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## Closer: Designing a Manufacturing Facility for the Zuni Pueblo Solar Energy Reinvestment Initiative

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# CLOSER

INDEPENDENT PROJECT SUBMITTED TO ROGER WILLIAMS UNIVERSITY, SCHOOL OF ARCHITECTURE IN FULFILLMENT OF THE REQUIREMENTS OF THE B.ARCH DEGREE IN ARCHITECTURE

X

SETH VAN NOSTRAND, CLASS OF 2009

X

STEPHEN WHITE, DEAN, SCHOOL OF ARCHITECTURE

X

ADVISOR WILLIAM MCQUEEN

X

ADVISOR LUIS CARRANZA



C L O S E R

together

to needed facilities

to the future

to the past

to a true community

to a solution

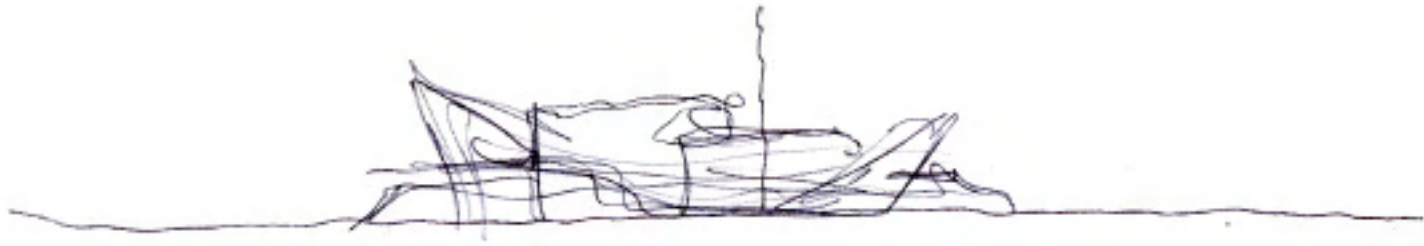


DESIGNING A MANUFACTURING FACILITY FOR THE ZUNI PUEBLO SOLAR ENERGY REINVESTMENT INITIATIVE

SETH VAN NOSTRAND







Native American life today on the reservations of the American southwest is a bleak and fragmented picture of a culture once steeped in tradition and tribal pride. Many live in destitute poverty and are separated from important facilities like health clinics and libraries, separated from any kind of community center, and most importantly, separated from each other. Most lack the necessary opportunities, skills and education to break out of poverty. For most, the demanding task of simply staying alive eclipses the importance of revitalizing their intrinsic customs.

In response to these issues, this thesis undertakes a master plan situated in the flat, open spaces to the west of Zuni, New Mexico, comprised of carefully selected program elements to make up the best possible town for the individual needs of its inhabitants. Specifically, this project also takes on the development of one of these buildings as a catalyst; a large-scale place of industry. A solar panel manufacturing facility would provide hundreds of jobs, labor skills for workers, a steady income and be a service to the greater American economy as renewables become increasingly in demand.

The facility is a machine itself; all the programmatic cogs working together to chug and churn out product in true industrial fashion. It is innovative in its approach to combining mechanized functionality with commitments to the workers; their health, and heritage; and to the environment. Open, collaborative workspaces and circulation linkages bring the factory community together while extensive, pioneering sustainable features like an amorphous solar panel concentrator ring are employed throughout the complex and the articulated landscape. A sweeping, sinuous circulation belt relates this landscape to the forms and people inside.

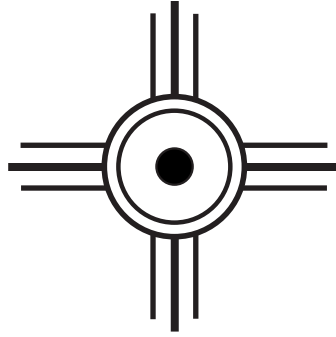
The aesthetic reads 'momentum' and 'inertia' since these are the overarching goals and themes of this work of architecture, but not alien from the southwest palette. This work is meant to be seen from the highway and will anchor the industrial sector as well as clearly articulate the global reach this community will develop.

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## INTRODUCTION

How do we allow a culture to modernize while  
maintaining a sense of past?

The project "Closer" arose as the result of a family trip to the American southwest in the summer of 2007. Driving through the New Mexico and Arizona reservation lands, I was met face-to-face with the bleak image of a depressed Native American life. These modern indigents are arrested in the narrow spaces between the rich culture of a past too long ago to remember, and a modern, global economy for which they are wholly ill-prepared to inhabit.

The image was impossible to ignore. Dilapidated, destitute homes sprouted from the scrub brush amongst a backdrop so beautiful and cliché in its character that it was surely used as the set for so many John Wayne classics. Every few miles another cardboard-clad trailer or a one room cinderblock enclosure grew alongside the highway. It was as if a once tight-knit community was one day picked up, shook, and thrown; its constituent pieces scattered like dice along the barren, sun scorched basalt. What struck me

the most was how far away these people were from... everything. Through observation and then through subsequent research, it became clear that there were no centralized facilities for literacy (like public libraries), for health care, for community interaction (like senior centers or convention areas) or for recreation. It seemed that each dwelling enclosed a completely independent story, like a secret, totally removed from the big world beyond its walls.

Miles of ravaged desert land washed together in the waning light; the almost inappropriate softness of a western sunset contrasting with the inherent brutality of the land. Though the drive wore into the darkness of night, pinpricks of light every few miles was a melancholy reminder that the lonely dwellings still existed, almost chthonically, under this blanketing of quiet...



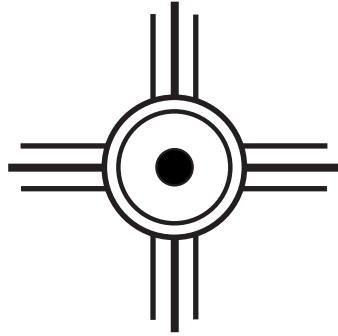
I began researching immediately after the excursion; exploring where exactly on the map we had been and who the humans were that inhabited these places of secret. The larger context is of course the American southwest, the flat areas that stretch across the New Mexico and Arizona border. More specifically though, I found the site I was interested in within the limits of McKinley

County in northwestern New Mexico. As for the tribes that inhabit the area, Zuni (categorized as 'Zuni-Pueblo'), Hopi and Navajo all stake their claim in McKinley County, though the Zunis and Navajo are by far the most populous with reservation lands taking up approximately 18% and 15% of the county respectively.









## THE PROPOSAL

The immediate and long-term problems that I feel most detrimentally face the Native Americans in and around the Zuni Reservation have been distilled into five overarching “Problem Ar-

eas” after my experience and the research that followed. These problem areas are Physical, Educational, Social, Health, and Environmental facets of Zuni life:

#### PHYSICAL

- Sparse housing patterns separate people from one another and important community resources
- Many homes are uninsulated, structurally unsafe, and too small
- High poverty rate inhibits good, safe construction

#### EDUCATIONAL

- Many Native Americans lack the job skills that are required for employment beyond the reservation
- Most Native American K-12 schools fall far below the national averages in Standardized Testing
- Sub-standard schooling can hurt students’ chances at higher education

#### SOCIAL

- Human interaction is an imperative part of leading an emotionally and mentally healthy life, and the town of Zuni offers no community centers appropriate for all ages
- Spaces for recreation (organized or other) are hard to come by or in poor condition
- Younger generations are becoming increasingly distanced from their heritage and their respective histories that make their people so culturally rich

#### HEALTH

- While Zuni has a medical center, their counseling services are lacking which is a serious problem in a community that suffers near-epidemic suicide, abuse and depression rates
- Substance abuse and rehabilitation centers are located far from town and are unaffordable
- Few health care subsidies are available for impoverished Native Americans. Local, quality care for free is badly needed

#### ENVIRONMENTAL

- There are some small-scale agricultural practices outside the town but they are irrigated unsustainably, directly from the Black Stone reservoir
- “Green Living” is virtually non-existent in the community which offers no recycling programs
- As with most of the country, plentiful, sustainable resources like the sun are not taken advantage of

These are the issues that must be addressed, and the issues that will be theoretically tackled in the following thesis project for the improvement of the Native American way of life on the Zuni reservation.

From a list of problems, one can begin to formulate potential solutions. But first, one must abandon the environment in which these problems proliferate. This is the basis of the project "Closer." By developing a town plan essentially from nothing and implementing carefully selected building projects, a catalyst will be created. This relatively small project will assimilate the buildings and services that these people need most and will draw them in. This will be a place to start a new life because of opportunities afforded by this design. And once settled they will continue to make their own opportunities, in the way they find most appropriate based on their intrinsic tendencies. The town will grow and change and hurt and heal like a beautiful organism, perfect in its individual response to the imperfect; the true needs of this very unique people.

Specifically, this thesis undertakes a master plan situated in the flat, open spaces to the west

of Zuni, New Mexico, comprised of carefully selected program elements that make up the best possible town for the individual needs of its inhabitants. In the interest of my education, this project will also take on the detailed design and development of one of these buildings, a large-scale place of business with mixed-use zones to accommodate all walks of life at all times of the day, week and year. A solar panel manufacturing facility would bring huge business into the Native American community. It would provide hundreds of jobs, labor skills for workers, a steady income and be a service to the greater American economy as renewables become increasingly in demand. Through careful design and integration into the master plan, this work will be the nexus of a future community where the Native Americans can gather, work, socialize, learn, construct, live, and truly call their own.



Reaching the goals of this project depend on its full completion; the assumption that all the programmatic elements are built and arranged according to the plan. When this happens, this new community will be able to meet the following goals:

<u>IMMEDIATE GOALS</u>	<u>LONG-TERM GOALS</u>
<p><b>PHYSICAL</b></p> <ul style="list-style-type: none"> <li>• To generate steady income for employees</li> <li>• To provide safe, comfortable housing (until permanent personal structures can be erected)</li> </ul>	<p><b>PHYSICAL</b></p> <ul style="list-style-type: none"> <li>• A full transplantation of people to this new community from Zuni and surrounding areas</li> <li>• Permanent residential zones designed by the members of the community in the way they see most fitting</li> </ul>
<p><b>EDUCATIONAL</b></p> <ul style="list-style-type: none"> <li>• To teach labor (and related) skills to workers</li> <li>• To educate about sustainability through recycling/reuse programs</li> <li>• To provide more conducive learning environments for children</li> </ul>	<p><b>EDUCATIONAL</b></p> <ul style="list-style-type: none"> <li>• A large group of educated workers</li> <li>• Improved standardized test scores in school</li> <li>• A crew of college-ready high schoolers with the intent to pursue higher education</li> </ul>
<p><b>SOCIAL</b></p> <ul style="list-style-type: none"> <li>• To offer safe, supervised places for kids and teens to gather and exercise</li> <li>• To provide safe, dynamic (and flexible) spaces for community members to congregate</li> <li>• To offer education, workshops, exhibits and activities focused around native customs and history</li> </ul>	<p><b>SOCIAL</b></p> <ul style="list-style-type: none"> <li>• A group of people more in touch with their roots than they were previously</li> <li>• A renewed appreciation for old customs, new customs and an affinity for combining the two</li> <li>• Community and child centers that are popular and successful in their aim to be safe and enjoyable places to spend time</li> </ul>
<p><b>HEALTH</b></p> <ul style="list-style-type: none"> <li>• To provide quality, personalized health care for free</li> <li>• To change outlooks by offering hope for a better future</li> </ul>	<p><b>HEALTH</b></p> <ul style="list-style-type: none"> <li>• A significant reduction in suicide &amp; depression rates</li> </ul>
<p><b>ENVIRONMENTAL</b></p> <ul style="list-style-type: none"> <li>• To begin utilizing abundant, local natural energy sources</li> <li>• To implement more sustainable strategies in agricultural practices</li> </ul>	<p><b>ENVIRONMENTAL</b></p> <ul style="list-style-type: none"> <li>• A renewed appreciation for the environment and our responsibility to preserve it</li> <li>• An appreciation low carbon footprints and the desire to become carbon-neutral over time</li> </ul>

To achieve these goals, solid methods of research must be adhered to in order to attain appropriate and accurate findings. With this project, significant research went not only into the programming, site, history of the building type, precedents and building codes, but also into the social circumstances that surround the Native American. I found it pertinent to analyze how the natives lived in history (their intrinsic building traditions); the relationships their structures took with one another and with the environment, and how they have become accustomed to living today.

After all, THIS IS AS MUCH A SOCIAL EXPERIMENT AS IT IS AN ARCHITECTURAL THESIS. A large draw of this project for me is to see ex-

actly how these people will respond to a brand-new town close to, but still away from, the homes that many of them have lived their entire lives in. The social benefits of this project are certain, but how will they choose to build and develop the areas zoned out as residential? What shape will their homes take? Will members of the family beyond the immediate live there also (as was the case 300 years ago)? Will their homes face south and use thick adobe trombe walls? Will homes be built within a greater aesthetic composition like the Chaco Canyon community almost one thousand years ago? Only time will truly tell, but let us gain some insight by taking a closer look at the people who this project is for...





Despite the bleak, previously mentioned conditions, the Zunis (who call themselves A:shiwi) are a proud people –and a close one. One particular elderly Zuni man stated in interview that “Everyone here has a role... No one, no matter what, is left behind. That is – and always has been – the Zuni way.” Despite losing much of their original lands (the current reservation encompasses only 700 square miles, but remains on earth that has been Zuni since before history), they’ve managed to preserve their cohesiveness. Even after Francisco Vasquez de Coronado conquered the area in 1530 and subsequent population decreases from disease and genocide took place, the Zuni people stand united. There are roughly 10,000 members of the tribe today and 91% of them live somewhere within the Zuni reservation. This exhibits a great level of interconnectedness, making them the closest, most concentrated tribe in the country. Some even still practice the ancient Zuni religion in which one greets the morning sun with a sprinkling of sacred cornmeal and marks the yearly calendar with rituals and dances, but it is a dying tradition.

The Zuni language is still spoken; certain radio stations broadcast in both English and Zuni,

but it’s also dying out. One such DJ notes “... if we only do Zuni, we get all these calls, people saying ‘uh, sorry, my Zuni isn’t that good, could you repeat that part about...’ But I like to think it helps, hearing us speak it.” And there are head start programs with the aim of teaching the language to a younger generation. The interest is there, just not sufficient programs and spaces to support it.

An equally unfortunate fact is the one Odell Jaramillo, a teacher and advisor in Zuni brings up. “Every young person I met hopes to live at the pueblo as an adult. But that means finding a job, which is not easily done... There are very few businesses, aside from the Indian craft trading posts, a few gas stations and small convenience stores.” In fact, the unemployment rate in Zuni was 62% at the end of 2007, and has gone up since.

These facts about the Zuni are gloomy, but promising. The unity these people possess in the face of such hardships show that they are the perfect candidates for this project and will probably be willing to take full advantage of all this new design has to offer them.

MORE SPECIFIC DEMOGRAPHIC INFORMATION FOR THE TOWN OF ZUNI:

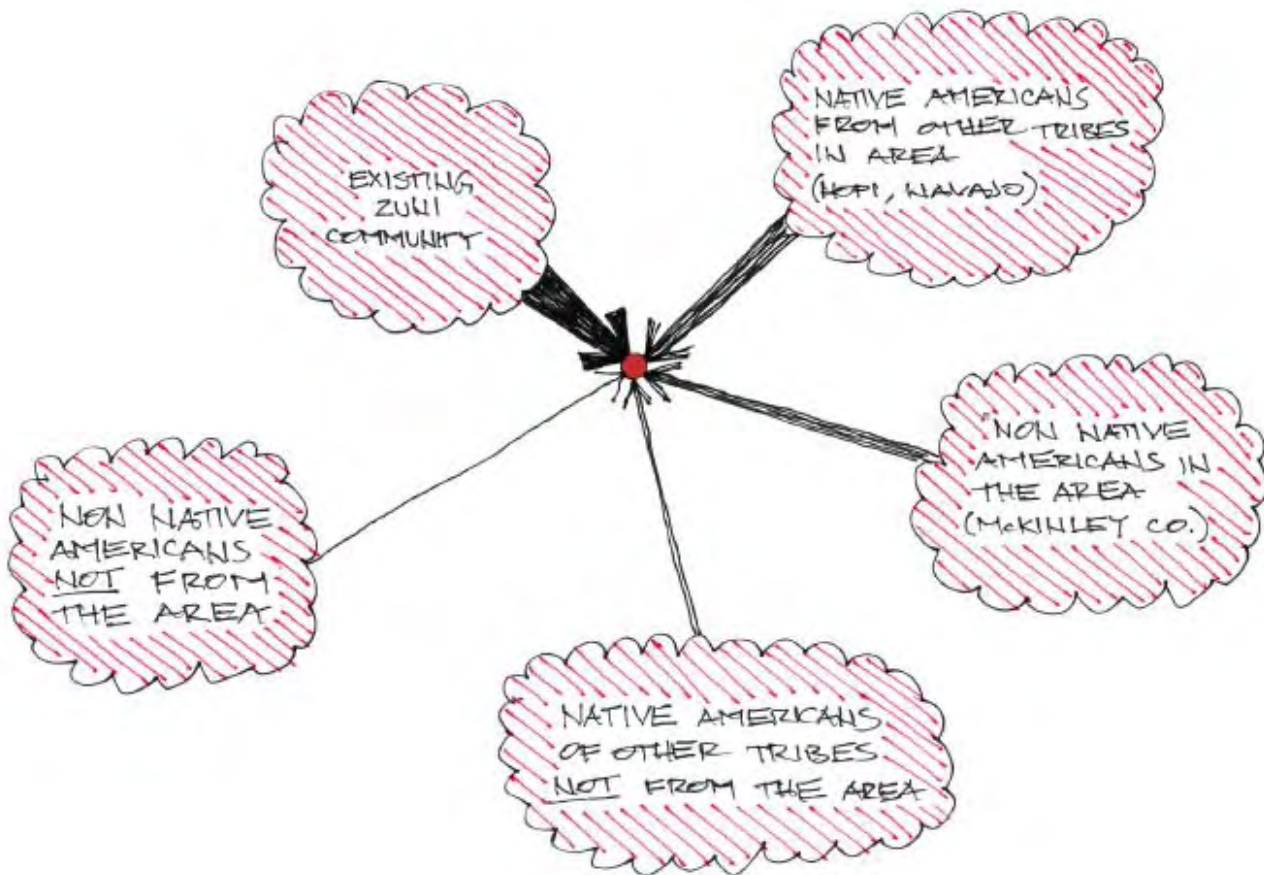
- 9,901 people with a negative 11% population growth rate
- 95.6% are Zuni Native American
- Median age is 28.9 (compared to the National mean of 37.6)
- Income per capita is \$8,267
- Median household income is \$20,986
- 7.48% have gone to college
- 62.62% have graduated high school
- Average home is worth between \$20,000 and \$39,000

*Mode of transportation to work in Zuni Pueblo, NM*





The new Zuni community will be an open and tolerant society, though there is a hierarchy to whom this project is designed to accommodate. Clearly the existing Zuni population from the area are the first to be served by this new town plan, but other demographics are certainly not discriminated against and are invited to start their lives anew in this community. The following diagram explores who will be a part of this project and how strong their prospective influence will be.

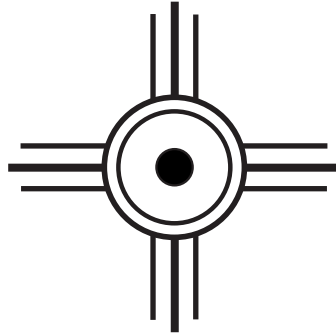


Based on information gathered about these people, how will they use this project? There are assumptions and goals, but what about the specifics? I've hypothesized three main issues that could possibly arise as trouble areas from this design:

<u>POTENTIAL ISSUES</u>	<u>PRE-EMPTIVE SOLUTIONS</u>
<p><b>TRANSPORTATION</b></p> <ul style="list-style-type: none"> <li>• During the early phases of the project, some people will have no way to get to the employer because of lack of vehicle</li> <li>• This inability could discourage their working in the new town</li> </ul> <p><b>COMMUTERS</b></p> <ul style="list-style-type: none"> <li>• Some people may choose to commute, which would counteract the whole catalyst idea of the proposal</li> </ul> <p><b>HOUSING</b></p> <ul style="list-style-type: none"> <li>• Temporary housing units are meant for individuals who live too far away to commute during the transitional phase of this project. These structures may become a crutch and turn into more permanent residences</li> </ul>	<p><b>TRANSPORTATION</b></p> <ul style="list-style-type: none"> <li>• Institute a shuttle service during the first two year 'transition period' back and forth from Zuni</li> <li>• Promote carpooling with parking incentives</li> </ul> <p><b>COMMUTERS</b></p> <ul style="list-style-type: none"> <li>• While it would be unethical to force people to move from their homes to this new town, commuters can be discouraged through 'proximity-parking' options and fees for parking 'commuter vehicles' in town</li> </ul> <p><b>HOUSING</b></p> <ul style="list-style-type: none"> <li>• An eighteen month residency limit will be placed on the temporary housing structures. This will give the community member ample time to procure work and save for the construction of their own home. This will also be long enough that the individual will have settled into their new community and job and not want to leave after eighteen months</li> </ul>

Finding a way to solve these problems can appear overwhelming, but they are issues that have been ignored for too long. Seeing these issues being solved through the implementation of this proposal – even if only in theory – is something I am very passionate about not only as a human rights advocate, but as part Native American as well. While Native American blood contributes to only a part of my ethnicity and is of the northeastern Iroquois tribe, I still sense a connection, and after seeing the depressed conditions in the southwest that are their everyday lives, I also sense some responsibility. As architects, we have the power to transform people's lives through design, which is precisely what the following project can do. Hurdles like extreme climate, limited local building materials, limited water availability and limited optimism litter the path of realizing this proposal, but once accomplished, these ideas can be applied to a vast number of other communities that suffer similar problems. In turn, this will help more people live better lives.





## THE PROGRAM

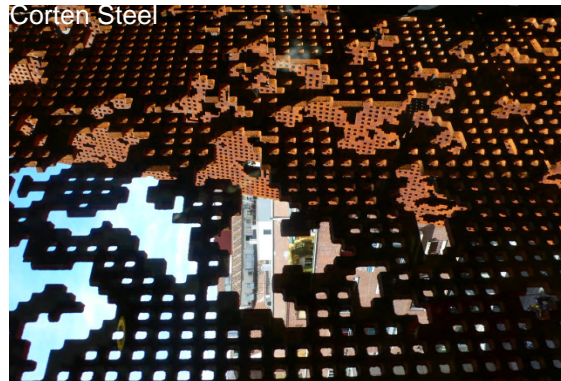


The master plan program is a composition; a seamless whole that has an aesthetically and functionally appropriate space for each of its constituent pieces. Following, are a number of possible arrangements of these elements. The relationship these members have with each other, the site and the environment is crucial in creating a first-class town plan that people will want to move to.

My vision for the plan has a radially oriented core with pinwheeling zones to allow growth in different sectors. Programmatic elements will be tied together visually with hardscapes and focal points that respond to an aesthetic both traditionally Zuni and American southwest, while remaining modern and forward-looking. Materials should be chosen from a clean, local palette, preferably oxidized steel, adobe, stone and concrete.

Pre-emptive planning for expansion is imperative. As the town's population grows, so will its respective residential and commercial zones. The schools, health center and manufacturing facility will also need breathing room for continued development.

Roads, rail links and parking areas must also be well-planned and be sympathetic to the future of the town. Many modern cities become bisected by transportation ways when they grow and are forced to build around them creating divisions that are unplanned and incompatible with the original master plan.



THE MASTER PLAN INCLUDES, BUT IS NOT LIMITED TO:

- **MANUFACTURING FACILITY (115,000sf)**  
A solar panel factory with manufacturing and assembly areas, R&D department and administration
- **AGRICULTURAL CENTER (200,000sf)**  
A self-sustaining structure with various levels for hydroponic 'desert' growing and experimentation
- **TRANSPORTATION HUB (6,000sf)**  
A train station and bus terminal; a statement to the forward direction of this town and their place in the greater southwest network
- **TEMP. WORKER HOUSING (14,000sf)**  
Suite-style housing complex for workers with transportation/commute issues. These arrangements will also foster community among workers
- **MULTI-FAITH CHURCH AND COMMUNITY CENTER (10,000sf)**  
A light-filled space modeled after ancient kivas for prayer, rituals, ceremonies, healing, meditation and formal worship. Plus flexible spaces for community functions
- **HERITAGE MUSEUM (7,000sf)**  
As a small heritage museum exists in Zuni, this work will house more class spaces and language labs than gallery space
- **K-7 PRIMARY SCHOOL (31,000sf)**  
Separate primary and secondary schools, while more expensive, are proven to be more successful for child social development than one large, combined school
- **8-12 SECONDARY SCHOOL (46,000sf)**  
This school would also house athletic facilities for all community members to use
- **HEALTH CLINIC (8,000sf)**  
A small, but well-equipped clinic plus counseling services and rehabilitation services
- **WASTE MANAGEMENT, WATER TREATMENT AND RECYCLING FACILITY (24,000sf)**  
Manages reservoir operations, grey water reclamation and trash/recyclable removal. Also responsible for generating recycling/reuse programs and incentives for the community
- **RESIDENTIAL DEVELOPMENT AREA**
- **COMMERCIAL DEVELOPMENT AREA**

### MASTER PLAN RELATIONSHIP OPTION: A

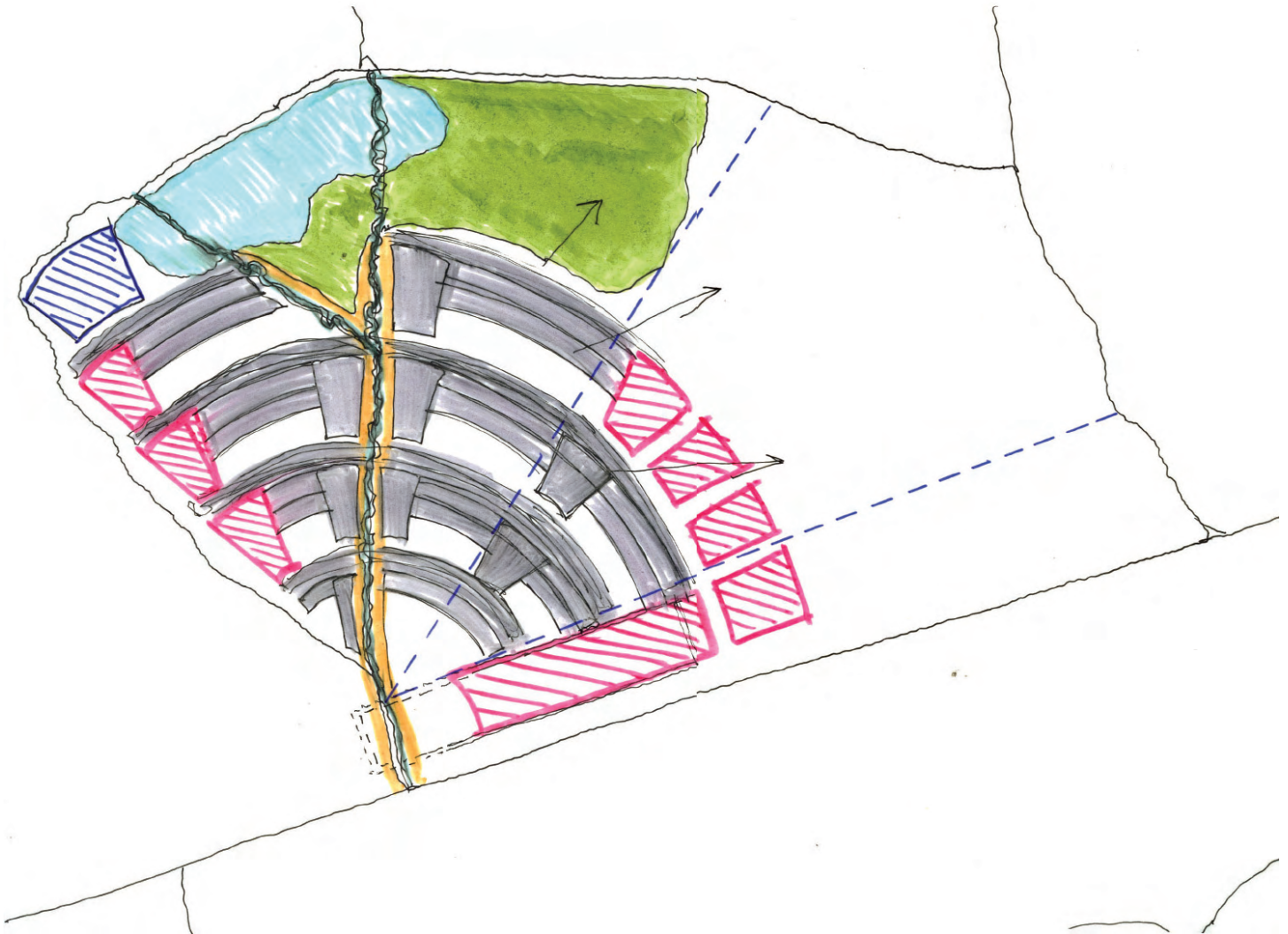
This first scheme uses the site's entrance as the "kernel" from which the rest of the town radiates. It has a strong commercial and civic (wedges in grey) attitude towards the water and is flanked by industrial/heavy commercial buildings. Here, the residences fit between the commercial blocks. The main manufacturing facility is adjacent to Route 53 and is architecturally tied in with the entrance to the site. The reservoir to the north connects two washes to create a large park and an "island" to be used for important civic or religious activities

#### PROS:

- (+) Commercial attitude at river edge
- (+) Strong presence of manufacturing facility
- (+) Integration of residential, commercial and civic

#### CONS:

- (+) Manufacturing facility too close to road way
- (+) Not enough "breathing room" along the wash
- (+) Flanking industrial zones inhibit integrated future growth





### MASTER PLAN RELATIONSHIP OPTION: B

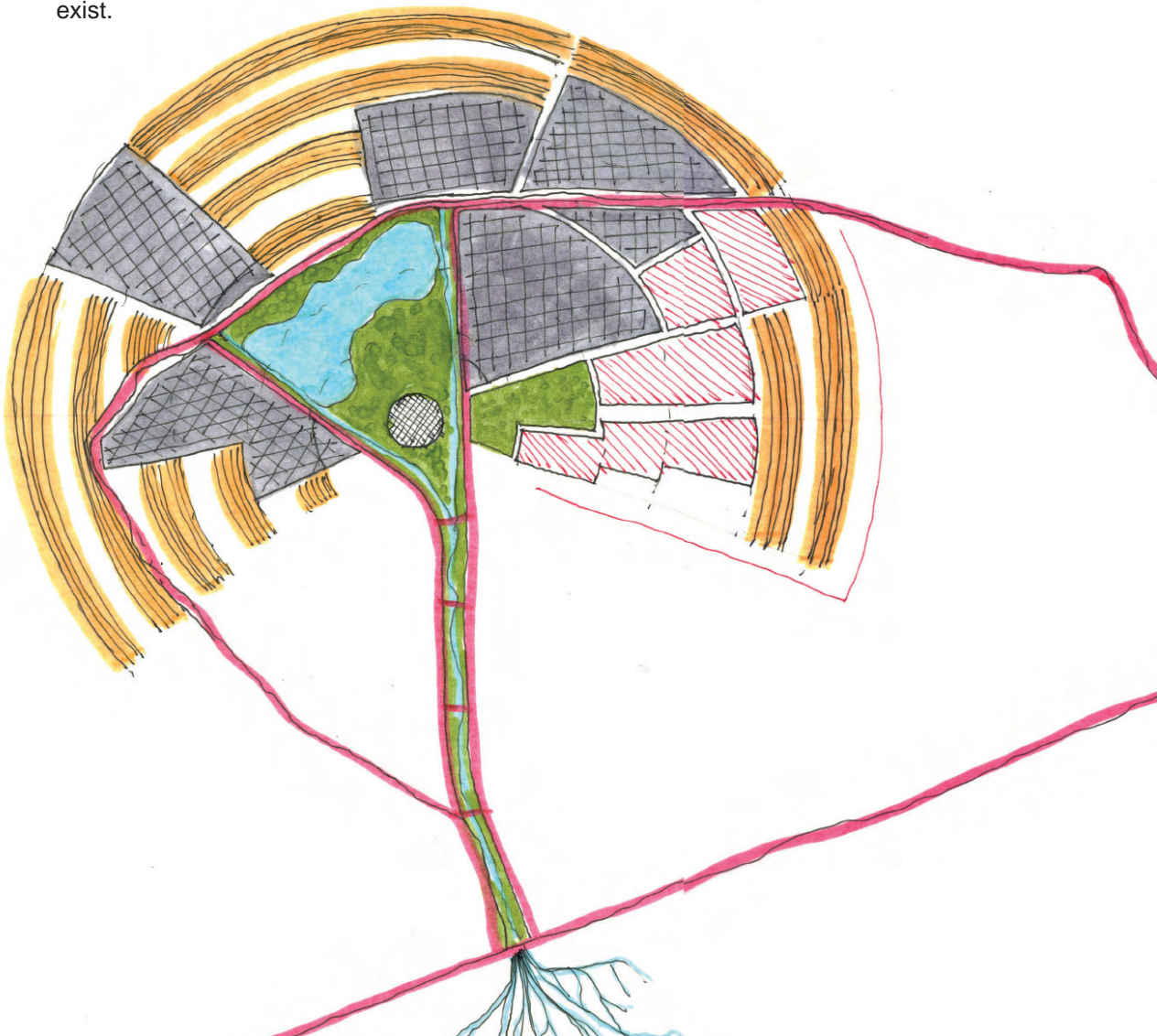
The second scheme moves the “kernal” up to the node at which the two washes meet for a more ‘spiritual’ starting point and, like the first, radiates from there. With this, the industrial sector is separated into its own wedge promoting future expansion, while the residential rings (in orange) fan out toward the outer ring. Commercial and civic spaces are broken up and placed along the washes and the northern road for access. In this scheme the roadway to get to the site is extended and culminates at a node at which a kiva, heritage center or museum might exist.

#### PROS:

- (+) Organic and spiritual beginning moment
- (+) Industrial sector has room for expansion
- (+) Integration of residential, commercial and civic

#### CONS:

- (+) Plan is no longer contained within the ring roads
- (+) Choppy commercial areas, no ‘district’
- (+) Weakened presence of the manufacturing facility on the site





### MASTER PLAN RELATIONSHIP OPTION: C

The third scheme takes the pros of the previous two ideas and modulates their relationships for a hybrid design. Here, the industrial sector is visible and prominent on the site, but has plenty of room for future expansion. The 'special' space at the meeting of the two washes still exists but is no longer the central core of the radial scheme, instead it gains importance by being the culminating point of a 2 mile long "river walk" devoted to pedestrians beginning at the entrance of the site. The residential sector has lots of room for future expansion and pays homage to the ancient Zuni tradition of 'layering' residences in rings around the central core. The commercial and civic district sit along the wash but are pushed back to 'green' spaces.

#### PROS:

- (+) Clearly sectioned zones with room for expansion
- (+) Pedestrian/recreation friendly layout

#### CONS:

- (+) Industrial sector very close to Route 53





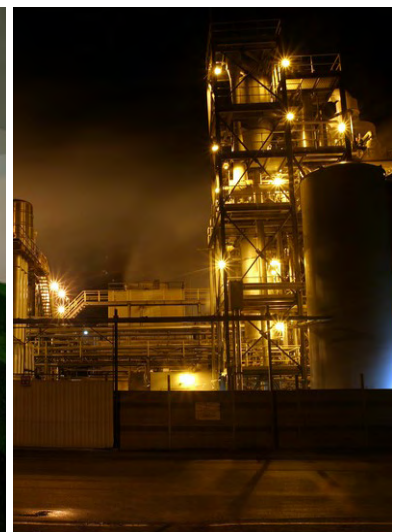
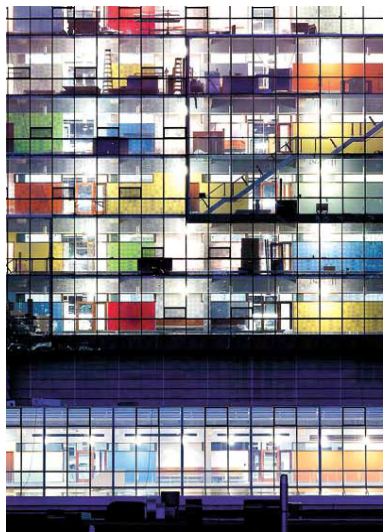
Addressing the architectural work of focus, I see the factory as a machine itself; all the programmatic cogs working together to chug and churn out product in true industrial fashion. I also see this factory as unique and innovative in its approach to combining this industrial functionality with commitments to the workers; their health, happiness, and heritage; and to the environment. Extensive winter gardens will add life and peace to the interior spaces while beautiful landscaped outdoor areas with water elements, paths and gardens will provide a physical and mental retreat for workers and community members.

The aesthetic should read 'momentum' and 'inertia' since these are the overarching goals and themes of this piece of architecture, but not alien

from the southwest palette. Metals 'frozen' at various stages of oxidation are viable options.

This piece is meant to be seen from the highway and must be able to anchor the industrial sector as well as clearly articulate the global reach this community will develop.

This was chosen as the 'one-building' to focus on because of its enormous impact on the life of this master plan. Without this manufacturing facility, the town would not have nearly the financial draw it will with it included. Its effects will be felt not only in the new community and surrounding towns, but also the American economy (even if ever so slightly) as it pumps out renewable energy products for domestic consumption and eventually consumers abroad.

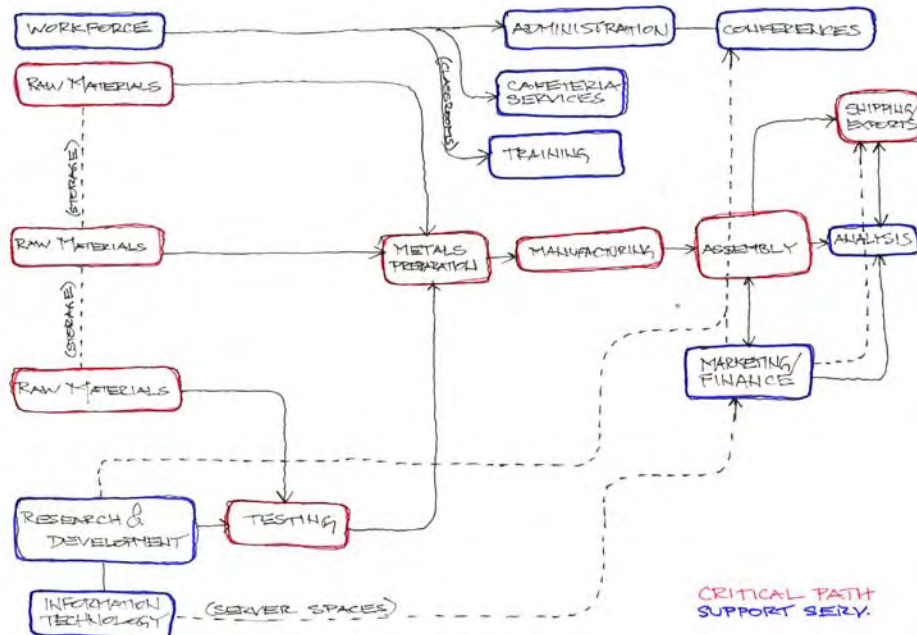


THE MANUFACTURING FACILITY PROGRAM INCLUDES, BUT IS NOT LIMITED TO THE  
FOLLOWING ELEMENTS:

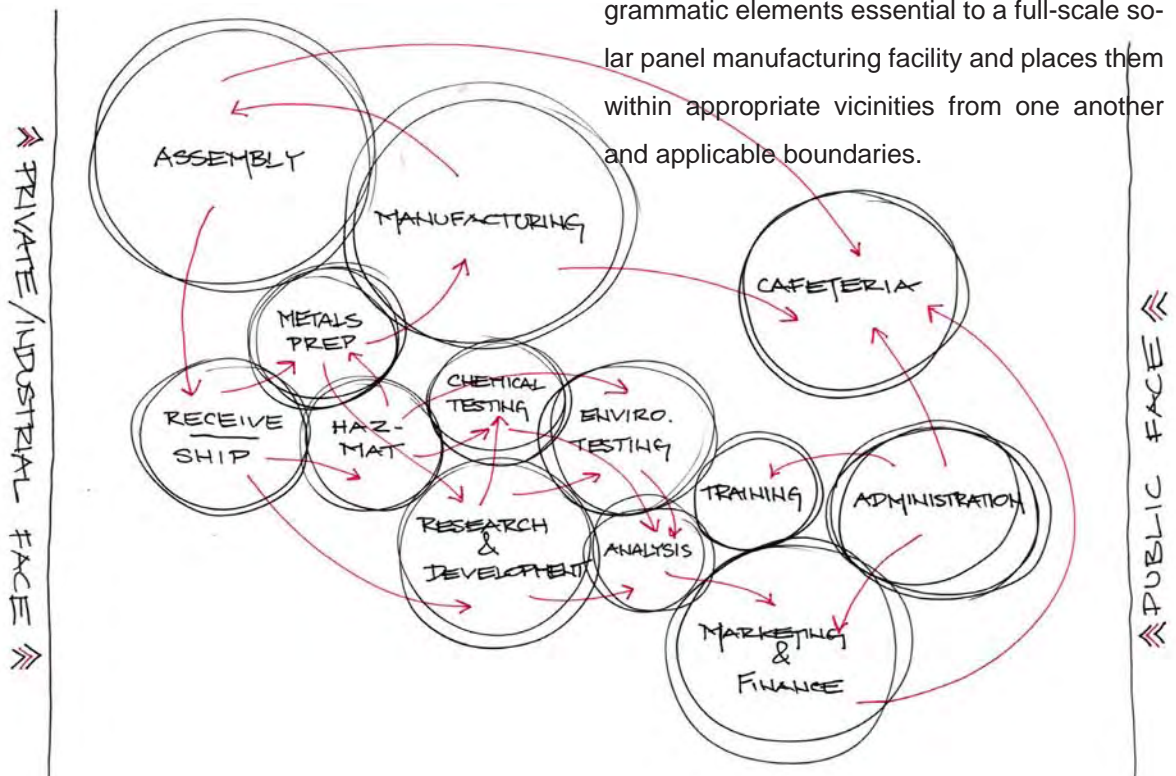
- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• <u>Administration</u> (2,500sf)               <ul style="list-style-type: none"> <li>Secretary offices (2)</li> <li>Human resources offices</li> <li>President and VP offices (1+5)</li> <li>Conference room</li> <li>Kitchen</li> <li>Copy center</li> </ul> </li> <li>• <u>Conference Rooms</u> (850sf)               <ul style="list-style-type: none"> <li>Main presentation theatre</li> <li>Medium conference room</li> <li>Small conference rooms (2)</li> </ul> </li> <li>• <u>Cafeteria</u> (1,000sf)               <ul style="list-style-type: none"> <li>Seating area (tiered)</li> <li>Kitchen</li> </ul> </li> <li>• <u>Training Department</u> (450sf)               <ul style="list-style-type: none"> <li>Large classroom (separable)</li> <li>Computer lab</li> </ul> </li> <li>• <u>Manufacturing Plant</u> (Open plan + Work stations) (24,000sf)</li> <li>• <u>Assembly Plant</u> (Open plan + Work stations) (46,000sf)</li> <li>• <u>Plating Room</u> (Double storey + Catwalks + Crane + Large door) (1,800sf)</li> <li>• <u>Research Laboratories</u> (3,000sf)               <ul style="list-style-type: none"> <li>Private offices</li> <li>Open area with computer stations</li> <li>Hazardous materials storage</li> </ul> </li> <li>• <u>Testing Laboratories</u> (4,000sf)               <ul style="list-style-type: none"> <li>Open area with work stations</li> <li>Lightning test chamber</li> <li>Chemical test chamber</li> <li>Open manual/submersible test chamber</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• <u>Shipping/Exports/Loading Docks</u> (5,000sf)               <ul style="list-style-type: none"> <li>Offices (3-4)</li> <li>Exportation preparation area</li> </ul> </li> <li>• <u>Material Storage Bay</u> (600sf)               <ul style="list-style-type: none"> <li>Hazardous materials Storage</li> <li>Open storage</li> </ul> </li> <li>• <u>Marketing and Sales Department</u> (8,000sf)               <ul style="list-style-type: none"> <li>Private offices</li> <li>Open plan with computer stations</li> </ul> </li> <li>• <u>Research and Development Department</u> (13,000sf)               <ul style="list-style-type: none"> <li>Private offices</li> <li>Open plan with engineering computer stations and work tables</li> </ul> </li> <li>• <u>Finance and Accounting Department</u> (3,500sf)               <ul style="list-style-type: none"> <li>Private offices</li> <li>Open area with computer stations</li> </ul> </li> <li>• <u>Information Technology</u> (550sf)               <ul style="list-style-type: none"> <li>Offices</li> <li>Computer work stations</li> <li>Server Room</li> </ul> </li> <li>• <u>Apporx. Total = 115,000sf</u></li> </ul> |
|---|--|



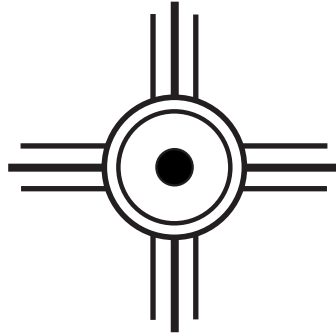
Before arranging the programmatic elements into a design, one must first understand the necessary progression of product development. This rough diagram explores the process raw materials take to becoming a finished solar panel ready for export. Many departments are interrelated but all are dependant on the critical path of product creation (diagrammed in red).



Based on the sequence raw materials take from their import to export, as well as the sequence of information relay and research in product development, spatial relationships can start to be formed. The following diagram takes the programmatic elements essential to a full-scale solar panel manufacturing facility and places them within appropriate vicinities from one another and applicable boundaries.







## THE REGULATIONS

## INTERNATIONAL BUILDING CODE REGULATIONS AND CLASSIFICATIONS:

Because the master plan contains many structures of varying materials for different purposes, the IBC regulations in this section are being explored through the manufacturing facility. In itself, the factory has numerous zones that range in classification from business zones (B), factory/industrial zones (F-1 and F-2), storage (S-1 and S-2) and even high hazard zones (H-2 and H-4).

Issues to consider carefully are the hazardous storage space, the plating room (containing numerous liquefied chemicals) and the testing laboratories, all of which have different ratings because of their toxicity. Further, the large open spaces of the assembly hall and manufacturing floor differ in their respective regulatory codes from the standard codes applied to the rest of the complex (i.e. in the more traditional computer work-station areas and administrative offices).

In a nutshell, the new Zuni town solar panel manufacturing facility project includes one (1) medium-rise office and assembly building. The building has a gross area of approximately 115,000 square feet. The building is four (4) stories with a basement and sub-basement. The sub-basement and roof area are primarily mechanical space. The ground floor will house a combination of lobby, reception and assembly/manufacturing services. The first floor will be used for laboratory space and research/development services while the second and third floors will house administrative, conference, office, marketing and finance areas.

THE MAJOR APPLICABLE CODES FOR THIS PROJECT INCLUDE:

Building:

- The International Building Code (IBC), 2006 edition.

Fire prevention:

- BOCA National Fire Prevention Code, 2006 edition.
- The National Fire Prevention Association (NFPA) Standards, as referenced by the IBC

Accessibility:

- The Americans with Disabilities Act Accessibility Guidelines (ADAAG)

Electrical

- The National Electric Code, 2006 edition, as adopted and amended by the state of New Mexico

Mechanical

- International Mechanical Code, 2006 edition as adopted and amended by the state of New Mexico

Plumbing

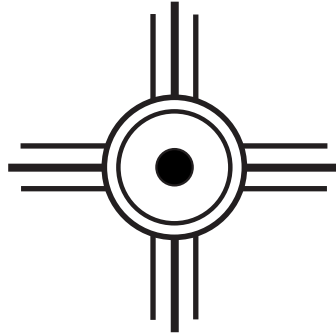
- National Standard Plumbing Code, 2006 edition as adopted and amended by the state of New Mexico

USE AND OCCUPANCY CLASSIFICATION:

The solar panel manufacturing plant is classified as a medium-rise Use Group B structure; however the assembly and manufacturing floors are classified as industrial zones under Use Group F-1 and F-2, respectively. Conference rooms and the lobby are classified as Use Group A-3. All areas which are occupied for the processing, storage, or other use of hazardous materials in excess of the exempt quantities specified in IBC Section 307, shall be classified as Use Group H-1, H-2, H-3, or H-4 in accordance with the hazards presented by each material as described in IBC section 307.







THE SITE

It has been said that the inherent genius of a site will inform the design of the building placed in it. The genius of this site lies in its history. Until the Spanish conquistadors in the 16th century, the Zuni Native Americans were the only ones who lived on this land. After the invasion their territory began to shrink smaller and smaller until they were guaranteed only the 700 square miles that today is the Zuni Indian Reservation, nonetheless, it is still ancestral land and as such, still holds magic with the Zunis.

In the analysis of this site, I went from the macro to the micro; from the topography and roads and cities that surround it at a regional scale, down to the geology of the soil that it is made up of.

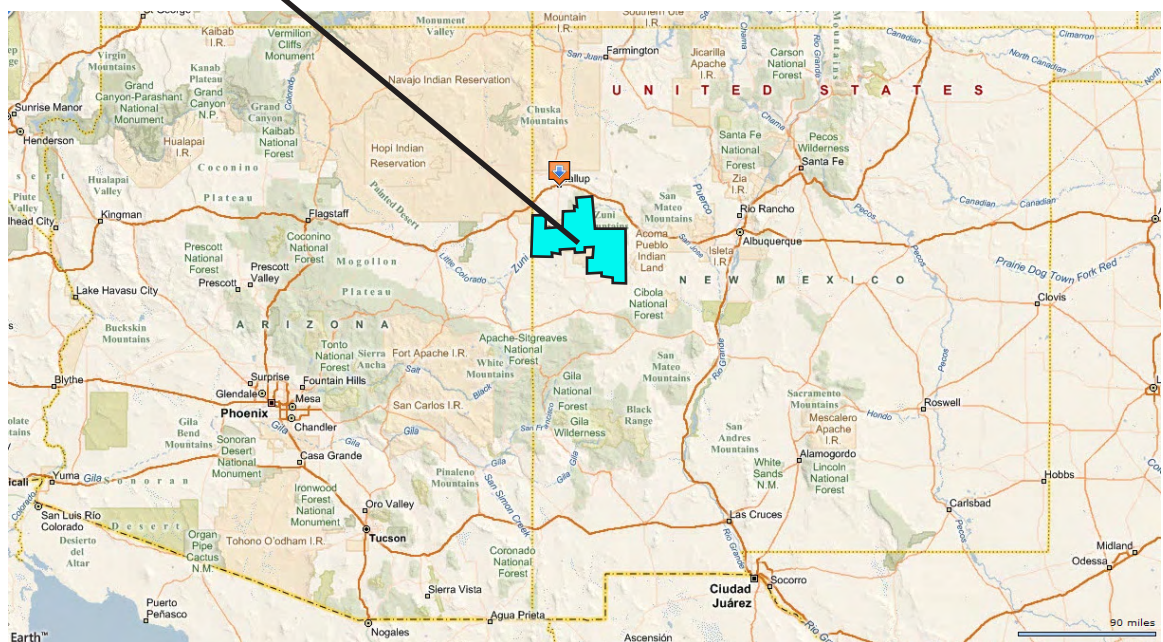
There will always be moral, political and social repercussions to the way a structure speaks with its site, so a clear and thorough analysis is the best way for this proposal to live harmoniously among its environment.



The Zuni Indian Reservation lies in the Zuni River valley and is located primarily in McKinley and Cibola counties in western New Mexico, about 150 miles west of Albuquerque. There are also several smaller non-contiguous sections in Apache County, Arizona, northwest of the city of St. Johns. The main part of the reservation borders the state of Arizona to the west and the Ramah Navajo Indian Reservation to the east. The main reservation is also surrounded by the Painted Cliffs, the Zuni Mountains and the Cibola National Forest.

The largest town on the reservation is Zuni Pueblo, which is seat of Tribal government. Also on the reservation are the towns of Black Rock and Pescado. The Zuni Tribe is governed by an elected governor, lieutenant governor, and a six member Tribal Council with elections being held every four years. The governor is the administrative head of the Tribal Council, which is the final decision-making body on the reservation. The council oversees finances, business decisions, taxes and contracts.

Zuni Indian Reservation;  
700 square miles





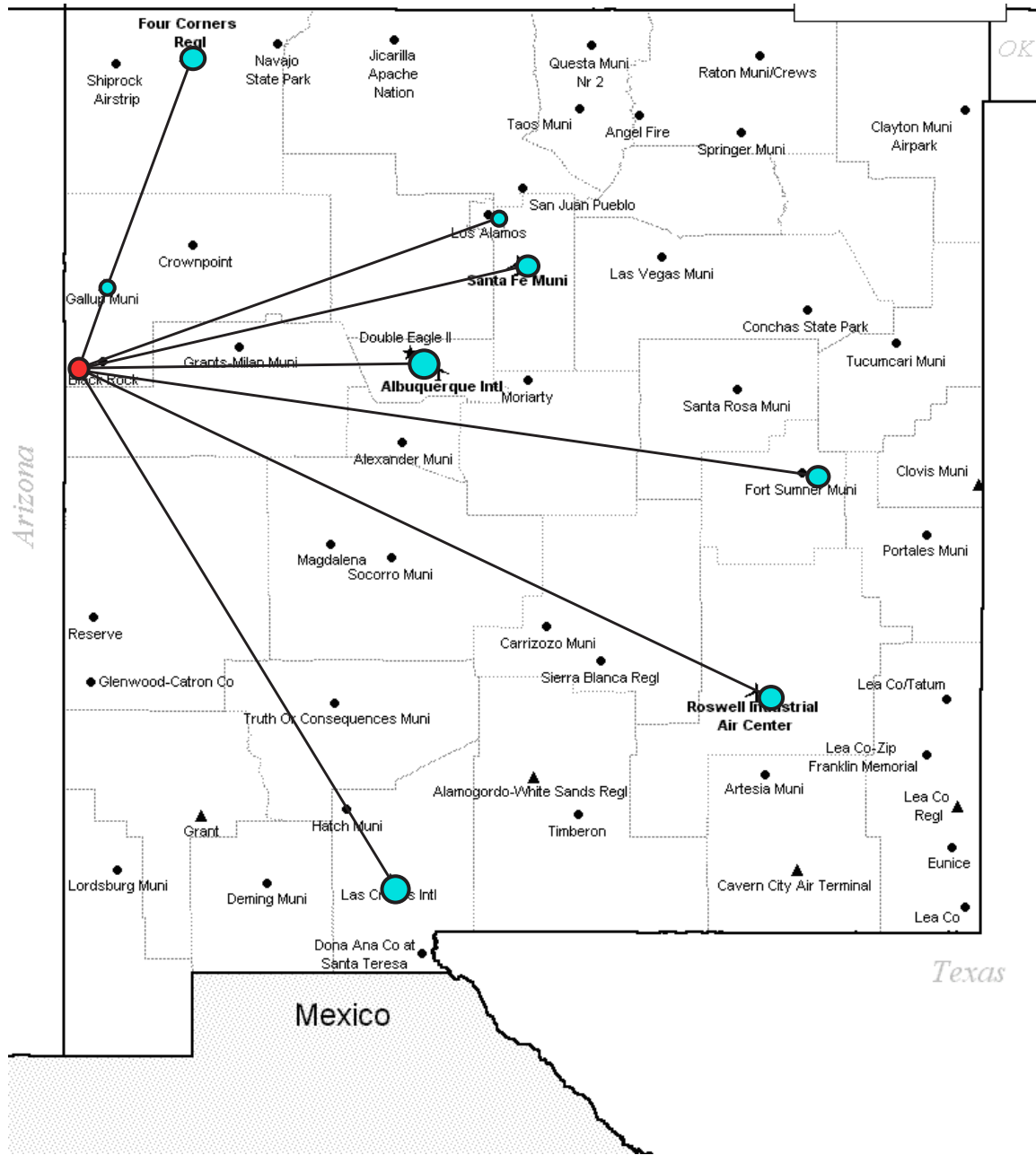
## RELATIONSHIPS WITH REGIONAL CITIES

Distances from Zuni:

With the exception of Gallup, NM 38 miles to the North of the site, most of New Mexico's cities are more than 150 miles away from the Zuni reservation. This distance will initiate the physical transplantation that this project strives for.

This map shows the major surrounding cities in terms of air-traffic.

<u>New Mexico</u>	
(+) Gallup	38mi
(+) Los Alamos	271mi
(+) Santa Fe	237mi
(+) Albuquerque	176mi
(+) Fort Sumner	335mi
(+) Roswell	374mi
(+) Las Cruces	333mi
<u>Arizona</u>	
(+) Phoenix	289mi
(+) Tucson	291mi

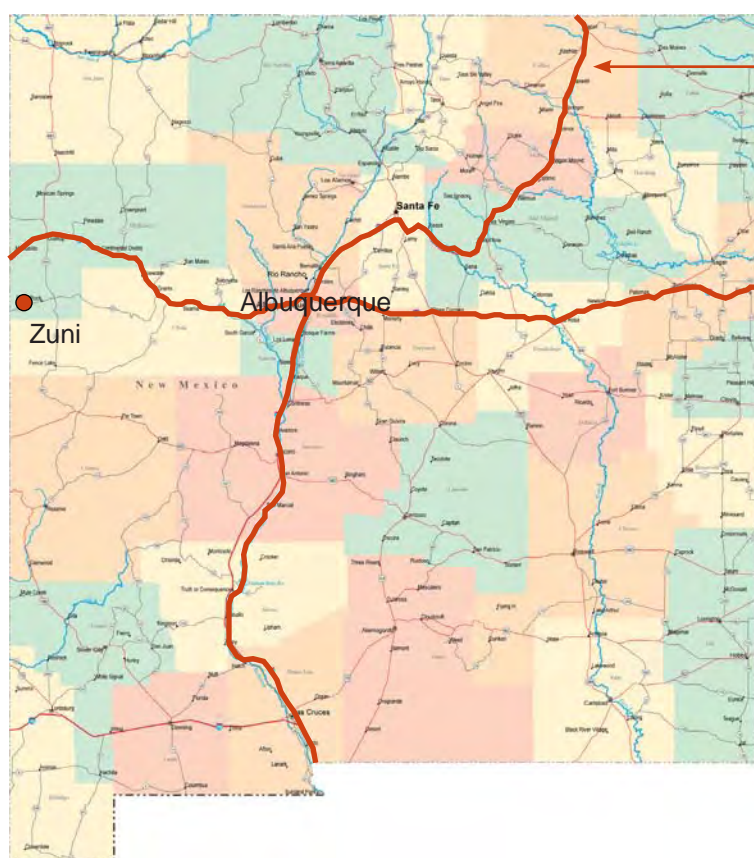


## REGIONAL ROADWAYS AND GOVERNMENT INFRASTRUCTURE:

Primary Federal roadways are diagrammed in red. Route 40 running east-west and Route 25 running north-south are the two largest inter-states crossing New Mexico which intersect in Albuquerque. Route 40 passes through Gallup from which the site in focus is most easily accessed.

McKinley County is in light green surrounding Zuni.

The US Railway Network runs through New Mexico as well and is diagrammed in the second map inset. The east-west line stops in Gallup and a secondary line could easily be implemented to reach the Zuni site.



## REGIONAL CLIMATE DATA:

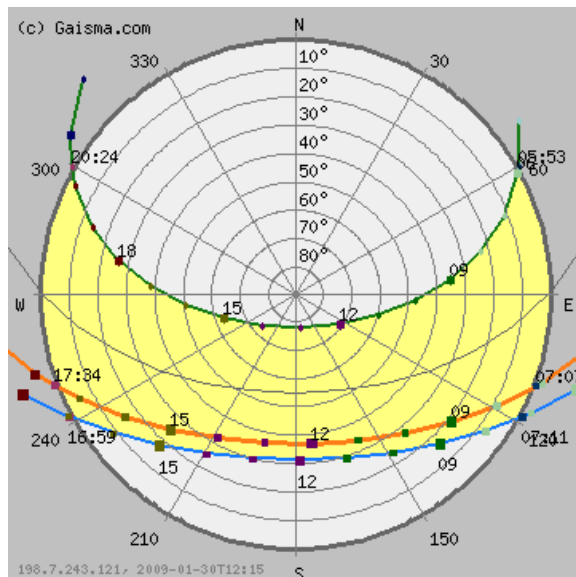
	Jan	Feb	Mar	Apr	May	Jun
Average Max. Temperature (F)	44.5	49.1	55.8	64.6	74.2	84.7
Average Min. Temperature (F)	14.1	18.5	23.0	28.2	36.8	45.0
Average Total Precipitation (in.)	0.79	0.72	0.84	0.55	0.55	0.44
Average Total Snowfall (in.)	6.5	5.5	4.4	2.5	0.5	0.0
Average Snow Depth (in.)	1	0.0	0.0	0.0	0.0	0.0

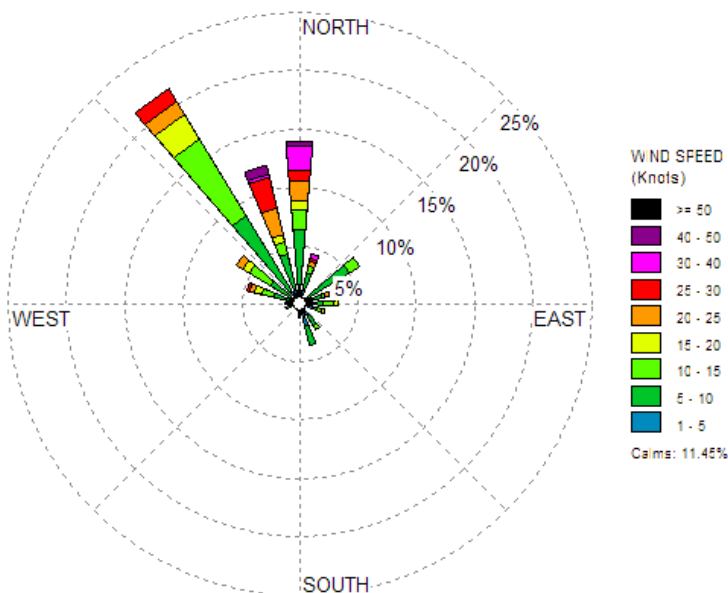
	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	87.7	84.8	78.9	67.7	53.8	45.4	65.9
Average Min. Temperature (F)	53.6	52.7	44.1	31.1	20.5	13.3	31.7
Average Total Precipitation (in.)	1.58	2.05	1.11	1.02	0.93	0.66	11.25
Average Total Snowfall (in.)	0.0	0.0	0.0	0.7	4.4	5.8	30.3
Average Snow Depth (in.)	0.0	0.0	0.0	0.0	0.0	1.0	0.0

The region around Zuni, New Mexico has a comfort index rating of 74 out of 100 which takes into account the average humidity levels, temperatures and wind speeds at the site throughout the year. The United States average is 44. In other words, this site is extremely desirable in terms of the physical comfort it affords its (future) inhabitants.

Right: Gallup, NM sun-path diagram (shaded region representing annual variation)



Below Right: Average annual wind speeds and directions for Gallup, NM.





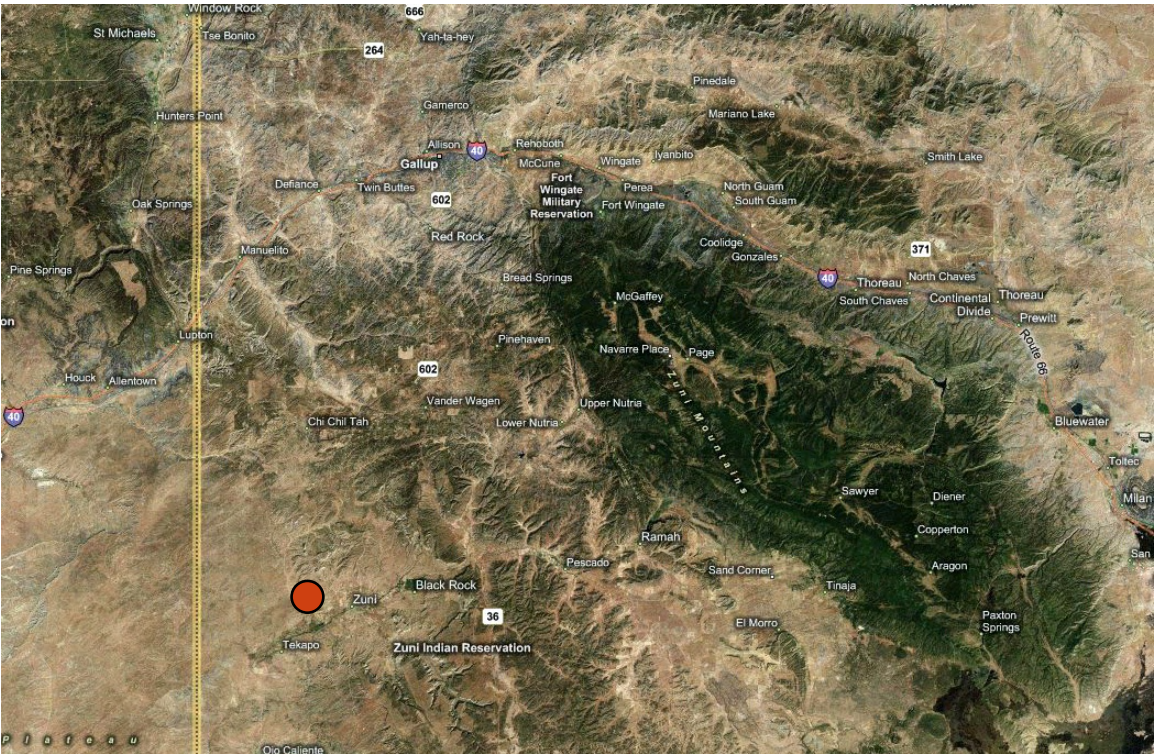
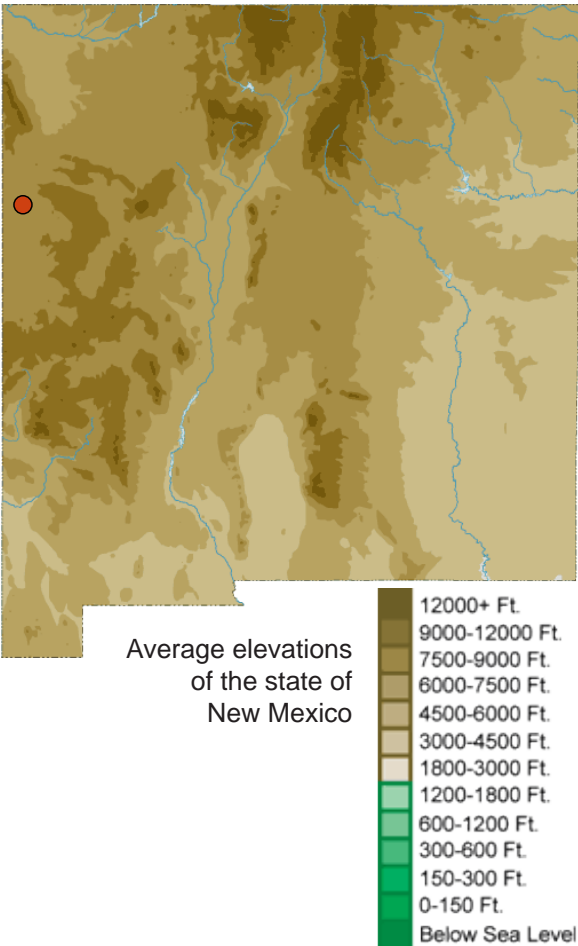
MCKINLEY COUNTY TOPOGRAPHY:

The site just outside Zuni is relatively flat; the northeast corner of the Colorado Plateau that stretches between Arizona and New Mexico. To the North, the Chuska Mountain range is visible, to the East one sees the Zuni Mountains and beyond them, the San Mateo range.

The Chuska Mountains are an elongate range within the Navajo Nation. The range is about 80 by 15 km (50 by 10 miles), and it trends north-northwest and The highest point is Roof Butte at 9823 feet,

Immediately surrounding the site, modest foot-hills snake their way from the South, and swing up around to the North.

So while the actual site has a only a slight slope averaging 1:20, it is very much cradled by the topography surrounding it.





## MCKINLEY COUNTY ROADWAYS AND INFRASTRUCTURE: GETTING TO THE SITE:

From US Route 40 in Gallup, one takes New Mexico Route 602 south into the heart of the Zuni reservation. 602 merges with 53 running east-west and passes the site of the master plan.

### US Route 40

- Major roadway
- 4-6 lanes, more when passing through cities
- Relatively flat
- Steady flow of traffic

Because 53 will be the primary access, views from this road into the site are important considerations. The manufacturing facility should anchor the site in the southeast corner to expose a modern image for the new community.

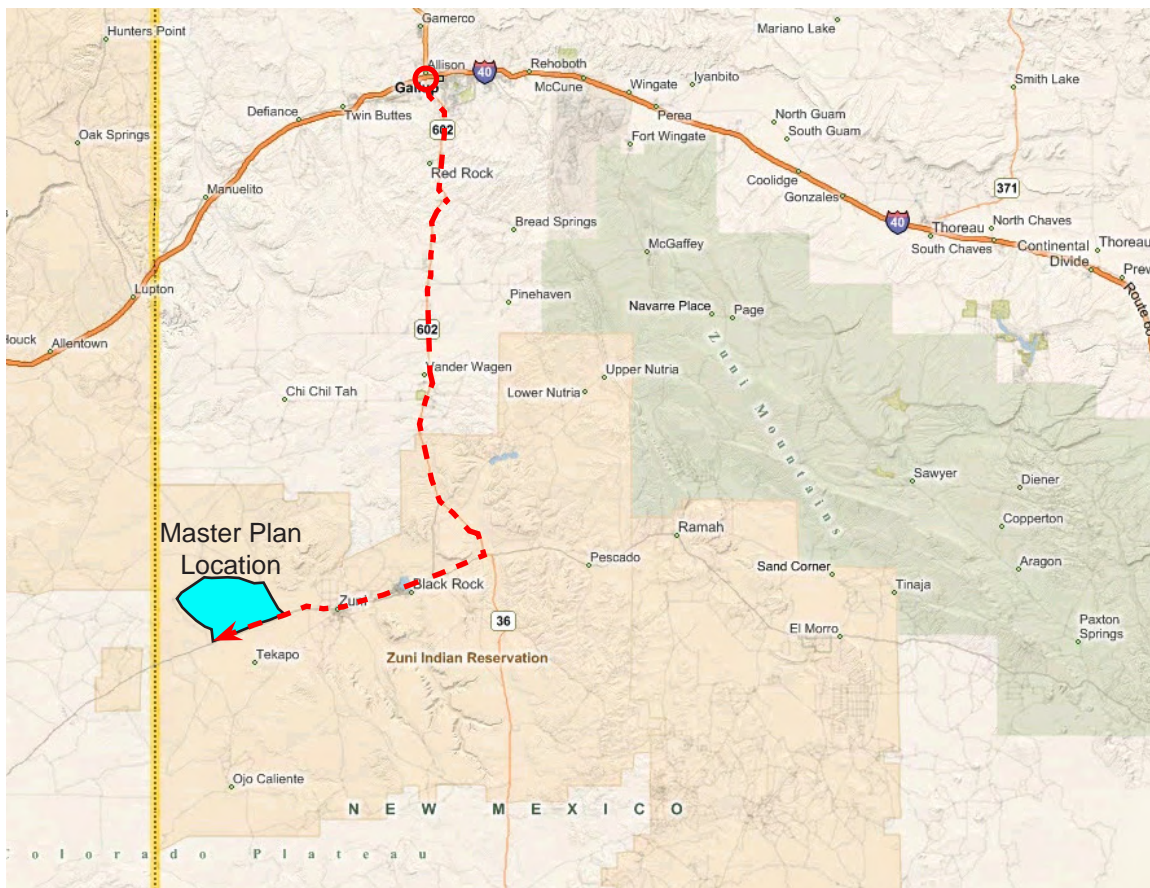
### NM Route 602

- Secondary roadway
- Moderate elevational changes
- 4 lanes
- Moderate traffic flow

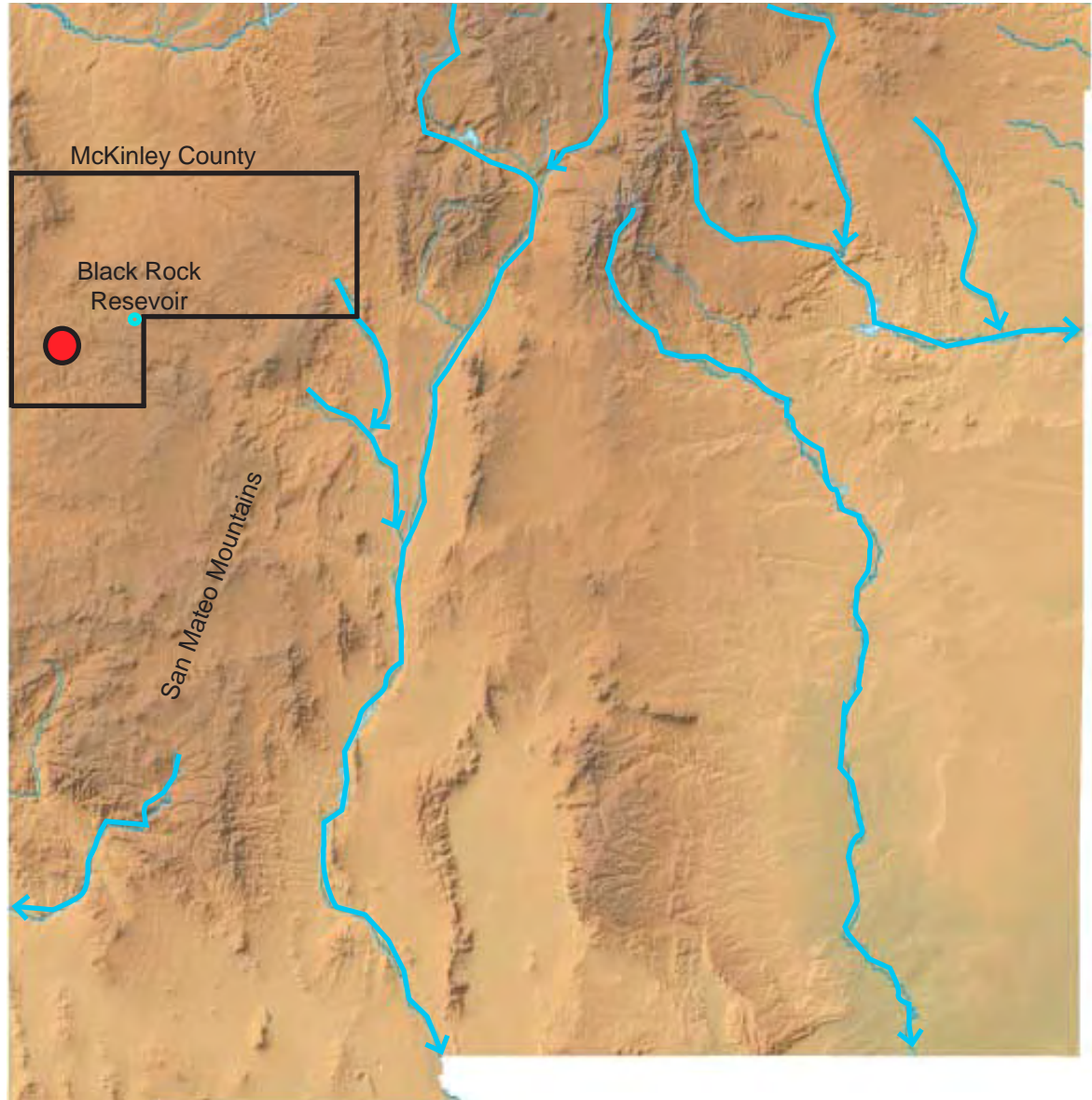
The east-west arm of the US Rail Network runs along side Route 40.

### NM Route 53

- Tertiary roadway
- Moderate elevational changes
- 2 lanes
- Minimal traffic west of Zuni



### MCKINLEY COUNTY WATER SOURCES AND DRAINAGE PATTERNS:



Water is always a concern in the southwest, though New Mexico is better off than neighboring states in that tributaries from the Rocky Mountains run through the state and various springs bubble up from around the San Mateo Mountains.

Approximately 23mi east of the site, Black Rock Reservoir feeds the town of Zuni and Black Rock. It is also used for crop irrigation between

Zuni and the proposed site, but is often used carelessly and unsustainably. Conserving this precious resource is of the utmost importance.

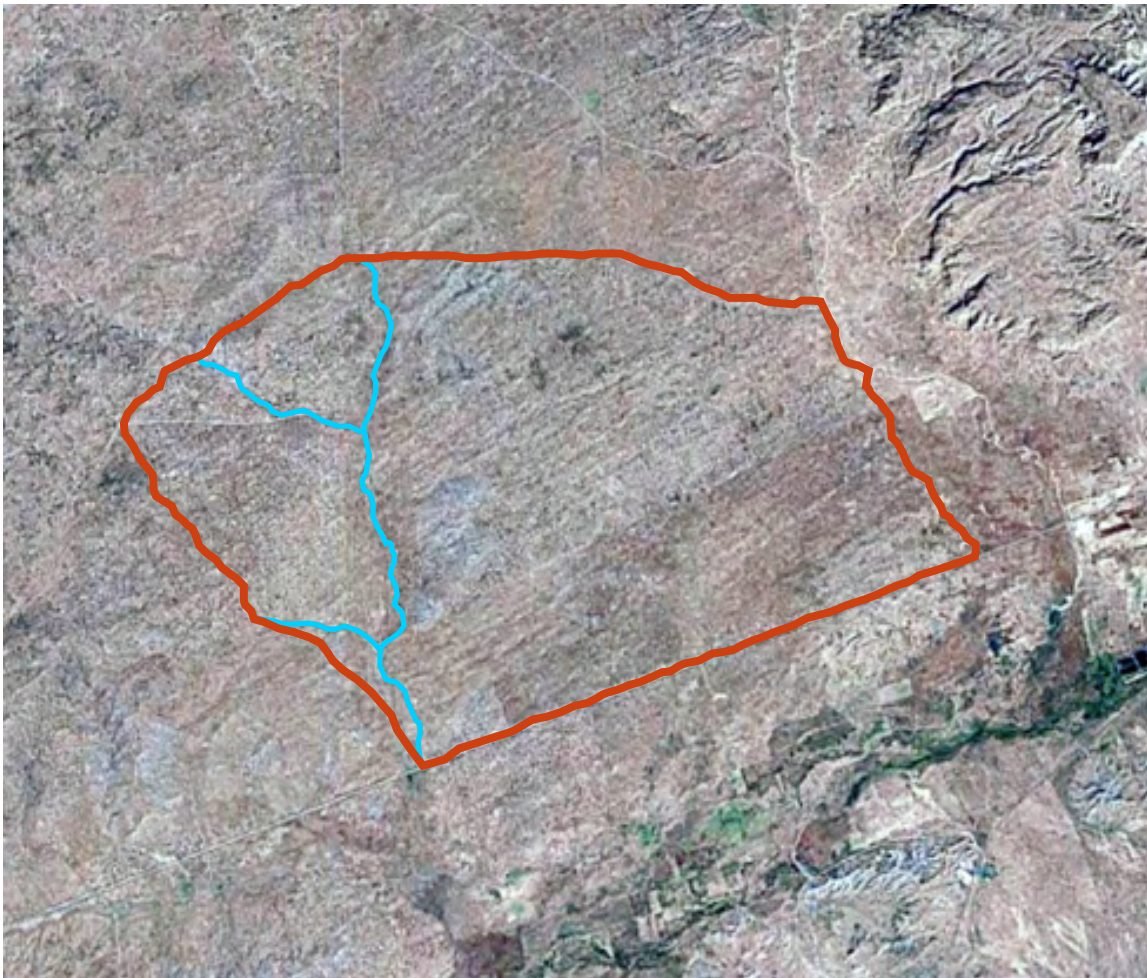
The proposed master plan necessitates a reservoir of its own. Human consumption plus the inevitable amount of water used in the manufacturing facility require water storage either in cisterns below ground or in above-ground reservoir like Black Rock.



### DEVELOPMENT SCALE SITE BORDERS:

At development scale, the site chosen for this master plan came from the need for a low-to-flat sloping site with hydrographic features at an appropriate distance from the town of Zuni and Gallup (see page 42). The area enclosed with red contains all these features and is large enough to allow the community to expand to a population of approximately 25,000 people (based on the footprint of American cities with densities similar to desired).

At its widest points, the site measures 5.1 miles from its east and west borders (see below) and 3.5 miles from its northern border to Route 53 in the south. The total area of the site is 14.3 square miles. This land area is comparable to that of Gallup, NM (13.4 square miles, population ~18,000); and Newport, RI (12.6 square miles, population ~26,000)



Northern border	2-lane packed dirt road, "Lunsico Road", little-to-no traffic
Western border	2-lane packed dirt road, "Lunsico Road", little-to-no traffic
Eastern border	2-lane paved road, "BIA-3", little-to-no traffic
Southern border	2-lane paved road, "NM Route 53", minimal traffic

## SOLAR ORIENTATION OF THE SITE:

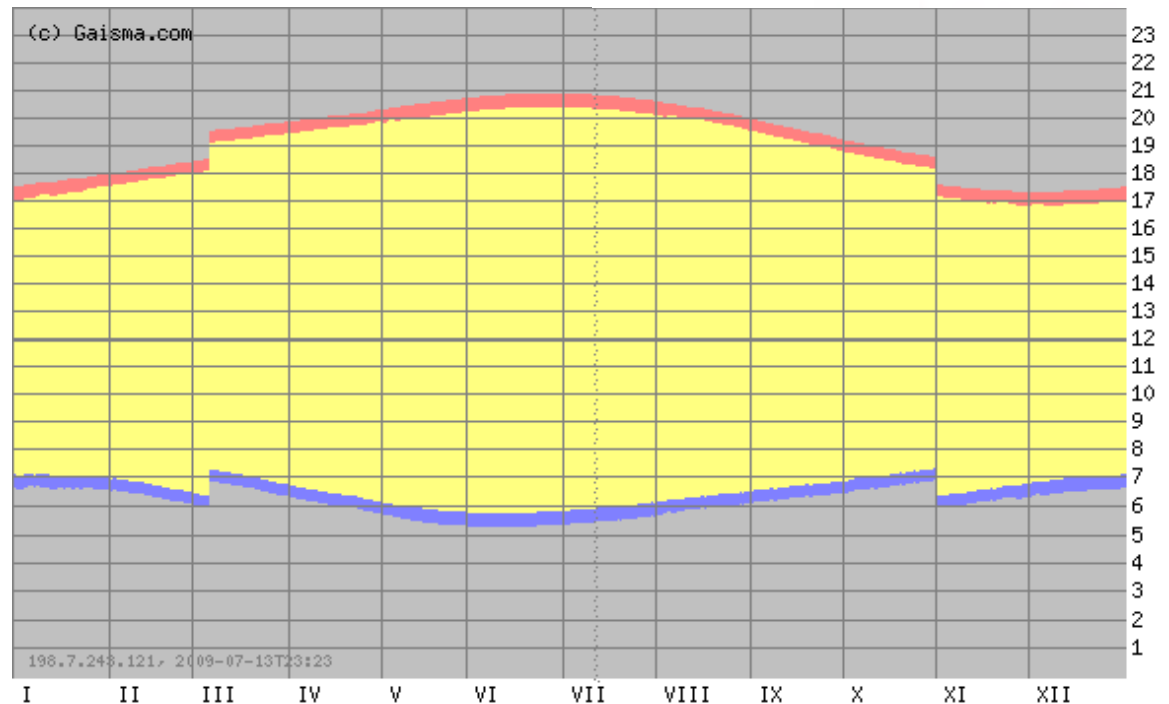
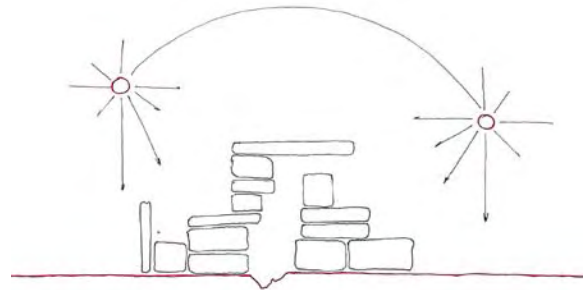
Vernacular southwestern architecture has always responded strongly to the sun's orientation. Ancient native dwellings used thick adobe walls for thermal massing and the tribes often constructed their cities in arc patterns that faced south. In traditional Zuni architecture, high blank walls face the north and vented trombe walls generally with 1-3 windows looked south.



Applying this solar information to the site, a radial plan in the language of traditional Zuni pueblos (as diagrammed on page 59) would take advantage of passive heating, and work with the site's contours and natural features. (See master plan diagrams on page 26)



Below, a daylight diagram shows the amount of sun available for passive solar heating and/or harnessing for energy. At right, how one might mass program around a site feature (the wash) according to solar orientation.



## THE SITE EXPERIENCE:

Taking queue from Kevin Lynch, I created an experience map of the site noting diagrammatically the major and minor paths, edges, nodes, districts, and landmarks that appeared to me personally, be they physical, mental and/or emotional. Found within the diagram are:

### Paths:

The most apparent paths to me were the washes and their edges, the major one running north to south and two minor ones intersecting it.

### Edges:

Major edges were found along the roads that ring the site, and minor edges along the washes and the historic line of the "Old Indian Treaty's Reservation Boundary."

### Nodes:

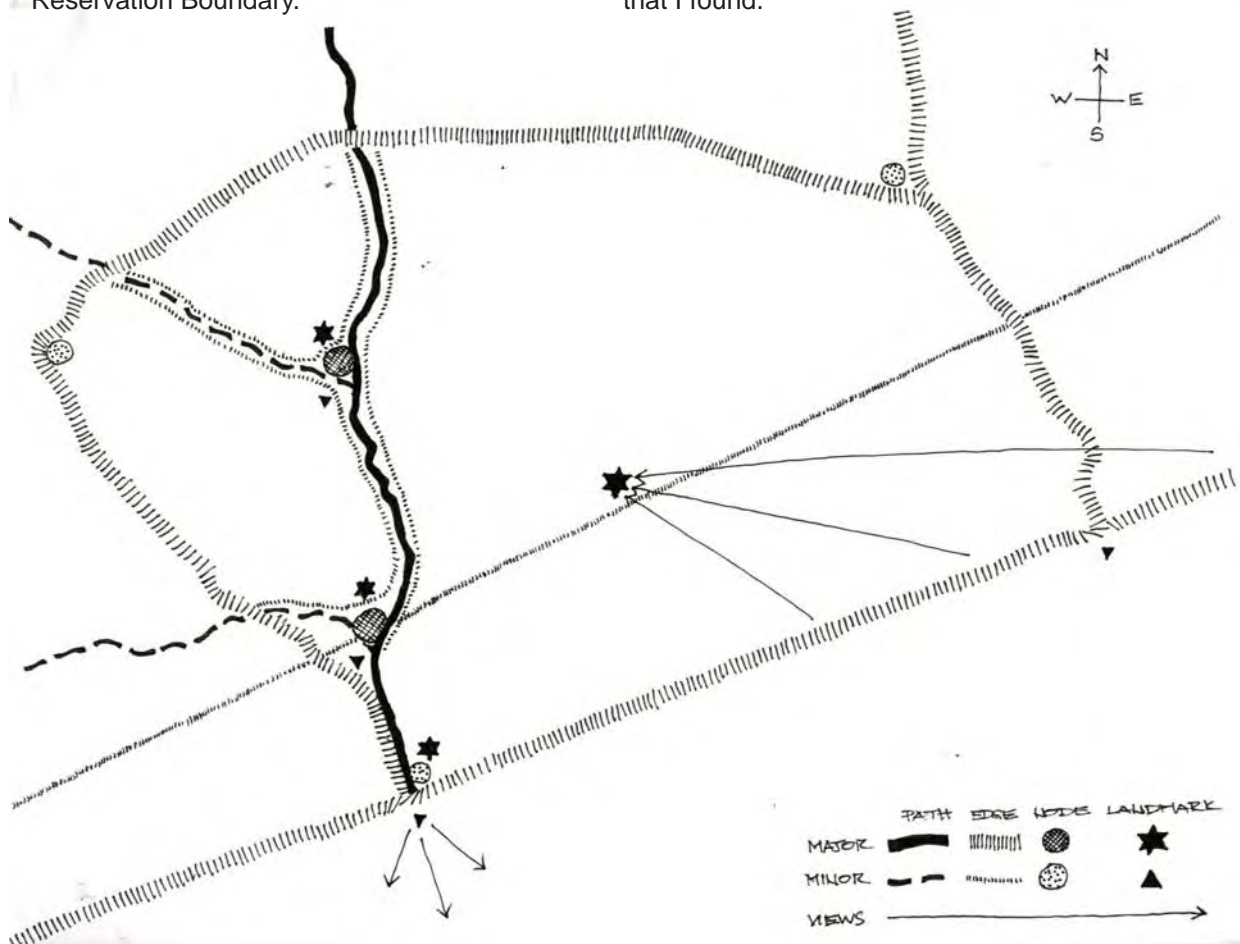
I found major nodes at the intersections of the washes and minor ones at road bends and intersections. These nodes are potential spaces for significant architectural works.

### Districts:

Districts are not diagrammed here because of the site's lack of development, but are easy to imagine as defined by the "edges."

### Landmarks:

The major and minor landmarks shown here are imaged because of their potential relationships to views in and out of the site and prominent locations adjacent to the major or minor nodes that I found.





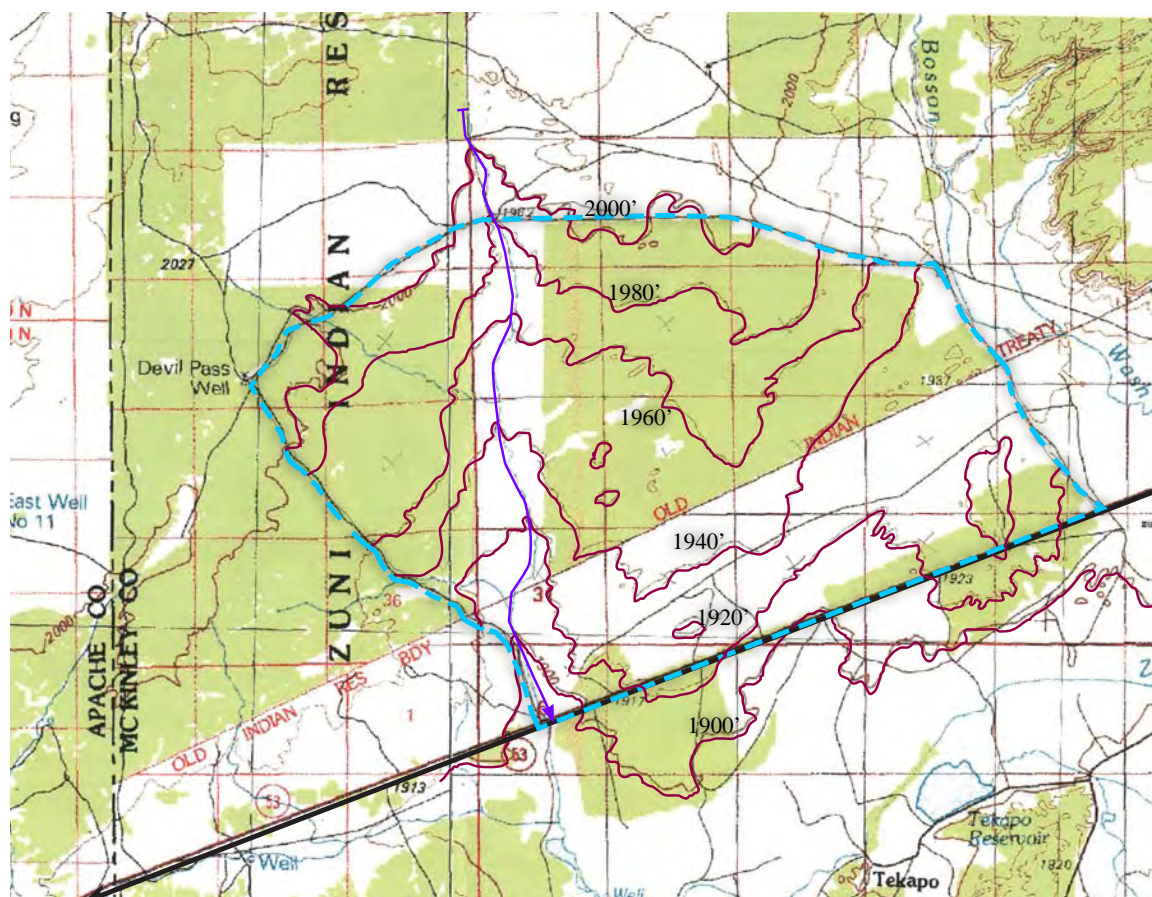
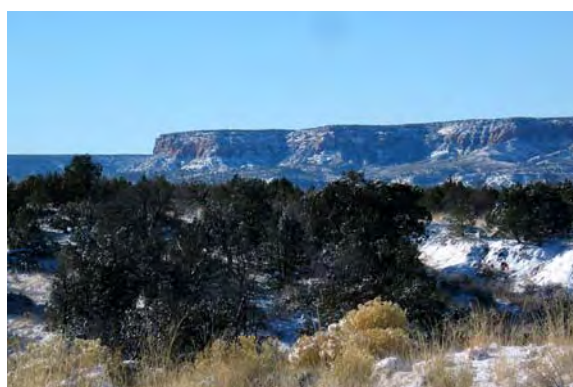
### SITE TOPOGRAPHY:

From Route 53 at the south of the site, the topography climbs subtly 100 feet in elevation to the northernmost boundary. With a north-south distance of 3.5 miles (or 18,480 feet) that makes for an average slope of 1:18.5.

The topography also dips to accommodate the washes which dive to a maximum of 8 feet in depth.

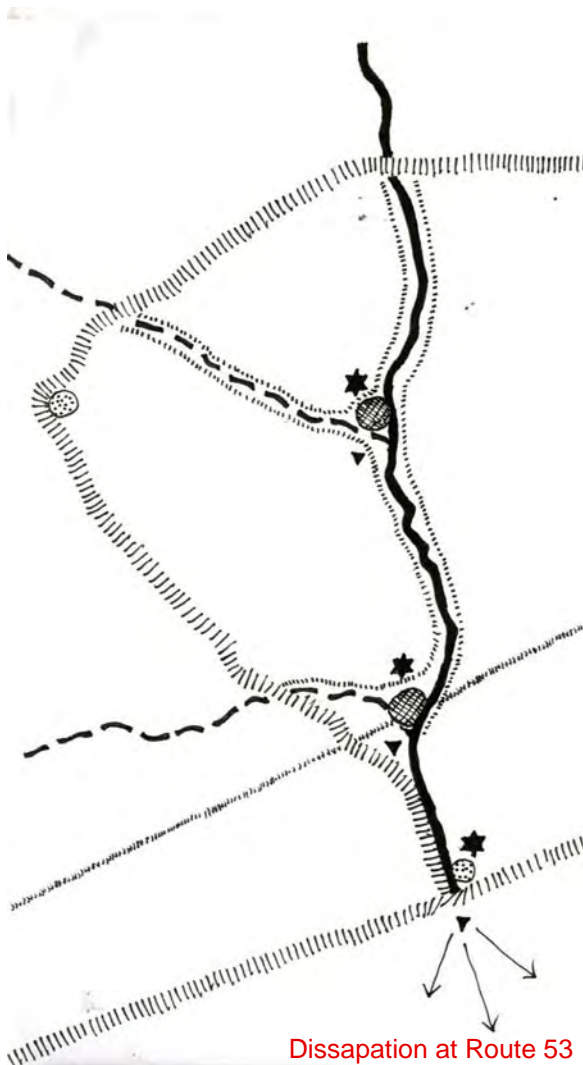
The average height of this site is 1,950 feet above sea level according to USGS data.

The most rapid change in elevation happens at the entry to the site via Lunsico Road where the road dips to surround the major wash.





### SITE DRAINAGE AND THE WASHES:



A large wash runs north to south through the site reaching widths of 15 to 18 feet at the two points where other washes from the hills to the west intersect it.

These washes are fed from the foothills that surround the site (see page 47) and contain water approximately 6 months of the year. New Mexico's rainy season lasts from July to November, though runoff from the surrounding mountains contributes additional water beyond that period.

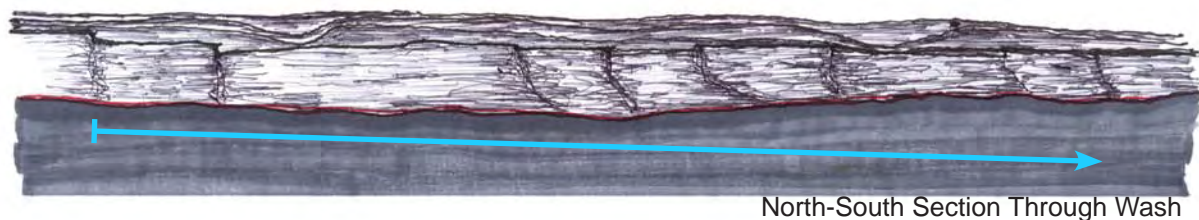
These features have the potential to dictate the positioning and size of the reservoir to be built on the land, and to possibly be kept full year-round depending on the climate and subsequent evaporation rate.

The wash runs through the site and "ends" by running under Route 53 at which point it dissipates through the continually sloping topography.

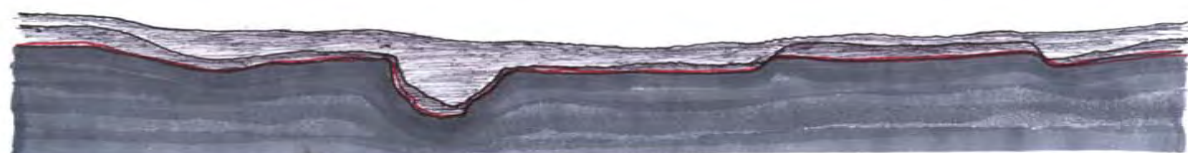
They also hold the potential to serve as the "kernel" from which this radial town plan can grow since the points of intersection create pieces of land that read as significant spaces.



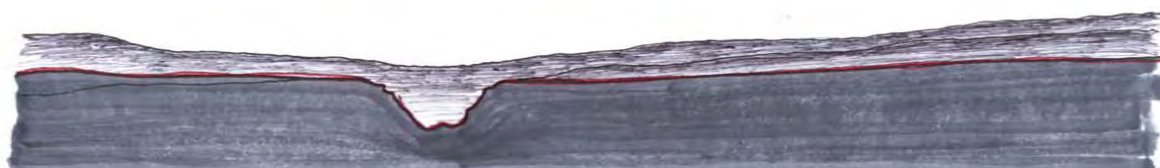
# SITE SECTIONS:



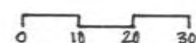
North-South Section Through Wash



East-West Section Through Wash; Southern Site



East-West Section Through Wash; Northern Site

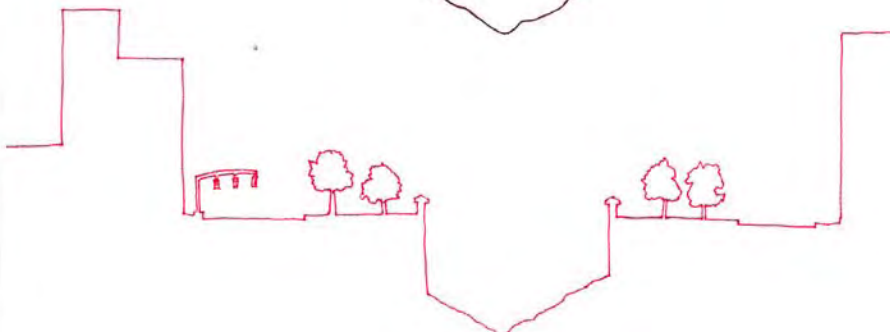
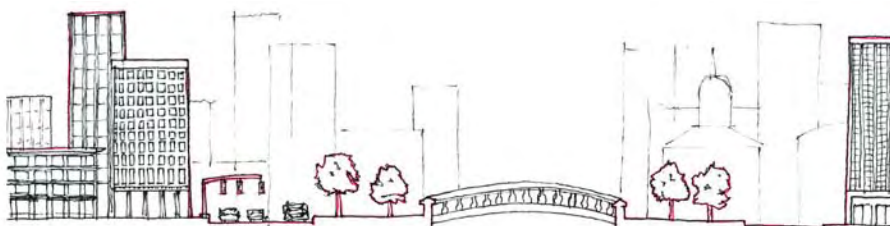
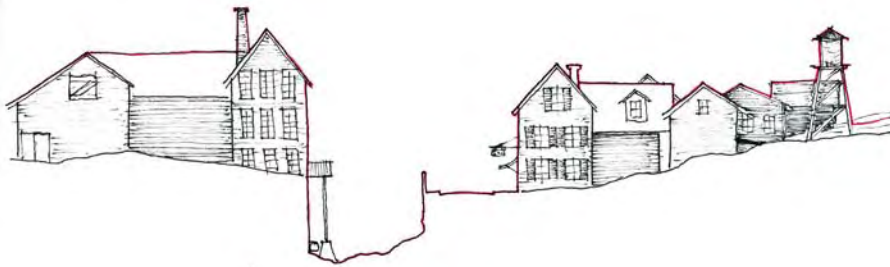


(A) This section of the wash shows the gradual path of water flow from north to south and the basalt walls that line the wash. The contours in the back display the overall site slope and small elevational variations.

(B) At the southern end of the site where one enters via Lun-sico Road, the contours are slightly steeper as they fold into the wash. Even low mesas (3-5 feet in height) appear east of the water.

(C) The northern part of the site has a more gradual slope and the wash is smaller and more clearly defined before it intersects the other two rivulets.

THEORETICAL SITE SECTIONS AND 'RIVER'S EDGE' ANALYSIS:



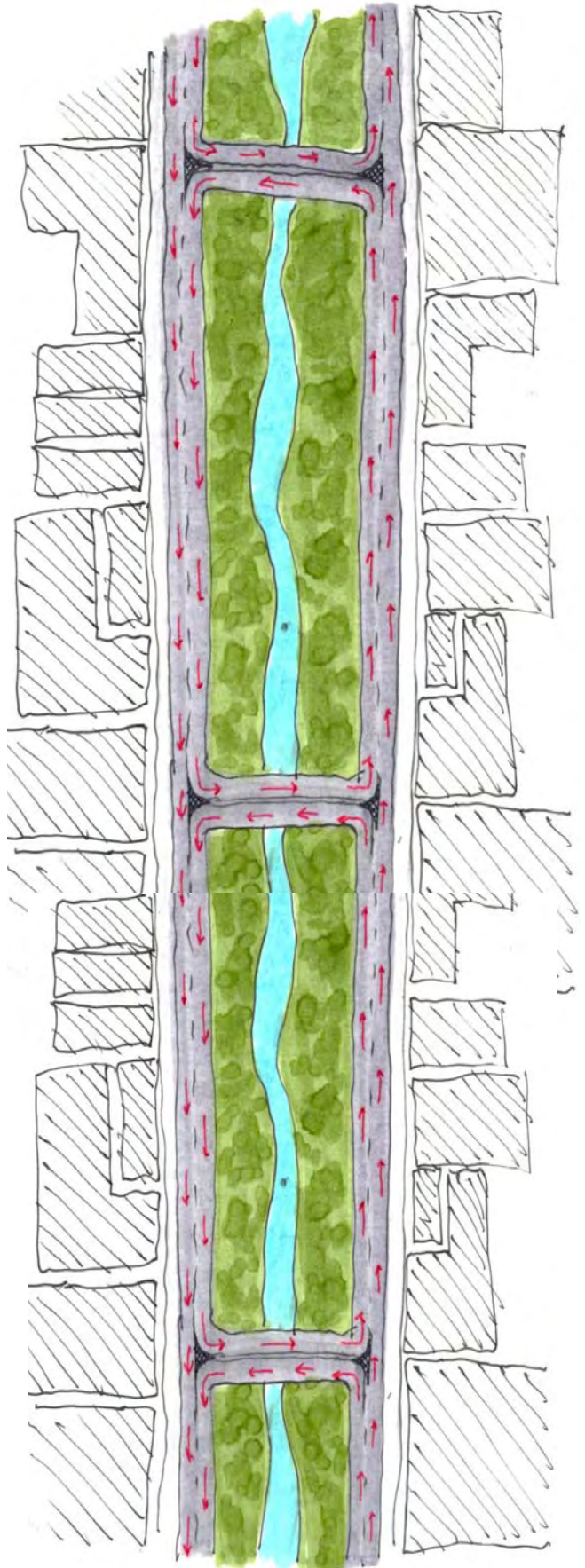


Looking wholistically at the site and its sectional characteristics, I decided to explore how various communities I am familiar with, situated on or next to a river, relate their building massings with respect to the water's edge. Because of the nature of the site, the wash will serve as the "kernal" from which this new community develops. It also responds to the genesis of 'River Valley Civilizations.' The pros and cons of these typologies will be weighed to better understand how the new Zuni community will respond to its own 'river.'

(A) This first diagram takes the wash from the proposed site and brings the surrounding mesas in close to the water's edge to create a theoretical, though regionally appropriate and plausible section. Here, the natural contours of the site flow organically into and out of the wash.

(B) This second diagram analyzes the typical New England mill town's approach to the river which takes a very closed-off attitude. High walls of the mill buildings that use the river for power often block pedestrian access and views. Generally there are no river's edge spaces devoted to the people of the town.

(C) This last diagram looks at the civic approach many modern cities take toward a canal or river running through them. In this example of Providence ca. 2020, generous green spaces are donated to the people of the city for leisure and recreation with roadways pushed back along the dense urban edge.



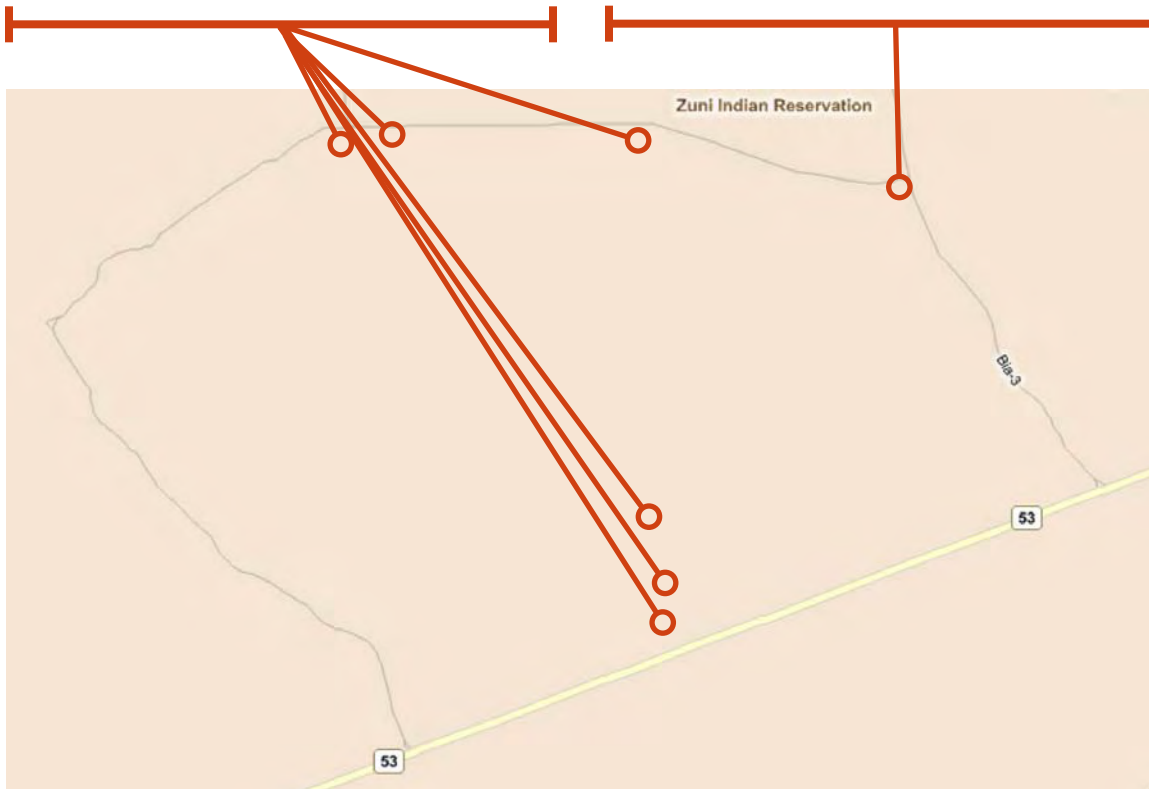
### EXISTING STRUCTURES:

From my observations there are 7 existing structures on the site. There are 6 mobile-home-style residences (all of which are in various states of disrepair) and one, one-floor adobe commercial building on the northeast corner of the site.

The homes are arranged along Lunsico Road along the northern border and a group of three off a dead-end dirt road extending from Route 53.



For this proposal, I am assuming that the residential structures will be removed, and the landowners compensated and relocated within the master plan scheme. This would be done at no charge and they would be allowed their choice of property zoned for residential development.

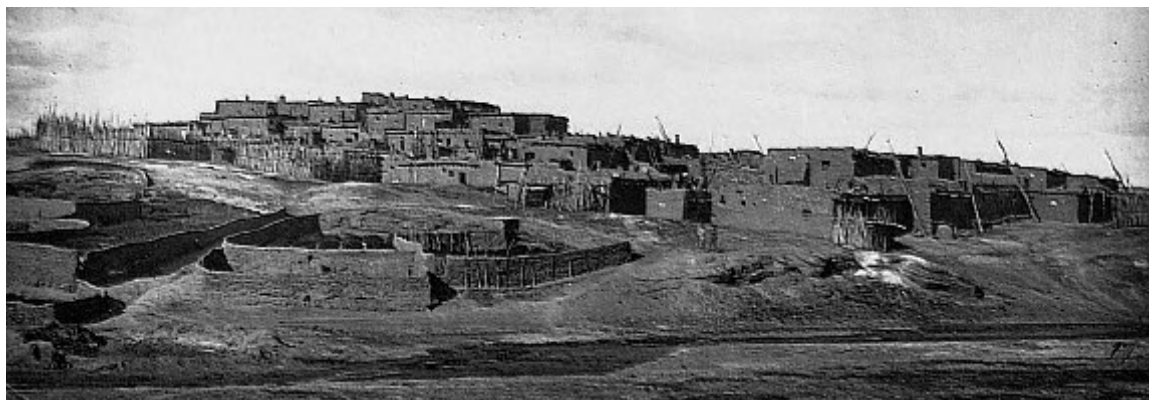




### SITE VIEWS:



Panoramic of the site looking west. Sagebrush and yucca plants dot the relatively flat landscape which crosses into Arizona.



A historic look at the town of Zuni as it was in 1873. This view is approximately 2 miles east from the site looking southeast



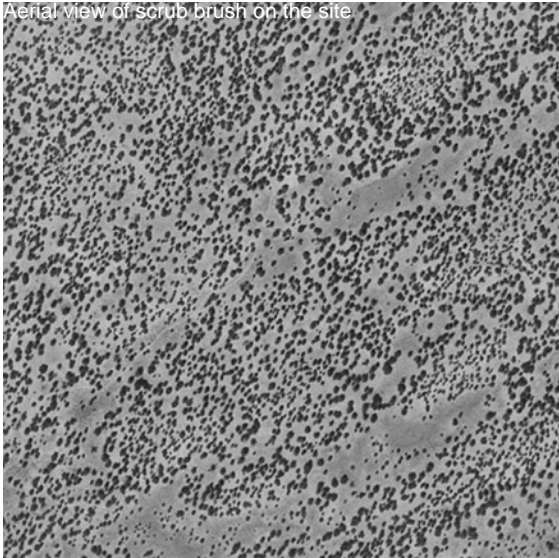
Views of Zuni dwellings along Route 53 between the town and the proposed site. The Chuska Mountains are visible to the back.





## SITE VEGETATION:

Aerial view of scrub brush on the site

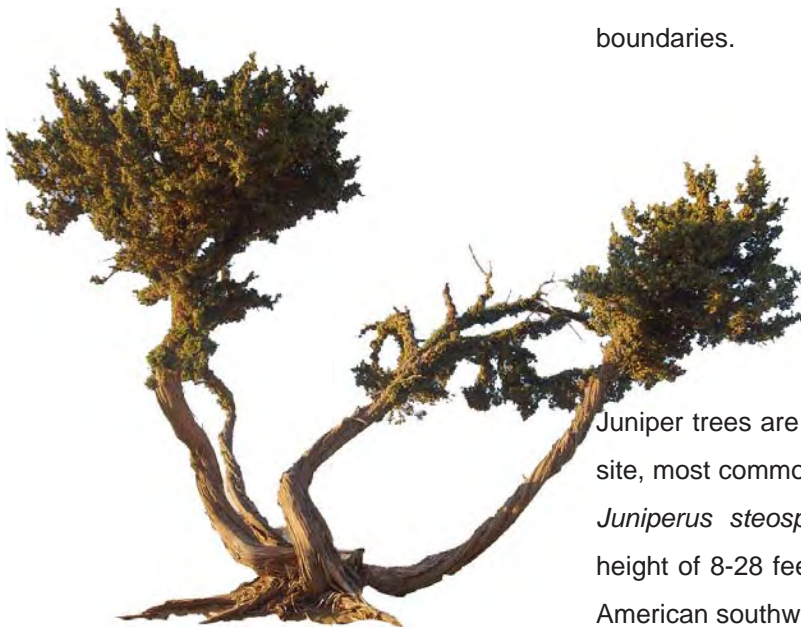


*Artemisia tridentata* is the most common variety of scrubbrush found on the site. Commonly known as sagebrush (below), this bush grows 2-5 feet tall on average and is concentrated to areas of the USA that receive more winter precipitation than summer.



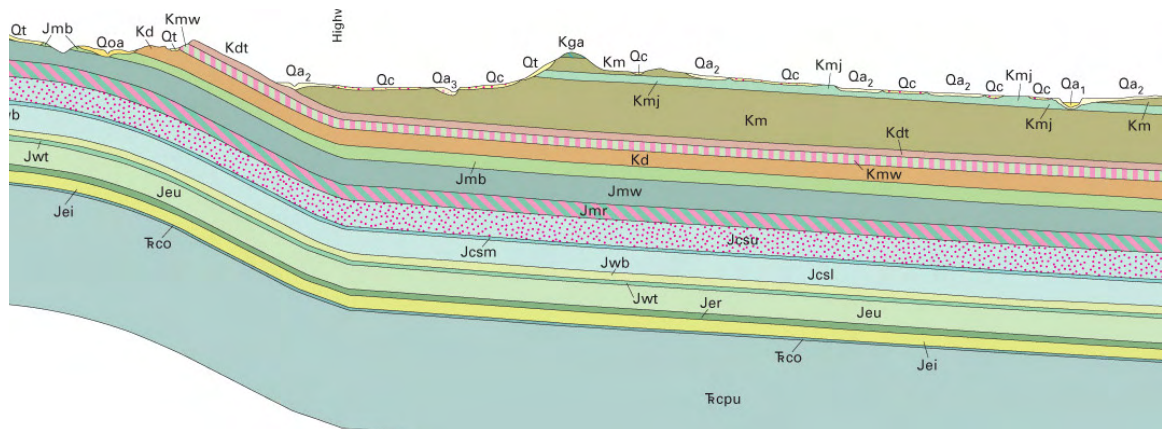
Various species of Yucca plants (most commonly the *Yucca Glauca*, left) appear in the site as well. They are succulent plants and as such can survive for weeks without water. Their pointed fan shape make them architecturally rich.

Unfortunately the *Saguaro cacti* (below), long know for their quintessentially western shape do not appear directly in the limits of this site, but do exist to the north and west beyond the boundaries.

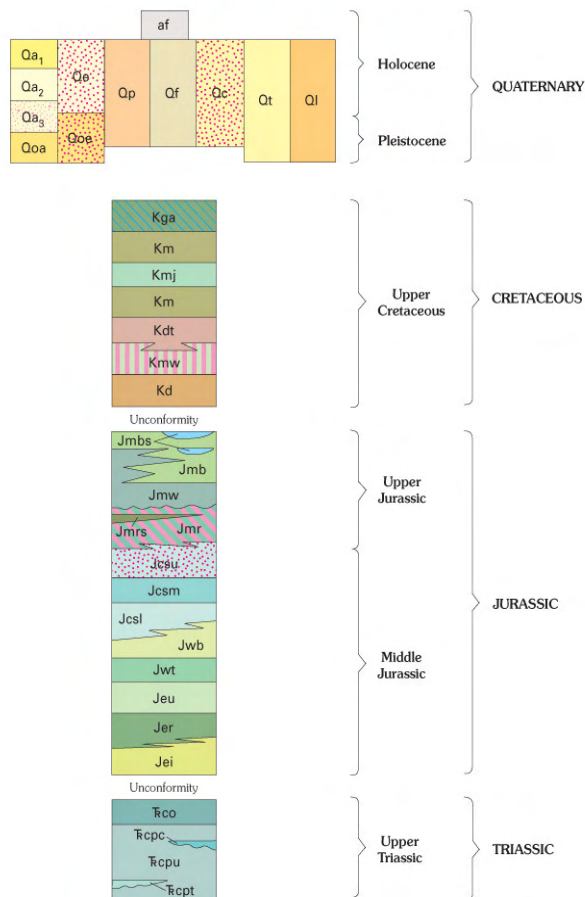


Juniper trees are found sparsely throughout the site, most commonly along the wash edge. The *Juniperus steosperma* grows to an average height of 8-28 feet and is common all over the American southwest

## SITE GEOLOGY:



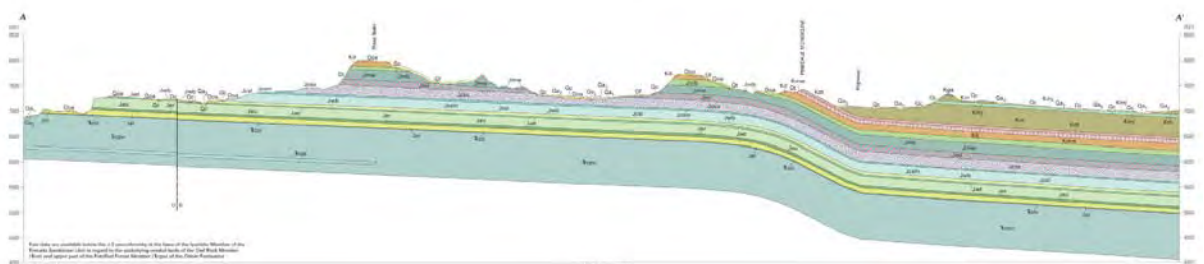
### CORRELATION OF MAP UNITS



The immediate site is a sandy soil, approximately 80% sand, 20% detritous. The colour is taupe, though iron oxide from some of the cretaceous-period rocks below come through for hints of red.

Underneath the soil, sheets of mostly basalt stone fold through the site. The high density of the rock layers under that make the site ideal for building. There are no shifting tectonic plates under the site either, so earthquakes are not an immediate threat here.

With little vegetation, the sand can become problematic during high winds. A succulent ground cover would be the smartest and fastest remedy in the case of urbanization.





### LAYERS OF PREOCCUPATION:

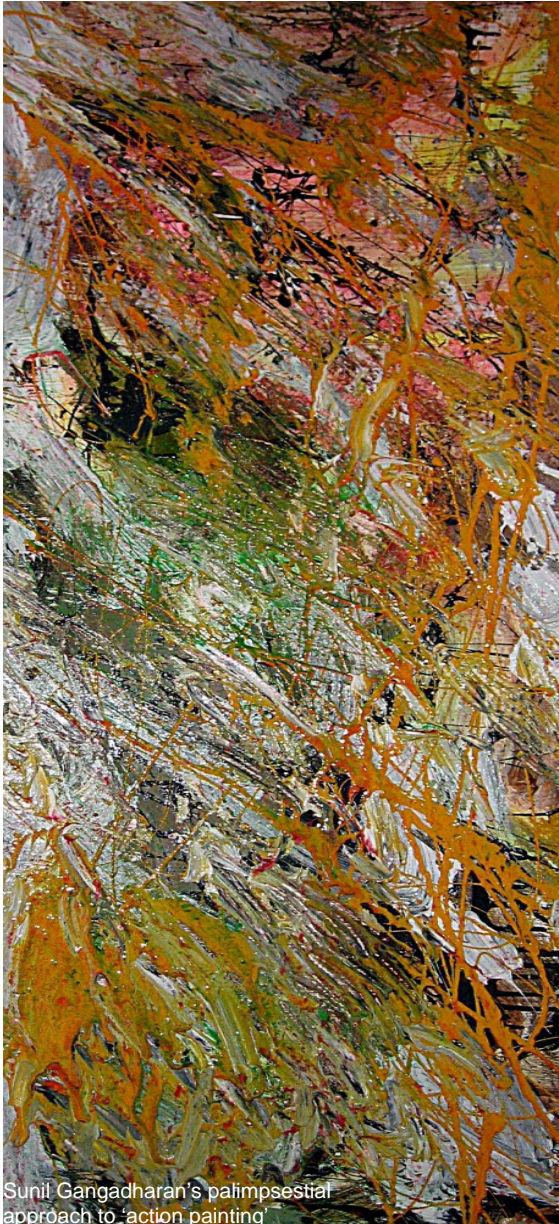
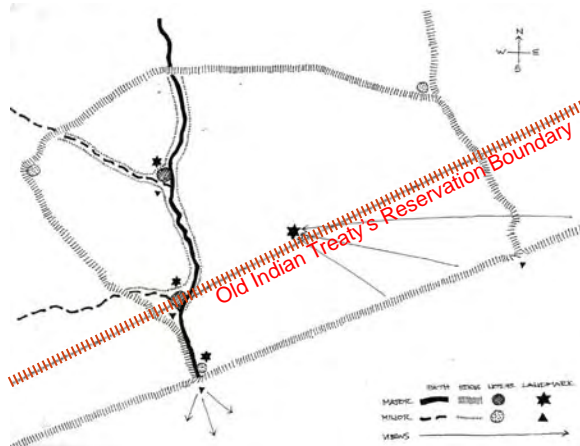


A frieze of horses and rhinos near the Chauvet Cave's Megaloceros Gallery

Like cave painting petroglyphs layered on top of one another, this site too, is palimpsestial. Pre-occupation is visible both with the eye and the mind as one begins to imagine the rich Zuni history that has played across its surface.

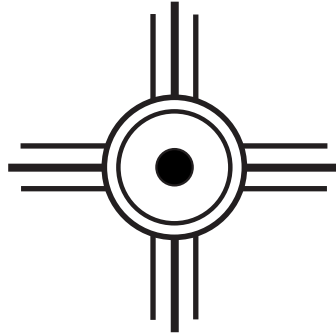
The land, as mentioned, has always been “Zuni” and as such has surely been traversed by the tribe and their ancestors for over one thousand years. This emotional and physical connection to the site makes it culturally rich and the perfect space for ‘place making.’

One such element is the Old Indian Treaty's Reservation Boundary line which slices the site from the northeast to the southwest. The demarcation of territory is an emotional petroglyph of the land and conveniently intersects the southernmost node where two washes meet. This could be the meaningful and legitimate kernal around which a town could grow.



Sunil Gangadharan's palimpsestial approach to 'action painting'

Less romantic though no less important are the six homes that exist on the property. Each inhabitant has a story and a relationship to the site and is as much a part of its composition as any historic element.



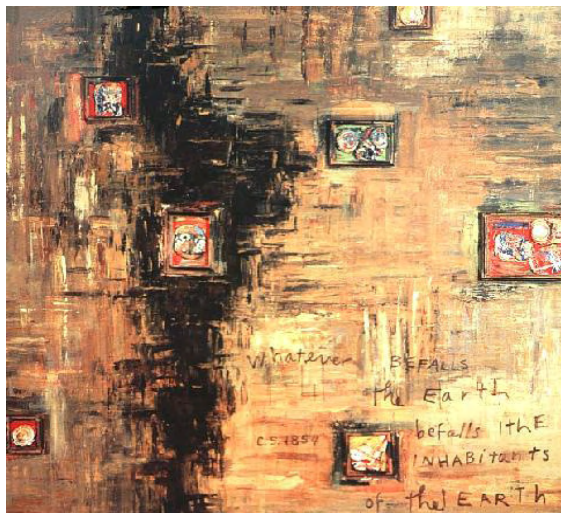
## THE PRECEDENTS



Many precedents were analyzed during the development of this proposal, but the following few represent a great cross-section to study and apply to this project. Precedents for both master plans and commercial buildings were considered because of this project's dual nature, and in addition, historical vs. modern approaches of building were explored.

Pueblo Bonito at Chaco Canyon explores the physical relationships of various program elements in a tight-knit tribal community in 10th century New Mexico. It also provides insight into the vernacular of the historical Native southwest. The GAP Headquarters Building in San Bruno exhibits an uncommon affinity for sustainability in an industrial situation. It also pays attention to the needs of the people that work there and provides them with numerous services and benefits.

These projects are very different from each other, but when their ideas are combined and distilled and made appropriate for this site, they offer great insight into what a successful master plan and manufacturing plant look like.



## PUEBLO BONITO:

- Project Type: Town Plan
- Project Location: Chaco Canyon, New Mexico
- Architect: Ancestors of the Zuni, Navajo and Hopi Native Americans
- Dates Constructed: 920ad - 1085ad

Though this proposal would be a modern interpretation, historic Pueblo architectural precedents of the American southwest provide insight into:

- The true vernacular of the region in terms of siting, solar orientation, hierarchies and responses to winds, climate and views
- Relationships between people by their patterns of building
- What kinds of spaces were/are of high importance
- How Native Americans build when uninhibited by Western Civilization
- Who they still are by how they built

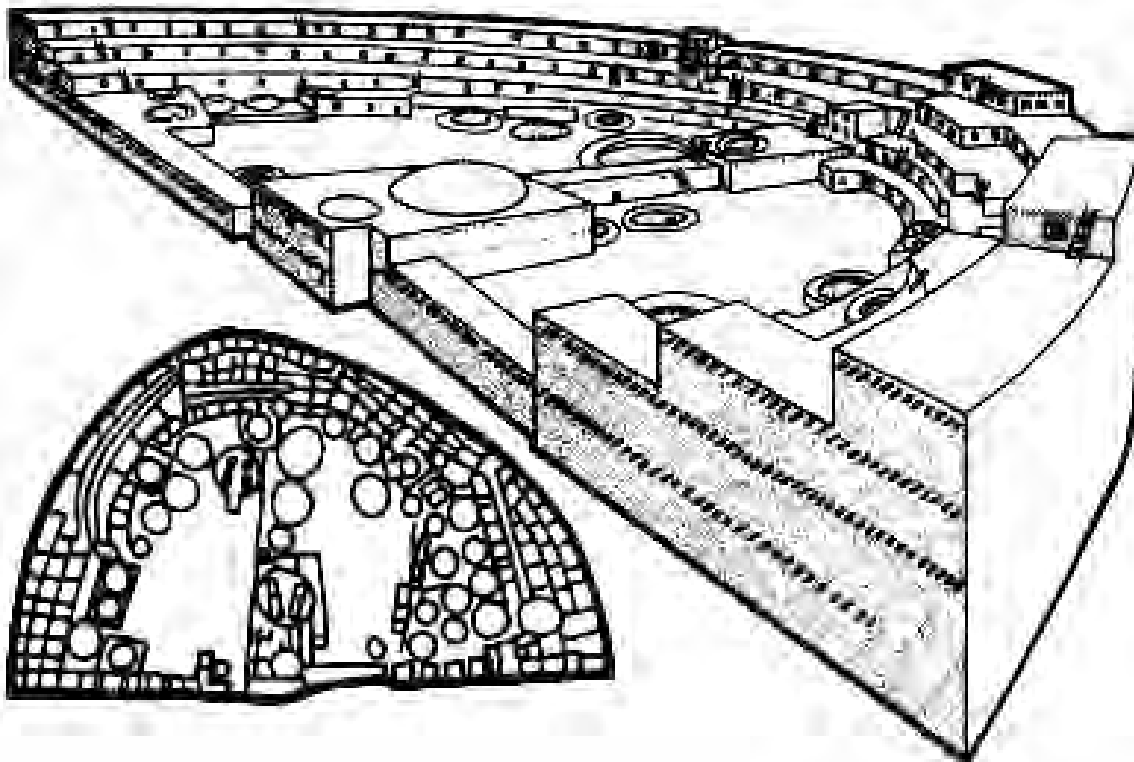
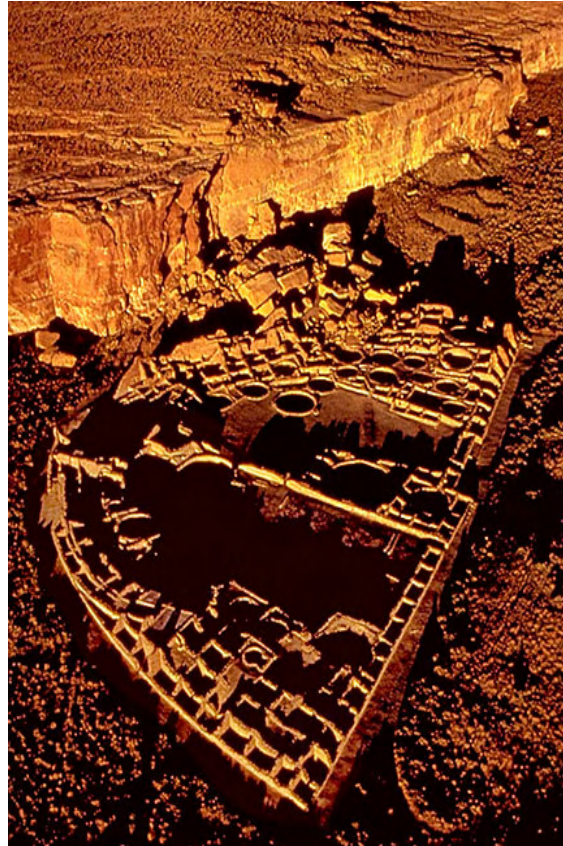




### PUEBLO BONITO:

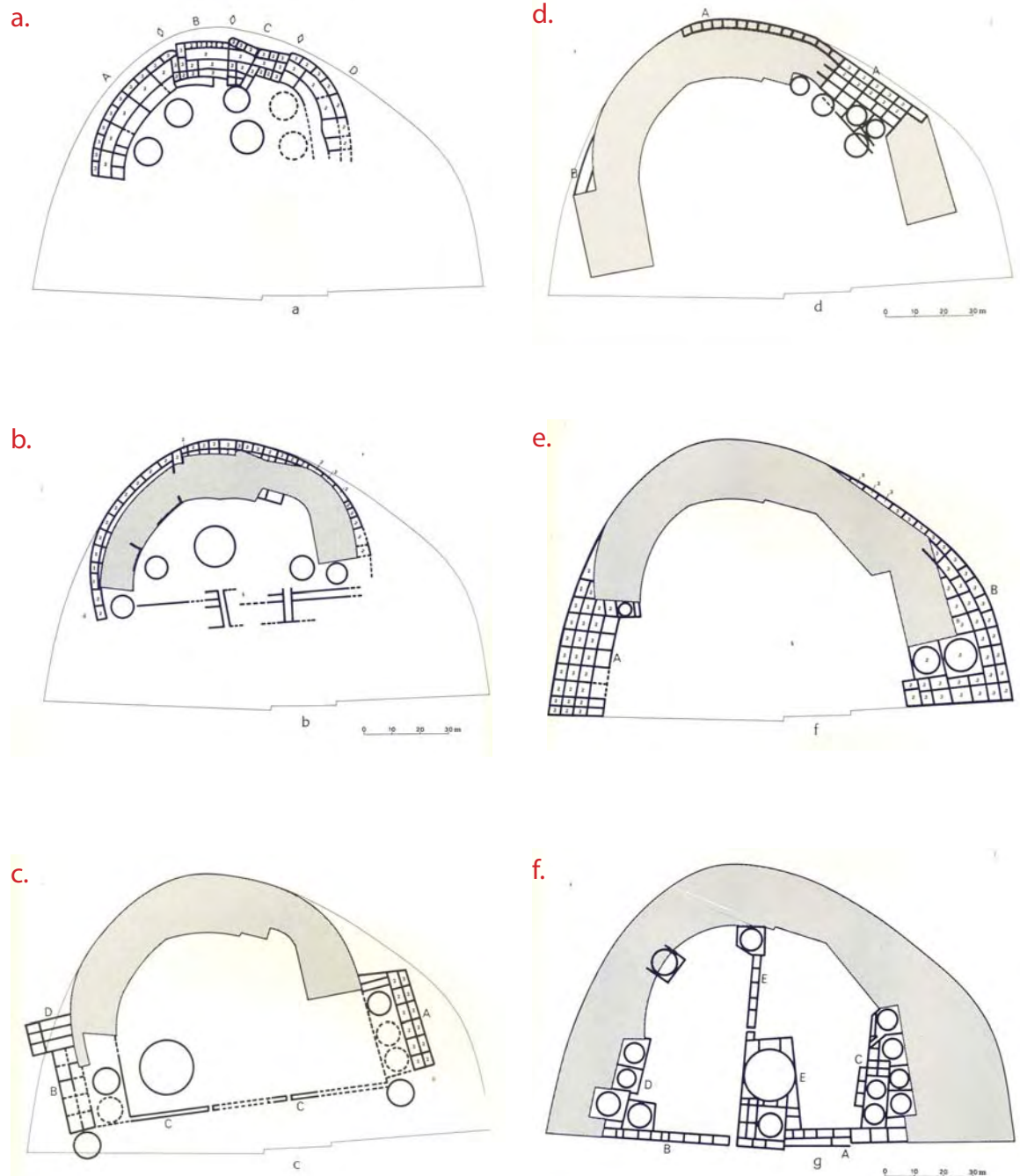
In terms of siting, nearly all ancient Pueblo architecture of the Southwest is sited in response to local conditions. With Pueblo Bonito, this is especially true:

- The horseshoe shape is oriented so that it maximizes southern exposure.
- Buildings placed on top of mesas to protect adjacent plazas from wind.
- Elevations are modulated to allow views through town to most important buildings like the central Kiva.
- Certain buildings for medicine and religious practices are situated on promontories for visual dominance.



# PUEBLO BONITO:

Concerning the process of development, Pueblo Bonito developed comprehensively from 920ad when it was begun to 1085ad when the last extension was added. Through this time, the main horseshoe shape remained because of its environmental benefits.





### PUEBLO BONITO:

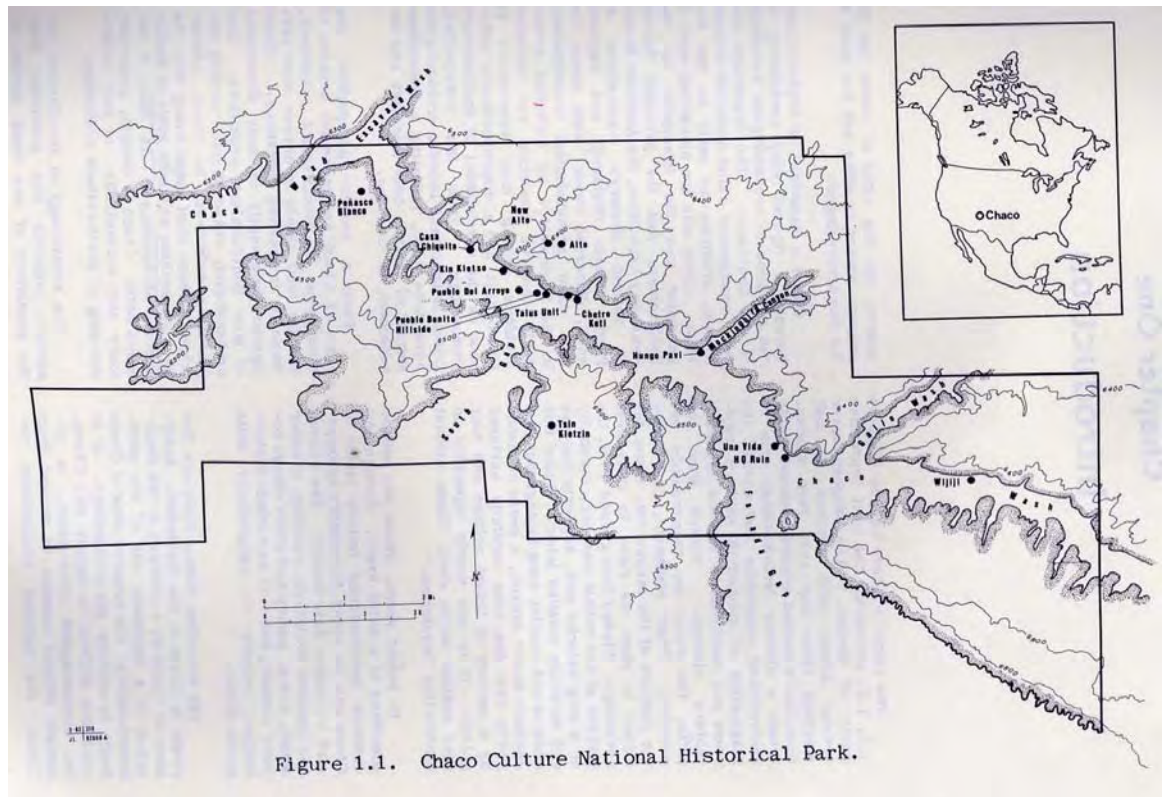
Important structures, like the round rooms found in the center of the Pueblo Bonito plan are 'Kivas' which developed from the earlier pit houses of the region. These semi-subterranean structures were built for multi-households as well as religious group spaces and contained formal-

ized interior furniture. This eludes to the importance of community in historic Native American establishments, something that has been lost over the centuries, at least in an architectural language.



### PUEBLO BONITO:

The people of Pueblo Bonito created transportation infrastructure as well as a town. Sophisticated road structures radiate out of the canyon connecting the edges of the San Juan Basin. Elements like masonry ramps, stairs and berms integrate Pueblo Bonito with its surroundings.





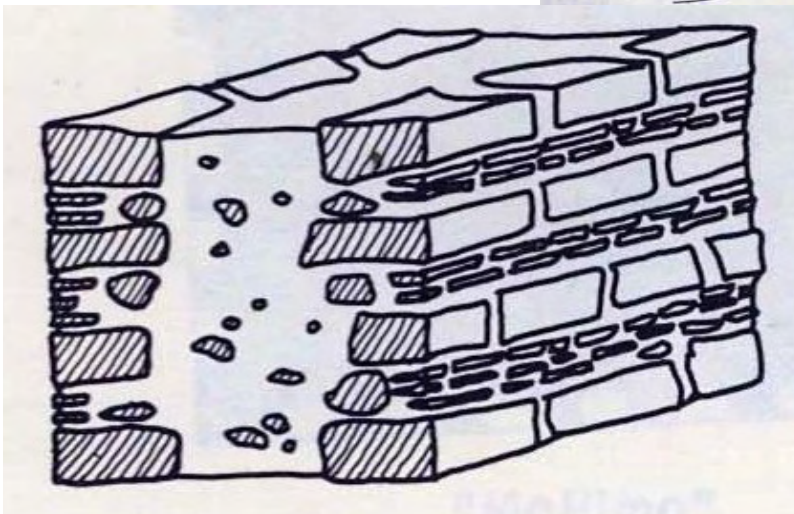
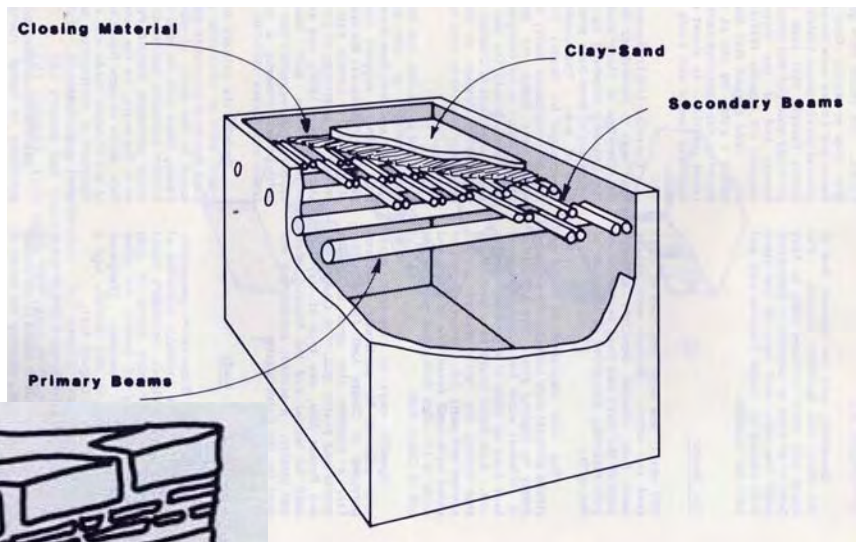
## PUEBLO BONITO:

### WALL CONSTRUCTION:

- Made of sandstone blocks and clay mortar
- Core & veneer wall systems used most prominently for their ability to modulate width
- Walls set into 50cm x 50cm foundations filled with rubble and clay mortar to prevent uneven settling
- Two vents built into each wall for natural circulation placed high in the walls about 30cm square
- Scratch coat of mortar used also as a wall plaster for uniform look and added stability

### ROOF & FLOOR CONSTRUCTION:

- Hierarchical system of
  - Vigas (Primary lintel beams)
  - Latillas (Secondary beams)
  - Split Shakes (Closing material like juniper or pinon)
  - Clay-Sand finish
- Reduction of wall widths at each story is a characteristic of Southwest Native architecture





GAP HEADQUARTERS, SAN BRUNO, CA:

- Project Type: Office/Factory Building
- Project Location: 901 Cherry Street, San Bruno, CA
- Architect: William McDonough + Partners
- Date Constructed: 1997

The green design and unique siting strategies of the GAP Headquarters building exhibits many of the same qualities that the manufacturing facility in this proposal strives for.

- The openness of the design, circulation of people, and urbane common spaces encourage a strong sense of community
- The building features many sustainable strategies, including a vegetated roof, raised floor for air delivery under individual control, operable windows, and day lighting
- Recognized as the second-most energy-efficient building in the state, one that exceeds California's strict energy requirements by 30%



GAP HEADQUARTERS, SAN BRUNO, CA:

Unlike many industrial or office buildings built today, the GAP Headquarters pays respect to the natural landscape of northern California. The proposal for Zuni must also respond to the inherent forms of its site, especially because of its lack of surrounding structures or other indicators.

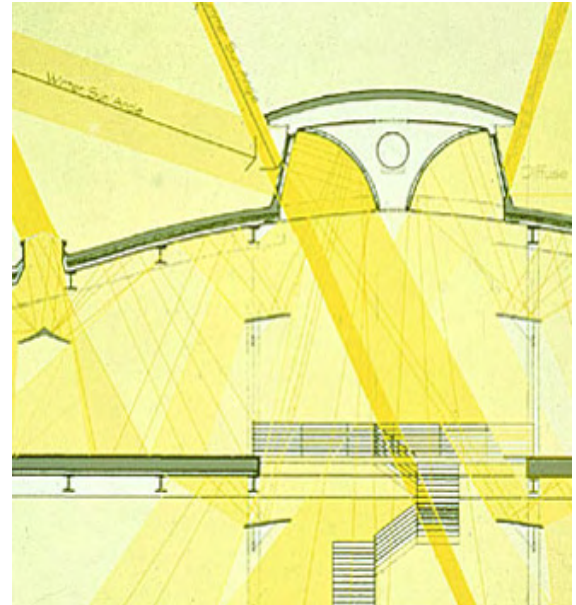
An undulating roof covered in native grasses and wildflowers responds to the surrounding terrain and re-establishes a coastal savannah ecosystem on 901 Cherry's roof.



GAP HEADQUARTERS, SAN BRUNO, CA:

901 Cherry Street's commitment to its workers' health and happiness is evidenced in the way the architecture gives open, light filled spaces to all occupants in all areas of the building:

- Clearstorys allow light to penetrate into deep interior spaces
- Light trays reflect and diffuse light along the interior curve of the roof
- Operable windows allow passive, natural ventilation
- Mezzanine levels and cut-outs in the floor plates allow natural light to reach sub-terranean levels





## VAN NELLE FACTORY, ROTTERDAM:

- Project Type: Industrial
- Project Location: Rotterdam, Netherlands
- Architect: Johannes Brinkman
- Dates Constructed: 1926 - 1930

Built as a tobacco company in 1926, the van Nelle factory is one of the oldest surviving industrial buildings of the international movement. Brinkman designed the facility with a number of unique and ingenuitive features that can be analyzed and possibly applied to the design of the solar panel factory in this proposal:

- The massing of the factory's blocks and their relationships between solid and void create an elegant composition that fits well on (and responds to) its river-side site
- The building features a graceful curtainwall system that responds to the environment with its orientation
- Glass bridges span the space between administrative and manufacturing blocks allowing for direct circulation





### VAN NELLE FACTORY, ROTTERDAM:

This Dutch tobacco processing facility is still in use after more than 90 years. Part of its success stems from its:

- Double height interior spaces that allow natural light to penetrate into otherwise dark central spaces
- Efficient siting allowing ample room for shipping and vehicular circulation
- Pleasant massing and curtain wall systems allowing great views both into and out of the building along the adjacent river



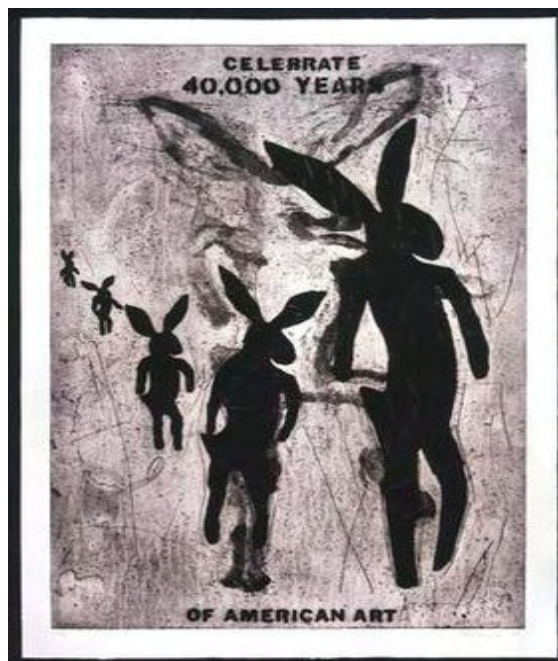
## THE ART OF JAUNE QUICK-TO-SEE SMITH:

- Project Type: Painting and Mixed-Media
- Project Locations: Montana, New Mexico, Various US locations
- Artist: Jaune Quick-to-see Smith
- Dates Active: 1960 - Present

Jaune Quick-to-See Smith was born at the Indian Mission on the Flathead Reservation in 1940. She is a member of the Flathead Indian Nation, Montana

Smith is a “cultural art worker.” She uses her Native worldview to address today’s tribal politics, human rights and environmental issues with humor. Critic Gerrit Henry wrote: “For all the primal nature of her origins, Smith adeptly takes on contemporary American society in her paintings, drawings and prints, looking at things Native and national through bifocals of the old and the new, the sacred and the profane, the divine and the witty.”

Jaune Quick-to-See Smith’s work fits in beautifully with this project as it criticizes and announces the joys, sorrows, and struggles of being a Native American in today’s world



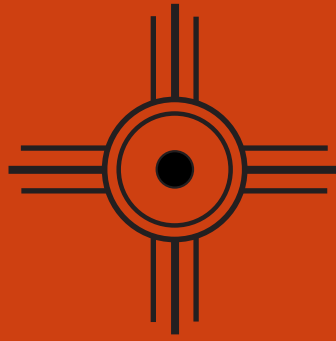


THE ART OF JAUNE QUICK-TO-SEE SMITH:







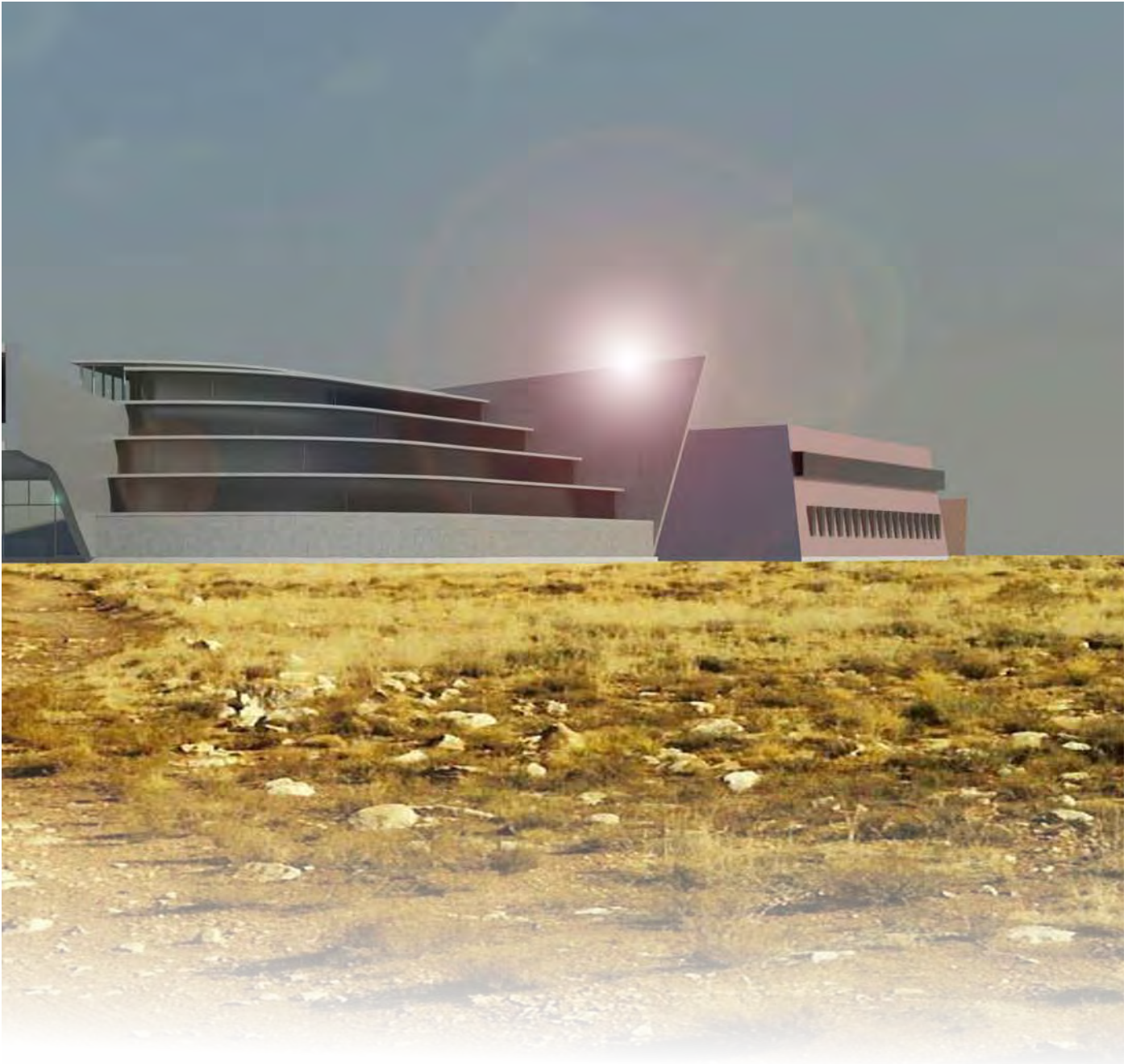


FINAL PROJECT DESIGN FOR THE ZUNI  
SOLAR ENERGY REINVESTMENT INITIA-  
TIVE ( ZSERI ) HEADQUARTERS AND  
MANUFACTURING FACILITY



The ZSERI Headquarters and Manufacturing Facility grows from the New Mexican landscape as a powerful assemblage of masses to announce the forward inertia of the Zuni people. The work speaks to their commitment to modernizing their community while concurrently stimulating a sense of pride and past as a unique sub-culture in America. The southwest façade (as shown

above) serves as the main point of entry into the complex and invites employees and visitors into the central atrium by way of the bank of glass doors under the lounge, which soars up into the southern sky. Forms step back and build-up in a composition that melts the hardness of the building materials with the softness of the surrounding scrub brush.



Program blocks, unique to their respective functions, line the southern elevation to absorb solar radiation and views. Between blocks, sections of the central atrium show through to house lush winter gardens that add a degree of natural informality to a corporate environment. This public face also serves to anchor the industrial sector of the town plan by providing dynamic architec-

tural elements visible all along the main roadway from the highway into the town at all hours of the day: At night, the complex glows auburn by way of stored solar energy in the blue-black New Mexican night. In fact nearly all electricity consumed by The ZSERI H+M is acquired from the solar panels on the work bay roofs, and from the solar concentrator ring in the town center.





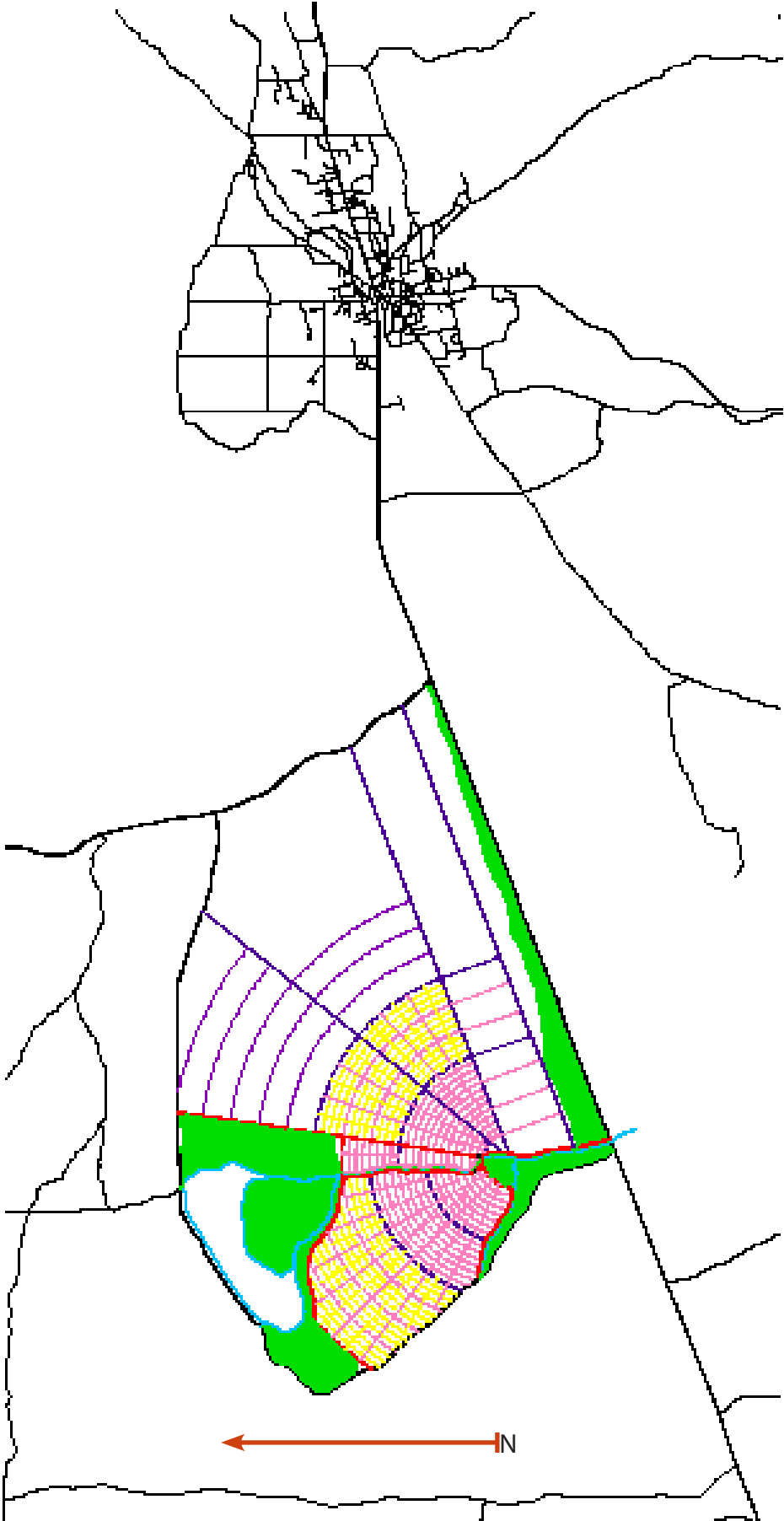
The presentation of this project begins with its site and the master plan that it is integral to. The town plan has, from conceptual stages, been the terminal goal of this thesis; the factory, the catalyst to get there. So in a macro-to-micro approach, one must understand the ambitious site choice and the location of the plan within its boundaries. Its relative proximity to the established town of Zuni and secondary highways made it an ideal choice since the easy transport of product and raw materials is imperative to the longevity of the factory and town. It was also chosen for its uninhabited expanse of mostly flat terrain, providing the clean slate the social goals of this project necessitate. To reiterate, these goals are to provide the Zuni people with a place that they can start fresh; call their own and design and build with their own hands in the way their intrinsic values and unique customs find most appropriate.

THE MASTER PLAN OUTLINED HERE IS A HYPOTHESIS. WHILE IT IS AN EDUCATED AND THOROUGHLY RESEARCHED THEORY, IT REMAINS JUST THAT. THE ULTIMATE FORM THIS TOWN WILL TAKE IS ENTIRELY DEPENDANT ON THE ZUNI PEOPLE THAT CREATE IT. THIS IS THE MYSTERY AND THE MAGIC AT THE VERY HEART OF THIS THESIS.





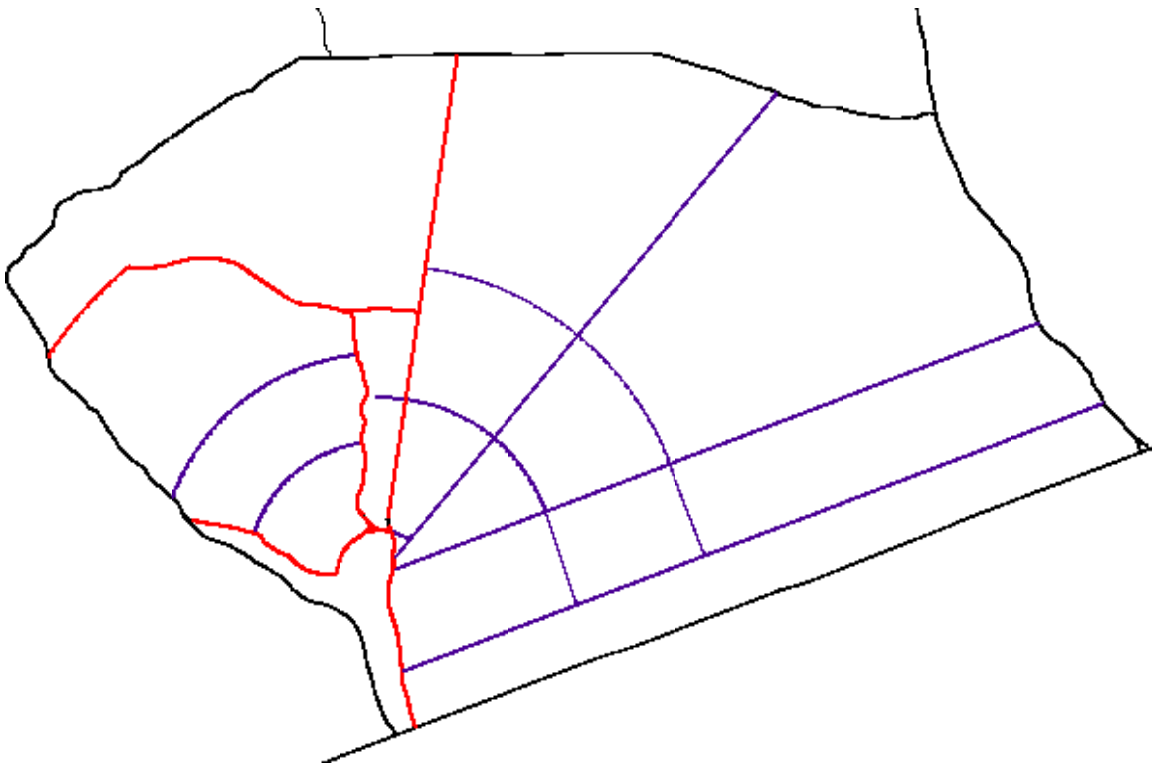
THE MASTER PLAN IN RELATION TO THE TOWN OF ZUNI, NEW MEXICO



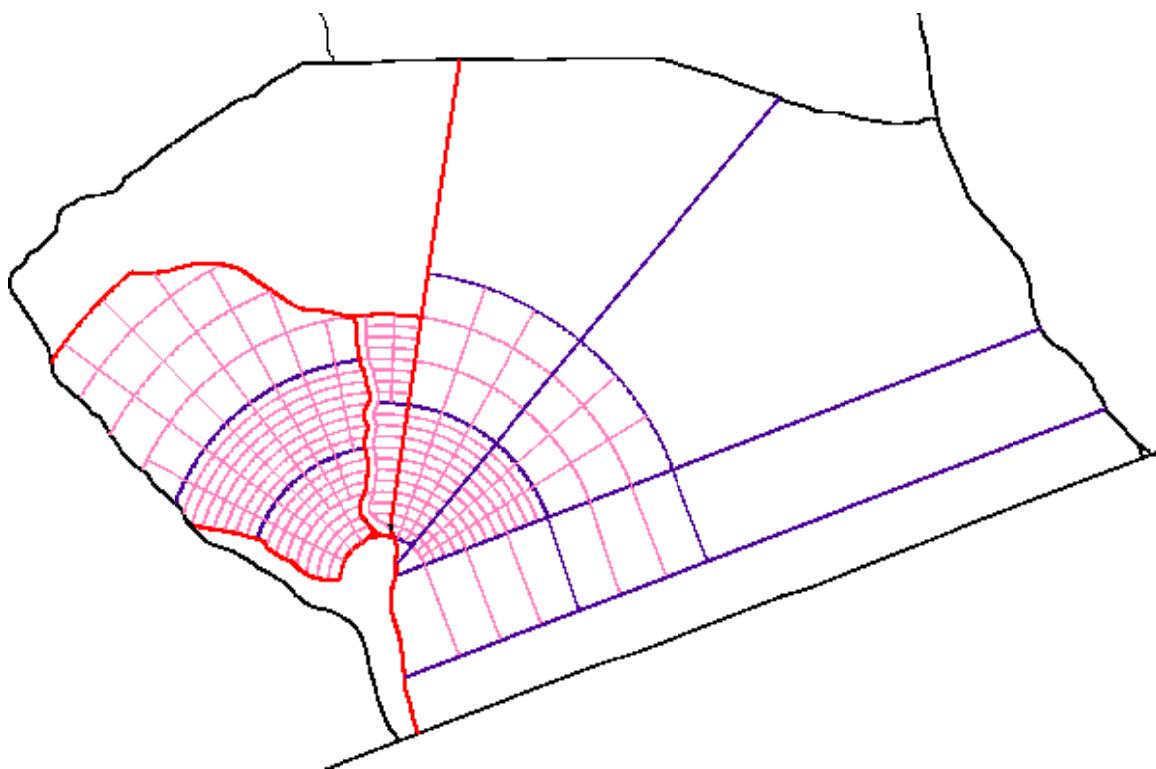
MASTER PLAN WITH MAIN TRAFFIC ARTERIES  
AND THEIR RELATIONSHIPS TO THE ECO-ZONES



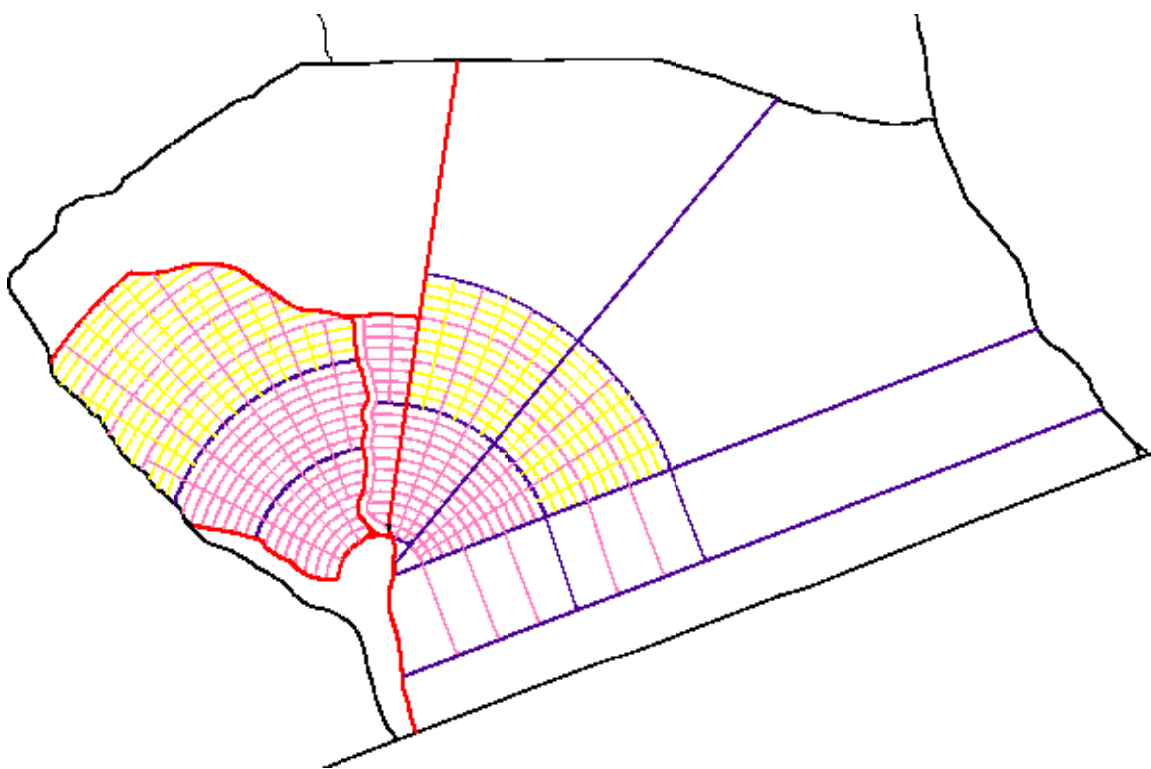
MASTER PLAN WITH PRIMARY ROADWAYS  
ADDED



MASTER PLAN WITH SECONDARY ROADWAYS  
ADDED



MASTER PLAN WITH TERCIARY (RESIDENTIAL)  
ROADWAYS ADDED

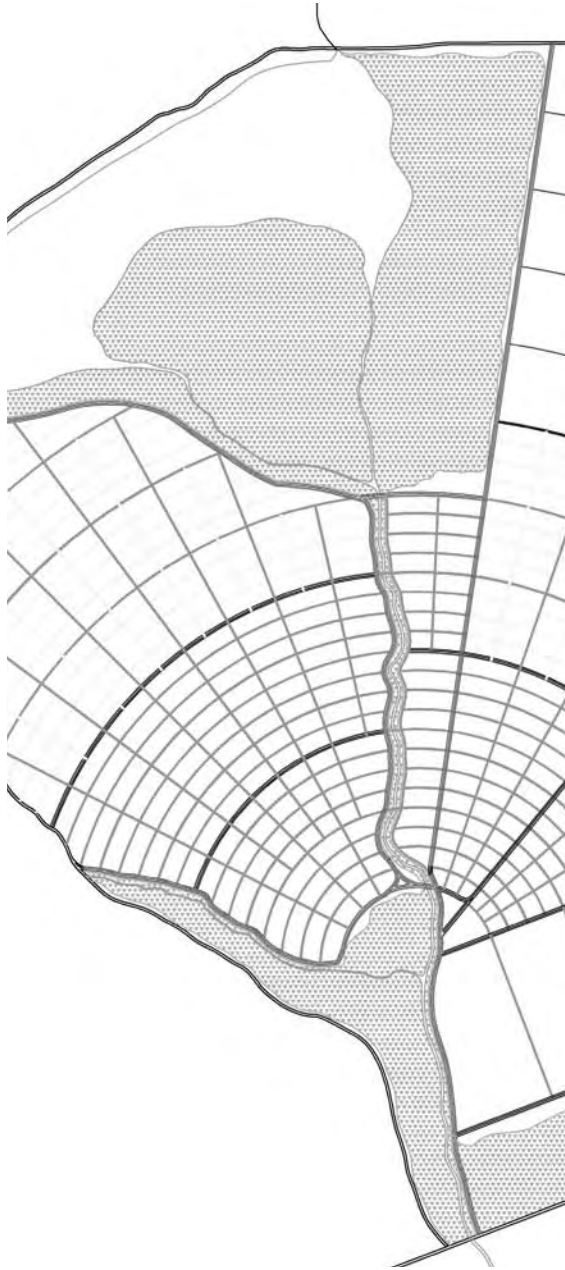


## MASTER PLAN PROJECTED ZONES

The master plan for the new Zuni manufacturing town is very much based on the radial construction of ancient Zuni pueblos. These towns were built to absorb the southern sun, were centered about a holy space, and grew out in semi-circular layers from that point; all of which this new master plan honors and expands upon.

The evocative kernel at which this new projects expands from, is the area where two washes meet, also the site of the Old Indian Treaty Boundary line which once separated reservation and pioneer lands. At this space, there is an eco-zone park housing paths, overlooks, picnicking areas, an outdoor theatre, and a large solar panel concentrator ring providing most of the electricity needs for the town's civic buildings.

Green spaces in this project are referred to as "eco-zones" as they are not always "green", although they are zoned spaces which may never be privately developed, used for hunting or fishing, mined, or clear-cut for any reason. Other eco-zones are found along the highway edges and around the reservoir which act as visual and sonic buffer zones between roadways and busy commercial areas, and these relaxing retreats.



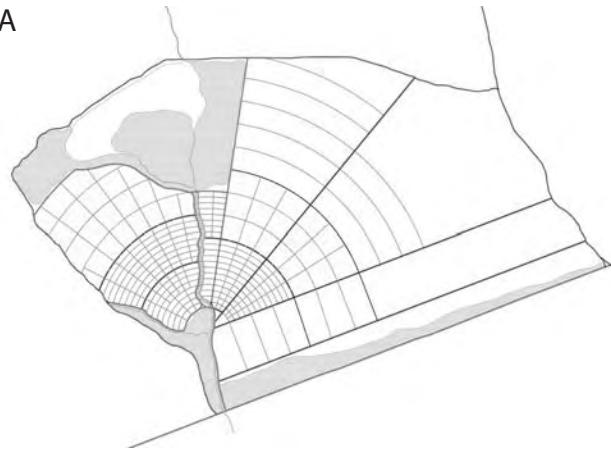


An intricate system of roadways was laid out to frame the various residential, commercial, and industrial zones. This grid also acts as guides for future town growth. The main traffic arteries (also diagrammed in red on previous page) take vehicular traffic from Route 53 along the wash and into the site at which point cars exit into the appropriate zones via intersections with primary and secondary roadways. These systems, in pink and blue respectively, are the roads that really define the zones of the town. Further from the town center, tertiary grids (yellow) appear for circulation within the residential areas.

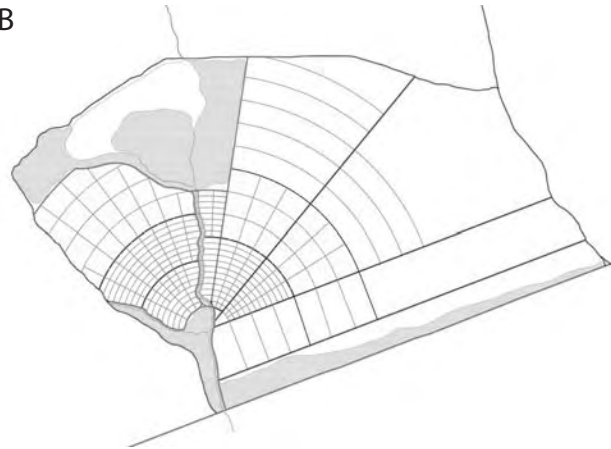
These zones, for private homes, are divided into blocks not unlike a typical suburban design. This master plan however, pushes them to the outer rings away from the commercial center as the ancient pueblos did, so that as more people move to this town, residential areas may expand simply by adding more peripheral rings. Within each block, homes are built close enough to the perimeter that a large common space is created in the center for use by all residents of that block.



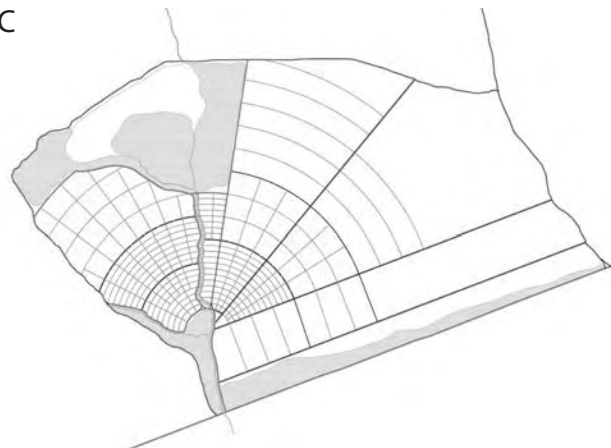
The civic and commercial zones (A) surround the center park and are divided by primary roadways into “mini-boroughs” with their own unique character. Two zones lie west of the wash, the inner-most designed for corporate construction like office buildings and the headquarters of technology and renewable energy-related industries. As the town grows into a city, this will become the “financial district” with the greatest density and verticality.



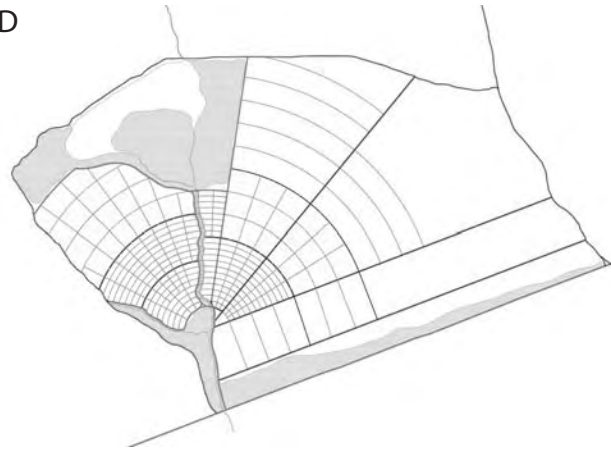
The sector outside of this to the north (B) will contain smaller businesses and buildings for grocery stores, a mall, large retailers and other mid-rise commercial structures.



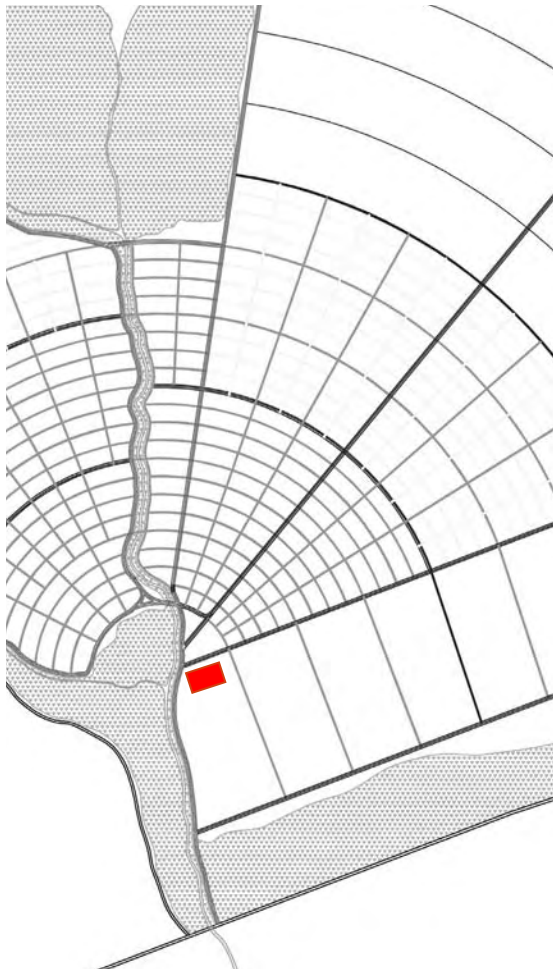
Moving east, the long and narrow district along the wash (C) will be the town’s “downtown” shopping and dining district with small stores, cafes, outdoor markets and a real sense of community. Contained by the wash to the west and a four-lane roadway to the east, this zone itself will be lightly traveled and oriented more toward pedestrian and bike travel.



All along the wash, an eco-strip provides town inhabitants with biking and walking paths that also connect two larger eco-zones to the north and south at which point the paths break into a complex set of trails.

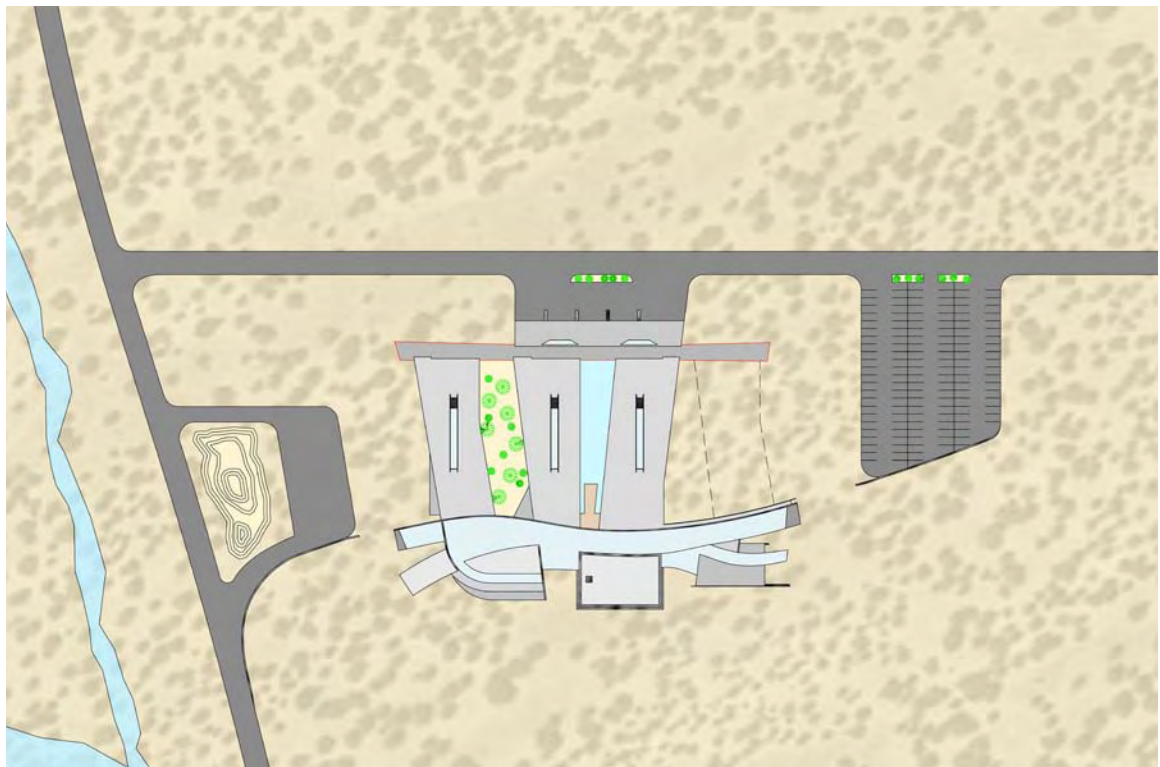


The two public wedges (D) to the west of the “downtown district” are home to civic spaces for the public school system, the town library, municipal buildings, town hall, a theatre and other public spaces.

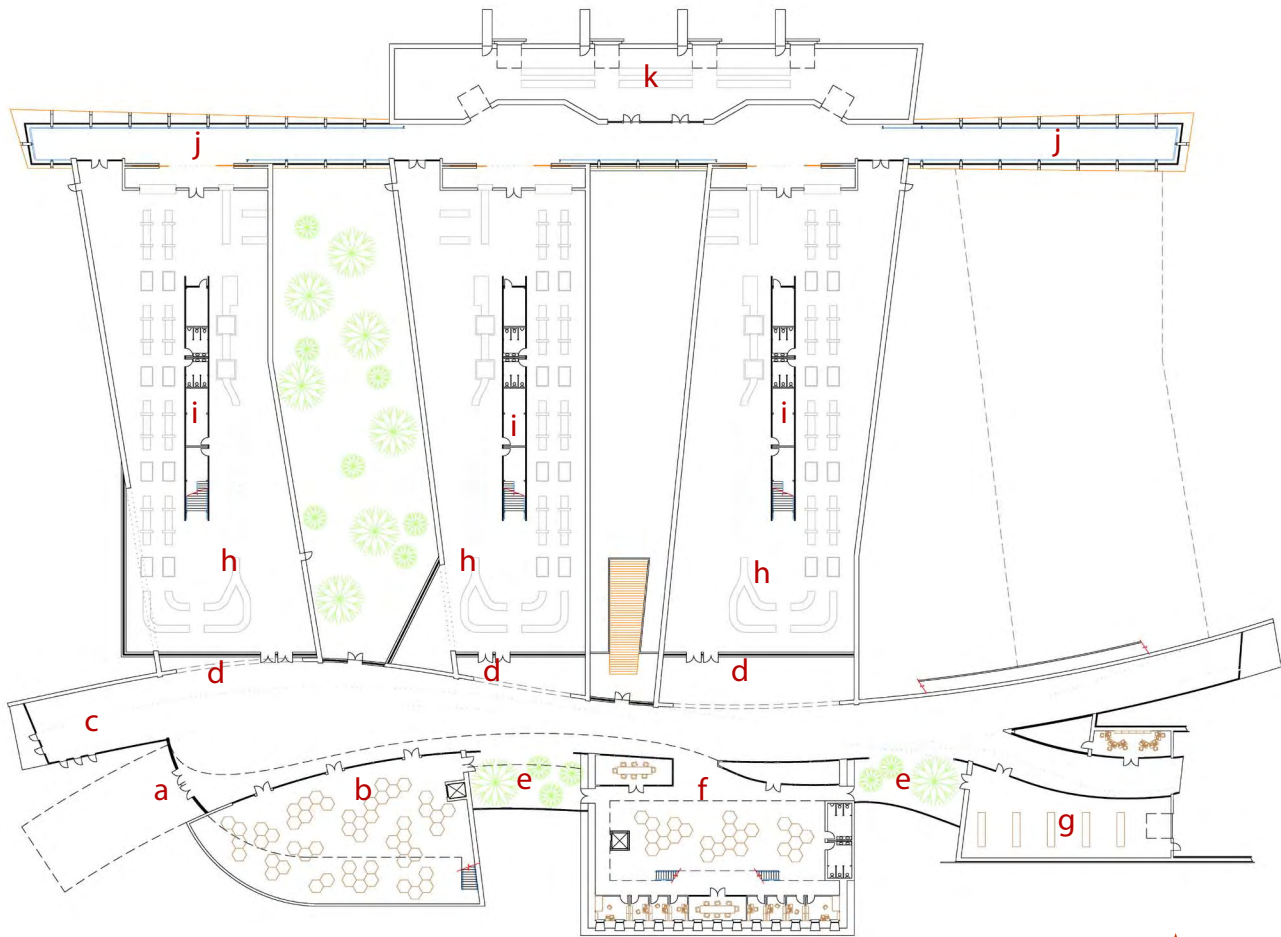


Outside the southern-most civic zone, lies a residential zone for temporary worker housing. This location places workers in the perfect balance between their jobs in the industrial district and the residential neighborhoods they will eventually be a part of. Parallel to Route 53, this industrial sector of the master plan stretches eastward and is kept separated from the public zones by a grid of roadways that also allow for easy expansion within the district. Further, this area is buffered from the main Route 53 by an eco-strip. The ZSERI H+M stands confidently at the corner of the industrial zone as its visual anchor point.

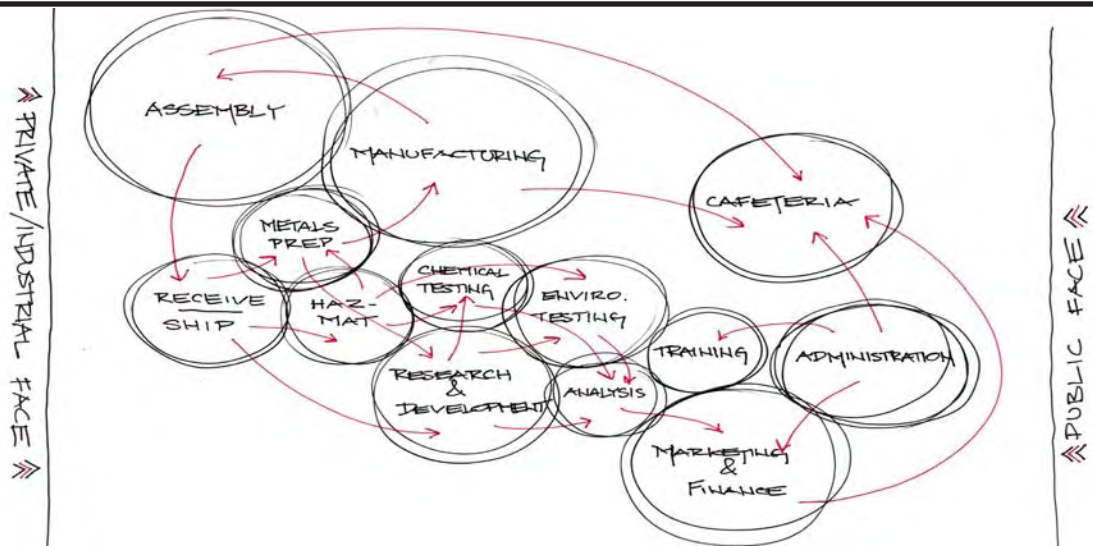
#### PARKING AND ACCESS



## GROUND FLOOR PLAN



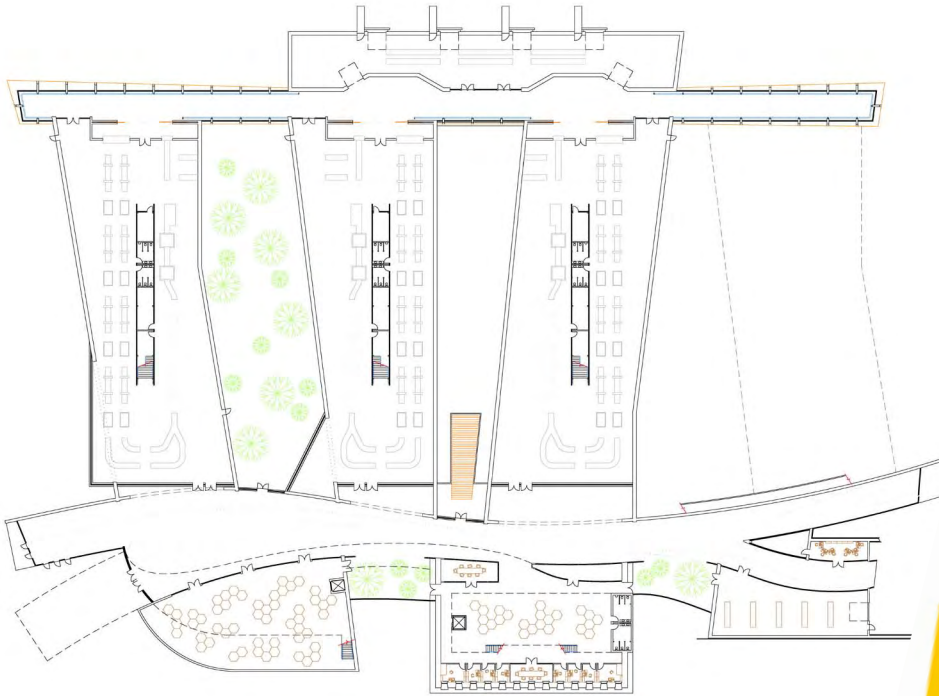




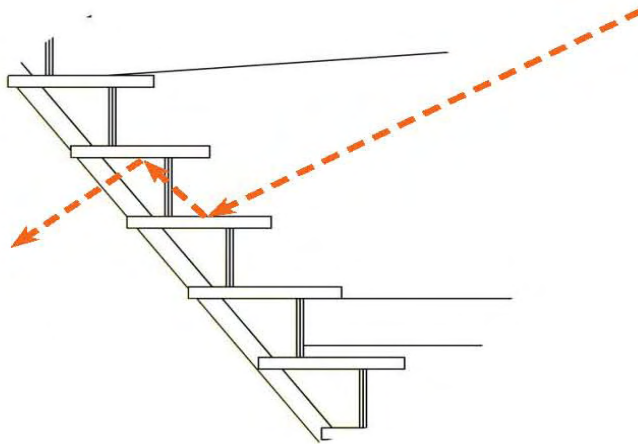
One enters the ZSERI H+M under the soaring lounge space through two sets of double glass doors into the atrium (a) whose contours stretch east the length of the complex. To the right, the administration offices (b) hum with activity through a bank of glass panels and welcome visitors in for information. The administration area contains groupings of modular desk systems that fit together in flexible arrangements within its three tiered, light-filled levels. Taking a sharp left to the opposite side of the atrium, one finds a gallery space (c) for interactive solar energy demonstrations and showcasing new technologies to visitors. Continuing down the main hall, three large punctures in the north wall (d) reveal entrances into the manufacturing bays, while flora abounds in south-facing alcoves (e) devoted to lush winter gardens. Above, a second story catwalk connects the administrative block with the research and development block past the first garden. The R&D block (f) is very responsive to the functionality requirements of the department. Two levels of offices, accessed by a surrounding catwalk, circumscribe a double-height collaborative and flexible work environment in the center. Conference rooms flank the north side, finding themselves appropriately

separating the R&D department and the public corridor. After another winter garden, the last block on the south side (g) comes into view. This understated space has outside access and is open for complete organizational control by the building users for whatever functions they deem pertinent. Back on the north side, the work bays (h) house all the equipment necessary for imported raw materials to be turned into functional amorphous solar panels. The product path encircles a program block in the center (i) accommodating restrooms, a floor-manager's office, storage, a mechanical control room and egress to the solar testing space on the roof. To the north, the bays all connect to a corridor called the "transfer bar" (j) which acts as a track for electric forklifts to run back and forth between the loading/shipping docks and the work bays transporting materials and finished product. The bar utilizes light shelves to filter the intense sun and serves to give it a horizontal orientation, blending it into the landscape. Entering the loading bay at the center (k), one notices conveyor belts moving raw materials to the west and east ends for storage and finished panels to the center for packaging and export. Four docks open outside to a lot sized for 18-wheeler transport trucks.

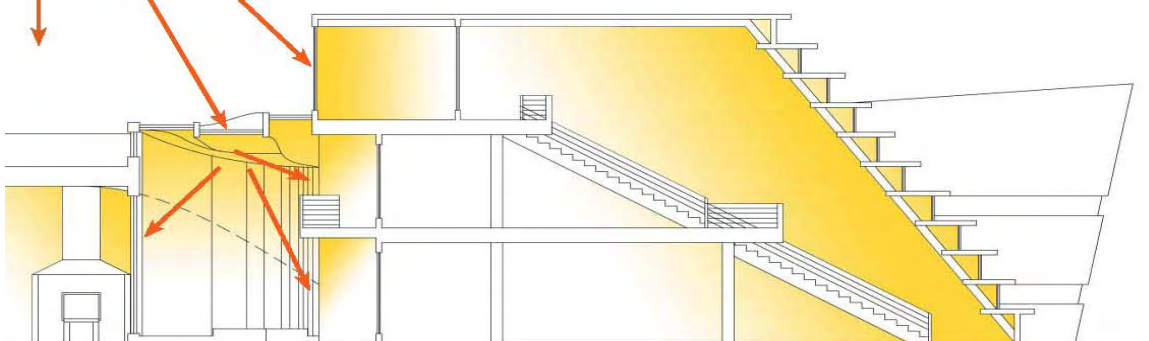
### SOLAR ORIENTATION



Southern sun sweeps gracefully across the south and west facades

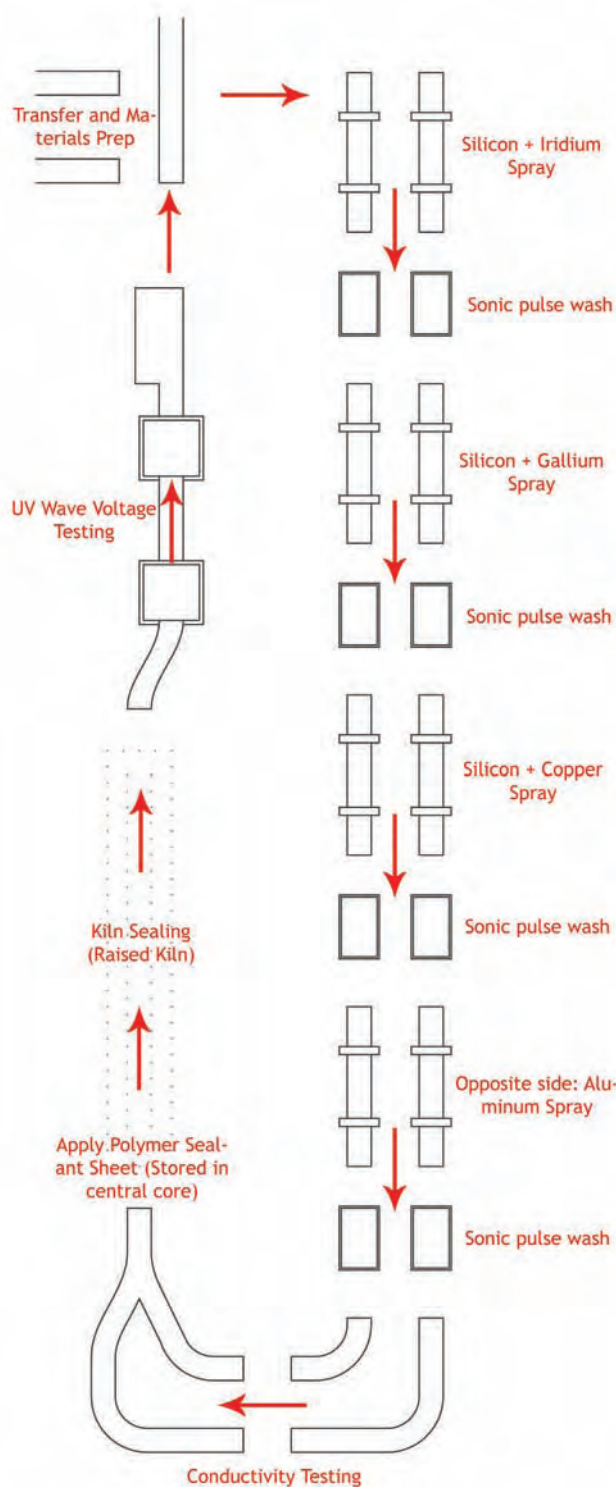


How the light shelves in the administration bay  
(and transfer corridor) control light intake:





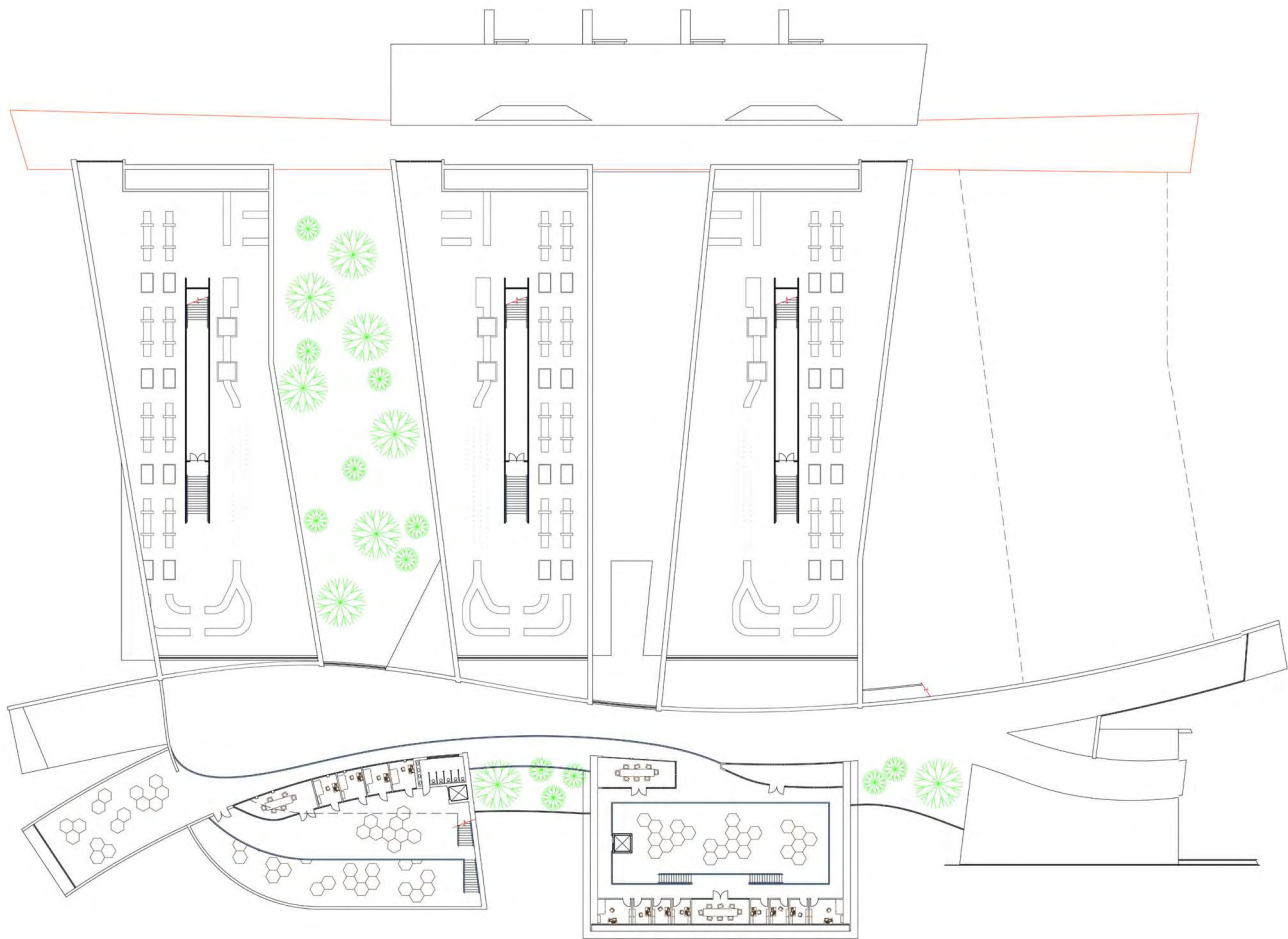
### THE MANUFACTURING PROCESS:



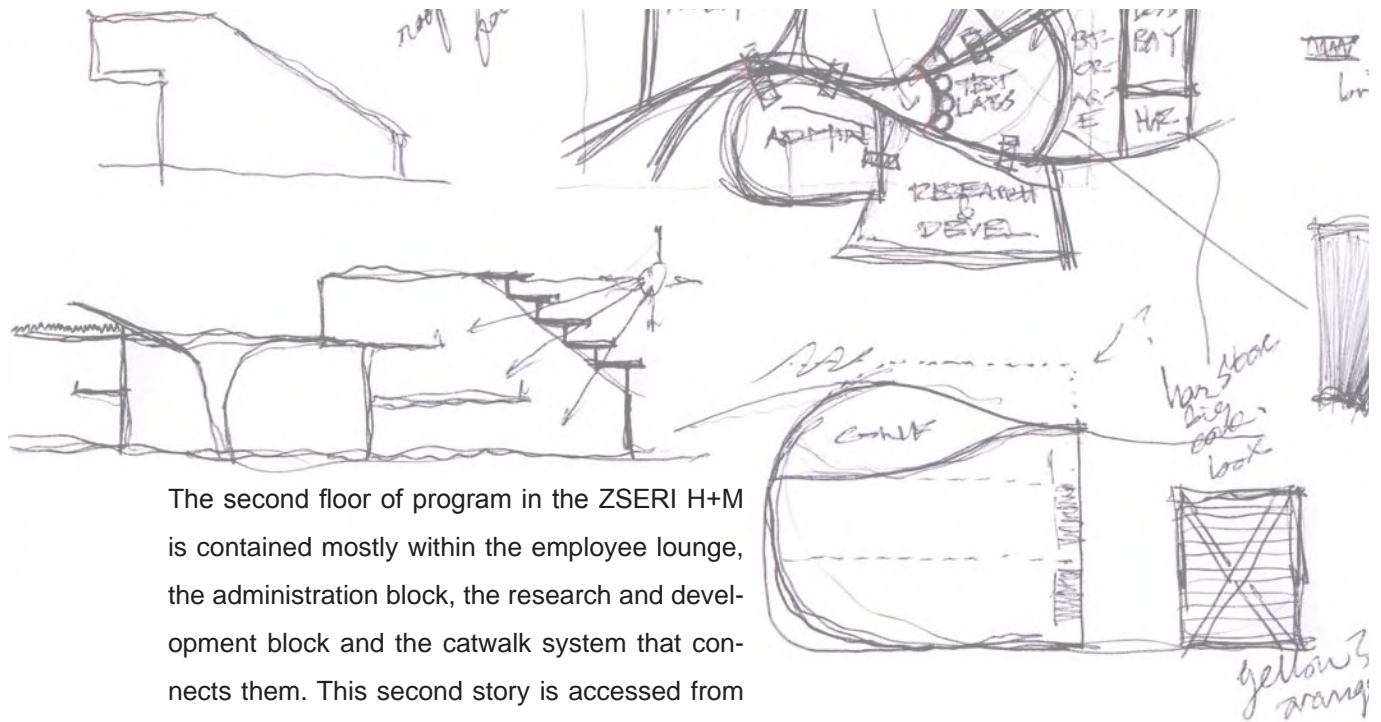
The process of making an amorphous solar panel is a highly coordinated and exacting procedure. Amorphous solar panels are different from their purely silicon counterparts in that they have multiple layers of different elemental combinations to absorb more wavelengths of the solar spectrum. Panels of glass must be sprayed with liquidated mixtures of these elements and then washed in a sonic pulse bath to remove any dust that may have accumulated on the surface before the next spray. After four such layers, the panels are ready to be tested for proper conductivity. This requires open work tables to attach flow meters to the contact points on each panel. After this, they are sealed with a polymer sheet that must be baked in a kiln to successfully adhere for weatherproofing. The final step is a UV test which places the panels in a chamber that simulates the solar spectrum and measures the electricity produced by the panel. The product is then sent to packaging for export.

This process manifests itself in the design of the work bays, in that their production dictates the shape of its structural enclosure. For more information on the design of the ZSERI H+M work bays, please refer to page 112.

## SECOND FLOOR PLAN

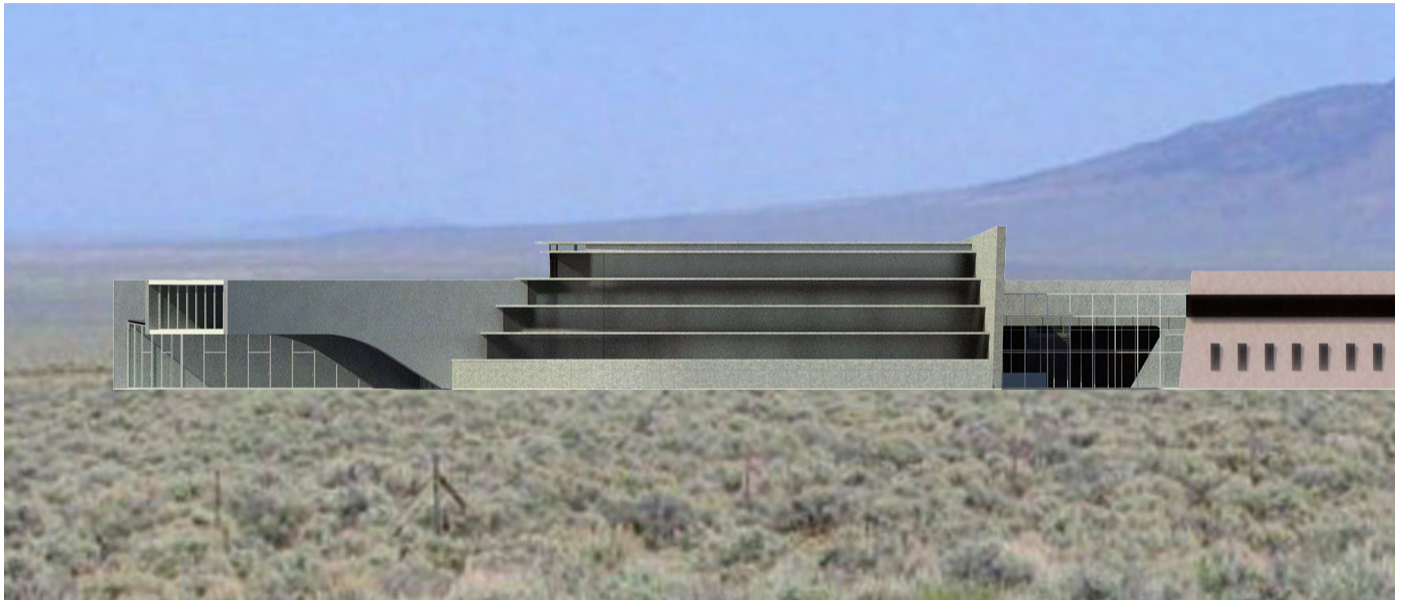






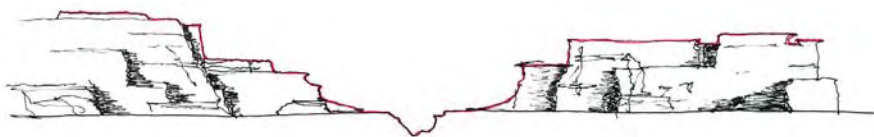
The second floor of program in the ZSERI H+M is contained mostly within the employee lounge, the administration block, the research and development block and the catwalk system that connects them. This second story is accessed from the stairs and elevator at the east end of the administration section as well as from the stairs and elevator in the pit of the R&D section which also provides access to the offices that encircle. That catwalk connects fluidly to the corridor walkway which snakes its way along the main atrium, waxing and waning in width at resting spots like where it overlooks the winter gardens. This extra space would be well utilized by small chairs and tables to provide informal meeting areas with a fabulous view of the garden and the southern landscape beyond. Back to the administration block, the second tier (unlike the first floor) has offices and a conference room that line the north wall adjacent to the central corridor. This tier is set back from the southern envelope allowing light to reach the offices, air to circulate, and to afford an open, collaborative work environment. The lounge is the western terminal of the second floor and gives the people of the ZSERI H+M a beautiful space to eat, socialize, and relax.

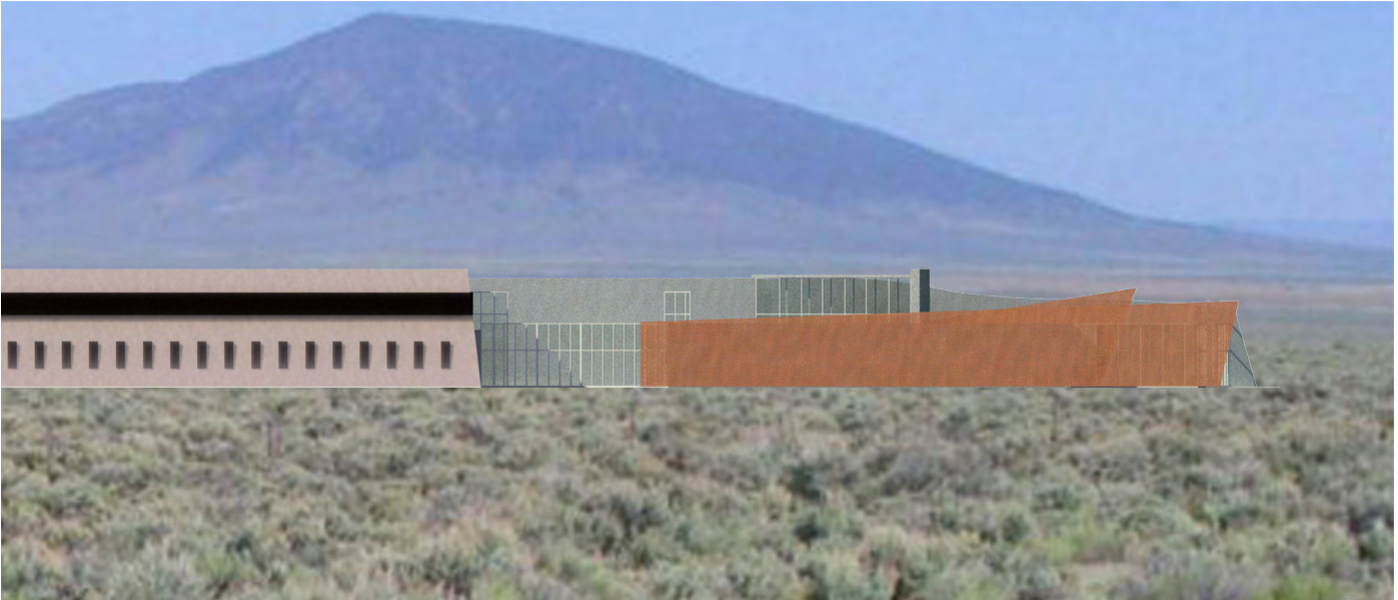
## SOUTH ELEVATION



The SOUTH ELEVATION of the ZSERI H+M is easily the most audacious. Designed for maximum light control and programmatic functionality, the southern facade is also a bold aesthetic statement that speaks to the purpose and future of this project. The three main program blocks along the south end are clearly articulated and differentiated by height and material. The geometries of these forms are linked together by the central atrium that rears its lofted head at the southwest corner of the complex. Moving east, the forms drop down and back, blending into the landscape. This is the face seen by nearly all those who enter the community and must therefore project itself as a solid and confident assembly, accentuated by a bit of artistic panache.

The WEST ELEVATION (pictured on the next spread) is also a significant facade in terms of its presence and orientation to the rest of the master plan. This face is seen driving (or walking, biking, etc.) along the main town artery that follows the river bed. The sober face of the western-most work bay is offset by the glass puncture that allows light and views into and out of the bay. At the southwest corner, the raised lounge and administration block can be seen engaged in a creative play of forms giving an otherwise ordinary elevation, a dynamic quality.





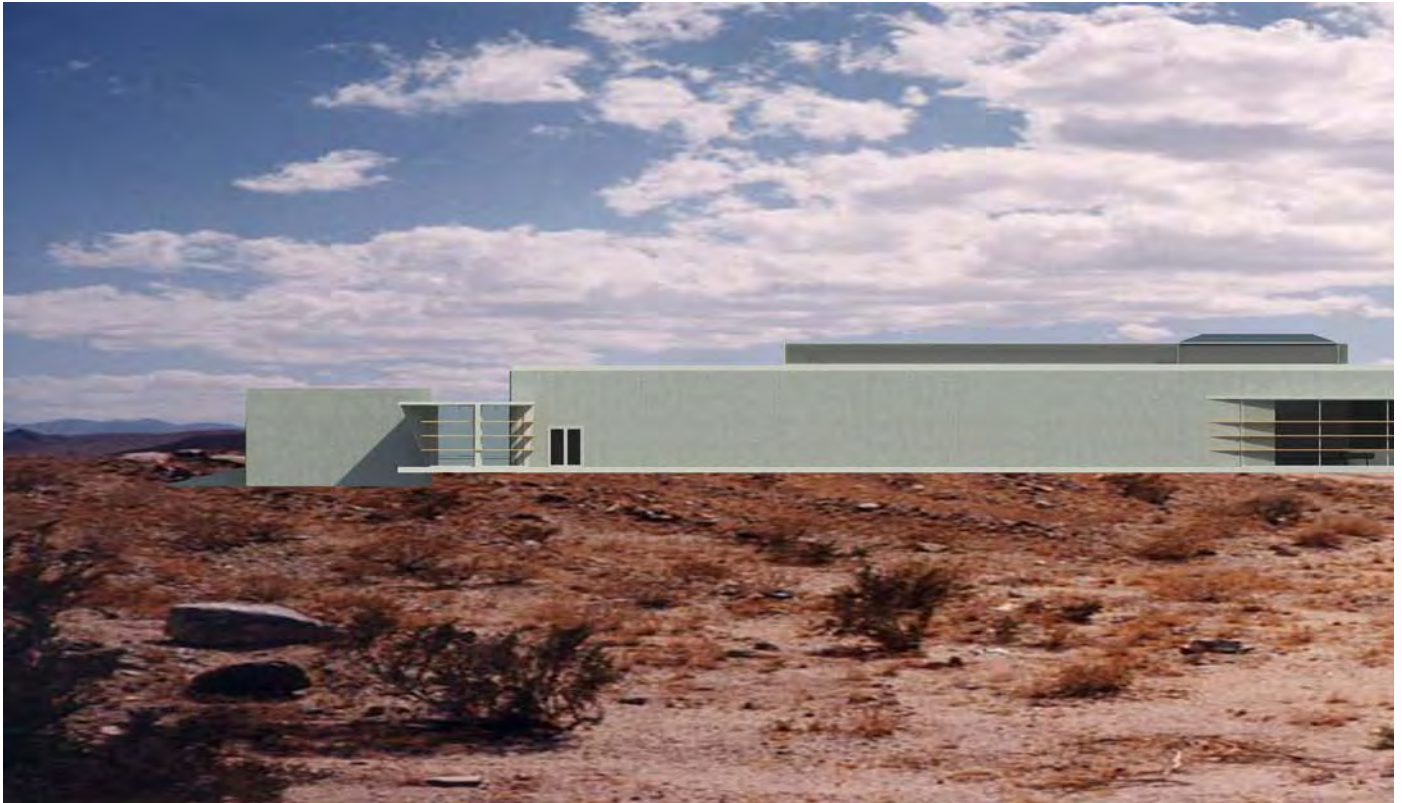
The NORTH ELEVATION (pictured on the next spread) focuses mainly on the loading bays at the 'back' of the complex. This drawing is helpful in understanding the scale of the transfer bar to the rest of the facility and how the geometries step back from the lowest point (the loading bays and transfer bar) to the work bay roofs and finally to the large forms that make up the powerful assemblage of the southern face. Four separate loading docks are spaced out generously from one another and are articulated by a rigid metal mesh frame of copper. These frames define the portals and tie the concrete facade into the regional palette.

The EAST ELEVATION is where the fourth expansion bay would be located. Currently, the facade displays the concrete east face of the third manufacturing bay and the loading dock for the flexible laboratory block. This side of the complex looks out to the open plains to the east which is zoned for future industrial projects.

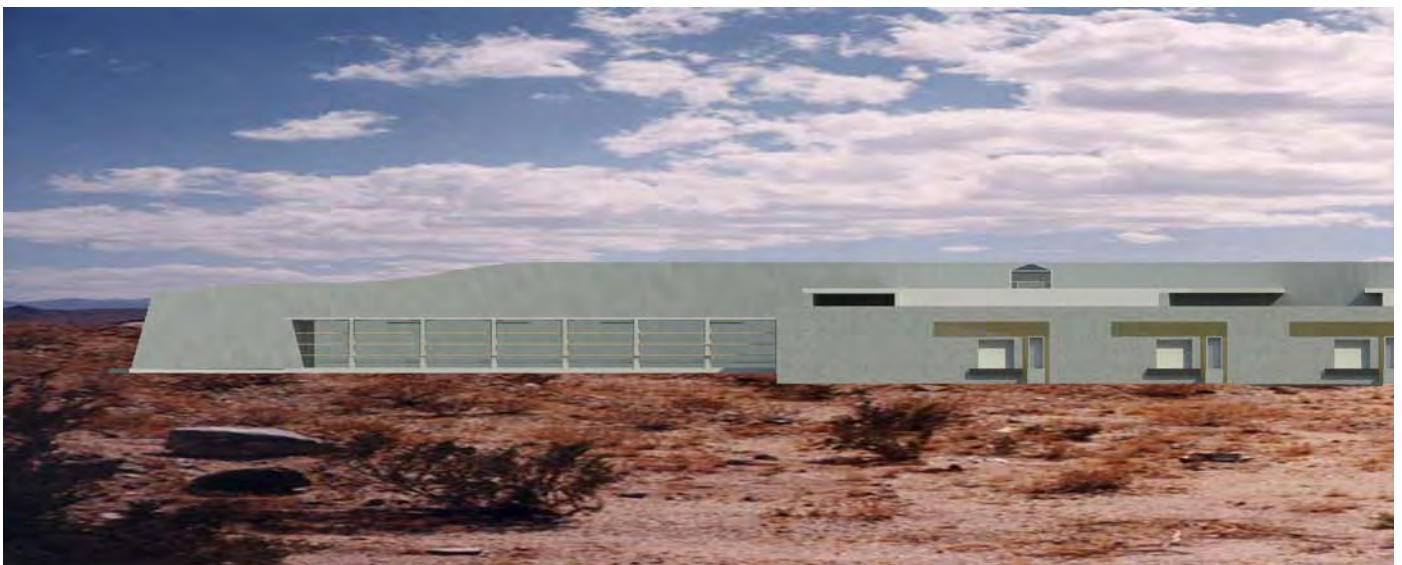




WEST ELEVATION

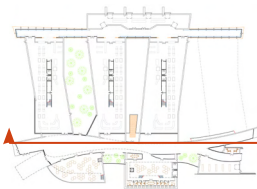


NORTH ELEVATION

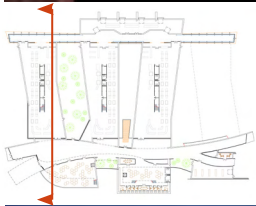




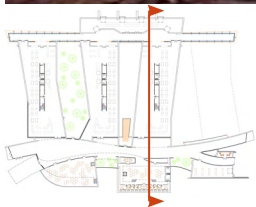




LONGITUDINAL SECTION CUT THROUGH ATRIUM, LOOKING NORTH



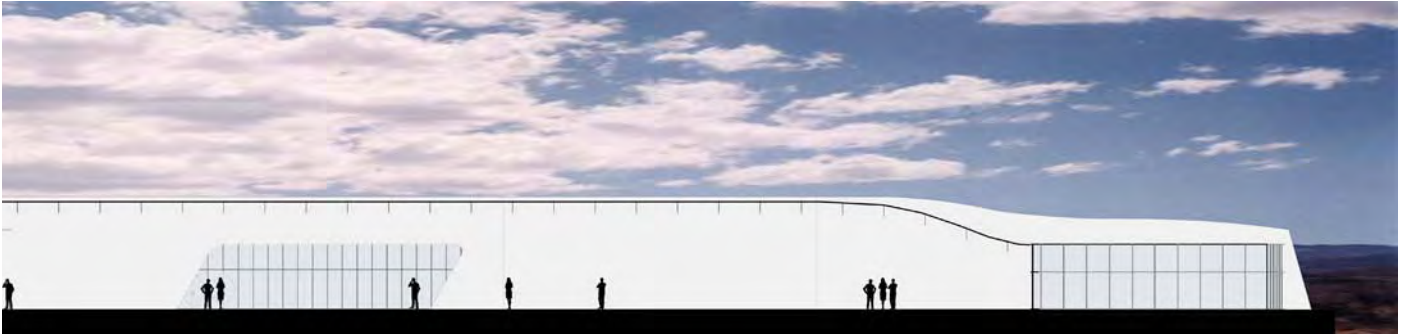
CROSS SECTION CUT THROUGH ADMINISTRATION BLOCK, LOOKING WEST



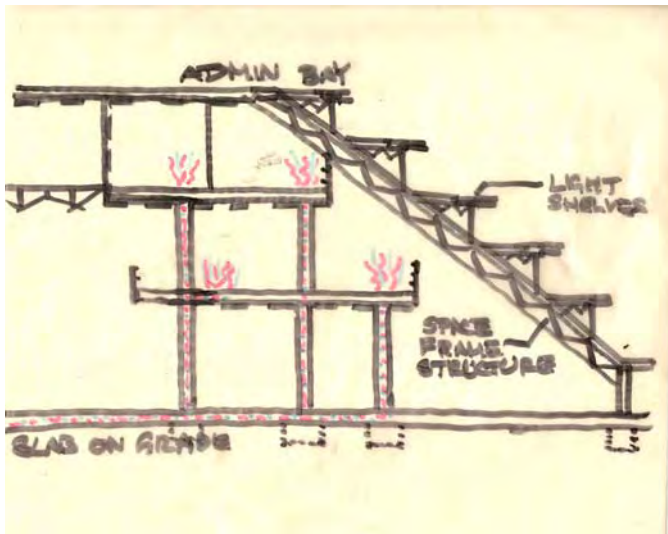
CROSS SECTION CUT THROUGH R&D BLOCK, LOOKING EAST



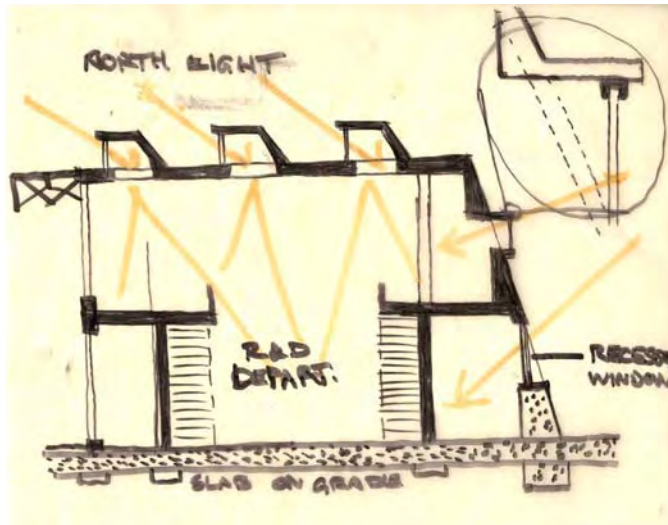




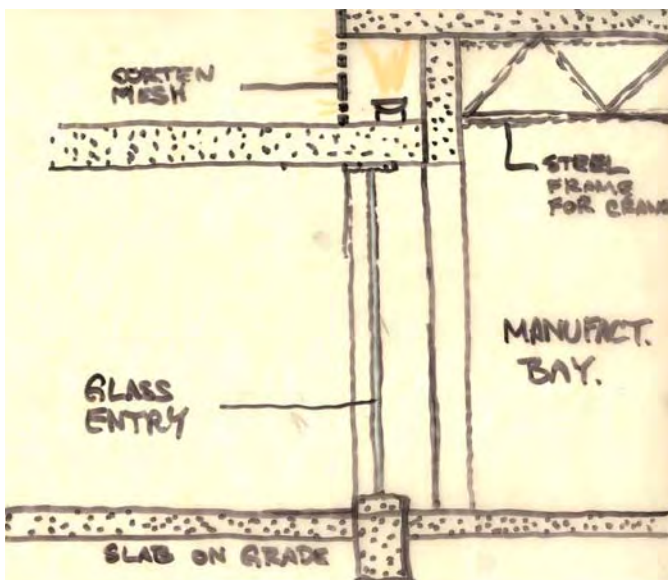
## SECTION ANALYSES: THUMBNAIL DETAIL SKETCHES



This sketch cuts through the administration bay and explains the relationship between the three tiers and the light shelves that protect the spaces from intense sunlight. Heating and ventilation is piped through the supporting piers holding the levels up.



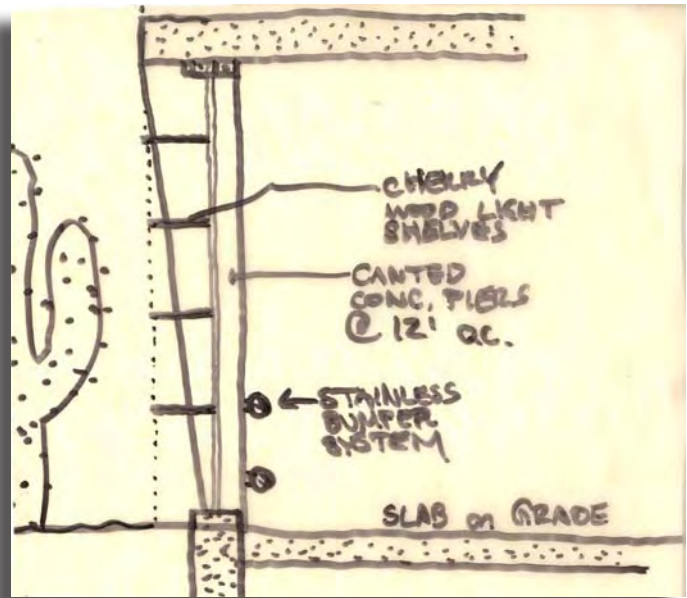
The Research and Development block employs two levels of office space along the walls and a double-height flexible space in the middle as demonstrated by this section. Angled skylights allow only soft, north light into the sensitive core space.



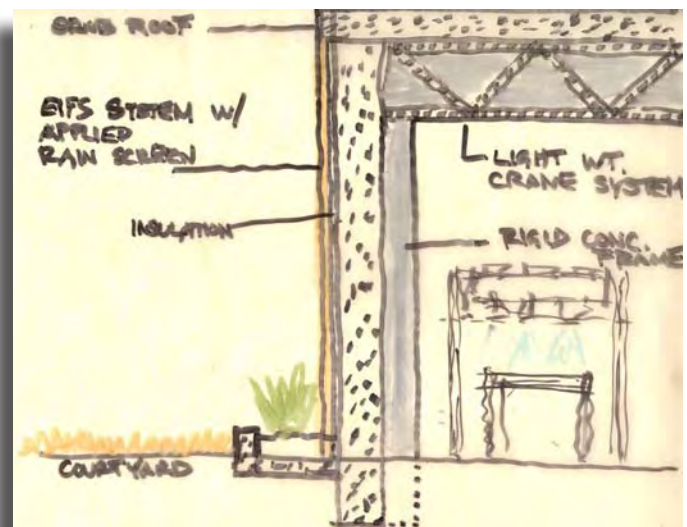
This section details the connection between the loading bay (left) and the manufacturing bay (right). The slab construction steps up in height in the manufacturing bay to allow space for the steel truss that assists in supporting the roof and the load of a small crane. This crane moves the solar panels along during their manufacturing process.



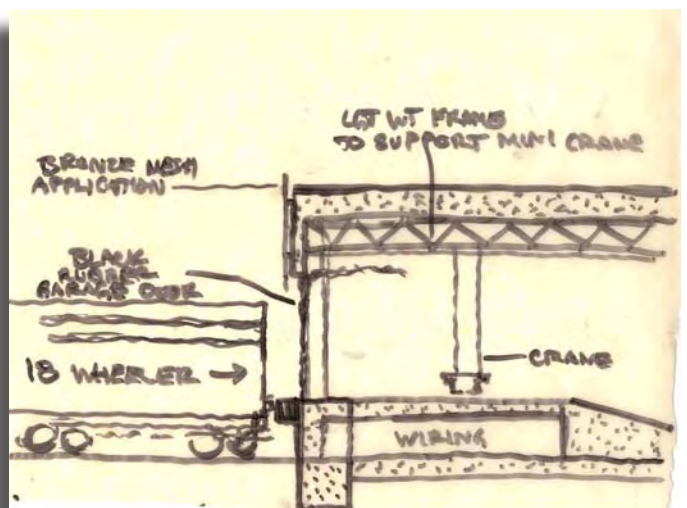
The long, low transfer bar has a concrete slab roof and floor, but uses canted concrete piers, wooden light shelves and glass for a more vernacular and horizontal aesthetic on the walls. The transfer bar also utilizes a bumper system to protect these walls from the traffic of forklifts, etc. involving low, stainless steel rails that run the entire length of the bar.



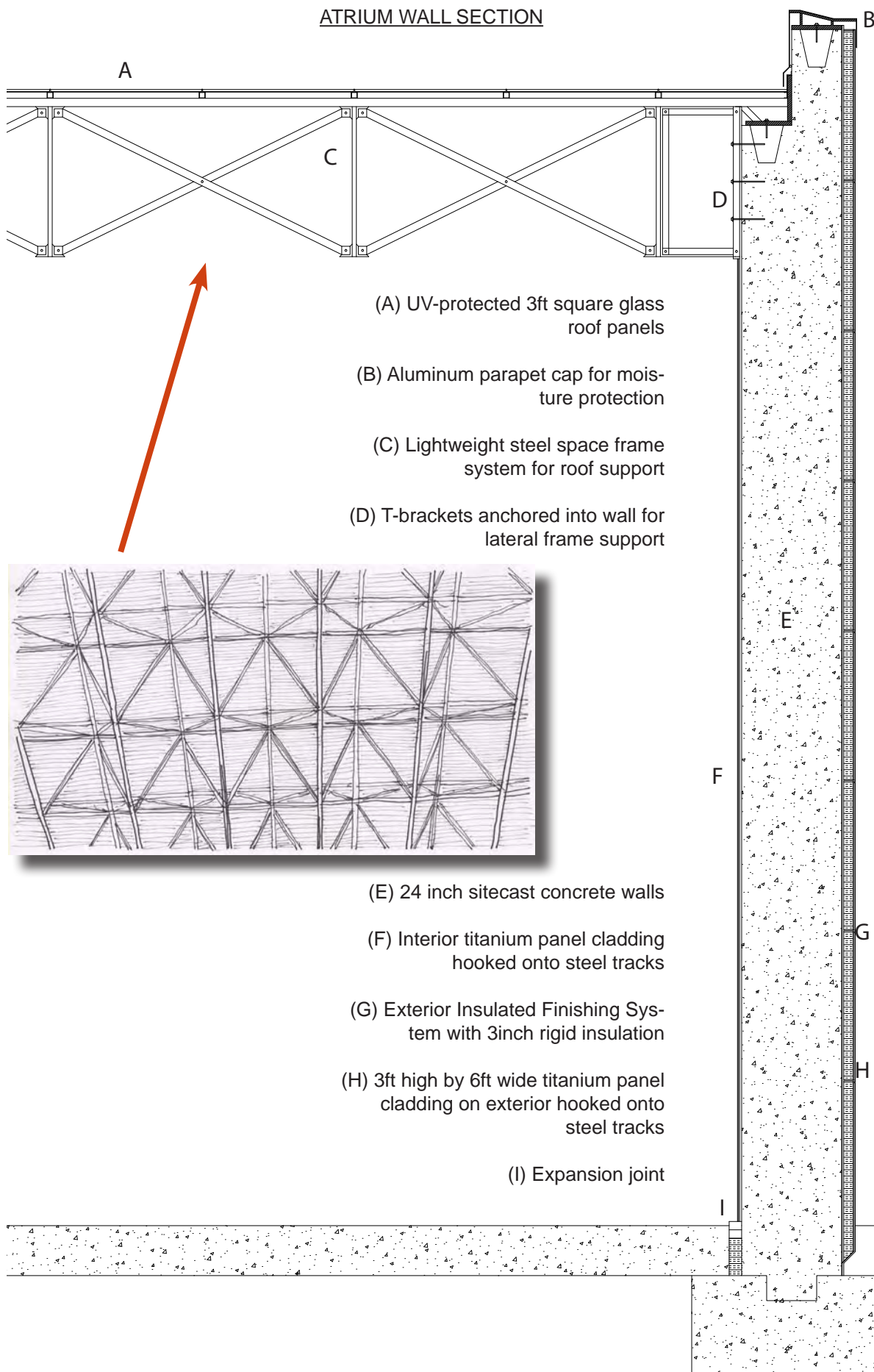
The exterior wall construction of the manufacturing bays involves site-cast, eighteen-inch concrete with an exterior insulation finishing system (EIFS) applied to the outside. This insulates the concrete which also act as trombe walls and provides a smoother aesthetic for the walls.



Here, the loading bay is designed for the trucks that import and export product through it. The raised floor allows room for the electrical and mechanical systems that run the conveyor belts. The bronze mesh, truck bumper and black door create an aesthetic composition on the north facade.



# ATRIUM WALL SECTION



(A) UV-protected 3ft square glass roof panels

(B) Aluminum parapet cap for moisture protection

(C) Lightweight steel space frame system for roof support

(D) T-brackets anchored into wall for lateral frame support

(E) 24 inch sitecast concrete walls

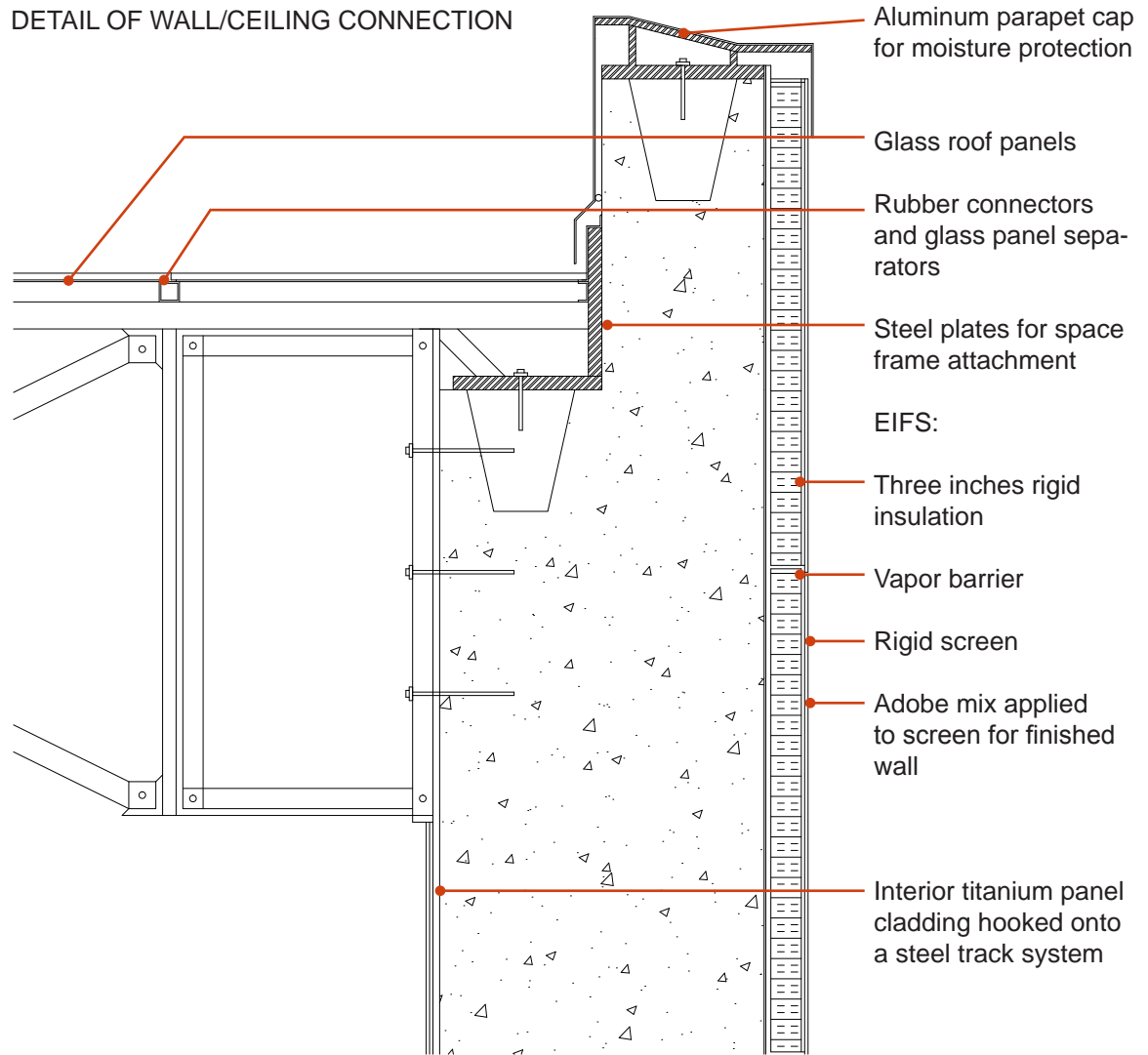
(F) Interior titanium panel cladding hooked onto steel tracks

(G) Exterior Insulated Finishing System with 3inch rigid insulation

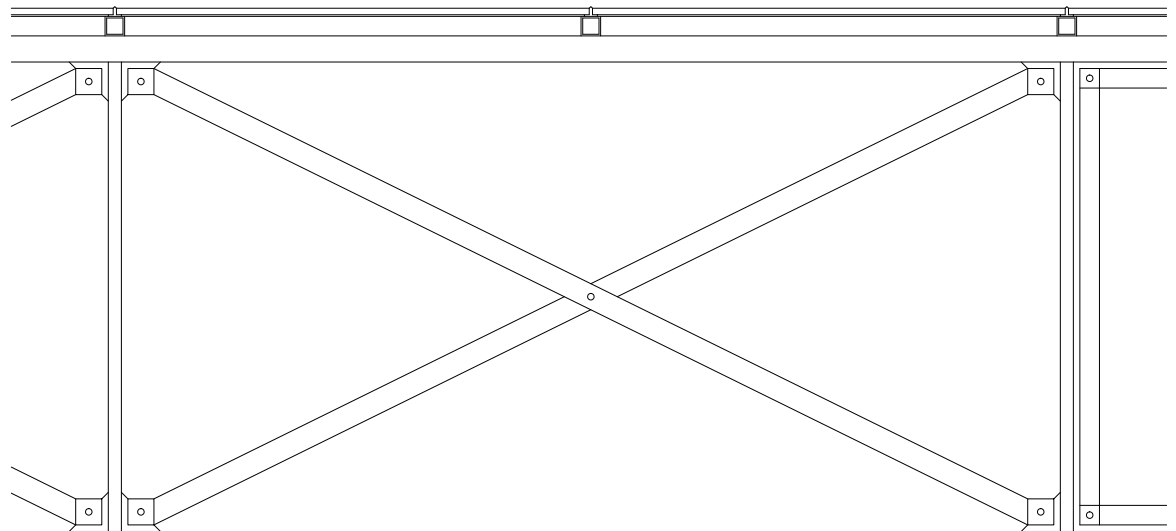
(H) 3ft high by 6ft wide titanium panel cladding on exterior hooked onto steel tracks

(I) Expansion joint

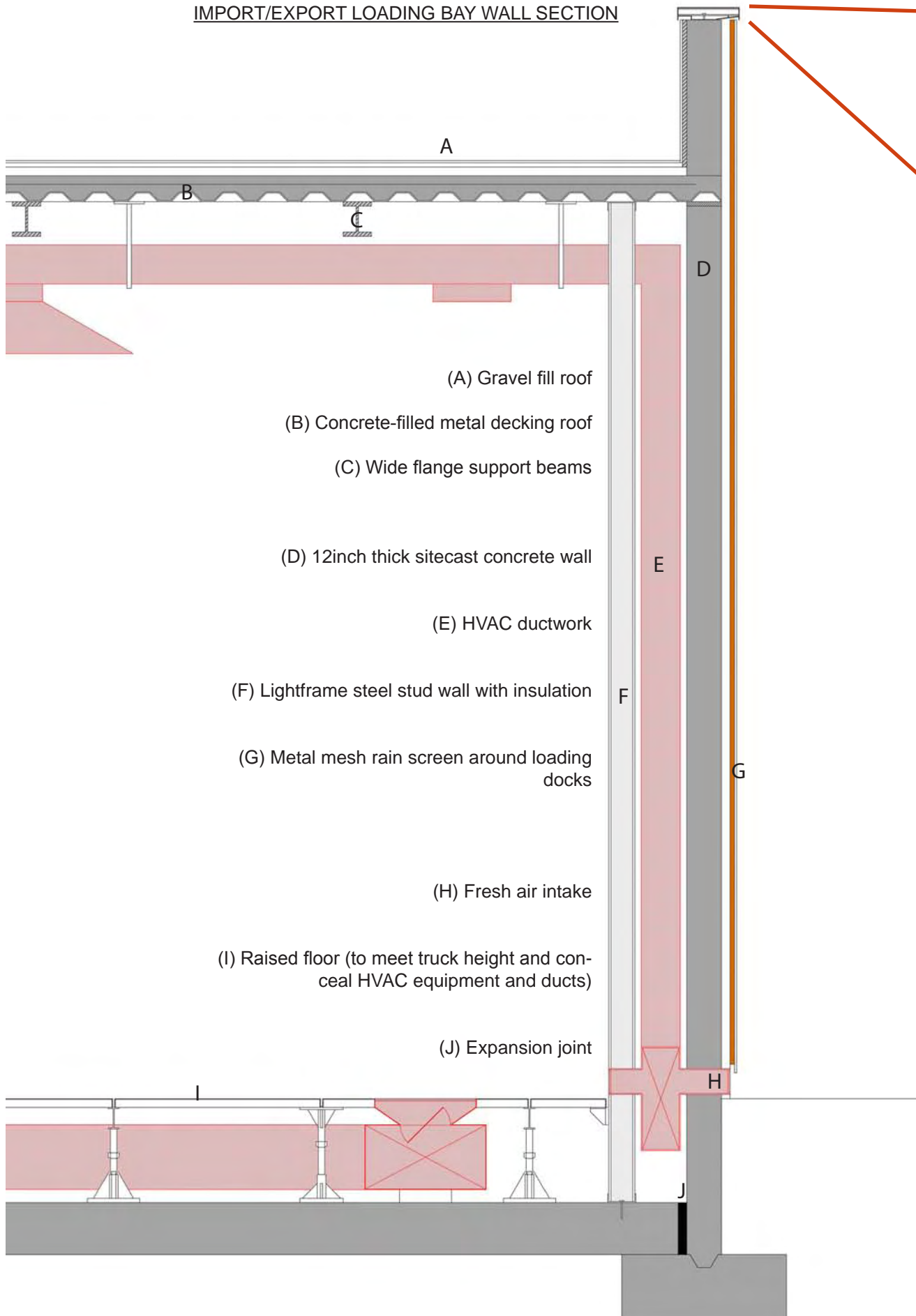
### DETAIL OF WALL/CEILING CONNECTION



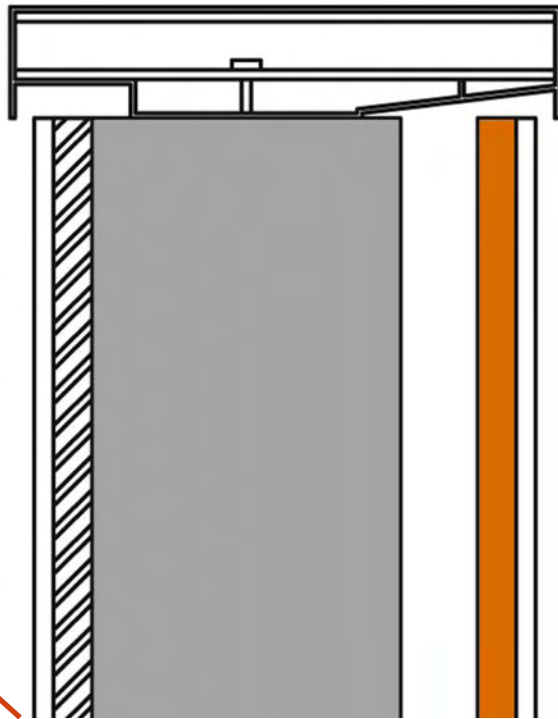
### DETAIL OF SPACE FRAME CONNECTIONS



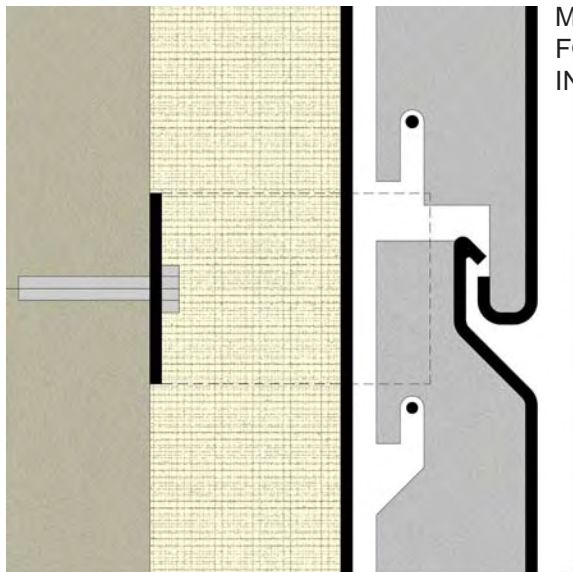
## IMPORT/EXPORT LOADING BAY WALL SECTION





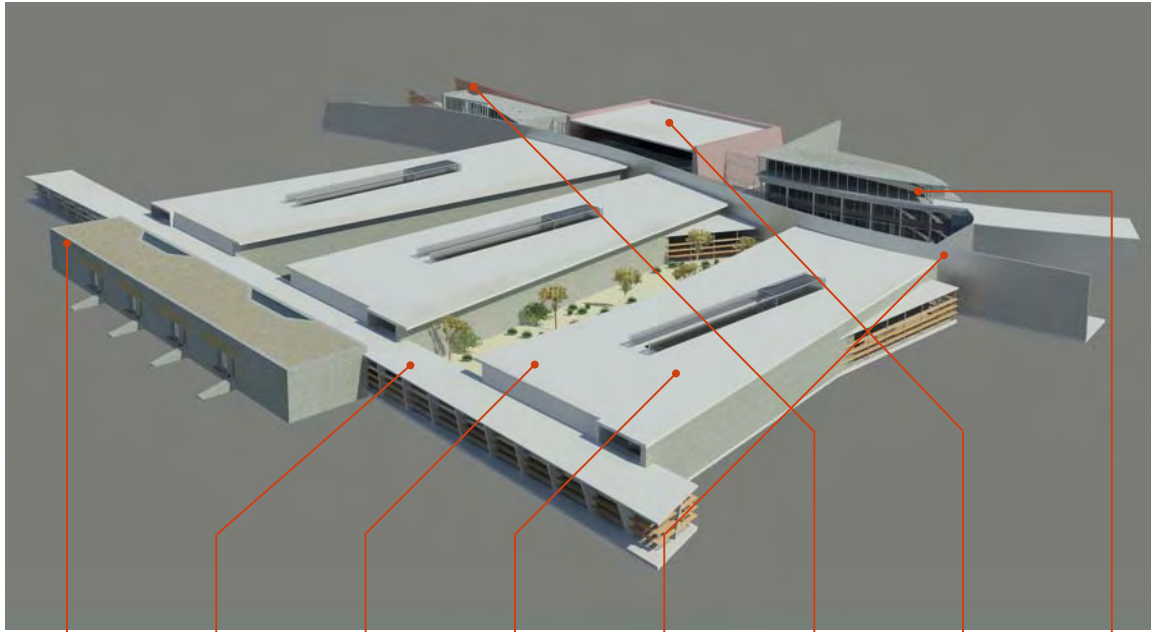


ALUMINUM PARAPET CAP DETAIL



METAL CLADDING CONNECTION DETAIL  
FOR RAIN SCREEN AND TITANIUM PANELS  
IN ATRIUM

## MATERIALITY



Loading Bay - Sitecast concrete with metal mesh accents over docks

Transfer Corridor - Cantled concrete piers with cherry wood light shelves over glass

Manufacturing Bay Roofs - Small gravel (for traction and easy removal for panel relocation). Frosted glass railings around mid-level program block

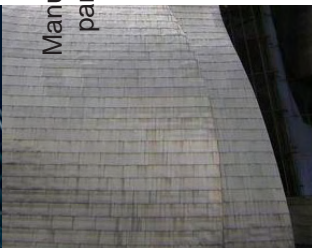
Manufacturing Bay - Sitecast concrete with a beige EIFS stucco for a vernacular tie and softer aesthetic

Main Atrium - 24in thick sitecast concrete walls with titanium sheet cladding and UV-protected glass roof over a lightweight steel truss system.

Flex Lab - Sitecast concrete construction with an angled copper metal-mesh facade for compositional geometries

R&D Block - Thick, monolithic sitecast rust-tinted concrete construction for color relation to the site

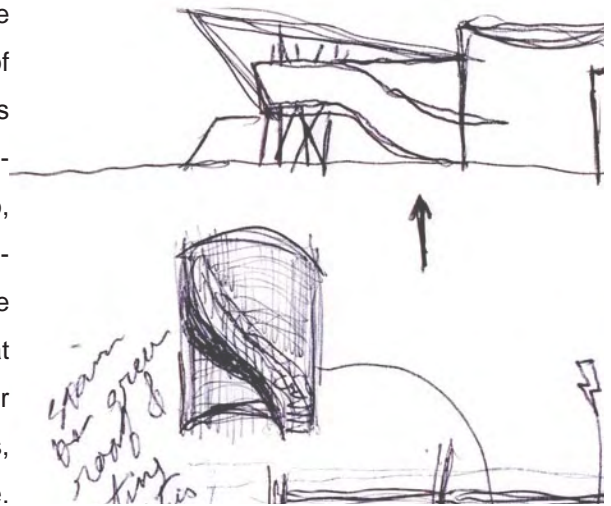
Administration Block - Tinted glass between concrete light shelves



## THE ENTRANCE

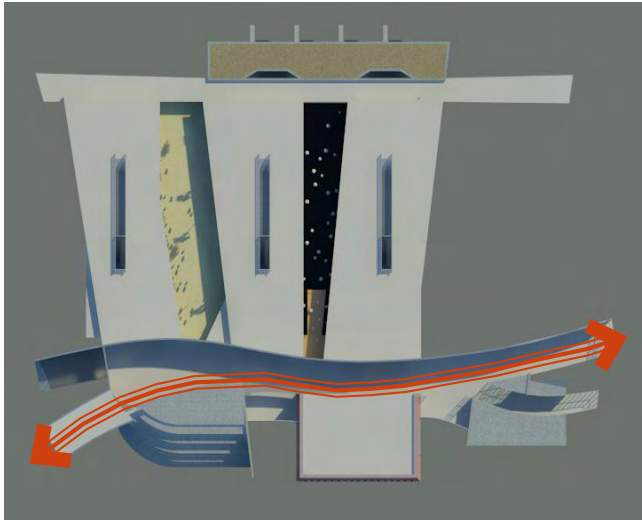


Designed as a collaborative space to socialize, meet, discuss, or simply relax and enjoy the view, the cantilevered lounge at the terminus of the atrium is the architectural flourish that makes the entrance to The ZSERI H+M the iconic centerpiece of the complex. It is supported by two, 24 inch-thick poured concrete sides clad in titanium that allows the open face to jut out into the southwestern sky. It also anchors the project at the public corner while enticing visitors in under its reach. Comfortable arrangements of chairs, tables and plantings flesh-out the interior space.

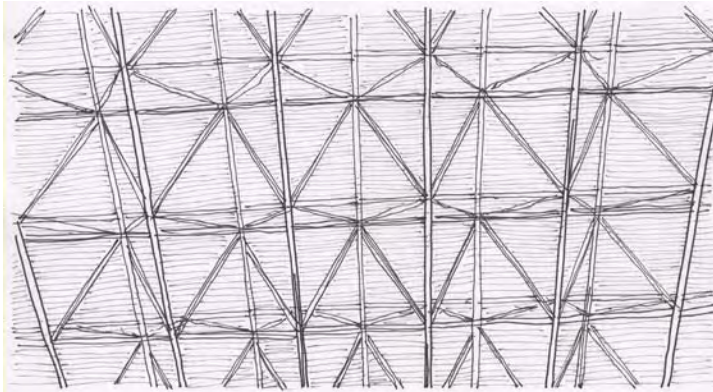




## THE SPLINE ATRIUM



The atrium roof (sketched at right and removed in lower render for clarity) is a series of lightweight steel trusses to appropriately support a glass roof. A UV film is placed on top of the roof glazing to protect users from the intense sun, while allowing enough in to provide light to interior work spaces and the vegetation that grows in large, sweeping planters.

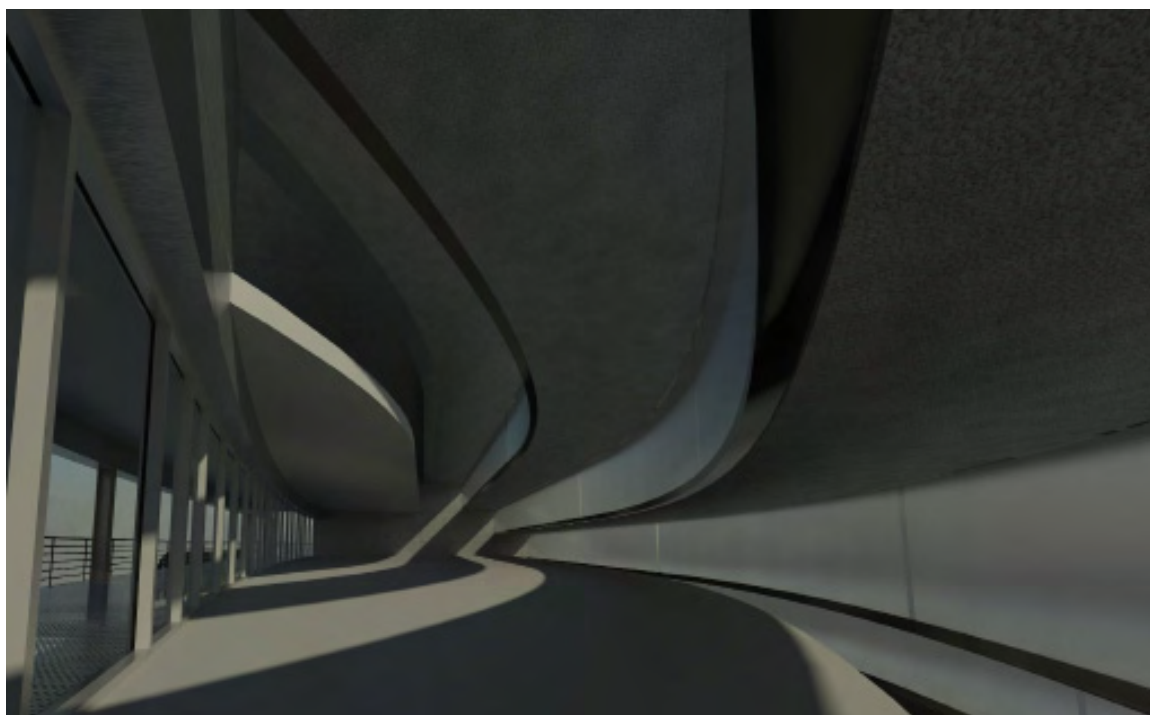


The spline atrium space was designed to represent the contours of the washes and paths (historic and modern) that run through the site. This allows the outside to come in while programmatically and acoustically separating the administrative functions of the building from the manufacturing areas. The atrium provides circulation to all of the main spaces as well as natural light to the offices and conference rooms that are adjacent to it. On the northern wall, large punctures in the titanium-clad concrete announce entrance into the manufacturing bays.

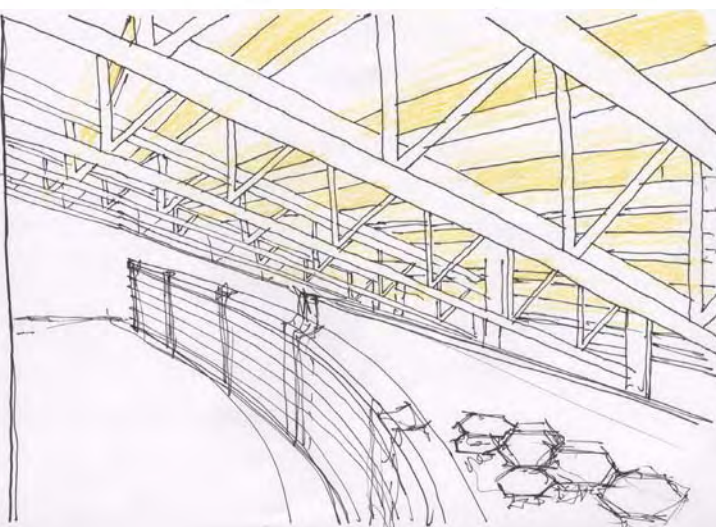
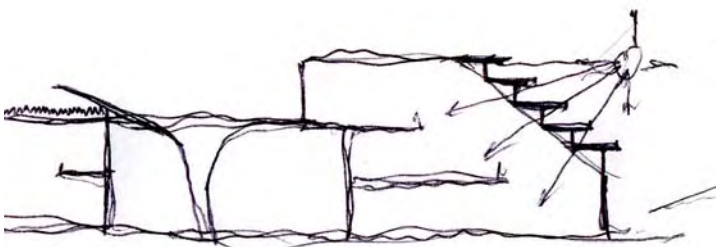




## THE ADMINISTRATION BLOCK

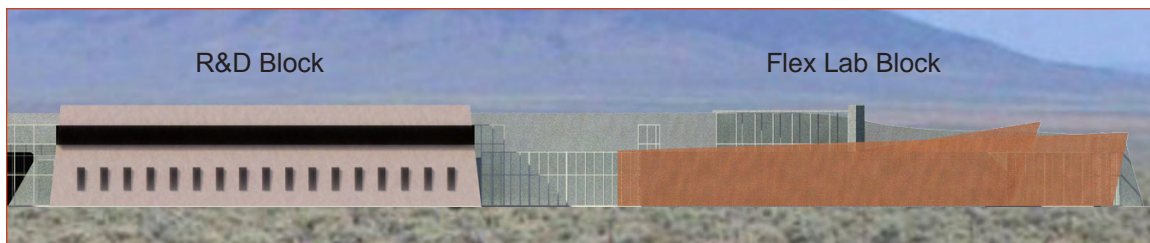
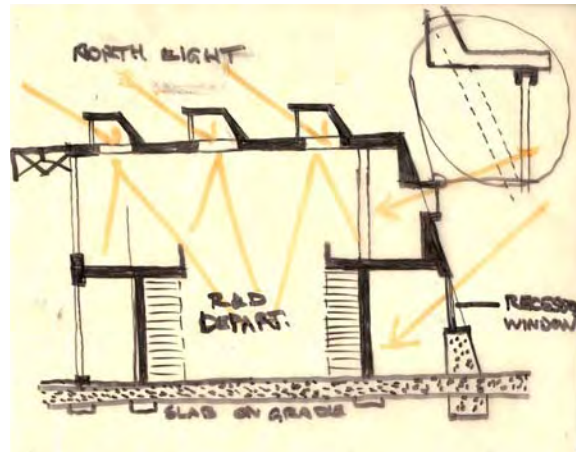


The administration block is an open, three-level space boasting sinuous curves that blend the western and southern facades and allow a solar management system of stepped vertical glazing and light shelves. The rendering above is taken from the second tier and has the supporting steel trusses removed (seen in lower right drawing). Each floor will be filled with arrangements of modular desk systems for the finance, marketing, administrative and other clerical departments. On the second level, the side adjacent to the atrium opens to the catwalk system leading to the R&D department and the lounge. On the lower level, a bank of glass doors provide access to the reception and information desks.



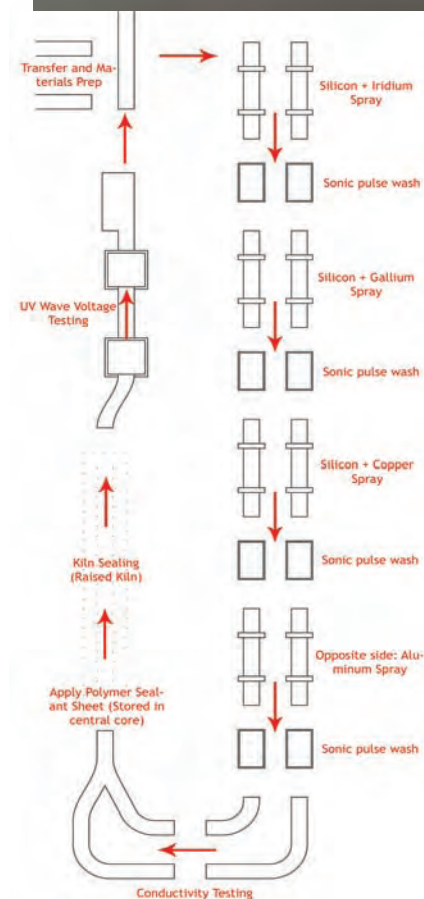
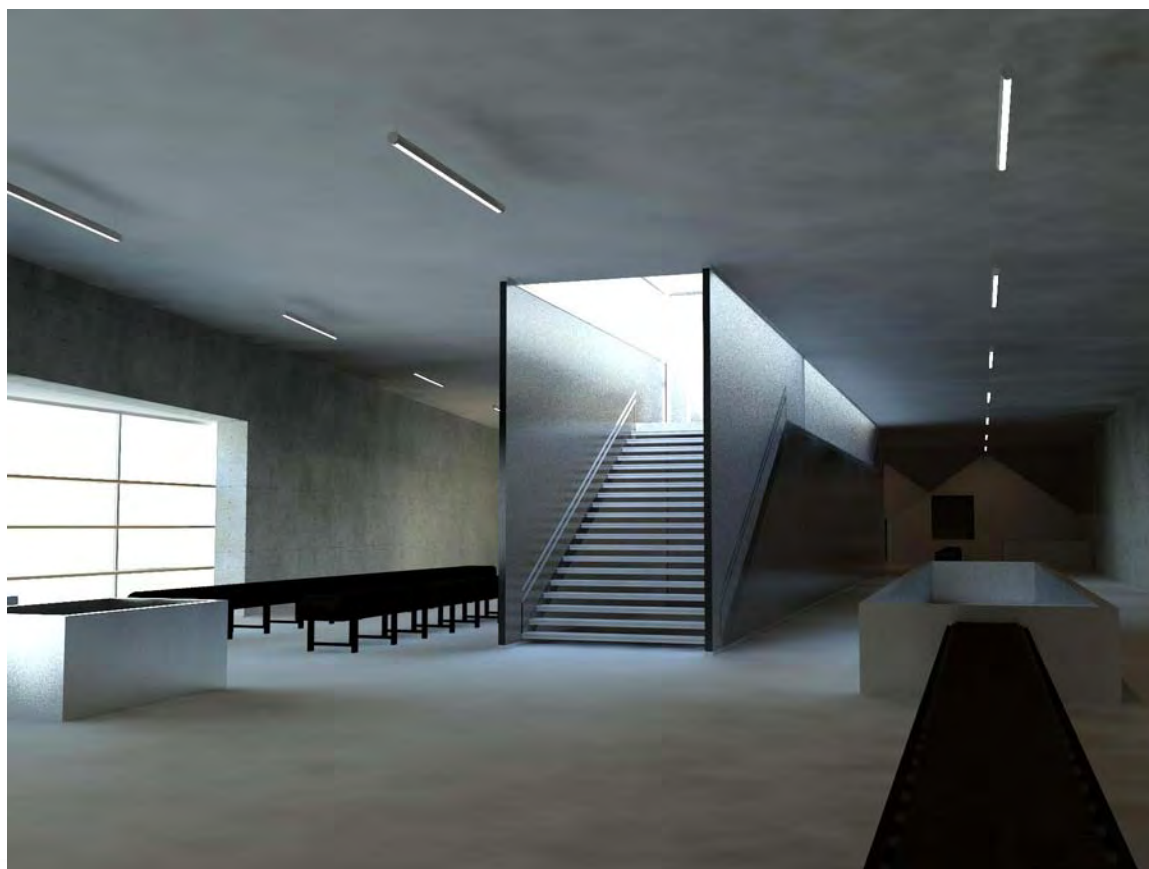
## THE RESEARCH AND DEVELOPMENT BLOCK AND FLEXIBLE LAB SPACE

The adjacent R&D block and flex lab are designed for maximum versatility. Stationary offices and conference rooms line the walls of the two-level R&D block absorbing the sun while allowing a collaborative engineering pit for arrangements of desks, computers and work stations. Soft, north light is guided in through angled skylight so as not to disrupt any solar-sensitive work that may be going on. The catwalk that circumscribes this space adds a further sense of community as all users can see and interact with each other. For large-scale testing and development space, the flex lab to the east provides one level of open area for any of R&D's additional needs and also includes a loading bay opening to the exterior.



Interior side of the R&D and administration blocks from atrium

## THE MANUFACTURING BAY

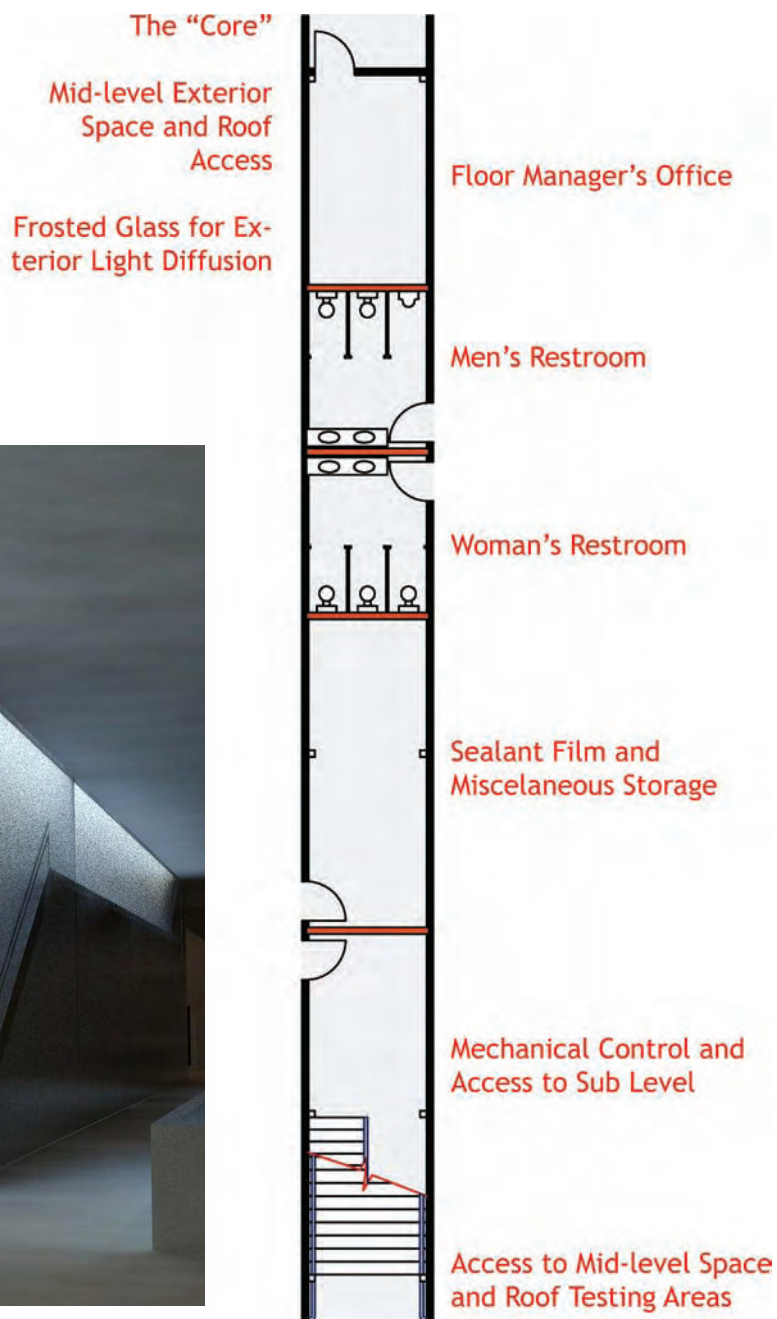
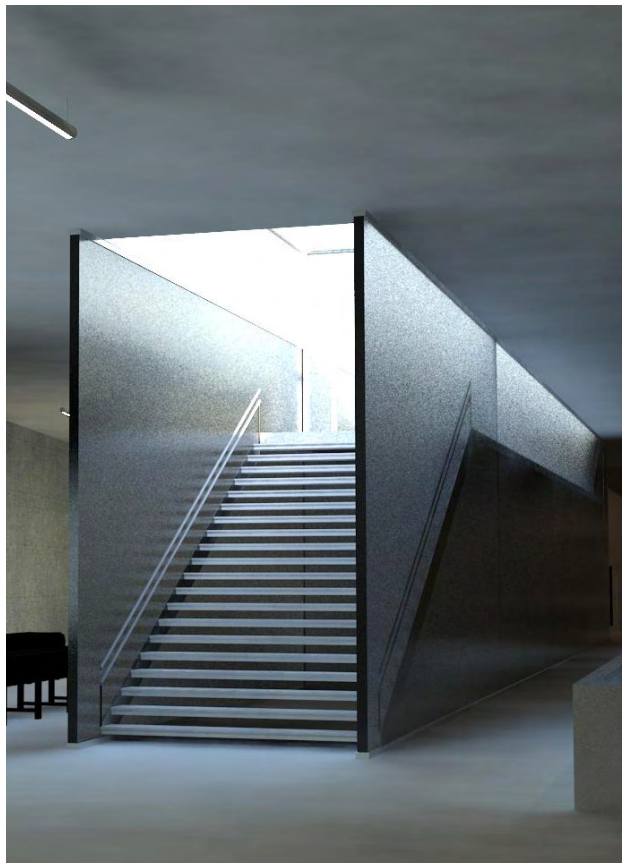


As mentioned in the explanation of the manufacturing process, the design of the work bay is dictated by the prescribed flow raw materials take in their journey to become solar panels. That ordered a rectangular bay 120' long by 48' wide. It was then decided to angle out the side walls to allow circulation around the equipment and a more dynamic experience. For example, on the western-most work bay, the canted section is glazed for views into and out of the bay. An area at the north end of each bay is devoted to storage, as is part of the central block described on the next page. The utilitarian poured concrete walls and floor are warmed by diffused light that enters the bay through the frosted walls of this central block.



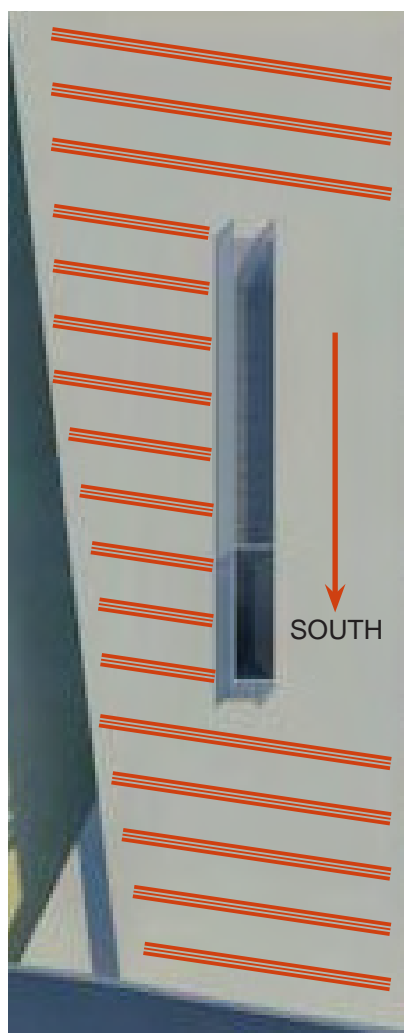
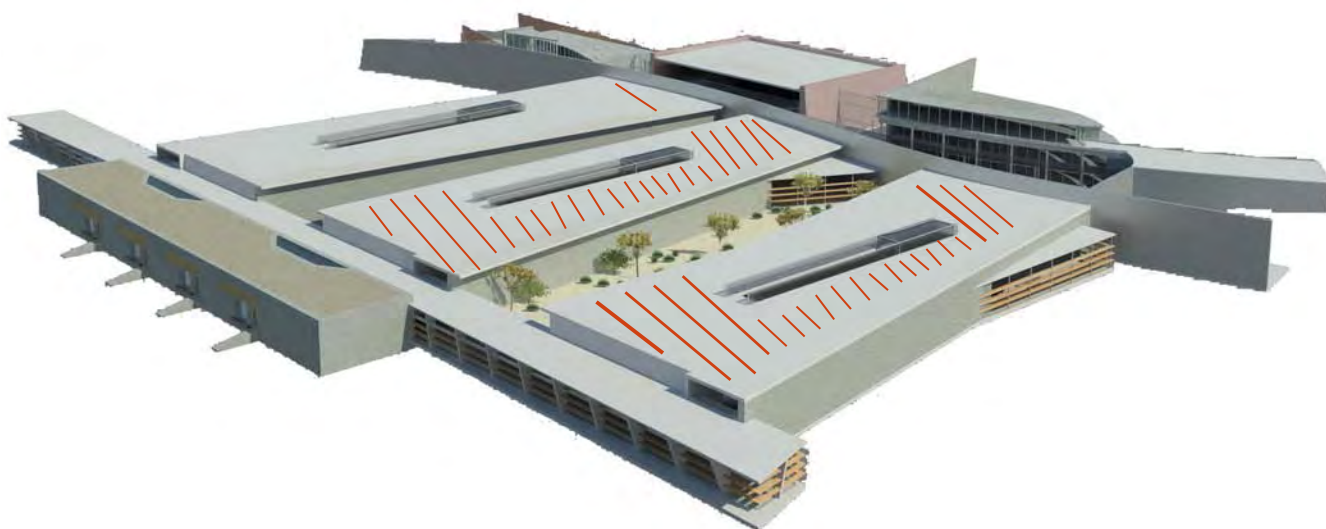
## THE WORK BAY LIGHT AND PROGRAM BLOCK

The central block of the work bays is a narrow bar of program that is primarily used for roof access where solar testing occurs. Also included in this rectangle are men's and women's restrooms, an office for the floor manager on duty, storage for the sealant film (adjacent to the kiln where it is used) and mechanical space under the stairs. The block is a light steel frame construction faced with frosted glass that softly diffuses outdoor light into the work bay.





## THE ROOF-TESTING SPACE



The large expanses of the manufacturing bay roofs are put to use in the ZSERI H+M as solar panel array fields and testing areas.

4,000 of the 6,000 approximate square feet per roof house about seventy, 36sf solar panels. These panels can produce 100 watts per square foot providing 252,000 watts at 100% efficiency. Average panel efficiency is at 20% giving 50,400 watts of electricity per hour. With 6hrs average peak wattage in Zuni, and three such roofs, 907.2 kilowatts of energy are produced each day. Annually, they provide about 331,128 kilowatts.

30-40% of the building's total energy consumption is supplied by the solar panels on the roof. When and if the next manufacturing bay is built, this roof will add additional space for solar energy production and offset the increased consumption. Additional high-efficiency, large-scale panels in the town's solar concentrator array will provide an approximate additional 30-40% (also providing energy for the municipal buildings) leaving only 20-40% of the building's energy consumption on the grid.

## THE COURTYARDS



The ZSERI H+M program is arranged in such a way that it affords interesting exterior spaces between the expansive work bays. It was decided to take full advantage of these spaces by giving them to the employees as peaceful desert retreats. One courtyard (above) named the 'Oasis Court' adds extensive succulent vegetation to the southwest landscape to provide shady havens. The second space called the 'Water and

Sky Court' (below) is used mostly as an exterior dining area, though its aesthetics can be appreciated during any use. Grey water recycled from the sonic pulse washes in the work bays is cycled through the courtyard providing a sublime river-like retreat in the middle of the desert. The space is especially appropriate for night gatherings such as department parties.

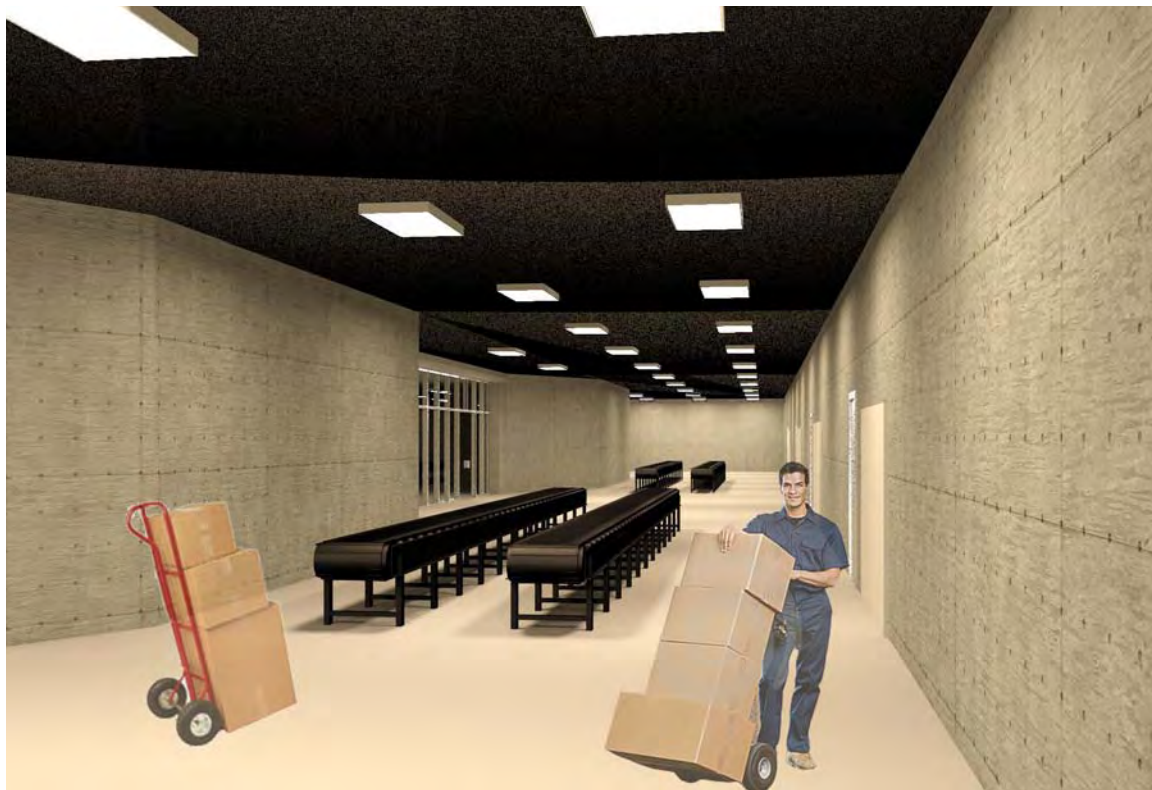


## THE TRANSFER CIRCULATION BAR



The materials transfer bar (above and facing page) and loading docks (below) make up the northern terminus of the complex. The transfer bar provides space for forklifts and hand carts to pass raw and finished materials to and from the manufacturing bays and loading docks. The corridor is clad in glass to melt into the landscape, but is protected from the sun by wood light shelves set between concrete piers. A stainless

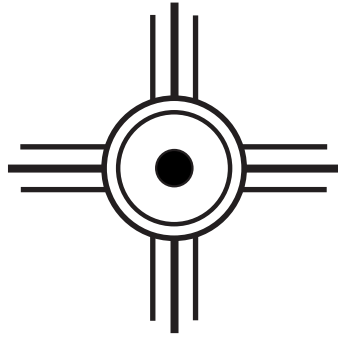
steel bumper system is employed along the bottom edge of the bar to minimize possible damage to the facade by the electric movers. Inside the shipping bay, conveyor belts assist workers in moving materials and product to and from the loading docks in the center and the storage space at each end.









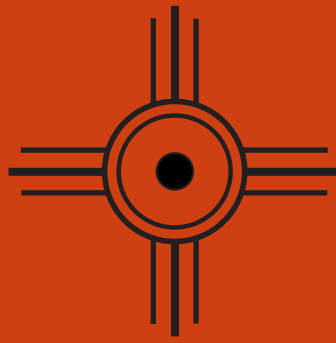


The problems and hardships endured by the Native Americans in the American southwest are issues that I strongly believe could be helped through architecture. A well-composed master plan incorporating all the needs of a very individual community, plus the design of a large-scale manufacturing facility will drive this new community successfully ahead. Given the physical opportunity, the resources and the motivation, these people will embrace this idea

of change and momentum and generate an inertia to achieve great things on their own, long after the construction teams leave. And while the master plan design and the program elements proposed here are not earth-shattering, their challenge lies beyond their respective physicality, in how they incorporate this idea of movement between the past and the future and ALLOW A CULTURE TO MODERNIZE WHILE MAINTAINING A SENSE OF HERITAGE.







RESEARCHED, PREPARED, DESIGNED  
AND WRITTEN BY SETH VAN NOSTRAND  
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