

How the old Sunshine Skyway Bridge may have collapsed on 9 May 1980

Here is how the southbound span of the Sunshine Skyway Bridge collapsed upon impact by the *Summit Venture*. This is my treatment of how it happened based upon looking at the various pictures of the bridge taken by the *St. Petersburg Times* (now the *Tampa Bay Times*) as well as other area media outlets after it collapsed as well as a review of the US Coast Guard Marine Board of Investigation report. After all, unlike videos of the collapse of the Interstate 35W bridge in St. Paul, Minnesota in 2008 and the well known collapse of the Tacoma Narrows Bridge in Tacoma, Washington in 1940, *there is no known video taken of the old southbound span of the Sunshine Skyway Bridge at the moment of impact at 7:38 AM on Friday, 9 May 1980.*

First, let's start with a basic design of a cantilever bridge. This image was taken from Wikipedia's article on the cantilever bridge and, although the cantilever bridge originally shown was that of the 1927 Cooper River Bridge in Charleston, South Carolina, I have edited the image to reflect what the Sunshine Skyway's southbound span had.

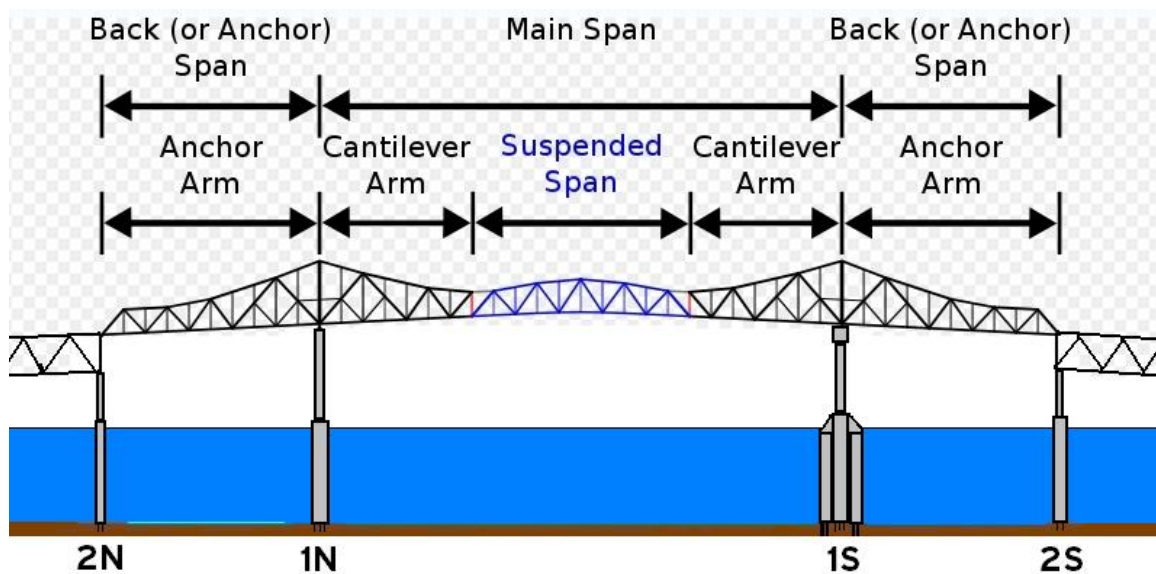


Diagram of the old Sunshine Skyway southbound span

Construction on the southbound span began in 1967 for a 1969 opening but the span did not open to traffic until 1971 due to major settling within Pier 1-S, the major support pier directly south of the channel. Piles were re-driven utilizing steel pilings similar to the 1954 northbound span into limestone to correct this major flaw but the pier ended up having a different look than the major channel pier to the north, Pier 1-N, which was constructed identical to the two main channel piers of the 1954 northbound span.



A photo of Pier 1-S taken in 1981

The first contact with the Sunshine Skyway by the *Summit Venture*, according to the US Coast Guard report, was with Pier 2-S, one of three anchor piers that hold the southern cantilever in place. Pier 2-S is the transition anchor pier from the cantilever through truss to the deck truss and is a vital support pier for the entire Sunshine Skyway structure.

With the action of wind and wave from the storm crossing Tampa Bay the ship drifted southward for a collision course with Pier 2-S. Due to the construction of the southbound Pier 2-S as opposed to the northbound Pier 2-S, the southbound Pier 2-S could not withstand the impact from a ship the size of the *Summit Venture*. Upon impact Pier 2-S was sheared off at the base with a loss of both support columns and the pier cap.

Once the impact with Pier 2-S was realized the bridge began to fall starting with part of the deck truss from Pier 3-S northward. A portion of the Sunshine Skyway's southbound span, especially the part that transitions from deck truss to through truss, fell straight down onto the bow of the *Summit Venture* immediately after impact. Along with the deck truss from Pier 3-S northward the through truss section up to Pier 1-S fell at a 90 degree angle where the roadway tilted facing the northbound span. However, a portion of the southbound span from where the point of impact was realized with Pier 2-S northward to Pier 1-S tilted and fell and came to a rest paralleling the *Summit Venture*, which came to rest upon Pier 2-S of the northbound span. The forward impact of the *Summit Venture* caused the southbound span to tilt at a 90 degree angle and fall into the center space in between the Pier 1-Ses of both the failing southbound and surviving northbound spans.



Another photo of Pier 1-S showing its counterpart holding up the northbound span, also taken in 1981. The space between the two piers is where the southbound span fell into after impact by the Summit Venture. The two piers are different as the pier to the right was the one repaired in 1969 due to settling and cracks which required pilings driven deeper below the water surface until limestone was reached.

Next, the section of through truss fell from Pier 1-S proper to the expansion joint just north of Pier 1-S that holds the center span in place. Due to the survivability of Pier 1-S this section tilted at a 90 degree angle and fell in a downward diagonal position from the center space of the two support piers to the expansion joint. This is why you may have seen pictures of the roadway resting on the bottom of Pier 1-S that was visible.

You know basically how a cantilever bridge works. It is a center span supported by two arms on each end that sit on a pier and are anchored on each far end. So far upon impact the Sunshine Skyway's southbound span lost the southern anchor pier (Pier 2-S) and the bridge that went with it up to the expansion joint just north of Pier 1-S in the main channel.

Now we have the center span to deal with, whether the northern cantilever will take the added weight of the center span on its own. With no southern cantilever to help support the center southbound span, the span fell into the main channel in the same tilt and fall 90 degree configuration at the same time as the southern cantilever.

When the center span fell down it came apart up to the expansion joint south of Pier 1-N. One segment of steel grid deck roadway just before the northerly expansion joint slanted down at about a 45 degree angle but it remained along with the surviving remains of the southbound span. It is on this segment of steel grid deck

that Richard Hornbuckle stopped his Buick Skylark a mere 14 inches short of the end of the bridge.

After all, the portion of the old Sunshine Skyway within the through truss cantilever span between the main channel piers consists of a steel grid deck for the roadway. Found on moveable sections of drawbridges, a steel grid deck has pieces of steel that are upright providing for good traction of vehicles driving across. What makes the familiar sound as one drives across a steel grid deck is that the roadway is open to what is below and it is a combination of air that goes through the grid vertically and a motor vehicle driving across horizontally. Besides, having a steel grid deck allowed for the Sunshine Skyway's main span to expand and contract depending on the season and the weather.

Was the northern cantilever of the old Sunshine Skyway's southbound span in danger of collapsing? No, because the northern cantilever was being held in place thanks to the intact northern anchor span, the deck truss held up by Piers 2-N, 3-N and 4-N. Had there been any impact on Pier 2-N in particular the northern cantilever would have suffered the same fate as the southern cantilever.

Now why did Pier 1-S – the Skyway southbound span's main channel pier that looks different than the other Skyway main channel piers due to repairs completed in 1969 – stood yet did not provide support to the failing southbound span on impact? Pier 1-S, as well as its companion 864 feet to the north of the Tampa Bay shipping channel, Pier 1-N – *do* support the superstructure 150 feet above the water but in essence these main piers act as a center of balance for the southern and northern cantilevers. In other words, the cantilever mounted on the main channel pier in the center is akin to a see-saw, only the ends are held up by the center span and the back span.

The forward impact of the Summit Venture upon collision with Pier 2-S pushed the failing span forward creating the tilt and fall effect. As Pier 1-S had no way of supporting the southern cantilever on its own weight, the entire southern cantilever probably split into two – thanks to a sturdier northbound span Pier 1-S which took a hit from the falling structural steel – as the span tilted and fell into Tampa Bay.

Earlier we discussed that the 1954 northbound span of the Sunshine Skyway had channel piers which were built utilizing steel pilings down to its limestone base providing for a sturdier support. The 1969/1971 southbound span, on the other hand, had channel piers including the major channel piers, Pier 1-S and Pier 1-N, which were built utilizing concrete pilings down to just below the bay bottom. It is because of the sturdiness of the northbound span Pier 2-S that the *Summit Venture* was able to come to rest without damage to that pier.

As such, the back span piers including Pier 2-S, in particular the back span piers of the Sunshine Skyway's southbound span, were not designed to withstand a direct impact by an ocean going vessel. For that reason, Pier 2-S was sheared off at its base upon impact.

Tragically, 35 people lost their lives when the Sunshine Skyway collapsed on 9 May 1980. It was reported that several vehicles were on the bridge at the moment of impact and the vehicles fell into the water below along with the failing span. Once the southbound span completed its horrific tumble into Tampa Bay more vehicles, unaware that the bridge had collapsed due to the weather conditions, tumbled off

the slanted 45 degree section of steel grid deck that led into the water below including several passengers aboard a Greyhound bus headed for Miami.

However, one person survived the horror of tumbling off the collapsed southbound span. Wesley McIntire tumbled off the slanted 45 degree section but he bounced off the deck of the *Summit Venture* which acted to help break the high impact fall before going into the water. Luckily, Wesley McIntire was rescued by the crew of the *Summit Venture* after he swam up from his vehicle to the surface.

Upon collapse, the damaged southbound span came to rest for the most part on the bottom of Tampa Bay. However, a good majority of the damaged southbound span came to rest upon the space between the Pier 1-Ses on both the northbound and southbound spans. But thanks to the design of the Pier 1-S on the northbound span, it basically came through unscathed save for a gouge mark on the edge.

Going back to the US Coast Guard report, Pier 3-S – the anchor pier where a portion of the deck truss from Pier 3-S to Pier 4-S survived – lost its eastern bearing assembly when the deck truss span tilted and fell into Tampa Bay upon impact. Pier 1-S – the main channel pier on the Sunshine Skyway's southbound span that had a different look than the other main channel piers – suffered extensive chipping not only on the concrete base and column but also on the top on the eastern bearing assembly as the span did its 90 degree tilt and eventual fall into Tampa Bay.

Even though the northbound span came through unscathed despite being hit by the falling structural steel of the southbound span, the Florida DOT had to perform a safety inspection of the northbound span to make sure it was safe to travel on. The northbound span was re-stripped to handle two way traffic and the Sunshine Skyway was reopened to traffic two days later on Sunday, 11 May 1980.

When the Sunshine Skyway was reopened, southbound traffic before the main span was funneled into one lane, then taken through an S turn through a narrow median opening the Florida DOT converted for that purpose. Later on in the months ahead, the Florida DOT constructed a temporary lane that allowed for a smooth transition from the southbound lanes over to the northbound span carrying the temporary southbound lane along with flashing warning beacons and signage letting motorists know that it is two way traffic on the main span for five miles. At the same time, the Florida DOT erected more permanent Jersey barrier wall barricades in order to prevent vehicles from going onto the collapsed southbound span, not to mention fencing and locked gates at the point where the incline starts.

As an additional safety precaution, the portion of the Sunshine Skyway southbound span's north cantilever arm from where it fell to one section just south of Pier 1-N was demolished. The north anchor arm containing what was left of the cantilever through truss as well as the northern deck truss was left in place.

The Sunshine Skyway's northbound span carried two way traffic for the next seven years until 30 April 1987 when the new cable stayed Sunshine Skyway Bridge opened. Once the bridge opened, barricades were erected for the last time closing the twin cantilever bridges that served the Tampa Bay region since 1954 and 1971. Both Sunshine Skyway cantilever spans and the main channel piers – including Pier 1-S, the main channel pier that survived the collapse but stood out as well as the damaged Pier 2-S sheared off at its base upon impact – were demolished in 1991. The only remaining piece of Sunshine Skyway history that exists today are the north

and south main span trestle bridges that led up to the twin cantilever bridges, which are used as fishing piers. Today only the southbound trestles are used as the fishing piers; the northbound trestles were used but were closed off due to structural integrity and portions of the northbound trestles were demolished.

Cantilever bridge graphic from Wikipedia
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