



# Building a Cadastral Land Base for your Enterprise GIS

FlexiCadastre Denver Conference 2015

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WhiteStar Corp.

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# ca·das·tral



- (of a map or survey) showing the extent, value, and ownership of land, especially for taxation.

# Parts of a Cadaster



- A Land Reference System
- Parcels
  - Surface Ownership
  - Mining Claims
  - Mineral Leases
  - Right of Ways
  - Others

# Land Reference Systems



- Public Land Survey System (Jeffersonian).
  - 30 States.
- Texas Land Survey System.
- Civil Townships.
- Georgia Militia Districts.
- New England Townships.
- Colonial Surveys, Metes and Bounds (Not LRS).

# Thomas Jefferson

April 13, 1743 – July 4, 1826



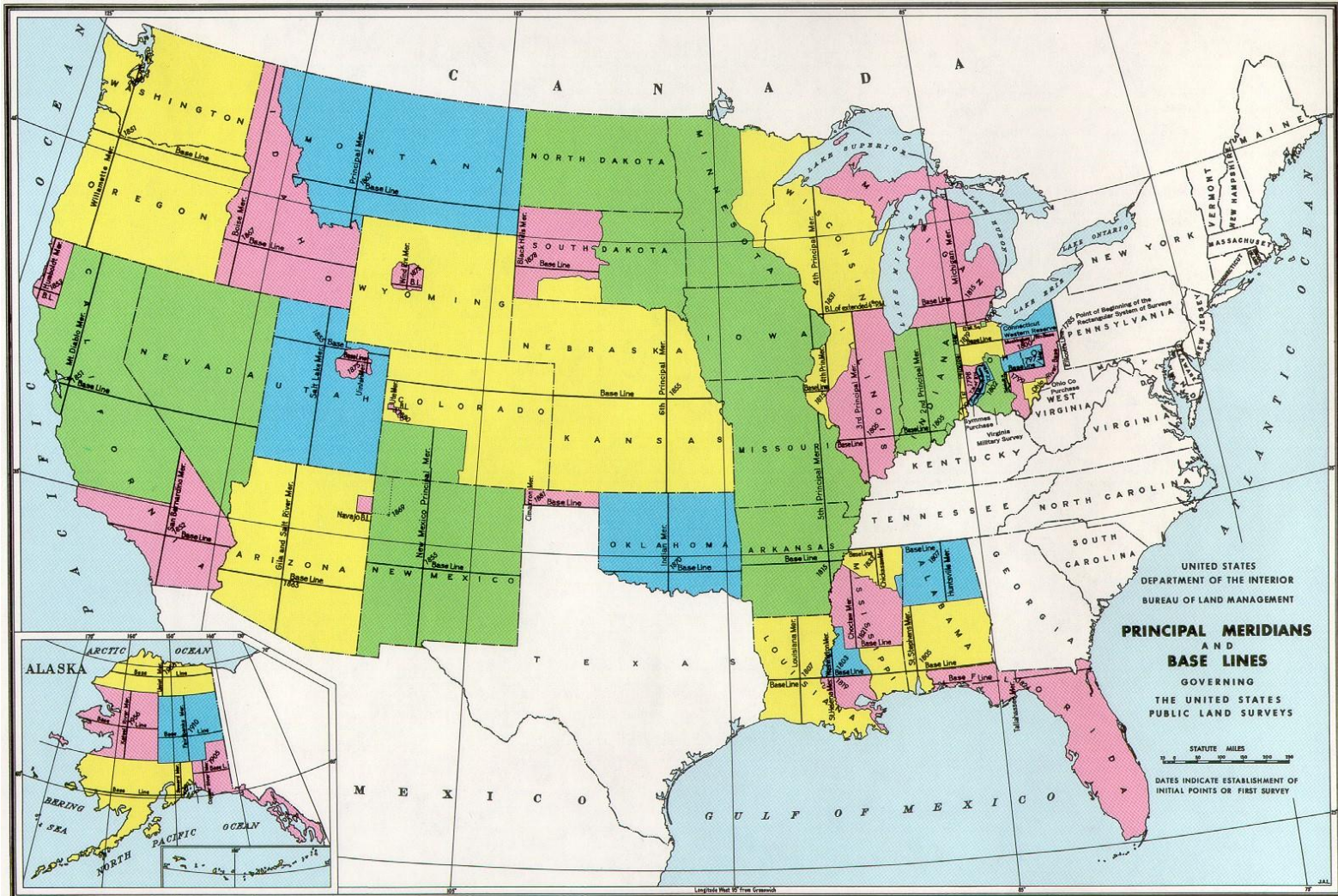
# Why a PLSS?



- Thomas Jefferson’s “Yeoman Farmers.”
- Land for Veterans.
- Revenue for Nascent USA.
- Railroad Building Incentive.
- Organized Land Transfer and Collateralization.
- Brief Real Estate Descriptions.
- O&G Leases and Wells

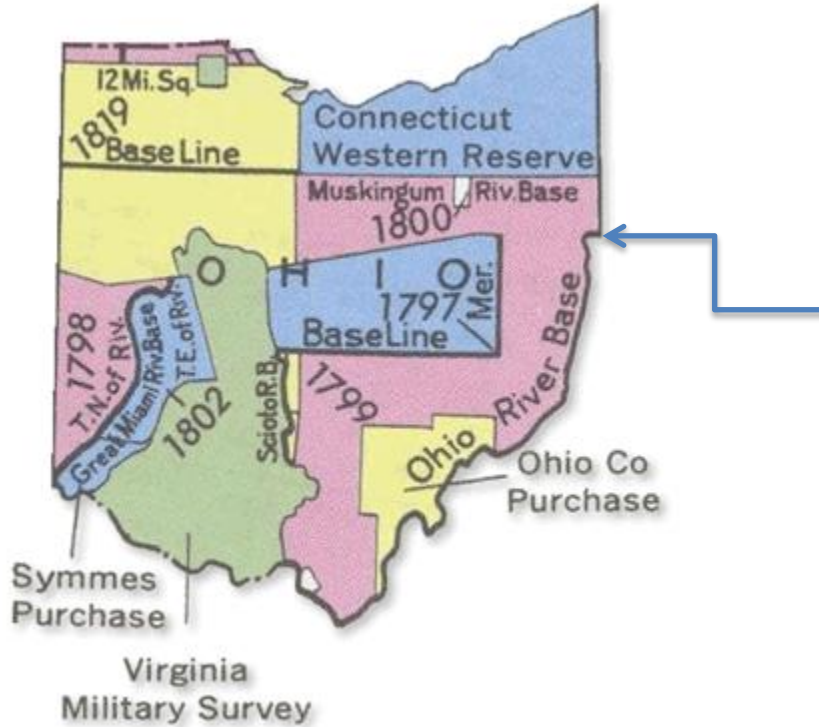


WHITESTAR



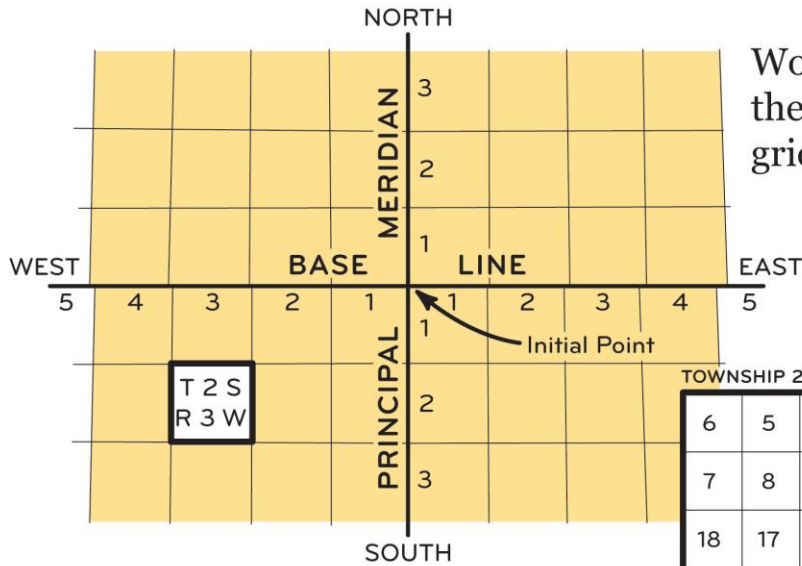


# Ohio: Practicing the PLSS





# TOWNSHIP GRID

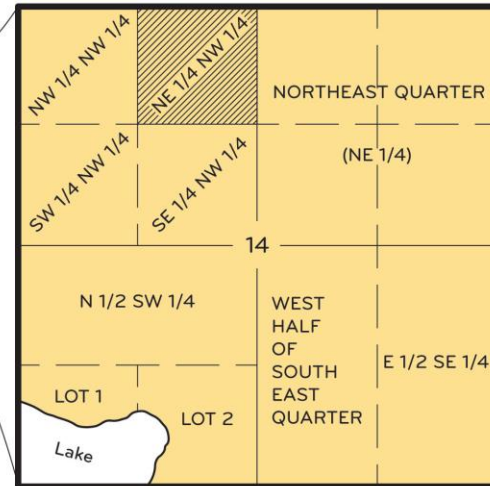


Working from a principal meridian and baseline, the surveyor marks off the township lines into grids of 36 square miles.

TOWNSHIP 2 SOUTH, RANGE 3 WEST

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	SEC 14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

## SECTION 14



Townships are further divided into sections of 1 square mile (640 acres). Sections are then numbered from 1 to 36.

# Equipment



Early Surveyor's  
Compass



Late 1800's Surveyor's Transit

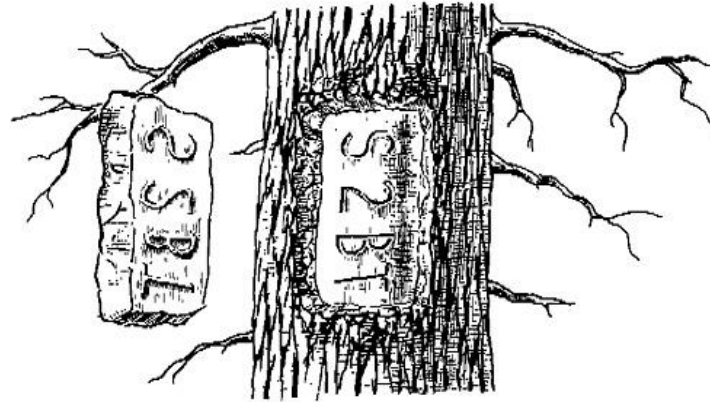


Early Surveyor's 2-Pole  
(33') Chain

# Monuments



Willamette Meridian disk.



Old bearing tree with overgrowth removed. The original marks are preserved and appear in reverse and relief on the overgrowth.



# Popular Culture

The head of a frog, the grinning face of a giant elephant, thick short legs set off by huge claws, the back of a dinosaur, and a long tail with spears at the end – It came from Section 37 Rhinelander, WI - Hodag



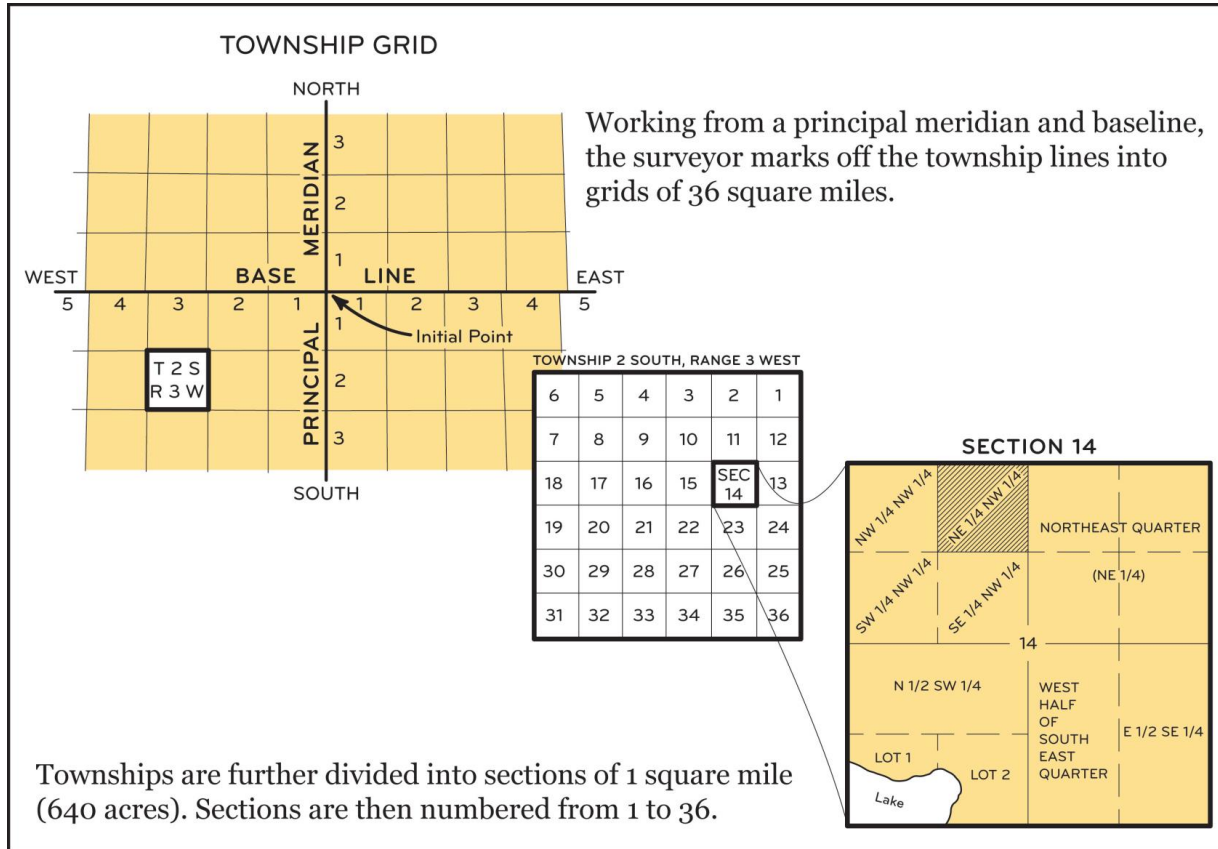
# Legal Descriptions (PLSS)



- Meridian
- Township
- Range
- Section
- Lot
- Aliquot

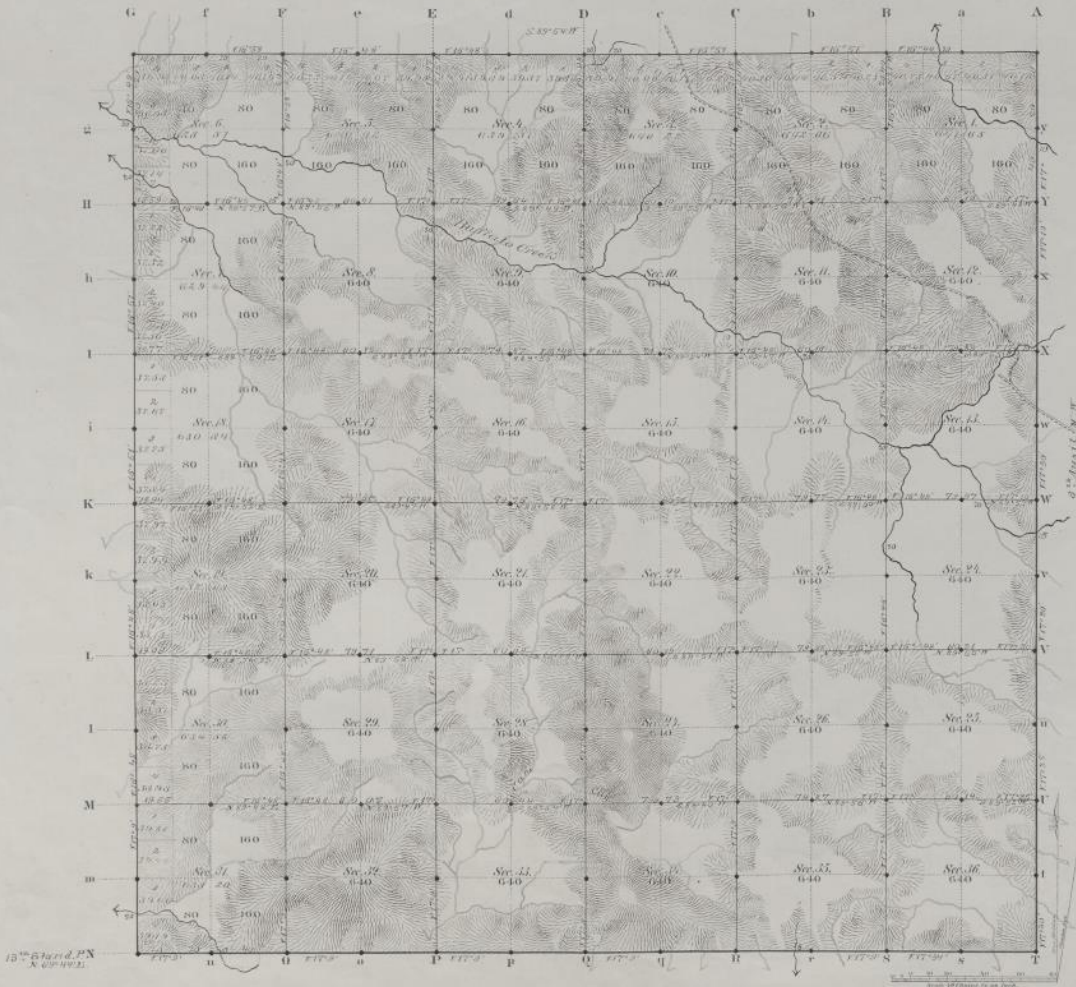
# 6 2N 3E 14 LOT 1

## 6 2N 3E 14 E/2 SE





TOWNSHIP N<sup>o</sup> 53 NORTH RANGE N<sup>o</sup> 69 WEST of the 6<sup>th</sup> Principal MERIDIAN.



15<sup>th</sup> 67<sup>th</sup> d. P.N.  
N. 69<sup>th</sup> 1921.

Total number of Acres 229 97 45

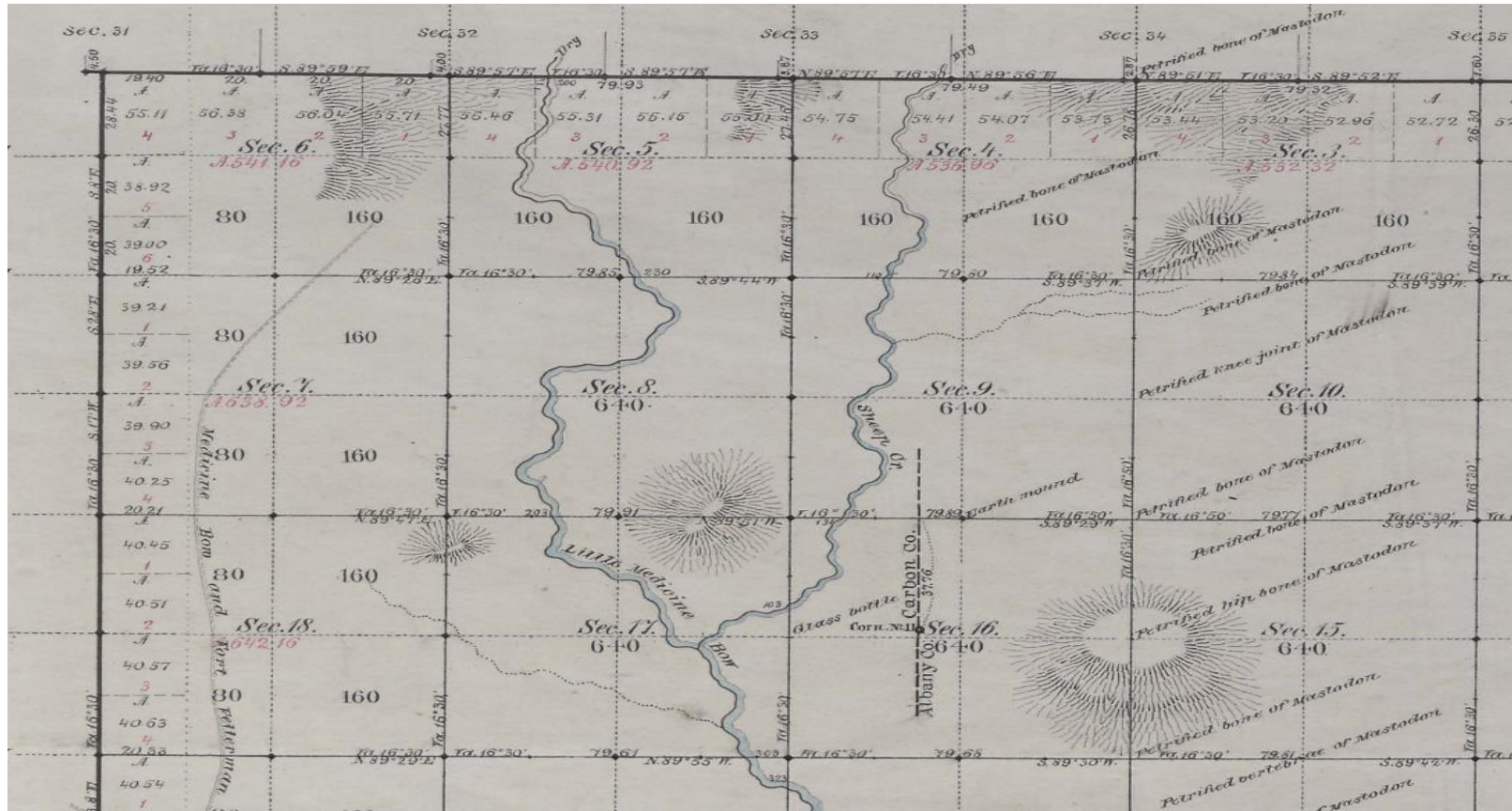
Section-Designated	By Whom Surveyed	Date of Subdiv.	Area of Acres sq. mi. ac.	Area Surveyed sq. mi. ac.	Remarks/Deficiency
T. 5 <sup>th</sup> Township lines	T. P. 234 H. C.	31 <sup>st</sup> Dec 25, 1852	11 29 82	11 29 82	Reg. 22, 1852 13 <sup>th</sup> 59 <sup>th</sup> 1852
Subdivisions			59 25 77	59 25 77	Reg. 52-84 5, 1852 15 <sup>th</sup> 5 <sup>th</sup>
Contour lines			0 00 00	0 00 00	Reg. 22, 1852
6 <sup>th</sup> 7 <sup>th</sup> 8 <sup>th</sup> W. R.			0 00 00	0 00 00	Reg. 22, 1852
12 <sup>th</sup> 61 <sup>st</sup> d. P.N.			0 00 00	0 00 00	Reg. 22, 1852

The above Map of Township N<sup>o</sup> 53 North Range N<sup>o</sup> 69 West of the 6<sup>th</sup> Principal Meridian Wyoming Territory is strictly conformable to the field notes of the survey thereof on file in this Office which have been examined and approved.

Surveyor General's Office, *Edw. C. David*,  
Cheyenne Wyoming, *Wm. J. Smith*  
July 6<sup>th</sup> 1853



# “Mastodon Bone” Corners



TOWNSHIP 53 NORTH, RANGE 69 WEST, OF THE SIXTH PRINCIPAL MERIDIAN, WYOMING.  
DEPENDENT RESURVEY



A history of surveys is contained in the field notes.

This plat represents the dependent resurvey of the Thirteenth Standard Parallel North, through R. 69 W., the Eighth Auxiliary Meridian West, through T. 53 N., between Rr. 68 and 69 W., the west and north boundaries and the subdivisional lines designed to restore the corners in their true original locations according to the best available evidence, T. 53 N., R. 69 W., Sixth Principal Meridian, Wyoming.

Certain modified lots and areas shown hereon pertain to Federal interest lands only. Except as indicated hereon, the lottings and areas are as shown on the plat approved July 6, 1953.

Survey executed by Anthony Mile', Cadastral Surveyor, beginning July 14, 1983, and completed November 5, 1984, pursuant to Special Instructions dated June 10, 1983, for Group No. 449, Wyoming.

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

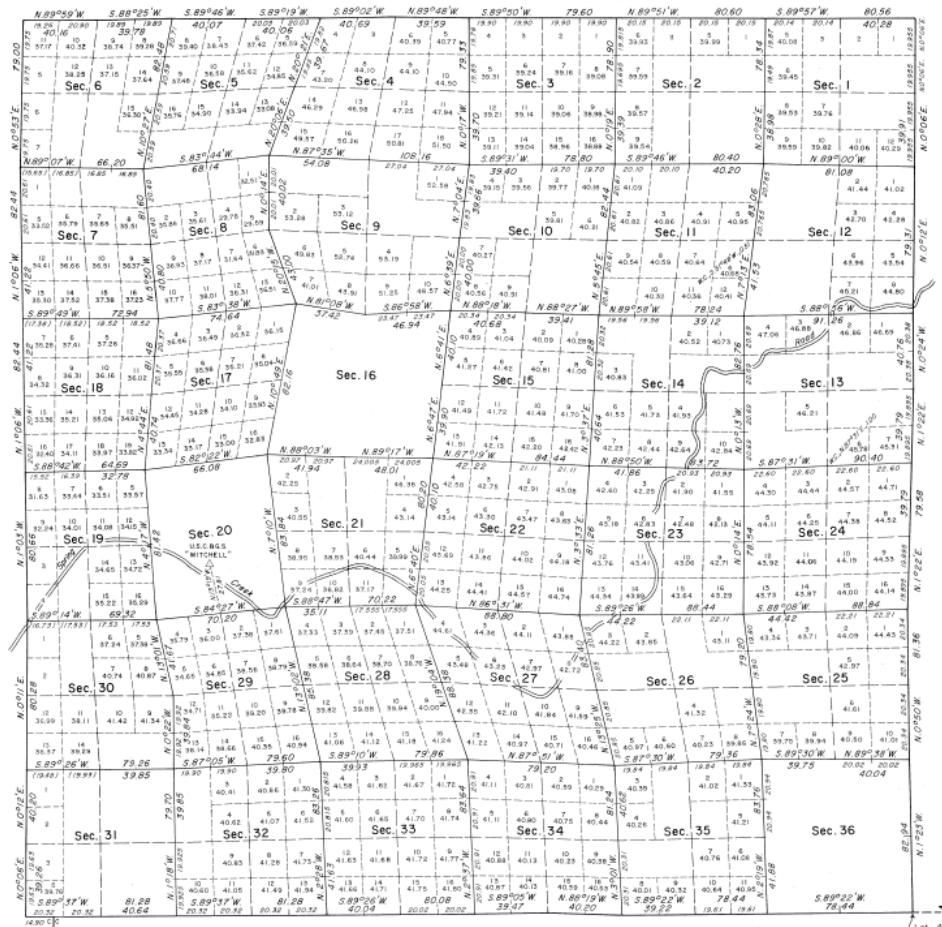
Cheyenne, Wyoming                      May 24, 1985

This plat is strictly conformable to the approved field notes, and the survey, having been correctly executed in accordance with the requirements of law and the regulations of this Bureau, is hereby accepted.

For the Director

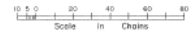
*Richard J. Oakes*

Chief Cadastral Surveyor for Wyoming



Sec. 32  
Lat. 44° 31' 35.9" N.  
Long. 108° 05' 05.3" W.

THIRTEENTH STANDARD PARALLEL NORTH





# Source Documents



														35.96
														3
														35.94
														4
														35.91
														4
														28.76
														5
														35.80
														6
														35.80
														7
														35.80
														1
														35.78
														2
														35.72
														3
														35.68
														4
														35.62
														4
														35.61

of Surveys	When Surveyed
4	3
639.926	Dec 10 <sup>th</sup> 1867
	640.08

The above Map of Township N 26 S and  
 Principal Meridian 1<sup>st</sup> Ranges  
 notes 639.92 mcs. thereon for  
 General Land Office  
 Surveyors General Office  
 April 24 1868  
 Washington D.C.

5
35.63
6
35.65
7
35.68

# Cadastral Data



- All Real Estate References the PLSS
  - In those 30 States using the PLSS Land Ref. Sys.
  - Oil and Gas Leases
  - Surface Ownership
  - Etc, etc.

# Statistics USA



- 70,909 Townships
- 2,279,345 Sections

State	Count	State	Count	State	Count
CA	4835	CO	3105	KS	2345
MT	4241	ND	2104	NM	3523
UT	2666	WY	2755	SD	2380



# Enterprise Geodatabase



- Feature Classes
  - Sections, Townships, Lots, Tracts, Quarter-Quarters
- Have These Attributes:
  - Meridian, Township, Range, Section, Survey Type, Survey Number, Aliquot.
- Lots of QA/QC required.

# Cadastral Data Generation



## Legal2Map LeaseBuilder

WellSpotters

LeaseBuilders

New LeaseBuilder

Data Entry

Upload File

Existing LeaseBuilder

Logout

### Data Entry

Please enter up to five (5) [multi-]LeaseBuilder (polygon) legal land descriptions below to locate by latitude and longitude.

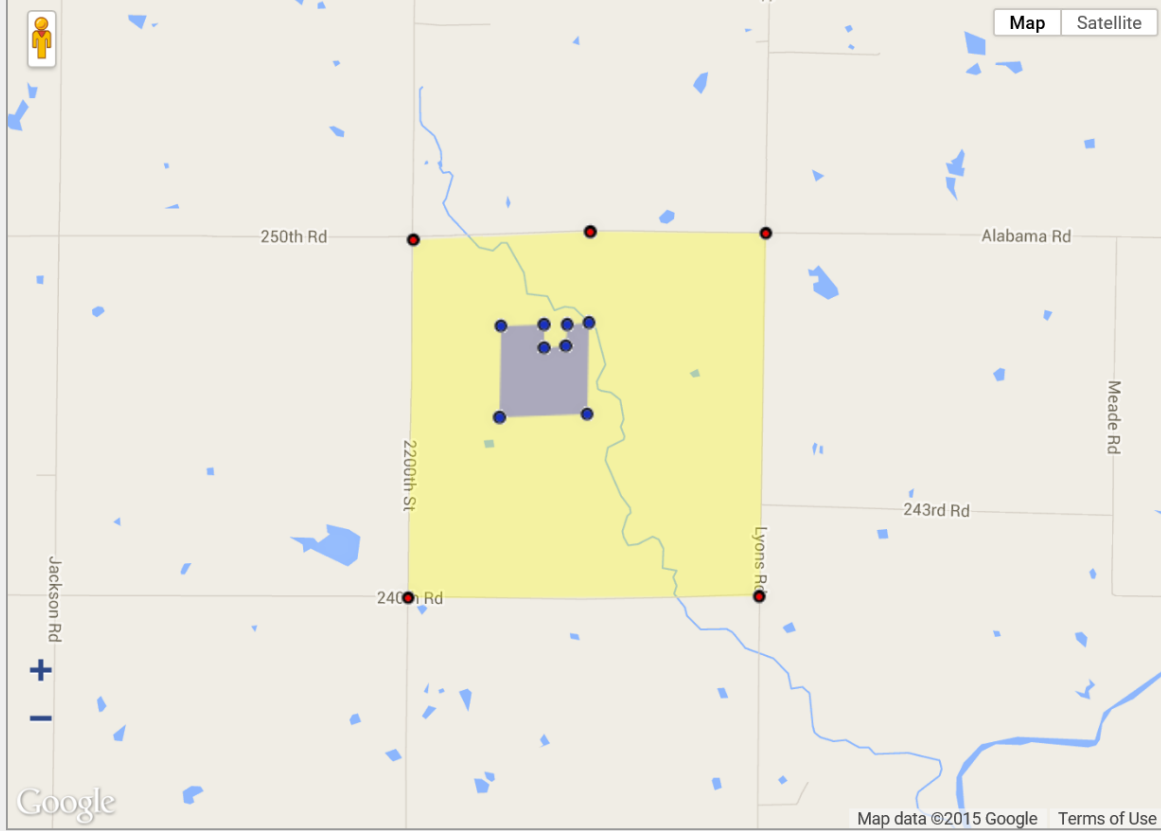
1	<input type="text" value="6 27S 19E 4 SE NW LESS NW NE SE NW"/>	⌵
2	<input type="text" value="6 27S 19E 4 ALL; 6 27S 19E 3 ALL"/>	⌵
3	<input type="text" value="6 27S 19E 4 NW LESS N1/2"/>	⌵
4	<input type="text" value="6 27S 19E 4 N1/2 NW"/>	⌵
5	<input type="text" value="6 27S 19E 4 ALL LESS S1/2"/>	⌵

You can also [upload a file](#).




current description

**6 27S 19E 4 SE NW LESS NW NE SE NW**

hover on markers for more information



### Legend

	Section point
	Result point
	Co-located Section and Result point

# Recap



- The USA has many LRS.
  - The PLSS is the Most Important, Used in 30 States.
- Thomas Jefferson was a Genius.
- Source Documents are 200 Years Old.
- Documents Georeferenced and Digitized.
- Much QA/QC to Produce Geodatabase.
- Once That Exists, can Generate Parcels.

# Resources



- WY BLM Survey Plats - <http://www.wy.blm.gov/cadastral/surveydocs.htm>
- WY BLM Cadastral Survey - [http://www.blm.gov/wy/st/en/resources/public\\_room/cadastral.html](http://www.blm.gov/wy/st/en/resources/public_room/cadastral.html)
- Technical History of the Public Land Survey System [http://nationalatlas.gov/articles/boundaries/a\\_plss.html](http://nationalatlas.gov/articles/boundaries/a_plss.html)
- Robert White – WhiteStar Corp – [rwhite@whitestar.com](mailto:rwhite@whitestar.com) (303) 781-5182 x111

# Questions?

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- [rwhite@whitestar.com](mailto:rwhite@whitestar.com)

