

March 18, 2022

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Dear Erik,

**RE: KRRP – IRON GATE TEMPORARY CONSTRUCTION ACCESS ROAD –  
DESIGN CRITERIA (DRAFT)**

This letter is intended to outline the design criteria for the temporary construction access road to access Iron Gate dam site from the left bank upstream of the dam as part of the Klamath River Renewal Project. Following acceptance of the criteria herein, Knight Piésold's (KP's) road design sub-consultant, Geoserv, Inc., will proceed with a preliminary road stability analysis and preliminary design of the proposed alignment.

Much of the proposed alignment is currently underwater in the Iron Gate Reservoir. In addition, no subsurface investigation data were available at the time of the preliminary design. As a result, the slope stability analysis and road design will be preliminary and subject to change. Site conditions will be reviewed by the Engineer following reservoir drawdown and the design will be updated as required prior to road construction.

## 1.0 PRIMARY DESIGN OBJECTIVES

- Design stable temporary haul roads to access Iron Gate dam.
- Avoid any material entering the post drawdown wetted perimeter of the Klamath River.
- Maximize usable soil for use as construction access road fill.
- Locate spoil areas within the project limits to reduce labor and haul costs.
- Design will be California PE stamped by GeoServ, Inc.

## 2.0 DESIGN CRITERIA

### 2.1 GENERAL HAUL ROAD DESIGN CRITERIA

- Iron Gate Access Road shall be designed as a temporary structure (i.e., 2 - 3-year design life).
- Iron Gate Access Road is for Contractor use only during construction and will be left as-is following Project completion. Following Project completion, road access will be blocked or prevented via rock/earthfill berm or other approved methods. A posted permanent sign will be needed at project completion at the barrier indicating danger of rock fall and slope stability for pedestrians. Proceed at your own risk.
- Runaway vehicles are not considered in this design due to tight spatial constraints.
- The road design is based on site conditions, temporary haul road industry best practices, equipment specifications and Contractor inputs.

- Iron Gate Access Road maintenance of driving surfaces, and any daily or weekly maintenance required for continued compliance to the design geometry for the duration of use, will be the responsibility of the Contractor.
- Following a snow event - road shall be ploughed clear and if icy, adhesion shall be improved through placing cinder/salts etc. or as per Contractor's road maintenance plan.
- Slope hazard mitigation shall be managed by the Contractor.
- Temporary road signage will be as required by the Contractor.
- Best Management Practices (BMP's) will be implemented.
- On-site materials will be used for haul road construction.

## 2.2 VEHICLE LOADING

- The road is designed to accommodate the maximum imposed tire contact pressure due to a fully loaded CAT 745C haul vehicle, as defined by the Contractor.
- Other construction equipment may be used, provided the maximum applied loads do not exceed the fully loaded CAT 745C.
- Vehicle Load Factor (dynamic impact/braking etc.) = 1.25.

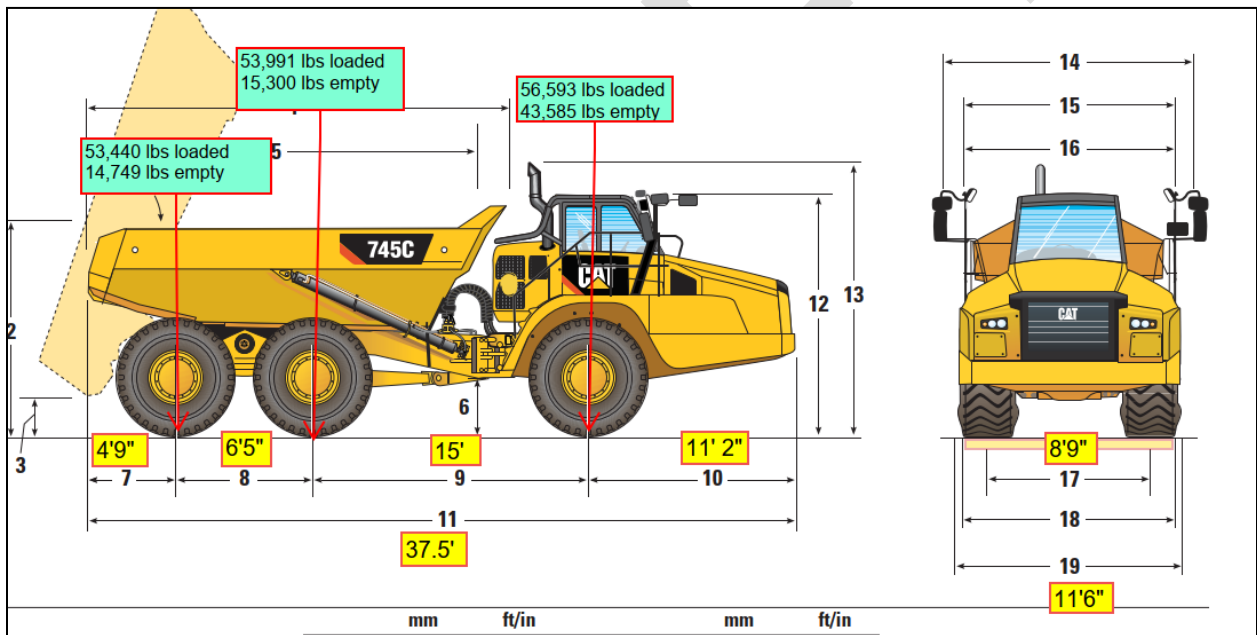
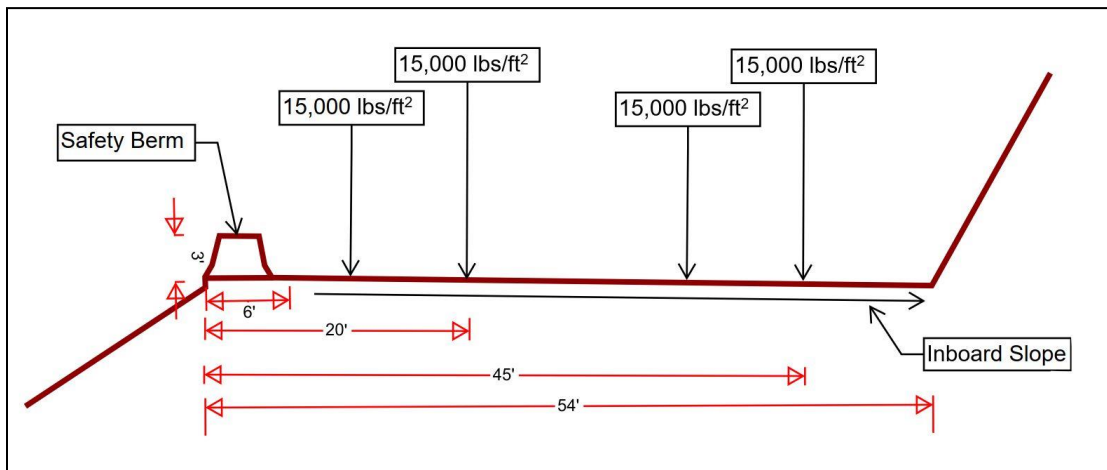


Figure 1 - CAT 745C Articulated Truck – Unfactored Nominal Axle Loads  
[\(CAT Product Specifications Sheet\)](#)



**Figure 2 - 2D Slope Section, CAT 745C Axle Loading (based on tire contact pressure)**

### 2.3 ROAD DESIGN CRITERIA

- 54 ft wide road - two way traffic (double lane).
  - 6 ft wide x 3 ft high safety berm (gabion baskets or earthfill/rock berm - TBD by Contractor).
  - 48 ft wide driving surface.
- Safety Berm is not designed for impact. Safety berm provides operators with visual/tactile feedback for vehicle alignment and road vehicular positioning.
- Maximum allowable road grade is 20%.
- Road will slope inwards from the outer edge to direct surface run-off. Drainage culverts and water management to be provided by the Contractor.
- Minimum allowable outside vehicle turning radius = 35 ft.

### 2.4 SLOPE STABILITY (GRANULAR MATERIALS)

- Includes all slopes comprised of loose/granular material (soils, gravel, rubble).
- Required factor of safety for limit equilibrium under static conditions will be 1.5.
- Inputs based on industry best practice for temporary haul roads (per MSHA and best practices for Forestry/Mining Haul Road applications). Actual soil and rock conditions to be field verified during construction.
- Peak Flood Events (considered for toe stability of sidecast material zones).
  - Iron Gate Flood Event (1% Probable Flood, Post Drawdown WSL) EL. 2,190 ft
  - Freeboard Assumed for long term slope stability 2 ft
- Seismic Peak Ground Acceleration (100 Year Return Period) 0.036g
- Sidecast spoiled material - slope stability factor of safety (FOS) 1.05

### 3.0 CLOSING

We trust the information contained herein meets your needs at this time.

Please do not hesitate to contact any of the undersigned if you have any questions or comments.

Yours truly,  
**Knight Piésold**

Prepared:

\_\_\_\_\_  
Craig Nistor

Reviewed:



\_\_\_\_\_  
Norm Bishop

Approval that this document adheres to the Knight Piésold Quality System:

Copy To:

Nick Drury, Kiewit Infrastructure West Co.

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