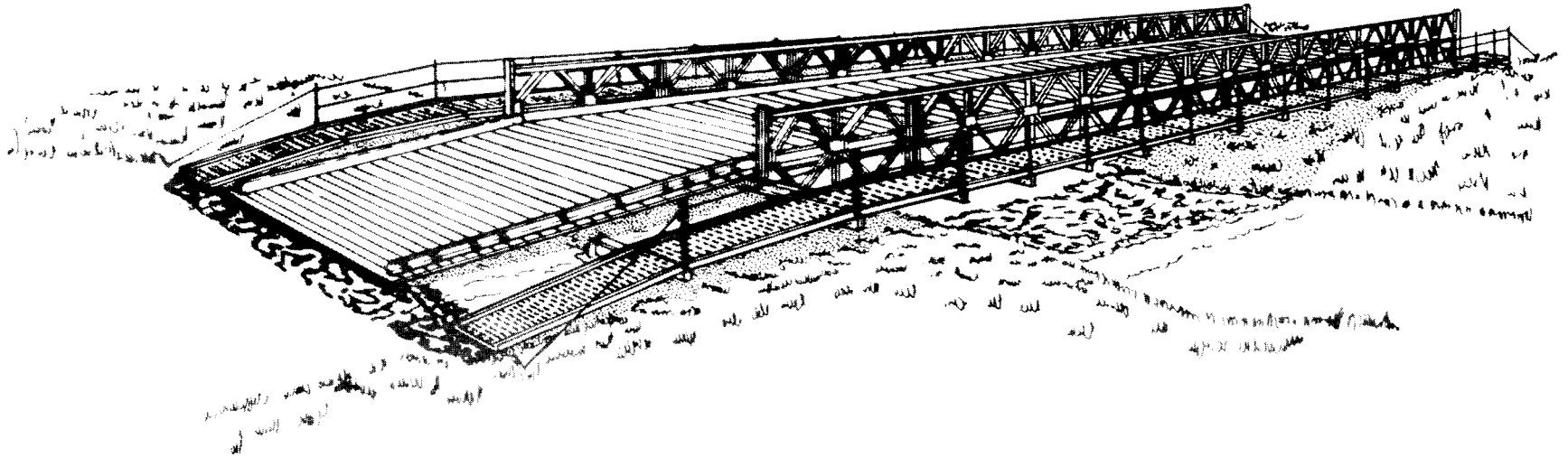


Part One

THE BAILEY M2 BRIDGE



CHAPTER 1

HISTORY AND USE OF THE BRIDGE

At the outset of World War II, the United States (US) Army sought a versatile bridge that could span a variety of gaps and be quickly assembled by manpower alone. For this reason, we adopted the design for the British prefabricated Bailey bridge, US nomenclature M1. We revised the design to provide a greater roadway width of 12% feet and designated it the Panel Bridge, Bailey M2 (Figure 1-1). The British then modified the US version by widening the bridge again, thus producing the extra-wide Bailey M3 bridge. The US Army does not stock the M3 bridge in its arsenal. The Bailey bridge is a through-type truss bridge, the roadway being carried between two main girders. The trusses in each girder are formed by 10-foot panels pinned end to end. In this respect, the Bailey bridge is often referred to as the “panel” or “truss” bridge.

ADVANTAGES

Some of the characteristics that make the Bailey bridge valuable to field commanders are—

- It is easy to install. Each part of the Bailey bridge is a standard machine-made piece and is interchangeable among spans. In most cases, no heavy equipment is required to assemble or launch a Bailey bridge; only basic pioneer skills and equipment are needed.

- It is highly mobile. All parts of the bridge can be transported to and from the bridge site by 5-ton dump trucks and trailers.
- It is versatile. Standard parts can be used to assemble seven standard truss designs for efficient single spans up to 210 feet long and to build panel crib piers supporting longer bridges. With minor non-standard modifications, the expedient uses of bridge parts are limited only by the user’s imagination.

CONSTRUCTION

Transverse floor beams, called transoms, are clamped to the bottom chords of the trusses and support stringers and decking. Sway braces between the girders provide horizontal bracing; rakers between the trusses and transoms keep the trusses upright; and bracing frames and tie plates between the trusses provide lateral bracing within each girder.

Main girders

The main girders on each side of the centerline of the bridge can be assembled from a single truss or from two or three trusses side by side. For greater strength, a second story of panels can be added to the trusses. The upper stories are bolted to the top chord of the lower story. For greatest strength, a third story is added. These three basic types are

shown in Figure 1-2 (page 4). The types of possible truss assemblies are given in Table 1-1 (page 4). A single-truss, double- or triple-story bridge is never assembled because it would be unstable. All triple-story bridges with the deck in the bottom story are braced at the top by transoms and sway braces which are fastened to overhead-bracing supports bolted to the top chords.

Materials

The decking, called chess, is wood. Panels, end posts, transoms, and ramps are a low-alloy, high-tensile steel. All other parts are carbon structural steel. All joints in the parts are welded.

Deck

The clear roadway between curbs, called ribbands, is 12 feet 6 inches wide. The transoms supporting the roadway are normally set on the bottom chords of the bottom story. Footwalks can be carried on the transoms outside of the main trusses on each side of the bridge.

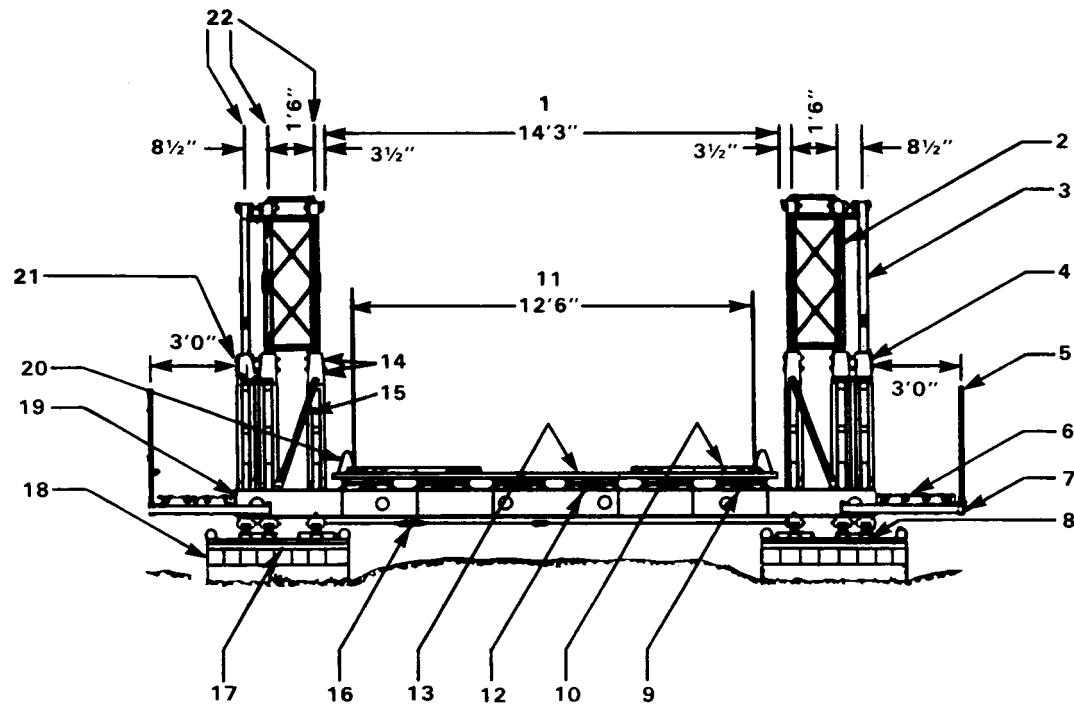
Bearings

End posts pinned to the end of each truss sit on cylindrical bearings which rest on a steel base plate. On soft soil, timber grillage is used under the base plates to distribute the load. The bridge can be assembled between banks of different elevations, but the slope should not exceed 30 to 1.

TYPES OF STRUCTURES

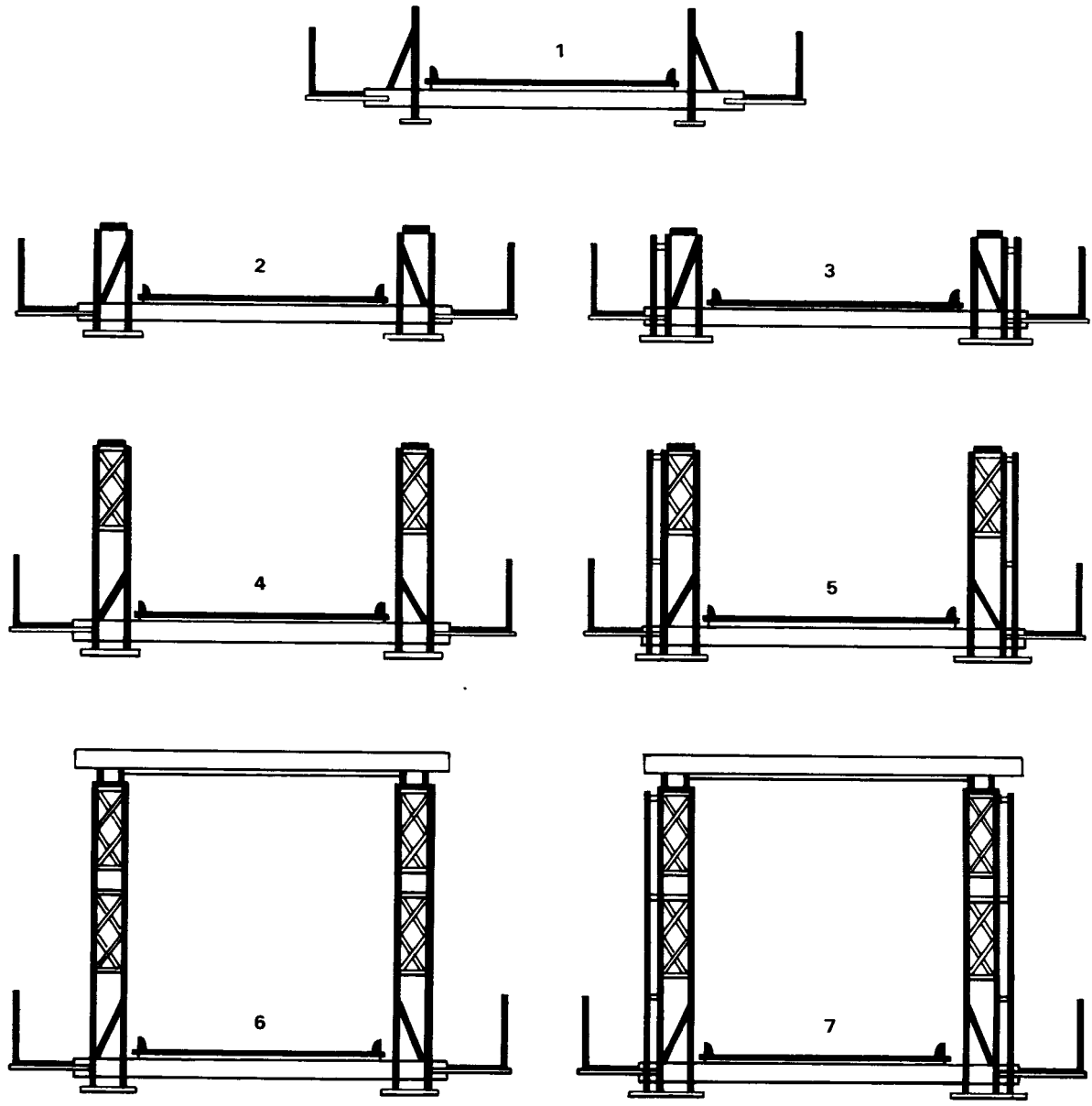
Panel bridge equipment can be used to assemble fixed bridges and panel crib piers and towers. Other special structures such as floating bridges, suspension bridges, retractable bridges, and mobile bridges, can be assembled using special parts. Panel bridge equipment is normally used to assemble fixed simple-span, through-type bridges from 30 to 210 feet long. The bridge can be assembled to meet varying conditions of span and load. Bridge weight per bay is given in Table 1-2 (page 5). The following special assemblies are also possible:

- Two-lane, through-type bridges; deck-type bridges; railway bridges; bridges on piers; and floating bridges can be built with panel bridge equipment.
- Panel crib piers and towers up to 70 feet high supporting continuous spans, and up to 110 feet high supporting broken spans, can be assembled with panel bridge equipment and special crib-pier parts.
- Many expedient structures can also be built with panel bridge equipment. These include causeways, box anchors, towers for floating bridge cables, and loading hoppers and gantries.



1 CLEARANCE BETWEEN TRUSSES	12 PLAIN STRINGER
2 BRACING FRAMES	13 CHESS
3 PANEL	14 PANEL PINS
4 END POST	15 RAKER
5 FOOTWALK POST	16 SWAY BRACE
6 FOOTWALK	17 BASE PLATE
7 FOOTWALK BEARER	18 GRILLAGE
8 BEARING	19 TRANSOM
9 BUTTON STRINGER	20 STEEL RIBBAND
10 WEAR TREAD	21 SHORT PANEL PINS
11 ROADWAY	22 CENTERLINE OF PANELS

Figure 1-1 Panel bridge, Bailey type M2



- 1 SINGLE-TRUSS SINGLE-STORY (SS)
- 2 DOUBLE-TRUSS SINGLE-STORY (DS)
- 3 TRIPLE-TRUSS SINGLE-STORY (TS)
- 4 DOUBLE-TRUSS DOUBLE-STORY (DD)
- 5 TRIPLE-TRUSS DOUBLE-STORY (TD)
- 6 DOUBLE-TRUSS TRIPLE-STORY (DT)
- 7 TRIPLE-TRUSS TRIPLE-STORY (TT)

Table 1-1 Abbreviations for single-lane panel bridges, Bailey type M2

TYPE		USUAL	
TRUSS	STORY	NOMENCLATURE	ABBREVIATION
Single	Single	Single-single	SS
Double	Single	Double-single	DS
Triple	Single	Triple-single	TS
Double	Double	Double-double	DD
Triple	Double	Triple-double	TD
Double	Triple	Double-triple	DT
Triple	Triple	Triple-triple	TT

Figure 1-2 Single-, double-, and triple-truss assemblies

This change supersedes page 5.

Table 1-2 Weight of M2 panel bridge in tons per bay

TYPE OF CONSTRUCTION		WEIGHT IN TONS PER BAY						
		SS	DS	TS	DD	TD	DT	TT
Bridge bays		2.76	3.41	4.01	4.66	5.88	6.46	8.29
Launching-nose bays		1.00	1.64		2.90			
Decking	Chess and steel ribbands	0.66	0.66	0.66	0.66	0.66	0.66	0.66
	Stringer only	0.79	0.79	0.79	0.79	0.79	0.79	0.79
	Wear treads (four 3" x 12" panels on each side)	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Miscellaneous	Footwalks	0.17	0.17	0.17	0.17	0.17	0.17	0.17
	Overhead-bracing (supports, transoms, sway bracing and chord bolts)	0.54	0.54	0.54	0.54	0.54	0.54	0.54

¹ Footwalks and wear treads not included.

² Overhead bracing included.