

CAMP BERRYESSA
PRE-DESIGN REPORT

Prepared for:
Napa County Regional Park & Open Space District
1195 Third Street, Room 210
Napa, California 94559

*This Pre-Design Report is prepared under the responsible charge of
Mrs. Melissa Pieri, California license number C59826.*

July 2012

PSOMAS
1075 Creekside Ridge Drive, Suite 200
Roseville, California 95678
(916) 788-8122

CAMP BERRYESSA

PRE-DESIGN REPORT

Prepared for:

Napa County Regional Park & Open Space District
1195 Third Street, Room 210
Napa, California 94559

July 2012

PSOMAS

1075 Creekside Ridge Drive, Suite 200
Roseville, California 95678
(916) 788-8122

TABLE OF CONTENTS

CAMP BERRYESSA

PRE-DESIGN REPORT

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
	Table of Contents	i
	List of Appendices	iii
	Government Code Section 7550.....	iv
1.0	Executive Summary.....	1- 1
2.0	Introduction	2- 1
3.0	Design Criteria	3- 1
	3.1 Alternative Selected.....	3- 1
	3.2 Phasing Plan.....	3- 1
	3.3 Camp Capacity.....	3- 2
	3.4 Site Constraints	3- 2
	3.5 Americans with Disabilities Act (ADA) Access Criteria	3- 3
	3.6 Site Opportunities	3- 3
	3.7 CEQA/NEPA	3- 3
4.0	General Site Layout.....	4- 1
5.0	Proposed Facilities.....	5- 1
	5.1 Tent Cabins.....	5- 1
	5.2 Activity Shelters	5- 1
	5.3 Cooking Areas	5- 1
	5.4 Bathroom/Shower Buildings.....	5- 2
	5.5 Yurts	5- 3
	5.6 Hand Launch Boat Trail	5- 3
	5.7 Protected Water Area.....	5- 3
	5.8 Amphitheater	5- 3
	5.9 Parking.....	5- 4
	5.10 Camp Host	5- 4
	5.11 Office/Store.....	5- 4
	5.12 Storage	5- 4
	5.13 Trails	5- 4
	5.14 Entrance Road.....	5- 5

CAMP BERRYESSA
PRE-DESIGN REPORT
TABLE OF CONTENTS

Section	Title	Page
6.0	Water System	6- 1
6.1	Water Demand	6- 1
6.2	Water Infrastructure.....	6- 1
7.0	Wastewater System	7- 1
7.1	Blackwater System	7- 1
7.2	Graywater System.....	7- 1
8.0	Electrical System.....	8- 1
8.1	Main Panel	8- 1
8.2	Local Panels.....	8- 1
8.3	Photovoltaic System	8- 1
9.0	Basis of Cost Estimates	9- 1

CAMP BERRYESSA
PRE-DESIGN REPORT
LIST OF APPENDICES

Appendix	Title
A	Figures
	1 Overall Site Plan
	2 Water System Schematic
	3 Graywater System Schematic
B	Typical Tent Cabin Layout
C	Typical Activity Shelter Layout
D	California State Parks Restroom Design Standards
E	Moore Creek Park Building (Basis of Combo Building Design)
F	Composting System Calculations and Specification Sheet
G	Napa County Roads and Streets Standards, Detail C-10
H	Water Demand Table
I	Blackwater Flow Calculations
J	Graywater Flow Calculations

CAMP BERRYESSA
PRE-DESIGN REPORT
GOVERNMENT CODE SECTION 7550

Pursuant to California Government Code Section 7550, following are the numbers and dollar amounts of all contracts and subcontracts relating to the preparation of this document:

Agreement No. 11-15 between Napa County Regional Park and Open Space District and Psomas, dated October 2011.

Dollar amount compensation for consultant and subconsultant efforts towards the completion of this document:

Psomas	\$14,553
Psomas Survey	\$14,430
Ateem Electrical	\$5,896
CRM Architects & Planners	\$4,950

SECTION 1
EXECUTIVE SUMMARY

1.0 EXECUTIVE SUMMARY

An Engineering report was prepared in 2010 by Questa Engineering Corporation outlining a variety of unique alternatives for development at Camp Berryessa in Napa, California.

Psomas, in conjunction with the Napa County Regional Park and Open Space District, selected Alternative D, Enhanced Rustic with Central Facilities and Services, with modifications and implementing phases based on available funds. See Section 2.2 Phasing Plan for a detailed list of what is included in each phase.

Phase 1 of the design will include facilities to provide for 67 camp users. Phase 2 will include facilities for the remaining 33 campers expected for the camp to run at full capacity.

All facilities will be ADA accessible.

The Camp Water System will include a new well, a Water Treatment Plant building with hydropneumatic tank, a Water Storage Tank, a service hydrant, and a distribution system, all equipped to handle the total expected water demands of 100 people.

The Graywater system will include tanks and pumps outside of each of the bathroom/shower buildings to store and pump sink and shower water to a subsurface drip irrigation (SDI) field. Phase 1 of the design will include composting toilets for 67 camper users. Only one of the two bathroom/shower buildings will be included in this phase. Phase 2 of the design will include an additional bathroom/shower facility for a total of 100 campers. The tank at the South bathroom/shower building will pump to the (larger) tank near the North bathroom/shower building site, and the pumps in that tank will pump to the SDI field.

The site will be designed to preserve as much space as possible for potential future blackwater field area. However, in our judgment, the site is not spacious enough to ever allow for a blackwater system, based on expected flow calculations and County blackwater regulations.

There will be a waste tank adjacent to each bathroom/shower building to collect liquid-end product (LEP) generated by the Composting Toilets designed for the site. The LEP will need to be pumped and hauled off-site regularly.

An Electrical system will be designed to provide power for the well pump, pressure pumps, WTP controls, convenience receptacles and lighting on the site. A photovoltaic system will be designed to offset 100% of the estimated energy used by the site.

The total cost for Phase 1 elements, including engineering design, permits, and a 15% contingency is \$1,513,000, which is within the total grant funds budget.

SECTION 2
INTRODUCTION

2.0 INTRODUCTION

This report summarizes the calculations and recommendations for elements of Camp Berryessa (Camp), an environmental and group campground facility to be developed by the Napa County Regional Park and Open Space District (District). This report, and the accompanying layout (Figure 1), represents the 30% (Conceptual) design for the Camp. Upon review and approval by the District, Psomas will begin detailed design, culminating in construction drawings, specifications, and cost estimate for the first phase of work.

The layout drawing and many of the calculations deal with the total buildout of the site. Recommendations cover buildout condition and also what part of the facilities should be constructed in Phase 1 in order to provide a functional camp within the initial budget.

The following documents were reviewed in conjunction with this report:

- Request for Proposals, Engineering, Design, and Construction Management for Camp Berryessa, issued in August, 2011 (with attachments and supplemental information);
- Management Agreement between The United States of America and Napa County Regional Park and Open Space District for Development, Management, Operation, and Maintenance of Camp Berryessa, dated July 6, 2011;
- Camp Berryessa Operations, Design, and Preliminary Engineering Study (Engineering Report), Prepared by Questa Engineering Corporation, January 2010 (with Appendices);
- Environmental Assessment/Initial Study for Camp Berryessa, February 2011;
- Napa County Code of Ordinances Title 13, Water Sewers, and Public Services;
- Chapter 16A of California Plumbing Code, Nonpotable Water Reuse Systems (Graywater System);
- Draft Final Accessibility Guidelines for Outdoor Developed Areas, developed by the Architectural and Transportation Barriers Compliance Board; and
- California State Parks Restroom Design Standards, developed by the Acquisition and Development Division, Northern Service Center.

Meetings held to discuss the project include:

- Pre-Proposal Meeting;
- On-site Kickoff Meeting;
- Conference call with Pete Munoa, Napa County Fire Marshal (entrance road, buildings, and water fire code requirements);
- Conference call with Sheldon Sapoznik and Stacy Harrington, Napa County Environmental Management (water and wastewater);
- Conference call with Bruce Burton, California Department of Public Health in Santa Rosa, (public water system); and

- Phone conversation with California Department of Parks and Recreation (wastewater systems – blackwater and graywater).

In addition, several telephone conferences were held with District staff, and vendors were contacted about various products under consideration for use at the Camp.

SECTION 3
DESIGN CRITERIA

3.0 DESIGN CRITERIA

Based on referenced documents, meetings, and discussions, the following design criteria will apply.

3.1 Alternative Selected

Alternative D, Enhanced Rustic with Central Facilities and Services (see the Questa Engineering Report) is the selected alternative for the ultimate project buildout development of the site (with modification). As such, the site layout drawing maintains space for most facilities associated with Alternative D. Space on site, and County requirements do not allow for construction of all Alternative D facilities, and funding does not allow for construction of the remaining Alternative D facilities at this time. As such, we propose the project be done in phases. Phase 1 was defined by estimating costs for each feasible Alternative D element, prioritizing the elements, then de-selecting enough lower-priority elements so that the final Phase 1 cost remains within the funding available.

3.2 Phasing Plan

The following facilities are associated with Alternative D, phase 1:

- Entrance Road turnouts and grading,
- Parking area,
- Trails,
- Electrical System,
- Water System,
- Gray Water System,
- Trash/Recycling,
- Signage/Kiosk,
- South Shower/Toilet Building,
- South Pod Activity Structure,
- South Pod Tent Cabins,
- Central Pod Activity Structure,
- Central Pod Tent Cabins,
- Yurt Grading,
- Storage Containers,
- Camp Store/Office,
- Camp Host area,
- Protected Water Area,
- Hand Board Launch, and
- Amphitheater.

The following facilities are associated with Alternative D, but will be shown as an additive alternate in the Phase 1 design (in priority order) and will only be constructed under Phase 1 if funding allows. This will herein be referred to as Phase 2:

- North Shower/Toilet Building,
- North Pod Tent Cabins,
- North Pod Activity Structure.

The following facilities, herein noted as Phase 3, are associated with Alternative D, but due to space constraints and County requirements cannot be included in the design (i.e. Phase 3 will not be designed or constructed):

- Black Water System*

* Eliminating the Black Water system from the design impacts final build out by excluding any future kitchen building, and sewer system for the camp host. Space on the site, given current regulations and anticipated flows is just not available.

For more information on the black water system, see Section 6.1 of this report.

3.3 Camp Capacity

The Questa Engineering Report estimated the user population to be 80 to 100 people “normal operation” with up to 200 people for “rare events” (page 20). These numbers were reported in the Environmental Assessment on page 2-10. A maximum capacity of approximately 100 people was used for design of Alternative D project build out facilities. However, due to budgetary constraints a maximum capacity of approximately 67 people was used for design of Phase 1.

For “rare events,” exceeding design capacity, and of up to 200 people:

- Additional people would camp in tents as the tent cabins would have inadequate capacity.
- Portable toilets for the number of people above design capacity will have to be placed on site and the composting toilets monitored closely so that they do not become overloaded.
- Graywater tanks must be pumped empty prior to the event and pumping limited each day so that the subsurface drip irrigation (SDI) system does not become overloaded. Excess graywater stored in the tanks can be distributed to the SDI system in the days after the event.

3.4 Site Constraints

The following site constraints are as follows:

- The site is a small peninsula of approximately 9 buildable acres, characterized by oak woodland and chaparral covering a single hill that rises nearly 40 feet above the high water mark of Lake Berryessa.
- Slopes range from 1% on a single small shoulder at the southern end of the peninsula to a predominate character of low oak covered west-facing hillsides ranging from 5-9% grades. Steeper upper slopes of 18% rise above this zone to the hilltop, which features a flat area approximately one quarter acre in size with slopes less than 2%. East-facing slopes in excess of 35% are covered by chaparral.
- Developed recreation improvements are to be confined to the area above the 455’ contour, as required by the Bureau of Reclamation.
- The wastewater facilities need to be located a minimum distance of 200 feet from the lake’s high water line (elevation 440 feet), as required by the Bureau of Reclamation.

- Only trails can be built within the graywater disposal area; however it is recommended minimal foot traffic and subsurface features be allowed in this area.
- A new well on the site must be located at least 100 feet from graywater and blackwater disposal areas.

3.5 Americans with Disabilities Act (ADA) Access Criteria

Because this project will develop tent cabins and lake access for overnight recreation use, accessible paths for visitors must conform to Outdoor Recreation Access Route (ORAR) standards as required by ADA. These standards include:

- Pathways, built of a firm and stable surface, to be a minimum of 36" wide and to be 5% or less in gradient, where possible.
- Grades may be up to 8.3% for distances of 50' feet or less; 8.34%-10% for up to 30'.
- Tent cabins, activity shelters, and yurts to be connected to paths as described above, with approved access into all facilities.
- Food preparation and eating shelters to be accessible and include accessible furnishings.
- Restroom/shower buildings to be accessible and include accessible furnishings.

3.6 Site Opportunities

- The lower western slopes of the site are gentle enough for overnight and day use improvements and offer scenic views and much-needed summer shade.
- The flat hilltop is large enough to accommodate group uses and offers some views to the water.
- Existing graded areas previously used for parking can be reused and ADA compliant pathways can connect this area with the western slopes where developed improvements can be located.

3.7 CEQA/NEPA

All CEQA and NEPA required Mitigation Measures outlined in the Environmental Assessment/Initial Study for Camp Berryessa, dated February 2011, will be met by this design.

SECTION 4
GENERAL SITE LAYOUT

4.0 GENERAL SITE LAYOUT

As suggested in the Questa Engineering Report, the site is well adapted from its previous uses to accept proposed project improvements with minimal site alteration. Existing graded terraces on the east side of the hill can be regraded to accommodate visitor parking and development of a new campground host site. The host site will be incorporated into the upper parking terrace and will be designed to accommodate a large RV and vehicle, and space for a second RV will be provided if allowed by detailed design parameters. By lowering the southern end of this upper terrace, a loop road connection can be made to the existing gravel access road. From this new lower elevation, a gentle new pathway following the contours can be constructed to provide easy ADA compliant access to the tent cabin area, confining cars to the eastern portion of the site.

All improved pathways are compliant with ADA Outdoor Recreation Access Route (ORAR) standards as noted above. All pathways shown on the plan are 5% or less with the exception of one 50' section of 8.3% grade path towards the hand launch boating area and one 50' section of 6.5% path to the South and Central tent clusters. Paths are to be six feet in width to accommodate "Gator" dimensioned service vehicles and to provide ample width for wheelchairs to pass. Paths are shown to approach a hand launch boating area in the northwest corner and to access the protected cove to the north.

The western face of the hill and the hilltop will include all visitor use improvements. This portion of the site naturally breaks down into four distinct "zones":

1. The "day use" zone, which includes the relatively flat lower slopes that occur between the high water line (elevation 440') and the development limit line (elevation 455'). Except for accessible paths to the lake, no improvements are proposed within this zone in this project except for a portion of the wastewater disposal field, which is below ground and not visible.
2. The second zone is the "cabin zone," which occupies the area between elevation 455' and elevation 465'. Within this zone there will be three clusters or pods of tent cabins, each with four tent cabins and a community shelter featuring six picnic tables for dining and an adjacent area with BBQs and food preparation tables for cooking. The three clusters (pods) will be sited with enough separation between them to establish a sense of individual identity. The pods are identified as the north, central, and south pods. Within the constraints identified, every effort was made to maximize shade for the tent cabins, although several will be exposed to direct sun. Two compost toilet and shower (combo) buildings will be also located in this zone; no cabin will be more than 325 feet from combo buildings. Phase 1 design includes the South and Central pods and South combo building, and Phase 2 design includes the North pod and combo building.
3. The third zone comprises the steepest slopes within the project area; this area separates the lake and the day use and cabin area from the flat hilltop area. This zone is primarily used to provide access along the contours from the upper parking area and the camp host site to the "welcome plaza" that will serve as the pedestrian "hub" of the recreation site. From this small flat arrival space, all pathways will emanate to various points within the project site. Informational signage will direct people to their cabins, to the lakeshore, to recreation facilities, or to the group facilities on the hilltop. The upper parking terrace is in this zone. At the north end of this terrace, a pad will be graded for storage containers that will hold kayaks and camp supplies. A new well will be located at the edge of the terrace along with a small enclosure for pump and chlorination equipment. The lower (main) parking terrace will be connected to the camp host site by a stairway that will lead to an outdoor "check-in" plaza with an overhead shade trellis. New landscaping can partially screen the host site from the view of entering visitors, while its location will still be obvious as the point of arrival. Accessible parking will be located on the upper terrace, along the accessible route that runs through the project site.

4. The fourth zone is the hilltop zone, which is reserved for group uses and programs with the exception of the water storage tank. A 5% pathway will ascend the hill and reach the top from the backside where two large County provided yurts will be located. A water storage tank will be located near the top of the hill. Part way up the slope, the path will split to reach a small campfire amphitheater with partial views to the lake and fully open access to the night sky. The amphitheater will require minimal grading to create a flat area for a campfire ring; seating can be provided along the contours for up to 100 people. In addition, if in the future a black water disposal system becomes viable, space for a future kitchen facility is also reserved on the hilltop. The existing access road that extends from the parking area will be kept to provide service access to the hilltop.

SECTION 5
PROPOSED FACILITIES

5.0 PROPOSED FACILITIES

The proposed facilities for Phase 1 and Phase 2 are described in this section. A general site plan showing project buildout is included in Figure 1 of Appendix A. It should be noted the proposed facilities may vary slightly from the Questa Engineering Report. Upon further analysis, the facilities were refined to best fit the site and stay within the available funding. Facilities included are:

5.1 Tent Cabins

In order to accommodate sleeping facilities for a maximum of 67 people in Phase 1, there will be four tent cabins in each of the two pods (South and Central) for a total of 8 at the site. Phase 2 will have an additional pod (North) for an additional four tent cabins. Each cabin will be approximately 12' x 14' (outside dimensions). Each cabin will contain four bunk beds, with sleep capacity of 8 people. The tent cabins will be wood framed structures with canvas walls. Each will have one storm door and one window. The tent foundation/deck will be a non-combustible material (Trex or similar).

There will be no plumbing or water supply in or adjacent to the tent cabins. There will be one low-wattage light in each cabin. At least one cabin per pod will be ADA accessible, with an additive alternate option to the Phase 1 plans being to include accessibility to all cabins.

A typical tent cabin layout is provided in Appendix B.

5.2 Activity Shelters

An activity shelter will be provided for each pod. For Phase 1, the South & Central pod activity shelters will be constructed. For Phase 2, the North activity shelter will be constructed. The shelter will be approximately 20' x 32' and have six picnic tables with seating for 36 people. Adequate accessible seating will also be provided. The activity shelter will be a prefabricated open shelter. The material of construction may either be a metal or wood structure on a concrete slab, or decomposed granite surface.

Each activity shelter will have adequate lighting and two electrical outlets.

All activity shelters and their access routes will be accessible.

A typical activity shelter layout is provided in Appendix C.

5.3 Cooking Areas

Adjacent to the Activity Shelters will be a flat graded area connected to the trails with two barbeques and two food preparation/serving tables, convenience receptacles, and adequate lighting. To meet fire marshal requirements, the barbeques will be located 25 feet from any combustible structure. For Phase 1, the South & Central cooking areas will be constructed. For Phase 2, the North cooking area will be constructed.

Trash and recycling containers will be located nearby, and a hose bib with gravel seepage pit will be provided.

All cooking areas and their access routes will be accessible.

5.4 Bathroom/Shower Buildings

There will be one combination bathroom/shower buildings (combo building), which the two Phase 1 constructed pods (South and Central) will share. There will be an additive alternate design for Phase 2, the North combo building, to serve the North Pod (also an additive alternate design for Phase 2). The building(s) will be approximately 22'x40', and have two showers and four waterless composting toilets each. According to California State Parks Restroom Design Standards, this provides adequate toilet and shower fixture for a standard overnight campground design (See Appendix D).

When both combo buildings are constructed and in use, care should be taken to ensure that occupancy throughout the camp is evenly distributed when not at maximum capacity to balance use at each building.

The combo building will be a wood framed structure with fiber cement siding, a metal roof and concrete foundation. The building will be a two-story design to accommodate the required layout of the composting toilet. The general layout of the combo building was provided by Napa County and is based on a similar park facility (Moore Creek Park) (see Appendix E). Due to the high cost of the building the design will be modified to reduce the overall building cost (to around \$80/sf, down from around \$120/sf). The building design may be squared up and the roof line may be straightened. Discussions with the District will be required to determine an acceptable building layout. For the cost estimate, \$80/sf was used to determine the building cost.

The shower room(s) will each have two showers with shared 60 gallon hot water heaters, and will drain to the graywater system. A water timer will be provided to limit showers to approximately 5 minutes apiece with a delay between water uses to encourage water conservation. Ultra-low flow shower heads and faucets will be provided.

There will be two lavatory sinks on the outside of each bathroom/shower building. The sinks will drain to the graywater system. Trash/recycling receptacles will be provided at the lavatory sink areas.

Graywater will be stored in tanks located adjacent to the building(s), and will pump to a subsurface drip irrigation (SDI) field. The South combo building will pump the Graywater to a tank near the North combo building, where the graywater will then be pumped to the disposal field. Graywater flow calculations can be found in Appendix J. See section 7.2 of this report for more information.

There will be 4 toilet rooms at each building, each containing one waterless composting toilet. Each waterless toilet will be constructed of impact resistant fiberglass and have a white finish. The toilets will be connected with chutes situated directly over the selected composting unit, and constructed at 18" height to comply with ADA requirements.

Each pair of composting toilets will be located above a composting system. There will be a total of four composters with two at each combo building. Each composting system requires ventilation provided by a fan, an automatic moistening system (3/4" fresh water line) controlled by a timer, a small submersible liquid removal pump, a liquid end-product separation tank, and a controller. See Appendix F for a composting system calculations and Specification sheet. Based on a preliminary quote from a composting toilet manufacturer, the total composting toilet equipment cost for the South combo building is \$50,000 (\$25,000 per composter).

The composting toilets will produce a small amount of flow, or liquid end-product (LEP). The LEP will be stored in 1500 gallon tanks adjacent to the building(s), and will need to be pumped and hauled off-site every two months.

There will be a hose bib with a gravel seepage pit and an electrical outlet in each of the composting toilet service areas.

All shower rooms, toilet rooms, and lavatory sink areas, and the access routes leading to them will be accessible. Adequate lighting and traditional furnishings/appurtenances shall be provided.

Identification/directional signage shall be provided.

5.5 Yurts

The District owns two yurts they would like to use as common meeting areas for the Camp Berryessa visitors. The two 30-foot diameter yurts will be located on the hilltop zone in the common area.

Based on the structural drawings received by the County, the floor is a raised wood floor (3/4-inch wood sheathing over joists) on wood posts. The roof is comprised of wood rafters. There will be no plumbing fixtures provided inside the yurts. One hose bib with a seepage pit will be located near the two yurts. There will be no electrical service or furnishings for the yurts. An accessible path will be provided to the entrance of each structure.

Phase 1 only includes the cost for the rough grading of the site. It is assumed the District will install the yurts and provide an accessible ramp for each structure.

5.6 Hand Launch Boat Trail

An accessible trail will be provided to the lake at the northwest portion of the site. For the purposes of design, the hand launch boat trail will terminate at elevation 430'. Because the elevation of the water fluctuates seasonally, operations at the camp will need to include monitoring of the trail to the water and extension of the accessible trail as necessary.

5.7 Protected Water Area

A designated protected area will be located on the northeast portion of the site. The protected area will be roped off by a buoy rope system with anchors. Within the protected area, one swim platform (8'x8') will be provided. An open lifeguard tower will be provided on the shore. There will be no water or electrical services in this area. An accessible path will be provided to the lifeguard tower. The scale of the protected area for Phase 1 has been limited to a smaller area that will ultimately be expanded as a part of Phase 2. The buoy system and platform will be included in the cost estimate; however, the County plans to contract out this portion of the work separately.

5.8 Amphitheater

An amphitheater will be located on the hilltop zone and will have an approximate capacity of 100 people. The amphitheater will be on a graded, sloped site facing the southwest. Seating will be provided, placed along contours. A fire pit and a painted wall for use as a projection screen will be provided.

One hose bib with a gravel seepage pit will be located near the amphitheater. Two convenience receptacles will be provided for the use of a projector. An accessible path will be provided to the amphitheater and a portion of the seating area will be accessible.

5.9 Parking

Two parking lots will be provided on the east side of the site. The lower lot is approximately 15,000 square feet and the upper lot is approximately 11,000 square feet. The upper and lower lots will be connected by a curved aggregate road. Based on typical design criteria, the curved road should be a minimum of 26 feet wide with a 35 foot minimum (inside radius) turning radius. The maximum slope should be 5 percent for uphill traffic and 8 percent for downhill traffic.

The lower lot will contain approximately 40 parking spaces. The upper lot will contain 2 accessible parking spaces and space for a camp host, storage containers, and a possible office/store. Bus parking can either be accommodated in the lower lot within the parking spaces or along the west side of the upper lot. The parking surface will be blue shale aggregate with a concrete or asphalt surface for the accessible parking spaces.

There will also be a stairway to the camp host site along the south end of the parking lot.

5.10 Camp Host

There will be a camp host site located on the upper parking lot to accommodate a 40-foot RV and vehicle. There will also be space to allow for an awning on the left side of the RV. On the east side of the RV site there will be a 10x16 ramada and concrete slab for visitor check-in, two picnic tables and a fire pit. There will be stairs from the lower parking lot to the check-in area. The camp host site will have a blue shale aggregate surface.

The camp host site will have a water service, but no sewer service. The camp host will be required to utilize the internal wastewater system in the RV. A forty amp electrical service will be provided for Phase 1. The area around the camp host site will be accessible including the route of travel from the accessible parking and to the main entrance path.

5.11 Office/Store

A combination office/store will be included in the Phase 1 design. The office/store will provide an area for the camp host to maintain an office and have an area to sell supplies to visitors. The building will be 12'x16' wood framed structure with a concrete foundation, and non-combustible roof and siding. There will be no water or sewer services in the phase 1 plan; however, future water service may be available in the future. Electricity will be provided to the building (lights and receptacles). A wall air conditioning unit will also be provided for the space. Accessible routes will be provided to and from the building.

5.12 Storage

There will be two steel storage containers located on the north side of the upper parking lot. The containers will be used to store boats, extra beds, and miscellaneous supplies. When the central facilities and services components are constructed, additional storage will be required.

5.13 Trails

The Questa Engineering Report identified three different types of trails within the Camp Berryessa site: primary, secondary, and interpretive. For the purposes of this study, only primary and secondary trails are shown. Primary trails shall be 8 feet wide, ADA accessible with blue shale aggregate surface. Secondary trails shall be 6 feet wide, ADA accessible with blue shale aggregate surface. The existing roads will remain, where feasible to provide vehicle access, including fire trucks. In particular, the road leading into

the site and up to the top of the hill (Yurt location), will remain as an emergency vehicle access route. Interpretive trails will be located as necessary during the design phase.

A meeting area and welcome kiosk (bulletin board) with informational signage will be provided near the center of camp (see Figure 1) to direct visitors to the various facilities. The area will have a rock boulder “seating area” around the perimeter.

5.14 Entrance Road

The existing gravel entrance road, that begins at Berryessa Knoxville Road and ends at the western most parking lot, shall comply with the Napa County Roads and Streets Standards, qualifying as a “Residential Driveway,” per the Fire Marshal. Detail C-10 (see Appendix G) of the Napa County Roads and Streets Standards shall be followed to the maximum extent possible. Per detail C-10, the travel way shall be 10-foot wide with a 4 foot drivable shoulder. The existing road appears to be at least 10 feet wide in most locations; however, a 4 foot shoulder may not be available in most areas. Psomas will request an exemption for the road width, and length of turnouts (if the maximum possible cannot meet detail C-10) as required, from the Fire Marshal and the County. Because the road is for rural access with minimal use, the asphalt berm shown in detail C-10 will not be required. The road surface shall be capable of supporting loads equivalent to the H2044 (40,000 pound vehicle).

SECTION 6
WATER SYSTEM

6.0 WATER SYSTEM

6.1 Water Demand

The water demand for Phase 1 and Buildout (Phase 3) are included in Appendix H and are summarized as follows:

- Phase 1 Water Demand: The Phase 1 water demand, based on a maximum of 100 people, is 1,016 gpd (maximum day without special events) with a peak flow of 43 gpm (Phase 3). Pressures will be set to provide between 30 and 50 psi at the water treatment plant (WTP) building.
- Buildout (Phase 3) Water Demand: The buildout water demand, based on 100 people, is 2,544 gpd (maximum day without special events) with a peak flow of 43 gpm. Pressures will be set to provide between 30 and 50 psi at the WTP building.

Buildout (Phase 3) includes the blackwater system and kitchen which, as previously discussed, is not feasible for this project. However, water flows for that portion of the project are negligible compared to Phase 1 and Phase 2, so the design of the Water System design and constructed infrastructure will not change.

6.2 Water Infrastructure

The water infrastructure for Phase 1 is summarized below.

- Well: A well will be constructed by the District with grant funds, but outside of the construction contract (when the construction contractor arrives on site the well will be complete, but without a pump or wellhead facilities). Estimated long-term production requirement is 5 gpm (Phase 3), with a targeted well pump test yield of 20 gpm.
- Water Treatment Plant (WTP) Building: A 12 x 16 wood frame building with concrete stem wall foundation, non-combustible siding, and comp or metal roof will be provided. Chlorination, water meter, hydropneumatic pressure pumps, and water system control system will be provided inside the water treatment plant building. A 600 gallon hydropneumatic tank will be located adjacent to the building. The building will be sized to allow for the installation of a filtration system if the well water quality does not meet CDPH standards.
- Water Storage Tank: An 8,000 gallon steel water tank (sized for 2 days storage at maximum demand (Phase 3) plus 2,500 gallons of fire flow storage) will be provided.
- Service Hydrant: A two-inch hydrant connected to the water storage tank with a 3-inch PVC line to allow filling of fire truck water tanks will be provided on the site.
- Distribution System: The distribution system will consist of a combination of one and two inch PVC pipelines with isolation valves and appurtenances. The distribution system will serve the South/Central restroom/shower building and various locations throughout the site as described by this report.

The water infrastructure for Phase 2 is summarized below.

- Distribution System: The distribution system will consist of a combination of one and two inch PVC pipelines with isolation valves and appurtenances. The distribution system will serve the North restroom/shower buildings and various locations throughout the site as described by this report.

SECTION 7
WASTEWATER SYSTEM

7.0 WASTEWATER SYSTEM

7.1 Blackwater System

The geotechnical report prepared in 2009 for the Questa Engineering Report indicated the Camp Berryessa site is constrained by very shallow soils underlain by low permeability weathered rock. Psomas and the County contacted Napa County Environmental Health and they require new soils to be imported and allowed to sit for one to two years for a blackwater system. Once the soil has compacted and created a long-term hydraulic characteristic, additional soil/percolation testing should be conducted.

For phase 1, no blackwater facilities were considered. Flow calculations were done for the later phases outlined in Alternative D of the Questa Engineering Report in order to determine the area required for fill in phase 1 to facilitate a future blackwater system, and are summarized in Appendix I.

If a kitchen facility were to be constructed, blackwater facilities would be required. The maximum blackwater flow calculations for Phase 3, using a soil loading rate of 0.1 gpd/sf yield a required subsurface drip irrigation field size of 14,280 square feet (sf). The County requires 200% replacement area be available for blackwater subsurface drip irrigation field, yielding a required total area of 57,120 sf.

SDI fields serving blackwater systems are required to have three feet of soil over an impermeable surface (bedrock). The soil loading rate of 0.1 gpd/sf is considered a conservative estimate of what the actual soil loading rate would be after importing soil. Based on site and County blackwater restrictions, a blackwater system is not feasible for this site. However, every effort will be made to preserve as much area on the site as possible so additional subsurface drip irrigation area can be reexamined in the future.

7.2 Graywater System

Graywater will be generated from the showers and the sinks located in the bathroom/shower building(s). The graywater calculations for Phase 1 and buildout are included in Appendix J. The maximum graywater flows do not change for Phase 1 and Phase 3 and are estimated to be about 867 gpd. Using a soil loading rate of 0.1 gpd/sf yields a required subsurface drip irrigation field size of 8,670 square feet. For a graywater system, at least 18 inches of soil over an impermeable layer (in this case, bedrock) is needed. Based on soils information in the Questa Engineering Report, there is sufficient area on the site with adequate soil over bedrock. SDI drip lines will be placed on the surface and then two inches of soil will be placed on top, per State graywater standards.

Each bathroom/shower building will require an adjacent tank and pump to store graywater generated by the sinks and the showers and move it to the SDI drip lines via a 2" forcemain. See section 4.4 of this report for more information.

SECTION 8
ELECTRICAL SYSTEM

8.0 ELECTRICAL SYSTEM

The electrical and instrumentation system for this project will be designed for efficient and secure distribution of power throughout the site. The main electrical locations at the site are:

8.1 Main Panel

A new single phase 240V service will be required for the site. A Net Energy Metering (NEM) connection will be requested of PG&E for the site for photovoltaic connection. The Main Panel, located in the Water Treatment Plant (WTP) building will distribute power to the building, locally and to three remote Lighting Panels. The Main panel will power the following local equipment/sites:

- Well Pump (approximately 2.4 kW)
- Pressure Pump (approximately 4.1 kW)
- WTP controls (approximately 9.0 kW)
- Convenience receptacles (approximately 7.2 kW)
- Camp Host – 40A/2 pole receptacle (approximately 2.4 kW)
- Lighting Panels (Approximately 2.8 kW)

8.2 Local Panels

Local Lighting Panels will be installed in each dining area building. The Local Lighting Panel will distribute power to the building and to local sites. Each panel will power the following local sites:

- Tent Cabins (4 each) – A single two-lamp fluorescent light will be provided in each cabin
- Cooking Areas – Similar fluorescent light fixtures as the tent cabin with two convenience receptacles
- Activity Shelters – Similar fluorescent light fixtures as the tent cabin with two convenience receptacles
- Bathroom/Shower building:
 - Building - similar fluorescent light fixtures as the tent cabins. An electric 240V, 1 phase hot water heater will be provided for each building. Insta-hot units will consume more energy.
 - Each pair of toilets will require power for the unit controls and submersible pump.

8.3 Photovoltaic System

A photovoltaic system will be designed to offset 100% of the estimated energy used by the site. The electrical control panels associated with the system will be installed in the WTP building. The photovoltaic modules will be installed on metal supports to provide shade in the parking lot, or placed on the roofs of the Activity Shelters. The estimated 25 modules (40” x 38” each) provides approximately 290 square feet of solar modules.

SECTION 9
BASIS OF COST ESTIMATES

9.0 BASIS OF COST ESTIMATES

The District received a grant from the California Coastal Conservancy and the Mead Foundation for design and construction of the Camp (Phase 1). The total funds available for construction are summarized below.

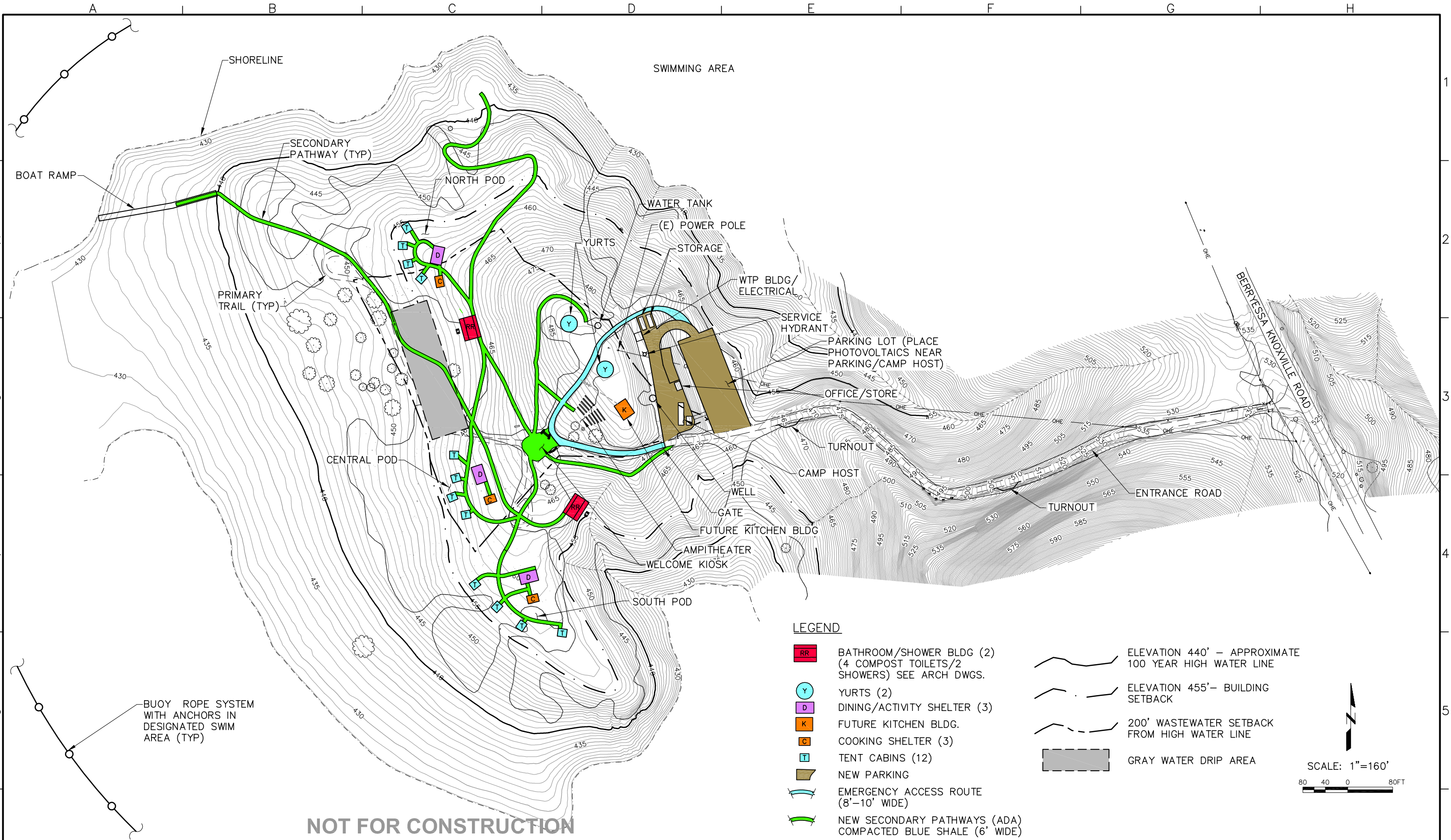
Total grant funds:	\$1,550,000
Engineering Costs:	166,134
Permits (Estimated):	<u>\$10,000</u>
Total Funds Available for Construction*:	\$1,373,866

* Cost of the new water well is included in this total.

The total cost for Phase 1 and Phase 2 (excluding Phase 3 and a kitchen facility), with all of the design elements included and a 15% contingency, is \$2,005,000 which exceeds the total grant funds of \$1,550,000. This is our reason for recommending only the South and Central pod living areas and only the South combo building for Phase 1, with the North pod facilities being included in the design as Phase 2, and an additive alternate to Phase 1. In addition, other elements (such as a larger protected water area) will need to either be built as an additive alternate to Phase 1, budget allowing, or be delayed until Phase 2.

The total cost for Phase 1 elements, including engineering design, permits, and a 15% contingency is \$1,513,000, which is within the total grant funds budget.

APPENDIX A
FIGURES



NOT FOR CONSTRUCTION

LEGEND

- BATHROOM/SHOWER BLDG (2)
(4 COMPOST TOILETS/2 SHOWERS) SEE ARCH DWGS.
- YURTS (2)
- DINING/ACTIVITY SHELTER (3)
- FUTURE KITCHEN BLDG.
- COOKING SHELTER (3)
- TENT CABINS (12)
- NEW PARKING
- EMERGENCY ACCESS ROUTE (8'-10' WIDE)
- NEW SECONDARY PATHWAYS (ADA) COMPACTED BLUE SHALE (6' WIDE)
- ELEVATION 440' - APPROXIMATE 100 YEAR HIGH WATER LINE
- ELEVATION 455'- BUILDING SETBACK
- 200' WASTEWATER SETBACK FROM HIGH WATER LINE
- GRAY WATER DRIP AREA

SCALE: 1"=160'
80 40 0 80 FT

DRAFT 04/26/12

© April 2012 Psomas ALL RIGHTS RESERVED This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Psomas and is not to be used in whole or in part without the written authorization of Psomas.		00/00/00	ISSUED FOR BIDS	Designed MAP
			ISSUED FOR CONSTRUCTION	Drawn JAC
				Checked DWH
				Job No. BELD022307
Rev	Date	By	Description	

These plans are preliminary drafts and are not to be used for anything except review. They are to be discarded after review. They are prepared under the responsible charge of Melissa A. Pieri, California license number C59826.

PSOMAS
3377 Coach Lane, Suite K
Cameron Park, Ca 95682
Tel (530) 677-5286
Fax (530) 677-5606

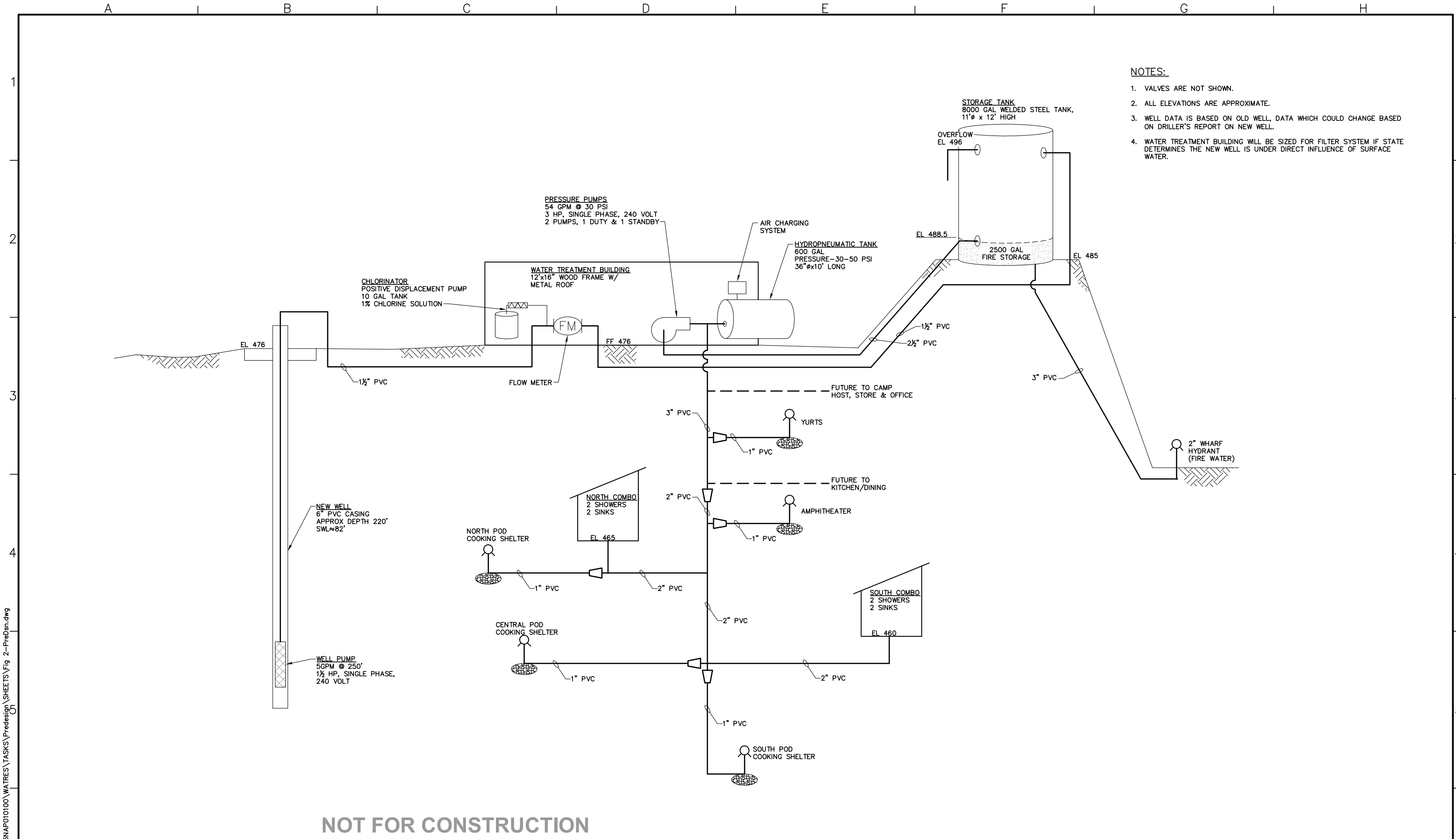
NAPA COUNTY REGIONAL PARK
AND OPEN SPACE DISTRICT
CAMP BERRYESSA RESTORATION

OVERALL SITE PLAN

Scale AS NOTED
Drawing No. Fig 1
Sheet No. X of X

C:\GNAP010100\WATRES\TASKS\PreDesign\SHEETS\GNAP0101-C01-PreDsn.dwg

JAMES CADE



- NOTES:**
1. VALVES ARE NOT SHOWN.
 2. ALL ELEVATIONS ARE APPROXIMATE.
 3. WELL DATA IS BASED ON OLD WELL, DATA WHICH COULD CHANGE BASED ON DRILLER'S REPORT ON NEW WELL.
 4. WATER TREATMENT BUILDING WILL BE SIZED FOR FILTER SYSTEM IF STATE DETERMINES THE NEW WELL IS UNDER DIRECT INFLUENCE OF SURFACE WATER.

NOT FOR CONSTRUCTION

P:\GNAP010100\WATRES\TASKS\PreDesign\SHEETS\Fig 2-PreDsn.dwg

DRAFT 02/02/12

© February 2012
Psomas
ALL RIGHTS RESERVED
This document, and the ideas and designs incorporated herein, as an instrument of professional service, is the property of Psomas and is not to be used in whole or in part without the written authorization of Psomas.

00/00/00	ISSUED FOR BIDS	Designed	MAP
	ISSUED FOR CONSTRUCTION	Drawn	JAC
		Checked	DWH
		Job No.	BELD022307
Rev	Date	By	Description

These plans are preliminary drafts and are not to be used for anything except review. They are to be discarded after review. They are prepared under the responsible charge of Melissa A. Pieri, California license number C59826.

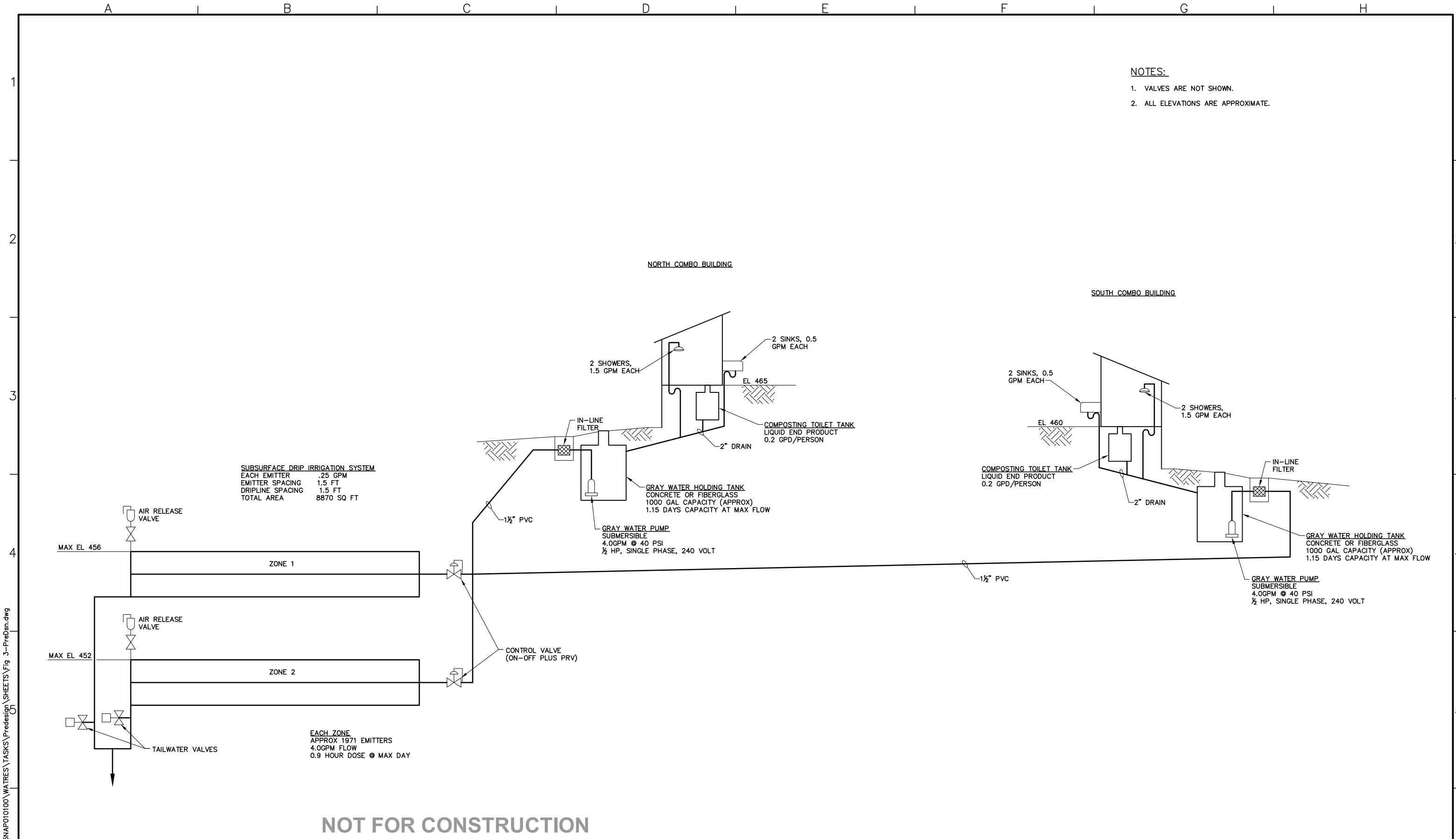
PSOMAS
3377 Coach Lane, Suite K
Cameron Park, Ca 95682
Tel (530) 677-5286
Fax (530) 677-5606

0 LINE IS 2 INCHES AT FULL SCALE
IF LINE IS NOT 2" SCALE ACCORDINGLY

**NAPA COUNTY REGIONAL PARK AND OPEN SPACE DISTRICT
CAMP BERRYESSA RESTORATION**

WATER SYSTEM SCHEMATIC

Scale	NONE
Drawing No.	Fig 2
Sheet No.	X of X



NOT FOR CONSTRUCTION

DRAFT 02/02/12

© February 2012
 Psomas
 ALL RIGHTS RESERVED
 This document, and the
 ideas and designs
 incorporated herein, as an
 instrument of professional
 service, is the property of
 Psomas and is not to be
 used in whole or in part
 without the written
 authorization of Psomas.

00/00/00	ISSUED FOR BIDS	Designed	MAP
	ISSUED FOR CONSTRUCTION	Drawn	JAC
		Checked	DWH
		Job No.	
Rev	Date	By	Description

These plans are preliminary drafts and are not to be used for anything except review. They are to be discarded after review. They are prepared under the responsible charge of Melissa A. Pieri, California license number C59826.

PSOMAS
 3377 Coach Lane, Suite K
 Cameron Park, Ca 95682
 Tel (530) 677-5286
 Fax (530) 677-5606

0 LINE IS 2 INCHES 2"
 AT FULL SCALE
 IF LINE IS NOT 2" SCALE ACCORDINGLY

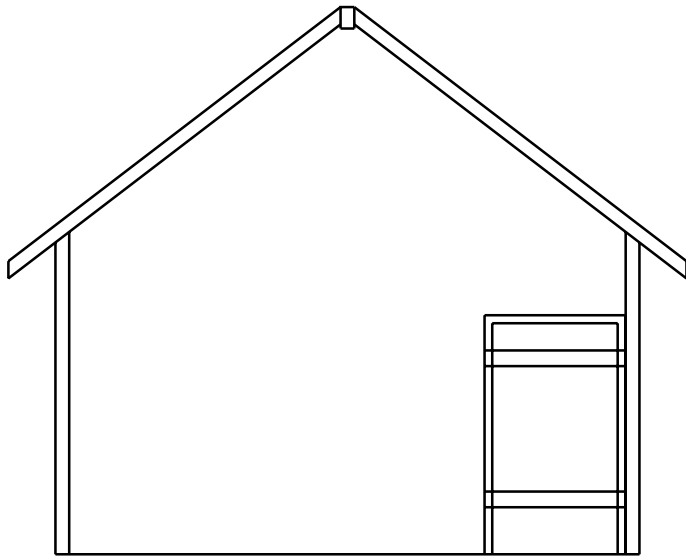
**NAPA COUNTY REGIONAL PARK
 AND OPEN SPACE DISTRICT
 CAMP BERRYESSA RESTORATION**

GRAY WATER SYSTEM SCHEMATIC

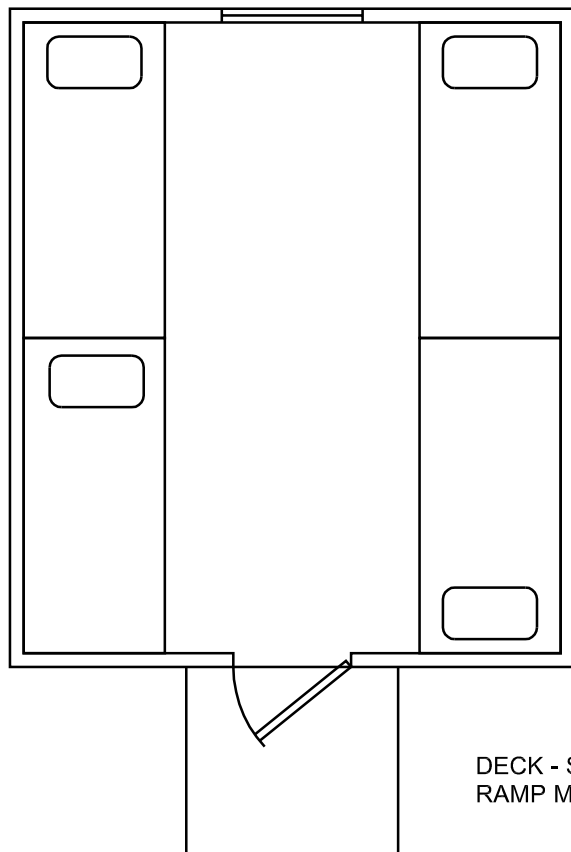
Scale	NONE
Drawing No.	Fig 3
Sheet No.	X of X

P:\GNAP010100\WATRES\TASKS\PreDesign\SHEETS\Fig 3-PreDsn.dwg

APPENDIX B
TYPICAL TENT CABIN LAYOUT



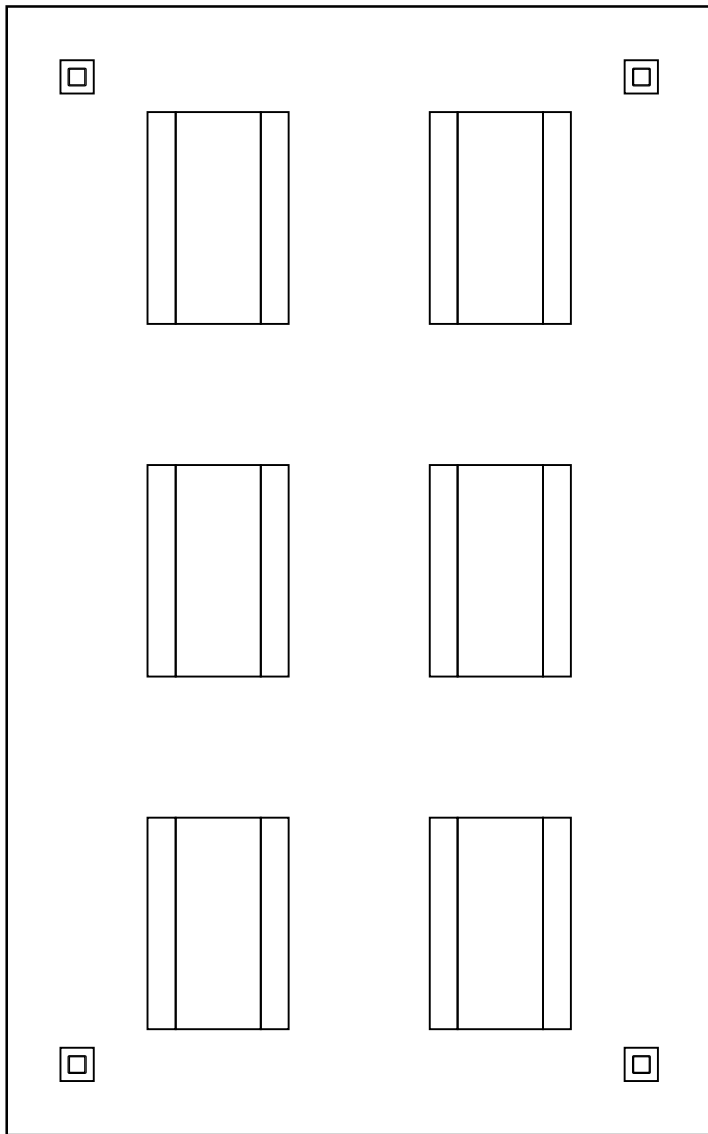
12 X 14 TENT CABIN
SWEETWATER "PIONEER"
ONE STORM DOOR (STD)
ONE WINDOW (UPGRADE)
7' SIDE WALLS (UPGRADE)



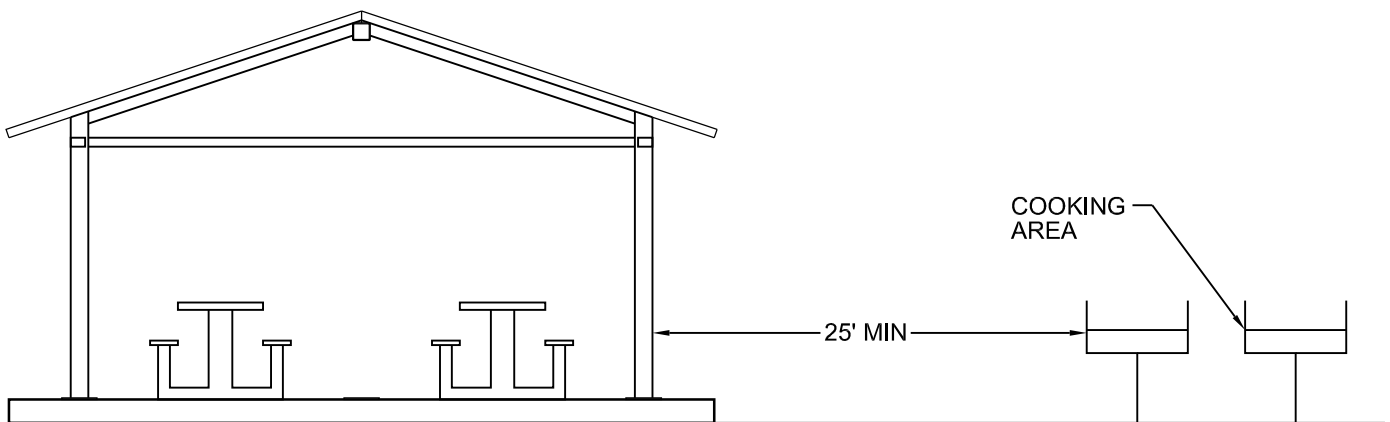
DECK - STEPS AND/OR
RAMP MAY BE NEEDED

APPENDIX B - TYPICAL TENT CABIN LAYOUT

APPENDIX C
TYPICAL ACTIVITY SHELTER LAYOUT



32 X 20 ACTIVITY SHELTER
6 PICNIC TABLES
1 ADA COMPLIANT PICNIC TABLE



APPENDIX C - TYPICAL ACTIVITY SHELTER LAYOUT

***APPENDIX D
CALIFORNIA STATE PARKS RESTROOM DESIGN STANDARDS***



Restroom Design Standards

2001 California Code of Regulations (CCR)
Part 5 California Plumbing Code
Page 52 Table 4-4 Minimum Plumbing Facilities

Title 24 California Building Standards Code
Chapter 4 Plumbing Fixtures & Fixture Fittings

General design requirements:

1. A restroom facility shall not be farther than 400 feet from any parking space or campsite it serves.
2. Beach facilities shall be located in accordance with the actual use patterns of the beach.
3. Day use facility requirements should apply on the basis of average daily use during periods of peak use.
4. The design capacity for each restroom facility is based on the following standards:

Standard	Day Use Beach	Unisex	Day Use Picnic	Campground
Persons per parking space	4:1*		2.5:1*	N/A
Persons per campsite	N/A		N/A	4:1*
Persons per toilet	100:1 M & 1F	500:1 - min. 2	50:1	best 25:1, max. 30:1
Persons per lavatory	200:1 M & 1F	500:1 - min. 2	50:1	best 25:1, max. 30:1
Persons per shower	N/A		N/A	best 25:1, max. 50:1
Campsites per toilet & lavatory	N/A		N/A	7.5:1
Campsites per shower	N/A		N/A	12.5:1

* Standard under normal conditions but can vary under site specific conditions

Day Use Beach Designs:

Parking Spaces	Building	Persons	Toilets	Lavatories
1 - 50	100 CS	200	2	2
51 - 75	150 CS	300	3	2
76 - 100	200 CS	400	4	2
101 - 125	250 CS	500	5	3
126 - 150	300 CS	600	6	3
151 - 175**	350 CS	650	7	4

** Over 160 parking spaces usually exceeds 400 feet limitation and would require two separate buildings.

Day Use Picnic Designs:

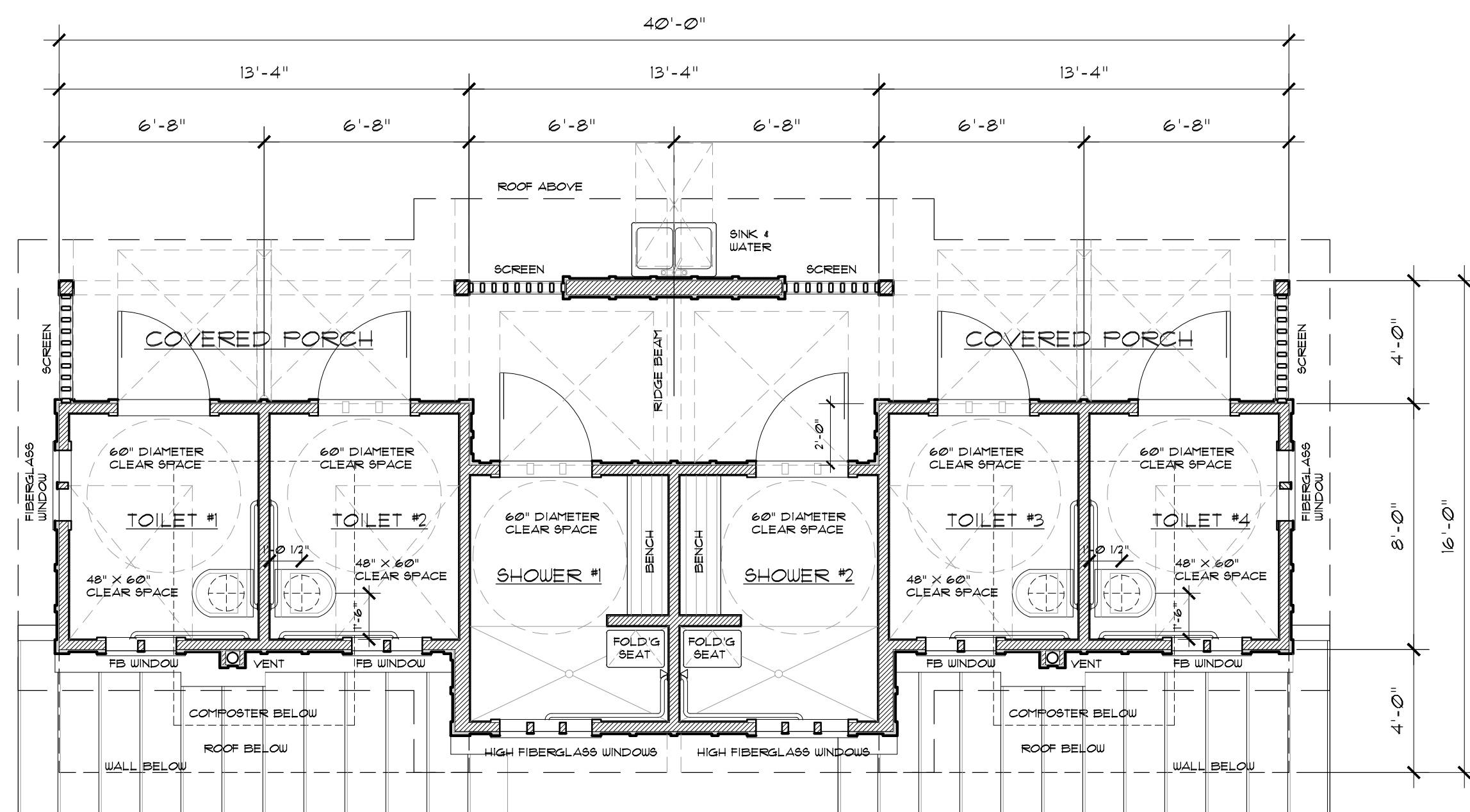
Parking Spaces	Building	Persons	Toilets	Lavatories
1 - 40	100 CS	100	2	2
41 - 60	150 CS	150	3	3
61 - 80	200 CS	200	4	4
81 - 100	250 CS	250	5	5
101 - 120	300 CS	300	6	6
121 - 140	350 CS	350	7	7

Overnight Campground Designs:

Campsites	Building	Persons	Toilets	Lavatories	Showers
1 - 15	100 CB	1 - 60	2	2	2
16 - 22	150 CB	61 - 88	3	3	3
23 - 30	200 CB	89 - 120	4	4	4
31 - 37	250 CB	121 - 148	5	5	5
38 - 45***	300 CB	149 - 180	6	6	6

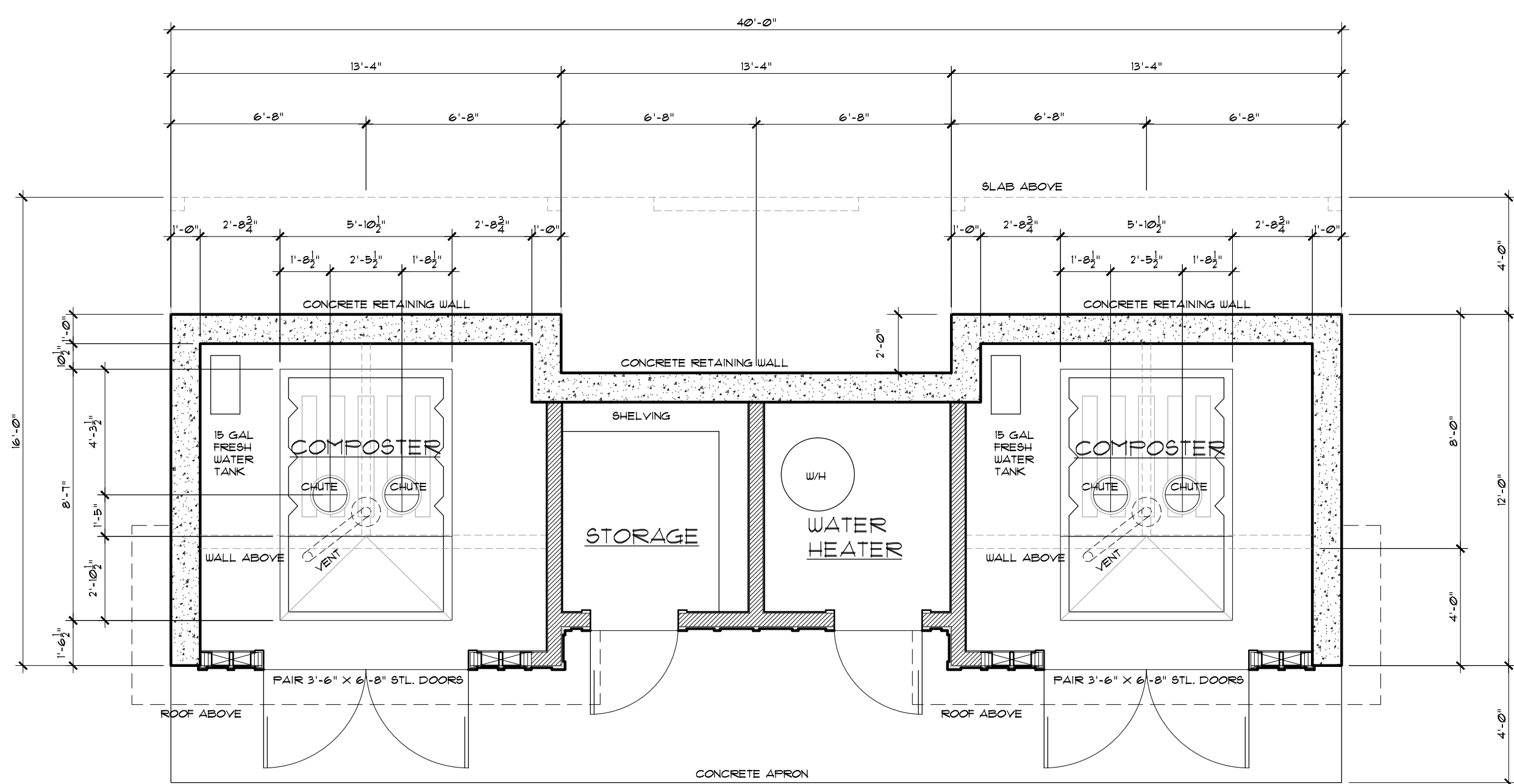
*** Over 45 campsites usually exceeds 400 feet limitation and would require two separate buildings.

APPENDIX E
MOORE CREEK PARK BUILDING (BASIS OF COMBO BUILDING DESIGN)



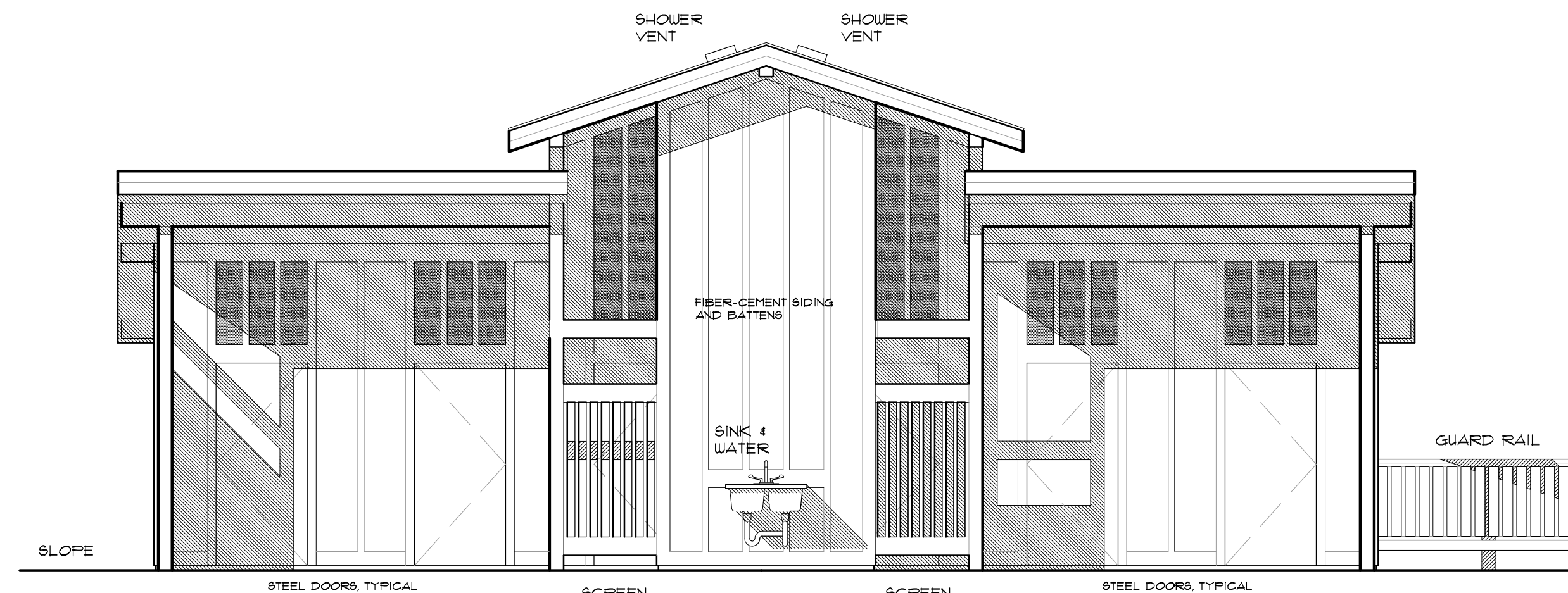
TOILET FLOOR PLAN

SCALE: 1/4" = 1'-0"

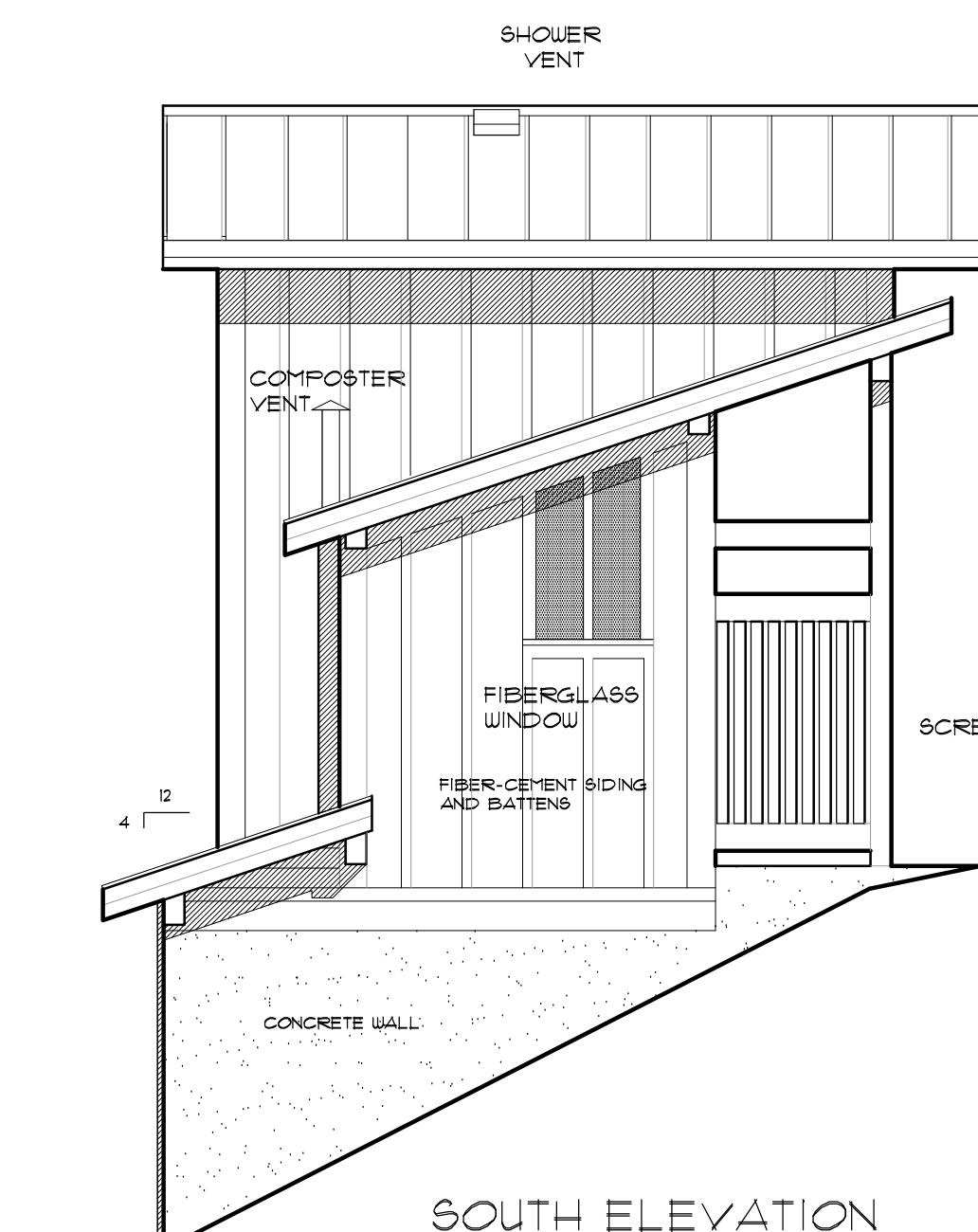


BASEMENT FLOOR PLAN

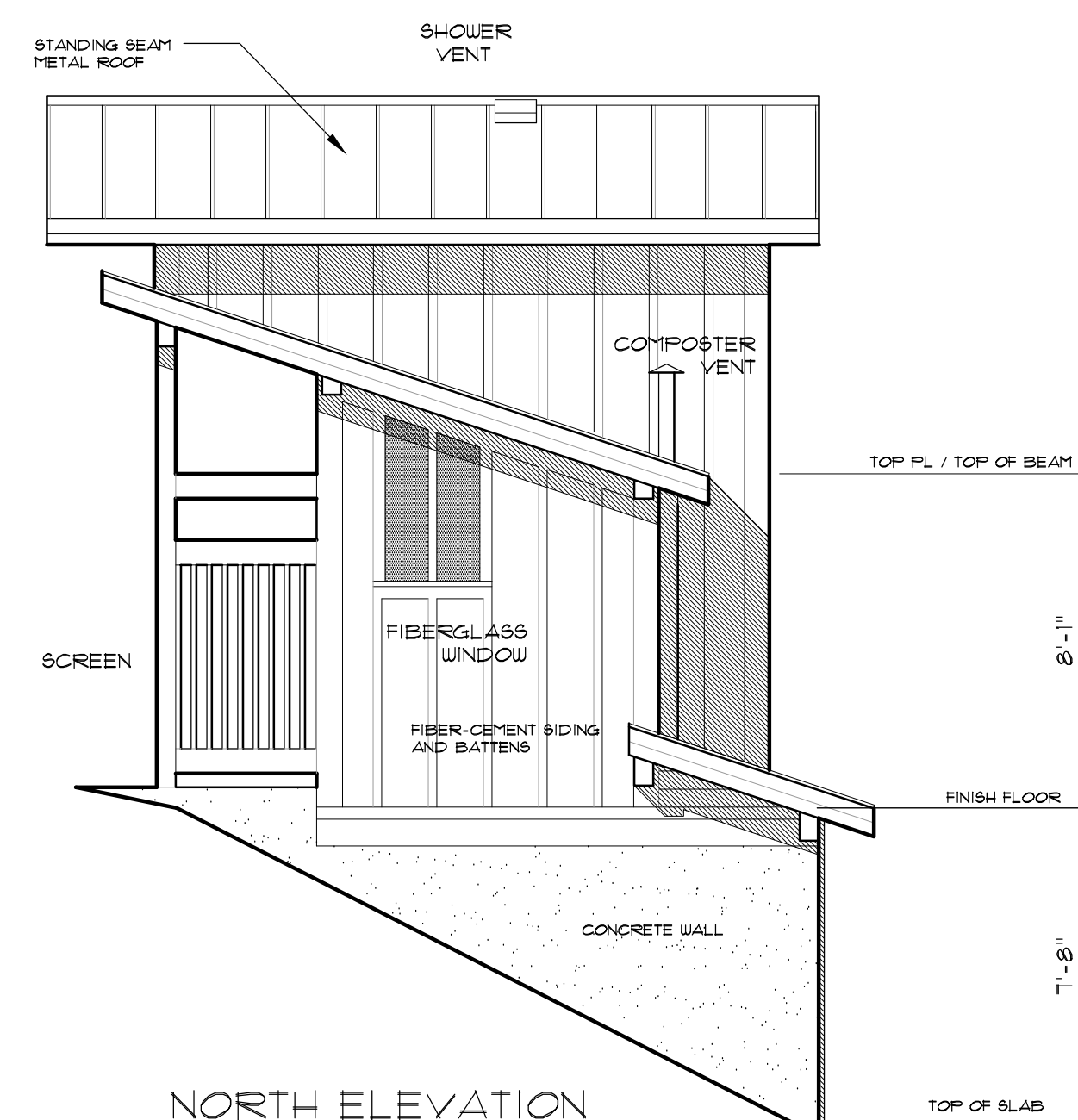
SCALE: 1/4" = 1'-0"



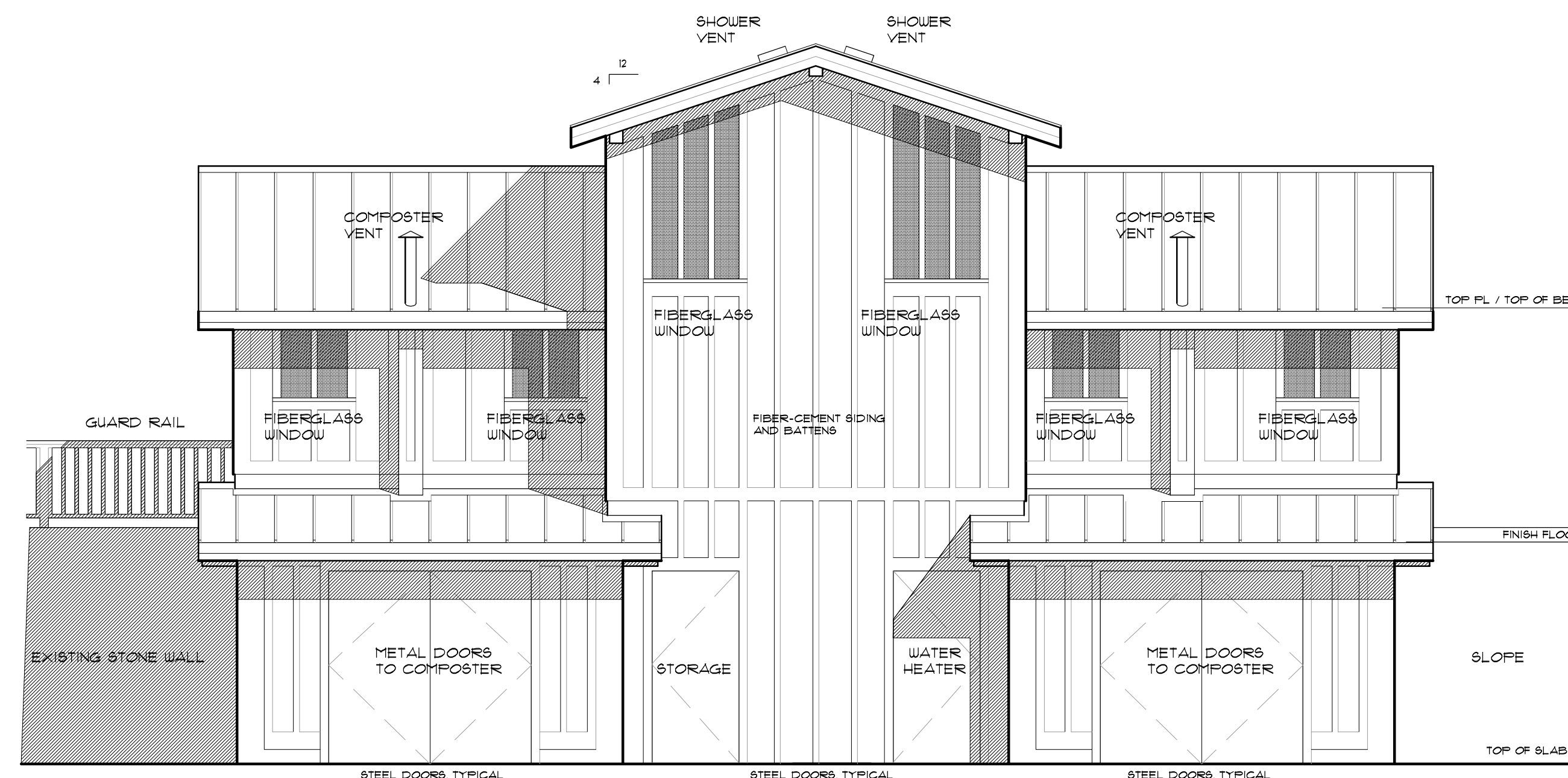
EAST ELEVATION



SOUTH ELEVATION



NORTH ELEVATION

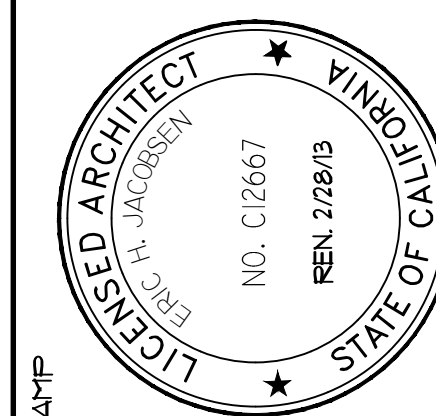


WEST ELEVATION

EXTERIOR ELEVATIONS

SCALE: 1/4" = 1'-0"

Jacobsen & Associates
ARCHITECTS
63 Monte Carlo Way
American Canyon, California 94503
Telephone: 707 / 645-1933
Fax: 707 / 645-1946



57-411F

**CAMPGROUND IMPROVEMENTS
MOORE CREEK PARK
NAPA COUNTY REGIONAL PARK
AND OPEN SPACE DISTRICT**

2607 CHILES - POPE VALLEY ROAD
NAPA, NAPA COUNTY, CALIFORNIA

SHEET TITLE
CAMPSITE TOILET PLANS & ELEV'S

NO.	REVISIONS	DATE:
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

SCALE
1/4" = 1'-0"

SHEET NO.

A5
BUILDING

APPENDIX F
COMPOSTING SYSTEM CALCULATIONS AND SPECIFICATION SHEET

Composting Toilets

Phase 1 Present

	Number of Days	Design people per day	Composter use per day (each)	Design people per month
1	31	52	65	1612
2	28	52	65	1456
3	31	102	128	3162
4	30	102	128	3060
5	31	102	128	3162
6	30	72	90	2160
7	30	72	90	2160
8	31	72	90	2232
9	30	102	128	3060
10	31	102	128	3162
11	30	82	103	2460
12	31	52	65	1612

Total people/year 29298
 Total uses/year 146490
 Uses/composter 36622.5

Liquid End Product	1	gallon per	20	uses
	5	uses per person (24 hour stay)		
LEP flow =	0.25	gpd per person		
	389.3333	gal/month		

Model M35 Automatic Specification	
Daily capacity:	180
Annual capacity:	65,000
Site parameters	
Uses/person:	5
Number of proposed composters:	4

Notes:

- 1) Composter use per day (each) = Design people per day * 5 uses per person / 4 composters on site
- 2) Composter M32 limits occupancy to 88 people total, assuming completely balanced use. Use M35.
- 3) Design people per day based on Population Base

128 uses per composter - 128/20 = 6.4 gpd per composter
 6.4 gpd/composter = 12.8 gpd/building
 12.8 gpd/building = 390 gal/month/building

*Use 1000 gallon LEP storage tank for bi-monthly pumping



Model M32 Automatic Specification Sheet

NSF Certification

The Clivus Model M32 is certified by the National Sanitation Foundation under Standard 41 (day-use, park).

Capacity

M32 VOLUME

Solids storage capacity: 183 cubic feet; 1,370 US gallons

Daily capacity at average temp. >65°F: 110 visits

Annual capacity at average temp. >65°F: 40,000 visits

Specifications and Materials

DIMENSIONS

Installed: Length: 103"; Width: 70.5"; Height: 67"

Weight: 750 lbs

Working Area on Top of Composter: 53"x53"

Waste Access Door: 10"x30" (composter front)

Compost Access Lid: 34.5"x70.5" (composter front)

Polyethylene Wall Thickness: 0.375" nominal

MATERIALS

The M32 Composter and its internal Liquid Separation Tank are rotationally molded high-density polyethylene resin that conforms with the following specifications:

- Density (ASTM D1505): 0.943 g/cm³
- Tensile Strength at Yield (ASTM D638): 3,000 psi
- Impact Brittleness Temperature (ARM Impact): -103°F
- Dart Impact (-40°C, 6.53 mils thickness): 180 ft-lbs
- Env't. Stress Crack Resistance (D1693): 700 hrs

VENTILATION

AC: 120V, 60 Hz, 71w, .67 amp fan with 263 cfm at free air. Fan made of GE Noryl plastic, totally enclosed, ball-bearing motor, in-line, direct drive. UL & CSA approved. Energy Star rated. Diameter: 11.75"; Inlet/Outlet Diameter: 6"; Length: 9.625". The fan is mounted in-line near the composter, with 4" PVC or ABS ducting (not included). 12V DC available.

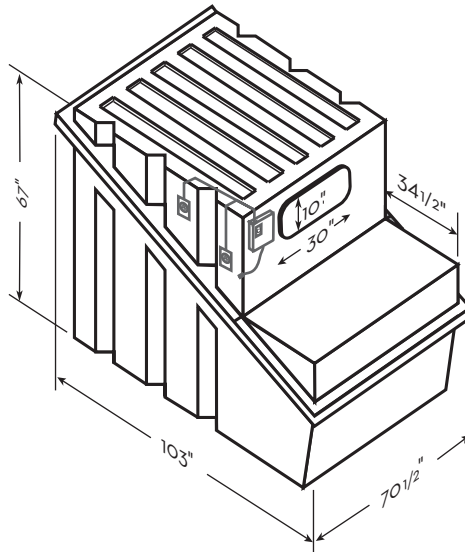


Figure 1. | M32 Composter

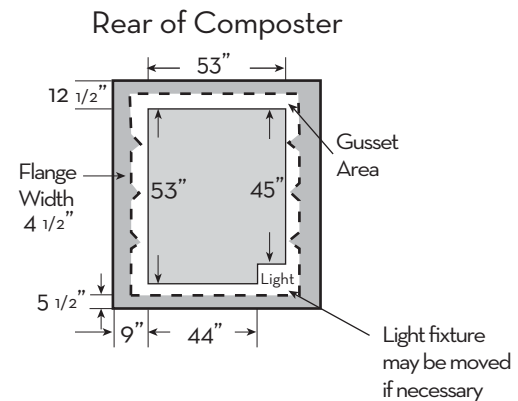


Figure 2. | M32 Composter, Top View

AUTOMATIC MOISTENING SYSTEM

An automatic control device monitors daily compost mass moistening. Timer is housed in water-resistant NEMA box. Spray time is pre-set at factory.

TANK ALARM

Automatic tank alarm responds to liquid level and air flow sensors.

AC: 120 VAC, 50/60 Hz, 7 watts max. Alarm Horn: 82 decibels at 10 feet; meets Type 3R water-tight standard as installed by factory. Alarm Beacon: meets Type 3R water-tight standard as installed by factory. CSA certified.

LIQUID REMOVAL PUMP

AC: Submersible, 115V, 5 amp, with 18', 3-conductor, oil-resistant cord. UL & CSA approved. 1" NPT liquid discharge outlet. Capacity is 20.4 gallons per minute at 1' with a maximum pumping height of 26.3'.

LIQUID END-PRODUCT SEPARATION TANK

Internal tank (45 US gallons) stores the liquid separately from the compost to enhance decomposition and to facilitate the removal of the liquid end-product by the automatic pump to a secondary storage tank.

Components

Solenoid: 120VAC, 50/60Hz, UL & CSA listed.

Timer: Synchronous motor, 48 max. on-off cycles, 120VAC, 0.1 watts. 12V DC available.

CONTROLLER

The 980 Controller regulates the functioning of the moistening, liquid removal, ventilation and fire suppression devices. Requires 20 amp circuit. Housing: water resistant NEMA box, 10"x8"x6".

TOILET OPTIONS

Waterless Toilet

Constructed of impact resistant fiberglass with sanitary white finish. Seat and lid are made of plastic; the liner is rotationally molded polyethylene. The toilet must be located directly over the composter, which is situated in a space or room below. The toilet is connected with a 14" diameter straight chute.

Toilet Height: Standard: 14"; ADA Compliant: 18". Width: 18.5"; Length: 24.25".

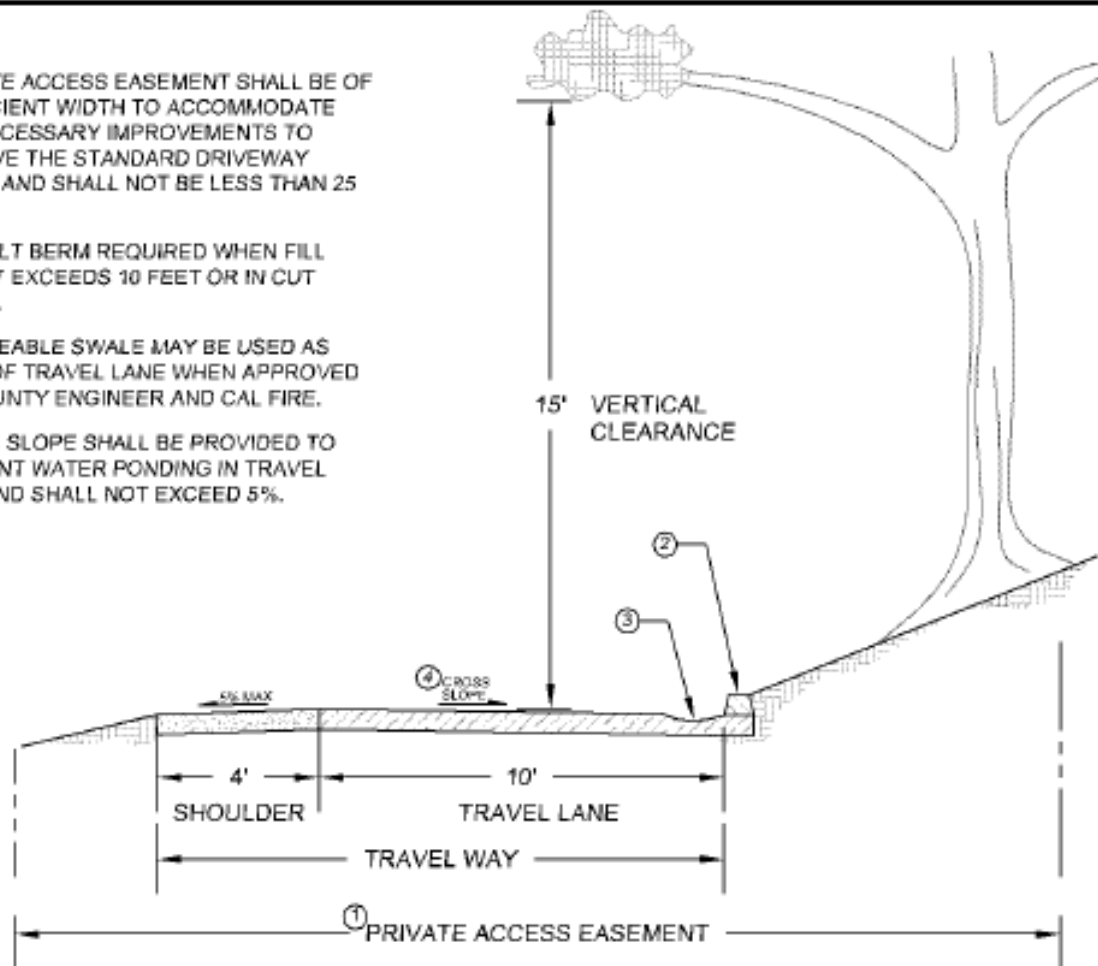
Foam-flush Toilet

The Foam-flush toilet is constructed of vitreous ceramic. The seat and lid are made of plastic. The toilet connects to the composting unit with a 4" plastic pipe. The drain may slope up to 45 degrees from vertical. A water connection and a power connection (AC) are required.

Toilet height: Standard: 16"; ADA compliant: 17.5". Width: 15"; Length: 29"

***APPENDIX G
NAPA COUNTY ROADS AND STREETS STANDARDS, DETAIL C-10***

- ① PRIVATE ACCESS EASEMENT SHALL BE OF SUFFICIENT WIDTH TO ACCOMMODATE ALL NECESSARY IMPROVEMENTS TO ACHIEVE THE STANDARD DRIVEWAY WIDTH AND SHALL NOT BE LESS THAN 25 FEET.
- ② ASPHALT BERM REQUIRED WHEN FILL HEIGHT EXCEEDS 10 FEET OR IN CUT AREAS.
- ③ A DRIVEABLE SWALE MAY BE USED AS PART OF TRAVEL LANE WHEN APPROVED BY COUNTY ENGINEER AND CAL FIRE.
- ④ CROSS SLOPE SHALL BE PROVIDED TO PREVENT WATER PONDING IN TRAVEL WAY AND SHALL NOT EXCEED 5%.



NOTES:

1. SEE SECTION 14 OF THESE STANDARDS FOR DESIGN CRITERIA.
2. ROAD SURFACING REQUIREMENTS FOR TRAVEL LANE (APPLIES TO RESIDENTIAL DRIVEWAYS AND AGRICULTURAL SPECIAL PURPOSE ROADS):

TRAVEL LANE ALL WEATHER SURFACE OPTIONS	RANGE OF $\text{\textcircled{C}}$ GRADE FOR SURFACE OPTION
5" CL. 2 AB	0% - 5% (MAX)
5" CL. 2 AB WITH DOUBLE SEAL COAT	0% - 16% (MAX)
2" HMA / 5" CL. 2 AB	0% - 20% (MAX)

3. SEE THE FOLLOWING DETAILS FOR DESIGN OF DRIVEWAY APPURTENANCES:

- > CONNECTION TO COUNTY ROAD -
DETAIL P-2 (RURAL) OR DETAIL P-5 (URBAN)
- > STANDARD DRIVEWAY TURNOUT -
DETAIL C-11
- > STANDARD DRIVEWAY TURNAROUND -
DETAIL C-12 OR DETAIL C-13

4. PROVIDE REFLECTOR TYPE ADDRESS NUMBER PLACARDS WITH 3" MIN. LETTER HEIGHT AT PUBLIC ROAD AND DRIVEWAY INTERSECTIONS.

NOT TO SCALE

COUNTY OF NAPA
DEPT. OF PUBLIC WORKS
RESIDENTIAL DRIVEWAY OR
AGRICULTURAL SPECIAL
PURPOSE ROAD

COUNTY ENGINEER

RCE 51790

JUNE 2011

APPENDIX H
WATER DEMAND TABLE

Water Facilities

Water use per person per day (gallons)	Phase		
	1	2	3
Shower*	7.5	7.5	7.5
Lavatory	1.0	1.0	1.0
Kitchen sink (at shade structure)		3.0	
Dining facility			14.0
Composting Toilets**	0.0	0.0	0.0
TOTAL (per person)	8.5	11.5	22.5
Design Population	102	102	102
TOTAL	867	1173	2295
Additional water use			
Washdown	50	150	150
Irrigation	150	150	150
Total Water Use	1067	1473	2595

	Wastewater Produced					
	1		2		3	
	Gray	Black	Gray	Black	Gray	Black
	7.5		7.5		7.5	
	1.0		1.0		1.0	
		0.0		3.0		0.0
		0.0		0.0		14.0
	0.00		0.00		0.00	
	8.50	0.00	8.50	3.00	8.50	14.00

Notes:

- * Low flow shower head = 1.5 gpm * 5 min/day per shower
- ** Composting toilets utilize 3 gpd (0.002 gpm) of water for compost pile moistening, and produce a liquid-end project (LEP) of 0.2 gpm

Well Pump Capacity Required			
Maximum water use	2595	gpd	4 gpm
	(10)	hour cycle	

Maximum Instantaneous Water Demand				
Fixture Units		Qty	FU/each	FU Total
RV - Camp Host				
	Toilet - Tank Type	1	4.0	4.0
	Lavatory	1	1.5	1.5
	Kitchen Sink	1	2.2	2.2
	5/8" Hose	1	9.0	9.0
Showers				
	Showerhead	6	2.5	15.0
	Lavatory	3	1.5	4.5
	5/8" Hose	3	9.0	27.0
Community Areas				
	Kitchen Sink***	3	2.2	6.6
	5/8" Hose	3	9.0	27.0
Composting Toilets				
	5/8" Hose	3	9.0	27.0
	Lavatory	3	1.5	4.5
Kitchen				
	Kitchen Sink	0***	2.2	0.0
	Dishwasher	1	2.0	2.0
	Mop Sink	2	2.2	4.4
	Lavatory	1	1.5	1.5
Total				136.2

Max instantaneous demand @ 60 psi	53	gpm	(per UPC table)
at 40 psi =	43	gpm	(correction for pressure)

Storage Requirement	
2 days at max =	5,190 gallons
Fire Storage	2,500 gallons
TOTAL	7,690 gallons

Pressure Pump	
54 gpm	at 30 psi
(125% of peak flow at minimum pressure)	
Approximate horsepower reqd	2.7 hp

Hydropneumatic Tank	
Minimum Pressure	30 psi
Maximum Pressure	50 psi
Estimated Tank Volume	600 gal 10 times pump rate, verify in design

APPENDIX I
BLACKWATER FLOW CALCULATIONS

Blackwater System Sizing

Phase 1 Present Black water flow per person 0 gpcd

	Number of days	Design campers per day	Blackwater Flow	Loading		Total gpd/sf	Field Capacity Required
				Soil gpd/sf	ET gpd/sf		
1	31	52	0.00	0.2	0	0.2	-
2	28	52	0.00	0.2	0	0.2	-
3	31	102	0.00	0.2	0	0.2	-
4	30	102	0.00	0.2	0.078	0.278	-
5	31	102	0.00	0.2	0.109	0.309	-
6	30	72	0.00	0.2	0.114	0.314	-
7	30	72	0.00	0.2	0.149	0.349	-
8	31	72	0.00	0.2	0.13	0.33	-
9	30	102	0.00	0.2	0.062	0.262	-
10	31	102	0.00	0.2	0.05	0.25	-
11	30	82	0.00	0.2	0	0.2	-
12	31	52	0.00	0.2	0	0.2	-

Black water - Phase 1 Present	
	Overall
Number of zones	
Disposal Area Reqd	sq ft
Application Rate	gpd/sf
drip emitter capacity	gph
emitter spacing	foot
dripline spacing	foot
Number of emitters	
Pump Capacity	gpm
Dose time	hours
Length of dripline	feet

Phase 2 Black water flow per person 3 gpcd

	Number of days	Design campers per day	Blackwater Flow	Loading		Total gpd/sf	Field Capacity Required	Field Capacity percent
				Soil gpd/sf	ET gpd/sf			
1	31	52	156	0.1	0	0.1	1,560	
2	28	52	156	0.1	0	0.1	1,560	
3	31	102	306	0.1	0	0.1	3,060	3
4	30	102	306	0.1	0.078	0.178	1,719	
5	31	102	306	0.1	0.109	0.209	1,464	
6	30	72	216	0.1	0.114	0.214	1,009	
7	30	72	216	0.1	0.149	0.249	867	
8	31	72	216	0.1	0.13	0.23	939	
9	30	102	306	0.1	0.062	0.162	1,889	
10	31	102	306	0.1	0.05	0.15	2,040	
11	30	82	246	0.1	0	0.1	2,460	
12	31	52	156	0.1	0	0.1	1,560	3

Black water - Phase 2	
	Overall
Number of zones	1
Disposal Area Reqd	3,060
Application Rate	0.1
drip emitter capacity	0.25
emitter spacing	2.0
dripline spacing	2.0
Number of emitters	765.0
Pump Capacity	3.2
Dose time	1.6
Length of dripline	1,530.0

Water and Wastewater Calculations

Phase 3 Buildout Black water flow per person 14 gpcd

	Number of days	Design campers per day	Blackwater Flow	Loading		Field Capacity	
				Soil gpd/sf	ET gpd/sf	required	percent
1	31	52	728	0.1	0	7,280	
2	28	52	728	0.1	0	7,280	
3	31	102	1428	0.1	0	14,280	3
4	30	102	1428	0.1	0.078	8,022	
5	31	102	1428	0.1	0.109	6,833	
6	30	72	1008	0.1	0.114	4,710	
7	30	72	1008	0.1	0.149	4,048	
8	31	72	1008	0.1	0.13	4,383	
9	30	102	1428	0.1	0.062	8,815	
10	31	102	1428	0.1	0.05	9,520	
11	30	82	1148	0.1	0	11,480	
12	31	52	728	0.1	0	7,280	
						14,280	3

Blackwater Phase 3 Buildout		
	Overall	Each zone
Number of zones	1	
Disposal Area Reqd	14,280	14,280
Application Rate	0.1	
drip emitter capacity	0.25	
emitter spacing	2.0	
dripline spacing	2.0	
Number of emitters	3,570.0	3,570.00
Pump Capacity	14.9	
Dose time	1.6	1.6
Length of dripline	7,140.0	7,140.00
		feet

APPENDIX J
GRAYWATER FLOW CALCULATIONS

Graywater System Sizing

Phase 1 Present Gray water flow per person 8.5 gpcd

	Number of days	Design people per day	Gray Flow	Loading		Total gpd/sf	Field Capacity	
				Soil gpd/sf	ET gpd/sf		required	Month
1	31	52	442	0.1	0	0.1	4,420	
2	28	52	442	0.1	0	0.1	4,420	
3	31	102	867	0.1	0	0.1	8,670	3
4	30	102	867	0.1	0.078	0.178	4,870	
5	31	102	867	0.1	0.109	0.209	4,150	
6	30	72	612	0.1	0.114	0.214	2,860	
7	30	72	612	0.1	0.149	0.249	2,460	
8	31	72	612	0.1	0.13	0.23	2,660	
9	30	102	867	0.1	0.062	0.162	5,350	
10	31	102	867	0.1	0.05	0.15	5,780	
11	30	82	697	0.1	0	0.1	6,970	
12	31	52	442	0.1	0	0.1	4,420	3

Gray water - Phase 1 Present			
	Overall	Each zone	
Number of zones	2	2	
Disposal Area Reqd	8,670	4,335	sq ft
Application Rate	0.1	0.1	gpd/sf
drip emitter capacity	0.5	0.5	gph
emitter spacing	2.0	2.0	foot
dripline spacing	2.0	2.0	foot
Number of emitters	2,167.5	1,083.75	
Pump Capacity	9.0	9.0	gpm
Dose time	1.6	0.8	hours
Length of dripline	4,335.0	2,167.50	feet

Design

Phase 2 Graywater flow per person 8.5 gpcd

	Number of days	Design people per day	Gray Flow	Loading		Total gpd/sf	Field Capacity	
				Soil gpd/sf	ET gpd/sf		gpd	percent
1	31	52	442	0.1	0	0.1	4,420	
2	28	52	442	0.1	0	0.1	4,420	
3	31	102	867	0.1	0	0.1	8,670	3
4	30	102	867	0.1	0.078	0.178	4,871	
5	31	102	867	0.1	0.109	0.209	4,148	
6	30	72	612	0.1	0.114	0.214	2,860	
7	30	72	612	0.1	0.149	0.249	2,458	
8	31	72	612	0.1	0.13	0.23	2,661	
9	30	102	867	0.1	0.062	0.162	5,352	
10	31	102	867	0.1	0.05	0.15	5,780	
11	30	82	697	0.1	0	0.1	6,970	
12	31	52	442	0.1	0	0.1	4,420	3

Gray water - Phase 2			
	Overall	Each zone	
Number of zones	2	2	
Disposal Area Reqd	8,670	4,335.00	sq ft
Application Rate	0.1	0.1	gpd/sf
drip emitter capacity	0.5	0.5	gph
emitter spacing	2.0	2.0	foot
dripline spacing	2.0	2.0	foot
Number of emitters	2,167.5	1,083.75	
Pump Capacity	9.0	9.0	gpm
Dose time	1.6	0.8	hours
Length of dripline	4,335.0	2,167.50	feet

Phase 3 Buildout Gray water flow per person 8.5 gpcd

	Number of days	Design people per day	Gray Flow	Loading		Total gpd/sf	Field Capacity	
				Soil gpd/sf	ET gpd/sf		required	percent
1	31	52	442	0.1	0	0.1	4,420	
2	28	52	442	0.1	0	0.1	4,420	
3	31	102	867	0.1	0	0.1	8,670	3
4	30	102	867	0.1	0.078	0.178	4,871	
5	31	102	867	0.1	0.109	0.209	4,148	
6	30	72	612	0.1	0.114	0.214	2,860	
7	30	72	612	0.1	0.149	0.249	2,458	
8	31	72	612	0.1	0.13	0.23	2,661	
9	30	102	867	0.1	0.062	0.162	5,352	
10	31	102	867	0.1	0.05	0.15	5,780	
11	30	82	697	0.1	0	0.1	6,970	
12	31	52	442	0.1	0	0.1	4,420	
							8,670	3

Gray water - Phase 3 Buildout			
	Overall	Each zone	
Number of zones	2		
Disposal Area Reqd	8,670	4,335.00	sq ft
Application Rate	0.1		gpd/sf
drip emitter capacity	0.5		gph
emitter spacing	2.0		foot
dripline spacing	2.0		foot
Number of emitters	2,167.5	1,083.75	
Pump Capacity	9.0		gpm
Dose time	1.6	0.8	hours
Length of dripline	4,335.0	2,167.50	feet