New Challenges for Army Combat Engineers:

Bomb Damage Assessment, Fire Damage Assessment, Evaluation of Diminished Capacity, and Developing New Strategies for Short, Medium and Long-term Mitigation/Repair

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Tikrit Bridge Demolition by Iraqi Forces
Views From the Bridge
Critical structures damaged by bombs and Improvised Explosive Devices must be evaluated for capacity. No clear cut methodologies or established protocol is presently included in combat engineering training syllabus to educate junior officers how to go about these tasks.
Bomb and fire-damaged bridge decks required immediate evaluation of diminished capacity. Then, decisions about what kinds of short, medium or long-term measures to effect repairs. At present, long-term repairs are generally turned over to civilian contractors.
Fire Damage Assessment
The traditional role of combat engineers has been Short-term combat bridging – “only there long enough to win the battles”
This view shows the longest floating river bridge assembled in a combat theater since World War II, across the Tigris River in Tikrit. A typical pontoon treadway bridge can be erected in just 6 hours, but would require two multi-role bridge companies, 36 Bridge Erection Boats, 80 Assault Float Bridge sections and 24/7 operability of the boats.
Temporary Bridge Solution
Mabey Johnson Bridge end connections
Pier 8, east end

Damaged Pier 7, west end
PIER 7 FRONT VIEW

*Mostly surface damage cracks - do not require daily measurement
PIER 7 TOP VIEW

- Bridge Pier Cap w/ Cantilever ends
- Bridge Beam & MJ Bearing area

East bound traffic

West bound traffic Using MJ

Bridge Pier

*Critical crack requires daily measurement

MEASURE THE DEGREE OF DEFLECTION BETWEEN THE EAST AND WEST SIDE OF THE CANTILEVER (MAY REQUIRE SURVEY EQUIPMENT)

MEASURE THE EXPANSION OF THE CRACK ALONG THE CAP OF THE CANTILEVER
**PIER 7 SIDE VIEW**

- **MEASURE THE EXPANSION OF THE CRACK ALONG THE END OF THE CANTILEVER**

**MEASURE DEFLECTION OF I-BEAM AT THE END OF THE CANTILEVER FOR INDICATION OF STRESS**

*Crack will not grow without crack on top of the pier cap growing Do not require daily measurement*
PIER 7 BOTTOM VIEW

Bridge Pier Cap w/ Cantilever ends

Bridge Pier

*Crack will not grow without crack on top of the pier cap growing
Do not require daily measurement
Mabey Johnson spans placed on upstream side of tail span gaps on the Tikrit Bridge across the Tigris River. Note repair of Pier 7.
Tikrit Bridge
- AFB
- 2x M-J on Fixed Bridge

Tikrit Bridge Bypass

Samarra

Roads to Kirkuk

Tikrit Bridge LOCs
Bypass Route
Length 24 km
Tikrit By-Pass Construction
Decisive Point – Bridge to Shore Connection

Unprepared Abutment
Landing Bay
Deflection angle = 6.5%

Deflection angle = 6.5%
Total Deflection = 4.2m

Material added for elevation to median water level
Rotating Junction

Median water level
Water line

Near shore (West side)
Unloading and moving Individual Pontoons

Pontoons Specifications:
- 40,000lbs ea
- 2 sizes: 40 & 20 ft
- 7 ft deep
- 10 ft wide
Assembling Floating Pontoon Piers
Assembled Span Launched

Launching Nose
Anchoring:
- River bottom investigated by Army divers
- Buried transoms used as Dead-man anchors for end spans
- Fluted anchors & pontoons filled with soil used for intermediate spans
Half-Complete Mabey Johnson Float Bridge
12 month pontoon bridge constructed by Bechtel across Tigris River

Segemented Mabey-Johnson trusses laid on rectangular steel pontoons. Each pontoon weighed 40 kips; lashed together in groups shown here. MLC 110 kip vehicle capacity, suitable for transit of M1A1 Abrams on transporters.
Opening and Proofing
Completed Mabey Johnson Float Bridge
Armored Vehicle Launched Bridge (AVLB) MLC 70

Old Bailey Bridge across Tigris Estuary (MLC 40)

Lateral Sway supports