[inside]OUT

environment and education as one

a senior thesis by

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TABLE OF CONTENTS

PROJECT OVERVIEW

Typology: landscape design

Site: Channel Islands High School (CI) in Oxnard, California
(alma mater, class of 2010)

Concept: The flow of water, people, and ideas.

Mission: Reduce water consumption and improve outdoor spaces.

DATA COLLECTION

The following elements are site inventory concerning site basics and water consumption. These are the building blocks that revealed the site's context, opportunities, and constraints.

DATA COLLECTION

I started my site inventory by taking photos of the school (below). Although I spent four years walking these halls, I had to asess the outdoor spaces though a new lense. With the design knowledge I have gained in my past 5 years at Cal Poly as a landscape architecture major, I saw my high school anew. CI is pretty much how I left it, but in a new context of severe drought. With this new perspective, I sought to design new open spaces that reflect daily student circulation and programs.

Next, I researched water data. In addition to volumes of water consumed, I mapped the hard and vegetated surfaces to see where infiltration was inhibited, and so on. Futhermore, I looked at the active water restrictions in Oxnard against those of nearby cities. Finally, I obtained a document on CI's current conservation efforts--a Landccape Water Use Survey Report. I hoped to lay out all the existing conditions against my vision for the school and see where to fill in the gaps.

site photos

Oxnard Union High School District, Oxnard, CA

Meter Summary by Period BL - 01

yyyy-mm	Start Date	End Date	#Days	Use	Billed Demand	Actual Demand	Cost	Cost / Unit	Cost / Day	Use / Day
Place: [CIHS] Channel Islands High School							**Energy Type: Irrigation - CCF**			
Meter: [IR-20655-170775] Channel Island High School							**Cost Center: [OUHSD] Oxnard Union High SD - CA**			
Rate: IRR										
Account: [IR-20655-170775] Channel Islands High School							**Vendor: [COO] City of Oxnard**			
2014 - 01	1/6/2014	2/3/2014	28	1,339 CCF			$5,059.98	$3.779	$180.71	47.83
2014 - 02	2/3/2014	3/4/2014	29	814 CCF			$3,186.81	$3.917	$109.89	28.06
2014 - 03	3/4/2014	4/2/2014	29	1,015 CCF			$3,944.45	$3.886	$136.02	35.00
2014 - 04	4/2/2014	5/6/2014	34	2,042 CCF			$7,804.09	$3.823	$229.53	60.05
2014 - 05	5/6/2014	6/3/2014	28	2,475 CCF			$9,435.17	$3.812	$336.97	88.39
2014 - 06	6/3/2014	7/2/2014	29	1,834 CCF			$7,022.01	$3.830	$242.14	63.23
2014 - 07	7/2/2014	8/5/2014	34	2,166 CCF			$8,272.96	$3.819	$243.32	63.71
2014 - 08	8/5/2014	9/4/2014	30	1,720 CCF			$6,594.49	$3.834	$219.82	57.33
2014 - 09	9/4/2014	10/1/2014	27	1,383 CCF			$5,327.37	$3.852	$197.31	51.22
2014 - 10	10/1/2014	11/3/2014	33	1,457 CCF			$5,606.74	$3.848	$170.51	44.16
2014 - 11	11/3/2014	12/3/2014	30	958 CCF			$3,727.87	$3.893	$124.26	31.92
2014 - 12	12/3/2014	1/5/2015	33	178 CCF			$796.95	$4.477	$24.15	5.39
Meter [IR-20655-170775] Channel Island High School Totals:			**364**	**13,002 KGAL**			**$66,778.89**			

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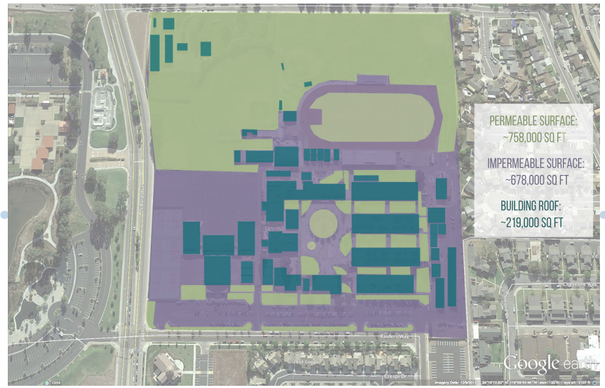
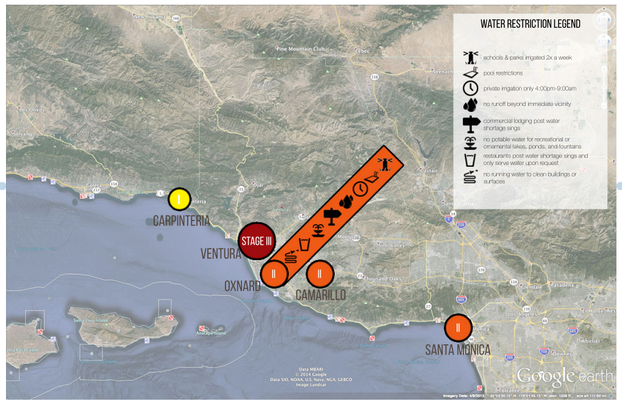
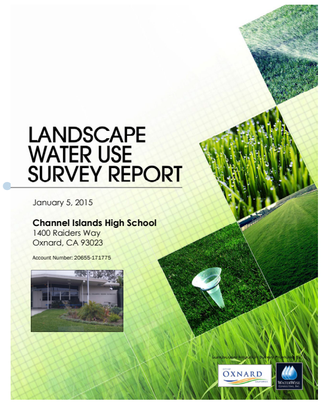
2014 water consumption data for irrigation at CI
(CIHS 2014 Water Usage, 2015, p. 1)



map of surfaces
(aerial photograph - Google, 2015)



map of water restrictions
(aerial photograph - Google, 2015)



courtesy of MaryAnn Larrieu
(WaterWise Consulting Inc. & City of Oxnard, 2015, p. cover)

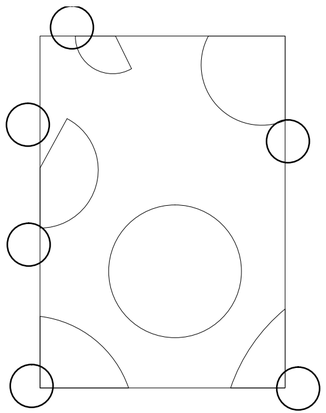
DATA INTERPRETATION

Here, the bits and pieces from the previous section come together as they are *visualized, interpreted and analyzed.* As a result, patterns were revealed that helped focus my project.

DATA INTERPRETATION

The next tier in my design process was to start layering data to create vizualizations. By representing the site inventory graphically, I was able to gain insight into what kind of design interventions I should pursue. For example, the top right graph was my first eye-opener. It compares CI's 2013 water consumption on two levels. The left halves of the circles represent irrigation and domestic water from January to December. The right halves of both circles are the amount of rainwater the site would collect from roof surfaces over a year. As a result, I was able to see just how much more water was used for irrigation. Moreover, it's evident that rainwater harvesting would not make a dent in irrigation while it would be closer to offsetting domestic water. Underneath is a volumetric visualization to further highlight the difference.

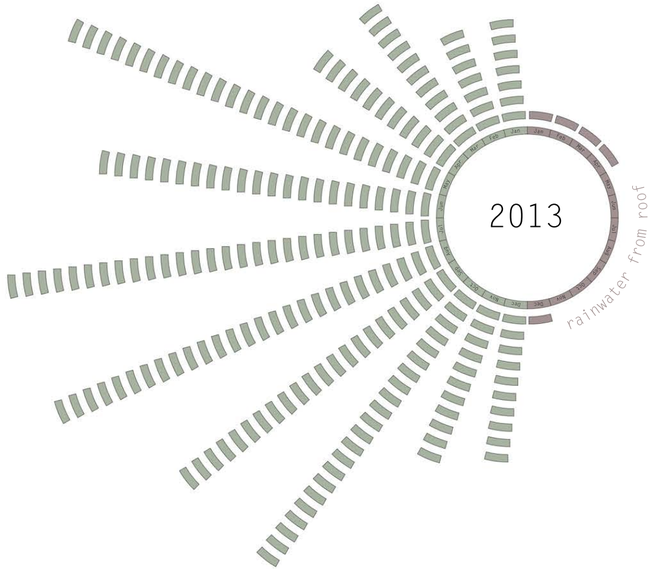
Below is a graphic showing the existing landscape for the Quad, the central plaza of campus. I layered the planters/obstacles with the circulation nodes that get the most pedestrian traffic. Consequently, I saw a discrepancy between the most efficient pathways and the orientation of the planted areas.

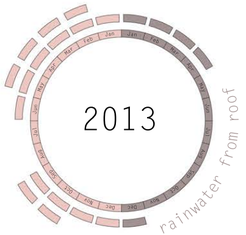


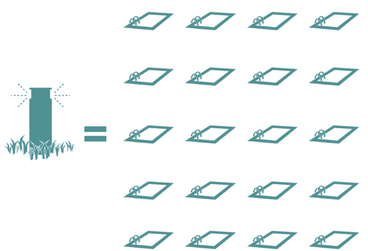
The Quad + circulation nodes
(aerial photograph - Google, 2015)

water consumed
for irrigation

water consumed
for domestic use







annual totals as
Olympic swimming pools
(660,000 US gal each)

CIHS water consumed
and collected on
roofs over one year

1 bar = 100 CCF
(hundred cubic feet)

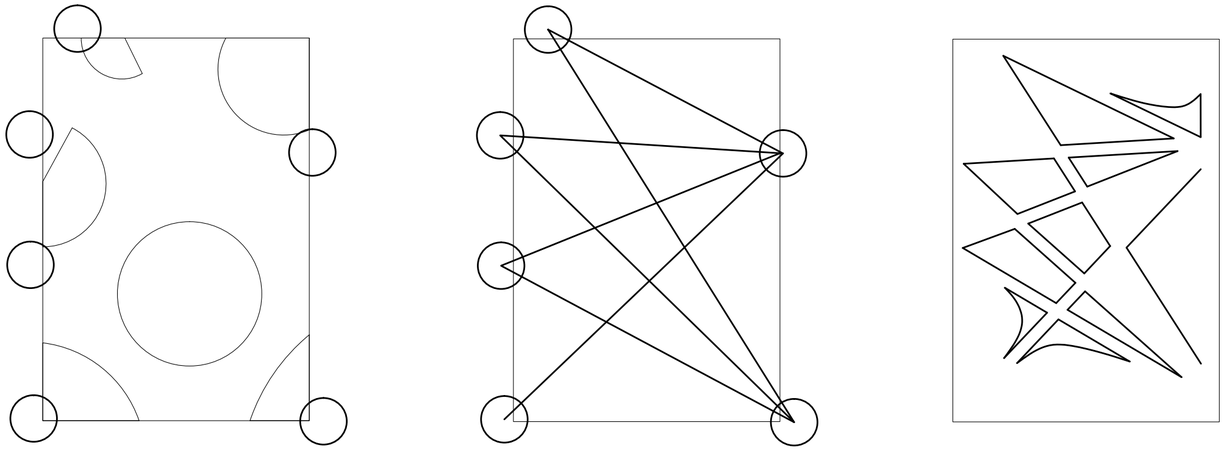
DATA SYNTHESIS

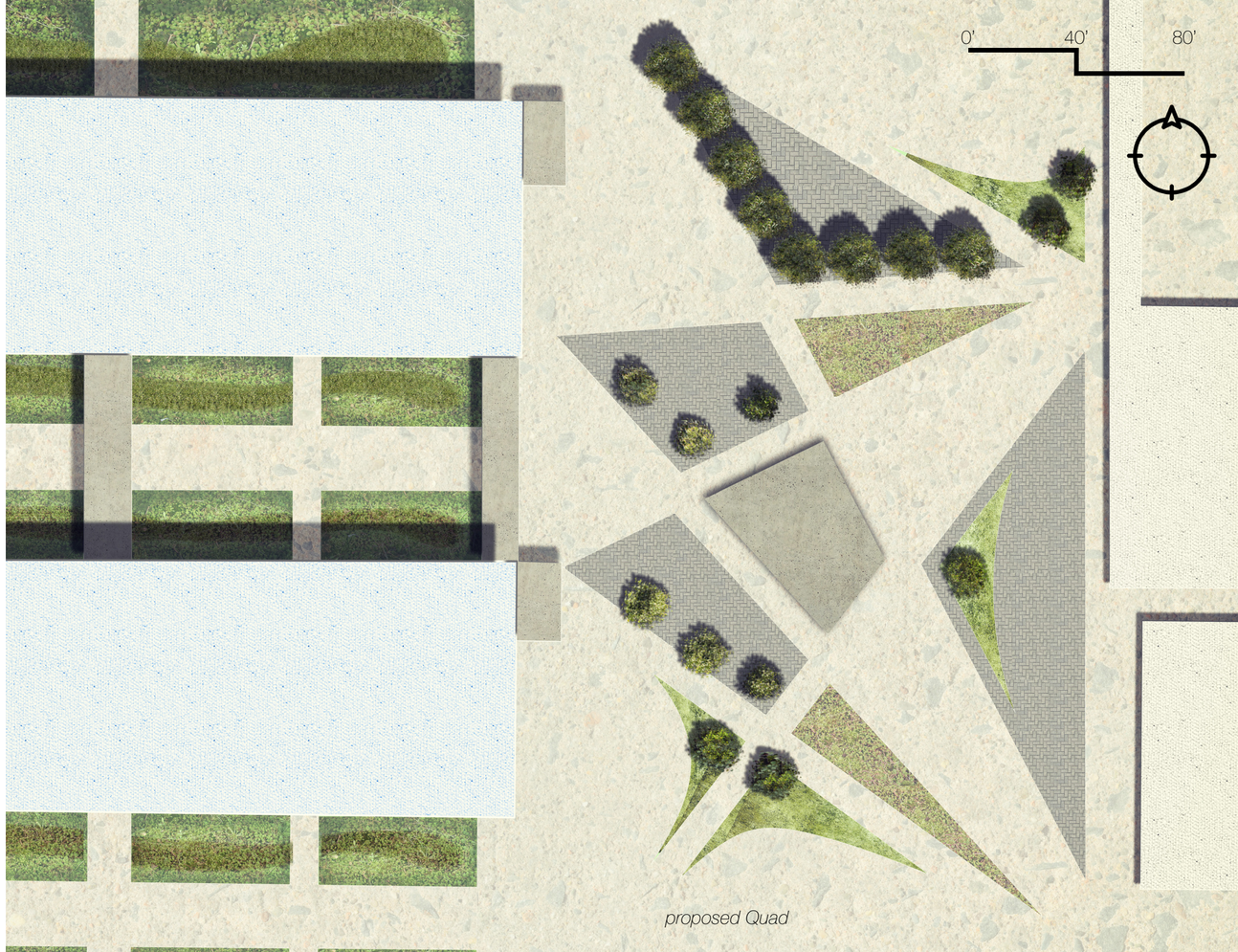
The aforementioned analysis is synthesized with my new ideas to produce my senior thesis.

DATA SYNTHESIS: [INSIDE]OUT

My primary motivations are user-based design, the water cycle, and the state-wide drought. In focusing on the Quad, I used a connection of the circulation nodes to create the new pathways and outdoor spaces. I also added more shade trees and seating for students to use. At the same time, I wanted to allow for multi use for the extracurricular groups and various events hosted on campus.The planted areas also serve more than one purpose. They will be used to educate on water-wise, site specific planting. My proposed Quad freatures 34% less irrigated area.

form generation





proposed Quad

DATA SYNTHESIS: [INSIDE]OUT

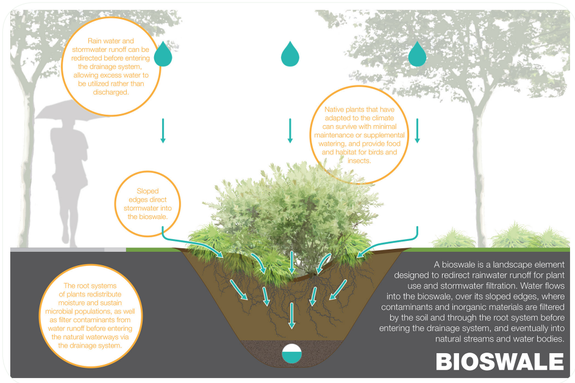
How can a water-conscious design benefit Channel Islands High School?

educational opportunities

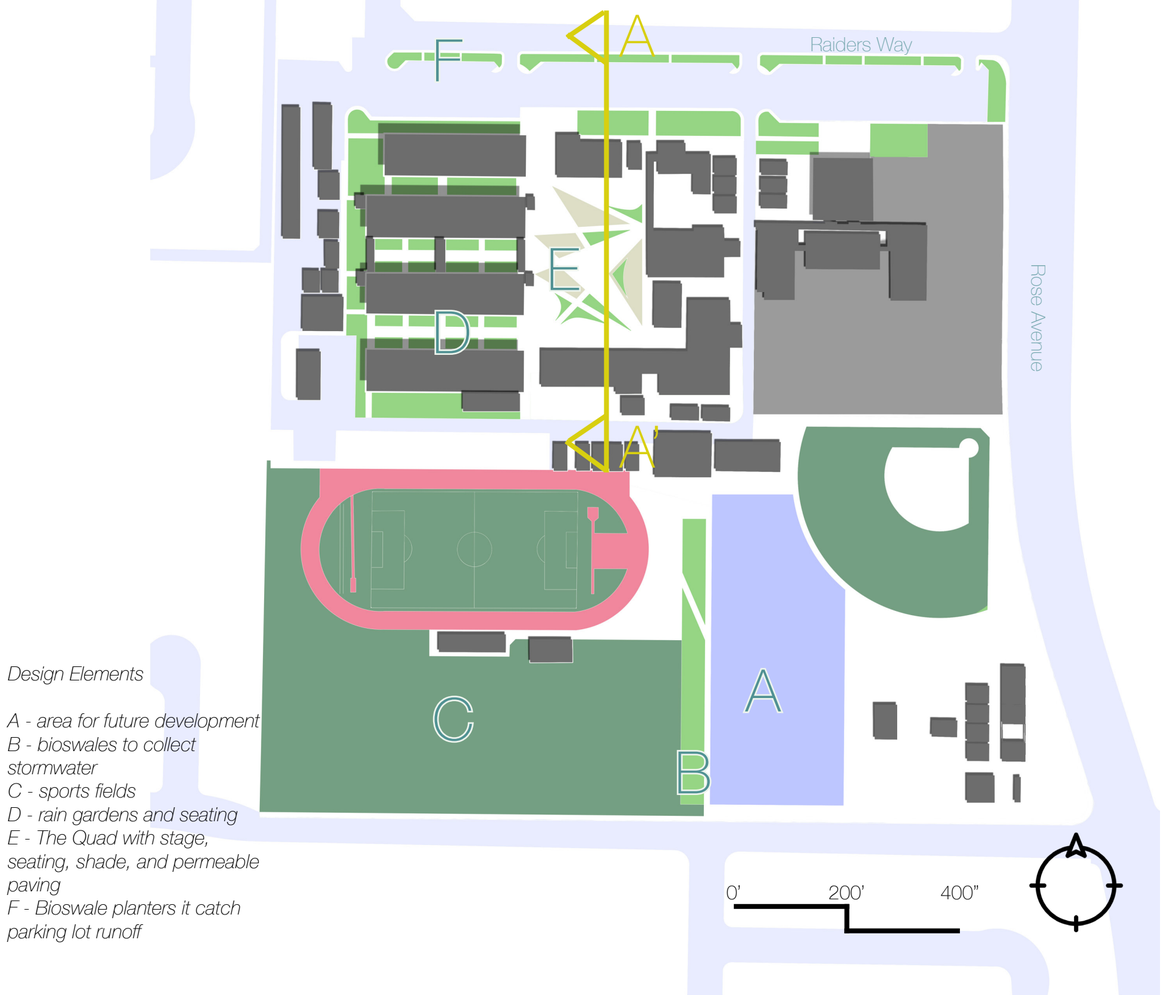
- biology classes and environmental clubs can conduct experiments
- outdoor spaces for demonstration, performances, or class on a sunny day
- multi-use outdoor spaces
- ways for students to connect with the landscape
- space for expansion

Low Impact Development (LID)

- mimics pre-development conditions
- retains and treats stormwater on-site
- allows rainwater to infiltrate through permeable paving, rain gardens, and bio swales
- slows the speed of stormwater, lessening the impact of erosion
- reduces pollution through filtering vegetation



an example of an LID technique - the bioswale (Asakura Robinson Company, 2015)

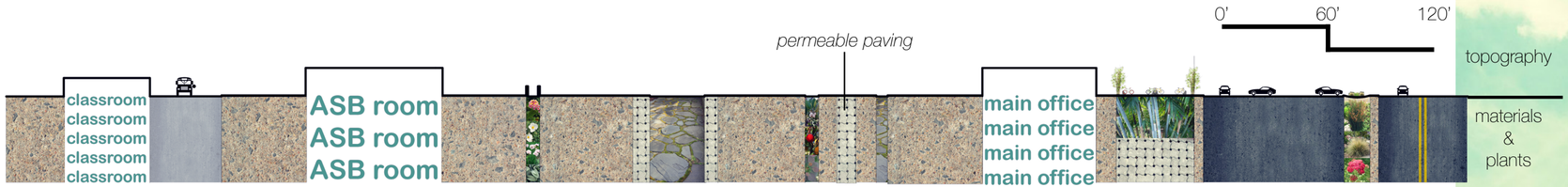


Design Elements

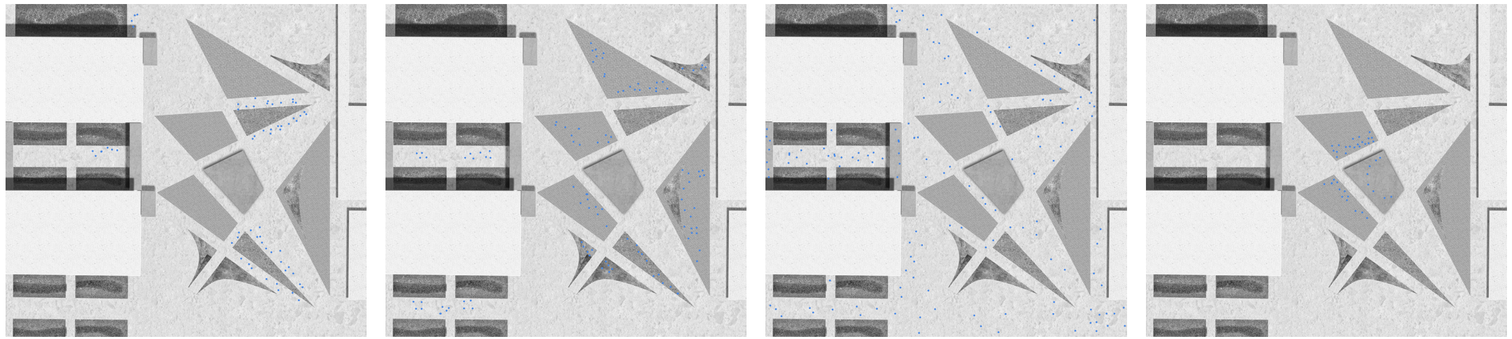
A - area for future development
B - bioswales to collect stormwater
C - sports fields
D - rain gardens and seating
E - The Quad with stage, seating, shade, and permeable paving
F - Bioswale planters it catch parking lot runoff

DATA SYNTHESIS: [INSIDE]OUT

Section A - A'



Program Diagrams



during class *lunch* *passing period* *lunch rally*

Quad perspective from north-east

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