National Park Service

Glen Canyon National Recreation Area – Hite Launch Ramp

Project Basis of Design

April 29, 2025

Prepared by:

Jacobs Government Services Company

Greenwood Village, CO

Contract No. 140P2023D0006

Task Order No. 140P2024F0155

Jacobs

Jacobs

GLCA Launch Ramps Design Criteria

Date: January 20, 2023

I. Introduction

In partnership with the Park, and input from other stakeholders during early listening sessions, Jacobs developed site specific design criteria to address project needs for the launch ramp concept designs.

II. Design Standards

1. Codes
    a. Local Building Codes for Arizona and Utah
        i. 2024 International Building Code (IBC 2024)
        ii. Building Code requirements for Structural Concrete (ACI 318-14)
    b. Launch Ramp Materials
        i. Concrete – Building Code requirements for Structural Concrete (ACI 318-14)
        ii. Steel – American institute of Steel Construction Steel Manual (AISC-14)
    c. Ramp and Marina
        i. California Boat Launching Facilities – Design Handbook
        ii. UFC 4-152-07 Design: Small Craft Berthing Facilities
    d. Roads
        i. AASHTO Green Book (GDHS 2018)
        ii. Park Road Standards – National Park Service 1984
2. Loads (Dead, Live, Snow and Wind)
    a. Seismic is not considered since for a slab on ground (without piles), the slab will move with the ground and there is not a structure period associated with it (different from pile-supported slab).
    b. However, seismic shear may need to be considered for the grade beams; further work required to confirm.
    c. Load combinations (per Table 5.3.1 of ACI 318-14)

III. Environmental Conditions

1. Water level
    a. Current site water level is 3535 ft. (as of January 10, 2022)
    b. Existing ramps were designed for a water level between 3540 to 3580 ft.
    c. Design low water level for this project is 350 ft.

2. Wind
    a. ASCE 7-16 Basic Wind Speed 120 mph based on a Risk Category of III or IV

b. Wind is applied to the side of the large houseboat (described under the Vessels section for each site), which creates an overturning moment. This overturning moment is applied to the ramp as a compression load on the leeward side.

3. Atmospheric Conditions
    a. Atmospheric Conditions are derived from the following NOAA stations:
        i. Hanksville, UT, US
        ii. Moab, Canyonlands Regional Airport (CNY)
        iii. Page, Page Municipal Airport (KPGA)

IV. Hite Site Design Criteria

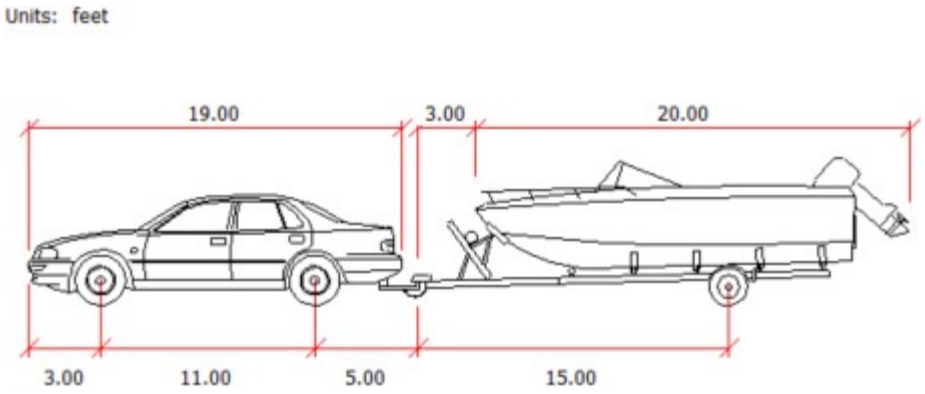
1. Summarized below are the anticipated Hite Design Criterion for a concept level design. To this point, Jacobs has only conducted a feasibility analysis, summarized in the Hite River Access Analysis Technical Memorandum. The below design criteria are subject to further discussion and evaluation once the Hite concept design is initiated.

2. Launch Ramp
    a. Ramp Width – 35 feet wide
    b. 3.5 ft min depth at the boat ramp during the operational season from spring through fall for J-boats. If this is not feasible, NPS has stated that a staging area for concessionaires to disassemble J-boats, load and haul away would be acceptable.
    c. From design guides, a 12 to 15% ramp slope is preferred, with 14% being the optimal slope for small crafts. Other sites have utilized a slope as low as 10.5% to allow for retrieval of large houseboats. Ramp slope needs would be evaluated further in the concept design.

3. Access Road and Parking lot
    a. Siting and Access, provide access from existing facilities and road to new Hite Take out site.
    b. Roadway classification: Class IV - Primitive Park Road.
        iv. Per NPS Park Road Standards, “these roads frequently have no minimum design standards and their use may be limited to specially equipped vehicles”.
        v. Design to be based on accommodating Ford F350 pickup truck. Use of road will be for launch and take-out of-J boats.
    c. Terrain – rolling to mountainous.
    d. Design Volume – unknown, assume <50 vehicles per day.
    e. Cross Section: 18 feet wide roadway with roadside ditches in cut sections. Design Assumptions: road will primarily be used for one way traffic, but allows width for two-way traffic needed. Note: Ditch capacity needed unknown. Roadside ditches were modeled with 2 feet bottom

width and 4:1 side slopes.

f. Design Vehicle used: AASHTO P-B (passenger vehicle towing boat). Overall vehicle length 42 ft



g. Minimum Turning radius 24 feet.
h. Minimum curve radius 50 ft (based on design speed of 15 mph and Auto turn modeling of design vehicle P-B)
i. Access road has a max grade of 12% (for design speed of 15 mph, rolling terrain = 11% max, mountainous terrain = 17% max)
j. Roadway surface: gravel

4. Geotechnical conditions
    a. No investigations currently planned, to be planned and conducted in concept design.
    b. Currently assumed to be a stiff rock subgrade.

V. Hydrologic and Hydraulic Analysis

1. Hydrology

    The offsite hydrology was completed using the SCS unit hydrograph method applied within the HEC-HMS model version 4.10. Drainage basins were delineated to potential culvert crossing locations along the roadway, parking lot and ramp alignment. Hydrologic analysis for the ditch sizing was completed using the Rational Method. The 10-, 50-, and 100-year floods were analyzed.

2. Hydraulics

    Hydraulic analysis was not included in the scope of services. Estimates were made for culvert sizing based on the hydrology results for cost estimating purposes. Preliminary hydraulic analysis was performed for roadside ditches to estimate earthwork quantities. It was determined that in most cases, a 1-foot ditch depth would convey the 100-year flow.