Vince's Bridge

How One Bridge Lies at the Center of Texas's Independence

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The story of how Texas won its independence is legendary and well-known. It has resonated in the hearts of Texans ever since we first heard the epic details in our seventh-grade history class: Santa Anna's march through Texas with his massive army, the epic battle at the Alamo, the daring cry of "Come and Take It," and the final capture of General Antonio López de Santa Anna, President of Mexico and Commander-in-Chief of the Mexican Army, at the Battle of San Jacinto. Yet few people realize that behind this iconic tale was the ingenious civil engineering of the Vince family, whose bridge, originally built for their ranching needs, played a pivotal role in securing General Sam Houston's ultimate victory over Santa Anna's forces.

Part 1: The Bridge at the Center of it All

Antonio López de Santa Anna's campaign to subdue the future Texas region featured 6,000 of Mexico's finest soldiers. This enormous force stood in stark contrast to the roughly 200 Texians who defended the Alamo and the approximately 900 who later fought at the Battle of San Jacinto. The Texian forces were primarily a volunteer militia composed of settlers and frontiersmen, which made a victory against Santa Anna's well-equipped army seem almost impossible.

The narrative began with the fall of the Alamo on March 6, 1836, followed by the tragic Goliad Massacre later that same month. Amid the chaos of the Runaway Scrape, mass evacuations ensued as Santa Anna's relentless campaign sought to crush the Texian rebellion. As he marched eastward, Santa Anna divided his forces and led an army of 750[1] men toward Harrisburg, intent on crushing the newly established capital.

On April 17, 1836, Santa Anna and his 750 men continued their march east over Vince's Bridge in pursuit of General Sam Houston and his army. Two days later, General Houston's army also crossed Vince's Bridge, tactically monitoring Santa

Anna's troops as they followed behind him. By April 20, the two forces were poised on the plains at San Jacinto, ready for the following day's battle.

That morning, in a decisive move, Sam Houston ordered Vince's Bridge to be destroyed. This strategic decision slowed any potential reinforcements for Santa Anna's forces, playing a crucial role not only in the Texians' winning the battle but also in the capture of Santa Anna during the final moments of the conflict.

After the 18-minute battle, Santa Anna and 66 of his men retreated in different directions. In his haste, Santa Anna rode directly to the site of Vince's Bridge, only to discover it had been destroyed. Bewildered, he abandoned his horse, hid in a nearby thicket, and was soon captured.

This rural ranching bridge was at the heart of these pivotal events, influencing decisions that ultimately paved the way for Texas's independence.

Part 2: The Vinces

The Vinces belonged to Stephen F. Austin's initial group of settlers, commonly known as the Old Three Hundred. For many modern Texans, having ancestry linked to one of these early families carries a level similar to the prestige which New Englanders associate with tracing their lineage back to the Mayflower. According to Bryan McAuley, Site Manager for the San Felipe de Austin State Historic Site, the Vinces migrated from Georgia with the goal of settling Texas. Like many of the Old Three Hundred, their motivation was the promise of large tracts of land and the hope of building generational wealth.

In 1824, both William and Allen Vince received tracts of land exceeding 4,000 acres, separated by a bayou. This grant was contingent upon the brothers ranching the property and making significant improvements within two years. Historical documents indicate that the family resided on William's tract while managing both parcels of land. Although the bayou was not particularly wide, its channel, approximately 10 feet deep, posed logistical challenges. These difficulties were especially pronounced during the wet season, when flooding and muddy banks made access a challenge.

Part 3: The Design of Vince's Bridge

Vince's Bridge played a pivotal role in the Texas battle for independence, yet little is known about the actual bridge design. Its historical significance is so profound that it was prominently depicted on the back of the Texas State Seal adopted in 1961. Despite extensive research, no definitive records have surfaced regarding the accuracy behind the bridge's depiction on the seal.

The bridge is also depicted in Charles Shaw's striking 1990 painting, "Destroying Vince's Bridge," which vividly captures Deaf Smith and his men working to destroy the bridge.

Charles Shaw is known for taking copious notes before beginning a project. However, after consulting with the Library Director of the Albert and Ethel Herzstein Library, located on-site at the San Jacinto Monument, it appears this was not the case for this particular work.

The two known depictions of Vince's Bridge present vastly different interpretations, yet neither is supported by solid historical evidence, leaving many unanswered questions about its design and construction. Despite its critical role in Texas history, the exact structure and engineering behind the bridge remain a mystery.

How did the Vince brothers build a bridge that was meant to only serve their ranching needs yet was strong enough to support the passage of both Sam Houston's and Santa Anna's armies?

To explore this topic further, the bridge's design and construction will be examined through five key components: length, width, materials, construction methods, and design loading. Once these factors are determined, a design calculation and corresponding drawing will be presented.

3.1 Length

There has been much debate about the true location of Vince's Bridge. After an extensive review of historical literature, the general consensus is that the Daughters of the Republic of Texas correctly identified its original site, commemorating it with a stone marker that remains there to this day.

Today, a modern vehicular bridge stands at the location. This structure is a two-lane, 227-foot-long concrete bridge, consisting of nine spans supported by concrete piles. At first glance, it seems unlikely that this was the actual site of Vince's Bridge. However, Andrew Sipocz, Regional Natural Resources Coordinator with Texas Parks & Wildlife, offers an important explanation; over the years, the area has undergone approximately 10 feet of subsidence, causing the bayou to expand significantly.

Referencing a 1919 topographic map, Sipocz illustrates the dramatic changes to the landscape. His insights help reshape our understanding of the original design and scale of Vince's Bridge. While the bayou today requires a bridge spanning over 200 feet, accounting for the 10 feet of subsidence reveals that the original required span would have been much shorter.

Historical accounts further support a more modest length for Vince's Bridge. Andrew Jackson Houston described Vince's Bayou as follows:

"In dry season that bayou was about fifty feet wide and about ten feet deep, but during a wet season, like that of the spring of 1836, when all streams were overflowing, the waters over the lowlands on one side made it several hundred yards wide."[2]

Additional investigation using historical aerial imagery reinforces this perspective. When a 1944 aerial photograph is overlaid with a current image, the impact of local subsidence on the flat terrain becomes clear. A rough measurement using the 1944 imagery shows the bayou's width to be approximately 50 feet perpendicular to the bank, which is consistent with Houston's description. This measurement also aligns with Charles Shaw's painting when scaled relative to the men and horse also depicted in the artwork.

3.2 Width

Historical accounts describe Vince's Bridge as being narrow, with some reports stating that mules were unable to cross due to its limited width. While the exact meaning of these accounts is open to interpretation, it is reasonable to assume the bridge was constructed to serve the Vince family's ranching operations. At the time, it was common for working ranches to use ox-drawn wagons as part of their daily activities. A typical two-wheeled wagon measured about 6 feet from wheel to wheel, but the overall width was determined by the span of the oxen pulling it. Historically, the yoke used for a pair of oxen measured approximately 7 feet across. Adding six inches of clearance on either side, plus another six inches for a railing, supports the assumption that the bridge may have been around 9 feet wide.

3.3 Materials

The exact year the bridge was built is unknown. Records indicate that Allen Vince received a land grant in 1824. A journal entry from Dilue Rose Harris, recorded in 1883, includes the first known mention of bridge. In her entry, she wrote: "The Vince brothers, Allen, William, Roberts, and Richard, lived at the bridge on Vince's Bayou."[3] Therefore, the bridge was likely constructed between 1824 and 1833.

Several sources state that the bridge was made of cedar:

- “After passing the house they crossed Vince’s Bayou on a bridge built of rough cedar.”[4]
- “If I recollect aright, it was built of cedar….”[5]

Andrew Sipocz explains that while cedar trees in the region could reach heights of up to 80 feet, their usable bole lengths were generally no more than 50 feet. Cedar trees were limited to areas north of Buffalo Bayou due to poor tree-growing conditions on the southern prairie. The most suitable timber for structural use likely came from virgin bald cypress stands in upstream swamp areas along Buffalo Bayou or the San Jacinto River, where trees could exceed 120 feet in height and provide usable bole lengths of up to 100 feet. Sipocz notes that bald cypress was historically referred to as cedar, and considering the bridge’s location, along with the wood’s durability and workability, it was most likely constructed from bald cypress.

3.4 Construction Methods

Between 1824 and 1833, obtaining cut lumber in this region was no easy task. Historical records indicate that in 1831, David Gouverneur Burnet brought a sawmill to the area near Old Lynchburg Road. Before this, lumber had to be painstakingly "sawed by hand at the pits," a labor-intensive process that required great effort.[6]

Fortunately, an example of early construction methods from this period still exists today. The house, simply called the "Old Place," is preserved in The Heritage Society's Sam Houston Park. Relocated to its current site in 1970, the house originally stood on the west bank of Clear Creek. It was constructed in 1824 by John R. Williams, one of Stephen F. Austin's Old Three Hundred.

While it is difficult to determine exactly which elements of the structure remain from its original construction, some observations can be made. Cut lumber was evidently used, and the home features notching and chinking techniques to connect its structural members. Interestingly, shortly after completing the house, John R. Williams sold the house and property to William and Allen Vince in 1825. The Vinces never lived in the home but instead used the property for ranching purposes.

3.5 Design Loading

The Vince family built their bridge to serve the needs of their ranching operation. Its width and structural integrity were likely sufficient to support a fully loaded wagon drawn by either horses or oxen. Although designed for modest, local use, historical records suggest the bridge also supported the crossing of both Sam Houston's and Santa Anna's armies.

The heaviest load Vince's Bridge likely ever experienced was the passage of the legendary Twin Sisters cannons, transported in preparation for the Battle of San Jacinto. The Twin Sisters were a pair of 6-pounder cannons. To estimate their weight, the Library Director of the San Jacinto Monument Library referenced a letter dated November 12, 1985, from James L. Kochan, Director of the U.S. Army Engineer Museum at Fort Belvoir, Virginia, addressed to Winston Atkins, librarian at the San Jacinto Museum of History. The letter states:

"The U.S. Army Ordnance Manual of 1841 records that the average size of an M1841 6-pounder cannon is 65.6 inches in length, with a 3.67-inch bore, and a total weight of 880 pounds."

Based on this information the bridge loading can be approximated as follows:

Estimated Load Breakdown (assuming only one cannon crossed at a time, and that care was taken to minimize the load on the bridge during each crossing)

Payload:

- Twin Sisters cannons: 880lb each = 880 lb

Ox Loading:

- *Four oxen: 6,000 lb
- Yoke: 100 lb

∑ = 6,100 lb

Hauling Equipment:

Field Carriage: 1,200 lb

*based on the common breed of oxen in the area at that time. (American Milking Devon Oxen). It was typical for a wagon to be pulled by two oxen, for balance, strength and redundancy. Includes weight of one teamster which is minimal compared to oxen weight.

Decking Load:

Based on the construction methods used in the "Old Place," it is assumed that rough cut bald cypress planks were used for the bridge decking. Air dried old growth bald cypress would have had a density of approximately 30 lb/ft^3. Assuming the use of 2" X8" planks laid transversely over a 50-foot span, approximately 75 planks would have been used. The estimated deck weight is calculated as follows:

- Deck weight: 75 planks X 30lb/ft^3 X (9ft X 2in X 8in) = 2,250 lb

Railing Load:

Assuming the railing weight is approximately 15% of the deck weight:

- Railing: 15% X 2,250 lb = 338 lb

4.0 Vince's Bridge Design

Bridge Dimensions

- Span: 50 ft
- Bridge Width: 9 ft
- Beam Size: Assume 7 beams ~ 15" x 15" Bald Cypress beam
- Note: For simplicity, assume decking and railing loads are uniformly distributed.

Loading

- Payload = 880 lb
- Ox Loading = 6,100 lb
- Field Carriage = 1,200 lb
- Deck Weight = 2,250 lb
- Rail Loading = 338 lb

Dead Load per Beam

- **Deck + Rail**

  Load = 2,250 lb + 338 lb = 2,588 lb
  Assume Equal Distribution:
  w_{D+R} = 2,588 lb / (9 ft × 50 ft) = 5.75 lb/ft²
  $w_{D+R,beam}$ = 5.75 lb/ft^2 × (15" beam / 12) = 7.2 lb/ft

- **Beam Self-Weight**

  Assume a 15" x 15" Bald Cypress beam

  Specific Weight of Bald Cypress = 30 lb/ft³
  Beam Weight = w_B = (15"/12)² × 30 lb/ft^3 = 46.9 lb/ft

- **Total Uniform Dead Load per Beam**

  w = w_{D+R} + w_B = 7.2 lb/ft + 46.9 lb/ft = 54.1 lb/ft

Live Load

- Payload = 880 lb
- Field Carriage = 1,200 lb

- Oxen = 6,100 lb (four oxen)

- The following represents typical spacing for an ox drawn field carriage.
- For a two wheel field carriage, it's reasonable to assume the oxen take 50% of the wagon load.
- Assume deck allows for even distribution of point loads transversely across all 7 beams.

- **Load Calculations**

  Wheel Load: $W = (½ (Payload) + Field Carriage) / \#\ of\ beams$

  $W = (½ (880\ lb) + 1{,}200\ lb) / 7 = 234\ lb$

  Ox Load:

  $O_{bridge} = (Oxen\ weight + 50\% \times Payload)/(4\ pairs\ of\ legs)$

  $O_{bridge} = (6{,}100\ lb + ½ \times 880\ lb) / 4 = 2{,}375\ lb$

  $O_{beam} = 2{,}375\ lb / 7\ beams = 339\ lb$

- **Combined Loading**

  Uniform Dead Load:

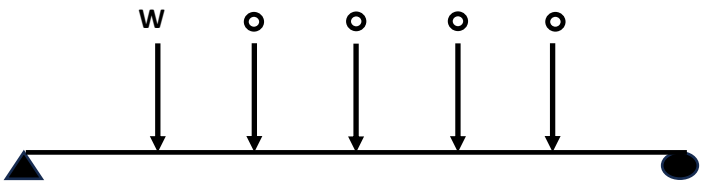
  $w = 54.1\ lb/ft$

  Point Loads:

  $W = 234\ lb$

  $O = 339\ lb$

- **Max Shear and Moment (Uniform Load)**



Maximum Shear:

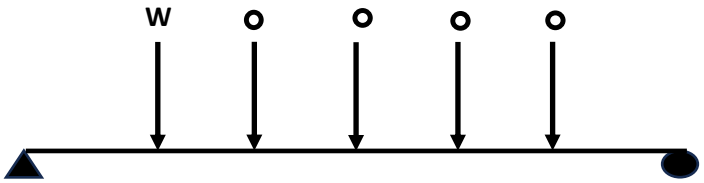
V_{max_w}= w x L / 2 = (54.1 lb/ft × 50 ft) / 2 = 1,353 lb

Maximum Moment:

M_{max_w}= w x L^2 / 8 = (54.1 lb/ft × (50 ft)²) / 8 = 16,906 ft-lb

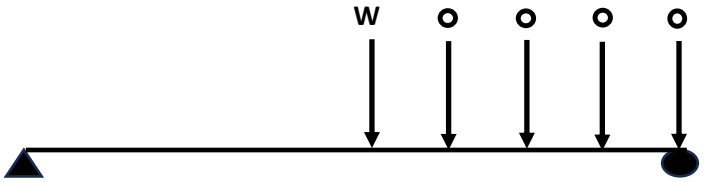
- **Max Shear and Moment (Point Load)**

Max Moment Location



M_{max_PL} = 21,189 ft-lb

Max Shear Location



V_{max_PL} = 1,293 lb

- **Combine Max Shear and Moment From Uniform and Point Loads**

$V_{max\_TOTAL} = V_{max\_w} + V_{max\_PL} = 1{,}353 + 1{,}293 = 2{,}646$ lb

$M_{max\_TOTAL} = M_{max\_w} + M_{max\_PL} = 16{,}906 + 21{,}189 = 38{,}095$ ft-lb

Check Beam Size

Beam Section Modulus:

$S = (b \times h^2)/6 = (15 \times 15^2)/6 = 562.5$ in³

Allowable Bending Stress

$F_b = 1{,}000$ psi (for old growth Bald Cypress)

Calculate Required Section Modulus

$S_{needed} = M_{max} / F_b = (38{,}095 \times 12) / 1{,}000 = 457$ in³

Check Beam Bending Capacity:

$S_{beam} = 562.5$ in³ > $S_{needed} = 512$ in³ → OK

Allowable Shear Stress

$f_{v\ allowable} = 100_{\ psi}$ (for old growth Bald Cypress)

Calculate Shear Stress for Square Beam

$f_{v\ actual} = (3 \times V) / (2 \times b^2) = (3 \times 2{,}646) / (2 \times 15^2) = 18$ psi

Check Beam Shear Capacity:

$f_{v\ allowable} > f_{v\ actual}$ → 100 psi > 38 psi → OK

Part 5 Conclusion

The Vince brothers built a bridge to meet their immediate needs using local materials and simple construction techniques. They likely had no knowledge of its capacity, relying instead on the old structural adage: “When in doubt, build it stout.” After several design iterations, the minimum required beam size was determined to be 15 inches by 15 inches by 50 feet. When asked whether a bald cypress tree large enough to produce such a beam was readily available, Andrew Sipocz responded with a resounding, “Absolutely!”

The Vince brothers’ handiwork proved remarkably durable. It supported the passage of the Twin Sisters cannons, which helped secure Sam Houston’s victory and, ultimately, Texas independence. The Vinces were not only pioneers in Texas but also early contributors to Texas civil engineering. In a sense, Texas owes its independence to a pair of civil engineers ahead of their time.

References

[1] Handbook of Texas Online. "The Runaway Scrape." *Son of the South*.

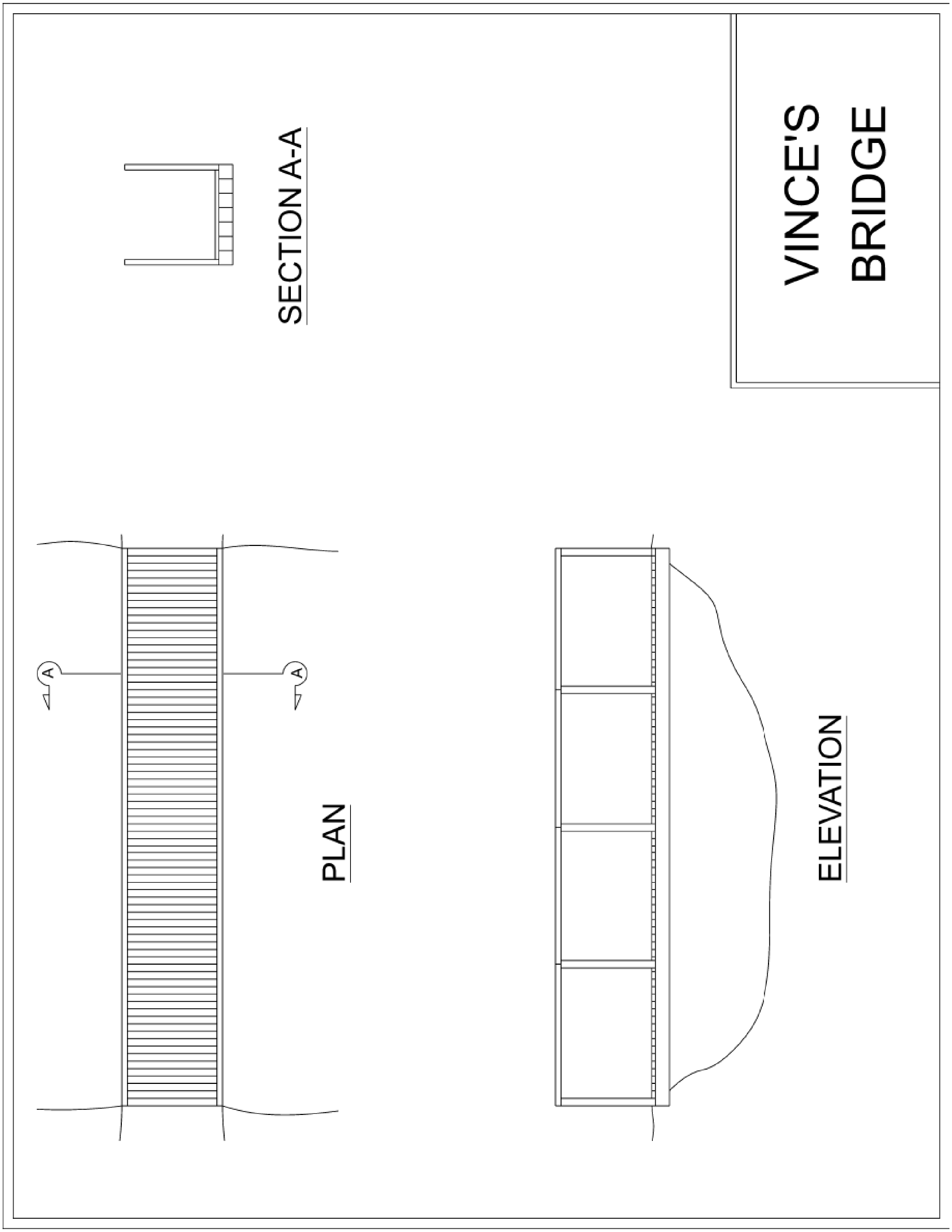
[2] Andrew Jackson Houston, Texas Independence (Houston: Anson jones Press, 1938), 222.

[3] Harris, 'The Reminiscences of Mrs. Dilue Harris," 89.

[4] A. J. Sowell, History of Fort Bend County, (Houston, W. H. Coyle & Co., 1904), 155.,

[5] Alsbury, "Burning of Vince's Bridge", 436

[6] The San Jacinto Battleground Focus: the People and Towns from 1822 Forward by James L. Glass (unpublished draft, dated 1 July 2001)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SECTION A-A
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