

JULY 2017

DESERT DISCOVERY CENTER ARCHITECTURAL FINAL REPORT

Prepared for the City of Scottsdale | Solicitation No. 16SQ009



SWABACK PARTNERS pllc
Architecture • Planning • Interior Design

“

*Invest wisely in beauty, it will serve
you all the days of your life.* ”

- Frank Lloyd Wright

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1. EXECUTIVE SUMMARY AND INTRODUCTION



EXECUTIVE SUMMARY AND INTRODUCTION

EXECUTIVE SUMMARY

The Desert Discovery Center is a history making place. It will be a place like no other. A one of a kind institution. A place that the McDowell Sonoran Preserve, The Sonoran Desert, and the Deserts of the World will be presented to the public in interpretive ways that are engaging, educational, unique and dynamic. All focused on understanding how we as humans can inhabit and adapt to deserts in better ways through understanding and appreciation. The Desert Discovery Center will be a place you will come back to time and time again, and each time you do you will experience something different.

The Architecture of the Desert Discovery Center, presented in this report, was conceived primarily as tool to aid in the interpretive experience. The architecture is one of the desert. It is inspired by the many wonderful examples of desert architecture that has been built currently within the Preserve. It is timeless, it is bold, it is durable, and most importantly, it is of minimal visual impact along the beauty of the Preserve to be first and foremost always.

Presented in this report is a compound of buildings that have been developed over the past year or more through intensive site analysis, listening to the public, researching topics of interpretation with many institutions and individuals, and studying examples worldwide. The architectural design was a collaborative effort lead by Swaback Partners and its Team of Consultant Partners, but informed by the work of Thinc, the DDCS, and ASU.

The site location at the Gateway, during the process shifted from just northwest of the existing Gateway Trailhead, to just south of the existing Maintenance building. The shifted site was based mostly on the input from the public and their concern of maintaining the current entry experience at the Gateway Trailhead. In the end, the new location allows for a lower site to help minimize visual impact as well as several other interpretive experiences that were not at the original location.

The current design has a series of linked desert pavilions that blur the line between indoors and outdoors through

their use of retractable door and window systems. The linked desert pavilions are all positioned to capture view sheds that are tied to the interpretive panels and experiences throughout. They are also positioned for maximum orientation to sun angles and integration with the site.

The project is conceived to be highly energy efficient through a sustainability strategy conceived by some of the top leading thinkers in the world on sustainability. The overall project has a building area of 5.34 acres, excluding parking and a new access road. It is 47,586 sf of gross conditioned area. The buildings and sitework have an estimated construction cost of \$33,533,443.00, excluding exhibit design or soft costs.

The materials used in the design are very similar to those used at the current Gateway Trailhead – rammed earth, rustic concrete, weathered steel, desert roof, low reflective glass. The buildings are less than 24’ feet in height, and are at a lower elevation than the current Gateway building, which makes the overall compound lower in height than the Gateway. Sight line studies included in this report taken from adjacent neighborhoods show minimal visual impact.

The Desert Discovery Center will be an environmental benchmark of excellence for the City, and an example of architectural design that will inform the visiting public of the evolving architectural typology that is unique to Scottsdale, and most importantly an architecture of the desert.



EXECUTIVE SUMMARY AND INTRODUCTION

INTRODUCTION

On June 16, 2016 Swaback Partners pllc, along with its multi-disciplinary Team that included Civil Engineers - Wood Patel, Traffic and Parking Engineers - Kimley Horn, Sustainability Consultants - Terrapin Bright Green, Landscape Architects - Trueform, and Cost Estimators - Cumming, were commissioned by the City of Scottsdale to work in collaboration with the Desert Discovery Center Scottsdale (DDCS), and its Experience Designers - Thinc, and its Management and Economic Advisors - ConsultEcon to Program, and Schematically Design the Desert Discovery Center (DDC).

Along with the Architectural Programming and Schematic Design effort, the following general activities were conducted:

- Public Presentations
- Meetings with DDCS
- Meetings with Arizona State University
- Meetings with numerous community organizations and institutions
- Prepared Documents for Processing the Municipal Use Master Site Plan (MUMSP)
- Conceptual Drainage Report
- Traffic Impact Analysis and Parking Report
- Creation of Sustainability Strategy
- Landscape Design Concept
- Statement of Probable Construction Cost
- All the reports referenced above are included within this report.

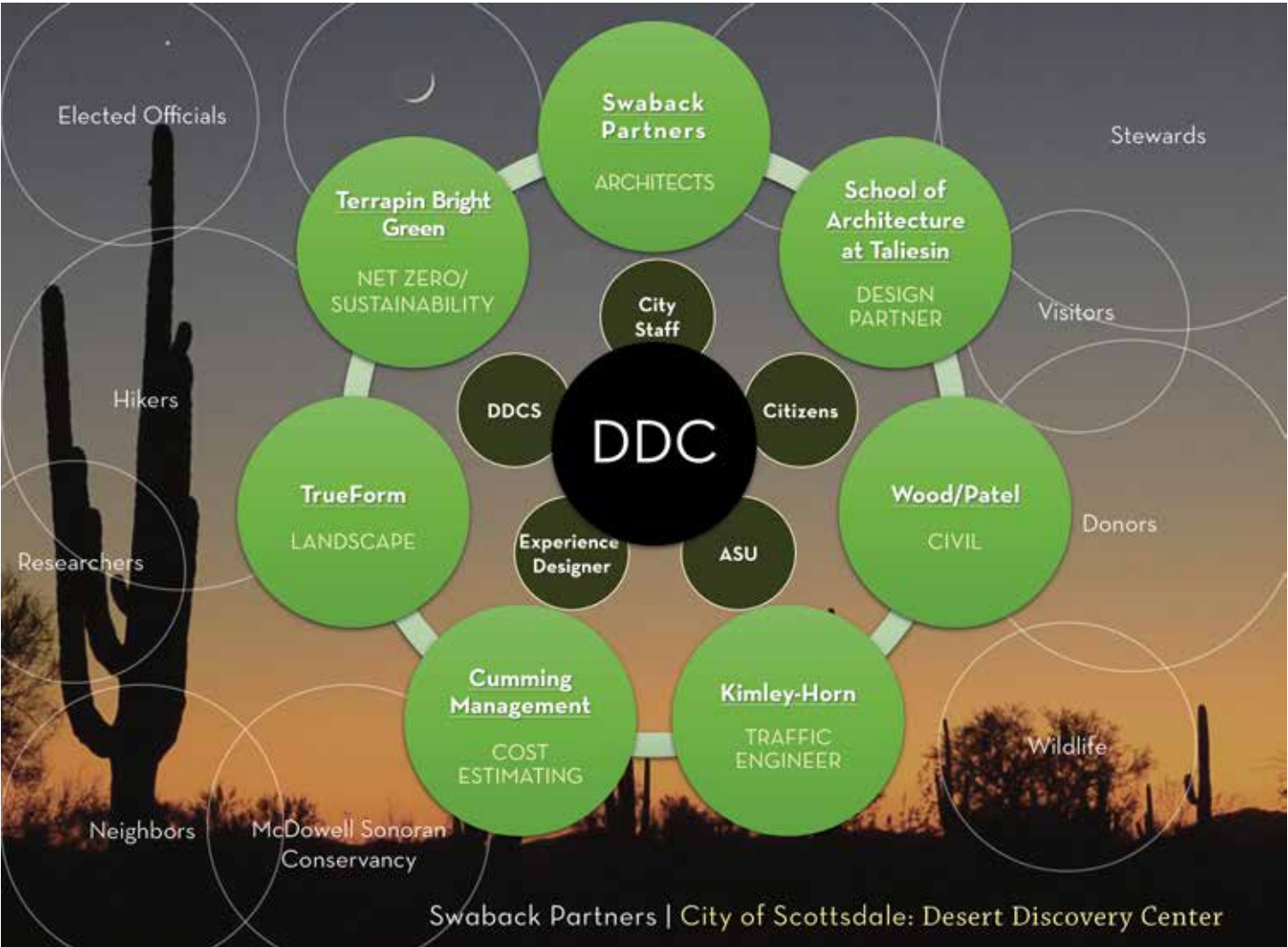
All the reports referenced above are included within this report.

The results of this work produced an Architectural Program and Schematic Design that is appropriately integrated into, and respectful of the magnificent site it will be located within. It will engage visitors in a world class experience that prepares them for their journey into the McDowell Sonoran Preserve, and educates them as to the beauty and mystery of the Sonoran Desert.

The Schematic Design is based on a series of linked desert pavilion forms that blur the line between indoors and outdoors. The pavilions are linked together with various experience-spaces that flow between them and open up to views of the Preserve and the City beyond. The architects see the design as more than a building—it is a tool for educating, learning, researching, enjoying, appreciating, and preparing you to experience the desert through the many exhibits and experiences conceived by Thinc, and the programs that will occur at the DDC. The architectural design has striven to be compatible, and consistent, with what we as the architects see as the emerging Typology of the Architecture of the Preserve. That typology is demonstrated through the many fine examples of the highly-integrated desert architecture built at Gateway, and the other Trailheads throughout the Preserve.

The Schematic Design that evolved as the result of this study has been informed by the Conceptual Design that evolved during the Phase 2 Feasibility Study, but has considerably advanced beyond it. The revised concept that evolved during this phase of study has produced a design that is smaller, less costly, and much more highly evolved from that in Phase 2. One of the most significant changes has been to relocate the facility from its previous location north of Gateway Trailhead to south of the existing Maintenance Building at Gateway. That will be discussed more in-depth in Section 2: Concept Evolution of this report. The shift of the site allows for a more expansive experience to occur at the DDC due to the site opportunities that were found southeast of behind the current Maintenance Building such as city views, adjacency to a wash, and access off an area of parking that is currently less utilized by hikers.

Beyond the space, flow, and functional needs of the pavilions the sustainability of the design was paramount. As such, a design concept was produced that links together many known strategies of sustainable design for desert buildings, and leaves flexibility for the opportunity to work with researchers and product designers as the design goes through Design Development, and Construction Documents to evolve and incorporate new and innovative concepts in the design.



EXECUTIVE SUMMARY AND INTRODUCTION

DESIGN TEAM

ARCHITECTURE:

Swaback Partners, pllc

- John Sather, AIA, AICP - Senior Partner
- Ryan Cook – Design Partner
- Brent Harris, LEED AP, CDT - Design Partner
- Annie Tapp – Project Coordinator
- Rebecca Talen – Project Graphics
- August Lietz - Student Intern at the School of Architecture at Taliesin

CIVIL ENGINEERING:

Wood Patel & Associates, Inc

- Darrel Wood, PE, RLS
- Dan Cronin, PMP, LEED AP, CDT

TRAFFIC:

Kimley-Horn & Associates, Inc

- Chuck Wright, PE

SUSTAINABILITY:

Terrapin Bright Green

- Bill Browning, Hon. AIA, LEED AP
- Jonce Walker, LEED AP, CSBA

LANDSCAPE:

Trueform Landscape Architecture Studio

- Todd Briggs, ASLA

COST ESTIMATE:

Cumming

- Daniel Pomfrett
- Feba Thomas

2. CONCEPT EVOLUTION



CONCEPT EVOLUTION

OVERALL GOALS

After listening to input from many sources, including the public in general, the Architectural team and the DDCS developed the following overall goals for the architectural design of the DDC:

- Be respectful to the site the DDC has the privilege to be integrated into.
- Complement the emerging typology of the existing architecture of the Preserve, as demonstrated in the other trailhead buildings.
- Be a tool for education and research.
- Enhance the interpretive experience through the Architecture.
- Promote an understanding, and appreciation for high quality architecture appropriate for the desert.
- Be a model of sustainability for arid climates by incorporating technologies of the past, present and future.
- Be a model of accessibility.
- Minimize visual impact.
- Be flexible to evolving programs and interpretive experiences.
- Have certain facilities available for non-paying visitors such as restrooms, and some interpretive experiences.
- Reinforce an understanding of the 4 organizing themes to the interpretive experience.
- Minimize on-going operational and maintenance costs through efficient design, and high quality material selections, and systems specifications.
- That the project has a strong local interest, but also a global stature.
- That the DDC could become a primary driver for tourism and educational interest.



MOVING BEYOND THE PHASE 2 FEASIBILITY STUDY

Swaback Partners was the lead consultant during the Phase 2 Feasibility Study, as such we are very familiar with its content, and the process that was used to conduct that Study.

We are also aware of the many public comments, both pros and cons, that were voiced regarding those results at the time it was presented to the City Council, as well as during the Phase 3 study. When the work for this study began, and the DDCS was made part of the process, we reviewed all those comments, as well as the Phase 2 and 3 reports. It was decided that rather than continue with developing the Phase 2 concept as presented in the Phase 2 report, that a modified direction would be pursued that addresses many of the concerns and new ideas that had emerged. The input of the experience designers, Thinc, and ASU added much to the discussion, as well as the many public comments. Some of the content of the concept developed within Phase 2 was still considered to be relevant, but a modified direction that looked to lowering the construction cost, making a smaller footprint, revising the architectural program to incorporate different interpretive experiences, and analyzing all the space allocations in light of the concept that was developed to locate only essential uses at the Gateway site

CONCEPT EVOLUTION

LISTENING AND LEARNING

Throughout the design process Swaback Partners attended, and participated in many public meetings, read on-going social media comments about the project, and participated in meetings with a variety of individuals, and community organizations that contributed thoughts to the design.

We listened and responded in the design to what seemed prudent, given our contracted Scope of Work.

During that process, it was evident that some of the public strongly opposed the DDC being built at all, for a variety of reasons, while others supported the DDC, but just not located within the Preserve. Others supported it whole heartedly. While it was not within our Scope of Work to determine whether the buildings should be built or not, but rather to listen and respond with a Schematic Design at the Gateway that incorporated what we learned.



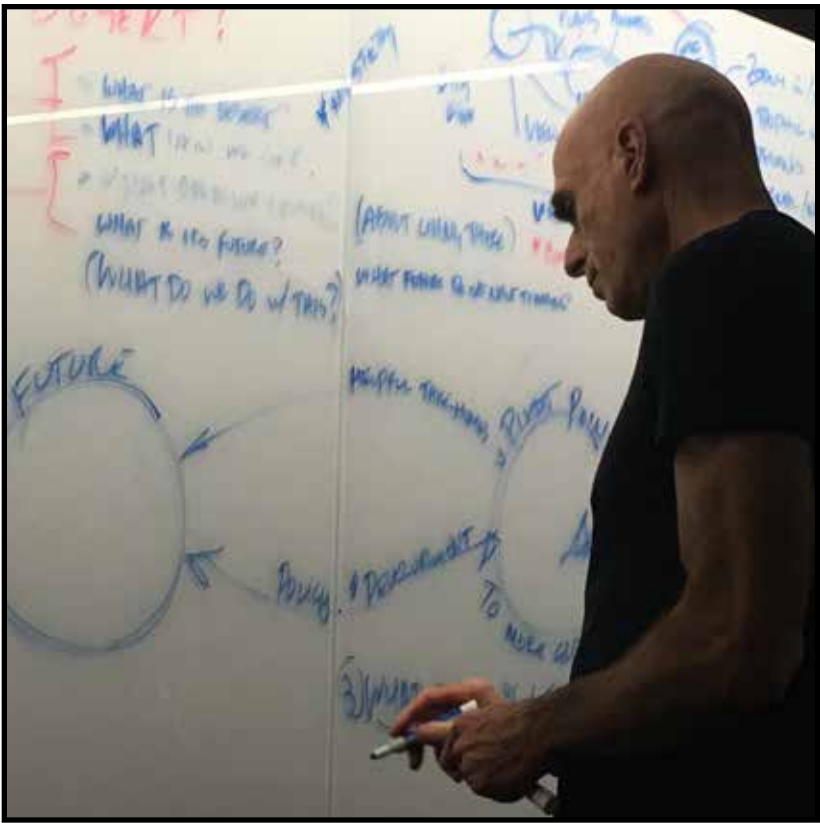
[Click to Play Video](#)

CONCEPT EVOLUTION

CO-DESIGN PROCESS WITH THE CITIZENS OF SCOTTSDALE, CITY OF SCOTTSDALE STAFF, DDCS, THINC AND ASU

The Citizens of Scottsdale, City of Scottsdale Staff, DDCS, Thinc and ASU were major co-design collaborators, together with Swaback Partners, of the Architectural Programing and Schematic Design presented within this report.

Throughout the Programming and Design process, design sessions were held every two weeks, in addition to numerous other meetings to seek input and reaction to the emerging design. Each group contributed to the design through a different perspective. The Public voiced many comments both for and against the emerging concept. It was our job to listen to both sides. The City Staff gave input from the perspective of Preserve, City operations, current conditions on site, the public input process, and operational issues. DDCS gave input from the perspective of operations of the facility, programming needs, interpreting input from numerous agencies and organizations it sought out, construction costs, visitation projections, and overall design. Thinc contributed to the collaborative process as the Experience Designers, inputting on the character of the spaces needed to incorporate those experiences. ASU contributed with the input of its many research faculty on their potential programs and research functions that they would like to conduct at the DDC.

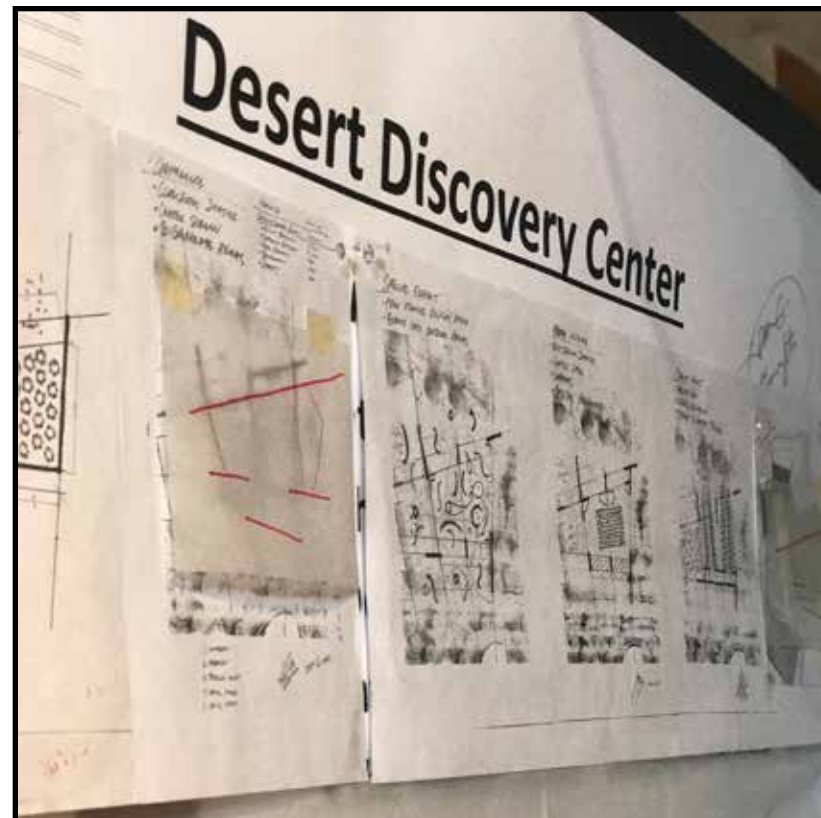


CONCEPT EVOLUTION

THINC TANK

For the duration of the project, a special workroom was set up at Swaback Partners that contained all the on-going work, as well as all other DDC studies from the past.

Most of the design sessions, and all of the design work, was conducted within this room, which became known as the Thinc Tank, acknowledging the significant contribution of the Experience Designers. Considerable amount of design work was also carried out in the field at the site through numerous site visits. The public was invited to come and visit the ongoing work during the presentations made on December 5, 2016. That invitation was captured on video, and was on the City website during most of the design process. Some members of the public did visit. Many organizations within Scottsdale and the Phoenix area also came and contributed within the work space. It was our belief that to properly focus on the magnitude and importance of the work that a total, immersive space like what emerged during the process was necessary.

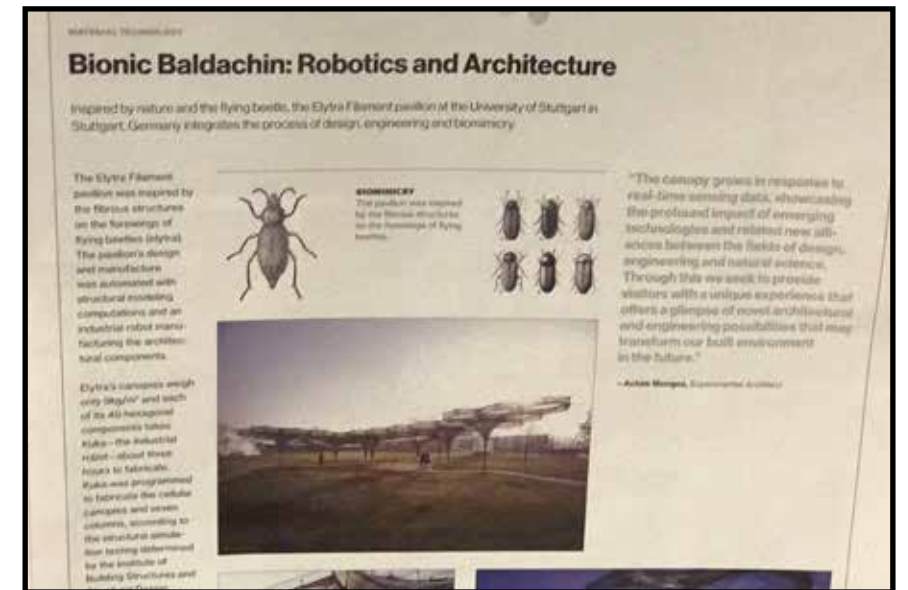


CONCEPT EVOLUTION

RESEARCH OF ANALOGOUS PROJECTS, AND BUILDINGS CURRENTLY WITHIN THE PRESERVE

From the beginning of Phase 2 the desire was for the DDC to be a world class institution, and a place like no other.

A place that gave you an experience you could only get at the DDC and to experience it again you had to return. A place that incorporated not only interpretive experiences, but deep research into life in the desert. It is to be a place not only for education, but also for fun of all ages. A place that every time you returned you could count on a new experience. You could study the Sonoran Desert and the Preserve at many different levels, and from many different points of views. As such the design Team continued throughout the process to use the world as a text book, and study many other institutions, and centers of interpretive experiences. We looked locally at institutions such as the Desert Botanical Gardens, The Arizona – Sonoran Desert Museum, The Arizona Science Museum, The Heard Museum, The Phoenix Zoo, Arcosanti, Cosanti, Taliesin West, and Kartchner Caverns. We also looked nationally at the Monterey Aquarium, the Springs Preserve, Red Rock Canyon Interpretive Center, the Living Desert, The 911 Memorial Museum, and many more. We looked globally at the emerging design for the 2020 World Expo in Dubai, as well as environmental interpretive centers in Australia, Saudi Arabia, and Spain. We studied these institutions for a variety of reasons such as – architectural programs, unique aspects of design and interpretation, visitation counts, as well as a whole variety of operational issues. All of this was done not to find concepts to duplicate, but to help us understand what has worked and not worked in the past and then to stand on the shoulders of all that we had learned, and go beyond that to create a world class institution for Scottsdale that presents the Preserve and celebrates the beauty and unique nature of the Sonoran Desert unlike any other institution.



CONCEPT EVOLUTION

ARCHITECTURAL TYPOLOGY

In addition to the research focused on the Architectural Program, we also researched what would be the most appropriate Architectural Design Response. With the project located within the Preserve we first studied each of the existing buildings in the Preserve. At the time of this report, there are 8 built trailheads within the Preserve, 4 of which have buildings that provided architectural guidance of the Preserve. Currently there are approximately 1,200 parking spaces that serve as a guide for integrating parking. We studied each building with respect to its plan-response to the site, its materials, its long-term maintenance issues, its space and flow, how the public seemed to be using it, what the MSC Stewards thought of the buildings, and what the visual impact was as viewed from the adjacent neighbors and trails. These images summarize what we see as an emerging Architectural Typology of the Preserve.

As one studies these photos and plans, certain similar characteristics are clear. The use of materials that withstand the harsh desert climate on these buildings, such as Corten steel and rammed earth seem to feel compatible with their context. The low slopes of the roof form feel appropriate to their mountain backdrop. The open nature of the spaces that help blur the line between indoor and outdoor spaces. The use of shade as a place of refuge on hot days and intense sun. Parking located slightly away from the trailhead buildings gives visitors a space to decompress and begin to enter the Preserve in an appropriate way.

Our designs address improvements on issues that included maintenance of certain materials not holding up to frequent use, materials exposed to the sun/heat, windows not properly located or shaded, as well as, interior spaces with poor acoustical qualities due to excessive metal. Parking surfaces were looked at as to their durability, and integration into their sites. Drainage issues caused erosion in some areas, and heavy use caused some surfaces to be paved where they initially were compacted soil. Parking separated by natural desert areas certainly helped minimize the visual impact.

Gateway Trailhead



Lost Dog Wash Trailhead



Tom's Thumb Trailhead



Brown's Ranch Trailhead



3. THE SITE



THE SITE

SITE ANALYSIS

Since the site north of the existing Gateway was the subject of the Phase 2 work, and that site analysis was included in that report, it was not duplicated here. It can be found on Pages 18 -22 of the Phase 2 report.

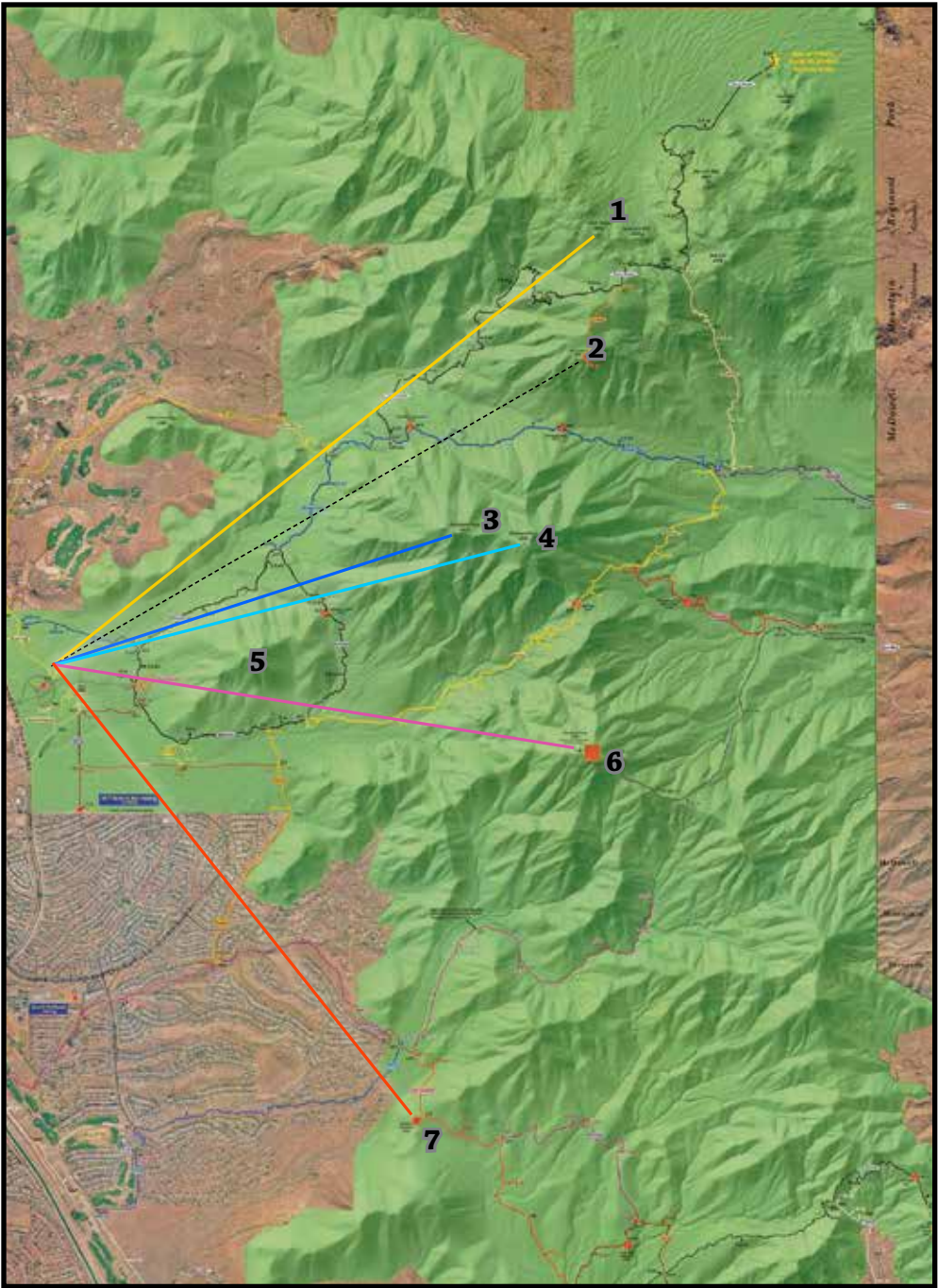
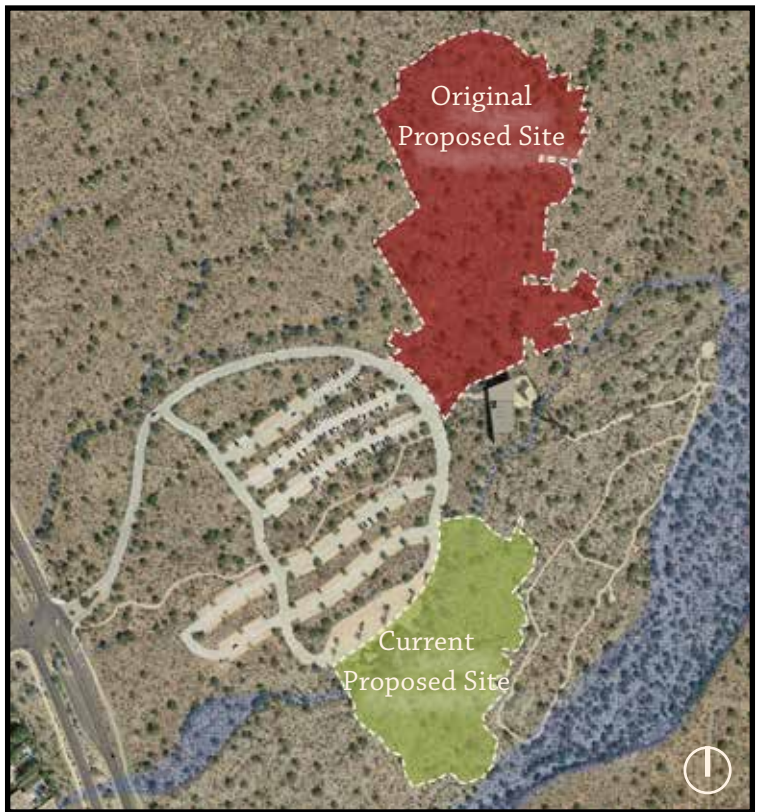
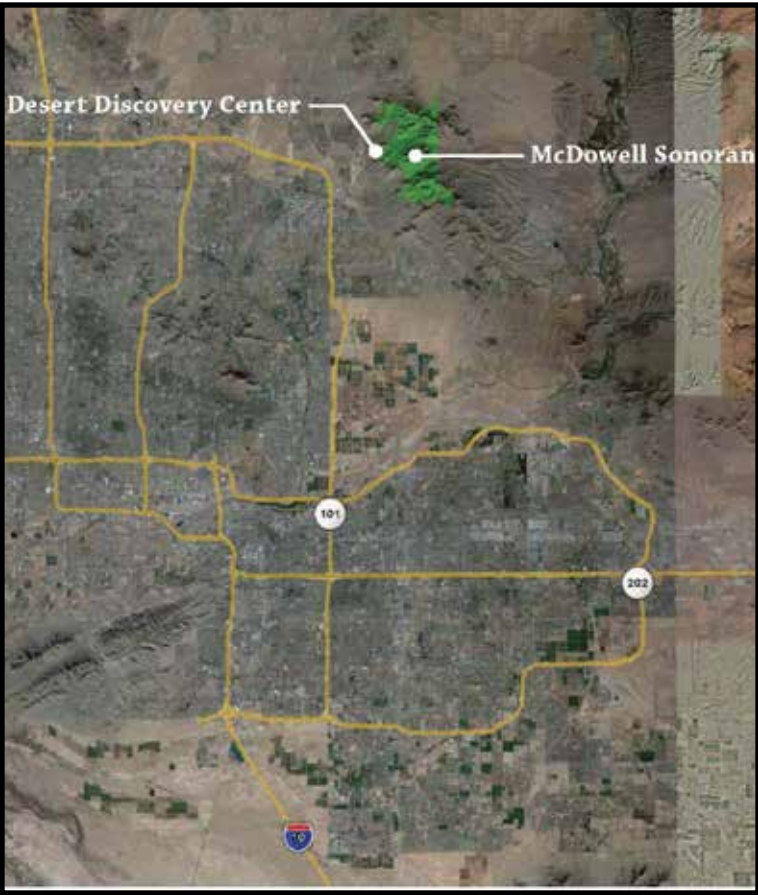
Alternative Site Considered within Gateway

As the design work continued, and more public commentary continued relating to the negative influence the DDC might have on the Gateway hiker experience, the design team looked for a compromise. It was discussed in several meetings with the DDCS, and City Staff, whether an alternative site within the Gateway area might be considered. Consideration was given to the existing parking lot area, to an area directly north of the parking lot, and to an area behind and east of the existing maintenance building. As time went on, and more discussion and site visits occurred, the area behind the existing maintenance site seemed to resolve many of the issues.

An existing, secondary, trailhead was located at that location for equestrian and hiker use, and the parking area was less used than the stalls nearest the Gateway trailhead. The area also offered many of the same view corridors that were explored by Thinc for their interpretive experiences. It also offered a better opportunity adjacent to a wash corridor for the interpretive experience regarding water flow and animal corridors. Meetings were held on site with several members of the City Staff to review the site relocation, who also consulted with the Acting City Manager at the time for approval. Our Teams Civil Engineers, and the City Engineer also looked at the drainage conditions, as well as the parking area and the use of the existing maintenance building. After much deliberation, it was decided by City Staff that it would be acceptable to move the design area to this new area for the purposes of this study.

Support Site Concept Considered

As the design work progressed on the second site, the idea of making a smaller footprint for the DDC by having only what were considered “essential uses” be located within the Preserve, and other spaces such as certain storage, offices, and overflow parking could possibly be located at a support site nearby, but not in the Preserve. Although the exact location for the support site has not been determined, a few possibilities exist on City owned land in the Bell Rd. Corridor. The DDCS, and its consultants analyzed the architectural program, and selected which spaces could be located at the support facility. With this new approach, we started the design based on the new site location with a smaller footprint goal.



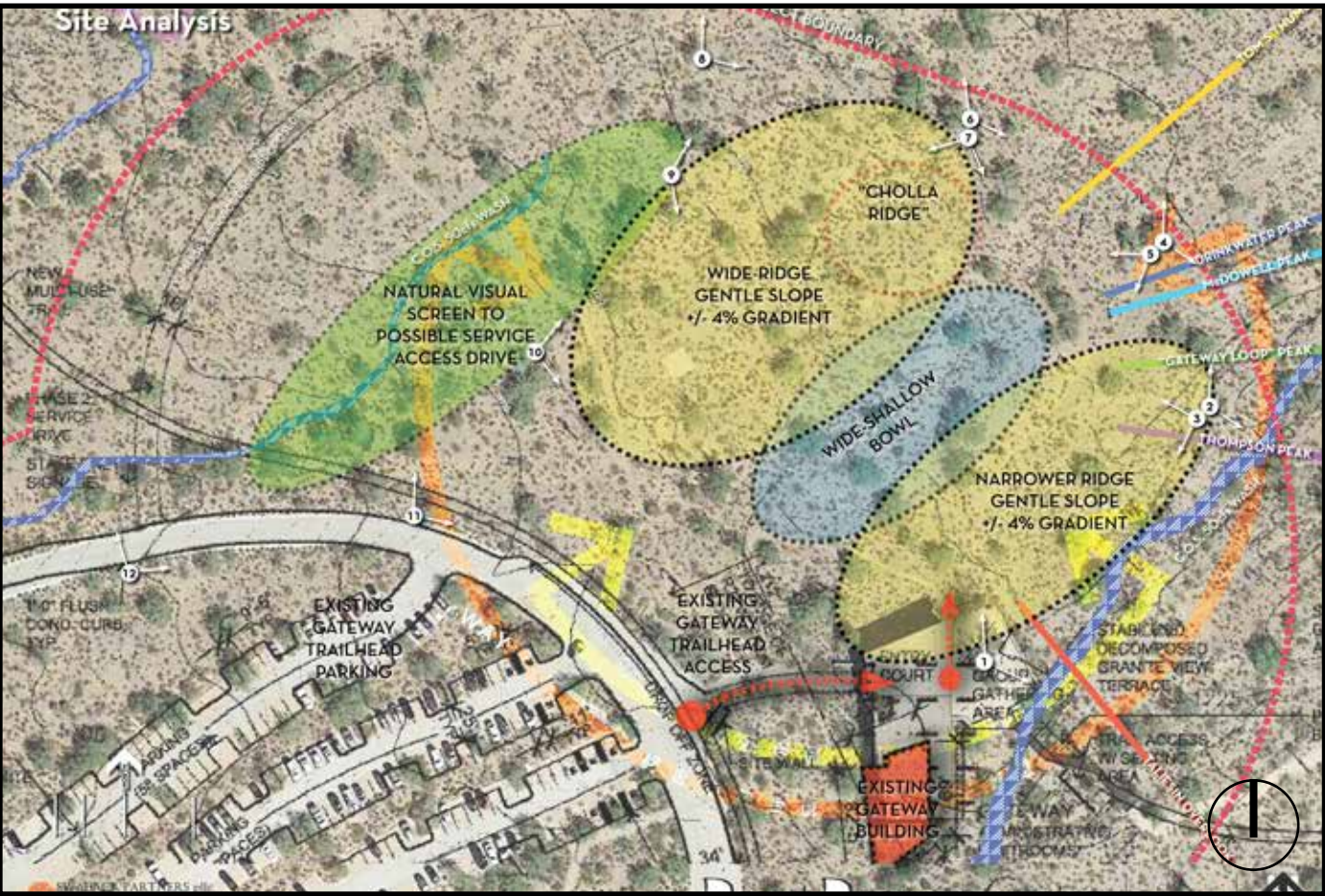
DDC PANORAMA (LANDFORMS)

- | | |
|--------------------|------------------------|
| 1. Tom's Thumb | 5. "Gateway Loop" Peak |
| 2. Lookout Point | 6. Thompson Peak |
| 3. Drinkwater Peak | 7. Taliesin Overlook |
| 4. McDowell Peak | |

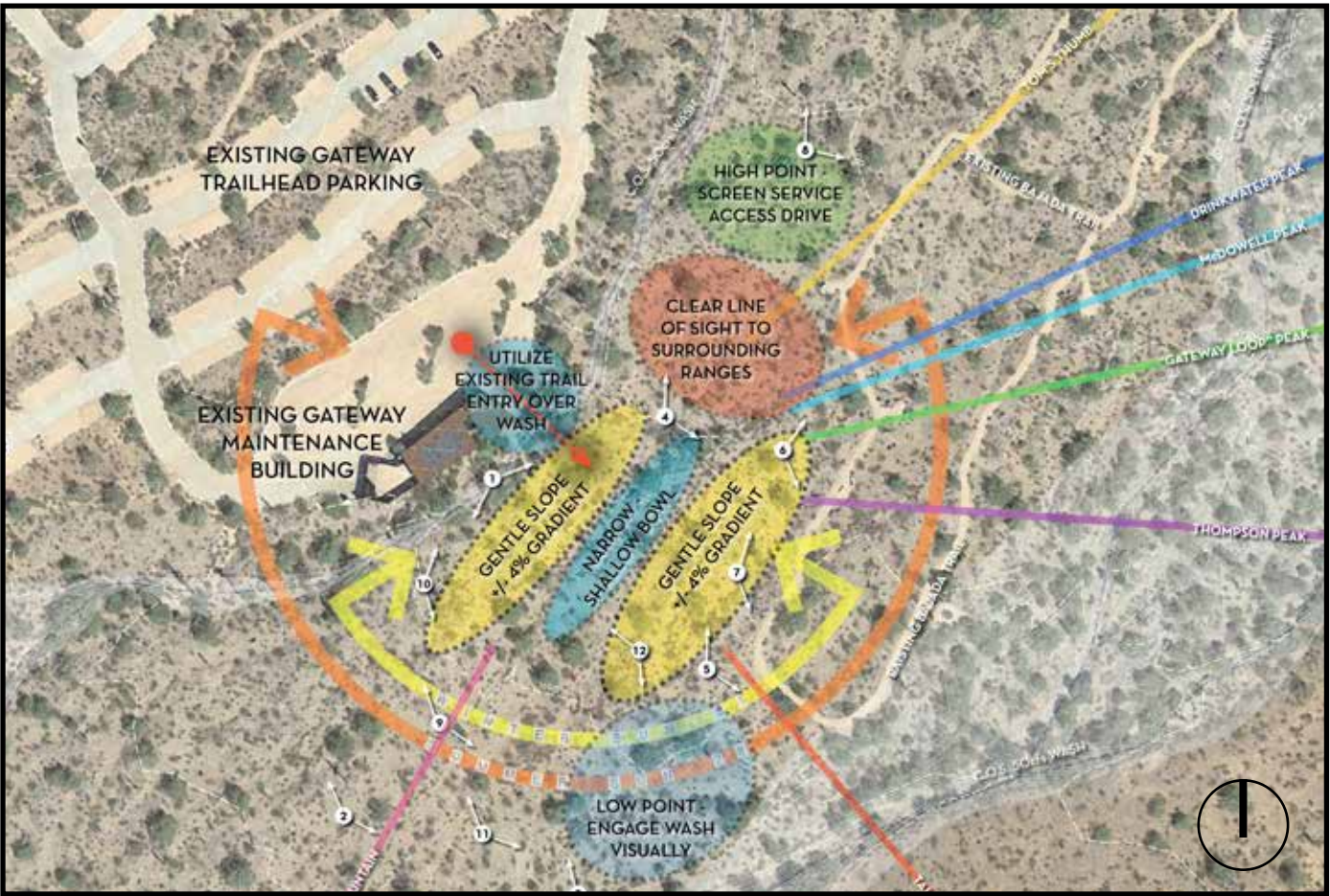
THE SITE

SITE ANALYSIS

ORIGINAL PROPOSED SITE LOCATION



CURRENT PROPOSED SITE LOCATION



THE SITE

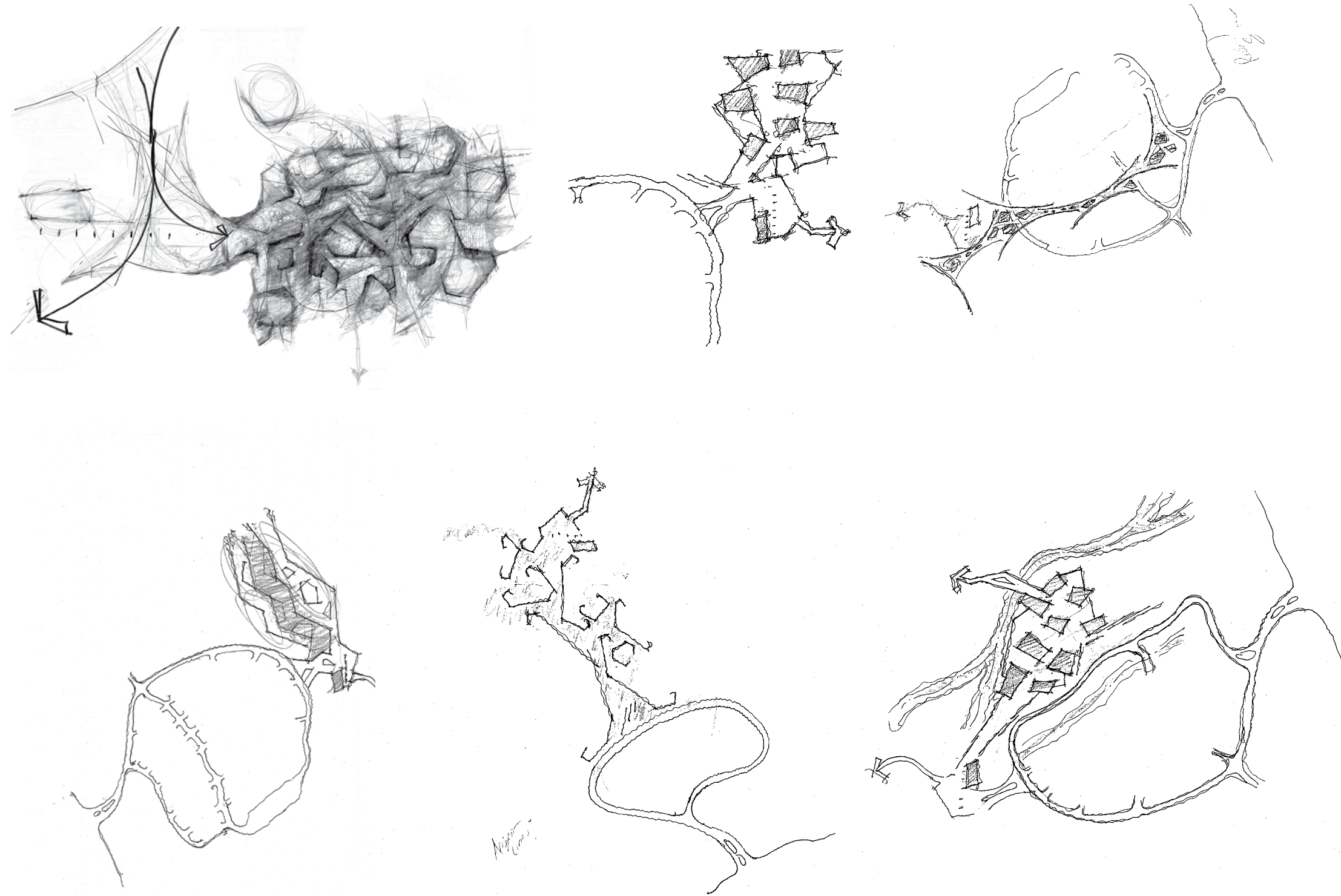
INITIAL SITE IMPRESSIONS

As you enter the Gateway Trailhead, the open-pavilion-form provides shelter and shade as you embark on your hike into the Preserve.

To the north, and mostly in alignment with the Gateway building is the proposed building site of the DDC. It was indicated on the initial Municipal Use Master Site Plan that was approved in (insert date) as part of the Gateway design. It was also this same site that the Phase 2 study used for its concept, and it is the site that the design team started its initial design work. The site location would allow for a free flow of hikers through the Gateway as always, and for those going to the DDC they would simply head a bit north on a proposed walkway into the DDC facilities.

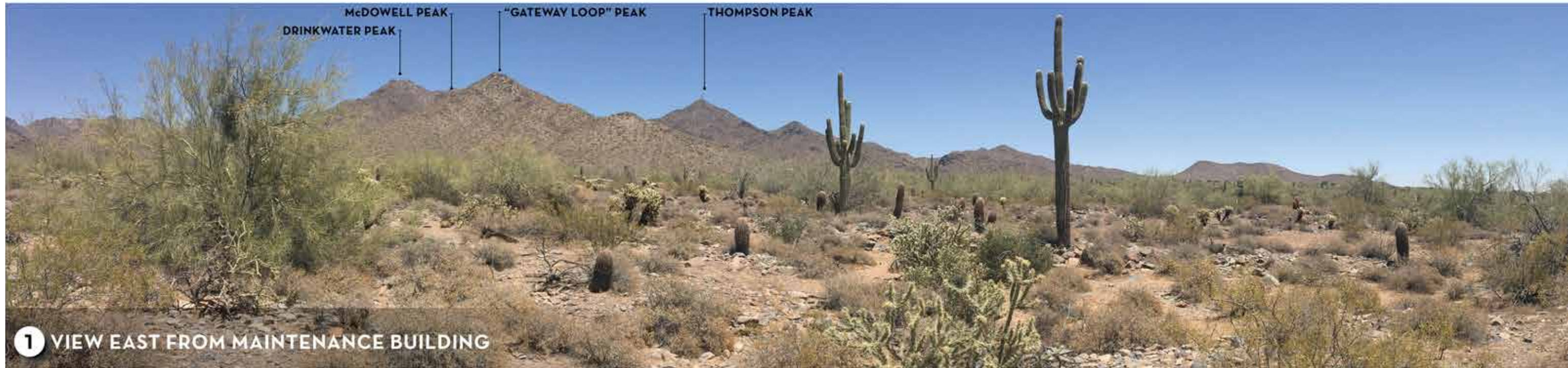
As the design process began, and public meetings were held, the impact of the DDC on the Gateway hiker experience was questioned. It was felt, by some, that the DDC would become a distraction to hikers and that it would greatly change their experience. Others saw it as an opportunity to offer a world class interpretive experience to educate hikers as they entered the Preserve to understand what they were about to experience, and help explain what they did not already know. It could also help educate visitors on how the desert changes throughout the different seasons.

The design team took those comments under advisement and started developing a series of design alternatives. Some of those very early sketches are included here.



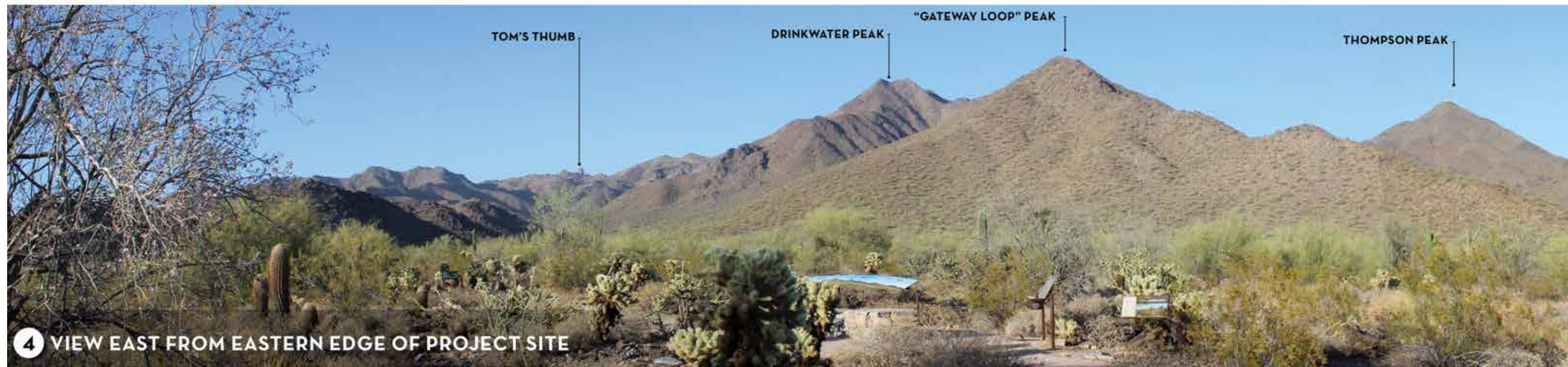
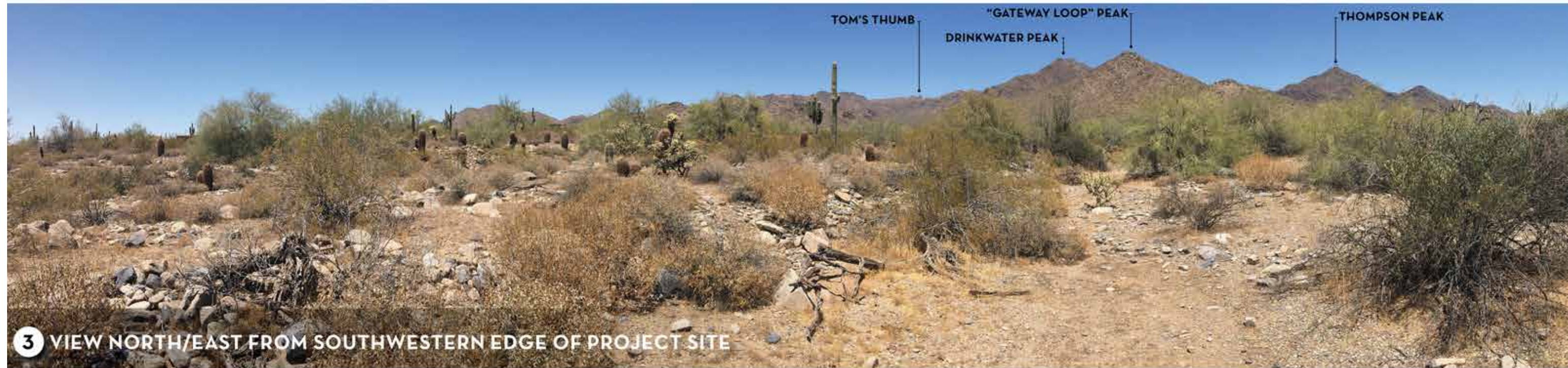
THE SITE

SITE ANALYSIS OF SECOND SITE



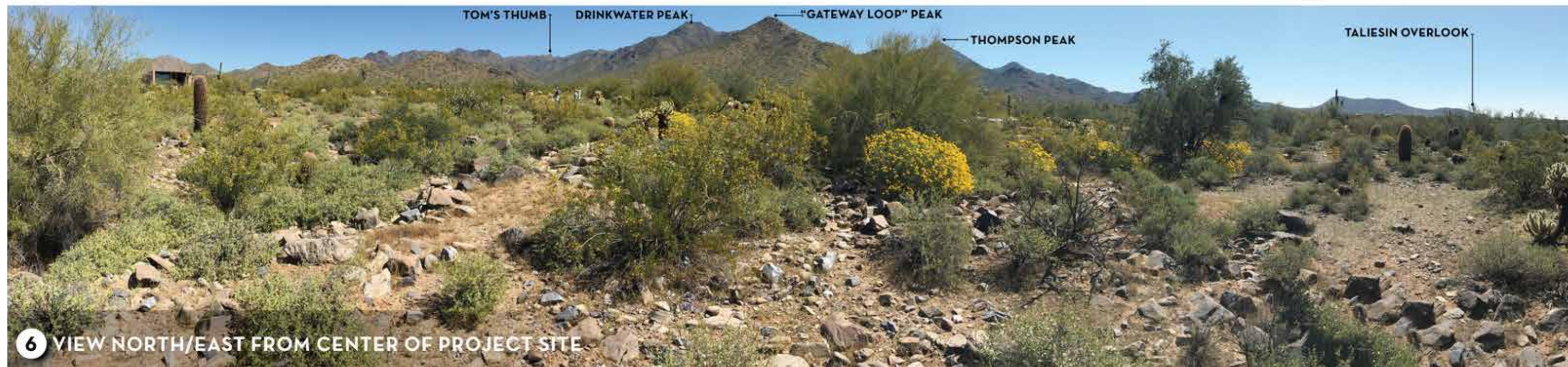
THE SITE

SITE ANALYSIS OF SECOND SITE



THE SITE

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THE SITE

SITE ANALYSIS OF SECOND SITE



THE SITE

SITE ANALYSIS OF SECOND SITE



4.

ARCHITECTURAL PROGRAM



THE ARCHITECTURAL PROGRAM

Based on new input from DDCS, Consult Econ, City of Scottsdale Staff, Thinc and ASU, in addition to some of the architectural programing during Phase 2, the following Program of Spaces was developed. The Program was based on keeping only essential spaces at the Preserve site and locating the remaining spaces at the support site.

	SPACE TYPE	NET SF	UNDER ROOF GROSS COND SF	UNDER ROOF GROSS NON-COND SF	UNDER CANOPY GROSS NON-COND SF	UNCOVERED NON-COND SF
PAVILION A			6,045			
ADMISSIONS	SUPPORT	483				
PRESERVE HISTORY	EXHIBIT				500	
DESERT KEEPERS	SUPPORT	5,109				
PAVILION B			2,131			
POD	EXHIBIT	1,910				
SENSE CORRIDOR	EXHIBIT				1,890	
PAVILION C			5,862			
PRESERVE CAFÉ	SUPPORT	2,043				
CAFÉ KITCHEN	SUPPORT	640				
PRESERVE SHOP	SUPPORT	1,094				
RETAIL STORAGE	SUPPORT	336				
COMMONS RESTROOMS	SUPPORT	1,224				
PAVILION D			12,947			
SONORAN SEASONS	SUPPORT	5,429				
RESTROOMS	SUPPORT	734				
STORAGE / MECH	SUPPORT	1,013				
CATERING	SUPPORT	1,357				
SCIENCE ENCOUNTER	EXHIBIT	2,363				
SONORAN PREFUNCTION	SUPPORT	1,610				
PAVILION E			3,999			
BAJADA	EXHIBIT	3,746				
PAVILION F						
MOUNTAINS & VALLEYS	EXHIBIT			1,001		2,133
PAVILION G						
SONORAN STEPS	SUPPORT				4,804	

THE ARCHITECTURAL PROGRAM

	SPACE TYPE	NET SF	UNDER ROOF GROSS COND SF	UNDER ROOF GROSS NON-COND SF	UNDER CANOPY GROSS NON-COND SF	UNCOVERED NON-COND SF
PAVILION H			4,252			
DEEP TIME	EXHIBIT	2,938				1,001
ANTHROPOCENE	EXHIBIT					
DEEP TIME RESTROOMS	SUPPORT	680				
PAVILION I						
WASH	EXHIBIT			3,183		1,977
PAVILION J						
SAGUARO SUNDIAL	EXHIBIT					1,907
PAVILION K			3,305			
CITY	EXHIBIT	3,221				
EDGE	EXHIBIT			704	559	
PAVILION L			9,045			
GLOBAL DRYLANDS INSTITUTE 1	RESEARCH	4,233				
GLOBAL DRYLANDS INSTITUTE 2	RESEARCH	4,479				
BREEZEWAY	RESEARCH			1,474		

TOTAL ON-SITE NET SF:	44,642
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ON-SITE EXHIBIT GROSS SF	16,050
ON-SITE SUPPORT GROSS SF	22,491
ON-SITE GROSS RESEARCH SF	9,045
TOTAL ON-SITE UNDER ROOF GROSS COND SF	47,586

ON-SITE PROGRAMMED UNDER ROOF NON-COND SF	6,362
PUBLIC CIRCULATION SPACE AND NON-PROGRAMMED AREAS SF	30,987
TOTAL ON-SITE UNDER ROOF NON-CONDITIONED SF	37,349

ON-SITE PROGRAMMED UNDER CANOPY NON-COND SF	7,753
ON-SITE MISC. CANOPY SF	26,305
TOTAL ON-SITE CANOPY SF	34,058

TOTAL ON-SITE UNCOVERED NON-CONDITIONED SF	7,018
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TOTAL ON-SITE EXHIBIT SPACE, COND & NON-COND SF	30,905
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OFF-SITE FACILITY SF	5,400
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SOURCE: SWABACK PARTNERS

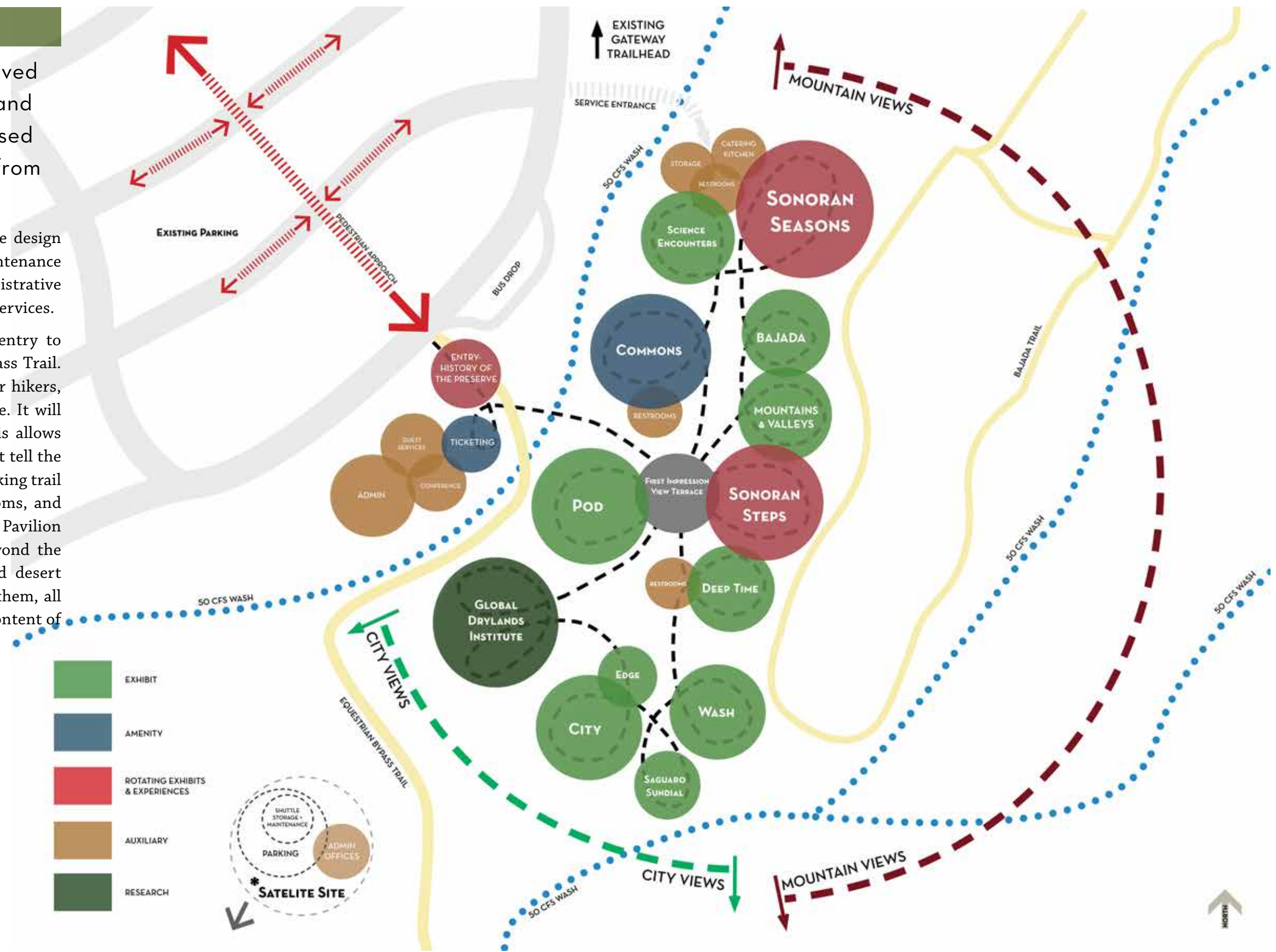
THE ARCHITECTURAL PROGRAM

SPACE AND FLOW

As the interpretive experience evolved and focused on the relocated site and its opportunities, a completely revised space and flow diagram emerged from what was envisioned in Phase 2.

The main entry to the DDC emerged during the design process to be adjacent to the existing maintenance building, which is being re-purposed as administrative space, ticketing, maintenance, and some visitor services.

As the diagram indicates, also located at the entry to the DDC is the trail head to the Equestrian Bypass Trail. This trail head will still be left free and open for hikers, although the equestrian nature of it may change. It will now share a common access with the DDC. This allows the public hikers to enjoy interpretive panels that tell the history of the Preserve, and display the overall hiking trail maps. Hikers will also be able to utilize restrooms, and some of the hospitality services in the Commons Pavilion without paying for admission to the DDC. Beyond the entry the DDC opens up to a series of linked desert pavilions with interpretive courtyards between them, all focused on framed view sheds aligned with the content of the interpretive exhibits.



5. ARCHITECTURAL CONCEPT



THE ARCHITECTURAL CONCEPT

OVERALL ARCHITECTURAL CONCEPT

The Architecture of the DDC is simple, bold and forward thinking.

Inspired by looking back in history at successfully sustainable architecture in deserts throughout the world, as well as looking forward as we continue to understand living in the deserts and arid lands. It is also informed by those who have built world class architecture in the Sonoran Desert before such as the Native Americans, Frank Lloyd Wright, and Paolo Soleri. It is an architecture that blurs the line of when one is indoors and when one is outdoors to take advantage of the times the weather allows for the openness. It responds to the harsh desert days of the summer, and the mildly cold day of winter by being able to enclose the spaces and retain the coolness of the evenings in summer, or warmth of the day in winter through thermal mass. It is an architecture that blends into it magnificent desert setting, and lastly it is an architecture of beauty. One that respects the most beautiful desert in the world. It is an architecture that is timeless, style and trend free. Sure of itself. One that visitors will immediately understand is appropriate to the Preserve, and an extension of the emerging architectural typology. Functionally, the architecture is crafted to respond to the interpretive experience and educational opportunities that exist within the DDC, as well as prepare visitors for their journey deeper into the Preserve.

SITE PLAN

As discussed earlier, the DDC was moved to a site behind and adjacent to the existing maintenance facility. As such it is now located between two wash corridors. Access is on the southeast side of the existing equestrian trailer parking. The existing trailer parking will be relocated elsewhere which will be determined through a future study. The site

plan indicates an addition of (fill in the blank) parking stalls within the overall Gateway parking area. Some of those stalls, (fill in the blank), were contemplated as part of the previously approved MUMSP. Some of the new stalls are a result of reconfiguring the equestrian trailer parking, which has been historically underutilized, and adding another drive lane. In discussion with the Traffic Engineer, and the City's Traffic Engineer, it was decided to add an additional right turn into the parking area off Thompson Peak Parkway, which will reduce congestion at the intersection of Carla Way, and Thompson Peak Parkway. As well as separate traffic to the DDC from Gateway hikers.

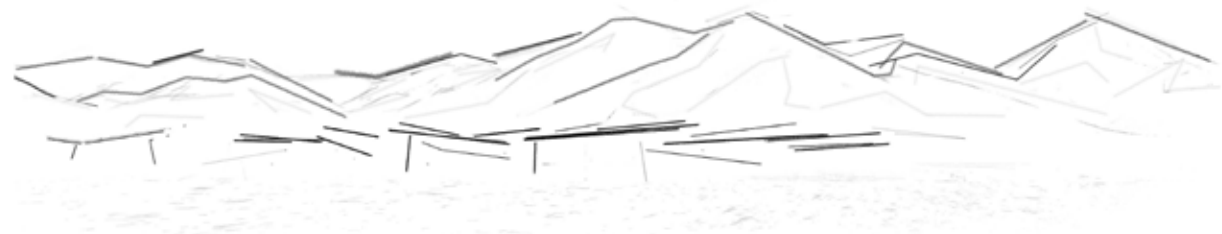
The site plan layout and the desired framed views of the desert and City of the individual, linked desert pavilions was generally determined by the interpretive experience to interact with the various educational topics. Additionally, the sun angles, animal corridors, existing vegetation, and the existing Bajada Trail were all considerations in the siting of the various pavilions and terrace areas.

The plan envisions emergency services for possible Fire and EMT situations to be able to drive into the center courtyard up to the Sonoran Step area and address the situation from that point. It is envisioned that the site plan is open to animal migration through the openings between the pavilions.

On-site security will be handled through security cameras, and on-site security personnel. The areas between the pavilions will have some degree of security barriers, but it is acknowledged that the inner courtyards could be accessed if passed through these open spaces, as they are not intended as tight security fences.

It was determined that a balance needed to be reached between the animal migration and security. Admittedly, animal migration patterns, in the immediate area of the DDC, will be altered as they are located by many existing trailhead buildings and paths within the Preserve.

ARCHITECTURAL CONCEPTS



LINES SUGGESTING SHAPES



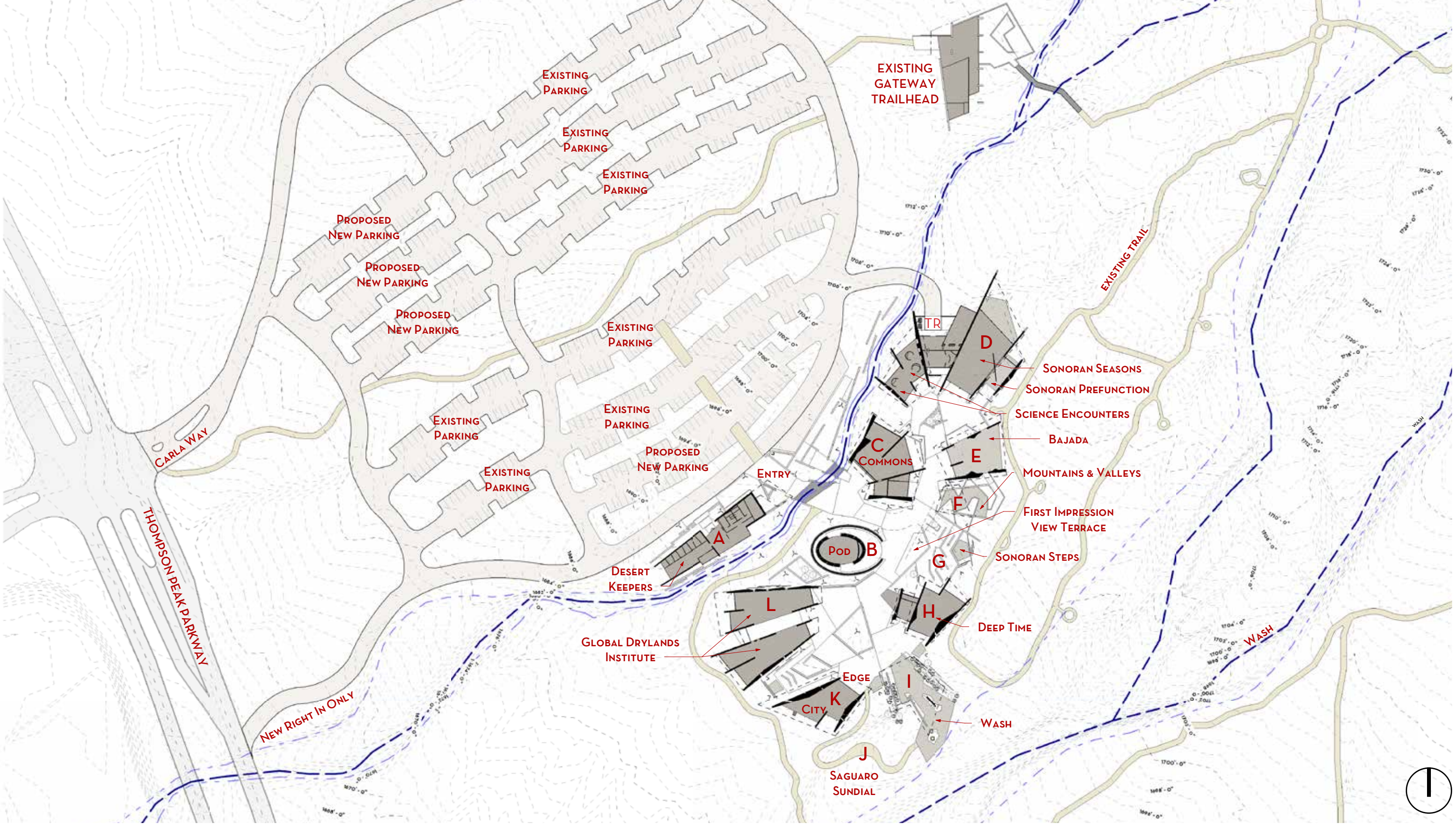
SHAPES SUGGESTING FORMS



FORMS SUGGESTING ARCHITECTURE

THE ARCHITECTURAL CONCEPT

SITE PLAN



THE ARCHITECTURAL CONCEPT



THE ARCHITECTURAL CONCEPT

LARGE SCALE FLOOR PLANS

The DDC plan consists of 7 pavilions, 2 roofed but open-air exhibit spaces, a re-purposed and expanded existing maintenance building, and a variety of interpretive courtyards, teaching alcoves, and terraces.

The organizational structure of the plan allows for hikers to freely access the Preserve through the Entry Portal, and for DDC visitors to clearly understand where to enter. Once past the greeting space, visitors are free to discover the content of the DDC on their own, in their own way, and on their own time schedule.

Groups will arrive in an area just northeast of the main entry. A bus/shuttle drop off point has been included at this point, which will allow school children to disembark the bus and immediately enter into a safe area where a guide can greet them and give an initial orientation without congesting the main entry area. This also allows for those getting off a bus to safely enter without having to cross a drive lane.

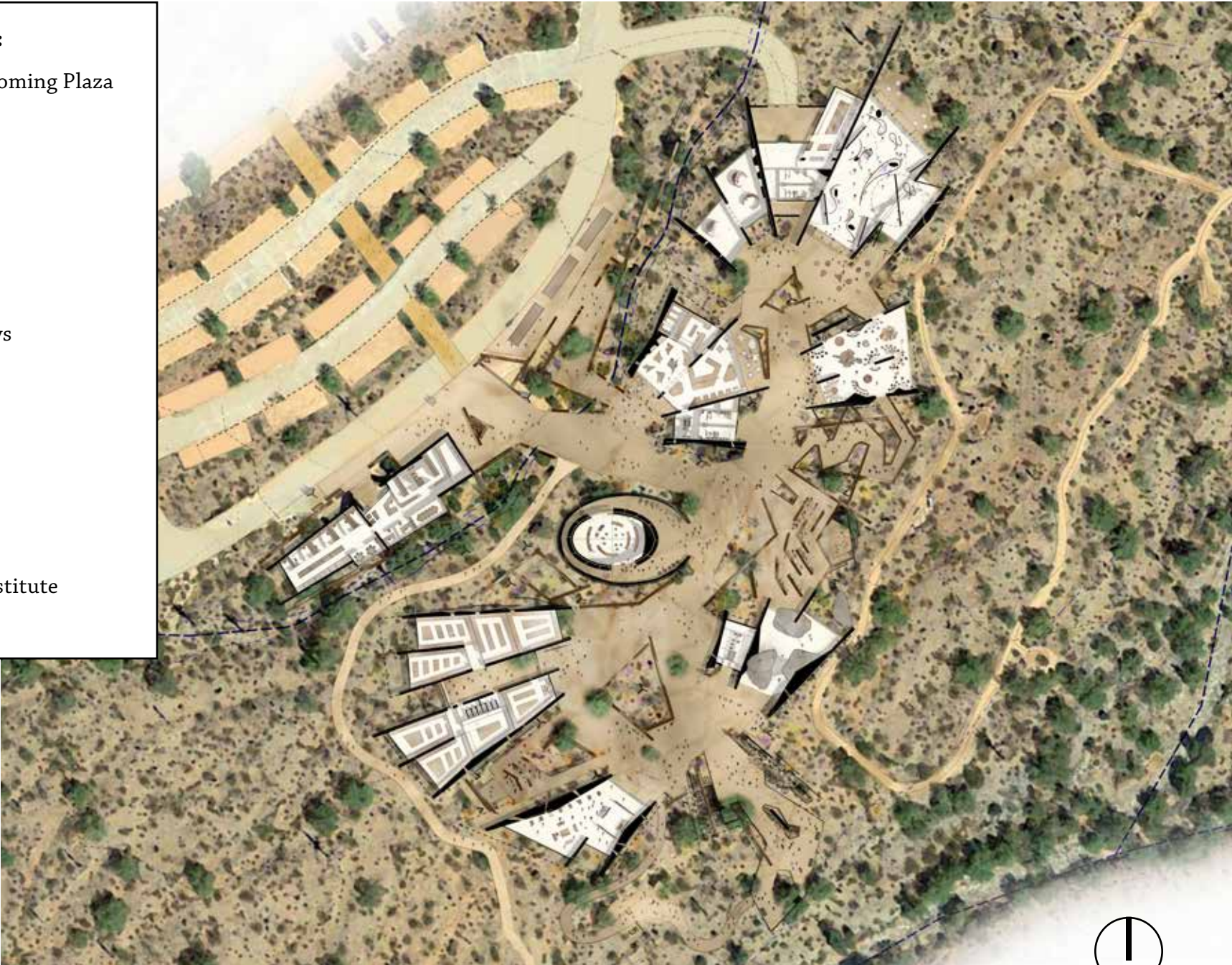
Upon entry, one is greeted with a framed view of the McDowell Mountain at the Sonoran Step interpretive area directly in front of you for a maximum impact experience of the view. To the left or to the right visitors can explore the various pavilions. No linear flow pattern was made part of the interpretive experience. This allows visitors to experience the DDC differently each time they visit. This also allows for dispersal of crowds during seasons of high visitation. The separated pavilion forms create spaces between them that are natural shade pockets due to the pavilion orientation. These spaces will be used as outdoor teaching areas, and unique interpretive spaces based on various subjects.

The architectural forms of the various pavilions were sited due to view sheds that the interpretive plan captures. Further, the shapes were formed to help frame those views in dramatic ways. The open-ended nature of each pavilion created by way of unique retractable glass wall systems, allows for a self-cooling effect much like a breezeway, which can be extremely effective during certain parts of the year before the heat reaches extremes. The retractable wall systems also allow for the pavilions to mechanically open up in the early morning to take advantage of cooler air, and then close down late in the morning as temperatures rise. Thus, capturing and holding some of the cool air.

- THE MAJOR SPACES:**
- Entry Portal / Welcoming Plaza
 - Desert Keepers
 - Commons
 - POD
 - Sonoran Seasons
 - Bajada
 - Mountains & Valleys
 - Sonoran Steps
 - Deep Time
 - Wash
 - Saguaro Sundial
 - City / Edge
 - Global Drylands Institute

Basic hospitality needs for visitors such as restrooms are located in several locations for convenience. At the ticketing area, there will be access for wheelchair and baby strollers to assure visitors maximum accessibility to the facilities. Points of service delivery for the Sonoran Seasons and the Commons will be made through a fully concealed and screened area just north the Sonoran Seasons.

The architecture and intended use for each individual Pavilion and major outdoor areas are further described on the following pages. Please refer to the Interpretive Plan for a thorough description of the exhibit spaces.



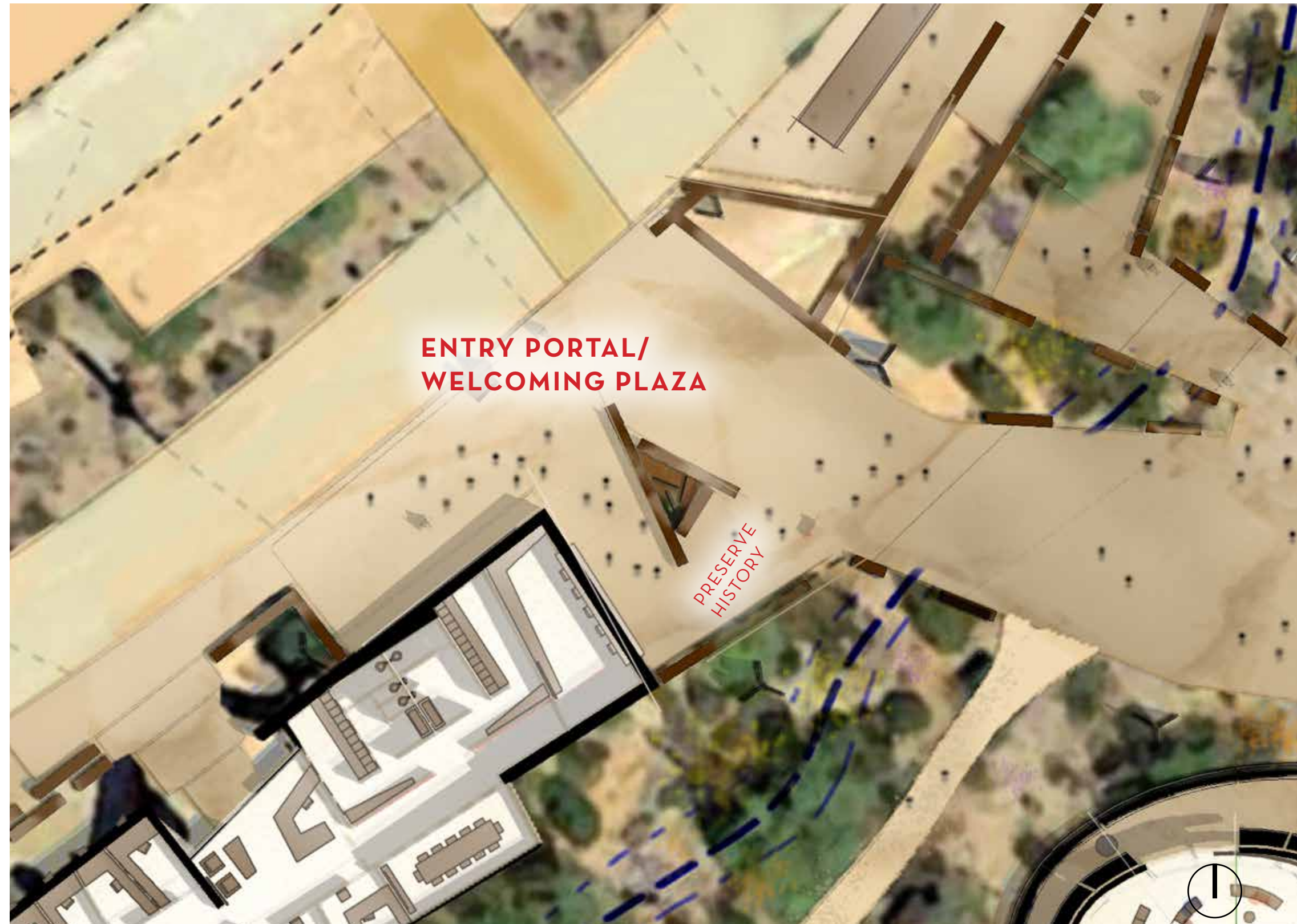
THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

ENTRY PORTAL / WELCOMING PLAZA

As visitors arrive either by foot, bicycle, personal vehicle or shuttle, they will enter adjacent to the existing maintenance building, which is being re-purposed as the Desert Keepers space, where ticketing will occur.

To the right of the Entry is easy access to hiking and the trailhead just over the wash. Restrooms are also conveniently available just inside the entry for DDC visitors and hikers. Interpretive panels will give an overview of the Preserve, as well as its history and the trail network after passing through the Entry Portal. Visitors who have prepaid Online, can have their passes registered by a high-tech reader for entry. Groups disembarking a bus or shuttle, will enter the group orientation area where a guide will provide an initial orientation. Tickets can also be conveniently purchased at kiosks located at the Entry, or at the ticketing window of the Desert Keepers Pavilion.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

COMMONS

Just after walking over the bridge that spans the wash, in the foreground are perfectly framed views of the McDowell Mountains and the Sonoran Steps.

To the left, the Commons Pavilion serves as a small café and retail shop.

Both spaces flow together and are open to visitors of the DDC, or those only making purchases in the shop or the café without paying to go into the DDC.

Terraces on both sides of the Commons Pavilion provide outdoor seating. Strict limitation on food and beverage items will be adhered to so no birds or animals are attracted to the space.

The Commons is also the central location for restrooms.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

SONORAN STEPS

The Sonoran steps are a unique collection of sitting areas that focus on the view to the mountains, and on a special platform for presentations that will be given on a regular basis.

The presentations will be live talks on a variety of subjects by DDC staff members, guest speakers, ASU researchers, as well as a variety of organizations who have information to contribute to the public's understanding of the Preserve and the Sonoran Desert in general.

This area is shaded by a unique shade structure designed to give shade and generate solar energy. This is an area that can accommodate approximately 120 - 150 people in a casual seating arrangement.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

POD

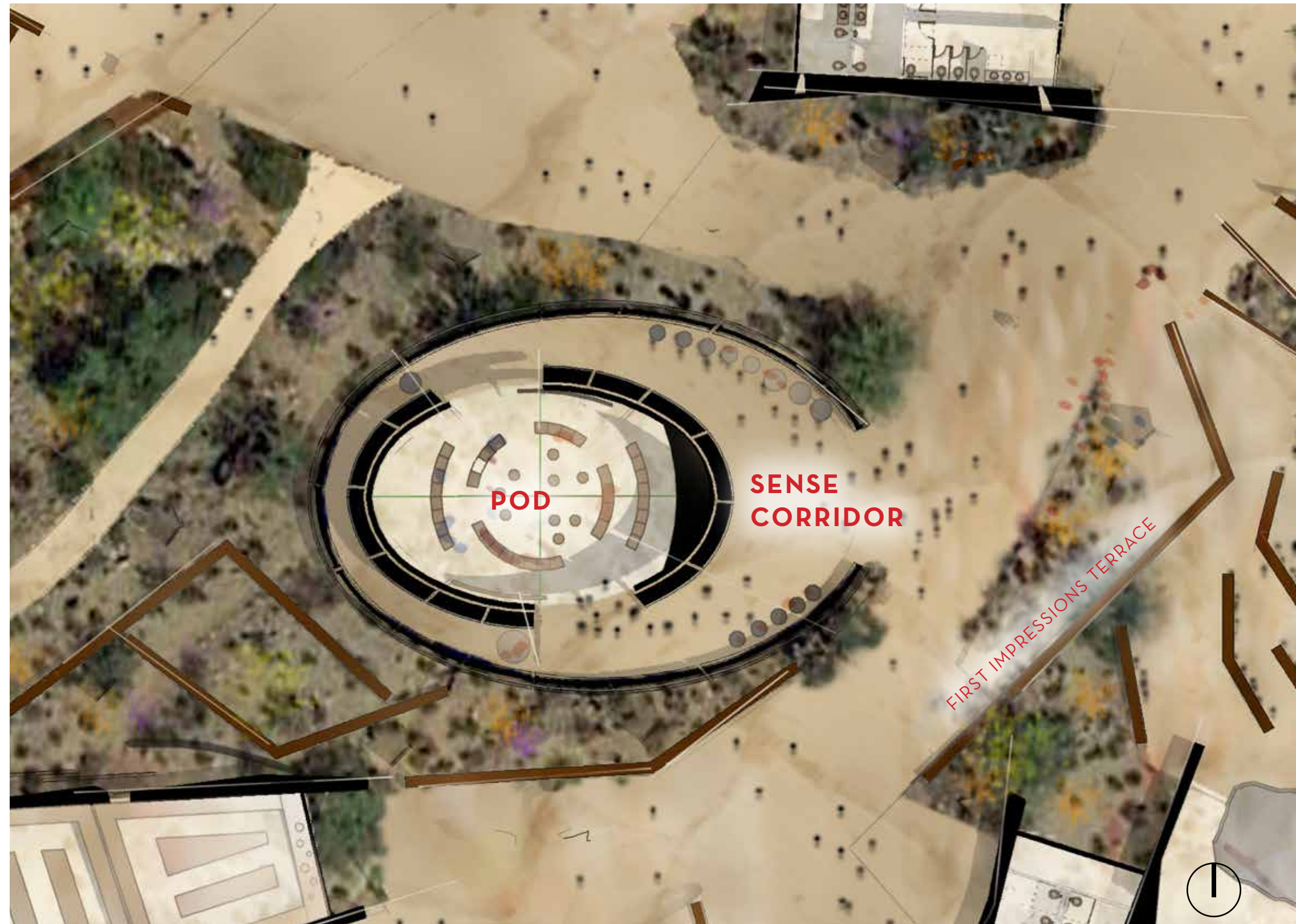
The Pod is an extremely unique pavilion, and is considered to be one of the centerpieces to the overall collection of spaces.

Its name and plan shape, are derived from the inspiration of a seed pod from a cactus as an abstract reference to the future of life within the desert. The many layers of the exterior walls of the POD engulf you as you enter.

Living within the desert is a major theme of interpretation at the DDC.

The space will function in many different ways and incorporate a variety of exhibits and immersive experiences.

The exterior shell of The POD will function as a unique cooling wall operational in the driest and hottest times of the year through the use of recycled gray water. It will also function as a major interpretive exhibit on simple technology combined with architecture to create a milder temperature within the space. The water wall shell is abstractly related the nature of water in the desert and the bursting forth of a desert bloom in the spring.



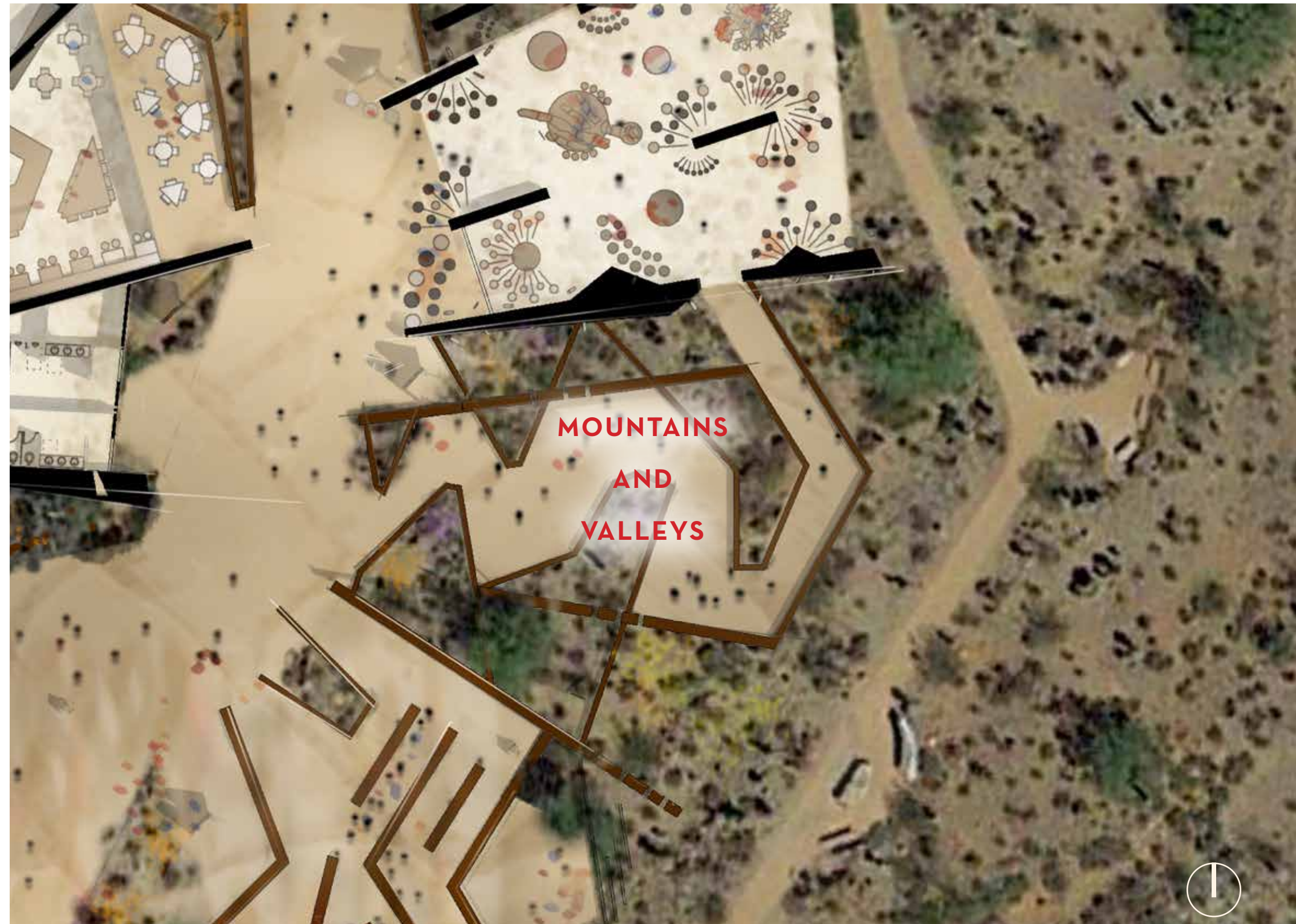
THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

MOUNTAINS AND VALLEYS

The architectural concept of this pavilion is to have the visitor experience the desert at a variety of levels, including below the desert floor by revealing portions of the hidden desert.

This experience is created by a series of landforms traversed by a series of ramps that drop down and rise up. The pavilion is totally open-air, but partially covered by a shade canopy.



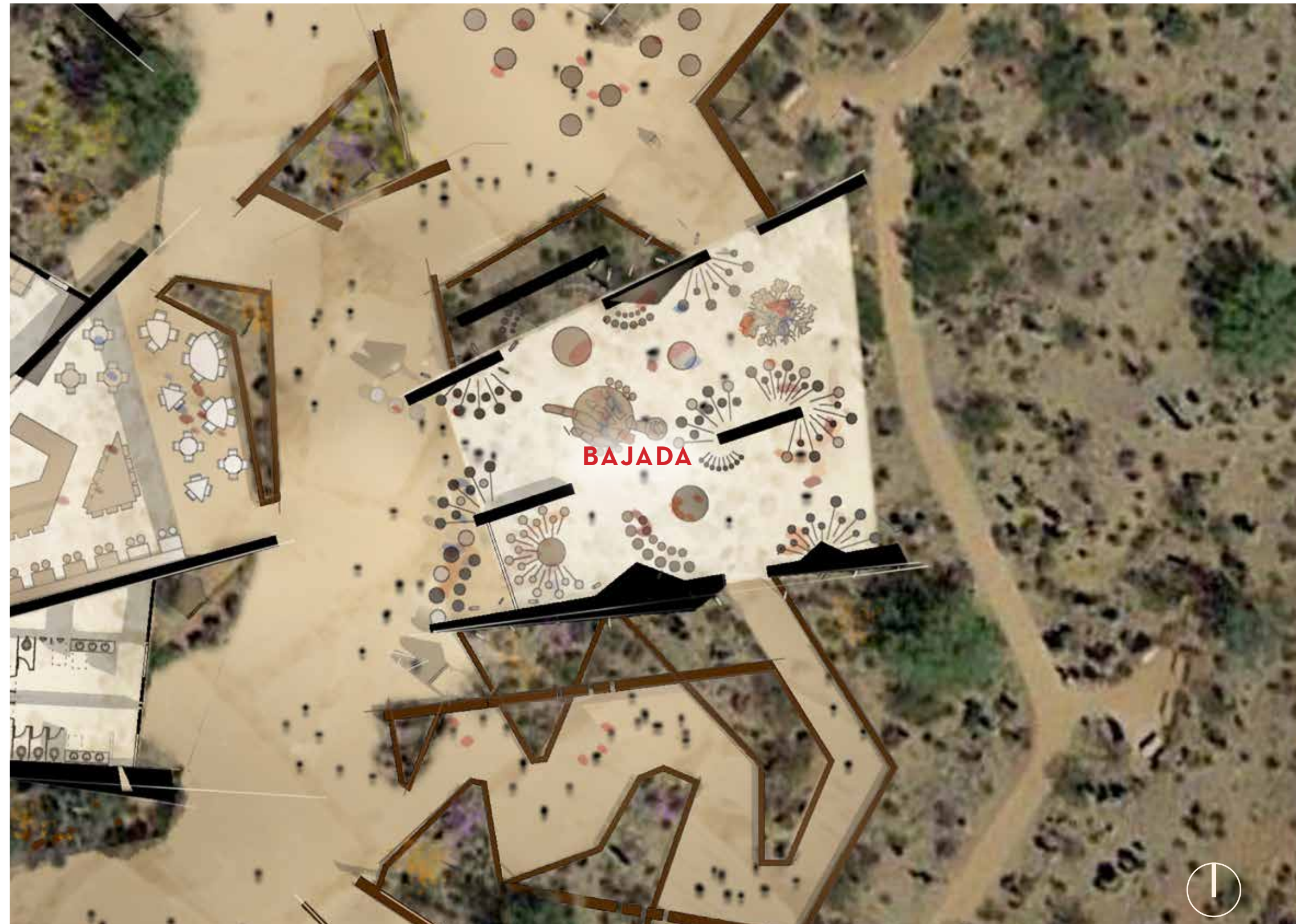
THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

BAJADA

The Bajada Pavilion is focused on a view of the bajada desert area and is adjacent to the Bajada Trail.

It contains a significant number of exhibits, and in some areas, the walls open up to vignette views of focused exhibits.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

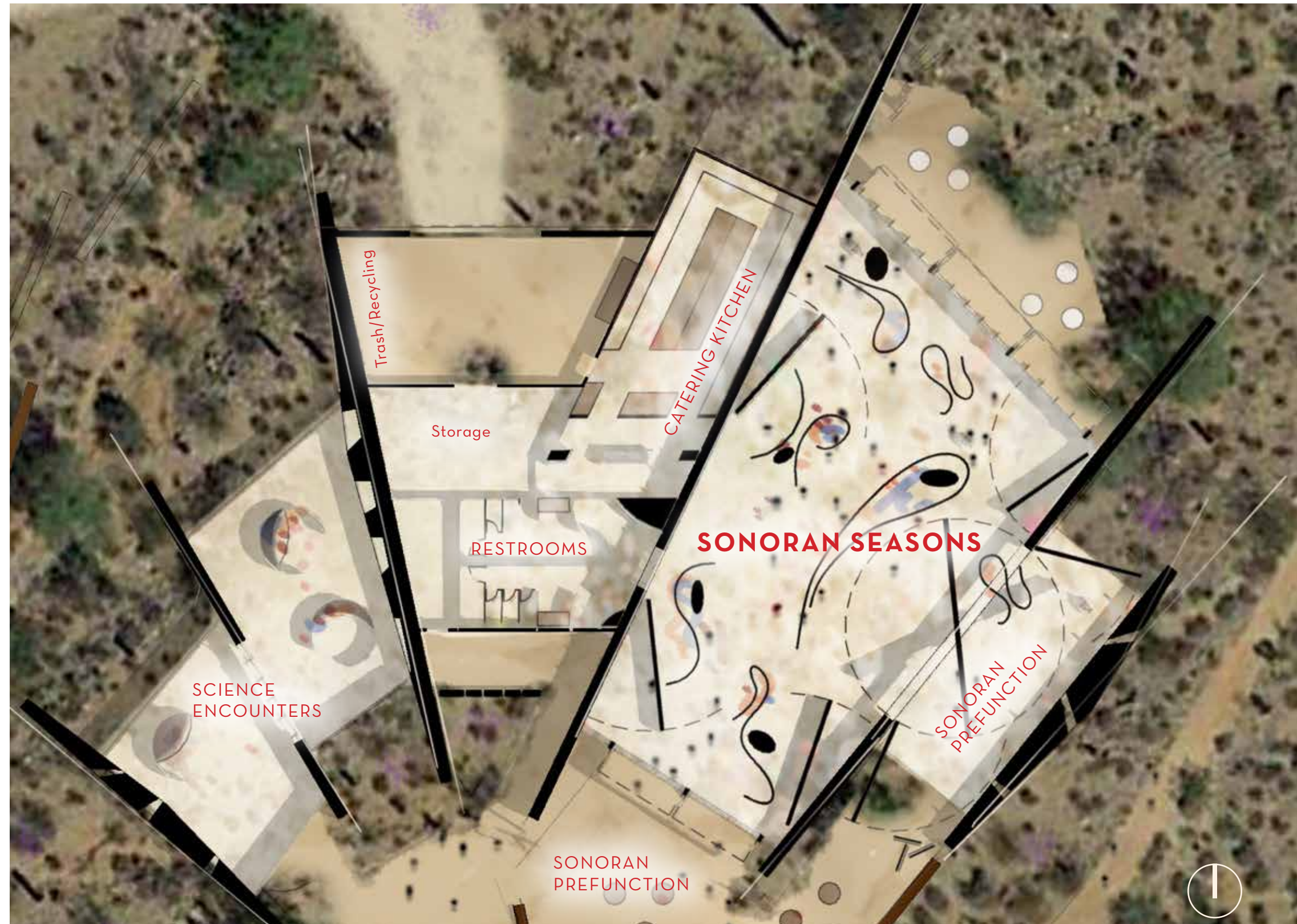
SONORAN SEASONS

Sonoran Seasons is a combined Pavilion containing two major spaces that will become one of the DDC's most exciting and dynamic areas.

The Sonoran Seasons is a highly imaginative, multi-use space that allows for a variety of rotating exhibits, symposiums, events, lectures, and exhibitions. It is designed as a series of pivoting panels that change character with each unique event. The large rotating wall panels fold against the wall to provide a large open space, or can be used to make several divided gallery spaces so different events, or programs can occur simultaneously. This space is also adjacent to a catering-only kitchen, which could be used to host events incorporating food service from time to time.

Adjacent to the Sonoran Seasons, is the Science Encounters space.

This is a space that has been designed as a type of Research Lab, that is highly interactive with the public. The content of this space will change from time to time depending on the program, and often it will be aligned with the programming occurring in the Sonoran Seasons. This space can be broken up and changed into many different configurations similar to the Sonoran Seasons by unique modules that divide the space with highly flexible technology infrastructure.

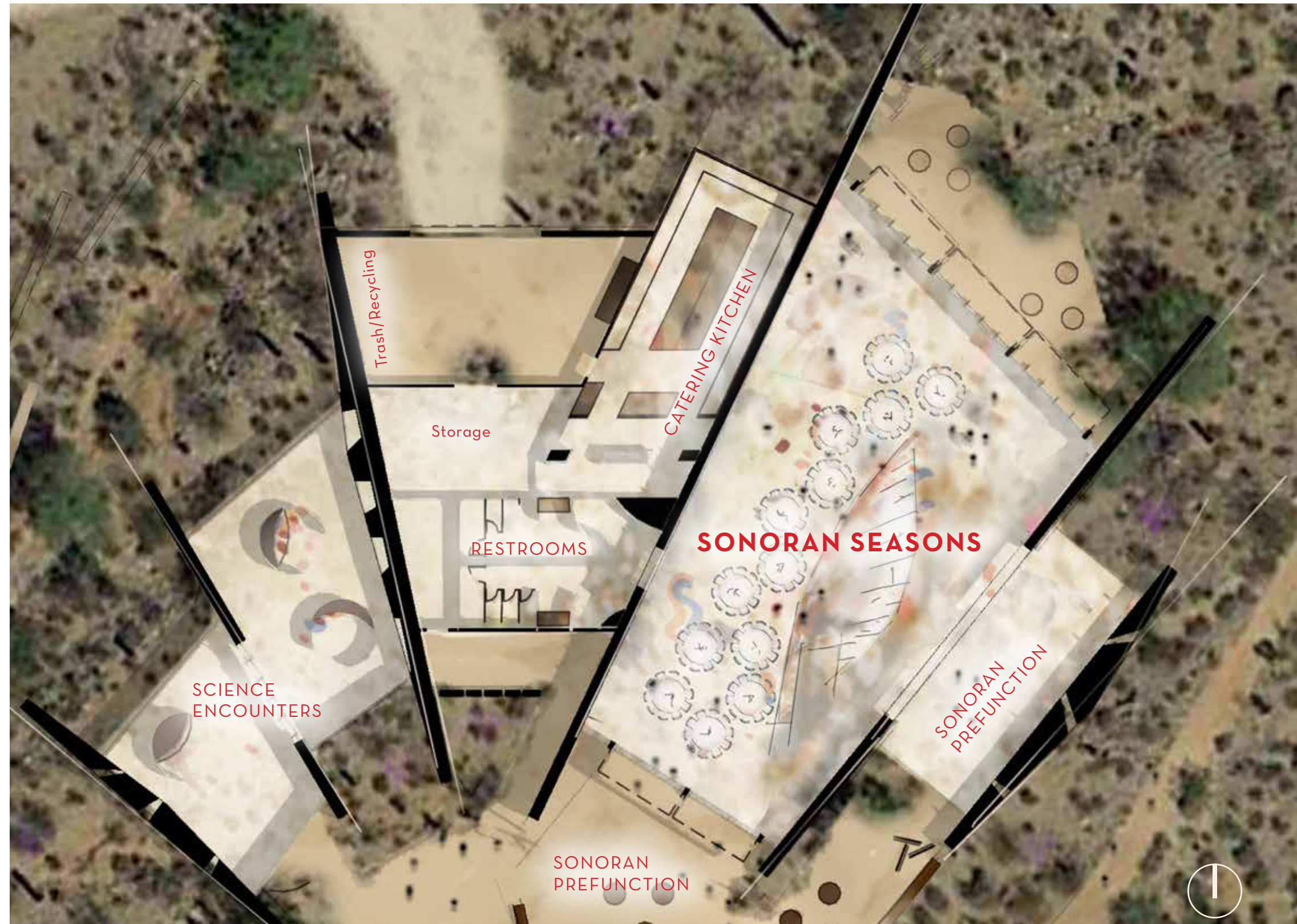


THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

SONORAN SEASONS

Alternative furnishing layout.

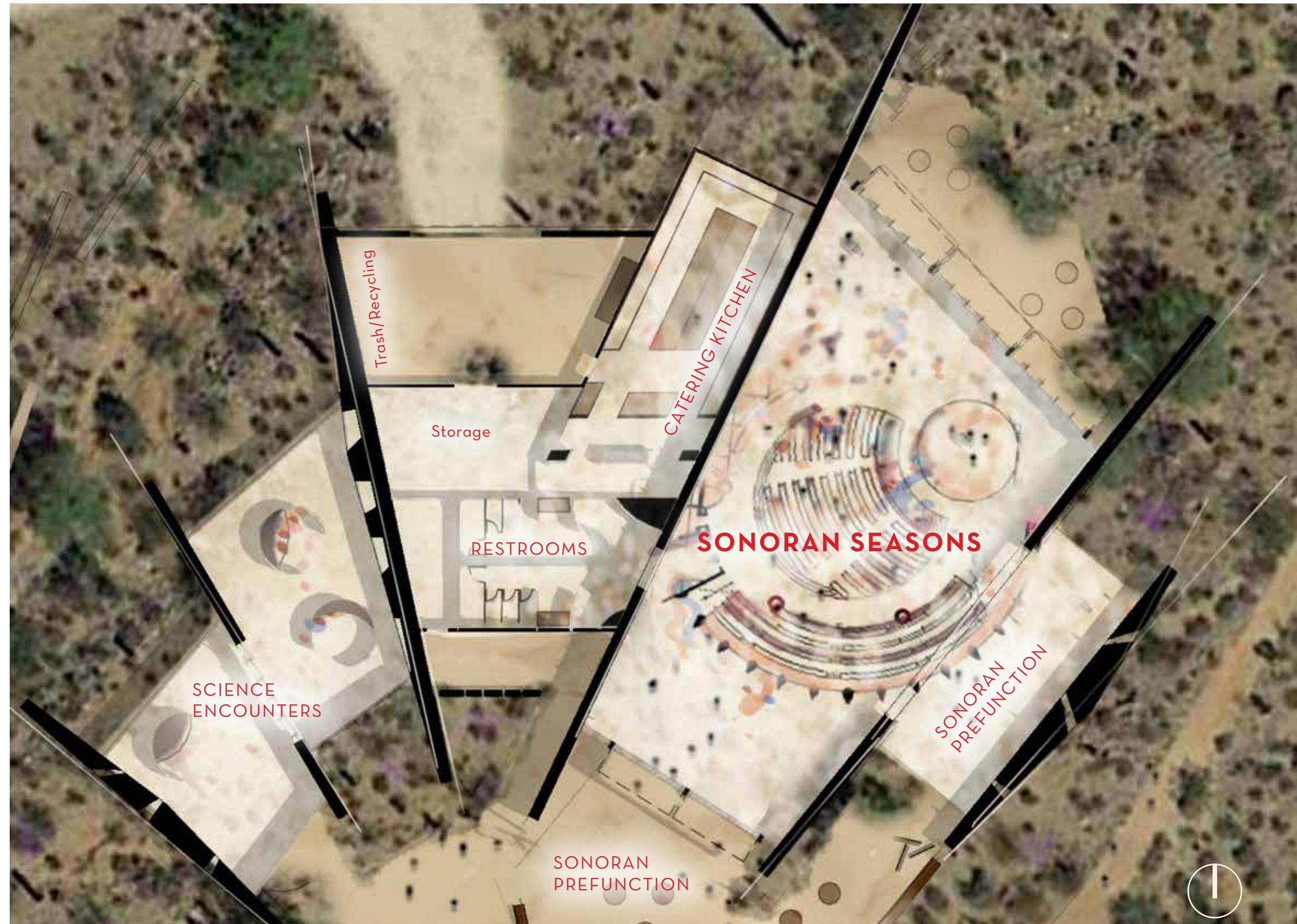


THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

SONORAN SEASONS

Alternative furnishing layout.



THE ARCHITECTURAL CONCEPT

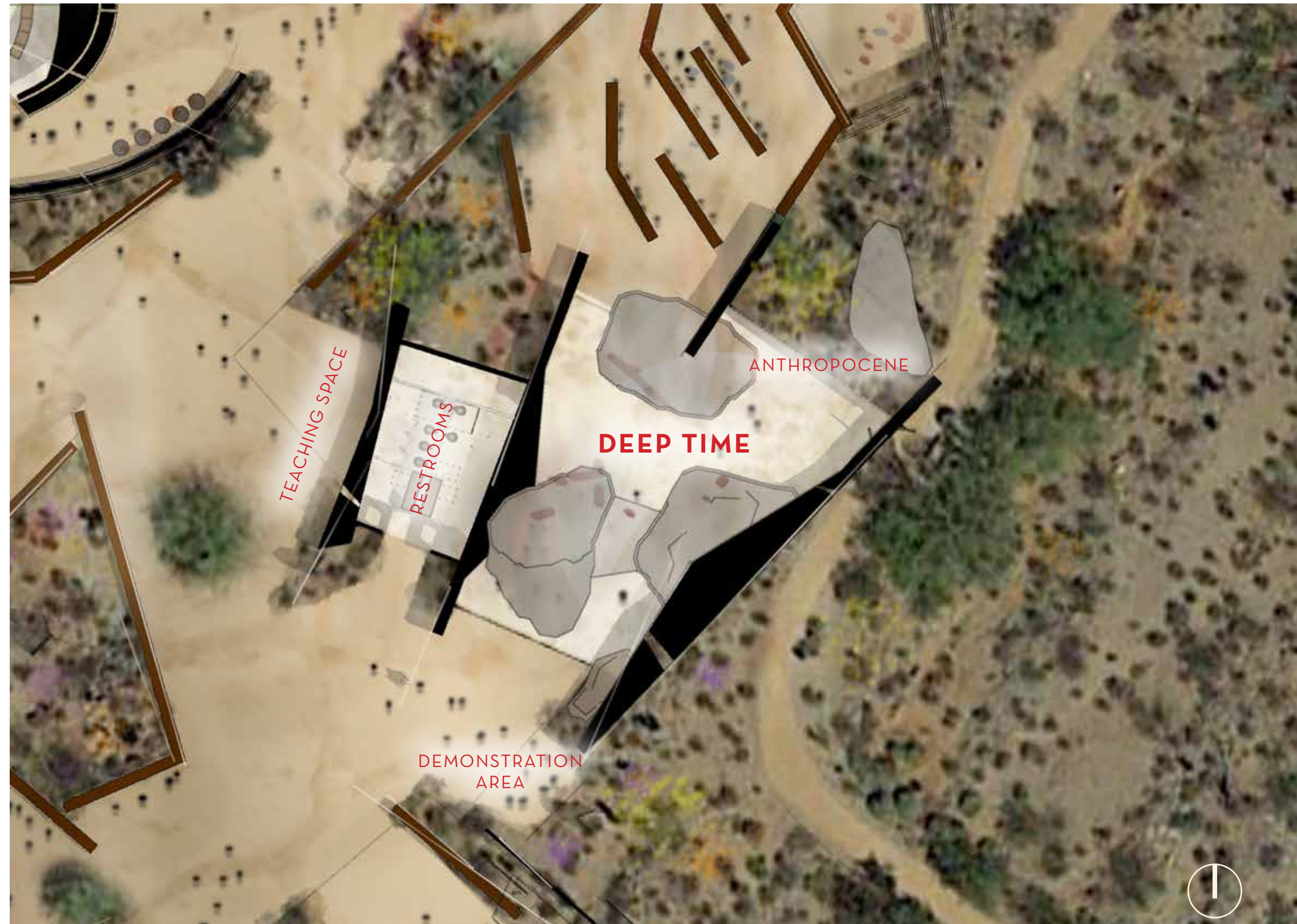
SMALL SCALE INDIVIDUAL PAVILION PLANS

DEEP TIME

The Deep Time Pavilion is a space that is created around significant rock formations that are recreated and enclosed within the pavilion to give visitors an interpretive experience.

Significant cantilevered roof frames shield the space from the early morning sun rising over the mountains. One of the restroom locations is part of this pavilion, as well as 2 outdoor teaching alcoves.

The pavilion view is set to frame a back drop of the McDowell Mountain's.



THE ARCHITECTURAL CONCEPT

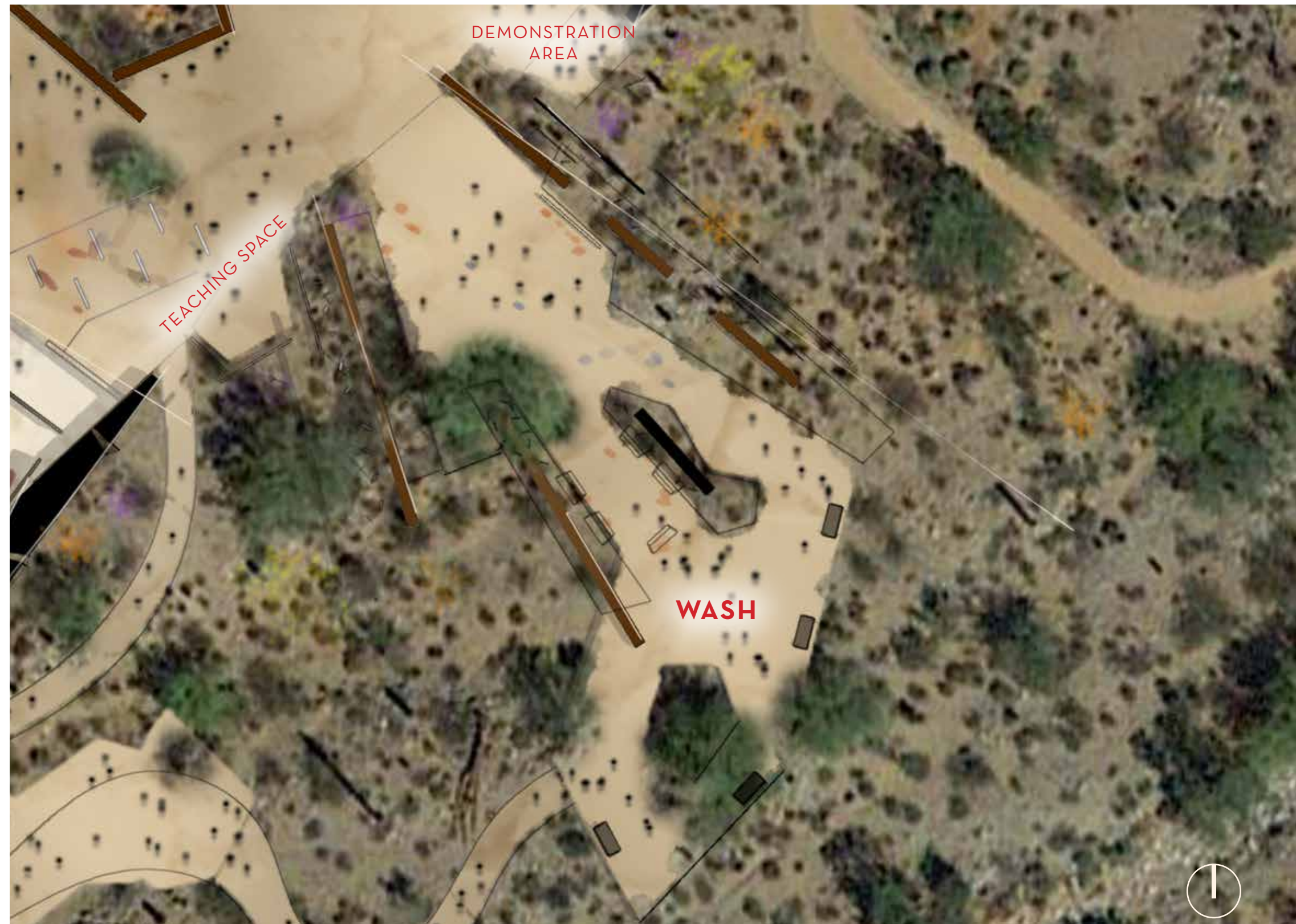
SMALL SCALE INDIVIDUAL PAVILION PLANS

WASH

The Wash Pavilion gives the visitor an intimate interaction with a desert wash, and allows the interpretive experience to focus on the significant subject of water in the desert.

This pavilion is an open-air but shielded with a roof form that covers a portion of the space.

Out of this pavilion, a small path leads to another exhibit focused on the Saguaro cactus called the Saguaro Sundial.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

SAGUARO SUNDIAL

The outdoor space immerses the visitor within a grouping of saguaros in their natural setting.

The space is intimate and totally open air. It is reached through a path leading from the Wash Pavilion and the City/Edge Pavilion.



THE ARCHITECTURAL CONCEPT

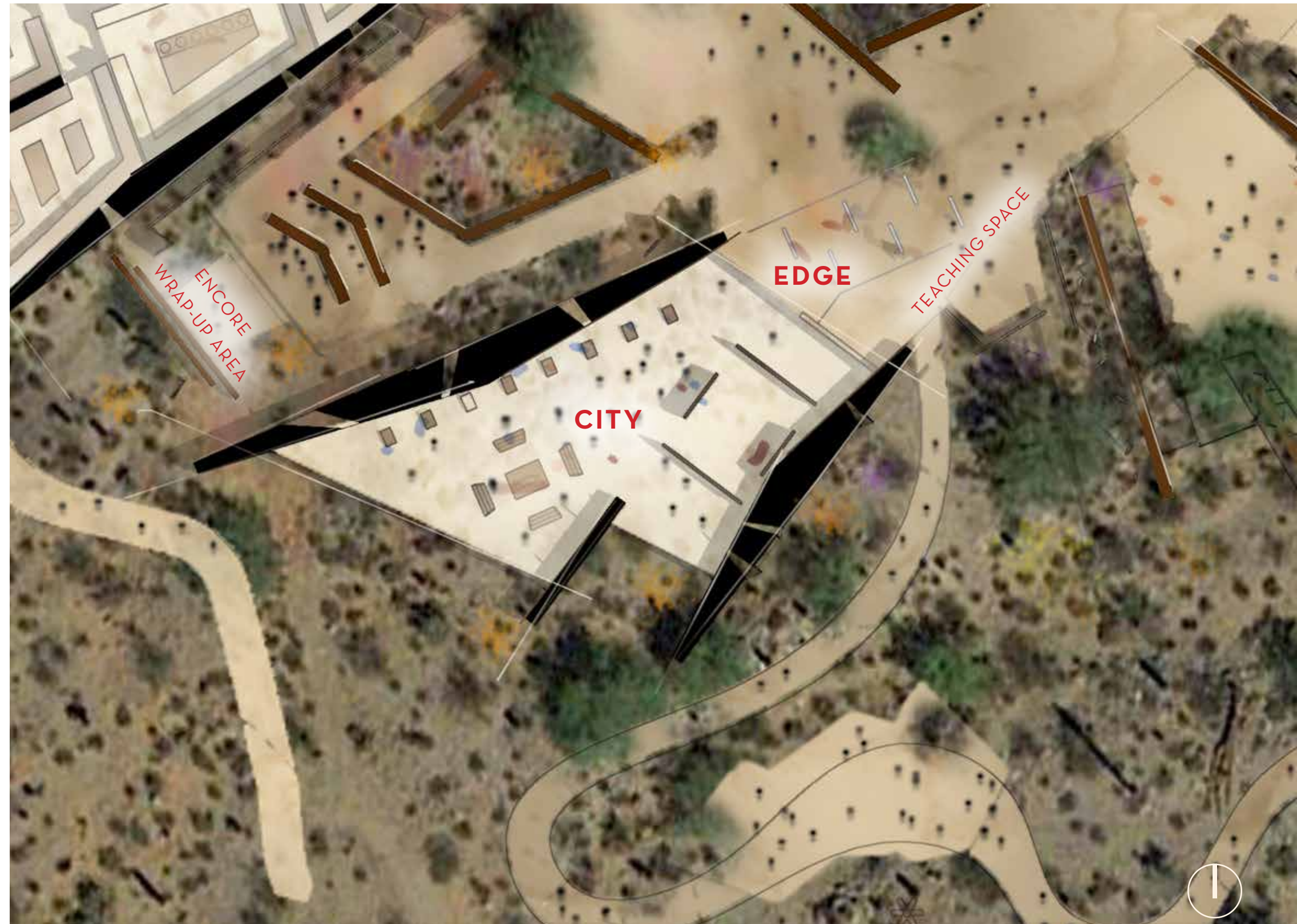
SMALL SCALE INDIVIDUAL PAVILION PLANS

CITY / EDGE

The City/Edge Pavilion merges exterior and interior exhibits focusing on the City view beyond.

The framed view of the City within the pavilion gives a stark contrast to the other pavilions which generally focus on the pristine desert setting.

A simple form with thick mass walls have special portal window slots that let day lighting leak into the space in select areas to highlight exhibits. This is a technique used in several other pavilions.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

GLOBAL DRYLANDS INSTITUTE

The Global Drylands Institute is a pavilion that will be occupied by a variety of primary researchers, visiting researchers, research assistants, and local scientists.

They will be based at the DDC conducting research related to the deserts, and arid lands throughout the Preserve. Some areas of the Global Drylands Institute will be open from time to time for public interaction with the researchers.

The Pavilion will have two large openings facing the Institutes courtyard so visitors can view on-going research.

The pavilion itself is highly flexible to accommodate many different research projects that may be considered in the future. The central breezeway will be an open core of the building allowing the research space direct access to the outdoors.

The view to the city will allow for programs to take place in the Institute from time to time, and focus attention on the built environment as well as the natural environment it sits within.



THE ARCHITECTURAL CONCEPT

SMALL SCALE INDIVIDUAL PAVILION PLANS

DESERT KEEPERS



THE ARCHITECTURAL CONCEPT

ROOF PLAN

The overall roof and shade canopy that link the individual desert pavilions has been shaped by a sun angle study conducted throughout the year.

It allows for shade to be created by the roofs in the most critical areas at the most critical time it is needed. Many of the pavilions support large cantilevered roofs that help shield the interior spaces from the sun. The roofs of the pavilion have a desert cobble roof that helps not only with minimizing the visual impact from above, but aids in cooling and heating the building. Roof drainage water will be captured in gutters and concealed downspouts and taken into an underground cistern to be filtered, and reused in the exterior skin of The POD with its unique cooling wall.



THE ARCHITECTURAL CONCEPT

DESERT SHADE STRUCTURE

Between each individual pavilion, and over most of the primary courtyards, will be a unique canopy that creates shade.

The canopy is envisioned to create shade patterns much like the shade created on the desert floor by the Palo Verde trees — creating a filtered light that will cast a cooling effect over the spaces below.

In addition to the cooling effect, the shade panels of the canopy will incorporate the latest, high-tech, transparent and flexible solar panels. This will allow the canopy to not only create shade but to create energy.



PERSPECTIVE VIEWS

BAJADA TRAIL

Approaching from the north, along the existing Bajada Trail, this view highlights the Sonoran Seasons. Roofs are shown covered in a desert cobble finish to blend then into the desert when viewed from above.



PERSPECTIVE VIEWS

DESERT DISCOVERY CENTER MAIN ENTRY

Approaching the Desert Discovery Center from the parking area, the walkway leads visitors through native landscaping.

This sequence frames a balanced view of the Pod peeking out from under the existing maintenance building with the Commons framing a powerful entry view.



PERSPECTIVE VIEWS



ENTRY BRIDGE

Entering the DDC after ticketing, visitors cross over an elevated bridge that allows the natural flow of the wash, much like the Gateway entry, the visitors are past the Commons and the Pod toward the Sonoran Steps where they are greeted with a perfectly framed view of the McDowell's.

PERSPECTIVE VIEWS

EQUESTRIAN BYPASS TRAIL

Hiking along the southern portion of the existing Equestrian Bypass Trail, this view highlights the deep south facing overhangs that are critical for adaptation to the desert habitat.



PERSPECTIVE VIEWS

WASH PAVILION

This view of the Wash Pavilion highlights the open nature of the exhibit space. To the right, the Wash Pavilion pulls out towards the existing wash, allowing visitors of all levels of mobility to enjoy the diverse flora and fauna that inhabits this biome.



PERSPECTIVE VIEWS



THE COMMONS

After crossing the entry bridge, hikers and visitors are greeted by the Commons. The Commons will provide visitors with a central hub to relax.

PERSPECTIVE VIEWS



SONORAN SEASONS COURTYARD

Designed as a space to gather and have events, this perspective shows the Sonoran Seasons Courtyard and the adjacent Scientific Encounter space.

PERSPECTIVE VIEWS



CONNECTED COURTYARDS

Designed as a space to educate with interpretive panel located throughout, this perspective highlights the view through the Wash Pavilion out to Taliesin Overlook. Flanked by a series of teaching platforms, this area offers great capacity for docents to enlighten visitors with deeper information before exploring further.

PERSPECTIVE VIEWS



SONORAN STEPS

With a focus on the mountain backdrop, this perspective shows another dynamic space for teaching and engaging with nature. A series of unique sitting platforms allows for presenters to capture visitor's imagination without hindering views to the mountains beyond.

PERSPECTIVE VIEWS



CITY / EDGE PAVILION

From the existing Equestrian Bypass Trail, this view shows the design strategies used to effectively inhabit the desert biome. Deep overhangs and unique operable door systems allow the exhibit spaces to climatically adjust in harmony with the seasons.

6. MATERIALS PALETTE



MATERIALS PALETTE

The materials selected for construction of the DDC were based on several factors. Primarily they were selected based on being highly durable, low maintenance, allowance for flexibility, and their cost effectiveness.

From an aesthetic point of view, they were selected to be materials of the desert – bold, rugged, and compatible with their setting. They needed to advance the overall sustainability goals. Lastly, we wanted to leave open the opportunity to incorporate future technologies that would be developed while the design continues to go through engineering and construction document phases, as well as into the future. The materials used in the construction of the existing buildings within the Preserve allowed us to review many of the materials and look at their long-term performance and cost / benefit rations. The following Palette of Materials is a general overview of the selections. As future phases of design advance these materials will continue to be evaluated, and analyzed along with their cost effectiveness in relation to the budget.

WALLS

The exterior walls and the mechanical equipment screen walls of the DDC will generally be stabilized rammed earth walls. Some of the accent walls will be locally manufactured, stabilized adobe block, and Corten steel panels. The adobe and the rammed earth will be raised off the ground with board formed concrete stem walls coming up 18” above the desert floor, to help protect them from any erosion. In some of the open pavilions the rammed earth will be left exposed on the interiors and in other spaces it will furred out with steel studs to allow for more durable, and cleanable surfaces such as in the kitchens, and restrooms.

ROOFS

The roofs were discussed earlier in detail, but generally will be steel framed and capped with steel decking that can be insulated from above, and left exposed on the interior for cost savings. When it is left exposed on the interior, floating ceiling plans that support lighting and acoustical material will float over portions of the room. The roof surface will be desert material, rocks and cobbles, that will be collected from the initial site work and then reused. Other desert debris will be added to the roofs to make then compatible with the desert floor when view from high up the mountain on the trails.



DESERT SHADE CANOPY

Woven throughout the DDC is a horizontal shade canopy that links the individual desert pavilions. As discussed earlier the desert shade canopy is a high tech, provider of shade and energy. Its shade pattern is an abstraction of the shade created by desert trees such as the Palo verde. It is evolving technology that should be available to the market by the time the DDC is under construction. Flexible inform and shape, semitransparent, and light weight, this shade devise will replace the need to have stationary roof top or ground mounted rigid solar panels. The technology is an outfall of the technology that the US Army developed to solar power its field tents. The design has been shaped to give the maximum shade in areas needed, but also opens to the sky in many places so that the canopy does not cut off views, or make the space feel to low. It is structurally suspended by a network of tensile steel cables and rods that are anchored into artistic column forms that are abstract shapes based on cactus.



GLASS - DOORS & WINDOWS

Most of the pavilions are designed to have a system of operable glass walls that can be opened mechanically to allow the cooler or warmer air to naturally cool or heat the space depending on the time of the year. A simple form of 100% natural air intake. The glass used in the system will be a high tech coated glass product with a Low E, and an anti-glare shield to minimize glare from the strong desert sun, to minimize any reflectivity that might affect the hikers experience form the mountain above. The retractable door system folds up horizontally with a unique mechanism somewhat similar to that which is used on airplane hangars.



FLOORS / TERRACES

For the most part the interior floors will be polished stained concrete, or a special terrazzo product incorporating crushed desert stone. These flooring have been selected for durability and ease of maintenance. In some areas of the interiors where there will be no foot traffic, compacted native soil in a very natural state will be used. The exterior terraces will be studied more in the future design phases. Initially they will be thought to be concrete with a special admix of desert stone which will be exposed. We want to pour the concrete so it will have a permeability to it through large open control joints filled with pebble stones from desert washes, allowing the water to run back into the soil. All the final selections will be based on current market prices and the latest cost estimate.

MATERIALS PALETTE

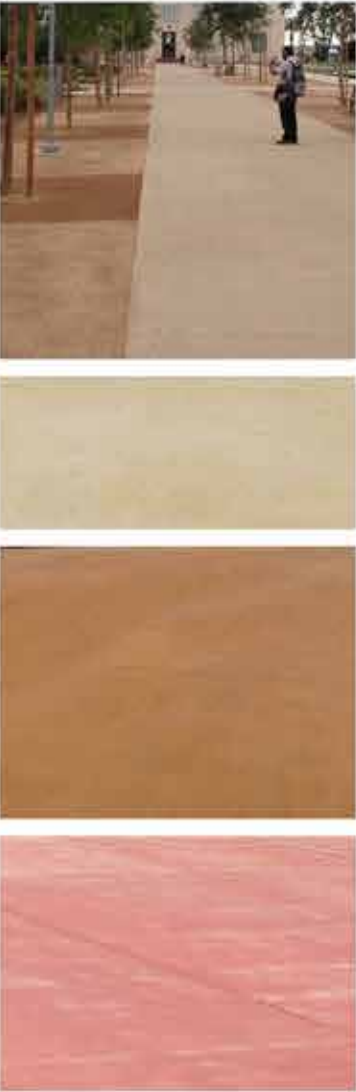


MATERIALS PALETTE

FLOORING



TECHNISOIL G5



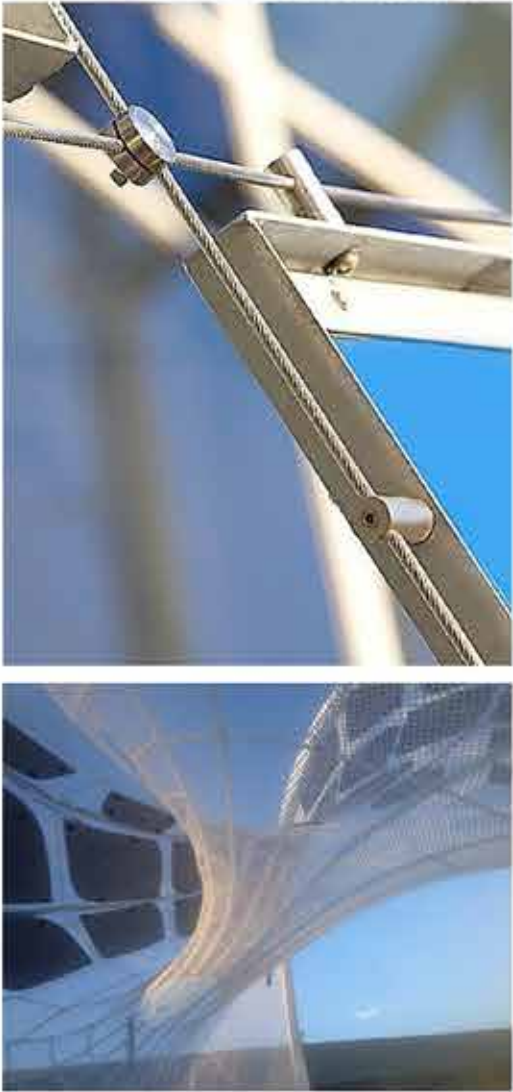
FOLD AWAY DOOR SYSTEM



GLASS



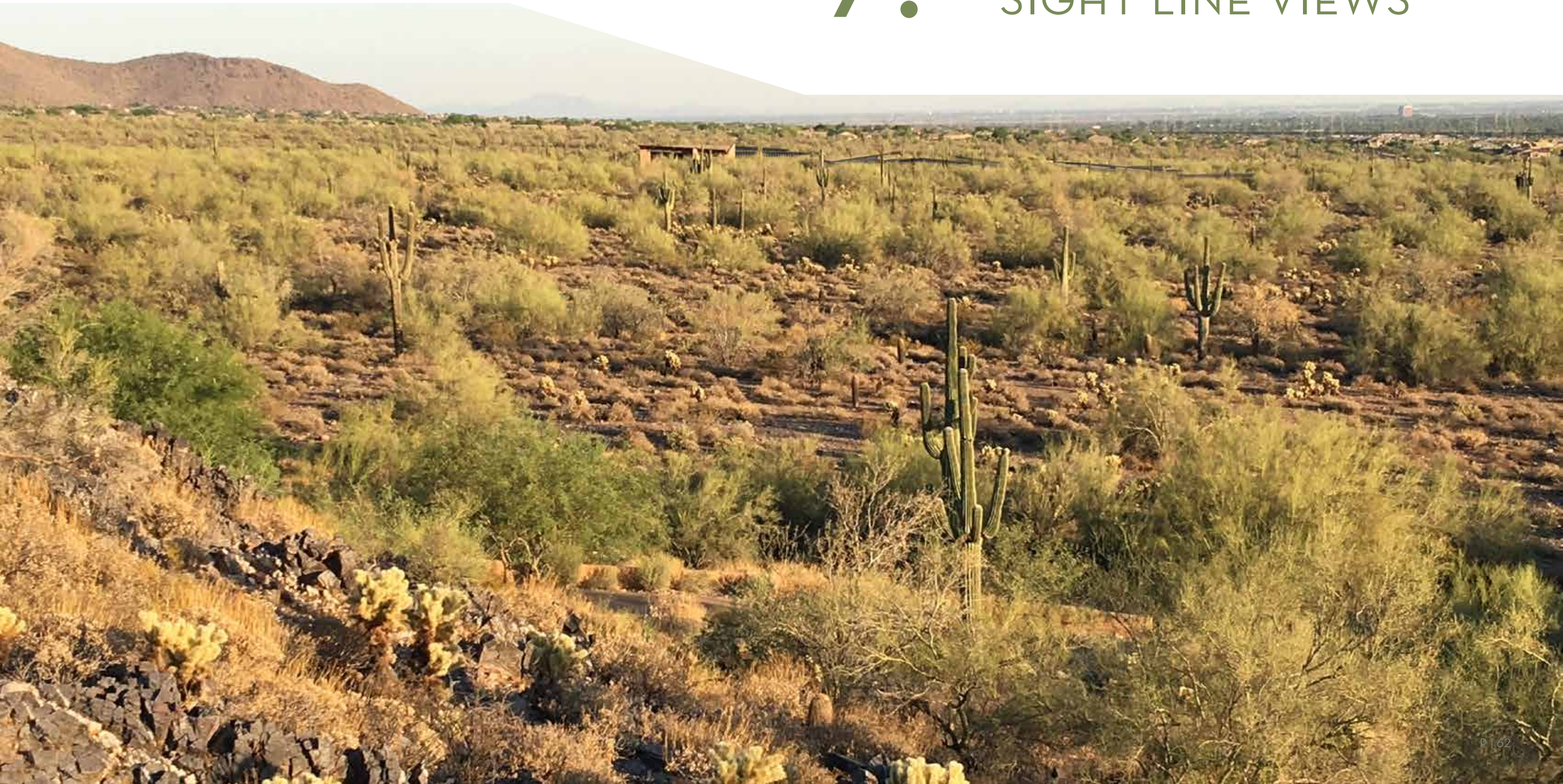
DESERT SHADE CANOPY



COOL WALL



7. SIGHT LINE VIEWS



SIGHT LINE VIEWS

SELECT SURROUNDING PROPERTY SIGHT LINE VIEWS

The following 4 sight line views were selected by City of Scottsdale staff and are meant to be a sampling of the view impact the DDC will have on surrounding properties. The views are actual photographs taken in June of 2017, at a camera height of 5'8". The DDC images were then computer generated and added to the image in the exact area and perspective angle that the camera would have seen if the buildings had been built at the time of the photograph.

VIEW FROM 104TH ST. AND BELL RD. LOOKING NORTH

Most of the DDC forms you see in this image are backdropped by the houses in DC Ranch and beyond.



SIGHT LINE VIEWS

VIEW FROM WINDGATE CROSSING LOOKING NORTHEAST

One can begin to see a few of the roof top forms in the left side of the image.



SIGHT LINE VIEWS

VIEW FROM WINDGATE RANCH LOOKING EAST

A few roof forms come above the tree line in the center of the image. The entry sign to the Gateway seems to have the most visual impact in this view.



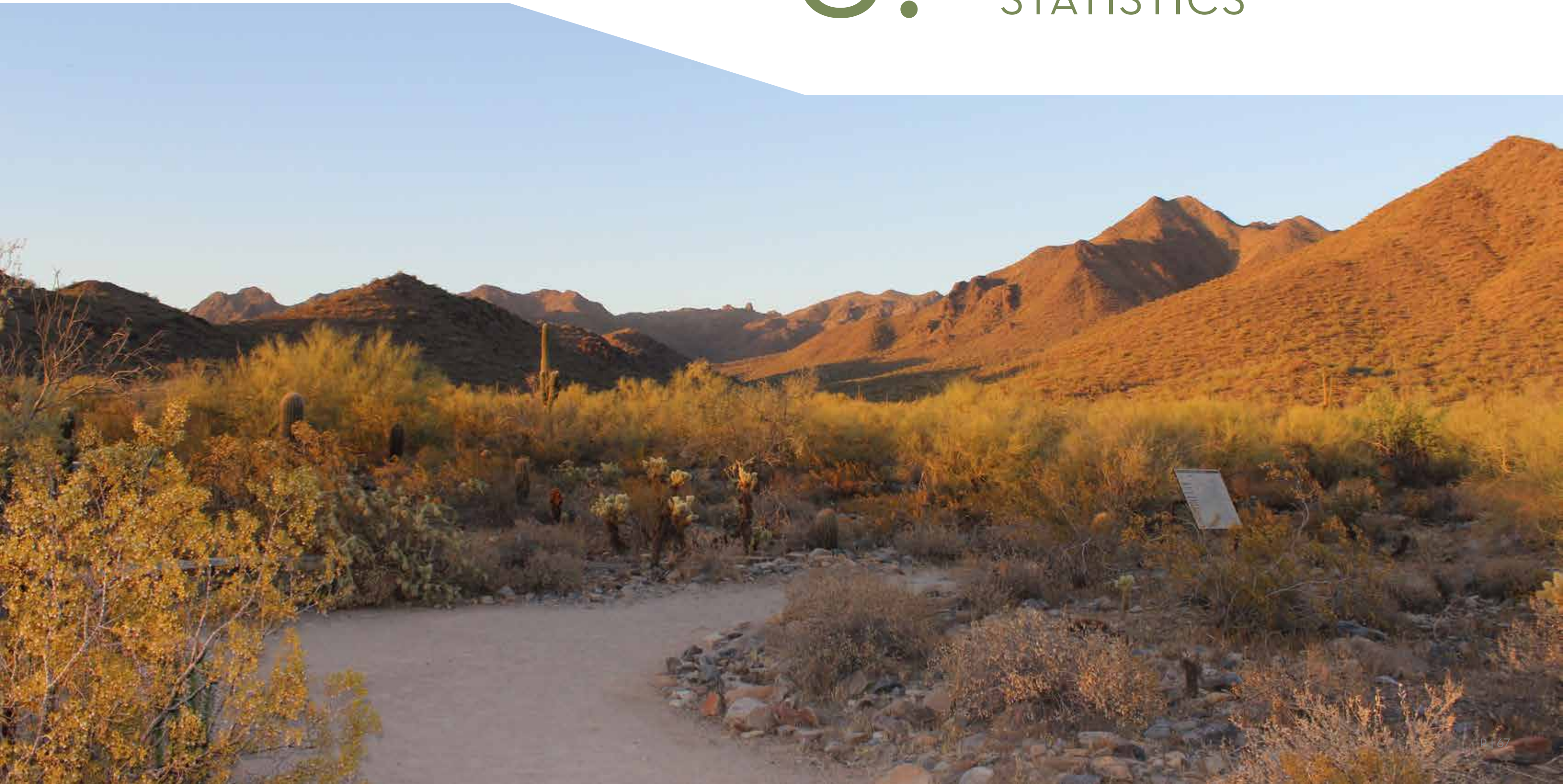
SIGHT LINE VIEWS

VIEW FROM SILVERLEAF LOOKING SOUTH

Since the DDC is lower in elevation than the Gateway, the image to the left in the center of the view is the existing Gateway Trailhead. The DDC buildings appear lower and to the right of the Gateway



8. OVERALL PROJECT STATISTICS

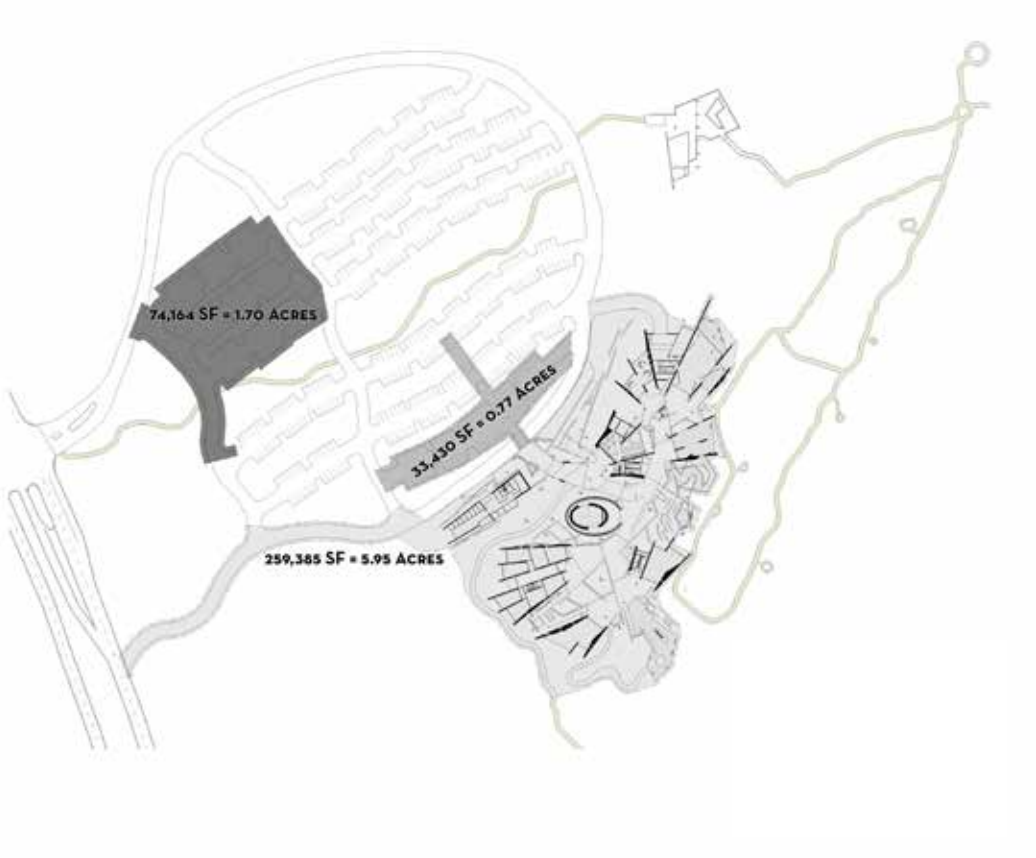


OVERALL STATISTICS

BUILDING STATISTICS

Area (Gross Conditioned SF).....	47,586
Height (Above Existing Grade).....	24'
Disturbance (Buildings)	5.34 acres
Parking.....	541
• Parking stalls existing:	381
• Parking stalls added:	163
Cost (Buildings).....	\$33,533,443.00

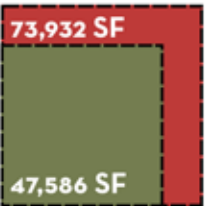
AREA OF DISTURBANCE



PHASE COMPARISON

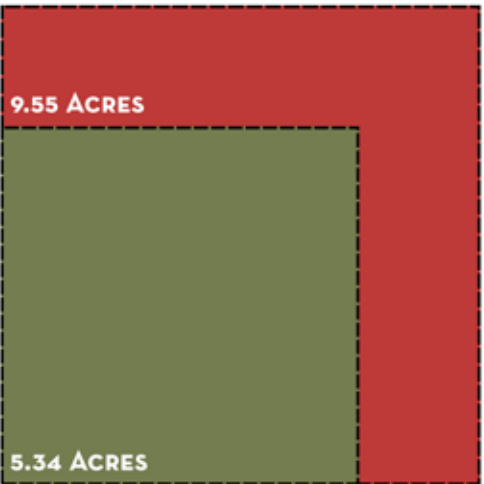


GROSS CONDITIONED AREA



REDUCED BY: 26,346 SF

AREA OF DISTURBANCE



REDUCED BY: 4.21 ACRES

9.

NET ZERO, LEED,
ENVIRONMENTAL
OPPORTUNITIES REPORT



NET ZERO, LEED, ENVIRONMENTAL OPPORTUNITIES REPORT

PRIMARY STRATEGY

Lower loads by creating efficient buildings, emphasizing passive & non-mechanical techniques.

Natural Structural Features

- Fractal patterns of desert trees
- Undulating sculptural walls
- Natural building materials

SECONDARY STRATEGY

Selection of efficient mechanical systems and heating & cooling devices.

Desert Crust Roofs

- Insulation value
- Pollinator habitat

Rammed Earth

- Low embodied energy
- Reusable formwork
- Smart thermal massing
- Passive solar heating
- Historic local link

Lighting

- Low energy use
- Enduring value
- Maximum controllability

THIRD STRATEGY

Lighting and energy analysis to optimize and reduce building loads.

Floating Roofs

- Unique 2-D shadow
- Functional 3-D shade
- Diffuse natural light

Rain Collection

- Features that celebrate rain events
- catchment and landscape distribution



Open Systems

- Allow airflow over skin
- Exhaust heated air
- Provide cross-ventilation

Operable Partitions

- Light flow
- Distant view corridors
- Air circulation
- Visual connection to nature

Polished Concrete Floors

- Maximum durability
- Low maintenance
- Exposed local aggregate

Minimal Grading

- Finish floors follow natural topography

Compacted Earth Circulation

- Stabilized decomposed granite
- Polished over time with use

Solar PV Array Options

- Roof integration
- Canopy integration
- Covered parking
- Off-site array

Structures Under Pavilions

- Self-shading concept
- Maintains historic flows and conveyance
- Provides opportunity for exterior circulation

Interconnecting Shade Canopies

- Patterned after desert shade tree canopies

DESERT DISCOVERY CENTER

Environmental Opportunities Report

5 APRIL 2017



Sun setting from within the McDowell Mountains.
Photo courtesy of CEBImagery via Flickr.

NET ZERO, LEED, ENVIRONMENTAL OPPORTUNITIES REPORT



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“Study nature,
love nature, stay
close to nature.
It will never fail
you.”
- Frank Lloyd
Wright

NET ZERO, LEED, ENVIRONMENTAL OPPORTUNITIES REPORT

Executive Summary

Introduction

This memo will help the development team understand which specific sustainability strategies and goals are critical in order to create the premier environmentally progressive experience in the Sonoran Desert. It includes detailed analysis and next step guidance to help the Desert Discovery Center design team ensure that sustainability is a cornerstone of the project.

The vision for the Desert Discovery Center (DDC) is to create an interpretive, educational and research center intended to enhance the McDowell Sonoran Preserve experience. The DDC is envisioned to be the focal point for education, research and dialogue about human interaction with arid environments as exemplified in the unique Sonoran Desert. The DDC will provide authentic and authoritative exhibits, programs and activities for residents, students, visitors, researchers, environmentalists and policy makers. Experiences will be inspiring and engaging, blurring the lines between education and entertainment in an “only here” immersion in the beautiful McDowell Mountains and Sonoran Desert.

In order to achieve the DDC goal of being a model of sustainable design and practice, Terrapin believes that the project should accomplish the following:

- Foster a net increase in habitat
- Conserve critical habitat and natural resources
- Create high performance-buildings
- Promote active living and wellness
- Connect with the local community

Project History

Scottsdale always has been a place for big ideas and special accomplishments – foremost among them the creation of the McDowell Sonoran Preserve. The DDC educational/interpretive center concept has been a part of the Preserve vision and has been identified in City planning documents and publications dating back to the McDowell Mountain Task Force in 1993, even before the first tax vote in 1995. At least six unanimous City Council actions over the past 20 years have acknowledged or accepted reports locating the DDC at the Gateway to the McDowell Sonoran Preserve.

Over the past 20 years the DDC concept has been discussed in numerous City meetings, open houses and community conversations. The concept has evolved from that of a basic information center into a global center focused on tourism, research, education and policies regarding sustainable living in arid environments.

Desert Discovery Center Scottsdale (DDCS), the City's nonprofit partner in planning the project, is building upon the work that has emerged from multiple previous studies reconsidering all aspects in terms of a new economy, new partners and a new vision. This includes expanding on the extensive public outreach done for the Phase II study in 2010, as well as the more than 200 meetings held with key stakeholders over the past two years.



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Gateway Trailhead Building
Image Credit: Bill Timmerman via Arch Daily

Site Precedents

It is important to understand the existing site from both the ecological framework in addition to the existing architecture. Currently, there are two buildings within the gateway area both designed by Weddle Gilmore Blackrock Studio. The structures feature design strategies that blend well with the desert and include sustainability efforts. Several of these design features may apply to the DDC including:

- Rainwater catchment and distribution system
- A “structure under a pavilion” design strategy
- Maintaining historic flows and conveyance channels
- Stone roof system
- Photovoltaic array

Recommendations/Next Steps

To ensure the success of the DDC, there are some critical steps to be taken as the project moves forward. Based on the research and discussions with the design team, we recommend the following actions:

- Determine the final siting and orientation of the structures
- Determine the final building materials
- Select a renewable energy strategy
- Select cooling strategies for structures and labs
- Determine ecological protection strategies

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Sustainability Topics

Biophilic Design

Biophilia is humankind's innate biological connection with nature. It helps explain why crackling fires and crashing waves captivate us; why a garden view can enhance our creativity; why shadows and heights instill a fascination and fear; and why animal companionship and strolling through a park have restorative, healing effects.

We understand that humans are an integral part of nature. This lends itself to cohesive design strategies that encourage experiences and outcomes that positively affect our minds, bodies, behavior, and environment. Interaction with nature enables a positive feedback loop of appreciation, stewardship, and affection for our surroundings, inspiring sustainability and the revival of our environment. This is especially important for many residents of the Sonoran Desert who lack a general reverence for the desert.

It is imperative that the design of the DDC connects visitors with the surrounding desert through biophilic strategies that celebrate this natural context. The experience needs to heighten this connection to the desert without it feeling programmed. The 14 patterns of Biophilic Design can reduce stress, improve cognitive function and creativity, improve our well-being and expedite healing.

14 Patterns of Biophilic Design

Nature in the Space

Nature in the Space addresses the direct, physical and ephemeral presence of nature in a space or place. This includes plant life, water and animals, as well as breezes, sounds, scents and other natural elements. Common examples include potted plants, flower beds, bird feeders, butterfly gardens, water features, fountains, aquariums, courtyard gardens and green walls or vegetated roofs. The strongest Nature in the Space experiences are achieved through the creation of meaningful, direct connections with these natural elements, particularly through diversity, movements and multisensory interactions.

Nature in the Space encompasses seven biophilic design patterns:

1. Visual Connection with Nature

A view elements of nature, living systems and natural processes. Interventions can include:

- Bryophyte walls at various scales
- Access to perennial streams
- Views to landscape vistas

2. Non-Visual Connection with Nature

Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes. Interventions can include:

- Desert species plants that have distinct odors like creosote
- Water features that create sound as well as provide micro-cooling
- An “edible desert” garden

3. Non-Rhythmic Sensory Stimuli

Stochastic and ephemeral connections with nature that may be analyzed statistically but not be predicted precisely. Interventions can include:

- Sonoran Desert tall grasses in the landscape pallet
- Features that interact with rain events
- Plant species that contribute to pollinators

4. Thermal & Airflow Variability

Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments. Interventions can include:

- Structures that funnel air movement through corridors
- Spaces with micro-cooling effects
- Materials that contribute to the alliesthesia effect (the subjective perception of pleasure or discomfort from an external thermal condition based on internal homeostasis). For example, if you are hot, a cool stone surface will feel particularly good against your wrists.

5. Presence of Water

A condition that enhances the experience of a place through seeing, hearing or touching water. Interventions can include:

- Water features that mimic the Sonoran Desert
- Pockets in the exterior walls that can capture rain
- Features that celebrate rain events

6. Dynamic and Diffuse Light

Leverages varying intensities of light and shadow that change over time to create conditions that occur in nature. Interventions can include:

- Structures that create unique shade patterns
- Sunset viewing platforms
- Interior lighting that can be adjusted based on time of day and seasons



Rain Chain at Phoenix Convention Center

Photo Credit: Ten Eyck Architects

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7. Connection with Natural Systems

Awareness of natural processes, especially seasonal and temporal changes characteristic of a healthy ecosystem. Interventions can include:

- Landscaping that celebrates desert vegetation blooming cycles
- Integrate the site structures into the existing washes and arroyos
- Visible rainwater capture and rain chains

Natural Analogues

Natural Analogues addresses organic, non-living and indirect evocations of nature. Objects, materials, colors, shapes, sequences and patterns found in nature, manifest as artwork, ornamentation, furniture, decor, and textiles in the built environment. Mimicry of shells and leaves, furniture with organic shapes and natural materials that have been processed or extensively altered (e.g., wood planks, granite tabletops), each provide an indirect connection with nature: while they are real, they are only analogous of the items in their “natural” state. The strongest in an organized and sometimes evolving manner.

Natural Analogues encompasses three patterns of biophilic design:

8. Biomorphic Forms & Patterns

Symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature. Interventions can include:

- Artwork that evokes natural patterns seen in the desert
- Imprints of leaves or grasses in walls and walkways
- Sculptures or walls that undulate like canyon walls and rock formations

9. Material Connection with Nature

Materials and elements from nature that, through minimal processing, reflect the local ecology or geology and create a distinct sense of place. Interventions can include:

- Rammed earth, gabion walls, and other natural structural features
- Local reclaimed wood for wall coverings
- Integrate saguaro skeletons, ocotillo, cholla and other desert materials into the structures

10. Complexity & Order

Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature. Interventions can include:

- Use fractal patterns into shade structures
- Design spaces to have columns that mimic saguaro skeletons

Nature of the Space

Nature of the Space addresses spatial configurations in nature. This includes our innate and learned desire to be able to see beyond our immediate surroundings, our fascination with the slightly dangerous or unknown; obscured views and revelatory moments; and sometimes even phobia inducing properties when they include a trusted element of safety. The strongest Nature of Space experiences are achieved through the creation of deliberate and engaging spatial configurations commingled with patterns of Nature of Space and Natural Analogues.

Nature of the Space encompasses four biophilic design patterns:

11. Prospect

An unimpeded view over a distance, for surveillance and planning. Interventions can include:

- Platforms that have long views of the mountains and the city
- Design a few points within the project that allow a view through the entire space
- Design interior spaces to have special viewshed reveals

12. Refuge

A place for withdrawal from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead. Interventions can include:

- Small rest areas that have vegetated overhead coverings and back protection
- Design refuge spaces that can be changed/adjusted (forts for children)
- Consider designing a few refuge spaces for larger groups with booth seating paired with prospect views

13. Mystery

The promise of more information, achieved through partially obscured views or other sensory devices that entice the individual to travel deeper in the environment. Interventions can include:

- Design for viewshed surprises, even better if they change seasonally
- Take design cues from slot canyons and meandering trails
- Design some short viewsheds to have only partial information at the termination

14. Risk/Peril

An identifiable threat coupled with a reliable safeguard. Interventions can include:

- Design the pedestrian bridge to traverse an arroyo or wash
- Design walkways that integrate water and stepping stones
- Design some of the roofs to be accessible



Mystery and Biomorphic Forms at the Arabian Public Library

Photo Credit: Ellen Forsyth via Flickr

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Materials

Materials selection for the DDC will have an impact on sustainability from an environmental perspective as well as an impact from a community education perspective. Therefore, it is critical that the materials be part of the educational story in a way that helps visitors understand that their own decisions impact the Sonoran Desert.

Rammed Earth

Rammed-earth structures are thought to be more sustainable and environmentally friendly than popular building techniques. Because rammed-earth structures use locally available materials, they usually have low embodied energy and generate very little waste. The soils used are typically subsoils low in clay (between 5% and 15%), allowing the topsoil to be retained for agricultural use. When the soil excavated in preparing the building's foundation is used, the cost and energy consumption for transportation are minimal.

The formwork panels can be removable and can be repeatedly reused, reducing the need for wood. Mixing cement with the earth can counteract sustainable benefits such as low embodied energy and humidity control since manufacture of the cement itself adds to the global carbon dioxide burden at a rate of 1.25 tonnes per tonne of cement produced.

The density, thickness and thermal conductivity of rammed earth make it a particularly suitable material for passive solar heating, which will benefit the DDC in the winters if the orientation is correct. Warmth takes almost 12 hours to work its way through a rammed-earth wall 35 cm (14 in) thick.

Although it is a low greenhouse emission product in principle, transport and cement manufacture can add significantly to the overall emissions associated with typical modern rammed earth construction. The most basic kind of traditional rammed earth has very low greenhouse gas emissions but the more highly engineered and processed variant of rammed earth has the potential for significant emissions.

This style of construction also blends well into the natural setting of the desert and is benign as it will eventually erode back into the desert. Additionally, it has a strong historical sense of place component as it was used to construct many of the Hohokam structures circa 1300.

Desert Living Wall

The design and materials of the first immersion structure should differentiate it from the rest of the DDC by integrating a desert living wall system. This can be accomplished by integrating a seeded



Hohokam "Stonehenge" Structure

Image Credit: theonlytourist via Flickr.



Existing Gateway Structure

Image Credit: Bill Timmerman via Arch Daily



"Habitat" wall system at Phoenix Convention Center

Photo Credit: Ten Eyck Architects

growing medium within a gabion wall system. The seeded zones could be kept moist by integrating an efficient drip system until the plant species are well established. A similar system can be found at the Phoenix convention center, although it is watered from the HVAC condensate.

A similar example of a desert living wall is located at the Phoenix Convention Center, which according to the design team was inspired by the distinctive geology and microclimates of the region. The amenity was created to mimic a lush canyon seep in the Arizonan desert. A 120-foot-long steel mesh wall serves as an armature for a vibrant assortment of Sonoran Desert plants fed by condensate harvested from the convention center's air conditioning system.

Recycled Content Materials

During our meetings and discussion, there was an interest in integrating recycled or upcycled materials into the structures. While this seems like an interesting concept, Terrapin thinks that integrating recycled materials into an entire structure or wall system will be a distraction from the overall mission of the DDC. However, there may be opportunities to integrate some smaller features that contain recycled content. Interventions may include:

- Paperstone - FSC certified recycled paper used for countertops
- Ultratouch Insulation - recycled denim insulation made in Chandler, AZ
- IceStone - countertop material using recycled glass and stone aggregate
- Upcycled custom desks or workstations using waste materials

Flooring

Compacted Earth

One of the flooring ideas mentioned by the design team was to think about how Native Americans, specifically the Navajo tribe, stabilized floors where they worshiped and took shelter. The Navajo Hogan floors are typically a compacted dirt that have been polished over the years by normal use. While we think the idea of a purely natural floor is a noble goal, there is concern about its longevity given the amount of traffic that the DDC is projected to receive.

Polished Concrete

Polished concrete is a good sustainable flooring option for the DDC since it doesn't require any additional materials or coatings, and provides a durable surface for highly trafficked areas. The exact

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Etsy reception desk made of recycled/found materials

Photo Credit: April Rinn via Flickr

appearance of the finished floor will depend heavily on the type of concrete mixture, aggregate, and polishing method. A rougher finish with coarse exposed local aggregate would align with the aesthetic of the DDC and feel closer to place. Using a high proportion of fly ash in the concrete mix is another sustainable option and will make the concrete appear more beige in color.

Road Oyl

Road Oyl is a resin-modified emulsion treatment for bare earth areas and unpaved road surfaces to control dust problems. It can be applied on top of dirt roads and paths to bind the road aggregate for a smooth, durable surface. It is a natural substance made from pine rosin and pine pitch, which are produced during timber processing. It is therefore environmentally-friendly and non-hazardous for outdoor pathways and roads at the DDC. However, it should not be used for indoor flooring because of health concerns around VOCs and off-gassing.

Energy

Aggressive energy reduction strategies can have multiple benefits, including lowering carbon emissions to mitigate climate change, producing more thermally comfortable buildings, improving the resilience of overstretched utility systems, and protecting facilities against future energy price shocks.

Net Zero Energy

The definition of a net-zero energy (NZE) building as defined by the Department of Energy (DOE) is an energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy.

These projects are sometimes also called Zero Energy and are still reliant on the electrical grid. This differs from stand alone buildings which are not connected to the electrical grid. Off-grid projects require larger renewable energy systems, batteries, and frequently other backup generation systems. A hybrid approach is where a projects has the capability to run independently if the grid fails (called 'islanding'). The U.S. military uses this hybrid strategy for installations in their Net-Zero Plus initiatives.

Some of the drivers for NZE include concerns about climate change, carbon emissions, fluctuating energy costs, and the reliability and resilience of the grid. Code initiatives, like Architecture 2030, seek to move all US energy codes to require net-zero for new construction by 2030 and is now part of the

California Title 24 energy code process. Rating systems like Energy Star, LEED, Passive House, and Living Building Challenge are all seeking to move building energy use in this direction.

With enough solar panels, almost any building can achieve net-zero energy, assuming cost and available surface area are no object. Early passive and active solar buildings were frequently designed as good solar collectors, but not great living spaces. The best strategy is to design good buildings that incorporate high levels of energy efficiency. 35–40% energy savings beyond current energy codes is considered the target range for NZE buildings.

Energy Reduction Strategies

An effective energy reduction strategy for the DDC is more than a list of technologies, it is a hierarchy of steps. First, lower the loads by making the buildings very efficient, with an emphasis on passive or non-mechanical techniques. The best buildings rely on basic passive design strategies, like increased insulation, air tightness, prevention of thermal bridging at joints, high performance windows, natural ventilation when appropriate, and good orientation and shading. The selection of efficient systems and heating and cooling devices comes second. These systems may be reduced in size due to the lower energy loads from good passive design. Third, the design team should conduct an energy analysis of the proposed ASU labs. A lighting analysis will also need to be conducted.

Vegetated Roofs

Vegetated roofs not only increase insulation value for the buildings, also decrease water runoff, provide habitat for pollinators, improve the view shed from the hiking trails, and reduce urban heat island. Desert extensive vegetated roofs are lighter in weight than intensive roofs and typically include desert adapted or native Sonoran species plants, including tall grasses, barrel cactus, creosote, etc. This type of vegetated roof needs little maintenance or human intervention once it is established. If designed correctly, it will hibernate seasonally like the native Sonoran desert and will not require permanent irrigation.

Lighting

Exterior lighting should be kept to an absolute minimum in order to avoid wildlife and neighbor disruption. Dark-sky compliant lighting fixtures would be very appropriate for this site.

Lighting for interior spaces should be of the highest energy efficiency with maximize controllability. LED lighting should be integrated throughout the project due to its extreme energy efficiency and long



Desert vegetated roof at the Getty Museum

Photo Credit: Landscape Urbanism

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life span. The cost of LED technology has been rapidly declining in the past few years. LEDs also now have improved color quality and tunability. These lighting systems should be designed to match the daily shift in sunlight color and seasons in order to minimize circadian rhythm disruption.

Energy Generation: Solar PV Arrays

Once the energy loads of the buildings are lowered, then it is time to consider renewable energy sources. Photovoltaic systems, either roof mounted or a ground mount solar shade structure, are an ideal renewable energy source for this climate. The prime location under consideration should be the large parking lot on the site. A solar PV parking structure would not only generate electricity for the site but also provide shade for the visitor’s vehicles.

PV chips have increased in efficiency and dropped significantly in price in recent years. Costs in PV technology has declined so much that in some electricity markets grid parity has occurred, this is the point where the technology is competitive with other generation sources on the grid. There are some new innovations, such as extraction wire routing (e.g., TenK Solar), that improve the resilience and net daily output of an array. The cost of PV systems is combination of the cost of the photovoltaic panels and the ‘balance of system” costs, including mounting racks, inverters, wiring, and construction costs. As the cost of panels has dropped, the balance of system costs have become more than 50% of total costs.

DDC could partner with a solar provider to install and maintain a large ground mount solar array on the off-site parking lot. This would allow the DDC to buy clean energy from this system without having the solar be located on the DDC lot. However, it is difficult to determine PV output potential from this site because there are currently no structures on it.

Using the NREL PV watts solar calculation tool, generation capacity for the existing Gateway parking area is estimated to be 2.24 MW with a total annual energy value of \$470,386. The Gateway parking lot is currently comprised of six main parking rows. The table on the following page details the area, system capacity, annual solar radiation, annual AC energy, and annual energy value of each of the six rows from north to south.



Rainwater capturing PV array at the Brooklyn Wholefoods

Photo Credit: Scott Lynch via Flickr

Solar PV Generation Potential of the Gateway Parking Area					
Location	Area (ft²)	DC System Capacity (kW)	Annual Solar Radiation (kW/m²/day)	Annual AC Energy (kWh)	Annual Energy Value (\$)
Northern Section #1	21,743	303.0	6.47	523,711	\$62,636
Northern Section #2	24,434	340.4	6.47	588,353	\$70,366
Northern Section #3	24,918	247.2	6.47	600,107	\$71,722
Southern Section #1	40,752	567.9	6.47	981,569	\$117,397
Southern Section #2	31,247	435.4	6.47	752,552	\$90,005
Southern Section #3	24,886	346.8	6.47	599,416	\$61,260
Totals	167,980	2,238	6.47	4,045,708	\$470,386

Solar Energy System Assumptions	
PV System Specifications	
Module Type	Standard
Array Type	Fixed (open rack)
Array Tilt	20°
Array Azimuth	180°
System Losses	14%
Inverter Efficiency	96%
DC to AC Size Ratio	1.1
Economics	
Average Cost of Electricity Purchased from Utility	0.12 \$/kWh

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Water

Since the DDC is located in the water-stressed Sonoran Desert which will become even more stressed by climate change, the site should aspire to achieve net-zero water. Net-zero water means that “one hundred percent of the project’s water needs must be supplied by captured precipitation or other natural closed loop water systems, and/or by recycling used project water,” according to the Living Building Challenge Standard 3.0, a green building certification standard. Although this is an ambitious goal, the project should use this as a guiding principle for the current design.

High-Efficiency Fixtures

The first step to achieving near net-zero water is to cut building water consumption. The team should specify “EPA Watersense” or high-efficiency water fixtures and dual flush toilets. It is not recommended to install waterless urinals as these have a high maintenance cost and contribute to the landfill due to the plastic cartridges. It is assumed that the water budget for the DDC will be small enough to not need to consider treated greywater and blackwater treatment. These interventions would drastically reduce the site’s potable water demand.

Rainwater Capture

Another component of attaining near net-zero water is to capture and reuse precipitation and runoff. Rainwater can be captured and stored in cisterns and water vaults under the parking areas, and then reused to irrigate landscaping. Capturing rainwater off of the roof is the best way to ensure good water quality without many contaminants. Capturing runoff from parking lots may require some additional filtration.

Natural Irrigation

The landscaping should have all native plants that don’t require potable water for irrigation. However, the landscape topography can still be designed to channel rainwater to where the plantings are. This way, the site naturally irrigates the plantings and maximizes rainwater during dry periods to ensure a flourishing landscape.

Biophilic Design

One of the biophilic design patterns is Presence of Water, which may seem difficult to integrate into the design given the strict water conservation goals. However, since water is such a precious resource, this is an excellent opportunity to celebrate it when it’s available and connect people to place. Ephemeral water features that only function during rain events, such a rain chains, arroyos, and water walls, would be an ideal way to connect people with the site and achieve Presence of Water. The best features can be seen, heard and touched by occupants.

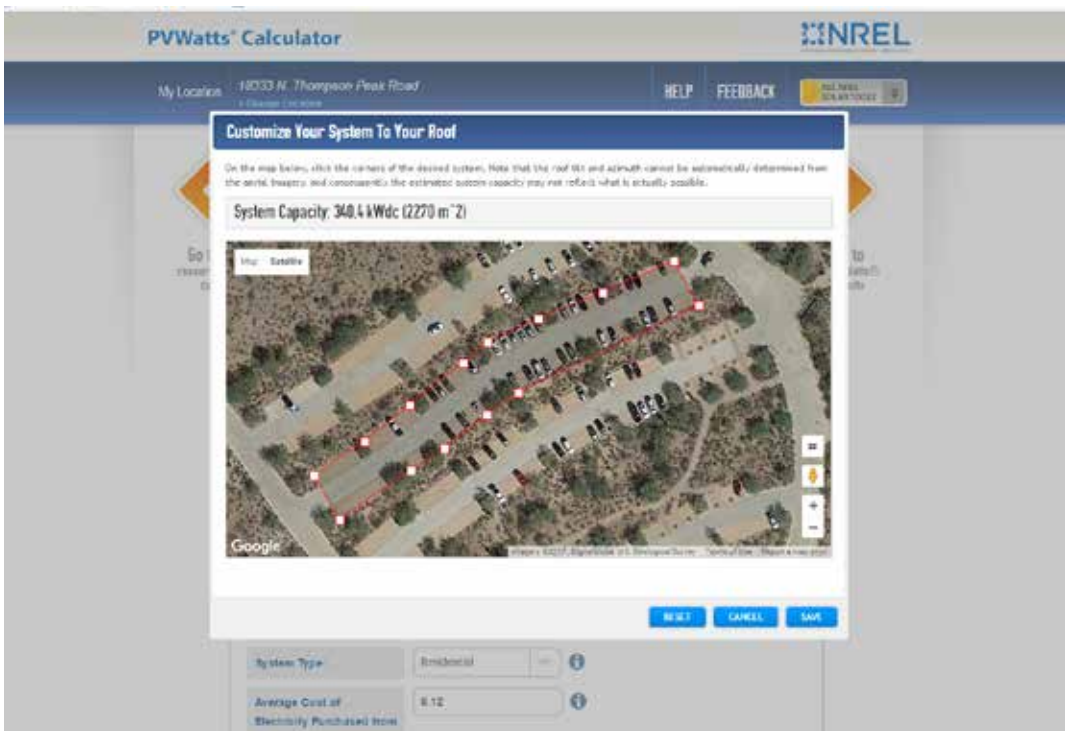
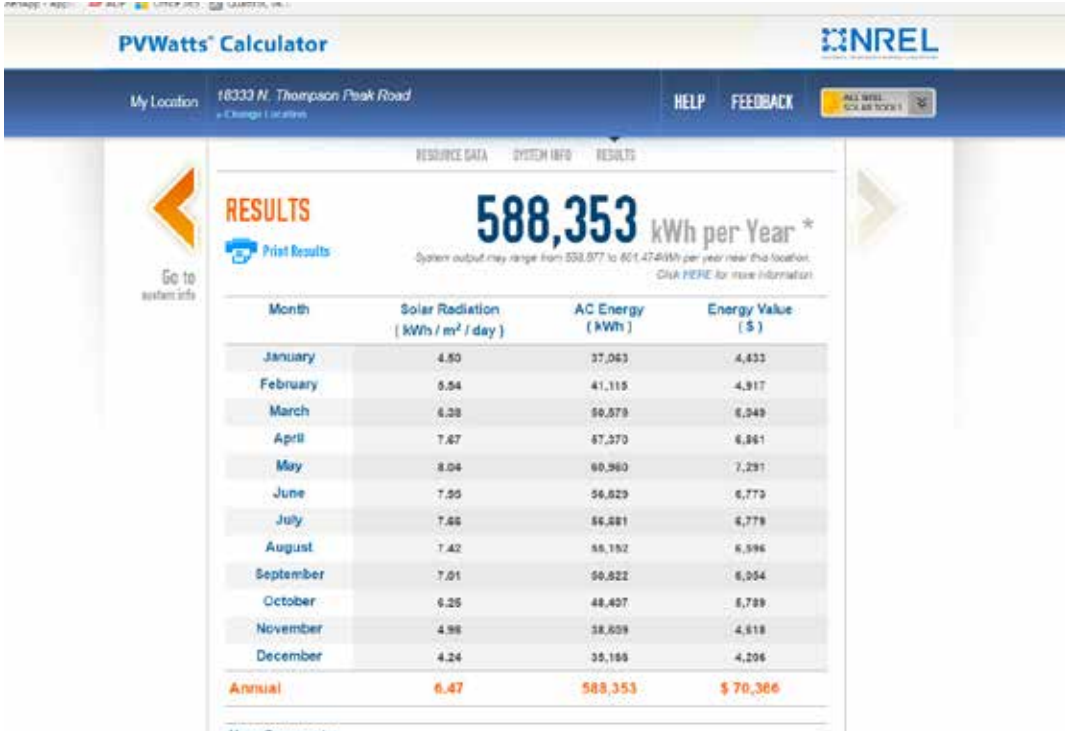
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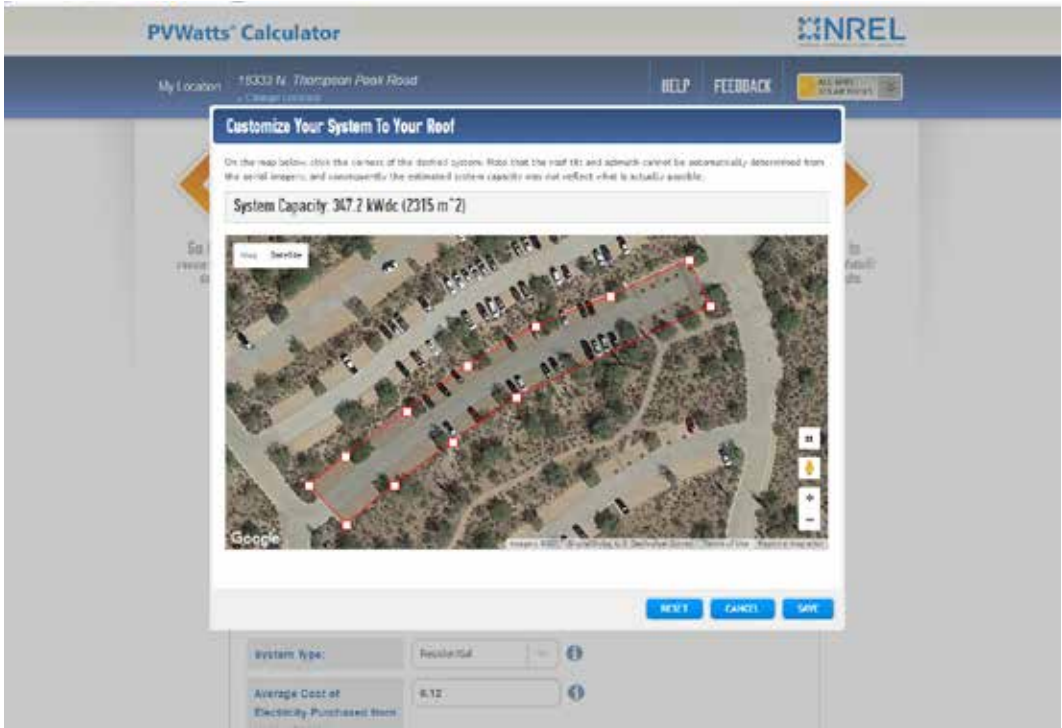
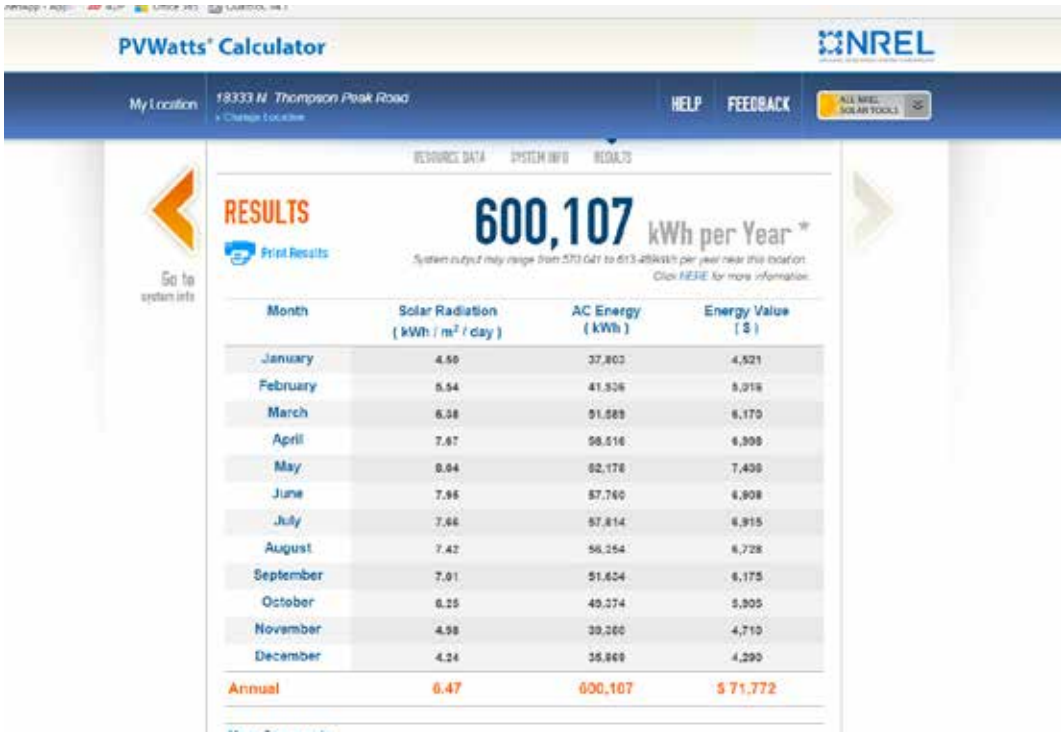
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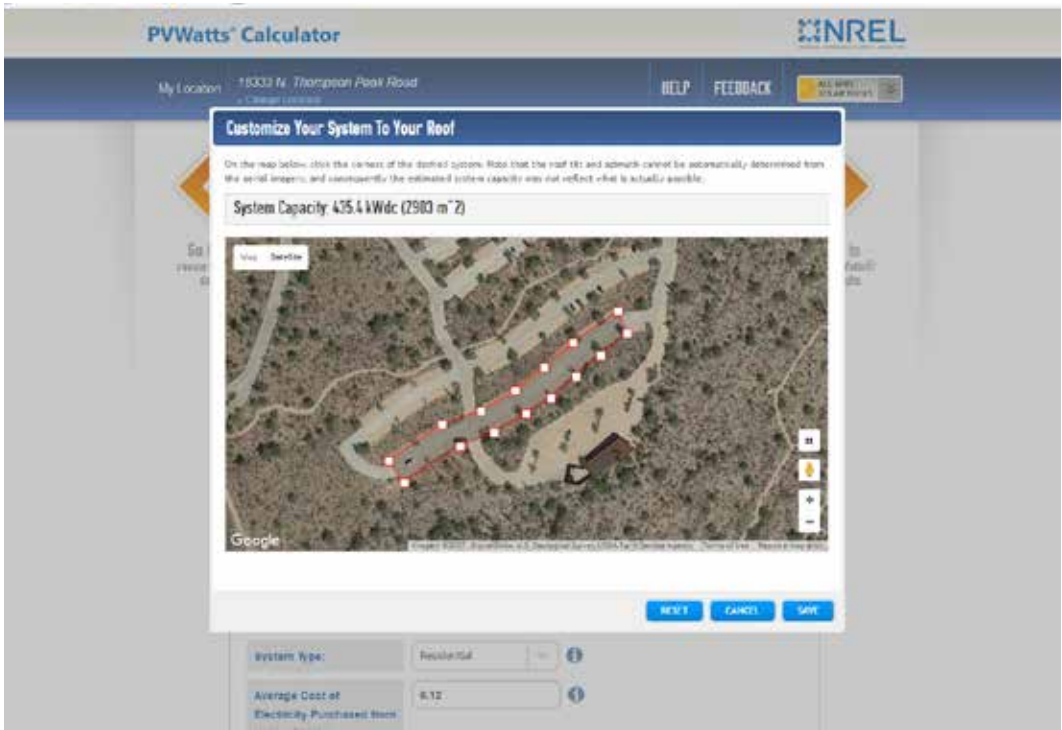
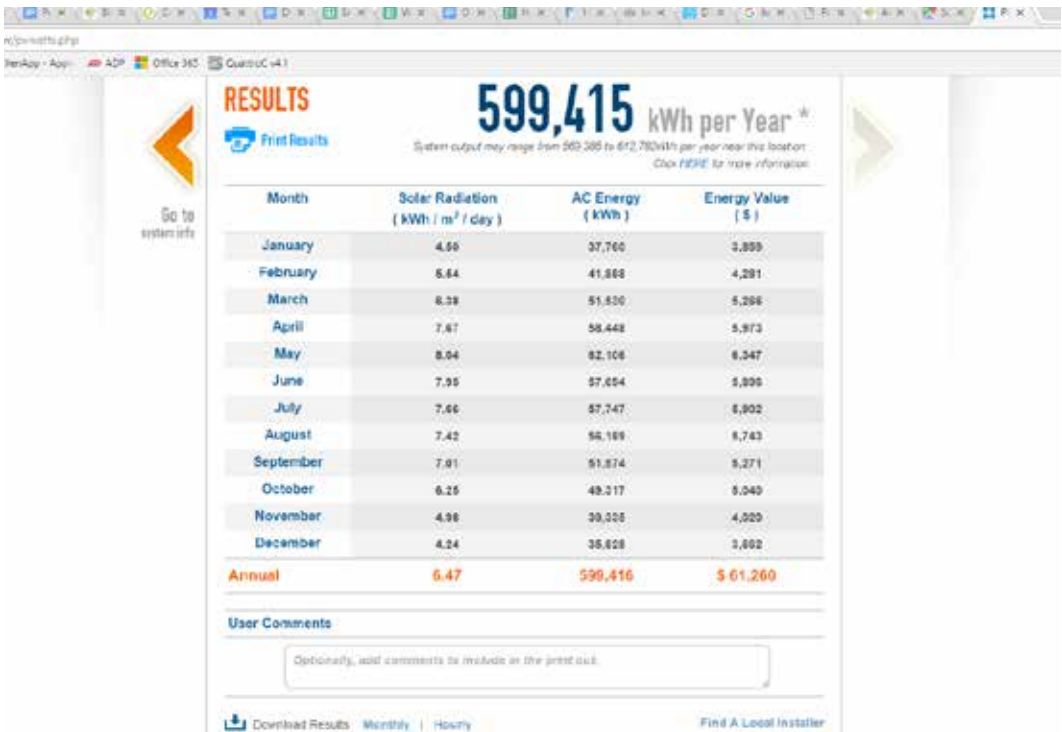
Appendix B: PV Watts Calculator



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Appendix C: Road Oyl Pamphlet

Road Oyl[®] Resin Modified Emulsion




Versatile and Multi-Purpose for Dust Control, Erosion Control and Stabilization


Road Oyl is a resin-modified emulsion that provides a cold-applied, high performance treatment for bare earth areas and unpaved road surfaces. Formulated from tree resin ingredients, this state-of-the-art, non-ionic emulsion technology is unique in its high bonding strength and is appropriate for use even in close proximity to wetland areas and other areas of environmental sensitivity. Road Oyl provides the clean, high performance technology needed for any type of project.

Originally developed to solve severe dust problems on mine haul roads, Road Oyl has been used around the world for over 20 years.

Since Road Oyl is made from all natural ingredients harvested on a sustainable basis, it has never had a problem being approved for use in any application or as part of an environmental permit issued to an operating entity such as a landfill, steel mill or mine.



BoVill Industries LLC
Providing Full Circle Solutions





The Facts

Road Oyl is versatile and multi-purpose in use for dust control, erosion control, stabilization, shoulder treatments and other specialized applications. It has been specifically designed and proven to be a long-term solution for efficient control of road dust. Whether you are creating a landing strip, access road, haul road, hardened surface, trail or have erosion control requirements, Road Oyl provides a reliable, environmentally friendly binder.

Traffic on a Road Oyl surface will compact the surface into a smooth dust free pavement-like surface. It penetrates road aggregate and binds it into a surface proven stronger than asphalt. Road Oyl darkens the aggregate or soil that it's applied to slightly but maintains the same basic look, which makes it desirable in natural settings. Road Oyl will not track when applied as directed.

How it's Made

Road Oyl is a natural flexible pavement binder emulsion formulated from pine rosin and pitch in water. The pitch and rosin, which comprise roughly 50% of Road Oyl by weight, are co-produced with other timber products from southern pine in the Southeastern United States. Pine pitch is a black, viscous "tar" derived from the distillation of wood; before the development of coal tar pitch. Pine rosin is the residue from distillation of turpentine oil from raw turpentine. The Road Oyl liquid is brownish in color with a mild odor. When rubbed between the fingers, it becomes extremely sticky as the water evaporates.

Environmentally Friendly

Made from all natural products harvested on a sustainable basis, Road Oyl is non-hazardous and safe for the environment.

BoVill Industries LLC
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Redmond, WA 98052
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info@bovillindustries.com
www.bovillindustries.com
11CP035 ©2012 Midwest Industrial Supply,

Economical

Road Oyl is shipped efficiently as a high concentrate and diluted with water before application. With its long lasting nature, you spend less time reapplying, saving you both time and money.

Long Lasting

The condition of the road, the degree of Road Oyl penetration, and the amount of traffic combine to determine the life of a Road Oyl application. It also helps stabilize the road in winter by protecting the road from water intrusion.

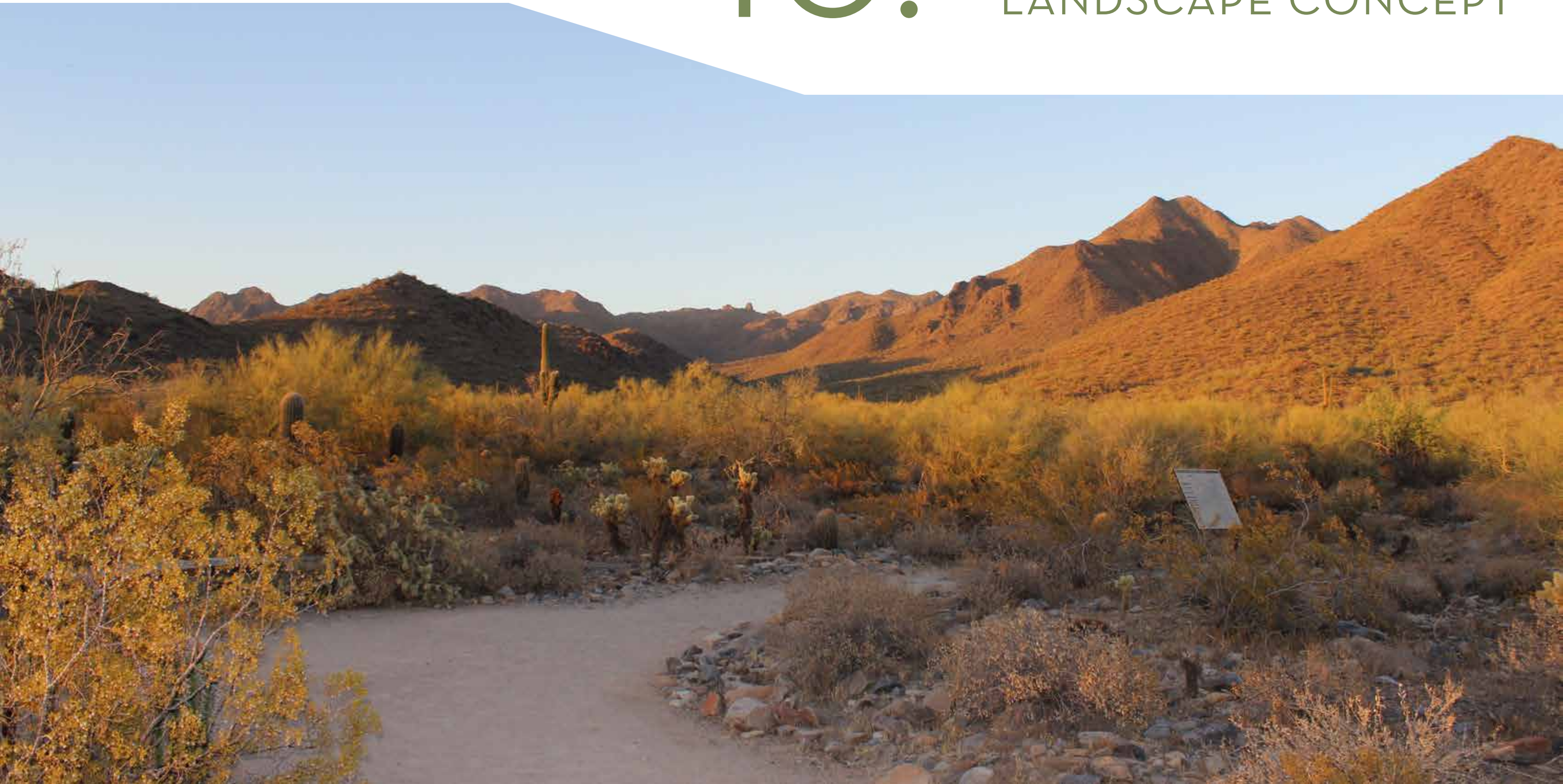
Physical Properties

Specific Gravity:	0.9 – 1.1 Kg/L
Weight per Gallon (US)	7.497 – 9.163 #/gallon
Appearance:	Light brown colored liquid emulsion
Odor:	Musty, woody
pH:	6 - 9
Boiling Point:	212°F (100°C)
Solubility in Water:	Dilutable
OSHA Hazard:	No
Flammability:	Non-flammable, non-combustible
Stability:	Stable under normal handling conditions
Corrosiveness:	Similar to water
Incompatibilities:	Can react with strong organic oxidizing materials, strong acids and strong bases.

Road Oyl is versatile and multi-purpose in use for dust control, erosion control, stabilization, shoulder treatments and other specialized applications.



10. LANDSCAPE CONCEPT



LANDSCAPE CONCEPT

LANDSCAPE GOALS:

- Preserve the natural character of each site
- Restore disturbed areas to replicate each site's natural character
- Provide natural habitat for indigenous animal species
- Minimize the use of potable water
- Provide educational and interpretive opportunities

LANDSCAPE PRESERVATION

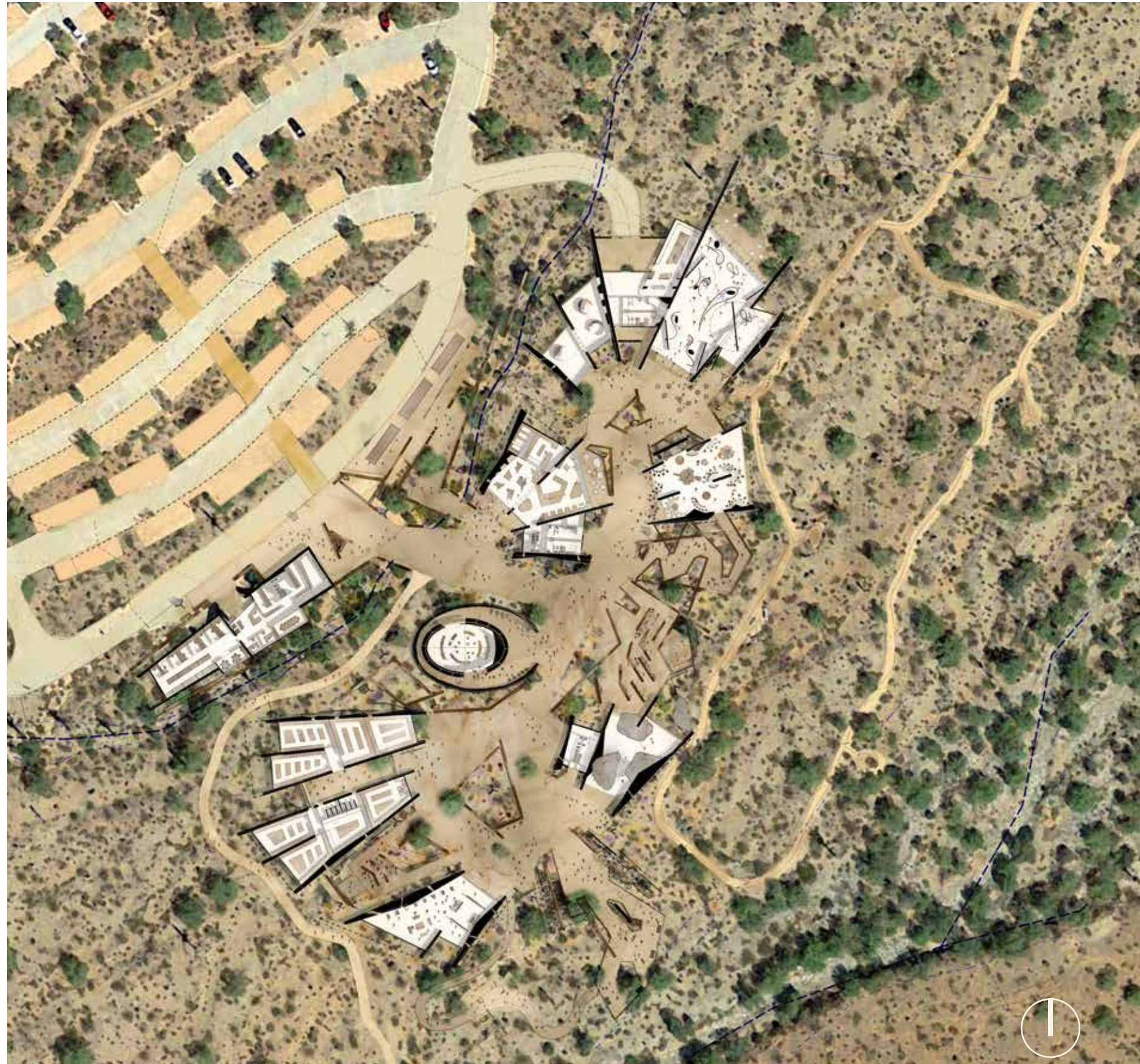
Establish a baseline inventory of the site's vegetation community, including plant species list, natural plant densities, habitats, plant associations and soil characteristics.

Provide a comprehensive inventory of all vegetation found within established construction envelope. Trees with a caliper of 10 inches or greater and all multi-arm saguaros shall be designated as significant site features and shall be left in place, undisturbed, to the greatest extent possible. Develop a salvage program for each specific site, including inventory checklist, tracking system, salvage methodologies, storage area and warranty specifications. The storage area may be located off-site to minimize on-site disturbance.

In addition to those plants protected under the City of Scottsdale's Native Plant Ordinance (Ord. No. 2262 Section 7.500) each site's salvage program should include the salvage of:

- All viable cacti of all sizes, including cholla, prickly pear, barrels, hedgehog, mammalarias, ocotillos, yuccas and immature saguaros
- All viable trees and shrubs with two inches or greater caliper
- A quantity of each species of shrub to satisfy the requirements of the site's restoration program shall be salvaged and/or procured prior to site clearing and grubbing in order to ensure availability

Develop a program to preserve native topsoils, including decomposed granite and "desert pavement" materials. Lichen covered rocks greater than 12 inches in diameter are to be salvaged and stockpiled for hand placement during restoration. Establish an area for stockpiling materials for use in topdressing disturbed areas of the site. If practical, storage area may be located off-site to minimize on-site disturbance. All rock top-dress materials shall match the character and color of the existing native stone.



LANDSCAPE CONCEPT

LANDSCAPE RESTORATION

All areas of the site that were either previously disturbed or which are disturbed during the process of creating amenities, shall be restored to blend with the natural character of the site. The predisturbance baseline shall be referenced to establish proper vegetative and soil characteristics.

A comprehensive restoration and revegetation program shall be developed for each site. Considerations should include the use of site salvaged materials such as trees, shrubs, cacti and topsoil. In addition, supplemental materials may be utilized to ensure existing densities and plant associations are re-established in order to maintain and to promote wildlife habitat. The restoration program shall use a combination of salvaged materials, one and five gallon size container plants, native seed mixes and native topdressing materials.

Native seed mixes shall be specified to include only those species of plants indigenous to the site and immediate surroundings, including wildflowers, grasses and other herbaceous perennials. If used, these materials should be dry scattered in the appropriate areas, ideally from mid-September through October. These materials shall not be hydroseeded and shall not require a permanent irrigation system.

All plant materials shall be native and indigenous to each specific site. Plant densities shall provide a seamless transition from newly planted areas to the existing, naturally occurring Preserve landscape.

PROPOSED RESTORATION PLANT PALETTE

TREES

- Cercidium floridum
- Blue Palo Verde
- Cercidium microphyllum
- Foothills Palo Verde
- Chilopsis linearis
- Desert Willow
- Olneya tesota Ironwood
- Prosopis velutina
- Native Mesquite

SHRUBS

- Abutilon palmeri
- Indian Mallow
- Ambrosia deltoidea
- Triangle Leaf Bursage
- Calliandra eriophylla
- Native Fairy Duster
- Datura wrightii
- Sacred Datura
- Encelia farinosa
- Brittlebush
- Ericameria laricifolia
- Turpentine Bush
- Justicia californica
- Chuparosa
- Larrea tridentata



- Creosote
- Lycium fremontii
- Fremont's Thornbush
- Simmondsia chinensis
- Jojoba
- Sphaeralcea ambigua
- Globemallow
- Trixis californica
- Trixis
- Viguiera deltoidea
- Goldeneye

ACCENTS

- Agave murpheyii
- Murphey's Agave
- Agave parryi
- Parry's Agave
- Asclepias subulata Desert Milkw
- Carnegia gigantea
- Saguaro
- Cylindropuntia acanthocarpa
- Buckhorn Cholla
- Cylindropuntia bigelovii Teddy Bear Cholla
- Dasylirion wheeleri
- Desert spoon
- Echinocerus engelmannii



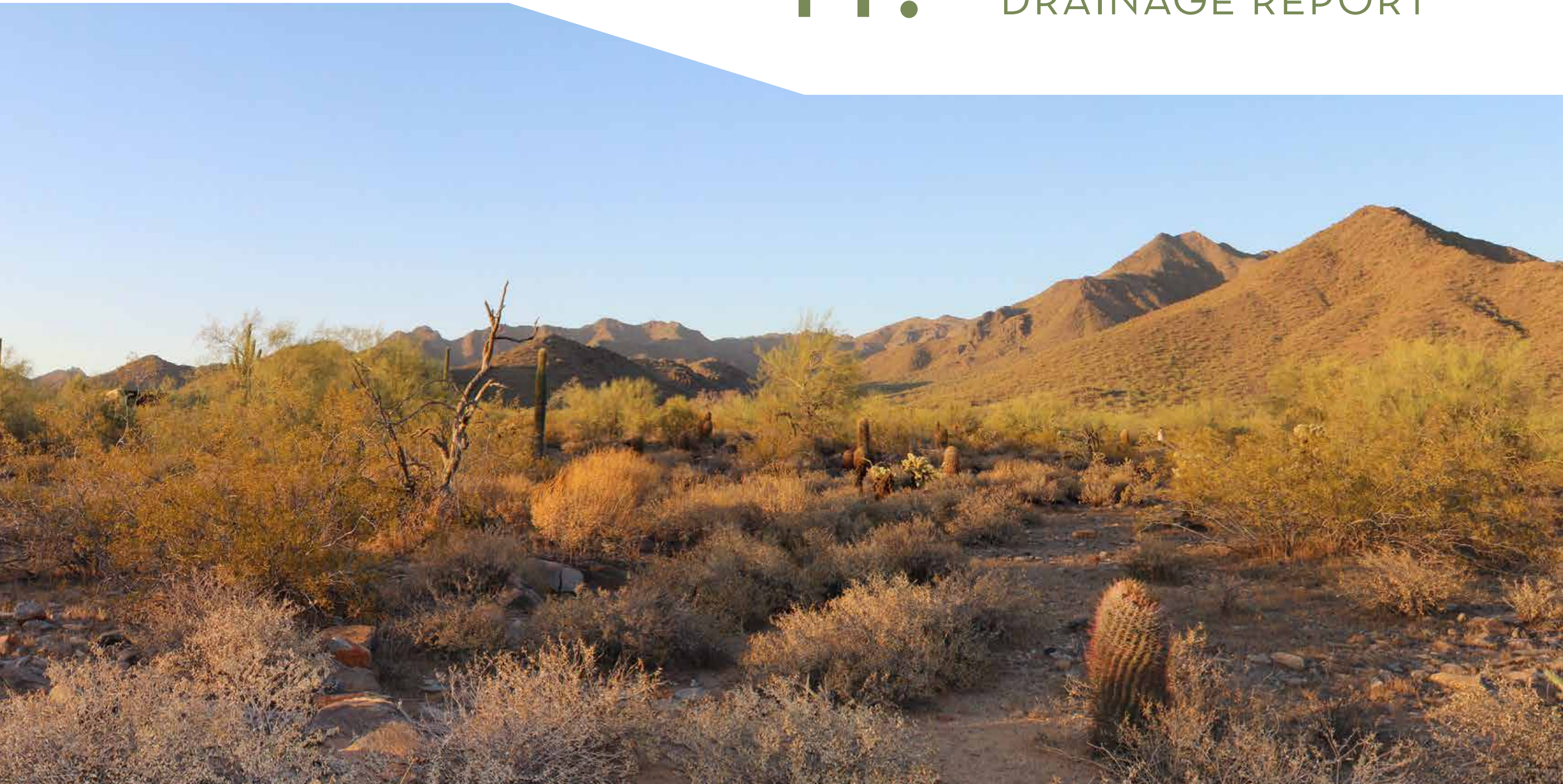
- Hedgehog Cactus
- Euphorbia antisyphilitica
- Candelilla
- Ferocactus cylindraceus
- Compass Barrel Cactus
- Ferocactus wislizenii
- Fish Hook Barrel Cactus
- Fouquieria splendens
- Ocotillo
- Opuntia basilaris
- Beavertail Prickly Pear
- Opuntia engelmannii
- Engelman's Prickly Pear
- Opuntia gosseliniana
- Violet Prickly Pear
- Opuntia santa-rita
- Santa Rita Prickly Pear

GROUNDCOVERS/ WILDFLOWERS

- Abronia villosa Sand Verbena
- Baileya multiradiata
- Desert Marigold
- Penstemon sp.
- Penstemon



11. CONCEPTUAL DRAINAGE REPORT



CONCEPTUAL DRAINAGE REPORT

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Jul 2017

WP# 164487



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CONCEPTUAL DRAINAGE REPORT

1.0 INTRODUCTION

1.1 Project Description

This report presents the drainage concepts in support of the proposed Desert Discovery Center (DDC). The project will consist of a number of structures, including interpretive, educational, and research facilities; addition of an access way to the center; expansion of the parking lot at the Gateway; and extension of access ways from the parking area to the center.

1.2 Project Location

The structural elements of the DDC sit on approximately 5.5 acres of land located south of the Gateway Trailhead and north of the Thompson Peak Wash within the McDowell Sonoran Preserve. Specifically, the proposed DDC site is located east of Thompson Peak Parkway approximately half a mile north of Bell Road, in the City of Scottsdale, within Section 32 of Township 04N, Range 05E, of the Gila and Salt River Base Line and Meridian, Maricopa, Arizona. Figure 1 – Project Location Map shows the location of the DDC site.



Figure 1 - Project Location Map

2.0 SITE DESCRIPTION

2.1 Existing Site Characteristics

The DDC site is currently undeveloped land. A small wash, herein referred to as Wash 1, runs along the northwest side of the site, and a large wash commonly referred to as the Thompson Peak Wash runs along the south side of the site. The land generally slopes from the northeast to the southwest, with runoff originating from the McDowell Mountains. Runoff from Thompson Peak Wash is conveyed west under the roadway via a 3-cell Conspan structure. Runoff from smaller washes is collected in drop inlets along the east side of Thompson Peak Parkway and conveyed in a storm drain under the roadway to the Conspan structure.

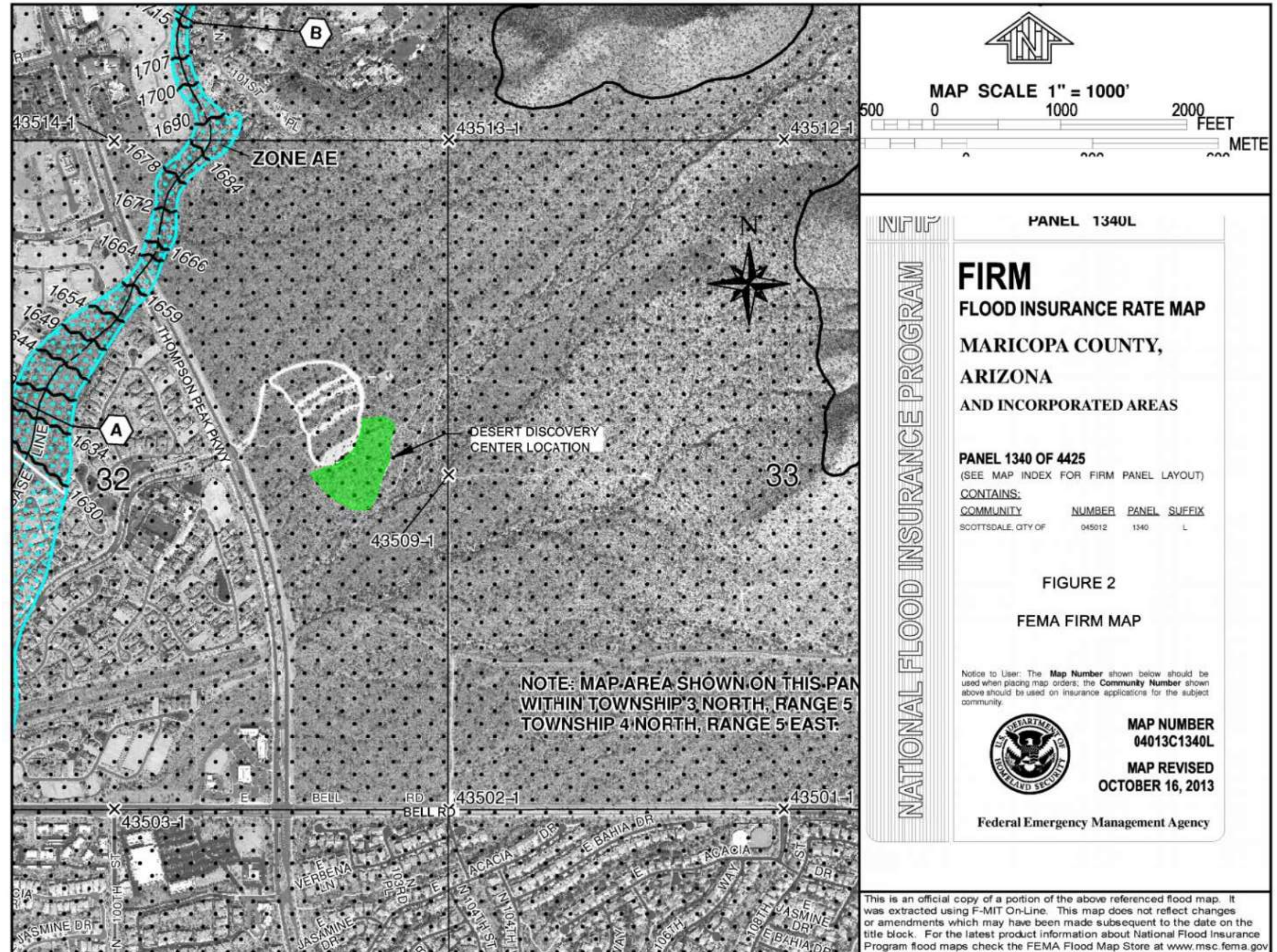
2.2 FEMA Designation

The DDC site is located within the Federal Emergency Management Agency’s (FEMA) Flood Insurance Rate Map (FIRM) Panel 04021C1340L, revised 10/16/2013, for Maricopa County and Incorporated Areas. The FIRM panel indicates the site is located within Shaded Zone ‘X’, which is defined as “Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.” Figure 2 – FEMA FIRM Map shows the project location within the FIRM panels.

WOOD/PATEL

3

*Desert Discovery Center
Conceptual Drainage Report
WP#164487*



CONCEPTUAL DRAINAGE REPORT

3.0 DRAINAGE EVALUATION

3.1 Hydrology

The regional hydrology for the Thompson Peak Wash along the south side of the project site is based on hydrology performed for the Reata Wash Flood Control Improvement Study. The HEC-1 model from this project was obtained and updated to reflect the area tributary to the Thompson Peak Wash. The HEC-1 analysis indicates that the existing 100-year peak discharge is 1,793 cfs.

For Wash 1, which has a drainage area of 26.2 acres, the Rational Method was used to calculate the peak discharge. This analysis estimates the 100-year peak discharge for Wash 1 at 75 cfs. Exhibit 1 is a drainage map showing the delineation for the contributing drainage areas to Wash 1 and the Thompson Peak Wash, along with the peak discharges.

3.2 Hydraulics

A hydraulic analysis was performed to determine if the regional flow tributary to the Thompson Peak Wash is contained within the limits of the wash. This analysis was performed using the HEC-RAS software, and shows that a breakout occurs approximately 920 feet north of the site for a 100-year rainfall event. The breakout is approximately 80 cfs. This breakout flows in a small wash and combines with Wash 1 approximately 250 feet north of the site. The 80 cfs from the breakout is not additive to the discharge in Wash 1 because the time of concentration of the breakout flow is much greater than the time of concentration of Wash 1. The recommended design flow for Wash 1 is 80cfs.

The capacity of Wash 1 was checked using the normal depth method in the FlowMaster software. Four sections were analyzed, and the following average results were obtained:

- Average capacity = 178 cfs (at elevation 6 inches below top of wash)
- Average flow velocity = 7.15ft/s
- Average flow depth = 1.7feet
- Average top width = 27.9feet

4.0 DRAINAGE CONCEPTS

4.1 Design Requirements

The DDC is located within the City’s Environmentally Sensitive Lands Overlay (ESLO), Lower Desert Landform, which requires that 25% of the site be permanently preserved as natural area open space (NAOS) and that specific environmental features, such as vegetation, washes, and mountain ridges and peaks, be protected from inappropriate development. The goal of the DDC is to minimize disturbance to existing land features as much as possible.

Based on the current edition of the City of Scottsdale’s Design and Standards & Policies Manual, the lowest floor elevation for a habitable structure is to be set at whichever criterion controls:

- a minimum of 14 inches above the highest natural grade
- a minimum of one foot above the 100-year water surface elevation if a wash is present

4.2 Offsite Drainage Concept

The offsite flows impacting the project site consist of the 80 cfs from Wash 1. Other than three proposed wash crossings, the wash will be left in its natural condition and the 80 cfs will continue to flow through it. Drainage structures will be proposed to allow pedestrians and vehicles to cross the wash with minimal disturbance to the wash.

Lateral migration must be considered in the design of structures near the washes. The recommended setback for structures near a wash was estimated based on a Level 1 analysis from Arizona Department of Water Resources (ADWR) State Standard 5-96. The recommended setback is 43 to 106 feet for the Thompson Peak Wash and 9 to 23 feet for Wash 1. In lieu of providing a setback, the footings of the structures could be extended to the scour depth to prevent lateral migration.

4.3 Onsite Drainage Concept

The concept under discussion is to allow minor runoff to sheet flow through the site and be collected in drainage swales along the east side of Thompson Peak Parkway, which then conveys the runoff to the Conspan structure. As-built plans for Thompson Peak Parkway show the Conspan structure has sufficient capacity for the post-development discharge from the DDC. The Conspan structure was designed for a flow of 5202 cfs. The peak discharge from the HEC-1 model which accounts for the DDC indicates a lower peak discharge of 4587 cfs at the Conspan structure.

Additionally, the time of concentration for the onsite flows is less than 10 minutes, while the time of concentration for the regional peak discharge is much greater. By the time the regional peak discharge arrives, the local peak discharge has already come and gone. Therefore, the additional runoff from the DDC’s post-development condition has no adverse drainage impact on the existing drainage system.

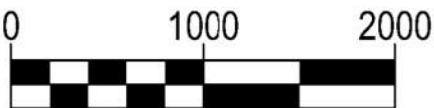
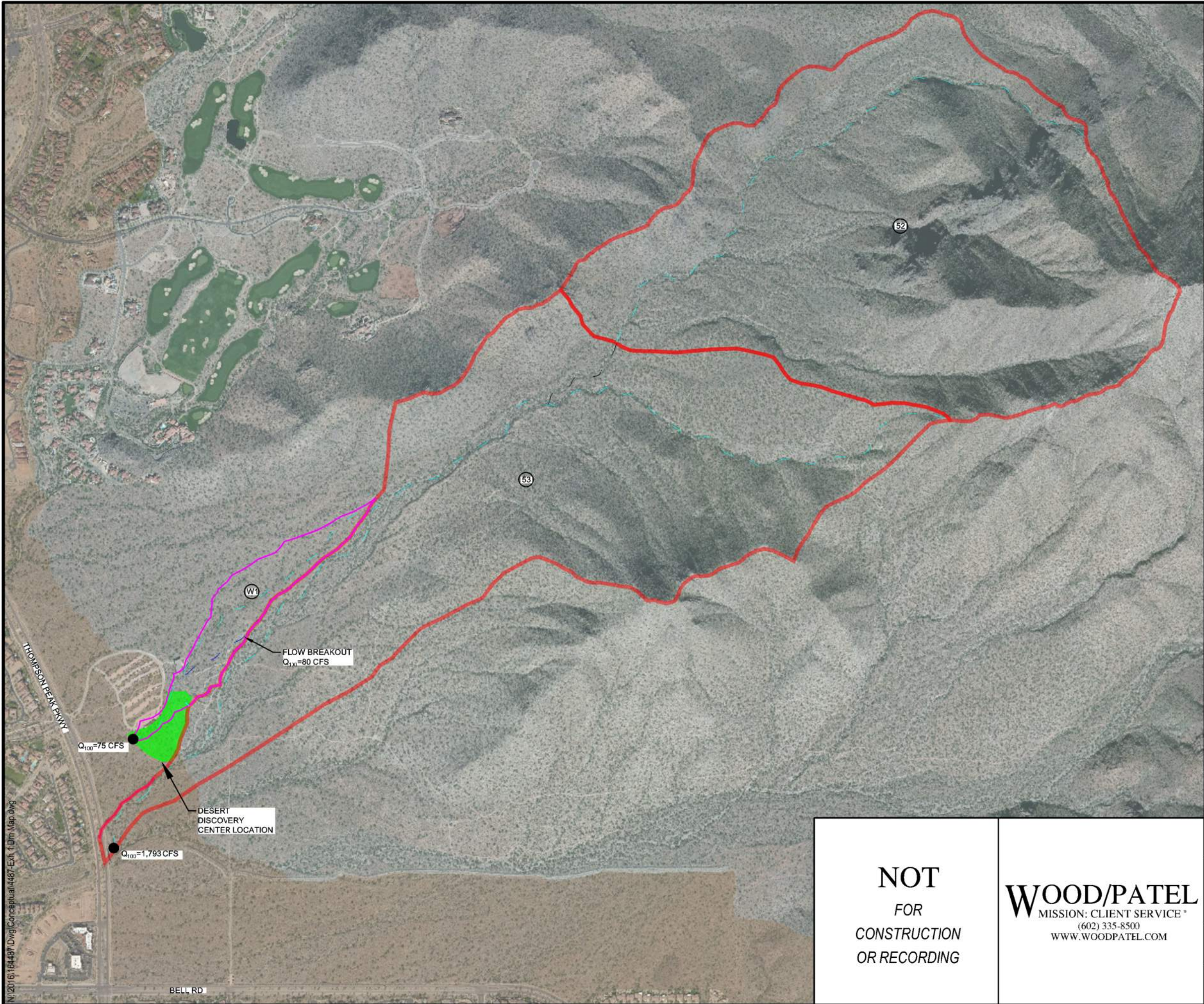
Cutoff walls currently are being discussed to be built at the upstream portion of the project site to provide lateral migration protection. The drainage concepts for the DDC project are shown in Exhibit 2.

5.0 SUMMARY

- The project site is located in the City’s ESLO Lower Desert Landform and is bounded on the north by Wash 1 and on the south by the Thompson Peak Wash.
- The design discharge for Wash 1 is 80 cfs. Three crossings are proposed across the wash. The majority of the wash will be left undisturbed.
- Lateral migration protection will be provided by buried structures along Wash 1 and the upstream portion of the project site.

6.0 REFERENCES

- JE Fuller/Wood Patel and Associates, Memorandum: Hydrologic Modeling, Reata Wash Flood Control Improvement Study, August2016.
- Swaback Partners, Desert Discovery Center, Feasibility Study: Phase II, September 2010.
- Kland Consulting Civil Engineers, Final Drainage Report for Gateway Access, May 2006.



Horz. 1 in. = 1000 ft.

LEGEND



SUB-BASIN AREA TRIBUTARY TO THOMPSON PEAK WASH



SUB-BASIN AREA TRIBUTARY TO WASH 1



FLOW PATH



CONCENTRATION POINT AND 100-YR PEAK DISCHARGE

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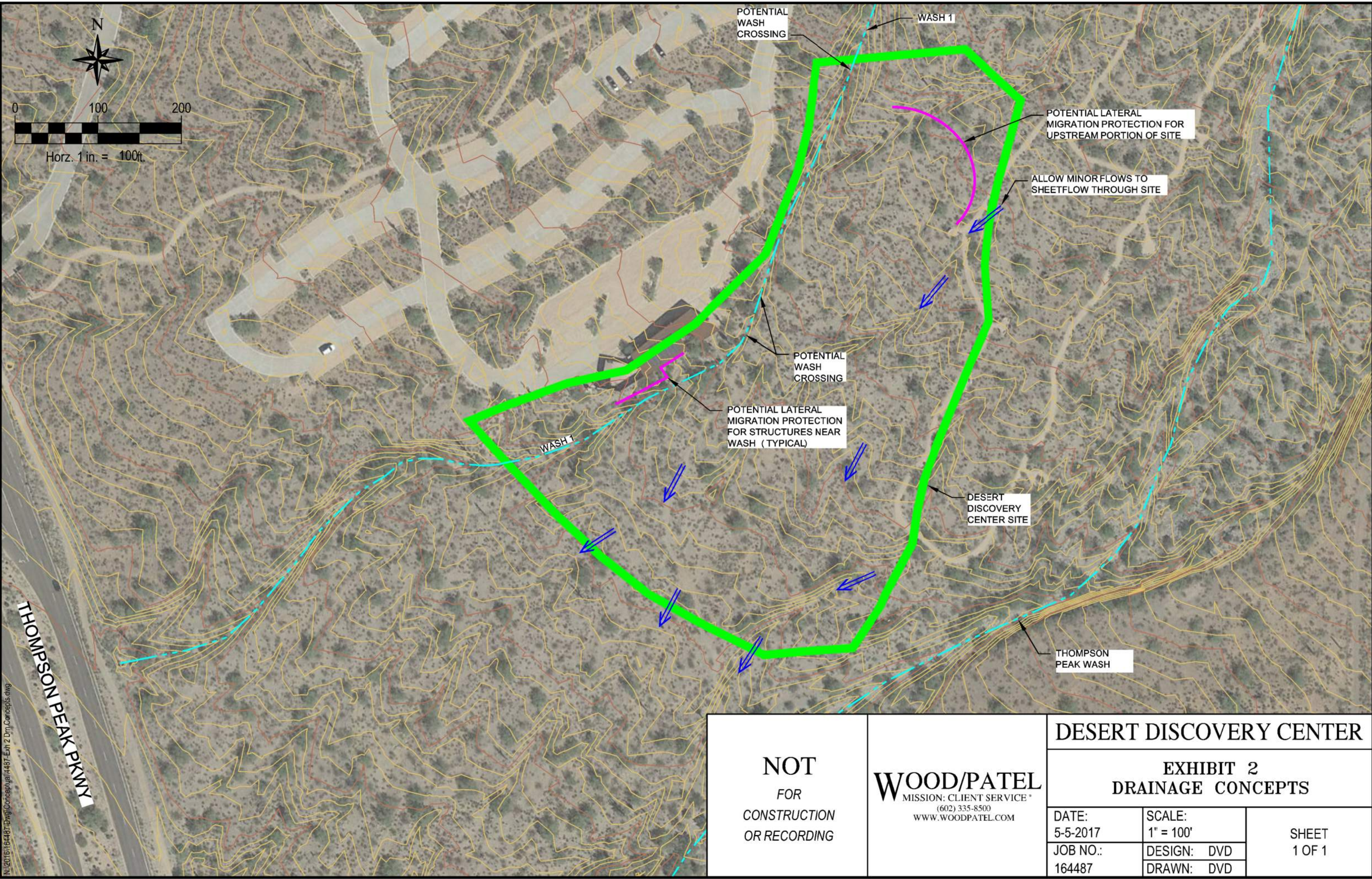
DESERT DISCOVERY CENTER

EXHIBIT 1 DRAINAGE MAP

DATE:
5-5-2017
JOB NO.:
164487

SCALE:
1" = 1000'
DESIGN: DVD
DRAWN: DVD

SHEET
1 OF 1



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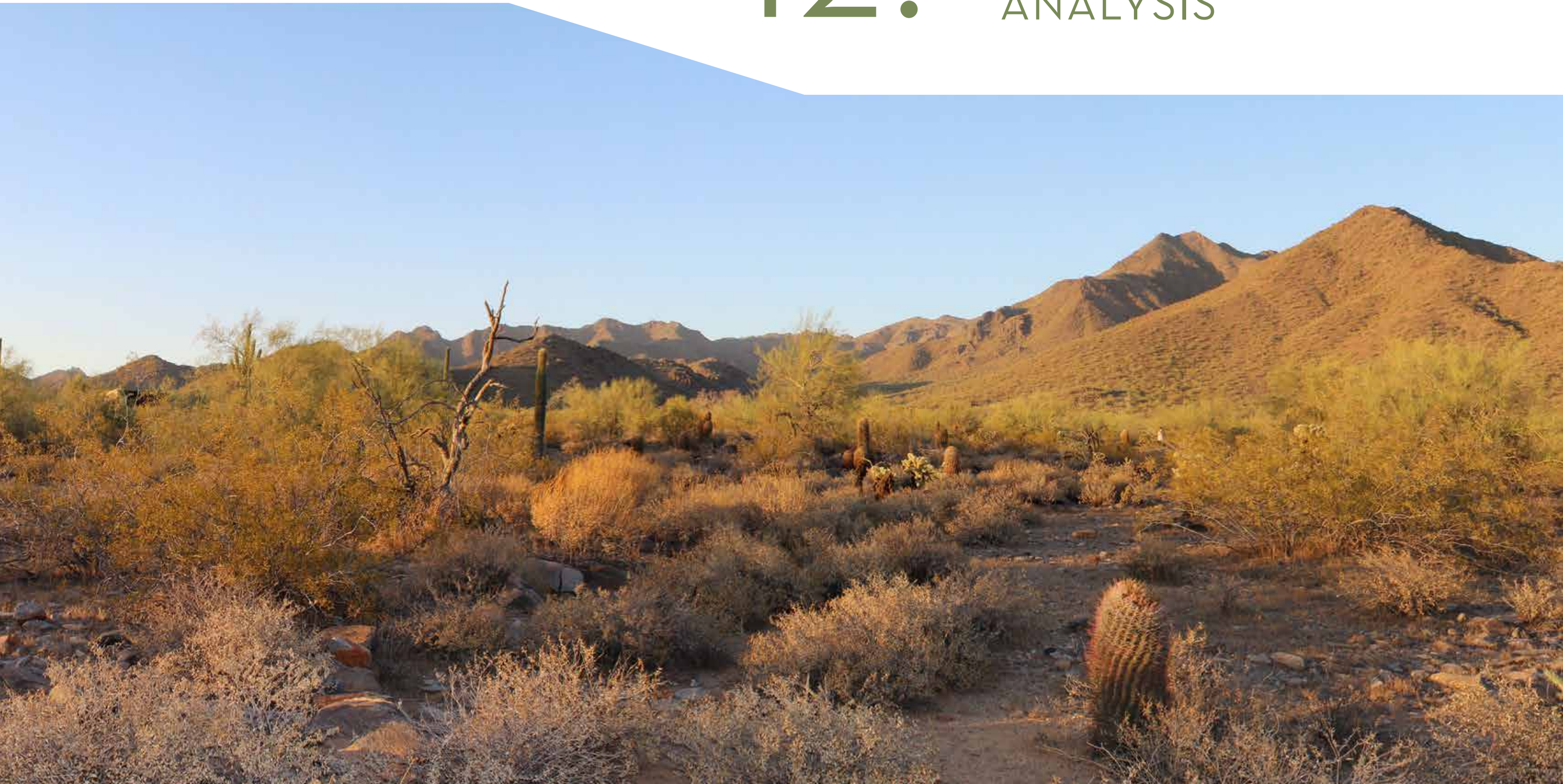
DESERT DISCOVERY CENTER

**EXHIBIT 2
DRAINAGE CONCEPTS**

DATE: 5-5-2017	SCALE: 1" = 100'	SHEET 1 OF 1
JOB NO.: 164487	DESIGN: DVD	
	DRAWN: DVD	

12.

TRAFFIC IMPACT ANALYSIS



TRAFFIC IMPACT ANALYSIS

INTRODUCTION

The determination of the appropriate parking supply for the Gateway Access Area relies upon a review of the parking needed for the existing facilities as well as the projections of parking demand for the Desert Discovery Center. The opportunities to expand the existing parking supply are constrained by the sensitivity to unlimited expansion of the existing parking field. Off-site parking provisions have been identified as a potential alternative to providing on-site parking for the expected peak parking demand. The existing and proposed uses are expected to generate the projected peak parking demand for only a limited number of hours per day on a few days per year during the peak month of activity. Providing on-site parking for the projected peak parking demand would result in a significant portion of the parking spaces going unused, except for very limited periods of time. The following review of parking demand was prepared to make a recommendation for the number of parking spaces to provide in order to have a combination of on-site and off-site parking spaces to meet the needs for the existing and proposed development.

GATEWAY ACCESS AREA PARKING DEMAND

Parking demand at the Gateway Access Area was previously reviewed in a 2011 analysis prepared for the City of Scottsdale. At the time of the 2011 study, the Gateway Access Area provided a total of 334 parking spaces. The results of the parking analysis documented the existing peak parking demand exclusive to the Gateway Access Area uses in 2011 of 300 spaces, and projected a 2020 parking demand of 400 to 525 parking spaces. Subsequently, the parking supply was expanded in 2015 to the current configuration which includes a total of 381 spaces.

The estimate of peak parking demand was based upon historical trail use and observed parking demand. The recommended parking supply was developed in order to provide an adequate parking for the peak utilization of the Gateway Access Area. The recommended 2020 parking supply was developed consistent with the number of spaces that would accommodate the potential parking demand of trail users for all but two hours over a two-year period. The future parking demand recommendation also anticipated a projected growth in trail use of 4% to 8% per year through the year 2020.

In order to validate the parking demand projections for the Gateway Access Area, a review of the car counts collected by the City of Scottsdale at the Gateway Access Area was performed. Monthly car counts from 2011 through 2016 were summarized to develop yearly totals.

Table 1

Year	Annual Entering Vehicles*
2011	116,390
2012	124,307
2013	128,456
2014	141,153
2015	169,445
2016	153,404

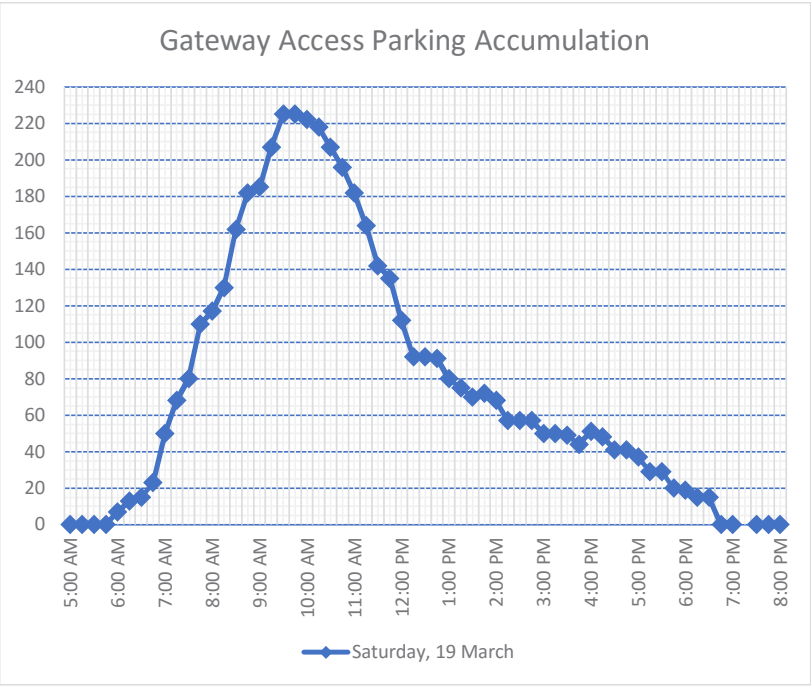
*Car Counts at Scottsdale McDowell Sonoran Preserve Gateway Trailhead

The annual volume increased from 116,390 in 2011 to 153,404 in 2016, a total increase in the annual car count of 37,014 or 31.8% over five years. There was significant variation in the year to year changes in the use of the Gateway Access Area. This variation is likely reflective of the impact of new trail facilities being completed and the overall fluctuation in trail utilization. The peak month of the year was generally consistent with March being the busiest month of the year. The overall increase in the observed utilization of the Gateway Access Area between 2011 and 2016 is equivalent to an annual growth rate of 5.68% per year.

The projected 2020 parking demand at the Gateway Access Area was presented as a range of between 400 spaces to 525 spaces corresponding to an anticipated annual increase of 4% to 8% respectively. Updating the future parking demand to account for the observed average annual growth rate between 2011 and 2016 of 5.68% per year in utilization, the corresponding 2020 peak parking demand will be approximately 450 spaces.

According to the Gateway Access Area parking analysis, this peak parking demand is reflective of the peak hour of the day (9:30 AM to 10:30 AM) of the peak day of the week (Saturday) of the peak month of the year (March). Typical parking occupancy data collected on a peak day (Saturday) during a peak month (March) shows that the length of time that the peak demand is observed is relatively short with a sustained peak duration of less than one hour. Figure 1 depicts the variation in peak parking demand observed for the Gateway Access Area observed on a Saturday in March in 2011, as presented in the *Additional Parking Analysis for the Gateway Access Area*. Outside of this short peak time, the demand for parking drops significantly for the remainder of the day. The result of providing the number of spaces required to accommodate the peak parking demand is that surplus spaces will be available throughout the year except for a limited number of weekend days where it would be possible that the parking supply would be completely utilized for a very short time period of time during the morning.

Figure 1.



TRAFFIC IMPACT ANALYSIS

DESERT DISCOVERY CENTER PARKING

The current Municipal Use Master Site Plan for the Gateway Access Area anticipates the addition of 163 spaces to the current existing parking supply of 381 spaces for a total of 544 spaces with the development of the Desert Discovery Center. The proposed parking supply to be provided under the Municipal Use Master Site Plan would have 94 surplus parking spaces compared to the 450-space peak parking demand projected in the year 2020 for the current uses at the Gateway Access Area.

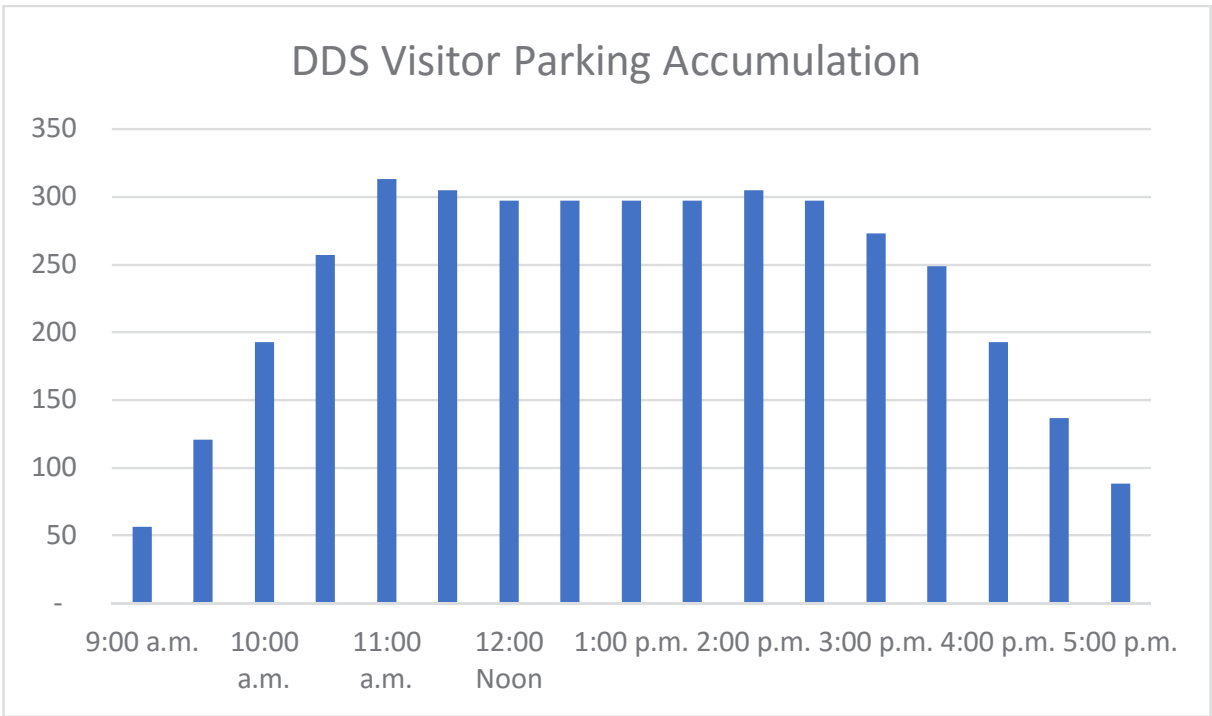
The proposed addition of the Desert Discovery Center has the potential to increase the parking demand at the Gateway Access Area. A detailed attendance and operations analysis was prepared for the Desert Discovery Center documenting the expected operational characteristics of the proposed facilities as it relates to the projected attendance population and time of day of visitation to the site. The mid-range visitation values were utilized to estimate the potential peak parking demand for the facility. The estimated mid-range visitation is projected to be 306,000 annual visitors. Of the annual visitor total, 39,780 visitors, or 13% of the annual total, are expected to visit in the peak month (March) and 11,138, or 28% of the peak month, are expected to visit the site in the peak week. The maximum daily visitor count is expected to be 18% of the weekly total or 2,005 in a single day (Saturday).

Visitors are expected to utilize the site primarily between the hours of 9:00 AM and 5:00 PM with the peak on-site population expected at 11:00 AM when 39% of the daily visitors (782 visitors) are expected to be on site at one time. The variation in parking accumulation anticipated for visitor activity is depicted in Figure 2 which shows the peak accumulation of 39% of the daily visitors on-site in the morning. The nature of the users of the proposed Desert Discovery Center is anticipated to promote a relatively high vehicle occupancy estimated to be 2.5 visitors per vehicle. Based on the peak on-site visitor population projection and the anticipated vehicle occupancy, the peak visitor parking demand is projected to be 313 spaces. The projected parking demand for visitors to the Desert Discovery Center is summarized in Figure 2.

Parking demand will be significantly influenced by the transportation mode selected by visitors. The level of parking demand presented in Figure 2 anticipates visitors arriving to the facility exclusively by private vehicle. Utilization of other transportation modes such as shuttle services from area hotels, buses or ride sharing services could raise the effective occupancy per parked vehicle, resulting in a further reduction in the peak parking demand.

In addition to the parking for visitors to the Desert Discovery Center, the project is expected to utilize up to 75 full time equivalent employees for the operation of the facility, along with approximately 20 research staff, who will also need to be accommodated in the peak parking demand. The vehicle occupancy of the employees is expected to be approximately one employee per vehicle adding a total of 95 spaces to the peak demand. The total number of employee and staff parking spaces are expected to be utilized at the same time as the peak Desert Discovery Center visitor parking demand, resulting in a total peak parking demand for the Desert Discovery Center of approximately 410 spaces.

Figure 2



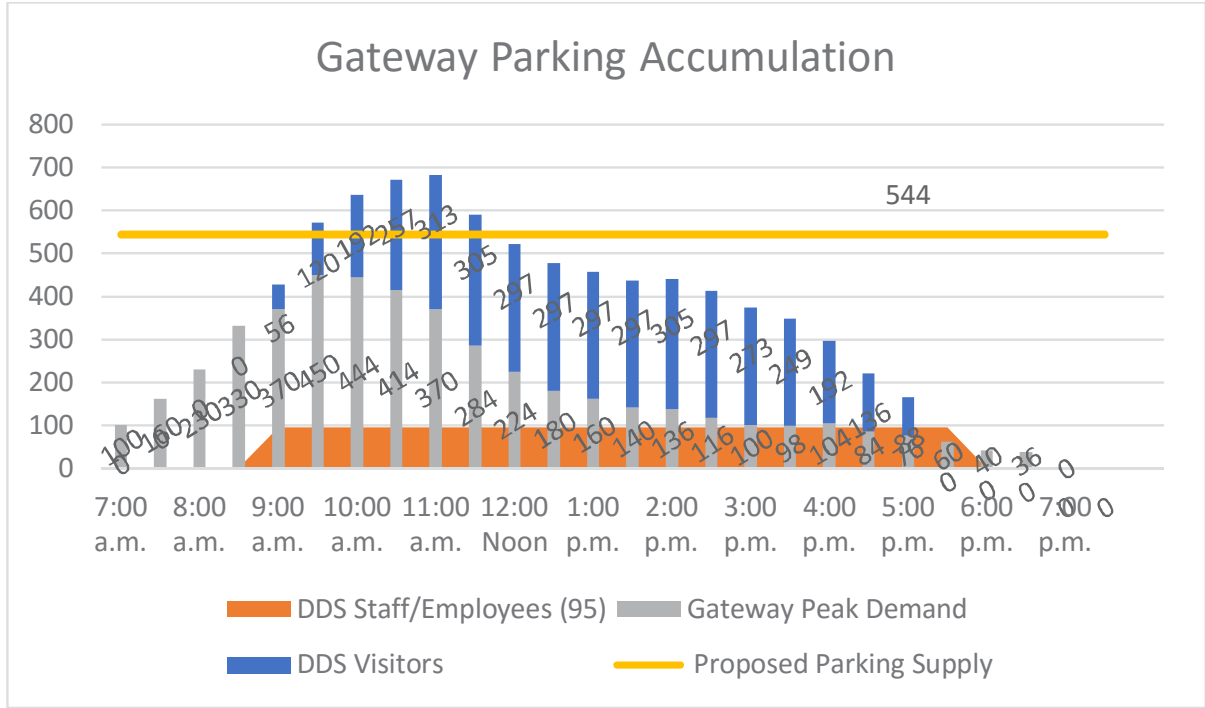
Combined Peak Parking Demand

The variability in the peak parking demand for the current Gateway Access Area uses and the proposed Desert Discovery Center are similar but are not identical. This variation in the peak parking demand characteristics provides opportunities for reductions in overall parking demand. Both existing and proposed uses are expected to experience peak parking demand in the same month of the year (March) and the same day of the week (Saturday). The time of day variability of the two uses is somewhat different with the existing uses experiencing a relatively short duration peak around 9:00 AM and the proposed Desert Discovery Center parking exhibiting a less variability in demand with the peak projected at 11:00 AM with a fairly consistent demand expected until around 3:00 PM.

Combining the peak parking demand for the projected year 2020 Gateway Access Area uses (450 spaces) with the observed hourly distribution of parking demand for the existing facilities, along with the projected Desert Discovery Center visitor parking demand (313 spaces) and the projected hourly visitor variation, provides an estimate of the hourly peak parking demand for the overall site. Figure 3 shows the graphical result of the cumulative peak parking demand for the proposed development.

TRAFFIC IMPACT ANALYSIS

Figure 3



The 95 Desert Discovery Center staff and employees parking spaces depicted in Figure 3 are expected to be provided off-site during peak demand periods and are not added into the parking accumulation totals. The cumulative peak parking demand of both the year 2020 Gateway Access Area user and Desert Discovery Center visitors is accommodated by the proposed parking supply of 544 spaces with the exception of the time period between 9:00 AM and 12:00 Noon. During these periods on the peak day, the peak parking demand is expected to exceed the on-site parking supply by a maximum of 139 spaces. The provision for 95 Desert Discovery Center staff and employees parking spaces along with 139 Desert Discovery Center visitor spaces (totaling 234 spaces) in an off-site parking area would adequately accommodate the projected peak parking demand for both the existing and proposed uses at the Gateway Access Area.

Off-Site Parking Opportunities

The off-site parking provisions will need to be implemented in a way that can be flexible and effective in supporting the combined parking demand at the Gateway Access Area. Off-site parking needs are expected to be limited to peak days during the peak months. Due to the number of factors that influence the actual peak parking demand, (vehicle occupancy rates, % of daily visitation in the peak hour, % of weekly visitation in the peak day, % of annual visitation in the peak week) the identification of which peak days will require utilization of off-site parking should be identified based on field verification of observed peak parking demand. Off-site parking provisions should be initiated when peak parking utilization of on-site spaces approaches 95%.

Off-site parking would not be required during most year, as there are significant reductions in peak parking demand on weekdays and during non-peak months. As peak parking demand from Desert Discovery Center visitors increases during weekend days approaching the peak season, parking for staff and employees (95 spaces) would be shifted from on-site to an off-site location. As the Desert Discovery Center visitor parking demand continues to increase, a portion of the visitor parking demand would also utilize an off-site parking solution.

Implementation of off-site parking for Desert Discovery Center staff and employees can be coordinated through internal employee communications. Provision for valet or shuttles to transport employees and staff from the off-site parking location to the Desert Discovery Center will need to be developed, depending on the final location of off-site parking. Off-site parking implementation for Desert Discovery Center visitor parking will require development of a comprehensive system for transporting Desert Discovery Center visitors from the off-site parking location to the facility and a process for communicating the utilization of off-site parking to the visitors during peak times. Final determination of the off-site parking implementation plan will consider the potential shuttle options (shuttle buses, shuttle vehicles, automated vehicles).

Conclusions

This parking evaluation has reviewed the parking demand for both the existing Gateway Access Area and the proposed addition of the Desert Discovery Center. Based on the review of the previous Gateway Access Area parking analysis, along with the actual growth observed in the utilization of the existing facilities, the projected 2020 peak parking demand for the existing Gateway Access Area is projected to be 450 spaces. Based on the attendance and operations analysis for the proposed Desert Discovery Center, the projected peak parking demand for visitors is projected to be 313 parking spaces with an additional 95 parking spaces for staff and employees for a total of approximately 410 spaces.

The provision of 544 on-site parking spaces will accommodate the parking demand for the combined uses for all but limited number of hours on peak days during the peak season. Off-site parking provisions for Desert Discovery Center staff and employees (95 parking spaces) and a portion of the Desert Discovery Center visitor parking demand (up to 139 parking spaces) totaling 234 spaces, will adequately accommodate the total peak parking demand of all of the existing and proposed uses at the Gateway Access Area.

TRAFFIC IMPACT ANALYSIS



TRAFFIC IMPACT ANALYSIS

Thompson Peak Parkway and
Windgate Ranch Road/Carla Way
Scottsdale, Arizona

Prepared for:
Swaback Partners, PLLC



TRAFFIC IMPACT ANALYSIS

Thompson Peak Parkway and
Windgate Ranch Road/Carla Way
Scottsdale, Arizona

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191023001
July 2017
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TRAFFIC IMPACT ANALYSIS

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TRAFFIC IMPACT ANALYSIS

1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

This report documents a traffic impact analysis performed for the proposed Desert Discovery Center exhibit, education, and research destination on the east side of the intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way in Scottsdale, Arizona. The site is anticipated to be built out by 2020.

1.2 REPORT PURPOSE AND OBJECTIVES

Kimley-Horn and Associates, Inc., has been retained by Swaback Partners, PLLC to perform the traffic impact analysis for the proposed development.

The purpose of this study is to address traffic and transportation impacts of the proposed development on surrounding streets and intersections. This traffic impact study was prepared based on criteria set forth by the City of Scottsdale, Category 3 Traffic Impact and Mitigation Analysis report. The specific objectives of this study are:

- To evaluate lane requirements on all existing roadway links and at all existing intersections within the study area;
- To determine future level of service (LOS) for all existing intersections within the study area and recommend any capacity-related improvements;
- To determine necessary lane configurations at all new driveways within the proposed development in order to provide acceptable future levels of service;
- To evaluate the need for auxiliary lanes at all study area intersections; and
- To evaluate the need for future traffic signals.

1.3 PRINCIPAL FINDINGS AND RECOMMENDATIONS

The proposed development is expected to generate 1,317 daily trips, with 192 trips occurring in the AM peak hour and 240 trips occurring in the PM peak hour. To ensure that the estimate of the traffic impacts is the maximum that can be expected, it is assumed that the site will be utilized at the projected peak visitation upon buildout in 2020.

- The site driveways are expected to operate at an acceptable LOS in 2025.
- Total traffic volumes at site build out show that the intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way warrants the installation of a traffic signal. It is recommended that a traffic signal be installed at this intersection when traffic counts reach the volumes required for warrants.

- The signalized intersections are expected to operate at an acceptable LOS in 2025 with the exception of minor movements. It is anticipated that during non-peak periods the LOS of the minor movements will improve.
- It is recommended that a westbound right-turn lane be provided at the Thompson Peak Parkway and Windgate Ranch Road/Carla Way intersection with 150 feet of storage. The exiting lane approaching Thompson Peak Parkway can be striped for the through lane to transition to the left-turn lane to achieve left-turn storage. The design of the westbound approach should accommodate vehicle turn arounds and be coordinated with the traffic signal improvements.
- In order to provide smooth ingress and egress to the proposed development, the westbound approach to Thompson Peak Parkway should be constructed with a throat length that accommodates the 150 feet of storage for the westbound right-turn lane.
- It is recommended that a right-turn deceleration lane with 150 feet of storage and a 90-foot taper be installed for the northbound approach to the site driveway D1 along Thompson Peak Parkway.
- It is recommended that sight triangles be provided at Thompson Peak Parkway/Windgate Ranch Road (Carla Way) to give drivers exiting the site a clear view of oncoming traffic. The landscaping within sight distance triangles must not obstruct drivers' views of the adjacent travel lanes.

2.0 PROPOSED DEVELOPMENT

2.1 SITE LOCATION

The proposed development, an exhibit, education, and research destination, is located on the east side of the intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way in Scottsdale, Arizona. The project location is shown in **Figure 1**.

2.2 LAND USE AND SITE PLAN

The overall development consists of the Desert Discovery Center. The total site area is on approximately 8.4 acres. The layout of the site is illustrated in **Figure 2**.

2.3 SITE ACCESSIBILITY

The site is accessed locally via Thompson Peak Parkway. Regional access is expected to be provided by the Loop 101 and by the other arterial streets in the vicinity such as Bell Road and Legacy Boulevard.

2.4 SITE CIRCULATION

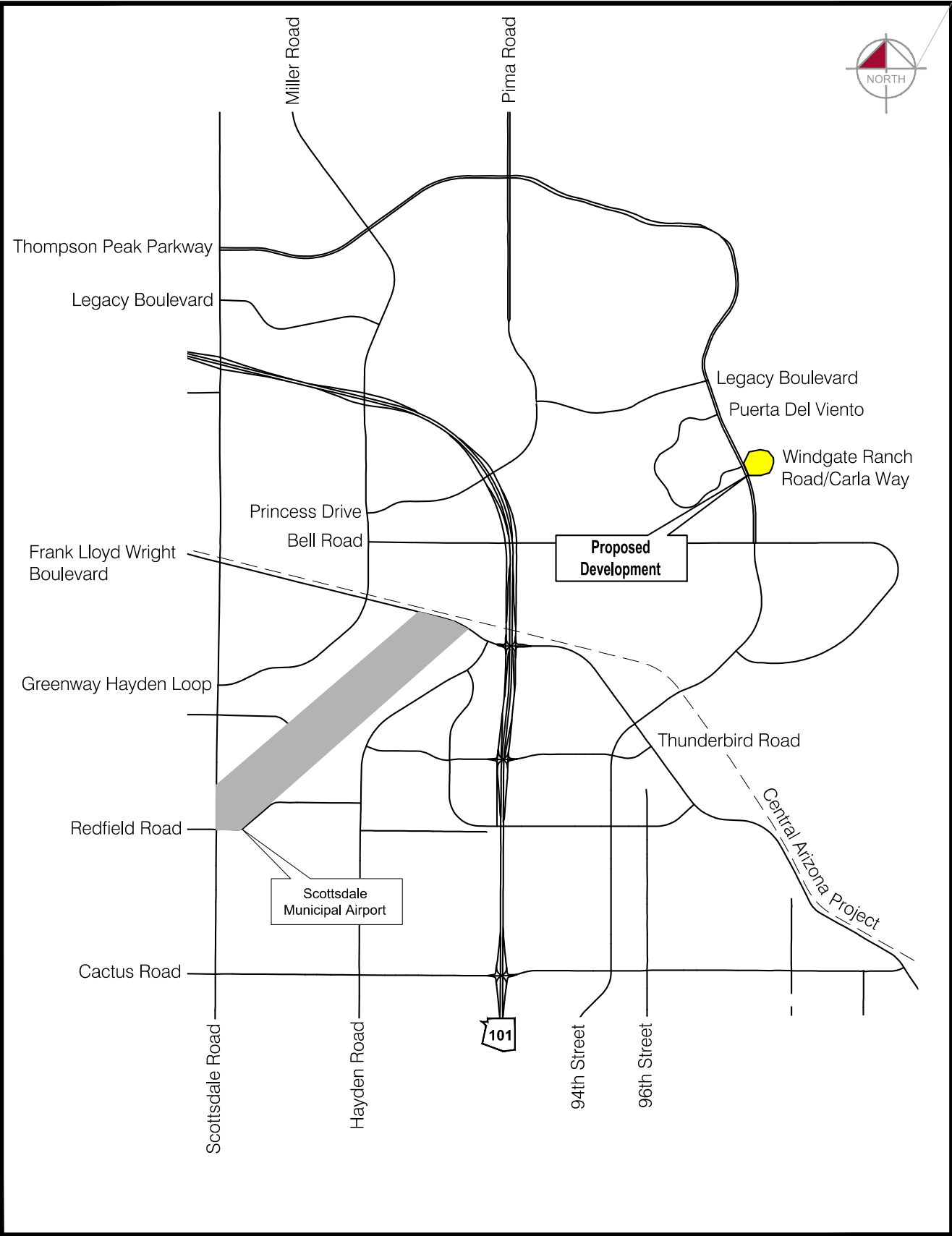
The site plan is shown in previously referenced **Figure 2**.

The site plan utilizes the existing intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way and one driveway for access along Thompson Peak Parkway. Driveway D1 is proposed as a right-in only drive along Thompson Peak Parkway approximately 400 feet south of Windgate Ranch

TRAFFIC IMPACT ANALYSIS

Road/Carla Way. The internal circulation is anticipated to be designed to prevent vehicles from exiting through Driveway D1. All other internal drives are expected to accommodate two-way traffic. An internal loop road connects the Windgate Ranch Road/Carla Way and Driveway D1 access points. The main parking area for the site is located within the loop road with the Desert Discovery Buildings clustered southeast and adjacent to the loop road.

The Windgate Ranch Road/Carla Way access has an operable gate and provides a turnaround option before reaching the gated entrance.



Kimley»Horn Figure 1
Vicinity Map
July 2017 Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS

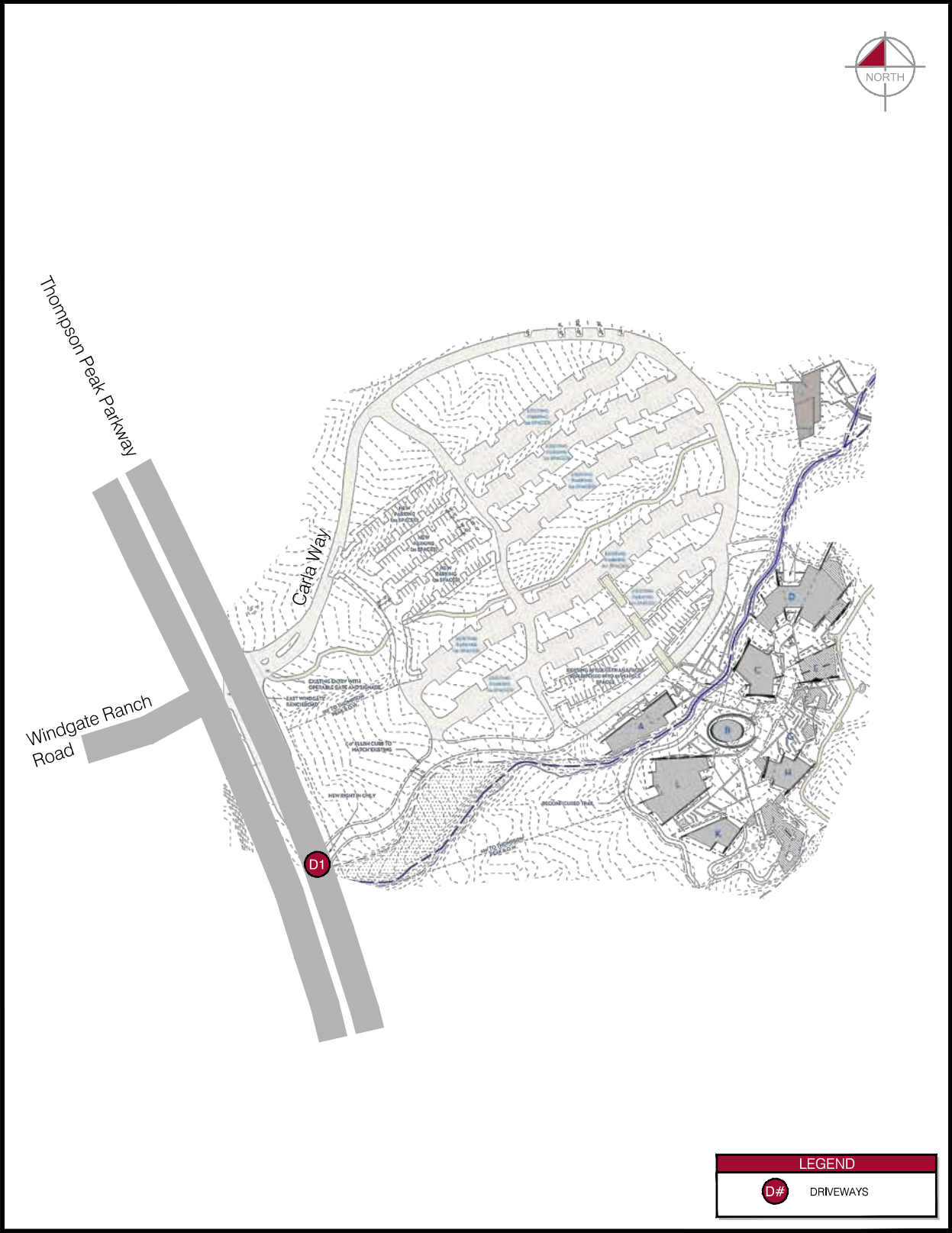


Figure 2
Site Plan

3.0 STUDY AREA

3.1 STUDY AREA

The study area includes the intersections of Thompson Peak Parkway with Bell Road, Windgate Ranch Road/Carla Way, Puerta Del Viento, Legacy Boulevard, and one site driveway.

3.2 ADJACENT LAND USE

The area in the vicinity of the site contains a mix of land uses that is comprised of primarily residential and recreational land use types. The McDowell Sonoran Preserve is located immediately east of the site. The Gateway Trailhead is located directly north of the site, and is expected to utilize the same parking lots. The areas to the north, south, and west of the site is comprised of primarily residential land uses. The Loop 101 exists west of the site, approximately 1.7 miles west of the intersection of Thompson Peak Parkway and Bell Road. Commercial and industrial land uses are found along the Loop 101. The Central Arizona Project (CAP) canal exists south of the site. The section of the canal near the site runs adjacent to Frank Lloyd Wright Boulevard, north of the roadway. The Scottsdale Airport exists approximately three miles southwest of the site on the west side of the Loop 101.

TRAFFIC IMPACT ANALYSIS

4.0 EXISTING CONDITIONS

4.1 PHYSICAL CHARACTERISTICS

The existing roadway network within the study area includes Thompson Peak Parkway, Bell Road, Windgate Ranch Road/Carla Way, Puerta Del Viento, and Legacy Boulevard. The existing intersection lane use and traffic control is shown in **Figure 3**.

Thompson Peak Parkway currently extends north-south with two lanes in each direction with a raised center median. Curb and gutter exist on both sides of the roadway in the vicinity of the site. Sidewalk exists on the west side of the street and a dirt path exists on the east side of the roadway in the vicinity of the site. The City of Scottsdale classifies Thompson Peak Parkway as a suburban minor arterial, and the posted speed limit is 45 miles per hour in both directions.

Bell Road currently extends east-west with two lanes in each direction west of Thompson Peak Parkway and one lane in each direction east of Thompson Peak Parkway. There is a raised center median west of Thompson Peak Parkway. There is an at grade landscaped median east of Thompson Peak Parkway. Curb, gutter, and sidewalk exist on both sides of the roadway west of Thompson Peak Parkway. Curb and gutter exist on both sides of the roadway east of Thompson Peak Parkway. The City of Scottsdale classifies Bell Road as a suburban minor arterial west of Thompson Peak Parkway and a suburban minor collector east of Thompson Peak Parkway. The posted speed limit is 45 miles per hour west of Thompson Peak Parkway and 40 miles per hour east of Thompson Peak Parkway.

Windgate Ranch Road/Carla Way currently extends east-west with one lane in each direction. Windgate Ranch Road is the street west of Thompson Peak Parkway and Carla Way is the street east of Thompson Peak Parkway. Windgate Ranch Road exists as a gated entrance to the Windgate Ranch residential community. Carla Way exists as a gated entrance to the McDowell Sonoran Preserve Gateway Trailhead. Windgate Ranch Road has a raised center median with curb, gutter, and sidewalk on both sides of the street. Windgate Ranch Road is a loop road that transitions to Puerta Del Viento and connects back to Thompson Peak Parkway.

Puerta Del Viento currently extends east-west with one lane in each direction and a raised center median. Puerta Del Viento is bound by Thompson Peak Parkway to the east where it forms a T-intersection. To the west, Puerta Del Viento is a loop road that transitions to Windgate Ranch Road. Puerta Del Viento exists as a gated entrance to the Windgate Ranch residential community. Curb, gutter, and sidewalk exist on both sides of the street. The posted speed limit is 25 miles per hour.

Legacy Boulevard currently extends east-west with two lanes in each direction west of Thompson Peak Parkway. Legacy Boulevard ends just east of Thompson Peak Parkway where it serves as the entrance to the DC Ranch Canyon Village shopping center. Legacy Boulevard extends approximately 1.4 miles west of Thompson Peak Parkway to Princess Drive. Legacy Boulevard crosses a wash approximately 0.4 miles west of Thompson Peak Parkway. The bridge over the wash exists as one lane in each direction, so a crossover exists on Legacy Boulevard to move all traffic to one lane on the north side of the street before transitioning back to two lanes in each direction. Curb, gutter, and sidewalk exist on

both sides of the street. The City of Scottsdale classifies Legacy Boulevard as a suburban minor arterial, and the posted speed limit is 40 miles per hour.

The existing intersections analyzed in this report are Thompson Peak Parkway/Bell Road (signalized), Thompson Peak Parkway/Windgate Ranch Road (Carla Way) (stop-controlled in the east-west direction), Thompson Peak Parkway/Puerta Del Viento (stop-controlled in the east-west direction), and Thompson Peak Parkway/Legacy Boulevard (signalized).

Thompson Peak Parkway/Bell Road has permitted left-turn phasing on all approaches. Thompson Peak Parkway/Legacy Boulevard has protected left-turn phasing on all approaches.

4.2 TRAFFIC VOLUMES

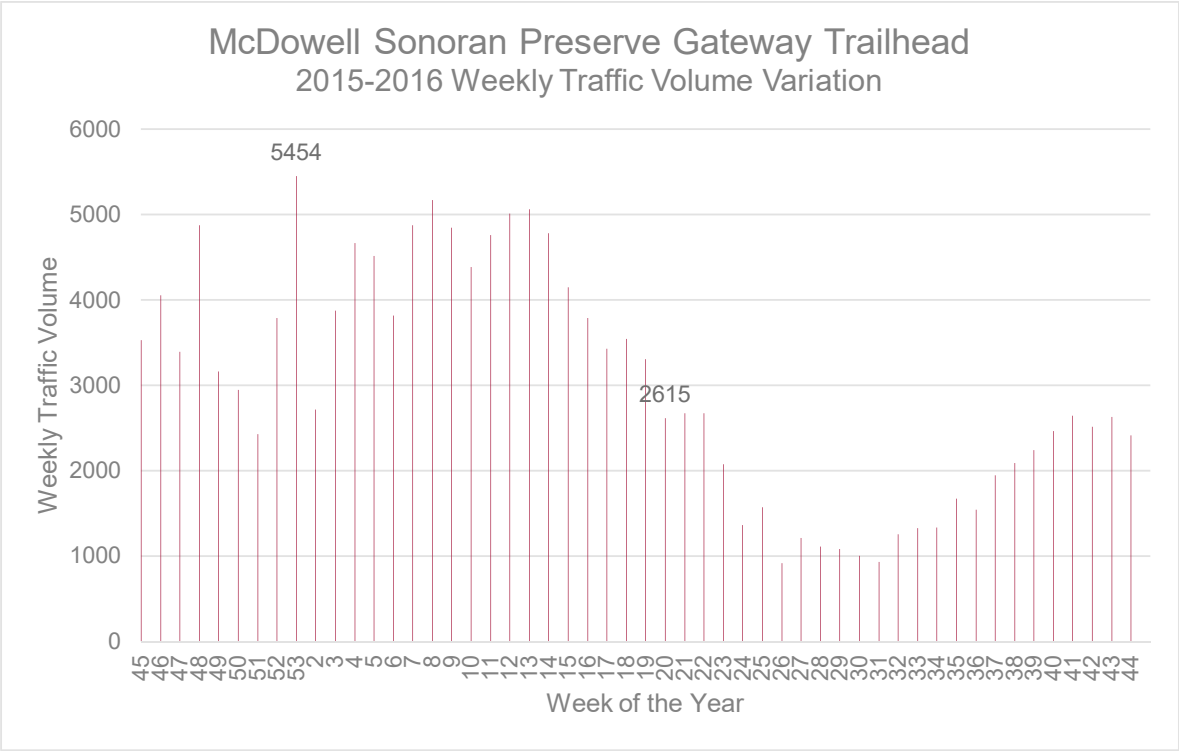
Turning movement counts were collected at the intersections of Thompson Peak Parkway/Bell Road, Thompson Peak Parkway/Windgate Ranch Road (Carla Way), Thompson Peak Parkway/Puerta Del Viento and Thompson Peak Parkway/Legacy Boulevard on Tuesday, May 9, 2017. The counts were performed between 7:00 AM and 9:00 AM and between 4:00 PM and 6:00 PM. The results of these counts are shown in **Figure 3**. A copy of the counts is attached in the **Appendix**.

In addition to peak hour turning movement counts, 24-hour bidirectional volume counts were performed along Thompson Peak Parkway on Tuesday, May 9, 2017. A copy of the counts is attached in the **Appendix**.

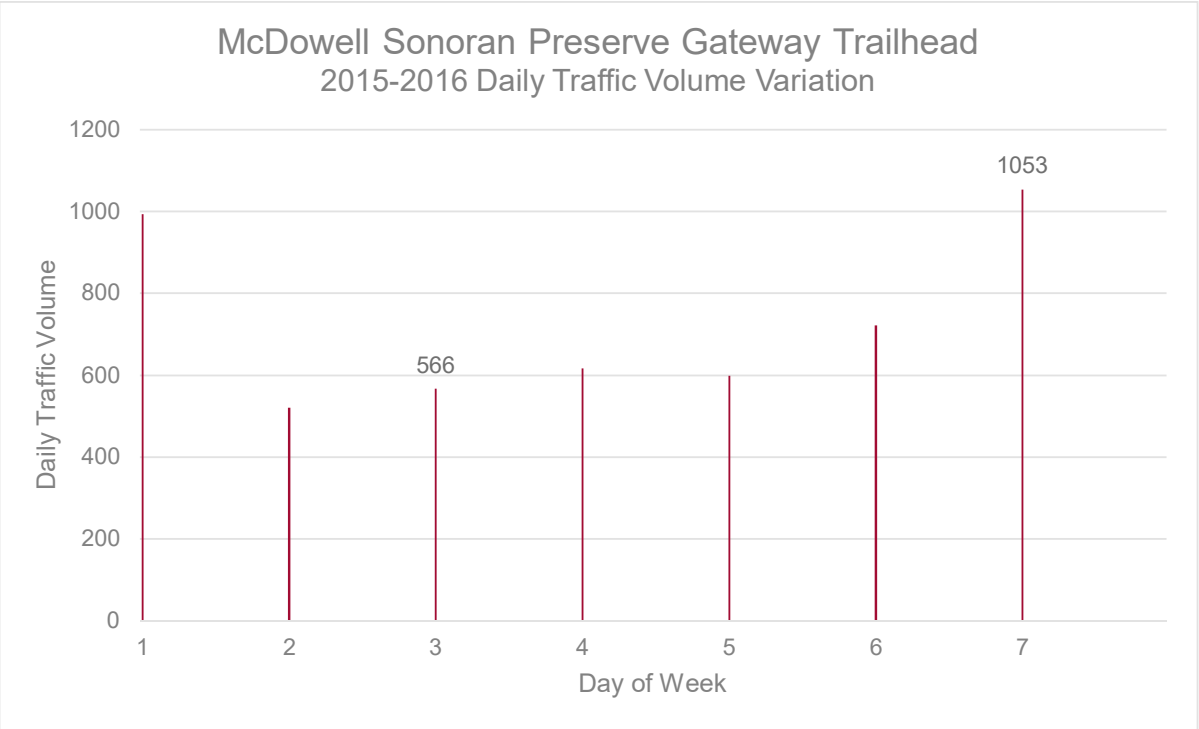
The existing McDowell Sonoran Preserve Gateway Trailhead is a unique land use that generates its peak site traffic during the weekends. In order to provide a conservative analysis, peak weekday turning movement counts were collected, and the existing McDowell Sonoran Preserve Gateway Trailhead site traffic volumes were adjusted to peak weekend traffic levels. To conduct this adjustment, two conversion factors were applied to the existing site traffic counts.

First, the existing trailhead site traffic volumes were adjusted by a peak week adjustment factor. The turning movement counts were collected during the week of May 9th. Based on 2015 to 2016 traffic volume data for the trailhead, the week of May 8th, 2016 to May 14th, 2016 had a traffic volume of 2,615. The peak traffic week occurred from December 27, 2015 to January 2, 2016 with a traffic volume of 5,454 as shown in the following chart. An adjustment factor of 2.09 (5,454 divided by 2,615) was applied to the existing site traffic volumes.

TRAFFIC IMPACT ANAYLSIS



Second, the existing trailhead site traffic volumes were adjusted by a peak day of the week adjustment factor. The turning movement counts were collected on a Tuesday. Based on 2015 to 2016 traffic volume data for the trailhead during the week with the peak hour volume (Week 13: March 20th through March 26th, 2016), the Tuesday traffic volume was 566 as shown in the following chart. The peak daily traffic volume occurred on Saturday with a traffic volume of 1,053. An adjustment factor of 1.86 (1,053 divided by 566) was applied to the existing site traffic volumes.



The peak week of year and peak day of week adjustment factors were applied to the existing McDowell Sonoran Preserve Gateway Trailhead site volumes. The resulting traffic volumes were utilized for the existing level of service calculations. The adjusted existing traffic volume figure is included in the **Appendix** for reference.

The monthly adjustment factor per the City of Scottsdale guidelines is 0.98 for the month of May. Existing traffic volumes were not adjusted per this monthly adjustment factor in order to provide a more conservative analysis.

4.3 LEVEL OF SERVICE

The LOS at the intersections of Thompson Peak Parkway with Bell Road, Windgate Ranch Road (Carla Way), Puerta Del Viento and Legacy Boulevard was evaluated using the traffic counts collected on Tuesday, May 9, 2017. The LOS for the intersections was evaluated using the *2010 Highway Capacity Manual* methodology for unsignalized and signalized intersections. Signalized intersections were evaluated using the existing signal timing data provided by the City of Scottsdale. LOS analysis worksheets and signal timing assumptions are included in the **Appendix**. The existing intersection geometry and control, shown in **Figure 3**, was used to obtain the LOS. The results of this analysis are shown in **Table 1** and **Table 2**.

TRAFFIC IMPACT ANAYLSIS

Table 1. Existing Level of Service: Signalized Intersections

Intersection	NB			SB			EB			WB			Intersection LOS
	L	T	R	L	T	R	L	T	R	L	T	R	
Thompson Peak Parkway and Bell Road													
AM Peak	B	A	A	A	A	A	D	D	D	D	D	B	
PM Peak	B	A	A	A	A	A	D	D	D	D	D	C	
Thompson Peak Parkway and Legacy Boulevard													
AM Peak	E	B	B	D	B	B	E	D	F	E	D	D	
PM Peak	E	B	B	D	B	B	E	D	F	E	D	D	

The signalized intersection of Thompson Peak Parkway and Bell Road operates at an acceptable LOS. The signalized intersection of Thompson Peak Parkway and Legacy Boulevard operates at an acceptable LOS, with the exception of the following movements:

- Northbound left-turn
- Eastbound left-turn
- Eastbound right-turn
- Westbound left-turn

Table 2. Existing Level of Service: Unsignalized Intersections

Intersection	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)												
AM Peak	A	-	-	A	-	-	A	-	B	E	B	
PM Peak	A	-	-	A	-	-	D	-	B	F	B	
Thompson Peak Parkway and Puerta Del Viento												
AM Peak	A	-	-	-	-	-	F	-	B		-	
PM Peak	A	-	-	-	-	-	D	-	B		-	

The unsignalized intersections operate at an acceptable LOS, with the exception of the following movements:

- Thompson Peak Parkway and Windgate Ranch Road (Carla Way) – westbound left-turn
- Thompson Peak Parkway and Puerta Del Viento – eastbound left-turn in the AM peak

4.4 CRASH DATA

Crash data at the intersections of Thompson Peak Parkway/Bell Road, Thompson Peak Parkway/Windgate Ranch Road (Carla Way), Thompson Peak Parkway/Puerta Del Viento, and Thompson Peak Parkway/Legacy Boulevard was obtained from the City of Scottsdale for January 2014 through April 2017.

Based on the crash data obtained from the City of Scottsdale, there were 29 crashes reported at the intersection of Thompson Peak Parkway/Bell Road over the three year period. There were six possible injuries, seven non-incapacitating injuries, and one incapacitating injury. One crash was a single vehicle,

five were front to side angle crashes, nineteen were left turn crashes, two were rear end crashes, five were head on crashes, two were sideswipe crashes, and one crash was categorized as other.

The intersection of Thompson Peak Parkway/Windgate Ranch Road (Carla Way) had three reported crashes over the three year period. There was one non-incapacitating injury. Two crashes were left turn crashes and one crash was a sideswipe crash.

The intersection of Thompson Peak Parkway/Puerta Del Viento had one reported crash over the three year period. The crash was a single vehicle crash with a possible injury.

The intersection of Thompson Peak Parkway/Legacy Boulevard had nine reported crashes over the three year period. There were two possible injuries and two non-incapacitating injuries. Three crashes were single vehicle, two were front to side angle crashes, two were left turn crashes, one was a rear end crash, and one was a sideswipe crash.

Thompson Peak Parkway from Bell Road to Legacy Boulevard had a collision rate of 0.28 collisions per million vehicle miles in 2014, which is below the 2014 average segment collision rate of 1.35 collisions per million vehicle miles in the City of Scottsdale. The crash data indicates that the number of collisions along the Thompson Peak Parkway roadway segment is below the historical average crash rate.

TRAFFIC IMPACT ANALYSIS

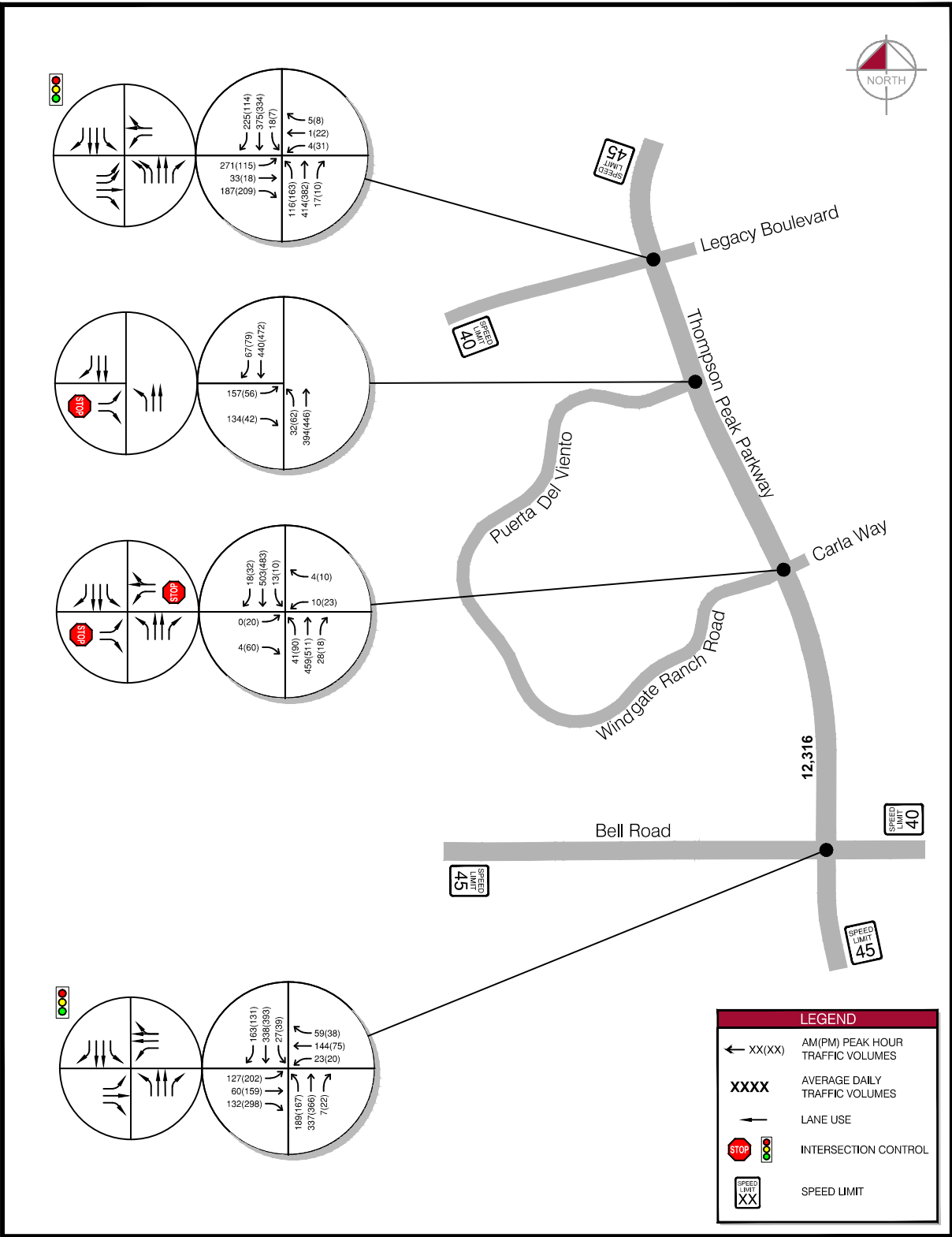


Figure 3
Existing Conditions

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July 2017 Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

5.0 PROJECTED TRAFFIC

5.1 SITE TRAFFIC FORECASTS

5.1.1 TRIP GENERATION

The proposed Desert Discovery Center is a unique land use that is expected to generate its peak traffic volumes outside the weekday AM and PM peak traffic periods. The facility is anticipated to open at 9:00 AM and close at 6:00 PM. Site information was provided by the developer and was used to estimate the number of daily and peak hour trips that can be attributed to the proposed development.

- High day attendance = 2,005 visitors
- 2.5 visitors per vehicle = 802 vehicles per day
- Average stay = 2 to 2.5 hours
- AM peak hour of 10:00 AM to 11:00 AM
 - 17% of daily visitors arrive = 136 trips
 - 7% of daily visitors depart = 56 trips
- PM peak hour of 2:00 PM to 3:00 PM
 - 13% of daily visitors arrive = 104 trips
 - 17% of daily visitors depart = 136 trips
- 77 employees = 154 daily trips
- 20 ASU researchers = 40 daily trips

It was assumed that the employees and ASU researches would arrive before the 10:00 AM peak hour and depart after the 3:00 PM peak hour. The trip generation characteristics of the site are summarized in Table 3.

Table 3. Project Trip Generation

Site Traffic Type	Daily Total	AM Peak			PM Peak		
		In	Out	Total	In	Out	Total
Visitor Vehicles	1,123	136	56	192	104	136	240
Employee Vehicles	154	0	0	0	0	0	0
ASU Researcher Vehicles	40	0	0	0	0	0	0
Total Trips	1,317	136	56	192	104	136	240

The proposed development is expected to generate 1,317 daily trips, with 192 trips occurring in the AM peak hour and 240 trips occurring in the PM peak hour. The anticipated peak hour traffic for the Desert Discovery Center does not coincide with the peak periods for the McDowell Sonoran Preserve Gateway Trailhead. In order to provide a conservative analysis, it was assumed that the peak periods of the Desert Discovery traffic coincide with the AM and PM peak hours of the street.

TRAFFIC IMPACT ANALYSIS

5.1.2 TRIP DISTRIBUTION

Distribution percentages for the site generated traffic were developed based on the surrounding roadway system, existing traffic volumes, population density, and land uses in the vicinity of the project site. **Figure 4** illustrates the trip distribution for the study area.

5.1.3 TRAFFIC ASSIGNMENT

Trips generated by the proposed development were assigned to the roadway network on the basis of the trip distribution and the likely travel patterns to and from the site. **Figure 5** shows the results of the traffic assignment.

5.2 FUTURE TRAFFIC FORECASTING

The background traffic volumes for the buildout year 2020 and horizon year 2025 were calculated based on 2017 traffic counts and the calculated annual traffic growth rates.

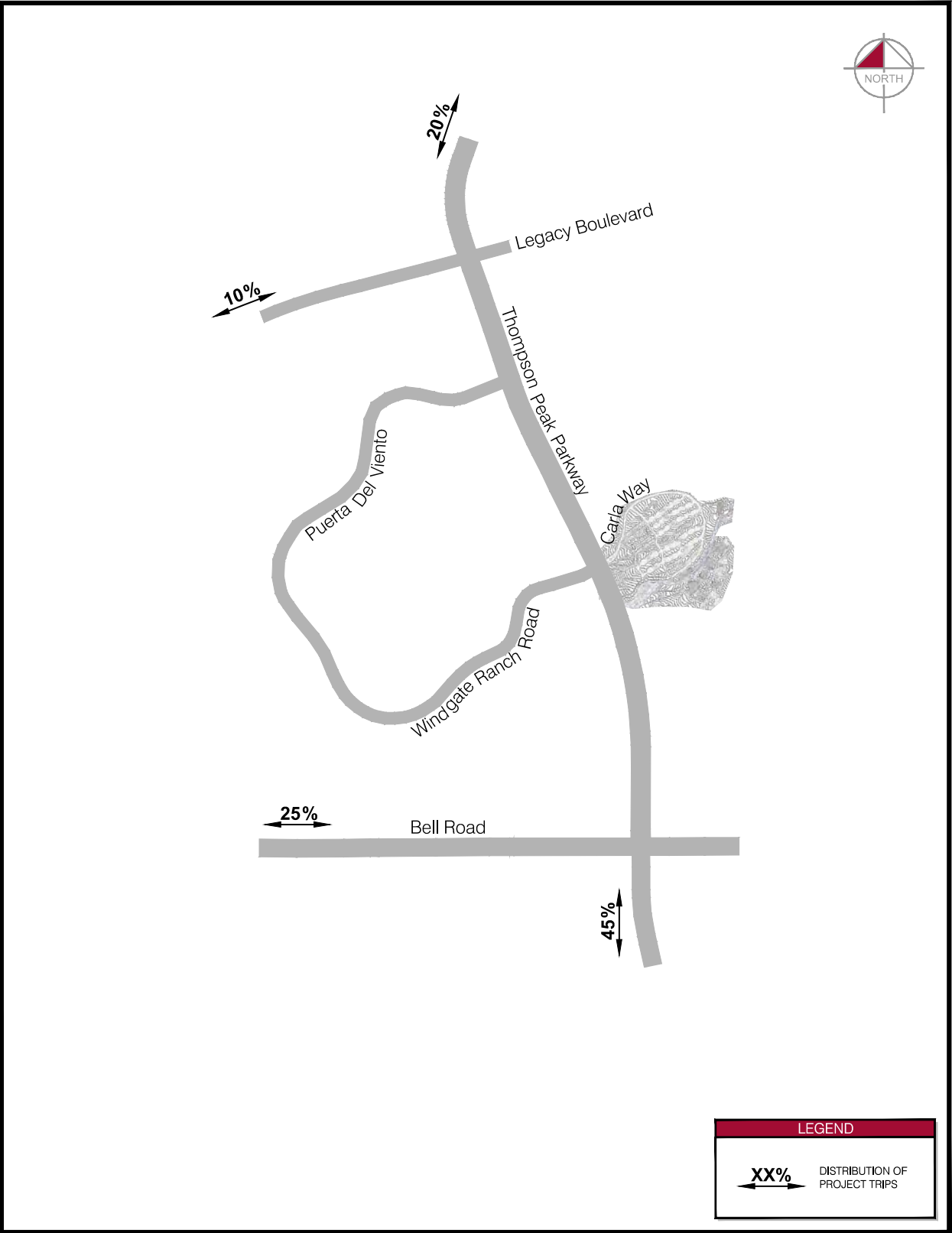
An annual growth rate of 1.0 percent per year was assumed and confirmed with the City of Scottsdale. The 1.0 percent growth rate was applied to the existing turning movements.

A growth rate of 5.7% was applied to the existing McDowell Sonoran Preserve Gateway Trailhead site traffic volumes based on Gateway Trailhead historical growth from 2011 to 2016.

The two growth rates were applied to the adjusted existing traffic volumes to obtain background traffic volumes for the buildout year 2020 and horizon year 2025. The resulting 2020 and 2025 background traffic volumes are shown in **Figure 6** and **Figure 7**.

5.3 TOTAL TRAFFIC

The results of the traffic assignment were added to the year 2020 and 2025 background traffic volumes shown in **Figure 6** and **Figure 7** to produce total traffic volumes for the study area. These total traffic volumes are shown in **Figure 8** and **Figure 9**.



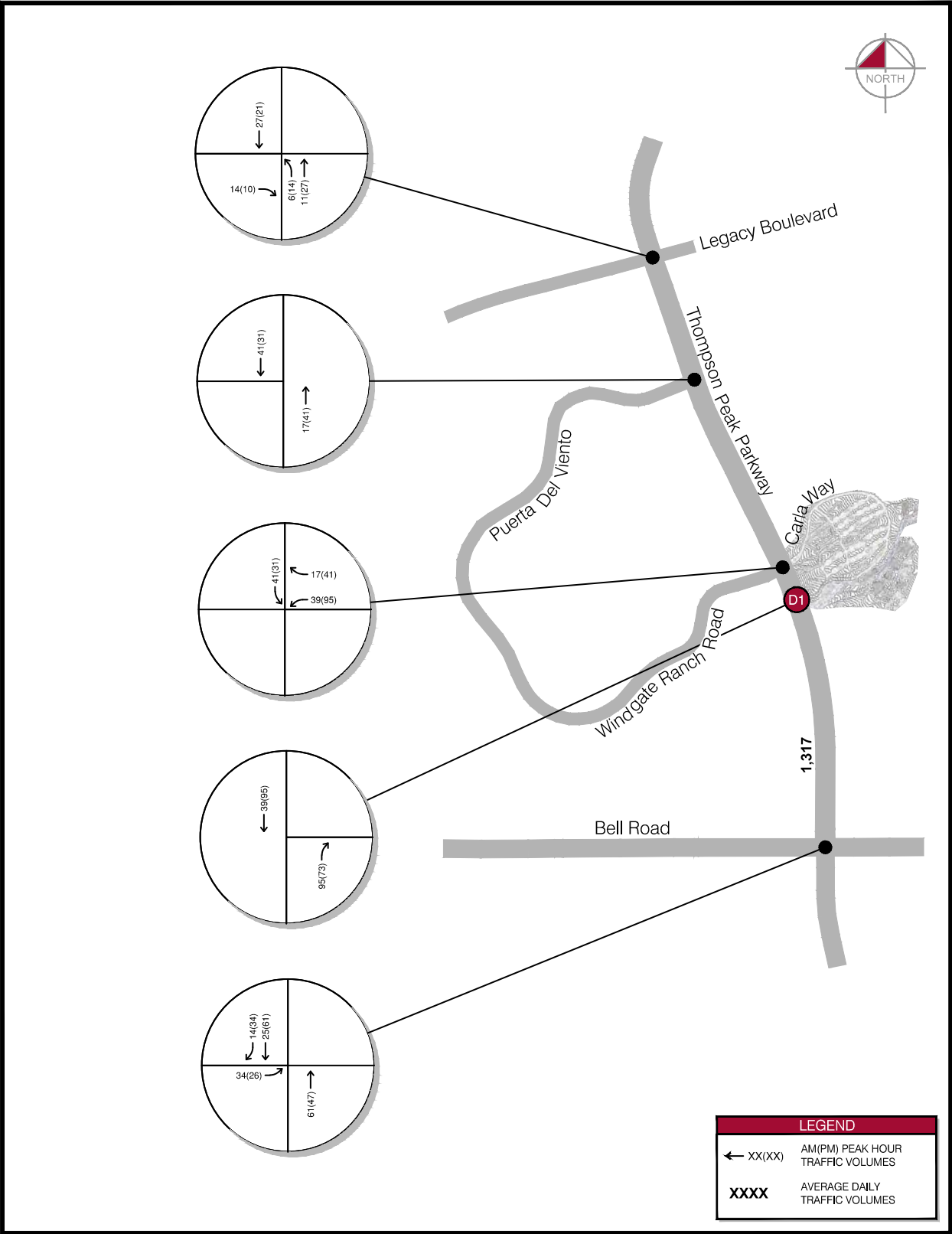
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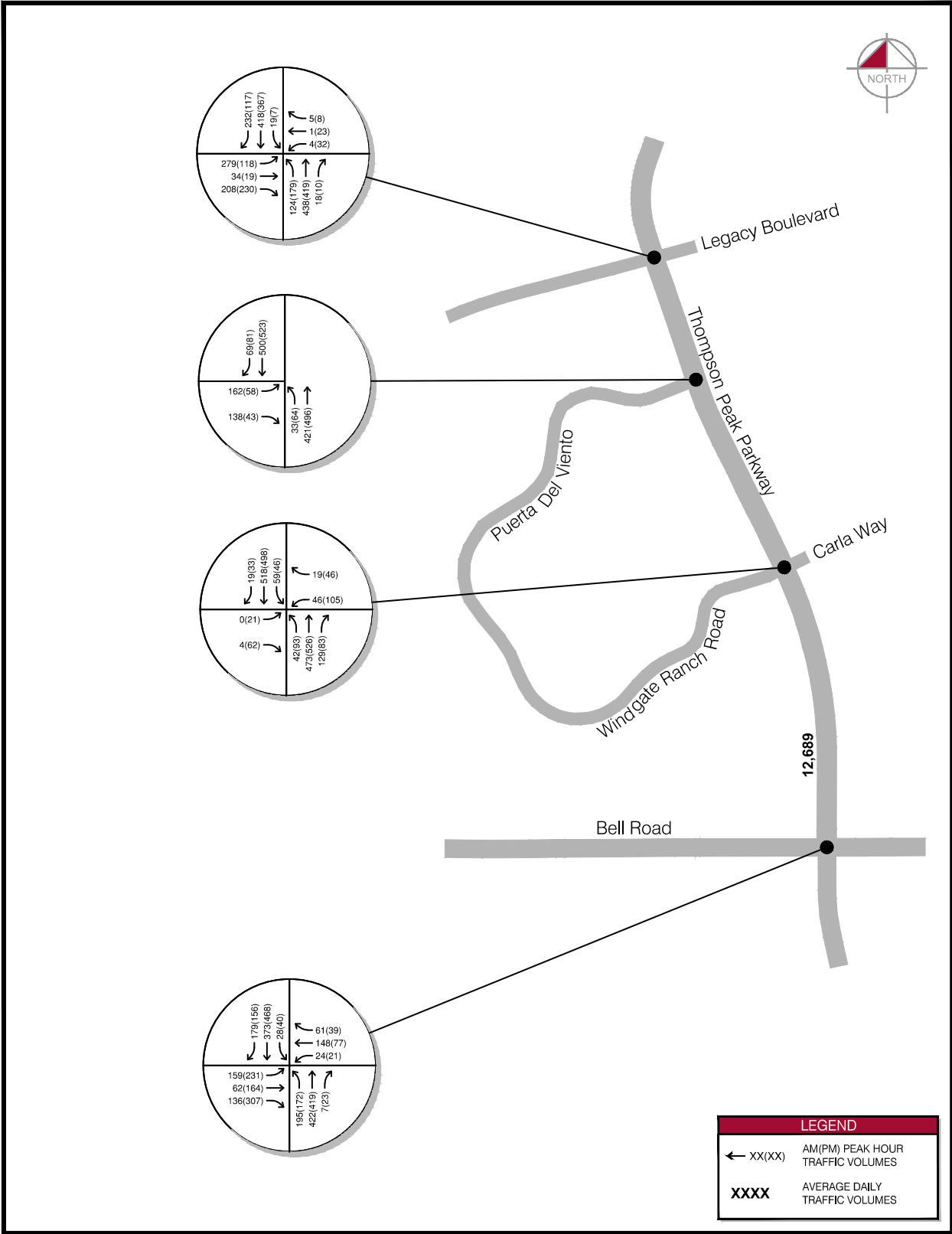
Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

Figure 4
Trip Distribution

TRAFFIC IMPACT ANALYSIS

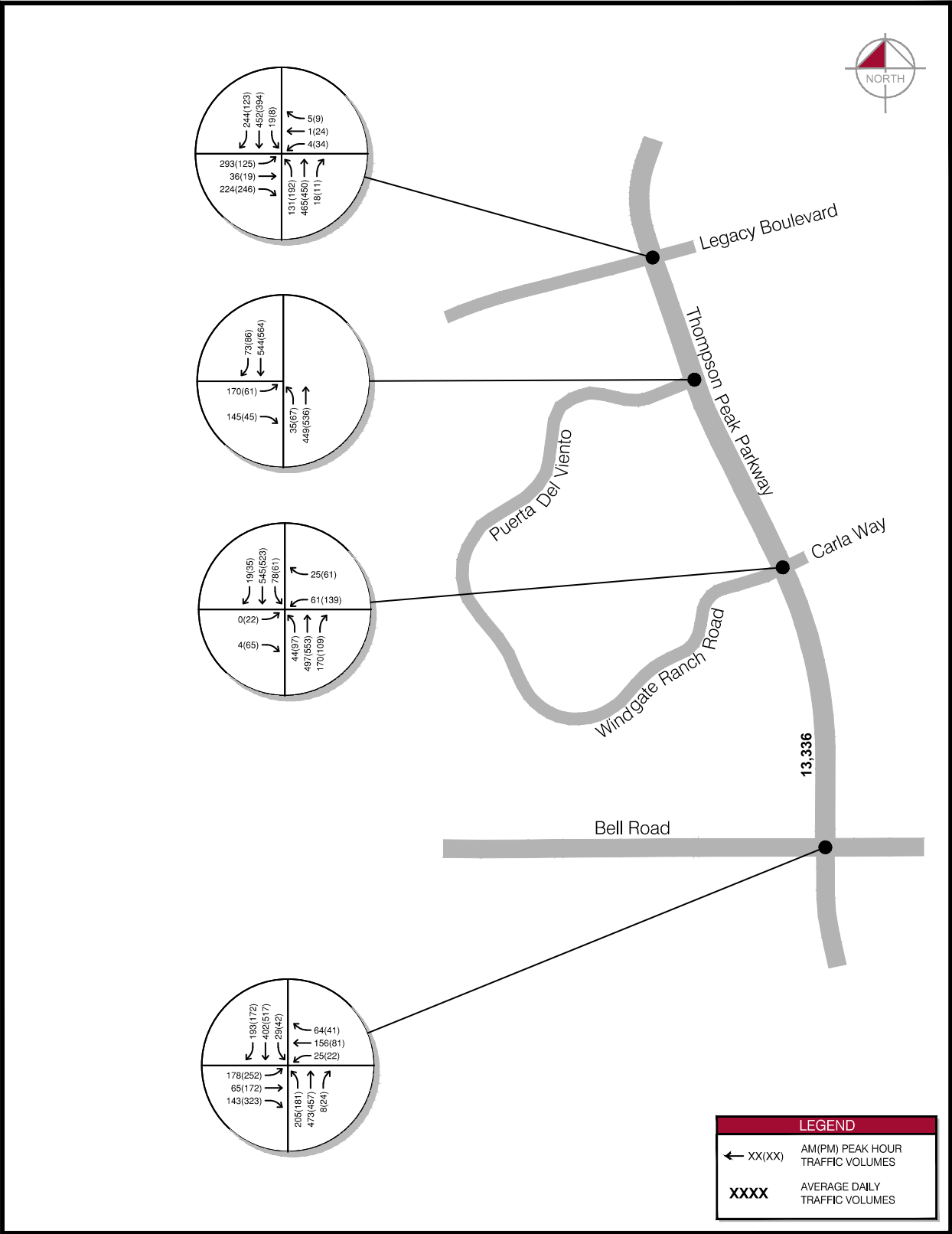


Kimley»Horn
July 2017
Figure 5
Site Traffic Assignment
Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis



Kimley»Horn
July 2017
Figure 6
2020 Background Traffic
Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

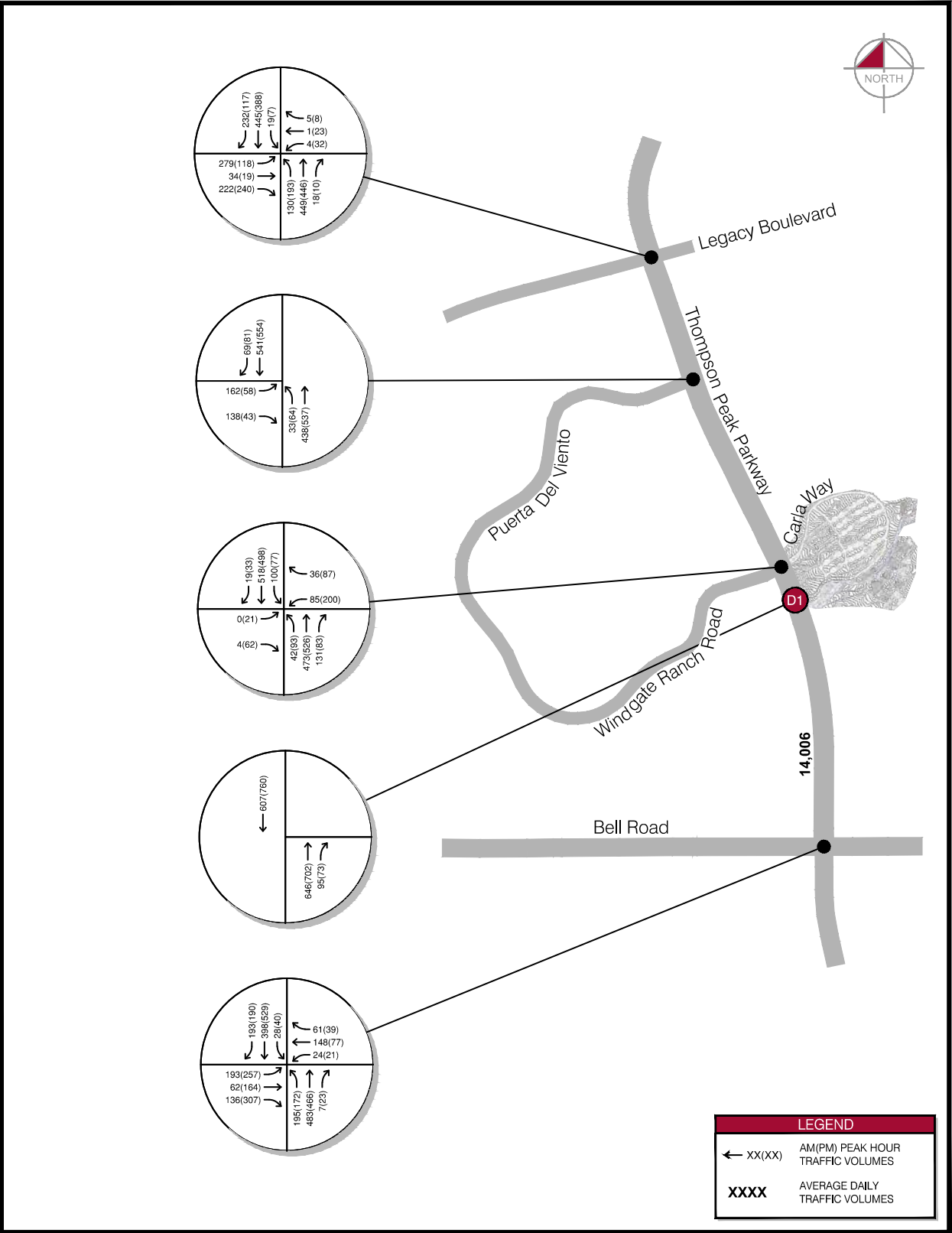
TRAFFIC IMPACT ANALYSIS



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July 2017

Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

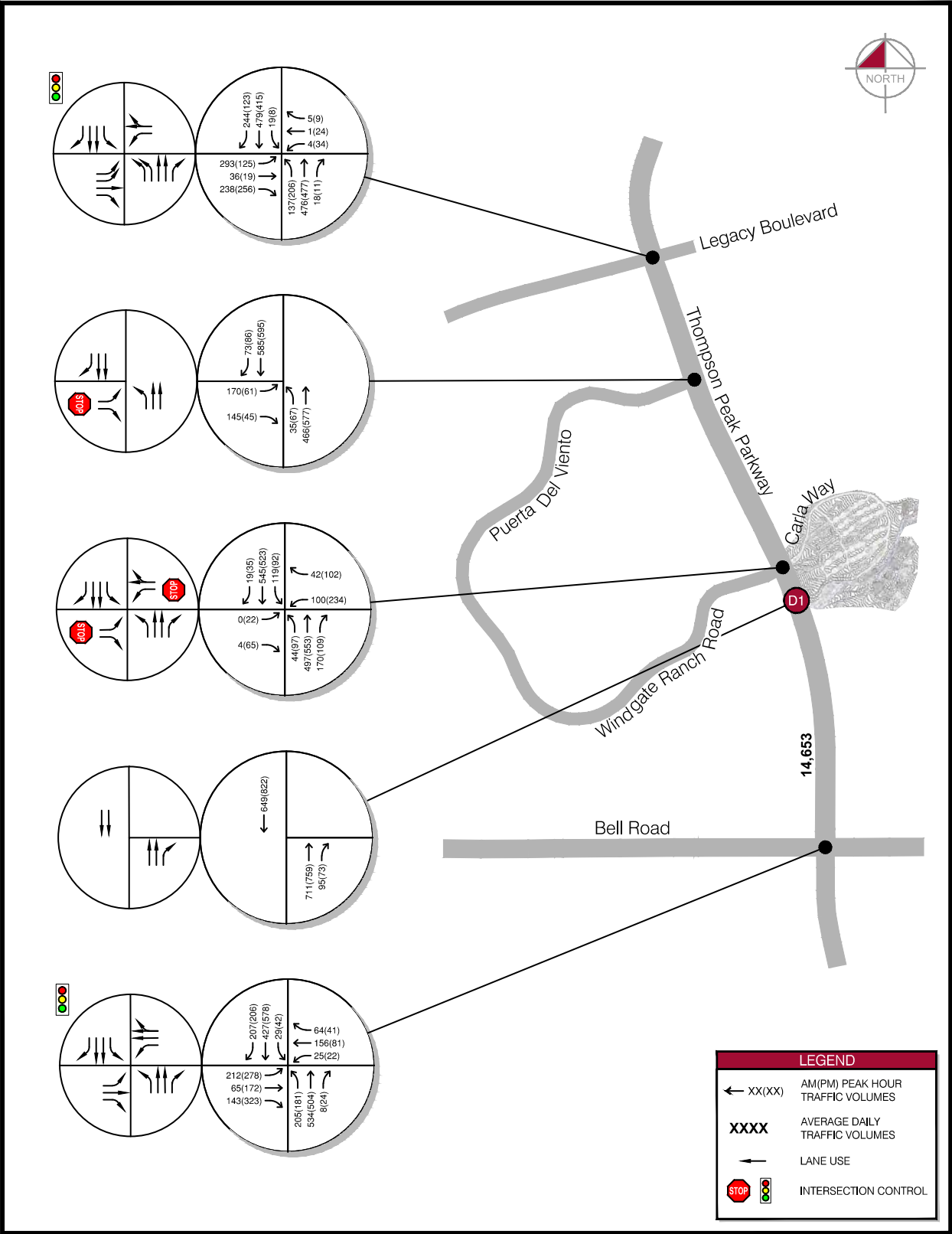


Kimley»Horn

July 2017

Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS



Kimley»Horn Figure 9
2025 Total Traffic and Recommended Geometry
July 2017 Thompson Peak Parkway and Windgate Ranch Road/Carla Way | Traffic Impact Analysis

6.0 TRAFFIC AND IMPROVEMENT ANALYSIS

6.1 LEVEL OF SERVICE ANALYSIS

The LOS for the study area intersections for 2020 and 2025 was evaluated using the *2010 Highway Capacity Manual* methodology for unsignalized and signalized intersections using *Synchro 9* analysis software. Signalized intersections were evaluated using the existing signal timing data provided by the City of Scottsdale. LOS analysis worksheets and signal timing assumptions are included in the **Appendix**.

6.1.1 2020 BACKGROUND TRAFFIC LEVEL OF SERVICE ANALYSIS

The unsignalized intersections in the study area were evaluated on the basis of the 2020 background traffic shown in **Figure 6**, and the existing geometry shown in **Figure 3**. The results of the analysis for the unsignalized intersection is shown in **Table 4**.

Table 4. 2020 Background Level of Service: Unsignalized Intersections

Intersection	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)												
AM Peak	A	-	-	A	-	-	A	-	B	F	B	
PM Peak	A	-	-	A	-	-	E	-	B	F	B	
Thompson Peak Parkway and Puerta Del Viento												
AM Peak	A	-	-	-	-	-	F	-	B		-	
PM Peak	A	-	-	-	-	-	D	-	B		-	

The unsignalized intersections are expected to operate at a satisfactory LOS in 2020, with the exception of the following movements:

- Thompson Peak Parkway and Windgate Ranch Road (Carla Way) – eastbound left-turn in the PM peak
- Thompson Peak Parkway and Windgate Ranch Road (Carla Way) – westbound left-turn
- Thompson Peak Parkway and Puerta Del Viento – eastbound left-turn in the AM peak

The signalized intersections in the study area were evaluated on the basis of the 2020 background traffic shown in **Figure 6**, and the existing geometry shown in **Figure 3**. The results of this analysis are shown in **Table 5**.

Table 5. 2020 Background Level of Service: Signalized Intersection

Intersection	NB			SB			EB			WB			Intersection LOS
	L	T	R	L	T	R	L	T	R	L	T	R	
Thompson Peak Parkway and Bell Road													
AM Peak	B	A	A	B	A	A	D	D	D	D	D	D	B
PM Peak	B	A	A	B	A	A	D	D	D	D	D	D	C

TRAFFIC IMPACT ANALYSIS

Intersection	NB			SB			EB			WB			Intersection LOS
	L	T	R	L	T	R	L	T	R	L	T	R	
Thompson Peak Parkway and Legacy Boulevard													
AM Peak	E	B	B	D	B	B	E	D	D	E	D	C	
PM Peak	E	B	B	D	B	B	E	D	D	E	D	C	

The signalized intersection of Thompson Peak Parkway and Bell Road is expected to operate at an acceptable LOS in 2020. The signalized intersection of Thompson Peak Parkway and Legacy Boulevard is expected to operate at an acceptable LOS in 2020, with the exception of the following movements:

- Northbound left-turn
- Eastbound left-turn
- Westbound left-turn

6.1.2 2025 BACKGROUND TRAFFIC LEVEL OF SERVICE ANALYSIS

The unsignalized intersections in the study area were evaluated on the basis of the 2025 background traffic shown in **Figure 7**, and the existing geometry shown in **Figure 3**. The results of the analysis for the unsignalized intersection is shown in **Table 6**.

Table 6. 2025 Background Level of Service: Unsignalized Intersections

Intersection	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)												
AM Peak	A	-	-	A	-	-	A	-	B	F		B
PM Peak	A	-	-	A	-	-	E	-	B	F		B
Thompson Peak Parkway and Puerta Del Viento												
AM Peak	A	-	-	-	-	-	F	-	B		-	
PM Peak	A	-	-	-	-	-	D	-	B		-	

The unsignalized intersections are expected to operate at a satisfactory LOS in 2025, with the exception of the following movements:

- Thompson Peak Parkway and Windgate Ranch Road (Carla Way) – eastbound left-turn in the PM peak
- Thompson Peak Parkway and Windgate Ranch Road (Carla Way) – westbound left-turn
- Thompson Peak Parkway and Puerta Del Viento – eastbound left-turn in the AM peak

The signalized intersections in the study area were evaluated on the basis of the 2025 background traffic shown in **Figure 7**, and the existing geometry shown in **Figure 3**. The results of this analysis are shown in **Table 7**.

Table 7. 2025 Background Level of Service: Signalized Intersection

Intersection	NB			SB			EB			WB			Intersection LOS
	L	T	R	L	T	R	L	T	R	L	T	R	
Thompson Peak Parkway and Bell Road													
AM Peak	C	A	A	B	A	B	D	C	D	D	D	C	
PM Peak	B	A	A	B	B	A	D	D	D	D	C	C	
Thompson Peak Parkway and Legacy Boulevard													
AM Peak	E	B	B	D	B	B	F	D	D	E	D	C	
PM Peak	E	B	B	D	B	B	E	D	D	E	D	C	

The signalized intersection of Thompson Peak Parkway and Bell Road is expected to operate at an acceptable LOS in 2025. The signalized intersection of Thompson Peak Parkway and Legacy Boulevard is expected to operate at an acceptable LOS in 2025, with the exception of the following movements:

- Northbound left-turn
- Eastbound left-turn
- Westbound left-turn

6.1.3 2020 TOTAL TRAFFIC LEVEL OF SERVICE ANALYSIS

The unsignalized intersections in the study area were evaluated on the basis of the 2020 total traffic shown in **Figure 8**, and the recommended geometry shown in **Figure 9**. The results of the analysis for the unsignalized intersections are shown in **Table 8**.

Table 8. 2020 Total Traffic Level of Service: Unsignalized Intersections

Intersection	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)												
AM Peak	A	-	-	A	-	-	A	-	B	F		B
PM Peak	A	-	-	A	-	-	E	-	B	F		B
Thompson Peak Parkway and Puerta Del Viento												
AM Peak	A	-	-	-	-	-	F	-	B		-	
PM Peak	A	-	-	-	-	-	E	-	B		-	

The unsignalized intersection of Thompson Peak Parkway and Puerta Del Viento is expected to operate at a satisfactory LOS in 2020, with the exception of the eastbound left-turn movement. Due to the poor LOS at the existing unsignalized intersection of Thompson Peak Parkway and Windgate Ranch Road (Carla Way) in 2020 total traffic conditions, the intersection was also analyzed as a signalized intersection. The signal warrant analysis is discussed in Section 6.2 of this report.

The signalized intersections in the study area were evaluated on the basis of the 2020 total traffic shown in **Figure 8**, and the recommended geometry shown in **Figure 9**. The results of this analysis are shown in **Table 9**.

TRAFFIC IMPACT ANALYSIS

Table 9. 2020 Total Traffic Level of Service: Signalized Intersections

Intersection	NB			SB			EB			WB			Intersection LOS
	L	T	R	L	T	R	L	T	R	L	T	R	
Thompson Peak Parkway and Bell Road													
AM Peak	C	B	A	B	B	B	D	C	D	D	C		C
PM Peak	B	B	A	B	B	B	D	D	D	D	C		C
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)													
AM Peak	A	A	A	A	A	A	-	-	-	D	-	-	A
PM Peak	A	A	A	A	A	A	D	-	-	D	-	-	B
Thompson Peak Parkway and Legacy Boulevard													
AM Peak	E	B	B	D	B	B	E	D	D	E	D		C
PM Peak	E	B	B	D	B	B	E	D	D	E	D		C

The signalized intersections of Thompson Peak Parkway/Bell Road and Thompson Peak Parkway/Windgate Ranch Road (Carla Way) are expected to operate at an acceptable LOS in 2020.

The signalized intersection of Thompson Peak Parkway/Legacy Boulevard is expected to operate at an acceptable LOS in 2020, with the exception of the following movements:

- Northbound left-turn
- Eastbound left-turn
- Westbound left-turn

6.1.4 2025 TOTAL TRAFFIC LEVEL OF SERVICE ANALYSIS

The unsignalized intersections in the study area were evaluated on the basis of the 2025 total traffic and recommended geometry shown in **Figure 9**. The results of the analysis for the unsignalized intersections are shown in **Table 10**.

Table 10. 2025 Total Traffic Level of Service: Unsignalized Intersections

Intersection	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)												
AM Peak	A	-	-	A	-	-	A	-	B	F		B
PM Peak	A	-	-	A	-	-	F	-	B	F		B
Thompson Peak Parkway and Puerta Del Viento												
AM Peak	A	-	-	-	-	-	F	-	B		-	
PM Peak	A	-	-	-	-	-	E	-	B		-	

The unsignalized intersection of Thompson Peak Parkway and Puerta Del Viento is expected to operate at a satisfactory LOS in 2025, with the exception of the eastbound left-turn movement. Due to the poor LOS at the existing unsignalized intersection of Thompson Peak Parkway and Windgate Ranch Road (Carla Way) in 2025 total traffic conditions, the intersection was also analyzed as a signalized intersection. The signal warrant analysis is discussed in Section 6.2 of this report.

The signalized intersections in the study area were evaluated on the basis of the 2025 total traffic and recommended geometry shown in **Figure 9**. The results of this analysis are shown in **Table 11**.

Table 11. 2025 Total Traffic Level of Service: Signalized Intersections

Intersection	NB			SB			EB			WB			Intersection LOS
	L	T	R	L	T	R	L	T	R	L	T	R	
Thompson Peak Parkway and Bell Road													
AM Peak	C	B	A	B	B	B	D	C	C	C	C		C
PM Peak	C	B	A	B	B	B	D	C	D	D	C		C
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)													
AM Peak	A	A	A	A	A	A	-	-	-	D	-	-	A
PM Peak	A	A	A	A	A	A	D	-	-	D	-	-	B
Thompson Peak Parkway and Legacy Boulevard													
AM Peak	E	B	B	D	B	B	F	D	E	E	D		C
PM Peak	E	B	B	D	B	B	E	D	D	E	D		C

The signalized intersections of Thompson Peak Parkway/Bell Road and Thompson Peak Parkway/Windgate Ranch Road (Carla Way) are expected to operate at an acceptable LOS in 2025.

The signalized intersection of Thompson Peak Parkway/Legacy Boulevard is expected to operate at an acceptable LOS in 2025, with the exception of the following movements:

- Northbound left-turn
- Eastbound left-turn
- Eastbound right-turn
- Westbound left-turn

6.2 SIGNAL WARRANT ANALYSIS

Total volumes shown in **Figure 9** for 2025 were used in the analysis to determine whether the intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way warrants the installation of a traffic signal. The signal warrant analysis is prepared based on the *2009 Manual on Uniform Traffic Control Devices (MUTCD)*. Warrant 3, the Peak Hour volume warrant, was evaluated for the intersection. A copy of *Figure 4C-3 Warrant 3 – Peak Hour* is provided in the **Appendix** for the intersection in addition to the analysis worksheet. Warrants 1 and 2, the eight-hour and four-hour warrants, were also evaluated for the intersection. It is determined that Warrant 1, Warrant 2, and Warrant 3 are met using 2025 total volumes shown in **Figure 9** for the intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way. As a result, it is anticipated that a traffic signal will be needed at this intersection at site build out or soon thereafter.

6.3 LEFT-TURN STORAGE ANALYSIS

The signalized and unsignalized intersections in the study area were analyzed to determine the left-turn storage needed to accommodate the expected traffic volumes in the year 2025.

TRAFFIC IMPACT ANALYSIS

The left-turn storage lengths were determined for the left-turn movements at the study area intersections. The existing and calculated storage lengths are summarized in **Table 12**. The calculations associated with these conclusions are included in the **Appendix**. The recommended storage lengths are based on total traffic volumes shown **Figure 9**.

Table 12. Left Turn Storage

Intersection and Approach	Existing	Recommended
Thompson Peak Parkway and Bell Road		
- Northbound Approach	275 feet	275 feet*
- Southbound Approach	260 feet	75 feet*
- Eastbound Approach	360 feet	350 feet*
- Westbound Approach	140 feet	75 feet*
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)		
- Northbound Approach	290 feet	150 feet*
- Southbound Approach	250 feet	175 feet*
- Eastbound Approach	160 feet	75 feet*
- Westbound Approach	50 feet	300 feet
Thompson Peak Parkway and Puerta Del Viento		
- Northbound Approach	200 feet	75 feet*
- Eastbound Approach	115 feet	150 feet
Thompson Peak Parkway and Legacy Boulevard		
- Northbound Approach	250 feet (Duals)	150 feet* (Duals)
- Southbound Approach	190 feet	75 feet*
- Eastbound Approach	200 feet (Duals)	175 feet* (Duals)
- Westbound Approach	75 feet	75 feet*

*Calculated value less than existing.

Left-turn storage can be achieved with the following mitigations:

- Locations anticipated to include site traffic:
 - Thompson Peak Parkway/Windgate Ranch Road (Carla Way) – Westbound Left
 - Left turn storage can be achieved by striping the westbound approach for the through lane to transition to the left-turn lane. It is anticipated that there will not be westbound vehicles traveling straight through the intersection. The west leg of the intersection is gated for an existing residential development. The design of the Carla Way westbound approach should accommodate vehicle turn arounds and be coordinated with the traffic signal improvements. The gated access on Carla Way may need to be modified.

- Locations not impacted by site traffic (no improvements recommended):
 - Thompson Peak Parkway/Puerta Del Viento – Eastbound Left
 - The left-turn storage deficiency exists under existing conditions. Site traffic is not expected to impact the recommended storage.

6.4 RIGHT-TURN LANES

Right-turn lanes are often recommended on roadways where right-turning vehicles create delays or safety problems for other traffic movements. The need for a right-turn lane depends on the speed of traffic on the road, the volume of traffic turning right, and the through traffic volume in the same lane as the right-turning traffic.

6.4.1 INTERSECTIONS

The signalized and unsignalized intersections in the study area were analyzed to determine the right-turn storage needed to accommodate the expected traffic volumes in the year 2025.

The right-turn storage lengths were determined for the right-turn movements at the study area intersections. The existing and calculated storage lengths are summarized in **Table 13**. The calculations associated with these conclusions are included in the **Appendix**. The recommended storage lengths are based on total traffic volumes shown **Figure 9**.

TRAFFIC IMPACT ANAYLSIS

Table 13. Right Turn Storage

Intersection and Approach	Existing	Recommended
Thompson Peak Parkway and Bell Road		
- Northbound Approach	255 feet	75 feet*
- Southbound Approach	450 feet	275 feet*
- Eastbound Approach	155 feet	375 feet
- Westbound Approach	Shared Thru-Right	125 feet
Thompson Peak Parkway and Windgate Ranch Road (Carla Way)		
- Northbound Approach	90 feet	225 feet
- Southbound Approach	90 feet	75 feet*
- Eastbound Approach	160 feet	125 feet*
- Westbound Approach	Shared Thru-Right	150 feet
Thompson Peak Parkway and Puerta Del Viento		
- Southbound Approach	90 feet	75 feet*
- Eastbound Approach	115 feet	125 feet
Thompson Peak Parkway and Legacy Boulevard		
- Northbound Approach	220 feet	75 feet*
- Southbound Approach	150 feet	300 feet
- Eastbound Approach	300 feet	325 feet
- Westbound Approach	Shared Thru-Right	75 feet

*Calculated value less than existing.

Right-turn storage can be achieved with the following mitigations:

- Locations anticipated to include site traffic:
 - Thompson Peak Parkway/Windgate Ranch Road (Carla Way) – Westbound Right
 - It is recommended that a westbound right-turn lane be constructed with 150 feet of storage. The gated access may need to be modified to account for the storage, and to accommodate vehicle turn arounds when a traffic signal is implemented. The design of the westbound approach should be coordinated with the traffic signal improvements.
 - Thompson Peak Parkway/Legacy Boulevard – Eastbound Right
 - The existing approach has two through lanes and one of the through lanes transitions to the right-turn lane. It is expected that the through lane can accommodate the calculated storage during the peak period.
- Locations not impacted by site traffic (no improvements recommended):
 - Thompson Peak Parkway/Bell Road – Eastbound Right
 - Thompson Peak Parkway/Bell Road – Westbound Right
 - Thompson Peak Parkway/Windgate Ranch Road (Carla Way) – Northbound Right

- Site traffic is anticipated to utilize the northbound approach at the site driveway D1 when entering the site. A portion of the existing McDowell Sonoran Preserve Gateway Trailhead traffic is expected to shift to utilize the proposed Driveway D1 as discussed in Section 6.4.2.
 - Thompson Peak Parkway/Puerta Del Viento – Eastbound Right
 - Thompson Peak Parkway/Legacy Boulevard – Southbound Right
 - Thompson Peak Parkway/Legacy Boulevard – Westbound Right

6.4.2 DRIVEWAY

The City of Scottsdale recommends a right-turn deceleration lane at site driveways when the following criteria is met:

- At least 5,000 vehicles per day are expected to use the street;
- The 85th percentile traffic speed on the street is at least 35 miles per hour;
- At least 30 vehicles will make right turns into the driveway during a one hour period.

Review of the 2025 total traffic volumes reveals that the northbound approach to the site driveway D1 will require a right-turn deceleration lane. It is recommended that a northbound right-turn deceleration lane be constructed with 150 feet of storage and a minimum 90-foot taper. The City of Scottsdale's standard vehicle storage length for a right-turn lane is 150 feet, with a 100-foot minimum length. The 150 feet of storage is recommended to account for a portion of the McDowell Sonoran Preserve Gateway Trailhead traffic that is expected to utilize the Driveway D1. The taper should satisfy City of Scottsdale requirements including the Design Standards and Policies Manual section 5-3.119, E – 1 and Standard Detail Number 2225.

6.5 DRIVEWAY CRITERIA

Driveway D1 at Thompson Peak Parkway is proposed as a right in, entrance only driveway located approximately 400 feet south of the existing Windgate Ranch Road (Carla Way) intersection with Thompson Peak Parkway. The driveway design should comply with City of Scottsdale Design Standards and Policies Manual sections 5-3.201 and 5-3.202.

6.6 SITE CIRCULATION

In order to provide smooth ingress and egress to the proposed development, the westbound approach to Thompson Peak Parkway/Windgate Ranch Road (Carla Way) should be constructed with a throat length that accommodates the 150-foot westbound right-turn lane. Provision of a sufficient throat length at Carla Way will prevent entering vehicles from obstructing traffic flow on the adjacent public street system and provide adequate on-site storage for exiting vehicles. Based on queuing analysis, the recommended on-site storage lengths for the westbound approach to the Thompson Peak Parkway/Windgate Ranch Road (Carla Way) is included in sections 6.3 and 6.4.1.

As discussed in section 6.5, Driveway D1 is a right-in, entrance only driveway. Provision of a sufficient throat length at Driveway D1 will prevent entering vehicles from obstructing traffic flow on Thompson

TRAFFIC IMPACT ANAYLSIS

Peak Parkway. The internal site circulation should be designed to prevent vehicles from exiting through Driveway D1. All other internal site circulation is expected to accommodate two-way traffic.

6.7 SIGHT TRIANGLES

It is recommended that sight triangles be provided at Thompson Peak Parkway/Windgate Ranch Road (Carla Way) to give drivers exiting the site a clear view of oncoming traffic. The landscaping within sight triangles must not obstruct drivers' views of the adjacent travel lanes. Internal site intersections should also provide site triangles.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The proposed development is expected to generate 1,317 daily trips, with 192 trips occurring in the AM peak hour and 240 trips occurring in the PM peak hour. To ensure that the estimate of the traffic impacts is the maximum that can be expected, it is assumed that the site will be utilized at the projected peak visitation upon buildout in 2020.

The site driveways are expected to operate at an acceptable LOS in 2025.

Total traffic volumes at site build out show that the intersection of Thompson Peak Parkway and Windgate Ranch Road/Carla Way warrants the installation of a traffic signal. It is recommended that a traffic signal be installed at this intersection when traffic counts reach the volumes required for warrants.

The signalized intersections are expected to operate at an acceptable LOS in 2025 with the exception of minor movements. It is anticipated that during non-peak periods the LOS of the minor movements will improve.

It is recommended that a westbound right-turn lane be provided at the Thompson Peak Parkway and Windgate Ranch Road/Carla Way intersection with 150 feet of storage. The exiting lane approaching Thompson Peak Parkway can be striped for the through lane to transition to the left-turn lane to achieve left-turn storage. The design of the westbound approach should accommodate vehicle turn arounds and be coordinated with the traffic signal improvements.

In order to provide smooth ingress and egress to the proposed development, the westbound approach to Thompson Peak Parkway should be constructed with a throat length that accommodates the 150 feet of storage for the westbound right-turn lane.

It is recommended that a right-turn deceleration lane with 150 feet of storage and a 90-foot taper be installed for the northbound approach to the site driveway D1 along Thompson Peak Parkway.

It is recommended that sight triangles be provided at Thompson Peak Parkway/Windgate Ranch Road (Carla Way) to give drivers exiting the site a clear view of oncoming traffic. The landscaping within sight distance triangles must not obstruct drivers' views of the adjacent travel lanes.

APPENDIX

- Traffic Counts
- Existing Traffic Volume Figure with Adjustment Factors Applied to Existing Site Traffic
- Signal Timing Information
- Existing AM Traffic Capacity Analysis
- Existing PM Traffic Capacity Analysis
- Crash Data
- 2020 Background AM Traffic Capacity Analysis
- 2020 Background PM Traffic Capacity Analysis
- 2025 Background AM Traffic Capacity Analysis
- 2025 Background PM Traffic Capacity Analysis
- 2020 Total AM Traffic Capacity Analysis
- 2020 Total PM Traffic Capacity Analysis
- 2025 Total AM Traffic Capacity Analysis
- 2025 Total PM Traffic Capacity Analysis
- Signal Warrant Analysis Calculations
- Left Turn Storage Calculations
- Right Turn Storage Calculations
- City of Scottsdale Design Standards and Policies

Traffic Counts

TRAFFIC IMPACT ANALYSIS

Intersection Turning Movement
Prepared by:



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Bell Rd. DAY: TUESDAY PROJECT#: 17-1179-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	1	1	2	1	1	1	1	1	2	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	45	39	2	3	81	65	16	5	21	5	54	5	341
7:15 AM	42	66	0	2	94	69	34	19	30	8	46	10	420
7:30 AM	60	102	0	6	92	33	19	16	31	4	34	15	412
7:45 AM	40	81	2	10	67	27	36	16	38	5	36	12	370
8:00 AM	47	88	5	9	85	34	38	9	33	6	28	22	404
8:15 AM	39	70	1	6	107	34	27	17	24	5	38	14	382
8:30 AM	47	76	2	9	94	40	23	22	30	5	30	14	392
8:45 AM	58	71	2	5	62	34	19	20	31	4	25	8	339
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	378	593	14	50	682	336	212	124	238	42	291	100	3060
Approach %	38.38	60.20	1.42	4.68	63.86	31.46	36.93	21.60	41.46	9.70	67.21	23.09	
App/Depart	985	/	905	1068	/	962	574	/	188	433	/	1005	

AM Peak Hr Begins at: 715 AM

PEAK													
Volumes	189	337	7	27	338	163	127	60	132	23	144	59	1606
Approach %	35.46	63.23	1.31	5.11	64.02	30.87	39.81	18.81	41.38	10.18	63.72	26.11	

PEAK HR.													
FACTOR:		0.823			0.800			0.886			0.883		0.956

CONTROL: Signal
COMMENT 1:
GPS: 33.640067, -111.861070

Intersection Turning Movement



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Bell Rd. DAY: TUESDAY PROJECT#: 17-1179-001

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	1	1	2	1	1	1	1	1	2	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	44	64	2	11	88	42	53	38	62	6	27	9	446
4:15 PM	50	83	5	11	82	35	38	27	69	2	17	8	427
4:30 PM	47	89	7	17	71	28	38	40	58	4	25	9	433
4:45 PM	38	86	7	6	99	37	53	32	83	6	21	7	475
5:00 PM	44	93	2	8	101	32	51	41	81	4	20	13	490
5:15 PM	36	104	7	18	98	35	48	42	68	5	18	8	487
5:30 PM	49	83	6	7	95	27	50	44	66	5	16	10	458
5:45 PM	24	76	7	9	74	28	40	47	63	3	15	9	395
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	332	678	43	87	708	264	371	311	550	35	159	73	3611
Approach %	31.53	64.39	4.08	8.22	66.86	24.93	30.11	25.24	44.64	13.11	59.55	27.34	
App/Depart	1053	/	1122	1059	/	1293	1232	/	441	267	/	755	

PM Peak Hr Begins at: 445 PM

PEAK													
Volumes	167	366	22	39	393	131	202	159	298	20	75	38	1910
Approach %	30.09	65.95	3.96	6.93	69.80	23.27	30.65	24.13	45.22	15.04	56.39	28.57	

PEAK HR.													
FACTOR:		0.944			0.932			0.952			0.899		0.974

CONTROL: Signal
COMMENT 1:
GPS: 33.640067, -111.861070

TRAFFIC IMPACT ANALYSIS

Intersection Turning Movement
Prepared by:



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Windgate Ranch Rd. DAY: TUESDAY PROJECT#: 17-1179-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	1	1	2	1	1	0	1	1	1	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	5	46	3	1	120	3	0	0	0	1	0	0	179
7:15 AM	10	68	4	1	187	3	0	0	0	4	0	0	277
7:30 AM	10	123	6	0	135	0	0	0	2	1	0	0	277
7:45 AM	11	103	4	4	108	5	0	0	1	3	0	0	239
8:00 AM	17	122	9	3	115	5	0	0	0	3	0	4	278
8:15 AM	3	111	9	6	145	8	0	0	1	3	0	0	286
8:30 AM	6	90	8	5	127	16	1	0	1	4	0	1	259
8:45 AM	11	87	10	6	114	9	0	0	1	10	0	5	253
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	73	750	53	26	1051	49	1	0	6	29	0	10	2048
Approach %	8.33	85.62	6.05	2.31	93.34	4.35	14.29	0.00	85.71	74.36	0.00	25.64	
App/Depart	876	/	761	1126	/	1086	7	/	79	39	/	122	

AM Peak Hr Begins at: 730 AM

PEAK													
Volumes	41	459	28	13	503	18	0	0	4	10	0	4	1080
Approach %	7.77	86.93	5.30	2.43	94.19	3.37	0.00	0.00	100.00	71.43	0.00	28.57	

PEAK HR.													
FACTOR:		0.892		0.840			0.500			0.500		0.944	

CONTROL: 2-Way Stop (EB & WB)
COMMENT 1:
GPS: 33.647797, -111.862486

Intersection Turning Movement



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Windgate Ranch Rd. DAY: TUESDAY PROJECT#: 17-1179-002

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	1	1	2	1	1	0	1	1	1	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	20	118	6	1	129	7	5	0	28	3	0	1	318
4:15 PM	22	101	4	1	107	8	3	0	11	4	0	1	262
4:30 PM	21	96	8	2	96	10	3	0	16	3	0	2	257
4:45 PM	24	112	9	5	112	9	6	0	13	9	0	1	300
5:00 PM	26	140	2	0	127	9	4	0	15	7	0	2	332
5:15 PM	22	125	2	3	120	5	4	0	21	2	0	2	306
5:30 PM	18	134	5	2	124	9	6	0	11	5	0	5	319
5:45 PM	30	89	1	0	94	5	6	0	14	1	0	1	241
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	183	915	37	14	909	62	37	0	129	34	0	15	2335
Approach %	16.12	80.62	3.26	1.42	92.28	6.29	22.29	0.00	77.71	69.39	0.00	30.61	
App/Depart	1135	/	967	985	/	1072	166	/	51	49	/	245	

PM Peak Hr Begins at: 445 PM

PEAK													
Volumes	90	511	18	10	483	32	20	0	60	23	0	10	1257
Approach %	14.54	82.55	2.91	1.90	92.00	6.10	25.00	0.00	75.00	69.70	0.00	30.30	

PEAK HR.													
FACTOR:		0.921		0.965			0.800			0.825		0.947	

CONTROL: 2-Way Stop (EB & WB)
COMMENT 1:
GPS: 33.647797, -111.862486

TRAFFIC IMPACT ANALYSIS

Intersection Turning Movement
Prepared by:



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Puerta del Viento DAY: TUESDAY PROJECT#: 17-1179-003

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	0	0	2	1	1	0	1	0	0	0	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	6	45	0	0	82	9	30	0	45	0	0	0	217
7:15 AM	7	55	0	0	119	5	22	0	60	0	0	0	268
7:30 AM	9	101	0	0	102	7	24	0	42	0	0	0	285
7:45 AM	8	94	0	0	89	6	24	0	36	0	0	0	257
8:00 AM	9	110	0	0	81	8	35	0	36	0	0	0	279
8:15 AM	9	109	0	0	118	17	61	0	39	0	0	0	353
8:30 AM	6	95	0	0	138	24	34	0	22	0	0	0	319
8:45 AM	8	80	0	0	103	18	27	0	37	0	0	0	273
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	62	689	0	0	832	94	257	0	317	0	0	0	2251
Approach %	8.26	91.74	0.00	0.00	89.85	10.15	44.77	0.00	55.23	####	####	####	
App/Depart	751	/	946	926	/	1149	574	/	0	0	/	156	

AM Peak Hr Begins at: 800 AM

PEAK													
Volumes	32	394	0	0	440	67	157	0	134	0	0	0	1224
Approach %	7.51	92.49	0.00	0.00	86.79	13.21	53.95	0.00	46.05	####	####	####	

PEAK HR.													
FACTOR:		0.895			0.782			0.728			0.000		0.867

CONTROL: 1-Way Stop (EB)
COMMENT 1:
GPS: 33.652998, -111.865438

Intersection Turning Movement



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Puerta del Viento DAY: TUESDAY PROJECT#: 17-1179-003

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	0	0	2	1	1	0	1	0	0	0	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	7	131	0	0	106	16	12	0	21	0	0	0	293
4:15 PM	18	94	0	0	105	16	10	0	16	0	0	0	259
4:30 PM	10	93	0	0	98	15	6	0	12	0	0	0	234
4:45 PM	9	112	0	0	106	16	13	0	8	0	0	0	264
5:00 PM	13	96	0	0	116	25	17	0	12	0	0	0	279
5:15 PM	14	122	0	0	126	16	15	0	8	0	0	0	301
5:30 PM	21	126	0	0	126	17	12	0	9	0	0	0	311
5:45 PM	14	102	0	0	104	21	12	0	13	0	0	0	266
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	106	876	0	0	887	142	97	0	99	0	0	0	2207
Approach %	10.79	89.21	0.00	0.00	86.20	13.80	49.49	0.00	50.51	####	####	####	
App/Depart	982	/	973	1029	/	986	196	/	0	0	/	248	

PM Peak Hr Begins at: 500 PM

PEAK													
Volumes	62	446	0	0	472	79	56	0	42	0	0	0	1157
Approach %	12.20	87.80	0.00	0.00	85.66	14.34	57.14	0.00	42.86	####	####	####	

PEAK HR.													
FACTOR:		0.864			0.963			0.845			0.000		0.930

CONTROL: 1-Way Stop (EB)
COMMENT 1:
GPS: 33.652998, -111.865438

TRAFFIC IMPACT ANALYSIS

Intersection Turning Movement
Prepared by:



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Legacy Blvd. DAY: TUESDAY PROJECT#: 17-1179-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	1	1	2	1	2	1	1	1	0.5	0.5	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	48	29	2	4	82	38	42	11	37	1	0	3	297
7:15 AM	43	64	1	4	80	40	38	8	34	2	1	1	316
7:30 AM	28	86	5	3	67	22	47	12	40	2	0	1	313
7:45 AM	29	109	4	0	54	26	53	8	54	2	0	1	340
8:00 AM	36	130	6	6	95	50	92	7	48	0	0	1	471
8:15 AM	24	92	2	5	122	98	78	5	51	0	0	2	479
8:30 AM	27	83	5	7	104	51	48	13	34	2	1	1	376
8:45 AM	25	68	4	2	63	28	40	4	31	1	3	2	271
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													
10:45 AM													
11:00 AM													
11:15 AM													
11:30 AM													
11:45 AM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	260	661	29	31	667	353	438	68	329	10	5	12	2863
Approach %	27.37	69.58	3.05	2.95	63.46	33.59	52.46	8.14	39.40	37.04	18.52	44.44	
App/Depart	950	/	1111	1051	/	1006	835	/	128	27	/	618	

AM Peak Hr Begins at: 745 AM

PEAK													
Volumes	116	414	17	18	375	225	271	33	187	4	1	5	1666
Approach %	21.21	75.69	3.11	2.91	60.68	36.41	55.19	6.72	38.09	40.00	10.00	50.00	

PEAK HR.													
FACTOR:		0.795			0.687			0.835			0.625		0.870

CONTROL: Signal
COMMENT 1:
GPS: 33.656404, -111.866772

Intersection Turning Movement



N-S STREET: Thompson Peak Pkwy. DATE: 05/09/17 LOCATION: Scottsdale
E-W STREET: Legacy Blvd. DAY: TUESDAY PROJECT#: 17-1179-004

	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
LANES:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
	1	2	1	1	2	1	2	1	1	1	0.5	0.5	
1:00 PM													
1:15 PM													
1:30 PM													
1:45 PM													
2:00 PM													
2:15 PM													
2:30 PM													
2:45 PM													
3:00 PM													
3:15 PM													
3:30 PM													
3:45 PM													
4:00 PM	36	79	3	4	83	31	34	4	44	5	7	6	336
4:15 PM	25	72	1	4	67	20	28	1	49	9	11	0	287
4:30 PM	37	89	3	5	77	21	20	1	54	8	7	6	328
4:45 PM	48	86	2	0	79	30	25	1	59	4	7	0	341
5:00 PM	31	106	4	2	89	27	28	6	47	5	7	2	354
5:15 PM	41	101	2	2	81	37	32	6	52	15	5	4	378
5:30 PM	43	89	2	3	85	20	30	5	51	7	3	2	340
5:45 PM	29	83	1	2	53	26	34	1	29	3	5	2	268
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

TOTAL	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
Volumes	290	705	18	22	614	212	231	25	385	56	52	22	2632
Approach %	28.63	69.60	1.78	2.59	72.41	25.00	36.04	3.90	60.06	43.08	40.00	16.92	
App/Depart	1013	/	958	848	/	1055	641	/	65	130	/	554	

PM Peak Hr Begins at: 445 PM

PEAK													
Volumes	163	382	10	7	334	114	115	18	209	31	22	8	1413
Approach %	29.37	68.83	1.80	1.54	73.41	25.05	33.63	5.26	61.11	50.82	36.07	13.11	

PEAK HR.													
FACTOR:		0.964			0.948			0.950			0.635		0.935

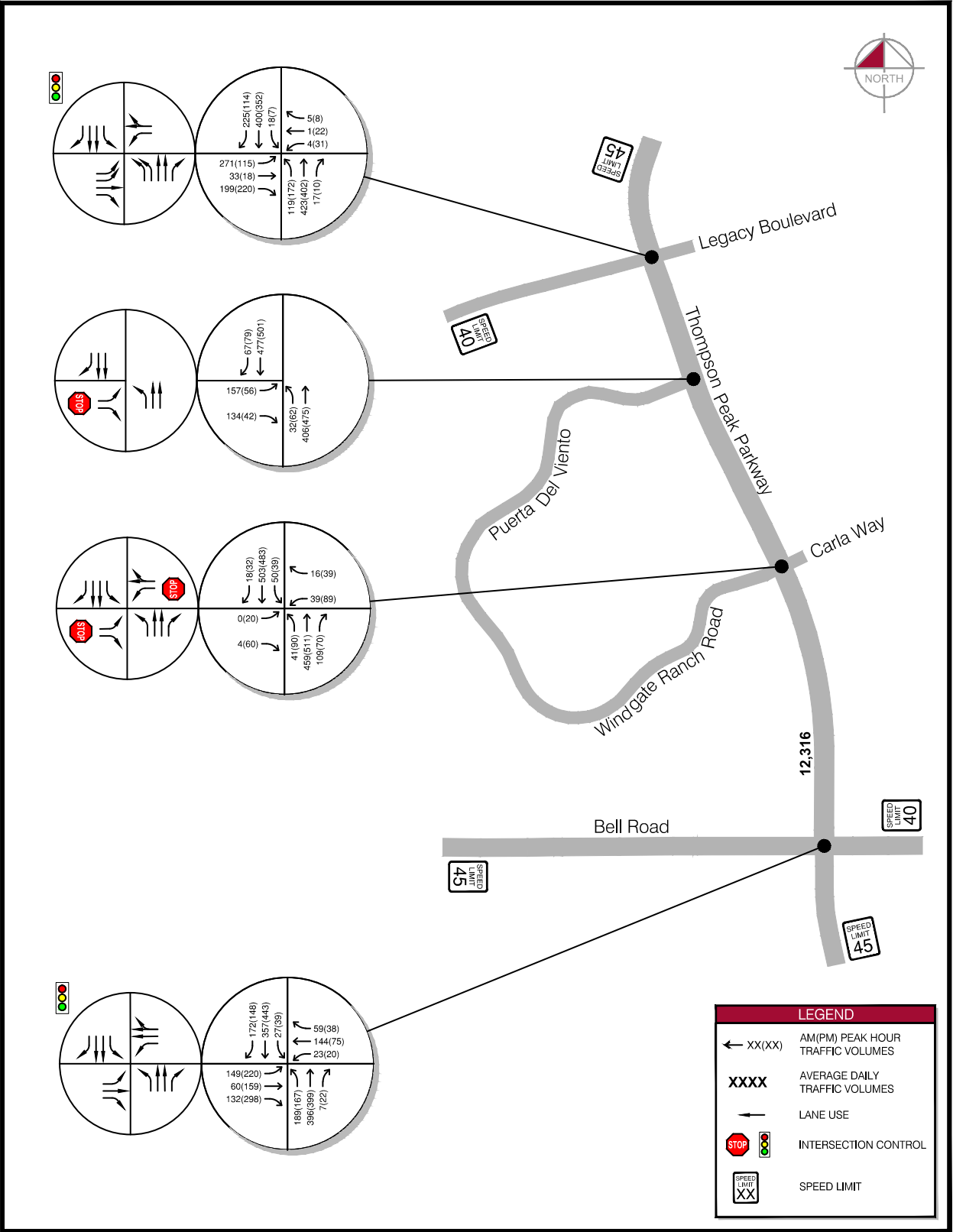
CONTROL: Signal
COMMENT 1:
GPS: 33.656404, -111.866772

TRAFFIC IMPACT ANAYLSIS

Prepared by: Field Data Services of Arizona/Veracity Traffic Group (520) 316-6745															
Volumes for: Tuesday, May 9, 2017					City: Scottsdale					Project #: 17-1179-005					
Location: Thompson Peak Pkwy. south of Windgate Ranch Rd.															
AM Period	NB		SB		EB	WB	PM Period	NB		SB		EB	WB		
00:00	0		1				12:00	92		104					
00:15	1		1				12:15	103		109					
00:30	3		2				12:30	87		100					
00:45	3	7	3	7		14	12:45	74	356	99	412		768		
01:00	2		0				13:00	100		95					
01:15	0		1				13:15	85		98					
01:30	2		2				13:30	77		91					
01:45	1	5	0	3		8	13:45	68	330	89	373		703		
02:00	0		0				14:00	84		113					
02:15	0		0				14:15	108		111					
02:30	0		0				14:30	113		130					
02:45	3	3	3	3		6	14:45	152	457	121	475		932		
03:00	1		3				15:00	178		123					
03:15	1		0				15:15	145		187					
03:30	1		1				15:30	126		132					
03:45	1	4	2	6		10	15:45	137	586	124	566		1152		
04:00	3		1				16:00	144		160					
04:15	4		3				16:15	127		122					
04:30	3		3				16:30	125		115					
04:45	10	20	2	9		29	16:45	145	541	134	531		1072		
05:00	29		11				17:00	168		149					
05:15	19		9				17:15	149		143					
05:30	23		16				17:30	157		140					
05:45	30	101	19	55		156	17:45	120	594	109	541		1135		
06:00	30		31				18:00	130		96					
06:15	55		36				18:15	101		92					
06:30	57		59				18:30	79		80					
06:45	58	200	94	220		420	18:45	77	387	80	348		735		
07:00	54		121				19:00	62		94					
07:15	82		191				19:15	54		67					
07:30	139		138				19:30	59		42					
07:45	118	393	112	562		955	19:45	44	219	60	263		482		
08:00	148		118				20:00	53		43					
08:15	123		149				20:15	52		43					
08:30	104		132				20:30	25		37					
08:45	108	483	125	524		1007	20:45	27	157	34	157		314		
09:00	90		95				21:00	19		27					
09:15	88		87				21:15	15		19					
09:30	94		99				21:30	10		23					
09:45	98	370	92	373		743	21:45	11	55	18	87		142		
10:00	85		105				22:00	15		10					
10:15	89		85				22:15	10		8					
10:30	87		89				22:30	6		7					
10:45	76	337	99	378		715	22:45	2	33	8	33		66		
11:00	78		90				23:00	3		2					
11:15	80		98				23:15	2		1					
11:30	80		109				23:30	1		4					
11:45	88	326	111	408		734	23:45	2	8	3	10		18		
Total Vol.	2249		2548			4797		3723		3796			7519		
GPS Coordinates:		33.646592, -111.861886										Daily Totals			
								NB	SB	EB	WB	Combined			
								5972	6344			12316			
AM						PM									
Split %	46.9%		53.1%		38.9%			49.5%		50.5%		61.1%			
Peak Hour	07:30		07:00		07:15			16:45		15:15		16:45			
Volume	528		562		1046			619		603		1185			
P.H.F.	0.89		0.74		0.94			0.92		0.81		0.93			

Existing Traffic Volume Figure with Adjustment Factors Applied to Existing Site Traffic

Signal Timing Information



TRAFFIC IMPACT ANALYSIS

THOMPSON PEAK & BELL			System #	222
BASIC TIMING PLAN	Section #	I.P. Address	Date Designed	
		MM1-5-1 172.17.12.22	1/31/2017	

TIMING PLAN - MM-2-1	Phase	2	4	6	8
	Movement	SBT	WBT	NBT	EBT
	NOTES				
	MIN GRN	10	7	10	7
	BK MGRN				
	CS MGRN				
	DLY GRN				
	WALK	10	10	10	10
	WALK2				
	WLK MAX				
RECALLS - MM-2-8	PED CLR/FDW	30	37	28	41
	PD CLR2				
	PC MAX				
	PED CO				
	VEH EXT	1	1	1	1
	VH EXT2				
	MAX 1	70	60	70	60
	MAX 2	90	70	90	70
	MAX 3				
	DYM MAX				
	DYM STP				
	YELLOW	4.7	4.7	4.7	4.7
	RED CLR	2.0	2.0	2.0	2.0
	RED MAX				
	RED RVT	2	2	2	2
	ACT B4				
	SEC/ACT				
	MAX INT				
	TIME B4				
	CARS WT				
	STPTDUC				
	TTREDUC				
	MIN GAP				
	LOCK DET				
	VEH RECALL	X		X	
	PED RECALL				
	MAX RECALL				
	SOFT RECALL				
	NO REST				
	ADD INIT CAL				

NOTES					
All approaches have advance detection.					

THOMPSON
PEAK - SB

BELL - WB

PHASING

BELL - EB

THOMPSON
PEAK - NB

PHASING SEQUENCES

TOD: MORNING

R1

R2

Use Timing plan:

TOD: MIDDAY

R1

R2

Use Timing plan:

TOD: EVENING

R1

R2

Use Timing plan:

TOD: WEEKEND

R1

R2

Use Timing plan:

FREE

R1

R2

Use Timing plan: 254

EXPIRES XX/XX/XXXX

THOMPSON PEAK & BELL										System #	222
COORDINATOR								Section #	Date Updated		
								0	1/31/2017		
	PHASE	1	2	3	4	5	6	7	8		
	FDW		30		37		28		41		
	YELLOW		4.7		4.7		4.7		4.7		
	ALL RED		2		2		2		2		
	WALK		30		37		28		41		
PLAN 1 AM PLAN OPERATIVE TIMES	R1	2	↓			4	←			COORD PATTERN	OFFSET
	R2	6	↑			8	→			Balanced	
	RING 1				RING 2						
	PHASE		2		4		6		8	Target Cycle Length	
	SPLIT									120	
	COORD									Actual Cycle Length	
	RECALLS									0	
PLAN 2 MIDDAY PLAN OPERATIVE TIMES	R1	2	↓			4	←			COORD PATTERN	OFFSET
	R2	6	↑			8	→			Balanced	
	RING 1				RING 2						
	PHASE		2		4		6		8	Target Cycle Length	
	SPLIT									XXX	
	COORD									Actual Cycle Length	
	RECALLS									0	
PLAN 3 PM PLAN OPERATIVE TIMES	R1	2	↓			4	←			COORD PATTERN	OFFSET
	R2	6	↑			8	→			Balanced	
	RING 1				RING 2						
	PHASE		2		4		6		8	Target Cycle Length	
	SPLIT									XXX	
	COORD									Actual Cycle Length	
	RECALLS									0	



THOMPSON PEAK & LEGACY

BASIC TIMING PLANS

RECOMMENDED
CLEARANCES

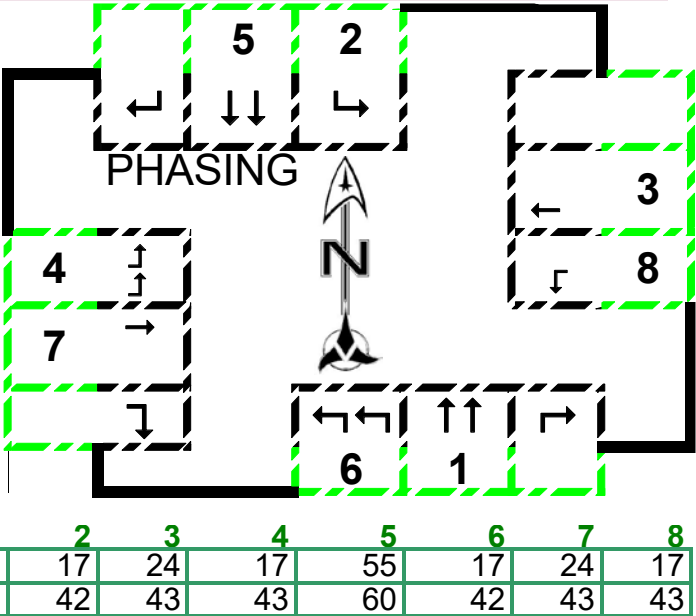
	N/S	E/W	LEFT TURN	DATE DESIGNED	
F.D.W.	20	30	STANDARD	2/1/2011	
YELLOW	5	4.2	3.0	SYSTEM #	SECTION #
ALL-RED	2	3.8	1.0	278	101

COMMUNICATIONS I.P. ADDRESS
MM-1-5-1 172.17. 12.78

TIMING #1	TIMING #2	TIMING #3	TIMING #4
CLEARANCE	SEQUENCE	PATTERNS	HISTORY

MM-2-1 TIMING PLAN #1
GREENS
PEDESTRIAN
MAXIMUMS
REDS
VOL DENSITY
MM-2-8 RECALLS

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MOVEMENT	NBT	SBL	WBT	EBL	SBT	NBL	EBT	WBL								
NOTES																
MIN GRN	10	5	6	5	10	5	6	5								
BK MGRN																
CS MGRN																
DLY GRN																
WALK	10		5		10		5									
WALK2																
WLK MAX																
PED CLR/FDV	20		30		20		30									
PD CLR2																
PC MAX																
PED CO																
VEH EXT		1	2	1		1	2	1								
VH EXT2																
MAX 1	55	20	25	20	55	20	25	20								
MAX 2	60	45	45	45	60	45	45	45								
MAX 3																
DYM MAX																
DYM STP																
YELLOW	5	3	4.5	3	5	3	4.5	3								
RED CLR	2	1	3.5	1	2	1	3.5	1								
RED MAX																
RED RVT	2		2		2		2									
ACT B4																
SEC/ACT																
MAX INT																
TIME B4																
CARS WT																
STPTDUC																
TTREDUC																
MIN GAP																
LOCK DET																
VEH RECALL																
PED RECALL	X					X										
MAX RECALL																
SOFT RECALL																
NO REST																
ADD INIT CAL																



SPLIT PLAN MAXIMUMS

NOTES





CITY OF SCOTTSDALE

CLEARANCES

THOMPSON PEAK & LEGACY

	PH1	2	3	4	5	6	7	8
FDW	20	0	30	0	20	0	30	0
YELLOW	5.0	3.0	4.5	3.0	5.0	3.0	4.5	3.0
ALL RED	2.0	1.0	3.5	1.0	2.0	1.0	3.5	1.0

SYSTEM #	278
SECTION #	101

COORDINATOR PATTERNS

MORNING

EVENING

N/S EX

MID-DAY

MIDNIGHT

E/W EX

CLEARANCE

BASIC TIME

SEQUENCE

HISTORY

MM-3-3
MORNING
SPLIT
PATTERNS

PLAN # 1
DATE EFFECTIVE 1/0/1900
OPERATIVE TIMES 0630-0900

TIMING PLAN # 1
SEQUENCE # 1
ACTION PLAN #

SEQUENCE

MOVEMENTS

NBT

SBL

WBT

EBL

SBT

NBL

EBT

WBL

PHASE

SPLIT

COORD
RECALLS (V, P, Mx)

GREEN

RING 1

1

2

3

4

5

6

7

8

120

ACTUAL
CYCLE

RING 1

RING 2

MM-3-2

AVAILABLE
COORDINATOR
PATTERN #s

1 1

1 2

1 3

1 4

1 5

1 6

2 1

2 2

2 3

2 4

2 5

2 6

3 1

3 2

3 3

3 4

3 5

3 6

PROGRESSION VALUES

DIR
CODE

COORD
DIR

B.O.G.
OFFSET

1

2

3

4

5

6

HYPERLINKS
TO MORNING
TIME-SPACE
DIAGRAMS

1

2

3

4

5

6

PLAN # 2
DATE EFFECTIVE 3/30/2009
OPERATIVE TIMES

PHASE

SPLIT

COORD
RECALLS (V, P, Mx)

GREEN

RING 1

1

2

3

4

5

6

7

8

120

ACTUAL
CYCLE

RING 1

RING 2

PLAN # 3
DATE EFFECTIVE 3/30/2009
OPERATIVE TIMES

PHASE

SPLIT

COORD
RECALLS (V, P, Mx)

GREEN

RING 1

1

2

3

4

5

6

7


8

120

ACTUAL
CYCLE

RING 1

RING 2



CITY OF SCOTTSDALE

CLEARANCES

THOMPSON PEAK & LEGACY

	PH1	2	3	4	5	6	7	8	SYSTEM #
FDW	20	0	30	0	20	0	30	0	278
YELLOW	5.0	3.0	4.5	3.0	5.0	3.0	4.5	3.0	SECTION #
ALL RED	2.0	1.0	3.5	1.0	2.0	1.0	3.5	1.0	101

COORDINATOR PATTERNS

MORNING

EVENING

N/S EX

MID-DAY

MIDNIGHT

E/W EX

CLEARANCE

BASIC TIME

SEQUENCE

HISTORY

MM-3-3
EVENING
SPLIT
PATTERNS

TIMING PLAN 1

SEQUENCE 1

ACTION PLAN

MOVEMENTS

NBT

SBL

WBT

EBL

SBT

NBL

EBT

WBL

SEQUENCE

R1

1 ↑

2 ↘

3 ←

4 ↗

R2

5 ↓

6 ↖

7 →

8 ↙

E/W

WALK & GREEN

FDW & GREEN

GREEN w/o WALK

LEFT

N/S

MM-3-2

AVAILABLE COORDINATOR PATTERN #s

7 1

7 2

7 3

7 4

7 5

7 6

8 1

8 2

8 3

8 4

8 5

8 6

9 1

9 2

9 3

9 4

9 5

9 6

PROGRESSION VALUES

DIR CODE

COORD DIR

B.O.G. OFFSET

1

NB

0

2

SB

0

3

NS

0

4

EB

0

5

WB

0

6

EW

0

HYPERLINKS TO EVENING TIME-SPACE DIAGRAMS

1

2

3

4

5

6

PLAN # 7

DATE EFFECTIVE

1/0/1900

OPERATIVE TIMES

1530-1830

PHASE

1

2

3

4

5

6

7

8

TARGET

SPLIT

57

19

27

17

57

19

27

17

120

COORD

X

X

X

X

X

X

X

ACTUAL CYCLE

RECALLS (V, P, Mx)

P

P

P

P

P

P

P

RING 1

GREEN

50

15

19

13

50

15

19

13

RING 2

120

RING 1

RING 2

PLAN # 8

DATE EFFECTIVE

OPERATIVE TIMES

PHASE

1

2

3

4

5

6

7

8

TARGET

SPLIT

62

21

22

15

62

21

22

15

120

COORD

X

X

X

X

X

X

X

ACTUAL CYCLE

RECALLS (V, P, Mx)

P

P

P

P

P

P

P

RING 1

GREEN

55

17

14

11

55

17

14

11

RING 2

120

RING 1

RING 2

PLAN # 9

DATE EFFECTIVE

OPERATIVE TIMES

PHASE

1

2

3

4

5

6

7

8

TARGET

SPLIT

52

15

32

21

52

15

32

21

120

COORD

X

X

X

X

X

X

X

ACTUAL CYCLE

RECALLS (V, P, Mx)

P

P

P

P

P

P

P

RING 1

GREEN

45

11

24

17

45

11

24

17

RING 2

120
























RING 1

RING 2











Existing AM Traffic Capacity Analysis

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	60	132	23	144	59	189	396	7	27	357	172
Future Volume (veh/h)	149	60	132	23	144	59	189	396	7	27	357	172
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	167	67	148	26	164	67	230	483	9	34	446	215
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.82	0.82	0.82	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	414	352	284	552	217	536	2357	1055	613	2357	1055
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.67	0.67	0.67	0.67	0.67	0.67
Sat Flow, veh/h	1145	1863	1583	1162	2484	976	771	3539	1583	901	3539	1583
Grp Volume(v), veh/h	167	67	148	26	115	116	230	483	9	34	446	215
Grp Sat Flow(s),veh/h/ln	1145	1863	1583	1162	1770	1691	771	1770	1583	901	1770	1583
Q Serve(g_s), s	17.1	3.5	9.6	2.2	6.5	6.9	19.5	6.3	0.2	1.8	5.8	6.3
Cycle Q Clear(g_c), s	24.0	3.5	9.6	5.7	6.5	6.9	25.3	6.3	0.2	8.2	5.8	6.3
Prop In Lane	1.00		1.00	1.00		0.58	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	414	352	284	393	376	536	2357	1055	613	2357	1055
V/C Ratio(X)	0.67	0.16	0.42	0.09	0.29	0.31	0.43	0.20	0.01	0.06	0.19	0.20
Avail Cap(c_a), veh/h	598	983	835	639	933	892	536	2357	1055	613	2357	1055
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.0	37.6	40.0	39.9	38.8	39.0	12.5	7.7	6.7	9.3	7.7	7.7
Incr Delay (d2), s/veh	1.2	0.1	0.3	0.1	0.2	0.2	2.5	0.2	0.0	0.2	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	1.8	4.2	0.7	3.2	3.2	4.5	3.2	0.1	0.5	2.8	2.9
LnGrp Delay(d),s/veh	50.2	37.7	40.3	40.0	39.0	39.1	15.0	7.9	6.7	9.5	7.8	8.2
LnGrp LOS	D	D	D	D	D	D	B	A	A	A	A	A
Approach Vol, veh/h	382			257			722			695		
Approach Delay, s/veh	44.2			39.2			10.2			8.0		
Approach LOS	D			D			B			A		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	86.6		33.4		86.6		33.4					
Change Period (Y+Rc), s	6.7		6.7		6.7		6.7					
Max Green Setting (Gmax), s	43.3		63.3		43.3		63.3					
Max Q Clear Time (g_c+I1), s	10.2		8.9		27.3		26.0					
Green Ext Time (p_c), s	2.9		0.7		2.7		0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	19.4											
HCM 2010 LOS	B											

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way




























Intersection												
Int Delay, s/veh	3.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	4	39	0	16	41	459	109	50	503	18
Future Vol, veh/h	0	0	4	39	0	16	41	459	109	50	503	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	-	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	50	50	50	89	89	89	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	78	0	32	46	516	122	60	599	21
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1068	-	299	1026	1326	258	599	0	0	516	0	0
Stage 1	718	-	-	608	608	-	-	-	-	-	-	-
Stage 2	350	-	-	418	718	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	176	0	697	189	154	741	974	-	-	1046	-	-
Stage 1	386	0	-	450	484	-	-	-	-	-	-	-
Stage 2	639	0	-	583	431	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	155	-	697	172	138	741	974	-	-	1046	-	-
Mov Cap-2 Maneuver	155	-	-	172	138	-	-	-	-	-	-	-
Stage 1	368	-	-	429	461	-	-	-	-	-	-	-
Stage 2	583	-	-	543	406	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.2			32.9			0.6			0.8		
HCM LOS	B			D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	974	-	-	-	697	172	741	1046	-	-		
HCM Lane V/C Ratio	0.047	-	-	-	0.011	0.453	0.043	0.057	-	-		
HCM Control Delay (s)	8.9	-	-	0	10.2	42.2	10.1	8.6	-	-		
HCM Lane LOS	A	-	-	A	B	E	B	A	-	-		
HCM 95th %tile Q(veh)	0.1	-	-	-	0	2.1	0.1	0.2	-	-		

TRAFFIC IMPACT ANALYSIS
























HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento

Intersection						
Int Delay, s/veh	9.6					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↰
Traffic Vol, veh/h	157	134	32	406	477	67
Future Vol, veh/h	157	134	32	406	477	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	89	89	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	184	36	456	612	86
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	912	306	612	0	-	0
Stage 1	612	-	-	-	-	-
Stage 2	300	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	273	690	963	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	725	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	263	690	963	-	-	-
Mov Cap-2 Maneuver	263	-	-	-	-	-
Stage 1	504	-	-	-	-	-
Stage 2	698	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	37.7		0.6		0	
HCM LOS	E					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	963	-	263	690	-	-
HCM Lane V/C Ratio	0.037	-	0.818	0.266	-	-
HCM Control Delay (s)	8.9	-	59.6	12.1	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	6.5	1.1	-	-

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard











												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 						 	 			 	
Traffic Volume (veh/h)	271	33	199	4	1	5	119	423	17	18	400	225
Future Volume (veh/h)	271	33	199	4	1	5	119	423	17	18	400	225
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	323	39	237	6	2	8	149	529	21	26	580	326
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.84	0.84	0.84	0.62	0.62	0.62	0.80	0.80	0.80	0.69	0.69	0.69
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	295	251	74	30	120	204	1711	765	222	1943	869
Arrive On Green	0.11	0.16	0.16	0.04	0.09	0.09	0.06	0.48	0.48	0.13	0.55	0.55
Sat Flow, veh/h	3442	1863	1583	1774	326	1306	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	323	39	237	6	0	10	149	529	21	26	580	326
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1632	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	11.1	2.2	17.8	0.4	0.0	0.7	5.1	10.9	0.8	1.6	10.6	14.0
Cycle Q Clear(g_c), s	11.1	2.2	17.8	0.4	0.0	0.7	5.1	10.9	0.8	1.6	10.6	14.0
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	373	295	251	74	0	150	204	1711	765	222	1943	869
V/C Ratio(X)	0.87	0.13	0.95	0.08	0.00	0.07	0.73	0.31	0.03	0.12	0.30	0.37
Avail Cap(c_a), veh/h	373	295	251	192	0	258	430	1711	765	222	1943	869
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.6	43.4	50.0	55.3	0.0	49.8	55.5	18.8	16.2	46.6	14.6	15.4
Incr Delay (d2), s/veh	18.1	0.1	41.5	0.2	0.0	0.1	1.9	0.5	0.1	1.1	0.4	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	1.1	10.7	0.2	0.0	0.3	2.5	5.4	0.4	0.8	5.3	6.4
LnGrp Delay(d),s/veh	70.8	43.5	91.5	55.5	0.0	49.9	57.4	19.3	16.3	47.7	15.0	16.6
LnGrp LOS	E	D	F	E		D	E	B	B	D	B	B
Approach Vol, veh/h	599				16			699			932	
Approach Delay, s/veh	77.2				52.0			27.3			16.5	
Approach LOS	E				D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.1	72.9	17.0	19.0	19.0	65.0	9.0	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	7.1	16.0	13.1	2.7	3.6	12.9	2.4	19.8				
Green Ext Time (p_c), s	0.1	1.1	0.0	0.5	0.0	1.1	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	36.3											
HCM 2010 LOS	D											

Existing PM
Traffic Capacity Analysis







												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	159	298	20	75	38	167	399	22	39	443	148
Future Volume (veh/h)	220	159	298	20	75	38	167	399	22	39	443	148
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	232	167	314	22	83	42	178	424	23	42	476	159
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	315	434	369	203	542	258	535	2320	1038	632	2320	1038
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.66	0.66	0.66	0.66	0.66	0.66
Sat Flow, veh/h	1261	1863	1583	910	2329	1107	789	3539	1583	939	3539	1583
Grp Volume(v), veh/h	232	167	314	22	62	63	178	424	23	42	476	159
Grp Sat Flow(s),veh/h/ln	1261	1863	1583	910	1770	1667	789	1770	1583	939	1770	1583
Q Serve(g_s), s	21.6	9.1	22.8	2.5	3.3	3.6	13.9	5.6	0.6	2.2	6.4	4.6
Cycle Q Clear(g_c), s	25.2	9.1	22.8	11.6	3.3	3.6	20.3	5.6	0.6	7.8	6.4	4.6
Prop In Lane	1.00		1.00	1.00		0.66	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	315	434	369	203	412	388	535	2320	1038	632	2320	1038
V/C Ratio(X)	0.74	0.38	0.85	0.11	0.15	0.16	0.33	0.18	0.02	0.07	0.21	0.15
Avail Cap(c_a), veh/h	687	983	835	471	933	880	535	2320	1038	632	2320	1038
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.8	38.8	44.0	43.7	36.6	36.7	12.3	8.1	7.2	9.6	8.2	7.9
Incr Delay (d2), s/veh	1.3	0.2	2.2	0.1	0.1	0.1	1.7	0.2	0.0	0.2	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	4.7	10.2	0.6	1.6	1.7	3.3	2.8	0.3	0.6	3.2	2.1
LnGrp Delay(d),s/veh	48.0	39.0	46.2	43.7	36.6	36.8	13.9	8.3	7.3	9.8	8.4	8.2
LnGrp LOS	D	D	D	D	D	D	B	A	A	A	A	A
Approach Vol, veh/h	713				147			625			677	
Approach Delay, s/veh	45.1				37.8			9.8			8.5	
Approach LOS	D				D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	85.4		34.6		85.4		34.6					
Change Period (Y+Rc), s	6.7		6.7		6.7		6.7					
Max Green Setting (Gmax), s	43.3		63.3		43.3		63.3					
Max Q Clear Time (g_c+11), s	9.8		13.6		22.3		27.2					
Green Ext Time (p_c), s	2.6		0.7		2.5		0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	22.9											
HCM 2010 LOS	C											

TRAFFIC IMPACT ANAYLSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way

Intersection												
Int Delay, s/veh	8.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	0	60	89	0	39	90	511	70	39	483	32
Future Vol, veh/h	20	0	60	89	0	39	90	511	70	39	483	32
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	-	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	82	82	82	92	92	92	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	0	75	109	0	48	98	555	76	40	498	33
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1051	-	249	1080	1329	278	498	0	0	555	0	0
Stage 1	578	-	-	751	751	-	-	-	-	-	-	-
Stage 2	473	-	-	329	578	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	181	0	751	172	154	719	1062	-	-	1011	-	-
Stage 1	468	0	-	369	416	-	-	-	-	-	-	-
Stage 2	541	0	-	658	499	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	152	-	751	140	134	719	1062	-	-	1011	-	-
Mov Cap-2 Maneuver	152	-	-	140	134	-	-	-	-	-	-	-
Stage 1	425	-	-	335	378	-	-	-	-	-	-	-
Stage 2	459	-	-	569	479	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	16.1			64			1.2			0.6		
HCM LOS	C			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1062	-	-	152	751	140	719	1011	-	-		
HCM Lane V/C Ratio	0.092	-	-	0.164	0.1	0.775	0.066	0.04	-	-		
HCM Control Delay (s)	8.7	-	-	33.3	10.3	87.5	10.4	8.7	-	-		
HCM Lane LOS	A	-	-	D	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	0.6	0.3	4.7	0.2	0.1	-	-		
























HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento

Intersection						
Int Delay, s/veh	2.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	56	42	62	475	501	79
Future Vol, veh/h	56	42	62	475	501	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	86	86	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	67	50	72	552	522	82
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	942	261	522	0	-	0
Stage 1	522	-	-	-	-	-
Stage 2	420	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	261	738	1041	-	-	-
Stage 1	560	-	-	-	-	-
Stage 2	631	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	243	738	1041	-	-	-
Mov Cap-2 Maneuver	243	-	-	-	-	-
Stage 1	560	-	-	-	-	-
Stage 2	587	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	18.8		1		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1041	-	243	738	-	-
HCM Lane V/C Ratio	0.069	-	0.274	0.068	-	-
HCM Control Delay (s)	8.7	-	25.3	10.2	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	0.2	-	-

TRAFFIC IMPACT ANAYLSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

Crash Data

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	18	220	31	22	8	172	402	10	7	352	114
Future Volume (veh/h)	115	18	220	31	22	8	172	402	10	7	352	114
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	121	19	232	48	34	12	179	419	10	7	371	120
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.64	0.64	0.64	0.96	0.96	0.96	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	177	295	251	77	198	70	235	1705	763	222	1906	853
Arrive On Green	0.05	0.16	0.16	0.04	0.15	0.15	0.07	0.48	0.48	0.13	0.54	0.54
Sat Flow, veh/h	3442	1863	1583	1774	1316	465	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	121	19	232	48	0	46	179	419	10	7	371	120
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1781	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	4.1	1.0	17.3	3.2	0.0	2.7	6.1	8.4	0.4	0.4	6.5	4.5
Cycle Q Clear(g_c), s	4.1	1.0	17.3	3.2	0.0	2.7	6.1	8.4	0.4	0.4	6.5	4.5
Prop In Lane	1.00		1.00	1.00		0.26	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	177	295	251	77	0	267	235	1705	763	222	1906	853
V/C Ratio(X)	0.68	0.06	0.93	0.62	0.00	0.17	0.76	0.25	0.01	0.03	0.19	0.14
Avail Cap(c_a), veh/h	373	295	251	192	0	282	430	1705	763	222	1906	853
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.9	42.9	49.8	56.4	0.0	44.5	55.0	18.3	16.2	46.1	14.3	13.8
Incr Delay (d2), s/veh	1.7	0.0	36.7	3.1	0.0	0.1	1.9	0.3	0.0	0.3	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.5	10.2	1.6	0.0	1.3	3.0	4.2	0.2	0.2	3.2	2.1
LnGrp Delay(d),s/veh	57.7	43.0	86.5	59.5	0.0	44.6	56.9	18.6	16.3	46.4	14.5	14.2
LnGrp LOS	E	D	F	E		D	E	B	B	D	B	B
Approach Vol, veh/h	372				94			608			498	
Approach Delay, s/veh	74.9				52.2			29.9			14.9	
Approach LOS	E				D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.2	71.6	10.2	26.0	19.0	64.8	9.2	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	8.1	8.5	6.1	4.7	2.4	10.4	5.2	19.3				
Green Ext Time (p_c), s	0.1	0.8	0.0	0.5	0.0	0.8	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			37.1									
HCM 2010 LOS			D									

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'13 -'14 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV. #1 #2	PHYS. COND. #1 #2	VIOLATION #1 #2	ACTION #1 #2	TRAV. DIR. #1 #2	MANNER OF COLLISION	COMMENTS
14-22706	141021	1701	THOMPSON PEAK	PY	BELL	RD	AT		2 2	0 0	1	4 1	EB WB	5	
14-21812	141010	0731	THOMPSON PEAK	PY	BELL	RD	AT		1	0	1	1	SB	97	
14-03354	140210	1156	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	7 1	4 1	NB SB	3	
13-29610	131224	0029	THOMPSON PEAK	PY	BELL	RD	AT		1 2	0 0	7 1	4 1	EB WB	3	
13-27651	131201	1757	THOMPSON PEAK	PY	BELL	RD	AT		3 2	0 0	7 1	4 1	NB SB	3	
13-24251	131022	1154	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	6 1	5 1	SB SB	2	
13-09331	130422	2019	THOMPSON PEAK	PY	BELL	RD	AT		1 3	0 0	7 1	4 1	EB WB	3	
13-06718	130322	1702	THOMPSON PEAK	PY	BELL	RD	AT		2 2	0 0	2 1	4 1	NB SB	2	
13-04158	130220	1335	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	2 1	1 3	EB EB	4	MULTI VEH 3

TRAFFIC IMPACT ANAYLSIS

REPORT #	DATE	TIME	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR	DIST	INJ. SEV.	PHYS. COND.	VIOLATION	ACTION	TRAV. DIR.	MANNER OF COLLISION	COMMENTS	
	YYMMDD	HHMM					FROM	FROM	#1	#2	#1	#2	#1	#2	#1	#2

KEY

INJURY SEVERITY: 1=NO INJURY, 2=POSSIBLE INJURY, 3=NON-INCAPACITATING INJURY, 4=INCAPACITATING INJURY, 5=FATAL INJURY, 99=NOT REPORTED / UNKNOWN

PHYSICAL CONDITION: 0=NO APPARENT INFLUENCE, 1=ILLNESS, 2=PHYSICAL IMPAIRMENT, 3=FELL ASLEEP / FATIGUED 4=ALCOHOL, 5=DRUGS, 6=MEDICATIONS, A=NO TEST GIVEN, B=TEST GIVEN, C=TEST REFUSED, D=TESTING UNKNOWN, 97=OTHER, 99=UNKNOWN

VIOLATION: 1=NO IMPROPER ACTION, 2=SPEED TOO FAST FOR CONDITIONS, 3=EXCEEDED LAWFUL SPEED 4=FOLLOWED TOO CLOSELY. 5=RAN STOP SIGN, 6=DISREGAREDED TRAFFIC SIGNAL7=MADE IMPROPER TURN, 8=DROVE/RODE IN OPPOSING TRAFFIC LANE, 9=KNOWINGLY OPERATED WITH FAULTY / MISSING EQUIPMENT, 10=REQUIRED MOTORCYCLE SAFETY EQUIPMENT NOT USED, 11=PASSED IN NO PASSING ZONE, 12=UNSAFE LANE CHANGE, 13=FAILED TO KEEP IN PROPER LANE, 14=DISREGARDED PAVEMENT MARKINGS, 15=OTHER UNSAFE PASSING, 16=INATTENTION/DISTRACTION, 17=DID NOT USE CROSSWALK, 18=WALKED ON WRONG SIDE OF ROAD, 19=ELECTRONIC COMMUNICATIONS DEVICE, 20=FAILED TO YIELD RIGHT OF WAY (added August 2014), 97=OTHER, 99 UNKNOWN

ACTION: 1=GOING STRAIGHT AHEAD, 2=SLOWING IN TRAFFICWAY, 3=STOPPED IN TRAFFICWAY, 4=MAKING LEFT TURN, 5=MAKING RIGHT TURN, 6=MAKING U-TURN, 7=OVERTAKING/PASSING, 8=CHANGING LANES, 9=NEGOTIATING A CURVE, 10=BACKING, 11=AVOIDING VEH/OBJ/PED/CYCLIST/ANIMAL, 12=ENTERING PARKING POSITION, 13=LEAVING PARKING POSITION, 14=PROPERLY PARKED, 15=IMPROPERLY PARKED, 16=DRIVERLESS MOVING VEHICLE, 17=CROSING ROAD, 18=WALKING WITH TRAFFIC, 19=WALKING AGAINST TRAFFIC, 20=STANDING, 21=LYING, 22=GETTING ON OR OFF VEHICLE, 23=WORKING ON/PUSHING VEHICLE, 24=WORKING ON ROAD, 97=OTHER, 99=UKNOWN

MANNER OF COLLISION: 1=SINGLE VEHICLE, 2=ANGLE (front to side, other than left turn), 3=LEFT TURN, 4=REAR END (front to rear), 5=HEAD-ON (front to front, other than left turn), 6=SIDESWIPE (same direction), 7=SIDESWIPE (opposite direction), 8=REAR-TO-SIDE, 9=REAR TO REAR, 97=OTHER, 99=UNKNOWN

TOTAL9

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'15 -'16 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV. #1 #2	PHYS. COND. #1 #2	VIOLATION #1 #2	ACTION #1 #2	TRAV. DIR. #1 #2	MANNER OF COLLISION	COMMENTS
16-01481	160119	1345	THOMPSON PEAK	PY	BELL	RD	AT		1 2	0 0	20 1	4 1	NB SB	3	
15-01355	150117	1906	THOMPSON PEAK	PY	BELL	RD	AT		2 1	0 0	20 1	4 1	SB NB	3	
15-02648	150131	1547	THOMPSON PEAK	PY	BELL	RD	AT		3 2	0 0	20 1	4 1	NB SB	3	
15-07065	150326	1537	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	6 1	1 1	EB SB	2	
15-07154	150327	1740	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	99 99	1 4	SB WB	3	
15-10713	150509	1436	THOMPSON PEAK	PY	BELL	RD	AT		3 3	0 0	20 1	4 1	NB SB	3	
15-24959	151114	1756	THOMPSON PEAK	PY	BELL	RD	AT		3	99	2	1	SB	1	
15-26414	151203	1249	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	2 1	1 3	EB SB	4	
15-00946	150113	0924	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	99 99	4 1	NB SB	7	
16-01170	160115	1505	THOMPSON PEAK	PY	BELL	RD	AT		1 2	0 0	20 1	4 1	NB SB	3	
16-27747	161212	1205	THOMPSON PEAK	PY	BELL	RD	AT		1 3	0 0	20 1	4 1	NB SB	5	
16-07794	160402	1304	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	20 1	4 1	EB WB	5	
16-12009	160524	1452	THOMPSON PEAK	PY	BELL	RD	AT		2 1	0 0	6 1	1 1	SB WB	2	
16-12468	160530	1111	THOMPSON PEAK	PY	BELL	RD	AT		3 3	0 0	20 1	3 3	NB WB	3	
16-17803	160809	2007	THOMPSON PEAK	PY	BELL	RD	AT		3 3	0 0	20 1	4 1	NB SB	3	MULTI VEH 3
16-23757	161025	0905	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	20 1	4 1	EB WB	3	
16-25085	161110	1852	THOMPSON PEAK	PY	BELL	RD	AT		4 1	0 0	2 1	1 4	SB NB	3	
16-25584	161116	1853	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	2 1	6 3	EB NB	5	
16-00371	160105	1706	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	20 1	4 1	EB WB	3	
16-02341	160129	2129	THOMPSON PEAL	PY	BELL	RD	AT		1 1	0 0	20 1	4 1	EB WB	3	

TRAFFIC IMPACT ANAYLSIS

REPORT #	DATE	TIME	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR	DIST	INJ. SEV.	PHYS. COND.	VIOLATION	ACTION	TRAV. DIR.	MANNER OF COLLISION	COMMENTS	
	YYMMDD	HHMM					FROM	FROM	#1	#2	#1	#2	#1	#2	#1	#2

KEY

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VIOLATION: 1=NO IMPROPER ACTION, 2=SPEED TOO FAST FOR CONDITIONS, 3=EXCEEDED LAWFUL SPEED 4=FOLLOWED TOO CLOSELY. 5=RAN STOP SIGN, 6=DISREGAREDED TRAFFIC SIGNAL7=MADE IMPROPER TURN, 8=DROVE/RODE IN OPPOSING TRAFFIC LANE, 9=KNOWINGLY OPERATED WITH FAULTY / MISSING EQUIPMENT, 10=REQUIRED MOTORCYCLE SAFETY EQUIPMENT NOT USED, 11=PASSED IN NO PASSING ZONE, 12=UNSAFE LANE CHANGE, 13=FAILED TO KEEP IN PROPER LANE, 14=DISREGARDED PAVEMENT MARKINGS, 15=OTHER UNSAFE PASSING, 16=INATTENTION/DISTRACTION, 17=DID NOT USE CROSSWALK, 18=WALKED ON WRONG SIDE OF ROAD, 19=ELECTRONIC COMMUNICATIONS DEVICE, 20=FAILED TO YIELD RIGHT OF WAY (added August 2014), 97=OTHER, 99 UNKNOWN

ACTION: 1=GOING STRAIGHT AHEAD, 2=SLOWING IN TRAFFICWAY, 3=STOPPED IN TRAFFICWAY, 4=MAKING LEFT TURN, 5=MAKING RIGHT TURN, 6=MAKING U-TURN, 7=OVERTAKING/PASSING, 8=CHANGING LANES, 9=NEGOTIATING A CURVE, 10=BACKING, 11=AVOIDING VEH/OBJ/PED/CYCLIST/ANIMAL, 12=ENTERING PARKING POSITION, 13=LEAVING PARKING POSITION, 14=PROPERLY PARKED, 15=IMPROPERLY PARKED, 16=DRIVERLESS MOVING VEHICLE, 17=CROSING ROAD, 18=WALKING WITH TRAFFIC, 19=WALKING AGAINST TRAFFIC, 20=STANDING, 21=LYING, 22=GETTING ON OR OFF VEHICLE, 23=WORKING ON/PUSHING VEHICLE, 24=WORKING ON ROAD, 97=OTHER, 99=UKNOWN

MANNER OF COLLISION: 1=SINGLE VEHICLE, 2=ANGLE (front to side, other than left turn), 3=LEFT TURN, 4=REAR END (front to rear), 5=HEAD-ON (front to front, other than left turn), 6=SIDESWIPE (same direction), 7=SIDESWIPE (opposite direction), 8=REAR-TO-SIDE, 9=REAR TO REAR, 97=OTHER, 99=UNKNOWN

TOTAL 20

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'17 -'18 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV. #1 #2	PHYS. COND. #1 #2	VIOLATION #1 #2	ACTION #1 #2	TRAV. DIR. #1 #2	MANNER OF COLLISION	COMMENTS
1708974	170420	0906	THOMPSON PEAK	PY	BELL	RD	AT		3 3	0 0	20 1	4 1	WB SB	2	
1705663	170310	1441	THOMPSON PEAK	PY	BELL	RD	AT		2 1	0 0	20 1	4 1	NB SB	3	
1705688	170310	1856	THOMPSON PEAK	PY	BELL	RD	AT		1 1	0 0	20 1	4 1	EB WB	3	
1707636	170402	1053	THOMPSON PEAK	PY	BELL	RD	AT		2 1	0 0	20 99	4 1	NB SB	5	MULTI VEH 3
1701793	170123	1454	THOMPSON PEAK	PY	BELL	RD	AT		1 4	0 0	20 1	4 1	EB WB	7	
1705772	170311	1650	THOMPSON PEAL	PY	BELL	RD	N	100	1 2	0 0	6 1	4 1	EB NB	3	

KEY

INJURY SEVERITY: 1=NO INJURY, 2=POSSIBLE INJURY, 3=NON-INCAPACITATING INJURY, 4=INCAPACITATING INJURY, 5=FATAL INJURY, 99=NOT REPORTED / UNKNOWN

PHYSICAL CONDITION: 0=NO APPARENT INFLUENCE, 1=ILLNESS, 2=PHYSICAL IMPAIRMENT, 3=FELL ASLEEP / FATIGUED 4=ALCOHOL, 5=DRUGS, 6=MEDICATIONS, A=NO TEST GIVEN, B=TEST GIVEN, C=TEST REFUSED, D=TESTING UNKNOWN, 97=OTHER, 99=UNKNOWN

VIOLATION: 1=NO IMPROPER ACTION, 2=SPEED TOO FAST FOR CONDITIONS, 3=EXCEEDED LAWFUL SPEED 4=FOLLOWED TOO CLOSELY. 5=RAN STOP SIGN, 6=DISREGARDED TRAFFIC SIGNAL7=MADE IMPROPER TURN, 8=DROVE/RODE IN OPPOSING TRAFFIC LANE, 9=KNOWINGLY OPERATED WITH FAULTY / MISSING EQUIPMENT, 10=REQUIRED MOTORCYCLE SAFETY EQUIPMENT NOT USED, 11=PASSED IN NO PASSING ZONE, 12=UNSAFE LANE CHANGE, 13=FAILED TO KEEP IN PROPER LANE, 14=DISREGARDED PAVEMENT MARKINGS, 15=OTHER UNSAFE PASSING, 16=INATTENTION/DISTRACTION, 17=DID NOT USE CROSSWALK, 18=WALKED ON WRONG SIDE OF ROAD, 19=ELECTRONIC COMMUNICATIONS DEVICE, 20=FAILED TO YIELD RIGHT OF WAY (added August 2014), 97=OTHER, 99 UNKNOWN

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TOTAL

6

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'13 -'14 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV #1 #2	PHYS. COND. #1 #2	VIOLATION #1 #2	ACTION #1 #2	TRAV. DIR. #1 #2	MANNER OF COLLISION	COMMENTS
14-26049	141203	1712	THOMPSON PEAK	PY	WINDGATE RANCH	RD	AT		11	00	971	41	WB NB	3	
14-00063	140101	1505	THOMPSON PEAK	PY	WINDGATE RANCH	RD	S	150	31	00	21	973	SB SB	6	CAR/BICYCLE

KEY

INJURY SEVERITY: 1=NO INJURY, 2=POSSIBLE INJURY, 3=NON-INCAPACITATING INJURY, 4=INCAPACITATING INJURY, 5=FATAL INJURY, 99=NOT REPORTED / UNKNOWN

PHYSICAL CONDITION: 0=NO APPARENT INFLUENCE, 1=ILLNESS, 2=PHYSICAL IMPAIRMENT, 3=FELL ASLEEP / FATIGUED 4=ALCOHOL, 5=DRUGS, 6=MEDICATIONS, A=NO TEST GIVEN, B=TEST GIVEN, C=TEST REFUSED, D=TESTING UNKNOWN, 97=OTHER, 99=UNKNOWN

VIOLATION: 1=NO IMPROPER ACTION, 2=SPEED TOO FAST FOR CONDITIONS, 3=EXCEEDED LAWFUL SPEED 4=FOLLOWED TOO CLOSELY. 5=RAN STOP SIGN, 6=DISREGAREDED TRAFFIC SIGNAL7=MADE IMPROPER TURN, 8=DROVE/RODE IN OPPOSING TRAFFIC LANE, 9=KNOWINGLY OPERATED WITH FAULTY / MISSING EQUIPMENT, 10=REQUIRED MOTORCYCLE SAFETY EQUIPMENT NOT USED, 11=PASSED IN NO PASSING ZONE, 12=UNSAFE LANE CHANGE, 13=FAILED TO KEEP IN PROPER LANE, 14=DISREGARDED PAVEMENT MARKINGS, 15=OTHER UNSAFE PASSING, 16=INATTENTION/DISTRACTION, 17=DID NOT USE CROSSWALK, 18=WALKED ON WRONG SIDE OF ROAD, 19=ELECTRONIC COMMUNICATIONS DEVICE, 20=FAILED TO YIELD RIGHT OF WAY (added August 2014), 97=OTHER, 99 UNKNOWN

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TOTAL

2

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'15 -'16 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV.		PHYS. COND.		VIOLATION		ACTION		TRAV. DIR.		MANNER OF COLLISION	COMMENTS
									#1	#2	#1	#2	#1	#2	#1	#2	#1	#2		
15-07515	150401	1031	THOMPSON PEAK	PY	WINDGATE RANCH	RD	AT		1	1	0	0	20	1	4	1	SB	SB	3	

KEY

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PHYSICAL CONDITION: 0=NO APPARENT INFLUENCE, 1=ILLNESS, 2=PHYSICAL IMPAIRMENT, 3=FELL ASLEEP / FATIGUED 4=ALCOHOL, 5=DRUGS, 6=MEDICATIONS, A=NO TEST GIVEN, B=TEST GIVEN, C=TEST REFUSED, D=TESTING UNKNOWN, 97=OTHER, 99=UNKNOWN

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ACTION: 1=GOING STRAIGHT AHEAD, 2=SLOWING IN TRAFFICWAY, 3=STOPPED IN TRAFFICWAY, 4=MAKING LEFT TURN, 5=MAKING RIGHT TURN, 6=MAKING U-TURN, 7=OVERTAKING/PASSING, 8=CHANGING LANES, 9=NEGOTIATING A CURVE, 10=BACKING, 11=AVOIDING VEH/OBJ/PED/CYCLIST/ANIMAL, 12=ENTERING PARKING POSITION, 13=LEAVING PARKING POSITION, 14=PROPERLY PARKED, 15=IMPROPERLY PARKED, 16=DRIVERLESS MOVING VEHICLE, 17=CROSING ROAD, 18=WALKING WITH TRAFFIC, 19=WALKING AGAINST TRAFFIC, 20=STANDING, 21=LYING, 22=GETTING ON OR OFF VEHICLE, 23=WORKING ON/PUSHING VEHICLE, 24=WORKING ON ROAD, 97=OTHER, 99=UKNOWN

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TOTAL

1

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'15 -'16 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV. #1 #2	PHYS. COND. #1 #2	VIOLATION #1 #2	ACTION #1 #2	TRAV. DIR. #1 #2	MANNER OF COLLISION	COMMENTS
15-04542	150224	0859	THOMPSON PEAK	PY	PUERTA DEL VIENTO	RD	AT		2	0	2	5	SB		1

KEY

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TOTAL1

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE

'13 -'14 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV.		PHYS. COND.		VIOLATION		ACTION		TRAV. DIR.		MANNER OF COLLISION	COMMENTS
									#1	#2	#1	#2	#1	#2	#1	#2	#1	#2		
14-19781	140913	2151	THOMPSON PEAK	PY	LEGACY	BL	AT		3	3	0	0	6	1	1	1	SB	WB	2	
14-01020	140113	1615	THOMPSON PEAK	PY	LEGACY	BL	AT		1	1	0	0	2	1	1	2	NB	NB	4	
13-19186	130822	1721	THOMPSON PEAK	PY	LEGACY	BL	AT		99		99		2		5		NB		1	HIT AND RUN
13-16602	130722	0603	THOMPSON PEAK	PY	LEGACY	BL	AT		2	2	0	0	7	1	4	1	NB	SB	3	

KEY

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TOTAL4

TRAFFIC IMPACT ANAYLSIS

CITY OF SCOTTSDALE'15 -'16 COLLISION SUMMARY

REPORT #	DATE YYMMDD	TIME HHMM	NORTH / SOUTH ST.	TYPE	EAST WEST ST.	TYPE	DIR FROM	DIST FROM	INJ. SEV. #1 #2	PHYS. COND. #1 #2	VIOLETION #1 #2	ACTION #1 #2	TRAV. DIR. #1 #2	MANNER OF COLLISION	COMMENTS
16-19576	160901	0551	THOMPSON PEAK	PY	LEGACY	BL	W	5	1 1	0 0	13 1	4 4	NB NB		6
16-01152	160115	1135	THOMPSON PEAK	PY	LEGACY	BL	AT		1 1	0 0	99 99	1 4	WB EB		3
15-17665	150812	1536	THOMPSON PEAK	PY	LEGACY	BL	AT		3	99	13	1	NB		1
15-09679	150427	0912	THOMPSON PEAK	PY	LEGACY	BL	AT		1 1	0 0	99 99	6 1	SB SB		2
15-00868	150112	0901	THOMPSON PEAK	PY	LEGACY	BL	AT		1	0	2	5	SB		1

KEY

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VIOLETION: 1=NO IMPROPER ACTION, 2=SPEED TOO FAST FOR CONDITIONS, 3=EXCEEDED LAWFUL SPEED 4=FOLLOWED TOO CLOSELY. 5=RAN STOP SIGN, 6=DISREGAREDED TRAFFIC SIGNAL7=MADE IMPROPER TURN, 8=DROVE/RODE IN OPPOSING TRAFFIC LANE, 9=KNOWINGLY OPERATED WITH FAULTY / MISSING EQUIPMENT, 10=REQUIRED MOTORCYCLE SAFETY EQUIPMENT NOT USED, 11=PASSED IN NO PASSING ZONE, 12=UNSAFE LANE CHANGE, 13=FAILED TO KEEP IN PROPER LANE, 14=DISREGARDED PAVEMENT MARKINGS, 15=OTHER UNSAFE PASSING, 16=INATTENTION/DISTRACTION, 17=DID NOT USE CROSSWALK, 18=WALKED ON WRONG SIDE OF ROAD, 19=ELECTRONIC COMMUNICATIONS DEVICE, 20=FAILED TO YIELD RIGHT OF WAY (added August 2014), 97=OTHER, 99 UNKNOWN

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TOTAL5
























2020 Background AM Peak Hour
Traffic Capacity Analysis

2014 Segment Collision Rates and Volumes, Sorted by Location
2014 Average Segment Collision Rate = 1.35 collisions per million vehicle miles











PRIMARY STREET	FROM	TO	VOLUME	LENGTH	NO. OF COL	COL RATE
GRANITE REEF	INDIAN SCHOOL	CAMELBACK	4400	0.50	0	0.00
GRANITE REEF	CAMELBACK	CHAPARRAL	4800	0.50	1	1.19
GRANITE REEF	CHAPARRAL	MCDONALD	5900	1.00	7	3.25
NORTHSIGHT/THUNDERBIRD	90TH	RAINTREE	9700	1.00	3	0.85
NORTHSIGHT	RAINTREE	HAYDEN	16000	0.75	10	2.28
PERIMETER	BELL	PRINCESS	3400	0.30	2	5.37
PIMA	MCDOWELL	THOMAS	4200	1.00	1	0.65
PIMA	THOMAS	INDIAN SCHOOL	6200	1.00	2	0.88
PIMA	INDIAN SCHOOL	CHAPARRAL	8700	1.00	2	0.63
PIMA	CHAPARRAL	MCDONALD	8800	1.00	1	0.31
PIMA	MCDONALD	INDIAN BEND	11300	1.00	2	0.48
PIMA	INDIAN BEND	VIA DE VENTURA	10800	1.00	2	0.51
PIMA	101 FWY	LEGACY	40000	0.75	6	0.55
PIMA	LEGACY	HUALAPAI	34600	0.60	2	0.26
PIMA	HUALAPAI	THOMPSON PEAK	29900	1.00	11	1.01
PIMA	THOMPSON PEAK	PINNACLE PEAK	34300	1.50	4	0.21
PIMA	PINNACLE PEAK	HAPPY VALLEY	33600	1.00	0	0.00
PIMA	HAPPY VALLEY	JOMAX	19600	0.90	1	0.16
PIMA	JOMAX	DYNAMITE	18600	1.00	0	0.00
PIMA	DYNAMITE	DIXILETA	15600	1.00	2	0.35
PIMA	DIXILETA	LONE MOUNTAIN	14900	1.00	1	0.18
PIMA	LONE MOUNTAIN	WESTLAND/LEGEND TR	13600	3.00	3	0.20
PIMA	WESTLAND/LEGEND TR	STAGECOACH PASS	11200	3.00	1	0.08
90TH	VIA LINDA	MOUNTAIN VIEW	20900	0.40	9	2.95
90TH	MOUNTAIN VIEW	SHEA	18700	0.50	13	3.81
92ND	MOUNTAIN VIEW	SHEA	14800	0.50	13	4.88
92ND	SHEA	CHOLLA	14700	0.50	2	0.75
92ND	THUNDERBIRD	RAINTREE	3300	0.50	0	0.00
92ND	RAINTREE	FRANK LLOYD WRIGHT	2100	0.50	0	0.00
94TH	CHOLLA	CACTUS	12100	0.50	1	0.45
94TH	CACTUS	SWEETWATER	12500	0.50	0	0.00
94TH	SWEETWATER	THUNDERBIRD	9300	0.50	2	1.18
94TH/THOMPSON PEAK	THUNDERBIRD	FRANK LLOYD WRIGHT	14300	0.75	9	2.30
THOMPSON PEAK	FRANK LLOYD WRIGHT	100TH	21000	0.25	4	2.09
THOMPSON PEAK	100TH	MCDOWELL MTN RANCH	30100	0.80	0	0.00
THOMPSON PEAK	MCDOWELL MTN RANCH	BELL	13500	0.75	5	1.35
THOMPSON PEAK	BELL	LEGACY	8200	1.20	1	0.28
THOMPSON PEAK	LEGACY	HORSESHOE CANYON	11300	0.85	0	0.00
THOMPSON PEAK	HORSESHOE CANYON	WINDGATE PASS	11000	0.85	1	0.29
94TH	BELL	LEGACY	4200	1.00	0	0.00
96TH	VIA LINDA	MOUNTAIN VIEW	5600	0.25	0	0.00
96TH	MOUNTAIN VIEW	SHEA	9400	0.50	4	2.33
96TH	SHEA	CHOLLA	8200	0.50	0	0.00
96TH	CHOLLA	CACTUS	7800	0.50	0	0.00
96TH	CACTUS	SWEETWATER	4000	0.50	0	0.00
96TH	SWEETWATER	THUNDERBIRD	3200	0.50	1	1.71

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	62	136	24	148	61	195	422	7	28	373	179
Future Volume (veh/h)	159	62	136	24	148	61	195	422	7	28	373	179
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	179	70	153	27	168	69	238	515	9	35	466	224
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.82	0.82	0.82	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	261	436	371	296	581	230	511	2315	1036	581	2315	1036
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.65	0.65	0.65	0.65	0.65	0.65
Sat Flow, veh/h	1139	1863	1583	1153	2480	980	750	3539	1583	875	3539	1583
Grp Volume(v), veh/h	179	70	153	27	118	119	238	515	9	35	466	224
Grp Sat Flow(s),veh/h/ln	1139	1863	1583	1153	1770	1690	750	1770	1583	875	1770	1583
Q Serve(g_s), s	18.4	3.6	9.8	2.3	6.6	7.0	22.2	7.1	0.2	2.0	6.3	6.8
Cycle Q Clear(g_c), s	25.4	3.6	9.8	5.9	6.6	7.0	28.5	7.1	0.2	9.1	6.3	6.8
Prop In Lane	1.00		1.00	1.00		0.58	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	261	436	371	296	414	396	511	2315	1036	581	2315	1036
V/C Ratio(X)	0.69	0.16	0.41	0.09	0.28	0.30	0.47	0.22	0.01	0.06	0.20	0.22
Avail Cap(c_a), veh/h	595	983	835	634	933	891	511	2315	1036	581	2315	1036
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.3	36.6	38.9	38.9	37.7	37.8	13.9	8.4	7.2	10.2	8.3	8.4
Incr Delay (d2), s/veh	1.2	0.1	0.3	0.0	0.1	0.2	3.0	0.2	0.0	0.2	0.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	1.9	4.3	0.7	3.2	3.3	5.0	3.5	0.1	0.5	3.1	3.1
LnGrp Delay(d),s/veh	49.5	36.6	39.2	38.9	37.8	38.0	17.0	8.6	7.2	10.4	8.5	8.8
LnGrp LOS	D	D	D	D	D	D	B	A	A	B	A	A
Approach Vol, veh/h	402			264			762			725		
Approach Delay, s/veh	43.4			38.0			11.2			8.7		
Approach LOS	D			D			B			A		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	85.2		34.8		85.2		34.8					
Change Period (Y+Rc), s	6.7		6.7		6.7		6.7					
Max Green Setting (Gmax), s	43.3		63.3		43.3		63.3					
Max Q Clear Time (g_c+I1), s	11.1		9.0		30.5		27.4					
Green Ext Time (p_c), s	3.1		0.7		2.8		0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	19.6											
HCM 2010 LOS	B											

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh	4.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	4	46	0	19	42	473	129	59	518	19
Future Vol, veh/h	0	0	4	46	0	19	42	473	129	59	518	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	50	50	50	89	89	89	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	92	0	38	47	531	145	70	617	23
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1117	-	308	1075	-	266	617	0	0	531	0	0
Stage 1	757	-	-	626	-	-	-	-	-	-	-	-
Stage 2	360	-	-	449	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	162	0	688	174	0	732	959	-	-	1033	-	-
Stage 1	366	0	-	439	0	-	-	-	-	-	-	-
Stage 2	631	0	-	559	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	140	-	688	157	-	732	959	-	-	1033	-	-
Mov Cap-2 Maneuver	140	-	-	157	-	-	-	-	-	-	-	-
Stage 1	348	-	-	417	-	-	-	-	-	-	-	-
Stage 2	569	-	-	515	-	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s	10.3		42.7		0.6		0.9					
HCM LOS	B		E									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	959	-	-	-	688	157	732	1033	-	-		
HCM Lane V/C Ratio	0.049	-	-	-	0.012	0.586	0.052	0.068	-	-		
HCM Control Delay (s)	8.9	-	-	0	10.3	56.1	10.2	8.7	-	-		
HCM Lane LOS	A	-	-	A	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.2	-	-	-	0	3.1	0.2	0.2	-	-		

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento

Intersection							
Int Delay, s/veh	12						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	↰	↱	↰	↱	↱	↱	
Traffic Vol, veh/h	162	138	33	421	500	69	
Future Vol, veh/h	162	138	33	421	500	69	
Conflicting Peds, #/hr	0	0	0	0	0	0	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	115	-	200	-	-	90	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	73	73	89	89	78	78	
Heavy Vehicles, %	2	2	2	2	2	2	
Mvmt Flow	222	189	37	473	641	88	
Major/Minor	Minor2		Major1		Major2		
Conflicting Flow All	952	321	641	0	-	0	
Stage 1	641	-	-	-	-	-	
Stage 2	311	-	-	-	-	-	
Critical Hdwy	6.84	6.94	4.14	-	-	-	
Critical Hdwy Stg 1	5.84	-	-	-	-	-	
Critical Hdwy Stg 2	5.84	-	-	-	-	-	
Follow-up Hdwy	3.52	3.32	2.22	-	-	-	
Pot Cap-1 Maneuver	257	675	939	-	-	-	
Stage 1	487	-	-	-	-	-	
Stage 2	716	-	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	
Mov Cap-1 Maneuver	247	675	939	-	-	-	
Mov Cap-2 Maneuver	247	-	-	-	-	-	
Stage 1	487	-	-	-	-	-	
Stage 2	688	-	-	-	-	-	
Approach	EB		NB		SB		
HCM Control Delay, s	47.2		0.7		0		
HCM LOS	E						
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR	
Capacity (veh/h)	939	-	247	675	-	-	
HCM Lane V/C Ratio	0.039	-	0.898	0.28	-	-	
HCM Control Delay (s)	9	-	76.8	12.4	-	-	
HCM Lane LOS	A	-	F	B	-	-	
HCM 95th %tile Q(veh)	0.1	-	7.7	1.1	-	-	
























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	279	34	208	4	1	5	124	438	18	19	418	232
Future Volume (veh/h)	279	34	208	4	1	5	124	438	18	19	418	232
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	332	40	248	6	2	8	155	548	22	28	606	336
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.84	0.84	0.84	0.62	0.62	0.62	0.80	0.80	0.80	0.69	0.69	0.69
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	295	347	74	30	120	210	1711	765	222	1937	867
Arrive On Green	0.11	0.16	0.16	0.04	0.09	0.09	0.06	0.48	0.48	0.13	0.55	0.55
Sat Flow, veh/h	3442	1863	1583	1774	326	1306	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	332	40	248	6	0	10	155	548	22	28	606	336
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1632	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	11.4	2.2	17.4	0.4	0.0	0.7	5.3	11.4	0.9	1.7	11.2	14.6
Cycle Q Clear(g_c), s	11.4	2.2	17.4	0.4	0.0	0.7	5.3	11.4	0.9	1.7	11.2	14.6
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	373	295	347	74	0	150	210	1711	765	222	1937	867
V/C Ratio(X)	0.89	0.14	0.71	0.08	0.00	0.07	0.74	0.32	0.03	0.13	0.31	0.39
Avail Cap(c_a), veh/h	373	295	347	192	0	258	430	1711	765	222	1937	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.8	43.4	43.4	55.3	0.0	49.8	55.4	19.0	16.2	46.7	14.8	15.6
Incr Delay (d2), s/veh	21.7	0.1	5.9	0.2	0.0	0.1	1.9	0.5	0.1	1.2	0.4	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	1.2	8.2	0.2	0.0	0.3	2.6	5.7	0.4	0.9	5.6	6.7
LnGrp Delay(d),s/veh	74.5	43.5	49.2	55.5	0.0	49.9	57.3	19.4	16.3	47.8	15.3	16.9
LnGrp LOS	E	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	620				16			725			970	
Approach Delay, s/veh	62.4				52.0			27.4			16.8	
Approach LOS	E				D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.3	72.7	17.0	19.0	19.0	65.0	9.0	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	7.3	16.6	13.4	2.7	3.7	13.4	2.4	19.4				
Green Ext Time (p_c), s	0.1	1.1	0.0	0.5	0.0	1.1	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	32.5											
HCM 2010 LOS	C											

TRAFFIC IMPACT ANAYLSIS











2020 Background PM Peak Hour
Traffic Capacity Analysis

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road







												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	231	164	307	21	77	39	172	419	23	40	468	156
Future Volume (veh/h)	231	164	307	21	77	39	172	419	23	40	468	156
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	243	173	323	23	86	43	183	446	24	43	503	168
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	326	452	385	208	568	267	508	2284	1022	607	2284	1022
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.65	0.65	0.65	0.65	0.65	0.65
Sat Flow, veh/h	1256	1863	1583	898	2338	1100	763	3539	1583	920	3539	1583
Grp Volume(v), veh/h	243	173	323	23	64	65	183	446	24	43	503	168
Grp Sat Flow(s),veh/h/ln	1256	1863	1583	898	1770	1669	763	1770	1583	920	1770	1583
Q Serve(g_s), s	22.7	9.3	23.3	2.6	3.4	3.7	15.6	6.1	0.7	2.4	7.0	5.1
Cycle Q Clear(g_c), s	26.4	9.3	23.3	11.9	3.4	3.7	22.7	6.1	0.7	8.5	7.0	5.1
Prop In Lane	1.00		1.00	1.00		0.66	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	326	452	385	208	430	405	508	2284	1022	607	2284	1022
V/C Ratio(X)	0.74	0.38	0.84	0.11	0.15	0.16	0.36	0.20	0.02	0.07	0.22	0.16
Avail Cap(c_a), veh/h	684	983	835	464	933	880	508	2284	1022	607	2284	1022
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.2	37.9	43.2	42.9	35.7	35.8	13.5	8.6	7.7	10.4	8.8	8.4
Incr Delay (d2), s/veh	1.3	0.2	1.9	0.1	0.1	0.1	2.0	0.2	0.0	0.2	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	4.8	10.3	0.7	1.7	1.7	3.5	3.0	0.3	0.6	3.5	2.3
LnGrp Delay(d),s/veh	47.5	38.1	45.1	43.0	35.7	35.9	15.5	8.8	7.7	10.6	9.0	8.8
LnGrp LOS	D	D	D	D	D	D	B	A	A	B	A	A
Approach Vol, veh/h	739			152			653			714		
Approach Delay, s/veh	44.2			36.9			10.6			9.1		
Approach LOS	D			D			B			A		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4		6		8				
Phs Duration (G+Y+Rc), s	84.2			35.8		84.2		35.8				
Change Period (Y+Rc), s	6.7			6.7		6.7		6.7				
Max Green Setting (Gmax), s	43.3			63.3		43.3		63.3				
Max Q Clear Time (g_c+I1), s	10.5			13.9		24.7		28.4				
Green Ext Time (p_c), s	2.8			0.8		2.7		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay				22.9								
HCM 2010 LOS				C								

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh	13.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	0	62	105	0	46	93	526	83	46	498	33
Future Vol, veh/h	21	0	62	105	0	46	93	526	83	46	498	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	82	82	82	92	92	92	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	0	78	128	0	56	101	572	90	47	513	34
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1096	-	257	1126	-	286	513	0	0	572	0	0
Stage 1	608	-	-	774	-	-	-	-	-	-	-	-
Stage 2	488	-	-	352	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	168	0	742	160	0	711	1049	-	-	997	-	-
Stage 1	450	0	-	357	0	-	-	-	-	-	-	-
Stage 2	530	0	-	638	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	138	-	742	~ 128	-	711	1049	-	-	997	-	-
Mov Cap-2 Maneuver	138	-	-	~ 128	-	-	-	-	-	-	-	-
Stage 1	407	-	-	323	-	-	-	-	-	-	-	-
Stage 2	441	-	-	544	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	17.2			104.5			1.2			0.7		
HCM LOS	C			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1049	-	-	138	742	128	711	997	-	-		
HCM Lane V/C Ratio	0.096	-	-	0.19	0.104	1	0.079	0.048	-	-		
HCM Control Delay (s)	8.8	-	-	37.1	10.4	145.7	10.5	8.8	-	-		
HCM Lane LOS	A	-	-	E	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	0.7	0.3	6.9	0.3	0.1	-	-		
Notes												
~: Volume exceeds capacity	\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon				

HCM 2010 TWSC
3: Thompson Peak Parkway & Puerta Del Viento

Intersection						
Int Delay, s/veh		2.2				
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	58	43	64	496	523	81
Future Vol, veh/h	58	43	64	496	523	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	86	86	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	51	74	577	545	84
Major/Minor	Minor2	Major1			Major2	
Conflicting Flow All	982	272	545	0	-	0
Stage 1	545	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	246	726	1020	-	-	-
Stage 1	545	-	-	-	-	-
Stage 2	619	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	228	726	1020	-	-	-
Mov Cap-2 Maneuver	228	-	-	-	-	-
Stage 1	545	-	-	-	-	-
Stage 2	574	-	-	-	-	-
Approach	EB	NB			SB	
HCM Control Delay, s	20.2	1			0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1020	-	228	726	-	-
HCM Lane V/C Ratio	0.073	-	0.303	0.071	-	-
HCM Control Delay (s)	8.8	-	27.5	10.3	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.2	0.2	-	-

TRAFFIC IMPACT ANAYLSIS























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	19	230	32	23	8	179	419	10	7	367	117
Future Volume (veh/h)	118	19	230	32	23	8	179	419	10	7	367	117
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	124	20	242	50	36	12	186	436	10	7	386	123
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.64	0.64	0.64	0.96	0.96	0.96	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	291	359	79	199	66	242	1708	764	222	1902	851
Arrive On Green	0.05	0.16	0.16	0.04	0.15	0.15	0.07	0.48	0.48	0.13	0.54	0.54
Sat Flow, veh/h	3442	1863	1583	1774	1338	446	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	124	20	242	50	0	48	186	436	10	7	386	123
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1784	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	4.3	1.1	16.7	3.3	0.0	2.8	6.4	8.7	0.4	0.4	6.8	4.7
Cycle Q Clear(g_c), s	4.3	1.1	16.7	3.3	0.0	2.8	6.4	8.7	0.4	0.4	6.8	4.7
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	291	359	79	0	265	242	1708	764	222	1902	851
V/C Ratio(X)	0.69	0.07	0.67	0.63	0.00	0.18	0.77	0.26	0.01	0.03	0.20	0.14
Avail Cap(c_a), veh/h	373	295	362	192	0	282	430	1708	764	222	1902	851
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.9	43.2	42.4	56.4	0.0	44.7	54.8	18.3	16.2	46.1	14.4	13.9
Incr Delay (d2), s/veh	1.7	0.0	4.0	3.1	0.0	0.1	2.0	0.4	0.0	0.3	0.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.6	7.7	1.7	0.0	1.4	3.1	4.3	0.2	0.2	3.4	2.1
LnGrp Delay(d),s/veh	57.6	43.2	46.3	59.5	0.0	44.8	56.8	18.7	16.2	46.4	14.7	14.3
LnGrp LOS	E	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	386			98			632			516		
Approach Delay, s/veh	49.8			52.3			29.9			15.0		
Approach LOS	D			D			C			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.4	71.5	10.3	25.8	19.0	64.9	9.3	26.8				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	8.4	8.8	6.3	4.8	2.4	10.7	5.3	18.7				
Green Ext Time (p_c), s	0.1	0.8	0.0	0.5	0.0	0.8	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				31.2								
HCM 2010 LOS				C								











2025 Background AM Peak Hour
Traffic Capacity Analysis

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	178	65	143	25	156	64	205	473	8	29	402	193
Future Volume (veh/h)	178	65	143	25	156	64	205	473	8	29	402	193
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	200	73	161	28	177	73	250	577	10	36	502	241
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.82	0.82	0.82	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	281	477	406	318	635	252	468	2237	1001	522	2237	1001
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.63	0.63	0.63	0.63	0.63	0.63
Sat Flow, veh/h	1125	1863	1583	1142	2475	983	714	3539	1583	825	3539	1583
Grp Volume(v), veh/h	200	73	161	28	125	125	250	577	10	36	502	241
Grp Sat Flow(s),veh/h/ln	1125	1863	1583	1142	1770	1689	714	1770	1583	825	1770	1583
Q Serve(g_s), s	20.8	3.6	10.1	2.3	6.8	7.2	27.7	8.6	0.3	2.4	7.3	7.9
Cycle Q Clear(g_c), s	28.0	3.6	10.1	6.0	6.8	7.2	35.0	8.6	0.3	11.0	7.3	7.9
Prop In Lane	1.00		1.00	1.00		0.58	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	281	477	406	318	454	433	468	2237	1001	522	2237	1001
V/C Ratio(X)	0.71	0.15	0.40	0.09	0.27	0.29	0.53	0.26	0.01	0.07	0.22	0.24
Avail Cap(c_a), veh/h	586	983	835	628	933	891	468	2237	1001	522	2237	1001
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.1	34.5	36.9	36.8	35.7	35.8	17.0	9.7	8.2	12.1	9.5	9.6
Incr Delay (d2), s/veh	1.2	0.1	0.2	0.0	0.1	0.1	4.3	0.3	0.0	0.3	0.2	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	1.9	4.5	0.7	3.3	3.4	6.0	4.3	0.1	0.6	3.6	3.6
LnGrp Delay(d),s/veh	48.3	34.6	37.2	36.9	35.8	36.0	21.3	10.0	8.2	12.4	9.7	10.2
LnGrp LOS	D	C	D	D	D	D	C	A	A	B	A	B
Approach Vol, veh/h	434			278			837			779		
Approach Delay, s/veh	41.9			36.0			13.3			10.0		
Approach LOS	D			D			B			A		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	82.5			37.5			82.5			37.5		
Change Period (Y+Rc), s	6.7			6.7			6.7			6.7		
Max Green Setting (Gmax), s	43.3			63.3			43.3			63.3		
Max Q Clear Time (g_c+I1), s	13.0			9.2			37.0			30.0		
Green Ext Time (p_c), s	3.6			0.8			2.3			0.8		
Intersection Summary												
HCM 2010 Ctrl Delay				20.2								
HCM 2010 LOS				C								

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh	9.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	4	61	0	25	44	497	170	78	545	19
Future Vol, veh/h	0	0	4	61	0	25	44	497	170	78	545	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	50	50	50	89	89	89	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	122	0	50	49	558	191	93	649	23
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1213	-	324	1167	-	279	649	0	0	558	0	0
Stage 1	835	-	-	657	-	-	-	-	-	-	-	-
Stage 2	378	-	-	510	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	138	0	672	149	0	718	933	-	-	1009	-	-
Stage 1	328	0	-	420	0	-	-	-	-	-	-	-
Stage 2	616	0	-	514	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	115	-	672	131	-	718	933	-	-	1009	-	-
Mov Cap-2 Maneuver	115	-	-	131	-	-	-	-	-	-	-	-
Stage 1	311	-	-	398	-	-	-	-	-	-	-	-
Stage 2	543	-	-	461	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.4			92			0.6			1.1		
HCM LOS	B			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	933	-	-	-	672	131	718	1009	-	-		
HCM Lane V/C Ratio	0.053	-	-	-	0.012	0.931	0.07	0.092	-	-		
HCM Control Delay (s)	9.1	-	-	0	10.4	125.4	10.4	8.9	-	-		
HCM Lane LOS	A	-	-	A	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.2	-	-	-	0	6.2	0.2	0.3	-	-		

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento

Intersection						
Int Delay, s/veh	18					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Vol, veh/h	170	145	35	449	544	73
Future Vol, veh/h	170	145	35	449	544	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	89	89	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	233	199	39	504	697	94
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1028	349	697	0	-	0
Stage 1	697	-	-	-	-	-
Stage 2	331	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 230	647	895	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	~ 220	647	895	-	-	-
Mov Cap-2 Maneuver	~ 220	-	-	-	-	-
Stage 1	455	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	72.8		0.7		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	895	-	220	647	-	-
HCM Lane V/C Ratio	0.044	-	1.059	0.307	-	-
HCM Control Delay (s)	9.2	-	123.8	13	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	10.2	1.3	-	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						
























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	293	36	224	4	1	5	131	465	18	19	452	244
Future Volume (veh/h)	293	36	224	4	1	5	131	465	18	19	452	244
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	349	43	267	6	2	8	164	581	22	28	655	354
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.84	0.84	0.84	0.62	0.62	0.62	0.80	0.80	0.80	0.69	0.69	0.69
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	295	352	74	30	120	219	1711	765	222	1927	862
Arrive On Green	0.11	0.16	0.16	0.04	0.09	0.09	0.06	0.48	0.48	0.13	0.54	0.54
Sat Flow, veh/h	3442	1863	1583	1774	326	1306	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	349	43	267	6	0	10	164	581	22	28	655	354
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1632	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	12.1	2.4	18.9	0.4	0.0	0.7	5.6	12.2	0.9	1.7	12.4	15.7
Cycle Q Clear(g_c), s	12.1	2.4	18.9	0.4	0.0	0.7	5.6	12.2	0.9	1.7	12.4	15.7
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	373	295	352	74	0	150	219	1711	765	222	1927	862
V/C Ratio(X)	0.94	0.15	0.76	0.08	0.00	0.07	0.75	0.34	0.03	0.13	0.34	0.41
Avail Cap(c_a), veh/h	373	295	352	192	0	258	430	1711	765	222	1927	862
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.1	43.5	43.7	55.3	0.0	49.8	55.2	19.2	16.2	46.7	15.3	16.0
Incr Delay (d2), s/veh	30.3	0.1	8.4	0.2	0.0	0.1	1.9	0.5	0.1	1.2	0.5	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	1.2	9.1	0.2	0.0	0.3	2.7	6.0	0.4	0.9	6.1	7.2
LnGrp Delay(d),s/veh	83.4	43.6	52.0	55.5	0.0	49.9	57.1	19.7	16.3	47.8	15.7	17.5
LnGrp LOS	F	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	659				16			767			1037	
Approach Delay, s/veh	68.1				52.0			27.6			17.2	
Approach LOS	E				D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.6	72.4	17.0	19.0	19.0	65.0	9.0	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	7.6	17.7	14.1	2.7	3.7	14.2	2.4	20.9				
Green Ext Time (p_c), s	0.1	1.2	0.0	0.6	0.0	1.2	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	34.2											
HCM 2010 LOS	C											

TRAFFIC IMPACT ANAYLSIS










2025 Background PM Peak Hour
Traffic Capacity Analysis

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road







																					
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR									
Lane Configurations																					
Traffic Volume (veh/h)	252	172	323	22	81	41	181	457	24	42	517	172									
Future Volume (veh/h)	252	172	323	22	81	41	181	457	24	42	517	172									
Number	3	8	18	7	4	14	1	6	16	5	2	12									
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0									
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00									
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863									
Adj Flow Rate, veh/h	265	181	340	24	90	46	193	486	26	45	556	185									
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1									
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.94	0.94	0.94	0.93	0.93	0.93									
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2									
Cap, veh/h	348	489	416	221	609	293	458	2215	991	561	2215	991									
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.63	0.63	0.63	0.63	0.63	0.63									
Sat Flow, veh/h	1248	1863	1583	877	2320	1115	715	3539	1583	885	3539	1583									
Grp Volume(v), veh/h	265	181	340	24	67	69	193	486	26	45	556	185									
Grp Sat Flow(s),veh/h/ln	1248	1863	1583	877	1770	1666	715	1770	1583	885	1770	1583									
Q Serve(g_s), s	24.9	9.5	24.2	2.8	3.5	3.8	19.7	7.1	0.7	2.8	8.4	5.9									
Cycle Q Clear(g_c), s	28.7	9.5	24.2	12.3	3.5	3.8	28.1	7.1	0.7	9.9	8.4	5.9									
Prop In Lane	1.00		1.00	1.00		0.67	1.00		1.00	1.00		1.00									
Lane Grp Cap(c), veh/h	348	489	416	221	465	437	458	2215	991	561	2215	991									
V/C Ratio(X)	0.76	0.37	0.82	0.11	0.14	0.16	0.42	0.22	0.03	0.08	0.25	0.19									
Avail Cap(c_a), veh/h	679	983	835	453	933	879	458	2215	991	561	2215	991									
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00									
Uniform Delay (d), s/veh	45.1	36.1	41.6	41.2	33.9	34.0	16.2	9.7	8.5	11.9	10.0	9.5									
Incr Delay (d2), s/veh	1.3	0.2	1.5	0.1	0.1	0.1	2.8	0.2	0.0	0.3	0.3	0.4									
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0									
%ile BackOfQ(50%),veh/ln	8.7	4.9	10.8	0.7	1.7	1.8	4.2	3.6	0.3	0.7	4.2	2.7									
LnGrp Delay(d),s/veh	46.4	36.3	43.1	41.2	34.0	34.1	19.0	10.0	8.6	12.2	10.2	9.9									
LnGrp LOS	D	D	D	D	C	C	B	A	A	B	B	A									
Approach Vol, veh/h	786			160			705			786											
Approach Delay, s/veh	42.6			35.1			12.4			10.3											
Approach LOS	D			D			B			B											
Timer	1	2	3	4	5	6	7	8													
Assigned Phs	2		4		6		8														
Phs Duration (G+Y+Rc), s	81.8		38.2		81.8		38.2														
Change Period (Y+Rc), s	6.7		6.7		6.7		6.7														
Max Green Setting (Gmax), s	43.3		63.3		43.3		63.3														
Max Q Clear Time (g_c+I1), s	11.9		14.3		30.1		30.7														
Green Ext Time (p_c), s	3.2		0.8		2.9		0.8														
Intersection Summary																					
HCM 2010 Ctrl Delay				23.0																	
HCM 2010 LOS				C																	

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh		36.6										
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	0	65	139	0	61	97	553	109	61	523	35
Future Vol, veh/h	22	0	65	139	0	61	97	553	109	61	523	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	82	82	82	92	92	92	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	0	81	170	0	74	105	601	118	63	539	36
Major/Minor												
	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1176	-	270	1207	-	301	539	0	0	601	0	0
Stage 1	665	-	-	812	-	-	-	-	-	-	-	-
Stage 2	511	-	-	395	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	147	0	728	~ 139	0	695	1025	-	-	972	-	-
Stage 1	416	0	-	339	0	-	-	-	-	-	-	-
Stage 2	514	0	-	602	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	115	-	728	~ 108	-	695	1025	-	-	972	-	-
Mov Cap-2 Maneuver	115	-	-	~ 108	-	-	-	-	-	-	-	-
Stage 1	373	-	-	304	-	-	-	-	-	-	-	-
Stage 2	412	-	-	500	-	-	-	-	-	-	-	-
Approach												
	EB			WB			NB			SB		
HCM Control Delay, s	19.5			257.9			1.1			0.9		
HCM LOS	C			F								
Minor Lane/Major Mvmt												
	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1025	-	-	115	728	108	695	972	-	-		
HCM Lane V/C Ratio	0.103	-	-	0.239	0.112	1.57	0.107	0.065	-	-		
HCM Control Delay (s)	8.9	-	-	45.9	10.6	\$ 366.4	10.8	9	-	-		
HCM Lane LOS	A	-	-	E	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	0.9	0.4	12.7	0.4	0.2	-	-		
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined				*: All major volume in platoon				

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento

Intersection						
Int Delay, s/veh		2.8				
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	61	45	67	536	564	86
Future Vol, veh/h	61	45	67	536	564	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	86	86	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	54	78	623	588	90
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1055	294	588	0	-	0
Stage 1	588	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Critical Hdwy	7.54	6.94	4.14	-	-	-
Critical Hdwy Stg 1	6.54	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	180	702	983	-	-	-
Stage 1	462	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	169	702	983	-	-	-
Mov Cap-2 Maneuver	169	-	-	-	-	-
Stage 1	425	-	-	-	-	-
Stage 2	502	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	28.4	1		0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	983	-	169	702	-	-
HCM Lane V/C Ratio	0.079	-	0.43	0.076	-	-
HCM Control Delay (s)	9	-	41.5	10.6	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.9	0.2	-	-

TRAFFIC IMPACT ANALYSIS

























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	19	246	34	24	9	192	450	11	8	394	123
Future Volume (veh/h)	125	19	246	34	24	9	192	450	11	8	394	123
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	132	20	259	53	38	14	200	469	11	8	415	129
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.64	0.64	0.64	0.96	0.96	0.96	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	188	295	368	82	195	72	256	1695	758	222	1875	839
Arrive On Green	0.05	0.16	0.16	0.05	0.15	0.15	0.07	0.48	0.48	0.13	0.53	0.53
Sat Flow, veh/h	3442	1863	1583	1774	1299	479	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	132	20	259	53	0	52	200	469	11	8	415	129
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1778	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	4.5	1.1	18.0	3.5	0.0	3.1	6.9	9.6	0.4	0.5	7.5	5.0
Cycle Q Clear(g_c), s	4.5	1.1	18.0	3.5	0.0	3.1	6.9	9.6	0.4	0.5	7.5	5.0
Prop In Lane	1.00		1.00	1.00		0.27	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	188	295	368	82	0	266	256	1695	758	222	1875	839
V/C Ratio(X)	0.70	0.07	0.70	0.65	0.00	0.20	0.78	0.28	0.01	0.04	0.22	0.15
Avail Cap(c_a), veh/h	373	295	368	192	0	282	430	1695	758	222	1875	839
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.8	43.0	42.2	56.3	0.0	44.7	54.6	18.8	16.4	46.1	15.0	14.5
Incr Delay (d2), s/veh	1.8	0.0	5.1	3.2	0.0	0.1	2.0	0.4	0.0	0.3	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.6	8.4	1.8	0.0	1.5	3.3	4.8	0.2	0.3	3.7	2.3
LnGrp Delay(d),s/veh	57.5	43.0	47.3	59.5	0.0	44.8	56.6	19.2	16.4	46.4	15.3	14.8
LnGrp LOS	E	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	411			105			680			552		
Approach Delay, s/veh	50.4			52.2			30.1			15.7		
Approach LOS	D			D			C			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.9	70.6	10.6	26.0	19.0	64.5	9.5	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	8.9	9.5	6.5	5.1	2.5	11.6	5.5	20.0				
Green Ext Time (p_c), s	0.1	0.9	0.0	0.6	0.0	0.9	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	31.6											
HCM 2010 LOS	C											











2020 Total AM Peak Hour
Traffic Capacity Analysis

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	193	62	136	24	148	61	195	483	7	28	398	193
Future Volume (veh/h)	193	62	136	24	148	61	195	483	7	28	398	193
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	217	70	153	27	168	69	238	589	9	35	498	241
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.82	0.82	0.82	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	298	493	419	332	656	259	463	2207	987	508	2207	987
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.62	0.62	0.62	0.62	0.62	0.62
Sat Flow, veh/h	1139	1863	1583	1153	2480	980	717	3539	1583	817	3539	1583
Grp Volume(v), veh/h	217	70	153	27	118	119	238	589	9	35	498	241
Grp Sat Flow(s),veh/h/ln	1139	1863	1583	1153	1770	1690	717	1770	1583	817	1770	1583
Q Serve(g_s), s	22.3	3.4	9.4	2.2	6.3	6.7	26.1	9.0	0.3	2.4	7.4	8.1
Cycle Q Clear(g_c), s	29.0	3.4	9.4	5.6	6.3	6.7	33.5	9.0	0.3	11.4	7.4	8.1
Prop In Lane	1.00		1.00	1.00		0.58	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	298	493	419	332	469	447	463	2207	987	508	2207	987
V/C Ratio(X)	0.73	0.14	0.36	0.08	0.25	0.27	0.51	0.27	0.01	0.07	0.23	0.24
Avail Cap(c_a), veh/h	597	983	835	635	933	891	463	2207	987	508	2207	987
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.4	33.7	35.9	35.9	34.8	34.9	17.2	10.2	8.6	12.8	9.9	10.0
Incr Delay (d2), s/veh	1.3	0.0	0.2	0.0	0.1	0.1	4.0	0.3	0.0	0.3	0.2	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	1.8	4.1	0.7	3.1	3.1	5.7	4.5	0.1	0.6	3.7	3.7
LnGrp Delay(d),s/veh	47.7	33.8	36.1	35.9	34.9	35.0	21.3	10.5	8.6	13.0	10.1	10.6
LnGrp LOS	D	C	D	D	C	D	C	B	A	B	B	B
Approach Vol, veh/h	440			264			836			774		
Approach Delay, s/veh	41.4			35.0			13.5			10.4		
Approach LOS	D			D			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	81.5		38.5		81.5		38.5					
Change Period (Y+Rc), s	6.7		6.7		6.7		6.7					
Max Green Setting (Gmax), s	43.3		63.3		43.3		63.3					
Max Q Clear Time (g_c+I1), s	13.4		8.7		35.5		31.0					
Green Ext Time (p_c), s	3.6		0.7		2.6		0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	20.3											
HCM 2010 LOS	C											

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh	24.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	4	85	0	36	42	473	224	100	518	19
Future Vol, veh/h	0	0	4	85	0	36	42	473	224	100	518	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	50	50	50	89	89	89	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	170	0	72	47	531	252	119	617	23
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1215	-	308	1172	-	266	617	0	0	531	0	0
Stage 1	855	-	-	626	-	-	-	-	-	-	-	-
Stage 2	360	-	-	546	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	137	0	688	~ 148	0	732	959	-	-	1033	-	-
Stage 1	319	0	-	439	0	-	-	-	-	-	-	-
Stage 2	631	0	-	490	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	108	-	688	~ 128	-	732	959	-	-	1033	-	-
Mov Cap-2 Maneuver	108	-	-	~ 128	-	-	-	-	-	-	-	-
Stage 1	303	-	-	417	-	-	-	-	-	-	-	-
Stage 2	541	-	-	429	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.3			183.1			0.5			1.4		
HCM LOS	B			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	959	-	-	-	688	128	732	1033	-	-		
HCM Lane V/C Ratio	0.049	-	-	-	0.012	1.328	0.098	0.115	-	-		
HCM Control Delay (s)	8.9	-	-	0	10.3	256.2	10.5	8.9	-	-		
HCM Lane LOS	A	-	-	A	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.2	-	-	-	0	11	0.3	0.4	-	-		
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento























Intersection						
Int Delay, s/veh	14.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Vol, veh/h	162	138	33	438	541	69
Future Vol, veh/h	162	138	33	438	541	69
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	89	89	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	222	189	37	492	694	88
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1014	347	694	0	-	0
Stage 1	694	-	-	-	-	-
Stage 2	320	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	235	649	897	-	-	-
Stage 1	457	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	225	649	897	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	457	-	-	-	-	-
Stage 2	680	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	61.1		0.6		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	897	-	225	649	-	-
HCM Lane V/C Ratio	0.041	-	0.986	0.291	-	-
HCM Control Delay (s)	9.2	-	102.2	12.8	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	8.9	1.2	-	-

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	279	34	222	4	1	5	130	449	18	19	445	232
Future Volume (veh/h)	279	34	222	4	1	5	130	449	18	19	445	232
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	332	40	264	6	2	8	162	561	22	28	645	336
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.84	0.84	0.84	0.62	0.62	0.62	0.80	0.80	0.80	0.69	0.69	0.69
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	295	351	74	30	120	217	1711	765	222	1930	863
Arrive On Green	0.11	0.16	0.16	0.04	0.09	0.09	0.06	0.48	0.48	0.13	0.55	0.55
Sat Flow, veh/h	3442	1863	1583	1774	326	1306	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	332	40	264	6	0	10	162	561	22	28	645	336
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1632	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	11.4	2.2	18.7	0.4	0.0	0.7	5.6	11.7	0.9	1.7	12.2	14.7
Cycle Q Clear(g_c), s	11.4	2.2	18.7	0.4	0.0	0.7	5.6	11.7	0.9	1.7	12.2	14.7
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	373	295	351	74	0	150	217	1711	765	222	1930	863
V/C Ratio(X)	0.89	0.14	0.75	0.08	0.00	0.07	0.75	0.33	0.03	0.13	0.33	0.39
Avail Cap(c_a), veh/h	373	295	351	192	0	258	430	1711	765	222	1930	863
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.8	43.4	43.6	55.3	0.0	49.8	55.3	19.0	16.2	46.7	15.2	15.8
Incr Delay (d2), s/veh	21.7	0.1	8.0	0.2	0.0	0.1	1.9	0.5	0.1	1.2	0.5	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	1.2	8.9	0.2	0.0	0.3	2.7	5.8	0.4	0.9	6.0	6.7
LnGrp Delay(d),s/veh	74.5	43.5	51.6	55.5	0.0	49.9	57.2	19.5	16.3	47.8	15.6	17.1
LnGrp LOS	E	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	636				16			745			1009	
Approach Delay, s/veh	63.1				52.0			27.6			17.0	
Approach LOS	E				D			C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.6	72.4	17.0	19.0	19.0	65.0	9.0	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	7.6	16.7	13.4	2.7	3.7	13.7	2.4	20.7				
Green Ext Time (p_c), s	0.1	1.2	0.0	0.5	0.0	1.2	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	32.7											
HCM 2010 LOS	C											

TRAFFIC IMPACT ANAYLSIS
























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	4	85	0	36	42	473	224	100	518	19
Future Volume (veh/h)	0	0	4	85	0	36	42	473	224	100	518	19
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863	1863	0	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	0	8	170	0	72	47	531	252	119	617	23
Adj No. of Lanes	1	0	1	1	0	1	1	2	1	1	2	1
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.89	0.89	0.89	0.84	0.84	0.84
Percent Heavy Veh, %	2	0	2	2	0	2	2	2	2	2	2	2
Cap, veh/h	262	0	0	262	0	0	667	2873	1285	596	2873	1285
Arrive On Green	0.00	0.00	0.00	0.11	0.00	0.00	0.81	0.81	0.81	0.81	0.81	0.81
Sat Flow, veh/h	1774	0		1774	170		786	3539	1583	688	3539	1583
Grp Volume(v), veh/h	0	0.0		170	54.8		47	531	252	119	617	23
Grp Sat Flow(s),veh/h/ln	1774			1774	D		786	1770	1583	688	1770	1583
Q Serve(g_s), s	0.0			11.3			1.7	4.0	4.3	5.6	4.8	0.3
Cycle Q Clear(g_c), s	0.0			11.3			6.5	4.0	4.3	9.5	4.8	0.3
Prop In Lane	1.00			1.00			1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262			262			667	2873	1285	596	2873	1285
V/C Ratio(X)	0.00			0.65			0.07	0.18	0.20	0.20	0.21	0.02
Avail Cap(c_a), veh/h	262			438			667	2873	1285	596	2873	1285
HCM Platoon Ratio	1.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0			52.1			3.3	2.5	2.5	3.6	2.6	2.2
Incr Delay (d2), s/veh	0.0			2.7			0.2	0.1	0.3	0.8	0.2	0.0
Initial Q Delay(d3),s/veh	0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0			5.7			0.4	2.0	2.0	1.1	2.4	0.2
LnGrp Delay(d),s/veh	0.0			54.8			3.5	2.6	2.9	4.3	2.7	2.2
LnGrp LOS				D			A	A	A	A	A	A
Approach Vol, veh/h									830			
Approach Delay, s/veh									2.8			
Approach LOS									A			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		3			6	7					
Phs Duration (G+Y+Rc), s	101.9		18.1			101.9	18.1					
Change Period (Y+Rc), s	4.5		4.5			4.5	4.5					
Max Green Setting (Gmax), s	62.5		5.5			62.5	25.5					
Max Q Clear Time (g_c+I1), s	11.5		0.0			8.5	13.3					
Green Ext Time (p_c), s	13.0		0.0			13.2	0.4					
Intersection Summary												
HCM 2010 Ctrl Delay					7.9							
HCM 2010 LOS					A							











2020 Total PM Peak Hour
Traffic Capacity Analysis

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	164	307	21	77	39	172	466	23	40	529	190
Future Volume (veh/h)	257	164	307	21	77	39	172	466	23	40	529	190
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	271	173	323	23	86	43	183	496	24	43	569	204
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	354	492	418	229	617	290	444	2210	989	555	2210	989
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.62	0.62	0.62	0.62	0.62	0.62
Sat Flow, veh/h	1256	1863	1583	898	2338	1100	694	3539	1583	878	3539	1583
Grp Volume(v), veh/h	271	173	323	23	64	65	183	496	24	43	569	204
Grp Sat Flow(s),veh/h/ln	1256	1863	1583	898	1770	1669	694	1770	1583	878	1770	1583
Q Serve(g_s), s	25.3	9.0	22.6	2.6	3.3	3.6	19.2	7.3	0.7	2.7	8.6	6.7
Cycle Q Clear(g_c), s	28.9	9.0	22.6	11.6	3.3	3.6	27.9	7.3	0.7	10.0	8.6	6.7
Prop In Lane	1.00		1.00	1.00		0.66	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	354	492	418	229	467	440	444	2210	989	555	2210	989
V/C Ratio(X)	0.77	0.35	0.77	0.10	0.14	0.15	0.41	0.22	0.02	0.08	0.26	0.21
Avail Cap(c_a), veh/h	685	983	835	466	933	880	444	2210	989	555	2210	989
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.9	35.8	40.8	40.5	33.7	33.8	16.3	9.8	8.6	12.0	10.1	9.7
Incr Delay (d2), s/veh	1.3	0.2	1.2	0.1	0.0	0.1	2.8	0.2	0.0	0.3	0.3	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	4.7	10.0	0.6	1.6	1.7	4.0	3.7	0.3	0.7	4.3	3.0
LnGrp Delay(d),s/veh	46.2	36.0	42.0	40.6	33.8	33.9	19.1	10.1	8.6	12.3	10.4	10.2
LnGrp LOS	D	D	D	D	C	C	B	B	A	B	B	B
Approach Vol, veh/h	767			152			703			816		
Approach Delay, s/veh	42.1			34.9			12.4			10.4		
Approach LOS	D			C			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	81.6		38.4		81.6		38.4					
Change Period (Y+Rc), s	6.7		6.7		6.7		6.7					
Max Green Setting (Gmax), s	43.3		63.3		43.3		63.3					
Max Q Clear Time (g_c+I1), s	12.0		13.6		29.9		30.9					
Green Ext Time (p_c), s	3.3		0.8		3.0		0.8					
Intersection Summary												
HCM 2010 Ctrl Delay	22.5											
HCM 2010 LOS	C											

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh	81.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	0	62	200	0	87	93	526	156	77	498	33
Future Vol, veh/h	21	0	62	200	0	87	93	526	156	77	498	33
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	82	82	82	92	92	92	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	0	78	244	0	106	101	572	170	79	513	34
Major/Minor												
	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1160	-	257	1189	-	286	513	0	0	572	0	0
Stage 1	672	-	-	774	-	-	-	-	-	-	-	-
Stage 2	488	-	-	415	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	151	0	742	~ 143	0	711	1049	-	-	997	-	-
Stage 1	412	0	-	357	0	-	-	-	-	-	-	-
Stage 2	530	0	-	585	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	112	-	742	~ 112	-	711	1049	-	-	997	-	-
Mov Cap-2 Maneuver	112	-	-	~ 112	-	-	-	-	-	-	-	-
Stage 1	372	-	-	323	-	-	-	-	-	-	-	-
Stage 2	407	-	-	482	-	-	-	-	-	-	-	-
Approach												
	EB			WB			NB			SB		
HCM Control Delay, s	19.6			\$ 436.1			1.1			1.1		
HCM LOS	C			F								
Minor Lane/Major Mvmt												
	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1049	-	-	112	742	112	711	997	-	-		
HCM Lane V/C Ratio	0.096	-	-	0.234	0.104	2.178	0.149	0.08	-	-		
HCM Control Delay (s)	8.8	-	-	46.7	10.4	\$ 621.1	10.9	8.9	-	-		
HCM Lane LOS	A	-	-	E	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	0.9	0.3	20.9	0.5	0.3	-	-		
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento





















Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Vol, veh/h	58	43	64	537	554	81
Future Vol, veh/h	58	43	64	537	554	81
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	86	86	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	51	74	624	577	84
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1038	289	577	0	-	0
Stage 1	577	-	-	-	-	-
Stage 2	461	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	227	708	993	-	-	-
Stage 1	525	-	-	-	-	-
Stage 2	601	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	210	708	993	-	-	-
Mov Cap-2 Maneuver	210	-	-	-	-	-
Stage 1	525	-	-	-	-	-
Stage 2	556	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	21.9		0.9		0	
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	993	-	210	708	-	-
HCM Lane V/C Ratio	0.075	-	0.329	0.072	-	-
HCM Control Delay (s)	8.9	-	30.3	10.5	-	-
HCM Lane LOS	A	-	D	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.4	0.2	-	-

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	19	240	32	23	8	193	446	10	7	388	117
Future Volume (veh/h)	118	19	240	32	23	8	193	446	10	7	388	117
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	124	20	253	50	36	12	201	465	10	7	408	123
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.64	0.64	0.64	0.96	0.96	0.96	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	295	369	79	201	67	257	1701	761	222	1879	841
Arrive On Green	0.05	0.16	0.16	0.04	0.15	0.15	0.07	0.48	0.48	0.13	0.53	0.53
Sat Flow, veh/h	3442	1863	1583	1774	1338	446	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	124	20	253	50	0	48	201	465	10	7	408	123
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1784	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	4.3	1.1	17.5	3.3	0.0	2.8	6.9	9.4	0.4	0.4	7.3	4.7
Cycle Q Clear(g_c), s	4.3	1.1	17.5	3.3	0.0	2.8	6.9	9.4	0.4	0.4	7.3	4.7
Prop In Lane	1.00		1.00	1.00		0.25	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	295	369	79	0	268	257	1701	761	222	1879	841
V/C Ratio(X)	0.69	0.07	0.69	0.63	0.00	0.18	0.78	0.27	0.01	0.03	0.22	0.15
Avail Cap(c_a), veh/h	373	295	369	192	0	282	430	1701	761	222	1879	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.9	43.0	42.0	56.4	0.0	44.5	54.6	18.6	16.3	46.1	14.9	14.3
Incr Delay (d2), s/veh	1.7	0.0	4.4	3.1	0.0	0.1	2.0	0.4	0.0	0.3	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.6	8.1	1.7	0.0	1.4	3.3	4.7	0.2	0.2	3.6	2.1
LnGrp Delay(d),s/veh	57.6	43.0	46.4	59.5	0.0	44.6	56.6	19.0	16.3	46.4	15.2	14.7
LnGrp LOS	E	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	397		98				676			538		
Approach Delay, s/veh	49.7		52.2				30.2			15.5		
Approach LOS	D		D				C			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.9	70.7	10.3	26.0	19.0	64.7	9.3	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	8.9	9.3	6.3	4.8	2.4	11.4	5.3	19.5				
Green Ext Time (p_c), s	0.1	0.8	0.0	0.6	0.0	0.8	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			31.3									
HCM 2010 LOS			C									

TRAFFIC IMPACT ANAYLSIS























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	0	62	200	0	87	93	526	156	77	498	33
Future Volume (veh/h)	21	0	62	200	0	87	93	526	156	77	498	33
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863	1863	0	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	26	0	78	244	0	106	101	572	170	79	513	34
Adj No. of Lanes	1	0	1	1	0	1	1	2	1	1	2	1
Peak Hour Factor	0.80	0.80	0.80	0.82	0.82	0.82	0.92	0.92	0.92	0.97	0.97	0.97
Percent Heavy Veh, %	2	0	2	2	0	2	2	2	2	2	2	2
Cap, veh/h	338	0	0	338	0	0	685	2721	1217	578	2721	1217
Arrive On Green	0.16	0.00	0.00	0.16	0.00	0.00	0.77	0.77	0.77	0.77	0.77	0.77
Sat Flow, veh/h	1774	26		1774	244		856	3539	1583	715	3539	1583
Grp Volume(v), veh/h	26	43.4		244	52.4		101	572	170	79	513	34
Grp Sat Flow(s),veh/h/ln	1774	D		1774	D		856	1770	1583	715	1770	1583
Q Serve(g_s), s	1.5			16.1			4.3	5.3	3.3	4.1	4.7	0.6
Cycle Q Clear(g_c), s	1.5			16.1			9.0	5.3	3.3	9.5	4.7	0.6
Prop In Lane	1.00			1.00			1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	338			338			685	2721	1217	578	2721	1217
V/C Ratio(X)	0.08			0.72			0.15	0.21	0.14	0.14	0.19	0.03
Avail Cap(c_a), veh/h	338			542			685	2721	1217	578	2721	1217
HCM Platoon Ratio	1.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3			49.4			5.0	3.8	3.6	5.1	3.7	3.3
Incr Delay (d2), s/veh	0.1			2.9			0.5	0.2	0.2	0.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7			8.1			1.1	2.6	1.5	0.9	2.3	0.3
LnGrp Delay(d),s/veh	43.4			52.4			5.4	4.0	3.8	5.6	3.9	3.3
LnGrp LOS	D			D			A	A	A	A	A	A
Approach Vol, veh/h									843			
Approach Delay, s/veh									4.1			
Approach LOS									A			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		3				6		7			
Phs Duration (G+Y+Rc), s	96.8		23.2				96.8		23.2			
Change Period (Y+Rc), s	4.5		4.5				4.5		4.5			
Max Green Setting (Gmax), s	55.5		7.5				55.5		32.5			
Max Q Clear Time (g_c+I1), s	11.5		3.5				11.0		18.1			
Green Ext Time (p_c), s	11.3		0.0				11.3		0.6			
Intersection Summary												
HCM 2010 Ctrl Delay					11.5							
HCM 2010 LOS					B							











2025 Total AM Peak Hour
Traffic Capacity Analysis

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	212	65	143	25	156	64	205	534	8	29	427	207
Future Volume (veh/h)	212	65	143	25	156	64	205	534	8	29	427	207
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	238	73	161	28	177	73	250	651	10	36	534	259
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.89	0.89	0.89	0.88	0.88	0.88	0.82	0.82	0.82	0.80	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	319	535	455	355	711	282	421	2128	952	454	2128	952
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	1125	1863	1583	1142	2475	983	681	3539	1583	771	3539	1583
Grp Volume(v), veh/h	238	73	161	28	125	125	250	651	10	36	534	259
Grp Sat Flow(s),veh/h/ln	1125	1863	1583	1142	1770	1689	681	1770	1583	771	1770	1583
Q Serve(g_s), s	24.8	3.5	9.7	2.2	6.5	6.9	32.7	10.8	0.3	2.9	8.5	9.4
Cycle Q Clear(g_c), s	31.7	3.5	9.7	5.7	6.5	6.9	41.2	10.8	0.3	13.7	8.5	9.4
Prop In Lane	1.00		1.00	1.00		0.58	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	319	535	455	355	508	485	421	2128	952	454	2128	952
V/C Ratio(X)	0.75	0.14	0.35	0.08	0.25	0.26	0.59	0.31	0.01	0.08	0.25	0.27
Avail Cap(c_a), veh/h	589	983	835	629	933	891	421	2128	952	454	2128	952
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.1	31.7	33.9	33.9	32.8	32.9	20.9	11.7	9.6	15.0	11.2	11.4
Incr Delay (d2), s/veh	1.3	0.0	0.2	0.0	0.1	0.1	6.0	0.4	0.0	0.3	0.3	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	1.8	4.3	0.7	3.2	3.2	6.8	5.4	0.1	0.7	4.2	4.3
LnGrp Delay(d),s/veh	46.4	31.8	34.1	33.9	32.9	33.0	26.9	12.1	9.6	15.4	11.5	12.1
LnGrp LOS	D	C	C	C	C	C	C	B	A	B	B	B
Approach Vol, veh/h	472			278			911			829		
Approach Delay, s/veh	40.0			33.1			16.1			11.9		
Approach LOS	D			C			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	78.9			41.1			78.9			41.1		
Change Period (Y+Rc), s	6.7			6.7			6.7			6.7		
Max Green Setting (Gmax), s	43.3			63.3			43.3			63.3		
Max Q Clear Time (g_c+I1), s	15.7			8.9			43.2			33.7		
Green Ext Time (p_c), s	4.1			0.8			0.1			0.8		
Intersection Summary												
HCM 2010 Ctrl Delay				21.1								
HCM 2010 LOS				C								

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way
























Intersection												
Int Delay, s/veh	53.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	4	100	0	42	44	497	170	119	545	19
Future Vol, veh/h	0	0	4	100	0	42	44	497	170	119	545	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	50	50	50	89	89	89	84	84	84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	8	200	0	84	49	558	191	142	649	23
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1310	-	324	1265	-	279	649	0	0	558	0	0
Stage 1	932	-	-	657	-	-	-	-	-	-	-	-
Stage 2	378	-	-	608	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	117	0	672	~ 126	0	718	933	-	-	1009	-	-
Stage 1	287	0	-	420	0	-	-	-	-	-	-	-
Stage 2	616	0	-	450	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	89	-	672	~ 107	-	718	933	-	-	1009	-	-
Mov Cap-2 Maneuver	89	-	-	~ 107	-	-	-	-	-	-	-	-
Stage 1	272	-	-	398	-	-	-	-	-	-	-	-
Stage 2	515	-	-	382	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	10.4			\$ 349.8			0.6			1.6		
HCM LOS	B			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	933	-	-	-	672	107	718	1009	-	-		
HCM Lane V/C Ratio	0.053	-	-	-	0.012	1.869	0.117	0.14	-	-		
HCM Control Delay (s)	9.1	-	-	0	10.4	492.2	10.7	9.2	-	-		
HCM Lane LOS	A	-	-	A	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.2	-	-	-	0	16.2	0.4	0.5	-	-		
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento























Intersection						
Int Delay, s/veh	22.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↱	↱	↱
Traffic Vol, veh/h	170	145	35	466	585	73
Future Vol, veh/h	170	145	35	466	585	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	73	73	89	89	78	78
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	233	199	39	524	750	94
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1090	375	750	0	-	0
Stage 1	750	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 210	623	855	-	-	-
Stage 1	427	-	-	-	-	-
Stage 2	692	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	~ 200	623	855	-	-	-
Mov Cap-2 Maneuver	~ 200	-	-	-	-	-
Stage 1	427	-	-	-	-	-
Stage 2	660	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	94.7		0.7		0	
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	855	-	200	623	-	-
HCM Lane V/C Ratio	0.046	-	1.164	0.319	-	-
HCM Control Delay (s)	9.4	-	163.9	13.5	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.1	-	11.6	1.4	-	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	293	36	238	4	1	5	137	476	18	19	479	244
Future Volume (veh/h)	293	36	238	4	1	5	137	476	18	19	479	244
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	349	43	283	6	2	8	171	595	22	28	694	354
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.84	0.84	0.84	0.62	0.62	0.62	0.80	0.80	0.80	0.69	0.69	0.69
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	373	295	355	74	30	120	226	1711	765	222	1920	859
Arrive On Green	0.11	0.16	0.16	0.04	0.09	0.09	0.07	0.48	0.48	0.13	0.54	0.54
Sat Flow, veh/h	3442	1863	1583	1774	326	1306	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	349	43	283	6	0	10	171	595	22	28	694	354
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1632	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	12.1	2.4	19.0	0.4	0.0	0.7	5.9	12.5	0.9	1.7	13.4	15.8
Cycle Q Clear(g_c), s	12.1	2.4	19.0	0.4	0.0	0.7	5.9	12.5	0.9	1.7	13.4	15.8
Prop In Lane	1.00		1.00	1.00		0.80	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	373	295	355	74	0	150	226	1711	765	222	1920	859
V/C Ratio(X)	0.94	0.15	0.80	0.08	0.00	0.07	0.76	0.35	0.03	0.13	0.36	0.41
Avail Cap(c_a), veh/h	373	295	355	192	0	258	430	1711	765	222	1920	859
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.1	43.5	44.0	55.3	0.0	49.8	55.1	19.3	16.2	46.7	15.6	16.2
Incr Delay (d2), s/veh	30.3	0.1	11.2	0.2	0.0	0.1	1.9	0.6	0.1	1.2	0.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	1.2	10.0	0.2	0.0	0.3	2.9	6.2	0.4	0.9	6.7	7.2
LnGrp Delay(d),s/veh	83.4	43.6	55.1	55.5	0.0	49.9	57.0	19.8	16.3	47.8	16.1	17.6
LnGrp LOS	F	D	E	E		D	E	B	B	D	B	B
Approach Vol, veh/h	675		16				788		1076			
Approach Delay, s/veh	69.0		52.0				27.8		17.5			
Approach LOS	E		D				C		B			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.9	72.1	17.0	19.0	19.0	65.0	9.0	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	7.9	17.8	14.1	2.7	3.7	14.5	2.4	21.0				
Green Ext Time (p_c), s	0.1	1.3	0.0	0.6	0.0	1.3	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			34.5									
HCM 2010 LOS			C									

TRAFFIC IMPACT ANAYLSIS
























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	4	100	0	42	44	497	170	119	545	19
Future Volume (veh/h)	0	0	4	100	0	42	44	497	170	119	545	19
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	0	1863	1863	0	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	0	8	200	0	84	49	558	191	142	649	23
Adj No. of Lanes	1	0	1	1	0	1	1	2	1	1	2	1
Peak Hour Factor	0.50	0.50	0.50	0.50	0.50	0.50	0.89	0.89	0.89	0.84	0.84	0.84
Percent Heavy Veh, %	2	0	2	2	0	2	2	2	2	2	2	2
Cap, veh/h	292	0	0	292	0	0	631	2813	1258	597	2813	1258
Arrive On Green	0.00	0.00	0.00	0.13	0.00	0.00	0.79	0.79	0.79	0.79	0.79	0.79
Sat Flow, veh/h	1774	0		1774	200		763	3539	1583	710	3539	1583
Grp Volume(v), veh/h	0	0.0		200	53.9		49	558	191	142	649	23
Grp Sat Flow(s),veh/h/ln1774				1774	D		763	1770	1583	710	1770	1583
Q Serve(g_s), s	0.0			13.2			2.1	4.6	3.4	7.3	5.5	0.4
Cycle Q Clear(g_c), s	0.0			13.2			7.6	4.6	3.4	11.9	5.5	0.4
Prop In Lane	1.00			1.00			1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	292			292			631	2813	1258	597	2813	1258
V/C Ratio(X)	0.00			0.68			0.08	0.20	0.15	0.24	0.23	0.02
Avail Cap(c_a), veh/h	292			438			631	2813	1258	597	2813	1258
HCM Platoon Ratio	1.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0			51.1			4.0	3.0	2.9	4.5	3.1	2.6
Incr Delay (d2), s/veh	0.0			2.8			0.2	0.2	0.3	0.9	0.2	0.0
Initial Q Delay(d3),s/veh	0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln0.0				6.7			0.5	2.3	1.6	1.6	2.8	0.2
LnGrp Delay(d),s/veh	0.0			53.9			4.3	3.2	3.1	5.4	3.3	2.6
LnGrp LOS				D			A	A	A	A	A	A
Approach Vol, veh/h									798			
Approach Delay, s/veh									3.2			
Approach LOS									A			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3			6	7					
Phs Duration (G+Y+Rc), s		99.9	20.1			99.9	20.1					
Change Period (Y+Rc), s		4.5	4.5			4.5	4.5					
Max Green Setting (Gmax), s		62.5	5.5			62.5	25.5					
Max Q Clear Time (g_c+l1), s		13.9	0.0			9.6	15.2					
Green Ext Time (p_c), s		13.6	0.0			13.8	0.4					
Intersection Summary												
HCM 2010 Ctrl Delay			9.0									
HCM 2010 LOS			A									











2025 Total PM Peak Hour
Traffic Capacity Analysis

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
1: Thompson Peak Parkway & Bell Road

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	278	172	323	22	81	41	181	504	24	42	578	206
Future Volume (veh/h)	278	172	323	22	81	41	181	504	24	42	578	206
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	293	181	340	24	90	46	193	536	26	45	622	222
Adj No. of Lanes	1	1	1	1	2	0	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.90	0.90	0.90	0.94	0.94	0.94	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	376	528	449	241	658	316	398	2140	957	511	2140	957
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.60	0.60	0.60	0.60	0.60	0.60
Sat Flow, veh/h	1248	1863	1583	877	2320	1115	650	3539	1583	845	3539	1583
Grp Volume(v), veh/h	293	181	340	24	67	69	193	536	26	45	622	222
Grp Sat Flow(s),veh/h/ln	1248	1863	1583	877	1770	1666	650	1770	1583	845	1770	1583
Q Serve(g_s), s	27.5	9.3	23.5	2.7	3.4	3.7	24.3	8.5	0.8	3.1	10.1	7.7
Cycle Q Clear(g_c), s	31.2	9.3	23.5	11.9	3.4	3.7	34.4	8.5	0.8	11.6	10.1	7.7
Prop In Lane	1.00		1.00	1.00		0.67	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	376	528	449	241	502	473	398	2140	957	511	2140	957
V/C Ratio(X)	0.78	0.34	0.76	0.10	0.13	0.15	0.48	0.25	0.03	0.09	0.29	0.23
Avail Cap(c_a), veh/h	680	983	835	455	933	879	398	2140	957	511	2140	957
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.8	34.1	39.2	38.8	32.0	32.1	19.6	11.1	9.5	13.8	11.4	10.9
Incr Delay (d2), s/veh	1.3	0.1	1.0	0.1	0.0	0.1	4.2	0.3	0.1	0.3	0.3	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	4.8	10.4	0.7	1.7	1.7	4.8	4.2	0.4	0.8	5.0	3.5
LnGrp Delay(d),s/veh	45.1	34.2	40.2	38.9	32.0	32.2	23.8	11.3	9.6	14.1	11.7	11.5
LnGrp LOS	D	C	D	D	C	C	C	B	A	B	B	B
Approach Vol, veh/h	814			160			755			889		
Approach Delay, s/veh	40.6			33.1			14.5			11.8		
Approach LOS	D			C			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	79.3			40.7			79.3			40.7		
Change Period (Y+Rc), s	6.7			6.7			6.7			6.7		
Max Green Setting (Gmax), s	43.3			63.3			43.3			63.3		
Max Q Clear Time (g_c+I1), s	13.6			13.9			36.4			33.2		
Green Ext Time (p_c), s	3.8			0.8			2.5			0.8		
Intersection Summary												
HCM 2010 Ctrl Delay				22.8								
HCM 2010 LOS				C								

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way































Intersection												
Int Delay, s/veh	144.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	22	0	65	234	0	102	97	553	109	92	523	35
Future Vol, veh/h	22	0	65	234	0	102	97	553	109	92	523	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	160	-	-	50	-	0	290	-	90	250	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	82	82	82	92	92	92	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	0	81	285	0	124	105	601	118	95	539	36
Major/Minor												
	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1240	-	270	1271	-	301	539	0	0	601	0	0
Stage 1	729	-	-	812	-	-	-	-	-	-	-	-
Stage 2	511	-	-	459	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	131	0	728	~ 125	0	695	1025	-	-	972	-	-
Stage 1	380	0	-	339	0	-	-	-	-	-	-	-
Stage 2	514	0	-	551	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	92	-	728	~ 95	-	695	1025	-	-	972	-	-
Mov Cap-2 Maneuver	92	-	-	~ 95	-	-	-	-	-	-	-	-
Stage 1	341	-	-	304	-	-	-	-	-	-	-	-
Stage 2	379	-	-	442	-	-	-	-	-	-	-	-
Approach												
	EB			WB			NB			SB		
HCM Control Delay, s	23.1			\$ 698.6			1.1			1.3		
HCM LOS	C			F								
Minor Lane/Major Mvmt												
	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1025	-	-	92	728	95	695	972	-	-		
HCM Lane V/C Ratio	0.103	-	-	0.299	0.112	3.004	0.179	0.098	-	-		
HCM Control Delay (s)	8.9	-	-	60	10.6	998.2	11.3	9.1	-	-		
HCM Lane LOS	A	-	-	F	B	F	B	A	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	1.1	0.4	27.7	0.6	0.3	-	-		
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

TRAFFIC IMPACT ANALYSIS

HCM 2010 TWSC Thompson Peak Pkwy & Windgate Ranch Rd
3: Thompson Peak Parkway & Puerta Del Viento

Intersection						
Int Delay, s/veh	2.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰↱	↰↱	↰↱	↰↱
Traffic Vol, veh/h	61	45	67	577	595	86
Future Vol, veh/h	61	45	67	577	595	86
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	115	-	200	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	86	86	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	54	78	671	620	90
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1111	310	620	0	-	0
Stage 1	620	-	-	-	-	-
Stage 2	491	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	203	686	956	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	581	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	186	686	956	-	-	-
Mov Cap-2 Maneuver	186	-	-	-	-	-
Stage 1	499	-	-	-	-	-
Stage 2	534	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	25.4		0.9		0	
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	956	-	186	686	-	-
HCM Lane V/C Ratio	0.081	-	0.39	0.078	-	-
HCM Control Delay (s)	9.1	-	36.2	10.7	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0.3	-	1.7	0.3	-	-























HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
4: Thompson Peak Parkway & Legacy Boulevard

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 		 	 			 	 		 		 
Traffic Volume (veh/h)	125	19	256	34	24	9	206	477	11	8	415	123
Future Volume (veh/h)	125	19	256	34	24	9	206	477	11	8	415	123
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	132	20	269	53	38	14	215	497	11	8	437	129
Adj No. of Lanes	2	1	1	1	1	0	2	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.64	0.64	0.64	0.96	0.96	0.96	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	188	295	375	82	195	72	271	1695	758	222	1859	832
Arrive On Green	0.05	0.16	0.16	0.05	0.15	0.15	0.08	0.48	0.48	0.13	0.53	0.53
Sat Flow, veh/h	3442	1863	1583	1774	1299	479	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	132	20	269	53	0	52	215	497	11	8	437	129
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1774	0	1778	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	4.5	1.1	18.7	3.5	0.0	3.1	7.4	10.2	0.4	0.5	8.0	5.1
Cycle Q Clear(g_c), s	4.5	1.1	18.7	3.5	0.0	3.1	7.4	10.2	0.4	0.5	8.0	5.1
Prop In Lane	1.00		1.00	1.00		0.27	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	188	295	375	82	0	266	271	1695	758	222	1859	832
V/C Ratio(X)	0.70	0.07	0.72	0.65	0.00	0.20	0.79	0.29	0.01	0.04	0.24	0.16
Avail Cap(c_a), veh/h	373	295	375	192	0	282	430	1695	758	222	1859	832
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.8	43.0	42.1	56.3	0.0	44.7	54.3	19.0	16.4	46.1	15.4	14.7
Incr Delay (d2), s/veh	1.8	0.0	5.6	3.2	0.0	0.1	2.0	0.4	0.0	0.3	0.3	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.6	8.8	1.8	0.0	1.5	3.6	5.1	0.2	0.3	4.0	2.3
LnGrp Delay(d),s/veh	57.5	43.0	47.7	59.5	0.0	44.8	56.3	19.4	16.4	46.4	15.7	15.1
LnGrp LOS	E	D	D	E		D	E	B	B	D	B	B
Approach Vol, veh/h	421				105		723				574	
Approach Delay, s/veh	50.5				52.2		30.3				16.0	
Approach LOS	D				D		C				B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.4	70.0	10.6	26.0	19.0	64.5	9.5	27.0				
Change Period (Y+Rc), s	4.0	7.0	4.0	8.0	4.0	7.0	4.0	8.0				
Max Green Setting (Gmax), s	15.0	50.0	13.0	19.0	15.0	50.0	13.0	19.0				
Max Q Clear Time (g_c+I1), s	9.4	10.0	6.5	5.1	2.5	12.2	5.5	20.7				
Green Ext Time (p_c), s	0.1	0.9	0.0	0.6	0.0	0.9	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay	31.8											
HCM 2010 LOS	C											

TRAFFIC IMPACT ANALYSIS

HCM 2010 Signalized Intersection Summary Thompson Peak Pkwy & Windgate Ranch Rd
2: Thompson Peak Parkway & Windgate Ranch Road/Carla Way

Signal Warrant Analysis Calculations

																	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR					
Lane Configurations																	
Traffic Volume (veh/h)	22	0	65	234	0	102	97	553	109	92	523	35					
Future Volume (veh/h)	22	0	65	234	0	102	97	553	109	92	523	35					
Number	3	8	18	7	4	14	1	6	16	5	2	12					
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0					
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00					
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
Adj Sat Flow, veh/h/ln	1863	0	1863	1863	0	1863	1863	1863	1863	1863	1863	1863					
Adj Flow Rate, veh/h	28	0	81	285	0	124	105	601	118	95	539	36					
Adj No. of Lanes	1	0	1	1	0	1	1	2	1	1	2	1					
Peak Hour Factor	0.80	0.80	0.80	0.82	0.82	0.82	0.92	0.92	0.92	0.97	0.97	0.97					
Percent Heavy Veh, %	2	0	2	2	0	2	2	2	2	2	2	2					
Cap, veh/h	379	0	0	379	0	0	644	2640	1181	567	2640	1181					
Arrive On Green	0.18	0.00	0.00	0.18	0.00	0.00	0.75	0.75	0.75	0.75	0.75	0.75					
Sat Flow, veh/h	1774	28		1774	285		835	3539	1583	730	3539	1583					
Grp Volume(v), veh/h	28	41.1		285	51.6		105	601	118	95	539	36					
Grp Sat Flow(s),veh/h/ln	1774	D		1774	D		835	1770	1583	730	1770	1583					
Q Serve(g_s), s	1.6			18.8			5.2	6.2	2.5	5.5	5.5	0.7					
Cycle Q Clear(g_c), s	1.6			18.8			10.7	6.2	2.5	11.7	5.5	0.7					
Prop In Lane	1.00			1.00			1.00		1.00	1.00		1.00					
Lane Grp Cap(c), veh/h	379			379			644	2640	1181	567	2640	1181					
V/C Ratio(X)	0.07			0.75			0.16	0.23	0.10	0.17	0.20	0.03					
Avail Cap(c_a), veh/h	379			542			644	2640	1181	567	2640	1181					
HCM Platoon Ratio	1.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00					
Upstream Filter(l)	1.00			1.00			1.00	1.00	1.00	1.00	1.00	1.00					
Uniform Delay (d), s/veh	41.0			48.1			6.2	4.7	4.2	6.5	4.6	4.0					
Incr Delay (d2), s/veh	0.1			3.6			0.5	0.2	0.2	0.6	0.2	0.0					
Initial Q Delay(d3),s/veh	0.0			0.0			0.0	0.0	0.0	0.0	0.0	0.0					
%ile BackOfQ(50%),veh/ln	0.8			9.6			1.3	3.1	1.1	1.2	2.7	0.3					
LnGrp Delay(d),s/veh	41.1			51.6			6.7	4.9	4.4	7.1	4.7	4.0					
LnGrp LOS	D			D			A	A	A	A	A	A					
Approach Vol, veh/h									824				670				
Approach Delay, s/veh									5.0				5.0				
Approach LOS									A				A				
Timer	1	2	3	4	5	6	7	8									
Assigned Phs	2		3			6	7										
Phs Duration (G+Y+Rc), s	94.0	26.0				94.0	26.0										
Change Period (Y+Rc), s	4.5	4.5				4.5	4.5										
Max Green Setting (Gmax), s	55.5	7.5				55.5	32.5										
Max Q Clear Time (g_c+l1), s	13.7	3.6				12.7	20.8										
Green Ext Time (p_c), s	11.8	0.0				11.9	0.7										
Intersection Summary																	
HCM 2010 Ctrl Delay			12.9														
HCM 2010 LOS			B														

TRAFFIC IMPACT ANALYSIS

TRAFFIC SIGNAL VOLUME WARRANT ANALYSIS (2009 MUTCD)

MAJOR STREET:

Thompson Peak Parkway

NB

SB

OF APPROACH LANES:

4

MINOR STREET:

Windgate Ranch Road/Carla Way

EB

WB

OF APPROACH LANES:

2

CITY, STATE:

Scottsdale, Arizona

COMMENTS:

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N):

N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N):

Y

			Thompson Peak Parkway		Total	Windgate Ranch Road/Carla Way		Minor Street Heavy Leg
			NB Approach	SB Approach		EB Approach	WB Approach	
06:00 AM	TO	07:00 AM	217	238	455			0
07:00 AM	TO	08:00 AM	426	609	1034			0
08:00 AM	TO	09:00 AM	523	567	1090			0
09:00 AM	TO	10:00 AM	401	404	805			0
10:00 AM	TO	11:00 AM	365	409	774		222	222
11:00 AM	TO	12:00 PM	353	442	795		335	335
12:00 PM	TO	01:00 PM	385	446	832		282	282
01:00 PM	TO	02:00 PM	357	404	761		222	222
02:00 PM	TO	03:00 PM	495	514	1009		194	194
03:00 PM	TO	04:00 PM	635	613	1247		194	194
04:00 PM	TO	05:00 PM	586	575	1161		134	134
05:00 PM	TO	06:00 PM	643	586	1229		134	134
06:00 PM	TO	07:00 PM	419	377	796			0
07:00 PM	TO	08:00 PM	237	285	522			0
08:00 PM	TO	09:00 PM	170	170	340			0
09:00 PM	TO	10:00 PM	60	94	154			0

07/20/17
Kimley-Horn and Associates

TRAFFIC IMPACT ANAYLSIS

TRAFFIC SIGNAL VOLUME WARRANT ANALYSIS (2009 MUTCD)

MAJOR STREET:

Thompson Peak Parkway

NB

SB

OF APPROACH LANES:

4

MINOR STREET:

Windgate Ranch Road/Ci

EB

WB

OF APPROACH LANES:

2

CITY, STATE:

Scottsdale, Arizona

COMMENTS:

0

ISOLATED COMMUNITY WITH POPULATION LESS THAN 10,000 (Y OR N):

N

85TH PERCENTILE SPEED GREATER THAN 40 MPH ON MAJOR STREET (Y OR N)

Y

			MAJOR ST TWO-WAY TRAFFIC	MINOR ST TRAFFIC HEAVY LEG	WARRANT 1 - Condition A, Part 1			WARRANT 1 - Condition B, Part 1			WARRANT 1 - Condition A, Part 2			WARRANT 1 - Condition B, Part 2			WARRANT 2 Four-Hour	WARRANT 3 Peak Hour
					MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET	MAIN LINE	SIDE STREET	BOTH MET		
THRESHOLD VALUES					420	140		630	70		336	112		504	56			
06:00 AM	TO	07:00 AM	455	0	Y						Y							
07:00 AM	TO	08:00 AM	1,034	0	Y				Y					Y				
08:00 AM	TO	09:00 AM	1,090	0	Y				Y					Y				
09:00 AM	TO	10:00 AM	805	0	Y				Y					Y				
10:00 AM	TO	11:00 AM	774	222	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11:00 AM	TO	12:00 PM	795	335	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
12:00 PM	TO	01:00 PM	832	282	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
01:00 PM	TO	02:00 PM	761	222	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
02:00 PM	TO	03:00 PM	1,009	194	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
03:00 PM	TO	04:00 PM	1,247	194	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
04:00 PM	TO	05:00 PM	1,161	134	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
05:00 PM	TO	06:00 PM	1,229	134	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
06:00 PM	TO	07:00 PM	796	0	Y			Y			Y			Y				
07:00 PM	TO	08:00 PM	522	0	Y						Y			Y				
08:00 PM	TO	09:00 PM	340	0							Y							
09:00 PM	TO	10:00 PM	154	0														
			13,004	1,717	14 6 6			12 8 8			15 8 8			13 8 8			8	7
					8 HOURS NEEDED			8 HOURS NEEDED			8 HOURS NEEDED for both Condition A & B						4 HRS NEEDED	1 HR NEEDED
					NOT SATISFIED			SATISFIED			SATISFIED						SATISFIED	SATISFIED

07/20/17
Kimley-Horn and Associates

Left Turn Storage Calculations

Left-turn Storage Analysis

Intersection	Direction (N,S,E,W)	Peak volume (vph)	Signalized???		If signalized		Required Storage
			(Place an "X")		Cycle Length (seconds)	# of Left-turn Lanes (#)	per Lane (ft.)
			Yes	No			(75' min. default)
							0
Thompson Peak Pkwy & Bell Rd	NB	205	X		120	1	275
	SB	42	X		120	1	75
	EB	278	X		120	1	350
	WB	25	X		120	1	75
							0
Thompson Peak Pkwy & Windgate Ranch Rd	NB	97	X		120	1	150
	SB	119	X		120	1	175
	EB	22	X		120	1	75
	WB	234	X		120	1	300
							0
Thompson Peak Pkwy & Puerta Del Viento	NB	67		X			75
	EB	170		X			150
							0
Thompson Peak Pkwy & Legacy Blvd	NB	206	X		120	2	150
	SB	19	X		120	1	75
	EB	293	X		120	2	175
	WB	34	X		120	1	75
							0
							0
							0
							0

SAMPLE CALCULATIONS

SIGNALIZED INTERSECTIONS

Storage: = $\left[\left(\frac{\text{veh}}{\text{interval}}\right) + z \times \left(\text{SQRT}\left(\frac{\text{veh}}{\text{interval}}\right)\right)\right] / L \times 25 \text{ ft/vehicle}$

$N = (\text{veh}/\text{interval})$
 $N = [(V) \times (C/3600)]$

Where :

$z = 1.282$ for 90 % confidence level (Most commonly used)
 $z = 1.645$ for 95 % confidence level

Where:

V = vehicles per hour
 C = cycle length in seconds
 25 ft/veh = Average Length of Vehicles
 L = number of left turn lanes

UNSIGNALIZED INTERSECTIONS

Storage = $[(V/60 \text{ minutes}) \times 2 \text{ minutes}] \times 25 \text{ ft/vehicle}$

Where:

V = vehicles per hour
 25 ft/veh = Average Length of Vehicles

Right Turn Storage Calculations

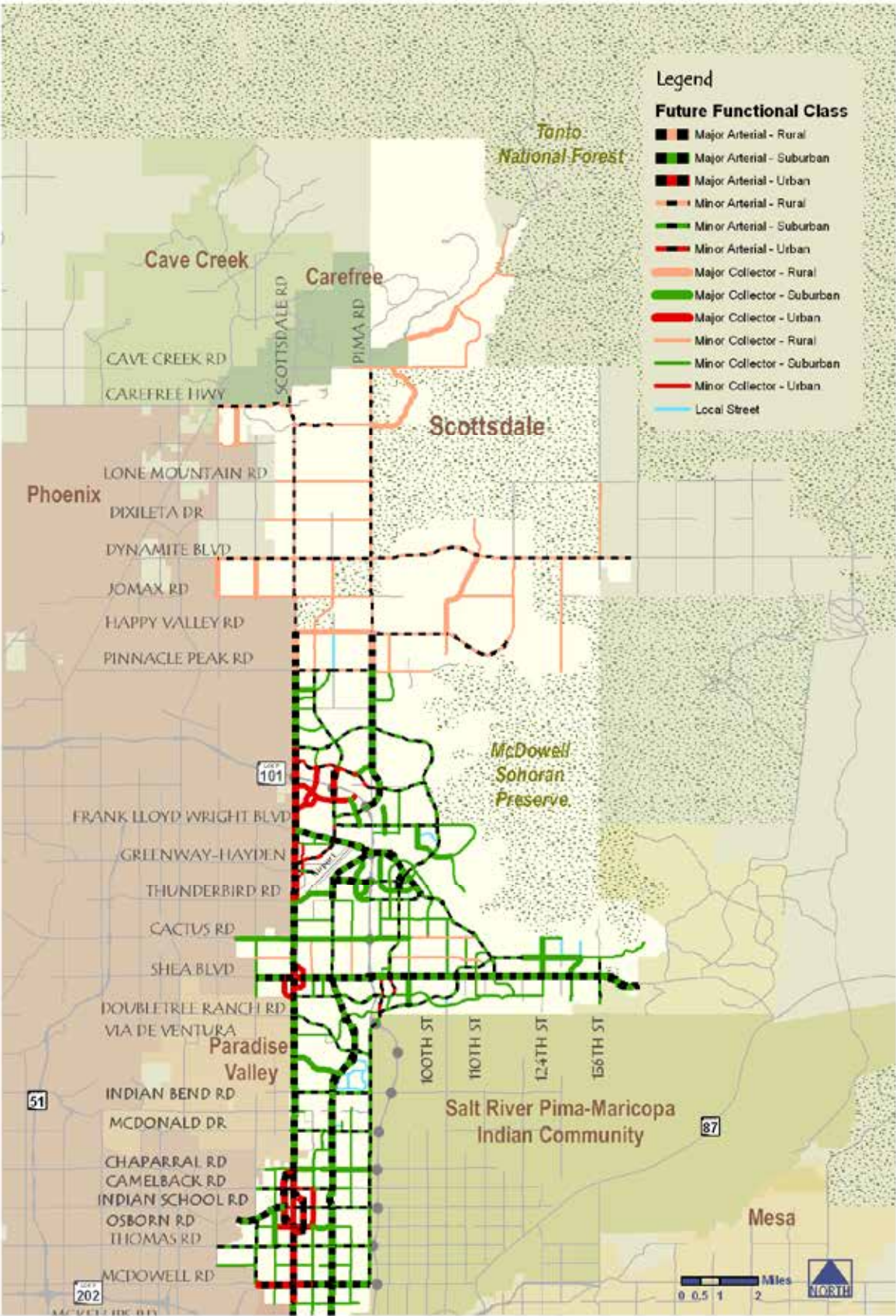
TRAFFIC IMPACT ANAYLSIS

Right-turn Storage Analysis

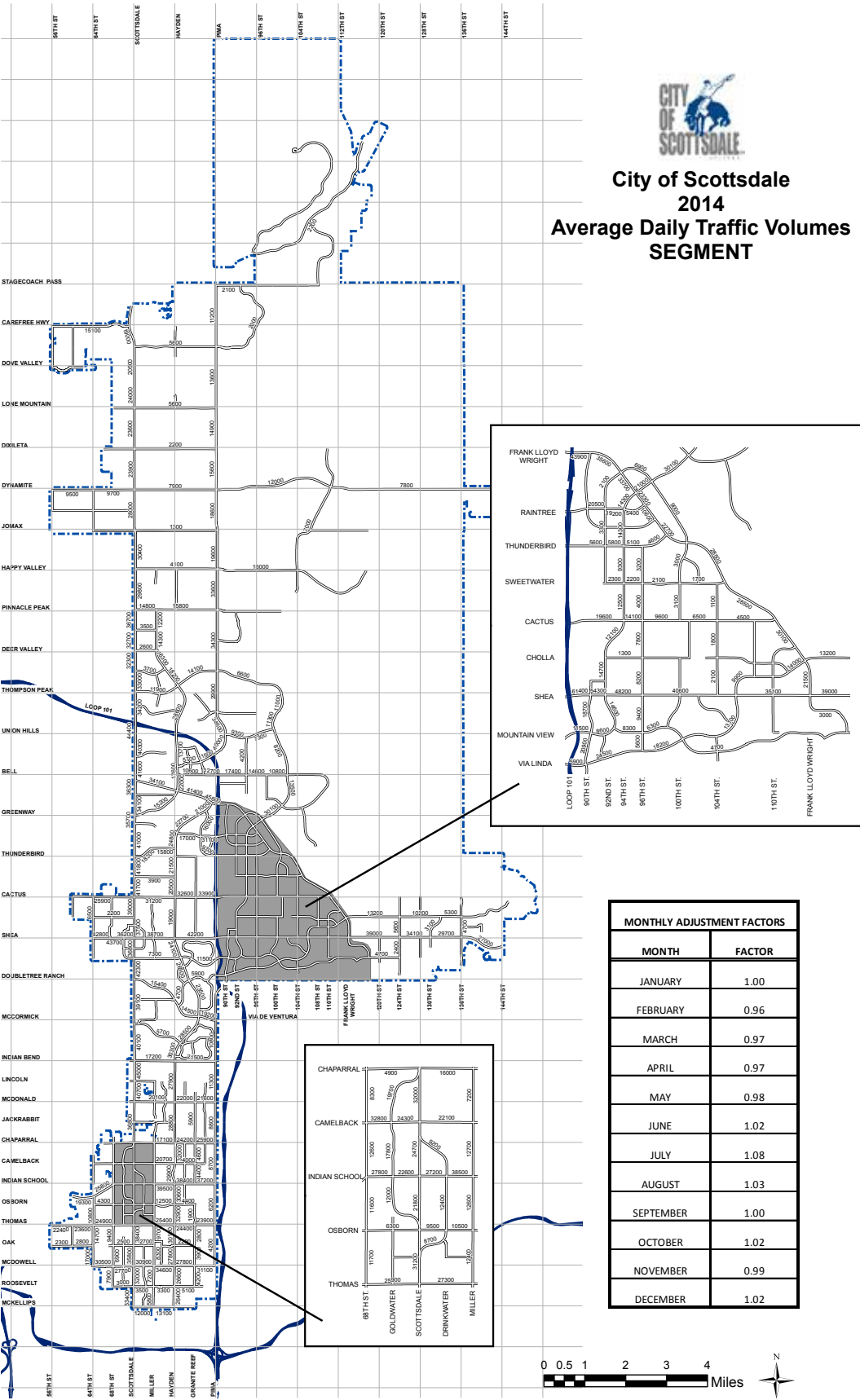
Intersection	Direction (N,S,E,W)	Peak volume (vph)	Signalized???		If signalized		Required Storage per Lane (ft.) (75' min. default)
			(Place an "X")		Cycle Length (seconds)	# of Right-turn Lanes (#)	
			Yes	No			
							0
Thompson Peak Pkwy & Bell Rd	NB	24	X		120	1	75
	SB	207	X		120	1	275
	EB	323	X		120	1	375
	WB	64	X		120	1	125
							0
Thompson Peak Pkwy & Driveway D1	NB	95		X			150
							0
Thompson Peak Pkwy & Windgate Ranch Rd	NB	170	X		120	1	225
	SB	35	X		120	1	75
	EB	65	X		120	1	125
	WB	102	X		120	1	150
							0
Thompson Peak Pkwy & Puerta Del Viento	SB	86		X			75
	EB	145		X			125
							0
Thompson Peak Pkwy & Legacy Blvd	NB	18	X		120	1	75
	SB	244	X		120	1	300
	EB	256	X		120	1	325
	WB	9	X		120	1	75
							0
							0
							0
							0

TRAFFIC IMPACT ANALYSIS

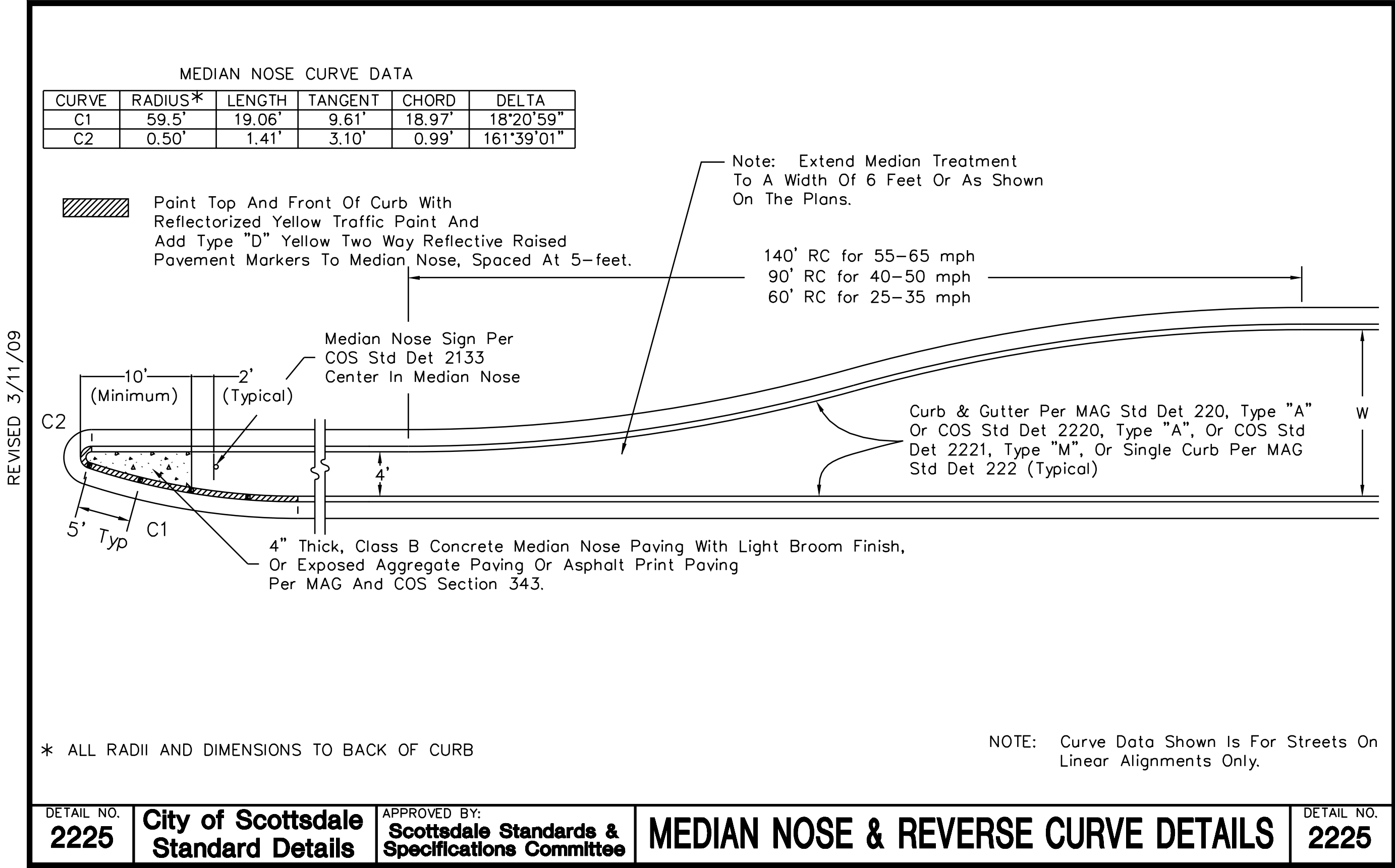
City of Scottsdale Design Standards and Policies



TRAFFIC IMPACT ANAYLSIS

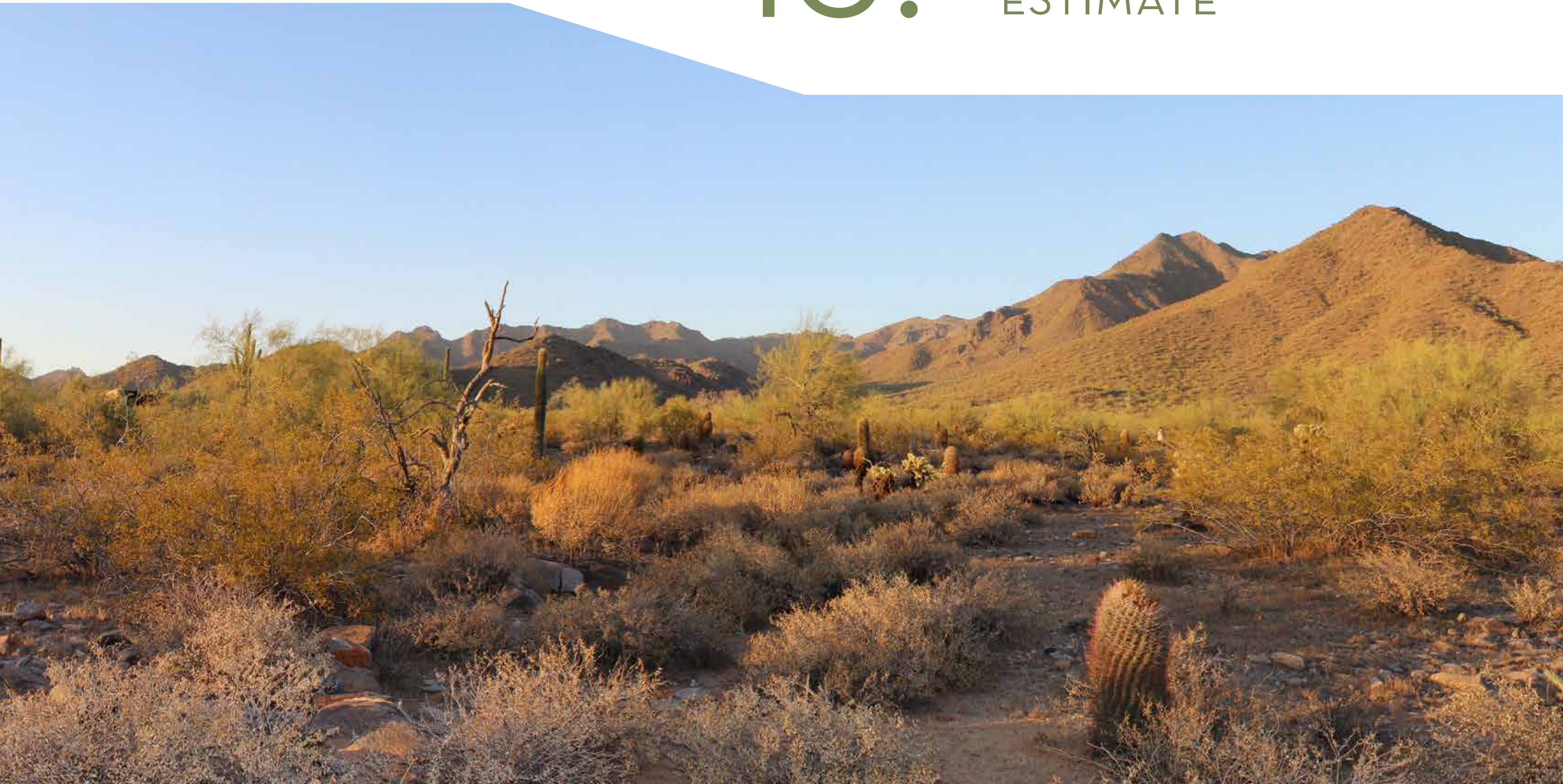


TRAFFIC IMPACT ANALYSIS



13.

CONCEPTUAL COST
ESTIMATE



CONCEPTUAL COST ESTIMATE



Desert Discovery Center
Scottsdale, AZ

Conceptual
July 18, 2017
Cumming Project No. 17-00349

Prepared for Swaback Partners

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

TABLE OF CONTENTS

- 1. Project Introduction**
 - Executive Summary
 - Project Summary
- 2. Cost Summaries**
 - Summary Matrix
- 3. Control Areas**
 - Controls
- 4. Construction Cost Back Up**
- 5. Appendix**
 - Scope Assumptions
 - Allowances Included

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

EXECUTIVE SUMMARY

1.1 Introduction

This estimate has been prepared, pursuant to an agreement between Swaback Partners and Cumming, for the purpose of establishing a probable cost of construction at the schematic design stage.

The project scope encompasses the construction of multiple pavilions across a signalr site, totalling 50,000gsf

1.2 Cost Estimation Breakdown

The total estimated project cost within our cost report is summarized below:

Description	Building	Exhibiton	Total
Construction	\$33,533,443	Excluded	\$33,533,443
Total Project Cost	\$33,533,443		\$33,533,443

1.3 Project Schedule

	Start	Finish		Duration
Design & Engineering	TBD	TBD		TBD
Construction	TBD	TBD		TBD

1.4 Key Assumptions & Exclusions

This document should be read in association with Appendices 1 - 2 which outline assumptions & project understanding

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

PROJECT SUMMARY MATRIX

Description	Building			Exhibitions			Total		
	Area	Original	Cost per sf	Area	Original	Cost per sf	Area	Original Budget	Cost per sf
1.0 Construction	58,153	33,533,443	576.65	EXCLUDED			58,153	33,533,443	576.65
1.1 Net Construction Cost	58,153	20,276,583	348.68						
1.2 Sitework / External Work 10.00%	58,153	6,965,538	119.78						
1.3 Design Contingency 10.00%	58,153	2,724,212	46.85						
1.4 Escalation 10.00%	58,153	2,996,633	51.53						
1.5 Loose Furniture 5.00%	26,985	570,477	21.14						
Project Total		33,533,443						33,533,443	

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

Element	SUMMARY MATRIX											
	Pavilion A 6,045 SF			Pavilion B 2,131 SF			Pavilion C 5,862 SF			Pavilion D 12,947 SF		
	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF
A) Shell (1-5)					\$791,666	\$371.50		\$1,663,559	\$283.79		\$3,544,785	\$273.79
1 Foundations				\$12,386		\$5.81	\$21,113		\$3.60	\$46,925		\$3.62
2 Vertical Structure				\$46,697		\$21.91	\$128,454		\$21.91	\$283,709		\$21.91
3 Floor & Roof Structures				\$78,940		\$37.04	\$214,687		\$36.62	\$475,098		\$36.70
4 Exterior Cladding				\$621,579		\$291.68	\$1,221,920		\$208.45	\$2,567,749		\$198.33
5 Roofing and Waterproofing				\$32,064		\$15.05	\$77,384		\$13.20	\$171,305		\$13.23
B) Interiors (6-7)	\$27,594	\$27,594	\$4.56	\$83,343	\$83,343	\$39.11	\$50,487	\$91,145	\$15.55	\$77,545	\$268,148	\$20.71
6 Interior Partitions, Doors and Glazing							\$40,658		\$6.94	\$190,603		\$14.72
7 Floor, Wall and Ceiling Finishes	\$27,594		\$4.56	\$83,343		\$39.11	\$50,487		\$8.61	\$77,545	\$23,482	\$5.87
C) Equipment and Vertical Transportation (8-9)		\$91,421	\$15.12		\$146,934	\$68.95		\$119,567	\$20.40		\$252,187	\$19.48
8 Function Equipment and Specialties	\$91,421		\$15.12	\$146,934		\$68.95	\$119,567		\$20.40	\$252,187	\$70,922	\$17.74
9 Stairs and Vertical Transportation												
D) Mechanical and Electrical (10-13)		\$362,821	\$60.02		\$124,152	\$58.26		\$404,641	\$69.03		\$804,029	\$62.10
10 Plumbing Systems							\$53,711		\$9.16	\$41,663		\$3.22
11 Heating, Ventilation and Air Conditioning	\$75,079		\$12.42	\$22,716		\$10.66	\$89,702		\$15.30	\$155,374	\$42,629	\$10.66
12 Electrical Lighting, Power and Communications	\$267,189		\$44.20	\$94,190		\$44.20	\$241,298		\$41.16	\$562,972	\$176,756	\$44.20
13 Fire Protection Systems	\$20,553		\$3.40	\$7,245		\$3.40	\$19,931		\$3.40	\$44,020	\$14,348	\$3.59
E) Site Construction (14-16)												
14 Site Preparation and Demolition												
15 Site Paving, Structures & Landscaping												
16 Utilities on Site												
F) Off-Site Facility												
Subtotal Cost		\$481,835	\$79.71		\$1,146,094	\$537.82		\$2,278,912	\$388.76		\$4,869,149	\$376.08
General Conditions 8.0%		\$38,547	\$6.38		\$91,688	\$43.03		\$182,313	\$31.10		\$389,532	\$30.09
General Requirements 3.5%		\$18,213	\$3.01		\$43,322	\$20.33		\$86,143	\$14.70		\$184,054	\$14.22
Bonds & Insurance 2.6%		\$12,528	\$2.07		\$29,798	\$13.98		\$59,252	\$10.11		\$126,598	\$9.78
Subguard Insurance 1.0%		\$4,818	\$0.80		\$11,461	\$5.38		\$22,789	\$3.89		\$48,691	\$3.76
Contractor's Fee 3.5%		\$19,458	\$3.22		\$46,283	\$21.72		\$92,029	\$15.70		\$196,631	\$15.19
Design Contingency 10.0%		\$57,540	\$9.52		\$136,865	\$64.23		\$272,144	\$46.43		\$581,465	\$44.91
Escalation to MOC, 09/15/17 10.0%		\$63,294	\$10.47		\$150,551	\$70.65		\$299,358	\$51.07		\$639,612	\$49.40
Total Estimated Construction Cost		\$696,233	\$115.18		\$1,656,062	\$777.13		\$3,292,940	\$561.74		\$7,035,732	\$543.43

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

Element	SUMMARY MATRIX														
	Pavilion H 4,252 SF			Pavilion K 3,305 SF			Pavilion L 9,045 SF			Exterior Improvements 33,067 SF			Overall Totals 58,153		
	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF	Subtotal	Total	Cost/SF
A) Shell (1-5)		\$1,460,151	\$343.40		\$1,066,972	\$322.84		\$2,704,205	\$298.97					\$12,302,214	\$211.55
1 Foundations	\$18,771		\$4.41	\$12,831		\$3.88	\$42,537		\$4.70				\$166,953		\$2.87
2 Vertical Structure	\$93,174		\$21.91	\$72,423		\$21.91	\$198,204		\$21.91				\$910,291		\$15.65
3 Floor & Roof Structures	\$157,370		\$37.01	\$121,620		\$36.80	\$334,470		\$36.98				\$1,528,815		\$26.29
4 Exterior Cladding	\$1,133,148		\$266.50	\$815,344		\$246.70	\$2,005,553		\$221.73				\$9,136,641		\$157.12
5 Roofing and Waterproofing	\$57,688		\$13.57	\$44,755		\$13.54	\$123,441		\$13.65				\$559,515		\$9.62
B) Interiors (6-7)		\$58,020	\$13.65		\$19,346	\$5.85		\$167,550	\$18.52					\$738,627	\$12.70
6 Interior Partitions, Doors and Glazing	\$21,226		\$4.99				\$113,834		\$12.59				\$366,321		\$6.30
7 Floor, Wall and Ceiling Finishes	\$36,794		\$8.65	\$19,346		\$5.85	\$53,716		\$5.94				\$372,305		\$6.40
C) Equipment and Vertical Transportation (8-9)		\$93,727	\$22.04		\$61,049	\$18.47		\$167,905	\$18.56					\$1,003,712	\$17.26
8 Function Equipment and Specialties	\$93,727		\$22.04	\$61,049		\$18.47	\$167,905		\$18.56				\$1,003,712		\$17.26
9 Stairs and Vertical Transportation															
D) Mechanical and Electrical (10-13)		\$283,872	\$66.76		\$193,170	\$58.45		\$528,489	\$58.43		\$557,515	\$16.86		\$3,492,423	\$60.06
10 Plumbing Systems	\$40,459		\$9.52										\$135,833		\$2.34
11 Heating, Ventilation and Air Conditioning	\$49,005		\$11.53	\$35,231		\$10.66	\$95,061		\$10.51				\$564,798		\$9.71
12 Electrical Lighting, Power and Communications	\$179,273		\$42.16	\$146,081		\$44.20	\$399,789		\$44.20	\$492,669		\$14.90	\$2,560,217		\$44.03
13 Fire Protection Systems	\$15,135		\$3.56	\$11,858		\$3.59	\$33,639		\$3.72	\$64,846		\$1.96	\$231,575		\$3.98
E) Site Construction (14-16)											\$3,375,374	\$102.08		\$3,375,374	\$58.04
14 Site Preparation and Demolition															
15 Site Paving, Structures & Landscaping										\$3,309,594		\$100.09	\$3,309,594		\$56.91
16 Utilities on Site										\$65,780		\$1.99	\$65,780		\$1.13
F) Off-Site Facility											\$1,900,000	\$300.00		\$1,900,000	\$300.00
Subtotal Cost		\$1,895,770	\$445.85		\$1,340,537	\$405.61		\$3,568,148	\$394.49		\$5,832,890	\$176.40		\$22,812,350	\$392
General Conditions 8.0%		\$151,662	\$35.67		\$107,243	\$32.45		\$285,452	\$31.56		\$466,631	\$14.11		\$1,824,988	\$31.38
General Requirements 3.5%		\$71,660	\$16.85		\$50,672	\$15.33		\$134,876	\$14.91		\$220,483	\$6.67		\$862,307	\$14.83
Bonds & Insurance 2.6%		\$49,290	\$11.59		\$34,854	\$10.55		\$92,772	\$10.26		\$151,655	\$4.59		\$593,121	\$10.20
Subguard Insurance 1.0%		\$18,958	\$4.46		\$13,405	\$4.06		\$35,681	\$3.94		\$58,329	\$1.76		\$228,123	\$3.92
Contractor's Fee 3.5%		\$76,557	\$18.00		\$54,135	\$16.38		\$144,093	\$15.93		\$235,550	\$7.12		\$921,231	\$15.84
Design Contingency 10.0%		\$226,390	\$53.24		\$160,085	\$48.44		\$426,102	\$47.11		\$696,554	\$21.07		\$2,724,212	\$46.85
Escalation to MOC, 09/15/17 10.0%		\$249,029	\$58.57		\$176,093	\$53.28		\$468,712	\$51.82		\$766,209	\$23.17		\$2,996,633	\$51.53
Total Estimated Construction Cost		\$2,739,315	\$644.24		\$1,937,024	\$586.09		\$5,155,837	\$570.02		\$8,428,300	\$254.89		\$32,962,965	\$566.84

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

SCHEDULE OF AREAS

Schedule of Areas	SF
-------------------	----

1. Enclosed Areas

Pavilion	SF
Pavilion A	6,045
Pavilion B	2,131
Pavilion C	5,862
Pavilion D	12,947
Pavilion E	3,999
Pavilion H	4,252
Pavilion K	3,305
Pavilion L	9,045

Total Gross Floor Area

47,586

2. Unenclosed Areas

Pavilion	SF
Pavilion A	500
Pavilion B	1,890
Pavilion F	3,134
Pavilion G	4,804
Pavilion H	1,001
Pavilion I	5,160
Pavilion J	1,907
Pavilion K	1,263
Pavilion L	1,474

Total Unenclosed

21,133

Total

58,153

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

SUMMARY - EXTERIOR IMPROVEMENTS

Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)				
1 Foundations				
2 Vertical Structure				
3 Floor & Roof Structures				
4 Exterior Cladding				
5 Roofing and Waterproofing				
B) Interiors (6-7)				
6 Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes				
C) Equipment and Vertical Transportation (8-9)				
8 Function Equipment and Specialties				
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)				
12 Electrical Lighting, Power and Communications	\$492,669	\$557,515	\$14.90	\$16.86
13 Fire Protection Systems	\$64,846		\$1.96	
E) Site Construction (14-16)				
14 Site Preparation and Demolition		\$3,375,374		\$102.08
15 Site Paving, Structures & Landscaping	\$3,309,594		\$100.09	
32 Exterior Improvements	\$65,780		\$1.99	
F) Off-site Facility				
		\$1,900,000		\$300.00
Subtotal		\$5,832,890		\$176.40
General Conditions	8.00%	\$466,631		\$14.11
Subtotal		\$6,299,521		\$190.51
General Requirements	3.50%	\$220,483		\$6.67
Subtotal		\$6,520,004		\$197.18
Bonds & Insurance	2.60%	\$151,655		\$4.59
Subtotal		\$6,671,659		\$201.76
Subguard Insurance	1.00%	\$58,329		\$1.76
Subtotal		\$6,729,988		\$203.53
Contractor's Fee	3.50%	\$235,550		\$7.12
Subtotal		\$6,965,538		\$210.65
Design Contingency	10.00%	\$696,554		\$21.07
TOTAL ESTIMATED CONSTRUCTION COST		\$8,428,300		\$254.89

Total Area: 33,067 SF

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Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
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DETAIL ELEMENTS - EXTERIOR IMPROVEMENTS

Element	Quantity	Unit	Unit Cost	Total
12 Electrical Lighting, Power and Communications				
Site service and distribution				
Site service and distribution	48,566	sf	\$6.00	\$291,396
Emergency power/Generator provisions	48,566	sf	\$1.00	\$48,566
Site Lighting	48,566	sf	\$0.35	\$16,998
Site Power	48,566	sf	\$0.35	\$16,998
Site Comm	48,566	sf	\$0.08	\$3,885
Site Security	48,566	ea	\$1.75	\$84,991
Miscellaneous				
Electrical Work				
Power and Lighting				
Service and distribution	675	sf	\$5.50	\$3,713
Emergency Service and Distribution	675	sf	\$3.50	\$2,363
HVAC & Equipment	675	sf	\$0.80	\$540
Convenience Power	675	sf	\$3.00	\$2,025
Lighting & Lighting Controls	675	sf	\$15.00	\$10,125
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	675	sf	\$2.30	\$1,553
Voice/Data System	675	sf	\$4.50	\$3,038
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	675	sf	\$0.75	\$506
Clock, PA, Speaker System	675	sf	\$0.50	\$338
Security, access control system				
Security & Access Control System (Conduit Only)	675	sf	\$1.10	\$743
Security & Access Control System	675	sf	\$0.75	\$506
CCTV System (Conduit Only)	675	sf	\$0.75	\$506
CCTV System	675	sf	\$2.00	\$1,350
Electroinic Safety and Security Systems Work				
Fire alarm system	675	sf	\$3.75	\$2,531

Total - Electrical Lighting, Power and Communications	\$492,669
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CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
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DETAIL ELEMENTS - EXTERIOR IMPROVEMENTS				
Element	Quantity	Unit	Unit Cost	Total
13 Fire Protection Systems				
Additional Fire Protection Requirements				
Fire water c/w meter, double check valve assembly	1	ea	\$30,850.00	\$30,850
Supervision	48,566	sf	\$0.20	\$9,713
Design/engineering, rentals, tagging & identification	48,566	sf	\$0.50	\$24,283
Total - Fire Protection Systems				\$64,846

15 Site Paving, Structures & Landscaping

AC Paving				
Fire access, 4" AC over 12" AB	32,000	sf	\$8.94	\$286,080
Decomposed Granite paving(3") for parking	100,000	sf	\$2.66	\$266,000

Desert Discovery Center
Scottsdale, AZ
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DETAIL ELEMENTS - EXTERIOR IMPROVEMENTS				
Element	Quantity	Unit	Unit Cost	Total
Concrete Curbs				
Concrete curbs & gutter	6,190	lf	\$27.77	\$171,896
Parking Lot Striping / Signage				
Standard stall	642	ea	\$22.59	\$14,503
Handicap symbols	13	ea	\$67.78	\$870
Concrete wheel stops	642	ea	\$47.06	\$30,213
Directional signage	14	ea	\$124.14	\$1,738
Hatched striping	3,000	sf	\$4.46	\$13,380
Landscape				
Planting				
Shrubbery, allowance	1	al	\$250,000.00	\$250,000
Decomposed granite paving (3") incl. fabric	45,000	sf	\$2.66	\$119,700
Site Walls				
CIP colored concrete seatwalls, 1.5' high	2,500	lf	\$195.28	\$488,200
Site Specialties				
Metal bridge	1	al	\$100,000.00	\$100,000
Open Exhibits- Prep & foundation	21,133	sf	\$25.00	\$528,325
Exterior Sunshades	1	al	\$152,820.00	\$152,820
Exterior light weight canopy system	5,000	sf	\$125.00	\$625,000
Premium: add photovoltaic panels to canopy system	3,478	sf	\$75.00	\$260,870
Total - Site Paving, Structures & Landscaping				\$3,309,594

16 Utilities on Site

Sanitary Sewer				
6" Sanitary sewer line, incl. trenching & backfill	1,000	lf	\$65.78	\$65,780

Total - Utilities on Site				\$65,780
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Off - Site Facility

Facility for additional administration & overflow parking	6334	sf	\$300.00	\$1,900,000
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CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

SUMMARY - PAVILION A				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)				
1 Foundations				
2 Vertical Structure				
3 Floor & Roof Structures				
4 Exterior Cladding				
5 Roofing and Waterproofing				
B) Interiors (6-7)		\$27,594		\$4.56
6 Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes	\$27,594		\$4.56	
C) Equipment and Vertical Transportation (8-9)		\$91,421		\$15.12
8 Function Equipment and Specialties	\$91,421		\$15.12	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$362,821		\$60.02
10 Plumbing Systems				
11 Heating, Ventilation and Air Conditioning	\$75,079		\$12.42	
12 Electrical Lighting, Power and Communications	\$267,189		\$44.20	
13 Fire Protection Systems	\$20,553		\$3.40	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$481,835		\$79.71
General Conditions	8.00%	\$38,547		\$6.38
Subtotal		\$520,382		\$86.08
General Requirements	3.50%	\$18,213		\$3.01
Subtotal		\$538,595		\$89.10
Bonds & Insurance	2.60%	\$12,528		\$2.07
Subtotal		\$551,123		\$91.17
Subguard Insurance	1.00%	\$4,818		\$0.80
Subtotal		\$555,941		\$91.97
Contractor's Fee	3.50%	\$19,458		\$3.22
Subtotal		\$575,399		\$95.19
Design Contingency	10.00%	\$57,540		\$9.52
TOTAL ESTIMATED CONSTRUCTION COST		\$696,233		\$115.18

Total Area: 6,045 SF

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

DETAIL ELEMENTS - PAVILION A				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations			Repurpose existing	
Total - Foundations				
2 Vertical Structure			Repurpose existing	
Total - Vertical Structure				
3 Floor & Roof Structures			Repurpose existing	
Total - Floor & Roof Structures				
4 Exterior Cladding			Repuprose Existing	
Total - Exterior Cladding				
5 Roofing and Waterproofing			Repuprpose Existing	
Total - Roofing and Waterproofing				
6 Interior Partitions, Doors and Glazing				
Interior Partitions			Assume open space (no fixed interior walls)	
Moveable walls			To Desert Great Room only	
Interior Glazing			Assume open space (no fixed interior walls)	
Interior glazing				
Door sidelights or transom				
Interior Doors			Assume not required	
Total - Interior Partitions, Doors and Glazing				

7 Floor, Wall and Ceiling Finishes

Prepared by CUMMING

Desert Discovery Center
Scottsdale, AZ
Conceptual

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DETAIL ELEMENTS - PAVILION A				
Element	Quantity	Unit	Unit Cost	Total
Interior Finishes				
Floors				
Integral color Conrete	6,045	sf	\$2.44	\$14,750
Base				
Wood base, 4"	271	sf	\$11.04	\$2,991
Walls				
Paint walls	1,620	sf	\$0.57	\$923
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	6,045	sf	\$0.65	\$3,929
Total - Floor, Wall and Ceiling Finishes				
8 Function Equipment and Specialties				
Toilet Cubicles				not required
Building Specialties				
Storage cabinets			included in building casework	
Fire extinguisher and cabinet, allowance	2	ea	\$372.85	\$746
Window Covering				
Mechoshades, manual				not required
Building Casework (allwoance)	6,045	sf	\$15.00	\$90,675
Total - Function Equipment and Specialties				
9 Stairs and Vertical Transportation				
Stairs				Assume not required
Total - Stairs and Vertical Transportation				
10 Plumbing Systems				not required
Total - Plumbing Systems				

Prepared by CUMMING

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

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DETAIL ELEMENTS - PAVILION A				
Element	Quantity	Unit	Unit Cost	Total
11 Heating, Ventilation and Air Conditioning				
Air-Side Equipment	6,045	sf	\$4.27	\$25,812
Air Distribution	6,045	sf	\$5.28	\$31,918
HVAC Controls	6,045	sf	\$2.37	\$14,327
Additional mechanical requirements	6,045	sf	\$0.50	\$3,023
Total - Heating, Ventilation and Air Conditioning				\$75,079
12 Electrical Lighting, Power and Communications				
Electrical Work				
Power and Lighting				
Service and distribution	6,045	sf	\$5.50	\$33,248
Emergency Service and Distribution	6,045	sf	\$3.50	\$21,158
HVAC & Equipment	6,045	sf	\$0.80	\$4,836
Convenience Power	6,045	sf	\$3.00	\$18,135
Lighting & Lighting Controls	6,045	sf	\$15.00	\$90,675
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	6,045	sf	\$2.30	\$13,904
Voice/Data System	6,045	sf	\$4.50	\$27,203
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	6,045	sf	\$0.75	\$4,534
Clock, PA, Speaker System	6,045	sf	\$0.50	\$3,023
Security, access control system				
Security & Access Control System (Conduit Only)	6,045	sf	\$1.10	\$6,650
Security & Access Control System	6,045	sf	\$0.75	\$4,534
CCTV System (Conduit Only)	6,045	sf	\$0.75	\$4,534
CCTV System	6,045	sf	\$2.00	\$12,090
Electroinic Safety and Security Systems Work				
Fire alarm system	6,045	sf	\$3.75	\$22,669
Total - Electrical Lighting, Power and Communications				\$267,189

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DETAIL ELEMENTS - PAVILION A				
Element	Quantity	Unit	Unit Cost	Total
13 Fire Protection Systems				
Automatic Sprinkler System	6,045	sf	\$3.40	\$20,553
Total - Fire Protection Systems				\$20,553
14 Site Preparation and Demolition				
				not required
Total - Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
				see Exterior
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site				
				see Exterior
Total - Utilities on Site				

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

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SUMMARY - PAVILION B				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$791,666		\$371.50
1 Foundations	\$12,386		\$5.81	
2 Vertical Structure	\$46,697		\$21.91	
3 Floor & Roof Structures	\$78,940		\$37.04	
4 Exterior Cladding	\$621,579		\$291.68	
5 Roofing and Waterproofing	\$32,064		\$15.05	
B) Interiors (6-7)		\$83,343		\$39.11
6 Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes	\$83,343		\$39.11	
C) Equipment and Vertical Transportation (8-9)		\$146,934		\$68.95
8 Function Equipment and Specialties	\$146,934		\$68.95	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$124,152		\$58.26
10 Plumbing Systems				
11 Heating, Ventilation and Air Conditioning	\$22,716		\$10.66	
12 Electrical Lighting, Power and Communications	\$94,190		\$44.20	
13 Fire Protection Systems	\$7,245		\$3.40	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$1,146,094		\$537.82
General Conditions	8.00%	\$91,688		\$43.03
Subtotal		\$1,237,782		\$580.85
General Requirements	3.50%	\$43,322		\$20.33
Subtotal		\$1,281,104		\$601.18
Bonds & Insurance	2.60%	\$29,798		\$13.98
Subtotal		\$1,310,902		\$615.16
Subguard Insurance	1.00%	\$11,461		\$5.38
Subtotal		\$1,322,363		\$620.54
Contractor's Fee	3.50%	\$46,283		\$21.72
Subtotal		\$1,368,646		\$642.26
Design Contingency	10.00%	\$136,865		\$64.23
TOTAL ESTIMATED CONSTRUCTION COST		\$1,656,062		\$777.13

Total Area: 2,131 SF

CONCEPTUAL COST ESTIMATE

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Scottsdale, AZ
Conceptual

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DETAIL ELEMENTS - PAVILION B				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation			assume not required	
Concrete layout	2,131	sf	\$0.18	\$384
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 8 footings in total				
Concrete, spread footings, 4000 psi	1	cy	\$225.14	\$267
Formwork, spread footings	48	lf	\$5.66	\$272
Foundation reinforcing 180# / cy)	213	lbs	\$1.26	\$269
Excavation	1	cy	\$14.79	\$19
Backfill	0	cy	\$12.79	\$2
Haul excess	1	cy	\$13.43	\$16
Continuous Footings			assume not required	
Grade Beams, assume 1ft x 2ft x 1ft	150	lf		
Concrete, grade beams, 4000 psi	11	cy	\$225.14	\$2,502
Formwork, grade beams	300	lf	\$4.90	\$1,470
Foundation reinforcing (180# / cy)	2,000	lbs	\$1.26	\$2,520
Excavation	12	cy	\$14.79	\$181
Backfill	1	cy	\$12.79	\$14
Haul excess	11	cy	\$13.43	\$149
Pile Foundations (Including Mobilization):			assume not required	
Miscellaneous				
Concrete, elevator pit			assume not required	
Perimeter foundation drain	150	lf	\$28.82	\$4,323
Total - Foundations				\$12,386

2 Vertical Structure

Structural Steel (Non-OSHDP Pricing), assume 12lbs/sf	13	t	\$3,272.61	\$41,844
Steel columns, WF				included above
Steel columns, tube steel				included above
Brace framing				included above
Miscellaneous bolts and connections				included above
Fireproofing to steelwork	13	t	\$379.57	\$4,853
Total - Vertical Structure				\$46,697

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DETAIL ELEMENTS - PAVILION B				
Element	Quantity	Unit	Unit Cost	Total
3 Floor & Roof Structures				
Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	33	cy	\$225.71	\$7,482
Formwork, slab on grade 5" thick, 3000 psi	150	lf	\$5.32	\$798
Sand base, 4"	2,131	sf	\$1.84	\$3,921
Gravel sub base, 6"	2,131	sf	\$1.68	\$3,580
Slab on grade reinforcing (#2 / sf)	4,262	lbs	\$1.26	\$5,370
Finish to slab	2,131	sf	\$0.51	\$1,087
Vapor barrier	2,131	sf	\$0.28	\$597
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	3	cy	\$221.42	\$734
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	2,557	sf	\$5.53	\$14,141
Finish to concrete deck	2,557	sf	\$0.51	\$1,304
Roof Decking				
3", 20 Ga. metal deck	2,131	sf	\$6.11	\$13,020
Overhangs, allow 20% of area	426	sf	\$6.11	\$2,604
Deck edging, 16 Ga.	170	lf	\$11.20	\$1,904
Miscellaneous				
Expansion joint/cover	2,131	sf	\$0.15	\$320
Miscellaneous metals, allowance	2,131	sf	\$1.00	\$2,131
Rough Carpentry, allowance	2,131	sf	\$1.00	\$2,131
Framing, 2" x 6", ceilings	2,131	sf	\$5.50	\$11,721
Plywood Sheathing				
Roof sheathing, 1/2"	2,131	sf	\$2.20	\$4,688
Exterior soffits (20% overhang)	426	sf	\$2.50	\$1,066
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	2,131	sf	\$0.08	\$170
Miscellaneous rough hardware	2,131	sf	\$0.08	\$170
Total - Floor & Roof Structures				\$78,940

4 Exterior Cladding

Exterior Walls And Parapets				
Exterior Metal Studs				
Metal stud framing, 6" 18 Ga. at 16" o.c.	2,533	sf	\$14.55	\$36,860
Sheathing				
Exterior walls, denglass sheathing	2,533	sf	\$3.09	\$7,828
Exterior Wall Insulation				
Sound batt insulation, unbacked				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backing	2,533	sf	\$1.44	\$3,648

CONCEPTUAL COST ESTIMATE

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Scottsdale, AZ
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DETAIL ELEMENTS - PAVILION B				
Element	Quantity	Unit	Unit Cost	Total
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	2,533	sf	\$2.76	\$6,992
Exterior Rammed Earth Wall	167	cy	\$750.00	\$125,000
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	2,533	sf	\$8.14	\$20,621
Add for steel troweled finish, hand applied (smooth)	2,533	sf	\$2.21	\$5,599
Exterior Glazing				
Kawneer framed curtainwall incl. all support framework, laminated glazing with tran	900	sf	\$75.00	\$67,500
Framed curtainwall with bi-folding system	900	sf	\$356.24	\$320,616
Exterior Doors				
Aluminum door sets, frames and hardware, glazed, double	2	pr	\$9,771.48	\$19,543
Premiums				
Panic hardware, per leaf	2	ea	\$941.47	\$1,883
Automatic door opening, per double leaf set	1	ea	\$4,269.75	\$4,270
Aluminum Sunshades / Roof canopies				
Exterior sunshades	1	al	see Exterior	
Miscellaneous				
Firesafing at perimeter walls	150	lf	\$8.13	\$1,220
Total - Exterior Cladding				\$621,579

5 Roofing and Waterproofing

Waterproofing				assume not required
Roofing				
Single ply membrane roofing	2,557	sf	\$4.98	\$12,735
Roof Insulation				
Rigid roof insulation, poly iso insulation	2,557	sf	\$4.81	\$12,300
Pedestal Paver System				assume not required
Skylights				assume not required
Roof Accessories				
Aluminum gutters	150	lf	\$19.75	\$2,963
Aluminum downspouts	180	lf	\$19.75	\$3,555
Access hatch				assume not required
Miscellaneous				
Caulking allowance	2,557	sf	\$0.20	\$511

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DETAIL ELEMENTS - PAVILION B				
Element	Quantity	Unit	Unit Cost	Total
Total - Roofing and Waterproofing				\$32,064
6 Interior Partitions, Doors and Glazing				
Interior Partitions				Assume open space (no fixed interior walls)
Moveable walls				To Desert Great Room only
Interior Glazing				Assume open space (no fixed interior walls)
Interior glazing				
Door sidelights or transom				
Interior Doors				
Total - Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes				
Interior Finishes				
Floors				
Integral color Conrete	2,131	sf	\$2.44	\$5,200
Base				
Wood base, 4"	150	lf	\$11.04	\$1,656
Walls				
Fabric wrapped acoustic wall panels	2,533	sf	\$11.79	\$29,868
Paint walls	2,533	sf	\$0.57	\$1,444
Allowance for feature / premium finishes	1		\$15,000.00	\$15,000
Ceiling				
Fiber wrapped feature ceiling panels	2,131	sf	\$14.16	\$30,175
Total - Floor, Wall and Ceiling Finishes				\$83,343
8 Function Equipment and Specialties				
Toilet Cubicles				not required
Building Specialties				
Storage cabinets				included with building casework
Fire extinguisher and cabinet, allowance	1	ea	\$372.85	\$373
Window Covering				
Mechoshades, manual	900	sf	\$8.94	\$8,046
Building Casework (allwoance)	2,131	sf	\$65.00	\$138,515

CONCEPTUAL COST ESTIMATE

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Scottsdale, AZ
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DETAIL ELEMENTS - PAVILION B				
Element	Quantity	Unit	Unit Cost	Total
Total - Function Equipment and Specialties				\$146,934
9 Stairs and Vertical Transportation				
Stairs			Assume not required	
Total - Stairs and Vertical Transportation				
10 Plumbing Systems			N/A	
Total - Plumbing Systems				
11 Heating, Ventilation and Air Conditioning				
Air-Side Equipment	2,131	sf	\$4.17	\$8,886
Air Distribution	2,131	sf	\$5.28	\$11,252
HVAC Controls	2,131	sf	\$0.72	\$1,534
Additional mechanical requirements	2,131	sf	\$0.49	\$1,044
Total - Heating, Ventilation and Air Conditioning				\$22,716
12 Electrical Lighting, Power and Communications				
Electrical Work				
Power and Lighting				
Service and distribution	2,131	sf	\$5.50	\$11,721
Emergency Service and Distribution	2,131	sf	\$3.50	\$7,459
HVAC & Equipment	2,131	sf	\$0.80	\$1,705
Convenience Power	2,131	sf	\$3.00	\$6,393
Lighting & Lighting Controls	2,131	sf	\$15.00	\$31,965
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	2,131	sf	\$2.30	\$4,901
Voice/Data System	2,131	sf	\$4.50	\$9,590
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	2,131	sf	\$0.75	\$1,598
Clock, PA, Speaker System	2,131	sf	\$0.50	\$1,066

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DETAIL ELEMENTS - PAVILION B				
Element	Quantity	Unit	Unit Cost	Total
Security, access control system				
Security & Access Control System (Conduit Only)	2,131	sf	\$1.10	\$2,344
Security & Access Control System	2,131	sf	\$0.75	\$1,598
CCTV System (Conduit Only)	2,131	sf	\$0.75	\$1,598
CCTV System	2,131	sf	\$2.00	\$4,262
Electroinic Safety and Security Systems Work				
Fire alarm system	2,131	sf	\$3.75	\$7,991
Total - Electrical Lighting, Power and Communications				\$94,190
13 Fire Protection Systems				
Automatic Sprinkler System	2,131	sf	\$3.40	\$7,245
Total - Fire Protection Systems				\$7,245
14 Site Preparation and Demolition			see Exterior	
Total - Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping			see Exterior	
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site			see Exterior	
Total - Utilities on Site				

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
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SUMMARY - PAVILION C				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$1,663,559		\$283.79
1 Foundations	\$21,113		\$3.60	
2 Vertical Structure	\$128,454		\$21.91	
3 Floor & Roof Structures	\$214,687		\$36.62	
4 Exterior Cladding	\$1,221,920		\$208.45	
5 Roofing and Waterproofing	\$77,384		\$13.20	
B) Interiors (6-7)		\$91,145		\$15.55
6 Interior Partitions, Doors and Glazing	\$40,658		\$6.94	
7 Floor, Wall and Ceiling Finishes	\$50,487		\$8.61	
C) Equipment and Vertical Transportation (8-9)		\$119,567		\$20.40
8 Function Equipment and Specialties	\$119,567		\$20.40	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$404,641		\$69.03
10 Plumbing Systems	\$53,711		\$9.16	
11 Heating, Ventilation and Air Conditioning	\$89,702		\$15.30	
12 Electrical Lighting, Power and Communications	\$241,298		\$41.16	
13 Fire Protection Systems	\$19,931		\$3.40	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$2,278,912		\$388.76
General Conditions	8.00%	\$182,313		\$31.10
Subtotal		\$2,461,225		\$419.86
General Requirements	3.50%	\$86,143		\$14.70
Subtotal		\$2,547,368		\$434.56
Bonds & Insurance	2.60%	\$59,252		\$10.11
Subtotal		\$2,606,620		\$444.66
Subguard Insurance	1.00%	\$22,789		\$3.89
Subtotal		\$2,629,409		\$448.55
Contractor's Fee	3.50%	\$92,029		\$15.70
Subtotal		\$2,721,438		\$464.25
Design Contingency	10.00%	\$272,144		\$46.43
TOTAL ESTIMATED CONSTRUCTION COST		\$3,292,940		\$561.74

Total Area: 5,862 SF

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation			assume not required	
Concrete layout	5,862	sf	\$0.18	\$1,055
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 10 footings in total				
Concrete, spread footings, 4000 psi	1.5	cy	\$225.14	\$334
Formwork, spread footings	80	lf	\$5.66	\$453
Foundation reinforcing 180# / cy)	267	lbs	\$1.26	\$336
Excavation	1.6	cy	\$14.79	\$24
Backfill	0.1	cy	\$12.79	\$2
Haul excess	1.5	cy	\$13.43	\$20
Continuous Footings			assume not required	
Grade Beams, assume 1ft x 1ft x 1ft	370	lf		
Concrete, grade beams, 4000 psi	13.7	cy	\$225.14	\$3,085
Formwork, grade beams	740	lf	\$4.90	\$3,626
Foundation reinforcing (180# / cy)	2,467	lbs	\$1.26	\$3,108
Excavation	15	cy	\$14.79	\$223
Backfill	1	cy	\$12.79	\$18
Haul excess	14	cy	\$13.43	\$184
Pile Foundations (Including Mobilization):			assume not required	
Miscellaneous				
Concrete, elevator pit			assume not required	
Perimeter foundation drain	300	lf	\$28.82	\$8,646
Total - Foundations				\$21,113

2 Vertical Structure				
Structural Steel (Non-OSHPD Pricing), assume 12lbs/sf	35.2	t	\$3,272.61	\$115,104
Steel columns, WF				included above
Steel columns, tube steel				included above
Brace framing				included above
Miscellaneous bolts and connections				included above
Fireproofing to steelwork	35.2	t	\$379.57	\$13,350
Total - Vertical Structure				\$128,454

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
3 Floor & Roof Structures				
Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	91	cy	\$225.71	\$20,582
Formwork, slab on grade 5" thick, 3000 psi	300	lf	\$5.32	\$1,596
Sand base, 4"	5,862	sf	\$1.84	\$10,786
Gravel sub base, 6"	5,862	sf	\$1.68	\$9,848
Slab on grade reinforcing (#2 / sf)	11,724	lbs	\$1.26	\$14,772
Finish to slab	5,862	sf	\$0.51	\$2,990
Vapor barrier	5,862	sf	\$0.28	\$1,641
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	9	cy	\$221.42	\$2,019
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	7,034	sf	\$5.53	\$38,900
Finish to concrete deck	7,034	sf	\$0.51	\$3,588
Roof Decking				
3", 20 Ga. metal deck	5,862	sf	\$6.11	\$35,817
Overhangs, allow 20% of area	1,172	sf	\$5.55	\$6,507
Deck edging, 16 Ga.	360	lf	\$11.20	\$4,032
Miscellaneous				
Expansion joint/cover	5,862	sf	\$0.15	\$879
Miscellaneous metals, allowance	5,862	sf	\$1.00	\$5,862
Rough Carpentry, allowance	5,862	sf	\$1.00	\$5,862
Framing, 2" x 6", ceilings	5,862	sf	\$5.50	\$32,241
Plywood Sheathing				
Roof sheathing, 1/2"	5,862	sf	\$2.20	\$12,896
Exterior soffits (20% overhang)	1,172	sf	\$2.50	\$2,931
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	5,862	sf	\$0.08	\$469
Miscellaneous rough hardware	5,862	sf	\$0.08	\$469
Total - Floor & Roof Structures				\$214,687

4 Exterior Cladding				
Exterior Walls And Parapets				
Exterior Metal Studs				
Metal stud framing, 6" 18 Ga. at 16" o.c.	5,067	sf	\$14.55	\$73,720
Sheathing				
Exterior walls, densglass sheathing	5,067	sf	\$3.09	\$15,656
Exterior Wall Insulation				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backin	5,067	sf	\$1.44	\$7,296

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	5,067	sf	\$2.76	\$13,984
Exterior Rammed Earth Wall	333	cy	\$750.00	\$250,000
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	5,067	sf	\$8.14	\$41,243
Add for steel troweled finish, hand applied (smooth)	5,067	sf	\$2.21	\$11,197
Exterior Glazing				
Framed curtainwall with bi-folding system	1,800	sf	\$356.24	\$641,232
Kawneer framed curtainwall incl. all support framework, laminated glazing w/til	1,800	sf	\$75.00	\$135,000
Exterior Doors				
HM door sets, HM frames and hardware, single	2	ea	\$2,228.80	\$4,458
Aluminum door sets, frames and hardware, glazed, double	2	pr	\$9,771.48	\$19,543
Premiums				
Panic hardware, per leaf	2	ea	\$941.47	\$1,883
Automatic door opening, per double leaf set	1	ea	\$4,269.75	\$4,270
Aluminum Sunshades / Roof canopies				
Exterior sunshades			see Exterior	
Miscellaneous				
Firesafing at perimeter walls	300	lf	\$8.13	\$2,439

Total - Exterior Cladding	\$1,221,920
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5 Roofing and Waterproofing

Waterproofing				assume not required
Roofing				
Single ply membrane roofing	7,034	sf	\$4.98	\$35,031
Roof Insulation				
Rigid roof insulation, poly iso insulation	7,034	sf	\$4.81	\$33,835
Pedestal Paver System				assume not required
Skylights				assume not required
Roof Accessories				
Aluminum gutters	300	lf	\$19.75	\$5,925
Aluminum downspouts	60	lf	\$19.75	\$1,185
Access hatch				assume not required
Miscellaneous				
Caulking allowance	7,034	sf	\$0.20	\$1,407

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
Total - Roofing and Waterproofing				\$77,384
6 Interior Partitions, Doors and Glazing				
Interior Partitions				
Interior Metal Studs				
Metal studs, 6", 16 Ga., at 16" o.c.	2,100	sf	\$11.62	\$24,402
Gypsum Board				
Gypsum board, 5/8" thick, finished (I4), type X	2,100	sf	\$2.76	\$5,796
Interior Wall Insulation				
Sound batt insulation, unbacked	2,100	sf	\$1.01	\$2,121
Interior Doors				
SC wood door incl. AL frame and hardware, single	1	ea	\$2,135.60	\$2,136
SC wood door incl. AL frame and hardware, double with vision panels	1	ea	\$4,275.57	\$4,276
Premiums				
Panic hardware, per leaf	2	ea	\$964.04	\$1,928

Total - Interior Partitions, Doors and Glazing	\$40,658
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7 Floor, Wall and Ceiling Finishes

Interior Finishes				
Floors				
Ceramic tile, floor	1,224	sf	\$13.12	\$16,059
Integral color Conrete	4,638	sf	\$2.44	\$11,317
Base				
Ceramic tile, base	60	lf	\$12.35	\$741
Wood base, 4"	290	lf	\$11.04	\$3,202
Walls				
Ceramic tile, walls	480	sf	\$13.64	\$6,547
Paint walls	6,687	sf	\$0.57	\$3,811
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	5,862	sf	\$0.65	\$3,810

Total - Floor, Wall and Ceiling Finishes	\$50,487
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8 Function Equipment and Specialties

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
Toilet Cubicles				
Standard, stainless steel	4	ea	\$1,585.07	\$6,340
Handicap, stainless steel	2	ea	\$1,714.80	\$3,430
Urinal screen, stainless steel	2	ea	\$535.33	\$1,071
Toilet / Restroom Specialties				
Bathroom mirrors	16	sf	\$33.79	\$541
Coat hook	4	ea	\$23.97	\$96
Grab bars	2	ea	\$165.28	\$331
Janitor mop sink rack	1	ea	\$108.87	\$109
Napkin dispenser / disposal, surface mounted	2	ea	\$476.64	\$953
Paper towel dispenser combo unit, recessed	2	ea	\$307.99	\$616
Sanitary napkin dispenser	1	ea	\$346.91	\$347
Sanitary napkin disposal	2	ea	\$153.99	\$308
Seat cover dispenser	2	ea	\$115.07	\$230
Soap dispenser	2	ea	\$78.41	\$157
Toilet paper dispenser	4	ea	\$68.03	\$272
Building Specialties				
Storage cabinets	1	al	included in building casework	
Fire extinguisher and cabinet, allowance	2	ea	\$372.85	\$746
Window Covering				
Mechoshades, manual	1,800	sf	\$8.94	\$16,092
Building Casework (allwoance)	5,862	sf	\$15.00	\$87,930

Total - Function Equipment and Specialties	\$119,567
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9 Stairs and Vertical Transportation

Stairs	Assume not required
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Total - Stairs and Vertical Transportation	
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10 Plumbing Systems

Water heater-Electric	1	ea	\$5,409.71	\$5,410
HW rough-in at water heater	1	ea	\$754.66	\$755
Sanitary Fixtures				
Water closet, floor, sensor FV	6	ea	\$1,007.99	\$6,048
Urinal, sensor FV	1	ea	\$1,177.71	\$1,178

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
Lavatory, wall, sensor faucet	6	ea	\$1,118.84	\$6,713
Mop sink	1	ea	\$519.58	\$520
Drinking fountain	1	ea	\$2,424.75	\$2,425
Floor drain	2	ea	\$225.15	\$450
Hose bibb	1	ea	\$119.50	\$120
Rough-ins	1,224	sf	\$12.31	\$15,062
Domestic Water	1,224	sf	\$5.66	\$6,928
Waste/Vent	1,224	sf	\$3.12	\$3,816
Roof Drainage	1,224	sf	\$1.24	\$1,521
Additional plumbing requirements	1,224	sf	\$2.26	\$2,767

Total - Plumbing Systems	\$53,711
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11 Heating, Ventilation and Air Conditioning

Public space:				
Air-Side Equipment	4,638	sf	\$5.21	\$24,164
Condensate Drainage	4,638	sf	\$0.73	\$3,386
Air Distribution	4,638	sf	\$5.28	\$24,489
HVAC Controls	4,638	sf	\$2.97	\$13,775
Additional mechanical requirements	4,638	sf	\$0.92	\$4,267
Restroom				
Air-Side Equipment	1,224	sf	\$4.24	\$5,190
Air Distribution	1,224	sf	\$5.60	\$6,855
HVAC Controls	1,224	sf	\$4.87	\$5,965
Additional mechanical requirements	1,224	sf	\$1.32	\$1,612

Total - Heating, Ventilation and Air Conditioning	\$89,702
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12 Electrical Lighting, Power and Communications

Electrical Work				
Power and Lighting				
Service and distribution	5,862	sf	\$5.50	\$32,241
Emergency Service and Distribution	5,862	sf	\$3.50	\$20,517
HVAC & Equipment	5,862	sf	\$0.80	\$4,690
Convenience Power	5,862	sf	\$3.00	\$17,586
Lighting & Lighting Controls	5,862	sf	\$15.00	\$87,930

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	4,638	sf	\$2.30	\$10,667
Voice/Data System	4,638	sf	\$4.50	\$20,871
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	4,638	sf	\$0.75	\$3,479
Clock, PA, Speaker System		sf	\$0.50	
Security, access control system				
Security & Access Control System (Conduit Only)	4,638	sf	\$1.10	\$5,102
Security & Access Control System	4,638	sf	\$0.75	\$3,479
CCTV System (Conduit Only)	4,638	sf	\$0.75	\$3,479
CCTV System	4,638	sf	\$2.00	\$9,276
Electroinic Safety and Security Systems Work				
Fire alarm system	5,862	sf	\$3.75	\$21,983
Total - Electrical Lighting, Power and Communications				\$241,298
13 Fire Protection Systems				
Public Space:				
Automatic Sprinkler System	4,638	sf	\$3.40	\$15,769
Restroom				
Automatic Sprinkler System	1,224	sf	\$3.40	\$4,162
Total - Fire Protection Systems				\$19,931
14 Site Preparation and Demolition				not required
Total - Site Preparation and Demolition				

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DETAIL ELEMENTS - PAVILION C				
Element	Quantity	Unit	Unit Cost	Total
15 Site Paving, Structures & Landscaping				see Exterior
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site				see Exterior
Total - Utilities on Site				

CONCEPTUAL COST ESTIMATE

SUMMARY - PAVILION D				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$3,544,785		\$273.79
1 Foundations	\$46,925		\$3.62	
2 Vertical Structure	\$283,709		\$21.91	
3 Floor & Roof Structures	\$475,098		\$36.70	
4 Exterior Cladding	\$2,567,749		\$198.33	
5 Roofing and Waterproofing	\$171,305		\$13.23	
B) Interiors (6-7)		\$268,148		\$20.71
6 Interior Partitions, Doors and Glazing	\$190,603		\$14.72	
7 Floor, Wall and Ceiling Finishes	\$77,545		\$5.99	
C) Equipment and Vertical Transportation (8-9)		\$252,187		\$19.48
8 Function Equipment and Specialties	\$252,187		\$19.48	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$804,029		\$62.10
10 Plumbing Systems	\$41,663		\$3.22	
11 Heating, Ventilation and Air Conditioning	\$155,374		\$12.00	
12 Electrical Lighting, Power and Communications	\$562,972		\$43.48	
13 Fire Protection Systems	\$44,020		\$3.40	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$4,869,149		\$376.08
General Conditions	8.00%	\$389,532		\$30.09
Subtotal		\$5,258,680		\$406.17
General Requirements	3.50%	\$184,054		\$14.22
Subtotal		\$5,442,734		\$420.39
Bonds & Insurance	2.60%	\$126,598		\$9.78
Subtotal		\$5,569,332		\$430.16
Subguard Insurance	1.00%	\$48,691		\$3.76
Subtotal		\$5,618,024		\$433.92
Contractor's Fee	3.50%	\$196,631		\$15.19
Subtotal		\$5,814,654		\$449.11
Design Contingency	10.00%	\$581,465		\$44.91
TOTAL ESTIMATED CONSTRUCTION COST		\$7,035,732		\$543.43

Total Area: 12,947 SF

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION D				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation			assume not required	
Concrete layout	12,947	sf	\$0.18	\$2,330
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 26 footings in total				
Concrete, spread footings, 4000 psi	3.9	cy	\$225.14	\$867
Formwork, spread footings	208	lf	\$5.66	\$1,177
Foundation reinforcing 180# / cy)	693	lbs	\$1.26	\$874
Excavation	4.2	cy	\$14.79	\$63
Backfill	0.4	cy	\$12.79	\$5
Haul excess	3.9	cy	\$13.43	\$52
Continuous Footings			assume not required	
Grade Beams, assume 1ft x 1ft x 1ft	840	lf		
Concrete, grade beams, 4000 psi	31.1	cy	\$225.14	\$7,004
Formwork, grade beams	1,680	lf	\$4.90	\$8,232
Foundation reinforcing (180# / cy)	5,600	lbs	\$1.26	\$7,056
Excavation	34.2	cy	\$14.79	\$506
Backfill	3.1	cy	\$12.79	\$40
Haul excess	31.1	cy	\$13.43	\$418
Pile Foundations (Including Mobilization):			assume not required	
Miscellaneous				
Concrete, elevator pit			assume not required	
Perimeter foundation drain	635	lf	\$28.82	\$18,301
Total - Foundations				\$46,925
2 Vertical Structure				
Structural Steel (Non-OSHDPD Pricing), assume 12lbs/sf	77.7	t	\$3,272.61	\$254,223
Steel columns, WF				included above
Steel columns, tube steel				included above
Brace framing				included above
Miscellaneous bolts and connections				included above
Fireproofing to steelwork	77.7	t	\$379.57	\$29,486

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DETAIL ELEMENTS - PAVILION D				
Element	Quantity	Unit	Unit Cost	Total
Total - Vertical Structure				\$283,709
3 Floor & Roof Structures				
Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	201	cy	\$225.71	\$45,457
Formwork, slab on grade 5" thick, 3000 psi	635	lf	\$5.32	\$3,378
Sand base, 4"	12,947	sf	\$1.84	\$23,822
Gravel sub base, 6"	12,947	sf	\$1.68	\$21,751
Slab on grade reinforcing (#2 / sf)	25,894	lbs	\$1.26	\$32,626
Finish to slab	12,947	sf	\$0.51	\$6,603
Vapor barrier	12,947	sf	\$0.28	\$3,625
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	20	cy	\$221.42	\$4,459
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	15,536	sf	\$5.53	\$85,916
Finish to concrete deck	15,536	sf	\$0.51	\$7,924
Roof Decking				
3", 20 Ga. metal deck	12,947	sf	\$6.11	\$79,106
Overhangs, allow 20% of area	2,589	sf	\$6.11	\$15,821
Deck edging, 16 Ga.	762	lf	\$11.20	\$8,534
Miscellaneous				
Expansion joint/cover	12,947	sf	\$0.15	\$1,942
Miscellaneous metals, allowance	12,947	sf	\$1.00	\$12,947
Rough Carpentry, allowance	12,947	sf	\$1.00	\$12,947
Framing, 2" x 6", ceilings	12,947	sf	\$5.50	\$71,209
Plywood Sheathing				
Roof sheathing, 1/2"	12,947	sf	\$2.20	\$28,483
Exterior soffits (20% overhang)	2,589	sf	\$2.50	\$6,474
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	12,947	sf	\$0.08	\$1,036
Miscellaneous rough hardware	12,947	sf	\$0.08	\$1,036
Total - Floor & Roof Structures				\$475,098
4 Exterior Cladding				
Exterior Walls And Parapets				
Exterior Metal Studs				
Metal stud framing, 6" 18 Ga. at 16" o.c.	10,724	sf	\$14.55	\$156,041

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DETAIL ELEMENTS - PAVILION D				
Element	Quantity	Unit	Unit Cost	Total
Sheathing				
Exterior walls, densglass sheathing	10,724	sf	\$3.09	\$33,139
Exterior Wall Insulation				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backing	10,724	sf	\$1.44	\$15,443
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	10,724	sf	\$2.76	\$29,599
Exterior Rammed Earth Wall	706	cy	\$750.00	\$529,166
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	10,724	sf	\$8.14	\$87,297
Add for steel troweled finish, hand applied (smooth)	10,724	sf	\$2.21	\$23,701
Exterior Glazing				
Framed curtainwall with bi-folding system	3,810	sf	\$356.24	\$1,357,274
Kawneer framed curtainwall incl. all support framework, laminated glazing with tr	3,810	sf	\$75.00	\$285,750
Exterior Doors				
HM door sets, HM frames and hardware, single	2	ea	\$2,228.80	\$4,458
HM door sets, HM frames and hardware, double	2	pr	\$4,412.46	\$8,825
Aluminum door sets, frames and hardware, glazed, single, tempered glass	2	ea	\$4,908.31	\$9,817
Aluminum door sets, frames and hardware, glazed, double	1	pr	\$9,771.48	\$9,771
Premiums				
Panic hardware, per leaf	4	ea	\$941.47	\$3,766
Automatic door opening, per double leaf set	2	ea	\$4,269.75	\$8,540
Aluminum Sunshades / Roof canopies				
Exterior sunshades			see Exterior	
Miscellaneous				
Firesafing at perimeter walls	635	lf	\$8.13	\$5,163

Total - Exterior Cladding	\$2,567,749
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5 Roofing and Waterproofing

Waterproofing				assume not required
Roofing				
Single ply membrane roofing	15,536	sf	\$4.98	\$77,371
Roof Insulation				
Rigid roof insulation, poly iso insulation	15,536	sf	\$4.81	\$74,730
Pedestal Paver System				assume not required
Skylights				assume not required
Roof Accessories				
Aluminum gutters	635	lf	\$19.75	\$12,541
Aluminum downspouts	180	lf	\$19.75	\$3,555

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DETAIL ELEMENTS - PAVILION D				
Element	Quantity	Unit	Unit Cost	Total
Access hatch				assume not required
Miscellaneous				
Caulking allowance	15,536	sf	\$0.20	\$3,107
Total - Roofing and Waterproofing				\$171,305

6 Interior Partitions, Doors and Glazing

Interior Partitions				
Interior Metal Studs				
Metal studs, 6", 16 Ga., at 16" o.c.	6,150	sf	\$11.62	\$71,463
Gypsum Board				
Gypsum board, 5/8" thick, finished (I4), type X	6,150	sf	\$2.76	\$16,974
Interior Wall Insulation				
Sound batt insulation, unbacked	6,150	sf	\$1.01	\$6,212
Fiberglass batt insulation, unbacked				
Mineral wool insulation, unbacked				
Moveable walls	1	al	\$75,000.00	\$75,000
Interior Doors				
SC wood door incl. AL frame and hardware, single	2	ea	\$2,135.60	\$4,271
SC wood door incl. AL frame and hardware, double with vision panels	3	ea	\$4,275.57	\$12,827
Premiums				
Panic hardware, per leaf	4	ea	\$964.04	\$3,856

Total - Interior Partitions, Doors and Glazing	\$190,603
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7 Floor, Wall and Ceiling Finishes

Interior Finishes				
Floors				
Ceramic tile, floor	590	sf	\$13.12	\$7,741
Integral color Concrete	12,357	sf	\$2.44	\$30,151
Base				
Ceramic tile, base	60	lf	\$12.35	\$741
Wood base, 4"	870	lf	\$11.04	\$9,605
Walls				

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DETAIL ELEMENTS - PAVILION D				
Element	Quantity	Unit	Unit Cost	Total
Ceramic tile, walls	480	sf	\$13.64	\$6,547
Paint walls	16,394	sf	\$0.57	\$9,345
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	12,947	sf	\$0.65	\$8,416
Total - Floor, Wall and Ceiling Finishes				\$77,545

8 Function Equipment and Specialties

Toilet Cubicles				
Standard, stainless steel	6	ea	\$1,585.07	\$9,510
Handicap, stainless steel	2	ea	\$1,714.80	\$3,430
Urinal screen, stainless steel	2	ea	\$535.33	\$1,071
Toilet / Restroom Specialties				
Bathroom mirrors	48	sf	\$33.79	\$1,622
Coat hook	8	ea	\$23.97	\$192
Grab bars	2	ea	\$165.28	\$331
Janitor mop sink rack	1	ea	\$108.87	\$109
Napkin dispenser / disposal, surface mounted	4	ea	\$476.64	\$1,907
Paper towel dispenser combo unit, recessed	4	ea	\$307.99	\$1,232
Sanitary napkin dispenser	1	ea	\$346.91	\$347
Sanitary napkin disposal	4	ea	\$153.99	\$616
Seat cover dispenser	4	ea	\$115.07	\$460
Soap dispenser	4	ea	\$78.41	\$314
Toilet paper dispenser	8	ea	\$68.03	\$544
Building Specialties				
Storage cabinets			included in building casework	
Fire extinguisher and cabinet, allowance	6	ea	\$372.85	\$2,237
Window Covering				
Mechoshades, manual	3,810	sf	\$8.94	\$34,061
Building Casework (allwoance)	12,947	sf	\$15.00	\$194,205

Total - Function Equipment and Specialties	\$252,187
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9 Stairs and Vertical Transportation

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DETAIL ELEMENTS - PAVILION D				
Element	Quantity	Unit	Unit Cost	Total
Stairs				Assume not required
Total - Stairs and Vertical Transportation				

10 Plumbing Systems

Water heater-Electric	1	ea	\$5,409.71	\$5,410
HW rough-in at water heater	1	ea	\$754.66	\$755
Sanitary Fixtures				
Water closet, floor, sensor FV	6	ea	\$1,007.99	\$6,048
Urinal, sensor FV	1	ea	\$1,177.71	\$1,178
Lavatory, wall, sensor faucet	6	ea	\$1,118.84	\$6,713
Mop sink	1	ea	\$519.58	\$520
Drinking fountain	1	ea	\$2,424.75	\$2,425
Floor drain	2	ea	\$225.15	\$450
Hose bibb	1	ea	\$119.50	\$120
Rough-ins	734	sf	\$12.31	\$9,032
Domestic Water	734	sf	\$5.66	\$4,154
Waste/Vent	734	sf	\$3.12	\$2,288
Roof Drainage	734	sf	\$1.24	\$912
Additional plumbing requirements	734	sf	\$2.26	\$1,659

Total - Plumbing Systems	\$41,663
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11 Heating, Ventilation and Air Conditioning

ASU field stations:				
Air-Side Equipment	4,229	sf	\$4.13	\$17,466
Air Distribution	4,229	sf	\$5.28	\$22,311
HVAC Controls	4,229	sf	\$0.63	\$2,675
Additional mechanical requirements	4,229	sf	\$0.47	\$1,993
Restroom				
Air-Side Equipment	734	sf	\$4.24	\$3,112
Air Distribution	734	sf	\$5.60	\$4,111
HVAC Controls	734	sf	\$4.87	\$3,577
Additional mechanical requirements	734	sf	\$1.32	\$966

DETAIL ELEMENTS - PAVILION D

Element	Quantity	Unit	Unit Cost	Total
Service areas & Desert Room:				
Air-Side Equipment	7,984	sf	\$4.27	\$34,092
Air Distribution	7,984	sf	\$5.28	\$42,156
HVAC Controls	7,984	sf	\$2.37	\$18,922
Additional mechanical requirements	7,984	sf	\$0.50	\$3,992

Total - Heating, Ventilation and Air Conditioning	\$155,374
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12 Electrical Lighting, Power and Communications

Electrical Work				
Power and Lighting				
Service and distribution	12,947	sf	\$5.50	\$71,209
Emergency Service and Distribution	12,947	sf	\$3.50	\$45,315
HVAC & Equipment	12,947	sf	\$0.80	\$10,358
Convenience Power	12,947	sf	\$3.00	\$38,841
Lighting & Lighting Controls	12,947	sf	\$15.00	\$194,205
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	12,213	sf	\$2.30	\$28,090
Voice/Data System	12,213	sf	\$4.50	\$54,959
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	12,213	sf	\$0.75	\$9,160
Clock, PA, Speaker System	12,213	sf	\$0.50	\$6,107
Security, access control system				
Security & Access Control System (Conduit Only)	12,213	sf	\$1.10	\$13,434
Security & Access Control System	12,213	sf	\$0.75	\$9,160
CCTV System (Conduit Only)	12,213	sf	\$0.75	\$9,160
CCTV System	12,213	sf	\$2.00	\$24,426
Electronic Safety and Security Systems Work				
Fire alarm system	12,947	sf	\$3.75	\$48,551

Total - Electrical Lighting, Power and Communications	\$562,972
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DETAIL ELEMENTS - PAVILION D

Element	Quantity	Unit	Unit Cost	Total
13 Fire Protection Systems				
ASU field stations:				
Automatic Sprinkler System	4,229	sf	\$3.40	\$14,379
Restroom:				
Automatic Sprinkler System	734	sf	\$3.40	\$2,496
Service areas & Desert Room:				
Automatic Sprinkler System	7,984	sf	\$3.40	\$27,146

Total - Fire Protection Systems	\$44,020
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14 Site Preparation and Demolition	not required
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Total - Site Preparation and Demolition	
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15 Site Paving, Structures & Landscaping	see site section
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Total - Site Paving, Structures & Landscaping	
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16 Utilities on Site	see site section
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Total - Utilities on Site	
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CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

SUMMARY - PAVILION E

Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$1,070,877		\$267.79
1 Foundations	\$12,391		\$3.10	
2 Vertical Structure	\$87,630		\$21.91	
3 Floor & Roof Structures	\$146,631		\$36.67	
4 Exterior Cladding	\$771,348		\$192.89	
5 Roofing and Waterproofing	\$52,878		\$13.22	
B) Interiors (6-7)		\$23,482		\$5.87
6 Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes	\$23,482		\$5.87	
C) Equipment and Vertical Transportation (8-9)		\$70,922		\$17.74
8 Function Equipment and Specialties	\$70,922		\$17.74	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$233,733		\$58.45
10 Plumbing Systems				
11 Heating, Ventilation and Air Conditioning	\$42,629		\$10.66	
12 Electrical Lighting, Power and Communications	\$176,756		\$44.20	
13 Fire Protection Systems	\$14,348		\$3.59	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$1,399,015		\$349.84
General Conditions	8.00%	\$111,921		\$27.99
Subtotal		\$1,510,936		\$377.83
General Requirements	3.50%	\$52,883		\$13.22
Subtotal		\$1,563,818		\$391.05
Bonds & Insurance	2.60%	\$36,374		\$9.10
Subtotal		\$1,600,193		\$400.15
Subguard Insurance	1.00%	\$13,990		\$3.50
Subtotal		\$1,614,183		\$403.65
Contractor's Fee	3.50%	\$56,496		\$14.13
Subtotal		\$1,670,679		\$417.77
Design Contingency	10.00%	\$167,068		\$41.78
TOTAL ESTIMATED CONSTRUCTION COST		\$2,021,522		\$505.51

Total Area: 3,999 SF

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CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation			assume not required	
Concrete layout	3,999	sf	\$0.18	\$720
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 8 footings in total				
Concrete, spread footings, 4000 psi	1.2	cy	\$225.14	\$267
Formwork, spread footings	64	lf	\$5.66	\$362
Foundation reinforcing 180# / cy)	213	lbs	\$1.26	\$269
Excavation	1.3	cy	\$14.79	\$19
Backfill	0.1	cy	\$12.79	\$2
Haul excess	1.2	cy	\$13.43	\$16
Continuous Footings			assume not required	
Grade Beams, assume 1ft x 1ft x 1ft	190	lf		
Concrete, grade beams, 4000 psi	7.0	cy	\$225.14	\$1,584
Formwork, grade beams	380	lf	\$4.90	\$1,862
Foundation reinforcing (180# / cy)	1,267	lbs	\$1.26	\$1,596
Excavation	7.7	cy	\$14.79	\$114
Backfill	0.7	cy	\$12.79	\$9
Haul excess	7.0	cy	\$13.43	\$95
Pile Foundations (Including Mobilization):			assume not required	
Miscellaneous				
Concrete, elevator pit			assume not required	
Perimeter foundation drain	190	lf	\$28.82	\$5,476
Total - Foundations				\$12,391
2 Vertical Structure				
Structural Steel (Non-OSHDP Pricing), assume 12lbs/sf	24.0	t	\$3,272.61	\$78,523
Steel columns, WF				included above
Steel columns, tube steel				included above
Brace framing				included above
Miscellaneous bolts and connections				included above
Fireproofing to steelwork	24.0	t	\$379.57	\$9,107

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
Total - Vertical Structure				\$87,630
3 Floor & Roof Structures				
Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	62	cy	\$225.71	\$14,041
Formwork, slab on grade 5" thick, 3000 psi	190	lf	\$5.32	\$1,011
Sand base, 4"	3,999	sf	\$1.84	\$7,358
Gravel sub base, 6"	3,999	sf	\$1.68	\$6,718
Slab on grade reinforcing (#2 / sf)	7,998	lbs	\$1.26	\$10,077
Finish to slab	3,999	sf	\$0.51	\$2,039
Vapor barrier	3,999	sf	\$0.28	\$1,120
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	6	cy	\$221.42	\$1,377
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	4,799	sf	\$5.53	\$26,537
Finish to concrete deck	4,799	sf	\$0.51	\$2,447
Roof Decking				
3", 20 Ga. metal deck	3,999	sf	\$6.11	\$24,434
Overhangs, allow 20% of area	800	sf	\$6.11	\$4,887
Deck edging, 16 Ga.	228	lf	\$11.20	\$2,554
Miscellaneous				
Expansion joint/cover	3,999	sf	\$0.15	\$600
Miscellaneous metals, allowance	3,999	sf	\$1.00	\$3,999
Rough Carpentry, allowance	3,999	sf	\$1.00	\$3,999
Framing, 2" x 6", ceilings	3,999	sf	\$5.50	\$21,995
Plywood Sheathing				
Roof sheathing, 1/2"	3,999	sf	\$2.20	\$8,798
Exterior soffits (20% overhang)	800	sf	\$2.50	\$2,000
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	3,999	sf	\$0.08	\$320
Miscellaneous rough hardware	3,999	sf	\$0.08	\$320
Total - Floor & Roof Structures				\$146,631
4 Exterior Cladding				
Exterior Walls And Parapets				
Exterior Metal Studs				
Metal stud framing, 6" 18 Ga. at 16" o.c.	3,209	sf	\$14.55	\$46,689

CONCEPTUAL COST ESTIMATE

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Scottsdale, AZ
Conceptual

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
Sheathing				
Exterior walls, densglass sheathing	3,209	sf	\$3.09	\$9,915
Exterior Wall Insulation				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backing	3,209	sf	\$1.44	\$4,621
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	3,209	sf	\$2.76	\$8,857
Exterior Rammed Earth Wall	211	cy	\$750.00	\$158,333
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	3,209	sf	\$8.14	\$26,120
Add for steel troweled finish, hand applied (smooth)	3,209	sf	\$2.21	\$7,092
Exterior Glazing				
Kawneer framed curtainwall incl. all support framework, laminated glazing with tr	1,140	sf	\$75.00	\$85,500
Framed curtainwall with bi-folding system	1,140	sf	\$356.24	\$406,114
Exterior Doors				
Aluminum door sets, frames and hardware, glazed, single, tempered glass	1	ea	\$4,908.31	\$4,908
Aluminum door sets, frames and hardware, glazed, double	1	pr	\$9,771.48	\$9,771
Premiums				
Panic hardware, per leaf	2	ea	\$941.47	\$1,883
Automatic door opening, per double leaf set		ea	\$4,269.75	
Aluminum Sunshades / Roof canopies				
Exterior sunshades			see Exterior	
Miscellaneous				
Firesafing at perimeter walls	190	lf	\$8.13	\$1,545
Total - Exterior Cladding			\$771,348	

5 Roofing and Waterproofing

Waterproofing			assume	not required
Roofing				
Single ply membrane roofing	4,799	sf	\$4.98	\$23,898
Roof Insulation				
Rigid roof insulation, poly iso insulation	4,799	sf	\$4.81	\$23,082
Pedestal Paver System			assume	not required
Skylights			assume	not required
Roof Accessories				
Aluminum gutters	190	lf	\$19.75	\$3,753
Aluminum downspouts	60	lf	\$19.75	\$1,185
Access hatch			assume	not required
Miscellaneous				

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
Caulking allowance	4,799	sf	\$0.20	\$960
Total - Roofing and Waterproofing				\$52,878
6 Interior Partitions, Doors and Glazing				
Interior Partitions				not required
Moveable walls			To Desert Great Room only	
Interior Doors				not required
Total - Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes				
Interior Finishes				
Floors				
Integral color Conrete	3,999	sf	\$2.44	\$9,758
Base				
Wood base, 4"	180	lf	\$11.04	\$1,987
Walls				
Paint walls	7,259	sf	\$0.57	\$4,138
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	3,999	sf	\$0.65	\$2,599
Total - Floor, Wall and Ceiling Finishes				\$23,482

8 Function Equipment and Specialties

Toilet Cubicles				not required
Building Specialties				
Storage cabinets			included with building casework	
Fire extinguisher and cabinet, allowance	2	ea	\$372.85	\$746

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
Window Covering				
Mechoshades, manual	1,140	sf	\$8.94	\$10,192
Building Casework (allwoance)	3,999	sf	\$15.00	\$59,985
Total - Function Equipment and Specialties				\$70,922
9 Stairs and Vertical Transportation				
Stairs			Assume not required	
Total - Stairs and Vertical Transportation				
10 Plumbing Systems				
			not required	
Total - Plumbing Systems				
11 Heating, Ventilation and Air Conditioning				
Air-Side Equipment	3,999	sf	\$4.17	\$16,676
Air Distribution	3,999	sf	\$5.28	\$21,115
HVAC Controls	3,999	sf	\$0.72	\$2,879
Additional mechanical requirements	3,999	sf	\$0.49	\$1,960
Total - Heating, Ventilation and Air Conditioning				\$42,629
12 Electrical Lighting, Power and Communications				
Electrical Work				

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
Power and Lighting				
Service and distribution	3,999	sf	\$5.50	\$21,995
Emergency Service and Distribution	3,999	sf	\$3.50	\$13,997
HVAC & Equipment	3,999	sf	\$0.80	\$3,199
Convenience Power	3,999	sf	\$3.00	\$11,997
Lighting & Lighting Controls	3,999	sf	\$15.00	\$59,985
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	3,999	sf	\$2.30	\$9,198
Voice/Data System	3,999	sf	\$4.50	\$17,996
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	3,999	sf	\$0.75	\$2,999
Clock, PA, Speaker System	3,999	sf	\$0.50	\$2,000
Security, access control system				
Security & Access Control System (Conduit Only)	3,999	sf	\$1.10	\$4,399
Security & Access Control System	3,999	sf	\$0.75	\$2,999
CCTV System (Conduit Only)	3,999	sf	\$0.75	\$2,999
CCTV System	3,999	sf	\$2.00	\$7,998
Electroinic Safety and Security Systems Work				
Fire alarm system	3,999	sf	\$3.75	\$14,996
Total - Electrical Lighting, Power and Communications				\$176,756
13 Fire Protection Systems				
Automatic Sprinkler System	3,999	sf	\$3.59	\$14,348
Total - Fire Protection Systems				\$14,348
14 Site Preparation and Demolition				
			not required	

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION E				
Element	Quantity	Unit	Unit Cost	Total
Total - Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				see Exterior
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site				see Exterior
Total - Utilities on Site				

CONCEPTUAL COST ESTIMATE

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Scottsdale, AZ
Conceptual

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SUMMARY - PAVILION H				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$1,460,151		\$343.40
1 Foundations	\$18,771		\$4.41	
2 Vertical Structure	\$93,174		\$21.91	
3 Floor & Roof Structures	\$157,370		\$37.01	
4 Exterior Cladding	\$1,133,148		\$266.50	
5 Roofing and Waterproofing	\$57,688		\$13.57	
B) Interiors (6-7)		\$58,020		\$13.65
6 Interior Partitions, Doors and Glazing	\$21,226		\$4.99	
7 Floor, Wall and Ceiling Finishes	\$36,794		\$8.65	
C) Equipment and Vertical Transportation (8-9)		\$93,727		\$22.04
8 Function Equipment and Specialties	\$93,727		\$22.04	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$283,872		\$66.76
10 Plumbing Systems	\$40,459		\$9.52	
11 Heating, Ventilation and Air Conditioning	\$49,005		\$11.53	
12 Electrical Lighting, Power and Communications	\$179,273		\$42.16	
13 Fire Protection Systems	\$15,135		\$3.56	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$1,895,770		\$445.85
General Conditions	8.00%	\$151,662		\$35.67
Subtotal		\$2,047,432		\$481.52
General Requirements	3.50%	\$71,660		\$16.85
Subtotal		\$2,119,092		\$498.38
Bonds & Insurance	2.60%	\$49,290		\$11.59
Subtotal		\$2,168,382		\$509.97
Subguard Insurance	1.00%	\$18,958		\$4.46
Subtotal		\$2,187,339		\$514.43
Contractor's Fee	3.50%	\$76,557		\$18.00
Subtotal		\$2,263,896		\$532.43
Design Contingency	10.00%	\$226,390		\$53.24
TOTAL ESTIMATED CONSTRUCTION COST		\$2,739,315		\$644.24

Total Area: 4,252 SF

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation			assume not required	
Concrete layout	4,252	sf	\$0.18	\$765
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 10 footings in total				
Concrete, spread footings, 4000 psi	1.5	cy	\$225.14	\$334
Formwork, spread footings	80	lf	\$5.66	\$453
Foundation reinforcing 180# / cy)	267	lbs	\$1.26	\$336
Excavation	1.6	cy	\$14.79	\$24
Backfill	0.1	cy	\$12.79	\$2
Haul excess	1.5	cy	\$13.43	\$20
Continuous Footings			assume not required	
Grade Beams, assume 1ft x 1ft x 1ft	310	lf		
Concrete, grade beams, 4000 psi	11.5	cy	\$225.14	\$2,585
Formwork, grade beams	620	lf	\$4.90	\$3,038
Foundation reinforcing (180# / cy)	2,067	lbs	\$1.26	\$2,604
Excavation	13	cy	\$14.79	\$187
Backfill	1	cy	\$12.79	\$15
Haul excess	25	cy	\$13.43	\$339
Pile Foundations (Including Mobilization):			assume not required	
Miscellaneous				
Concrete, elevator pit			assume not required	
Perimeter foundation drain	280	lf	\$28.82	\$8,070
Total - Foundations				\$18,771

2 Vertical Structure

Structural Steel (Non-OSHDP Pricing), assume 12lbs/sf	25.5	t	\$3,272.61	\$83,491
Steel columns, WF				included above
Steel columns, tube steel				included above
Brace framing				included above
Miscellaneous bolts and connections				included above
Fireproofing to steelwork	25.5	t	\$379.57	\$9,684

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
Total - Vertical Structure				\$93,174

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
3 Floor & Roof Structures				
Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	66	cy	\$225.71	\$14,929
Formwork, slab on grade 5" thick, 3000 psi	280	lf	\$5.32	\$1,490
Sand base, 4"	4,252	sf	\$1.84	\$7,824
Gravel sub base, 6"	4,252	sf	\$1.68	\$7,143
Slab on grade reinforcing (#2 / sf)	8,504	lbs	\$1.26	\$10,715
Finish to slab	4,252	sf	\$0.51	\$2,169
Vapor barrier	4,252	sf	\$0.28	\$1,191
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	7	cy	\$221.42	\$1,465
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	5,102	sf	\$5.53	\$28,216
Finish to concrete deck	5,102	sf	\$0.51	\$2,602
Roof Decking				
3", 20 Ga. metal deck	4,252	sf	\$6.11	\$25,980
Overhangs, allow 20% of area	850	sf	\$6.11	\$5,196
Deck edging, 16 Ga.	336	lf	\$11.20	\$3,763
Miscellaneous				
Expansion joint/cover	4,252	sf	\$0.15	\$638
Miscellaneous metals, allowance	4,252	sf	\$1.00	\$4,252
Rough Carpentry, allowance	4,252	sf	\$1.00	\$4,252
Ceiling Framing				
Framing, 2" x 6", ceilings	4,252	sf	\$5.50	\$23,386
Plywood Sheathing				
Roof sheathing, 1/2"	4,252	sf	\$2.20	\$9,354
Exterior soffits (20% overhang)	850	sf	\$2.50	\$2,126
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	4,252	sf	\$0.08	\$340
Miscellaneous rough hardware	4,252	sf	\$0.08	\$340
Total - Floor & Roof Structures				\$157,370

4 Exterior Cladding				
Exterior Walls And Parapets				
Exterior Metal Studs				
Metal stud framing, 6" 18 Ga. at 16" o.c.	4,729	sf	\$14.55	\$68,805
Sheathing				

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
Exterior walls, densglass sheathing	4,729	sf	\$3.09	\$14,612
Exterior Wall Insulation				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backing	4,729	sf	\$1.44	\$6,810
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	4,729	sf	\$2.76	\$13,052
Exterior Rammed Earth Wall	311	cy	\$750.00	\$233,333
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	4,729	sf	\$8.14	\$38,493
Add for steel troweled finish, hand applied (smooth)	4,729	sf	\$2.21	\$10,451
Exterior Glazing				
Framed curtainwall with bi-folding system	1,680	sf	\$356.24	\$598,483
Kawneer framed curtainwall incl. all support framework, laminated glazing with trar	1,680	sf	\$75.00	\$126,000
Exterior Doors				
Aluminum door sets, frames and hardware, glazed, single, tempered glass	1	ea	\$4,908.31	\$4,908
Aluminum door sets, frames and hardware, glazed, double	1	pr	\$9,771.48	\$9,771
Premiums				
Panic hardware, per leaf	2	ea	\$941.47	\$1,883
Automatic door opening, per double leaf set	1	ea	\$4,269.75	\$4,270
Aluminum Sunshades / Roof canopies				
Exterior sunshades			see Exterior	
Miscellaneous				
Firesafing at perimeter walls	280	lf	\$8.13	\$2,276
Total - Exterior Cladding			\$1,133,148	

5 Roofing and Waterproofing

Waterproofing			assume not required	
Roofing				
Single ply membrane roofing	5,102	sf	\$4.98	\$25,410
Roof Insulation				
Rigid roof insulation, poly iso insulation	5,102	sf	\$4.81	\$24,543
Pedestal Paver System			assume not required	
Skylights			assume not required	
Roof Accessories				
Aluminum gutters	280	lf	\$19.75	\$5,530
Aluminum downspouts	60	lf	\$19.75	\$1,185
Access hatch			assume not required	
Miscellaneous				
Caulking allowance	5,102	sf	\$0.20	\$1,020

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
Total - Roofing and Waterproofing				
\$57,688				
6 Interior Partitions, Doors and Glazing				
Interior Partitions				
Interior Metal Studs				
Metal studs, 6", 16 Ga., at 16" o.c.	900	sf	\$11.62	\$10,458
Gypsum Board				
Gypsum board, 5/8" thick, finished (I4), type X	900	sf	\$2.76	\$2,484
Interior Wall Insulation				
Sound batt insulation, unbacked	900	sf	\$1.01	\$909
Interior Doors				
SC wood door incl. AL frame and hardware, single	1	ea	\$2,135.60	\$2,136
SC wood door incl. AL frame and hardware, double with vision panels	1	ea	\$4,275.57	\$4,276
Panic hardware, per leaf	1	ea	\$964.04	\$964
Total - Interior Partitions, Doors and Glazing			\$21,226	

7 Floor, Wall and Ceiling Finishes

Interior Finishes				
Floors				
Ceramic tile, floor	685	sf	\$12.76	\$8,741
Integral color Concrete	3,567	sf	\$2.44	\$8,703
Base				
Ceramic tile, base	52	lf	\$12.35	\$642
Wood base, 4"	253	lf	\$11.04	\$2,793
Walls				
Ceramic tile, walls	416	sf	\$12.45	\$5,179
Paint walls	5,213	sf	\$0.57	\$2,971
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	4,252	sf	\$0.65	\$2,764

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
Total - Floor, Wall and Ceiling Finishes				\$36,794
8 Function Equipment and Specialties				
Toilet Cubicles				
Standard, stainless steel	4	ea	\$1,585.07	\$6,340
Handicap, stainless steel	2	ea	\$1,714.80	\$3,430
Toilet / Restroom Specialties				
Bathroom mirrors	16	sf	\$33.79	\$541
Coat hook	6	ea	\$23.97	\$144
Grab bars	2	ea	\$165.28	\$331
Janitor mop sink rack	1	ea	\$108.87	\$109
Napkin dispenser / disposal, surface mounted	2	ea	\$476.64	\$953
Paper towel dispenser combo unit, recessed	2	ea	\$307.99	\$616
Sanitary napkin dispenser	1	ea	\$346.91	\$347
Sanitary napkin disposal	3	ea	\$153.99	\$462
Seat cover dispenser	3	ea	\$115.07	\$345
Soap dispenser	2	ea	\$78.41	\$157
Toilet paper dispenser	6	ea	\$68.03	\$408
Building Specialties				
Storage cabinets			included in building casework	
Fire extinguisher and cabinet, allowance	2	ea	\$372.85	\$746
Window Covering				
Mechoshades, manual	1,680	sf	\$8.94	\$15,019
Building Casework (allwoance)	4,252	sf	\$15.00	\$63,780

Total - Function Equipment and Specialties	\$93,727
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9 Stairs and Vertical Transportation

Stairs	Assume not required
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Total - Stairs and Vertical Transportation	
--	--

10 Plumbing Systems

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
Water heater-Electric	1	ea	\$5,409.71	\$5,410
HW rough-in at water heater	1	ea	\$754.66	\$755
Sanitary Fixtures				
Water closet, floor, sensor FV	6	ea	\$1,007.99	\$6,048
Urinal, sensor FV	1	ea	\$1,177.71	\$1,178
Lavatory, wall, sensor faucet	6	ea	\$1,118.84	\$6,713
Mop sink	1	ea	\$519.58	\$520
Drinking fountain	1	ea	\$2,424.75	\$2,425
Floor drain	2	ea	\$225.15	\$450
Hose bibb	1	ea	\$119.50	\$120
Rough-ins	685	sf	\$12.31	\$8,429
Domestic Water	685	sf	\$5.66	\$3,877
Waste/Vent	685	sf	\$3.12	\$2,135
Roof Drainage	685	sf	\$1.24	\$851
Additional plumbing requirements	685	sf	\$2.26	\$1,549

Total - Plumbing Systems	\$40,459
--------------------------	----------

11 Heating, Ventilation and Air Conditioning

Restroom				
Air-Side Equipment	685	sf	\$4.24	\$2,904
Air Distribution	685	sf	\$5.60	\$3,837
HVAC Controls	685	sf	\$4.87	\$3,338
Additional mechanical requirements	685	sf	\$1.32	\$902
Pavilion				
Air-Side Equipment	3,567	sf	\$4.17	\$14,874
Air Distribution	3,567	sf	\$5.28	\$18,834
HVAC Controls	3,567	sf	\$0.72	\$2,568
Additional mechanical requirements	3,567	sf	\$0.49	\$1,748

Total - Heating, Ventilation and Air Conditioning	\$49,005
---	----------

12 Electrical Lighting, Power and Communications

Electrical Work				
Power and Lighting				
Service and distribution	4,252	sf	\$5.50	\$23,386
Emergency Service and Distribution	4,252	sf	\$3.50	\$14,882

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
HVAC & Equipment	4,252	sf	\$0.80	\$3,402
Convenience Power	4,252	sf	\$3.00	\$12,756
Lighting & Lighting Controls	4,252	sf	\$15.00	\$63,780
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	3,567	sf	\$2.30	\$8,204
Voice/Data System	3,567	sf	\$4.50	\$16,052
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	3,567	sf	\$0.75	\$2,675
Clock, PA, Speaker System	3,567	sf	\$0.50	\$1,784
Security, access control system				
Security & Access Control System (Conduit Only)	3,567	sf	\$1.10	\$3,924
Security & Access Control System	3,567	sf	\$0.75	\$2,675
CCTV System (Conduit Only)	3,567	sf	\$0.75	\$2,675
CCTV System	3,567	sf	\$2.00	\$7,134
Electroinic Safety and Security Systems Work				
Fire alarm system	4,252	sf	\$3.75	\$15,945
Total - Electrical Lighting, Power and Communications				\$179,273
13 Fire Protection Systems				
Restroom				
Automatic Sprinkler System	685	sf	\$3.40	\$2,329
Pavilion				
Automatic Sprinkler System	3,567	sf	\$3.59	\$12,806
Total - Fire Protection Systems				\$15,135
14 Site Preparation and Demolition				not required

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DETAIL ELEMENTS - PAVILION H				
Element	Quantity	Unit	Unit Cost	Total
Total - Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				see Exterior
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site				see Exterior
Total - Utilities on Site				

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SUMMARY - PAVILION K				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$1,066,972		\$322.84
1 Foundations	\$12,831		\$3.88	
2 Vertical Structure	\$72,423		\$21.91	
3 Floor & Roof Structures	\$121,620		\$36.80	
4 Exterior Cladding	\$815,344		\$246.70	
5 Roofing and Waterproofing	\$44,755		\$13.54	
B) Interiors (6-7)		\$19,346		\$5.85
6 Interior Partitions, Doors and Glazing				
7 Floor, Wall and Ceiling Finishes	\$19,346		\$5.85	
C) Equipment and Vertical Transportation (8-9)		\$61,049		\$18.47
8 Function Equipment and Specialties	\$61,049		\$18.47	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$193,170		\$58.45
10 Plumbing Systems				
11 Heating, Ventilation and Air Conditioning	\$35,231		\$10.66	
12 Electrical Lighting, Power and Communications	\$146,081		\$44.20	
13 Fire Protection Systems	\$11,858		\$3.59	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$1,340,537		\$405.61
General Conditions	8.00%	\$107,243		\$32.45
Subtotal		\$1,447,780		\$438.06
General Requirements	3.50%	\$50,672		\$15.33
Subtotal		\$1,498,452		\$453.39
Bonds & Insurance	2.60%	\$34,854		\$10.55
Subtotal		\$1,533,306		\$463.94
Subguard Insurance	1.00%	\$13,405		\$4.06
Subtotal		\$1,546,712		\$467.99
Contractor's Fee	3.50%	\$54,135		\$16.38
Subtotal		\$1,600,847		\$484.37
Design Contingency	10.00%	\$160,085		\$48.44
TOTAL ESTIMATED CONSTRUCTION COST		\$1,937,024		\$586.09

Total Area: 3,305 SF

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation			assume not required	
Concrete layout	3,305	sf	\$0.18	\$595
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 8 footings in total				
Concrete, spread footings, 4000 psi	1.2	cy	\$225.14	\$267
Formwork, spread footings	64	lf	\$5.66	\$362
Foundation reinforcing 180# / cy)	213	lbs	\$1.26	\$269
Excavation	1.3	cy	\$14.79	\$19
Backfill	0.1	cy	\$12.79	\$2
Haul excess	1.2	cy	\$13.43	\$16
Continuous Footings			assume not required	
Grade Beams, assume 1ft x 1ft x 1ft	200	lf		
Concrete, grade beams, 4000 psi	7.4	cy	\$225.14	\$1,668
Formwork, grade beams	400	lf	\$4.90	\$1,960
Foundation reinforcing (180# / cy)	1,333	lbs	\$1.26	\$1,680
Excavation	8.1	cy	\$14.79	\$121
Backfill	0.7	cy	\$12.79	\$9
Haul excess	7.4	cy	\$13.43	\$99
Pile Foundations (Including Mobilization):			assume not required	
Miscellaneous				
Concrete, elevator pit			assume not required	
Perimeter foundation drain	200	lf	\$28.82	\$5,764
Total - Foundations				\$12,831
2 Vertical Structure				
Structural Steel (Non-OSHPD Pricing), assume 12lbs/sf	19.8	t	\$3,272.61	\$64,896
Steel columns, WF			included above	
Steel columns, tube steel			included above	
Brace framing			included above	
Miscellaneous bolts and connections			included above	
Fireproofing to steelwork	19.8	t	\$379.57	\$7,527
Total - Vertical Structure				\$72,423

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
3 Floor & Roof Structures				
Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	51	cy	\$225.71	\$11,604
Formwork, slab on grade 5" thick, 3000 psi	200	lf	\$5.32	\$1,064
Sand base, 4"	3,305	sf	\$1.84	\$6,081
Gravel sub base, 6"	3,305	sf	\$1.68	\$5,552
Slab on grade reinforcing (#2 / sf)	6,610	lbs	\$1.26	\$8,329
Finish to slab	3,305	sf	\$0.51	\$1,686
Vapor barrier	3,305	sf	\$0.28	\$925
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	5	cy	\$221.42	\$1,138
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	3,966	sf	\$5.53	\$21,932
Finish to concrete deck	3,966	sf	\$0.51	\$2,023
Roof Decking		sf		
3", 20 Ga. metal deck	3,305	sf	\$6.11	\$20,194
Overhangs, allow 20% of area	661	sf	\$5.55	\$3,669
Deck edging, 16 Ga.	240	lf	\$11.20	\$2,688
Miscellaneous				
Expansion joint/cover	3,305	sf	\$0.15	\$496
Miscellaneous metals, allowance	3,305	sf	\$1.00	\$3,305
Rough Carpentry, allowance	3,305	sf	\$1.00	\$3,305
Framing, 2" x 6", ceilings	3,305	sf	\$5.50	\$18,178
Plywood Sheathing				
Roof sheathing, 1/2"	3,305	sf	\$2.20	\$7,271
Exterior soffits (20% overhang)	661	sf	\$2.50	\$1,653
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	3,305	sf	\$0.08	\$264
Miscellaneous rough hardware	3,305	sf	\$0.08	\$264
Total - Floor & Roof Structures				\$121,620

4 Exterior Cladding				
Exterior Walls And Parapets				
Exterior Metal Studs				
Metal stud framing, 6" 18 Ga. at 16" o.c.	3,378	sf	\$14.55	\$49,147
Sheathing				
Exterior walls, densglass sheathing	3,378	sf	\$3.09	\$10,437
Exterior Wall Insulation				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backing	3,378	sf	\$1.44	\$4,864
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	3,378	sf	\$2.76	\$9,323

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
Exterior Rammed Earth Wall	222	cy	\$750.00	\$166,667
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	3,378	sf	\$8.14	\$27,495
Add for steel troweled finish, hand applied (smooth)	3,378	sf	\$2.21	\$7,465
Exterior Glazing				
Framed curtainwall with bi-folding system	1,200	sf	\$356.24	\$427,488
Kawneer framed curtainwall incl. all support framework, laminated glazing with trar	1,200	sf	\$75.00	\$90,000
Exterior Doors				
Aluminum door sets, frames and hardware, glazed, single, tempered glass	1	ea	\$4,908.31	\$4,908
Aluminum door sets, frames and hardware, glazed, double	1	pr	\$9,771.48	\$9,771
Premiums				
Panic hardware, per leaf	2	ea	\$941.47	\$1,883
Automatic door opening, per double leaf set	1	ea	\$4,269.75	\$4,270
Aluminum Sunshades / Roof canopies				
Exterior sunshades			see Exterior	
Miscellaneous				
Firesafing at perimeter walls	200	lf	\$8.13	\$1,626
Total - Exterior Cladding				\$815,344

5 Roofing and Waterproofing

Waterproofing				assume not required
Roofing				
Single ply membrane roofing	3,966	sf	\$4.98	\$19,751
Roof Insulation				
Rigid roof insulation, poly iso insulation	3,966	sf	\$4.81	\$19,076
Pedestal Paver System				assume not required
Skylights				assume not required
Roof Accessories				
Aluminum gutters	200	lf	\$19.75	\$3,950
Aluminum downspouts	60	lf	\$19.75	\$1,185
Access hatch				assume not required
Miscellaneous				
Caulking allowance	3,966	sf	\$0.20	\$793
Total - Roofing and Waterproofing				\$44,755

6 Interior Partitions, Doors and Glazing

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
Interior Partitions				Assume open space (no fixed interior walls)
Moveable walls				To Desert Great Room only
Interior Glazing				Assume open space (no fixed interior walls)
Interior glazing				
Door sidelights or transom				
Interior Doors				Assume not required
Total - Interior Partitions, Doors and Glazing				

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
7 Floor, Wall and Ceiling Finishes				
Interior Finishes				
Floors				
Integral color Conrete	3,305	sf	\$2.44	\$8,064
Base				
Wood base, 4"	200	sf	\$11.04	\$2,208
Walls				
Paint walls	3,378	sf	\$0.57	\$1,925
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	3,305	sf	\$0.65	\$2,148
Total - Floor, Wall and Ceiling Finishes				\$19,346
8 Function Equipment and Specialties				
Toilet Cubicles				N/A
Building Specialties				
Storage cabinets			included with building casework	
Fire extinguisher and cabinet, allowance	2	ea	\$372.85	\$746
Window Covering				
Mechoshades, manual	1,200	sf	\$8.94	\$10,728
Building Casework (allwoance)	3,305	sf	\$15.00	\$49,575
Total - Function Equipment and Specialties				\$61,049
9 Stairs and Vertical Transportation				
Stairs			Assume not required	
Total - Stairs and Vertical Transportation				
10 Plumbing Systems				
			N/A	

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
Total - Plumbing Systems				
11 Heating, Ventilation and Air Conditioning				
Air-Side Equipment	3,305	sf	\$4.17	\$13,782
Air Distribution	3,305	sf	\$5.28	\$17,450
HVAC Controls	3,305	sf	\$0.72	\$2,380
Additional mechanical requirements	3,305	sf	\$0.49	\$1,619
Total - Heating, Ventilation and Air Conditioning				\$35,231
12 Electrical Lighting, Power and Communications				
Electrical Work				
Power and Lighting				
Service and distribution	3,305	sf	\$5.50	\$18,178
Emergency Service and Distribution	3,305	sf	\$3.50	\$11,568
HVAC & Equipment	3,305	sf	\$0.80	\$2,644
Convenience Power	3,305	sf	\$3.00	\$9,915
Lighting & Lighting Controls	3,305	sf	\$15.00	\$49,575
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	3,305	sf	\$2.30	\$7,602
Voice/Data System	3,305	sf	\$4.50	\$14,873
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	3,305	sf	\$0.75	\$2,479
Clock, PA, Speaker System	3,305	sf	\$0.50	\$1,653
Security, access control system				
Security & Access Control System (Conduit Only)	3,305	sf	\$1.10	\$3,636
Security & Access Control System	3,305	sf	\$0.75	\$2,479
CCTV System (Conduit Only)	3,305	sf	\$0.75	\$2,479
CCTV System	3,305	sf	\$2.00	\$6,610
Electroinic Safety and Security Systems Work				
Fire alarm system	3,305	sf	\$3.75	\$12,394

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION K				
Element	Quantity	Unit	Unit Cost	Total
Total - Electrical Lighting, Power and Communications				\$146,081
13 Fire Protection Systems				
Automatic Sprinkler System	3,305	sf	\$3.59	\$11,858
Total - Fire Protection Systems				\$11,858
14 Site Preparation and Demolition				not required
Total - Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				see Exterior
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site				see Exterior
Total - Utilities on Site				

CONCEPTUAL COST ESTIMATE

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SUMMARY - PAVILION L				
Element	Subtotal	Total	Cost / SF	Cost / SF
A) Shell (1-5)		\$2,704,205		\$298.97
1 Foundations	\$42,537		\$4.70	
2 Vertical Structure	\$198,204		\$21.91	
3 Floor & Roof Structures	\$334,470		\$36.98	
4 Exterior Cladding	\$2,005,553		\$221.73	
5 Roofing and Waterproofing	\$123,441		\$13.65	
B) Interiors (6-7)		\$167,550		\$18.52
6 Interior Partitions, Doors and Glazing	\$113,834		\$12.59	
7 Floor, Wall and Ceiling Finishes	\$53,716		\$5.94	
C) Equipment and Vertical Transportation (8-9)		\$167,905		\$18.56
8 Function Equipment and Specialties	\$167,905		\$18.56	
9 Stairs and Vertical Transportation				
D) Mechanical and Electrical (10-13)		\$528,489		\$58.43
10 Plumbing Systems				
11 Heating, Ventilation and Air Conditioning	\$95,061		\$10.51	
12 Electrical Lighting, Power and Communications	\$399,789		\$44.20	
13 Fire Protection Systems	\$33,639		\$3.72	
E) Site Construction (14-16)				
14 Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
16 Utilities on Site				
Subtotal		\$3,568,148		\$394.49
General Conditions	8.00%	\$285,452		\$31.56
Subtotal		\$3,853,600		\$426.05
General Requirements	3.50%	\$134,876		\$14.91
Subtotal		\$3,988,476		\$440.96
Bonds & Insurance	2.60%	\$92,772		\$10.26
Subtotal		\$4,081,248		\$451.22
Subguard Insurance	1.00%	\$35,681		\$3.94
Subtotal		\$4,116,929		\$455.16
Contractor's Fee	3.50%	\$144,093		\$15.93
Subtotal		\$4,261,022		\$471.09
Design Contingency	10.00%	\$426,102		\$47.11
TOTAL ESTIMATED CONSTRUCTION COST		\$5,155,837		\$570.02

Total Area: 9,045 SF

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DETAIL ELEMENTS - PAVILION L				
Element	Quantity	Unit	Unit Cost	Total
1 Foundations				
Basement Excavation				assume not required
Concrete layout	9,045	sf	\$0.18	\$1,628
Spread Footings, assume 2ft x 2ft x 1ft, 15ft o/c, 22 footings in total				
Concrete, spread footings, 4000 psi	3.3	cy	\$225.14	\$734
Formwork, spread footings	132	lf	\$5.66	\$747
Foundation reinforcing 180# / cy)	587	lbs	\$1.26	\$739
Excavation	3.6	cy	\$14.79	\$53
Backfill	0.3	cy	\$12.79	\$4
Haul excess	3.3	cy	\$13.43	\$44
Continuous Footings				assume not required
Grade Beams, assume 1ft x 1ft x 1ft	790	lf		
Concrete, grade beams, 4000 psi	29.3	cy	\$225.14	\$6,587
Formwork, grade beams	1,580	lf	\$4.90	\$7,742
Foundation reinforcing (180# / cy)	5,267	lbs	\$1.26	\$6,636
Excavation	32	cy	\$14.79	\$476
Backfill	3	cy	\$12.79	\$37
Haul excess	29	cy	\$13.43	\$393
Pile Foundations (Including Mobilization):				assume not required
Precast, prestressed - 14" square				
Precast, prestressed - 18" square				
Piles, steel H-section, 12" x 12" x 74#				
Miscellaneous				
Concrete, elevator pit				assume not required
Perimeter foundation drain	580	lf	\$28.82	\$16,716
Total - Foundations				\$42,537
2 Vertical Structure				
Structural Steel (Non-OSHDPD Pricing), assume 12lbs/sf	54.3	t	\$3,272.61	\$177,605
Steel columns, WF				included above
Steel columns, tube steel				included above
Brace framing				included above
Miscellaneous bolts and connections				included above
Fireproofing to steelwork	54.3	t	\$379.57	\$20,599

CONCEPTUAL COST ESTIMATE

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DETAIL ELEMENTS - PAVILION L

Element	Quantity	Unit	Unit Cost	Total
Total - Vertical Structure				\$198,204

3 Floor & Roof Structures

Slab On Grade 5" Thick, 3000 psi				
Concrete, slab on grade	141	cy	\$225.71	\$31,757
Formwork, slab on grade 5" thick, 3000 psi	580	lf	\$5.32	\$3,086
Sand base, 4"	9,045	sf	\$1.84	\$16,643
Gravel sub base, 6"	9,045	sf	\$1.68	\$15,196
Slab on grade reinforcing (#2 / sf)	18,090	lbs	\$1.26	\$22,793
Finish to slab	9,045	sf	\$0.51	\$4,613
Vapor barrier	9,045	sf	\$0.28	\$2,533
Concrete, slab on grade, add for thickened edges, allow 10% of concrete	14	cy	\$221.42	\$3,115
Roof Deck Fill				
3 1/2" thick normal weight concrete deck topping, 3000 psi, incl. reinforcing	10,854	sf	\$5.53	\$60,023
Finish to concrete deck	10,854	sf	\$0.51	\$5,536
Roof Decking				
3", 20 Ga. metal deck	9,045	sf	\$6.11	\$55,265
Overhangs, allow 20% of area	1,809	sf	\$6.11	\$11,053
Deck edging, 16 Ga.	696	lf	\$11.20	\$7,795
Miscellaneous				
Expansion joint/cover	9,045	sf	\$0.15	\$1,357
Miscellaneous metals, allowance	9,045	sf	\$1.00	\$9,045
Rough Carpentry, allowance	9,045	sf	\$1.00	\$9,045
Framing, 2" x 6", ceilings	9,045	sf	\$5.50	\$49,748
Plywood Sheathing				
Roof sheathing, 1/2"	9,045	sf	\$2.20	\$19,899
Exterior soffits (20% overhang)	1,809	sf	\$2.50	\$4,523
Miscellaneous Rough Carpentry				
Miscellaneous blocking/strapping and backing	9,045	sf	\$0.08	\$724
Miscellaneous rough hardware	9,045	sf	\$0.08	\$724

Total - Floor & Roof Structures	\$334,470
---------------------------------	-----------

4 Exterior Cladding

Exterior Walls And Parapets
Exterior Metal Studs

Prepared by CUMMING

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Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

DETAIL ELEMENTS - PAVILION L

Element	Quantity	Unit	Unit Cost	Total
Metal stud framing, 6" 18 Ga. at 16" o.c.	9,796	sf	\$14.55	\$142,525
Sheathing				
Exterior walls, densglass sheathing	9,796	sf	\$3.09	\$30,268
Exterior Wall Insulation				
R-19 batt insulation, exterior walls and returns, semi-rigid incl. foil backing	9,796	sf	\$1.44	\$14,106
Gypsum Board to Interior of Exterior				
Interior of exterior, 5/8" thick gypsum board X, finished	9,796	sf	\$2.76	\$27,036
Exterior Rammed Earth Wall	644	sf	\$248.29	\$160,009
Exterior Plaster, Machine Finish				
Exterior plaster, machine finish, walls, 3 color	9,796	sf	\$8.14	\$79,736
Add for steel troweled finish, hand applied (smooth)	9,796	sf	\$2.21	\$21,648
Exterior Glazing				
Framed curtainwall with bi-folding system	3,480	sf	\$356.24	\$1,239,715
Kawneer framed curtainwall incl. all support framework, laminated glazing with 1	3,480	sf	\$75.00	\$261,000
Exterior Doors				
HM door sets, HM frames and hardware, single	2	ea	\$2,228.80	\$4,458
HM door sets, HM frames and hardware, double	1	pr	\$4,412.46	\$4,412
Aluminum door sets, frames and hardware, glazed, double	1	pr	\$9,771.48	\$9,771
Premiums				
Panic hardware, per leaf	2	ea	\$941.47	\$1,883
Automatic door opening, per double leaf set	1	ea	\$4,269.75	\$4,270
Aluminum Sunshades / Roof canopies				
Exterior sunshades				see Exterior
Miscellaneous				
Firesafing at perimeter walls	580	lf	\$8.13	\$4,715

Total - Exterior Cladding	\$2,005,553
----------------------------------	--------------------

5 Roofing and Waterproofing

Waterproofing				assume not required
Roofing				
Single ply membrane roofing	10,854	sf	\$4.98	\$54,053
Roof Insulation				
Rigid roof insulation, poly iso insulation	10,854	sf	\$4.81	\$52,208
Pedestal Paver System				assume not required
Skylights				assume not required
Roof Accessories				
Aluminum gutters	580	lf	\$19.75	\$11,455
Aluminum downspouts	180	lf	\$19.75	\$3,555

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CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

DETAIL ELEMENTS - PAVILION L				
Element	Quantity	Unit	Unit Cost	Total
Access hatch			assume not required	
Miscellaneous				
Caulking allowance	10,854	sf	\$0.20	\$2,171
Total - Roofing and Waterproofing				\$123,441
6 Interior Partitions, Doors and Glazing				
Interior Partitions				
Interior Metal Studs				
Metal studs, 6", 16 Ga., at 16" o.c.	6,300	sf	\$11.62	\$73,206
Gypsum Board				
Gypsum board, 5/8" thick, finished (I4), type X	6,300	sf	\$2.76	\$17,388
Interior Wall Insulation				
Sound batt insulation, unbacked	6,300	sf	\$1.01	\$6,363
Moveable walls			not required	
Interior Glazing			not required	
Interior Doors				
SC wood door incl. AL frame and hardware, single	5	ea	\$2,135.60	\$10,678
HM door in HM frame, incl. hardware, single	2	ea	\$2,135.60	\$4,271
Premiums				
Panic hardware, per leaf	2	ea	\$964.04	\$1,928
Total - Interior Partitions, Doors and Glazing				\$113,834

7 Floor, Wall and Ceiling Finishes

Interior Finishes				
Floors				
Integral color Conrete	9,045	sf	\$2.44	\$22,070
Base				
Wood base, 4"	1,050	lf	\$11.04	\$11,592
Walls				
Paint walls	16,096	sf	\$0.57	\$9,174
Allowance for feature / premium finishes	1	al	\$5,000.00	\$5,000
Ceiling				
Paint gypsum board ceilings/soffit drops	9,045	sf	\$0.65	\$5,879

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

DETAIL ELEMENTS - PAVILION L				
Element	Quantity	Unit	Unit Cost	Total
Total - Floor, Wall and Ceiling Finishes				\$53,716
8 Function Equipment and Specialties				
Toilet Cubicles			not required	
Building Specialties				
Storage cabinets			included with building casework	
Fire extinguisher and cabinet, allowance	3	ea	\$372.85	\$1,119
Window Covering				
Mechoshades, manual	3,480	sf	\$8.94	\$31,111
Building Casework (allwoance)	9,045	sf	\$15.00	\$135,675
Total - Function Equipment and Specialties				\$167,905
9 Stairs and Vertical Transportation				
Stairs			Assume not required	
Total - Stairs and Vertical Transportation				
10 Plumbing Systems				not required
Total - Plumbing Systems				
11 Heating, Ventilation and Air Conditioning				
Air-Side Equipment	9,045	sf	\$4.13	\$37,356
Air Distribution	9,045	sf	\$5.28	\$47,720
HVAC Controls	9,045	sf	\$0.63	\$5,722
Additional mechanical requirements	9,045	sf	\$0.47	\$4,263

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

DETAIL ELEMENTS - PAVILION L				
Element	Quantity	Unit	Unit Cost	Total
Total - Heating, Ventilation and Air Conditioning				\$95,061
12 Electrical Lighting, Power and Communications				
Electrical Work				
Power and Lighting				
Service and distribution	9,045	sf	\$5.50	\$49,748
Emergency Service and Distribution	9,045	sf	\$3.50	\$31,658
HVAC & Equipment	9,045	sf	\$0.80	\$7,236
Convenience Power	9,045	sf	\$3.00	\$27,135
Lighting & Lighting Controls	9,045	sf	\$15.00	\$135,675
Low Voltage/Communication Systems				
Phone/data system				
Voice/Data System (Raceways Only)	9,045	sf	\$2.30	\$20,804
Voice/Data System	9,045	sf	\$4.50	\$40,703
Clock, PA, speaker system				
Clock, PA, Speaker System (Conduit Only)	9,045	sf	\$0.75	\$6,784
Clock, PA, Speaker System	9,045	sf	\$0.50	\$4,523
Security, access control system				
Security & Access Control System (Conduit Only)	9,045	sf	\$1.10	\$9,950
Security & Access Control System	9,045	sf	\$0.75	\$6,784
CCTV System (Conduit Only)	9,045	sf	\$0.75	\$6,784
CCTV System	9,045	sf	\$2.00	\$18,090
Electroinic Safety and Security Systems Work				
Fire alarm system	9,045	sf	\$3.75	\$33,919
Total - Electrical Lighting, Power and Communications				\$399,789
13 Fire Protection Systems				
Automatic Sprinkler System				
Automatic Sprinkler System	9,045	sf	\$3.40	\$30,753
Backflow preventer, red press	9,045	sf	\$0.32	\$2,886

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
05/04/17

DETAIL ELEMENTS - PAVILION L				
Element	Quantity	Unit	Unit Cost	Total
Total - Fire Protection Systems				\$33,639
14 Site Preparation and Demolition				
				not required
Total - Site Preparation and Demolition				
15 Site Paving, Structures & Landscaping				
				see Exterior
Total - Site Paving, Structures & Landscaping				
16 Utilities on Site				
				see Exterior
Total - Utilities on Site				

CONCEPTUAL COST ESTIMATE

Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

APPENDIX 1 - SCOPE ASSUMPTIONS	
Description	Assumed Scope
General Project Info	<div>- Escalation included</div> <div>- Local GC laydown / compound area within proximity.</div> <div>- Local trade parking available both onsite (partial) and offsite.</div> <div>- All sub trades to be competitively bid.</div> <div>- Labor pool from Scottsdale / Phoenix</div>
Detailed Assumptions	
1. Substructure / Foundations	<div>- Mass excavation and haul excess</div> <div>- Temporary shoring and dewatering excluded</div> <div>- Conventional continuous footings / spread footings.</div> <div>- Sub slab drainage.</div>
2. Structure	<div>- Structural steel system with brace frames - 12 lb / sf. with fireproofing</div> <div>- Concrete slab on grade - 5" thick</div> <div>- 3" 20 Ga. Metal roof deck with overhangs</div>
3. Envelope / Roofing	<div>- Exterior substrate of metal studs, densglas sheathing & R-19 batt insulation (20%)</div> <div>- 40% of premium envelope such as rammed earth wall</div> <div>- Exterior glazing comprises 40% of total envelope.</div> <div>- Aluminum framed curtain wall with insulated spandrel panels.</div>
4. Interiors	<div>- Metal stud framed interior construction for combined pavilions</div> <div>- SC, HM interior door sets in service buildings as required</div> <div>- Floors: Flooring considered is sealed concrete for all areas & ceramic tiles for restrooms</div> <div>- Ceilings / soffits: regular paint and acoustical fabric for desert time pavilion</div> <div>- Walls: regular paint and acoustical fabric wrapped wall panels for desert time pavilion</div> <div>- Base: Wood base 4" for all pavilions</div> <div>- Stainless steel restroom cubicles and fixed RR specialties</div> <div>- Mecoshades window covering</div>
6. Plumbing	<div>- Full plumbing system including all sanitary fixtures</div> <div>- Internal roof drainage.</div>
7. HVAC	<div>- Stand alone HVAC systems for each pavilion</div>
8. Electrical	<div>- Main primary and secondary power upgrade.</div> <div>- Emergency generator</div> <div>- LED lighting</div> <div>- Full fire alarm system.</div> <div>- Rough in of all low voltage systems (CCTV, security)</div> <div>- phone.</div>
9. Fire Protection	<div>- Wet pipe sprinklers throughout.</div>
10. Sitework	<div>- 4" AC paving for access roads</div> <div>- Decomposed granite paving 3" for existing & future parking</div> <div>- Parking stripes, curbs stopper & signage for future parking</div>

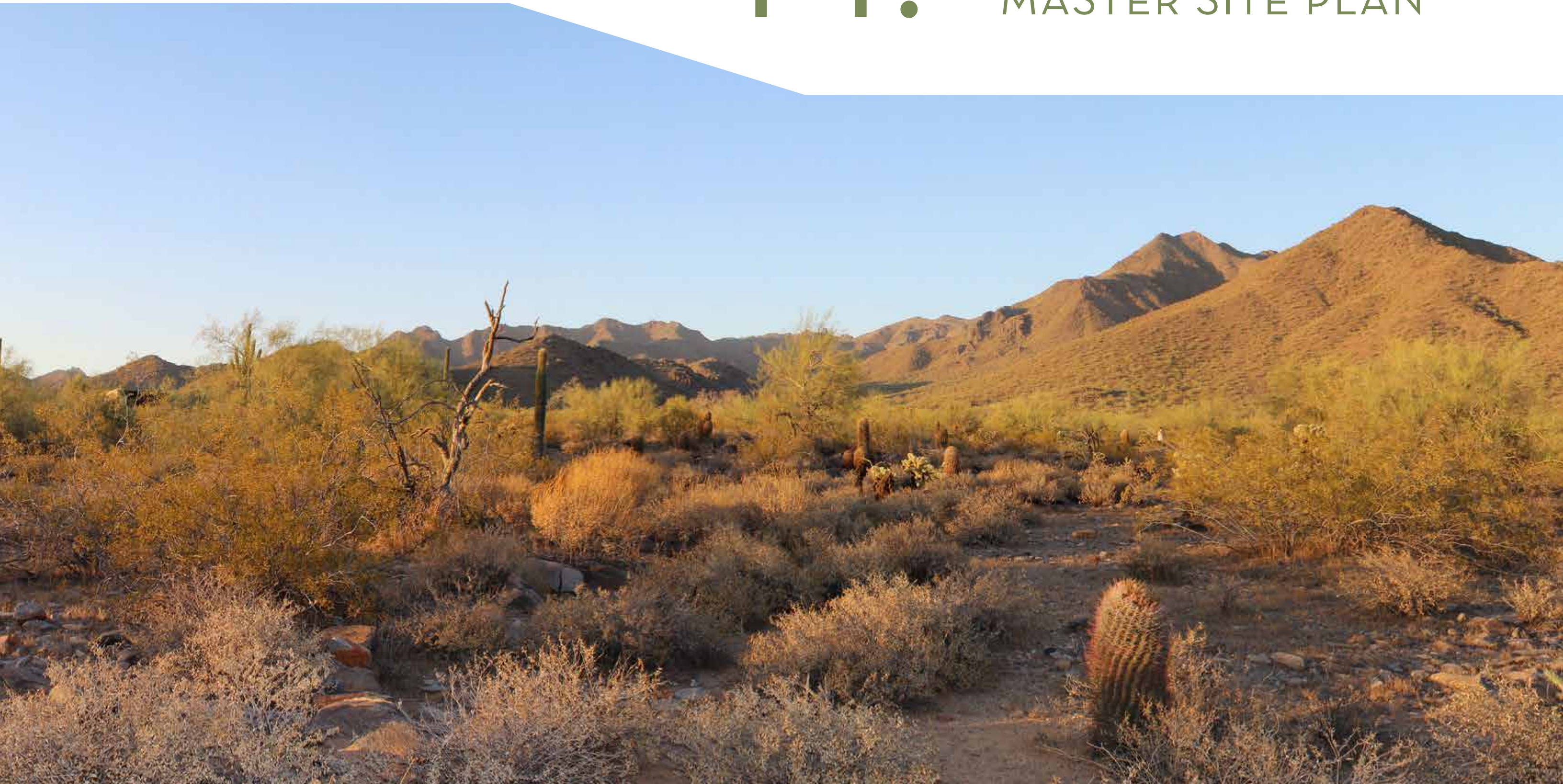
Desert Discovery Center
Scottsdale, AZ
Conceptual

Project # 17-00349
07/18/17

APPENDIX 1 - SCOPE ASSUMPTIONS	
Description	Assumed Scope
	<div>- CIP colored 1.5' high seat walls</div> <div>- Prep & foundation for open exhibits</div> <div>- Temporary path of travel, traffic management, and utility re-routes.</div> <div>- Decomposed granite paving for pathway</div> <div>- New sewage utility distribution connected to Gateway trailhead</div>
11. Exclusions	<div>- Cost for exhibits</div>

14.





MUNICIPAL USE
MASTER SITE PLAN



The site plan illustrates the layout of the R1-10 ESL development. Buildings are labeled A through L, with building D featuring a service yard with a 6' screen wall and rolling gate. The plan includes various parking areas: existing parking with 58, 65, 68, 67, 63, 36, and 24 spaces, and new parking with 36 spaces. A reconfigured trail and existing trails are shown, along with an existing gateway trailhead. Roads include North Thompson Peak Parkway, East Windgate Ranch Road, and Thompson Peak Road. Right-of-way (R.O.W.) lines are marked at 150', 292', and 636' to Thompson Peak Road. Other features include a reconfigured trail, a wash, and a 1'-0" flush curb to match existing conditions. The plan also shows a 150' Thompson Peak R.O.W. and a 636' to Thompson Peak R.O.W. line. A note indicates that equestrian parking is to be relocated, with the location to be verified. The plan is titled 'R1-10 ESL' and includes a north arrow.

EXISTING PARKING:	381 SPACES
PROPOSED PARKING:	163 SPACES
TOTAL PARKING:	544 SPACES

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 CIRCULATION PATH
 HIKING TRAILS
 WASH
 100 YEAR FLOODPLAIN - 50

ARCHITECTURAL APPENDIX



Desert Discovery Center

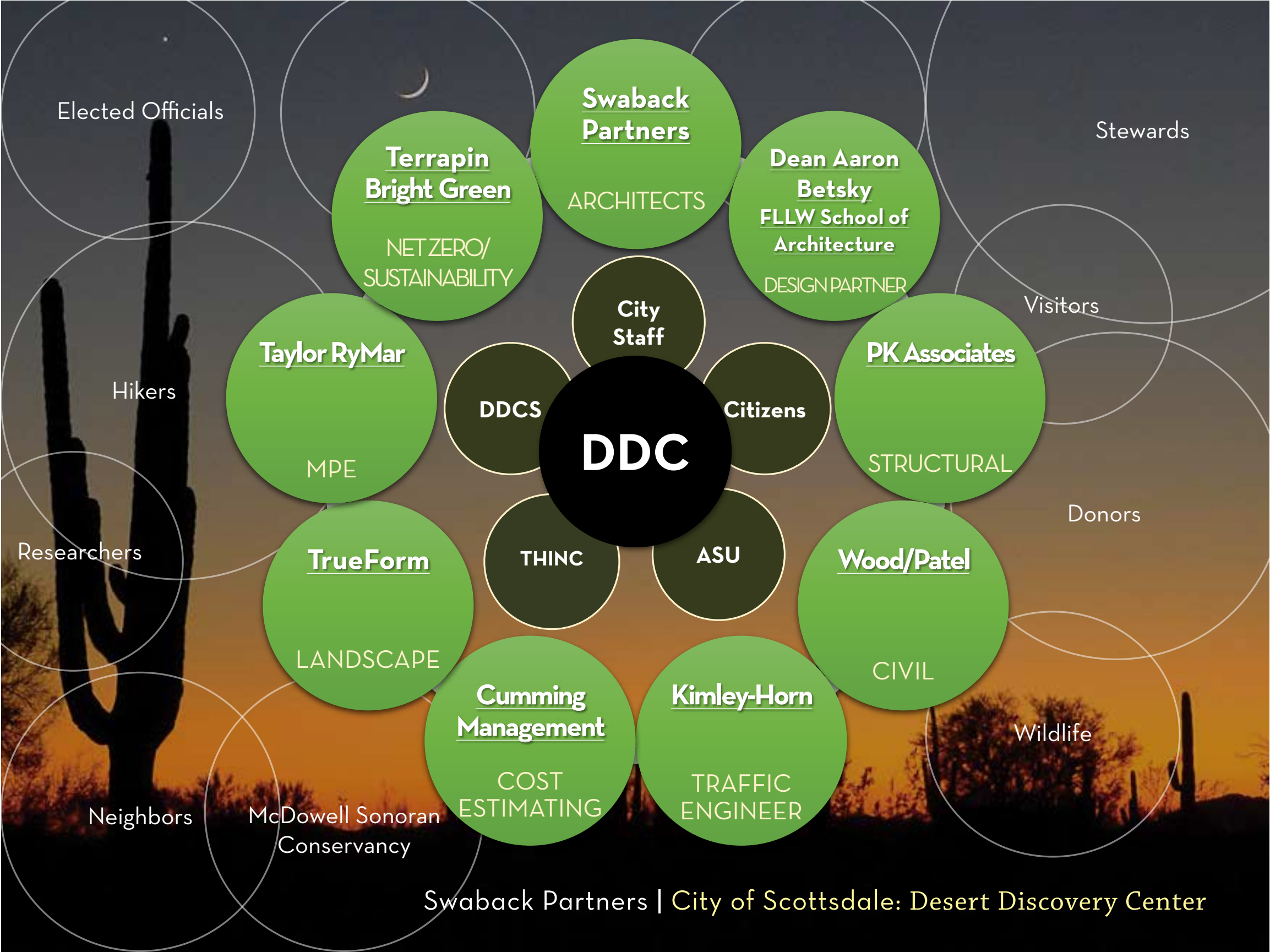
ARCHITECTURAL PROGRAMMING UPDATE



PRESENTATION TO CITY COUNCIL
November 28th, 2016

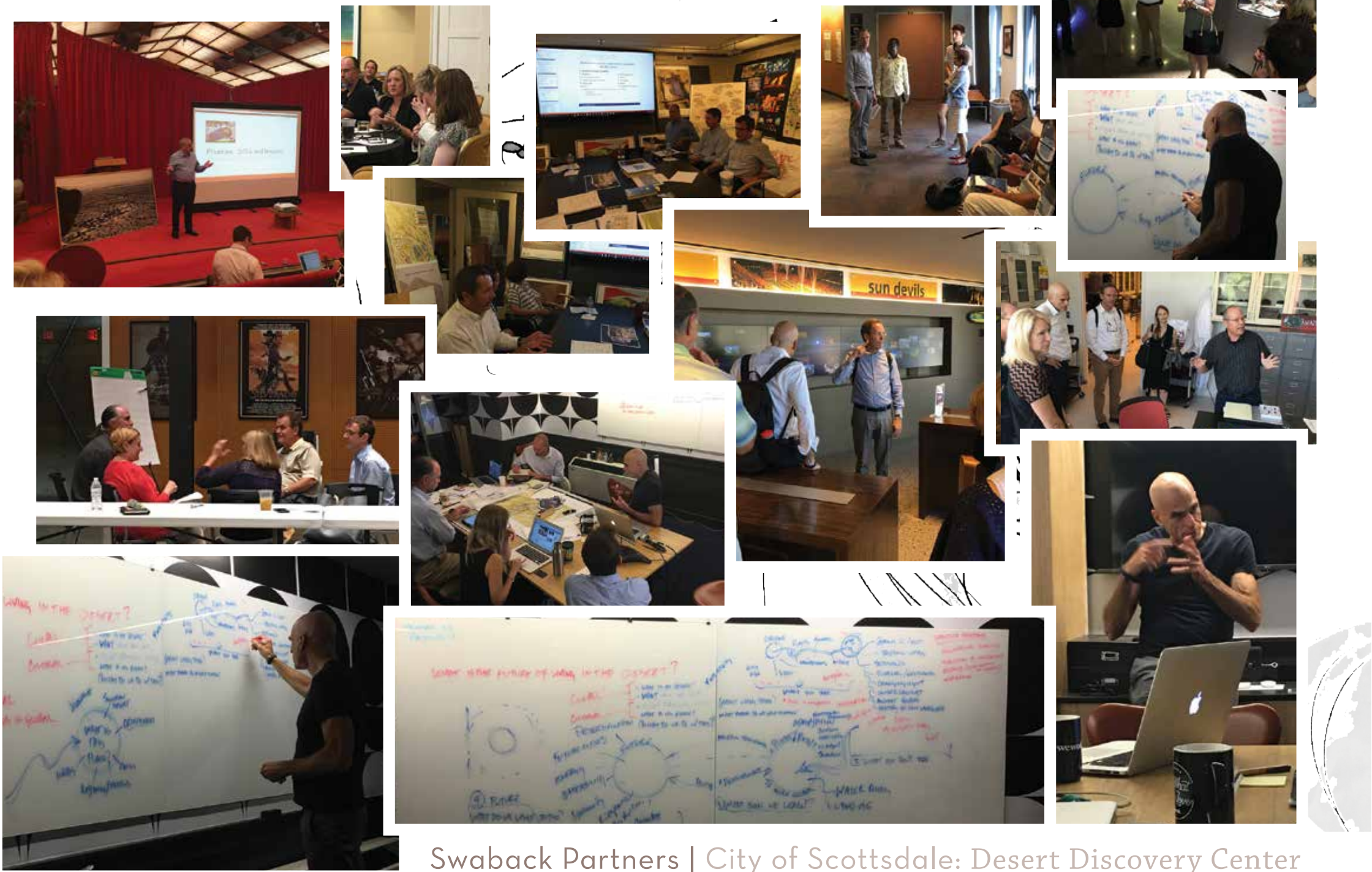


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TEAM WORK SESSIONS



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SENSITIVE Design

Recognizing what we need to be **Sensitive** to:

- The **Land**
- The **Wildlife**
- The **Preserve** at Large
- To all the **Citizens** of Scottsdale
- The **Hikers** who have always used the **Gateway**
- The **Visitors** and all their needs
- The **McDowell Sonoran Conservancy**
- The **Stewards**
- The **Citizen Scientists**

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- **Elected Officials** who will **review** the **project**
- The **potential Donors**
- The **surrounding Neighbors**
- **Doing more with less**
- An **Efficient Operations Strategy**
- **Operating costs**
- The **Ability** to raise **Construction Funds**

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SENSITIVE Design

Recognizing what we need to be **Sensitive** to:

- **Moving beyond Phase II Conclusions**
- **“Right Sizing”** the project. Bigger may not be better.
- The needs of the **Tourism Industry**
- **Flexibility** for an unknown **Future**
- **Not creating a museum**
- **Not creating just another refrigerated box**
- Creating an **Environment** that is both **Educational** and **Enjoyable**
- **Creating** a significantly **Beautiful** place
- Truly creating a **World Class Institution**

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APPROACH The Design Process

Rather than being focused solely
on “doing less harm” or Net Zero
focus on...

Net Positive Design

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DESERT DISCOVERY CENTER

Summary of Major Places

- **Hikers Access to Trails**
 - Just like always
- **Arrival Zone** / first impression experience
 - Wayfinding
 - Strong first impression that you are somewhere special
- **Group Arrival Zone**/orientation/kids/bus drop off/group check in
 - Adjacent, but separated from main arrival zone
- **An Amazing View**/first look/meeting terrace/Kodak moment
 - A celebration of beauty. A spiritual encounter
- **Main Entry**
 - Greeting / Welcome
 - ♦ A sense of openness
- **Cafe/Shop** – subsidence and provisions
 - Open to all
 - Unique foods, refreshments, and products

Swaback Partners | City of Scottsdale: Desert Discovery Center

DESERT DISCOVERY CENTER

Summary of Major Places Cont.

- **Necessities**
 - Restrooms
 - Admissions
 - Hospitality
 - ♦ Mobility aids
 - ♦ Accessibly / impairment tools
- **First Immersion**
 - Cooling experience / refreshing
 - Overall Orientation
 - Decompression
- **Linked Desert Pavilions to Discovery**
 - **WONDER** - What is before us?
 - **HIDDEN** - What can't we see?
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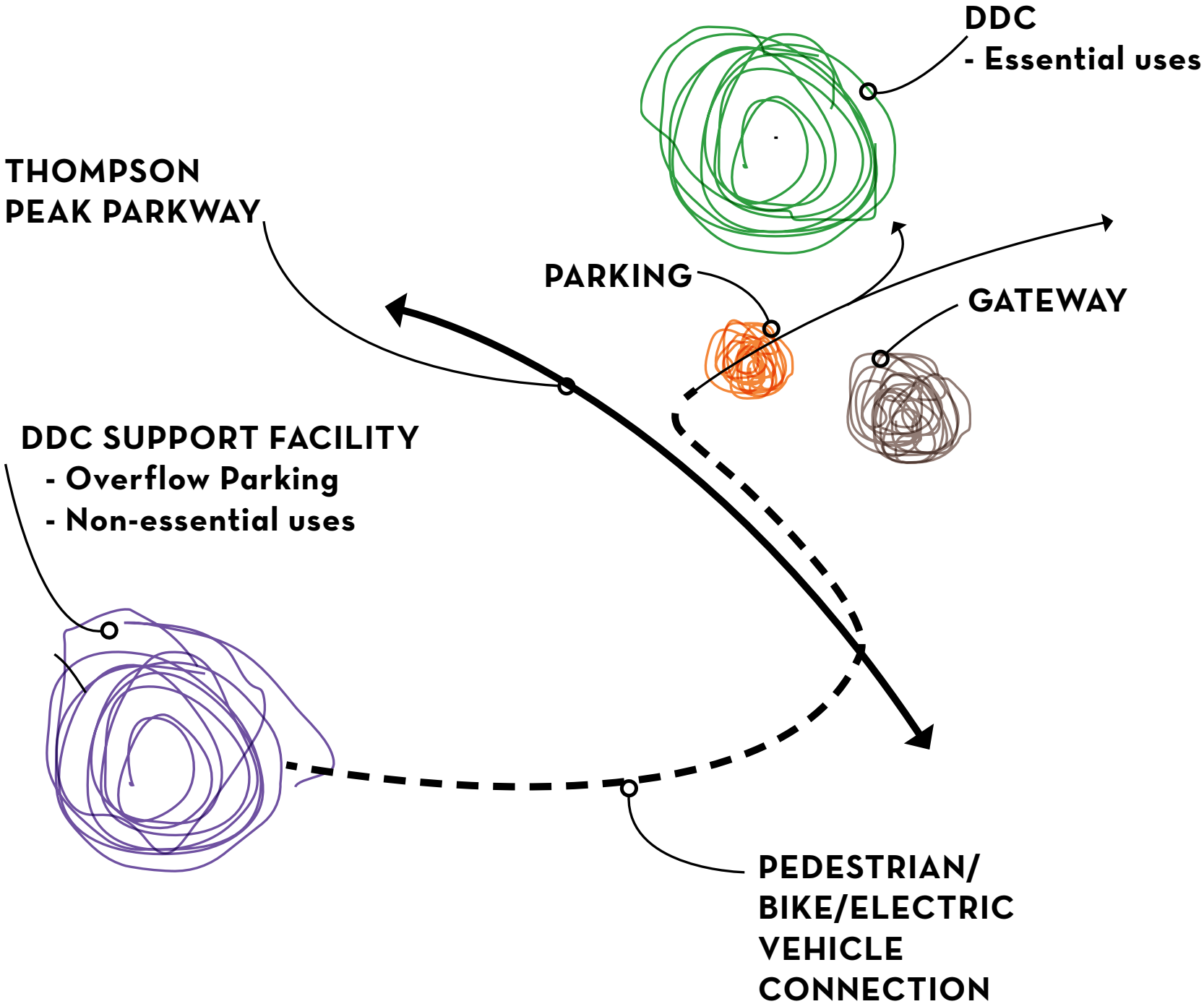
DESERT DISCOVERY CENTER

Summary of Major Places Cont.

- **Intriguing spaces between**
- **ASU investigative / exhibition labs**
- **Volunteer Base**
- **Desert Great Room**
- **Sonoran Steps**
 - Shaded Seating
- **Team Headquarters**
 - Team Workspaces
 - Team gathering spaces
 - Team Restrooms
 - IT space
 - Storage
 - Work shop / Reuse shop
 - Workshop
- **Mobility storage and transit zone**

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OFF-SITE FACILITY
Additional Support



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Desert Discovery Center

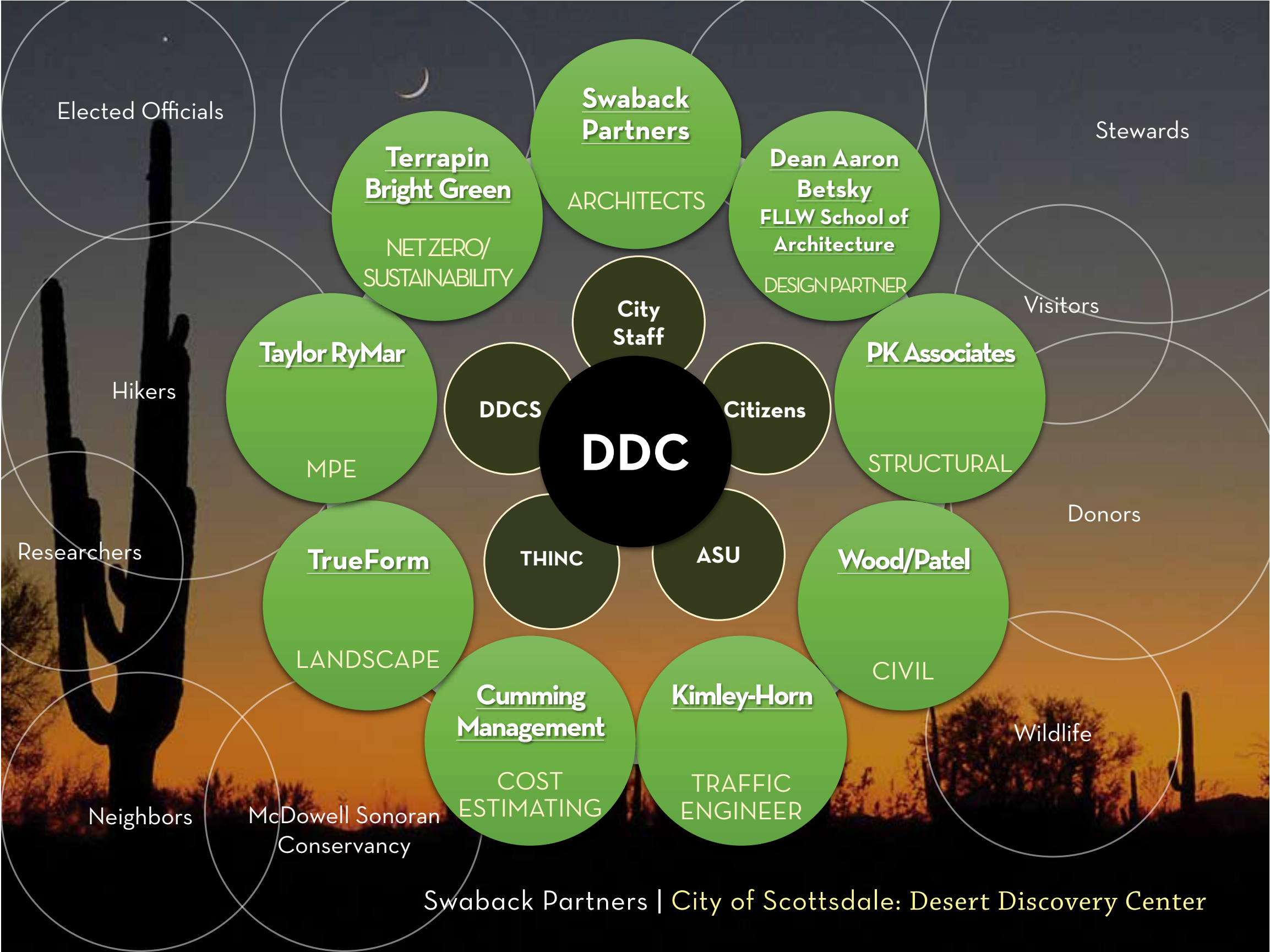
ARCHITECTURAL PROGRAMMING UPDATE



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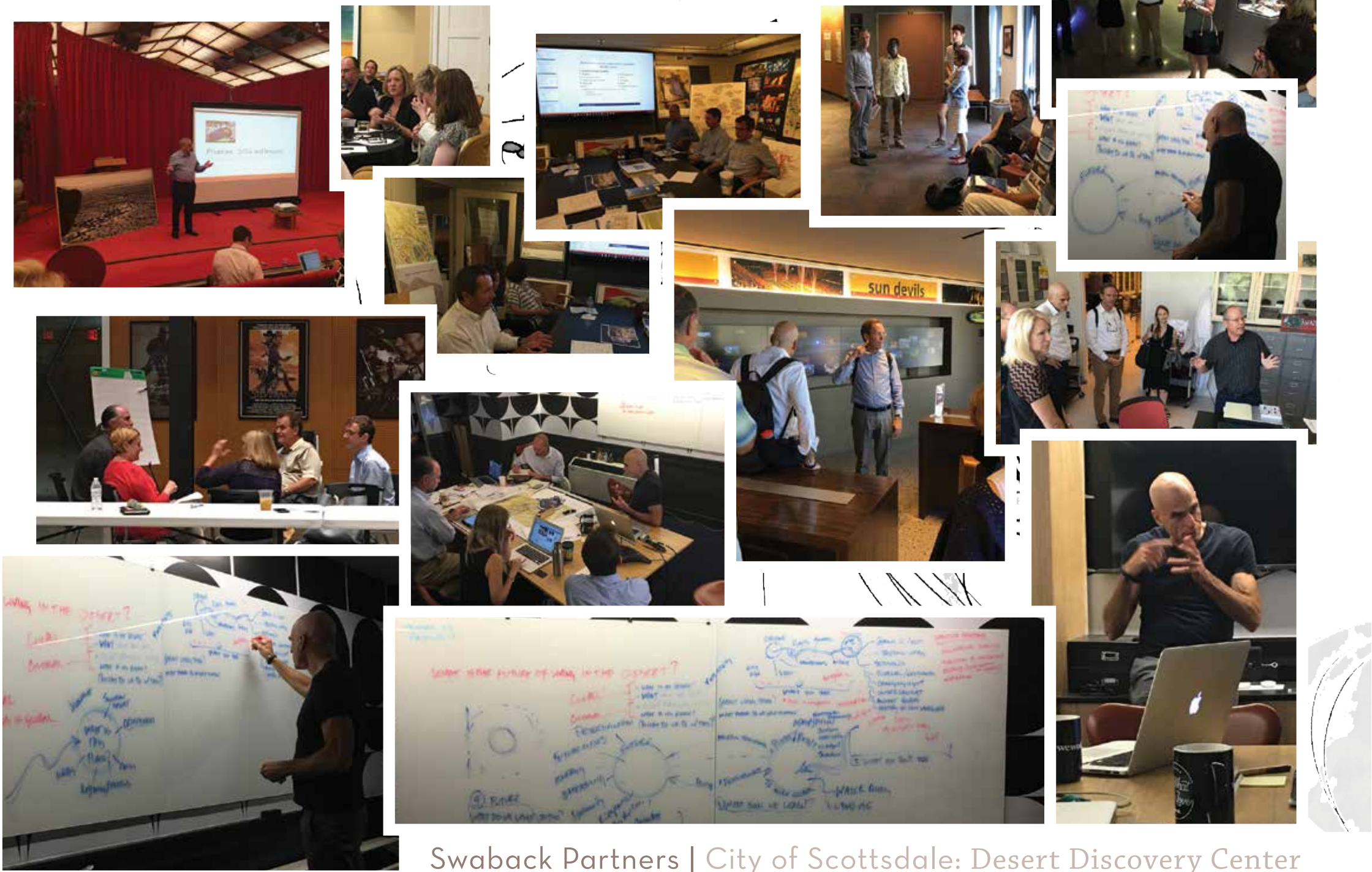


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TEAM WORK SESSIONS



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DDC THING TANK



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APPROACH The Design Process

Rather than being focused solely
on “doing less harm” or Net Zero
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NET POSITIVE Design

Design a Center that simply by visiting it one experiences a different and **positive change** in their point of view of living in the desert.

Swaback Partners | City of Scottsdale: Desert Discovery Center

NET POSITIVE Design

Design a Center that allows for each visit to be **unique** so you are **inspired to return** and learn more.

Swaback Partners | City of Scottsdale: Desert Discovery Center

NET POSITIVE Design

Design a Center that brings a divided
Scottsdale together again, and renews our
creative spirit that once was at our core.

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LANDSCAPE Themes

- Water Harvesting
- Microclimates
- Adaptation
- Plant Biomes
- Animal Habitats
- Senses of the Desert
- Ethnobotanical

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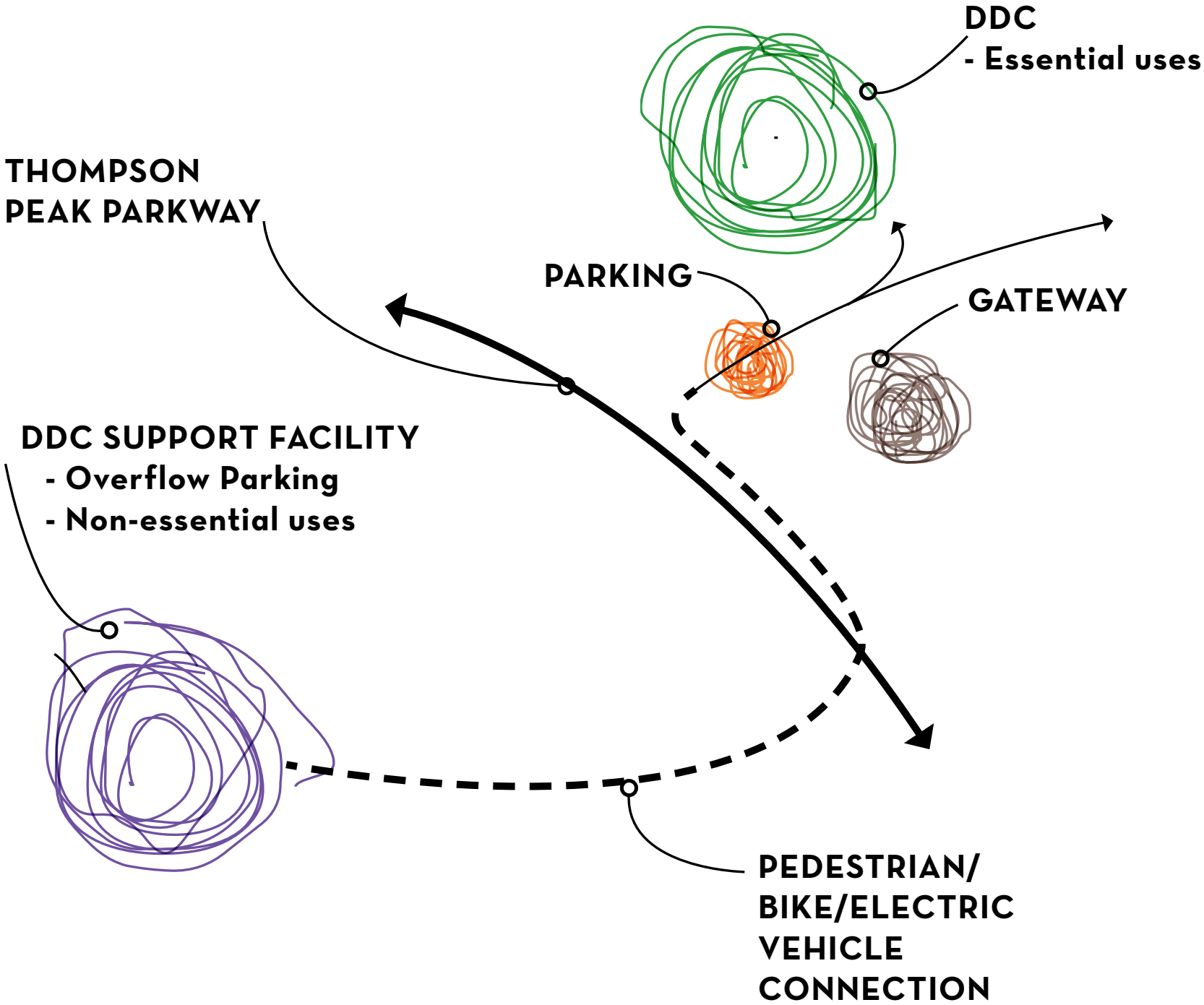
ALTERNATIVE PARKING

Shuttle, shared transportation, etc.

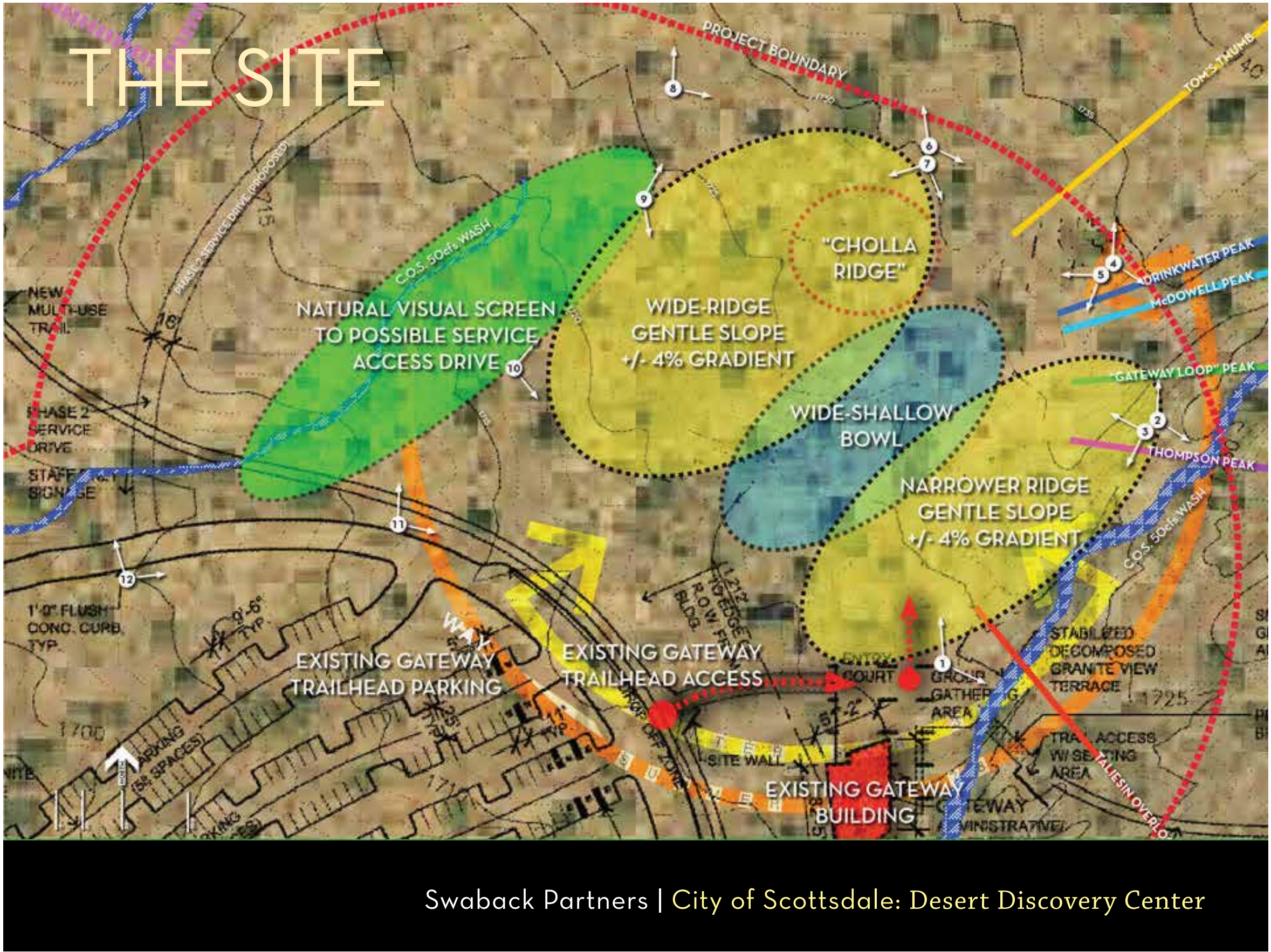
- Off-Site **Overflow parking** with shuttle
- Off-Site **non-essential staff parking** with shuttle
- **Ride Share** concepts
- **Timed Ticketing**
- **Cooperative** shuttles with **Hotels**
- Others?

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OFF-SITE FACILITY
Additional Support



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MINIMAL VISUAL IMPACT
Architectural Typology of the Preserve

Gateway Trailhead



Lost Dog Wash Trailhead



Tom's Thumb Trailhead



Brown's Ranch Trailhead



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SITE SKETCHES

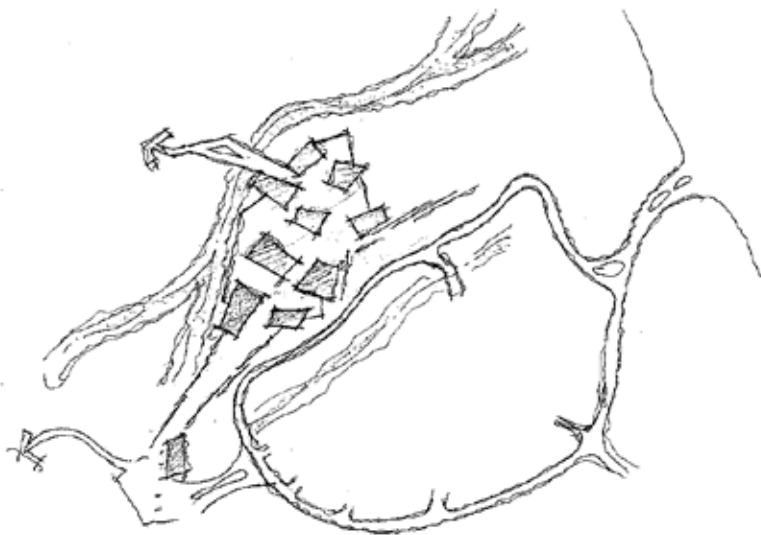
SKETCH ONE



SKETCH TWO



SKETCH THREE

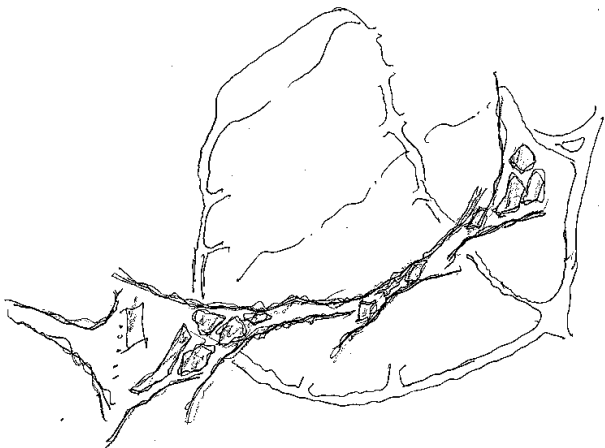


SKETCH FOUR

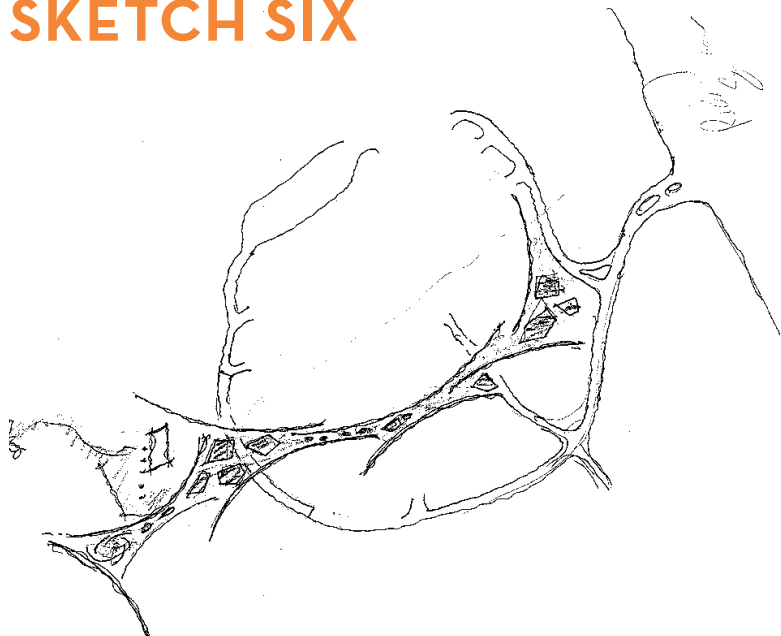


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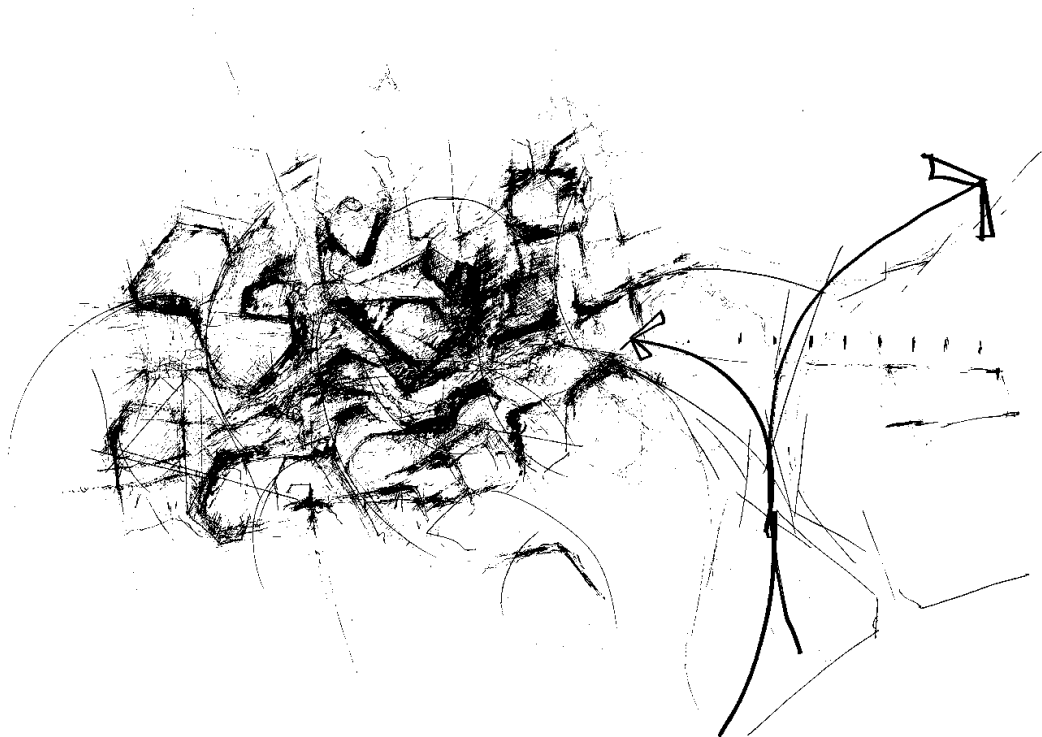
SKETCH FIVE



SKETCH SIX



SKETCH SEVEN




SITE SKETCHES

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APPROACH Creativity

Our **aspiration** is that the DDC can be become the **single most authentically exciting expression of Sonoran desert architecture** since Taliesin West.

Swaback Partners | City of Scottsdale: Desert Discovery Center

A photograph of a desert landscape at sunset. The sky is a gradient of purple, orange, and yellow. In the foreground, there are several cholla cacti and some yellow wildflowers. In the middle ground, there are several tall saguaro cacti. In the background, there are rolling hills and a valley with some distant lights.

What will draw people
to the Desert Discovery Center,
and what will inspire them
to come back?

Swaback Partners | City of Scottsdale: Desert Discovery Center

WHAT'S ON-GOING...

The Desert Discovery Center's Future

- Continued **Architectural Programming**
- **Traffic** Study / **Parking** Study
- **Collaborating** with **Thinc**
- **Cost Modeling**
- **Schematic** Design
- **Sustainability Strategy**

SWABACK PARTNERS

Swaback Partners is a team of dedicated individuals providing services in special case architectural design, community planning and development services, interior design, environmental and graphic design. The firm was founded in 1978 and currently practices throughout the United States, Mexico, and the World.

With over 39 years of study and preparation, Swaback partners was founded to create an Architectural and Planning practice which would provide individualized work for demanding clients. From the start, Swaback Partners set out to build an organization of sufficient depth to undertake very special projects. The result is an enviable group of clients, including some of the most interesting organizations in the world. The experience of the firm has included a significant number of award winning custom residential designs, residential developments, private clubs and spas, resorts, hotels, and restaurants. Additionally, the firm has a strong base in sustainable building practices.

SCHOOL OF ARCHITECTURE AT TALIESIN

The School of Architecture at Taliesin builds architects of the future by offering comprehensive study towards a professional Master of Architecture (M.Arch) degree. The program is designed for students who thrive in a multifaceted environment focusing on rigorous design, critical thinking, and hands-on learning. The School's specialized approach facilitates an individualized educational experience and fosters a close relationship between students, faculty, and staff.

TERRAPIN BRIGHT GREEN

Terrapin Bright Green was founded in 2006 by distinguished environmental strategist Bill Browning and architects Rick Cook and Bob Fox of the prestigious firm COOKFOX Architects. Chris Garvin, an accomplished green architect, soon joined the firm. Together, this alliance of expertise established Terrapin as a trusted consultant to major corporations and developers, governments and other organizations seeking to answer the challenges of high-performance design in the 21st century.

We believe that reconnecting people with the environment will lead to a healthy, prosperous, and regenerative future for all. We leverage high-performance design, whole systems thinking, and research in biophilic design, bio-inspired innovation, and ecological design to make this goal a reality.

TRUEFORM LANDSCAPE ARCHITECTURE

TRUEFORM landscape architecture studio was formed in 2012 with a passion for creating meaningful and memorable places. With over 25 years combined experience and having collaborated alongside one another for over 8 years, Todd Briggs and Roger Socha joined forces to create a studio that focuses upon work in various realms including higher education, urban design, wellness and residential gardens. Our work exhibits a strong commitment to utilizing regionally appropriate and enduring materials that fit texturally and cohesively within the desert southwest. Embracing purpose with beauty, our innovative and thoughtful place making encourages social interaction within comfortable, dynamic and ecological responsible landscapes.

CUMMING

Cumming has evolved into a 550-person, multi-faceted consulting firm with a determined focus on providing services that add value at every step of a project's development. Today, we continue to serve as a devout advocate for our project management and cost consulting clients — we solve problems, deliver solutions, and drive results. Cumming's exceptional management skills have led to us becoming one of the most successful project management and cost consulting firms in our industry. We operate with optimal efficiency, we hire and train the most talented and motivated industry leaders, and we actively explore opportunities to improve and add value.

KIMLEY-HORN

Kimley-Horn provides a wide range of consulting services to public and private clients for the visible built environment and the less-visible elements related to these facilities.

We plan and design roadways and bridges, airport runways and transportation systems, traffic signals, water/sewer systems, parking, transit systems, and more. We are civil, transportation, and systems engineers; urban and land planners; environmental specialists; landscape architects and urban designers; and computer/systems specialists.

WOOD/PATEL

Our team of experts make Wood/Patel a collaborative firm. We strive to create, connect and protect our Client's projects and the communities we live in. We accomplish this through our passion for client service, smart design, using technological resources to efficiently solve challenges, and giving back to the community. You'll find three common denominators with our people – we have passion, we are experts and we deliver client service. These are the roots of our core values...

