

ICING ON THE CAKE

WHERE INFRASTRUCTURE MEETS SUSTAINABLE LANDSCAPES



LYNN CAPOUYA INC.
LANDSCAPE ARCHITECTS

LANDSCAPE ARCHITECTURE



WHAT MY FRIENDS THINK I DO



WHAT MY MOM THINKS I DO



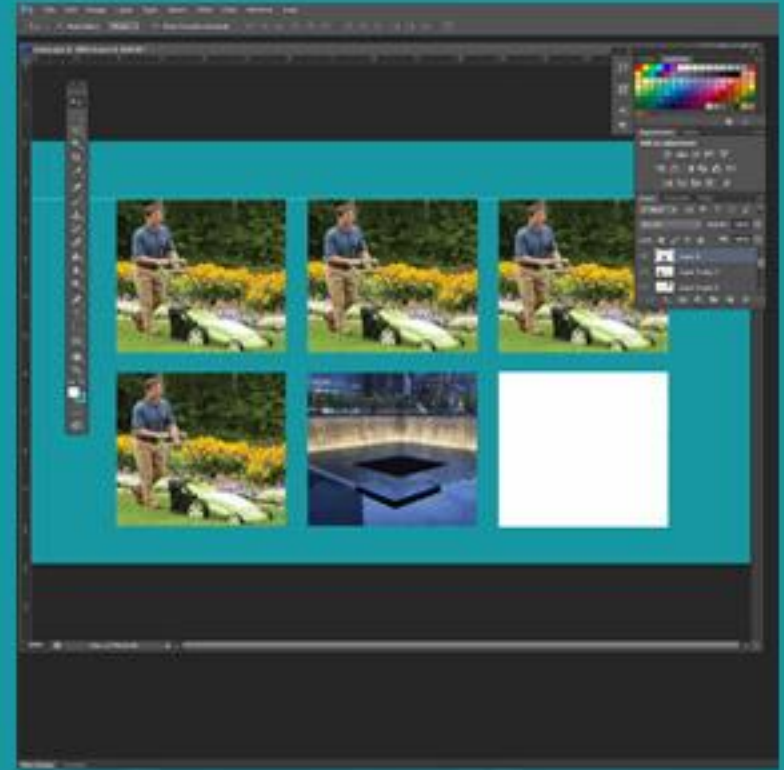
WHAT SOCIETY THINKS I DO



WHAT ARCHITECTS THINKS I DO



WHAT I THINK I DO



WHAT I REALLY DO

VALUE

LCI

ADDS

+ WATER MANAGEMENT

maximize irrigation efficiency | water capture + quality + reuse | turf to drought tolerant

+ PERFORMANCE METRICS

water use calculations + water use projections vs. CA state requirements (ab1881)

+ COMPREHENSIVE SUSTAINABILITY

analysis of site issues | strategic master planning | implementation | education

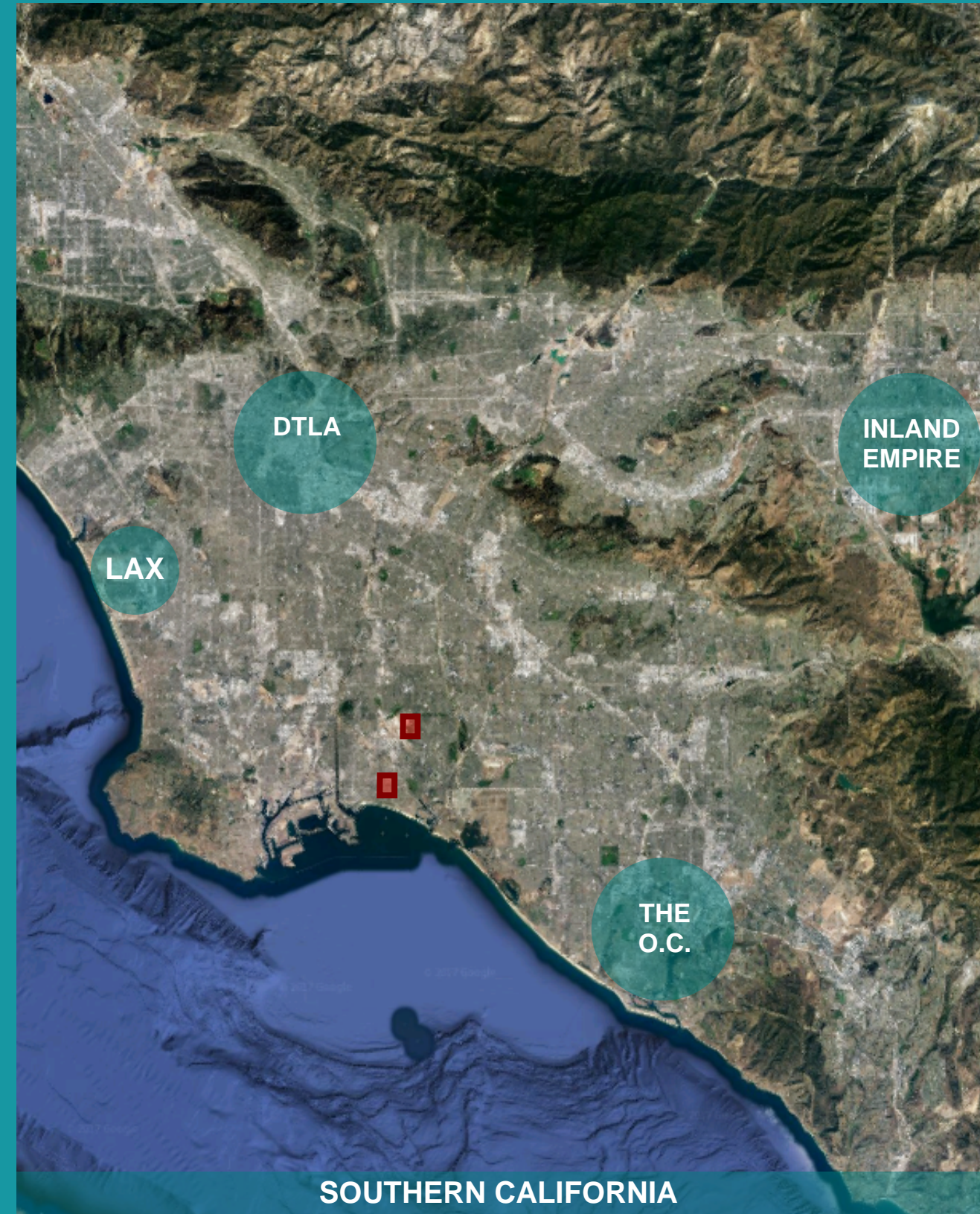
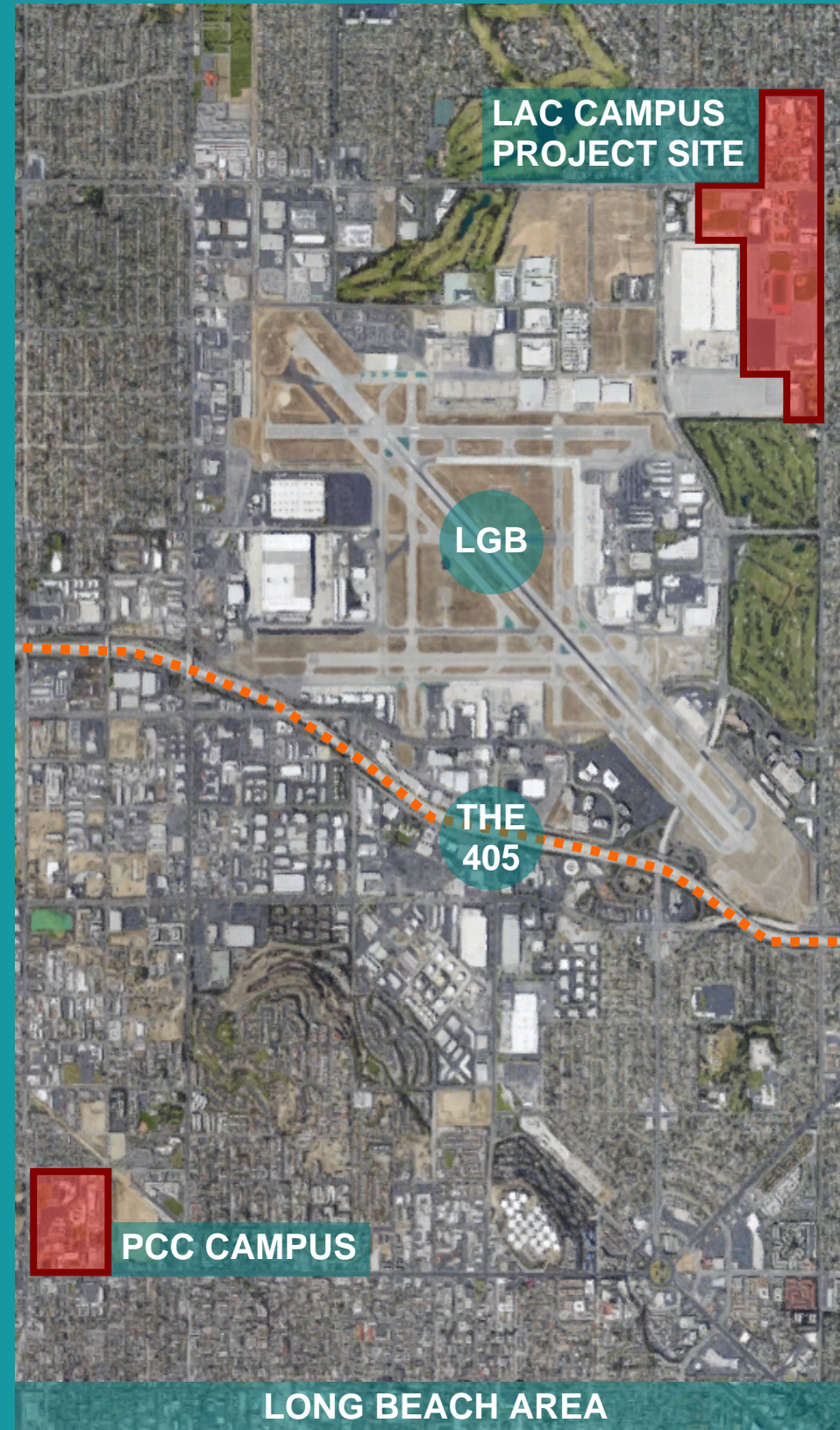
LBCC

CAMPUS OVERVIEW



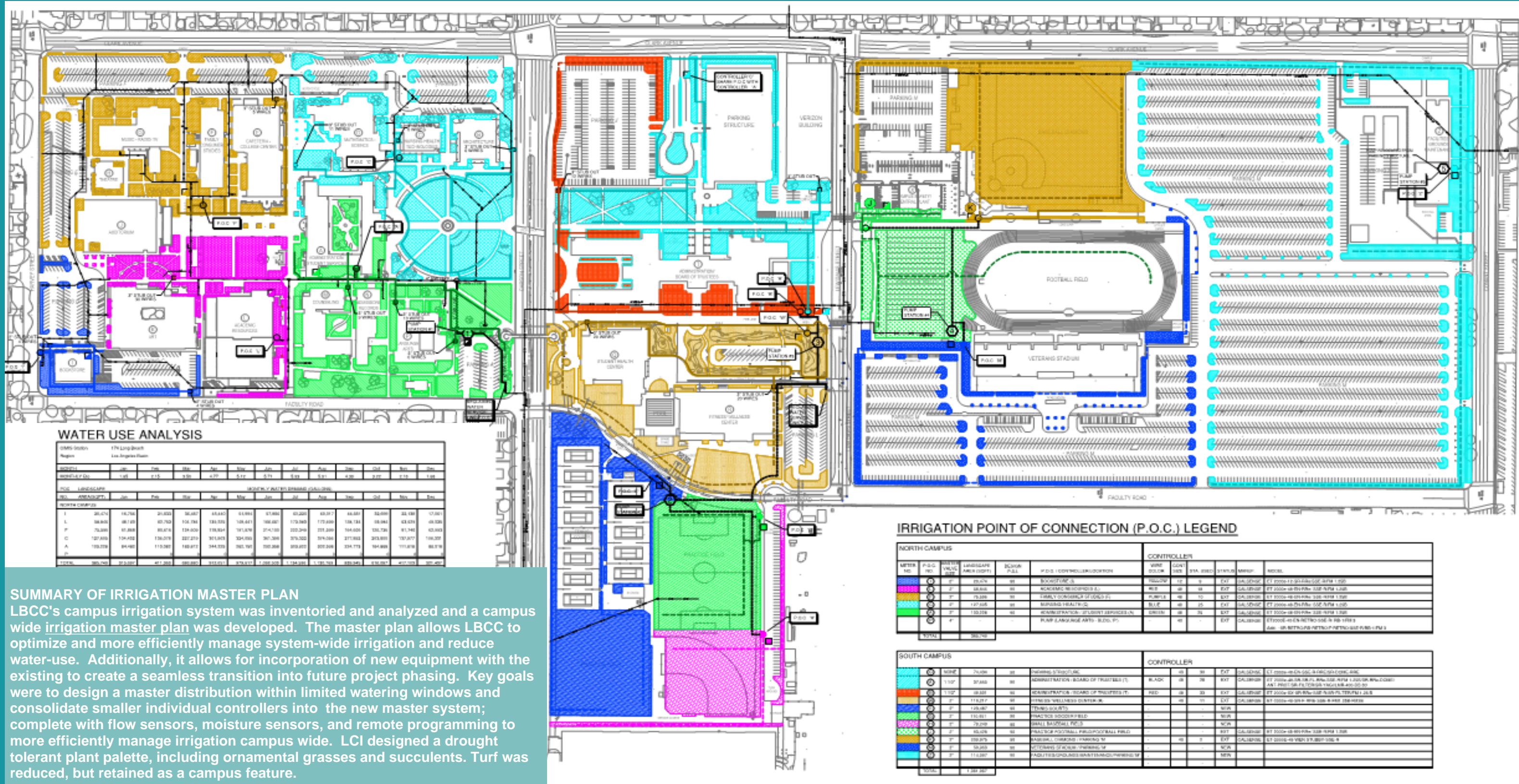
STATISTICS

- Origin - founded in 1927
- Geography - Located in Long Beach, California 22 miles southeast of LAX Airport
- Campus - 2 locations in Long Beach - a Liberal Arts campus (LAC - 112 acres) and a Pacific Coast campus (PCC - 30 acres).
- Population - 24,739 students
 - 56% Hispanic
 - 14% White
 - 13% African American
 - 12% Asian / Pacific Islander
 - 4% Multi-ethnicity
 - 1% Native American / Unreported
- Education - 820 courses
 - 46% Bachelor's Degree
 - 7% Associate Degree
 - 19% Vocational
 - 2% Personal
 - 4% Basic Skills
 - 16% Undecided
 - 7% Unreported
- Athletics - 18 programs with more national and state titles than any other CA Community College.



L B C C

IRRIGATION MASTER PLAN - CONNECTING THE WATER



SUMMARY OF IRRIGATION MASTER PLAN
 LBCRC's campus irrigation system was inventoried and analyzed and a campus wide irrigation master plan was developed. The master plan allows LBCRC to optimize and more efficiently manage system-wide irrigation and reduce water-use. Additionally, it allows for incorporation of new equipment with the existing to create a seamless transition into future project phasing. Key goals were to design a master distribution within limited watering windows and consolidate smaller individual controllers into the new master system; complete with flow sensors, moisture sensors, and remote programming to more efficiently manage irrigation campus wide. LCI designed a drought tolerant plant palette, including ornamental grasses and succulents. Turf was reduced, but retained as a campus feature.

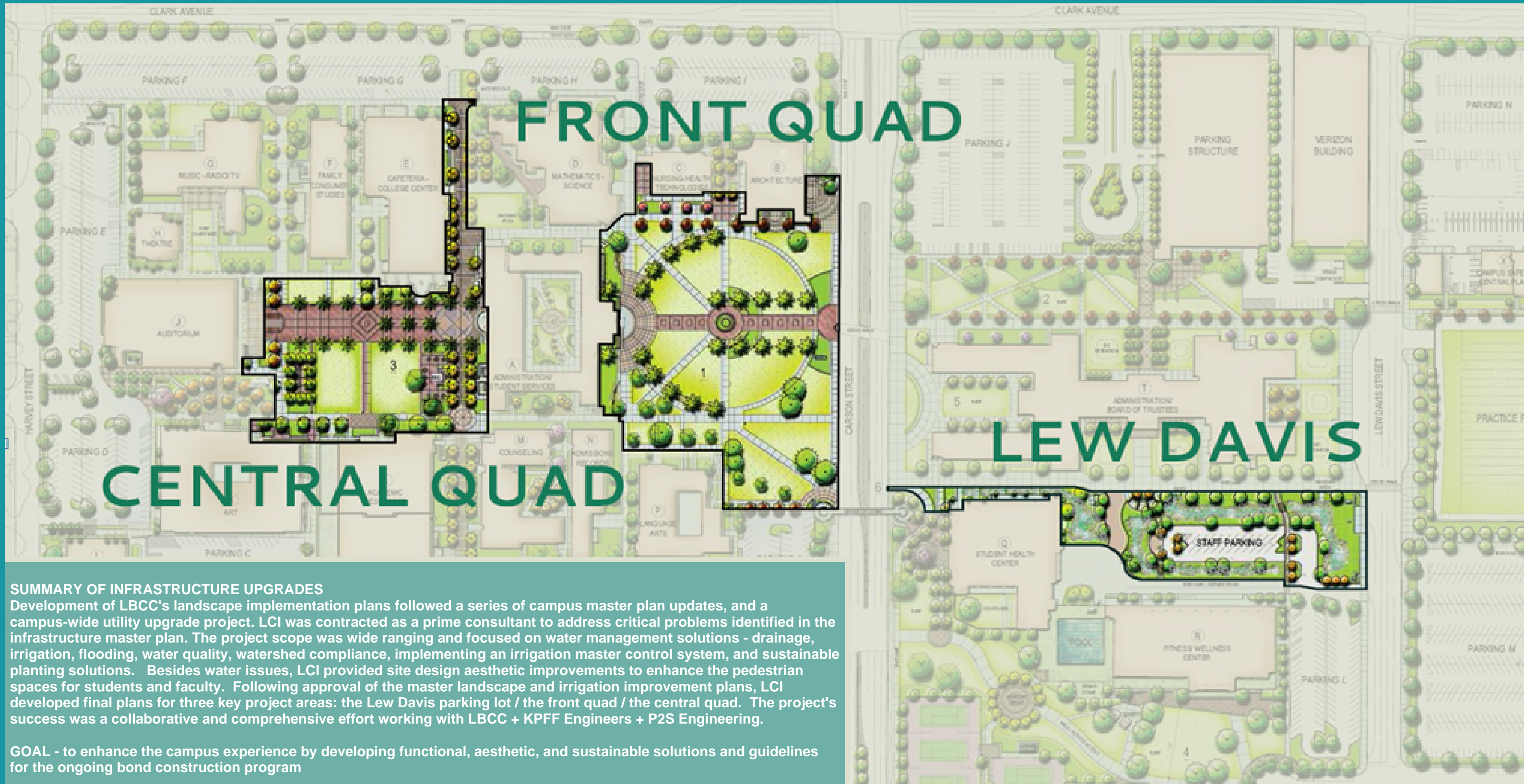
L B C C

1 CAMPUS + 3 SITES + 3 SOLUTIONS



LBCC

1 CAMPUS + 3 SITES + 3 SOLUTIONS



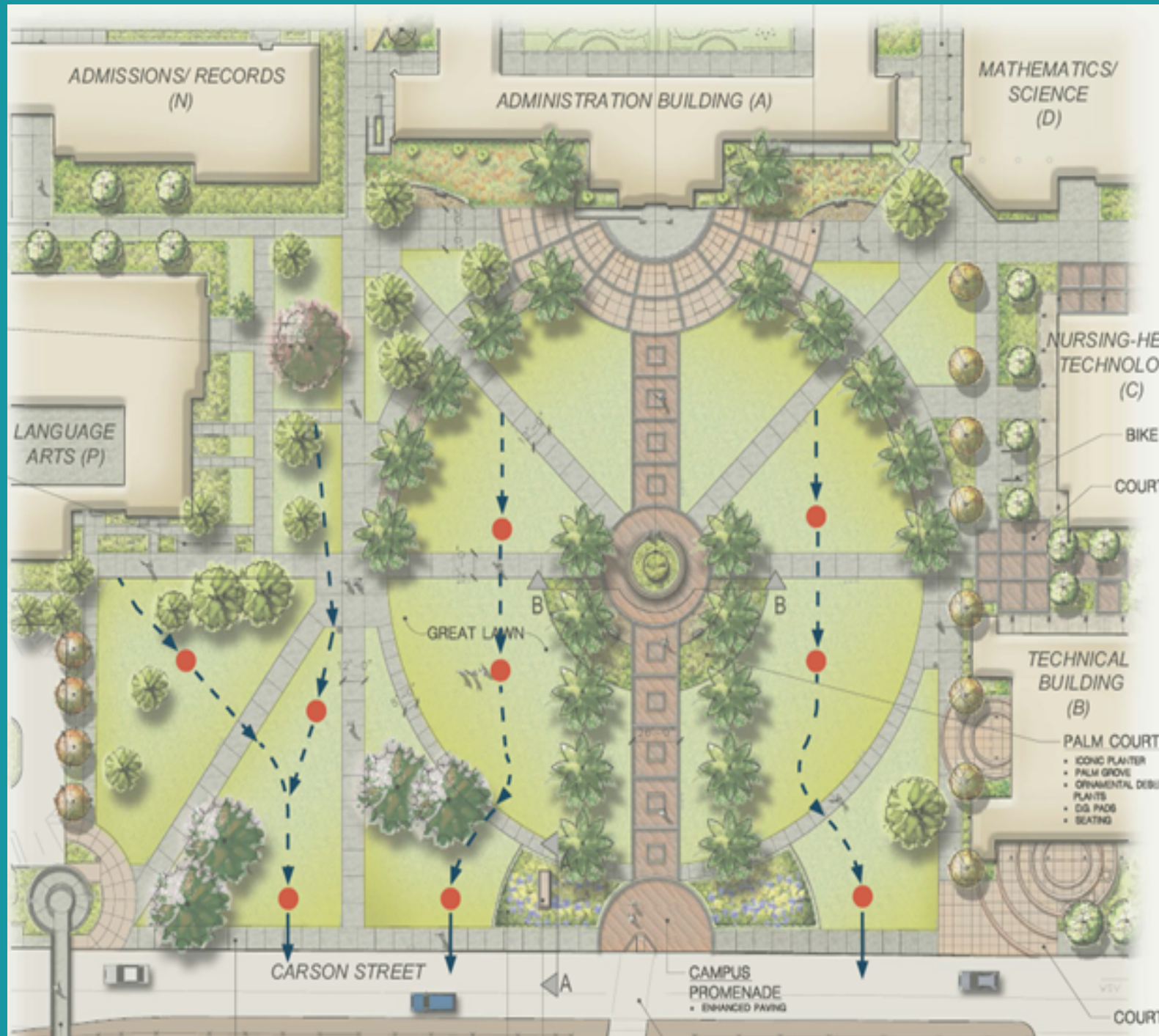
SUMMARY OF INFRASTRUCTURE UPGRADES

Development of LBCC's landscape implementation plans followed a series of campus master plan updates, and a campus-wide utility upgrade project. LCI was contracted as a prime consultant to address critical problems identified in the infrastructure master plan. The project scope was wide ranging and focused on water management solutions - drainage, irrigation, flooding, water quality, watershed compliance, implementing an irrigation master control system, and sustainable planting solutions. Besides water issues, LCI provided site design aesthetic improvements to enhance the pedestrian spaces for students and faculty. Following approval of the master landscape and irrigation improvement plans, LCI developed final plans for three key project areas: the Lew Davis parking lot / the front quad / the central quad. The project's success was a collaborative and comprehensive effort working with LBCC + KPFF Engineers + P2S Engineering.

GOAL - to enhance the campus experience by developing functional, aesthetic, and sustainable solutions and guidelines for the ongoing bond construction program

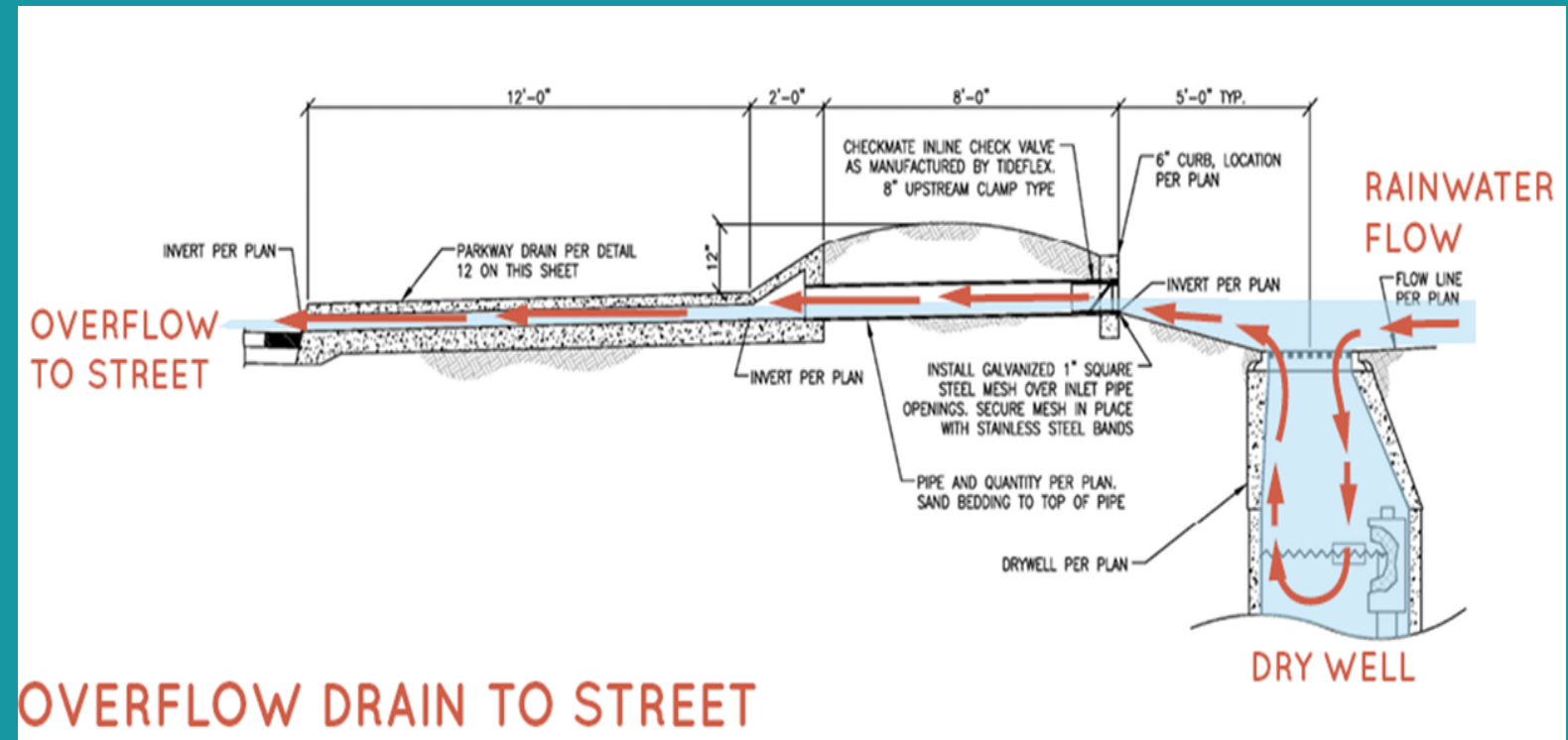
L B C C

FRONT QUAD SOLUTION



SUMMARY OF FRONT QUAD

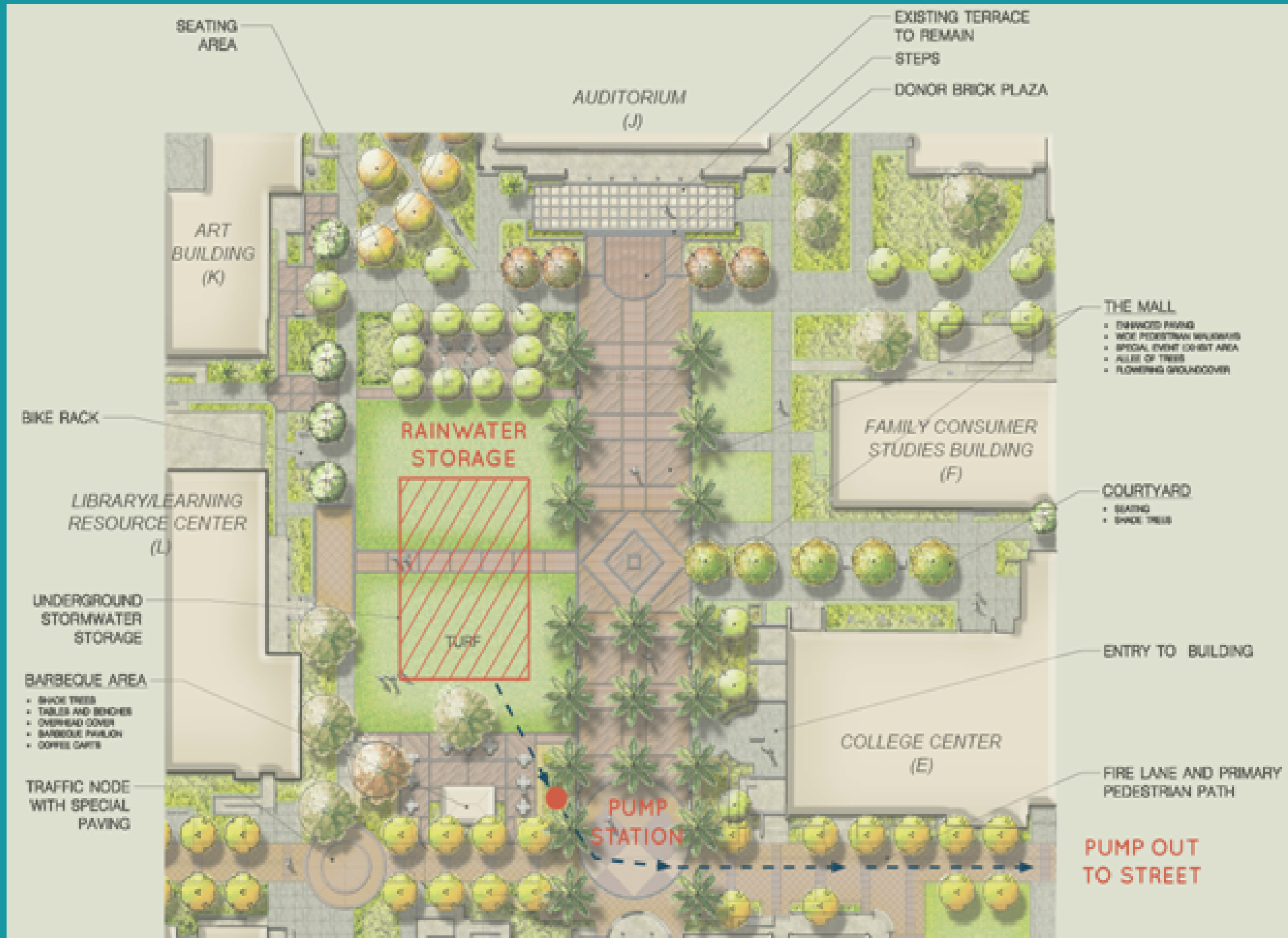
The front quad was flat and had no drainage - any rain equaled flooding. There were extensive utility conflicts, plus no documentation for some of the underground infrastructure. Space for drainage retention was limited to a few spots. The school did not want runoff from the quad going into an already overloaded city stormwater system. The solution was a series of concrete dry wells (red dots) to retain water until it could infiltrate into the ground or overflow into city system. The wells have a 4' interior diameter with 4"-thick precast concrete liners.



● CONCRETE DRY WELLS

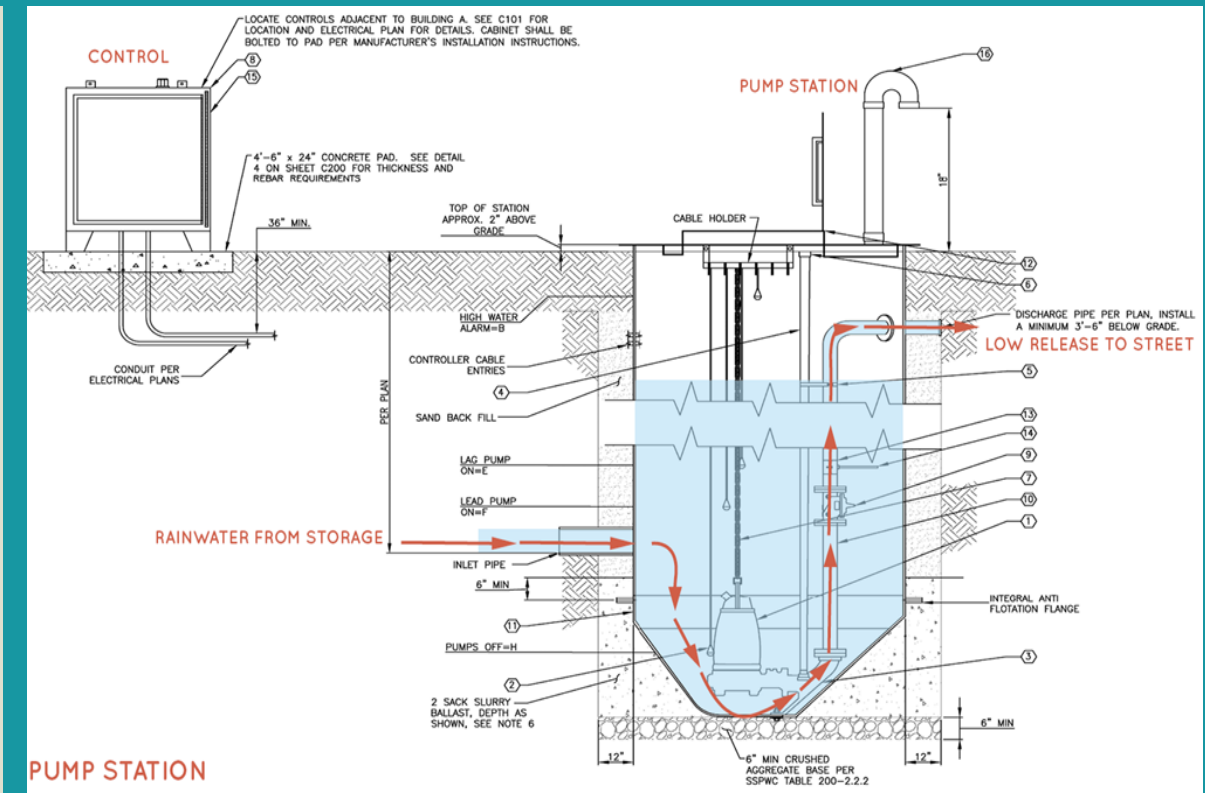
L B C C

CENTRAL QUAD SOLUTION



SUMMARY OF CENTRAL QUAD

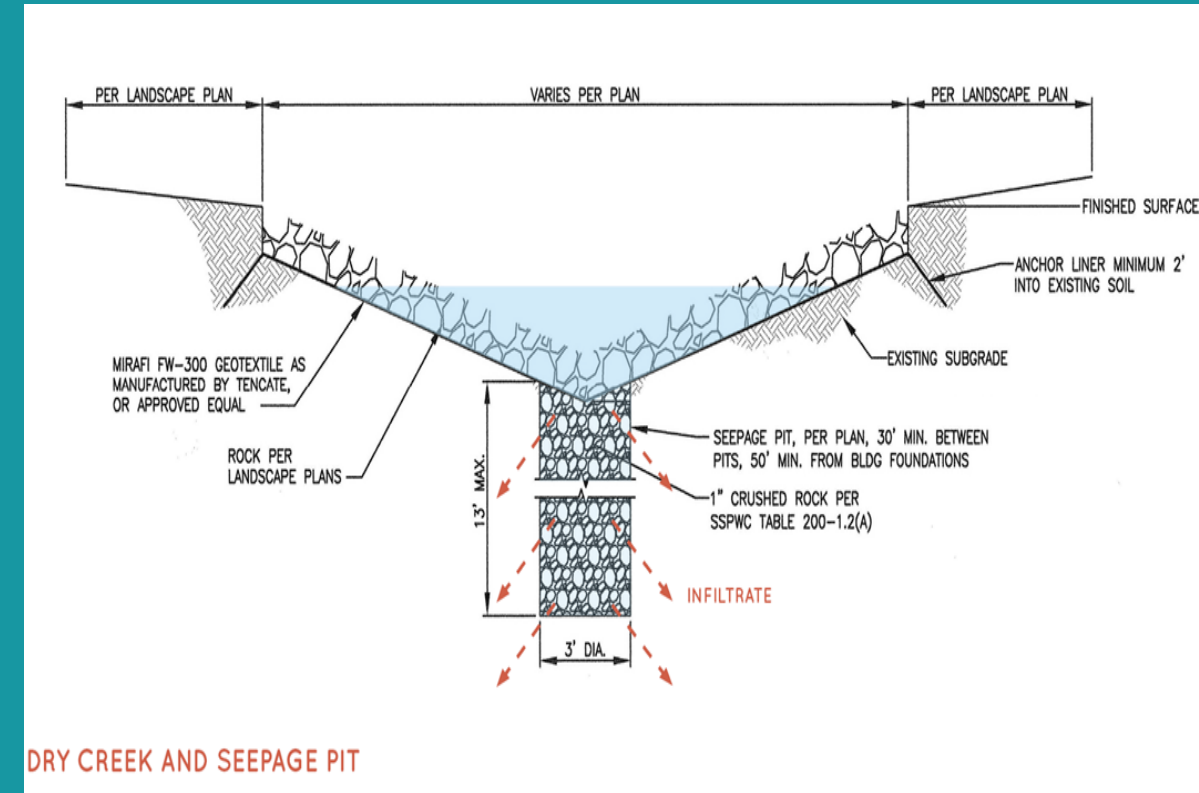
The central quad had a flat terrain with an undersized drainage system. The existing large turf areas (balanced by new drought-tolerant plantings) allow for underground water capture and retention of runoff. A horizontal system of 8' diameter galvanized storage tubes were implemented as the best solution for water capture and retention option. This stored runoff is released slowly to a pump station via concrete drainage tubes three feet in diameter, augured to a depth of 13 feet. The pump station regulates the release of this runoff to the street, where it flows into the city's stormwater system.



8' DIA. GIANT TUBES UNDER GREEN SPACE FOR RAINWATER STORAGE

L B C C

LEW DAVIS PARKING SOLUTION



DRY CREEK AND SEEPAGE PIT



VEGETATED DRY CREEK WITH SEEPAGE PITS

SUMMARY OF LEW DAVIS PARKING LOT

The existing parking lot site was flat, had poor drainage and received runoff from adjacent buildings and street which inevitably caused flooding. Additionally, the site had a high water table and potential archaeological impacts if excavation exceeded 13 feet. The proposed design employed concrete drainage tubes three feet in diameter, augured to a depth of 13 feet. The tubes collect the runoff from the street and adjacent buildings during storms and retain it in the managed drainage swale until the water can infiltrate first into the tubes and then through the clay soil and into the water table.

LBCC

CREATING A COMMUNITY ASSET



FRONT QUAD - BEFORE



CENTRAL QUAD - BEFORE



LEW DAVIS PARKING - BEFORE



FRONT QUAD - AFTER



CENTRAL QUAD - AFTER



LEW DAVIS PARKING - AFTER





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ALVORD USD

CAMPUS OVERVIEW

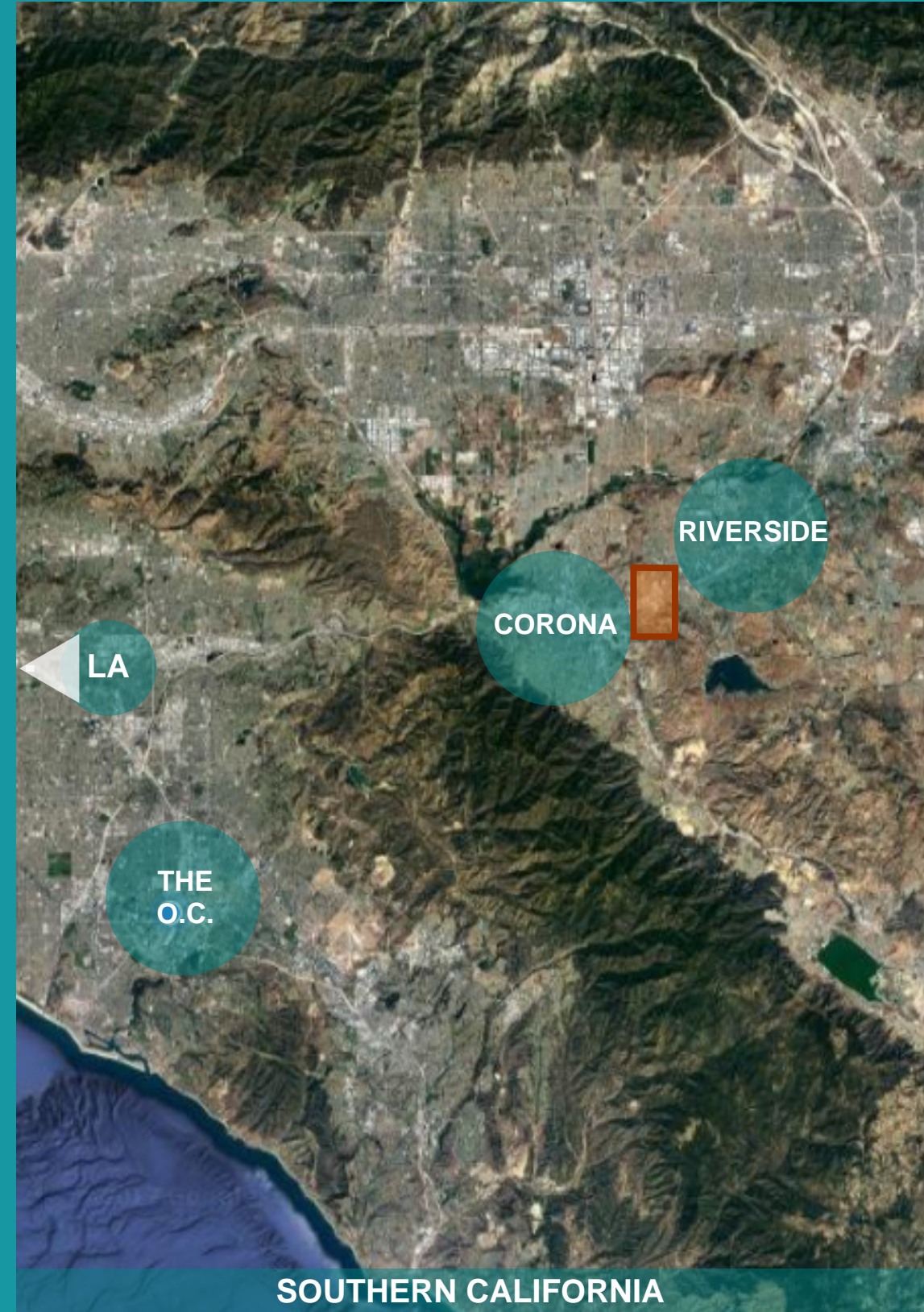


STATISTICS

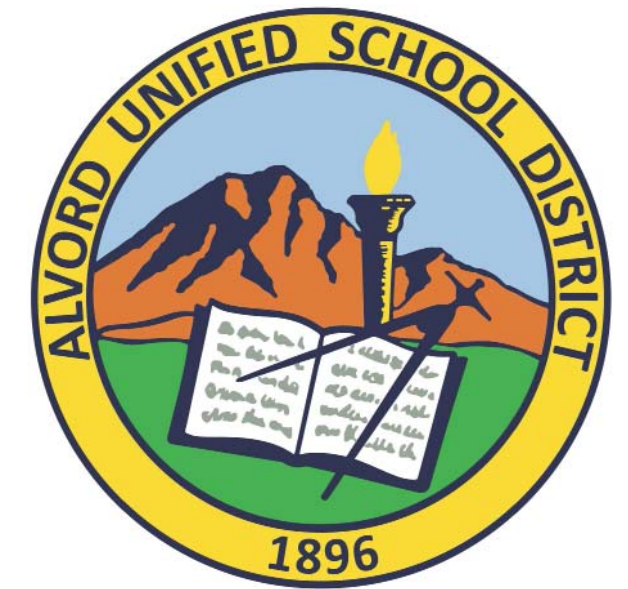
- Origin - founded in 1896, became USD in 1960
- Geography - encompasses the western portion of the city of Riverside, eastern portion of the city of Corona, and segments of Riverside County.
- Campus - 23 schools
- Population - nearly 20,000 students
- Fun Fact - named after William Alvord, former mayor of San Francisco and early university of California Trustee



INLAND EMPIRE AREA



SOUTHERN CALIFORNIA



WATER MANAGEMENT ASSESSMENT
LANDSCAPE, IRRIGATION, DRAINAGE



#	LA	IR	DR	OBSERVATION OF EXISTING CONDITIONS	PROPOSED SOLUTION
1	X	X	X	Lake Orrenmaa – Client (and facility staff) expressed that major flooding issues occur during rainy periods in central courtyard area adjacent to outdoor patio. Because of inadequate drainage capabilities the rain creates ponding over existing sidewalk connection.	Redesign Courtyard from large turf area to Rain Garden with diverse plant materials which could potentially improve stormwater infiltration and drainage and provide a natural education feature for students / teachers - team discussed potential solution of developing rain garden within north planting area (low point) to capture stormwater runoff and allow for water to be slowly released into storm drain system, infiltrated, and celebrated. There is Opportunity for rain garden to become educational element for students as well. Team also discussed rerouting of walk to covered plaza and removal of portion of existing walk to enlarge proposed rain garden area. Irrigation system retrofit would be required for any redesigned landscape areas. For this proposed solution, LCI recommends further investigation into the site grading, stormwater management, landscape design, and irrigation. All grading / drainage solutions to be further investigated by Civil Engineer.
2	X	X		Interior Courtyards – landscape of the interior courtyards consists predominantly of turf. Turf is extremely water intensive and state regulations are mandating reduction of water use. Most of the existing trees were observed to be in adequate condition and providing large amounts of shade.	Reinvigorate Courtyard from large water intensive turf areas to water-wise aesthetic landscape feature - redesign by strategic replacement of some turf areas with drought tolerant plants and/or inert materials (see image palettes). Redesign of courtyards could tie into design of proposed rain garden. Irrigation system retrofit would be required for any redesigned landscape areas.
3	X	X		Black Top – there is an 8-10' wide border of exposed soil (no turf / planting) at perimeter of blacktop area. Client expressed issues (slippage) with transition from blacktop to athletic field because of dirt / gravel build up. There is opportunity for providing landscaped edge to fill in bare areas.	Provide planted transition at perimeter of black top area - install low growing drought tolerant plant material and retrofit irrigation system. Mulch, artificial turf, or hardscape elements could be provided within proposed planting area to allow access points between adjacent sports fields and black top area. Irrigation system retrofit would be required for any redesigned landscape areas.
4			X	North Courtyard Drainage – drainage from this area is not reaching the under sidewalk drain.	Regrade turf area and clean drain out - regrading area would direct water to the drain. All grading / drainage solutions to be further investigated by Civil Engineer.
5	X	X		Exposed Soil at Pavement Edges – there are conditions of 2-3' wide border of exposed soil (no turf / planting) at edge of pavement within interior courtyards. Potential for slipping hazard from dirt / gravel build-up and visually unappealing	Provide planted transition at exposed areas along perimeter of concrete - install low growing drought tolerant plant material and retrofit irrigation system. Renovation could tie into development of courtyards and proposed rain garden
6	X	X		School Entry – landscape of the main entry / parking area (Fillmore / Indiana) consists predominantly of turf. Turf is extremely water intensive and state regulations are mandating reduction of water use. Additionally there are no shade trees in parking areas.	Reinvigorate Main Entry from large water intensive turf areas to water-wise aesthetic landscape feature for students, teachers, visitors, and neighborhood - redesign by strategic replacement of some turf areas with drought tolerant plants and/or inert materials (see image palettes). Additionally install trees in existing parking islands to give shade for parked cars. Irrigation system retrofit would be required for any redesigned landscape areas.
7	X	X		Existing Tree in South Courtyard – tree is in poor condition and visually unappealing	Reinvigorate South Courtyard with new specimen tree(s) - remove and replace existing tree with new tree or multiple trees. The space is large enough that multiple fruit trees could be installed and utilized as educational opportunity for students and teachers to grow their own healthy food. Irrigation system retrofit would be required for any redesigned landscape areas.
8	X	X		West Perimeter Trash Enclosure – existing views at west perimeter along Fillmore Street to trash enclosure are visually unappealing from surrounding neighborhood.	Provide soft green edge and screen unappealing views to trash enclosure - install tall vertical drought tolerant plant materials in front of trash enclosure fencing. Irrigation system retrofit would be required for any redesigned landscape areas.
9	X	X		Existing Transformer – existing transformer in west courtyard adjacent to classrooms and is accessible to students and visually unappealing	Provide soft green barrier and screen unappealing views to transformer - install medium height shrubs around 3 sides of transformer to provide barrier between student use and screen primary views. Access shall still be provided. Irrigation system retrofit would be required for any redesigned landscape areas.
10	X	X		Existing Pump Station – existing irrigation pump is adjacent to playground. In discussion with maintenance staff, the pump is antiquated and has not been in use for a long time. The pump is in a fenced enclosure but could create potential liability for kids playing adjacent to it. Additionally the pump and fenced enclosure are visually unappealing.	Option 1 - Provide soft green barrier between playground and screen unappealing views to pump - install medium height shrubs around enclosure on playground side to provide barrier between student use and screen primary views. Access can be provided from parking area. Irrigation system retrofit would be required for any redesigned landscape areas. Option 2 - Remove pump (and associated equipment) - remove pump and reconnect pipes underground with the mainline. This option requires further investigation by civil engineer and LCI
11		X		Existing Irrigation System – existing irrigation system has two points of connection and neither connection has a master valve or flow sensor installed. This may create a situation where irrigation mainline is constantly under pressure and will cause stress	Install flow sensors and master valves - It is LCI's opinion that this can be accomplished with minimal disturbance to the existing landscape with current controller technology. This would help protect mainline and monitoring.
12		X		Existing Irrigation Controller – the existing Hunter ACC and ICC controller are not currently connected to a centralized system or a web server receiving local weather data for self-adjusting. These controllers are not considered smart controllers.	Replace existing controllers - install new controllers that are capable of communicating with each other to share flow from the same mainline and monitor usage based on mainline capacity. It is LCI's opinion that replacing existing controllers can be done without major construction work to the existing infrastructure. This would help protect mainline and monitoring.
13		X		Existing Backflow Preventer – there are (2) existing backflow preventers. One backflow services only the athletic fields while the landscape outside of the athletic fields (classrooms, parking, etc) is serviced by an outdated (not per code) backflow. Current code requires a backflow preventer for irrigation systems to be code compliant as there is potential for cross contamination for system back into water connection	Retrofit existing irrigation system - connect system that has outdated backflow preventer to existing backflow preventer. This is a serious condition and should be undertaken immediately.
14	X	X		Existing Garden Areas – there are existing wood planters which contain dying plant material and the (2) garden areas in fenced enclosures (west perimeter) are need of refresh. It is not known whether the gardens are actively being used by the students	Provide engaging new garden areas for student / teacher hands on educational experience - work with school to redesign and replant garden areas as opportunity to engage students and teachers with the outdoors and provide educational experience. Additionally new materials, colors, site furniture, and outdoor "work stations" could be implemented to further enhance the experience for students and faculty. Experience could be collaborative with LCI working with and receiving input from students and teachers on the garden use and design.
15	X	X		Black Top Shade Trees – there are large shade trees on east side of school at black top with some small seating areas. Client expressed interest in providing more seating and taking advantage of shaded areas.	Activate space by providing additional seating / outdoor classroom opportunities around the large shade trees - the space is well shaded and large enough that with additional site furniture the space could potentially be used for outdoor teaching opportunities. Selected site furniture could be made from recycled materials providing additional educational experience for students and teachers. Seating would also provide space for parents to relax comfortably in the shade while watching their kids play on adjacent fields.
16			X	Blacktop – drainage is ponding at playground blacktop low point	Civil is not recommending any solution for the blacktop ponding unless the play area will be reconstructed All grading / drainage solutions to be further investigated by Civil Engineer.

LA = landscape
IR = irrigation
DR = drainage



PRIMARY ISSUE



SECONDARY ISSUE



FUTURE OPPORTUNITY



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SITE WATER ISSUES ANALYSIS - MATRIX

ORRENMAA ELEMENTARY SCHOOL

1a



*note - photos not provided for observations 11, 12, 13 because they are not visible or not installed
 1a - *callout - the number references comments from sheet 1a / the letter references photograph from sheet 1c



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SITE WATER ISSUES ANALYSIS - MAP

ORRENMAA ELEMENTARY SCHOOL



1b



*note - photos not provided for observations 11, 12, 13 because they are not visible or not installed

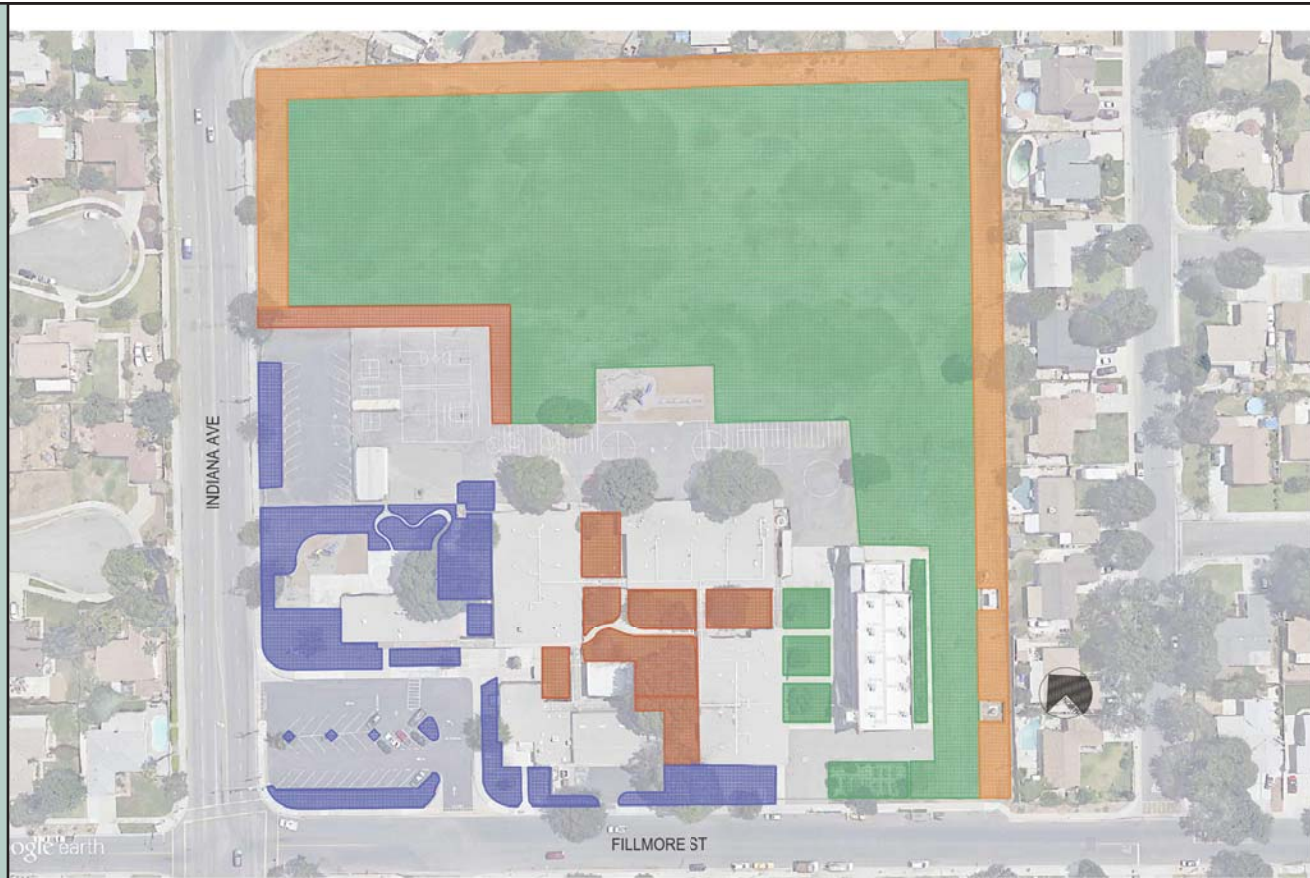


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SITE WATER ISSUES ANALYSIS - PHOTOS

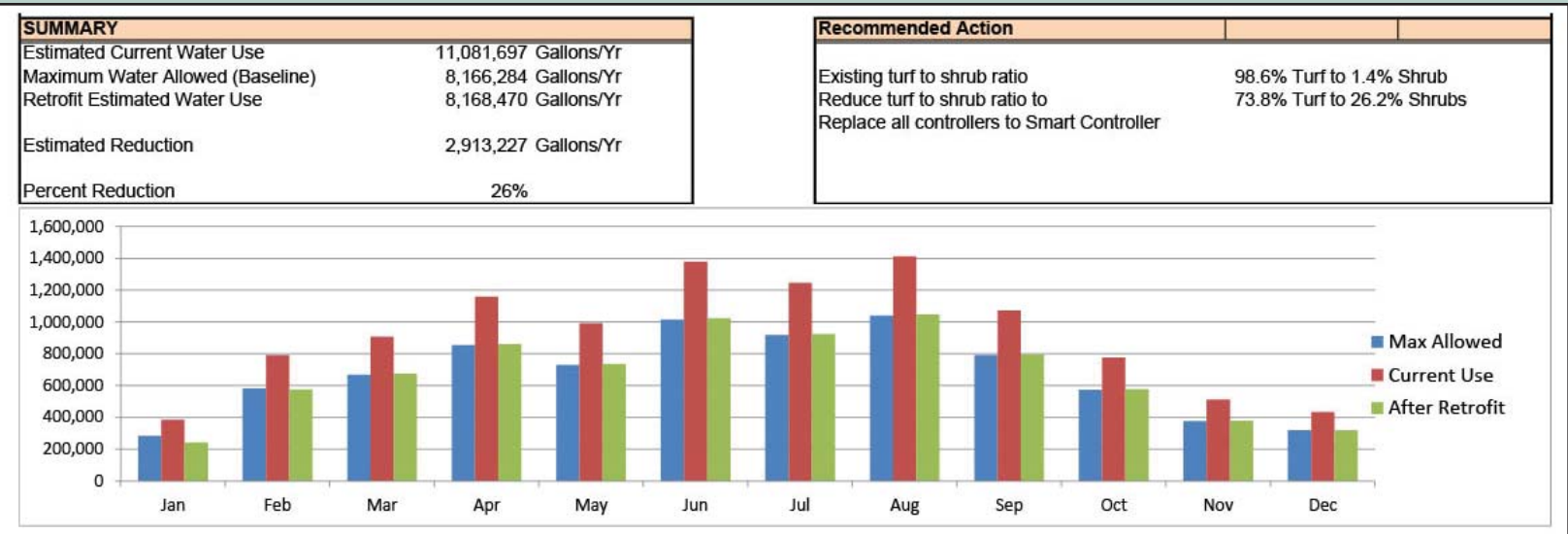
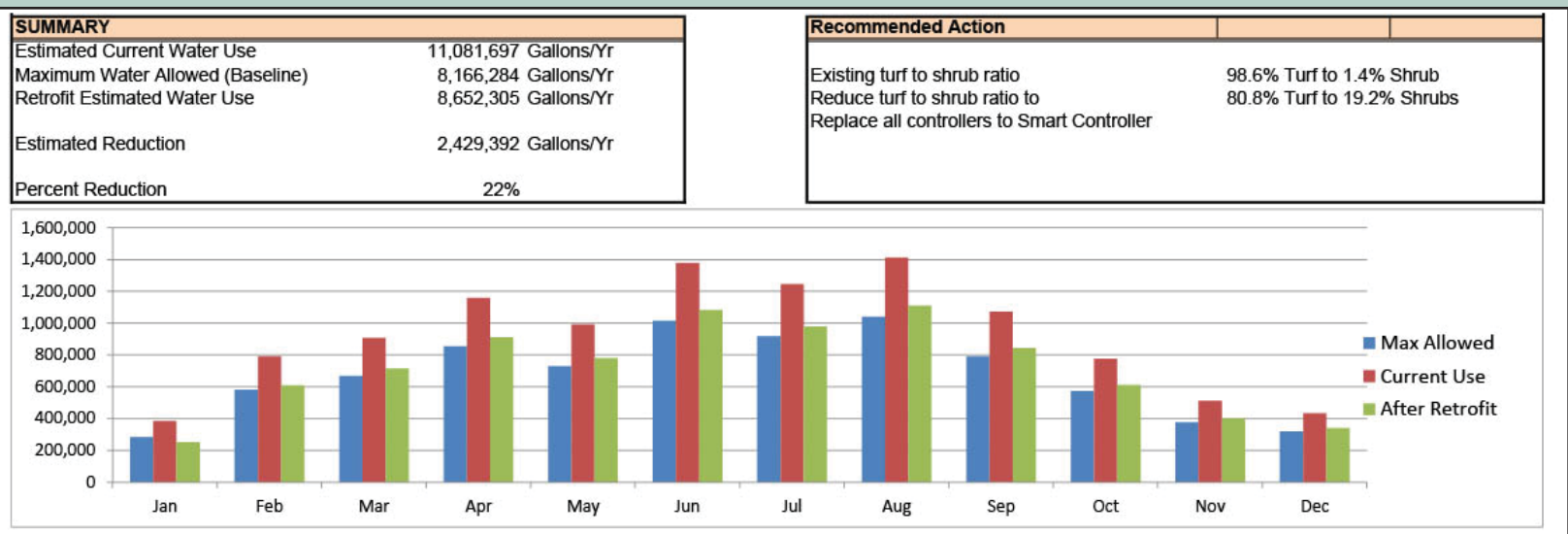
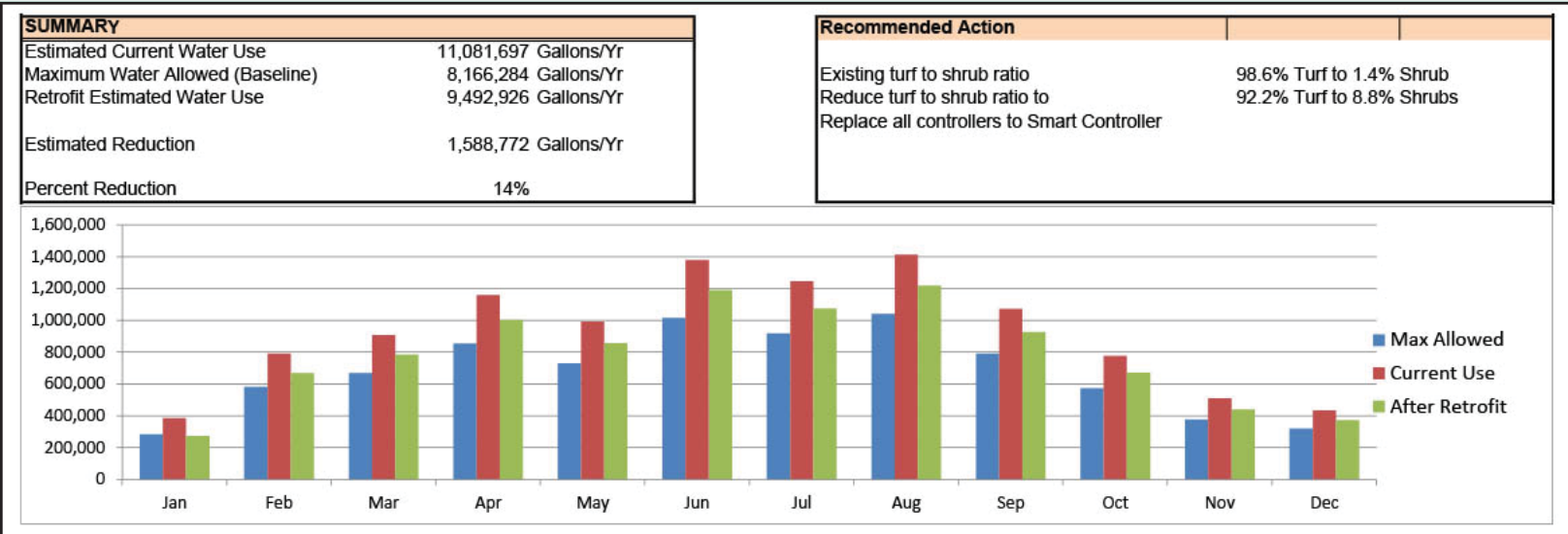
ORRENMAA ELEMENTARY SCHOOL

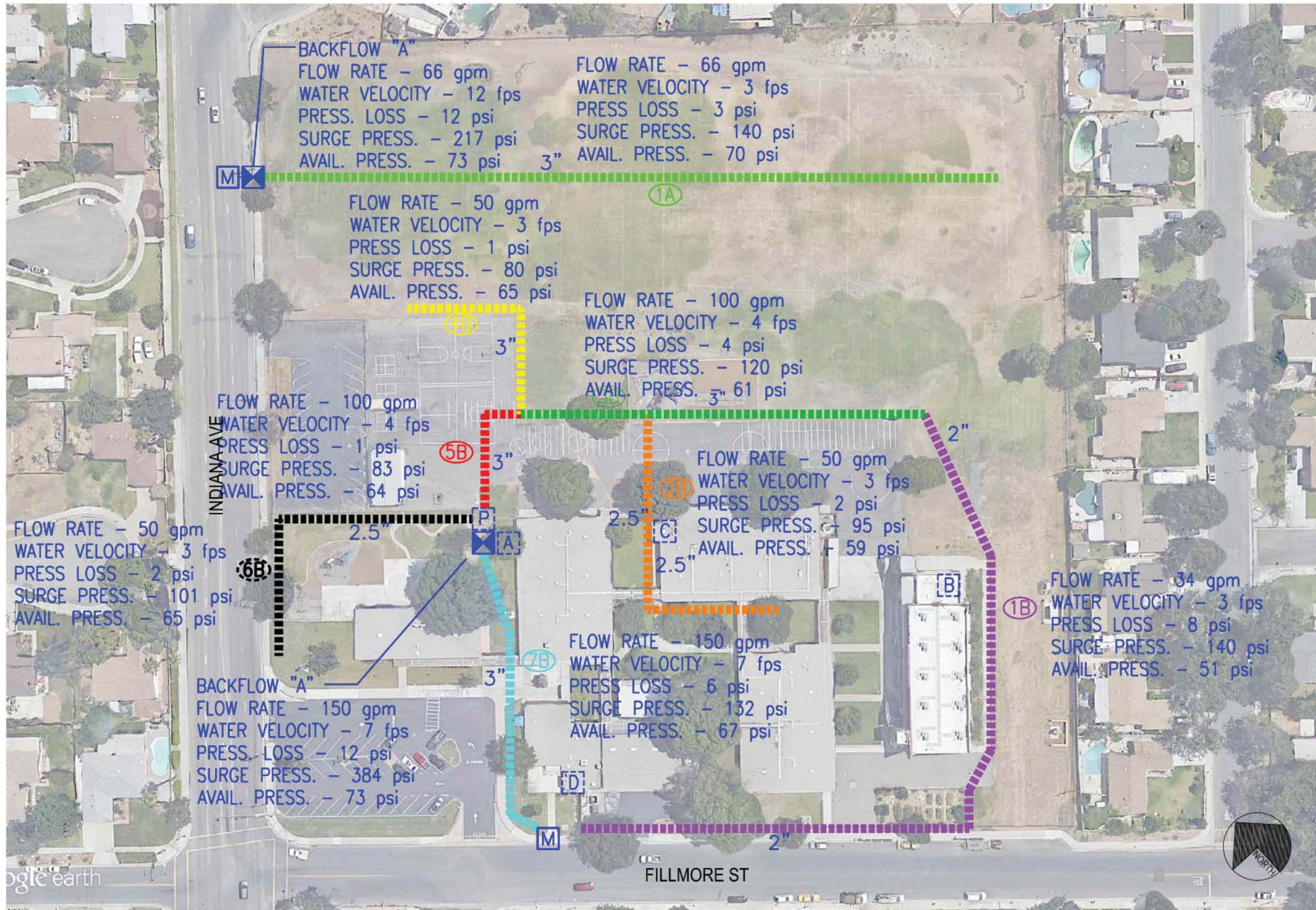




- PRIMARY AREA**
-transition at blacktop and central courtyards, including "Lake Orrenmaa" (see observations 1, 2, 3)
- SECONDARY AREA**
-all non-primary turf / planting areas (parking, streetscape, entry, playground)
-excludes athletic fields
- SPECIAL LANDSCAPE AREA**
-all athletic fields - to remain turf areas
-turf areas adjacent to 2-story buildings - out of scope
- ATHLETIC FIELD PERIMETER**
-15-20' turf area perimeter of athletic fields. This area is required to be converted from turf to drought tolerant shrubs to meet Tier 3 calculations

*note - legend colors represent planting areas (predominantly turf) to be replanted with drought tolerant materials (include irrigation retrofit). Legend applies only to key map (not bar graph tiers)





- LEGEND**
- [M] EXISTING WATER METER
 - [X] EXISTING BACKFLOW PREVENTER
 - [A] EXISTING 7 STATION CONTROLLER
 - [B] EXISTING 3 STATION CONTROLLER
 - [C] EXISTING 18 STATION CONTROLLER
 - [D] EXISTING 7 STATION CONTROLLER
 - [P] EXISTING PUMP STATION
 - EXISTING IRRIGATION MAINLINE

*note - analysis is for stress on existing mainline system

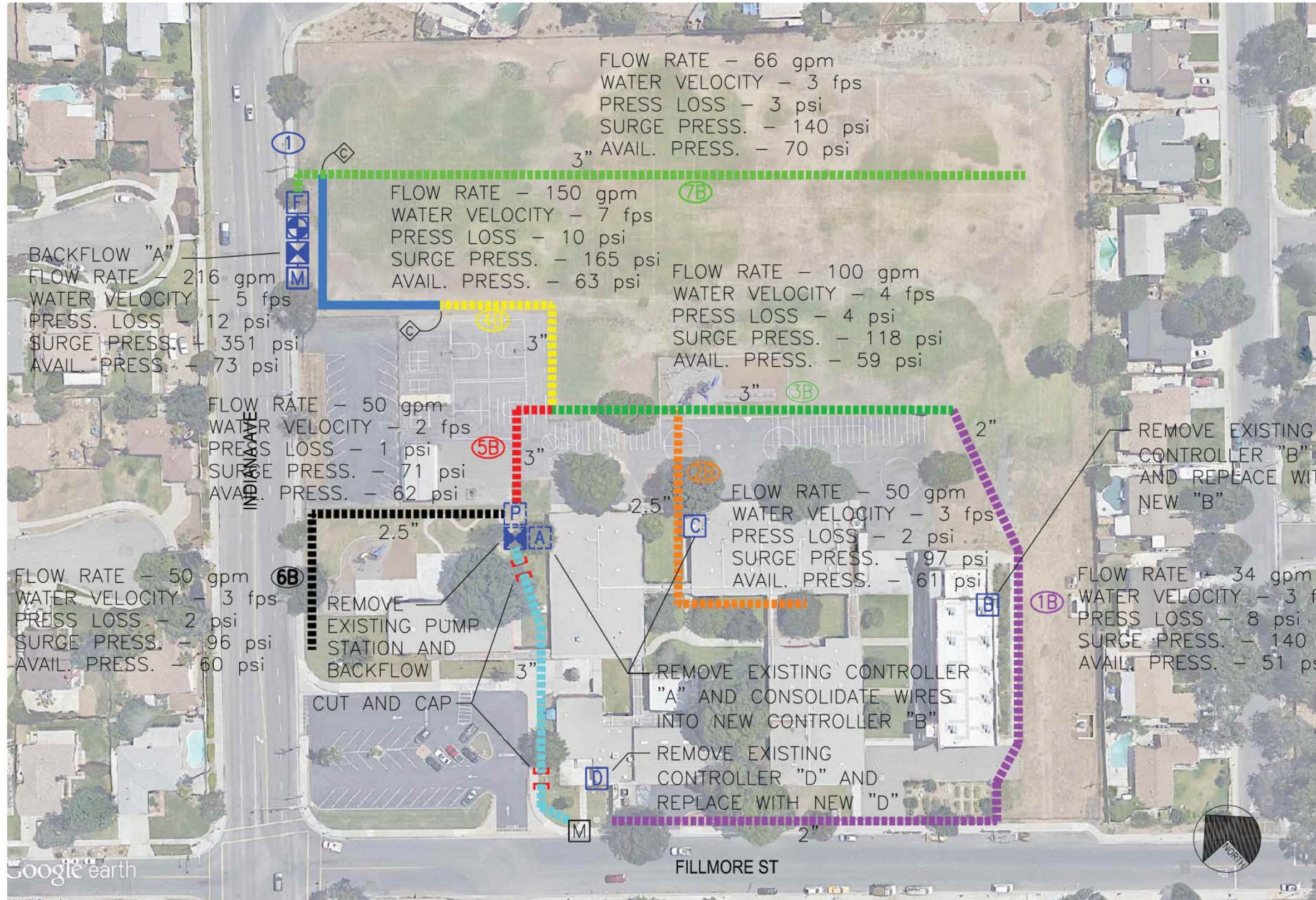


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 LANDSCAPE ARCHITECTS

IRRIGATION ANALYSIS - MAIN LINE SYSTEM (EXISTING)
 ORRENMAA ELEMENTARY SCHOOL



1d



LEGEND

- PROPOSED WATER METER
- EXISTING WATER METER
- PROPOSED BACKFLOW PREVENTER
- PROPOSED IRRIGATION MASTER VALVE
- PROPOSED IRRIGATION FLOW SENSOR
- PROPOSED X STATION CONTROLLER
- PROPOSED X STATION CONTROLLER
- PROPOSED X STATION CONTROLLER
- PROPOSED X STATION CONTROLLER
- PROPOSED IRRIGATION MAINLINE
- EXISTING IRRIGATION MAINLINE
- EXISTING IRRIGATION MAINLINE TO BE ABANDONED IN PLACE
- CONNECTION
- CUT AND CAP PIPE

*note - analysis is for stress on existing mainline system



ENTRY	Botanical Name	Common Name	Form	Shade Tolerant
	Agave attenuata	Foxtail Agave	succulent	x
	Ceratostigma plumbaginoides	Dwarf Plumbago	groundcover	x
	Dianella revoluta	Little Rev Flax Lily	grass	x
	Dietes iridioides	African Iris	grass / shrub	
	Gaura lindheimeri 'So White'	Geyser White Gaura	shrub	
	Hesperaloe parviflora	Red Yucca	shrub	
	Lantana x 'New Gold'	New Gold Lantana	groundcover	
	Lomandra longifolia 'Breeze'	Dwarf Mat Rush	grass	x
	Muhlenbergia capillaris	Pink Muhly Grass	grass	
	Phormium 'Black Adder'	Black Adder Flax	grass	x
	Rhaphiolepis indica 'Ballerina'	Ballerina Indian Hawthorn	shrub	
	Senecio mandraliscae	Blue Chalksticks	groundcover	
	Tradescantia pallida	Purple Heart	groundcover	x
Zauschneria californica 'Route 66'	Route 66 California Fuchsia	shrub		
Cercidium x 'Desert Museum'	Desert Museum Palo Verde	ornamental tree		
Cercis occidentalis	Western Redbud	ornamental tree		

COURTYARDS	Botanical Name	Common Name	Form	Shade Tolerant
	Agave attenuata	Foxtail Agave	succulent	x
	Ceratostigma plumbaginoides	Dwarf Plumbago	groundcover	x
	Dianella revoluta	Little Rev Flax Lily	grass	x
	Dietes iridioides	African Iris	grass / shrub	
	Lomandra longifolia 'Breeze'	Dwarf Mat Rush	grass	x
	Phormium 'Black Adder'	Black Adder Flax	grass	x
	Rhaphiolepis indica 'Ballerina'	Ballerina Indian Hawthorn	shrub	
	Senecio mandraliscae	Blue Chalksticks	groundcover	
	Tradescantia pallida	Purple Heart	groundcover	x

PARKING	Botanical Name	Common Name	Form	Shade Tolerant
	Carissa macrocarpa 'Green Carpet'	Green Carpet Natal Plum	groundcover	
	Lantana x 'New Gold'	New Gold Lantana	groundcover	
	Lomandra longifolia 'Breeze'	Dwarf Mat Rush	grass	x
	Myoporum parvifolium 'Putah Creek'	Creeping Myoporum	groundcover	
	Rhaphiolepis indica 'Ballerina'	Ballerina Indian Hawthorn	shrub	
	Rhus Lancea	African Sumac	tree	
			tree	

SLOPES	Botanical Name	Common Name	Form	Shade Tolerant
	Arctostaphylos 'Emerald Carpet'	Carpet Manzanita	groundcover	
	Dietes iridioides	African Iris	grass / shrub	
	Lantana sellowiana 'Monswee'	Trailing Lantana	groundcover	
	Muhlenbergia capillaris	Pink Muhly Grass	grass	
	Myoporum parvifolium 'Putah Creek'	Creeping Myoporum	groundcover	
	Zauschneria californica 'Route 66'	Route 66 California Fuchsia	shrub	

SCREEN	Botanical Name	Common Name	Form	Shade Tolerant
	Ligustrum japonicum 'Texanum'	Waxleaf Privet		
	Westringia 'Wynyabbie Gem'	Coast Rosemary		

IRRIGATION	EQUIPMENT TYPE	EQUIPMENT DESCRIPTION	MODEL
	Backflow Preventer	Febco	825YD Series
	Wye Strainer	Febco	758A Series
	Master Valve	Griswold	2000 Series
	Flow Sensor	Calsense	FM Series
	Gate Valve	Febco	F-619-RW-SON Series
	Controller	Calsense	CS-3000 Series

***note**

1. list is broad in scope for implementation across campuses - LCI recommends further design study for specific locations
2. some planting areas within courtyard areas are in shade, refer to plants marked as "shade tolerant" for these areas





AGAVE ATTENUATA



CERATOSTIGMA PLUMBAGINOIDES



DIANELA 'REVOLUTA'



DIETES 'IRIDIOIDES'



GAURA LINDHEIMERI 'WHITE'



HESPERALOE PARVIFLORA



LANTANA 'NEW GOLD'



LOMANDRA LONGIFOLIA 'BREEZE'



MUHLENBERGIA 'PINK MUHLY'



PHORMIUM 'BLACK ADDER' (S)



RHAPHIOLEPIS 'BALLERINA'



SENECIO



SETCREASEA 'PURPLE HEART'



ZAUSCHNERIA 'ROUTE 66'



CERCIDIUM X 'DESERT MUSEUM' TREE

*note - refer to section 5a for specific plant locations and other notes



7 x 7 x 7

THE FUTURE - DESIGN ENERGY WATER

Promoting energy and water reduction, while simultaneously improving the built environment for quality education, in the design of school buildings. Bring the past (existing buildings) into the present because the future is already there.

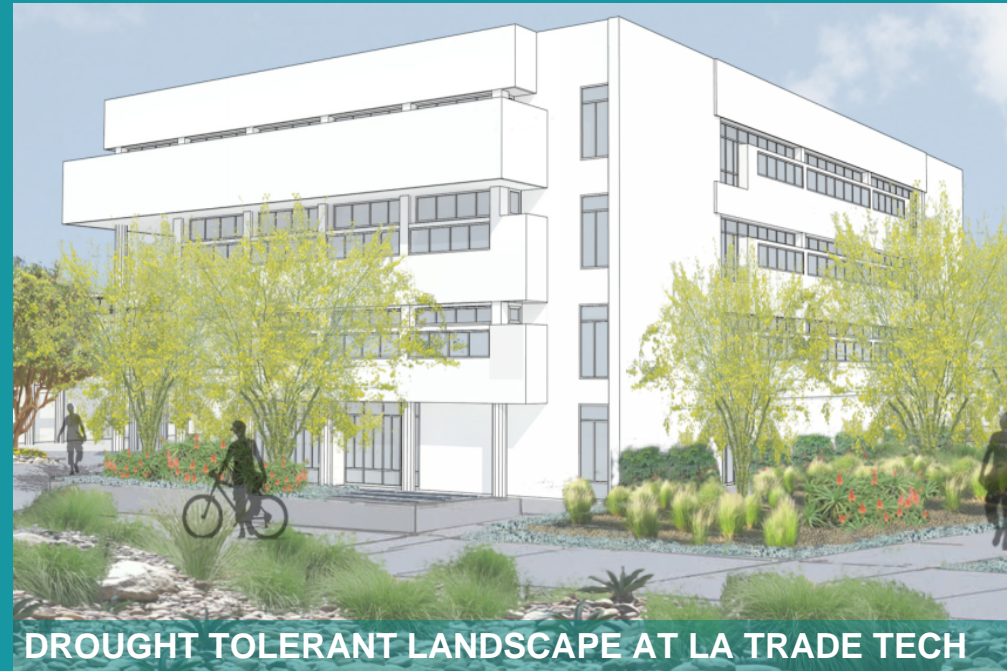
+ 50% site water reduction

exceed CA State water mandate of 25% reduction within budget requirements

+ campus bio-swale system

water animated through site, cleaning, and infiltrating back into aquifer

+ drought resistant turf



7 x 7 x 7

NATURAL VS. SYNTHETIC TURF

SUMMARY

- 1 - Natural has higher annual costs (on-going) while Synthetic has higher initial and end of life cycle replacement cost (15 year)
- 2 - Synthetic costs are higher than Natural over 15-year span because of initial construction and end of life-cycle replacement
- 3 - Synthetic is associated with more potential injuries
- 4 - The potential for high surface temperature and bacteria with Synthetic are significant concerns

ATTRIBUTES / INJURIES

NATURAL

Pros: low initial investment, low surface temperature, natural feel, low slip coefficient

Cons: low use tolerance, high water use, weather sensitive, high maintenance cost

Injuries: hamstring, knee, shin splints, ankle

SYNTHETIC

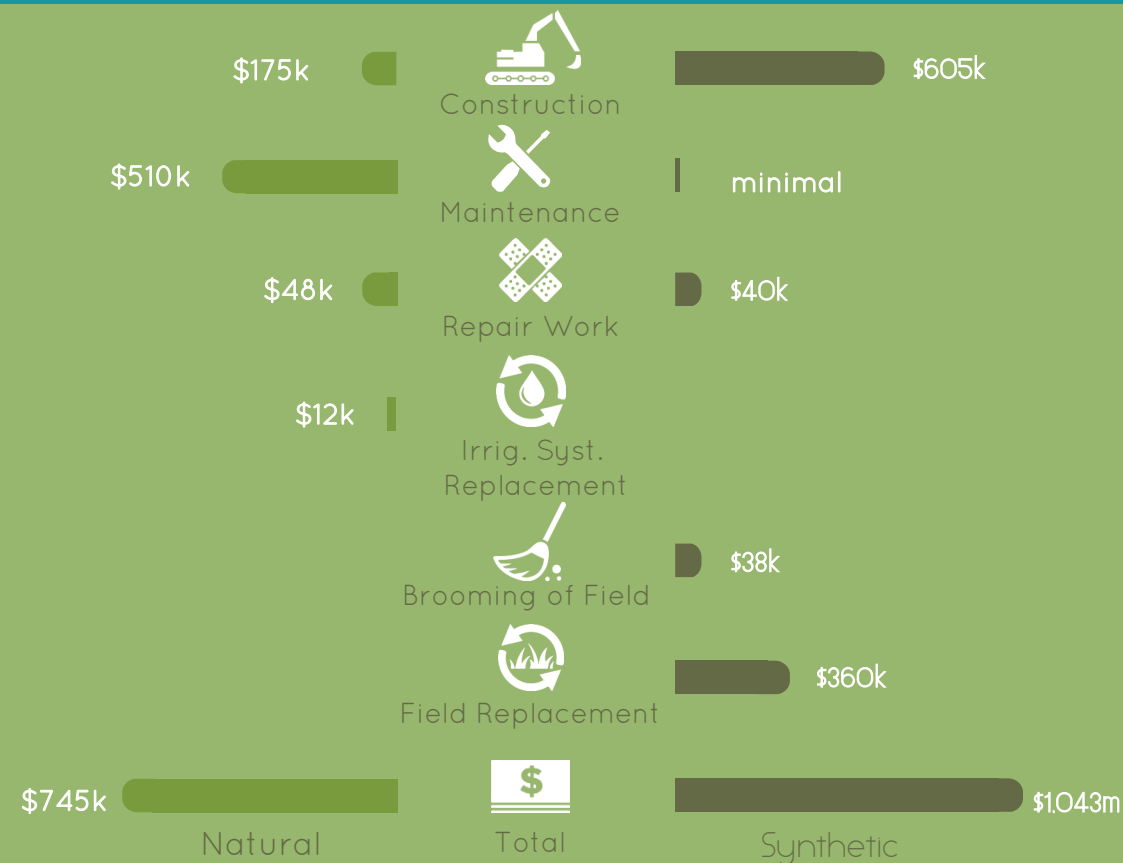
Pros: low water use, low maintenance cost, high use tolerance, weather resistant

Cons: high initial investment, possible carcinogenic, high surface temperature, high replacement cost, potential infection from bacteria

Injuries: hamstring, knee, shin splints, ankle, turf burn, staph infection from bacteria

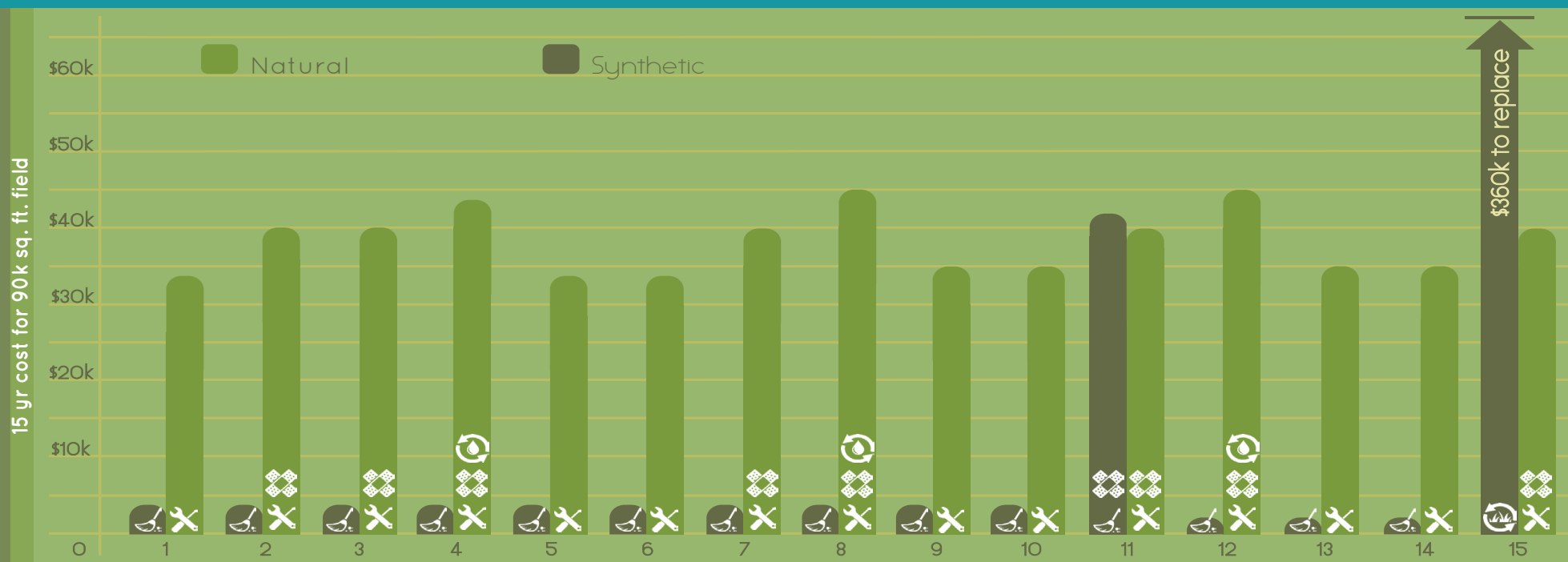
COST COMPARISON

15 yr cost for 90k sq. ft. field



COST COMPARISON

15 yr cost for 90k sq. ft. field



SOURCE: DIGERONIMO-MIKULA ASSOCIATES INC.

VALUE

LCI

ADDS

+ WATER MANAGEMENT

maximize irrigation efficiency | water capture + quality + reuse | turf to drought tolerant

+ PERFORMANCE METRICS

water use calculations + projections vs. CA state requirements (ab1881)

+ COMPREHENSIVE SUSTAINABILITY

analysis of site issues | strategic master planning | implementation | education

Got Questions - Say Howdy!
bret hanson
bret@lcapouya.com
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