3 STANDARDS, CRITERIA AND PROCEDURES

3.1 Standards and Criteria

Kleinfelder and our subcontractors used the following applicable regulations, policies, standards and guidelines for each portion of the Facility Condition Assessment:

3.2 Roads/Parking Lots

The facility condition assessment includes evaluation of the roadways within the seven resort areas. The resort areas combine for more than 15 miles of roadway.[1] To economically evaluate this length of road Kleinfelder employed a statistical approach to roadway characterization. Following an initial site inspection, roads were identified on topographic maps and were classified as either collector or secondary. Collectors include the main roads through resorts as well as roads that collect traffic from lesser roads. All other paved roads were classified as secondary. This study did not include gravel roads or short driveways that serve only two or three dwellings. Tables 2-8 provide the results of the conditions assessment for roads/parking lots.

Sampling locations were selected based on random sampling procedures. Twenty sampling locations were identified in each resort, 10 on collector roads and 10 on secondary roads. All sampling locations consisted of 50-foot long pavement segments regardless of the width of the pavement. Sampling locations were identified in the field by pacing or measuring from adjacent surface features as shown on the topographic maps, and should be considered very approximate. At each sampling location the pavement condition was visually rated and the pavement geometry and roadside conditions were noted. The results of this statistical sampling process were used, in combination with a reconnaissance level site inspection, to form the basis of the conclusions and recommendations that are contained herein. Plates 2-8 refer to sampling locations and other observations regarding roads and parking lots on a resort by resort basis.

A summary of the criteria and standards used in the evaluation of pavements is as follows:

Roads and Parking Lots

[1] *USBR estimates of the length of paved roads at each resort are shown on the bottom of Tables 2 through 8. Kleinfelder did not perform survey services but we estimated roadway length based on available topographic maps. Our estimates are also presented on the subject tables. Kleinfelder's estimates are significantly higher than those of the USBR.*

- Napa County Code Sections:
- Title 10 Vehicles and Traffic
- Title 12 Streets, Sidewalks and Public Places
- Title 17 Subdivisions
- Napa County Adopted Road and Street Standards (Aug 2, 1999)
- Pavement Condition Index (PCI) as documented in USA-CERL Technical Report M-90-05
- 1998 California Building Code
- American Association of State Highway and Transportation Officials (AASHTO)

The evaluation process is described in more detail in the following sections. Results of the evaluations are provided in the resort by resort discussion in later sections of this report. A summary of the pavement condition assessment is presented in Tables 2 through 8 (Appendix A).

3.2.1 Roadway Geometry

An overview of roadway geometry was made during our site reconnaissance. Roadway geometry was also recorded at each sampling location. Because federal lands are immune from state and local regulations, Napa County has not reviewed the design or construction of any of the roads in the seven concession areas. Also, most roads were constructed before the current county regulations were adopted. Kleinfelder reviewed roadway geometry for compliance with Napa County Street Standards and with recommendations of the American Association of State Highway and Transportation Officials (AASHTO).

Napa County Standards.

Information that is contained in this report section is based primarily on the "Napa County Adopted Road and Street Standards," revised August 2, 1999 and on conversations with Mr. Larry Bogner of the Napa County Department of Public Works.

Private roads must be built to same standards as public roads. For private developments that were constructed prior to the adoption of current design standards (1971) Napa County does not normally enforce regulations retroactively. However, an upgrade to current design standards would be required under the following conditions. 1) If significant improvements are made (50% of the value of the current improvements over a five-year period). 2) A use permit is obtained. 3) There is construction of a new road or the extension of an existing road. 4) New subdivisions are permitted in the development. 5) Conditional certificates of compliance are obtained. In addition, if applications are submitted for new building permits all roads that service the affected property typically need to be improved to county standards.

Napa County does not have regulations specifically pertaining mobile home parks or resorts. The three types of minor roads in the Napa County Standards that best apply to the existing site usages are as follows.

1) Loop Road and Non Continuing Minor. Serves abutting property; traffic volume up to 250 vehicles per day.
2) Cul-de-Sac. Serves as an access road to abutting property; traffic volume up to 250 vehicles per day.
3) One Way Loop Roads. Special purpose roads depending upon site circumstances; maximum length ½ mile in hill areas (average slope of 10% or more); traffic volume up to 150 vehicles per day.

County requirements pertaining to these three road types are presented in Table 9. For use with this table, any developments which have an average lot size of less than ¾ acre per dwelling and/or in which 90% of the lots have frontages less than 115 feet are classified as high density. A high-density classification would appear to apply to all of the seven resort areas. In high-density areas, full on-street parking is required, consisting of two parallel parking lanes. In addition, fully improved Portland Cement curbs and sidewalks are required. These criteria would require paved roadways (including traffic lanes, parking lanes and sidewalks) that are at least 40 feet wide, compared to an average of 20 feet or less in all resorts. Additionally extensive drainage improvements would be required. Requirements for high-density developments are not compatible with existing roadways and would require virtually complete demolition and reconstruction of most resort areas.

However, the county code contains provisions that provide flexibility for developments that are not in strict compliance with street standards, but which satisfy the intent of the code. Because these permits are discretionary, it is not possible to fully characterize the County's requirements. Engineering studies would be necessary to estimate traffic flows, the number of parking spaces required and other drainage and geometric considerations. For comparison purposes we have included in Table 9 (in appendix A) the county's requirements for low-density developments. It is possible that the County would accept these standards, if sufficient off-street parking is provided.

AASHTO Guidelines

This section is primarily based on "Guidelines for Geometric Design of Very Low-Volume Local Roads," American Association of State Highway and Transportation Officials, 2001.

A very low-volume local road is a road that has a design average daily traffic volume of 400 vehicles per day or less. The AASHTO manual provides nine subclasses of low volume roads. (When roads meet the definition of more than one of the subclasses it is recommended that the road should be evaluated using the design guidelines applicable to each functional class, and the higher of the applicable design guidelines should be applied.)

The two most applicable road subclasses are:

"*Rural Recreational and Scenic Roads*. Recreational and scenic roads serve specialized land uses including parks, tourist attractions and recreational facilities such as campsite or boat-launch ramps, and are found primarily in rural areas. Traffic is open to the general public, and their users are more likely than users of other functional subclasses of local roads to consist of unfamiliar drivers. Recreational and scenic roads do not generally carry significant volumes of truck traffic, but do serve recreational vehicles including motor homes, campers, and passenger cars pulling boats and other trailers. In many cases, these roads may carry highly seasonal traffic volumes. Recreational and scenic roads may accommodate a wide range in speeds and trip lengths may be fairly long. Such roads may be either paved or unpaved. The ability of vehicles in opposing directions to pass one another is an important design consideration. Access past parked vehicles is not a major concern because parking on rural roads is not common."

"*Urban Residential Streets.* Urban residential streets typically serve to provide access to single- and multiple-family residences in urban areas. Motorists using such streets generally include only residents and their visitors. Use of such streets by large trucks and other heavy vehicles is rare, except for occasional use by delivery and maintenance vehicles. Accessibility for fire trucks and school buses is an important consideration in the design of residential streets. The major functional requirements for very low-volume local roads in urban areas include the ability for vehicles in opposite directions to pass one another, the need for vehicles to pass parked or stopped vehicles, the need to provide access for fire trucks and other emergency vehicles, and the need to accommodate occasional larger delivery vehicles."

AASHTO guidelines typically do not require upgrading of the geometry of low volume existing roads unless there is evidence of a site specific safety problem. This is due to the fact that accidents are rare on this type of road because of very low traffic volumes and slow speeds.

3.2.2 Roadside Design

AASHTO: "Both the safety literature and the risk assessment conducted by Neuman indicate that run-off-the-road crashes on roads with very low traffic volumes occur so infrequently as to make any minimum clear zone width demonstrably not cost-effective.

Research has found that roadside clear zones provide very little benefit, and that traffic barriers are not generally cost effective, on roads with very low traffic volumes. However, there are no established criteria to identify those limited situations where provision of a roadside clear zone or a traffic barrier may be warranted.

Roadside clear zones and traffic barriers are not generally cost effective and need not generally be provided, except in situations where the engineering judgement of the designer identifies the need for the provision of a roadside clear zone or guardrail. Evidence of a site-specific safety problem that could indicate the desirability of providing a roadside clear zone or a guardrail can

include reported crashes or evidence of roadside encroachments. However, both roadside encroachments and crashes are generally very rare on very low-volume local roads."

3.2.3 Pavement Design Life

The design life for a well designed asphalt pavement is typically 20 years. Our experience is that actual life is somewhat greater, normally in the range of 25 to 30 years before major rehabilitation is required. Failure usually occurs gradually through fatigue or weathering. By tracking over time the amount of distress that a pavement shows, it is often possible to anticipate when major repairs are likely to be required.

3.2.4 Pavement Condition Index

All pavements in this project were visually rated in accordance with the Pavement Condition Index (PCI) method. This rating method was developed over a period of many years to result in a composite index that reflects the pavement condition based on observable defects. The method used is described more fully in the Micro PAVER Pavement Management System manuals, which were developed through funding from the US Federal Highway Administration and the American Public Works Association. This method is generally consistent with ASTM D5340 (Standard Test Method for Airport Pavement Condition Index Surveys) with the exception that some distress severity ratings have been modified to reflect the differences in usage between roadways and airfield pavements.

The PCI of a pavement is a measure of its present serviceability. A PCI rating of 100 reflects a pavement in nearly perfect condition. A rating of 10 or lower indicates a pavement with extensive failures that is in immediate need of repair. When combined with a knowledge of the pavement structure and performance history, the PCI can be used to develop a relatively reliable indicator of remaining pavement life. For this project no pavement coring or deflection testing was performed, and the history of existing pavements is not well known. We have combined the PCI ratings with our experience with similar pavements to develop a model of estimated remaining pavement life. These values should be considered very approximate and would normally be used in combination with physical testing to determine appropriate types of pavement remediation.

Pavements are highly variable. This appears to be due to a combination of three factors.

1) Poor Road Construction. Many of the roads appear to have been constructed on a poor subgrade, with minimal aggregate base. In many areas, subgrade soils appear to be expansive. Additionally, roads of significantly different ages were included in this survey.

2) Variable Traffic Levels. Many of the resorts have a single access road that serves the entire resort. These roads typically receive much more traffic at the entrance than at the more

distant end. Similarly, secondary roads are highly variable in the amount of traffic that they receive and number of dwelling units that they serve.

3) Poor maintenance. Preventive maintenance does not appear to be performed at any of the resorts. Maintenance appears to consist of repairing only the worst, totally failed areas of roadway. As a result some pavements are a conglomerate of aged failing areas and newer patched areas.

3.2.5 Pavement Thickness and Design Life

A well designed pavement is typically expected to have at least a 20-year design life. For reference purposes we estimated design pavement sections for the resort areas based on Caltrans methods for a 20-year design life. Collector roads were designed for a Traffic Index (TI) of 5 to 6, corresponding to approximately 2 to 10 trucks per day (garbage trucks, dump trucks, delivery trucks etc.) Smaller secondary roads were designed for a TI of 4 to 5, corresponding to approximately 1 to 10 trucks per week. For this range of traffic values, and a soil subgrade R-value of 5 (typical for this area), pavement thickness as summarized below:

Road Classification	Traffic Index	Asphalt Concrete/Aggregate Base AC/AB
Secondary	4	2.0”/8”
Collector	5	3.0”/9”

Any new pavements (road widening, curve modifications, turnarounds etc.) should be constructed to these thicknesses. Pavement coring was not performed and as such thicknesses of existing pavements were not measured. However, based on observations at potholes and road shoulders, it appears that few, if any, existing pavements meet the thicknesses shown in the preceding table. Because of thinner than desired pavement sections, and the fact that virtually all pavements show significant use, none of the roadways that we rated satisfy the Reclamation “long term” criteria of having a useful life through the year 2024.

3.3 Waste Water Systems

The evaluation of wastewater systems and recommendations made regarding these systems adhere to the standards and requirements promulgated by the Regional Water Quality Control Board. The evaluation of potable water systems and recommendations made regarding these systems adhere to the standards and requirements promulgated by the State of California Department of Health Services. In both cases, we have also adhered to the requirements of the local health department. Criteria and Standards are summarized as:

Waste Water Systems

- United States Code, Title 33, Subchapter III, Standards and Enforcement
- California Health and Safety Code, Part 13, Chapter 4
- California Water Code
- Napa County Code, Title 13

Wastewater treatment systems for six of the seven concession areas consist of storage ponds designed for zero discharge. Only Steele Park uses an alternative form of wastewater treatment; Steele Park uses the services of an activated sludge treatment facility operated by Napa County. At each of the other concession areas, wastewater is collected by local sewer systems and pumped to retention ponds. Some facilities have spray systems to reduce algae formation and increase dissolved oxygen (DO) levels in the ponds.

Several concession areas are using spray irrigation to dispose of wastewater from the retention ponds, especially during the summer months when park usage is highest. Typically, these sprays are applied to forested areas surrounding the ponds. Detailed discussions of the specific wastewater systems are presented in each separate concession area section of this report.

3.4 Potable Water Systems

The criteria and standards for the evaluation of potable water systems is summarized as:

Potable Water Systems

- United States Code, Title 33, Subchapter III, Standards and Enforcement
- California Health and Safety Code, Part 12
- California Water Code
- Napa County Code, Title 13

Potable water for Steele Park is provided by a municipal water system. At Spanish Flat, water treatment is provided off-site. Mixed media filters at Markley Cove, and pressure filters at each of the remaining concession areas are used to treat lake water. Polymer for flocculation and liquid chlorine for disinfecting are provided at each water treatment facility. Chlorine analyzers were provided at each treatment facility with alarms to notify the maintenance staff of low chlorine levels. Turbidimeters were provided at some facilities. Backwash water from the filters commonly drains to a small, excavated pit near the water treatment facility.

A detailed discussion of the specific water systems are presented in each separate concession area section of this report. An engineering evaluation inventory matrix for each resort is summarized in Table 10. An engineering evaluation inventory summary for the potable/wastewater systems is summarized in Table 11. Resort specific matrix summaries are presented in Tables 12 through 18 (Appendix A).

3.5 Electrical Systems

Most concession buildings have individual PG&E meters and are served by an overhead high voltage distribution system with pole-mounted transformers owned by PG&E that runs through the marina. Some small concession buildings are sub-fed from larger buildings via a resort-owned distribution system. Electrical power was generally found to be distributed throughout a wire and conduit type electrical system. Typically, branch conductors were generally enclosed in Electro-metallic tubing (EMT). All power wiring appeared to be copper. Criteria and standards for evaluating the electrical systems are:

Electrical Systems

- NFPA 70, National Electric Code, all relevant sections but in particular *Article 555, Marinas and Boatyards, and Article 553, Floating Buildings*
- NFPA 303, *Fire Protection Standard for Marinas and Boatyards*
- NFPA 30A, *Automotive and Marine Service Station Code*

Findings are provided for each resort in later sections of this report and summarized in Tables 19 through 25 (Appendix A).

3.6 Boat Launch Facilities

The seven marinas located at Lake Berryessa each have facilities for launching small boats from vehicle driven trailers. In evaluating the boat launch ramps, the Kleinfelder team considered access, traffic controls, slope, depth, retaining curbing, surface scoring, signing and maintenance. The courtesy docks were inspected to determine material, anchoring system, flotation billets and overall general condition. This report includes the assessed condition of the boat launch facilities as well as the efficiency and effectiveness. Criteria used includes:

Boat Launch Facilities

- Military Handbook 1025/5, "*Ferry Terminals and Small Craft Berthing Facilities*", September 1988.
- Department of Boating and Waterways, State of California, "*Layout and Design Guidelines for Small Craft Berthing Facilities*", Boating Facilities Division.
- Department of Boating and Waterways, State of California, "*Cal Boating Launching Facilities*", Boating Facilities Division.

Findings are provided for each resort in later sections of this report and summarized in Tables 12 through 18 (Appendix A).

3.7 Shoreline Developments

A senior geotechnical engineer walked the lakeside perimeter of the resorts to evaluate the condition of the various shoreline retaining structures. The retaining structures were evaluated

on their current structural condition, and their probable ability to function on an acceptable level to the year of 2030.

In nearly all situations, the retaining structures were found to be deficient for a number of reasons, including the following:

- Little, if any, engineering incorporated into their design;
- Substandard construction utilized during installation;
- Foundation failure due to settlement and/or foundation undermining due to wave erosion;
- Lack of back of wall drainage systems to control excessive hydrostatic pressures;
- Outward tilting of wall due to excessive lateral pressures, and resulting settlement of the backfill; and,
- Deteriorated or substandard construction materials: i.e., the use of non-galvanized metal for fasteners, pipes and cables; non-treated wood; exposed steel reinforcement; and, non-reinforced masonry construction.

Generally, the retaining structures appeared to be built by the individual tenants, on an "as needed" basis, without any building permits or construction inspection.

A summary of those shoreline development structures findings are presented in the resort specific sections of this report.

3.8 Marinas and Fuel Systems

The marinas and fuel docks are evaluated using the safety guidelines established by the California Boating and Waterways Commission and those required by state/county and Federal policy. The condition assessment includes evaluation of the flotation materials, construction materials, anchoring systems, electrical systems, sewer and water systems and fueling systems. It has been determined that future contracts will require encapsulated flotation billets. Unacceptable docks are identified. Criteria for evaluation include:

Marinas and Fuel Docks

- Military Handbook 1025/5, "*Ferry Terminals and Small Craft Berthing Facilities*", September 1988.
- Department of Boating and Waterways, "*Layout and Design Guidelines for Small Craft Berthing Facilities*", Boating Facilities Division.
- Uniform Fire Code
- 4) National Fire Protection Association (NFPA) 30: *Flammable and Combustible Liquids Code*
- NFPA 30A: *Automotive and Marine Service Station Code*
- NFPA 70: *National Electrical Code*
- NFPA 303: *Marinas and Boatyards*
- ANSI B31.1: *Fuel Piping Installation*

All seven resorts assessed at Lake Berryessa have floating docks with no anchor piling used. The floating docks are designed to support all vertical loads by buoyancy provided by the floats. The vertical loads include dead and live (transitory) loadings applied to the floats. The mooring lines provide the lateral load resisting system to counter the horizontal loading produced by wind forces on the boats and current forces on the docks.

The mooring lines are generally attached to the shore side of the main dock and on either side of the outboard end of the main dock. Altering the line lengths or altering the tension on hand winches where provided performs adjustments for the dock position due to the varying lake levels. Gangways or access ramps are used to gain entry to the main walkways of the floating docks. The typical dock arrangement consists of the gangway, a main walkway and the finger piers that define the berth boundaries. Vessels berthed at the resorts include a wide size range of craft from personal watercraft to houseboats with the majority being boats of approximately 20 feet in length. The berths range in length from 18 to 24 feet, with the majority at 20 feet.

Findings are provided for each resort in later sections of this report and summarized in Tables 12 through 18 (Appendix A).

3.9 Preliminary Environmental Survey

The Kleinfelder team conducted a preliminary environmental survey regarding known or suspected releases of hazardous substances on or near the subject site. A Recognized Environmental Condition is defined by the American Society of Testing and Materials (ASTM) *Standard Practice for Phase I Environmental Site Assessments*, *Phase I Environmental Site Assessment Process* (E1527-00), as "the presence or likely presence of hazardous substances or petroleum products under conditions that indicate a release into structures on the property or into the ground, groundwater or surface water of the property." A checklist form was used for the Preliminary Environmental Survey.