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# Publication announcement on "Design Guidelines for Installing a Joined Rigid-Frame Driftwood Entrapper in the Existing Sabo Facilities"

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## 1. Introduction

Driftwood is considered the major factor that intensifies sediment-related disasters throughout the Japanese homeland Structural countermeasures against driftwood need to be accelerated. Multiple discussions on driftwood countermeasures have been held in the Sabo Technical Center (STC). These discussions have been included in the STC "Study Group on the Development of New Sabo Technology." Our objective is to make full use of the existing Sabo check dams, which, in general, feature a hydraulically nonconsecutive form (namely, man-made waterfalls). Specifically, we focus on the improvement of the spillway upstream section in the existing facilities. In the STC design guidelines with reference to the "Design Handbook of Steel Sabo Structures," we describe a rigid joined steel frame installed in the spillway upstream section.

These guidelines can be purchased by filling out an order form via the STC Home page.

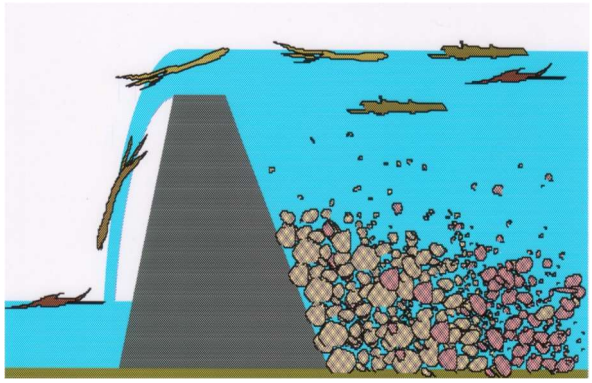


Image of a hydraulically nonconsecutive weir/dam in the bedload-flow-dominant stream section.

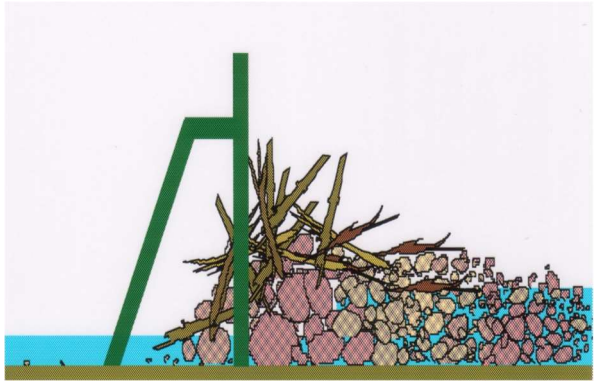


Image of a hydraulically consecutive steel frame entrapper in the bedload-flow-dominant stream section.

## 2. Purpose of driftwood entrappers and joined rigid frames

Driftwood entrappers are used for driftwood capturing. Their purpose is to entrap driftwood, which contains sand and gravel debris originating from floods in the debris-flow-dominant stream section and the bedload-flow-dominant stream section. Therefore, an effective entrapment system must be able to capture 1) sand and gravel; 2) mainly

flood water with a low sediment content. The specific weight of driftwood parts with a sufficient length dictates their natural separation in the flooding channel because of gravel deposits when the floating driftwood parts are driven on the stream surface. The spacing between adjacent rigid-frame components must be sufficient both vertically and horizontally to assist this natural separation process; additionally, their height should protrude over the water surface both in the debris flow and sediment flood.

The joined rigid-frame driftwood entrapper is an improved version of an on-purpose steel rigid-frame entrapper installed in the spillway upstream section of the existing Sabo facilities with sufficient longitudinal space to allow sediment and water to flow through and downward. In our engineering elaboration, we focus only on the minimum modifications required for the existing dam facilities (i.e., no cutting out or changes in elevation). Our objective is to design a driftwood entrapper with sufficient spacing from the spillway upstream section. Driftwood must be entrapped right upstream of the main dam/weir without affecting the spillway operation. For many years, engineering efforts have been made to avoid blocking flood water or its containing gravel. In this way, the risk of upstream bank erosion and backwater flow, which often causes damaging impoundment, is reduced. The proposed "joined rigid-frame driftwood entrapper" is suitable for various applications, including, but not limited to, existing Sabo facilities, where installing an entrapping frame on the spillway is difficult, and/or those unsuited to major renovation to make them hydraulically consecutive Sabo facilities. Two structures that improve entrapment efficiency are described in detail. The first is suitable for Sabo facilities with no margin to full sedimentation in terms of sediment management and planning. The second is suitable for Sabo facilities with a substantial margin up full sedimentation, i.e., a planned sedimentation elevation. The guidelines include the procedures for the designing and planning of joined rigid-frame driftwood entrappers. The study workflow and the external forces that need to be considered are described in detail. We anticipate that our study will be useful for planners and engineers who face the complex challenge of mitigating driftwood-related disasters by implementing reliable structural countermeasures.

**Joined rigid-frame driftwood entrappers:**
**(left: without a margin; (right) with a margin to full sedimentation).**

### 3. Technical consulting services provided by STC

Many requests for providing technical consulting have been submitted to STC from both national offices and local municipalities. The modification of the existing facilities appears to be the main request of most clients because it not only improves driftwood entrapment but also leads to fundamental redesign encompassing structural safety check-ups.

The STC guidelines include basic design and planning procedures. Some clients may request more in-depth and in-detail case-by-case technical consulting for applying the guidelines; additionally, they may request to receive the related technical documents at hand.

Clients are encouraged to contact our office to address their technical concerns and request proper advice by paying a fee. We can provide a better understanding of the Sabo facilities in specific streams and basins on-site by contacting experts in the field.

Customized technical advice is essential for effective design and planning. Our technical consulting services have been highly successful and have earned a good reputation. Additionally, they are not limited to driftwood operations but also to the reinforcement of historical legacy masonry structures and small but steep-stream planning to the highest technically possible extent regarding sediment washout and erosion control.

STC will continue to contribute to the development of Sabo engineering by timely including field-case-based insights into our technical guidelines and compendium.

### 4. Short remarks

STC has been engaged in publishing the "Design Handbook of Steel Sabo Structures" and "Field Handbook of Sabo Soil Cement" both of which are addressed to individuals in charge of designing and implementing Sabo structures. Our sincere hope is to support long-time

professionals by providing our guidelines to improve facility design and planning. We express our deep appreciation to those who supported our drafting team by freely providing the necessary figures and photos. Finally, we declare that we are fully responsible for any errors or misguidance. Thank you!

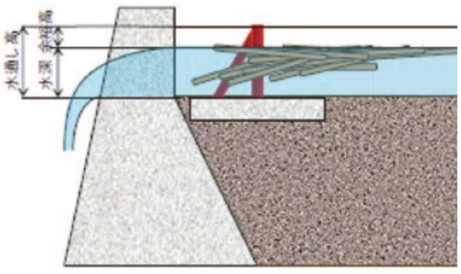
**Picture showing a field where technical consulting is provided by an STC member.**

# Design Guidelines for Installing a Joined Rigid-Frame Driftwood Entrapper in the Existing Sabo Facilities
# Improvement in Driftwood Entrapment by installing a Rigid-Frame Entrapper in the Spillway Upstream Section of the Existing Sabo Facilities

## Published in March 2020

Driftwood is considered the major factor that intensifies sediment-related disasters throughout the Japanese territory. Structural countermeasures against driftwood need to be accelerated. Many discussions on driftwood countermeasures have been held in the Sabo Technical Center (STC) to produce the necessary guidelines, which are available this April.

## Contents



**Installation works for joined rigid-frame driftwood reapers Design of a Joined rigid-frame entrapper**

**(Without a margin and with a margin to full sedimentation)**

**Sabo and Landslide Technical Center (STC)**