NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

January 30, 2015

Group Chairman's Factual Report

STRUCTURES

DCA13MA081

Attachment 13

Telair Study
M-ATV Secured to 9G Forward
November 20, 2014

All the Pieces For Complete Cargo Competence ™

Telair INTERNATIONAL
An AAR Company

M-ATV Secured with Tiedowns to 9G Forward

B747-428 (BCF)

Registration: N949CA
MSN 25630

29-Apr-2013, Bagram (Afghanistan)

Scope of Work

All the Pieces For Complete Cargo Competence ™

- An M-ATV (12614 kg) shall be restrained to 9G forward under consideration of all other load directions.
- The tiedown calculation will only be shown for the forward direction.
- The following tiedown scheme has been performed for NTSB investigation support

Tiedown Points for M-ATV

(FWD Direction)

M-ATV, TIEDOWN CALCULATION FWD		AVAILABLE CAPABILITY					REQUIRED CAPABILITY			
DIRECTION	TIEDOWN LOCATION	FLOOR ANGLE	CENTERLINE ANGLE	NUMBER OF TIEDOWN FITTINGS	TIEDOWN ALLOWABLE (KG)	TOTAL TIEDOWN ALLOWABLE (KG)	LOAD FACTOR	WEIGHT (KG)	TOTAL (KG)	MARGIN OF SAFETY
FWD	PALLET LOCK TIE DOWN RING	8	2	2	2268	113896	9	12614	113526	0,00
FWD	PALLET LOCK TIE DOWN RING	5	1	2	2268					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	4	8	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	4	8	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	5	8	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	10	21	2	1080					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	16	50	2	540					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
FWD	PALLET LOCK TIE DOWN RING	0	0	2	2268					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
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FWD	PALLET LOCK TIE DOWN RING	0	0	2	2268					
FWD	PALLET LOCK TIE DOWN RING	0	0	2	2268					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
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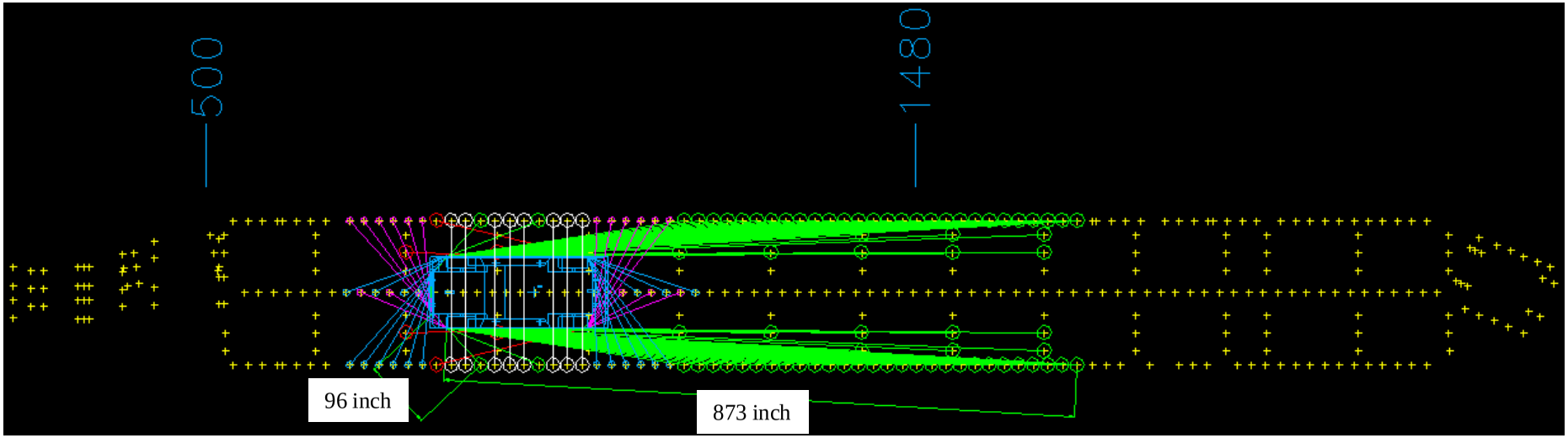
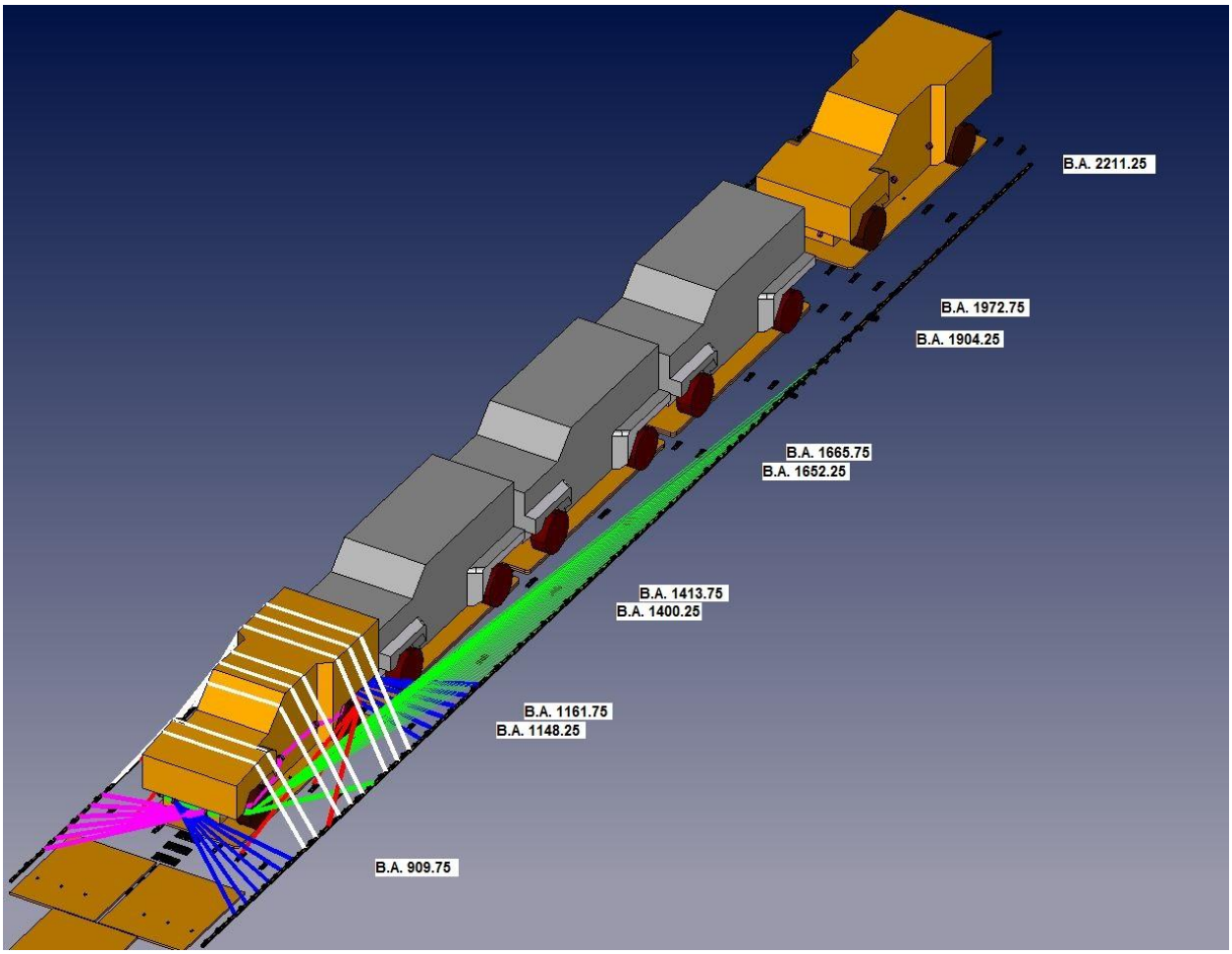
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					
FWD	SIDE GUIDE, DOUBLE STUD FITTING	0	0	2	1247					

[redacted]

Summary

- Only Telair hardware was considered (no Boeing seat track)
- One (1) M-ATV located from B.A. 809 – 1056
- Attention:
  - For this theoretical analysis, a B747-400F nose door freighter main deck was used with the Upperdeck starting a STA 777 since otherwise the 9g FWD straps would have ended even in the side cargo door area
  - Loading a full-height M-ATV at this location in a B747-400BCF only would be possible if the tires would have been taken off the vehicle to lower the height below 96 inches
- 39 Straps = 78 Tiedown Points necessary for FWD Direction (9G)
- Strap length between 2 x 96 inch and 2 x 873 inch (floor angle and M-ATV width ignored)
- Assumed tiedown strap elongation 7 % (see http://www.trip-co.nl/aircargo/aircargo.php?categorie=restraint-products&sub=tie-down-straps)
- 2 x 873 inch x 7 % = 122 inch strap elongation
- Most likely scenario in a 9G Forward case: The shortest strap will be streched to 7 % and fails before the longer straps are loaded to their maximum capability. To calculate the strap loads an analysis would be required that takes into account the stiffness of the straps.
- Therefore it is not possible to safely and properly secure a M-ATV vehicle in any location.

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B.A. 1148.25
B.A. 909.75