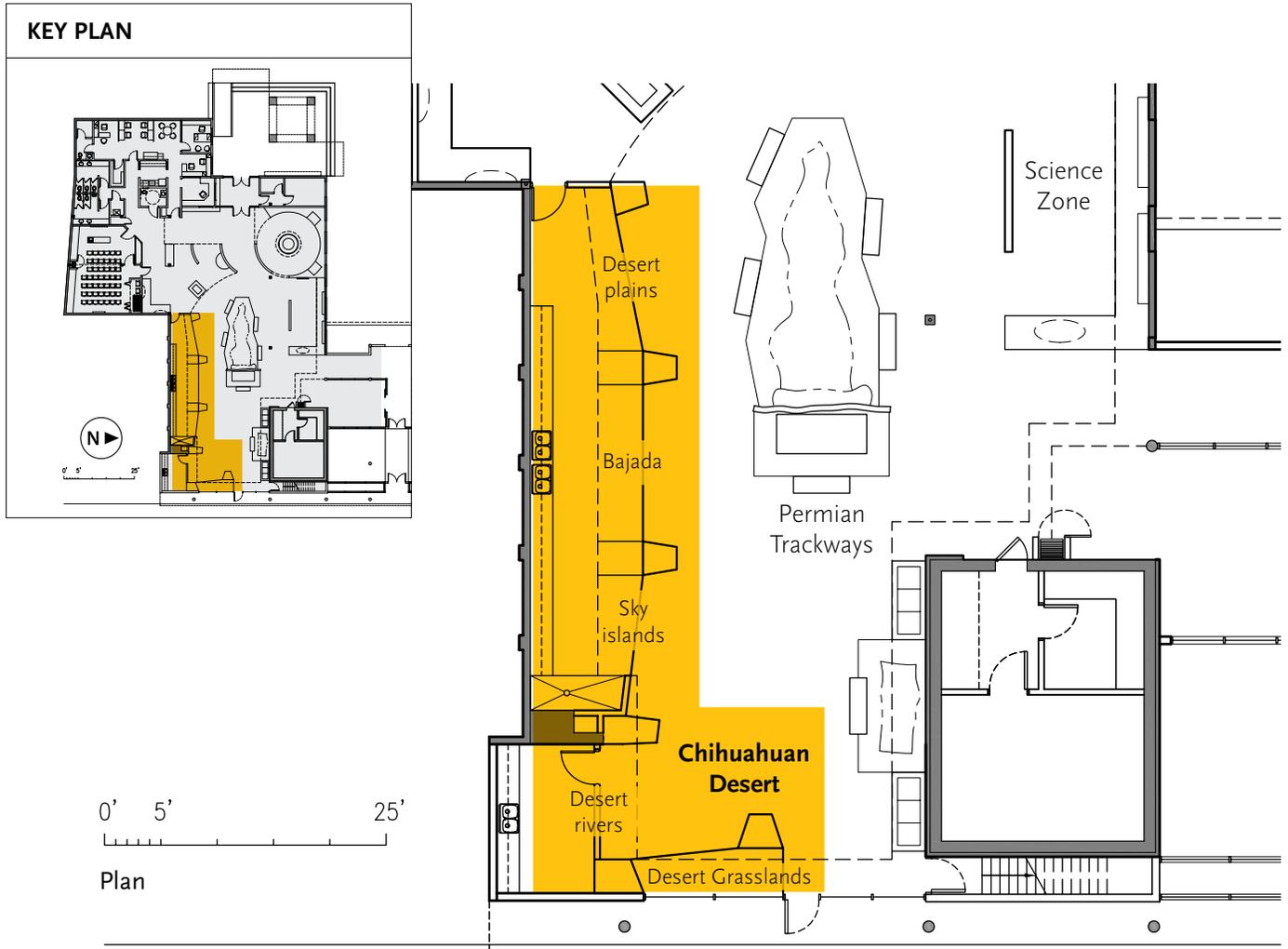
## THE CHIHUAHUAN DESERT

**Visitor experience:** The desert is not barren... it's full of life, represented here by living reptiles, amphibians, and fish, as well as by mounted birds and mammals. Five sections, each represented by its characteristic plants, group the specimens into habitat areas that visitors will recognize. A/V and graphics communicate the interrelationships between plants and animals, and the varied and amazing adaptations of individual species to life in a desert environment.



Chihuahuan Desert area

THE CHIHUAHUAN DESERT



Education links

For students, these exhibits will be used to interpret topics including native plants, animal adaptations, biomes, life cycles, food chains and webs, and taxonomic classification. The topics address one of the State curriculum benchmarks in Life Science: *Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.*

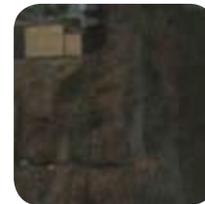
Program opportunities

Desert programs will take place both in the natural environment (hiking programs and family camping trips) and in the museum. Programs offered in the building will include experiences such as live animal encounters led by the naturalist, workshops on xeriscaping (gardening with minimal water) and the identification of native plants and their use in everyday life.

## THE CHIHUAHUAN DESERT: DISPLAYING LIVE ANIMALS

The live animals chosen for exhibition will reflect the kind of creatures that visitors to the museum may encounter when they are out in the desert camping or hiking, visiting a State Park, or even in their own backyards.

- Live animals will be grouped according to desert habitats. Although most animals are not found exclusively in a single habitat, they will be shown in the environment where they are likely to be encountered.
- No live mammals will be exhibited. Mammals require a high level of daily maintenance—feeding, cleaning and ‘enrichment’ activities, requiring a level of staffing that the museum cannot undertake.
- It is important that all live animal enclosures are easily observed by people of varying heights, from small children to adults.
- This means that the base height of any tank should be no higher than 24 to 30 inches off the floor. Stacking live animal enclosures one above the other would prevent younger children seeing into the higher tanks.
- This height is also convenient for staff to access tanks easily and quickly from a service area behind. Any mess that is created can be kept out of sight.
- The rear service area provides a sink and a long counter area that can easily handle tanks that have been temporarily removed from display for cleaning, or are housing animals not intended for display.
- All of the live animals to be exhibited (invertebrates, fishes, amphibians, lizards, turtles and snakes) require no special conditions and can be maintained in this facility.
- If the design requires it, tanks housing invertebrates such as the millipede, scorpion and tarantula may be accessed from the front. This presents no problem for feeding or cleaning these animals.
- While a large number of desert creatures are nocturnal, and a nocturnal exhibit would be popular there is not sufficient space in the museum to do it justice.
- Nocturnal animals will still be displayed, though they may be inactive. For some species, it may be possible to position a shelter so that the daytime resting location of the animal still makes it visible to the visitor.



**THE CHIHUAHUAN DESERT – COMMUNICATIONS PLAN**

KEY IDEA	SECONDARY IDEAS	POSSIBLE INTERPRETIVE MEDIA
<b>The Chihuahuan Desert: a living landscape</b>		
<p>When you walk in the desert, it may seem dry and barren, but life survives and even flourishes in unexpected ways.</p>	<ul style="list-style-type: none"> <li>• Within the desert environment, there are different habitats for life, based on factors such as soil, water and altitude.</li> <li>• Certain plants and animals characterize each habitat.</li> <li>• Within each habitat grouping there are fascinating linkages between specific plants and animals.</li> <li>• The biggest challenge for all desert organisms is to find and retain water, especially during the driest months of the year.</li> <li>• When the brief summer wet season arrives, life blossoms and changes in the desert.</li> <li>• Desert animals must adapt to the major swings in temperature from day to night, and from summer to winter. Some live underground during the hottest part of the year.</li> <li>• Human activities such as grazing domestic animals, building homes, dam-building and water diversion for irrigation have changed the desert environment, affecting a number of plant and animal species.</li> </ul>	<ul style="list-style-type: none"> <li>• 5 habitat groupings, each including images of characteristic plants, living animals, mounted birds and mammals</li> <li>• Sound cues for identification</li> <li>• Graphic cues to associations between species</li> <li>• Individual examples of water-retention strategies of plants and animals</li> <li>• Images showing how each habitat changes after rain</li> <li>• Sound of amphibians calling</li> <li>• Deal with specific adaptations in each habitat</li> <li>• Show which animals live underground</li> <li>• Each human activity is discussed in the context of the habitat where it is most important</li> </ul>



## PERMIAN TRACKWAYS

**Visitor experience:** Twenty-five years ago local researcher Jerry MacDonald found layer upon layer of local fossil tracks documenting life along an ancient seashore, from a time long before the dinosaurs. Visitors to MoNaS will be able to see two of these spectacular trackways, and learn why they are globally important. Interactive A/V and graphics will bring to life the astonishing animals that made the tracks, and recreate the very different world in which they lived.



Central Permian Trackways exhibit

PERMIAN TRACKWAYS



**Permian reptile skeleton behind the east end of the trackways exhibit**

The articulated Dimetrodon is “walking” on a glass panel, leaving a trail of footprints. Below the glass, an angled mirror allows the visitor to view the underside of the creature to better understand what the trackway can tell us about the creature and vice versa.

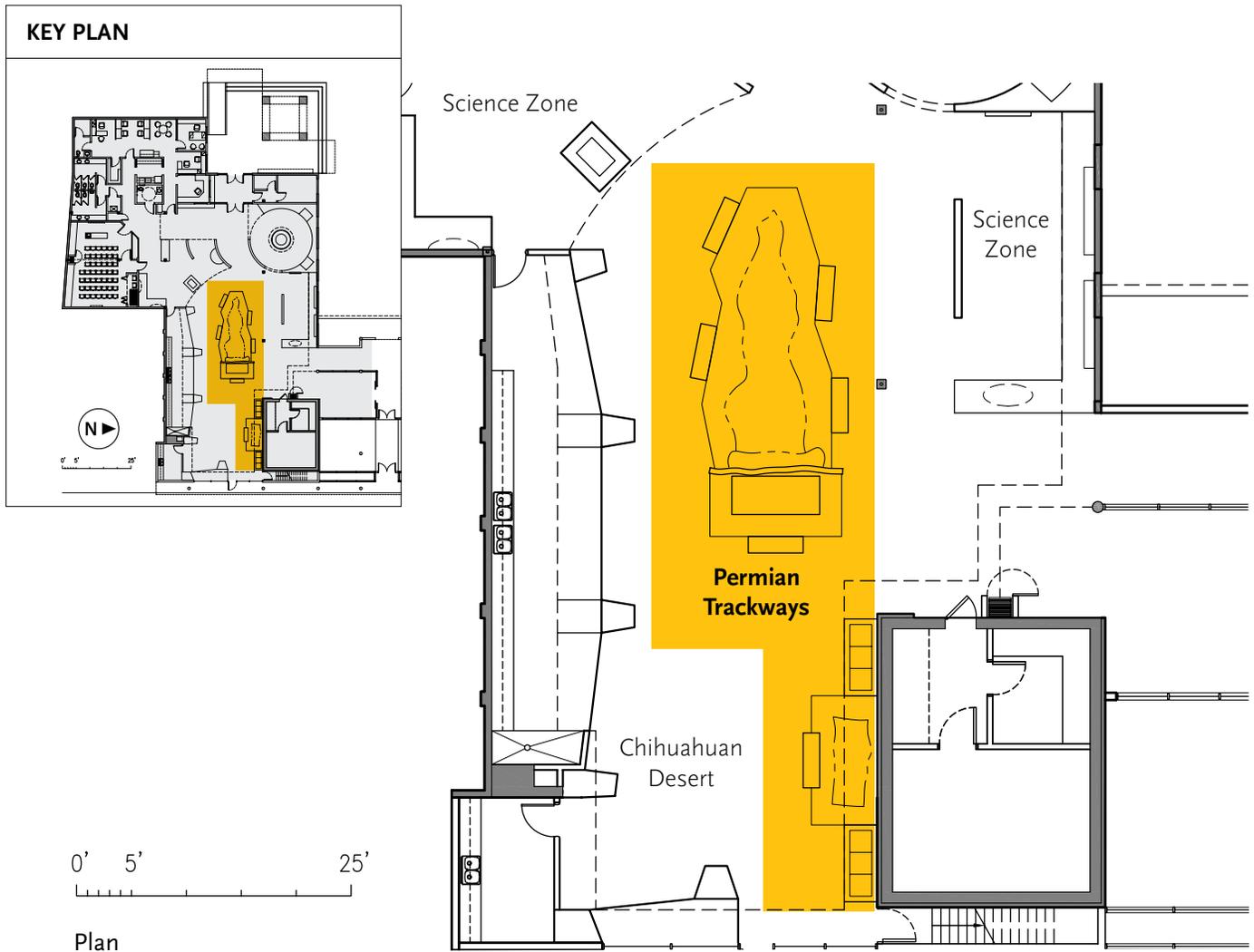
## PERMIAN TRACKWAYS



### **“Feeding Frenzy” trackway cast and adjacent live animals**

This trackway shows the tracks of many different types of creatures on a surface that is angled towards the visitor for close viewing. Beside it is a display comprising a small piece of trackway, a touchable cast of the same track, and a live animal that produces similar tracks. This demonstrates how we look to contemporary examples to learn about ancient creatures.

PERMIAN TRACKWAYS



Education links

The Permian Trackways are an excellent vehicle for teaching about geology, paleontology, the fossil record, and animal locomotion. In particular, they allow teachers to address the benchmark requirement: *Examine the scientific theories of the origin, structure, energy and evolution of Earth and its atmosphere, and their interconnections.* There is special emphasis on these topics in grades 3, 6 & 7.

Program opportunities

Visitor programs (to be planned in cooperation with the Bureau of Land Management) will include field trips to the Prehistoric Trackways National Monument in the Robledo Mountains, the opportunity to meet a BLM ranger and learn about the trackways at the museum, and track-making activities and fossil digs for children.

PERMIAN TRACKWAYS – COMMUNICATIONS PLAN

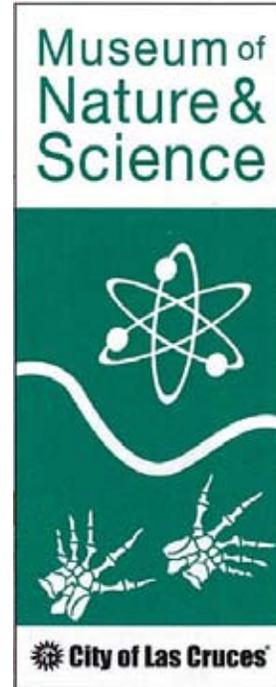
KEY IDEA	SECONDARY IDEAS	POSSIBLE INTERPRETIVE MEDIA
<b>Permian Trackways:</b> moments in distant time		
<p>The desert mountains conceal an important fossil find: the trackways of ancient animals that lived before the dinosaurs.</p>	<ul style="list-style-type: none"> <li>The tracks were made 290 million years ago on a beach beside an inland sea, and preserved due to a rare combination of circumstances.</li> <li>They are particularly valuable because some of the trackways preserve the evidence of how ancient animals moved over significant distances.</li> <li>Some of the animals whose movement was captured were distant relatives of living desert animals.</li> <li>Other tracks were left by animals and plants from groups that have long disappeared from the earth.</li> <li>The trackway evidence can be best understood by looking at how comparable animals move today.</li> <li>Taken together, the tracks and other fossil evidence give us ‘film clips’ of a very different world, and help scientists understand other fossils from this period found at sites all over the world.</li> <li>The tracks were recognized and brought to the attention of science over 20 years ago by the energy and persistence of local scientist Jerry MacDonald.</li> <li>When exposed to the weather, trackways are fragile and soon damaged—they need to be protected.</li> <li>The trackways sites in the Robledo Mountains are now part of the prehistoric Trackways National Monument, in the care of the federal Bureau of Land Management.</li> </ul>	<ul style="list-style-type: none"> <li>Interesting timeline to express how old these tracks are</li> <li>Trackway showing lengthy sequence of footprints</li> <li>Dimetrodon skeleton</li> <li>Juxtaposition with relevant living animals</li> <li>‘Field guide’ to the early Permian fauna in the trackways</li> <li>Interactive using video of modern animals to match to trackways</li> <li>Cast of major trackway with multiple tracks</li> <li>Fossil trees, and other plants</li> <li>Animation/recreation of the trackway scene</li> <li>Account of discovery, using Jerry’s words and images</li> <li>BLM recognition element</li> </ul>

## GRAPHIC DESIGN APPROACH

Information and interpretive graphics will have a clear hierarchy of importance, be inviting to read, and reflect the museum’s combination of nature and science content. Graphic design will be complementary, but not necessarily identical, to the existing signage and visual identity of the museum.



Existing signage and logo using various fonts.



## TYPOGRAPHIC LEVELING

Typographic leveling uses a system of standard type sizes to distinguish between different levels of information on graphic carriers such as panels, rails and labels. A clear typographic hierarchy helps to ensure visitors understand the relative importance of different kinds of information.

<p><b>Level 1</b></p> <p>Human evolution is not a figment of our imagination. Scientific evidence shows that a diversity of humans evolved over 6 million years as they adapted to changing environments.</p>	<p><b>Level 2 Typo</b></p> <p>Human evolution is not a figment of our imagination. Scientific evidence shows that a diversity of humans evolved over 6 million years as they adapted to changing environments.</p>	<p><b>Level 3 Typograph</b></p> <p>Human evolution is not a figment of our imagination. Scientific evidence shows that a diversity of humans evolved over 6 million years as they adapted to changing environments.</p>	<p><b>Level 4 Typography</b></p> <p>Human evolution is not a figment of our imagination. Scientific evidence shows that a diversity of humans evolved over 6 million years as they adapted to changing environments.</p>
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Type sizes reflecting the hierarchy of the information. (E.g. level 1 is for introductions; level 4 is for captions)

## TYPOGRAPHY

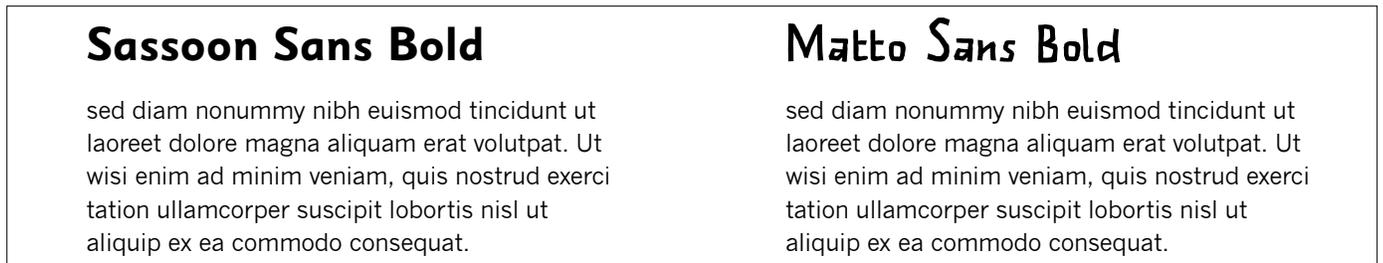
For exhibit graphics, a generic typeface for text on all exhibits is recommended.

The font, *News Gothic* has a modern letter-form that complements both typefaces in the museum’s existing signage and logo. Legible and stylistically neutral, this family of fonts is suitable for both nature and science content. *News Gothic* also includes a full range of styles, including the italics necessary for scientific names in labels.

*News Gothic* can be mixed with other custom typefaces to help reflect the specific content of the individual exhibits.



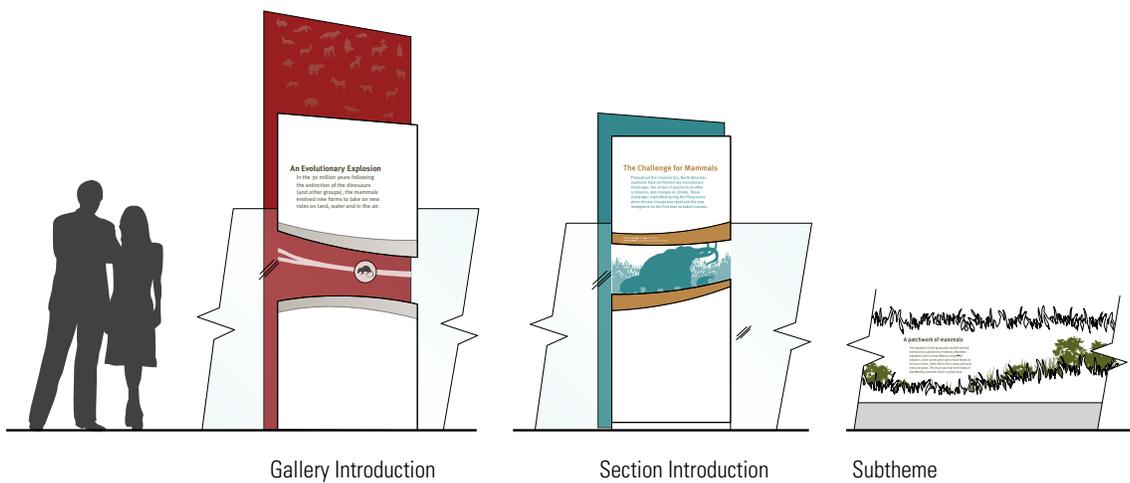
News Gothic



News Gothic text paired with Sassoon Sans Bold and Matto Sans Bold

## GRAPHIC CARRIERS

The information hierarchy can also be expressed through the size, shape, and position of the graphic carriers. This is an example of a graphic carrier system from an introduction panel down to an individual specimen label. A clear, consistent graphic hierarchy not only helps to ensure interpretive ideas are communicated to visitors, but also strengthens the gallery's overall identity.

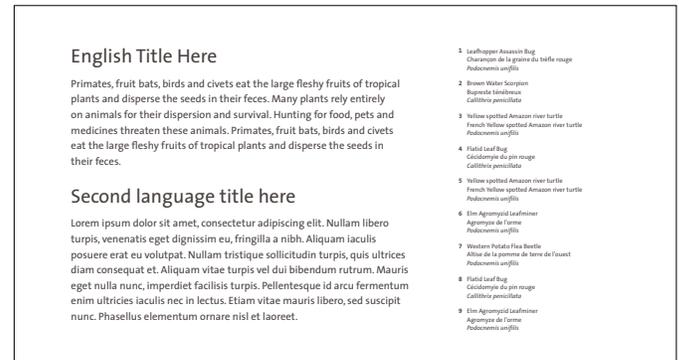


## BILINGUAL EXHIBITS

There are various ways to treat bilingual text in a museum environment. The key issue is to ensure the text in each language is easy for readers to distinguish visually from the other, so that visitors can find the information in their language of choice.

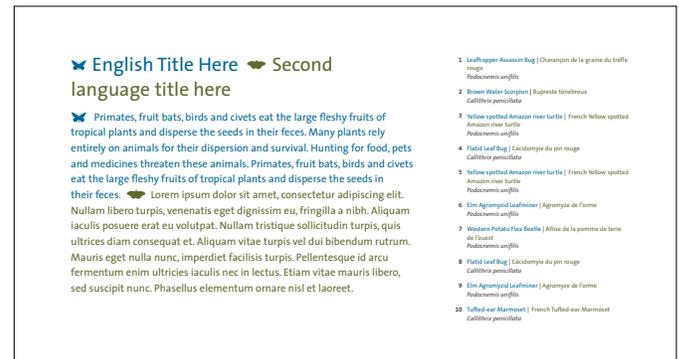
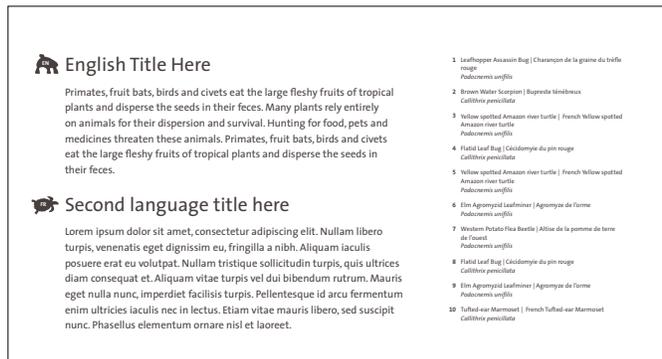
Some effective methods (shown below) include using consistent placement of text in each language, and distinguishing languages by type color or use of an icon.

Other ways of distinguishing between two languages include the use of different fonts (which has the potential to be visually confusing), or presenting the text on separate panels for each language, if space allows. Option 2 below is recommended, as this layout is the most clear and simple way to allow visitors to quickly and easily distinguish between languages.



1. All titles are situated at the top of the panel and languages are separated by a vertical line. This option saves the most space. Drawbacks are that the second title may be broken onto two lines, appearing to give precedence to the first language.

2. Bilingual titles are kept with their block of text, which is very clear and makes it easy to quickly differentiate between languages. For labels, each language starts on a different line, which takes up a lot of space.



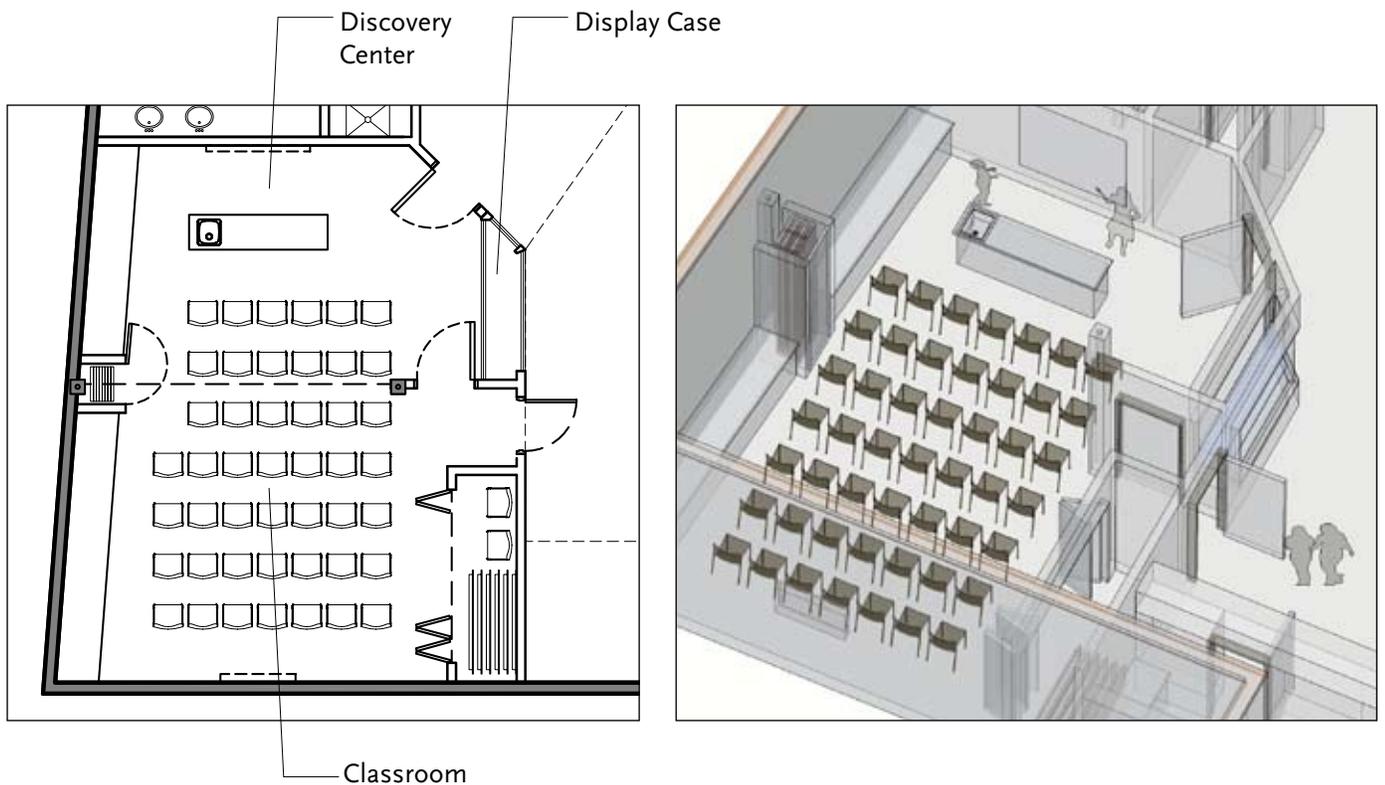
3. Icons are used to indicate each language. As visitors move through the space, they start to look for the familiar icon associated with their language.

4. Colors (and icons) are used to differentiate between languages. This can be tricky to keep the contrast equal and legible on the panel. This option may also limit the options for background panel materials and/or color.



## DISCOVERY CENTER AND CLASSROOM

**Visitor experience:** These two spaces will host both school groups and families, providing a combination of hands-on and classroom experiences. In the Discovery Center, children can try experiments and get their hands dirty, supervised by a museum staffer. At other times, visitors can explore nature and science on their own, through activities such as looking at specimens through a microscope. The classroom will be the location for more formal learning activities, and the two spaces will combine to create a room seating up to 46 people for special events.



## DISCOVERY CENTER AND CLASSROOM

### Education links

The Discovery Center will feature activities on Physical Science (including Matter, Chemistry, Mechanics, Electricity, Physics, Optics and Acoustics). These exhibits and programs will address the NM curriculum benchmark: *Understand the structure and properties of matter, the characteristics of energy and the interactions between matter and energy.* These subjects, included in all grade levels, are increasingly important to the understanding of modern technology and sustainability.

### Program opportunities

Possible program vehicles for the Discovery Center topics include the Science Olympiad, spring break day camp, summer lab academy, demonstrations with local scientific experts, and co-programming activities with other Las Cruces museums.

The classroom will provide space for groups of up to 25 people (primarily adults) to participate in programs such as science classes, lectures, films, demonstrations, seminars, and teacher training. It will also serve as a meeting room for affiliated science organizations.



## MUSEUM OPERATIONS

Once established in its new building, the Museum of Nature and Science will seek accreditation from the American Association of Museums. This recognition, the result of a rigorous assessment of all museum functions, means the museum operates to the high standards appropriate to a public institution.



### Currently, the museum operates with four full time staff:

- Museum Manager, Michael Walczak
- Education Curator, Kimberly Hanson
- Naturalist, Rich Quick
- Administrative Assistant, Leticia Soto

### With the move to a newer and larger facility, MoNaS staffing needs will increase to include the following:

- A full-time Exhibit Technician to maintain the permanent exhibits and prepare and mount temporary exhibits. This is an essential position in order to keep the new interactive exhibits and media operational at all times. Such exhibits require ongoing daily maintenance and repair, and without a person dedicated to their maintenance, most of these exhibits will be inoperable in a short period.
- A part-time Naturalist (28 hours per week) to provide essential animal care services in support of the Naturalist, including ensuring continuous quality animal care and program presentation during all the hours during which the museum operates.
- A part-time Educator (28 hours per week) to assist in developing educational programs to be delivered in-house and through outreach, in response to the demand expected from increasing annual attendance, and increased hours of operation.
- A full-time receptionist at the Main Street entrance (shared with the Museum of Art) to welcome visitors to the Museum and to provide information to facilitate their visit.
- A part-time Registrar (28 hours per week) to provide collections management support for the existing collections and new collections that will be added in conjunction with the new exhibits.

### Work spaces for both the current full-time staff and the planned additional staff are included in the plans for the office and service areas in the new building.

In addition, the following new staff will be required to support the planned extension of hours for the entire museum system:

- Two part-time custodians (28 hours per week) to be shared between the 3 downtown museums and the Railroad Museum.
- One full-time security officer to patrol all the museum properties during open hours.

**BUILDING PROGRAM**

A building program was developed with the MoNaS team to determine optimum space usage and phasing for the new museum. Lobby, staff and back-of-house areas were rationalized to allow maximum display and program areas. Open plan and flow areas minimized corridors and dead circulation areas while ensuring maximum future flexibility.

Functional zone	Required Spaces	Area (square feet)		Options	Notes
		Phase 1	Phase 2		
<b>New Entry</b>					
Lobby	Lobby and circulation	600			
	café & seating area	300			open into lobby
	Donor Recognition Area	included			within Lobby
Retail Spaces	Shop Display	450			open into lobby
	Street display windows				140 sq ft - not included in floor space
		<b>1350</b>	<b>0</b>		
<b>EXHIBITION</b>					
Permanent Exhibits	Our Planet, Our Universe	620			
	Science Zone	1300			
	Permian trackways	1650			
	Chihuahuan desert	1650			
Temporary Gallery	Temporary Gallery	N/A	1500		
		<b>5220</b>	<b>1500</b>		
<b>ADMINISTRATION</b>					
	offices	1300	N/A		
	information/reception	included	N/A		
		<b>1300</b>	<b>0</b>		
<b>EDUCATION/PROGRAMS</b>					
	Discovery Center	350	N/A		
	Classroom	420	N/A		
	Storage	included	N/A		included Classroom
		<b>770</b>	<b>0</b>		

Continued...

**BUILDING PROGRAM**

Continued...

<b>BUILDING OPERATIONS</b>	Support spaces including:	<b>1035</b>		
	Shipping/Receiving	N/A	N/A	in adjacent art museum
	Janitor Closets	included	N/A	
	Telephone and Electric	included	N/A	
	sprinkler room	included	N/A	
	AV room	included	N/A	
	vestibule	included	N/A	
	Women's Washroom	included	N/A	
	Men's Washroom	included	N/A	
	Family/ Accessible Washroom	included	N/A	
	Vault - includes collections storage & workshop	430	N/A	
	Mechanical room and HVAC	N/A	N/A	above vault - not included in floor areas
		<b>1465</b>	<b>0</b>	
<b>TOTAL NET FACILITIES</b>		<b>10,105</b>	<b>1,500</b>	
Circulation (15%)	Averaged into above spaces	N/A	N/A	
<b>GRAND TOTAL NET AREA</b>		<b>10,105</b>	<b>1,500</b>	<b>Square feet</b>

\* highlighted areas denotes difference between the two scenarios

\* NOTE: Areas not included in square fottage allocation: Coat/Bag Check, Stroller/Wheelchair Storage, Group Lobby, Group Orientation Area, Group Coats/Lockers, Shop Office, Shop Washrooms, Shop Janitors Closet, Reception/Waiting Area, Meeting Room, Resource Centre & File Room, Staff WC/Change Room/ First Aid, Staff Lounge w/ Kitchenette, Crate/Fixture Storage, Security Control Room, Maintenance office, Maintenance Stores.



**BUDGET**

Exhibits	\$1,669,020
Base Building	\$3,178,187
	<b>\$4,847,207</b>

**BUDGET**

**Exhibits**

ITEM	DESCRIPTION	
1	Building wayfinding signage	
2	Energy Dashboard exhibit	
3	Lobby Information system	
4	<b>Planet Earth</b>	
	a) Solar system case and model	
	b) case for spaceport etc. 4'x3'	
	c) Case for telescopes 4'x3'	
	d) "Magic planet" or "Omniglobe"	
	e) Railings and interface housing	
	f) graphic panels, vinyl lettering etc	
5	<b>Pure sciences (SW area)</b>	
	a)4 interactive exhibits +install	
	b)Intro graphics and graphic panels	
6	<b>Pure Sciences (N area)</b>	
	a) "Viewscape" installation	
	b) 3 interactives + millwork	
	c) Graphic intro wall	
7	<b>Trackways exhibit</b>	
	a)Graphic Intro+graphics	
	b) Info rail	
	c) Transluscent wall	
	d) Graphics to wall	
	e) Glass topped table 8'x4'x5'high	
	f) Inforail	
	g) angled mirror and support	
	h) Special lighting	
	i) "Feeding frenzy wall display"	
	j) Insect Cases for feeding frenzy	
	c) glass cases 2'x2'x6" ??	
	k) Interactive media soft+hardware	
	l) Stone slab mounts and install	
8	<b>Chihuahuan Desert</b>	
	a) 14# animal tanks 4'x18"x21"	
	b) 2# animal tanks 2'x2'x2'	
	c) Habitate intros + labels	
	d) Chihuahuan Desert Intro Panel	
9	<b>Mounts etc</b>	
10	<b>Taxidermy</b>	
11	<b>Carpet install</b>	
12	<b>Directional speakers4#</b>	
13	<b>Shop Drawings</b>	
14	<b>FFE</b>	
15	<b>AV Room + cabling</b>	
16	<b>Classroom projector + screen</b>	
17	<b>Classroom White board</b>	
18	<b>Lighting</b>	
19	<b>Aiming lights (client supplied)</b>	
	Sub-Total	
20	<b>Fabricators OH+Profit 18%</b>	
	Sub-Total	
21	<b>Design Contingency @ 5%</b>	
	Sub-Total	
22	<b>Taxes @ 7.4375%</b>	
23	<b>Permit fees allowance ??</b>	
	Sub-total	
24	<b>Design Fees @ 15%</b>	
25	<b>Expenses 20% of design fee</b>	
	<b>TOTAL</b>	<b>\$ 1,669,020</b>

**Base Building**

ITEM	DESCRIPTION	
1	<b>General Requirements</b>	
2	<b>Siteworks</b>	
3	<b>Demolition</b>	
	General	
	Sheetrock Removal	
	Asbestos/Vinyl tile removal/encaps	
	Remove Main St arches??	
	<b>Excavation/backfill</b>	
	Floor depression	
	Formwork for new floor depression	
3	<b>Concrete</b>	
	General work	
	demo and install water services	
5	<b>Metals (structure etc)</b>	
	New Stud and insulation	
	Miscellaneous	
	Railings	
	Misc metalsfolding screen suppts	
6	<b>Wood and plastic</b>	
	General millwork	
	Plywood reinforcement behind DW	
7	<b>Thermal and moisture protection</b>	
	a) New roof 8,900 sf @ \$6.00	
	b) Other new roofs	
8	<b>Windows and Doors</b>	
	Gen Alum screens and wd doors	
9	<b>Finishes</b>	
	a) Carpet 9,000 incln exhibits	
	b) Linoleum in classroom etc	
	c) Tiles in restrooms etc	
	d) framed vanity mirrors	
	<b>Walls</b>	
	a) Exterior North wall	
	b) General	
	<b>Ceilings</b>	
	a) Bulkheads	
	b) New ceilings	
	c) spray existitng ceiling	
10	<b>Specialties</b>	
	Partitions etc	
15	<b>Mechanical</b>	
	General HVAC	
16	<b>Electrical</b>	
	General Electrical + Lighting	
	<b>Solar Panels</b>	
	Panels	
	<b>Sub-Total</b>	
	General Conditions and OH 18%	
	<b>Sub-Total</b>	
	Taxes @ 7.4375%	
	Permit fees	
	<b>Sub-Total</b>	
	A/E Fees @10%	
	A/E Expenses @10% of fees	
	<b>Sub-Total</b>	
	<b>TOTAL</b>	<b>\$ 3,178,187</b>



**PROPOSED SCHEDULE**

This report outlines the conceptual approach for both the building, and the exhibits that it is to house. Following approval by Council, the intention is to procure separate design-build contracts for both architectural renovations and the exhibit design and fabrication, with the intention of starting construction in April 2011, and opening in the second half of 2012. The following schedule is based on this general approach.

TASK	2010						2011												2012											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
1. Arch. RFP	→	→																												
2. Exhibit RFP	→	→																												
3. Design Development (Arch)			→	→																										
4. Contract Documents (Arch)									→	→																				
5. Construction (14 months)																														
6. Concept Design (Exhibit)			→	→																										
7. Design Development (Exhibits)									→	→																				
8. Contract Documents (Exhibit)																														
9. Contract Admin- a) Fabrication																														
b) Installation & Commissioning																														
10. Opening																												*		



## ACKNOWLEDGMENTS

### MONAS STAKEHOLDERS & PLANNING PARTNERS

**The Foundation for Las Cruces Museums**

**The Paleozoic Trackways Foundation**

**New Mexico State University**

- Office of the President
- Dept. of Civil Engineering
- Facilities Planning & Construction Dept.
- Plant & Environmental Sciences Dept.

**Las Cruces Downtown Partnership**

**Doña Ana Arts Council**

**U.S. Bureau of Land Management**

**Southern New Mexico Natural History Foundation**

**New Mexico Museum of Natural History & Science, Albuquerque**

- Spencer G. Lucas, Ph.D
- Jerry MacDonald

**The Office of U.S. Senator Jeff Bingaman**

**The Office of U.S. Senator Tom Udall**

**The Office of State Representative Jeff Steinborn**

**The Office of State Senator Mary Kay Papen**

**The Office of State Senator Mary Jane Garcia**

**City of Las Cruces:**

- Office of the City Manager
- Offices of the Mayor & City Council
- Public Services Dept.
- Convention & Visitor's Bureau
- Economic Development Dept.
- Grants Administration Dept.
- Public Works Dept.
- Facilities Dept.
- Museums Administration

**MONAS PLANNING TEAM:**

- Will Ticknor, Director of Museums
- Michael Walczak, Director of the Museum of Natural History (MNH)
- Kimberly Hanson, Education Curator, MNH
- Richard Quick, Naturalist, MNH
- J. Carey Crane, Senior Curator of Exhibitions
- Stephanie Long, Senior Curator of Collections
- Lisa Pugh, Director of the Museum of Art
- Julie Hansen, Volunteer Coordinator & Education Team Leader

**CONSULTANTS**

**Reich+Petch Design International**

Tony Reich  
Tracy Bright  
Michelle Parrish  
Shawn Banerd  
Michael Monka  
Kevin Hansen (advisor)

**Blue Sky Design**

Paul Martinovich

**Science North**

Franco Mariotti

**Bohannon Huston, Engineer**  
Mathew Thompson

**Clare Randall Smith & Pendlebury Cost Consultants**

Paul Campbell

DRAFT



APPENDIX

## BUILDING SERVICES REPORT SUMMARY

### HEATING/VENTILATION/AIR CONDITIONING:

The upper room level currently utilized as the mechanical room will remain and be renovated. The existing parallel gas-fired furnaces, split system all duct work will be removed. A new fan powered variable air volume (VAV) series system will be installed.

#### Duct System:

An insulated round or square duct system will be installed in a bulkhead or above a suspended ceiling. Ceiling and wall diffusers and returns will be utilized. A central air handler with variable volume supply fan and pre-heat and cooling coils will be installed in the mechanical room. An energy recover heat exchanger with HEPA filters will be utilized for all indoor quality exhaust air exchanges.

#### Heating:

A natural gas-fired hot water heater will provide heat capacity for the VAV boxes providing individual heating supply air to individual offices, common, and exhibit hall areas. Hot water will be circulated to individual VAV boxes via a circulating pump.

#### Cooling:

An exterior roof mounted direct expansion condenser will be installed, estimated to be 20 tons. The condenser will be mounted in the same location as the previous unit on the west side of the west mechanical room wall.

### DOMESTIC PLUMBING:

All existing domestic plumbing systems will be removed from the building interior. New pipe systems will be installed as described.

#### Water:

2" water riser from existing meter in Water Street will be relocated to the southwest building corner and rise to the ceiling space. Cold water to extend to the mechanical room across the ceiling space and bulkhead.

#### Natural Gas:

2" gas riser and meter will be relocated to the west from current location and extend up to parapet and across roof to mechanical room for supply to hot water heater and air handler pre-heat cycle.

#### Sewer:

A 30'x25' section of existing concrete floor adjacent to south wall will need to be removed to allow relocation of sewer piping to new fixture locations. Existing 4" sewer service exiting building to Water Street will not be replaced unless field inspections prove underground deterioration. A full building length floor cut extension will be required to service wash down area located on the east wall and floor drains behind exhibits. A drain for condensate will need to extend to the mechanical room.

#### Plumbing Fixtures:

Low water use toilets and urinals are planned. Lavatories and general service sinks will be incorporated at locations shown.

### FIRE SPRINKLER SYSTEM:

A minimum 4" fire main or possibly 6" main will need to be connected to city main in Water Street, and extended to southwest building corner. A pipe riser, valve and alarm to be housed in interior fire sprinkler room for fire department inspections. Fire sprinkler network to extend through existing building area including new addition. Current Museum of Art to be connected is not anticipated to be sprinkled and will be isolated with fire doors. Fire alarm system with smoke detectors for air handler shutdown and riser valve notification to fire department will need to be connected to telephone network. Local pull stations, strobes and sirens are anticipated to be required.

### POWER DISTRIBUTION:

An existing El Paso Electric 120/208 volt, 300 kVA transformer is located on the southwest building corner. A new 600 ampere service will extend across the west building front to the new electrical room located on the northwest building corner. Power distribution panels will be located in this room. General power to receptacles and equipment devices will be provided as necessary.

## BUILDING SERVICES REPORT SUMMARY

### LIGHTING:

Controllable breaker and separate dimming ballast panels will also be located within the electrical room. Interior lighting to be LED or halogen track, individually suspended or on a fixed grid in exhibit halls. All common and office areas will have suspended ceiling indirect T5 fluorescent fixtures. Classroom to have dimmable halogen fixtures and indirect fluorescent fixtures. Central emergency inverter for building wide backup source power to 15% of fixtures and egress points.

### COMMUNICATIONS:

A dedicated audio/video room will be located adjacent to the electrical room. Structured cabling systems for voice, data, A/V and security will be routed to this location and terminate in network patch panels. Building computer network server will be located here and connection to city fiber optic network and local telecommunication utility. Qwest connection is located on the southwest building corner and will have a multipair copper connection for multiple telephone line access. A dedicated A/V controller will be reserved for exhibit hall and classroom areas. Security camera power supply and video recorder for building access points and exhibit hall area will be provided and connected to network.

### ALTERNATIVE ENERGY:

A photovoltaic system with 150 panels is planned to achieve 5% renewable energy target. Panels are individual polycrystalline 175 watt photovoltaic cells mounted on adjustable incline posts set through roof membrane and attached to roof deck. Two 1.5 kilowatt wind turbine generators mounted on west arch columns. Structured cabling from generation to inverters located in electrical room. Net revenue meter per local El Paso Electric utility standard to be linked for revenue recompensation. Software for building energy management to be placed on building network and displayed on wall mounted 40" flat screen computer terminal.

### STRUCTURAL:

Unknown at this time, but truss reinforcement expected due to loading individual loading exceeding allowable. Specific information forthcoming.

## BUILDING SERVICES REPORT

### I) **BUILDING SERVICES REPORT**

The renovated City of Las Cruces Science and Nature Museum will be designed to meet at a minimum a LEED Certified (40 to 49 LEED points) with a possible goal of LEED Silver (50 to 59 LEED points) under the new LEED 2009 New Construction and Major Renovation Rating System Version 3. This analysis of the individual building mechanical and electrical services are structured in relation to the LEED checklist and discussed in detail within each section. Only sections of the LEED checklist directly related to mechanical or electrical services are discussed within this report, all other architectural elements are not addressed.

#### **Sustainable Sites**

##### **SS Credit 6.1: Stormwater Design Quantity Control**

Additional on-site infiltration zones will be incorporated with plastic underground infiltration galleries to reduce runoff by 25% from existing.

##### **SS Credit 6.2: Stormwater Design Quantity Control**

Runoff from roof and parking areas will flow through vegetated area and a stormwater quality improvement manhole prior to the infiltration gallery to achieve 80% total suspended solids removal prior to infiltration.

##### **SS Credit 7.2: Heat Island Effect: Roof**

A roof membrane with solar reflectance index (SRI) of 78 or better will be used for 75% of the roof area.

##### **SS Credit 8: Light Pollution Reduction**

All exterior lighting will comply with lighting power densities defined by ASHRAE/IESNA Standard 90.1, as well as exhibiting full-cutoff fixtures to comply with Las Cruces night sky ordinances. High reflectance parking and pedestrian surface areas will be minimized.

#### **Water Efficiency**

##### **WE Credit 3: Water Use Reduction**

New high efficiency fixtures, such as dual flush toilets, low-flow or non-water urinals, and low-flow lavatories will be used to establish a 20% reduction from the existing building fixture baseline use.

Continued...

## BUILDING SERVICES REPORT

Continued...

### **Energy and Atmosphere**

#### **EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems**

The intent of this is to verify the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents. The owner shall document the project requirements. The design team shall document the Basis of Design (BOD). A commissioning plan shall be incorporated in to the construction documents.

#### **EA Prerequisite 2: Minimum Energy Performance**

The intent of this is to establish the minimum level of energy efficiency for the building and associated systems. Project shall be designed to comply with ASHRAE/IESNA 90.1-2007

#### **EA Prerequisite 3: Fundamental Refrigerant Management**

In order to reduce ozone depleting gases, construction documents shall specify zero use of CFC-based refrigerants in new building HVAC equipment.

#### **EA Credit 1: Optimize Energy Performance**

The building's energy consumption and demand is anticipated to be optimized by a minimum of 20% over the ASHRAE 90.1 compliant building energy baseline. The whole building energy usage will be modeled to establish an energy baseline in a DOE EnergyPlus or similar software. Mechanical system power and natural gas consumption and electrical systems power consumption will be evaluated. To achieve at least 7 points in this credit the building will have to perform 20% better than ASHRAE Standard 90.1-2007 requirements. The room temperature set points for the spaces will be set as follows:

- General public areas (occupied space): 77 deg F cooling / 70 deg F heating
- Offices and (occupied space): 75 deg F cooling / 70 deg F heating
- Vestibules (unoccupied space): 79 deg F cooling / 70 deg F heating
- Mechanical and storage(unoccupied space): 79 deg F cooling / 65 deg F heating

Modeling the lighting system through photometric software such as AGI32 to provide an efficient lighting design, and the use of high efficiency LED lighting where possible will reduce the average power density to levels below the allowable values stated in ASHRAE 90.1. Building envelope insulation R-Values will need to be increased above ASHRAE 90.1 minimum to assist in the energy reduction.

#### **EA Credit 2: On-site Renewable Energy**

On-site renewable energy will be used to offset energy costs and achieve 11% renewable energy generated on-site by means of solar and wind generation. The whole building energy usage will be modeled to establish existing energy baselines. Each major building generation system will be connected back to a Building Energy Management System. These systems will be connected to the building utility service by means of a renewable energy credit meter and net meter arrangement as dictated by the El Paso Electric renewable energy credit policy.

Continued...

## BUILDING SERVICES REPORT

Continued...

The estimated annual building consumption is projected to be 10 kWh/square foot or 100,000 kWh per year. The flat roof of the building is an ideal candidate for installation of photovoltaic panels. The base design will be to use typical 175 Watt panels, which could generate 26 kilowatts of peak power. With a 90% efficiency rating, used to account for wire and thermal loss, and inverter inefficiency, and 5.5 sun hours per day, or 2007 sun hours per year, the actual potential power generated will be 9,500 kWh per year or roughly 9% generation of the total building estimated demand. Installing one or two 1.5 kW wind generators in combination with the solar system, with a capacity factor in this urban building setting of 0.1 (actual production factor), may produce nearly 2,500 kWh, possibly boosting the building generation to 11% of total energy consumption or better.

### **EA Credit 5: Measurement and Verification**

The measurement and verification plan is critical for efficient building operations and for confirming to energy savings. The use of a highly sophisticated Energy Management System throughout the museum to monitor multiple energy systems will help achieve this.

The primary motivations of this plan are as follows:

- To reduce energy costs in this project and future projects by confirming energy savings.
- To assist with post-construction commissioning by identifying operational problems that may otherwise go unnoticed.
- To document the effectiveness of the green building strategies employed, so that effective strategies can be replicated in future community projects.

### **EA Credit 6: Green Power**

The purchase of renewable energy to provide at least 35% of the building annual electric consumption, or roughly 35,000 kWh, through the engagement of a minimum two year contract with El Paso Electric will achieve 2 points.

## **Indoor Environmental Quality**

### **EQ Prerequisite 1: Minimum IAQ Performance**

The intent of this is to establish minimum indoor air quality (IAQ) performance to prevent the development of indoor air quality problems in buildings, thus contributing to the comfort and well-being of the occupants. Minimum compliance with ASHRAE 62.1 shall be achieved.

### **EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control**

Smoking is banned in Las Cruces public facilities and will not be an issue for this facility.

### **EQ Credit 1: Outdoor Air Delivery Monitoring**

The intent of this credit is to provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being. Installation of carbon dioxide and airflow measurement equipment will feed the information to the Building Automation System (BAS) to trigger corrective action as required.

Continued...

## BUILDING SERVICES REPORT

Continued...

### **EQ Credit 2: Increased Ventilation**

The intent of this credit is to provide additional outdoor air ventilation to further improve indoor air quality for improved occupant comfort and well-being. An increase of breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum ASHRAE 62.1 rates will be required.

### **EQ Credit 3.1: Construction IAQ Management Plan – During Construction**

The intent of this credit is to reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants. This will require adopting an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways. Sequencing of the installation of absorptive materials such as gypsum wallboard or carpeting will be necessary.

### **EQ Credit 3.2: Construction IAQ Management Plan – Before Occupancy**

As part of the IAQ management plan, a pre-occupancy phase shall also be defined. This will involve either a building “flushout” with a high volume airflow or to conduct baseline IAQ air testing after construction ends and prior to occupancy.

### **EQ Credit 6.1: Controllability of Systems - Lighting**

The intent of this credit is to provide a high level of lighting system control by individual occupants or specific spaces to promote the productivity, comfort and well-being of building occupants. It is planned for this building to house a central programmable lighting controller and panel to manage specific lighting areas throughout the building. Individual local controllers will enable specific fixtures or patterns to be dimmed or patterned.

### **EQ Credit 6.2: Controllability of Systems - Thermal Comfort**

The intent of this credit is to provide a high level of thermal comfort system control by individual occupants or specific spaces to increase comfort. The primary duct system planned for this building will exhibit individual variable air volume dampers with individual room thermostats to enable occupants to adjust to suit individual task needs and preferences.

### **EQ Credit 7.1: Thermal Comfort - Design**

The intent of this credit is to provide a comfortable thermal environment for building occupants. This will require compliance with ASHRAE Standard 55-2007, to maintain temperature and humidity in defined levels for comfort. This will need to be carefully evaluated in conjunction with the exhibits and animals planned for the facility.

### **EQ Credit 7.2: Thermal Comfort - Verification**

The intent of this is to provide for the assessment of building thermal comfort over time. Building owner will thermal comfort survey within a period of 6 to 18 months after occupancy, and develop a corrective action plan if more than 20% of occupants are dissatisfied.

STRUCTURAL ANALYSIS



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June 8, 2010

Mr. Will Ticknor  
Director of Museums  
City of Las Cruces  
P.O. Box 20000  
Las Cruces, NM 88004

Re: Structural Analysis Summary  
Las Cruces Museum of Nature and Science

Dear Mr. Ticknor,

Bohannon Huston, Inc (BHI) has completed a structural review of the existing building that will house the Las Cruces Museum of Nature and Science in order to determine the adequacy of the structure to accommodate the proposed modifications to convert the existing bank building into a public museum. The review was done in compliance with the International Building Code 2006. The scope of work does not include designs of modifications or retrofits that may be required, but will discuss possible modifications and estimated costs.

**Building Description**

The Las Cruces Museum of Nature and Science will be located in an existing brick building originally built in 1955 as the Farmers and Merchants Bank. The building was most recently the home of the Bank of the Rio Grande before it was purchased by the City of Las Cruces. The building is being renovated to obtain LEED certification. Part of the certification requirements includes the use of renewable and green energy to power the building. The renewable and green power sources will consist of solar panels spaced on a 7 foot grid over the majority of the roof area and two small wind generators mounted to the exterior entrance arch.

BHI reviewed the original 1955 construction drawings and performed a site visit to confirm that the layout of the structural support systems match the construction drawings. There is a 20 foot by 50 foot addition and a separate architectural stucco archway added to the west side of the building which were not part of the original structure. The dates of the addition and arch construction are unknown and no construction drawings or record drawings were available for review.

The building covers an area of approximately 8,800 square feet. The 18 gauge, 2-inch deep, steel roof deck bears on steel joists spaced at 8 feet on center with spans varying from 14 to 36 feet. The joists are supported by brick walls or steel posts and beams. Post spacing varies from 14 to 27 feet. The brick walls are supported on continuous concrete strip foundations and the posts are supported on concrete spread footings.

The existing building roofing was a built-up roof over a 1-inch layer of rigid insulation. Specifications on the original built-up roof were not available, however these types of roof systems generally consist of three to five layers of roofing membrane, covered by a bitumen material and surfaced with aggregate, asphalt or elastomeric coating. Built up roofing systems weigh approximately 5.5 to 6.5 pounds per square foot (psf). The existing roofing has been removed and will be replaced with lighter roofing consisting of rigid insulation and a PVC liner.

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ENGINEERING >

SPATIAL DATA >

ADVANCED TECHNOLOGIES >



**STRUCTURAL ANALYSIS**

The two HVAC units are proposed to be located in the northeast side of the building. The capacity of the joists in that area is not adequate to support the large point loads imposed by this equipment. It is recommended that additional roof joists be added under the units to carry their additional load. Depending on the final placement of the units, the existing beam may also need to be stiffened with plates welded to the top and bottom flanges.

**Cost Estimate**

The costs for structural modifications are estimated below. The cost estimate does not include design fees, demolition, roofing, modifications to architectural systems or the design and cost of the separate frame for the wind generator support.

Angle Supports for Solar Panels	\$20,000
Steel Beam, Columns and Spot Footings to Replace Brick Bearing Wall	\$15,000
Steel Joists for HVAC Units, Beam Stiffening	\$5,000
<b>TOTAL ESTIMATED COST</b>	<b>\$40,000</b>

**Recommendations**

The existing roof support system is adequate to carry the proposed additional load from the solar panels spread over the full roof area. Structural modifications are required to replace the existing brick bearing wall to be removed and to strengthen and supplement the existing structural supports under the proposed HVAC units. The wind generators will need a separate structural support.

BHI can provide design services for the design and detailing of the required structural modifications as outlined in this letter if requested.

If you have any questions, please do not hesitate to contact me at (505) 823-1000.

Sincerely,



Erin Clements, P.E.  
Project Engineer  
Structural Engineering Group

Reviewed By:



Gary Landon, P.E.  
Senior Vice President  
Structural Engineering Group

CC: Tracy Bright, Reich Petch

EAC//le  
Enclosures

AVAILABLE LEED CREDITS

The LEED 2009 checklist displays the suggested LEED point count currently, however it may not include all the architectural elements. We anticipate that additional points will be planned and pursued in the initial design stages to achieve at least a LEED Certified building. The 11 points in the “?” column represent potential points that to verified by a LEED consultant at a later date.

				<h3>LEED 2009 for New Construction and Major Renovation</h3>	
				<b>Project Checklist</b>	
				Project Name: Las Cruces MoNaS	
				Date: June 8, 2010	
<b>6</b>	<b>0</b>	<b>2</b>	<b>Sustainable Sites</b>	<b>Possible Points: 26</b>	
Y	N	?			
<b>Y</b>			Prereq 1	Construction Activity Pollution Prevention	
			Credit 1	Site Selection	1
			Credit 2	Development Density and Community Connectivity	5
<b>1</b>			Credit 3	Brownfield Redevelopment	1
<b>1</b>			Credit 4.1	Alternative Transportation—Public Transportation Access	6
			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
		<b>2</b>	Credit 4.4	Alternative Transportation—Parking Capacity	2
			Credit 5.1	Site Development—Protect or Restore Habitat	1
			Credit 5.2	Site Development—Maximize Open Space	1
<b>1</b>			Credit 6.1	Stormwater Design—Quantity Control	1
<b>1</b>			Credit 6.2	Stormwater Design—Quality Control	1
			Credit 7.1	Heat Island Effect—Non-roof	1
<b>1</b>			Credit 7.2	Heat Island Effect—Roof	1
<b>1</b>			Credit 8	Light Pollution Reduction	1
<b>2</b>	<b>0</b>	<b>4</b>	<b>Water Efficiency</b>	<b>Possible Points: 10</b>	
Y			Prereq 1	Water Use Reduction—20% Reduction	
		<b>4</b>	Credit 1	Water Efficient Landscaping	2 to 4
				<input type="checkbox"/> Reduce by 50%	2
				<input checked="" type="checkbox"/> No Potable Water Use or Irrigation	4
			Credit 2	Innovative Wastewater Technologies	2
<b>2</b>			Credit 3	Water Use Reduction	2 to 4
		<b>2</b>		<input type="checkbox"/> Reduce by 30%	2
				<input type="checkbox"/> Reduce by 35%	3
				<input type="checkbox"/> Reduce by 40%	4

Continued...

AVAILABLE LEED CREDITS

Continued...

18 0 0			Energy and Atmosphere	Possible Points: 35	
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
7			Credit 1	Optimize Energy Performance	1 to 19
				Improve by 12% for New Buildings or 8% for Existing Building Renovations	1
				Improve by 14% for New Buildings or 10% for Existing Building Renovations	2
				Improve by 16% for New Buildings or 12% for Existing Building Renovations	3
				Improve by 18% for New Buildings or 14% for Existing Building Renovations	4
				Improve by 20% for New Buildings or 16% for Existing Building Renovations	5
				Improve by 22% for New Buildings or 18% for Existing Building Renovations	6
			7	Improve by 24% for New Buildings or 20% for Existing Building Renovations	7
				Improve by 26% for New Buildings or 22% for Existing Building Renovations	8
				Improve by 28% for New Buildings or 24% for Existing Building Renovations	9
				Improve by 30% for New Buildings or 26% for Existing Building Renovations	10
				Improve by 32% for New Buildings or 28% for Existing Building Renovations	11
				Improve by 34% for New Buildings or 30% for Existing Building Renovations	12
				Improve by 36% for New Buildings or 32% for Existing Building Renovations	13
				Improve by 38% for New Buildings or 34% for Existing Building Renovations	14
				Improve by 40% for New Buildings or 36% for Existing Building Renovations	15
				Improve by 42% for New Buildings or 38% for Existing Building Renovations	16
				Improve by 44% for New Buildings or 40% for Existing Building Renovations	17
				Improve by 46% for New Buildings or 42% for Existing Building Renovations	18
				Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19
6			Credit 2	On-Site Renewable Energy	1 to 7
				1% Renewable Energy	1
				3% Renewable Energy	2
				5% Renewable Energy	3
				7% Renewable Energy	4
				9% Renewable Energy	5
			6	11% Renewable Energy	6
				13% Renewable Energy	7
			Credit 3	Enhanced Commissioning	2
			Credit 4	Enhanced Refrigerant Management	2
3			Credit 5	Measurement and Verification	3
2			Credit 6	Green Power	2

Continued...

AVAILABLE LEED CREDITS

Continued...

1 0 0			Materials and Resources	Possible Points: 14
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1 Storage and Collection of Recyclables	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		<input checked="" type="checkbox"/>	Reuse 55%	1
		<input type="checkbox"/>	Reuse 75%	2
		<input type="checkbox"/>	Reuse 95%	3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2 Construction Waste Management	1 to 2
		<input type="checkbox"/>	50% Recycled or Salvaged	1
		<input type="checkbox"/>	75% Recycled or Salvaged	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3 Materials Reuse	1 to 2
		<input type="checkbox"/>	Reuse 5%	1
		<input type="checkbox"/>	Reuse 10%	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4 Recycled Content	1 to 2
		<input type="checkbox"/>	10% of Content	1
		<input type="checkbox"/>	20% of Content	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5 Regional Materials	1 to 2
		<input type="checkbox"/>	10% of Materials	1
		<input type="checkbox"/>	20% of Materials	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6 Rapidly Renewable Materials	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7 Certified Wood	1
7 0 5			Indoor Environmental Quality	Possible Points: 15
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1 Minimum Indoor Air Quality Performance	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 2 Environmental Tobacco Smoke (ETS) Control	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1 Outdoor Air Delivery Monitoring	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2 Increased Ventilation	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1 Construction IAQ Management Plan—During Construction	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2 Construction IAQ Management Plan—Before Occupancy	1
		<input type="checkbox"/>	Credit 4.1 Low-Emitting Materials—Adhesives and Sealants	1
		<input type="checkbox"/>	Credit 4.2 Low-Emitting Materials—Paints and Coatings	1
		<input type="checkbox"/>	Credit 4.3 Low-Emitting Materials—Flooring Systems	1
		<input type="checkbox"/>	Credit 4.4 Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		<input type="checkbox"/>	Credit 5 Indoor Chemical and Pollutant Source Control	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6.1 Controllability of Systems—Lighting	1
		<input type="checkbox"/>	Credit 6.2 Controllability of Systems—Thermal Comfort	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.1 Thermal Comfort—Design	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.2 Thermal Comfort—Verification	1
		<input type="checkbox"/>	Credit 8.1 Daylight and Views—Daylight	1
		<input type="checkbox"/>	Credit 8.2 Daylight and Views—Views	1

Continued...

## AVAILABLE LEED CREDITS

Continued...

1	0	0	<b>Innovation and Design Process</b>	<b>Possible Points: 6</b>
			Credit 1.1 Innovation in Design: Specific Title	1
			Credit 1.2 Innovation in Design: Specific Title	1
			Credit 1.3 Innovation in Design: Specific Title	1
			Credit 1.4 Innovation in Design: Specific Title	1
			Credit 1.5 Innovation in Design: Specific Title	1
1			Credit 2 LEED Accredited Professional	1
0	0	0	<b>Regional Priority Credits</b>	<b>Possible Points: 4</b>
			Credit 1.1 Regional Priority: Specific Credit	1
			Credit 1.2 Regional Priority: Specific Credit	1
			Credit 1.3 Regional Priority: Specific Credit	1
			Credit 1.4 Regional Priority: Specific Credit	1
35	0	11	<b>Total</b>	<b>Possible Points: 110</b>

Certified 40 to 49 points   Silver 50 to 59 points   Gold 60 to 79 points   Platinum 80 to 110

## DESERT MATRIX

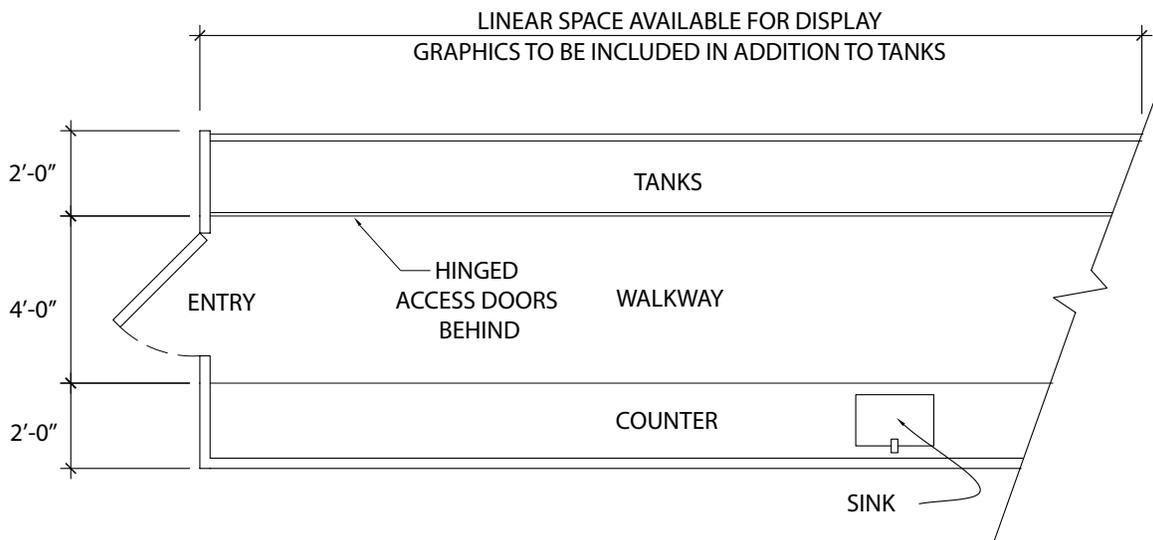
Matrix of plants and animals for possible display in Chihuahuan Desert Exhibit

HABITAT TYPE	ICONIC LARGE PLANT SPECIES	POSSIBLE LIVING ANIMALS	POSSIBLE TAXIDERMIED ANIMALS
<b>Alluvial plain</b> Most familiar and common habitat visitors will see	Creosote bush Tarbush Honey mesquite	Western Diamondback Rattlesnake Checkered whiptail Spiny lizard Western Green Toad	Roadrunner Black-tailed jackrabbit Collared peccary
<b>Bajada</b> Slopes running up to the mountains	Soaptree yucca Lechaguilla Sotol Ocotillo Mormon tea Parry's century plant	Desert King Snake Gopher snake Western hog-nosed snake Chihuahua Desert millipede Longnose Leopard lizard Canyon Treefrog	Coyote Botta's Pocket Gopher Turkey vulture Bobcat Spotted bat Red-tailed hawk
<b>Oak-Juniper-Pinyon Pine Woodlands</b> Mountains from 5 to 7,000'	Evergreen oaks Pinyon pine Juniper	Collared lizard Canyon Treefrog	Ringtail Cougar Desert Bighorn (horns only?)
<b>Rio Grande Bosque</b> Habitat type found beside permanent watercourses	Fremont cottonwood Desert willow Salt cedar	Snapping Turtle Texas Spiny soft-shelled Turtle Rio Grande Silvery Minnow Western Painted Turtle	Bobcat Gray fox Beaver Botta's Pocket Gopher
<b>Grasslands</b> Once the predominant habitat, now widely replaced by scrub desert	Tobosa Black grama Sacaton	Ornate Box Turtle Western Spadefoot	Black-Tailed Prairie Dog Burrowing Owl Pronghorn

## LIVE ANIMAL DISPLAY REQUIREMENTS

- The live animals chosen to be exhibited should reflect the kind of creatures that visitors to the museum can encounter when they are out in the desert camping or hiking, visiting a park or even in their own backyards. Visitors should 'relate' with what they see in the museum to their own world. This connection to their own lives serves as a powerful initiating tool to want to learn more about the creature in the exhibit.
- The live animals are grouped according to habitats that are found in the desert. Although some animals are not exclusive to that habitat they never the less are a typical denizen that may be encountered.
- The habitat groupings follow each other in a linear exhibit. The habitats house a cross-section of 'iconic' creatures and plants that live in a particular habitat. It is important for visitors to make associations of certain life forms with certain types of landscape. Habitat groupings encourage the visitor to the realization that physical characteristics of an environment can assert certain demands on living things resulting in unique adaptive features by its inhabitants.
- Each habitat grouping has its own physical characteristics which are highlighted visually and in the graphics.
- From a visitor perspective it is important that all habitats are easily observed by people of varying heights. Family groups will be common to the museum and it is essential that 5 and 6 year-olds see the creatures in an exhibit as well as an adult.

This means that the height of any habitat (its base) be no higher than 26 to 30 inches off the floor. This in turn implies that the habitats be positioned in a linear fashion not varying much in height off the floor, no more than a couple inches. Attempts at stacking live animal enclosures to fit more diverse animals should be discouraged. Stacking enclosures would eliminate the sight lines that younger children require to



SINGLE SIDED  
LIVE ANIMAL DISPLAY

## LIVE ANIMAL DISPLAY REQUIREMENTS

see into the enclosures. It is worth noting that to many children, just seeing live lizards, snakes and scorpions close up is an exciting and stimulating experience. Good views are important! A properly positioned exhibit provides visitor comfort.

- The fact that most habitats are in a linear fashion provides the opportunity to access them easily and quickly from behind. This is important because any 'mess' that is created is kept off the exhibit floor and in a back area where visitors cannot view it.

The back area provides a long counter and sink that can easily handle an aquarium (exhibit) that has been removed from viewing and placed in a position/place that provides ease of cleaning.

- All of the live animals from the invertebrates to the amphibians, lizards, turtles and snakes are of low maintenance. That is to say that *none* require much work from a day to day basis. Mammals on

the other hand would require a high level of daily work, from feeding to cleaning as well as 'enrichment' activities. Furthermore mammals need to exercise and it is questionable whether the museum would have space to house any mammals in lieu of the other creatures on the wish list.

- Invertebrates such as the whip scorpion, scorpion and tarantulas can be accessed from the front. This is good for two reasons; first, if visitor interactions are encouraged then the ease of access makes such an interaction more likely. Two, because of their low maintenance the front access is no problem for feeding or cleaning.
- The desert has a diverse number of nocturnal creatures and introducing a whole new world that is literally a part of our lives would be beguiling. A nocturnal exhibit would be popular but also would require a large footprint to do it justice. Ideally it should be a room that visitors immerse themselves into.

This is not possible in the new museum simply because of the shortage of space and therefore not recommended.

However one can still display nocturnal creatures such as the scorpion and some of the snakes. Providing a shelter in these enclosures where the creature can feel secure is important. Such shelters can be placed in such a way that the animal can feel secure and be viewed by a visitor through the glass. For example leaning flat rocks or wood against the viewing glass would meet both requirements.