

Anecdotal Review of NHTSA fatal end terminal hits with attempt to determine pre-crash device and any possible concerns related to Frankensteining, damage, obsolescence, or installation concerns. This was a “best effort” attempt as the original data was extraordinarily flawed. It prevents useful data but original crash reports and more in depth analysis would be required to be 100% certain on each impact. This was not an attempt to prove causation between any defect and death.

FL	Florida	19 Fataals	
FL	2/19/20	SRT 350 4/19	None
FL	8/11/20	BCT (2/19)	None
FL	3/1/2020	SRT 350 (9/19)	Upside down and significantly modified SRT 350
FL	11/7/20	FLEAT 350 (6/19)	Bolt through Post 3
FL	9/8/20	SKT350 (5/19)	None
FL	2/27/20	Blunt end (6/15)	Suspected gating into swamp
FL	4/16/19	BCT (2018)	Suspected gating into swamp
FL	12/13/19	No guardrail	
FL	11/11/19	FLEAT 4/19	None
FL	4/22/18	No guardrail	
FL	10/31/18	FLEAT 350	Suspect bolt at 3 but uncertain
FL	11/3/17	Blunt end (2013)	None
FL	10/4/17	No guardrail at location	
FL	5/7/17	No guardrail at location	
FL	2/8/17	ET Plus 6/16)	FRANKENSTEINED with SRT 350 Rail 1
FL	4/27/17	BCT Cable 4/16	None
FL	3/14/16	SRT 350 12/15	UPSIDE DOWN GUARDRAIL
FL	5/13/16	No guardrail found	
FL	10/6/16	BCT (5/16)	12.5 foot guardrail

Tampa Area Review:

9/22	i-275	https://goo.gl/maps/a1pNjr8pQacYbdm37	FLEAT w/ Bolt 3 through rail
9/22	i-275	https://goo.gl/maps/b5ae71scxb4eB9BJ6	FLEAT w/ Bolt 3 through rail
12/22	i-275	https://goo.gl/maps/LG2QzC6egsBdHMRK9	FLEAT w/ Bolt 3 through rail and fractured Post 1
9/22	i-275	https://goo.gl/maps/uCWpGFe2pkHS7M9P6	Upside Down Srt 350 rail 2
9/22	i-275	https://goo.gl/maps/8kzt6LPJ6FiMantNA	FLEAT w/ Bolt 3 through rail

10/22	i-275	https://goo.gl/maps/Rv5XXxM7dYgLDtGCA	Upside Down Srt 350 rail 2
10/22	i-275	https://goo.gl/maps/phxRRy6iYiLDA7Yr7	FRANKENSTEINED FLEAT head with et+ rail 1.
9/22	i-275	https://goo.gl/maps/vA6h8pqkRZScBPKq7	FLEAT w/ Bolt 3 through rail
6/22	i-275	https://goo.gl/maps/iCSg1UmtqfAdFFFv9	FRANKENSTEINED FLEAT head with generic rail
11/22	i-75	https://goo.gl/maps/L5J6Xyb8onKxTVtX6	FLEAT w/ Bolt 3 through rail
11/22	i-75	https://goo.gl/maps/8SuQAGP4LJpUeJh8	FLEAT w/ Bolt 3 through rail
10/22	i-75	https://goo.gl/maps/zAKYz8q3ugcyv6Uc7	FLEAT w/ Bolt 3 through rail
10/22	i-75	https://goo.gl/maps/nwg27fPLGdXF1ZWB8	Upside Down Srt 350 rail 2
10/22	i-75	https://goo.gl/maps/3zoD8MBKpBVQYCYq9	Upside Down Srt 350 rail 2
11/22	i-75	https://goo.gl/maps/tPkoBRQFTWNe9s8k9	FRANKENSTEINED SRT 350 rail 1 with generic rail 2
10/22	i-75	https://goo.gl/maps/9uUrXKAS1kiC5wQH9	FRANKENSTEINED boxing glove head with SKT350 impact head and SRT350 Rail 2
10/22	i-75	https://goo.gl/maps/wQAnh62XsRjUl34g9	FRANKENSTEINED SRT 350 rail 1 with generic rail 2. Missing slot guard
11/22	i-75	https://goo.gl/maps/XbZ2yWDAmkJEcwFg5	FRANKENSTEINED SRT 350 rail 1 with upside down and backward SRT RAIL 1 at rail 2 with missing slot guards
10/22	i-75	https://goo.gl/maps/nhpy9JBV3SRCHKBk9	FLEAT w/ Bolt 3 through rail
10/22	i-75	https://goo.gl/maps/XtLSJNGK8rcchPFj8	FLEAT w/ Bolt 3 through rail
11/22	i-75	https://goo.gl/maps/qkZrW9uwuq36u1tY6	FRANKENSTEINED Fleat with SRT rail 1
11/22	i-75	https://goo.gl/maps/nbaRWSSRwgREHCyQA	FLEAT w/ Bolt 3 through rail
6/22	i-75	https://goo.gl/maps/g9aMiT2qVbS65Wqa7	FRANKENSTEINED Fleat with SRT rail 1
11/22	i-75	https://goo.gl/maps/Qc49a61dc2Dhetd66	Lindsay X-MAS with UPSIDE down/ backwards Slider Assembly
9/22	i-75	https://goo.gl/maps/2KXxJk7JASCRBBxBA	Soft Stop Bolted through Rail 1 at first tall post
11/22	i-75	https://goo.gl/maps/QywuWFaHXhoZeEJc9	FLEAT w/ Bolt 3 through rail
11/22	i-75	https://goo.gl/maps/FjuL5fLcBtw1pzYY6	Upside down SRT 350 rail 2
11/22	i-75	https://goo.gl/maps/Fjvw4VvMj9Ge7qx9A	Upside down SRT 350 rail 2
6/22	i-75	https://goo.gl/maps/dF1hUtt511Gkvin29	FRANKENSTEINED SRT rail 1 with BCT Rail1 as rail 2

Miami Area Units of Concern:

I-95	https://goo.gl/maps/BnnARpqilXaBx727A	Frankensteined ET+ with SKT Rail 1
I-95	https://goo.gl/maps/y4eXQv4FCApoJTmY9	Upside down SRT Rail 2 with bolting issues

I-95	https://goo.gl/maps/zYa1DnMY46qYZ2eR6	Frankensteined Fleat with ET+ Rail 1
I-95	https://goo.gl/maps/XyzeBySficZKkJk8	Frankensteined Fleat with ET+ Rail 1
I-95	https://goo.gl/maps/hphxLXXUxFq1fW59A	Frankensteined ET+ with BCT Cable
I-195	https://goo.gl/maps/2zTCmkihEPkWWDE8	Frankensteined ET+ with BCT Cable

Tallahassee Concerns/ Capitol:
 Five FLEAT end terminals bolted through rail at Post 3:
<https://youtube.com/shorts/24Qebvyej-M>

City Survey:

City	Issue	Pinned location	Length of Time
Jacksonville	ET+ Head FRANKENSTEINED with BCT Cable Bracket	https://goo.gl/maps/ZeZCNRgehm3QLnTM6	1/2022
Hialeah	Fleat with bolt through Rail at Post 3	https://goo.gl/maps/qE4PRqg4F2JX6ZSd8	6/2022
Pembroke Pines	FLEAT with bolt through rail at Post 3	https://goo.gl/maps/EhV9SuoS53B3amaEA	6/2022
Lehigh Acres	Fleat with bolt through Rail at Post 3	https://goo.gl/maps/tMV8AkMbSfkehSj8	11/2022
Palm Bay	React-C next to water with less than 150 feet of downstream rail	https://goo.gl/maps/wKTYMbtQjn6b19BS8	9/2022
Clearwater	Upside down SRT Rail 2	https://goo.gl/maps/2XSFD7WYXndJnPjs8	9/2022
Miami Gardens	Upside down SRT350 Rail 2	https://goo.gl/maps/MUwB4ijyGzdJBtJf8	7/2022
Pompano Beach	Frankensteined SKT with SRT Rail 1	https://goo.gl/maps/899nSPwCr5wbhNEN7	10/2022
Lakeland	Bolt through FLEAT @ Post 3	https://goo.gl/maps/CuopxdMkFkxUtZum9	9/2022
Davie	Bolt through FLEAT @ Post 3	https://goo.gl/maps/CvS6W6wmQVuUQWUq6	7/2022

Orlando/ Disney Concerns:

1. Upside down SRT-350 Rail 2		https://goo.gl/maps/baEcsAreTmdWB2TJ8
2. Lindsay X-Mas improper rail lapping	World Drive	https://goo.gl/maps/sWoxs6LboM5nxJC37
3. Lindsay X-Lite (install issues)	World Drive	https://goo.gl/maps/8McbumFE6a5xu7Zi7
4. Lindsay X-Lite (damaged)	Epcot Drive	https://goo.gl/maps/cGWBByq2EMktqPR418
5. Upside down SRT350 Rail 2	Epcot Drive	https://goo.gl/maps/un8uMVUmiVoByftJ8
6 Lindsay X-Lite (install issues)	Epcot Drive	https://goo.gl/maps/CvdRyL9FgoNrKVFB7

7. Lindsay X-Lite (install issues)	Epcot Drive	https://goo.gl/maps/SA55ja8pgSK2bfSZ9
8. Lindsay X-Lite (install issues)	Epcot Drive	https://goo.gl/maps/GUSf3grjRRF95uzJ6
9. Lindsay X-Lite (install issues	Epcot Drive	https://goo.gl/maps/e1A3nUb7xUdRQBKj8
10. Upside down SRT350 Rail 2)	Epcot Drive	https://goo.gl/maps/X5QWmxuroJNmd3j49
11. Frankensteined SRT 350	Epcot Drive	https://goo.gl/maps/McDFsvKPp3ZmVWkk9
12. Upside down SRT350 Rail 2)	Epcot Drive	https://goo.gl/maps/sTK2bxsmi5er3biQA
13. Upside down SRT350 Rail 2)	Epcot Drive	https://goo.gl/maps/rsiPSVnoM67qdWqu8
14. Unanchored Blunt End	Epcot Drive	https://goo.gl/maps/G2kvtgVAPIVue8eQ9
1.5 BCT Terminal (VERY HIGH)	World Drive	https://goo.gl/maps/kiqRBXbnN3AMEzxRX7
16 Upside down SRT rail 2	World Center Drive	https://goo.gl/maps/Hjd9eC617UcBgiwy7
FDOT Terminals		
1. Upside down SRT Rail 2	i-4	https://goo.gl/maps/XatZgWfuPdJ8ugXY7
2. Upside down SRT Rail 2	I-4	https://goo.gl/maps/mNq4dvCzTy6F6cpd7
3. FRANKENSTEINED SRT	I-4	https://goo.gl/maps/t24epX7Z8gZyzj6J9
4. Frankensteined SRT	I-4	https://goo.gl/maps/rk412cYELTKL5unb6
5. Upside down SRT Rail 2	I-4	https://goo.gl/maps/QVn1ccXDtsYeDpCx8
6. Upside down SRT rail 2	I-4	https://goo.gl/maps/4bKwHR9C1uQJx7wD8
7. Upside down SRT rail 2	I-4	https://goo.gl/maps/hHqe8GUKDnztgWhN7
8. Regent C and SRT 350 Frankensteining guardrail	I-4	https://goo.gl/maps/YJdWEqRSBF3BC2e6
9Upside down SRT rail with other errors	I4	https://goo.gl/maps/k7QwSCSszLc8vvMm3A
10. Upside down srt rail rail 2	i4	https://goo.gl/maps/2v1dCpBsVDBrShM9
11. Upside down SRT rail 2		https://goo.gl/maps/dLTHnbPq5ovhW4at7
12. Upside down srt Rail 2	I4	https://goo.gl/maps/HquxaBopckPo2aVdA

Recommendations to FDOT

1. Other than inspecting for new damaged units FDOT should immediately suspend all inspections of guardrail pending an URGENT development of new inspection protocols. **The mistakes noted were done under the current system; if FDOT continues doing what it's been doing the Department should expect the same results.**
2. The Department, in consultation with the manufacturers, developers, and installers of these devices should immediately develop a plan to inspect every guardrail end terminal in the State of Florida for installation concerns, latent damage, frankensteining, length of need, or obsolescence.
3. Florida DOT should develop a plan of attrition for obsolete end terminals. This “attrition plan” must include actual ATTRITION. When the Department repairs obsolete equipment in-kind the obsolete equipment will remain on the roadside for decades. Specific considerations:
 - a. Florida DOT should develop policies that prohibit any repair to any roadside safety hardware tested prior to NCHRP Report 350.
 - b. Florida DOT will develop a plan to remove and replace any remaining blunt end/ turndown approach terminals on any FDOT maintained roadway. **Please note the removal guidance dates to the 1960s.**
 - c. Florida DOT will develop a plan to remove and replace any remaining NCHRP Report 230 devices including but not limited to the BCT Terminal.
 - d. Florida DOT will develop policies that prohibit the repair of any NCHRP Report 350 device which is no longer marketed/ supported by the manufacturer. This includes the following devices:
 - i. Regent-C
 - ii. Regent
 - iii. X-Lite
 - iv. ET-2000/ ET + family of devices
 - v. MELT**The Department will only repair devices which are currently supported by the manufacturer with original/ as-tested parts.**
4. Florida DOT should develop policies which require all end terminals whether flared/ tangent to have been tested to MASH standards. The Department should prohibit the purchase of any NCHRP350 devices no later than 12/31/2023.
5. Florida DOT should IMMEDIATELY develop policies which ensure only non-gating end treatments are installed when the possibility of gating into water, trees, etc. exists. To that end Florida DOT should review the ERMES and NGT terminals for possible inclusion on its QPL. The placement of both devices will provide non-gating terminals and the option of dual sourcing.

6. Florida DOT will develop policies requiring manufacturers to:
 - a. Label all parts within a guardrail end terminal.
 - b. Label all parts which must be installed directionally with a label indicating the direction of installation.
 - c. Provide mitigation strategies to prevent bolt placement through rails when the bolt must not pass through the rail
 - d. Provide color coded bolt heads related to specific installation applications.
7. Florida DOT will implement policies to monitor impacts on roadside safety hardware. This could include the use of cellular devices, RFID tagging, or other less technically advanced devices.
8. Florida DOT will develop "Guardrail Gardens" with an exemplar installation of any end treatment that is installed or maintained on FDOT roadways. These locations will be used for routine training. These will be safe and secure locations around Florida.
9. Florida DOT will develop an intensive training program for installers of roadside safety hardware in the State of Florida.
10. Florida DOT will require all devices placed on Florida DOT roadways to have received the full suite of testing, be tested to MASH, and that the testing be conducted at a FULLY independent crash test lab.
11. Florida DOT will develop and implement a plan to monitor in service performance of roadside safety hardware.
12. Florida DOT will develop policies which encourage manufacturers to continuously improve their products. This policy will require that ANY change be disclosed to the Department. These changes will be supported with analysis, engineering analysis, finite element analysis, LS DYNA, bogey testing, or crash testing.