COUNTY OF HAWAII

DEPARTMENT OF PARKS & RECREATION

HAWAIIAN PARADISE PARK NEW PARK MASTER PLAN

FINAL

MARCH 2018

Cover Photo: View of the proposed park site.
Credit: SSFM International, Inc.

ACKNOWLEDGMENTS

ELECTED OFFICIALS

- Mayor Harry Kim
- Valerie Poindexter, Council Chairwoman
- Eileen O'Hara, District 4 Councilmember
- Jennifer Ruggles, District 5 Councilmember

COMMUNITY

- Puna Community Development Plan Action Committee
- Hawaiian Paradise Park Owners Association

PROJECT TEAM

- SSFM International, Inc.
- Ki Concepts LLC
- Fleming & Associates
- Marine and Coastal Solutions International, Inc.
- J. Uno & Associates, Inc.
- Ronald N.S. Ho & Associates, Inc.

GOVERNMENT AGENCIES

- County of Hawai'i Department of Parks and Recreation
  - Parks Maintenance Division
  - Recreation Division
  - Elderly Activities Division
- County of Hawai'i Planning Department
- County of Hawai'i Department of Public Works
- County of Hawai'i Department of Environmental Management
- County of Hawai'i Department of Water Supply
- County of Hawai'i Civil Defense Agency
- County of Hawai'i Mass Transit Agency
- Hawai'i Police Department
- Hawai'i Fire Department
- Hawai'i County Office of Aging

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1 INTRODUCTION

ENVISIONING A NEW PARK IN HAWAIIAN PARADISE PARK

"A safe, open, and friendly public space for children, teenagers, young adults, middle-aged adults, and the elderly, and for activity levels ranging from quiet enjoyment to intensive cardio exercise and organized sports."

Photo Credit: Wayne Joseph, www.waynejoseph.wordpress.com

1.1 Purpose for New Park

The Puna District within the County of Hawai'i is the fastest growing district on the island according to the Puna Community Development Plan, amended in 2011. Between 2000 and 2030, Puna's population is expected to grow from about 31,000 to 75,000 (a 140% increase). As the population grows in this district, more parks and recreational opportunities are needed. The Puna Community Development Plan (COH, 2011) identifies a particular need for these opportunities in Hawaiian Paradise Park where development is on the rise.

Under County Resolution No. 360-16, fee-simple ownership of a 20-acre parcel, identified as Tax Map Key (TMK) (3) 1-5-039: 267, was accepted by the County through dedication by the Hawaiian Paradise Park Owners Association (HPPOA) for the purpose of establishing a park in the Hawaiian Paradise Park (HPP) subdivision to support and encourage healthy lifestyles and healthy families. As a condition of the resolution, the County Department of Parks and Recreation (DPR) was tasked to complete a master plan for the park.

1.2 Vision and Goals

A vision for the future park and project goals were confirmed through the public engagement process (see inset on previous page). The new park's vision calls for "a safe, open, and friendly public space for children, teenagers, young adults, middle-aged adults, and the elderly, and for activity levels ranging from quiet enjoyment to intensive cardio exercise and organized sports."

Goals for the new park include: 1) providing compatible recreational uses within the park supportive of the community's needs; and 2) providing appropriate facilities within the park to support DPR's current programs and public services.

1.3 Background and History

A Hawaiian Paradise Park Community Master Plan was prepared in 1997 by the HPPOA and adopted by County Resolution No. 184-97. Section IV of the master plan refers to developing a new 20-acre community park and recreational facility that "could include a ballfield, swimming pool, tennis courts, basketball courts, picnic areas, tot lots and related facilities."

The HPPOA Community Action Committee updated the 1997 master plan in 2015 with Data Amendments adopted by County Resolution 284-15. As part of the update, a survey to solicit feedback on the community's needs was completed by more than 400 HPP residents which indicated that recreational facilities (i.e. parks and recreational opportunities and sports fields) was the highest priority for the community. The park and recreational amenities desired by the community included a park, walking and biking trails, swimming pool, gymnasium, sports fields, community hall, theater, library, after school center, senior center, dog park, skateboard park, tennis courts, and playgrounds. In 2016, the HPPOA Parks Committee conducted another survey of HPP residents to identify community park and recreational needs. The results of this 2016 survey were used in the preparation of this master plan.

Entrance Sign visible along Kea'au Pāhoa Road. Photo credit: www.bigislandnow.com

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2 BACKGROUND AND PROJECT SETTING

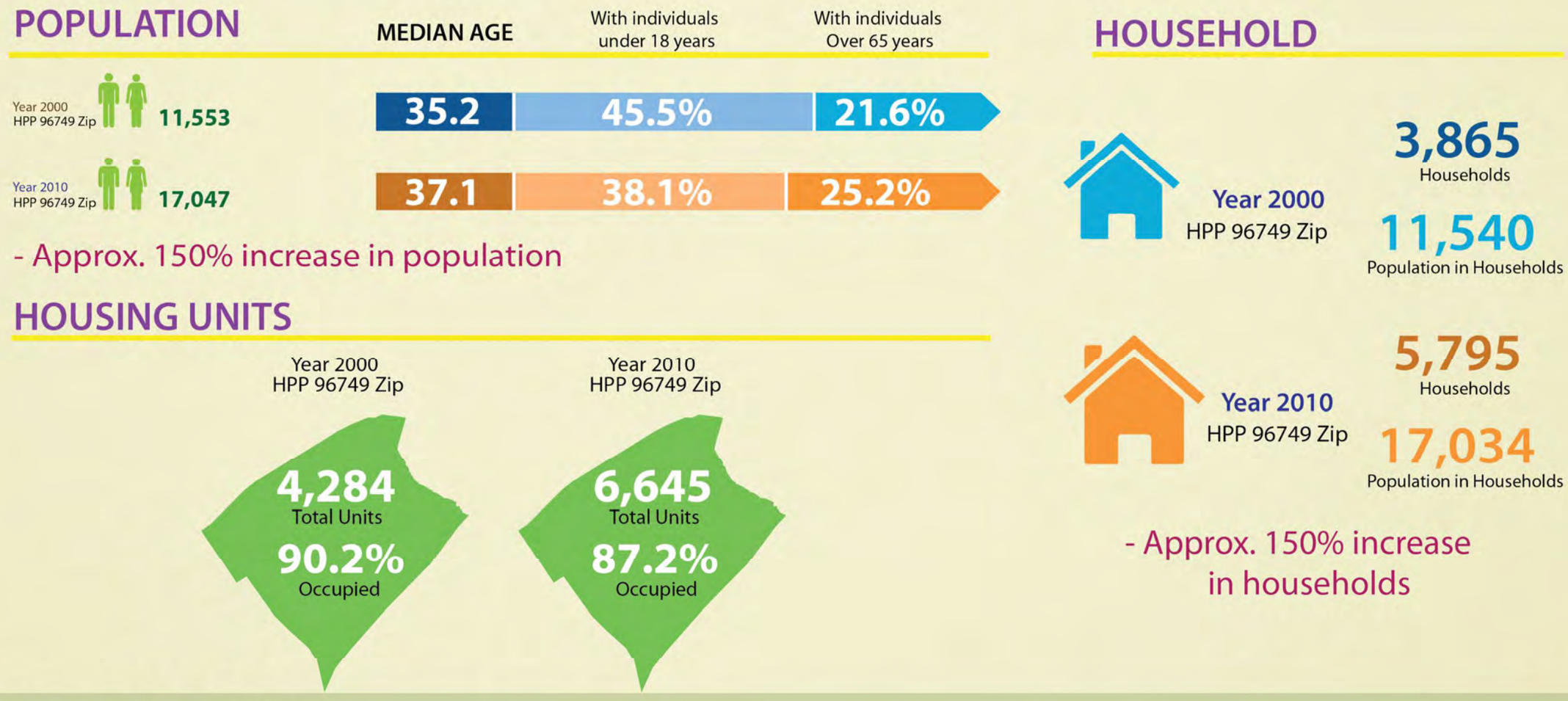
2.1 DEMOGRAPHICS
2.2 EXISTING LAND USES
2.3 COUNTY RECREATIONAL FACILITIES IN PUNA

2.1 Demographics

According to the Hawaiian Paradise Park Owners Association (HPPOA), there are 8,800 lots in Hawaiian Paradise Park (HPP) and approximately 5,700 are built out (65%). Between 2000 and 2010, the HPP zip code area (96749) experienced significant growth in population. The addition of 5,494 individuals nearly doubled HPP's population over that 10-year span. Correspondingly, the number of households in HPP also doubled over that same span.

Approximately 38% of households within the HPP zip code had individuals under 18 years old and 25% of households had individuals over 65 years old. Collectively, in 2010 the percentage of households with children and seniors are slightly higher in HPP (63.3%) than the rest of the island (60.9%) despite HPP's percentage decreasing slightly since the 2000 census (67.1%). The info-graphic below shows detailed data of Hawaiian Paradise Park zip code 96749 in Years 2000 and 2010.

Figure 1: Hawaii Paradise Park Census Data Info-graphic



2.2 Land Uses

The general area within and adjacent to the current project site has been subjected to over a century of intensive sugar cane cultivation. The developed lands around the project site consist of the HPP and Orchidland Estates residential subdivisions.

County Land Use Planning Allocation Guide

The project site is designated as "rural" according the County's Land Use Planning Allocation Guide (LUPAG) map. Use of the site as a public park is consistent with the LUPAG.

Puna Community Development Plan Land Use

The Puna Community Development Plan (Puna CDP), amended in 2011, designates the site as a portion of the "Regional Town Center" which is planned for higher densities, and connections to public infrastructure due to is location close to Kea'au-Pahoa Road (Highway 130). Another 20-acre park is currently shown on Maku'u Drive and 16th Street, however, the next update of the Puna CDP may include provisions for both parks to be developed within HPP. The Puna CDP recognizes Hawaiian Paradise Park as an area developing at a relatively fast pace and needs for park and recreational opportunities. Watumull owns the 20-acre parcel across 25th Avenue which is planned for commercial use. However, there are no known plans available from Watamull to indicate their intent to begin development of the commercial center.

State Land Use District

The State Land Use District (SLUD) designation is Agricultural. Use of the site as a public park is consistent with the Agricultural designation.

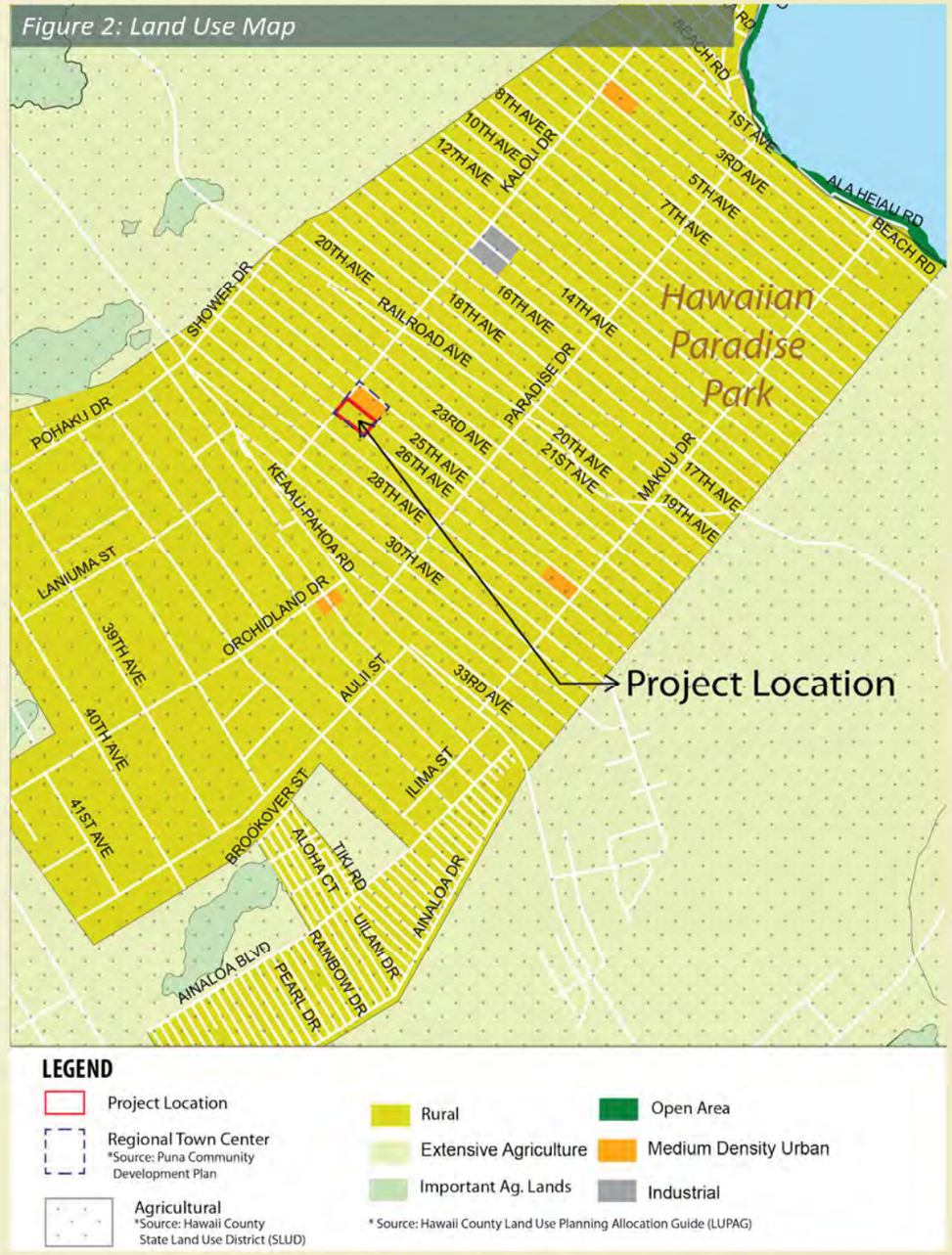
Other Land Use Designations

The site is not within the County's Special Management Area (SMA).
The County's zoning designation is "Open." According the Planning Department, the new park would not trigger any new zoning or land use changes since it would be defined as a "Public Use."

Lava Flow Hazard Zone

The site is within Hazard Zone 3, described as areas where 1 to 5 percent of the zone has been covered by lava since 1800, and 15 to 75 percent has been covered in the past 750 years (Wright et. al., 1992).

Figure 2: Land Use Map



2.3 County Recreational Facilities in Puna

According to Hawaii County Code, Chapter 8, Article 1, Park Dedication Code, Section 8-6, Population Density Requirements, there shall be a minimum ratio of five (5) acres of land for park and playground purposes for each one thousand persons in every district. This proposed project is contributes towards meeting that public interest standard but is not intended to satisfy the entire need for such facilities in the Puna District.

Typical types of parks managed by the County include the following:

NEIGHBORHOOD Park: typically designed to meet the needs of neighborhood. Smallest of park types.

COMMUNITY Park: typically designed for small neighborhood communities.

DISTRICT Park: typically designed to meet the needs of an entire district population capable for island wide attractions, such as Pāhoa Park and may allow for swimming pools.

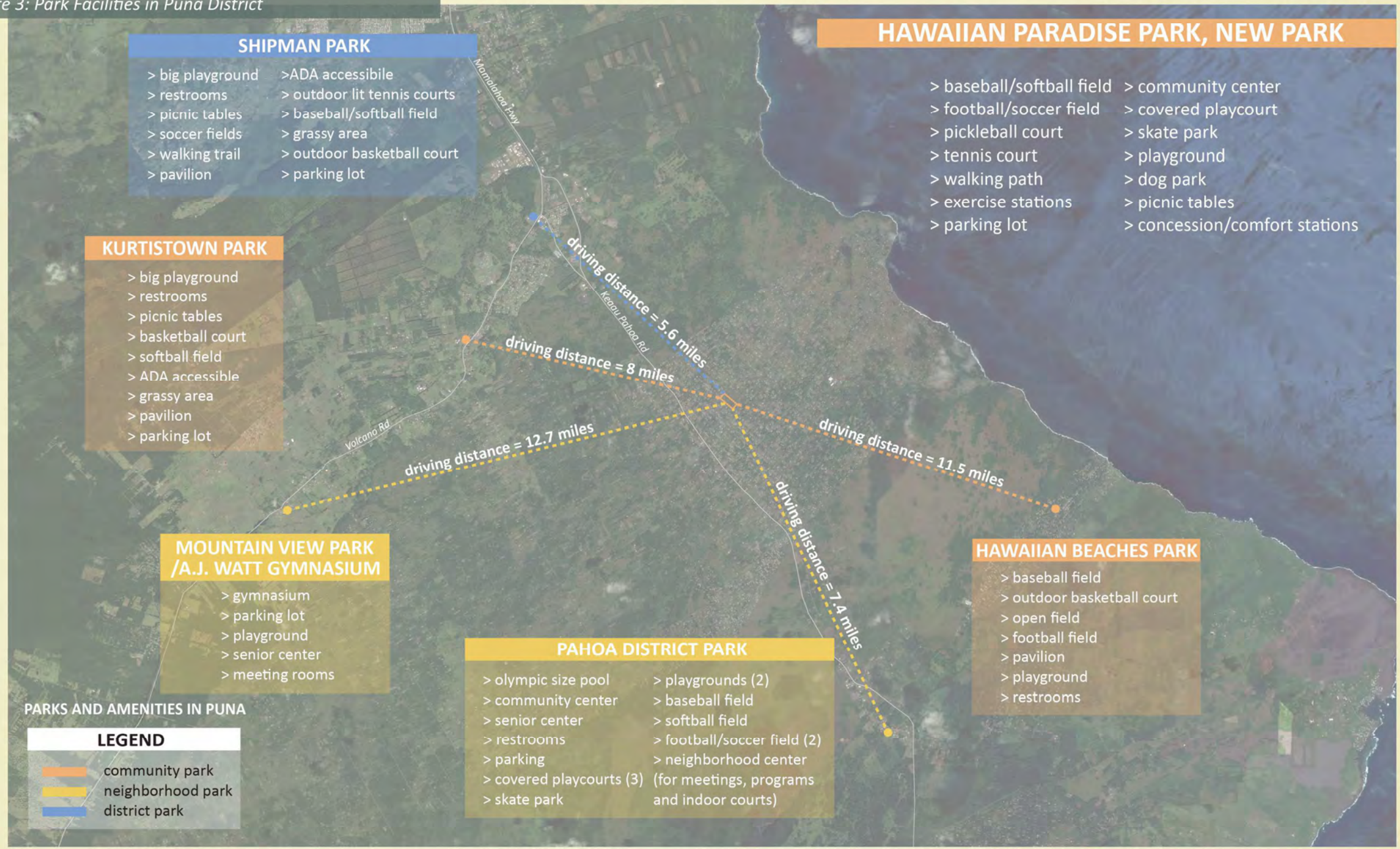
REGIONAL Park: typically designed to meet the needs of a specific region, usually a larger scale in comparison to a district park, such as Old Airport Park in Kona and Ho'olulu Complex in Hilo, may allow for swimming pools.

To the right are photos of two (2) other parks in the Puna District and on the following page is a map showing location and amenities of park facilities in Puna District.

Pāhoa Park

Shipman Park

Figure 3: Park Facilities in Puna District



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SITE ANALYSIS

Figure 4: Project Location Map

3.1 Climate and Site Placement

The climate of the Puna District varies considerably from comparatively sunny rocky shoreline to cloud-covered rainforests in upper elevations. The average annual rainfall in the general vicinity of the project area ranges between approximately 120 and 160 inches. Temperatures in this area of the Puna District usually fall between the sixties and eighties. As expected, the cooler temperatures and heavier rainfall occur in the winter and spring months (October through April) and warmer temperatures and lighter rainfall occur during the summer and fall months (May-September).

The predominant land soil type is classified as Lava flows, pahoehoe (rLW) (Sato et. al, 1973). According to the Natural Resources Conservation Service, the site consists of Keaukaha highly decomposed plant materials. The soils maps indicate this is organic material over pahoehoe lava, in a well-drained drainage class (NRCS, 2017). During design development, a soils investigation will be required.

3.2 Access

All existing major mauka-makai collector roads within Hawaiian Paradise Park (HPP) are two-lane paved roads owned by HPP. The minor crossroads are a mixture of paved and unpaved facilities also owned by HPP. The parcel is bordered by Kaloli Drive, 25th Avenue and 26th Avenue which are all paved roadways.

Vehicle access to the site can utilize potential new driveways off 25th Avenue and 26th Avenue. The Hawaiian Paradise Park Owners Association (HPPOA) has indicated a desire to provide one-way entrance off 26th Avenue and one-way exit off 25th Avenue. Access directly from Kaloli Drive is not desired or recommended. Details of ingress and egress locations will be further developed during design. Access and internal park roads will be designed for appropriate fire lane access, impacts to surrounding lots and operational impacts on surrounding intersections.

3.3 Flora

Existing vegetation appears to be native Ohia (Metrosideros polymorpha) forest with understory of Uluhe fern. Other non-native species such as Albizzia, Octopus tree, Gunpowder tree, and Waiwee (Strawberry Guava) are present. It is possible that some of the Ohia trees in the area are experiencing Rapid Ohia Death (ROD). Accordingly, care per State quarantine procedures should be taken to prevent or reduce the spread of ROD from this site.

3.4 Drainage

There are no existing drainage structures or gulches to dispose of stormwater runoff; however, the uneven nature of the topography creates natural low and high spots throughout the 20-acre parcel. Existing drainage patterns generally flow in the northerly direction. In general, runoff will flow away from buildings and will flow and infiltrate into the ground or be collected by swales, gutters along rooftops and inlets and conveyed to shallow drywells and/or detention basins for on-site disposal. The parking lot, and field runoff will be handled by a series of shallow drywells. Due to the rocky nature of the area, it is possible to use detention basins to allow water to percolate; however, further evaluation is needed as design progresses.

3.5 Archaeology

There are no known archaeological resources documented at this site. Archaeological research throughout Puna has focused primarily on the coast and areas of proposed construction relating to roadways and industrial development. Recent archaeology within the coastal zone reveals that the coast was the primary zone for habitation in both prehistoric and historic times.

3.6 Underground Lava Tubes

There is a possibility that lava tubes may be encountered in the project area. Lava tubes and lava tube caves are a notable geological features in Puna. In many cases, the presence of a lava tube is not known unless a cave roof collapses from construction activity or vegetation clearing otherwise results in the discovery of a skylight. The depth of lava tube caves often cannot be determined without detailed surveying. The Kazumura Cave is a documented lava tube cave near the project site which crosses both 25th and 26th Ave between Kaloli Drive and Paradise Drive. At more than 60 km long and 1,101 m deep the Kazumura Cave (lava tube) has been called the longest and deepest lava tube in the world and the deepest cave in the USA. While relatively close in proximity to the project site it seems unlikely that the Kazumura Cave will be affected by project-related construction given the depth of the cave below the surface (Allred, 1997).

3.7 Domestic Water

There is no domestic water service serving the project site. An extension of the municipal water supply system from the intersection of Kea'au-Pahoa Road and Kaloli Drive to the park site is recommended. The existing water system has available capacity to meet the potable water demands and the fire flow protection requirements for the proposed facilities within the Park. The municipal water supply extension provides the greatest benefit for a safe and reliable water source, adequate fire protection for the proposed site and improving fire protection for the local community as well as the lower costs when considering initial construction and on-going operational costs.

As an alternative to extending the municipal water system, the County also has the option to construct a rainwater catchment system or the option to install a rainwater catchment system, with a lesser degree of treatment, for irrigation and non-potable indoor uses along with the municipal water system extension.

3.8 Wastewater

There is no public sewer system serving the project site or Puna community. The closest public wastewater facility is along Volcano Highway, approximately 10 miles away. It is anticipated that the on-site sewage will be disposed of via sewerlines from buildings to multiple septic tank and leach field chamber systems. Preliminary calculations and grades indicate that three separate leach fields will be needed. Since these chamber systems are underground, the open field areas of the park (i.e. fields or lawn areas) will likely serve as suitable locations. One leach field is expected to serve the concession stand and comfort station building. Another leach field will service the pool building and covered play courts. The last leach field will service the community center.

Each facility will have restrooms, drinking fountains and hose bibbs. Draining and maintenance of the pool water will not be able to be disposed of in leach fields. Drinking fountains or hose bibbs that are not in the vicinity of a leach field can be drained to individual seepage pits.

3.9 Electrical and Telecommunications

Hawaii Electric Light Company (HELCO) is the sole electric utility on the island. Hawaiian Telecom (HTCO) and Charter Communications both offer broadband, cable television and telephone signals. HELCO's, HTCO's, and Charter Communication's existing facilities serving the HPP subdivision consist of aerial cables attached to joint overhead pole lines along most of the privately owned roadways. Based on current technologies, both HTCO and Charter Communications would likely provide service to this project via fiber optic cable.

An inquiry has been directed to HELCO as to whether their existing overhead distribution system has sufficient capacity to serve the proposed park but a response has not been received. The worst case scenario is that HELCO would need to upgrade its existing Hawaiian Paradise Park substation transformer and re-conductor portions of their overhead distribution system in order to support the new park. If the worst case scenario requires implementation, discussions between the County and HELCO would need to occur. On-site electric and telecommunications systems would be developed during design. Consideration for a photo-voltaic (PV) system will be made during the project design phase.

Illumination for park roadways, parking lots, walkways, playcourts and lighted fields will be provided meeting all applicable regulations.

3.10 Landscaping and Irrigation

By applying a bioregional landscape approach to the park's landscape and maintenance, the landscape's planting shall not require permanent automatic landscape irrigation. This low maintenance directive of a minimal plant palette of trees, select groundcover and mainly lawn combined with the region's abundant rainfall results in no need for a permanent automatic irrigation system for the park's planting. The area's annual rainfall should provide sufficient monthly rainfall to support the plantings once established. Temporary irrigation will be required for establishment of all planting during a recommended 180 day maintenance period.

4 COMMUNITY INVOLVEMENT

4.1 STAKEHOLDER MEETINGS
4.2 PUBLIC MEETINGS

4.1 Stakeholder Meetings

Stakeholder meetings were conducted with the following individuals or groups. Stakeholders primarily consisted of elected officials, representatives from Hawaiian Paradise Park Owners Association (HPPOA) and County Department of Parks and Recreation (DPR) Divisions. A detailed summary of each stakeholder meeting can be found in Appendix A of this document.

November 7, 2017 – Meeting with County of Hawaii Councilmembers and Hawaiian Paradise Park Owners Association (HPPOA) Representative

The purpose of this meeting was to receive input from area Councilmembers and HPPOA representatives on the project history and current needs.

November 9, 2017 – Meeting with DPR Divisions

The purpose of this meeting was to receive input from DPR's Maintenance and Recreation division on park needs.

November 20, 2017 – Meeting with the Planning Department

The meeting purpose was to receive input from County Planning Department long-range planning Division on how proposed park aligns with the Puna Community Development Plan or other known plans.

November 22, 2017 – Meeting with the DPR Elderly Assistance Division

The meeting purpose was to receive input from DPR's Elderly Activities Divisions (EAD) on possible senior activity and program needs.

4.2 Public Meetings

Engaging the Hawaiian Paradise Park (HPP) community and public was important in understanding the preferences for park and recreational facilities in this master plan process. Two (2) public meetings were held in HPP for the purpose of gathering the community's input in preparing alternatives and the final master plan. These public meetings were the primary means of engagement with the community.

The first public meeting was held on Sunday, January 7, 2018 at the Hawaiian Paradise Park Owners Association (HPPOA) Activity Center to present the vision, goals and preliminary alternative plans. A PowerPoint presentation covered the project background, master plan process, vision, goals and three (3) preliminary alternative plans.

Following the PowerPoint presentation, meeting attendees were broken up into three (3) groups and directed to one of three stations set up for break-out discussions on conceptual alternatives 1, 2 or 3. Each station had the corresponding alternative displayed on poster board along with a facilitator and note-taker. The following questions were addressed by groups at each station:

1. What opportunities do you see in this alternative?
2. What issues and constraints do you see in this alternative?
3. What other recreational amenities should be considered?

Each group was allowed approximately fifteen minutes to discuss the alternative and provide feedback on the specific station comment sheet. Each group rotated through each station once. Meeting attendees reconvened and each facilitator summarized the topics and concerns that were brought up during the break-out sessions.

A second public meeting was held on Monday, February 19, 2018 at the HPPOA Activity Center to present the preliminary master plan. A PowerPoint presentation covered the results and feedback and comments received on the three (3) conceptual alternatives presented at the first public meeting and the two preliminary master plan alternatives ("base" and "base + options") which were refined based on that input. The details on each amenity under consideration in the master plan was explained.

Following the PowerPoint presentation, a Q&A session was held to give meeting attendees the opportunity to ask questions about both preliminary master plan alternatives. A summary of the questions and comments received at both meetings is provided in Appendix A of this document.

County of Hawaii Department of Parks and Recreation

HAWAIIAN PARADISE PARK NEW PARK MASTER PLAN

The County of Hawaii Department of Parks and Recreation (DPR) is proposing to develop a master plan for a new public park within Hawaiian Paradise Park (HPP) in Keaau, Puna District. The new park would be located on a County-owned, 20-acre parcel bordered by Kaloli Drive, 25th Avenue and 26th Avenue. This park would serve the HPP subdivision to support and encourage healthy lifestyles and healthy families.

Two (2) public meetings are planned for as part of this park master planning process. The first public meeting will be held to present a proposed vision, goals, and preliminary alternative plans. A second public meeting will be held to present the preliminary master plan.

WE WANT *Your* INPUT!

» *Join Us* «

@

HAWAIIAN PARADISE PARK OWNERS ASSOCIATION (HPPOA)
ACTIVITY CENTER AT 15-1570 MAKUU DRIVE
BETWEEN 16TH & 17TH STREETS

MEETING #1
PRESENTATION OF PLAN ALTERNATIVES FOR COMMENT
JANUARY 7, 2018
3:00 PM - 6:00 PM

MEETING #2
PRESENTATION OF PRELIMINARY MASTER PLAN FOR COMMENT
FEBRUARY 19, 2018
3:00 PM - 6:00 PM

If you require special assistance in these events (i.e. interpreter, wheelchair accessibility) please contact
Jared Chang at (808) 356-1242 or jchang@ssfm.com
at least three (3) business days prior to the event.

Public meeting notice flyer (left) distributed to HPPOA, the public and stakeholders.

PowerPoint presentation by SSFM (left) and photo of the Alternative 1 break-out station from the first public meeting on held on January 7, 2018.

Members hanging out after the second public meeting on February 19, 2018 to share their ideas with Councilmember Eileen O'Hara.

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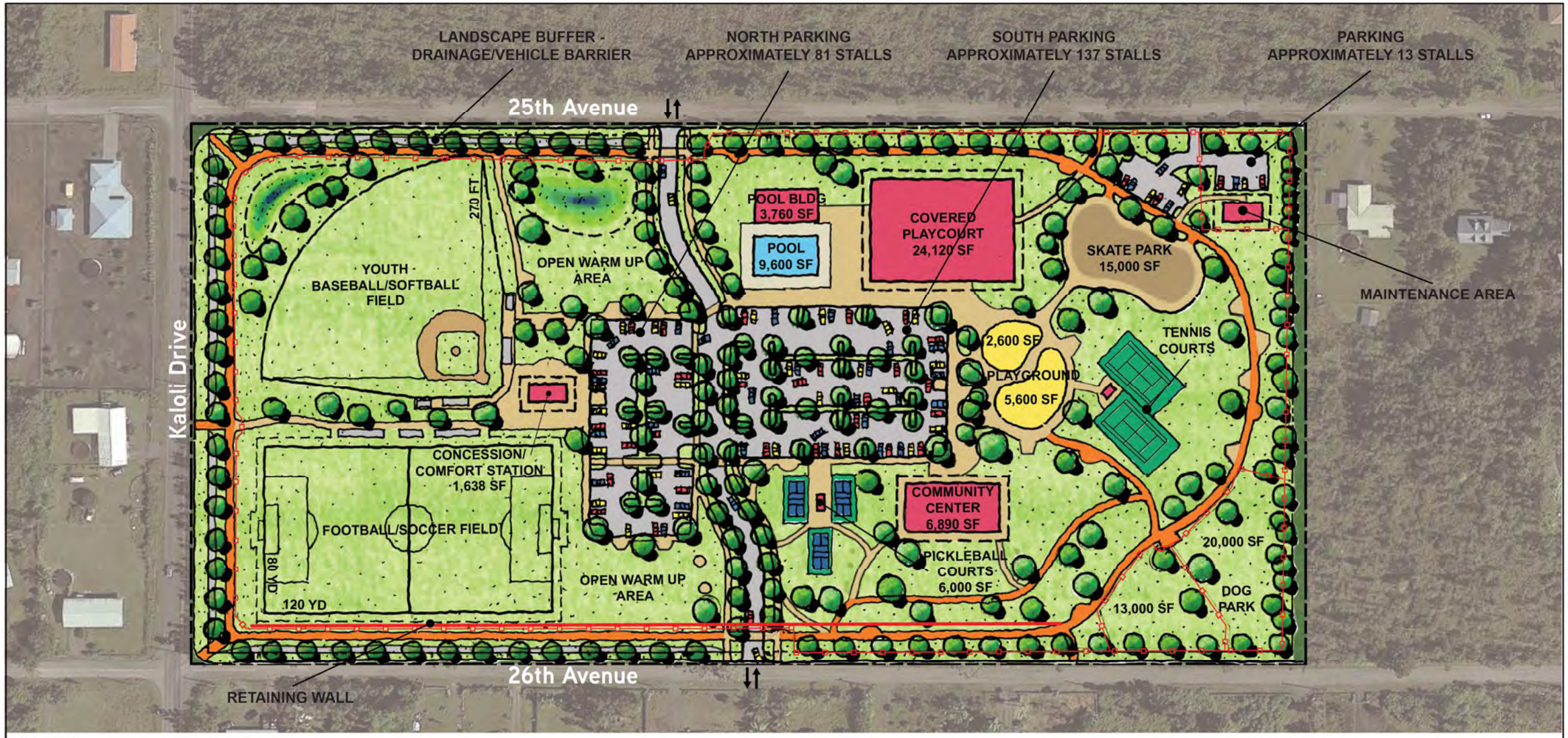
MASTER PLAN

Figure 5: Final Master Plan



LEGEND:

Roads (Grey) Sidewalks (Brown) · Perimeter Path (Orange) · Other Path/ Paving (Beige) · Biofiltration Swale and Basins · Landscape Buffer Drainage/Vehicle Barrier · Buildings · Trees & Grass Area · Picnic Area · Exercise Stations · Fencing

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT
SCALE: 1 IN = 120 FT

FINAL MASTER PLAN

5.1 Active park area/Play fields

Baseball/Softball field (270 ft wide field)

FEATURES

- Dimensioned to accommodate youth and adult softball and up to pony league baseball (ages 3-23 years old)
- Bleachers near 1st and 3rd base
- Dugouts near 1st and 3rd base
- Nighttime lighting
- Scorer's booth behind backstop
- Scoreboard

DESCRIPTION

The baseball/softball field is placed on the 25th Avenue side of the park to minimize light pollution and the impact of foul balls flying into residential areas. It is sized to accommodate all ages – from pony league baseball up to adult softball. An open warm up area for baseball or softball teams is located south of the 1st base-side of the field.

A concession/comfort station is situated between the baseball/softball field and the football/soccer field so that it may serve both fields at any time. The North Parking lot is sized to accommodate sports games and practices, and is situated for easy access to both fields.

Football/Soccer field (80 x 120 yd)

FEATURES

- Dimensioned to accommodate high school football and soccer
- Nighttime lighting
- Bleachers
- Team-seating
- Scoreboard

DESCRIPTION

The football/soccer field is sized to accommodate high school football and soccer. An open warm up area for football or soccer teams is located on the parking lot-side of the field.

Tennis Court (two courts)

FEATURES

- Similar to Shipman Park
- Nighttime lighting

DESCRIPTION

A comfort station is situated between both courts for convenience.

Pickleball Courts (three courts)

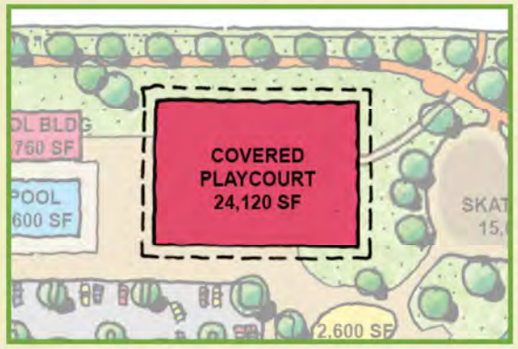
FEATURES

- For seniors
- Concession in the middle
- Close to parking lot
- Pavilion in common area

DESCRIPTION

Pickleball is a sport for all ages, and is a cross between of ping-pong, badminton and tennis. Pickleball is one of the fastest-growing sports in the country, and is popular amongst seniors. Since Hawaiian Paradise Park is a growing community with 25% of households containing individuals over 65 years old, the pickleball courts will encourage and help seniors to be active.

Covered Playcourt (24,120 SF)



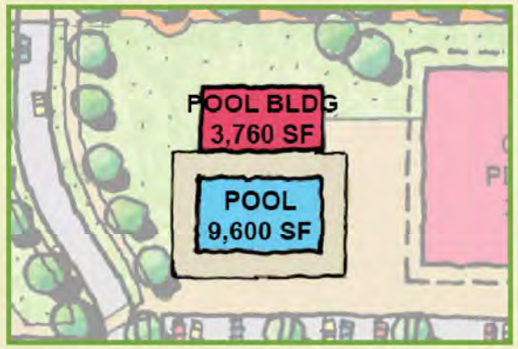
FEATURES

- Two regulation basketball/ Volleyball courts
- Rolling three-tiered bleachers
- Storage rooms
- Office for recreation staff
- Janitor closet
- Warming kitchen/concession
- Men's, women's and family restrooms
- Scoreboards, court divider

DESCRIPTION

The covered playcourt contains two regulation sized basketball and volleyball courts. Each court has a scoreboard, two team benches and one set of three-tiered bleachers, which can sit 81 people. Men's and women's restrooms have four toilet stalls and one ADA accessible stall. The covered playcourt also contains seven storage rooms and one office to be used by recreation staff. A warming kitchen is located on the pool-side of the playcourt to serve both amenities.

Pool (9,600 SF + 3,760 SF pool bldg.)



FEATURES

- 25m pool with six lanes
- 4' deep only
- Paved area between pool and Playcourt for vehicle access to pool bldg.
- Men's, women's and family restroom
- Janitor room in men's and women's restroom
- Storage room
- Total occupancy = 454

DESCRIPTION

The 25 meter pool has six lanes and is sized to accommodate all ages – from young children to seniors. Located in the pool building are men's and women's restrooms. Each restroom contains three shower stalls, one ADA accessible shower, a changing area, drying area, two toilet stalls (for women's) and two urinals (for men's), and one ADA accessible toilet stall. There is also a family restroom which contains one toilet and one ADA accessible shower on the pool-side of the playcourt to serve both amenities.

Skate Park (15,000 SF)

FEATURES

- Flat surface, street-style type

DESCRIPTION

Near the skate park is a small parking lot to discourage skaters from skating through the North and South parking lots.

Playground (2,600 SF for small kids, 5,600 SF for bigger)

FEATURES

- Separated by age groups (2-5 years old and 5-12 years old)
- Standard DPR playground equipment

DESCRIPTION

There are two playground areas located between the community center and the covered playcourt. One area is for children ages 2-5 years old, and the other is for children ages 5-12 years old. The playground is in close proximity to the parking lot so families can easily travel to and from their cars. It is also located between the community center and covered playcourt for easy access to restrooms.

5.2 Passive Recreation Areas

Picnic areas

FEATURES

- Scattered throughout park
- Connected to perimeter and paved paths
- Near trees for shading

Fencing

FEATURES

- Prevent vehicles from entering the perimeter of the park in unauthorized areas
- Use of landscape buffer in addition to fencing
- Keep people out of park after it's closed
- Safety and security

DESCRIPTION

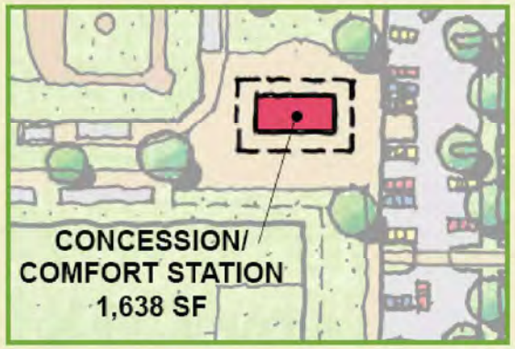
The perimeter of the park is fenced for safety and security during open park hours and after hours. The maintenance area is completely fenced off for added security for maintenance staff and their equipment.

Dog parks (13,000 SF + 20,000 SF)

FEATURES

- Separated into two areas based on size of dogs
- Dog waste stations
- Fenced/secured entrance
- ADA accessible path to dog park

Concession/comfort station



FEATURES

- Location serves both the football/ soccer field and baseball/softball field
- Close to parking
- Serving kitchen
- Restrooms

DESCRIPTION

The concession/comfort stations are located in three areas of the park; one serves the baseball/softball and football/soccer fields. The larger concession near the play fields will contain a family restroom and serving kitchen. The smaller comfort stations will contain restrooms to be used by the pickleball and tennis players. Concession/comfort stations are located near play fields and courts to allow easy access to restrooms and water fountains.

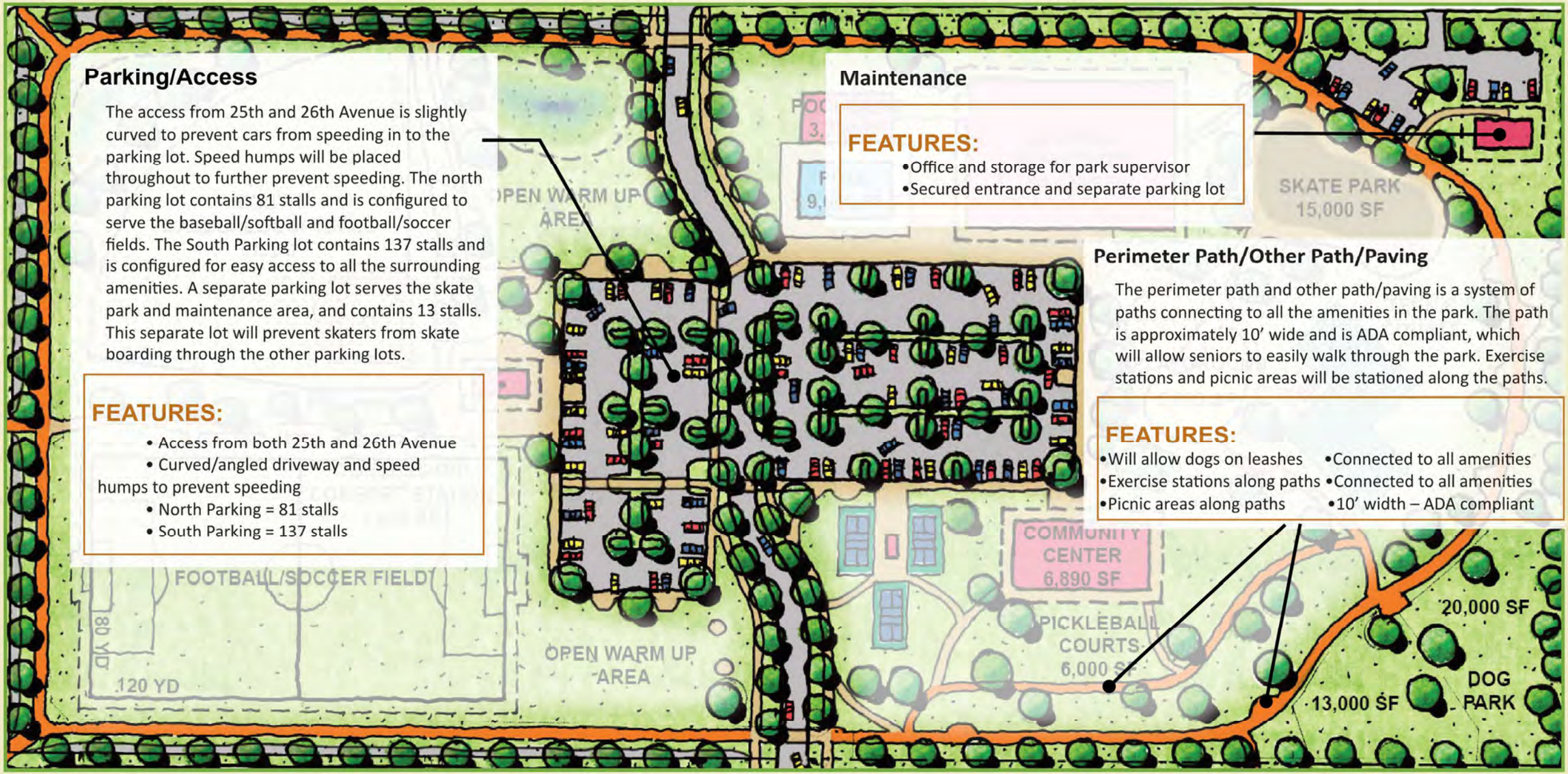
Community Center (6,890 SF)

FEATURES

- Similar to Shipman Park
- Accommodate large parties up to 200 people max
- Office space and storage rooms (for chairs and tables)
- Will be used by DPR's Elderly Activities Division for senior classes
- Has open field next to it for expansion of usable space
- Small office space for EAD
- Serving kitchen
- Kiln room
- Interior bathrooms with family restroom
- Exterior bathrooms on pickleball court side

DESCRIPTION

The community center has 4,000 SF of event space to accommodate up to 277 people. A garage door opening on the north and south sides extends the space to the plaza and lawn areas outside. There is also a senior program storage room, kiln room, and office which will serve DPR's Elderly Activities Division's programs and functions.


Parking/Access
The access from 25th and 26th Avenue is slightly curved to prevent cars from speeding in to the parking lot. Speed humps will be placed throughout to further prevent speeding. The north parking lot contains 81 stalls and is configured to serve the baseball/softball and football/soccer fields. The South Parking lot contains 137 stalls and is configured for easy access to all the surrounding amenities. A separate parking lot serves the skate park and maintenance area, and contains 13 stalls. This separate lot will prevent skaters from skate boarding through the other parking lots.
FEATURES:
• Access from both 25th and 26th Avenue
• Curved/angled driveway and speed humps to prevent speeding
• North Parking = 81 stalls
• South Parking = 137 stalls
Maintenance
FEATURES:
•Office and storage for park supervisor
•Secured entrance and separate parking lot
Perimeter Path/Other Path/Paving
The perimeter path and other path/paving is a system of paths connecting to all the amenities in the park. The path is approximately 10' wide and is ADA compliant, which will allow seniors to easily walk through the park. Exercise stations and picnic areas will be stationed along the paths.
FEATURES:
•Will allow dogs on leashes
•Exercise stations along paths
•Picnic areas along paths
•Connected to all amenities
•Connected to all amenities
•10' width – ADA compliant
SKATE PARK
15,000 SF
COMMUNITY CENTER
6,890 SF
PICKLEBALL COURTS
6,000 SF
FOOTBALL/SOCCER FIELD
80 YD
120 YD
OPEN WARM UP AREA
20,000 SF
13,000 SF
DOG PARK

5.3 Cost Estimate

Potential construction cost estimates have been prepared for the projects major elements including utilities (drainage, domestic water, sewer, electrical and telecommunications); park amenities and ancillary improvements within the park. The current estimated design and construction costs associated with the new park is approximately $50,000,000. Note that park maintenance operations and costs have not been estimated at this time or for the purposes of this master plan.

5.4 Implementation

The concepts and descriptions of park amenities presented in this document is intended to set forth the Hawaiian Paradise Park New Park Master Plan. The master plan will be subject to more detailed feasibility study and refinement during design. At this time, concepts are general and intended to guide the next steps of the park planning process which will include design and entitlement actions. While not available at this time, a park construction phasing plan is anticipated to be needed due to the costs involved to construct the entire park master plan and ancillary infrastructure improvements.

5.5 Potential Permits and Approvals Required

Below is a list of permits and approvals anticipated to be needed for the project:

A. Grading Permit, County of Hawaii, Department of Public Works (including for electrical and plumbing)

B. Department of Health, Wastewater Branch, Individual Wastewater System, Approval to Construct and Occupy

C. Building Permit, County of Hawaii, Department of Public Works

D. National Pollutant Discharge Elimination System (NPDES), Discharge of Storm Water Associated with Construction Activities, Department of Health, Clean Water Branch.

E. Disability Communication and Access Board Document Review

F. Hawaii Department of Transportation, Permit to work in the State Right of Way

G. Hawaii Revised Statutes Chapter 343 Environmental Assessment

6 REFERENCES

REFERENCES

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APPENDIX

PUBLIC AND STAKEHOLDER PARTICIPATION SUMMARY

A.1 Feedback from Stakeholder Meetings

November 7, 2017 – Meeting with County of Hawaii Councilmembers and Hawaiian Paradise Park Owners Association (HPPOA) Representative

- A Walking path is important for seniors since Pāhoa has no dedicated walking path.
- Incorporate a buffer between park and neighboring residential properties
- Consideration should be given to have a senior softball field, soccer field, football field and possible other needs by charter schools in the area.
- At a minimum the park features should include a walking path, dog park, playground, ball fields, and covered playcourt.

A.2 Consultations with County Departments

November 9, 2017 – Meeting with DPR Divisions

According to the DPR Recreation and Maintenance divisions, the following facilities and design considerations are needed and/or desired for the new park:

Baseball field – sized for all ages (up to high school, if possible) and inclusive of the following:

- Completely fenced
- Nighttime lighting
- Dugouts
- Bleachers on each side
- Scorer's booth behind backstop
- Scoreboard
- Design should also consider surrounding areas and impacts from balls hitting houses, etc.

Indoor/Outdoor Covered Play Court – should accommodate two regulation basketball/volleyball courts. Other amenities/considerations should include:

- Consider options for indoor tennis as well. The Pana'ewa court surfacing allows for this (poured-in-place rubberized flooring).
- Rolling three-tiered bleachers that will not damage court surface.
- Storage rooms similar to Pāhoa Park.
- Concession on exterior of structure.
- May house Recreation Director's office.
- Take into consideration ways to keep rain from blowing in (prevailing winds/over hangs). Issues with Pana'ewa being unusable at times due to wind-driven rain conditions.

Multipurpose Field – Should accommodate high school football and soccer. Look into separating fields if there is enough room with the remaining master plan program, otherwise use a combination field similar to Waimea District Park. Other amenities/considerations should include:

- Completely fenced
- Nighttime lighting
- Covered main bleacher (Similar to Pāhoa)
- Player seating areas (Similar to Pāhoa)
- Drinking fountains

Walking Path – Should be a minimum 10 foot wide shared use path (similar to Hilo Bayfront Trails) with nighttime lighting. Skateboarding will be prohibited. Dogs will be allowed on leashes. Dog waste stations should be provided. Also consider exercise fitness stations.

Children's Playground – If there is room, separate playground areas by age groups (2 to 5 and 5 to 12), but if not together is fine. DPR no longer installs swings with their playgrounds due to the large required safety zones and minimal uses it can accommodate. The playground perimeter needs to be clearly defined either with fencing, seat walls, or other feature.

Skateboard Park – Flat surface/ street-style type.

Tennis Courts – Consider outdoor two court system similar to Shipman Park with nighttime lighting. This can be in addition to or replace the option of accommodating indoor tennis

courts on the covered play court.

Community Center – Should be similar to Waimea Park or Kulaimano Park. The existing facility in HPP holds up to 125 people. This new community center should be able to accommodate large parties up to 200 people maximum. It should not be much larger than that since 300 person capacity triggers emergency shelter requirements. Consider orientation and initial phasing to allow for future expansion. Similar to Hilo Municipal Golf Course where the restaurant doors slide open and allow for additional outside usable space. Also need to include office space and storage room(s).

Dog Park – Dogs need to be addressed in some manner since the community feels it is important. Including a designated dog park within the HPP park should not take away recreation space from human users and also poses maintenance issues for DPR staff. There is also a question as to whether people would use it instead of the other open areas of the park including the walking paths. For the purposes of the master plan, we will not initially include a designated dog park but we will assume that dogs will be allowed in the park on leashes in designated areas and will incorporate dog waste stations accordingly. Special attention will need to be paid to delineating areas of the park where dogs are allowed so that enforcement is clear, i.e. fencing of restricted areas such as fields and playgrounds.

Office Space and Storage Rooms – Since there is no maintenance office in this area, consider adding an office and lockable storage room (shop type with office like at Shipman Park) for a possible park supervisor to be located in this park, this area is growing quickly so this is an eventual need for the area. Storage room estimated at 50x20 ft, if can be stand-alone that would be good but need to consider lost efficiency of having too many stand-alone buildings. If possible, situate this office so that visibility over the park is maximized.

Comfort Stations – Depending on master plan layout may need to include multiple facilities for sports fields, community center, etc.

Concessions – Location should take into consideration distance between the sports fields and the community center. Ideally it would serve both but the most logical location would be at the community center/covered play courts (similar to Pāhoa Park). This will likely just be a serving kitchen as certified kitchens can be a challenge.

Security – Encourage visibility from the outside-in to discourage illicit and reckless activities, homeless encampments, and crime. Design the park to maximize "eyes" on the park by neighbors. Make sure areas such as walking paths and comfort stations are well-lit and visible, incorporate fencing in ways to prevent access to unauthorized areas by the public. Consider providing an additional room in the community center to serve as a police substation (DPR to check with HPD to see if this is desired by them). In addition, the recreation director's office should have good visibility of the entire park.

Fencing – As mentioned in various sections earlier, need to prevent vehicles from entering the perimeter of the park in unauthorized areas but DPR does not want to fence the entire perimeter. While fencing would be appropriate along the south side of the property where private residences abut the park, other treatments such as earth berms or swales in combination with fencing should be employed in other areas. Focus on fencing smaller interior features such as sports fields, playgrounds, etc.

Plumbing and electrical fixtures would be consistent with DPR standards for durability, ease of maintenance and replacement. Likely need to have septic system for wastewater. Likely need to domestic water connection to county system since demand may be too great for catchment water system. Will need water fountains.

Lights - Incorporate lights for the whole park in later phases, but keep placeholders in design and the master plan. Zone lighting controls so that each area can be controlled separately.

MTA Park and Ride – Suggest that this be located off site on a separate adjacent parcel. DPR would not be responsible for parked cars. Having a bus stop at or near the park is good.

Landscaping

- Add some trees for shade but not line the whole park. Lots of people use pop up tents anyway for shade. Don't "block" view of park from outside.
- Irrigation not needed.
- No steep grades, hard to maintain. IV: 34 maximum
- Soil preparation – need at least 8-12 inches of good base soil. Depending on where soil comes from you may or may not have sleeping grass (i.e. problematic weeds)

issues in the future. Design plans should consider soil settlement also, since this is an issue for other parks in this area.

- May not be specified at this level of planning, but consider type of grassing to be used for his area. Carpet and centipede grass does well.

Architecture

- Make sure character is homogeneous
- Utilitarian
- Easy to maintain
- Energy efficient
- Natural lighting during daytime with supplemental lighting for cloudy days
- Multi-staged lights
- Color scheme will be up to the community
- Consider ways to keep out pigs as they will destroy grassing.

November 20, 2017 – Meeting with the Planning Department

The Planning Department offered the following suggestions for the park:

- Plan for transit accommodations within the Regional Town Center whether that is on the park site or adjacent site. A park-and-ride has been in the discussion before. This supports the goal of reducing traffic in the area.
- Design for three (3) park frontages and design the park so that it fits within the regional town center context in the future.
- Consider other neighboring subdivisions specifically Orchidland when planning the park.

November 22, 2017 – Meeting with the DPR Elderly Assistance Division

The DPR Elderly Assistance Division offered the following suggestions for the park:

- For the walking path, consider multiple distances. A mile might be too long for a walking path for seniors, try to create shorter runs but more importantly think about ADA and grades.
- Flat runs are desirable for seniors. Note the Pāhoa walking path doesn't go all the way around and is not flat. Machado Acres Park (off Keone St.) in South Hilo is a good example because it is mostly flat and has different path options for shorter or longer walks ("figure 8" design). At Machado, users are allowed to walk with their dogs on a leash as long as they clean up. There are no specific dog waste stations there.
- One good idea is to have covered rest areas along the walking path and possibly double it up with a bus stop. Bus stops should be covered.
- Papa'aloa is probably the smallest space EAD uses at about 80 persons capacity. Desired in HPP is probably a 150 or 200 person capacity design. The highest occupancy events are usually community rentals for parties like graduations. If ear marked as a "community center" it has to be available to the public for rental, so that needs to be considered.
- When looking at occupancy requirements for the building code, can assume non-fixed chairs/seating.
- Recommend providing an open area outside that can be expanded into as usable space. This helps keep the building square footage lower and promotes outdoor activities, which is good for the senior programs.
- Would be good if the community center can be used for public meetings as well as elections/polling places.
- Ainaloa has a good community facility attached to the park (Ainaloa Long House).
- Main thing is that everything is ADA accessible and has enough storage spaces to accommodate county users along with building users. Some users may include after school programs, Tutu and Me early education, schools, etc. Being able to store tables and chairs is one of the primary needs.
- Typically senior programs are held in the morning (up until about noon), then the space can be dedicated to youth and after school programs as needed.
- Storage is very important. Need three separate locked areas. This allows for County specific storage needs as well as other parties that rent or occupy the facility frequently.
- Would be nice to have an office for EAD, but if space is limited an area off to the side with a desk may be sufficient.
- Should also have a kitchen available. Doesn't have to be full commercial kitchen.
- If allowed to run some programs out of HPP, EAD would be interested and may need to staff the program.

- EAD has been flexible with facility spaces available to them. Example is the former Pāhoa fire station where they needed to relocate when lava flows were approaching, then returned when the lava threat diminished. Since it is a federally funded program that must keep it going, even if it means shuffling around.
- There are other emergency shelters in the district so this park doesn't necessarily need to be designed for that. Kea'au High School is one. However, there may be uses for the park to house people during times of emergency.

A.3 Public Meeting No. 1

A public meeting was held on Sunday, January 7, 2018 at the Hawaiian Paradise Park Owners Association Activity Center to present the vision, goals and preliminary alternative plans.

David Tarnas (MCSI) opened the meeting by introducing the project team and recognizing special attendees (Councilwoman Eileen O'Hara and DPR Deputy Director Maurice Messina). Jared Chang (SSFM) presented the project background, master plan process, vision, goals and preliminary alternative plans.

Following the PowerPoint presentation, meeting attendees were broken up into three (3) groups and directed to one of three stations (for conceptual alternatives 1, 2 or 3) set up for break-out discussions. Each station had the corresponding alternative displayed on poster board along with a facilitator and note-taker. The following questions were addressed by groups at each station:

1. What opportunities do you see in this alternative?
2. What issues and constraints do you see in this alternative?
3. What other recreational amenities should be considered?

Each group was allowed approximately fifteen minutes to discuss the alternative and provide feedback on the station comment sheet. Groups rotated through each station once.

Meeting attendees reconvened and each facilitator summarized the topics/concerns

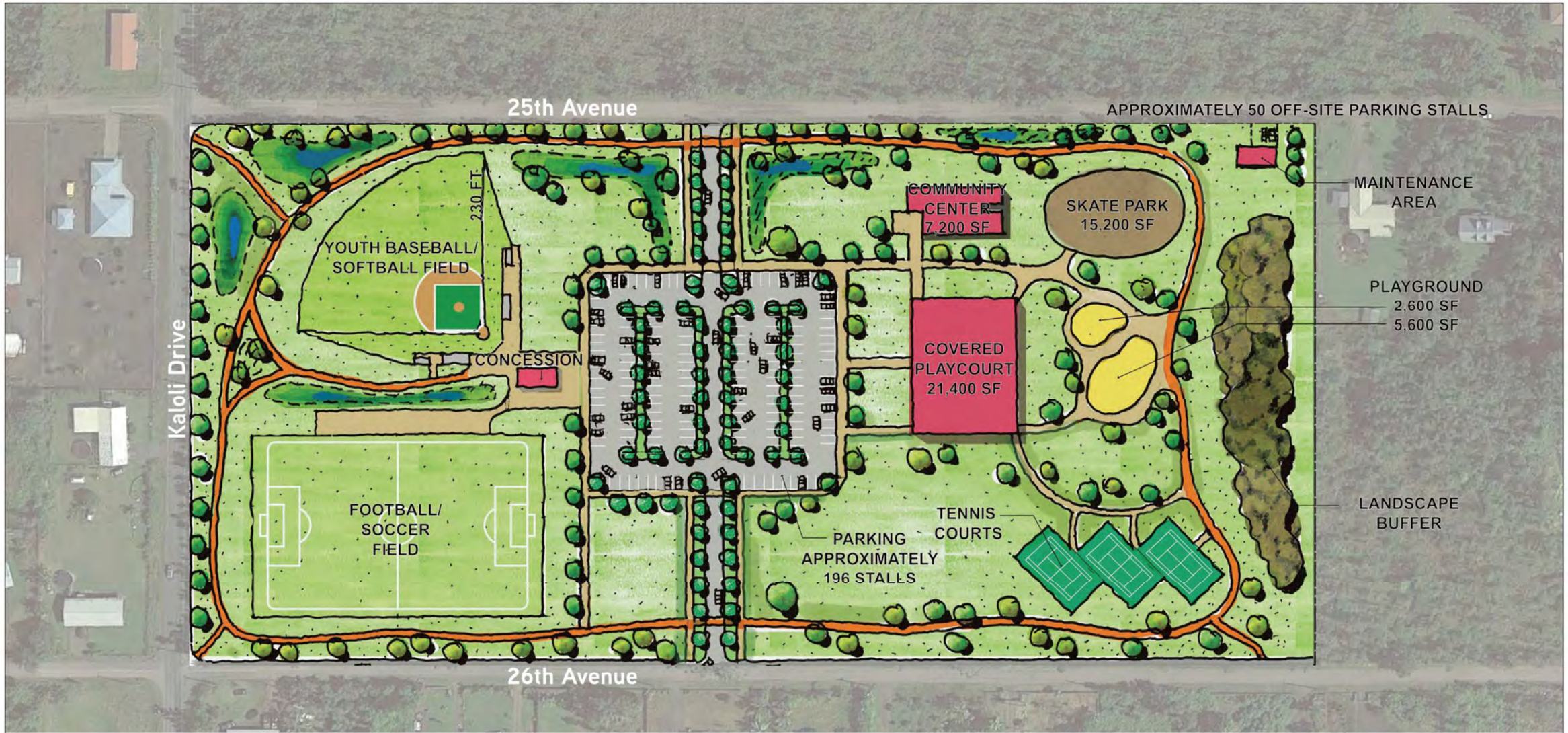
PowerPoint presentation by SSFM

Alternative 1 Station

Alternative 2 Station

Alternative 3 Station

Figure 1: Draft Alternative 1 Conceptual Plan



LEGEND:

- Roads (Grey) Sidewalks (Brown)
- Walking Path (Orange)
- Biofiltration Swale and Basins
- Buildings
- Trees & Grass Area

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT

DRAFT ALTERNATIVE 1 FOR PUBLIC COMMENT (JANUARY 2018)
"CENTRAL PARKING" CONCEPT

Figure 2: Draft Alternative 2 Conceptual Plan

LEGEND:

Roads (Grey)
Sidewalks (Brown)

Walking Path
(Orange)

Biofiltration Swale
and Basins

Buildings

Trees & Grass Area

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT

DRAFT ALTERNATIVE 2 FOR PUBLIC COMMENT (JANUARY 2018)
"ROUNDABOUT" CONCEPT

Figure 3: Draft Alternative 3 Conceptual Plan

LEGEND:

Roads (Grey)
Sidewalks (Brown)

Walking Path (Orange)

Biofiltration Swale and Basins

Buildings

Trees & Grass Area

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT

DRAFT ALTERNATIVE 3 FOR PUBLIC COMMENT (JANUARY 2018)
"LOOPED PARKING" CONCEPT

The following comments were made on the General Comment Forms and Alternative Comment sheets that were passed out during the meeting. These comments consist of those that applied to all three alternatives, and then further separated into comments made on each specific alternative. Comments that were submitted are provided below and are italicized.

General Comments by Category and Number of Responses

- *Want a fenced off-leash dog park that was originally proposed in the HPP survey*
- *Need a swimming pool (for seniors, water aerobics classes, etc.)*
- *Include community gardens*
- *More amenities and exercise equipment for seniors*
- *Fencing around the park for security*
- *Include sand volleyball courts*
- *Exercise stations along walking path*
- *More bathroom locations*
- *Include picnic areas with BBQ stations*
- *Certified commercial kitchen in the community center*

Amongst the comments received, a dog park was highly requested and mentioned; it appeared on the General Comment Form and all the Alternative Comment Sheets. Many feedback emails were also sent to Jared following the Public Information Meeting to request a dog park be added to the Master Plan.

A swimming pool was also highly requested by the public; it appeared on the General Comment Form, all of the Alternative Comment Sheets, and was also mentioned in emails sent to Jared.

Other issues and requests that were made throughout all the comment sheets were to add more amenities and exercise equipment for seniors to use, reduce the amount of tennis courts and/or baseball fields to add a sand volleyball court, add exercise stations along the walking path, include picnic/BBQ pavilions, fence the perimeter of the park, and add more bathrooms throughout the park.

The following comments appeared multiple times on the Alternative Comment Sheets and station notes.

Alternative 1 Comments

- *Has the most parking stalls*
- *Like the idea of two-way egress/ingress*
- *Include bike stands*
- *Central parking minimizes the amount of cars and limits walking pedestrians*
- *Playground location is far from the parking lot*

Alternative 2 Comments

- *Parking area creates easy access to each activity area*
- *Least parking of the alternatives*
- *Like the access from 25th and 26th*
- *Enlarge the skate park*
- *Reduce to one baseball/softball field*
- *Like the centrally located playground and community center*

Alternative 3 Comments

- *Parking design eliminates car traffic and noise on 26th*
- *Looped parking puts a lot of traffic on 25th, plus additional traffic flow from pro posed commercial center*
- *Less parking, inadequate for multiple team sports/tournaments going on at once*
- *There may be issues with access only on 25th*

The number of parking stalls and vehicle access from 25th and 26th were the main points of interest on all three alternatives. Comments concerning the proximity of the parking lot to play fields, the community center, skate park, and the playground were also of concern to the public.

Secondary to parking and vehicle access was the issue with the amount of play fields and exercise stations each alternative had. A majority of the comments made on play fields were to reduce the amount (if more than one was indicated) of baseball/ softball fields or tennis courts in order to allow room for a pool, dog park or sand volleyball court. There were also many requests to add exercise stations along the walking path and near play fields.

PowerPoint presentation by SSFM

Meeting attendees reviewing the "base" and "base + options" master plan alternatives

A.4 Public Meeting No. 2

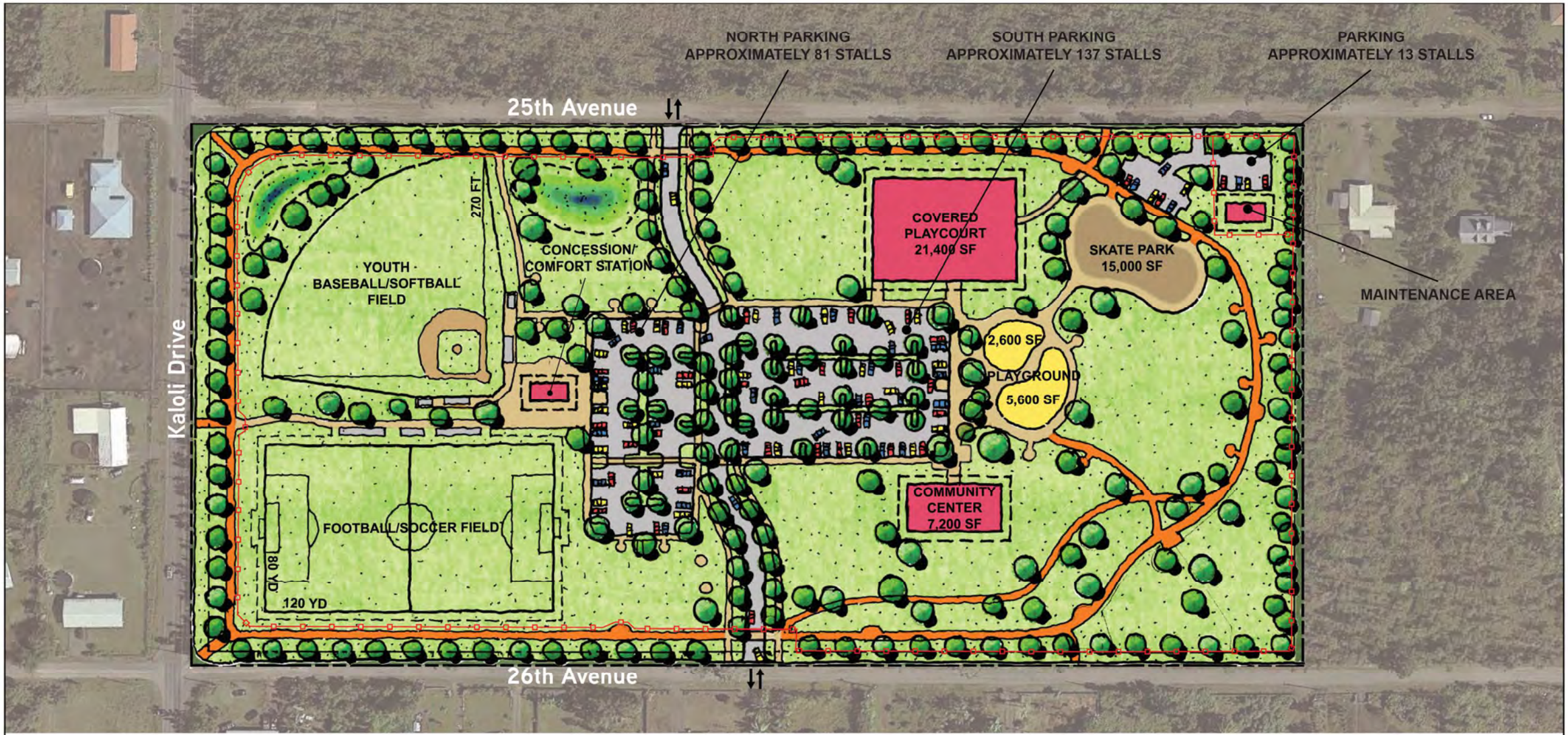
A second public meeting was held on Monday, February 19, 2018 at the Hawaiian Paradise Park Owners Association Activity Center to present the preliminary master plan.

David Tarnas (MCSI) opened the meeting by introducing the project team and recognizing special attendees (Councilwoman Eileen O'Hara, DPR Director Roxcie Waltjen, and DPR Deputy Director Maurice Messina). Jared Chang (SSFM) presented the pros and cons and the feedback and comments received on the three (3) conceptual alternatives that were presented at the first Public Meeting held on January 7, 2018.

The two preliminary master plan alternatives ("base" and "base + options") were presented and details on each amenity to be included was explained. The presentation ended at approximately 4:00 PM.

Following the PowerPoint presentation, a Q&A session was held to give meeting attendees the opportunity to ask questions about both preliminary master plan alternatives. A summary of the questions and comments received can be found below.

Figure 4: Preliminary Master Plan (Base)



LEGEND:

Roads (Grey) Sidewalks (Brown) | Walking Path (Orange) | Biofiltration Swale and Basins | Buildings | Trees & Grass Area | Picnic Area | Seating Area | Exercise Stations | Fencing

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT
SCALE: 1 IN = 120 FT

PRELIMINARY MASTER PLAN (BASE)

Figure 5: Preliminary Master Plan (Base+Options)

LEGEND:

Roads (Grey) Sidewalks (Brown) · Walking Path (Orange) · Biofiltration Swale and Basins · Buildings · Trees & Grass Area · Picnic Area · Seating Area · Exercise Stations · Fencing

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT
SCALE: 1 IN = 120 FT

PRELIMINARY MASTER PLAN (BASE + OPTIONS)

The following comments were made during the Q&A session and on the General Comment Forms, and covered the project in general. These comments consist of those that applied to the two alternatives, and then further separated into comments made on each specific alternative. Comments that were submitted are provided below and are italicized.

Which preliminary master plan elements are most important to you?

- *Dog park*
- *Pool*
- *Pickleball courts*
- *Sand volleyball courts*
- *Skate park*
- *Restrooms*
- *Open space/picnic areas*
- *Walking path that incorporates exercise stations*
- *Community center*

Amongst the comments received, a dog park was mentioned the most in response to this question. Feedback emails were also sent to Jared following the Public Information Meeting where it was mentioned that they preferred the base + options alternative because it included the dog park.

A swimming pool was also highly mentioned in response to this question and also appeared in the feedback emails.

Is there anything else you would like to share with us?

- *I think the plan as described is fantastic. Please keep all elements as discussed on base + options.*
- *Need restrooms on each side of the park. Add restrooms by the dog park.*
- *Include water fountains. Need those at the dog park also.*
- *Tennis courts don't seem to be necessary and can be included in a later phase.*
- *Pool could be included in a later phase.*
- *Pickleball? Out of all the people at this meeting only one (1) couple raised their hands that they had ever played pickleball.*

In general, most of the responses to this question indicated that the base + options preliminary master plan was favored over the base preliminary master plan, with comments on minor additions/subtractions of amenities and features. Comments on the traffic along Kaloli, 25th and 26th, and security and lighting of the park were also frequently mentioned in response to this question.

Meeting attendees sharing thoughts and ideas after meeting

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B

APPENDIX
PRELIMINARY ENGINEERING REPORTS

CONTENTS

1.0 Civil Engineering

1.1 INTRODUCTION

1.1.1 DESIGN STANDARDS

1. “Water System Standards”, Department of Water Supply (DWS), County of Hawai‘i, 2002
2. “Storm Drainage Standard”, Department of Public Works (DPW), County of Hawai‘i, October, 1970
3. Hawai‘i Administrative Rules, Title 11 Department of Health, Chapter 62 Wastewater Systems
4. “Topographic Survey” by Imata and Associates
5. “Standard Details for Public Works Construction”; Department of Public Works, September 1984, referred to as “Standard Details”
6. “Standard Specifications for Public Works Construction”; Department of Public Works, September 1986, referred to as “Standard Specifications”
7. 2010 Americans with Disabilities Act (ADA) Standards for Accessible Design; Department of Justice, September 15, 2010
8. Hawai‘i County Ordinances, Chapter 25, Division 5 - Off-Street Parking and Loading
9. “A Policy on Geometric Design of Highways and Streets”, American Association of State Highway and Transportation Officials (AASHTO), 2011, 6th Edition

1.1.2 EXISTING CONDITIONS

The site is located on a 20-acre parcel situated approximately 3,500 feet Northeast of Kea‘au-Pāhoa Road (Highway 130), the main north-south roadway serving the Puna community. The site is bounded by 25th Avenue to the northeast (toward Makai), Kaloli Avenue to the Northwest, 26th Avenue to the southwest (toward mauka) and residential properties to the southeast.

The site is gently sloped and consists of an elevation difference of approximately 48 feet within 1,500 feet, or 3% slope. Localized slopes within the site are generally steep in some areas with mounds and dips and slopes in a south to north direction.

1.2 DRAINAGE

County of Hawai‘i Storm Drainage Standard will apply to this project. Rainfall Intensity Plate Maps from the drainage standards were used to calculate rainfall intensities. These intensities were then used to estimate peak flows for a 10-year and 50-year return period event for both the existing and proposed conditions.

The Rational Method was used to calculate peak flows, based on a 1-hour rainfall duration with rainfall intensities of 4.5 inches/hour and 5.8 inches/hour, respectively (as per Plate 1 and 2 of the storm drainage standards). Times of concentration were estimated for each drainage area, based on the individual overland slopes and lengths (Plate 3 of the storm drainage standards).

1.2.1 EXISTING

Land use is currently undeveloped with areas of natural forest of brush and ‘ōhi‘a trees. There are no existing drainage structures or gulches to dispose of stormwater runoff; however, the uneven nature of the topography creates natural low and high spots throughout the 20-acre parcel. Existing drainage patterns generally flow in the northerly direction. The existing site has been delineated into several drainage areas (see Figure 1). The drainage areas and estimated peak flow rates produced by the 1-in 10-year and 1-in 50-year design storms at each area have been presented in Table 1.

As mentioned in the previous section, the parcel is bordered on three sides by paved roadways. The slope of these roads is generally a crowned condition resulting half of the roadway pavement draining toward the parcel property line. Site observations and interviews with HPP residents concluded that roadside runoff and/or ponding have not historical been an issue. Offsite roadway improvements are not part of the scope of work of this masterplan. However, in the future, once the need for improvements are determined the pavement runoff will need to addressed through the use of curbs, swales, drywells, or other drainage infrastructure to ensure no negative impacts to the park parcel. The topography on the southeast edge of the site (residential border) does not appear to have any drainage ways that enter the property based what is shown on the topographic information available.

Figure 1: Pre-Development Drainage Condition

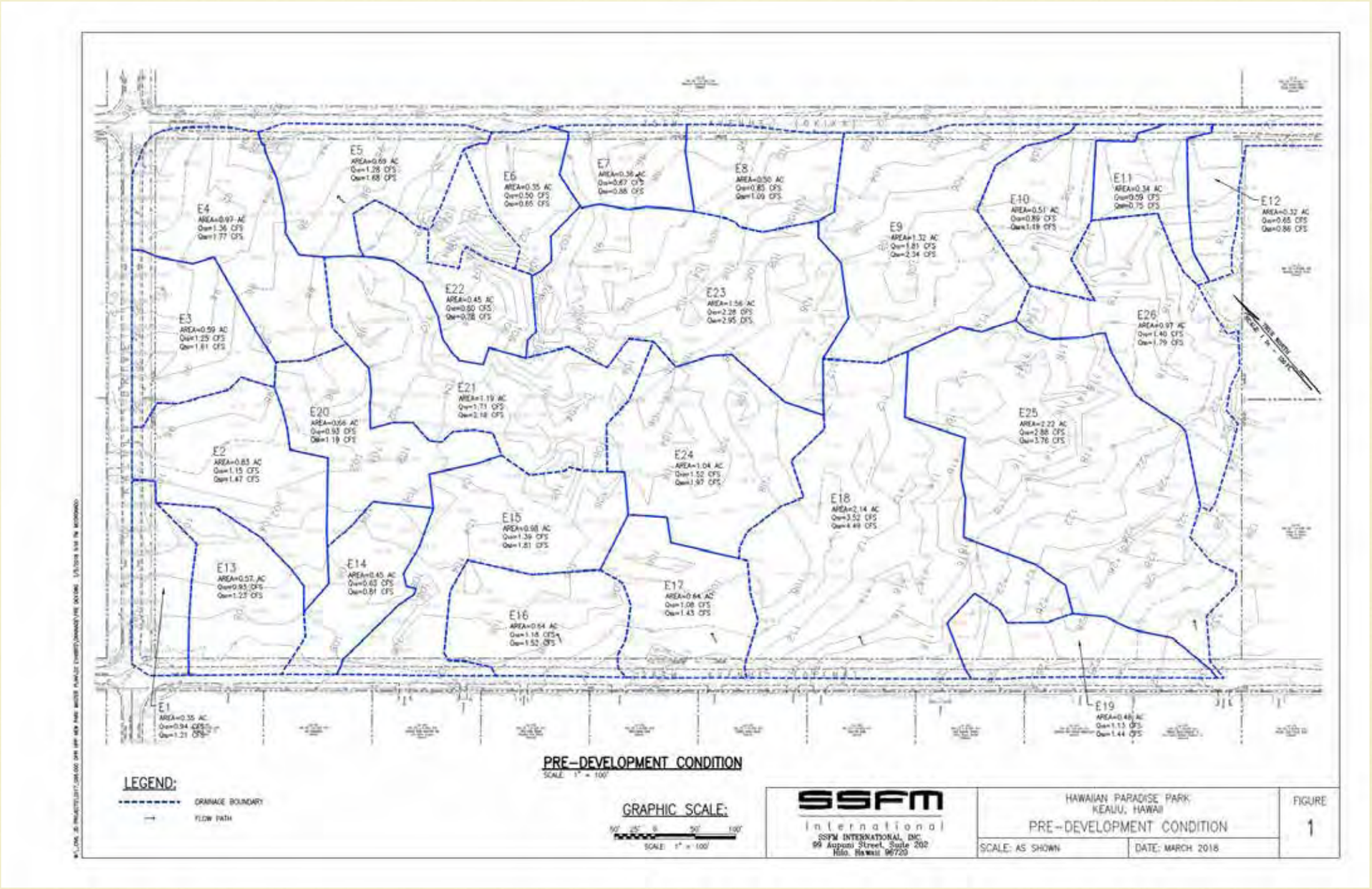


Table 1: Summary of Existing Flow Rates

Drainage Basin	Area (ac)	Peak Flow Q_{10} (cfs)	Peak Flow Q_{50} (cfs)
E1	0.35	0.94	1.21
E2	0.83	1.15	1.47
E3	0.59	1.25	1.61
E4	0.97	1.36	1.77
E5	0.69	1.28	1.68
E6	0.35	0.50	0.65
E7	0.36	0.67	0.88
E8	0.50	0.85	1.09
E9	1.32	1.81	2.34
E10	0.51	0.89	1.19
E11	0.34	0.59	0.75
E12	0.32	0.65	0.86
E13	0.57	0.93	1.23
E14	0.45	0.63	0.81
E15	0.98	1.39	1.81
E16	0.64	1.18	1.52
E17	0.64	1.08	1.43
E18	2.14	3.52	4.49
E19	0.48	1.13	1.44
E20	0.66	0.93	1.19
E21	1.19	1.71	2.18
E22	0.45	0.60	0.78
E23	1.56	2.28	2.95
E24	1.04	1.52	1.97
E25	2.22	2.88	3.76
E26	0.97	1.40	1.79
TOTAL	**21.14**	**33.10**	**42.84**

1.2.2 PROPOSED

In general, runoff will flow away from buildings and will flow and infiltrate into the ground or be collected by swales, gutters along rooftops and inlets and conveyed to shallow drywells and/or detention basins for onsite disposal. It is assumed that shallow drywells have the capacity to dispose of two cubic feet per second (2 cfs) of stormwater runoff. During final design, the use of deep drywells, with a capacity to dispose of six cubic feet per second (6 cfs) of storm water runoff, will be evaluated. Percolation tests will be performed during the design and construction phases to confirm disposal rates.

The proposed drainage conditions are shown in Figure 2. The drainage areas have been delineated to reflect the conceptual proposed grading. Table 2 presents a summary of the proposed drainage areas and the estimated flow rates from the 1-in 10-year and 1-in 50-year storms under the proposed drainage conditions.
The Park development will utilize roof drains and downspouts to handle runoff from roof areas. The downspouts will connect to underground drainlines which will pipe to new drywells. Drainage areas P21, P22 and P23 are over the shallow drywell 2 cfs capacity; however, the overflow could be handled by the detention basin in the northern portion of the site, at the corner of Kaloli Drive and 25th Avenue. Drainage Area P35 represents offsite drainage and flow that could possibly be handled by an offsite swale.

The preliminary master plan includes two detention basins: one at the corner of Kaloli Drive and 25th Avenue (Detention Basin 1), and the other at the 25th Avenue entrance to the Park (Detention Basin 2). Each detention basin bottom will include shallow or deep drywells to supplement the basin drainage.

Preliminary detention basin sizing calculations have been performed and for conservative purposes, assumed no percolation or infiltration into the ground, or under a 100% clogged scenario. Calculations indicate that Detention Basin 1 be approximately 8,200 cubic feet in volume. This would mean a drainage basin of 2,800 square feet, 3 feet deep. Drainage Basin 2 is approximately 31,000 cubic feet in volume, or 15,500 square feet, 3 feet deep. Both detention basins will have minimum 6:1 side slopes for safety reasons.

During the more detailed planning and design of the project, engineers will determine the necessary water quality standards and which Best Management Practices (BMPs) would be most effective for this project.

Figure 1: Post-Development Drainage Condition

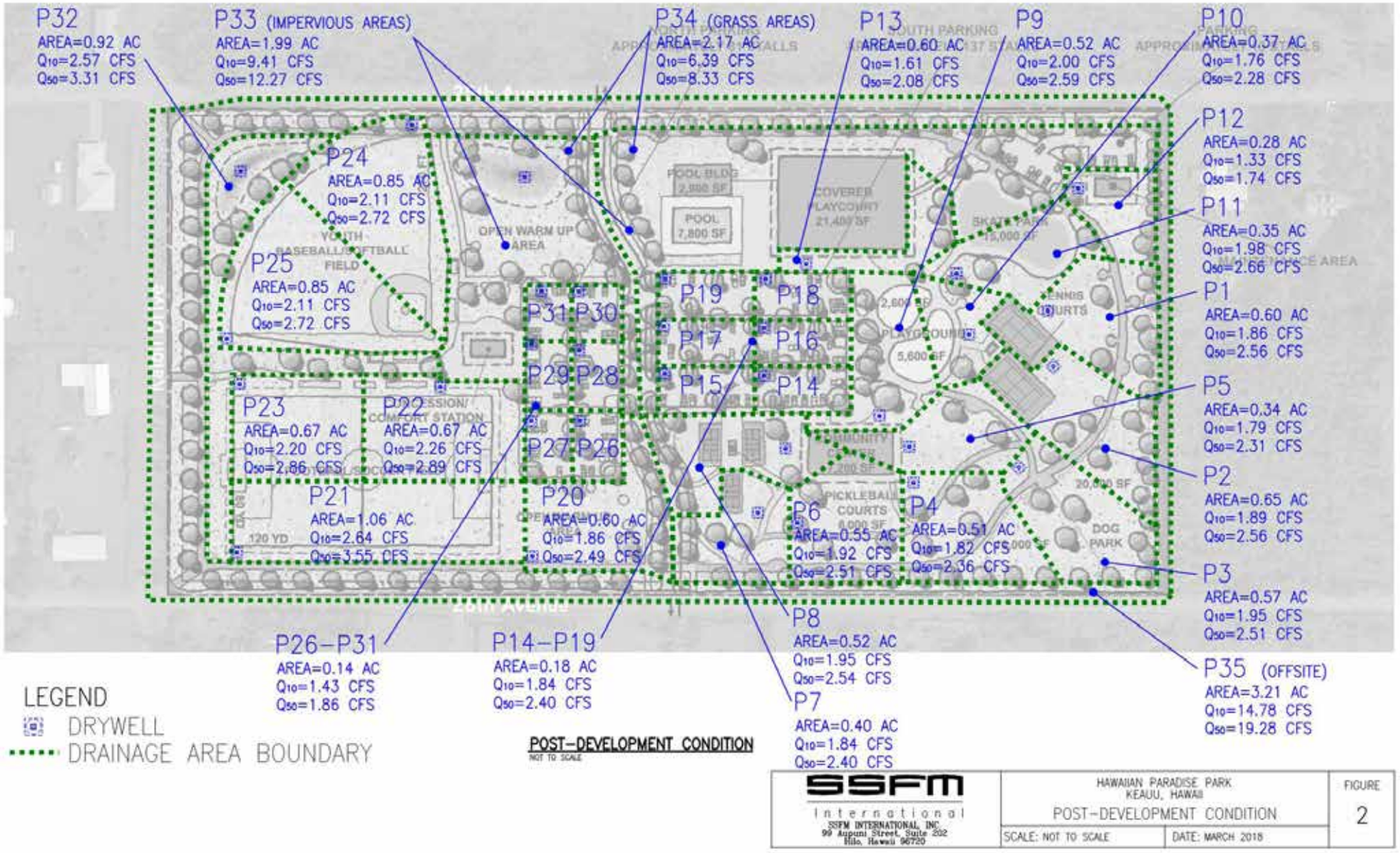


Table 2: Summary of Proposed Flow Rates

Drainage Basin	Area (ac)	Peak Flow Q_{10} (cfs)	Peak Flow Q_{50} (cfs)
P1	0.60	1.86	2.56
P2	0.65	1.89	2.56
P3	0.57	1.95	2.51
P4	0.51	1.82	2.36
P5	0.34	1.79	2.31
P6	0.55	1.92	2.51
P7	0.40	1.84	2.40
P8	0.52	1.95	2.54
P9	0.52	2.00	2.59
P10	0.37	1.76	2.28
P11	0.35	1.98	2.66
P12	0.28	1.33	1.74
P13	0.60	1.61	2.08
P14	0.18	1.84	2.40
P15	0.18	1.84	2.40
P16	0.18	1.84	2.40
P17	0.18	1.84	2.40
P18	0.18	1.84	2.40
P19	0.18	1.84	2.40
P20	0.60	1.86	1.97
P21	1.06	2.64	3.55
P22	0.67	2.26	2.89
P23	0.67	2.20	2.86
P24	0.85	2.11	2.72
P25	0.85	2.11	2.72
P26	0.14	1.43	1.86
P27	0.14	1.43	1.86
P28	0.14	1.43	1.86

Table 2: Summary of Proposed Flow Rates

P29	0.14	1.43	1.86
P30	0.14	1.43	1.86
P31	0.14	1.43	1.86
P32	0.92	2.57	3.31
P33	1.99	16.30	21.26
P34	2.17	9.94	12.96
P35	3.21	14.78	19.28
TOTAL	**21.14**	**33.10**	**42.84**

1.3 GRADING

The schematic grading plan follows the general criteria:

- Sports fields and lawn areas are graded to 1-2% for drainage purposes
- Parking lots are graded 1-5% for drainage purposes, except at ADA stalls where slopes are at maximum 1.25%
- Playcourts (except the covered playcourt) are graded to 1-2% for drainage purposes
- The dog park is graded to a maximum 10%. Due to its location on the site and the topography of the area, the dog park is sloped to be able to work with the other elements and grades of the park
- Slopes between buildings or areas where foot traffic is expected are limited to either 10% (grass) or 5% (paved) or less
- Walkways are ADA compliant (less than 1.5% longitudinally, less than 7.5% for ramps)
- All other areas are graded to 3:1 or less for maintenance and mowing purposes

An effort to balance earthwork quantities of cut and fill is expected to minimize the cost of purchasing offsite borrow material and disposing of excess excavated material at an off-site location. Preliminary grading indicates that there is a surplus of excavation (55,000 cubic yards) over embankment needed (30,000 cubic yards). Since the grading plan is still preliminary, efforts to further balance the earthwork will occur during final design. Grading operations shall be in conformance with Chapter 10 of the County of Hawai'i County Code.

A retaining wall is anticipated as part of the conceptual design. The retaining wall location is between 26th Avenue and the football/soccer field for the length of the field. Since park areas in general tend to be flat compared to the existing topography, there is an elevation difference between the higher existing 26th Avenue and the lower elevation of the field area. The location is preliminary and shall be further evaluated during final design. The wall varies in height from 4 feet to 8 feet.

More detailed soils investigations for grading and retaining wall design will be performed as planning of the project proceeds.

1.4 ROADWAYS AND WALKWAYS

1.4.1 ROADWAYS AND PAVEMENT DESIGN – OFF-SITE

All existing major mauka-makai collector roads within Hawaiian Paradise Park (Shower Drive, Kaloli Drive, Paradise Drive, and Maku'u Drive) are paved, privately-owned (by HPP) two-lane roads. The minor crossroads, also two-lane and privately-owned by HPP, are a mixture of paved and unpaved areas within the subdivision. 25th Avenue and 26th Avenue are paved within the project area. The existing speed limit along Kaloli Drive is 35 mph and 25 mph along 25th Avenue and 26th Avenue.

Since the project will generate additional traffic on the existing roadways in the vicinity of the project site, a Traffic Impact Assessment Report (TIAR) will be prepared for this project during the environmental planning stage, which will outline the requirements and impacts of the park and improvements possibly needed to the surrounding roadways and intersections.

1.4.2 ROADWAYS AND PAVEMENT DESIGN – ON-SITE

Under this project, it is assumed that roadways and parking lot pavement structure will be based on the County of Hawai'i Standard Details. However, as part of the geotechnical investigation that will be performed during design development it is recommended that a pavement justification report for both on-site and off-site roadway and parking areas be conducted to verify adequacy.

1.4.3 WALKWAY AREAS

The exterior/perimeter walkway that borders the park property shall be 10 feet wide minimum. Interior walkways between park elements (e.g. parking lot, buildings fields, etc.) shall be 5 feet wide minimum.

1.4.4 SITE ACCESS

Site access will be via 25th Avenue and 26th Avenue. Access along Kaloli Street will not be allowed. Sight distance at these access points shall comply with the American Association of State Highway and Transportation Officials (AASHTO) Stopping Sight Distance Requirements. Per AASHTO intersection sight distance requirements, sight distance is a minimum 280' from a stop-controlled minor road. Adjustments factors shall be applied for vertical grades.

1.5 UTILITIES

1.5.1 WATER
See water PER.

1.5.2 WASTEWATER
There is no public sewer system serving the Hawaiian Paradise Park subdivision or Puna community. The closest public wastewater facility is along Volcano Highway, approximately 10 miles away.

It is anticipated that the onsite sewage will be disposed of via sewerlines from buildings to multiple septic tank and leach field chamber systems. Preliminary calculations and grades indicate that three separate leach fields are needed. For purposes of initial analysis, each leach field system will have a minimum 2,000 gallon septic tank and a chamber system approximately 30' x 80' in size. Since these chamber systems are underground, the open field areas of the park (i.e. fields or lawn areas) will be used for placement. Figure 3 illustrates the potential location of the leach field systems as discussed below.

One leach field will service the western portion of the park in the vicinity of the baseball and football/soccer fields. The concession stand and comfort station building is the main generator of wastewater for this leach field. In addition, hose bibbs and drinking fountains, depending on placement, will connect to the leach field. Due to the need for gravity flow for the system, the location of this leach field is ideal between the western parking lot and 25th Avenue.

Another leach field will service the pool building and covered play courts. Each facility will have restrooms, drinking fountains and hose bibbs. Draining and maintenance of the pool water will not be able to be disposed of in the leach field. Location of this leach field is between the pool facilities and the vehicle driveway.

The last leach field will service the community center, which includes restrooms, drinking fountains and hose bibbs. Location of the leach field will be in the open lawn area of the community center or between the community center and tennis courts.

Drinking fountains or hose bibbs that are not in the vicinity of a leach field can be drained to individual seepage pits.

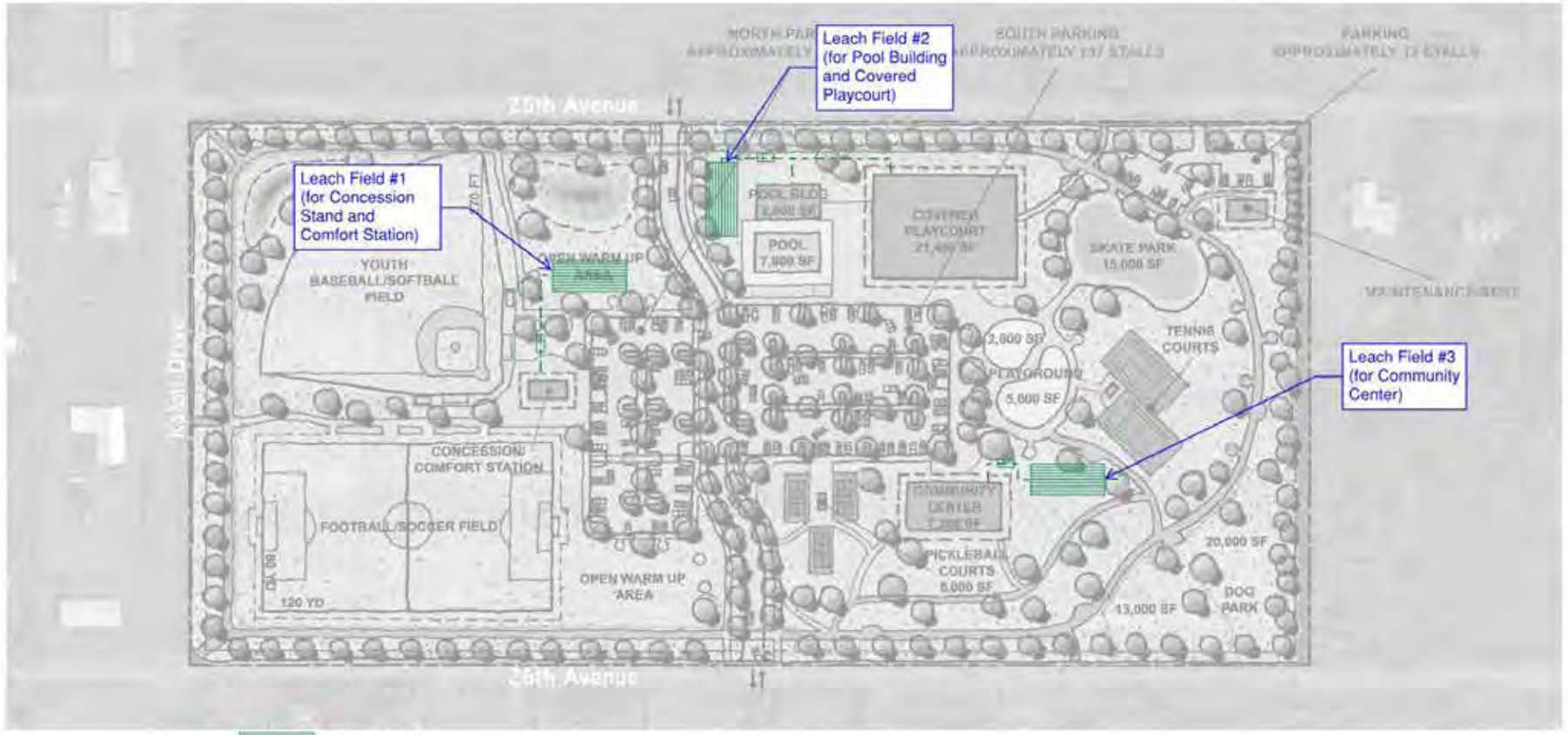
Sewer system design shall comply with Department of Health Wastewater System Standards. Pool drainage shall comply with Department of Health Rules for Public Swimming Pools.

1.5.3 ELECTRICAL
See electrical PER.

1.6 ENGINEERING PERMITS & APPROVALS
Below is a list of permits it is anticipated are needed during design

- Grading Permit, County of Hawaii, Department of Public Works
- Department of Health, Wastewater Branch, Individual Wastewater System, Approval to Construct and Occupy
- Building Permit, County of Hawaii, Department of Public Works
- National Pollutant Discharge Elimination System (NPDES), Discharge of Storm Water Associated with Construction Activities, Department of Health, Clean Water Branch. It is anticipated that an Individual NPDES is needed as the marine area in the project area is in Class AA waters, per the latest Water Quality Standards Map.
- Disability Communication and Access Board Document Review

Figure 3: Proposed Leach Field Locations



PROPOSED LEACH FIELD LOCATIONS
NOT TO SCALE

SSFM International SSFM INTERNATIONAL, INC. 99 Aupuni Street, Suite 202 Hilo, Hawaii 96720	HAWAIIAN PARADISE PARK KEAUU, HAWAII LEACH FIELD LOCATIONS SCALE: NOT TO SCALE | DATE: MARCH 2018	FIGURE 3

2.0 WATER SERVICING

2.1 INTRODUCTION

The enclosed report presents a summary of the options reviewed for providing potable and non-potable water sources in support of the Master Plan Development for the new Park Master Plan within Hawaiian Paradise Park. The project site is located within TMK 1-5-039:267, which is bordered by Kaloli Drive to the north, 26th Avenue to the west and 25th Avenue to the east, within the Hawaiian Paradise Park subdivision. Copies of the current concept plans for the park are included in the Appendix as Exhibits A1 and A2.

The scope of this study is to perform an assessment of the following:

• Existing capacity and availability of municipal water in the vicinity of the park, and the design/construction effort required to convey the required supply of water to the park site for the projected ultimate demand of the park and, separately for the possible future expansion of municipal water distribution required to supply the Hawaiian Paradise Park subdivision.
• To assess the requirements for creating on-site storage and collection systems for potable and non-potable supply for consumption, restrooms, maintenance, irrigation, fire protection and other needs to be used either in conjunction with or in place of a municipal water supply.

The purpose of this study to determine preliminary costs and effort required to supply water for the park from various sources including expansion of the municipal water system to service the park; an on-site system of rainwater collection and storage for potable and non-potable uses; or a combination of municipal water for potable uses and rainwater collection/storage system for non-potable uses.

2.2 BACKGROUND INFORMATION

The County of Hawaii, Department of Parks and Recreation, has engaged SSFM International to develop a preliminary Master Plan for the park site. Although the master plan has not yet been finalized, it is anticipated that the park will include community recreation facilities such as:

• Multi-Purpose Soccer and Football Field
• Baseball/Softball field
• Community Center
• Covered play courts
• Children's Playground
• Maintenance Area
• Comfort Stations
• Concession Stands
• Tennis Courts
• Pickleball court
• Swimming pool

The project site is currently not serviced with a municipal water supply. As outlined above, potential options for meeting the demands of the park include an extension of the municipal water supply system to the project site, as well as development of an on-site rainwater collection system, or potentiality a combination of the two sources.

2.3 ANALYSIS

2.3.1 WATER DEMAND ESTIMATES

Domestic Demand
To determine an estimate of the water demands within the park, a number of criteria were reviewed. These include the County of Hawaii, Department of Water Supply (DWS) criteria as presented within the 2002 Water Systems Standard, and also the 2003 International Plumbing Code.

The County of Hawaii DWS standards were reviewed to estimate the average daily demand and determine the required fire flow based on the proposed land use and park designation. The following presents a summary of the DWS criteria and estimated flow rates for the proposed park, using the DWS criteria.

Table 3: ESTIMATED WATER DEMANDS WITH DWS CRITERIA

Zoning Designation	Average Daily Demand	Park Area	Average Day Demand	Maximum Day Demand	Peak Hour Demand
Schools, Parks	4000 gal/acre	20 acres	80,000 gal/day	120,000 gal/day	278 gpm

Although not specifically stated within the DWS criteria, it is our understanding that the estimated demand per acre for Schools and Parks includes a component for irrigation demands, and not strictly for potable water demands. To provide a separate estimate of the potable water component we have also included a summary of the County of Maui DWS criteria for Commercial/Residential Mix, which is based on the building area. Of note, the County of Hawaii DWS criteria does not include a unit flow rate based on floor area, thus the County of Maui criteria was used for comparison purposes. The following table presents a summary of the estimated potable water component using the design rate of 140 gal/1000 ft2 as per County of Maui criteria for Commercial/Residential Mix.

Table 4: ESTIMATED POTABLE WATER DEMAND USING FLOOR AREA

Building/Facility	Area (Ft^2)	Average Day Demand	Maximum Day Demand	Peak Hour Demand
Comfort Station	2400	336 gal/day	504 gal/day	1.17 gpm
Concession	2400	336 gal/day	504 gal/day	1.17 gpm
Community	7200	1008 gal/day	1512 gal/day	3.50 gpm
Maintenance	1250	175 gal/day	263 gal/day	0.61 gpm
Total		1855 gal/day	2783 gal/day	6.44 gpm

For comparison purposes, we have also prepared an estimate of the potable water demand based on a preliminary estimate of the fixture unit count and the International Plumbing Code (2003). The calculation sheets for the preliminary fixture unit counts are included in the Appendix, with a summary presented in the table below.

Table 5: SUMMARY OF PEAK DEMAND BASED ON ESTIMATED FIXTURE UNIT COUNTS

Facility/Location	Fixture Unit Count	Peak Flow Rate	Peak Demand
HPP Park -West	47.6	50 gpm	1500 gal/day
HPP -Pool/Court	45.4	48 gpm	1440 gal/day
HPP – Community Center	42.6	47 gpm	1410 gal/day
Total		**145 gpm**	**4350 gal/day**

Irrigation Demands

To include a separate component for the irrigation demand, we have estimated the amount of irrigation based on an average daily application rate of 3/10 inch over the areas to be irrigated. The irrigated areas are likely to vary depending upon the selected master plan, however we have based the extent of irrigated areas and average daily demands as presented in Table 6 below. In estimating the peak flow rate, we have assumed that the irrigation system would be operated over a 6-hour period.

Table 6: SUMMARY OF ESTIMATED DAILY IRRIGATION VOLUME

Facility	Area (ft^2)	Depth of Irrigation (ft)	Irrigation Volume (ft3)	Irrigation Volume (gal)	Peak Flow Rate (gpm)
Ball field	57,000	0.025	1425	10,660	30
Soccer Field	100,000	0.025	2500	18,701	52
Miscellaneous	87,120	0.025	2178	16,293	45
Total				**45,654 gal/day**	**127 gpm**

Combined Domestic and Irrigation Demands

The following table presents a summary of the estimated flow rates, based on the various criteria and options as presented in the above sections. The County of Hawaii, DWS demand multiplier of 1.5 has been applied to convert average day demand rates to maximum day demand rates, where applicable.

Table 7: COMPARISON OF WATER DEMAND ESTIMATES

	DWS Criteria			IPC and Irrigated Area Criteria		
	Total	Potable	Non-Potable	Potable	Irrigation	Total
Average Day	80,000	1743	78,257	2900	45,654	**48,554**
Maximum Day	120,000	2615	117,385	4350	68,481	**72,831**
Peak Hour	278	6.05	272	145	190	**335**

For the purposes of the concept design, the enclosed analysis has been based on the demand rates and volumes from the IPC and estimated irrigation rates as presented in the above table. Based on our review, these demand estimates would be more reflective for the new park development plan at Hawaiian Paradise Park. The increased potable water demands during peak hour may be more reflective of periodic events with heavy park usage, and a moderate reduction in total water demand is considered more appropriate for the climatic conditions near HPP with increased precipitation and corresponding reduction in irrigation demand.

Fire Flow Demand

The DWS standards do not contain a specific fire flow requirement for Parks or Community Centers as are anticipated within the proposed HPP Park. For the purposes of this study, the Land Use designation as Schools, Neighborhood Business, Small Shopping Centers, Hotels and High Rise Apartments within Table 100-19 of the DWS Water Systems Standards manual was selected as the applicable criteria. Under this designation, the required fire flow criteria is presented in the following table. Further coordination with the Hawaii Fire Department is recommended, as the planning and design process continues to evolve.

Table 8: SUMMARY OF FIRE FLOW REQUIREMENTS

Land Use	Fire Flow Rate	Required Duration	Volume	Hydrant Spacing
Schools, Neighborhood Business, Small Shopping Centers, Hotels and High Rise	2000 gpm	2 hours	240,000 gal	300 ft
Single Family (> 10,000 ft² lot size)	500 gpm	2	60,000 gal	600 ft

2.3.2 WATER SUPPLY OPTIONS

Extension of Municipal System

As noted above, the project site is not currently serviced by the Department of Water Supply (DWS) distribution system. The DWS has a 12-inch diameter watermain along Keaau-Pahoa Road (Highway 130), and also along Paradise Drive up to the existing volunteer fire station, at 20th Avenue. The nearest connection point to the existing water supply system for the HPP Park would be at the intersection of Kaloli Drive and Keaau-Pahoa Road.

In discussions with DWS representatives, they have indicated that there is currently availability and capacity within the existing 12-inch water line on Keaau-Pahoa Road to service the proposed park development. Permit approval from the Department of Transportation- Highways Divisin would be required for the watermain crossing, and the watermain along Kaloli Drive would need to be protected within a DWS right-of-way.

The DWS was not able to provide data on the available flow rates and residual pressures at the proposed point of connection. Flow testing of the existing hydrants, near the intersection of Keaau-Pahoa Road is recommended and the analysis can be verified once the results of the flow tests are available. For conceptual design purposes, the analysis of the proposed expansion has been estimated based on operating pressures in the range of 60 psi near the proposed connection point.

In order to provide municipal water to the proposed park, the system expansion would include the installation of a 12-inch diameter watermain on Kaloli Drive (approximately 4300

ft) and the installation of 1200 ft of 12-inch watermain on 25th Avenue, fronting the park site. The proposed expansion was modelled using the EPANET water model to estimate the available capacity, pressure losses, and maximum velocity.

The proposed watermain extensions are shown on Figure 4, and the results of the analysis are presented within the attached Appendix. Based on the preliminary analysis, the expansion of the municipal water system would be able to meet the peak hour demands of 335 gpm, with residual pressures in the range of 87 psi. Under fire flow demands of 2000 gpm, it is anticipated that the residual pressure would be in range of 56 psi, which meets the minimum pressure requirements of 20 psi in the DWS standards.

In addition to modeling the estimated water demands for the Park, the enclosed analysis also includes an estimate of the available capacity to service the nearby residential demands of the Hawaiian Paradise Park neighborhood. Based on the DWS standards, the maximum permissible velocity, without fire flow is 6 ft/s. With a 12-inch diameter pipe, and a peak velocity of 6 ft/s, this equates to a peak flow rate of 2,115 gpm. With a demand rate of 335 gpm for the Park, this leaves a remaining capacity of 1,780 gpm available for residential demand.

As outlined in the DWS design criteria, the Average Day Demand rate under the DWS Single Family Zoning Designation, is 400 gal/unit. With a demand factor of 5.0 x Average Day, this translates to a peak hour flow rate of 1.38gpm per residential unit. With an available capacity of 1,780 gpm the 12-inch diameter watermain, would be able to support approximately 1,290 single family units. Of note, the existing water-main on Keaau-Pahoa Road is also a 12-inch diameter line, and presently services a number of homes along Keaau-Pahoa Road. The total number of serviceable properties therefore will be reduced, depending upon the number of units currently serviced by the existing 12-inch waterline on Keaau-Pahoa Road. This should be confirmed during future design phases as the number of serviced units and maximum velocity begins to approach the maximum permissible values.

On-Site Catchment

As an alternative to an extension of the municipal water supply system, the Department of Parks and Recreation would also like to explore the feasibility of an on-site rainwater catchment system or a combination of municipal water supply and on-site catchment to meet the water requirements for the new park. The following section presents a summary of the water supply potential for a catchment system, based on the concept development plans for the Park.

There are a number of rain gages located in the vicinity of the project site. The nearest gage to the north is located approximately 4.9 miles north of the project site (Gage #513872). To the south, there is a rain gage located at 4.3 miles south-east of the project site (Gage #517457). Figure 5 depicts the rain gage locations relative to the project location.

Figure 4: Proposed DWS Water System Extension

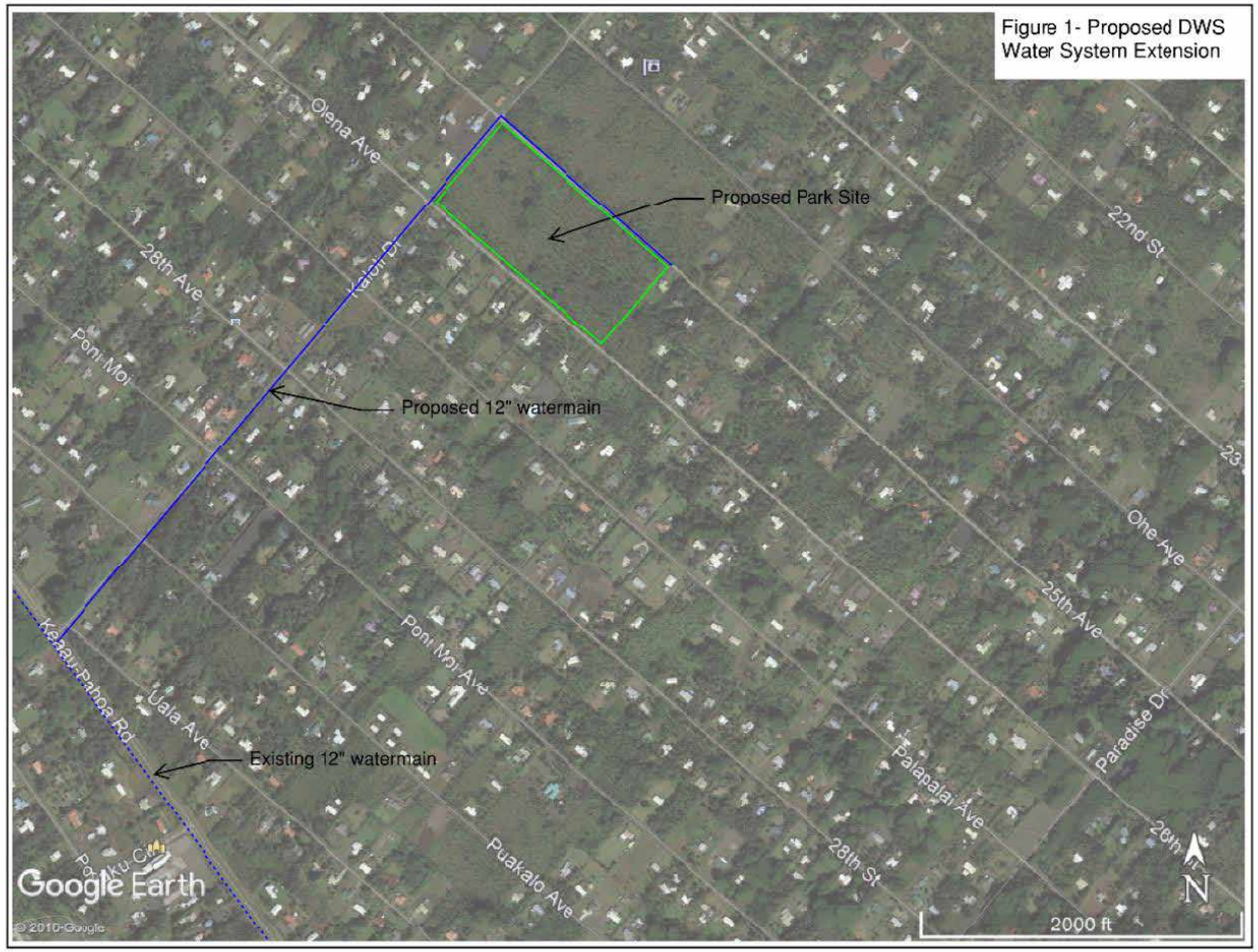


Figure 5: Existing Rain Gage Locations

Figure 6 shows the average daily precipitation (7-day running average) for the gage to the north of the project and Figure 7 shows the average daily precipitation for the gage located to the south of the project, near Pahoa. The rain gage near Keaau indicates an average daily precipitation in the range of 0.45 inches. The rain gage near Pahoa indicates an average daily precipitation slightly less than the Keaau rain gage, but still within the range of 0.4 inches per day. Therefore, for the enclosed catchment analysis we have used an average daily precipitation of 0.4 inches.

Figure 6: Average Daily Precipitation, Rainfall Gage 513872, Keaau

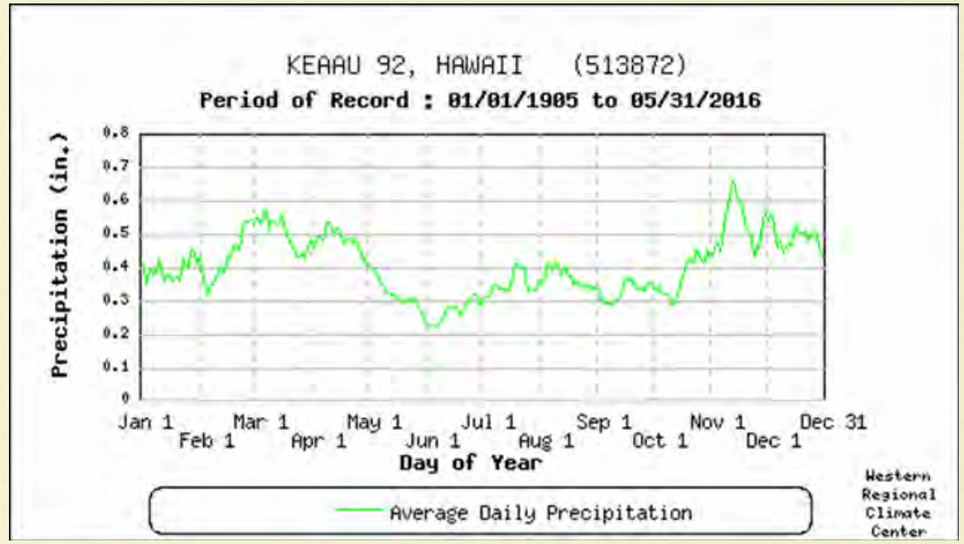
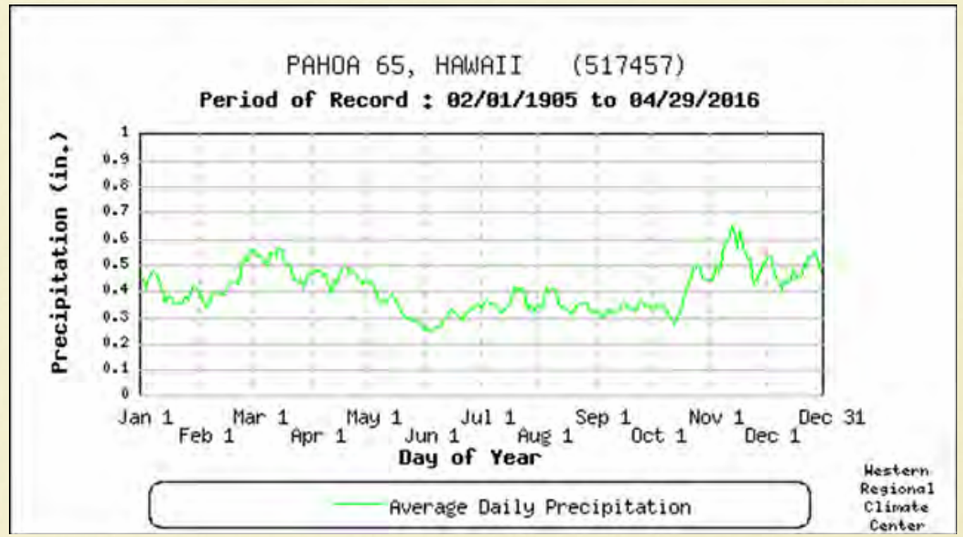


Figure 7: Average Daily Precipitation, Rainfall Gage 517457, Pahoa



The total roof area is likely to vary depending upon the selected development plan. For the purposes of the enclosed analysis, the available catchment area is based on the roof areas as shown in Table 9 below.

Table 9: ESTIMATE OF DAILY RAINWATER CATCHMENT VOLUME

Facility	Roof Area (ft^2)	Rainfall Depth (in)	Catchment (gal)	Losses (gal)	Net Volume (gal)
Covered Playcourt	21,000	0.4	5240	520	4720
Comfort Station	2400	0.4	600	60	540
Concession Stand	2400	0.4	600	60	540
Community Center	7200	0.4	1800	180	1620
Total	33,000		8240	820	7420

Based on the above table, the catchment system would be able yield an average of 7,400 gal/day, and over a one-week period would provide approximately 52,000 gal. The above rainwater catchment estimates include a 10% allowance for losses within the various components of the catchment systems. While this catchment volume would not meet the total irrigation demands for the playfields as estimated above, it may be used to supplement some smaller landscape features, or serve as an additional indoor water source.

2.3.3 WATER SOURCE CONSIDERATIONS

Municipal Water Supply

An extension of the municipal water supply system provides a number of advantages, compared to an on-site catchment system. Primarily, the advantages are related to the public safety issues and water quality standards that are associated with a public water supply system. The existing DWS water supply system utilizes proven ground-water sources, with certified operators to ensure that the supply, treatment, and delivery of potable water is in compliance with the Safe Drinking Water Regulations.

In addition, the DWS system is able to meet the domestic water demands and the required fire flow demands without the addition of on-site storage tanks or pumping facilities. The installation of additional fire hydrants along Kaloli Drive and 25th Avenue will also improve fire protection for the HPP area, with the installation of new and more accessible fire hydrants within the existing neighborhood. In addition to improved fire protection within the local community, the extension of the municipal water supply system will also provide a benefit to existing homes along Kaloli Drive, should they wish to connect to the municipal water system.

The disadvantage of the municipal water supply extension may include a reliance on the public water supply system and potential water restrictions that may be in place in the event that there is a water shortage or consumption restrictions are imposed. In addition, the Park would be responsible for the costs of water used on site, including potable water demand, and irrigation if the municipal system is used for irrigating the play fields.

As noted above, the extension of the municipal water system would include a connection to the existing waterline on Keaau-Pahoa Road at Kaloli Drive, and installation of a new water line along Kaloli Drive to the park site.

For the water supply options as presented above, we have prepared preliminary construction costs estimates to aid in assessing and comparing the available alternatives. The major items of work and preliminary costs associated with the municipal water supply extension have been summarized in the following table.

Table 10: ESTIMATED CONSTRUCTION COSTS, MUNICIPAL WATER SUPPLY

Item Description	Unit	Quantity	Unit Rate	Extension
Connect to Existing 12"	ea	1	$10,000	$10,000
12" Gate valves	ea	6	$5,000	$30,000
12" Watermain	lf	5500	$65	$357,500
Fire Hydrants	ea	10	$6,000	$60,000
Road Restoration (5ft wide)	yd^2	3060	$250	$765,000
Chlorination and Testing	ea	1	$15,000	$15,000
Traffic Control	LS	1	$75,000	$75,000
Subtotal				$1,312,500
Engineering				$131,250
Contingency (25%)				$328,125
Estimated Total				**$1,771,875**

In addition to the construction cost estimates, we have included an estimate for on-going operations and maintenance costs that would be associated with the various options. Within the option to connect to the municipal water supply system, the operational requirements and responsibility for water supply and treatment are largely with the DWS. As such, the costs and charges associated with the operations and maintenance are transferred into the purchase costs for the water. The calculations related to the water fees and charges are presented in the Appendix, and include $165,000 in Facilities Charges, plus an estimated monthly cost in the range of $2,060. It should be noted that the irrigation amount in each of the reviewed alternatives was limited to a maximum of 129,000 gal/month, to match the net amount that would be available using the catchment system as presented above.

This allowed for an equivalent cost comparison between the various options, even though the DWS connection would be able to provide more irrigation, but with an increased cost for water purchase.

The one-time charges and estimated monthly costs for the DWS water supply were converted to a Present Value amount to allow for a cost comparison between the various alternatives. The Present Value analysis was carried out using an annual 4% interest rate and a term of 20 years. The resulting Present Value using the DWS municipal water supply option is estimated to be $500,740 as outlined in the attached Appendix.

Based on the above, the total Present Value including the estimated construction costs and on-going operations and maintenance costs for the above option are estimated to be $2,272,615.

Rainwater Catchment System

Development of an on-site catchment system will require significant infrastructure investment, particularly if the intent is to provide potable water within the Park. The basic components of the system are anticipated to include:

- Collection piping
- Raw water storage tank
- Filtration equipment
- Disinfection equipment
- Treated water storage tank
- Distribution pump and pressure tank
- Firefighting storage tank
- Fire pump with backup drive

Since the new water source would provide potable water to a fairly extensive public population, it is possible that the water system would be designated as a Regulated Public Water System by the Department of Health, Safe Drinking Water Branch. As a Public Water System, the County may be required to provide a qualified Licensed Operator of the water system and ensure continued compliance with current regulations, including treatment, monitoring and sampling requirements.

The costs and risks associated with operating and maintaining the Public Water System can be significant, particularly considering the variability in the catchment raw water quality and parameters. The table below presents a summary of the main components, based on conceptual review, however the suitability of the treatment equipment cannot be verified until water samples are available for testing and validating with the proposed equipment. The minimum treatment options for potable indoor use are anticipated to include equipment such as;

- Pre-filtration and screening
- Cartridge filtration – 3 to 5 micron sediment filters, followed by 3 micron activated carbon filters
- Cartridge filtration – 1 micron Absolute filters
- Disinfection with chlorine to provide a residual of 0.2ppm

The major items of work and preliminary costs associated with the rainwater catchment system have been summarized in the following table.

Table 11: CONSTRUCTION COST ESTIMATE, CATCHMENT WATER SYSTEM (INDOOR POTABLE)

Item Description	Unit	Quantity	Unit Rate	Extension
Site Collection Piping	lf	2500	$50	$125,000
Raw Water Storage Tank	gal	50,000	$4.50	$225,000
Raw Water Pumps	LS	1	$200,000	$200,000
Water Treatment Building	LS	1	$50,000	$50,000
3 - Micron Pre-filters	LS	1	$20,000	$20,000
Activated Carbon Filters	LS	1	$25,000	$25,000
1- Micron Absolute Filters	LS	1	$35,000	$35,000
Chlorination System	LS	1	$45,000	$45,000
Treated Water Storage Tank	gal	10,000	$6.00	$60,000
Treated Water Pumping System	LS	1	$350,000	$350,000
Metering and On-line Monitoring	LS	1	$55,000	$55,000
Electrical/Controls	LS	1	$125,000	$125,000
Fire Storage Tank	gal	240,000	$3	$780,000
Fire Pump (2000gpm)	LS	1	$125,000	$125,000
Subtotal				$2,220,000
Engineering				$266,400
Contingency (25%)				$555,000
Estimated Total				**$3,041,400**

Similar to the municipal water supply option, we have included an allowance for on-going operations and maintenance costs that would be associated with the rain-water catchment options. Within the option to use the rainwater catchment system for potable water supply, the operational requirements and responsibility for water supply and treatment remain with the Department of Parks and Recreation (DPR). As such, the costs associated with the operations and maintenance of the treatment and distribution system also remain with the DPR. The estimated effort and costs related to the water supply system are presented in the Appendix, and include an estimated monthly cost in the range of $6,260.

The estimated monthly costs for the rainwater catchment system were converted to a Present Value amount to allow for a cost comparison between the various alternatives. The Present Value analysis was carried out using an annual 4% interest rate and a term of 20 years. The resulting Present Value using the on-site rainwater catchment option is estimated to be $1,020,500 as outlined in the attached Appendix.

Based on the above, the total Present Value including the estimated construction costs and on-going operations and maintenance costs for the above option are estimated to be $4,061,900.

Combined DWS Supply and Rainwater Catchment System
As an option to providing potable water with the on-site catchment system, the County may also consider using the on-site catchment source for non-potable water uses such as localized landscape and irrigated features and non-potable indoor uses such as flushing toilets and urinals. Water quality and its impact on public health is a primary concern with rainwater harvesting. Rainwater used for residential irrigation (small scale applications) does not typically require treatment. Larger, commercial applications and non-potable indoor uses require treatment but the type of use and raw water quality will determine the extent of treatment.

The benefits of providing a rainwater re-use system include;

- Providing an inexpensive source of water
- Augments drinking water supplies
- Reduces stormwater runoff and pollution
- Helps reduce peak summer demands

Within the HPP Park, the treatment requirements for using harvested rainwater will likely require some level of screening, and filtration to prevent particles and debris from traveling through the plumbing systems, as well as disinfection with Ultraviolet light (UV) or chlorination because of bacterial concerns.

The minimum treatment options for non-potable indoor use are anticipated to include equipment such as;

- Pre-filtration and screening
- Cartridge filtration – 5 to 10 micron sediment filter
- Disinfection with chorine to provide residual of 0.2ppm

The major items of work and preliminary costs associated with the rainwater catchment system have been summarized in the following table. It should be noted that the cost estimates do not include on-site piping or distribution of the water supply, as these are expected to be similar within each water supply option.

Table 11: CONSTRUCTION COST ESTIMATE, CATCHMENT WATER SYSTEM (INDOOR POTABLE)

Item Description	Unit	Quantity	Unit Rate	Extension
Site Collection Piping	lf	2500	$50	$125,000
Raw Water Storage Tank	gal	50,000	$4.50	$225,000
Raw Water Pumps	LS	1	$200,000	$200,000
Water Treatment Building	LS	1	$50,000	$50,000
3 - Micron Pre-filters	LS	1	$20,000	$20,000
Activated Carbon Filters	LS	1	$25,000	$25,000
1- Micron Absolute Filters	LS	1	$35,000	$35,000
Chlorination System	LS	1	$45,000	$45,000
Treated Water Storage Tank	gal	10,000	$6.00	$60,000
Treated Water Pumping System	LS	1	$350,000	$350,000
Metering and On-line Monitoring	LS	1	$55,000	$55,000
Electrical/Controls	LS	1	$125,000	$125,000
Fire Storage Tank	gal	240,000	$3	$780,000
Fire Pump (2000gpm)	LS	1	$125,000	$125,000
Subtotal				$2,220,000
Engineering				$266,400
Contingency (25%)				$555,000
Estimated Total				**$3,041,400**

Similar to the above water supply options, we have included an estimate for on-going operations and maintenance costs that would be associated with the combined municipal water supply and rainwater catchment option. Within the option to use the rain-water catchment system for water supply, the operational requirements and responsibility for water supply and treatment remain with the Department of Parks and Recreation (DPR). In considering the reduced level of treatment with the non-potable water supply, we have reduced the estimated level of effort and costs associated with operating and maintaining the rainwater collection system.

The estimated effort and costs related to the water supply system are presented in the Appendix, and include a combination of DWS charges for potable water supply and fire protection, plus an estimate of the operational costs for the rainwater catchment system. The costs include $27,500 in DWS Facilities Charges, and an estimated monthly cost in the range of $1,200 for potable water, plus an estimated monthly cost in the range of $2,750 for the operating the non-potable water system.

The estimated monthly costs for the rainwater catchment system were converted to a Present Value amount to allow for a cost comparison between the various alternatives. The Present Value analysis was carried out using an annual 4% interest rate and a term of 20 years. The resulting Present Value using the combined DWS municipal water supply and rainwater catchment system is estimated to be $670,940 as outlined in the attached Appendix.

Based on the above, the total Present Value including the estimated construction costs for the combined municipal system and rainwater catchment supply, plus the on-going operations and maintenance costs for the combined system are estimated to be $4,038,865.

2.4 CONCLUSION

As presented above, the County of Hawaii, Department of Parks and Recreation has several options available to provide a water source at the proposed recreation facility within Hawaiian Paradise Park.

The option to supply the new Park with an extension of the municipal water supply system is expected to include a connection to the existing system at the intersection of Keaau-Pahoa Road and Kaloli Drive and the installation of approximately 5500ft of 12-inch waterline. The

existing water system has available capacity to meet the potable water demands and the fire flow protection requirements for the proposed facilities within the Park. The concept-level estimates for the proposed waterline extension are estimated to be in the range of $ 1.77M. The Present Value analysis to include the initial construction costs plus the ongoing operations and maintenance costs is estimated to be $2.27M.

As an alternative to extending the municipal water system, the County also has the option to construct a rainwater catchment system. The project area receives a significant amount of rainfall, on a consistent basis, and is in a position to capitalize on the available precipitation amounts. The costs associated with collection and treatment of the catchment water however are substantial. In addition, if the water is to be treated to a potable water designation, the County will be required to provide a qualified and Licensed Operator, in conformance with the safe Drinking Water regulations. Based on the conceptual review as presented above, the construction costs for the rainwater catchment, storage and treatment systems are estimated to be in the range of $3.04M. The Present Value analysis to include the initial construction costs plus the ongoing operations and maintenance costs is estimated to be $4.06M.

The County also has the option to install a rainwater catchment system, with a lesser degree of treatment, for irrigation and non-potable indoor uses. This option, as presented above, includes a combination of the municipal water system extension for potable water and fire protection, plus a rainwater catchment system for non-potable uses. This option would reduce the amount of municipal water consumption on-site and help reduce the peak summer demands; however the additional capital costs for the catchment, treatment and pumping are significant. The concept level estimate for the non-potable catchment system is estimated to be in the range of $1.60M, and combined with the municipal water system extension, the total costs would be in the range of $3.37M. The Present Value analysis to include the initial construction costs plus the ongoing operations and maintenance costs is estimated to be $4.04M.

In considering the above alternatives, it is recommended that the Department of Parks and Recreation pursue the option to extend the municipal water supply system and service the planned recreational facilities with a County of Hawaii Department of Water Supply water source. The municipal water supply extension provides the greatest benefit for a safe and reliable water source, adequate fire protection for the proposed site and improving fire protection for the local community as well as the lower costs when considering initial construction and on-going operational costs.

3.0 ELECTRICAL SYSTEM

3.1 EXISTING CONDITIONS

The sole electric utility serving the Hawaii Island is Hawaii Electric Light Company (HELCO) which operates and is regulated under its tariff approved by the State Public Utilities Commission (PUC). Similarly, Hawaiian Telecom (HTCO) operates and is regulated under a tariff approved by the PUC and was the sole provider of telecommunications services until the advent of cable television. Subsequently, Charter Communications (Charter fka Oceanic Time Warner Cable), which is not regulated by the State PUC but is a franchisee of the Department of Commerce and Consumer Affairs (DCCA), has become a competitor to HTCO and, similar to HTCO, can offer broadband, cable television and telephone signals.

Under rights initiated during the Kingdom of Hawaii, in HELCO's case, and during the government of the Territory of Hawaii, in HTCO's case, the infrastructure of both these companies may occupy public rights-of-ways. If the utility companies are requested to provide service to multiple customers utilizing private rights-of-ways, grants of easement must be conveyed by the private property owners to allow the utility companies the right to access, install and maintain their facilities. The overhead facilities are typically jointly owned by the members of the joint pole committee which, on Hawaii Island consists of HELCO, HTCO, the County of Hawaii and the State Department of Transportation. Although Charter, under Hawaii Revised Statute Article 440, is treated similarly to a public utility, Charter must enter into a leasing agreement with HTCO to attach to overhead, joint pole facilities or apply to HELCO for permission to attach to poles where HTCO does not have joint ownership.

HELCO's, HTCO's, and Charter's existing facilities serving the Hawaiian Paradise Park Subdivision consist of aerial cables attached to joint overhead pole lines along most of the privately owned roadways.

3.2 PROJECTED ELECTRICAL POWER AND TELECOMMUNICATIONS DEMANDS

The total anticipated electrical connected load is 500 kVA and the anticipated peak demand load is 300 kVA and is based on the projected loads at full build-out of the new park.

Based on current technologies, both HTCO and Charter would likely provide service to this project via fiber optic cable pairs which would be terminated at hub equipment. The County would determine whether service from one or both telecommunications companies are required for the Park facilities.

3.3 IMPACTS AND MITIGATION

An inquiry has been directed to HELCO as to whether their existing overhead distribution system has sufficient capacity to serve the proposed park but a response has not been received. The worst case scenario is that HELCO would need to upgrade its existing Hawaiian Paradise Park substation transformer, currently rated at 7.5 MVA, and re-conductor portions of their overhead distribution system in order to support the Park load. If the worst case scenario requires implementation, discussions between the County and HELCO would need to be held to determine whether the County would bear any cost for these off-site improvements.

Both HTCO and Charter have indicated that they would be able to provide service to the proposed new park, if necessary, by reinforcing their existing aerial facilities with additional fiber optic strands.

3.4 PROPOSED ELECTRICAL AND TELECOMMUNICATIONS SYSTEM

Off-site Electrical:
This is currently indeterminate. See the first paragraph of 3.3 Impacts and Mitigation

On-site Electrical and Telecommunications:
The on-site electric and telecommunications systems would consist of concrete encased, PVC conduits, typically installed within a common trench and located, where feasible, under the park roadways and walkways, where feasible. Handholes would be placed periodically to serve as pulling points for the utility cables and to connect to HELCO distribution transformers for service to the Park buildings and outdoor facilities. The anticipated duct complement for the main infrastructure would consist of 2-4" conduits for HELCO, a 4" conduit each for HTCO and Charter.
In addition to HELCO transformer pads within the Park, HTCO and Charter may request hub equipment sites which are approximately 8' x 8' in size.

Area Lighting:
Illumination for Park roadways, parking lots, walkways, playcourts and lighted fields will be designed to meet Illuminating Engineering Society (IES) RP- 6 Sports and Recreational Lighting criteria. Luminaires selected will be specified to conform to the Hawaii County Code Chapter 14, Article 9 Outdoor Lighting and be designed to minimize glare and provide illumination levels in conformance with the above stated criteria.

3.5 ALTERNATE ENERGY

Currently there are three (3) programs that allow for an alternate energy system, in this case the system under consideration is a photovoltaic or PV system, to be connected to a facility or building that also has a HELCO electric service: 1) the Standard Interconnect Agreement; 2) the Customer Grid Supply + (CGS+) program; and 3) the Smart Export program. It should be noted that for the latter two programs, both offer some compensation, roughly 30% of the actual cost of electricity, for the surplus electricity generated by the PV system but both programs also have maximum subscription capacities, which by the time the project is designed and constructed, may be reached. Other programs that were previously offered such as Net Energy Metering and Feed-in Tariff are fully subscribed and not accepting new applications. A fourth option is the off-grid option under which the PV system would be the sole source of power to the building or facility.

Standard Interconnect Agreement (SIA):
The SIA is required for all alternate energy facilities that are proposed to be interconnected with HELCO's system, regardless of any complementary programs such as CGS+ or Smart Export that may be executed in parallel with this agreement. As part of the agreement, technical data about the proposed components of the alternate energy facility are submitted for review and approval by HELCO.

Under the SIA, the maximum size of the PV system is limited to the anticipated maximum daytime peak demand load of the building or facility so that very little if any power is fed back into HELCO's system. HELCO pays no compensation for any power that might inadvertently be fed onto their system.

Customer Grid Supply + (CGS+) Program:
In addition to completing the SIA, the CGS+ would allow for excess power from the PV system to be fed back onto HELCO's system during the day for which HELCO would credit the customer roughly 10.55 cents per kilowatt-hour (kWhr). In order to qualify for this program, HELCO would require advanced technology inverters and a communication connection so that HELCO could curtail the inflow of power from the PV system, if required.

Smart Export Program:
In addition to completing the SIA, Smart Export would allow for excess power from the PV system to be fed back onto HELCO's system for compensation only between 4 P.M. (1600) and 9:00 AM (0900). If power from the PV system is fed back onto HELCO's system after 9:00 AM and before 4:00 P.M. there is no compensation. This program requires, therefore, the installation of battery storage with the intention that between the hours of 9:00 A.M. and 4:00 P.M., the PV system would be used to re-charge the batteries and off-set power consumption by the building or facility. In the late afternoon, the charged batteries would be used to off-set power consumption and, if spare power is available, export to HELCO's system. The compensation offered for under this program is 11 cents per kWhr.

Off-Grid:
Since the Park facilities would be open at night and field lighting and parking lot lighting is being included in the master plan, the PV system in an off-grid application would need to include battery storage and would need to be sized to support the peak nighttime demand load. If inclement weather limits the ability of the PV system to charge the storage batteries during the day, most if not all of the Park facilities would not be usable at night.

Roof-Top Only PV System (based on Master Plan Buildings):
At full build-out, there will be approximately 51,000 square feet (sf) of gross roof space. The net roof space available for PV system installation is more likely to be 80% of this or approximately 40,000 sf. which would, at 250 kW per acre, accommodate a 230 kW PV system. The budget cost for such a system, without battery storage, would be $600,000. A 230 kW lithium-ion battery storage system would add approximately $2,860,000 to the budget.

Net-Zero PV System:
To off-set the entire anticipated 300 kVA peak demand load, which will likely occur at night

when the field, parking lot and walkway lighting will be in use, a total of 54,000 sf is required for the Net-Zero PV system. The budget cost for a Net Zero system, without battery storage, would be $750,000. A 300 kW lithium-ion battery storage system would add approximately $3,750,000 to the budget.

Daytime Off-Set PV System:
To off-set the daytime peak demand load which is anticipated to be 125 kW and includes the covered playcourt, community center, pool building and concession stand, the budget cost for a 125 kW PV system would be $320,000.

4.0 LANDSCAPE

4.1 INTRODUCTION

4.1.1 PROJECT DESCRIPTION AND OVERALL LANDSCAPE DESIGN

The HPP New Park is envisioned as a neighborhood park designed to serve the recreational needs of the diverse population of Hawaiian Paradise Park and the surrounding area, a region with a notable lack of services including recreation facilities. The twenty acre site located on Kaloli Drive between 25th and 26th Avenue is situated in a residential neighborhood of agricultural zoned one acre lots on its western, southern and eastern boundaries. On its northern boundary across 25th Avenue there is another twenty acre site intended for commercial development.

Through a series of community meetings, a range of recreational activities were identified and prioritized by community members and the County of Hawaii Parks & Recreation department staff. Guidance was provided by department staff to house programs, activities, administrative and operational needs.

Active recreation elements include a youth baseball/softball field; a football/ soccer field; covered play courts; a swimming pool; a skateboard park; playground for children ages 0-5 years and 5-12 years; tennis and pickle ball courts and exercise stations on a pedestrian path circuit. A community center with offices, meeting rooms and storage is also included for community services. Passive recreation needs are provided for by plaza spaces, picnic locations, a dog park, pedestrian paths and open lawn areas. Other supporting facilities include public parking with access roads, concession and comfort stations and a maintenance building and yard.

These various program elements are sited to maximize the proximity and r elationships between compatible activities and minimize less compatible activities and avoid conflicts. For example, the central parking scheme with curved access road brings both vehicles and pedestrians onto the site at safe controlled speeds then allows them easy and direct access including for the disabled to the desired activities. Pedestrian and vehicular circulation are clearly delineated to create safe interaction and multiple routes through the park. The park design also responds to the surrounding context of existing residences and the future potential of commercial development across 25th Avenue. The more active and higher volume activities such as football/soccer, youth baseball and softball are located on the Kaloli Drive end of the park. As one moves from that eastern end to the west side, the park's activities become less active, lower in volume and more passive. The pedestrian entrances, covered play courts, swimming pool complex and the skate park on the 25th Avenue frontage anticipate and invite people to move freely between the park and the future commercial development site. A strong landscape buffer along the east end of the park minimizes impact on the adjacent home(s) next door while along the Kaloli Drive and the western ends of the 25th and 26th Avenue frontages a landscape buffer deters vehicles from parking on the road shoulders and could potentially serve a bio-filtration purpose.

Storm water runoff will be handled by sensitive grading and drainage through a system of drywells and grassed detention basins and swales throughout the landscape. To the greatest degree possible the generation and conveyance of storm water runoff from ball fields, lawn areas and paved surfaces will be minimized and infiltrated into the landscape at grassed swales, retention/bio-filtration basins and drywells. Sub-surface drainage for parking lots, athletic fields and other areas should be evaluated in future design development in conjunction with geotechnical investigation. These storm water best management practices will be sized to accommodate the local area's precipitation and will be integrated into park grading and overall aesthetic character.

4.1.2 REFERENCE DOCUMENTS

1. Plants for Tropical Landscapes, Rauch, F., & Weissich, P., University of Hawai'i Press, 2000.
2. The Watersmart Garden, Rauch, F., & Weissich, P., University of Hawai'i Press, 2014.
3. A Native Hawaiian Garden. Culliney, J. L., and Koebee, B. P., University of Hawaii Press, 1999.
4. Hawai`i's Native Plants, Bohm, B. A., Mutual Publishing, 2004
5. Hawaiian Heritage Plants, Kepler, A. K., University of Hawai`i Press, 1998.
6. Plants and Flowers of Hawai`i, Sohmer, S. H., Gustufson, R., University of Hawaii Press, 1989.
7. In Gardens of Hawai'i, Marie C. Neal , Bishop Museum Press, 1965 Giambelluca TW, Chen Q, Frazier AG, Price JP, Chen Y-L, Chu P-S, Eischeid J., and Delparte, D. 2011.
8. The Rainfall Atlas of Hawai'i. http://rainfall.geography.hawaii.edu

4.1.3 CODES AND STANDARDS

1. Hawaii County Code Chapter 25 Zoning Code Landscape Requirements
2. Hawaii County Planning Department Rules of Practice and Procedure; Rule 17 Landscaping Requirements
3. Puna Community Development Plan, Chapter 3.5 Parks and Recreation

4.2 LANDSCAPE DESIGN

4.2.1 IRRIGATION SYSTEM

By applying a bioregional landscape approach to the park's landscape and maintenance, the landscape's planting shall not require permanent automatic landscape irrigation. The Park's Department low maintenance directive of a minimal plant palette of trees, select groundcover and mainly lawn combined with the region's abundant rainfall results in no need for a permanent automatic irrigation system for the park's planting. The area's annual rainfall should provide sufficient monthly rainfall to support the plantings once established. Mean annual rainfall of the area is approximately 138 inches with monthly precipitation ranging from 9 inches in June, the driest month to a high of 16.5 inches in November.

Temporary irrigation will be required for establishment of all planting during a recommended 180 day maintenance period. Upon the approval of the established landscape the contractor will turn over the maintenance to the Parks Department.

4.2.2 LANDSCAPE PLANTING

Perimeter Zone

The park site is fronted by existing streets – Kaloli Drive on the west or mauka edge, 25th Avenue on the north and 26th Avenue on the south. The remaining east edge borders the adjacent residential agricultural zoned lot. This perimeter area along the existing roads contains an unpaved shoulder from the existing road edges to the outer edge of the paved perimeter path which circumscribes the park on the three street frontages. Part of this perimeter zone outside of the Park parcel is in the road right-of-way and is NOT included as part of the Park project. However, this edge and any street improvements should be coordinated with the design of the park to integrate curbs or not, vehicle deterrents and landscape – to maximize the park design with the surrounding streetscape and potential future commercial center.

The current park design includes a landscape buffer strip that serves as a vehicle deterrent to prevent vehicles from parking along portions of the street frontages. This portion of the perimeter includes the area between the park parcel boundary and outer edge of the paved perimeter path along the Kaloli Drive, and the western ends of the 25th and 26th Avenue frontages. This perimeter zone contains a line of regularly spaced street trees that frame the park and an understory of approximately one half lawn and one half crushed on-site lava rock used as a xeriscape vehicle barrier. This lava rock groundcover layer will range from 4 inches to 16 inches in diameter laid on top of a landscape weed fabric. The lava rock treatment can potentially serve as a bio-filtration device if designed as part of a swale. Another option would be to have this rock treatment on a berm to enhance the vehicular deterrent and pedestrian separation function. The line of trees will consist of two to three-different species for biodiversity, pest and disease resilience; and will be limbed up to provide clear views into and out from the park for visual surveillance and security. These trees will provide physical and psychological separation between the street and perimeter path while shading the perimeter path. The perimeter zones along the eastern ends of 25th and 26th Avenues south of the park access roads will consist of the regularly spaced trees and lawn understory only. Planting along the east edge of the park will consist of more irregularly spaced groupings of trees and shrubs to visually screen the park from the adjacent residential lot.

Parking Lot Planting

The planting within central parking area will consist of the required trees per Hawaii County Code chapter 25 and Rule 17 Landscaping Requirements for buffering, screening, moderating visual impacts and microclimate of expansive parking lots by providing shade, air quality, storm water runoff management and carbon sequestration. The ground plane under trees and within interior parking islands and medians will consists of a combination of lawn, paving, gravel mulch and, to a lesser degree, shrubs and groundcover.

It is important to note that in the parking lot especially within the interior islands and medians, trees should be provided with the greatest amount of soil volume possible to ensure the trees long term health and viability and to avoid root damage to paving and curbs. In these limited spaces, trees are surrounded by pavement, temperature build up, glare and higher volumes of storm water runoff with contaminants and thus are subject to significant stress. In this relatively young geologic area, dense basalt "Blue Rock" is often shallow and can be impermeable. Specifications will typically call for the "Blue Rock"

subgrade to be ripped and thus fractured, topped with a transition layer of crushed rock with fines and then planting soil mix placed atop that. A minimum of 3 feet depth of planting soil mix is recommended in these interior planter areas (medians and islands) to provide adequate soil volumes for the trees' roots. The soil volumes in these areas will be as continuous as possible according to best urban forestry practices. It is important to note that the recommended planting soil depths are a critical component of an integrated system with the underlying ripped, crushed, graded and compacted lava rock subgrade. This system of subgrade, planting soil and planting ensures subsurface drainage, filtration of storm water runoff, health of the landscape planting and all the associated ecological services that planting provides while also helping to minimize damage to paving, curbs and other hardscape infrastructure. Providing these soil volumes also help minimize the potential for pavement damage by tree roots by encouraging deeper rooting. Trees will be selected for less aggressive root growth, ability to thrive in these urban conditions, pest and disease resistance. Additionally, root barriers will be installed to avoid pavement damage.

Turf Grass Zone

The majority of the park will consist of turf grass as the predominant landscape surface. Turf grass is one of the few plant species capable of withstanding active play and heavy foot traffic. However it is also among the most water consumptive, high maintenance and nutrient needy plant species used in the built environment. To ensure the health of turf grass it is critical to provide for sufficient volume of healthy soil to ensure the turf grass roots are deep rooted to draw required nutrients and water particularly important during drier drought conditions. Again, the site's subgrade will be ripped, crushed, graded and compacted lava rock. Accordingly, a minimum 12 inches compacted depth of planting soil mix for all turf grass planting is recommended. While costing more initially, by providing this depth of soil versus the more typical 4 to 6 inches of soil depth the turf grass will be more resilient to dry periods and likely to cost less in maintenance and lawn restoration/replacement in the long term. And since no permanent irrigation is planned this will be even more important.

At the baseball/softball and football/soccer fields the planting soil mix will be a sandy planting soil mix to ensure proper drainage to support the high intensity athletic use. The remainder of the turf grass areas will have a well-drained loamy/cinder planting soil mix.

Selection of appropriate warm-season species/cultivar/varieties of turf grass is critical to ensure that the lawn will serve its intended function as a durable recreational ground surface. The grass specie(s) ideally will be easy and quick to establish; adaptable to shade (as trees grow and buildings cast their shadows); somewhat salt tolerant (the park is inland but still relatively close to the coastal zone); drought tolerant (especially since no permanent irrigation is planned); low maintenance; and durable. The grass species needs to be both resistant to high intensity use (especially the athletic play fields) and quick to recover from that wear. Lower maintenance lawn is a prime consideration to the Parks department staff. Lawn grass species that can go longer periods of time between mowing; require less nitrogen fertilizer, thatching, aeration, top dressing and other turf management practices; and are less prone to pests and disease shall be selected. Single species or blends of grass seed/stolon may be selected. Several grass species that meet these requirements are listed in the following plant palette.

A variety of trees are strategically located throughout this turf grass zone to create space, accentuate entries, delineate park zones and circulation routes, and human comfort by providing shade and aesthetic character. Planting of shrubs and groundcover have been kept at a minimum to comply with the park's department's maintenance ability and capacity.

Bioswale/Storm Water Retention Zone

Throughout the park storm water runoff will be ideally be captured, minimally conveyed, filtered and infiltrated back into the earth. Refer to the civil section for more details on this storm water management approach. Most of these functions will occur within the park landscape through swales, berms, retention and detention basins. With the exception of possible storm water facilities (i.e. swales and detention basins) clad in lava rock ground-cover the majority of the storm water management facilities will occur in turf grass areas for ease of maintenance by Park's staff. Turf grass will slow the movement of storm water and partially filter sediment. Trees throughout the park will also serve to help management storm water by dissipating energy of heavy rain, reducing soil erosion as well as reducing runoff through evapotranspiration.

For all landscape planting, it is assumed that planting soil mixes will be imported to the site

as it is not anticipated that there are significant on-site soil to be stockpiled after clearing and grubbing. These imported planting soil mixes shall be analyzed at a qualified soil laboratory and recommendations for soil amendments including but not limited to lime, major, minor and micronutrients, and organic matter shall be incorporated before installation. Mulching with wood chips and/or gravel will be required for all tree and shrub/groundcover planting areas.

Proposed Plant Palette

The landscape plant palette for HPP New Park consists of appropriate native Hawaiian and other species adapted to the Puna region. Native Hawaiian plants are plants that migrated to Hawaii by natural processes such as wind, transported by birds or by riding ocean currents. These plants are considered indigenous, native to Hawaii and other places they are established in. Over time these indigenous plants evolve and adapt becoming distinct from their original ancestors. Such plants are considered endemic to Hawaii, meaning they are unique to Hawaii and found no-where else. Indigenous and endemic plants require less water, fertilizer, herbicides, and pesticides to remain healthy in our local environs as they have evolved here. The following plant palette consisting of mostly indigenous and endemic plants contributes to restoring an authentic landscape character and regional sense of place. And, it will also be much less costly for the Park's department and interested community volunteers to maintain in comparison to conventional tropical ornamental landscapes.

The following recommended plants are labeled (I) for indigenous, (E) for endemic or (P) for Polynesian-introduced species.

Large Trees

True Kamani (P)	Calophyllum inophyllum
Narra	Pterocarpus indicus
Neem	Azadirachta indica
Pak Lan	Michelia x alba
Gold tree	Tabebuia donnell-smithii
Royal Poinciana	Delonix regia

Medium Trees

False Olive	Elaeodendron orientale
Hala (I), (P)	Pandanus tectorius
Kou (I), (P)	Cordia subcordata
Kukui (P)	Aleurites moluccana
Lonomea (E)	Sapindus oahuensis
Milo (P)	Thepesia populnea
ʻŌhiʻa Lehua (E)	Metrosideros polymorpha
Singapore Plumeria	Plumeria obtuse
Tulipwood	Harpullia pendula

Small Trees

Dwarf Hau (I)	Hibiscus tiliaceus
Hao (E)	Rauvolfia sandwicensis
White Tecoma	Tabebuia berteroi

Palms

Loulu Palm (E)	Pritchardia spp.

Large/Medium Shrubs

ʻAʻaliʻI (I)	Dodonaea viscosa
Alaheʻe (I)	Psydrax odorata
Kokiʻo (E)	Hibiscus kokio ʼSt. Johnianusʼ
Kokiʻo ʻula (E)	Hibiscus clayi
Naio (I)	Myoporum sandwicense
Nānū (E)	Gardenia brighamii
Naupaka (I)	Scaevola sericea
Kokiʻo keʻokeʻo (E)	Hibiscus arnottianus
Ti (P)	Cordyline fruticosa

Groundcovers

ʻĀkia (E) bi	Wikstroemia uva-ursi
ʻAkoko (E)	Chamaesyce celasroides
Kupukupu Fern (I)	Nephrolepis cordifolia
Naio papa (I)	Myoporum sandwicense

Nanea (I)	Vigna marina
O‘ahu Sedge (E)	Carex wahuensis
Pōhinahina (I)	Vitex rotundifolia
‘Uki‘uki (I)	Dianella sandwicensis
‘Ūlei (I)	Osteomeles anthyllidifolia

Grasses

Bermudagrass	Cynodon Dactylon (common and improved selections)
Seashore Paspalum	Paspalum vaginatum
St. Augustinegrass	Stenotaphrum secumdatum
Centipedegrass	Eremochloa ophiuroides
Carpetgrass	Axonopus affinis

4.2.3 SITE FURNISHINGS

Figure 8: Site Furnishing Examples

5.0 Architectural

5.1 Preliminary Code Analysis

Community Center
Occupancy Group = A3, (IBC 2006 section 302)
Construction Type = II-B without sprinklers
Stories = 2, (IBC 55', Zoning 45').
Allowable Area = 9,500 square feet, (IBC 2006 Table 503)
Area Modification = Aa = 9,500 + 7,125 + 9,500 = 36,125 square feet, were I_f = .75 and all buildings are setback 60' from all other buildings and 30' from the property lines.

Occupant Load, (IBC 2006 table 1004.1.1)
Assembly without fixed seating, Unconcentrated = 1/15 square feet of net area.
15 x 299 occupants = 4,485 square feet.
67' x 67' = 4,485 gross square feet.
Assembly without fixed seating, Concentrated = 1/7 square feet of net area.
7 x 299 occupants = 2,093 square feet.
46' x 46' = 2,093 gross square feet.
(The square footage does not include Accessory Uses, storage, restrooms or offices.)
(We need more information on the requirements for Emergency Shelters).
(Suggest we request County Building and Fire input on acceptable load factor).

Automatic Sprinkler System:
Not required in A3 occupancy if building is less than 12,000 square feet, or the occupant load is less than 300, or if floor level is at exit discharge level.

Manual Alarm:
Not required for less than 300 occupants.

Parking:
For Meeting Facilities = 1/75 square feet.
4,485sf/75 = 60 spaces. (5 bicycle spaces = 1 parking space).
30% can be compact spaces.
(3) Handicapped parking spaces required.
Loading space not required when less than 5,000 square feet of building area.

Covered Playcourt
Occupancy Group = A4, (IBC 2006 section 302)

Construction Type = II-B with sprinklers
Stories = 2, (IBC 55', Zoning 45').
Allowable Area = 9,500 square feet, (IBC 2006 Table 503)
Area Modification = Aa = 9,500 + 7,125 + 9,500 = 36,125 square feet, were I_f = .75 and all buildings are setback 60' from all other buildings and 30' from the property lines.
Sprinkler System Increase = 3 x 9,500sf = 28,500 square feet.

Occupant Load, (IBC 2006 table 1004.1.1)
Assembly with Fixed Seating, Unconcentrated = 1/15 square feet of net area.
15 x 1,133 occupants = 17,000 square feet.
130' x 130' = 17,000 gross square feet.
Assembly without fixed seating, Concentrated = 1/7 square feet of net area.
7 x 2,428 occupants = 17,000 square feet.
(The square footage does not include Accessory Uses, storage, restrooms or offices.)
(Suggest we request County Building and Fire input on acceptable load factor)
(We need to know bleacher capacity. Requires 18" of bench length per person).

Automatic Sprinkler System:
Is required in A4 occupancy if the building is over than 12,000 square feet, or the occupant load is over than 300. (IBC 2006 section 903.2.1.4)

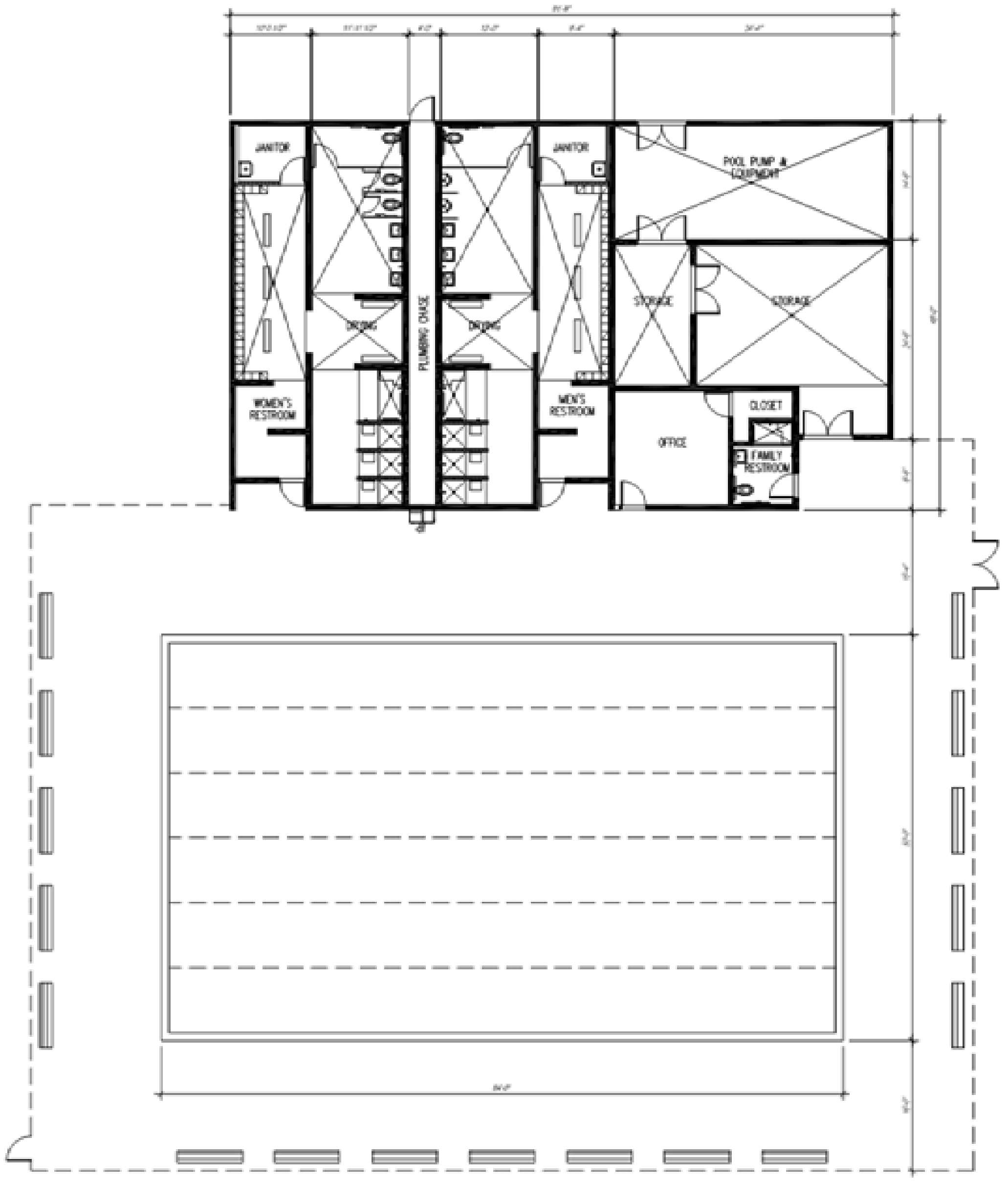
Manual Alarm:
Is required for more than 300 occupants. (IBC 2006 section 907.2.1)

Parking:
For "Park Area" to be determined by the Director, per zoning 25-4-51, (17).
For Major Outdoor Recreation Facility = 1/200 square feet of gross area plus 3 per court.
17,000sf/200 = 85 + 6 spaces = 91 spaces. (5 bicycle spaces = 1 parking space).
30% can be compact spaces.

(4) Handicapped parking spaces required.
Loading space required when more than 5,000 square feet of building area.
(2) Loading spaces required

NOTES
Assumed Maximum Occupancy = less than 300 for Community Hall to not trigger Emergency Shelter requirements.
Assume covered play courts 100’ x 100’ plus bleacher and Accessory areas. = +10,000 + 7,000 = 17,000 square feet.
Assumed (2) volleyball, (2) tennis courts and (2) basketball courts in covered structure.
Combined Parking count = 60 + 91 = 151 + Director’s count for “Park Area”. (Zoning 25-4-51), approximately a 60’ x 680’ parking area for 151 spaces. Plus (2) Loading Zones, (1) 12’x50’ and (1) 10’x22’.

Plot Date: March 12, 2018



3 POOL BUILDING FLOOR PLAN
SCALE: 1/8" = 1'-0"

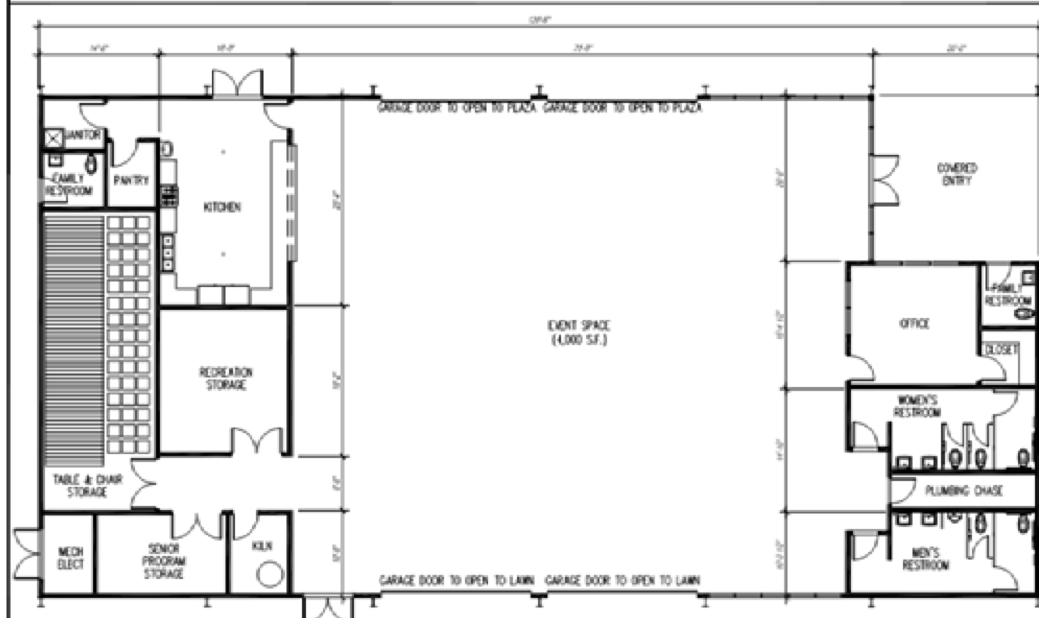
NORTH

0 4' 8'
SCALE IN FEET

1 CONCESSION & COMFORT STATION FLOOR PLAN
SCALE: 1/8" = 1'-0"

NORTH

0 4' 8'
SCALE IN FEET



2 COMMUNITY BUILDING FLOOR PLAN
SCALE: 1/8" = 1'-0"

NORTH

0 4' 8'
SCALE IN FEET

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FLEMING & Associates, LLC
557 MANONO STREET
HILO, HAWAII

CONSULTANT:

HPP NEW PARK MASTER PLAN
—
KALOLOI AVENUE
KEAAU, HAWAII 96749
(3) 1-5-039:267

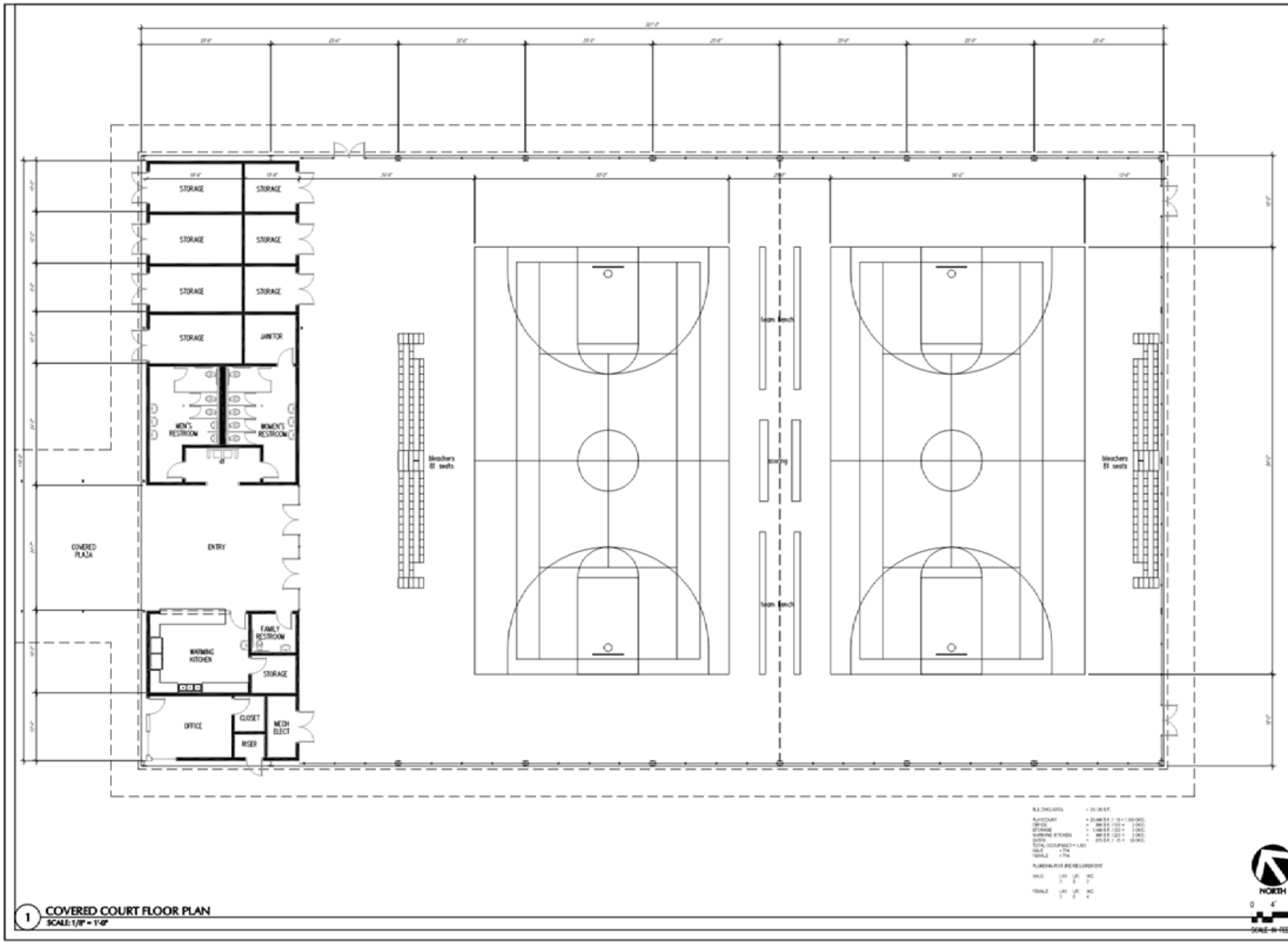
REVISIONS:

PROJECT NO.: 17036.00
PROJECT ARCH.: FLA
PROJECT PLANS: —

SHEET CONTENTS:
HPP CONCESSIONS, COMMUNITY & POOL BUILDING FLOOR PLAN

DATE: MARCH 11, 2018

SHEET:
A - 2



1 COVERED COURT FLOOR PLAN
SCALE: 1/8" = 1'-0"

Plot Date: March 12, 2018

S:\PRODUCTION\Projects\17036.00 HPP New Park Master Plan\3.00 Design\3.01 Basis of Design\3.01.0 FLA - Sheet Set\17036 HPP CPC FP.dwg

FLEMING & Associates, LLC
937 MAKAONO STREET
HILO, HAWAII

LICENSED PROFESSIONAL ARCHITECT
No. 11481
HAWAII, U.S.A.

NUM	DESCRIPTION	Value

CONSULTANT:

HPP NEW PARK MASTER PLAN

KALOLOI AVENUE
KEAAU, HAWAII 96749
(3) 1-5-039:267

REVISIONS:

PROJECT NO.:17036.00
PROJECT ARCH.: FLA
PROJECT PLANS: —

SHEET CONTENTS:
COVERED COURT FLOOR PLAN

DATE: MARCH 13, 2018

SHEET:
A-1

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT
SCALE: 1 IN = 120 FT

PRELIMINARY ALTERNATIVE
DRAFT v1

Exhibit A1

APPENDIX A: WATER SERVICING EXHIBITS AND CALCULATIONS

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT
SCALE: 1 IN = 120 FT

PRELIMINARY ALTERNATIVE
DRAFT v1

Exhibit A1

COUNTY OF HAWAII
DEPARTMENT OF PARKS & RECREATION
HPP NEW PARK MASTER PLAN

0 60 120 240 FT
SCALE: 1 IN = 120 FT

PRELIMINARY ALTERNATIVE
DRAFT v1

Exhibit A2

FIXTURE UNIT SUMMARY
HPP PARK - WEST
TMK: 1-5-039:267 COUNTY OF HAWAII, DEPARTMENT OF PARKS AND RECREATION

FIXTURE TYPE	NO. OF FIXTURES	F.U. PER FIXTURE	TOTAL F.U.
General Public Use			
Water Closet, Flush Valve	7	3.5	24.5
Urinal	2	2.8	5.6
Lavatory	6	1	6
Drinking Fountain	6	0.5	3
Service Sink/Mop Sink	1	3	3
Hose Bibb	1	2.5	2.5
Hose Bibb, each additional	3	1	3
		TOTAL	47.6

PEAK FLOW REQUIREMENTS FOR NEW WATER METER

	Fixture Units (FU)	Gallons Per Minute (GPM)	Gallons Per Day (GPD)
Domestic - Peak Public Demand	47.6	50	1500

FIXTURE UNIT SUMMARY
HPP PARK - POOL/COURT
TMK: 1-5-039:267 COUNTY OF HAWAII, DEPARTMENT OF PARKS AND RECREATION

FIXTURE TYPE	NO. OF FIXTURES	F.U. PER FIXTURE	TOTAL F.U.
General Public Use			
Water Closet, Flush Valve	7	3.5	24.5
Urinal	3	2.8	8.4
Lavatory	8	1	8
Drinking Fountain	4	0.5	2
Service Sink/Mop Sink	1	3	
Hose Bibb	1	2.5	2.5
Hose Bibb, each additional		1	0
		TOTAL	45.4

PEAK FLOW REQUIREMENTS FOR NEW WATER METER

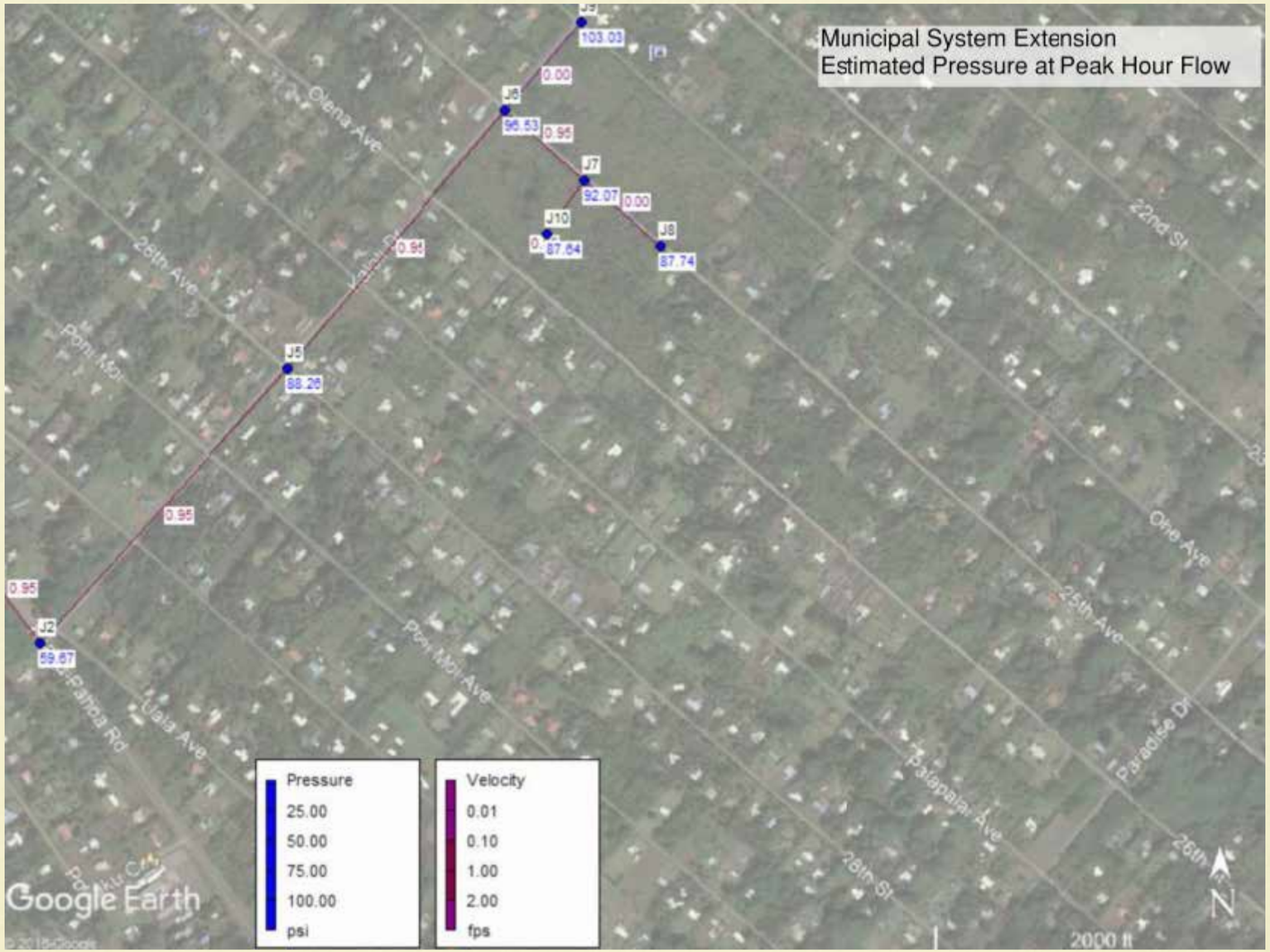
	Fixture Units (FU)	Gallons Per Minute (GPM)	Gallons Per Day (GPD)
Domestic - Peak Public Demand	45.4	48	1440

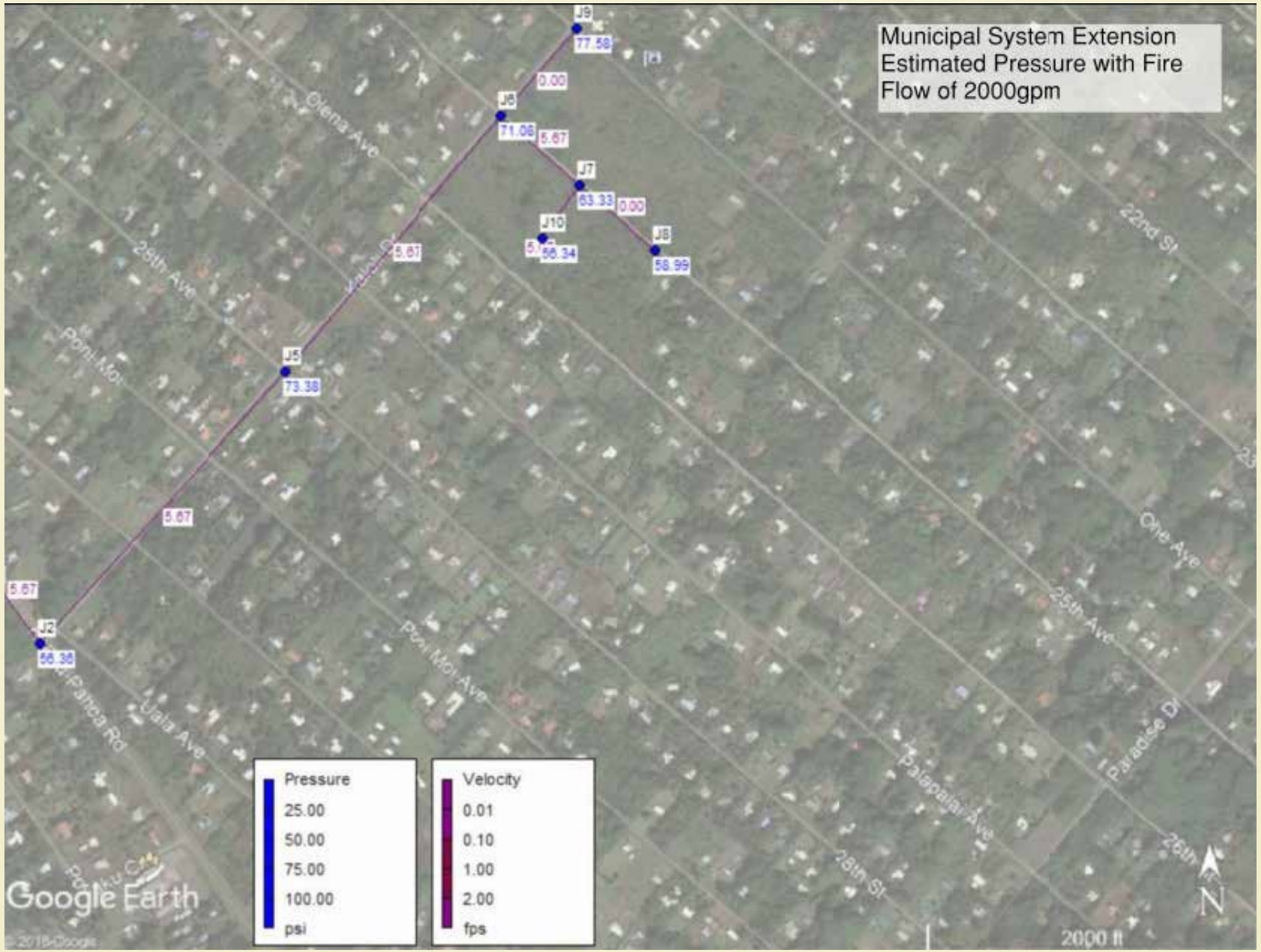
FIXTURE UNIT SUMMARY
HPP PARK - COMMUNITY CENTER
TMK: 1-5-039:267 COUNTY OF HAWAII, DEPARTMENT OF PARKS AND RECREATION

FIXTURE TYPE	NO. OF FIXTURES	F.U. PER FIXTURE	TOTAL F.U.
General Public Use			
Water Closet, Flush Valve	7	3.5	24.5
Urinal	2	2.8	5.6
Lavatory	8	1	8
Drinking Fountain	2	0.5	1
Service Sink/Mop Sink	1	3	
Hose Bibb	1	2.5	2.5
Hose Bibb, each additional	1	1	1
		TOTAL	42.6

PEAK FLOW REQUIREMENTS FOR NEW WATER METER

	Fixture Units (FU)	Gallons Per Minute (GPM)	Gallons Per Day (GPD)
Domestic - Peak Public Demand	42.6	47	1410


Municipal System Extension
Estimated Pressure at Peak Hour Flow
J9
103.03
0.00
J8
96.53
0.95
J7
92.07
0.00
J10
87.64
J6
87.74
0.94
J5
88.26
0.95
0.95
J2
59.67
Pressure
25.00
50.00
75.00
100.00
psi
Velocity
0.01
0.10
1.00
2.00
fps
Google Earth
2000 ft
N
Ola'a Ave
Pohaku Cir
Pohaku Rd
Pohaku Ave
Pohaku Dr
Paradise Dr
Paiapaia Ave
Pohaku St
Pohaku Ln
Pohaku Cir
Pohaku Rd
Pohaku Ave
Pohaku Dr
Paradise Dr
Paiapaia Ave
Pohaku St
Pohaku Ln


Municipal System Extension
Estimated Pressure with Fire
Flow of 2000gpm
J9
77.58
0.00
J6
71.06
5.67
J7
63.33
0.00
J10
56.34
J8
58.99
5.67
J5
73.38
5.67
5.67
J2
66.36
Pressure
25.00
50.00
75.00
100.00
psi
Velocity
0.01
0.10
1.00
2.00
fps
Google Earth
2000 ft
N
Oiena Ave
26th Ave
Poni Moi
Poni Moi Ave
Uaia Ave
Palapalai Ave
25th Ave
Ohe Ave
22nd St
28th St
26th
Paradise D

Hawaiian Paradise Park

Estimate of Water Costs
Connection to Municipal Water Supply Option

	Potable	Irrigation	Total
Average Day (gal)	2,900	4,300	7,200
Monthly Total (gal)	87,000	129,000	216,000

Note: Irrigation amount reduced to reflect estimate collection volume with a Rainwater Catchment system, for comparison purposes.

Description			One-Time Cost	Montly Costs
A. Montly Standby Charges				
Potable (1.5")				$ 80.00
Irrigation (4")				$ 377.00
B. General Use Rates (Potable Meter)				
Block 1 (5000 gal)	5	$ 0.92		$ 4.60
Block 2 (5001-400,000)	82	$ 2.01		$ 164.82
General Use Rates (Irrigation Meter)				
Block 1 (5000 gal)	5	$ 0.92		$ 4.60
Block 2 (5001-4,700,000gal)	124	$ 2.01		$ 249.24
D. Fire Protection Monthly Standby Charges				
6" Private Fire Line				$ 119.00
E. Fire Line or Fire Service Meters - Monthly Standby Charges				
6" Private Fire Line				$ 675.00
G. Facilities Charges				
1.5" Potable Meter			$ 27,500.00	
4" Irrigation Meter			$ 137,500.00	
J. Power Cost Charges				
Monthly Demand	216,000			
Unit Rate (per 1000 gal)	$ 1.73			
Cost				$ 373.68
K. Energy CIP Charges				
Monthly Demand	216,000			
Unit Rate (per 1000 gal)	$ 0.05			
Cost				$ 10.80
Total Estimated Charges			**$ 165,000.00**	**$ 2,058.74**

Present Value of Costs with 4% interest, 20 year term

One-time Charges	$ 165,000
Monthly Costs	$ 335,740
Total Present Value	**$ 500,740**

Hawaiian Paradise Park

Estimate of Water Costs
Rainwater Collection Option

	Potable	Irrigation	Total
Average Day (gal)	2,900	4,300	7,200
Monthly Total (gal)	87,000	129,000	216,000

Note: Irrigation amount reduced to reflect estimate collection volume.

Description			**Montly Costs**
Hawaiian Electric Charges			$ 23.50
Green Infrastructure Fee			$ 6.25
Pumping Costs			
Volume Pumped (Potable)	87,000		
Power Cost (per Kw-hr)	0.294		
Head (ft)	120		
Pump Efficiency	0.75		
Motor Efficiency	0.85		
Cost Per 1000 gal	$ 0.17		
Monthly Cost			$ 15.17
Volume Pumped (Irrigation)	129,000		
Power Cost (per Kw-hr)	0.294		
Head (ft)	120		
Pump Efficiency	0.75		
Motor Efficiency	0.85		
Cost Per 1000 gal	$ 0.17		
Monthly Cost			$ 22.49
Total Estimated Electrical costs			**$ 67.40**

Estimate of Operating and Maintenance Costs

Description		Units	Unit Rate	Quantity	Materials	Labour	Total Monthly
Site Visits (assume 16hrs /wk)		Hrs	$ 50.00	64		$ 3,200.00	$ 3,200.00
5 Micron Filters (assume 1 per month)		EA	$ 365.00	1	$ 365.00	$ 50.00	$ 415.00
Chlorine Solution		Wk	$ 40.00	4	$ 160.00		$ 160.00
1 Micron Absolute Filters (assume 2 per month)		EA	$ 950.00	2	$ 1,900.00	$ 100.00	$ 2,000.00
Water Testing		EA	$ 100.00	4		$ 400.00	$ 400.00
	Ave Monthly Cost				$ 2,425.00	$ 3,750.00	**$ 6,175.00**

Total Estimated Montly Costs **$ 6,257.57**

Present Value of Costs with 4% interest, 20 year term

One-time Charges	$ -
Monthly Costs	$ 1,020,490
Total Present Value	**$ 1,020,490**

Hawaiian Paradise Park

Estimate of Water Costs
Combination of Municipal System and Rainwater Collection Option

1) Connection to Municipal Water Supply (Potable)

	Potable	Irrigation	Total
Average Day (gal)	2,900	0	2,900
Monthly Total (gal)	87,000	0	87,000

Description			One-Time Cost	Montly Costs
A. Montly Standby Charges				
Potable (1.5")				$ 80.00
Irrigation (4")				$ -
B. General Use Rates (Potable Meter)				
Block 1 (5000 gal)	5	$ 0.92		$ 4.60
Block 2 (5001-400,000)	82	$ 2.01		$ 164.82
General Use Rates (Irrigation Meter)				
Block 1 (5000 gal)	0	$ 0.92		$ -
Block 2 (5001-4,700,000gal)	0	$ 2.01		$ -
D. Fire Protection Monthly Standby Charges				
6" Private Fire Line				$ 119.00
E. Fire Line or Fire Service Meters - Monthly Standby Charges				
6" Private Fire Line				$ 675.00
G. Facilities Charges				
1.5" Potable Meter			$ 27,500.00	
4" Irrigation Meter			$ -	
J. Power Cost Charges				
Monthly Demand	87,000			
Unit Rate (per 1000 gal)	$ 1.73			
Cost				$ 150.51
K. Energy CIP Charges				
Monthly Demand	87,000			
Unit Rate (per 1000 gal)	$ 0.05			
Cost				$ 4.35
Total Estimated Charges			**$ 27,500.00**	**$ 1,198.28**

Present Value of Costs with 4% interest, 20 year term

One-time Charges	$ 27,500
Monthly Costs	$ 195,420
Total Present Value	**$ 222,920**

Combined Present Value Amount **$ 670,940**

2) Rainwater Collection System (Non potable)

	Potable	Irrigation	Total
Average Day (gal)	0	4,300	4,300
Monthly Total (gal)	0	129,000	129,000

Note: Irrigation amount reduced to reflect estimate collection volume with a Rainwater Catchment system, for comparison purposes.

Description			Montly Costs
Hawaiian Electric Charges			$ 23.50
Green Infrastructure Fee			$ 6.25
Pumping Costs			
Volume Pumped (Potable)	0		
Power Cost (per Kw-hr)	0.294		
Head (ft)	120		
Pump Efficiency	0.75		
Motor Efficiency	0.85		
Cost Per 1000 gal	$ 0.17		
Monthly Cost			$ -
Volume Pumped (Irrigation)	129,000		
Power Cost (per Kw-hr)	0.294		
Head (ft)	120		
Pump Efficiency	0.75		
Motor Efficiency	0.85		
Cost Per 1000 gal	$ 0.17		
Monthly Cost			$ 22.49
Total Estimated Electrical costs			**$ 52.24**

Estimate of Operating and Maintenance Costs

Description		Units	Unit Rate	Quantity	Materials	Labour	Total Monthly
Site Visits (assume 10hrs /wk)		Hrs	$ 50.00	40		$ 2,000.00	$ 2,000.00
5 Micron Filters (assume 1 per month)		EA	$ 365.00	1	$ 365.00	$ 50.00	$ 415.00
Chlorine Solution		Wk	$ 20.00	4	$ 80.00		$ 80.00
Water Testing		EA	$ 100.00	2		$ 200.00	$ 200.00
	Ave Monthly Cost				$ 445.00	$ 2,250.00	**$ 2,695.00**

Total Estimated Montly Costs **$ 2,747.24**

Present Value of Costs with 4% interest, 20 year term

One-time Charges	$ -
Monthly Costs	$ 448,020
Total Present Value	**$ 448,020**

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