

SACS Environmental Center Trail Bridge Replacement

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The replacement wood bridge and supporting soil must safely carry the load of a maintenance utility terrain vehicle (UTV) with its personnel, and equipment loaded in the bed. The bridge will need to be widened to a minimum of 6-foot clear width to allow for the UTV access while maintaining a level of stable crossing. The bridge alignment will need to be shifted horizontally to improve overall trail layout while accommodating the wetland. Safety features, including pedestrian railings on both sides with no significant gaps, will be required to protect young children, pedestrians, and pets from falling or passing through the structure. Footings must be at a minimum depth of 3.5 feet below the ground surface to satisfy frost protection requirements and may extend deeper depending on soil conditions. All design and construction activities must comply with applicable local safety codes, accessibility requirements, and environmental regulations in Allen County, Indiana. The final design should minimize unnecessary increases in project cost, complexity, and construction difficulty. These are requirements, specifications, and parameters requested by the client that cannot be changed. The final and completed structure must prove to be durable, easy maintenance, and safe crossing for both pedestrians and UTVs.

To build the Southwest Allen County Schools (SACS) trail bridge replacement, several site and material conditions will determine how these requirements are met. The bridge is situated in a wetland hence environmental concern like unstable soils, low bearing capacity and soil compaction will have to be investigated significantly. Site hydrology will also have to be assessed to determine water elevation during rainy periods and to set the bridge above that. The preferred raw materials are wood due to its accessibility and cost; structural steel members are off limit since there is no road leading up to the bridge. Everything must be hand carried or wheelbarrowed over. The different types of screws and bolts used in binding the wood together are an additional consideration. Since the client requests the use of treated wood, the major limitation would be the maximum allowable stress of lumber, which is weaker than steel, and varies with species and grade of wood. Construction must remain within the capabilities of students, volunteers, and maintenance personnel to handle, limiting the use of specialized equipment and complex construction methods. Furthermore, final design and construction will be limited by the surrounding wetland conditions and necessary permitting requirements. All in all, these conditions favor a design that minimizes costs and construction complexity.