



# Missouri/Iowa Boundary Line Investigation

Adam Teale takes  
a GPS observation  
at Mile 50 West.

**T**he Missouri DNR's Land Survey Program recently selected Midland Surveying Inc. and affiliate Company Midland GIS Solutions of Maryville and St. Joseph, Missouri to perform a boundary line investigation, monumentation search and perpetuation of existing monuments along the Missouri/Iowa boundary. Midland's past experience on large boundary projects provided stellar credentials for the job.

In 1999, Midland had been selected to retrace the disputed boundary between Missouri and Nebraska at McKissick's Island in Atchison County, Missouri. The disputed land, consisting of more than 5000 acres, was created by avulsion from a major flood of the Missouri River in 1867. This resulted in a long dispute and eventual 1904 U.S. Supreme Court decision requiring a survey of McKissick's Island. Eighteen of the original 36 concrete monuments from the 1904 survey were

recovered, enabling surveyors to retrace and remonument the entire disputed boundary. Some of the original monuments were located at a depth of nearly six feet below the silt of the 1867 river channel. Midland's 1999 survey was ratified and approved by the state legislatures in both Missouri and Nebraska and eventually by the United States Congress as a part of the Missouri-Nebraska State Line Boundary Compact (see Missouri/Iowa State Boundary Time Line).

Three years later, in 2002, a survey was requested that would reestablish the lost boundary between Buchanan and Platte counties in Missouri. A survey team was assembled that included Platte County Surveyor Charles Kutz, state surveyor Mike Flower, Chief of the Cadastral section for the Missouri DNR Land Survey Program Dan Lashley, and yours truly. This survey involved extensive research of prior county and state road survey records, which proved to provide the most reliable evidence of the lost boundary. Using modern

>> Troy L. Hayes, LS



technology, we were able to retrace the ancient road surveys and reestablish the lost county line. This retracement survey was approved and adopted by county commissioners in Buchanan and Platte Counties as the official county boundary.

With those credentials under its belt, Midland was selected by the Land Survey Program in 2005 to perform yet another critical survey – the Missouri/Iowa boundary line investigation.

The investigation began with research of the original surveys along the Missouri/Iowa boundary. Field search and recovery of the existing cast iron monuments, which had been established at 10-mile intervals along the original boundary, followed the research. The final phase of the project included the establishment of State Plane Coordinates and preparation of Certified Land Corner Documents for the recovered monuments.

The original survey of the Missouri/Iowa boundary, commonly known as Sullivan's Line, was completed by surveyor John Sullivan in 1816. Sullivan was to mark the west and north boundaries of Missouri. He commenced at the east bank of the Missouri River opposite the mouth of the Kansas River and navigated north 100 miles to establish the Northwest Corner of the state. He then ran east just over 151 miles to the Des Moines River on the state's east boundary. Sullivan blazed trees and established wooden posts



**Mile 70 East had fallen over, but distances to adjacent monuments and testimony from local residents confirmed that it remained in its original location.**

at each mile along the boundary. In the years following Sullivan's survey, there were numerous disputes as to the location of the state boundary – the most famous being the Honey War which led to a small border skirmish between

## **HISTORY OF MISSOURI/NEBRASKA BOUNDARY COMPACT**

### **1990**

Missouri General Assembly approves definition for state boundary (compact) to be a compromised boundary fixed at the center of the main channel of the Missouri River, except for land known as McKissick's Island. No action by Nebraska.

### **1990-1997**

Issue remains as is, with no action by Nebraska.

### **1997**

Missouri passes legislation as previously established in 1990.

### **1998**

Nebraska passes an act to adopt the compact as previously defined in Missouri bill.

### **1999**

House Joint Resolution 54 – U.S. Congress passes compact signed by President Clinton as Public Law 106-101.



**Mile 130 East was recovered near the calculated search position utilizing the Trimble Geo-Explorer. The monument is located in a remote area inhabited by Amish farmers. Local residents that were interviewed had no knowledge of the monument.**





**Sullivan's NW Corner and the commemorative monument placed by the local historical society.**

the militias of Iowa and Missouri over the location of some productive honey trees with respect to the state boundary. In 1850, the United States Government appointed commissioners from the states of Missouri and Iowa to retrace and establish permanent monuments along Sullivan's Line. They were also instructed to establish the Missouri/Iowa boundary on the north side of the Platte Purchase, which extended from the west end of Sullivan's Line approximately 60 miles west to the Missouri River. During the survey of 1850, evidence of Sullivan's Line was recovered. The surveyors also commenced at Sullivan's northwest corner and extended Sullivan's Line west on a parallel of latitude from that point, establishing new monuments at each mile, as well as new cast iron monuments at every 10th mile west to the Missouri River.

The retracement of Sullivan's Line in 1850 revealed that the original line did not follow a true parallel of latitude, and that Sullivan had encountered problems with his direction as he ran along the original line. However, the evidence of this original line was ultimately held as the state boundary. Even after the line was retraced in 1850, disputes continued to occur along the boundary. The last of these major conflicts occurred around the turn of the century between residents of Decatur County, Iowa and Harrison and Mercer Counties in Missouri. To



**The Highway Department of Fremont County, Iowa assisted in the recovery of Mile 50 West.**



**Troy Hayes points to the top of Mile 50 West. The original monument was recovered six feet below the surface of the existing road.**



## MISSOURI/IOWA STATE BOUNDARY TIME LINE

### 1816

John C. Sullivan completes a survey of the West and North Line of a tract ceded to the U.S. by the Osage Indians. The survey commenced at the mouth of the Kansas River and ran north 100 miles to the Northwest Corner of Missouri Territory and then East to the rapids of the Des Moines River.

### 1821

Missouri becomes a state and uses the same description as that for Sullivan's line to describe the boundaries.

### 1836

U.S. Congress passes an Act to extend Missouri's western boundary to the Missouri River (Platte Purchase) as soon as Indian title is quieted. North boundary line is to run west on a parallel of latitude from the old northwest corner of Sullivan's survey west to the Missouri River.

### 1836

Missouri General Assembly has Brown run a survey of the north boundary which falls in some cases as far as 9½ miles north of Sullivan's boundary line.

### 1846-1849

A dispute continues between Missouri and Iowa on the boundary because of the discrepancies between Brown and Sullivan's lines. U.S. Supreme Court decides on Sullivan's line as the boundary.

### 1850

By order of the U.S. Supreme Court, Sullivan's line is retraced by Commissioners Hendershott and Brown. Brown dies in 1850 and is replaced by Commissioner Wells. The Commissioners order a re-survey of the line by Surveyor Dewey from Iowa and Surveyor Walker from Missouri. They run the line west from Sullivan's original northwest corner on a parallel of latitude using a Burt's solar compass. Sullivan's line is also retraced to the east of the original northwest corner and cast iron monuments are placed at 10-mile intervals along the boundary in both directions from the original northwest corner.

### 1896

The U.S. Supreme Court orders a re-survey of the boundary line between Mile Post 40 East and Mile Post 60 East. The survey is completed by the U.S. Coast and Geodetic Survey as a retracement of Sullivan's line, and granite markers are placed every mile along the line for this 20-mile stretch.



Mile 60 East was recovered along a heavily wooded fence line utilizing search positions entered into a Trimble Geo-Explorer handheld GPS unit.

resolve that dispute, the United States Coast and Geodetic Survey was commissioned to retrace the boundary between Mile 40 and Mile 60 east. During this survey, evidence from the original survey was recovered and granite monuments were placed at each mile along this 20-mile stretch.

After reviewing the notes and reports of the original surveys, I solicited the help of GIS specialists from our affiliate company, Midland GIS Solutions, to assist in preparing search maps and extracting search coordinates for the 15 monuments that were to be recovered as a part of this project. Utilizing digital orthophotography and the public land survey grid layer available from USGS, the GIS specialists prepared digital maps and used original government plats in the vicinity of the 10th mile cast iron monuments to plot the location of the monuments along the state boundary. This was done relevant to the fallings noted on the original government plats between the nearest intersecting section lines. Once the maps were prepared, a preliminary search coordinate was extracted from the map for each of the monuments. This provided the field crews with a visual image of the search area as well as a search coordinate to be inserted into the Trimble GeoExplorer handheld GPS receiver that was utilized for the initial search. Utilizing the work maps and search coordinates, surveyors were able to recover several of the original monuments during their initial search (see photos). The actual coordinate positions of the recovered monuments were recorded with the GeoExplorer, and refined search positions were calculated for missing monuments. Utilizing this process, the field crews were able to recover 13 of the 15 monuments in the contract and

confirmed the removal or destruction of the other two monuments.

Testimony from local residents and personnel from the County Engineering Departments in Iowa's bordering states also proved invaluable in the recovery of the monuments. In the case of Mile 50 West at Sullivan's original northwest corner, the monument was recovered after refining the search position by determining coordinates on the recovered monuments at Miles 40 and 60 West. This monument, which was reported to have been set in a low, wet swale in the original notes, was found buried approximately six feet below the fill of a county road just to the west of a sizeable culvert with a large drainage area running north and south from the county road. When surveyors were unable to confirm the location of this monument using hand tool excavations, the Fremont County, Iowa Highway Department graciously volunteered a backhoe to excavate and confirm the location of the monument (see photo). The monument was found in its original position and had apparently been capped with concrete

at the time the road was constructed. Keith Hinds with the Decatur County Iowa Engineer's Office also volunteered his personal time to assist Midland Surveying with the recovery of the 40th and 50th mile monuments to the east of the original northwest corner.


After the monuments were recovered, static GPS observations were taken in sessions at each monument for a minimum of two hours. Due to the lack of existing control monumentation along large areas of the boundary in north central Missouri, the Land Survey Program requested that we process all GPS observations utilizing the On-Line Positioning User Service (OPUS), maintained by the National Geodetic Survey. In the vicinity of some of the monuments, we discovered in comparing the OPUS observations to existing control monumentation, that the results were very good, with only negligible differences between published coordinates and the results of the OPUS observations.

To complete the project, a Missouri Certified Land Corner Document was

prepared for each recovered monument and published with State Plane Coordinate values. These documents were filed with the Land Survey Program, which will, in turn, file copies with each of the Missouri Counties along the boundary. Midland also provided each Iowa County affected by the project with copies of the same documents to their County Engineer Offices.

Midland GIS Solutions is currently utilizing the coordinate values of the state boundary monuments in preparing a county-wide geographic information system for Harrison County, Missouri, and is in hopes of using the data obtained from the boundary survey as they continue to map the northern counties of Missouri and the southern counties of Iowa on future projects. *A*

**Troy Hayes** is president of Midland Surveying, a company that has served northern Missouri and southern Iowa for more than 30 years. The company has offices in Maryville and St. Joseph, Missouri, and in Clarinda, Iowa.



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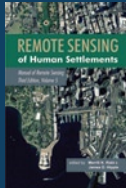
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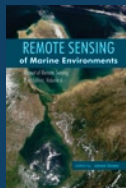
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