

DESIGN REPORT
FOR
SUNDANCE RV RESORT
@ EMPIRE LANDING
WASTEWATER COLLECTION

Prepared for:

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INTRODUCTION

The following is a design report for Sundance RV Resort. This parcel of land is located southeast of Parker Dam Road along the Colorado River in the Southeast Quarter of Section 25, Township 2 North, Range 26 East, of the San Bernardino Base and Meridian Line (See Figure 1). The project is a proposed 9.87 acre 127 unit RV park. The improvements include the construction of an access road, utilities, and 127 RV Spaces.

Existing facilities include three public restrooms, wastewater service is provided by existing onsite septic, lift station and off-site leach field.

Proposed Wastewater service will be provided by new onsite collection, septic treatment, new lift stations and expanded leach fields.

The vicinity map is shown in Figure 1. We are seeking the appropriate approvals for construction.

WASTEWATER COLLECTION

As part of the construction, the developer is installing an onsite wastewater gravity collection system (RV Park plumbing) using four-inch [4"] diameter PVC piping thru a septic treated tank and then to three (3) Pump stations that will force wastewater to the existing park lift station that will force the wastewater to existing and proposed Leach Fields.

The proposed Leach Fields are proposed to augment the existing leach system, expanding capacity by 10,000 gpd in the built out condition.

The existing wastewater system contains 3 plumbed restrooms, an RV dump Station, septic tanks, lift station, and leach fields.

All existing collection is directed to the lift station and then is pumped to the existing leach fields. The existing lift station has a daily capacity of at least 144,000 gallons per day.

The proposed wastewater collection flows are covered below.

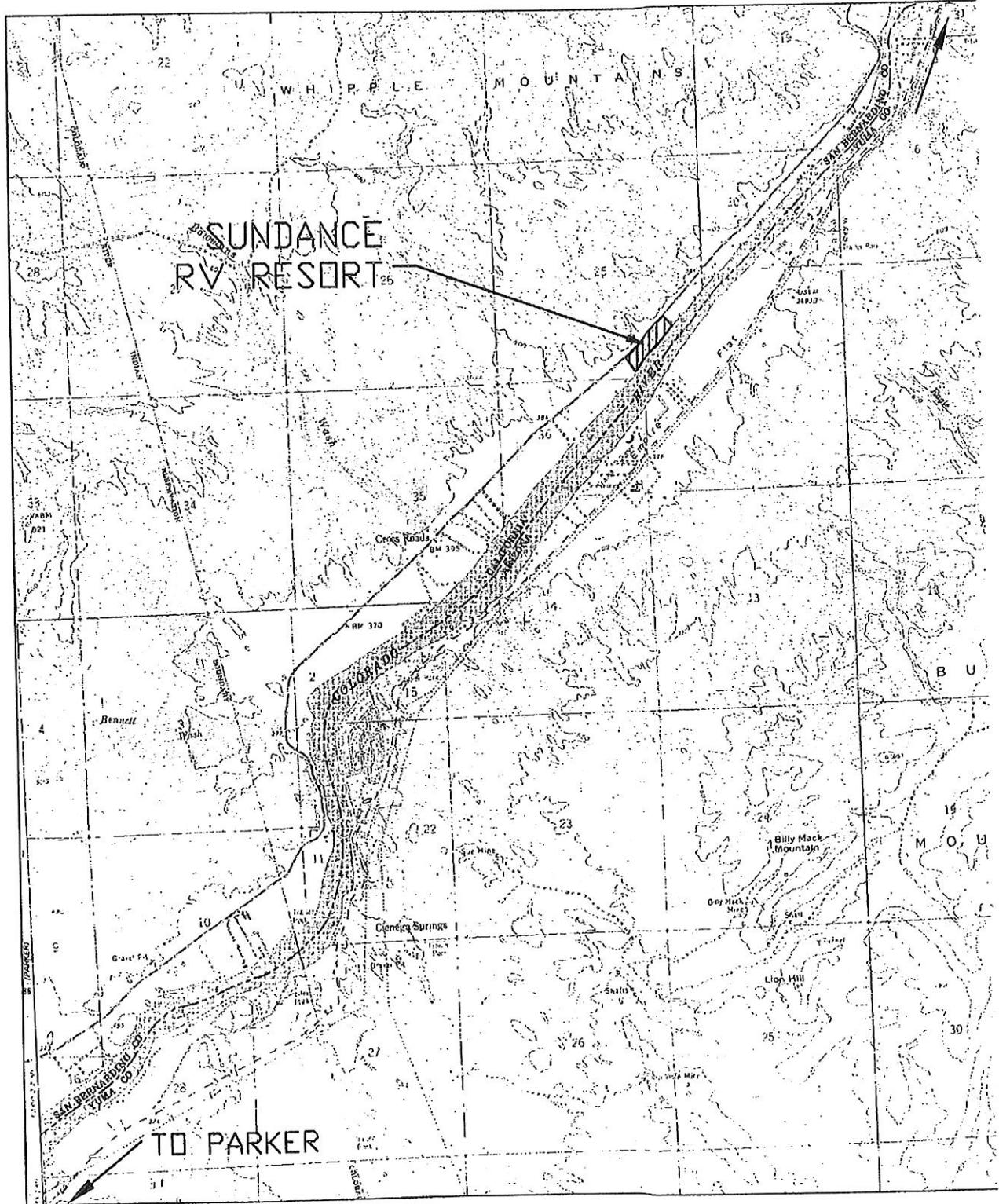
Average and Peak Flows

The proposed flows, an average daily sewer flow of 14,400 GPD (10.00 GPM) was calculated. The peak day sewer flow is 28,800 GPD (20.00 GPM) and the peak hour sewer flow is **40.0 GPM**. The peak day and peak hour flows were calculated per the Special Districts Department of San Bernardino County Design Criteria and Plan Preparation requirements. The peak day flow is 2 times the average daily flow, and the peak hour flow is 4 times the average daily flow.

The wastewater flow calculations are shown in Appendix "A".

SITE/LOCATION MAP
N.T.S.

TO LAKE
HAVASU



WASTEWATER

The existing wastewater collection system, septic tank treatment, efficient lift station and leach disposal fields will be incorporated into the overall proposed improvements.

DESIGN CRITERIA

The system heads, proposed lift station equipment and float elevations and cycle times are described below.

System Heads

The static head for this project varies per pump, which is the elevation difference between the sump of the pump station and the discharge point of the force main. The static heads for this project range from 3.8 to 11.8 feet. The friction head losses are the losses in the pipe due to friction and depends on the flows generated by the pump. At 50 gpm, the friction losses are between 11.5 and 38.2 feet. The TDH is the sum of the static head and the friction head.

The System Head calculations are summarized in Appendix "B".

Lift Station Equipment

For this project a package lift stations (Pump Sta.) manufactured by Liberty Pumps will be installed. The package duplex station offers several interchangeable pumps as part of the package system. The pumps chosen for this project are 2 HP, 1-Phase, submersible pumps (Liberty Pumps model number #D3672LSG36). This pump has a capacity of **50 gpm at 108 feet** of TDH (each). The pump curve is provided in Appendix "C".

The lift station wet well has a diameter of 36 inches, and is 6 feet deep, with a usable depth of 3.0 feet for storage volume.

Float Elevations and Cycle Time

The package lift station provides 3 floats for pump operation. The first float is the all-pumps-off float, which is set at 13 inches above the invert of the wet well (See Lift Station Schedule). The next float, the pump-on float, is set at 31 inches above the invert of the wet well, which provides 136 gallons of storage with 79 gallons of operational volume. The third and last float, alarm float, is set at 37 inches above the invert of the wet well. The last float is the alarm float and is set at the invert elevation of the incoming gravity sewer line. With the above storage volume, float elevations and peak hour sewer flow the pump cycle time ranges **from 7.3 minutes to 10.5 minutes**.

All calculations are summarized in Appendix "B".

OPERATION AND MAINTENANCE PLAN

The operation and maintenance plan for the Sundance RV Park's gravity sewer systems is as follows:

The gravity sewer system, which consists of 4-inch gravity mainlines, Septic Tanks and associated Pump stations, are owned and operated by the Bureau of Land Management. The operation plans will include standard visual inspection on a monthly basis at the Pump station locations. If these visual inspections indicate an accumulation of solids in the Pump stations, flushing of the lines will be implemented to clean the system.

If sections are found to have need for continued flushing, these sections would be inspected by camera to determine the cause of any accumulation of solids and a plan to correct the problem will be formulated and implemented.

Monthly inspections of the existing and proposed septic tanks will be performed to determine solids levels. When solids levels meet or exceed 25% of the tank depth the tank will be pumped and solids transported to the landfill by a licensed septic hauler.

CONCLUSION

The Sundance wastewater collection system is designed in accordance with California Water Board, OWTS Policy. The proposed wastewater collections system is a gravity system to a Septic tank(s), to a packaged Pump station which pumps the waste water to an existing Lift Station which forces the waste water to a new and the existing leach systems.

The plans and specifications accompanying this Design Report are designed utilizing the criteria outlined in this report.

The Proposed Sundance RV Resort at Empire Landing is designed to handle all of the flows from the existing Empire Landing Camp Ground and the proposed improvements of Sundance RV Resort. The proposed sewer lines have the ability to convey the flows developed by this final phase of the project.

APPENDIX “A”

SEWER FLOW CALCULATIONS

APPENDIX A

SEWER FLOW CALCULATIONS

DESIGN CRITERIA

Existing Empire Landing Camp Ground, Developed – Camp Spaces = 40
(Existing Public Restrooms)

Average Daily Flow per EPA OSWT Manual, Table 3-6, Campground Developed,
use 30 gallons per day, per Space.

$$40 \times 30 = 1200 \text{ gpd}$$

Existing Empire Landing Dump Station – Users per Day = 20

Average Daily Flow per Table 1—Forest Service Handbook 7409.11, Section 44.11
Travel Trailer Dump Station, use 25 Gallons per use.

$$20 \times 25 = 500 \text{ gpd}$$

Proposed Sundance RV Park - RV spaces = 127

Average Daily Flow per EPA OSWT Manual, Table 3-6, Camps: Trailer Camp, use 100 gallons
per day, per Recreational Vehicle Space.

$$100 \times 127 = 12,700 \text{ gpd}$$

Total of waste water generated by the entire site: 14,400 gpd

APPENDIX “B”

SYSTEM DESIGN CALCULATIONS

APPENDIX B

SYSTEM DESIGN CALCULATIONS

Proposed Wastewater System:

Proposed System 1:

(wastewater to existing plumbing collected at the main Lift Station)

Average Daily Flows - Sundance RV Park, Pump Station #1 - 46 spaces

46 Spaces x 100 gpd/lot = 4,600 gpd

Peaking factor 4,600 gpd x 4.00 => 12.8 gpm

Proposed sewage Grinder Pump Station Liberty Pumps Model D3672LSG (82 Gal. from 'OFF' until 'ON')

Duplex 50 gpm @108' TDH each pump.

Force sewer 2" PVC, 760' long

Friction Head = 38.15

Static head 11.4'

TDH = 49.6

Q = 47 gpm @ 4.8 fps

Operational volume fill time = (79 gal / 12.8 gpm) = 6.2 min.

Pump run time = (79 gal/47gpm) = 1.7 min per cycle.

Cycle time @ 12.8 gpm = 7.9 min. OK

= 3.8 starts per hour for each pump. OK

Proposed System 2:

(wastewater to existing plumbing collected at the main Lift Station)

Average Daily Flows - Sundance RV Park, Pump Station #2 - 31 spaces

31 Spaces x 100 gpd/lot = 3,100 gpd

Peaking factor 3,100 gpd x 4.00 => 8.6 gpm

Proposed sewer Grinder Pump Station, Liberty Pumps Model D3672LSG

Duplex 50 gpm @108' TDH each pump.

Force sewer - 2" PVC, 416'

Static head 10.6'

Friction Head = 22.5

TDH = 33.1

Q = 50 gpm @ 5.1 fps

Operational volume fill time = (79 gal / 8.6 gpm) = 9.2 min.

Pump run time (79 gal / 50 gpm) = 1.6 min per cycle

Cycle time @ 8.6 gpm = 10.8 min OK

= 2.8 starts/hour for each pump. OK

Proposed System 3:

(wastewater to existing plumbing collected at the main Lift Station)

Average Daily Flows - Sundance RV Park, Pump Station #3 - 50 spaces

50 Spaces x 100 gpd/lot = 5,000 gpd

Peaking factor 5,000 gpd = 4.00 => 13.9 gpm

Proposed sewer Grinder Pump Station, Liberty Pumps Model D3672LSG

Duplex 50 gpm @108' TDH each pump.

Force sewer 2' PVC, 67'

Static head = 7.9'

Friction Head = 3.6

TDH = 11.5'

Q = 50 gpm @ 5.1 fps

Operational volume fill time = (79 gal / 13.9 gpm) = 5.7 min.

Pump run time (79 gal / 50 gpm) 1.6 min per cycle.

Cycle time @ 13.9 gpm = 7.3 min OK

= 4.1 starts per hour for each pump. OK

Proposed Septic Tanks:

Septic tank design is per Appendix K, California Plumbing Code 2007, Table K-3, all three systems are calculated for Waste/Sewage Flow, over 1,500 gallons a day.

Flow x 0.75 + 1,125 = septic tank size.

Proposed Tanks System 1:

Average Daily Flow for System 1 is 4,600 gallons.

$$4,600 \times 0.75 + 1,125 = 4,575 \text{ gallons}$$

A septic tank of 4,575 gallons is required, a septic tank or tanks of 4,575 gallons or more will be provided.

Proposed Tanks System 2:

Average Daily Flow for System 2 is 3,100 gallons.

$$3,100 \times 0.75 + 1,125 = 3,450 \text{ gallons}$$

A septic tank of 3,450 gallons is required, a septic tank or tanks of 3,450 gallons or more will be provided.

Proposed Tanks System 3:

Average Daily Flow for System 3 is 5,000 gallons.

$$5,000 \times 0.75 + 1,125 = 4,875 \text{ gallons}$$

A septic tank of 4,875 gallons is required, a septic tank or tanks of 4,875 gallons or more will be provided.

EXISTING LIFT STATION CAPACITY

The existing lift station at Empire Landing consists of two (2) Gorman-Rupp Centrifugal pumps powered by a WEG W21 5.0 hp motor operating at 1730 rpm at each pump. The system is setup for Lead/Lag operation. Pumps currently provide an operating range curve of 250 gpm @ 30 FT, 150gpm @ 36FT, 100gpm @ 39ft, and 50gpm @ 40FT.

Wet Well 6' in Diameter, capacity from 'OFF' to Lead Pump 'ON' => 334.3 gallons.
Existing system wet well capacity => 6,800 gallons.

3" pvc Suction pipe (1 per pump)

Lead/Lag 'OFF' - El. = 366.9

Lead 'ON' - El. = 368.48

Lag 'ON' - El. = 369.48

HWL - El. = 370.48

EXISTING FLOW OPERATIONS:

Existing sewer Lift Station, Gorman-Rupp Pumps Model T3A3S-B

Duplex 250 gpm @ 30' TDH each pump.

Force sewer 4' PVC, 878.6 L.F.

Static head = 14.1' to existing leach fields

Friction loss in force main a@ 196gpm =>17.9'

TDH = 32'

Q = 196 gpm @ 32' and Velocity =5.1 fps

Pump run time 1.7 min per cycle.

Cycle time @ 4.7 gpm(peak flow) = 73.2 min. OK

= 0.61 starts per hour for each pump. OK

EXISTING LIFT STATION - PROPOSED OPERATIONS:

Developed Park Total Peak Hour 57,600 gpd => 40 gpm

Existing sewer Lift Station, Gorman-Rupp Pumps Model T3A3S-B

Duplex 250 gpm @ 30' TDH each pump.

Force sewer 4' PVC, 878.6 L.F.

Static head = 18.1' to proposed leach fields

Friction loss in force main a@ 181gpm =>15.4'

TDH = 33.5'

Q = 181 gpm @ 33.5' and Velocity =6.7 fps

Pump run time 2.7 min per cycle.

Cycle time @ 40 gpm(peak flow) = 11.1 min. OK = 2.2 starts per hour for each pump. OK

PROPOSED LEACH FIELD DESIGN

Each proposed field will provide for 5000 gallons per day as the existing field was designed, providing 15,000 gallons per day total capacity (three fields total).

Each field will be provided with a 100% reserve field which will be constructed along with the fields to be used.

Perk Rate = 0.6 (MPI of 1) per EPA LL Graph

Flow Rate = 5,000 (per field)

Perk Rate x flow (gallons) = Absorption Area

$0.6 \times 5000 = 3000$ SF.

Absorption Area = 3000 SF.

$\frac{\text{Absorption Area}}{\text{Trench Area}} = \text{Total Linear Feet}$

$\frac{3000}{4.5} = 667$ Linear Feet required

680 Linear feet provided.

APPENDIX “C”

PUMP CURVE