

Patagonia, Anizona: Affordable Housing Study

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The Drachman Institute is the research and public service unit of the College of Architecture and Landscape Architecture at The University of Arizona, dedicated to the environmentally sensitive and resource-conscious development of neighborhoods and communities. The Drachman Institute dedicates its research and outreach activities to the proposition that housing is the building-block of neighborhoods, and neighborhoods are the building-blocks of communities.

Support funding for this project was provided in part by the Arizona Department of Housing.

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Executive Summary

The cost of land in Patagonia, Arizona, has increased significantly in the last few years probably due to part-time residents buying second homes in the town. This has artificially increased the sale prices of land without a similar increase in wages for the working, full-time residents.

The goal of this project was to provide the Town of Patagonia with housing models that can be used on infill lots and on larger master planned parcels in order to create affordable housing for the workforce.

The long term affordability of the proposed housing is to remain unaffected by the increasing cost of land through the use of the Community Land Trust already in place.

Seven housing designs were developed for use on infill and master planned parcels. Two large parcels, the "Railroad Parcel" and the "Farm Parcel," were selected to be master planned because of their availability and location within town. Both of the parcels have access to sewer and water, are within walking distance to the heart of town, and the roads that access the sites are paved and can accommodate the increased traffic load the proposed developments would create.

The master-planned "Railroad Parcel" integrates housing, mixed-use buildings (retail space with apartments above), the "Rails to Trails" project and a town garden into one cohesive plan which responds to the existing topography. All of the buildings are placed on the slightly higher southern portion of the site with rail bed remaining in place. The Rails to Trails project and the open space around it would serve as a vegetated buffer between the highway and the buildings. This plan provides a total of 42 affordable housing units.

The master planned "Farm Parcel" is designed to create the most affordable houses on the site allowed by the Patagonia Town Code while responding to the existing densities and housing patterns of the surrounding parcels. The site is organized around a series of retention basins that help to channel the rain water runoff and create vegetated open space for the entire community to enjoy. This plan provides 55 affordable housing units.



The Drachman Institute (DI), through a contract with the Arizona Department of Housing (ADOH), was asked to provide the following services for the Town of Patagonia:

An affordable housing feasibility study and schematic housing designs with emphasis on costs associated with compliance with floodplain regulations, availability of water and wastewater infrastructure, and the adequacy of transportation infrastructure to handle the increased volume of traffic resulting from such a project.

The goal of the work was to develop a strategy for affordable housing development opportunities in Patagonia.

Background

The Town of Patagonia has experienced a dramatic increase in market values of housing in recent years. Lots without improvements are valued between \$75,000 and \$100,000, putting them out of reach of teachers, police officers, and other public employees. In response, the Patagonia Regional Community Foundation and La Semilla Community Stewardship Organization convened a work group with the Town to develop a plan to address this serious community issue. The group also facilitated the creation of a locally-governed 501(c)3 housing trust, called Community Homes of Patagonia. The Town would like to use this trust to develop affordable units.





Introduction



Population, Housing, and Economic Profile

The Town of Patagonia is located in Santa Cruz County, Arizona, approximately 18 miles north of the international border at Nogales and 61 miles from Tucson. Patagonia is surrounded by the Santa Rita and the Patagonia mountains. The town covers an area of 1.2 square miles at an elevation of 4,044 feet. It is one of Arizona's smaller incorporated jurisdictions with a population of less than one thousand. Almost 40 percent of the town's population is of Hispanic Origin.

Population

In general, the growth of population and housing in many smaller communities are affected by the pattern of growth in major adjacent population centers. For example, the increase in population and housing prices in Maricopa County impacts communities in Pinal County. The Tucson metropolitan area is less than one hour driving time from Patagonia. As land and housing prices in the Tucson, Green Valley, and the Nogales areas are becoming less affordable, it is possible that some of the newcomers to the area, who cannot afford living in those areas, will move to the Patagonia area.

Population Growth: Patagonia's total population increased by only 3.6 percent between 1990 and 2005. During the same period, Santa Cruz County population increased by 48.5 percent and Arizona's population increased by 64.9 percent.

	1990	2000	2005	Growth Rate 1990 - 2005
Patagonia	888	881	920	3.6%
Santa Cruz Co.	29,676	38,381	44,055	48.5%
Arizona	3,665,228	5,130,632	6,044,985	64.9%

According to a preliminary, unofficial population projection by Arizona Department of Economic Security, Patagonia's total population will approach 1,003 by 2015, from its 2005 level of 920.

Population by Age: In 2000, the percentage of youth age 19 and under was lower in Patagonia than in Santa Cruz County, and the percentage of population

20 years and older was greater. The median age in Patagonia was 47.3 years, compared with 31.8 years for Santa Cruz County.

Patagonia and Santa Cruz County Population by Age: Year 2000

Aga Distribution	Patago	nia	Santa Cruz County		
Age Distribution	Number	%	Number	%	
Under Age 5	46	5.2	3,333	8.7	
5 to 19	151	17.1	10,673	27.8	
20 to 64	496	56.4	20,261	52.7	
65 and Older	188	21.3	4,114	10.8	
Median Age		7.3 Years	31.8 Years		
Average Household Siz	e	2.18	3.23		
Average Family Size		2.85	3.66		

Source: U.S. Census Bureau, Census 2000.

Population by Race and Ethnicity: In terms of ethnic distribution, four out of ten people in Patagonia and eight out of ten people in Santa Cruz County are of Hispanic Origin. Further details of racial breakdown and ethnicity distribution for Patagonia and Santa Cruz County are presented in the following table:

Patagonia and Santa Cruz County Population by Race and Ethnicity: Year 2000

Dogg and Ethnicity	Patago	Patagonia		Santa Cruz County	
Race and Ethnicity	Number	%	Number	%	
One Race	867	98.4	37,372	97.4	
White	762	86.5	29,168	76.0	
African American	0	0	145	0.4	
Native American	8	0.9	251	0.7	
Asian	4	0.5	201	0.5	
Native Hawaiian and Pacific Islander	0	0	33	0.1	
Other	93	10.6	7,574	19.7	
Two or More Races	14	1.6	1,009	2.6	
Hispanic (Ethnicity)	348	39.5	31 005	80.8	

Hispanic (Ethnicity)	348	39.5	31,005	80.8
Non-Hispanic	533	60.5	7,376	19.2
Total Population	881	100	38,381	100
Source: US Census 2000.				

Demographics

Housing

According to Census 2000, the total number of housing units in Patagonia was 502. Of that total, 249 units were single family detached, 33 units multifamily (attached), 207 mobile homes, and 13 "other."

Assuming the distribution of housing units by housing type will remain the same for 2015 as it was in 2000, the total housing units and the distribution of total housing units by housing type will look as presented in the following table:

Patagonia Housing Units: 2000 and 2015

Year	Single	Multi-	Mobile	Other	Total Housing
	Family	Family	Homes	Other	Units
2000	249	33	207	13	502
2015	283	38	236	15	572

Source: US Census 2000

2006 Arizona's Housing Market ...a glance

According to the findings of the Arizona Department of Housing study "2006 Arizona's Housing Market ... a glance," the median income of a police officer, a firefighter, or a nurse is not enough to qualify for the mortgage of a median-priced home in the Nogales area. People who work as waiters/waitresses or in retail cannot even afford to rent (housing is considered affordable if an individual or working family spends no more than 30 percent of income on housing).

Housing Unit Characteristics - Census 2000 Data

- **--Occupied Housing Units:** There were 404 occupied housing units in Patagonia in year 2000. Of that total, 278 units were owner-occupied and 126 units renter-occupied.
- **--Housing Cost:** The median monthly housing costs for owners with a mortgage was \$692, for owners without mortgages \$221, and for renters \$416.
- --Housing Affordability: Almost 17 percent of owners and 33.9 percent of

renters in Patagonia spent 30 percent or more of their household income on housing.

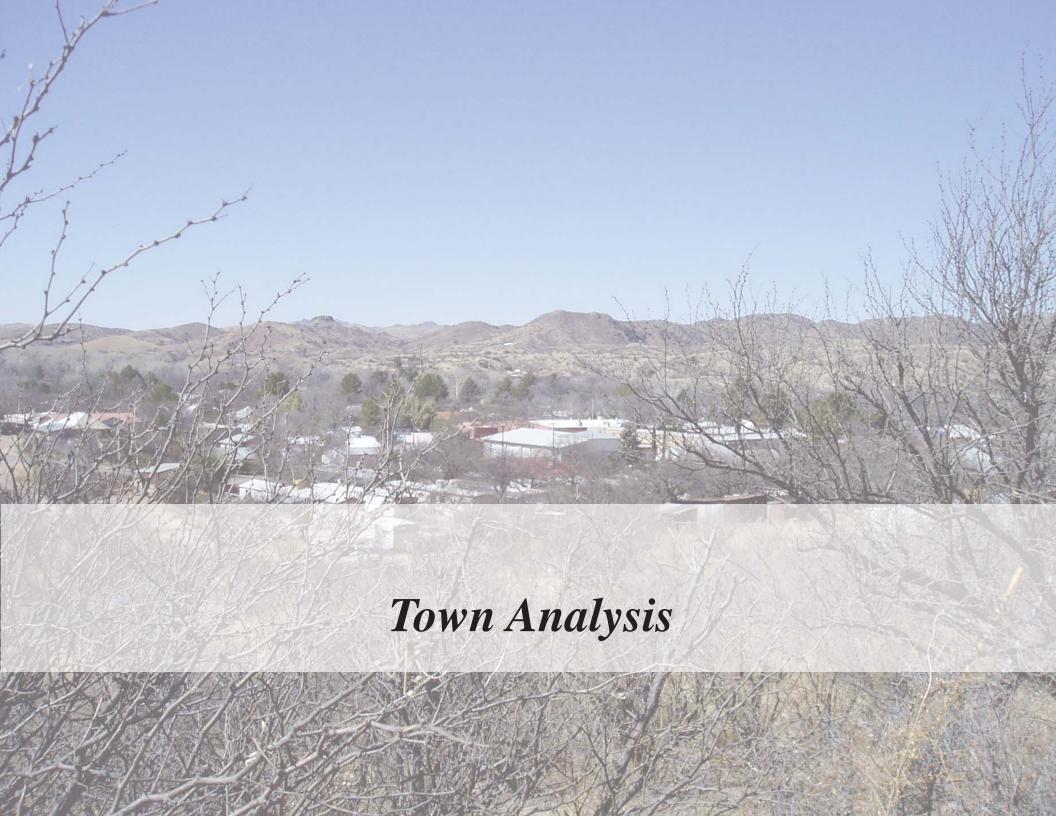
Selected Economic Indicators

For Santa Cruz County, the major industries in terms of employment include Services, Retail Trade, and Wholesale Trade. In Patagonia, the major drivers of the economy are Agriculture, Tourism, and Government.

Below is a list of selected economic indicators for the region:

- **--Labor Force:** Data from Arizona Department of Economic Security reveals that by the end of November 2006, the average size of labor force for Patagonia was 433. Of that total, 409 were employed and 24 unemployed. During the same period, the unemployment rate in Patagonia was 5.5 percent, compared to 7.8 percent for Santa Cruz County and 4.2 percent at the state level.
- **--Household Income:** The Census 2000 indicates median household income for Patagonia was \$25,795, compared to \$29,710 for Santa Cruz County and \$40,558 for Arizona.
- **--Persons in Poverty:** The percent of persons in poverty was 25.1% in Patagonia, according to Census 2000, compared to 24.5% for Santa Cruz County and 13.9% for Arizona.
- **--Median Earnings:** According to Census 2000, the median earnings of male full-time, year-round workers in Patagonia was \$25,625, compared to \$27,972 for Santa Cruz County and \$35,184 for Arizona. The median earnings of female full-time, year-round workers was \$24,844 in Patagonia, \$21,107 in Santa Cruz County and \$26,777 at the state level.
- (1) Data Source for income, poverty, and wages were the Census 2000 and Arizona Department of Economic Security.

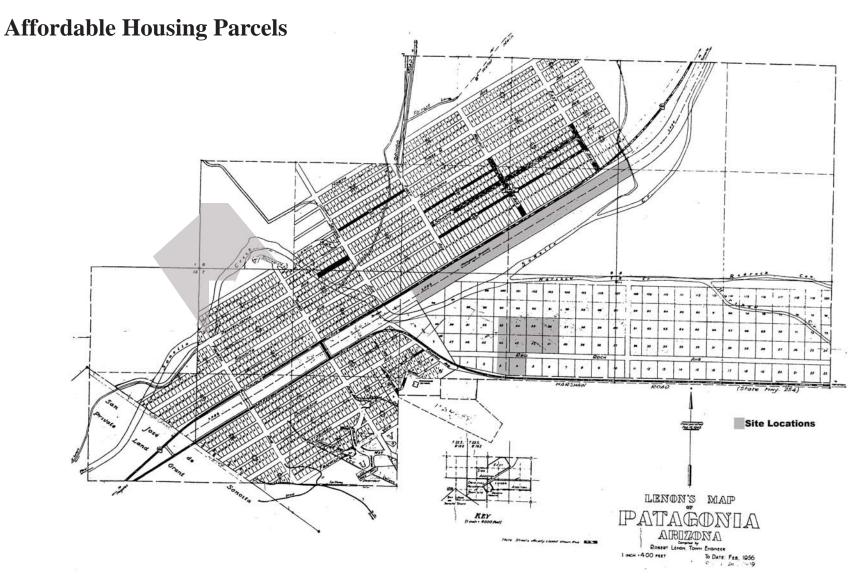
Demographics



Patagonia: An Aerial View



This is an aerial view of the town of Patagonia (outlined in black) and the adjacent land.



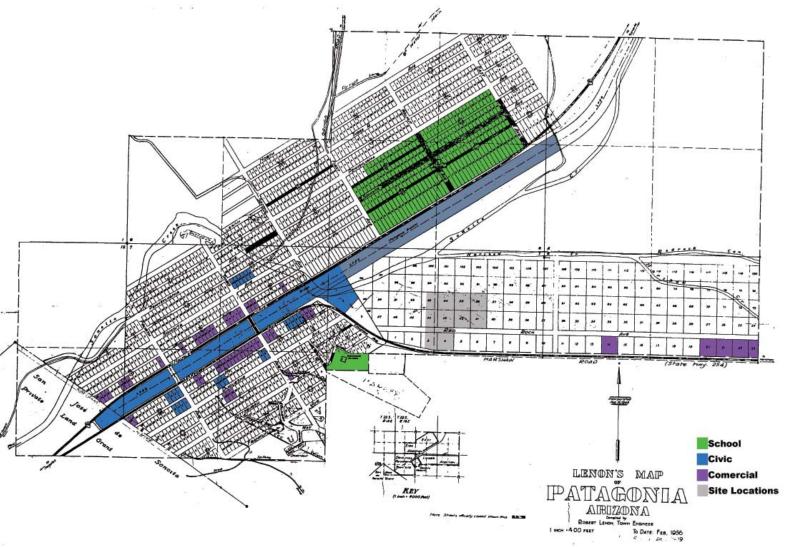
The three original parcels, Farm, Rail, and the Montessori School parcels are shown shaded in gray. Since the initiation of this project, the focus has been on the Railroad and Farm parcels. These parcels were chosen to be developed because both of the parcels have access to sewer and water, are with in walking distance to the heart of town and the roads that access the sites are paved and can accommodate the increased traffic load the proposed developments would create.

Land Use Overview Map



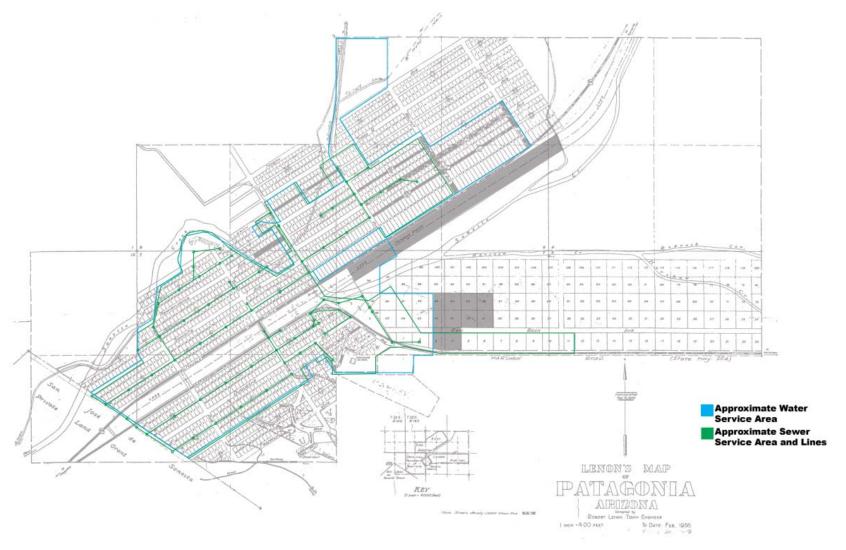
This map shows the current land use patterns in the town of Patagonia.

Public Land Uses



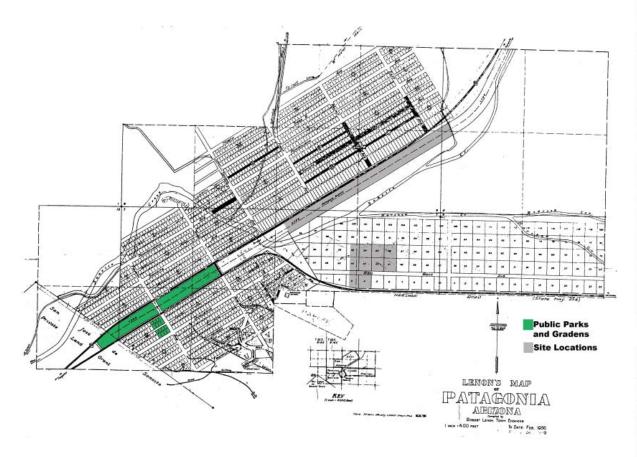
The majority of the commercial spaces are clustered along the main civic strip in the heart of the town. At present, all the schools are located at significant distances from the civic, park, and commercial areas.

Existing Utility System Map



Both the Rail and the Farm properties are adjacent to the existing town utility system.

Patagonia Park Spaces









For a town of its size, Patagonia has an abundance of public space. However, most of the public space is clustered along the main strip in the form of the central park area and the community garden.

Town Character: A Visual Analysis



















Single-Story Homes

Two-Story Buildings

Open Spaces



Rosa Vista, Mesa, Arizona, Planned 1991





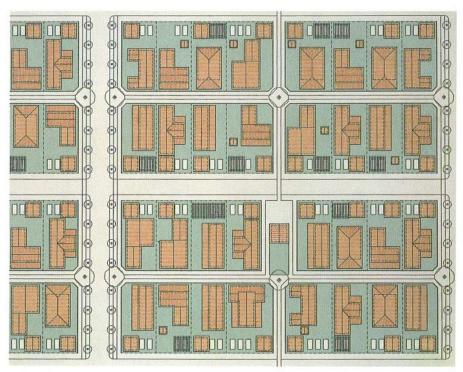


Rosa Vista is a planned community in Mesa, Arizona. It was designed by the firm Duany Platter-Zyberk and Company, seeking to create walkable, vibrant communities that foster social unity and conserve natural resources. This project is located in the same climate as Patagonia and uses manufactured housing of a similar scale and style to the existing housing in Patagonia.

Rosa Vista, Mesa, Arizona, Planned 1991

- Total Units 380
 - Single Family
 - Manufactured Homes
 - Club House, Shops, Theater, Tennis Courts, Grass Areas
 - Surface Parking For Common Areas and 4 or 5 Off-street Parking Spaces per Unit
 - 30 acres
 - 12.5 units/acre
 - Planning Completed in 1991

Typical Street Layout- the Rooftops are Red and the Yards are Green



Typical House Elevations









Oroysom Village, Fremont, CA, 2001





Oroysom Village was designed by David Baker + Partners and built in Fremont, California. It was completed in 2001. This project shows how clustered parking and attached housing can provide extra space for public amenities and green space.

Oroysom Village, Fremont, CA, 2001

- Total Units 101
 - 60 units Family housing
 - 41 units Senior housing
 - Community Room, Tot Lot, Open Play Areas
 - Surface Parking
 - 6.0 acres
 - 16 units/acre







Case Study Projects

Mabuhay Court, San Jose, CA, 2002







Another project designed by David Baker + Partners, this one was built in San Jose, California, and completed 2002. It is a mixed-use project combining a senior center, a park, and a community center. This project demonstrates the high quality of construction that can be achieved on affordable housing projects.

Mabuhay Court, San Jose, CA, 2002

- Total Units 96
 - Senior Housing
 - Mixed-Use Project
 - 16,000 square foot Community Center, Public Park
 - Underground Parking
 - 1.7 acres
 - 56 units/acre









Moonridge Village, Half Moon Bay, CA, 2001









Moonridge Village is a community of affordable farm worker housing in Half Moon Bay, California. It was completed in 2001, and was also designed by David Baker + Partners. This project is an example of how a long linear site, such as the "Railroad Parcel," can be organized.

Moonridge Village, Half Moon Bay, CA, 2001

- Total Units 160
 - Soccer Fields, Basketball Court, Tot Lots, Community Gardens and Orchards, Picnic-Barbeque Area
 - Community Facilities including Classrooms, Laundry Facilities, Computer Center, Child Development Center, Post Office, Management and Maintenance Offices
 - Surface Parking
 - 40 acres
 - 4 units/acre









West End Commons, Oakland, CA, 2005







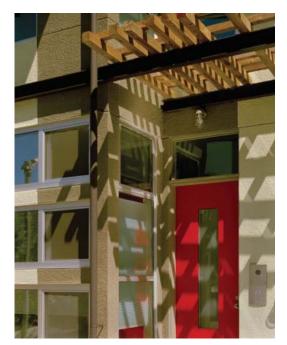


West End Commons is a development of Live/work townhomes, incorporating spaces in some of the dwellings that could be used as office space for the residents. Built in Oakland, California in 2005 by David Baker + Partners. This project is a model for mixed-use development located on the West end of the "Railroad Parcel."

West End Commons, Oakland, CA, 2005

- Total Units 91
 - Live/Work Town Homes
 - Meandering Park
 - Amenities
 - Surface Parking & Individual Garages
 - 2.4 acres
 - 35 units/acre









Case Study Projects

Orchard Village and Oak Hill, Chattanooga, TN, 1991





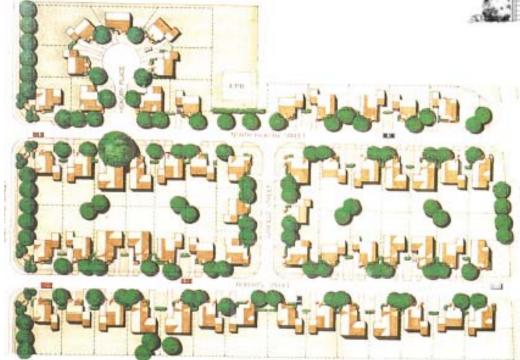
Orchard Village and Oak Hill in Chattanooga, Tennessee consist of 2, 3, and 4 bedroom single family residences. Designed by Brian Clements and Stroud Watson, construction was completed in 1991. This project demonstrates how single family detached units on individual lots can be arranged in a compact manner in order to preserve open space both for public and private use.

Orchard Village and Oak Hill, Chattanooga, TN, 1991

- Total Units 49
 - 2, 3 and 4 Bedroom Single Family Homes
 - Open Play Spaces, Private Yards, Pavilions, 2000 sqft Open Space
 - Garage and Surface Parking
 - 7.3 acres
 - 6.8 units/acre



The "Virtage": frost elevation



Case Study: Trudeslund Community







Trudeslund is a community in Denmark that was formed by a group of families who wanted to develop a co-housing type of community for themselves. It was designed by Vankustein Architects and completed in 1981. This project is an example of the kind of walkable neighborhoods and "micro-communities" that could be created within the two master planned sites. It also demonstrates the mixing of double and single story residences, and those residences with their site, preserving open spaces for the use of residents.

Trudeslund Community, Birkerød, Denmark, 1981

- Total Units 33
 - Town Homes, Stacked Flats, Single Family Homes, designed to be separately sellable
 - Co-housing Model
 - Common House for Shared Resources, Childcare
 - Surface Parking
 - 4.2 acres
 - 13 units/acre

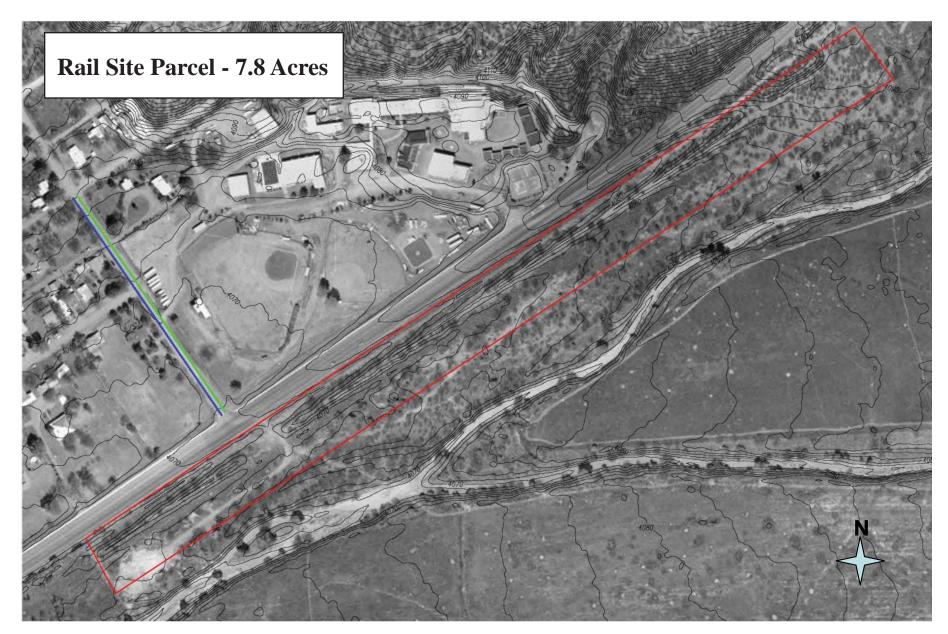






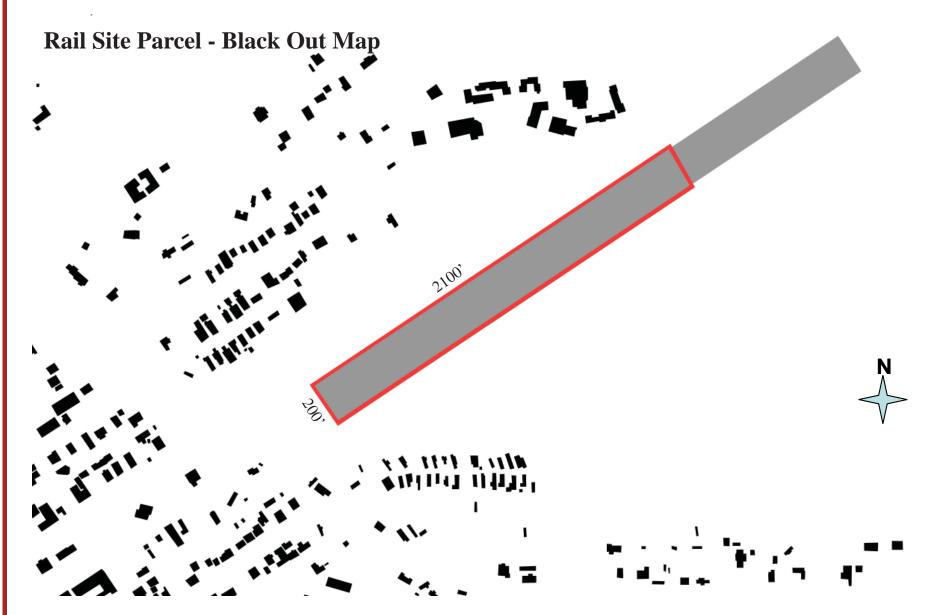






An aerial photo of the Rail Site parcel.

The Rail Site



This map shows how structures are massed in the areas immediately adjacent to the Railroad Parcel. This shows us what the present structural densities and types are, along with the distribution patterns in the built environment.

The Rail Site

Visual Analysis



Views of the southern half of the site







Historic rail bed



Mound at the north end of the site



One of the access points to the site

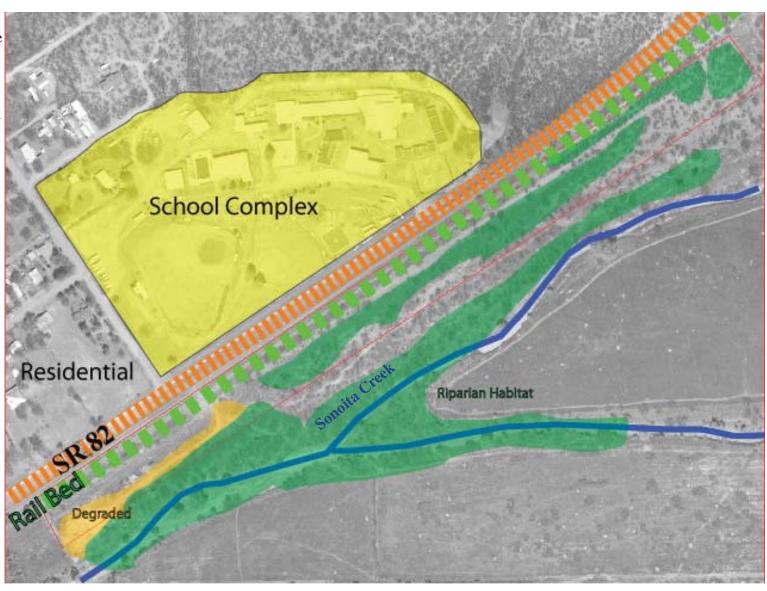
The Rail Site

Land Use

The site sits across
State Road 82 from the
Patagonia community
school complex, at the
north edge of town.
To the south is Sonoita
Creek, a dry creek that
surfaces at the Nature
Conservancy site just
south of Patagonia.

The western edge of the site, the area that abuts the highway, is dominated by an historic rail bed that the community of Patagonia wishes to convert to a greenway.

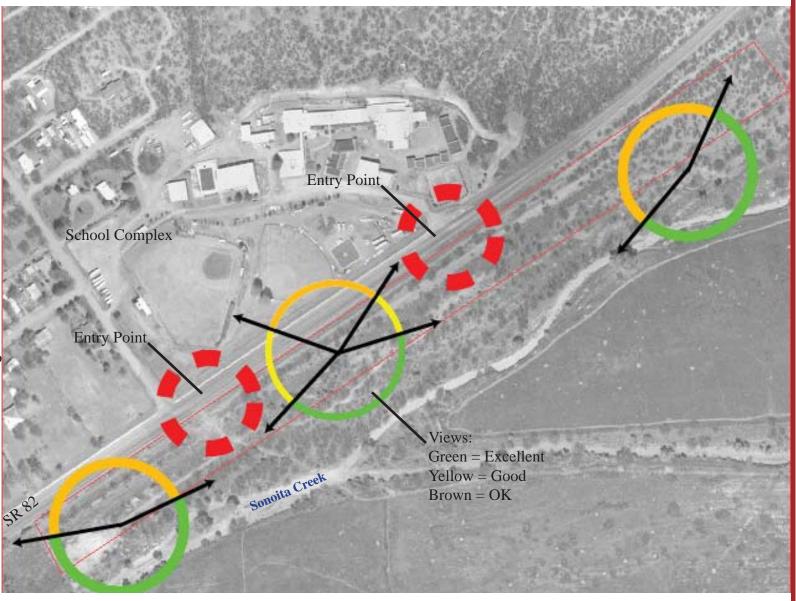
The rest of the site is open space with a moderate amount of native vegetation, with some riparian habitat to the east, just off the the site.



Views and Circulation

Towards the southern end of the site is the current primary access point. This access point is well positioned to tie into the utility system which currently ends across the highway from the site. The main access road from the school could also connect into the site.

Views are generally good from every vantage point on the site, with the best views looking out onto the south and the open space that abounds there.



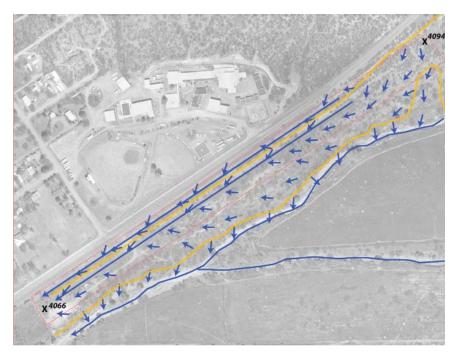
Slope Analysis



There is an historic rail bed that runs the length of this site. The rail bed has the steepest slopes, with some over 10%.

The majority of the site away from the rail bed is 5% or less. These minor slopes are the most suitable for building.

Drainage Analysis



The site receives a fair amount of runoff from the surrounding areas. The two ridges that run along the course of the site direct the water from the rail bed but also from the edge of Sonoita Creek.

The areas of the greatest concern regarding run off are on the southern half of the site, on either side of the rail bed.

The highest point on the site is at the northern end and the lowest point, 4066' MSL, is located the southern end of the site.

Flood Plain Map



This is a FEMA flood plain map with the site overlaid. The areas shown in light blue indicate areas that would have to be filled with soil in order to be above the flood plain and before being approved for construction.

Design Implications







- -The rail bed should be preserved and developed as a public amenity. This will add value to the proposed properties, create a buffer from the highway, and make cost effective use of the natural topography.
- -Drainage is to the center of the linear site, making the east side the most suitable for the placement of houses.
- -Proximity to Sonoita Creek creates opportunities for recreational linkages.
- -Utility access is at the southern end of the site; development should be focused there.
- -The site is well vegetated with native plant species and is adjacent to riparian habitat.
- -Small housing clusters will allow for higher density without compromising the rural character of the site. It will also aid in creating connections, ease circulation issues, and maintain ecological integrity.

Conceptualization







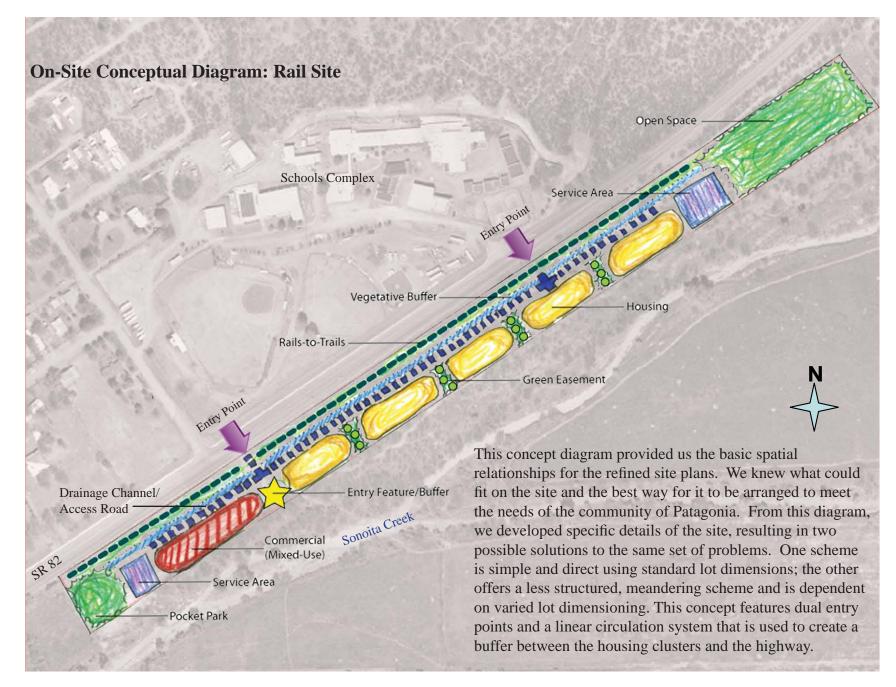
Fig. 1: Access road on the north side

Fig. 2: Access road on the south side

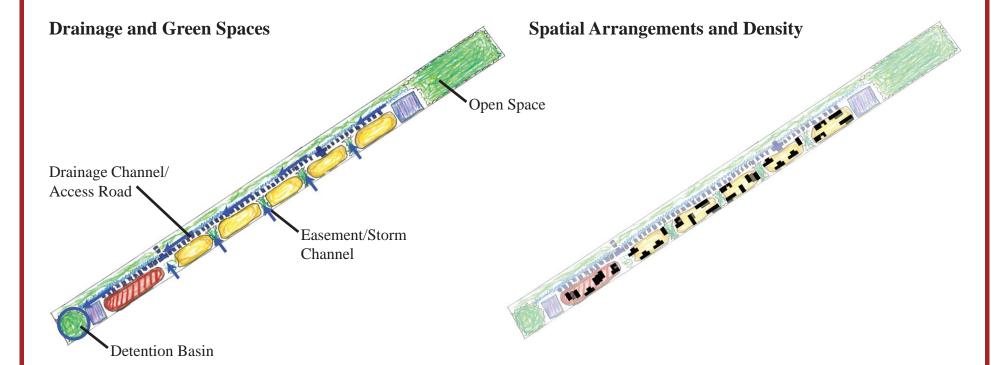
Fig. 3: Large "block" type lots

Using the program developed through our site analysis and with input from the community, we used standard Patagonia lot dimensions as "puzzle pieces" to see what conceptual orientations and configurations would work best on this linear site. The three diagrams above are some examples of this process. Dozens of variations were tried and the result solved these design-related issues:

- Public open space at both ends of the site create destinations and buffer the future residents, while keeping a rural profile for the development.
- The entry feature/buffer announces arrival for commercial visitors and provides a transition between the different land uses.
- The Rails-to-Trails Greenway buffers the development from SR 82 and increases adjacent land values and commercial opportunities, while simultaneously offering improved quality of life for the residents.
- Green easements between residential clusters create the feel of a small village, preserve open space, and solve ecological issues such as drainage and habitat fragmentation.



The Rail Site

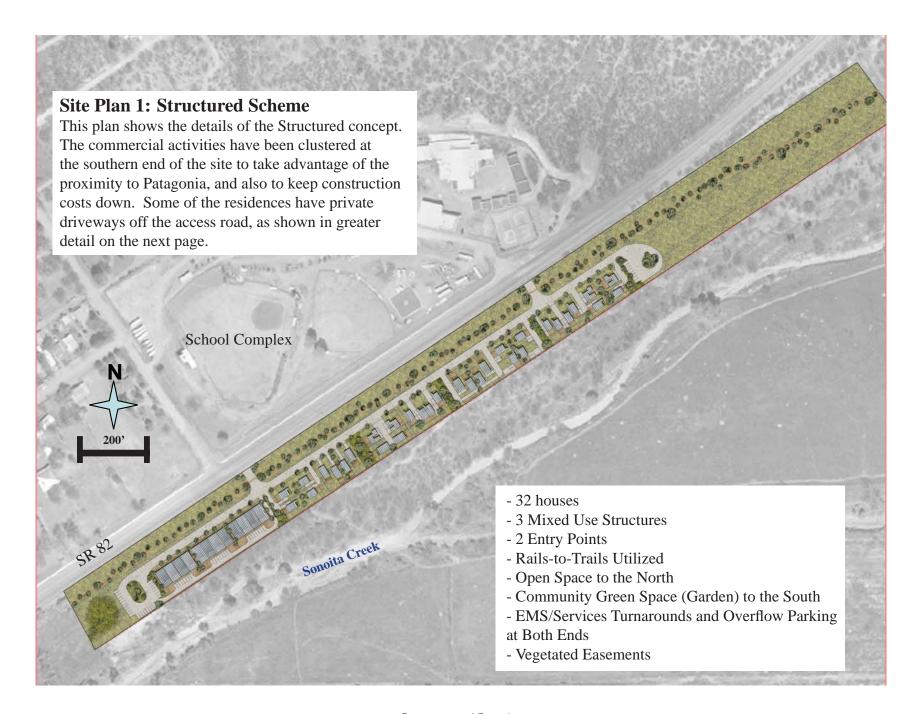


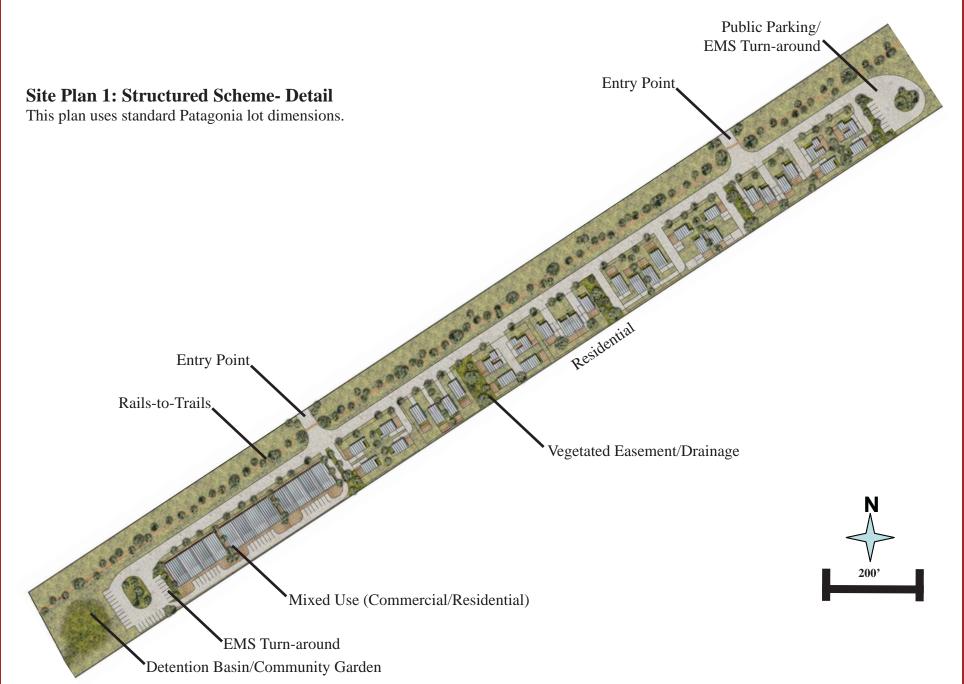
The access road also parallels a drainage channel that can be designed to handle storm water during peak rain events.

At the southern end of the site there is a detention basin to capture some of the rain water. Between each housing cluster is a narrow public easement that can be used to channel storm water, and will double as aesthetic and environmental amenities, ensuring that the Rail Site development maintains the rural character of Patagonia.

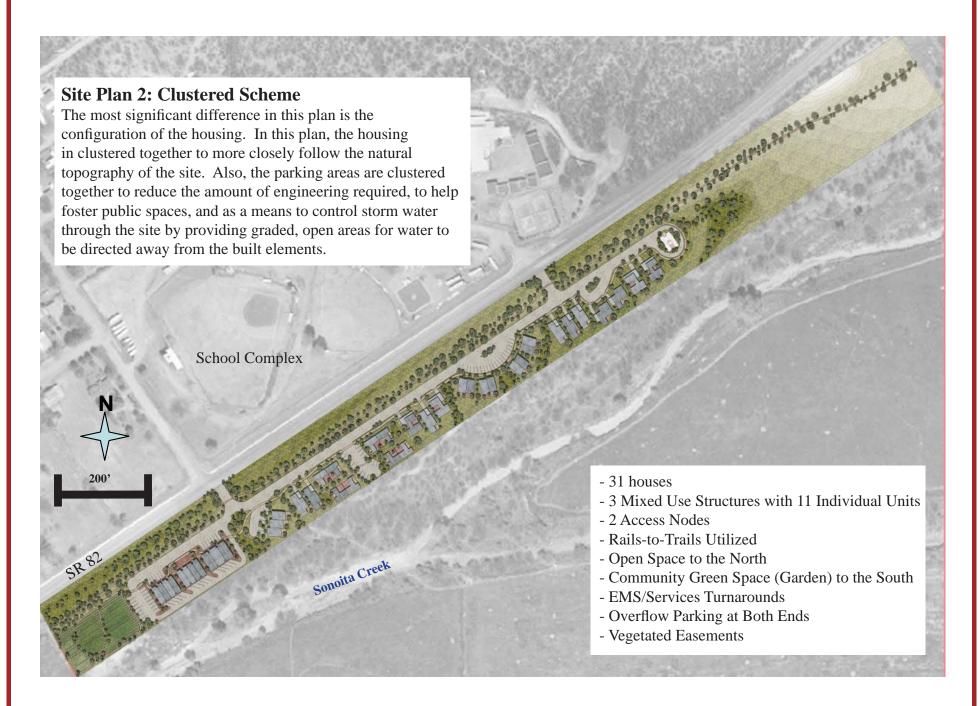
Using black-outs of existing Patagonia housing types and at the densities most likely to prove economically viable for an affordable housing project, we discovered that this conceptual plan would prove effective. A relatively high number of units could be built, yet the negative externalities associated with this development type (lack of private space, environmental and aesthetic compromises) could be planned for and mitigated.



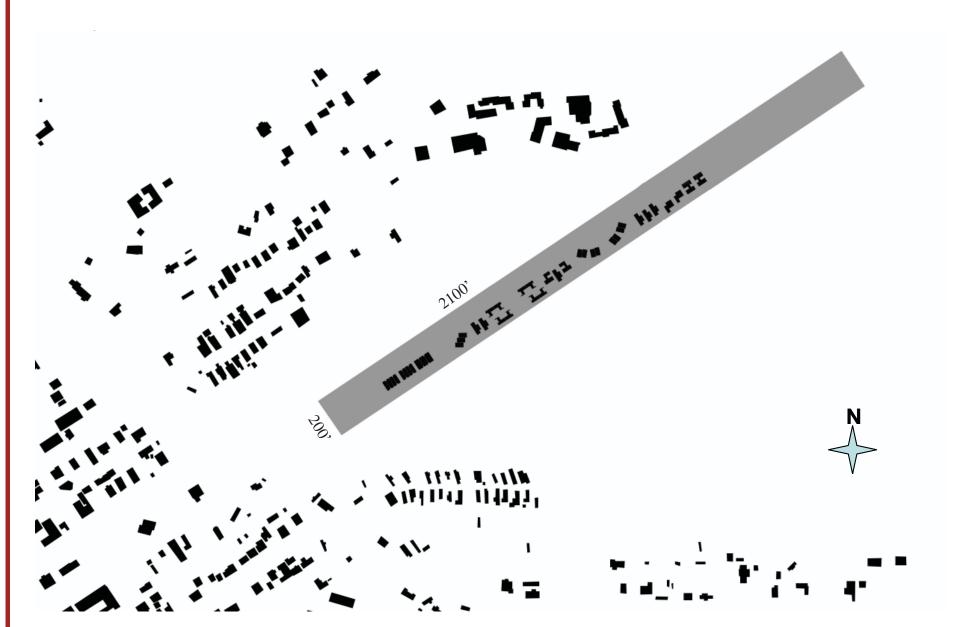




The Rail Site







Using this black out map to compare structural densities, the Clustered Scheme maintains the present urban form of Patagonia.





The mixed use (commercial and residential) section of the development provides entrances to the stores in the front at street level with private residential balconies above.





The mixed use buildings are built in groups of 4 with vegetated walkways in between.





The transition between the commercial and residential is a large space with flowering plants and trees to provide physical and visual separation.





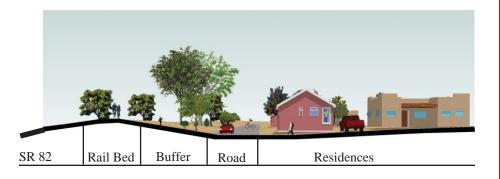
From the covered patio of this house, the residents can look out to a shared public courtyard.





From the Rails to Trails path the houses of the development can be seen through the buffer of vegetation. The buffer also provides a pleasant landscape for the houses to look out upon.

Section A



This section shows a conceptual relationship between the various land use types in the site. The topography has been modeled based on surveyed data. The historic rail bed will provide a good buffer from the noise and traffic on SR 82, while simultaneously creating a cherished public amenity in the form of a recreational greenway. Recreational amenities have been proven to increase the value of adjacent properties.

This greenway will be a pedestrian link with the town of Patagonia, improving foot traffic for the businesses located in the mixed use section of the development. The greenway will also connect children to their schools and help make the community at large more active and healthy.





The Rails to Trails pathway and vegetated buffer can be seen from the balcony of the two story houses in the center of the residential portion of the development.





The streetscape of the residential area is varied and rich with character and individuality. The site is planned to offer the social positives of a village, yet still retain the rugged open feel of the rural southwest.





An aerial perspective of the Farm Site parcel.

The Farm Site



This map shows how structures are massed in the areas immediately adjacent to the Farm parcel. This shows the structural densities and types with the distribution patterns.

Visual Analysis

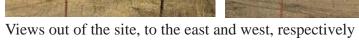


Looking east across the site



Looking north from the road



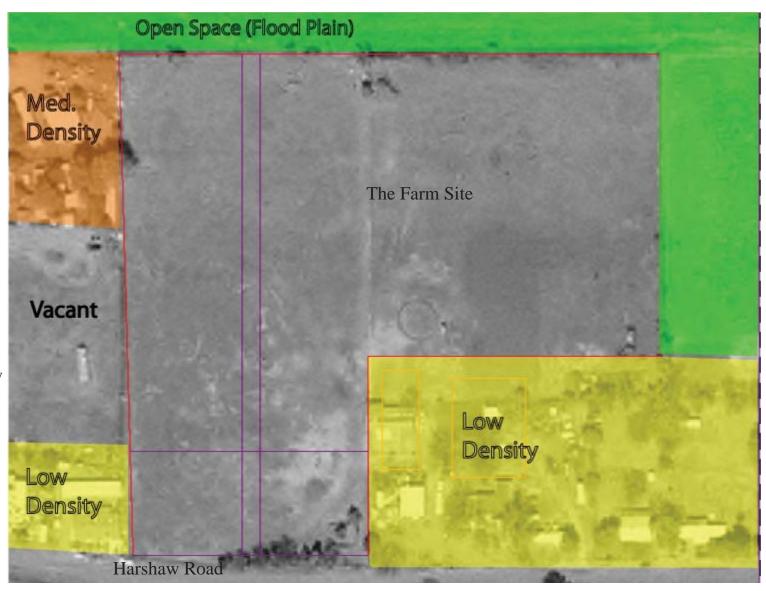


Land Use

The Farm Site is a 9-acre parcel that sits along the north edge of Harshaw Road, just east of Patagonia. To the north and east of the site is open space that is currently listed as flood plain. To the south is low density residential lots predominated by single family residences. To the west is a medium density mobile home community.

The Farm Site is mostly devoid of any plant life larger than native grasses.



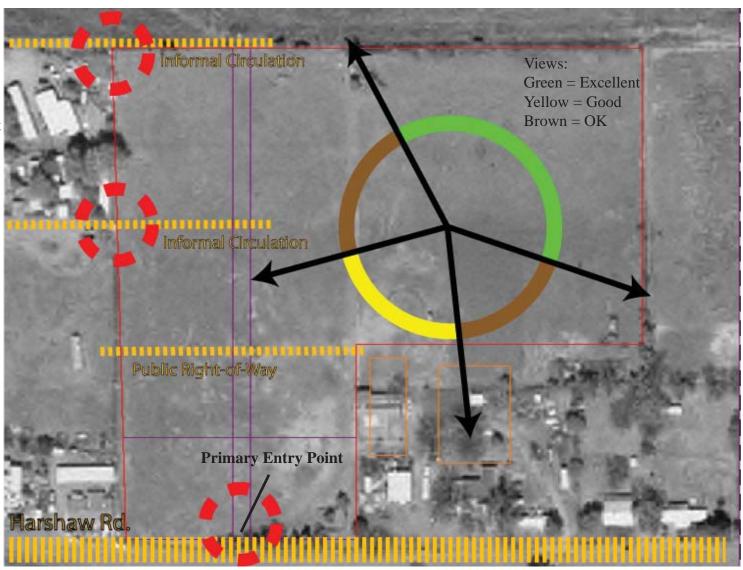


Views and Circulation

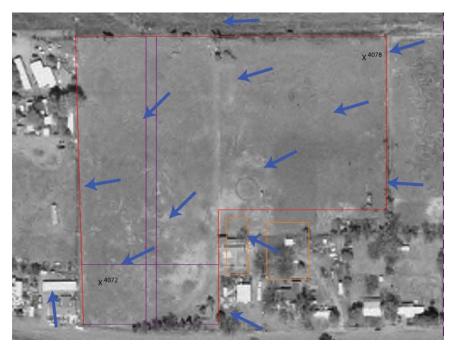
Views from the site are excellent to the northeast, out onto the open flood plain. The only other views are those to the west (into the mobile home community) or those to the south (into the low density housing).

Primary access is from a single point at Harshaw Road. There are currently informal secondary access points, used predominantly by pedestrians, to the west and the north. The pedestrian routes to the north could potentially connect to the Rail Site and the proposed Rails-to-Trails project.

There is also a public right-of-way in the southern part of the site.



Drainage Analysis



The Farm Site has very little in the way of natural topographic features other than a gentle <2% slope that runs down slope from the northeast to the southwest.

Given the natural topography of the site, most of the storm water drainage is going to come in the form of sheet flow. Sheet flow on a site is generally a boon for development because it can be managed and adapted more easily than focused or channeled drainage.

The lowest spot on the site is in the southwest corner where there is a natural, albeit, slight depression that could be maximized as a potential detention basin.

Flood Plain Map



This is a FEMA flood plain map with an overlay of the Farm parcel. While the entire parcel is in the flood plain, only some sections of it will require significant modifications to reach compliance.

The areas highlighted by light blue show where there would have to be significant infill with soil in order to rise above the flood zone.

Design Implications



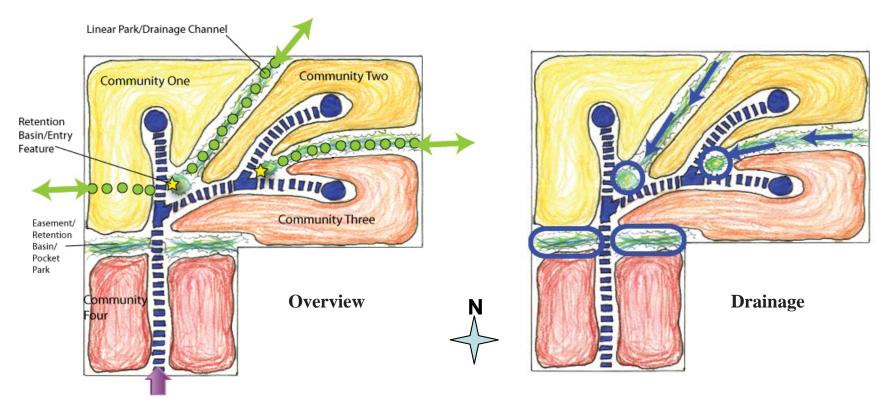




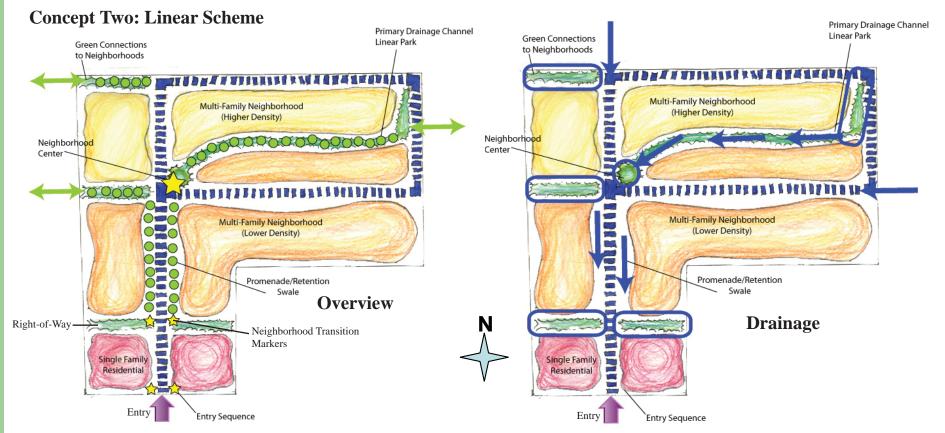
- Development should respect the character of the surrounding neighborhoods.
- Existing informal pedestrian circulation systems should be augmented.
- The site is relatively flat and experiences sheet flow during storm events. The drainage system should direct and control run-off through the site.
- Enhance the shrub and canopy vegetation on the site.
- The road easement at the south of the site is to be maintained.
- Take advantage of the good views to the north and northeast.

Three concepts for this site were initially developed and presented to the public. Response to those concepts at the public presentation and additional feedback lead to the focus on concept 3, "Center Green". From this concept, two alternative site plans were developed, one with 4.7 housing units/acre, the other with 6 housing units/acre. Both plans incorporate a similar mix of single and multiple family housing types.

Concept One: Cul de Sac Scheme

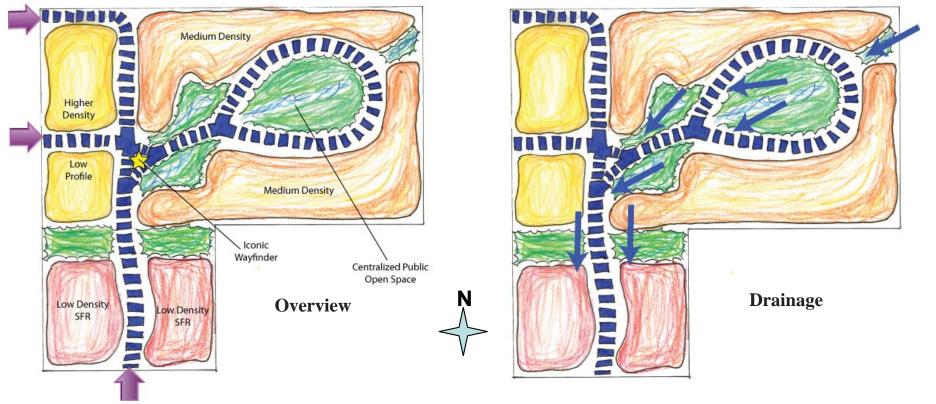


- The circulation system has distunct provisions for vehicles and pedestrians.
- Neighborhood motifs are separated by their access road and by green spaces.
- Phasing and a diversity of housing types are possible.
- Each branch of the circulation system has its own retention basin, highlighted with blue in the drainage diagram.
- We chose to not pursue this concept because it did not create strong enough circulatory connections between the site and the surrounding neighborhoods.



- The circulation system is designed to allow for as many conventional lots as possible while still address the constraints created by the public right-of-way and storm water management. Road placement also addresses potential future growth and expansion into this area by designing the access road on a grid and preserving as open space those areas that would be turned into future neighborhood streets.
- Green spaces form the transition zones between residential types. These transitions are further explored by entry/sequence icons (such as public art or pocket parks) to help define the neighborhoods and give them a sense of place and identity.
- Easements are respected and current informal circulation network to the neighborhood to the west and to Sonoita Creek to the north are strengthened.
- The negative aspects of this concept, and why it was not pursued, were that it is too rigid in design and too urban in its layout, counter to the request that Patagonia's rural character be respected. Further, the fragmentation between housing types is not conducive to healthy neighborhoods.

Concept Three: Center Green Scheme



This concept consolidates vehicular circulation and uses centralized open spaces instead of linear spaces as public amenities and to deal with drainage.

- Vehicular connections to adjacent neighborhoods are provided at the northwest corner of the site.
- The circulation system is fluid and centralized with the public spaces, allowing a large number of houses to have frontage to public space.
- Green spaces are centralized, creating larger spaces with the potential for a variety of uses.
- This configuration has the greatest capacity for on-site water retention.

Center Green: Site Plan 1

Distribution patterns maintain a visual cohesion between the Farm and surrounding neighborhoods, as seen on the preceding "black-out" map.

- 42 houses
- A mix of housing types including single-family and multi-family and one and twostory structures
- 4.7 units per acre
- Additional vehicular access to adjacent neighborhoods
- Centralized open spaces for public use and storm water management

See the appendix for a description of possible community land mangaement strategies.



Primary Entry

Center Green: Site Plan 2 (Modified)

This plan uses non-standard lot dimensions to better address drainage issues and to maximize the total number of housing units.

- 55 houses
- A mix of housing types and distributions including single-family and multifamily and one and twostory structures
- Higher density with six units per acre
- Access to the adjacent neighborhood at the northwest corner
- A series of pedestrian paths connect the neighborhood through the open spaces

See the appendix for a description of possible community land mangaement strategies.



The Farm Site





From this covered patio the cluster of attached 2 bedroom duplexes can be seen through the vegetated buffer that stands between them and the main road.

Perspectives





This perspective shows what the facade of a series of multi-story attached units will look like from the street.





A series of detached single family houses line this street. They all have the same floor plan but different materials are used to give every house its own identity.

Perspectives





Public open space is visible from every home. From within this home's carport/patio the central retention basin can be seen and helps soften the view from one house to another.





From the sidewalk across the street, the cluster of detached 2 bedroom houses can be seen.

Perspectives





These houses face the northern portion of the public open space that runs through the entire community.



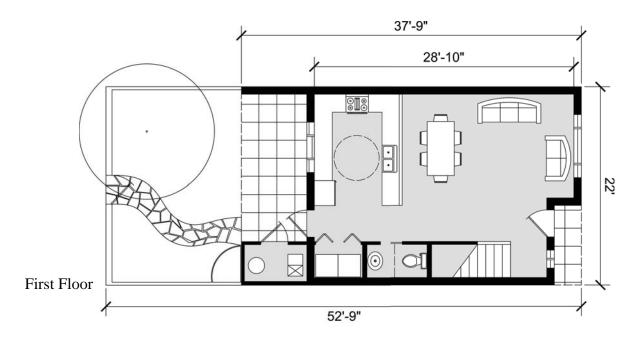
Two-Story House

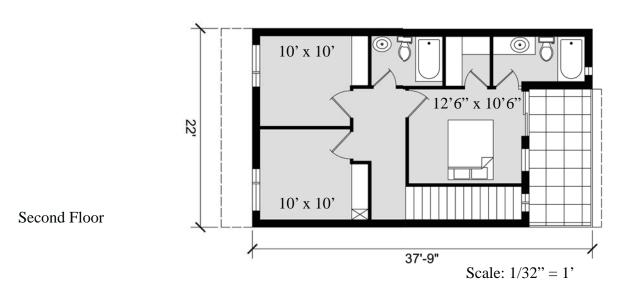


Housing

Two-Story House -- Floor Plans

This is an 1185 sqft plan with 3 bedrooms and 2.5 bathrooms. The bedrooms are on the second floor with the public spaces on the ground floor. The covered balcony is accessed through the master bedroom. The 2 full baths are on the second floor with the half bath on the first floor. The kitchen is adequately sized to allow for a wheelchair to turn around. The unit has a covered back patio that opens onto a private, enclosed back yard.

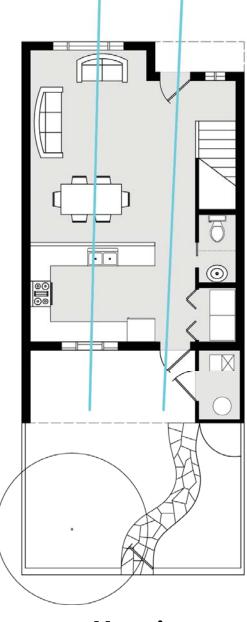


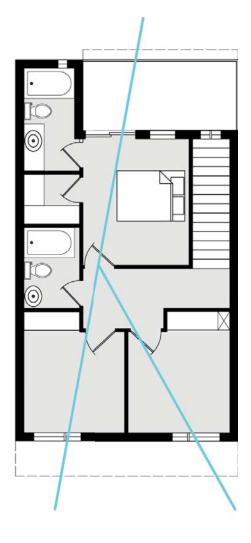


Housing

Two-Story House -- Natural Ventilation Diagram

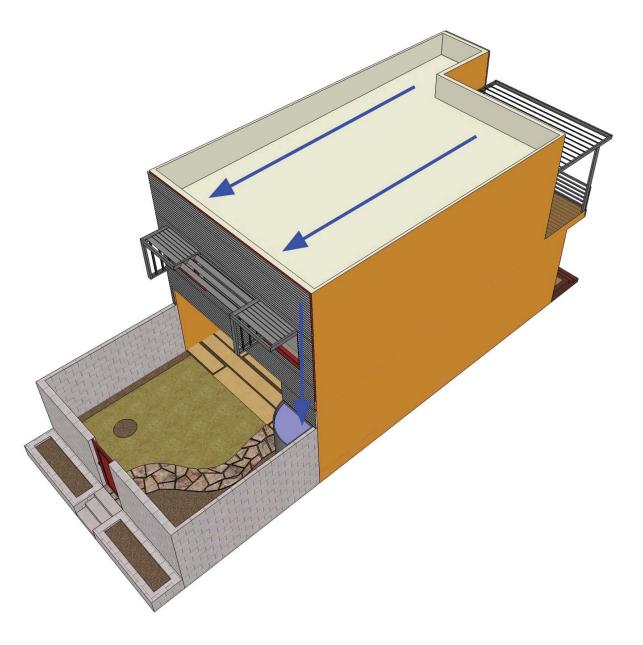
This diagram shows how natural ventilation is used to cool this house. The cross-ventilation occurs from front to back or viceversa along the long axis of the house.





Housing

Two-Story House -- Water Harvesting Diagram



Two-Story House -- Elevations















Two-Story House -- Alternative Configuration











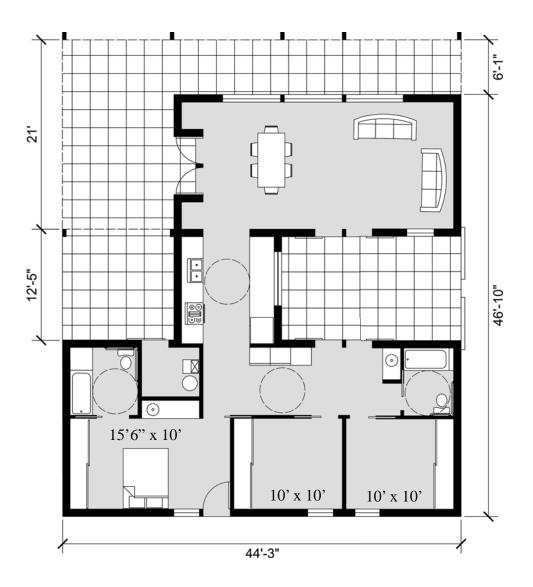


Housing



Accessible House -- Floor Plan

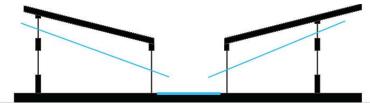
This is a 1285 sqft plan with 3 bedrooms and 2 bathrooms. It has been designed to be fully wheel-chair accessible. The carport doubles as a patio, and connects to the wide front porch. There is a private courtyard with sliding glass doors that can open up the space for ventilation or large gatherings.



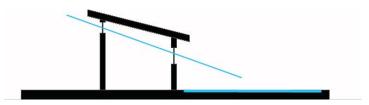
Scale: 1/32" = 1'

Accessible House -- Natural Ventilation Diagram

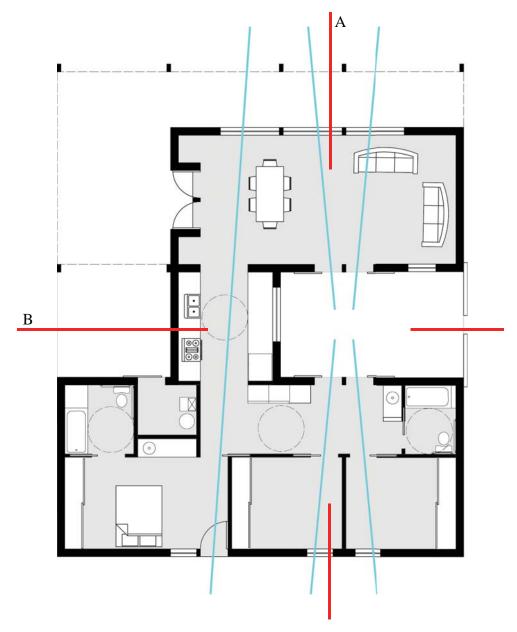
This diagram shows how natural ventilation is used in this house. The roof has been configured to encourage a stack effect, drawing cooler air from the courtyard and exhausting the warmer air out of the clerestories.



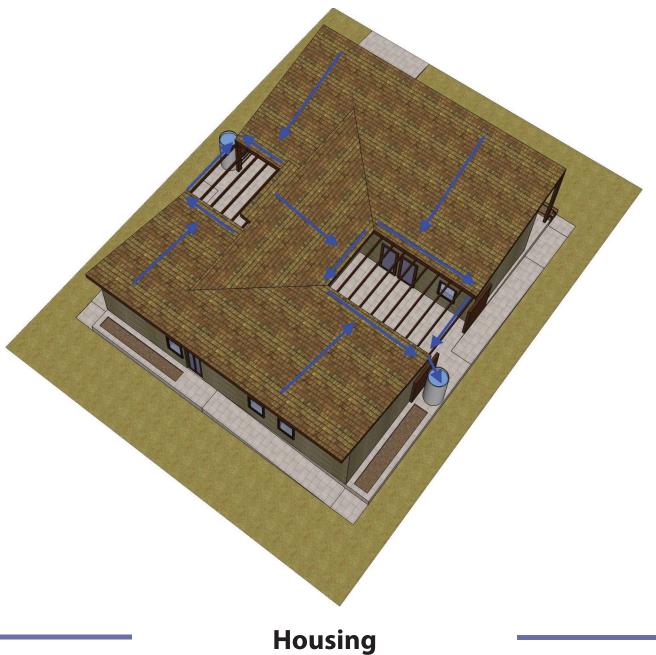
Section A is taken through the bedrooms, the courtyard, and the living area.



Section B is taken through the kitchen and the courtyard.



Accessible House -- Water Harvesting Diagram



Accessible House -- Elevations



Housing

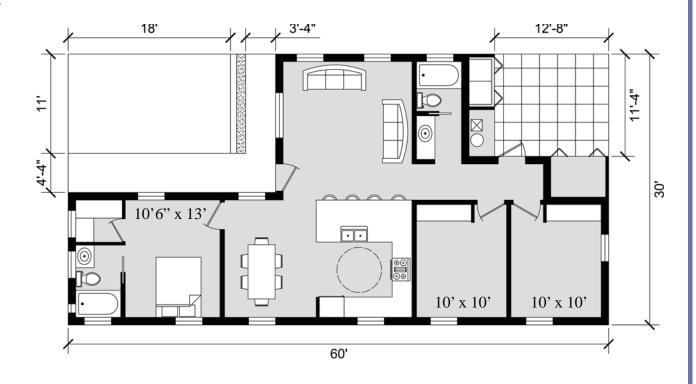
Single Family Detached - House 1



Housing

Single Family Detached - House 1 -- Floor Plan

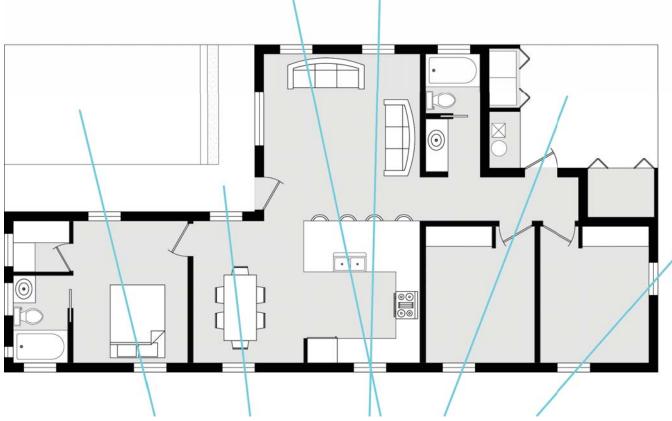
This 1095 sqft plan has 3 bedrooms and 2 baths. There is a breakfast bar between the living room and the kitchen. The carport doubles as an outdoor living space, and provides an area for a flower garden between the carport and the living room window. The kitchen is adequately sized to allow for a wheelchair to turn around. There is also extra storage space located off of the back patio.



Scale: 1/32" = 1'

Single Family Detached - House 1 -- Natural Ventilation Diagram

This diagram shows how natural ventilation is used in this house. There is cross-ventilation in every room allowing ventilation of select rooms or ventilation of the entire house.



Single Family Detached - House 1 -- Water Harvesting Diagram



Single Family Detached - House 1 -- Elevations



Housing

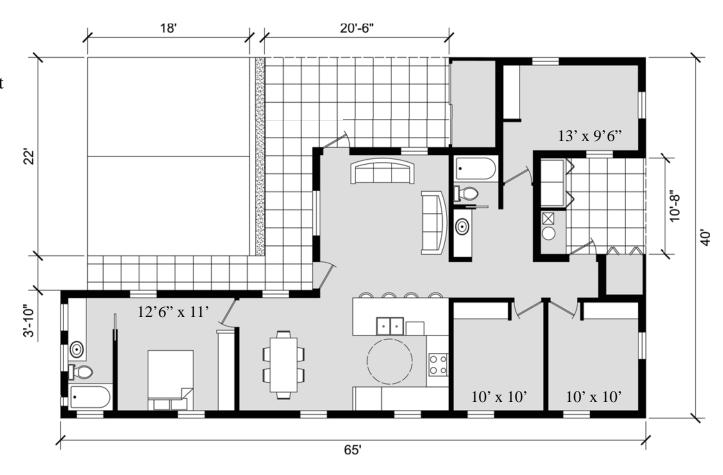
Single Family Detached - House 2



Housing

Single Family Detached - House 2 -- Floor Plan

This 1337 sqft plan is an expanded version of House 1. This plan has 4 bedrooms and 2 baths. There are 2 covered patios and a double carport that can be used as exterior living space. Between the carprot and the living room there is space for a flower garden. There are two storage rooms located off of each patio. Inside, the breakfast bar separates the living room from the kitchen and the kitchen is adequately sized to allow for a wheelchair to turn around.



Scale: 1/32" = 1'

Single Family Detached - House 2 -- Expansion

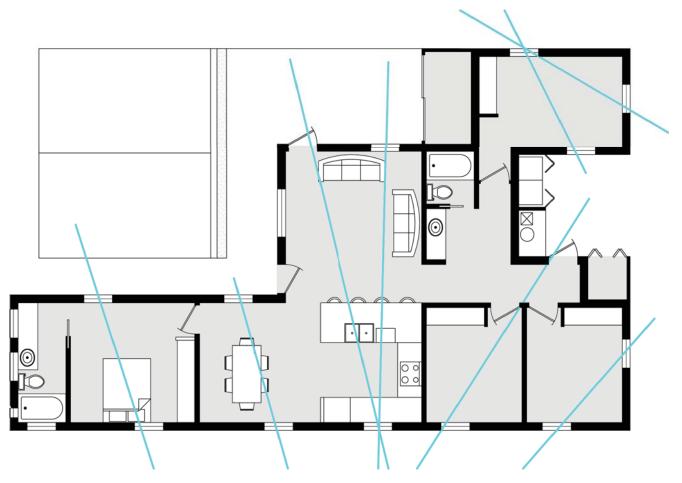
This diagram shows the differences between the 3 bedroom version and this 4 bedroom version. The carport is expanded to accommodate another car. Another storage area is added off of the new patio beside the living room. A hallway is created to provide access to the fourth bedroom and the master suite is rearranged.



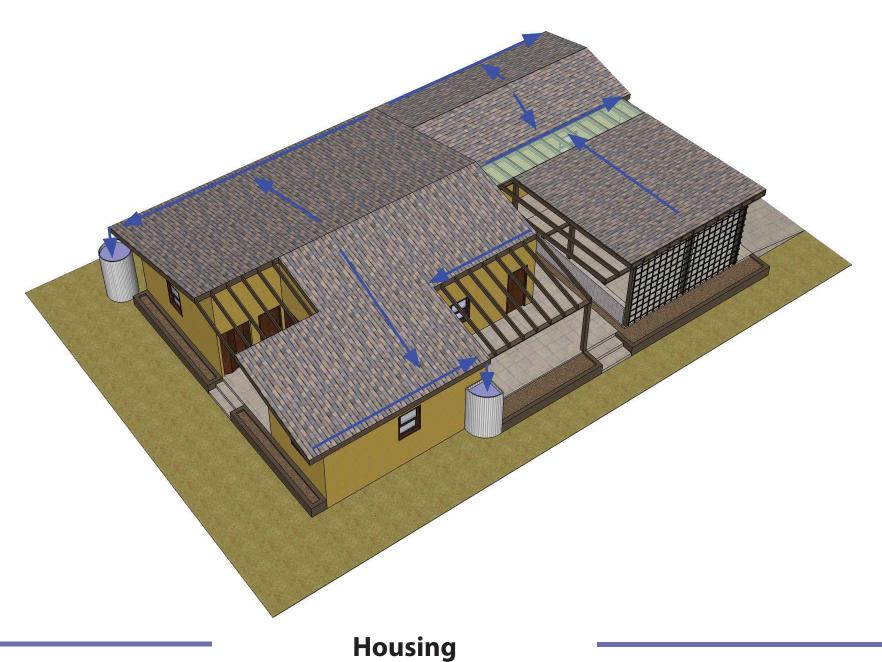
House 1

Single Family Detached - House 2-- Natural Ventilation Diagram

This diagram shows how natural ventilation is used in this house. There is cross-ventilation in every room allowing ventilation of select rooms or ventilation of the entire house.



Single Family Detached - House 2 -- Water Harvesting Diagram



Single Family Detached - House 2 -- Elevations



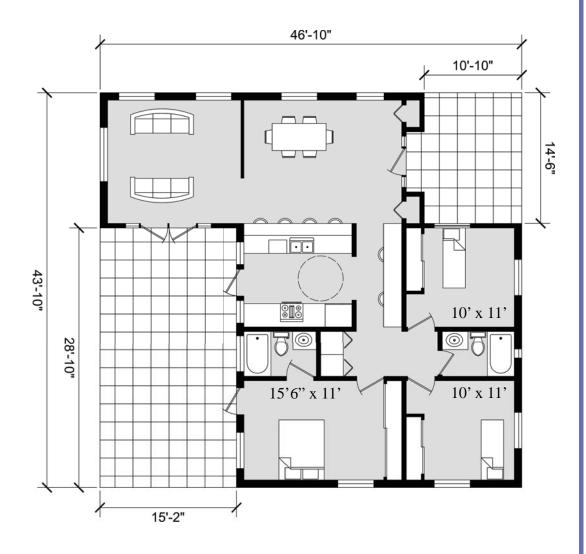
Housing



Housing

Single Family Detached - House 3 -- Floor Plan

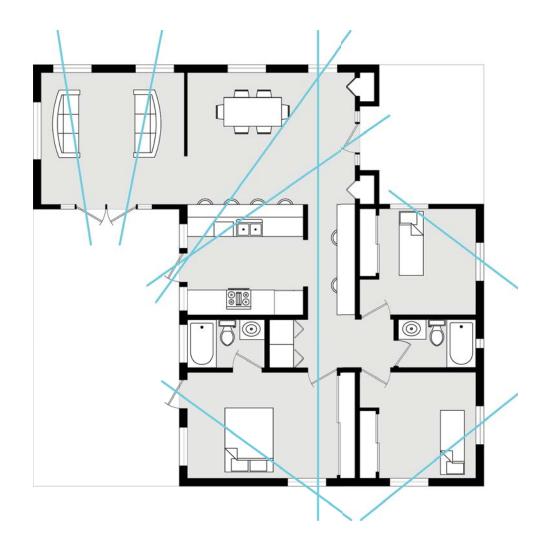
This 1295 sqft plan has 3 bedrooms and 2 baths. The house has two patios which provide natural light and air to all of the rooms and increase living space. The kitchen is arranged in a galley style for efficient use, and includes a breakfast bar. The kitchen is adequately sized to allow for a wheelchair to turn around. The hall space is made functional with the addition of a work counter.



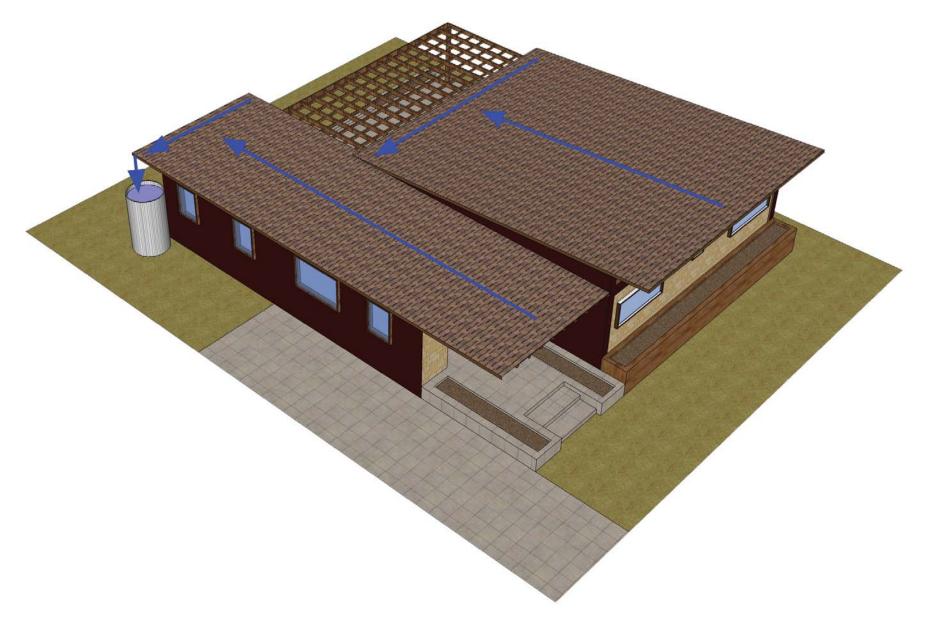
Scale: 1/32" = 1'

Single Family Detached - House 3 -- Natural Ventilation Diagram

This diagram shows how natural ventilation is used in this house. The cross-ventilation occurs in various directions so the house can be opened up catch the prevailing wind no matter where it is coming from. All of the bedrooms have two windows so the rooms can be vented even when the doors are closed.



Single Family Detached - House 3 -- Water Harvesting Diagram



Single Family Detached - House 3 -- Elevations



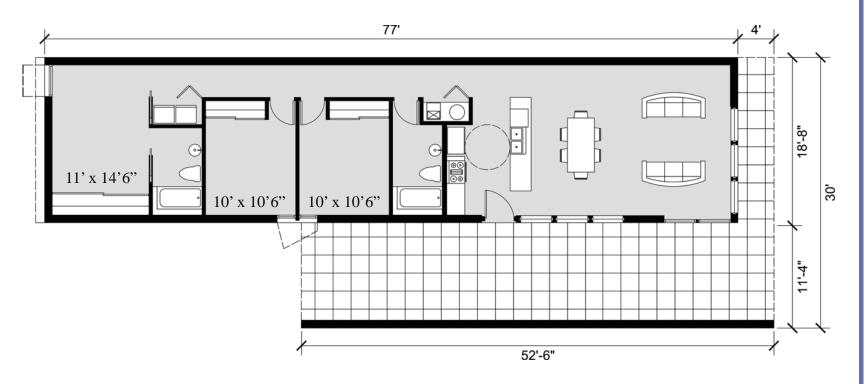
Housing



Housing

Linear House -- Floor Plan

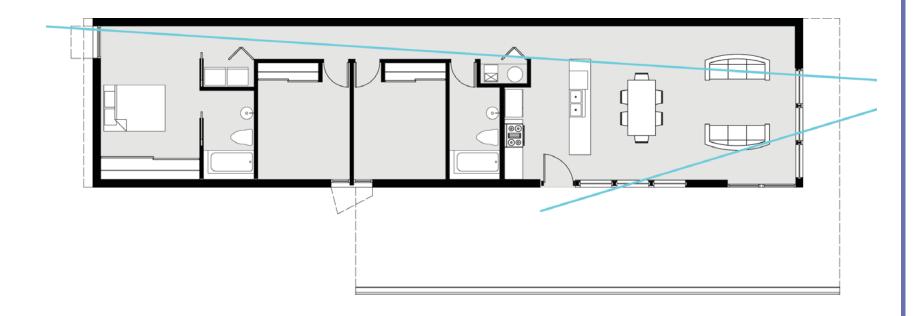
This unit is linear in proportion to matches the many manufactured and mobile homes in Patagonia. It is 1250 sqft and has 3 bedrooms and 2 baths. The carport is oversized to double as outdoor living space and to help shade the side of the house where a majority of the windows are. There are sliding glass doors off of the living room so the space can be opened up to the patio/carport for expanded living space. The kitchen is adequately sized to allow for a wheelchair to turn around.



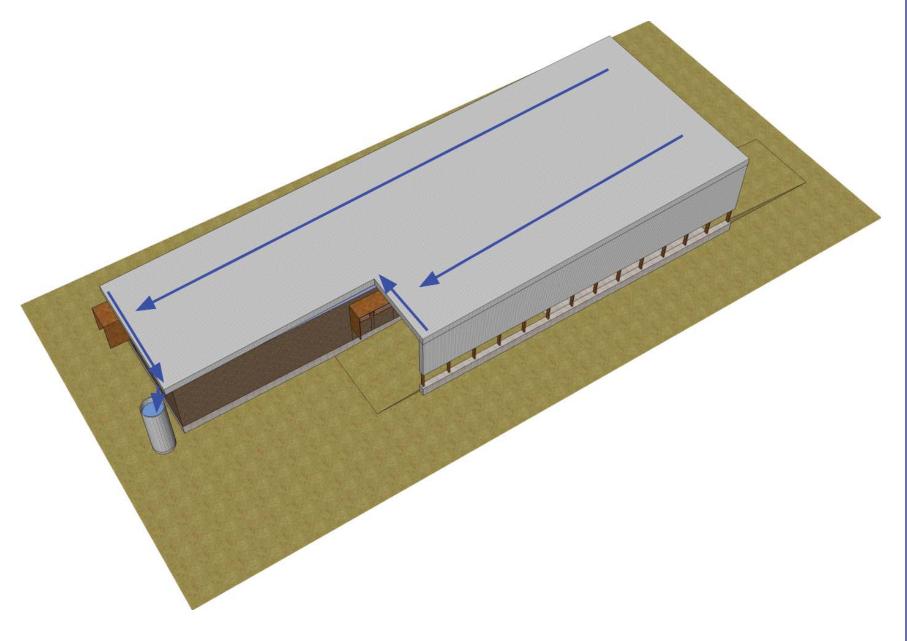
Scale: 1/32" = 1'

Linear House -- Natural Ventilation Diagram

This diagram shows how natural ventilation is used in this house. The cross-ventilation occurs from the bedroom windows through the public spaces. The roof angles from the master bedroom up to its highest point in the living room to vent hot air out of the clerestory in the front of the house.



Linear House -- Water Harvesting Diagram



Linear House -- Elevations











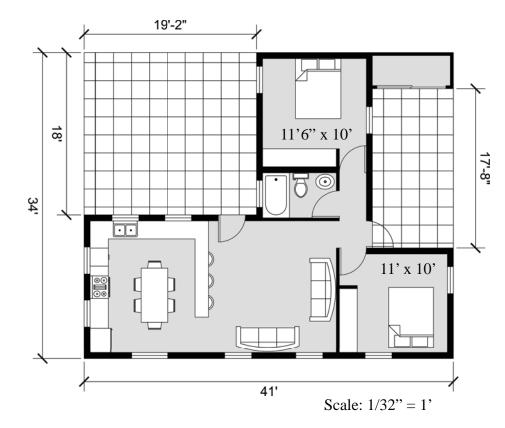


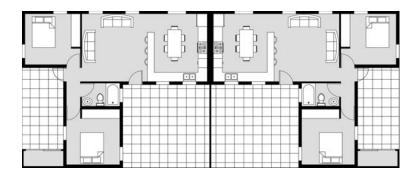
Attached/Detached House

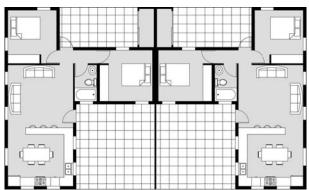


Attached/Detached House -- Floor Plan

This is the smallest house with 755 sqft, 2 bedrooms and 1 baths. It can be built detached as a single family house or attached as a duplex. There is a covered back patio, and a large front patio. The ample exterior space provides more usable living space and helps make this small house feel larger with out increasing the utility bills or building cost. The plan can be attached either at the kitchen wall or the bedroom/storage wall, as shown below.

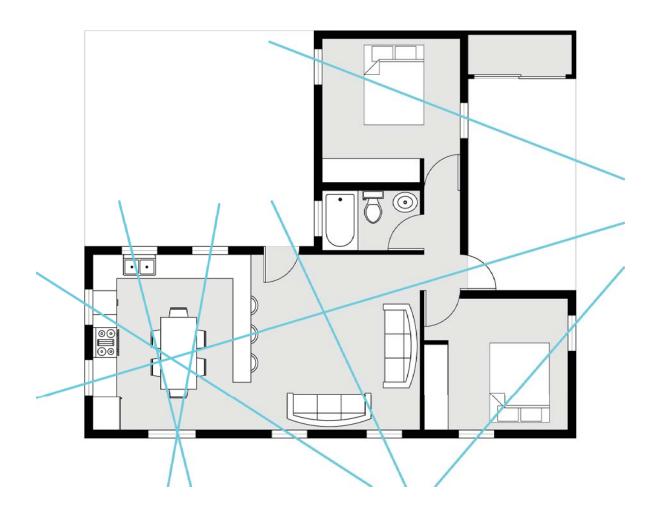




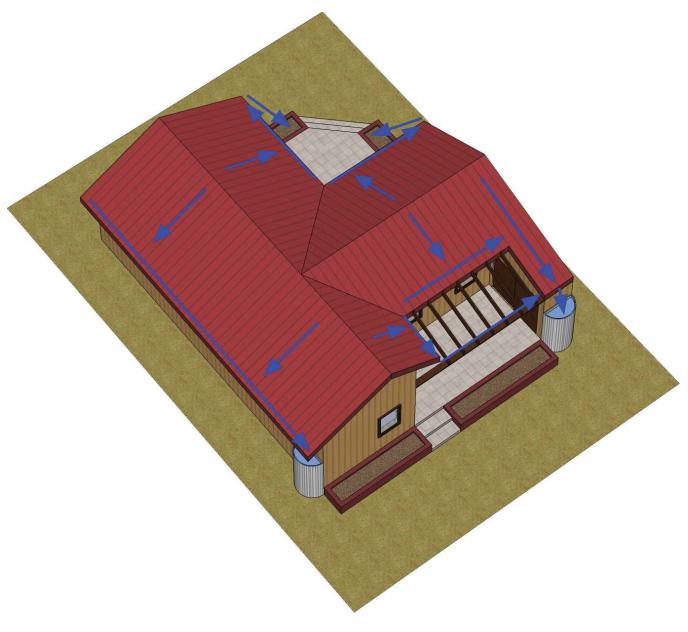


Attached/Detached House -- Natural Ventilation Diagram

This diagram shows how natural ventilation is used in this unit. The cross-ventilation flows from the courtyards through the spaces. There is ventilation through every room even when built attached. The only difference from this diagram when the duplex is attached along the kitchen wall is the subtraction of the front windows in the kitchen. There is still ventilation from the courtyard wall of the kitchen to make up for the subtraction of these windows. In the bedroom the ventilation would stay the same when the duplex was attached on the bedroom/storage wall.

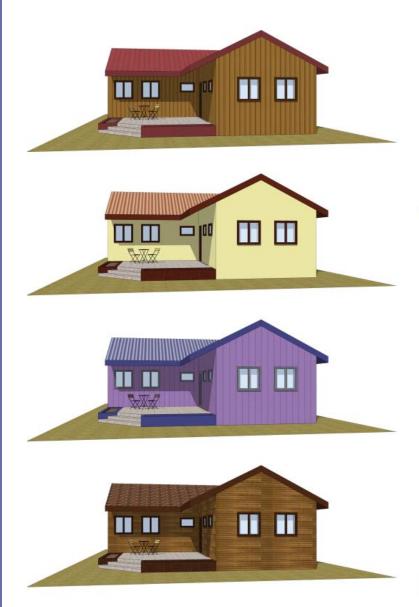


Attached/Detached House -- Water Harvesting Diagram



Housing

Attached/Detached House -- Elevations









Community Land Management Strategies

The plans in this document have incorporated public open spaces into every scheme. It is our belief that these open spaces will be cherished public amenities and will provide the residents of these developments with recreational and social opportunities. The conflict between public and private spaces, and who is responsible for them, is an issue that must be resolved. Below are descriptions of some of the more common community land management strategies in practice in the U.S. The use of a community land trust in particular is a recommended strategy for affordable housing in Patagonia.

Community Land Trusts (CLTs):

Community land trusts acquire and hold land, but sell off any residential or commercial buildings which are on the land. In this way, the cost of land in the housing equation is minimized, thus making the housing more affordable. The land leases, in addition to being long-term (typically ninety-nine years) and renewable, are also assignable to the heirs of the leaseholder. Most, if not all, CLTs have in place policies and formulas that restrict the resale price of the housing in order to maintain its long-term affordability. CLTs are democratically-controlled, non-profit corporations with an elected board of trustees. While members have a say in the policies and activities of the CLT, there is no personal ownership of any portion of any assets which the CLT may own or control.

Cooperative Housing:

A housing cooperative is formed when people join with each other to own or control the housing and/or related community facilities in which they live. Usually they do this by forming a non-profit cooperative corporation. In this respect, cooperative housing is much like a community land trust, but a critical difference between these two strategies is how home ownership is defined. In cooperative housing, the owner buys shares of the corporation, entitling them to use their housing unit and the community facilities, whereas in a community land trust, the individual actually owns their home and leases the land underneath it from the land trust.

Community Land Management Strategies Continued

Condominium:

A condominium is a form of home ownership in which individual units of a larger complex are sold. Those who purchase units in a condominium technically own everything from their walls inward, with the land owned entirely by a separate entity. All of the individual homeowners have shared rights to most common areas, such as the roads, parking, open spaces and community centers. Maintenance of these areas becomes the responsibility of a condominium association. Every owner owns a share of interest in the condominium association, plus an obligation to pay monthly dues or special fees for larger projects.

Townhouses:

A townhouse is a home that is attached to one or more other houses, but which sits directly on a parcel of land that is owned by the individual homeowners. Additional land such as roads, open space, and other community facilities are owned and maintained by the community, as are the shared structural elements such as walls and roofs.

Suburbanization:

In this scenario, the housing units and the lots they occupy are individually owned. Public spaces such as roads and open spaces would be maintained by either the town of Patagonia or a Home Owners' Association (HOA). HOAs are the governing bodies in common-interest developments such as suburban communities. Membership in a suburban HOA is usually a condition of ownership within that community. In the event a development has the HOA maintain public spaces, this work is usually contracted with private entities.

Community Land Management Strategies Sources:

Community Land Trusts, August 2007. http://www.communitylandtrust.org.uk/index.php?option=com_content&task=blogcategory&id=16&Itemid=39

National Association of Housing Cooperatives, August 2007. http://www.coophousing.org/resources_boards.shtml

PlannersWeb: Planning Commissioners Journal, August, 2007. http://www.plannersweb.com/articles/pet112.html

Poster, Prof. Charles, Interview, August 3, 2007.

Water Harvesting

Harvesting water involves the capture, diversion, and/or storage of rainwater for irrigation and other uses.

Benefits of Rainwater Harvesting

- Conserves groundwater and reduces water costs
- Reduces local flooding and drainage problems
- Flushes salt buildup
- Decreases landscaping and property maintenance needs
- Provides excellent quality water for many uses

Methods of Water Harvesting

Gabions:

Rocks bound in wire mesh are placed in drainages to slow erosion. The sides are keyed into the wash banks to hold them in place. Extra water is provided to vegetation both in and beside the wash. Gabions can be used in both major and minor drainages; however, gabions in large drainages have can have a negative impact on the water regime if not designed properly. Typically, they should be done on a smaller scale to avoid any problems.



Gabions in use

Swales:

Rainwater harvesting swales are created by digging a basin on a contour and piling the remaining dirt on the downside of the basin to create a berm. Swales are designed to slow water and spread it horizontally across the landscape. They allow water to soak into the ground, supplying vegetation with extra water and inhibiting soil erosion. Swales can be used in planting areas or on roadsides to help with erosion. The berm can become a place for pathways.



Swale

Swales used for arid agriculture

Permeable surfaces:

Pervious materials such as granite, gravel, and open paving blocks allow water to soak into the soil. Using pervious materials for parking areas, plazas, pathways, and even roads would allow water to penetrate into the ground and also soften the landscape.



Grass-Crete

Permeable Pavers

Water Harvesting Continued

Cisterns:

Cisterns are receptacles for holding rainwater that is typically collected from rooftops of buildings. Cisterns can sit on top of houses, on the ground, or be buried below ground. Some come prefabricated, but they can also be made easily. They should include a filter to keep mosquitoes and debris out. Water collected is good for irrigation purposes.



Cisterns

Retention Basins:

Retention basins, also known as retention ponds, are small earthen depressions used to harvest and hold rain water for a limited period of time. Other functions of retention basins are to filter out sediments from the held water (also to filter pollutants if it is a bioremediation retention basin) and to replenish ground water sources. They are often used to increase localized ground water replenishment around large developed sites that often have little permeable surfacing. Retention basins should be built where stormwater usually collects. They are often used for areas over 20 acres, but they can be modified for smaller scale applications.



Retention Basins

Water Harvesting Sources:

<u>Handbook of Water Sensitive Planning and Design</u>, Robert L. France, Ed. Lewis Publishers: Cambridge, 2002.

"Retention Basins", Ministry of the Environment, British Columbia, Canada. July, 2007. http://www.em.gov.bc.ca/Mining/MiningStats/Aggregate%20BMP%20Hand book/BMPs/Retention%20Basin.pdf.

"Water Harvesting Guidance Manual", City of Tucson, Department of Transportation, Stormwater Management Section. October, 2005.

"Water in the Tucson Area: Seeking Sustainability", Water Resources Research Center, College of Agriculture and Life Sciences, University of Arizona. July, 2007. http://ag.arizona.edu/AZWATER/publications/sustainability/report_html/chap4_02.html.

Plant List: Trees



Cat's claw acacia, *Acacia* greggii
Small to medium tree, yellow blooming flower puffs, full sun, frost tolerant.



Foothills palo verde, *Cercidium microphyllum*Small tree, yellow blooming flower puffs, full sun, excellent wildlife habitat.



Desert hackberry, *Celtis pallida*Small tree, red blooming flowers, full sun, fruits feed wildlife.



Sweet acacia, *Acacia farne-siana*Small to medium tree, yellow to orange blooming flowers, full sun, attracts pollinators.



Desert Museum palo verde, Parkinsonia aculeata
Small to medium tree, yellow blooming flowers, full sun.



Western hackberry, *Celtis reticulata*Medium to large tree, full sun, fruits feed wildlife.



Angelita Daisy, *Angelita Daisy*Ground cover to small shrub, yellow blooming flowers, partial sun.



Blue sage, *Salvia chamaedry-oides*Small shrub, blue blooming flowers, partial sun, attracts pollinators.



Arizona cliffrose, *Purshia* subintegra
Small to medium shrub. Perrinial, blooms in spring/summer, prefers rocky outcroppings.



Brittle bush, *Encilia farinosa* Small shrub, yellow blooming flowers and whitish leaves, full sun and even reflected heat.





Autumn sage, *Salvia Greggii* Small shrub with reddish flowers, very fragrant, attracts pollinators.



Butterfly bush, *Buddleia* davidi
Small to medium shrub, purple blooming flowers, partial sun.



Chuparosa, *Justicia californica*Small shrub, red blooming flowers, partial sun to full sun,



Gray thorn, *Ziziphus obtusi-folia*Medium to large shrub, full sun, the fruits are enjoyed by native birds such as Gambel's quail.



Desert cassia, *Cassia nemo-philia*Medium to large shrub, yellow blooming flowers, full sun and reflected heat. Tolerates frost.



Jojoba, *Simmondsia chinensis* Large shrub, full sun and reflected heat, dense branching and fruits make it a popular species for fauna.



Fairy duster, *Calliandra eriophylla*Small to medium shrub,
white to red blooming flowers, full sun, attracts pollinators.



Little leaf cordia, *Cordia* parvifolia Medium to large shrub, white blooming flowers, full sun, can tolerate reflected heat and frost.



Mexican bird of paradise, *Caesalpinia mexicana*Large shrub, yellow blooming flowers, full sun and reflected heat.



Red bird of paradise, *Caesal* Large shrub, yellow to red blooming flowers, full sun, can tolerate reflected heat, and attracts pollinators.



Mexican honeysuckle, *Justicia spicigera*Small shrub, red blooming flowers, partial sun.



Silvercloud sage, *Leucophyllum candidum* 'Silver Cloud' Small to medium shrub, purple flowers with whitish leaves, partial to full sun, can tolerate reflected heat.



Red justicia, *Justicia candu-cans*Small shrub, red blooming flowers, partial to full sun.



Silvercloud cassia, *Cassia* artemisioides
Medium shrub, orange blooming flowers with light green-silver leaves, partial sun to full sun, drought resistant.



Tombstone rose, *Rosa bank-siae*Large shrub, can be trained as a vine, small white blooming flowers, partial to full sun.



Sandpaper verbena, *Verbena rigida*Groundcover to small shrub, purple blooming flowers, partial to full sun, tolerates reflected heat.



Wooley butterflybush, *Angelita Daisy*Small shrub, white to yellow to red blooming flowers, light green to whitish leaves, partial sun, attracts pollinators.

Plant List: Desert Adapted



Blue agave, *Agave tequilana* Small to medium shrub, full sun, can tolerate reflected heat.



Desert spoon, *Dasylirion* wheeleri
Medium shrub, spiny, full sun, tolerates reflected heat.



Buckhorn cholla, *Opuntia* acanthocarpa
Medium to large shrub, red flowers, full sun, tolerates reflected heat. Excellent bird habitat.



EDesert christmas cholla, *Opuntia leptocaulis*Medium to large shrub, white flowers, full sun, tolerates reflected heat. Excellent bird habitat. The fruits are edible.



Hedgehog cactus, *Echinocereus triglochidiatus*Groundcover to small shrub, red to purple flowers, full sun, tolerate reflected heat, edible fruit.

Plant List: Desert Adapted



Hohokam agave, *Agave murpheyi*Medium to large shrub, huge flowering stalk, full sun, tolerates reflected heat, many traditional indigenous uses.



Red yucca, *Hesperaloe par-viflora*Small to medium shrub, red to pink flowers on a very dramatic stem, full sun, tolerates reflected heat.



Pencil cholla, *Opuntia ramosissima*Medium to large shrub, red flowers, full sun, tolerates reflected heat, edible fruits, excellent bird habitiat.



Soaptree yucca, *Yucca elata* Large shrub, full sun, very sculptural, fronds used for weavings and ropes.



Prickly pear, *Opuntia spp*. Medium to large shrub, red flowers with numerous red fruits, full sun, reflected heat tolerant.



Tree beargrass, *Nolina matapensis* Large shrub, full sun, tolerates reflected heat, seeds are eaten by wildlife.

Plant List: Accents



Arizona grape, *Vitis arizonica* Vine, greenish-white flowers and purple fruits, partial sun, people and animals eat the fruit.



Devil's Claw, *Proboscidea* parviflora
Groundcover to small shrub, yellow to pinkish-purple flowers that can be quite large, partial to full sun.



Bull grass, *Angelita Daisy* Groundcover to small shrub, yellow blooming flowers, partial sun,



Deer grass, *Muhlenbergia rigens* Grass, full sun, birds eat the seeds.

this EMPI form.

EMPLOYEE SURVEY - All responses will be anonymous. Please do not put your name on this form.	II be anony	mous. Pie	ease do no	t put your r	name on this
Please answer the following questions.					
Do you currently own or rent your home? Ov	Own Rent	t			
Do you currently live in patagonia? Yes	No				
If you answered NO to the above question:					
Where do you currently live?					I
What are the factors that have influenced your decision to live outside of Patagonia? (Please check all that apply) To be near family or friends Housing costs are too high Lack of rental housing A short supply of housing Lack of nearby amenities (shopping, daycare, entertainment) Other (please specify)	d your decisi oing, daycare	on to live o	outside of Pa	tagonia?	
What would attract you to live in Patagonia?	onia?				I
Please rate the following statements:	Strongly	Agree	Disagree	Strongly Disagree	Don't Know / Unsure
There is an adequate availability of housing in Patagonia					
There is an adequate availability of housing suitable for families in Patagonia.					
There is an adequate availability of housing for purchase in Patagonia.					
There is a an adequate availability of quality rental housing in Patagonia.					
There are adequate amenities in Patagonia (shopping, daycare, schools, entertainment, etc.)					

Please provide any additional comments on housing issues in Patagonia:

