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ALPINE MEADOWS CAMP
Review of Selected Civil Engineering Aspects of the Camp

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ALPINE MEADOWS CAMP
SUMMARY OF FINDINGS AND RECOMMENDATIONS

This analysis focused on the following main areas of the camp:

- Water System
- Wastewater System
- Stormwater System
- Road System

Findings and recommendations are summarized as follows:

Water System

1. Continue working with the Barton Flats Camping Association on the operation and maintenance of the water treatment plant. Work with the operator on improving treatment output and reliability. Continue to investigate the possible need for expanding treatment capacity based on the projected future demands of all members
2. Size a new water tank based on future development of Alpine Meadows
3. Relocate the water tank up the hill to provide sufficient pressure by gravity, eliminating the need for booster pumps, hydropneumatic tanks, and fire pumps
4. Construct the new water tank of glass fused steel to provide longer life with lower maintenance.
5. Evaluate and upgrade distribution system to provide adequate fire flow to fire hoses and to buildings with sprinklers based on future development plans

Wastewater System

6. Continue to regularly pump and maintain septic systems and grease traps
7. Expand septic systems as new buildings are developed

Stormwater System

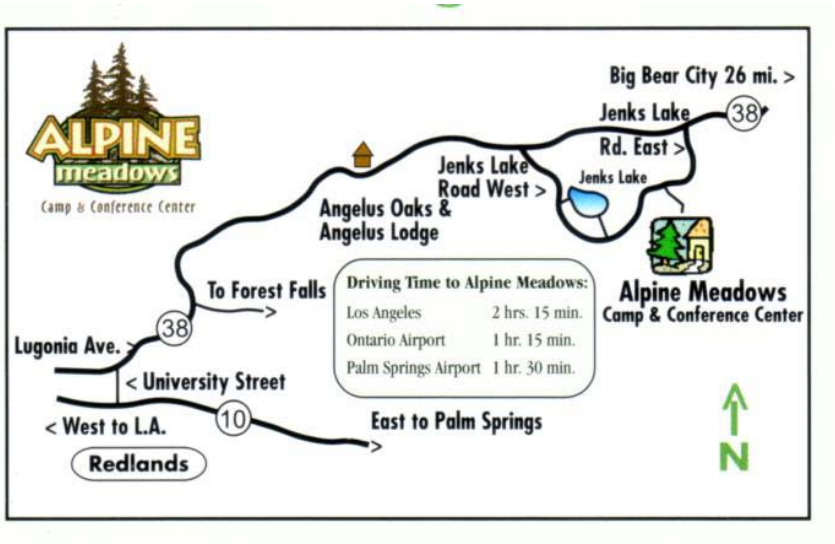
8. Evaluate the potential need for stormwater system upgrades based on future development plans. It appears unlikely that anything more than minor building and area drainage would be needed.

Road System

9. Repave existing entrance road with petromat underlayment
10. Regrade ditches and shoulders
11. Place and compact shoulder backing

The following sections summarize the rationales for the analysis and the recommendations.

INTRODUCTION



Vicinity Map of Alpine Meadows Camp

The Alpine Meadows Camp was born out of the efforts of Peter Huber to resurrect an abandoned summer camp in the San Bernardino mountains. The camp had operated at the site in various forms since the 1920's. The long history of the camp and poor maintenance of facilities had lead to the degradation of the support infrastructure. Peter Huber undertook efforts to rebuild cabins and water, wastewater, and other support systems. This transformation took the camp to another level of quality, amenities, and service.

Future owners of the camp have an opportunity to raise Alpine Meadows Camp to the next level in the evolution .

The purpose of this technical analysis is to provide a preliminary assessment of some of the support facilities and identify areas potentially needing improvement to bring the camp to the next level.

This analysis focuses on the following main areas:

- Water System
- Wastewater System
- Stormwater System
- Road System

The assessment was based on background documents provided by camp staff, through a field investigation on 8-17-04, and through other research.
It should be noted that this analysis is based on existing conditions and uses at the site. Future development and use of the site will necessitate a reevaluation of these engineering aspects and recommendations specific to the future proposals.

Water Treatment Plant for the Barton Flats Camping Association

WATER SYSTEM

Water for the Alpine Meadows camp is provided for potable uses, exterior fire hoses, interior building sprinkling, and irrigation. Each of these is discussed in this analysis.

Potable Water Supply

The potable water for Alpine Meadows Camp comes from the South Fork of the Santa Ana River. The USFS owns the intake system and the treatment plant. The Barton Flats Camp Association, which is made up of eight separate camps including Alpine Meadows, is responsible for the operation of the water system. Summary information regarding the water system is included in Appendix A (To be included in final report)

Water Treatment Plant Filtration Equipment

The water treatment plant is licensed by the California Department of Health Services and is operated by a contract operator. The treatment plant was designed and built by the USFS and is of sophisticated design using membrane treatment technology, which is capable of providing high quality finished water. The camping association has had occasional issues with the operation of the treatment plant. One of the main issues has been that the treatment plant has not been operated consistently to provide the design output. The low water temperature has been cited as a reason for the periodic lower output, but there are likely operational issues as well. The camping association has been addressing the operational issues and has considered installing a sand filter as well to provide additional capacity and reliability. The treatment plant is relatively new and should be capable of providing sufficient water for existing needs given appropriate operation and maintenance. In the future, the plant may need to be upgraded to meet future needs.

One issue with the management of the overall drinking water supply for the Barton Flats Camping Association has to do with the timing of the use of water. There is a relatively small amount of storage at the treatment plant and most of the storage is in tanks at individual camps. There is a small below ground concrete storage tank at the treatment plant that provides interim storage as the water is conveyed to each of the camps. Alpine Meadows is the closest camp to the treatment plant and hence, receives water first. There is the need for the camps to coordinate filling of swimming pools at the beginning of the season, otherwise the small tank at the treatment plant can be drained and there can be a shortage of drinking water at some camps. According to camp

Below Ground Storage Tank at the Water Treatment Plant

staff, this has not been the case for Alpine Meadows since there is a separate storage tank for Alpine Meadows that receives water first in line.

88,000 Gallon Painted Bolted Steel Water Tank Showing Leaking Plug

The storage tank for Alpine Meadows is located down the hill from the treatment plant. It is 88,000 gallons in size and is a painted bolted steel tank. The tank has various leaks and has been patched numerous times. It is not seismically restrained. The tank will need to be replaced in the near future. It is recommended that the new tank be constructed of bolted glass fused steel which provides a long life and does not require recoating.

It is recommended that the new tank be located at an appropriate location up the hill on USFS property at the proper elevation, which would be outside the boundaries of the existing camp.

The main reason for moving the tank is that the existing tank is at an elevation where it is too low relative to the buildings to provide adequate pressure by gravity and a booster pump system is needed. The booster pump system requires an electric pump and hydropneumatic tank to operate. If there is a power outage then a generator would be needed to provide water. As discussed below, the network of fire hoses throughout the camp are fed off of the potable water booster pump, which will not provide a high flow for fighting a fire and is dependent on electricity. Also, as discussed below, the fire sprinkler system feeds off of a separate pipeline from the 88,000 gallon tank and has a rated fire pumping system. If there was adequate flow from a storage tank up the hill, then a separate fire pumping system would not be needed. This could save money in the future if the camp were to be expanded with additional buildings that require sprinkling.

Electric Booster Pump in Vault and Hydropneumatic Tank For Potable Water System

Water Distribution System Layout

Existing maps and surface features were evaluated and camp staff were consulted to assess the approximate location of the potable water piping. This is schematically shown on the map provided in the back of this report (To be provided with final report).There is one network of pipes from the storage tank that supplies potable needs in buildings and also the fire hoses. There is a separate piping system from the storage tank to the fire pumping system. The irrigation system is also separate and uses a non potable supply. The distribution systems are described in greater detail below.

Exterior Fire Hoses

The Alpine Meadows Camp is equipped with 14 exterior fire hoses in exterior storage sheds. The fire hoses are connected to the 2 inch water distribution system that feeds the buildings with potable water. The sheds provide both storage of the hoses and access to the below ground piping in vaults. The vaults are filled with plastic bags of insulation. This helps protect the piping from freezing.

Typical Fire Hose Storage Shed and View of Below Ground Piping With Bags of Insulation

The fire hoses are connected to the potable water system that are fed from the hydropneumatic tank and booster pump from the 88,000 gallon storage tank. It is recommended that the water distribution system be reevaluated based on required fire flow rates and upgrades be made to the water distribution system. As stated above, this would include building a new storage tank higher up the hill to provide gravity flow, which eliminates the need for booster pumps.

Fire Pump and Riser in Eagle Lodge

Interior Building Sprinkling

Currently Eagle Lodge and Coyote Lodge are the only buildings with fire sprinkler systems. There are some old sprinklers in Wolf Lodge, but they are not connected to a water system. The fire pump is in a closet in Eagle lodge and it was recently installed along with the

sprinkler systems as part of major permitted upgrades.

The fire pumping system is fed from a separate 4 inch pipe from the storage tank. If the water storage tank were moved up with hill to an appropriate location to provide adequate pressure, and an adequately sized distribution pipe were installed, then the fire pumping system could be eliminated. The fire risers and other fire sprinkling mechanical equipment would still be required for to meet the building codes required for the planned structures.

Below Ground Irrigation Storage and Shed with Booster Pump and Hydropneumatic Tank

Irrigation System

Alpine Meadows Camp has an irrigation system separate from the potable and fire systems. The irrigation system captures backwash water from the water treatment plant and stores it in two 1500 gallon below ground tanks. There is a separate booster pump and hydropneumatic tank that conveys the water to various irrigation systems around the camp. There were no maps available showing irrigation piping and camp staff only had a general idea where pipes were likely located and no coherent map could be created from this information, although irrigation valving and sprinklers is generally apparent in the field.

The irrigation system meets the current needs of the camp. If the camp is expanded, the irrigation system should be reevaluated to determine what will be required to meet the new irrigation requirements.

Hydropneumatic Tank and Electric Booster Pump for Irrigation Water System

WASTEWATER SYSTEM

Typical Wastewater Cleanout Riser

The wastewater system consists of ten separate systems that were installed in 1995. The systems were permitted and inspected by the San Bernardino Building and Safety Department. Copies of the individual permits are included in Appendix B (To be included in the final report).

The site was inspected and existing maps were reviewed. Systems served one or more buildings. Each system was of similar configuration with a septic tank and associated leach fields. Cleanout risers were common. The access ports for both distribution boxes and for the septic tanks were constructed of concrete riser rings and cast iron lids. This is a level of quality not commonly used in areas of low or

no vehicle traffic and will provide a long useful life.

Typical Septic Tank Access Manholes

There were discrepancies between a number of different maps that were in camp files. The set of plans that are stamped by the Building and Safety Department as approved for construction do not reflect what appears in the field. Upon discussion with Peter Huber, it was learned that the USFS wanted deeper trenches that were shorter so as to reduce the area of ground disturbance. The same sidewall area would be provided if the trenches were twice as deep and half as long, which appears to be what was done. Calls into the Building and Safety Department yielded no additional information on the configuration of the leach fields. The permits in Appendix B suggest that all systems were inspected and approved in the field during construction. A conceptual map of the septic tank and leachfield system for the camp is presented in a pocket in the back of this report (To be provided with the final report). The conceptual map is based on an assessment of surface features, relevant maps, and discussions with camp staff.

Typical Septic System Distribution Manhole

It had been reported that there were some possible septic odors in the camp. A walk around inspection was conducted during the 8-17-04 site visit. There was no evidence of failing septic systems such as surfacing effluent. A slight odor was detected at one point near a manhole cover and the cover was removed to inspect. It was a distribution manhole with several pipes in it. The odor was not unusual and is what can be typically associated with normal septic system operation. Septic tanks have air volume that is above the wastewater in the tank. As the water flows in and out of the tank, the air volume varies because the water surface can change. This requires that some air volume exchanges in and out of the tank. It either exchanges through spaces around access covers or potentially through the soil if the air can move though the leach pipes and through perforations into the leach field soils. If desired, the access covers can be sealed with a product called Ram Nek or similar to reduce air exchange around the covers.

Storm Drain at Wolf Lodge

STORMWATER SYSTEM

The storm events at the camp are infrequent, but can on occasion be intense for short duration. Snow also falls in the winter. Snow melt and stormwater run off the surface and generally there are no

developed drainage ditches or piping. The one exception is that a small drain was installed in a sidewalk area behind a retaining wall at Wolf Lodge that was a low spot that puddle. Other than that, there is little need for formal drainage facilities. As the camp is expanded in the future, the potential for additional building and site drainage should be evaluated on a case by case basis.

ROADS

There is a main roadway into camp off Jenks Lake Road that is paved. There are also a series of gravel roads within the camp that service the cabins, lodges, dining hall, and support buildings.

The main road in camp is approximately 4,000 feet long and an average of 10 feet wide. It is unknown when the road was originally paved. Based on its condition, the road has not had a significant paving improvement for many years. There is evidence of a series of thin paving patches along the road, some of which are peeling. Although there is severe alligator cracking on much of the road, large potholes and damage to the road subgrade have yet to develop. However, without additional maintenance, more severe degradation of the roadway will occur. There is also no crown on the road and the shoulders of the road have not been graded for some time, which is needed to facilitate proper draining. Without significant work to the road, the existing paving will break up and pothole severely over time.

Peeling Thin Pavement Patch

Typical Condition of Access Road Showing Alligator Cracking

It is recommended that the entrance road be repaved. This should include petromat fabric to bride the alligator cracking, a leveling course of asphalt to reestablish the proper road grade, and a two tenths of a foot minimum asphalt overlay course. The shoulders of the road should also be graded to create proper drainage. Backing (a type of base rock) should also be compacted on the shoulders to make an even transition from the asphalt to the shoulder, which helps protect the edge of the paving and provides a smooth transition.

An alternative to improving the road would be to wait until it deteriorates further, then bring in a pavement grinder and grind and recompact the surface and apply an oil sealant. This would provide an improvement over dirt, but with regular traffic and a variety of weather conditions, overall performance would be poor.

The gravel roads within the camp are in relatively good condition, although they are uneven in places. Since traffic is low, and the condition is relatively good, paving is not warranted. Occasional light grading is likely all that will be needed to keep the camp roads in acceptable condition.

Eagle Lodge and Typical Gravel Roads Around the Camp

CONCLUSION

Overall, the camp is typical of a rugged remote summer camp. It can be improved as desired to meet future design and performance requirements and the various support systems should be evaluated and upgraded based on future site specific plans.