



Making the Memorial

The Design, Theory and Construction of the

Kentucky Vietnam Veterans Memorial

Frankfort, Kentucky

Helm Roberts Architect/Planner

Lexington, KY

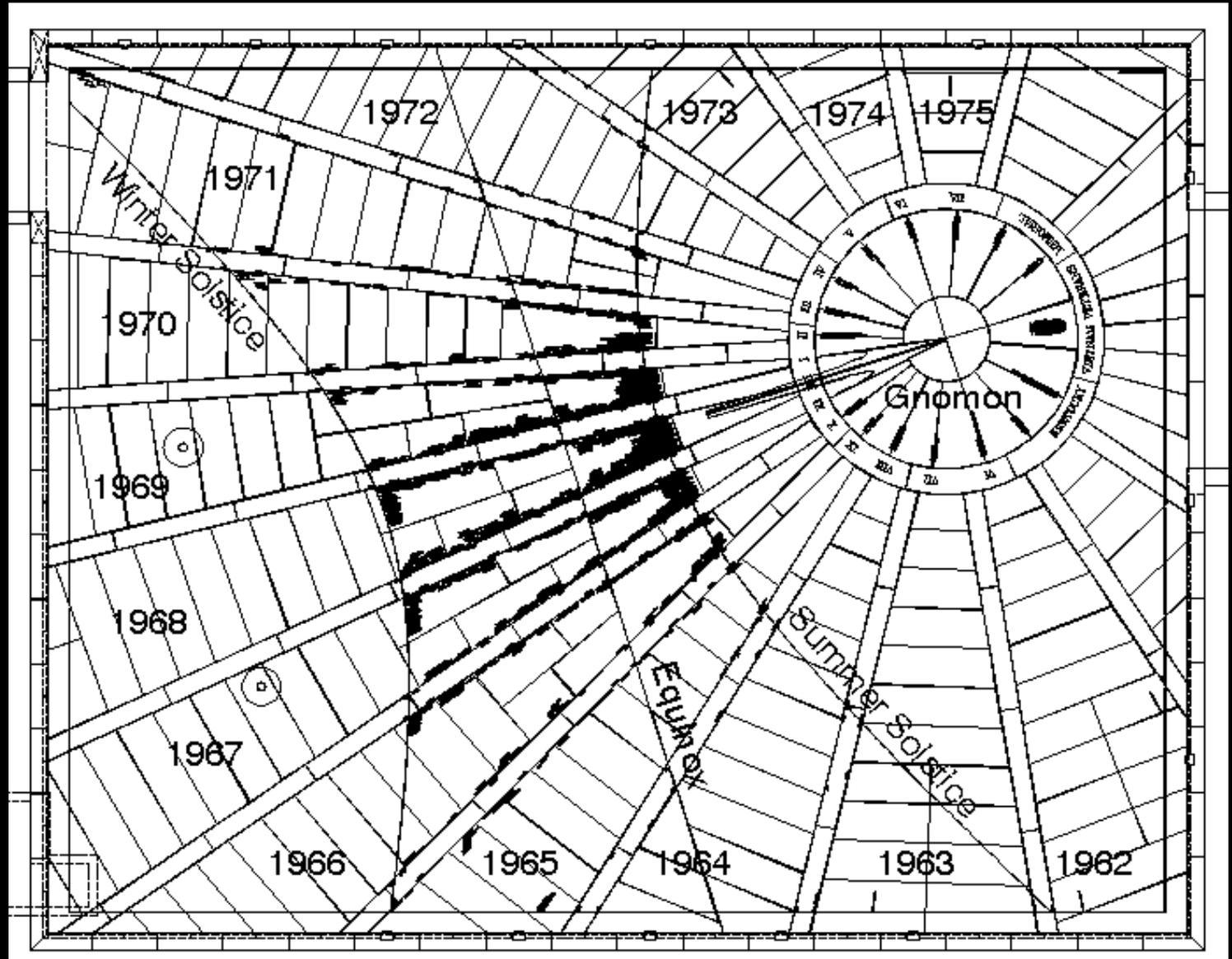


The Memorial

A Memorial Sundial In Granite and Stainless Steel

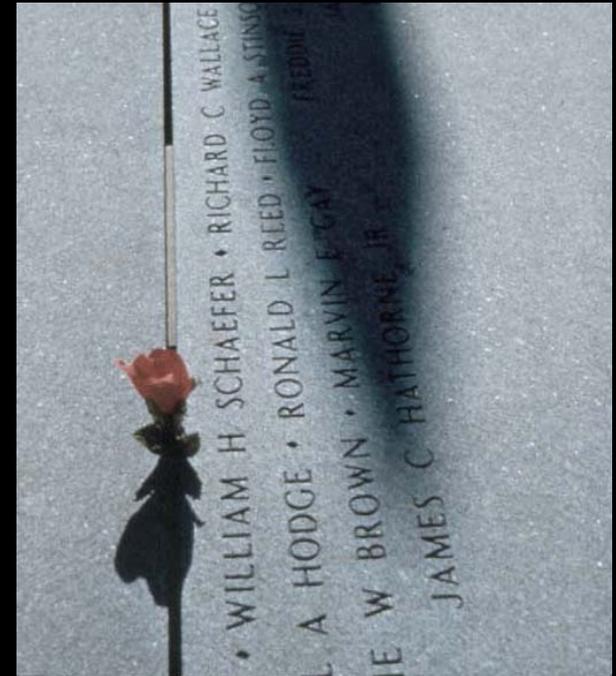


Plan of the Memorial





The tip of the shadow touches the name of each fallen veteran on the anniversary of his death.





The Origins

The Vietnam Veterans Memorial Washington, DC



- Inspired Vietnam Memorials Nationwide
- West Wall Points to Lincoln Memorial
- East Wall Points to Washington Monument
- Completed 1983
- Most Visited Place in Washington, DC



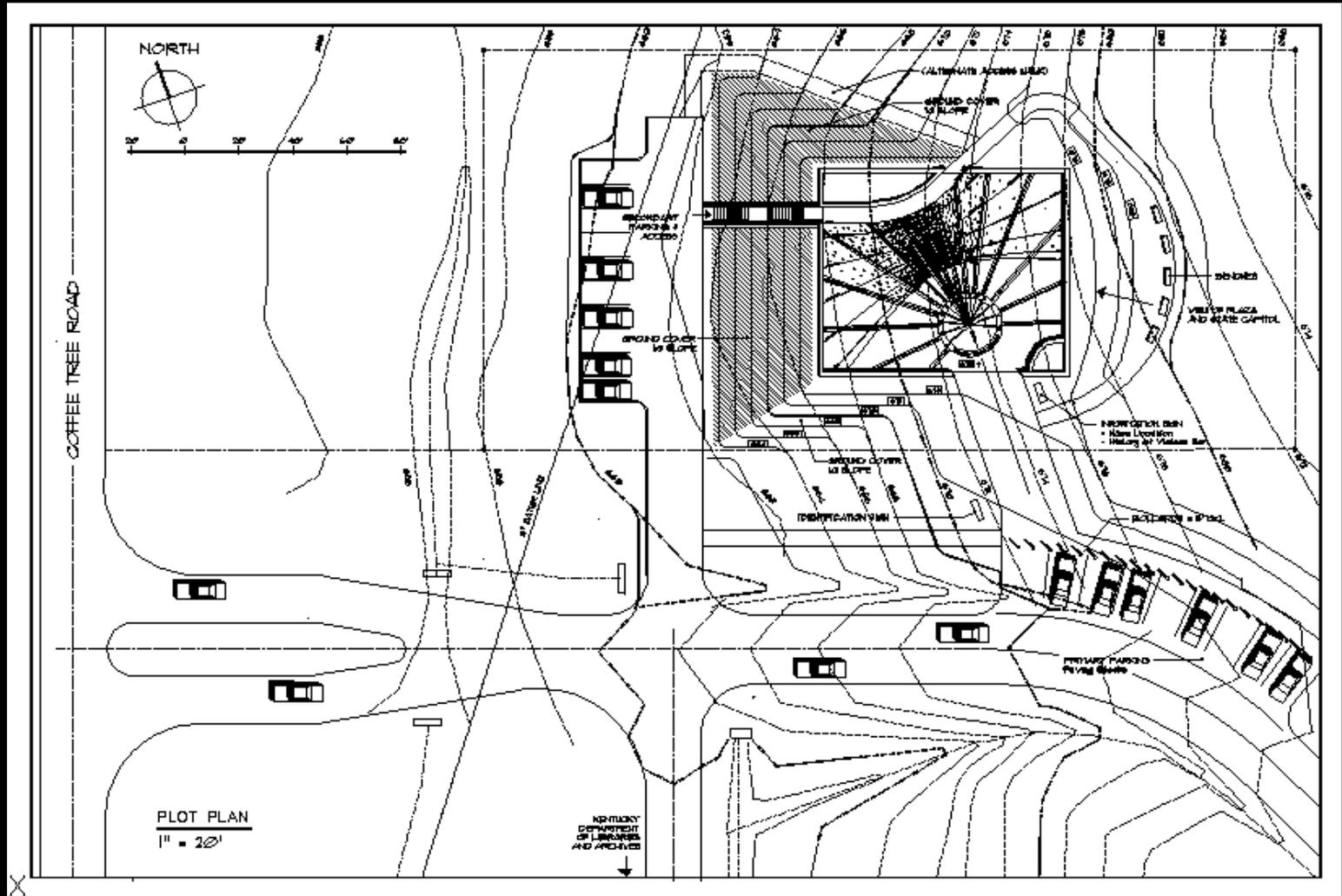


The Design Competition

The Design Competition

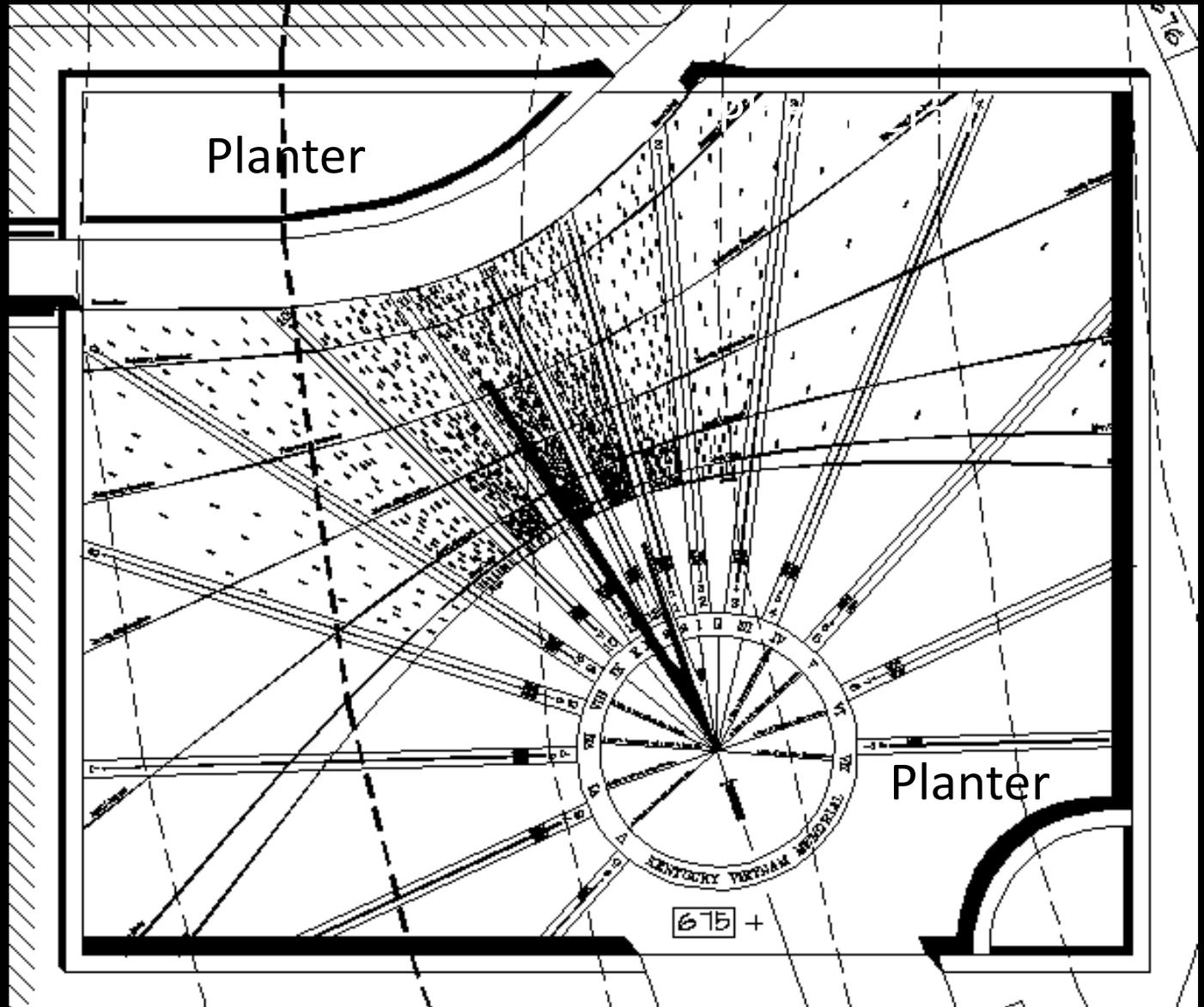
- International competition
- Model required
- Almost 1,100 names of veterans lost from Kentucky
- Library and archives site
 - ◆ Open land
 - ◆ View of capital building across river

The Site Plan Submitted

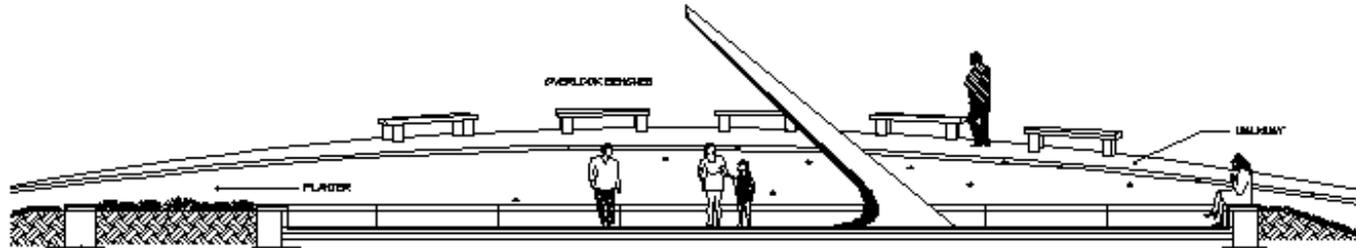


Split Parking...Plaza Orientation, East/West

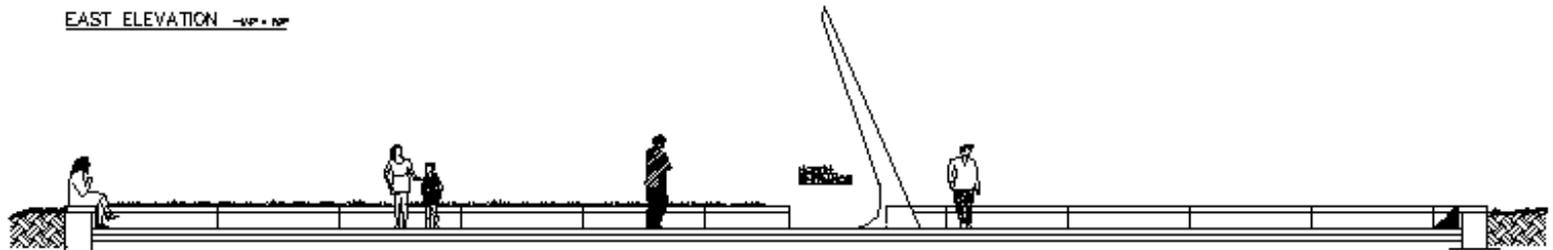
Original Plaza Design



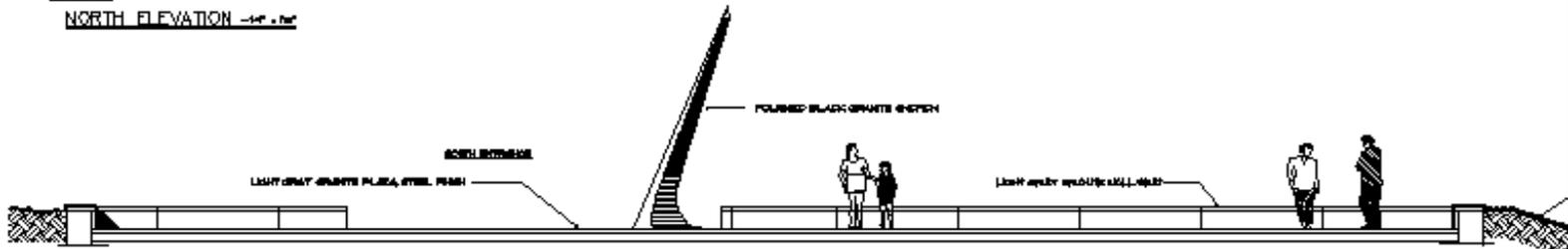
Elevations



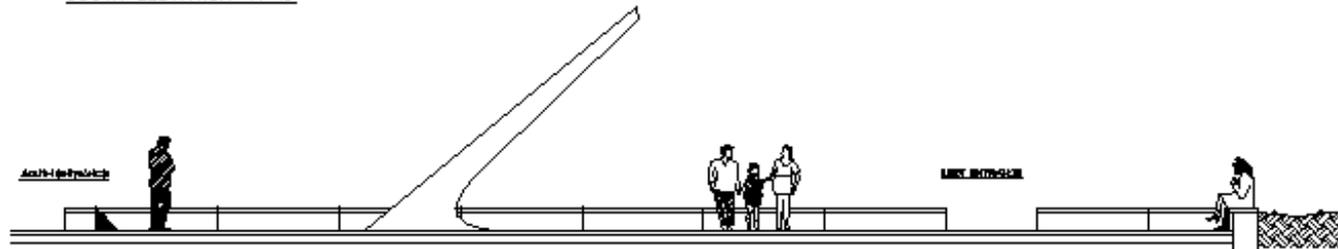
EAST ELEVATION -1/4" = 1/8"



NORTH ELEVATION -1/4" = 1/8"

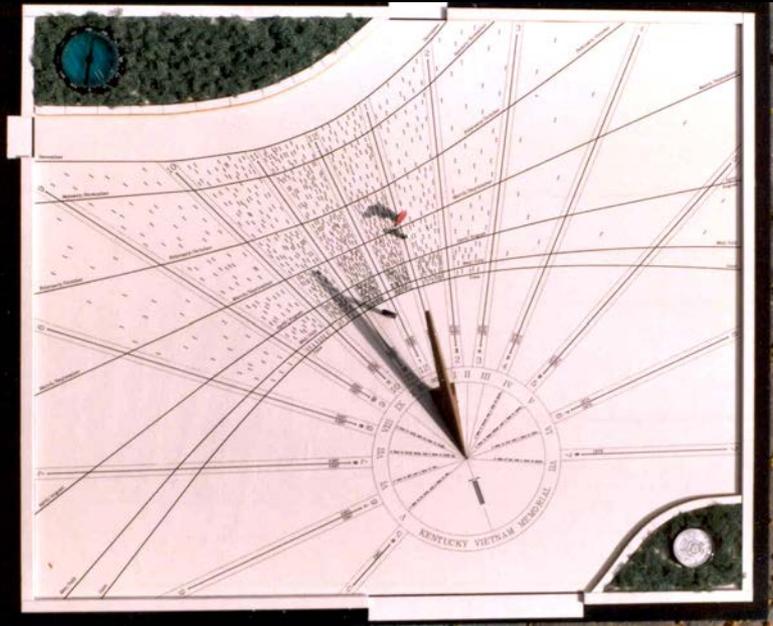


SOUTH ELEVATION -1/4" = 1/8"

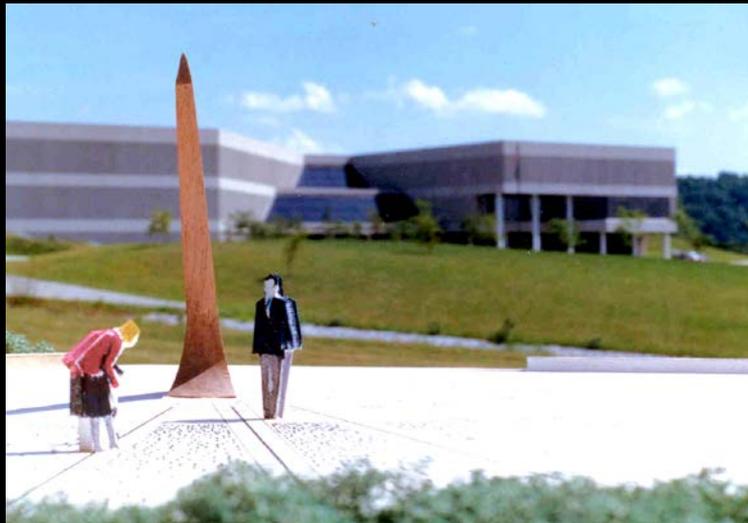


WEST ELEVATION -1/4" = 1/8"

Photos of Entry Model



Plaza Detail



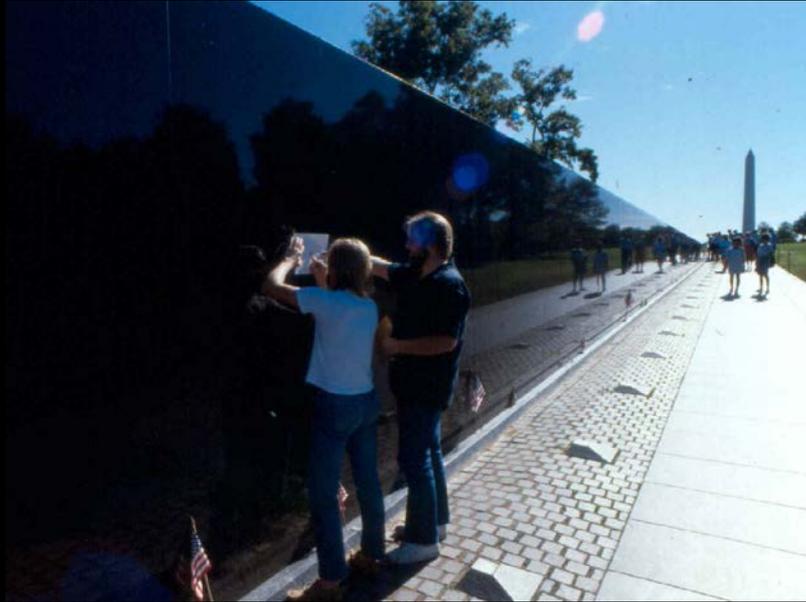
Looking toward Library and Archives Building

And the winner is.....

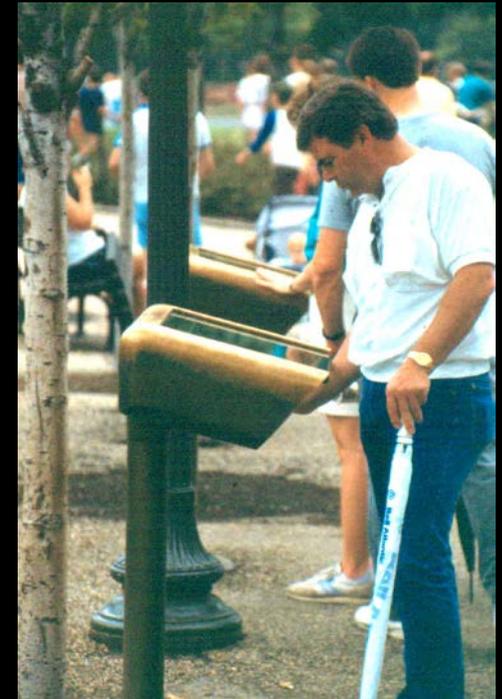
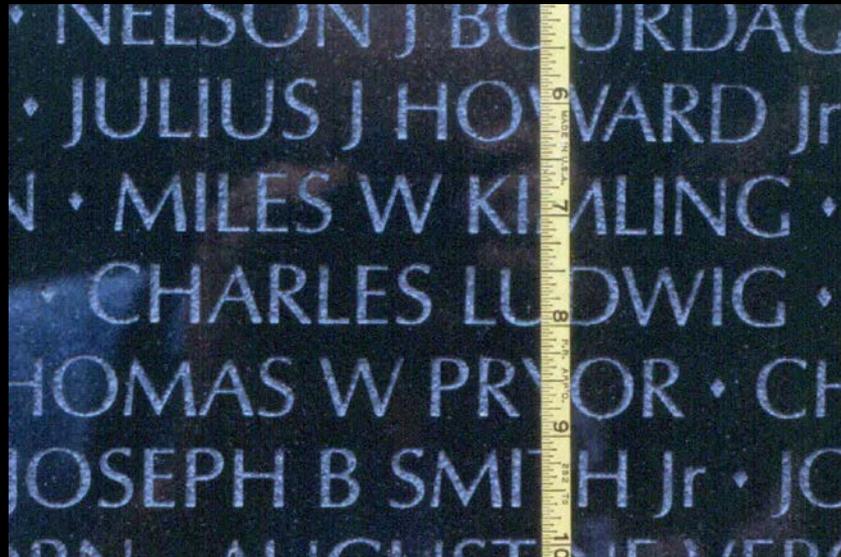


Preparing to Design.... Research

The National Memorial



- Rubbings
- Lettering Size, Style
- Directories of Names



The Illinois Vietnam Memorial



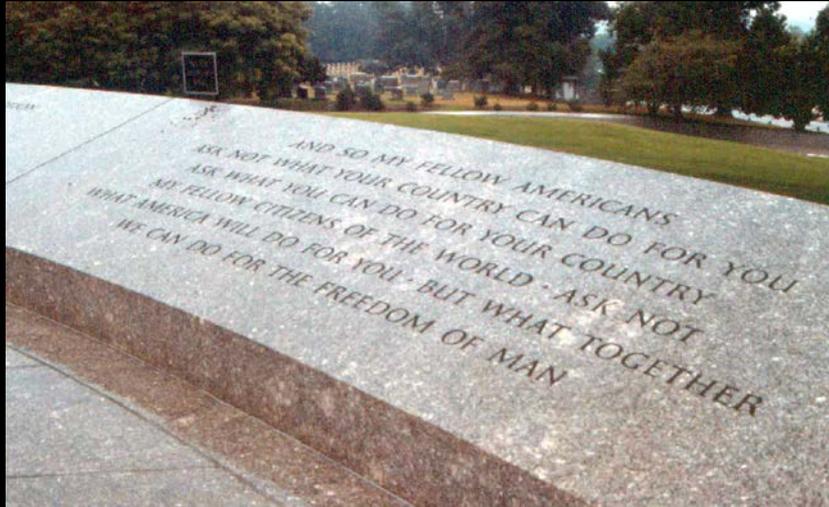
Arlington National Cemetery



- Grave Marker
- Typeface
“Government”
- Since Civil War



Arlington...John F. Kennedy Grave



- “Government” style lettering

- Standing water on Grave Marker





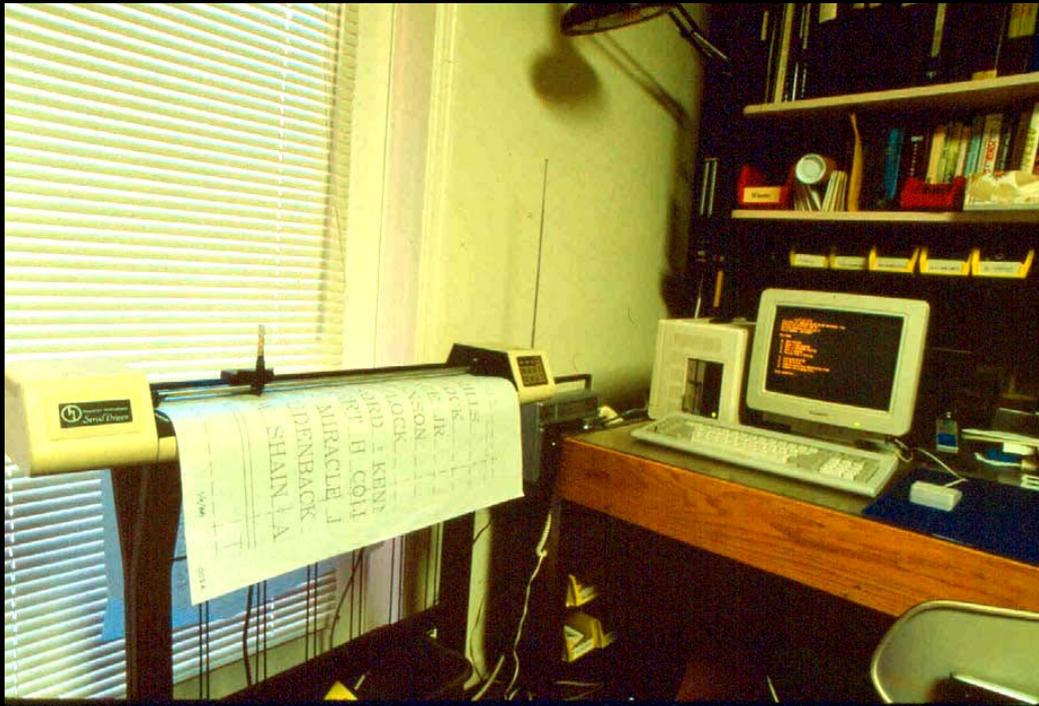
Computers in 1987 State of the Art

IBM AT 286 Computer



- DOS
- AutoCAD 2.6
- SuperCalc
- R:Base
- WordStar
- Acecalc

Houston Instruments 251 Plotter

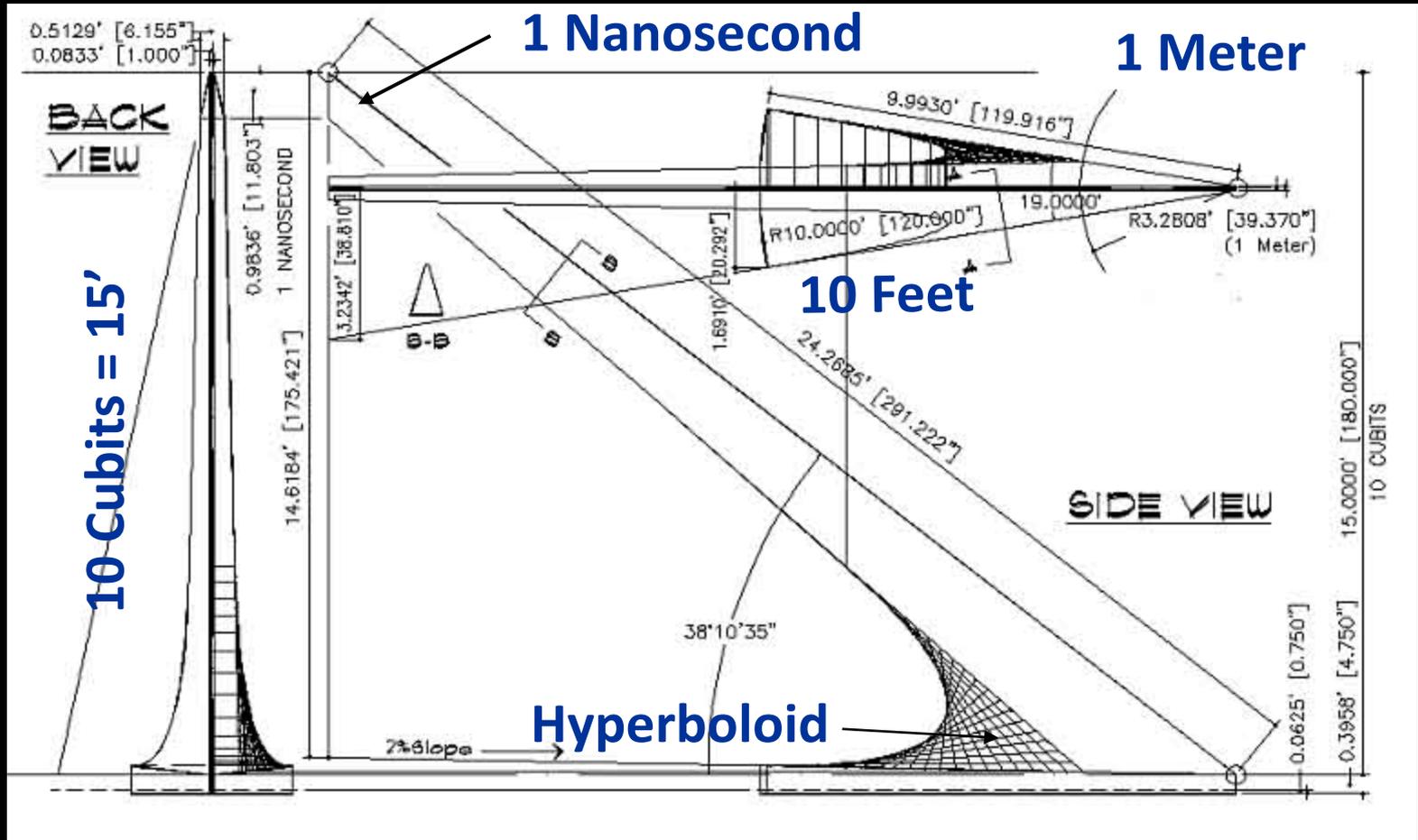


- Max Sheet: 22"x 34"
- Single Pen
- Plots in Hours...not Minutes



The “Gnomon”

The "Gnomon"....The Arm or Pointer

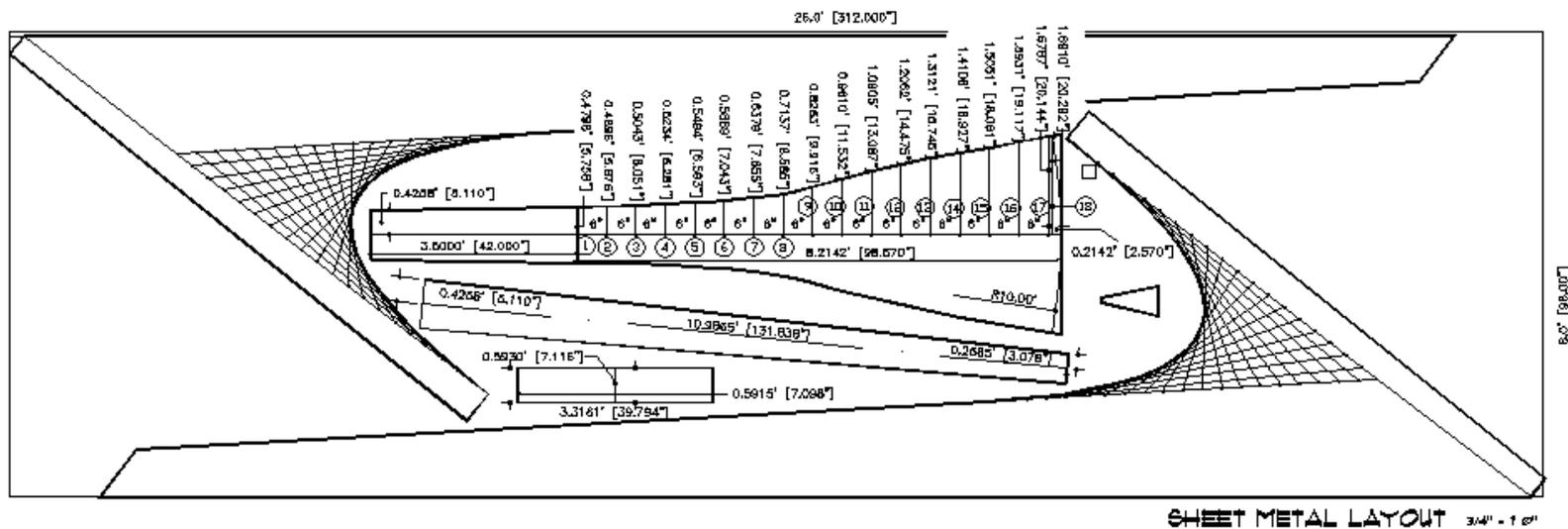


Shop Drawing

Gnomon Stainless Steel Shop Drawing

25' long

8' wide



Sheetmetal Layout

Welding the Gnomon

Gnomon Dedication



- Nov. 11, 1987 by Governor Martha Lane Collins
- Cargo Parachute Unveiling



The Plaza Design

The Astronomical Calculations

- Acecalc: A Shareware Program discovered among other programs claiming similar output
- U. S. Naval Observatory Printout

Nautical Almanac Office
U.S. Naval Observatory
Washington, D.C. 20392

	45 ^m	50 ^m	55 ^m	
	7° 14'	8° 00'	8° 47'	ALTITUDE
	127.0	127.8	128.7	AZIMUTH
	15 56	16 35	17 13	
	137.9	138.9	139.9	
	22 50	23 18	23 46	
	150.6	151.7	152.9	
	27 18	27 33	27 46	

“Acecalc” a Fortuitous Shareware Discovery

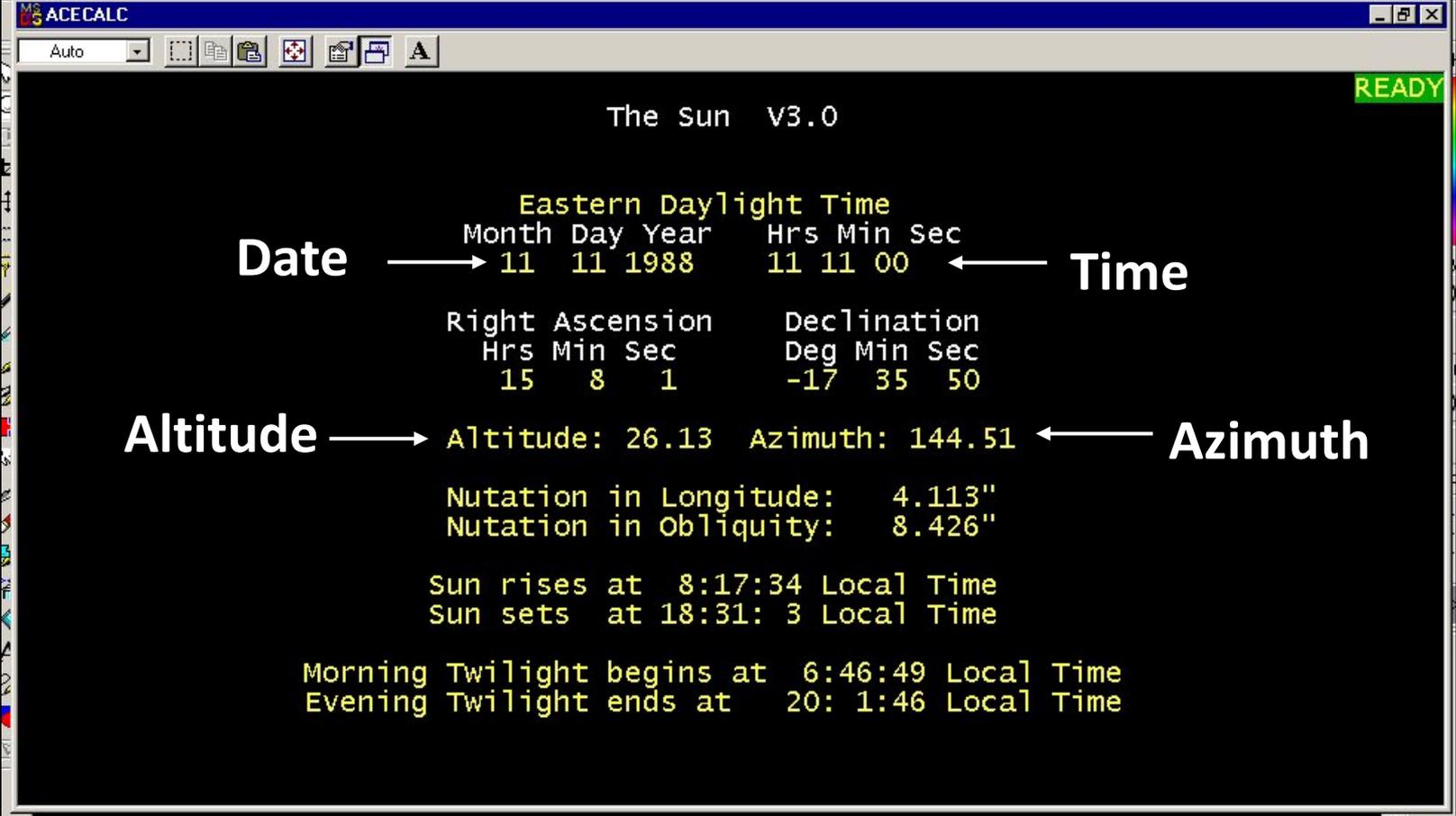
```
+++++ U S E R - S U P P O R T E D   S O F T W A R E +++++
+
+           If you find this software of value to you,
+           a $25 donation is suggested,
+           so that we can continue to make enhancements
+           and other software available to you.
+
+           AstroSoft, Inc.
+           Post Office Box 4451
+           Hayward, CA 94540-4451
+
+ AstroSoft is a nonprofit, tax-exempt educational and scientific
+ organization, which includes among its activities the offering of software
+ intended primarily for educational and scientific institutions. Donations
+ are tax-deductible to the extent allowed by law.
+
+           Regardless of whether you make the suggested donation,
+           you are encouraged to copy this software
+           within the terms of the Limited License.
+
+++++
```

Hit ENTER to continue...

Locations of Sun, Moon, etc.....

Universal Time 17:07:03	2/ 7/10 13:07:03 2452313.2132	Sidereal Time 20:38:10
Part I: Astronomical Ephemeris Kentucky Vietnam Memorial		
<u>The Sun</u> The Moon The Planets Eclipses Astrophotography Exposures Mean Sidereal Time and Julian Day Precession of Coordinates	Phases of the Moon Equinoxes and Solstices Galilean Satellites of Jupiter Perpetual Calendar Polaris DOS Shell Exit	
Use the Arrow Keys to select an option, then hit the ← key... Hit H for Help		

Altitude and Azimuth of the Sun for anywhere....anytime



The Sun V3.0

READY

Eastern Daylight Time

Date → Month Day Year Hrs Min Sec ← **Time**
 11 11 1988 11 11 00

Right Ascension Declination
Hrs Min Sec Deg Min Sec
 15 8 1 -17 35 50

Altitude → Altitude: 26.13 Azimuth: 144.51 ← **Azimuth**

Nutation in Longitude: 4.113"
Nutation in Obliquity: 8.426"

Sun rises at 8:17:34 Local Time
Sun sets at 18:31:3 Local Time

Morning Twilight begins at 6:46:49 Local Time
Evening Twilight ends at 20:1:46 Local Time

Converting Acecalc to AutoCAD



- R:Base database management System was used to convert Altitude and Azimuth readings to Radial Coordinates in AutoCAD

Sunline Conversion Formulae

#	Name	Type	Length	Key	Expression
1	LOST	DATE			
2	OBS	TIME			
3	ALT	REAL			
4	AZI	REAL			
5	ALT2	REAL			
6	RAW	REAL			('ALT' + .32)
7	HT	REAL			(14.6184/TAN('ALT2' * .#PI/180)) (-('RAW' * COS('AZI' * .#pi/180)) * .82)
8	DIS	REAL			('RAW' - ('RAW' * 'HT'/14.6184))
9	DIFF	REAL			('RAW' - 'DIS')
10	RAW2	REAL			(14.4934/TAN('ALT2' * .#PI/180))
11	HT2	REAL			(-('RAW2' * COS('AZI' * .#PI/180)) * .82)
12	DIS2	REAL			('RAW2' - ('RAW2' * HT2 '/14.4934))
13	DIFF2	REAL			'DIS' - 'DIS2'

Current number of rows: 1166

HELM ROBERTS - ARCHITECT/PLANNER - LEXINGTON, KY

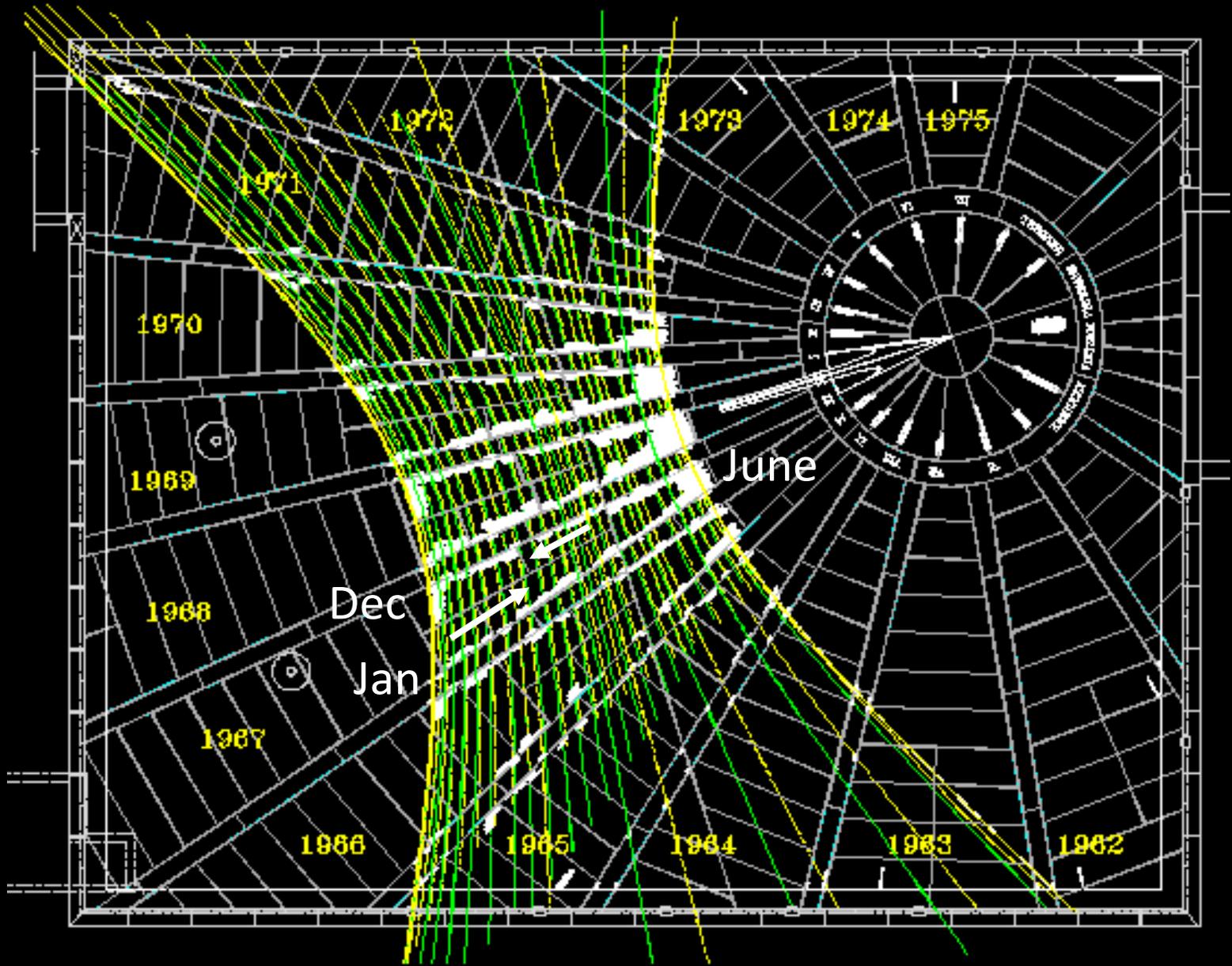
LOST:	TIME:	ALTITUDE:	DISTANCE:	AZIMUTH:	REMA
01/01/88	10:00:00	17.85	44.33	<140.92	
01/01/88	11:00:00	24.20	32.04	<154.20	
01/01/88	12:00:00	27.97	27.20	<168.83	
01/01/88	13:00:00	28.66	26.44	<184.49	
01/01/88	14:00:00	26.17	29.36	<199.79	
01/01/88	15:00:00	20.86	37.64	<213.69	
01/01/88	16:00:00	13.32	59.62	<225.79	
01/11/88	10:00:00	18.28	43.32	<139.35	
01/11/88	11:00:00	24.90	31.08	<152.52	
01/11/88	12:00:00	28.95	26.16	<167.46	
01/11/88	13:00:00	29.90	25.18	<183.41	
01/11/88	14:00:00	27.60	27.65	<199.08	
01/11/88	15:00:00	22.38	34.95	<213.33	
01/11/88	16:00:00	14.88	53.49	<225.71	
01/21/88	10:00:00	19.39	40.83	<137.53	
01/21/88	11:00:00	26.30	29.28	<150.87	
01/21/88	12:00:00	30.64	24.49	<166.14	
01/21/88	13:00:00	31.82	23.40	<182.57	
01/21/88	14:00:00	29.63	25.49	<198.79	
01/21/88	15:00:00	24.43	31.81	<213.51	
01/21/88	16:00:00	16.87	47.21	<226.24	
02/01/88	10:00:00	21.35	36.98	<135.35	
02/01/88	11:00:00	28.60	26.65	<149.00	
02/01/88	12:00:00	33.25	22.21	<164.81	
02/01/88	13:00:00	34.82	21.10	<182.02	
02/01/88	14:00:00	32.47	22.87	<199.04	
02/01/88	15:00:00	27.16	28.30	<214.40	
02/01/88	16:00:00	19.43	40.90	<227.56	
02/11/88	10:00:00	23.73	33.06	<133.26	
02/11/88	11:00:00	31.29	24.00	<147.30	
02/11/88	12:00:00	36.20	19.96	<163.79	
02/11/88	13:00:00	37.69	18.91	<181.92	
02/11/88	14:00:00	35.47	20.50	<199.85	
02/11/88	15:00:00	29.95	25.30	<215.88	

Sunline Table for AutoCAD

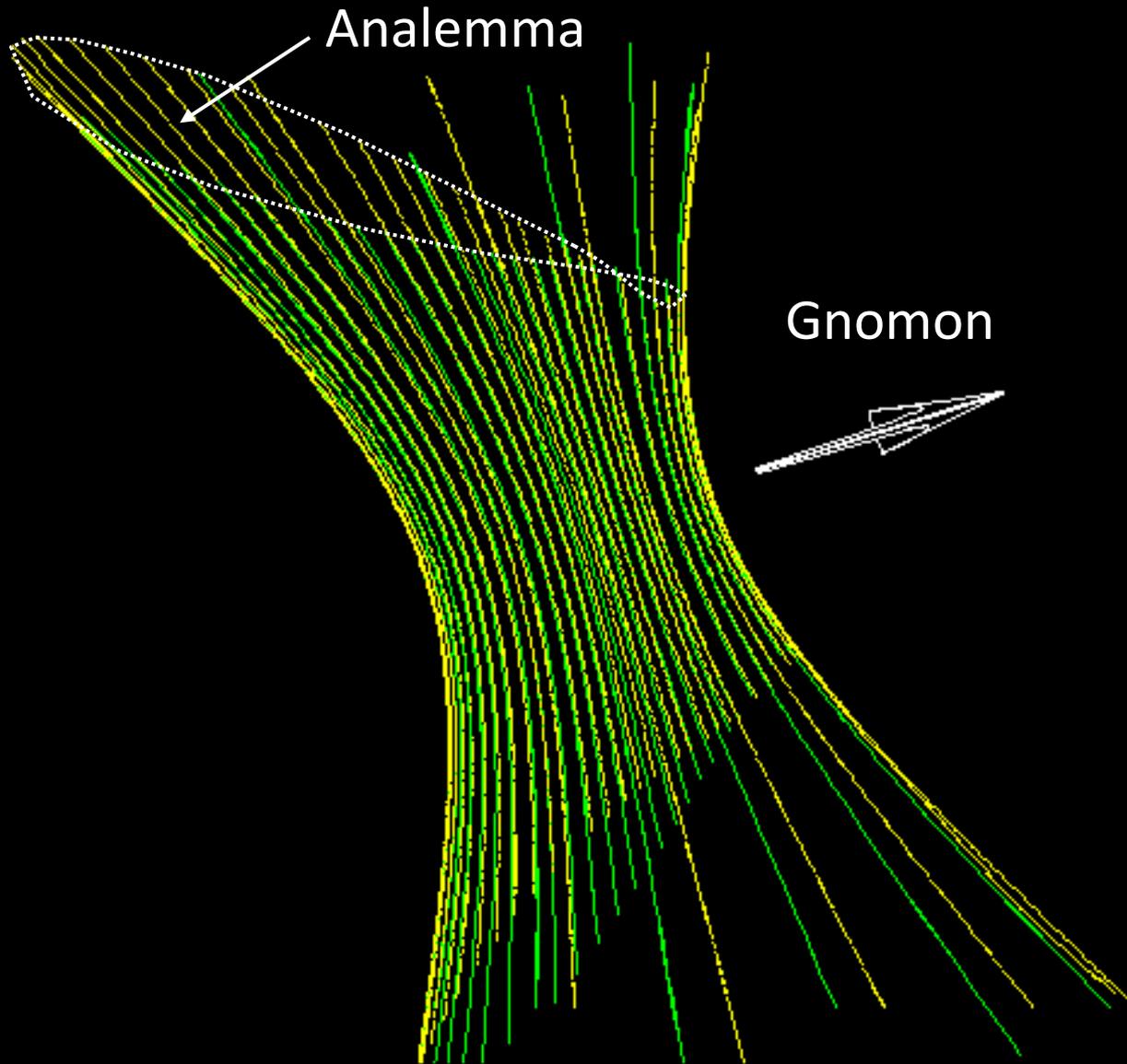
- Distances and Angles from the tip of the Gnomon
- 2% Slope of Plaza

1 hour = 1 Year of
Vietnam War

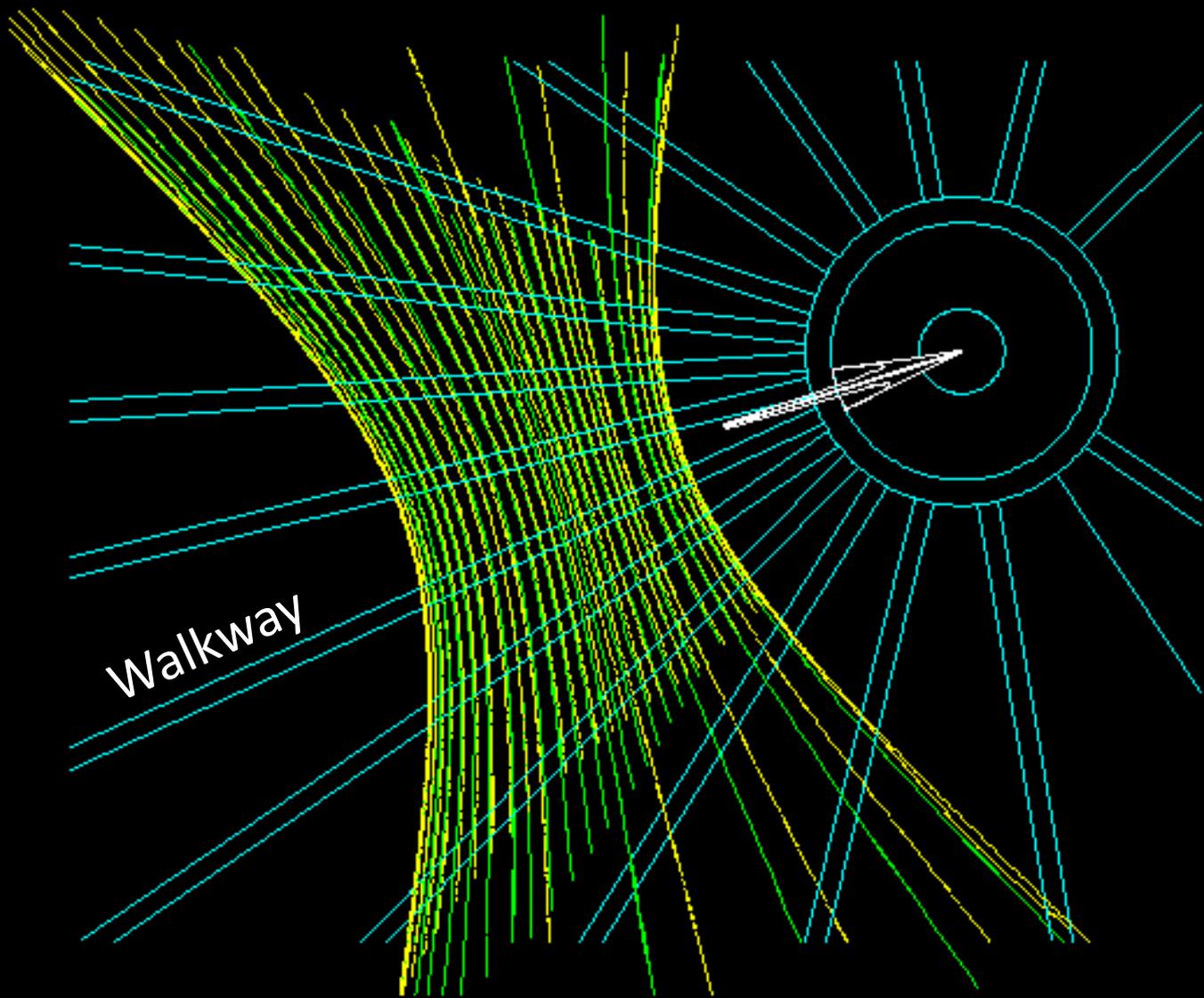
Memorial Concept



Memorial Sunlines



Walkways.....on Hour Lines



The Veterans Name Database

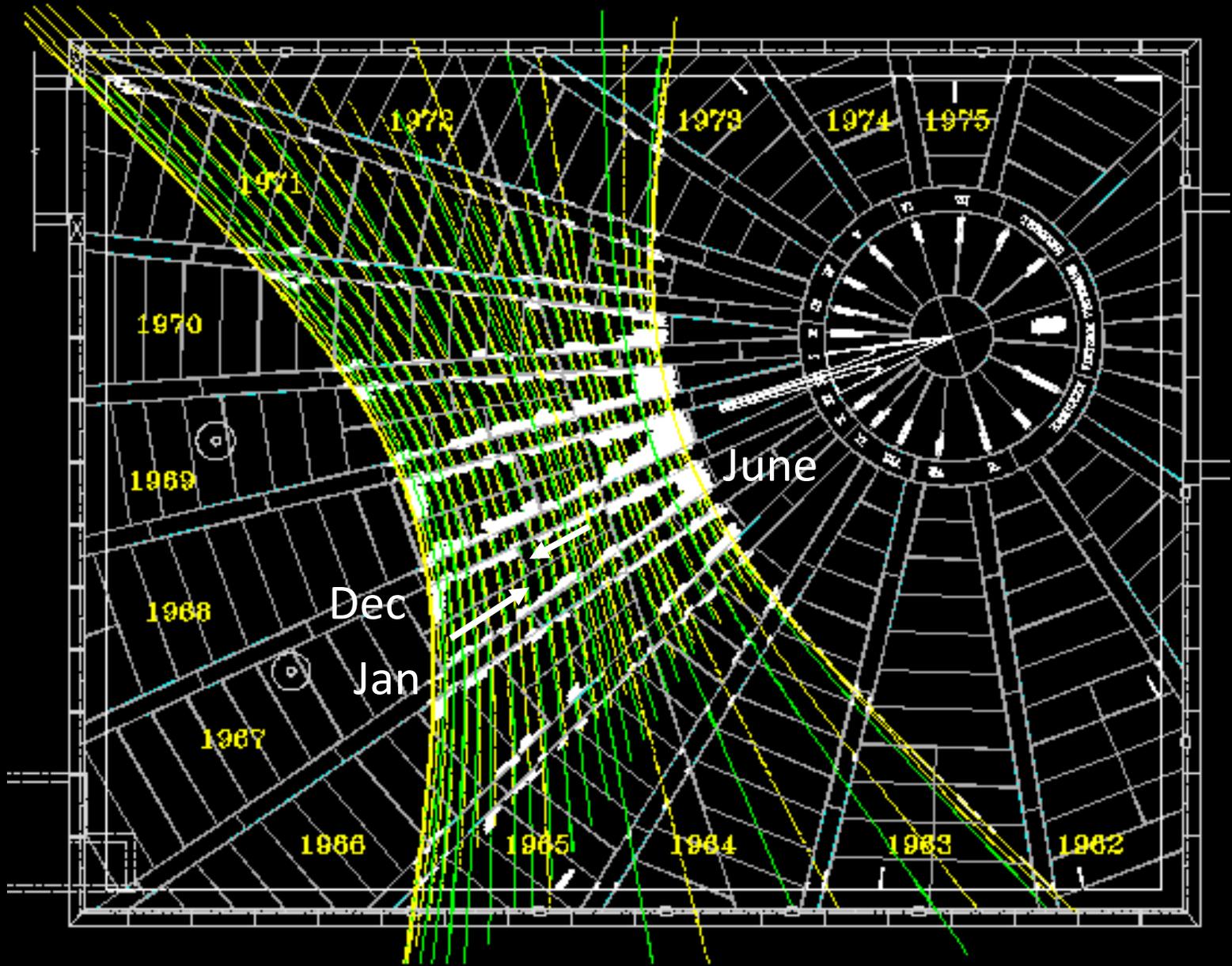
... key [F2] to delete, [F5] to reset

	LOST	LAST	FIRST	MIL
CHARLES S. ABEL	09/13/66	ABEL	CHARLES	S.
EMMITT C. ADAMS	02/20/66	ADAMS	EMMITT	C.
JAMES H. ADAMS	04/09/69	ADAMS	JAMES	H.
FRANK L. ADAMSON	06/24/65	ADAMSON	FRANK	L.
JEFFREY S. AKER	01/18/68	AKER	JEFFREY	S.
ARVEL D. AKERS	01/08/66	AKERS	ARVEL	D.
DENNIS O. AKERS	06/05/68	AKERS	DENNIS	O.
WILLIE G. ALDRIDGE	12/10/68	ALDRIDGE	WILLIE	G.
CHARLES F. ALLEN, II	10/04/65	ALLEN	CHARLES	F.
JAMES W. ALLEN	04/23/68	ALLEN	JAMES	W.
JOHN F. ALLEN	03/19/69	ALLEN	JOHN	F.
KENNETH ALLEN	12/28/67	ALLEN	KENNETH	-0
ALFRED E. ALVEY, JR.	03/08/69	ALVEY	ALFRED	E.
RONALD L. ALVEY	18/05/67	ALVEY	RONALD	L.
DELMER ANDERSON	01/13/68	ANDERSON	DELMER	-0
JAMES D. ANDERSON	08/15/69	ANDERSON	JAMES	D.
RONNIE C. ANDERSON	11/24/66	ANDERSON	RONNIE	C.
WALTER E. ANDERSON, JR.	03/10/68	ANDERSON	WALTER	E.
JOSEPH C. ANDREW	02/18/68	ANDREW	JOSEPH	C.
JAMES L. ANTE	09/03/67	ANTE	JAMES	L.

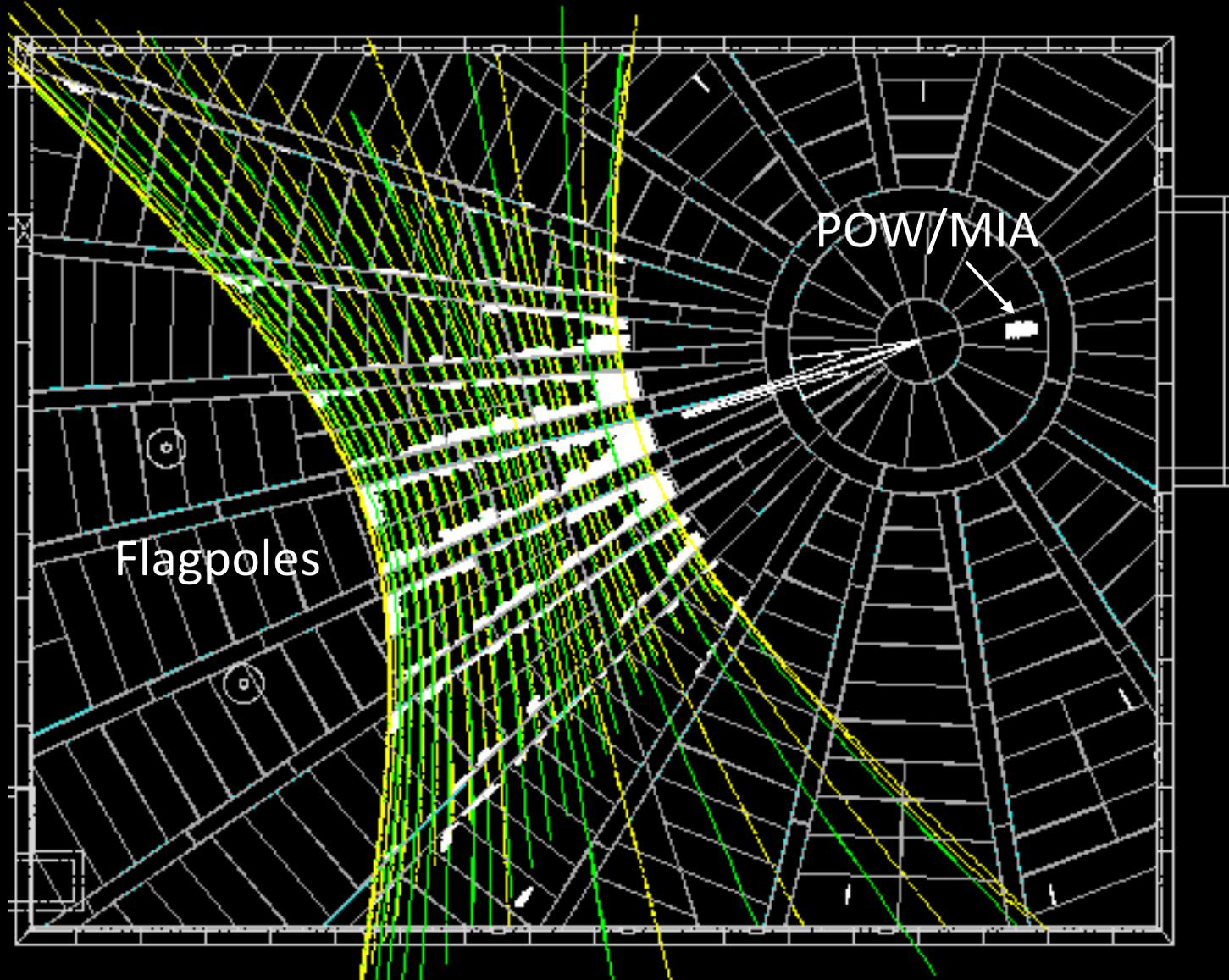
- Names
- Date of Death

1 hour = 1 Year of
Vietnam War

Placing the Names

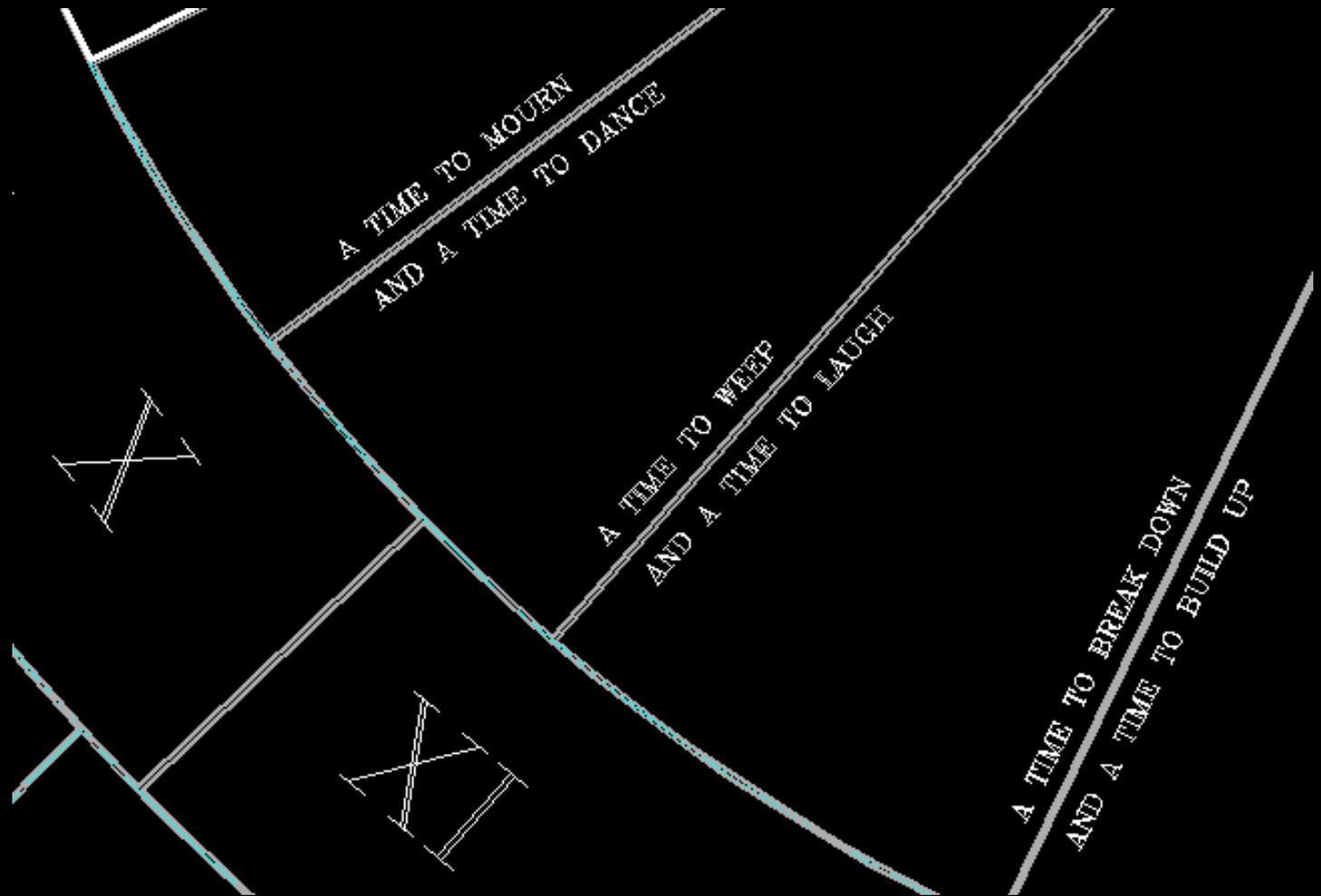


Slab Joint Pattern...no split names

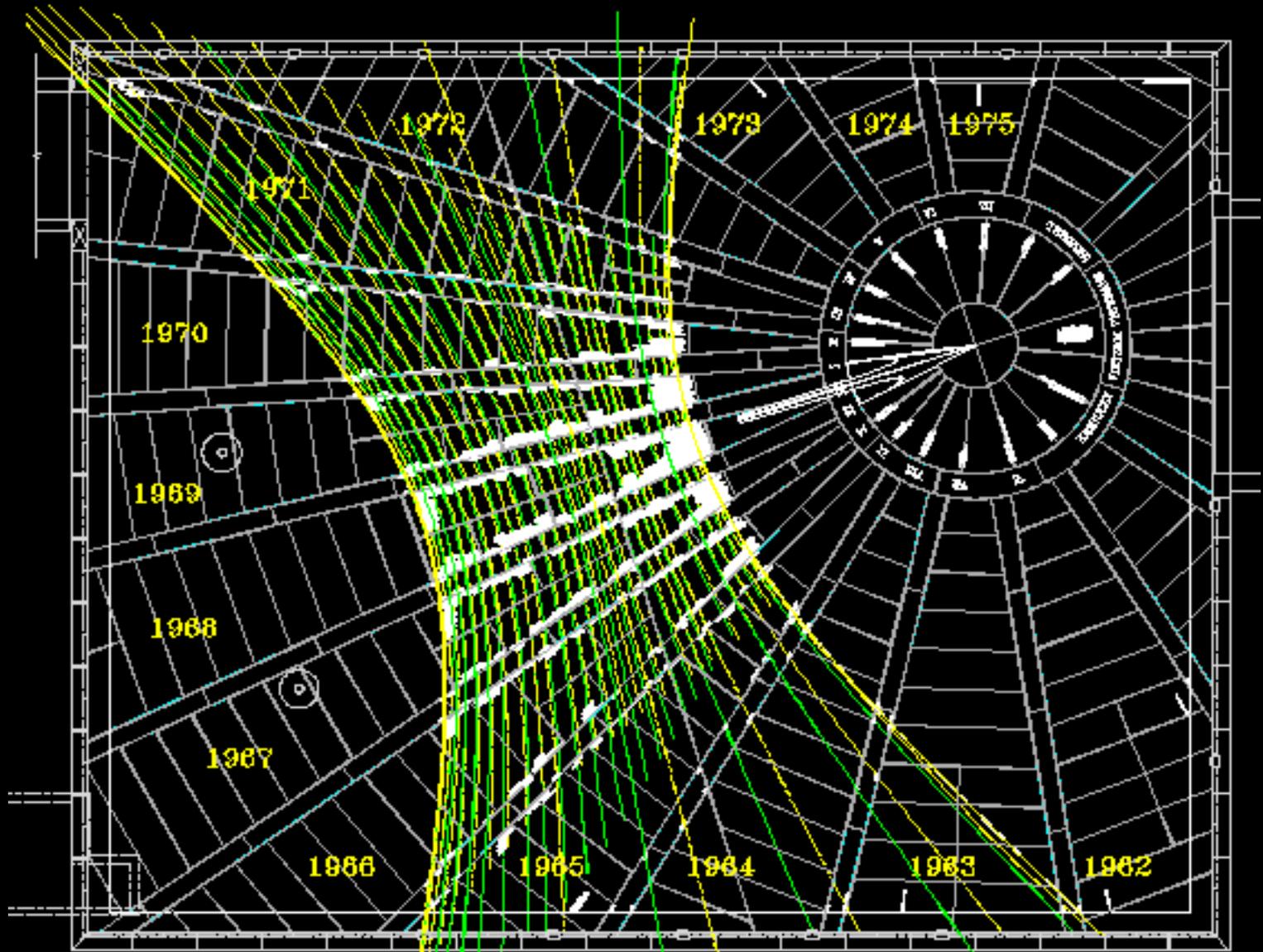


Detail...Ecclesiastes Lettering

“A time to be born, a time to die.....
A time for war, and a time for peace”



Slabs and Lettering Complete





The Granite Plaza

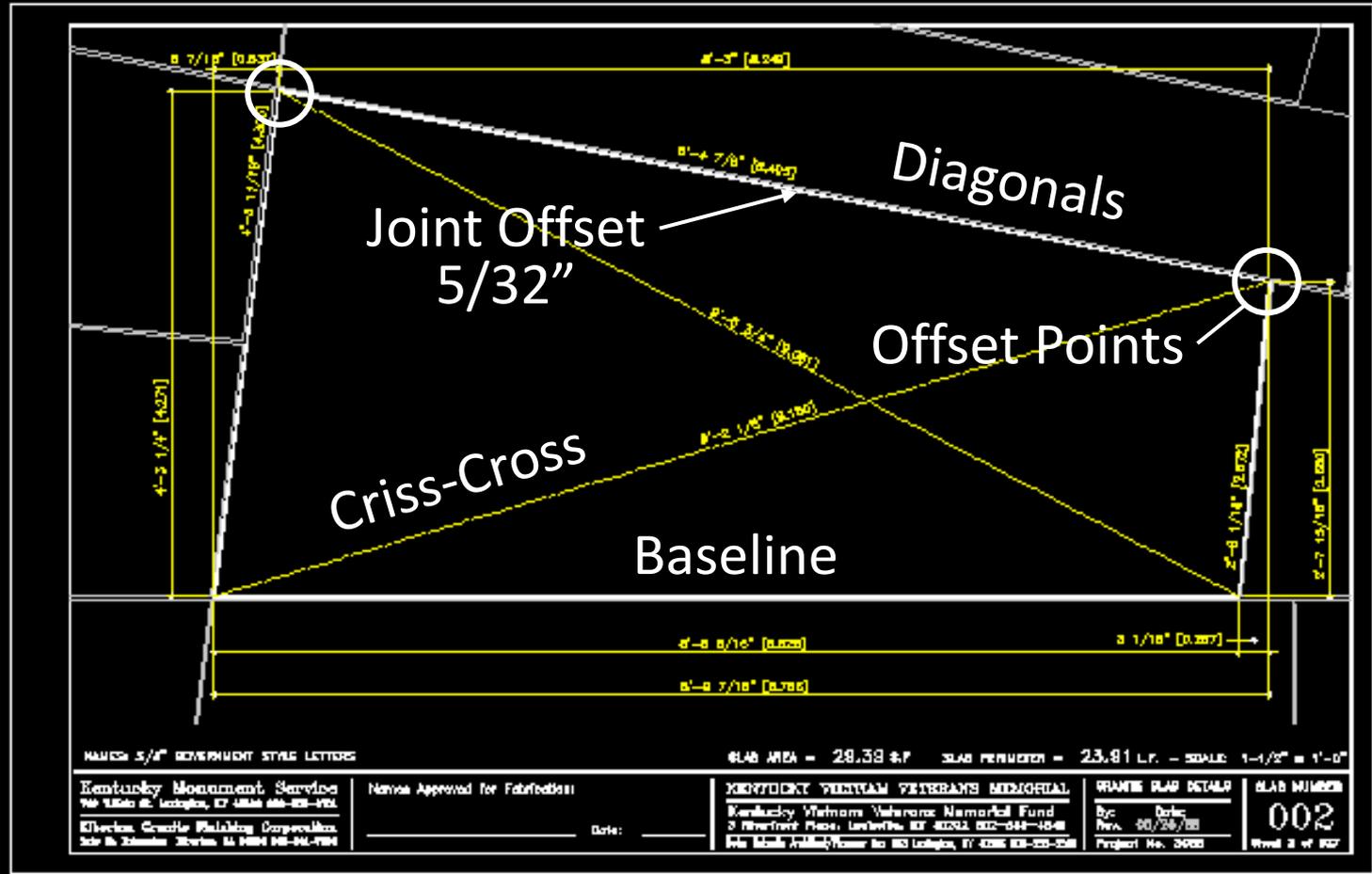
Bidding the Granite

- Bid Drawings not complete
 - ◆ Approximate Plaza area and number of Names
 - ◆ Maximum slab size depended on fabricator equipment.
- Three Bidders
 - ◆ Rock of Ages
 - ◆ Coldstream Granite
 - ◆ Elberton Granite Finishing
- Elberton company selected on Fall of 1987
 - ◆ Slab Limitations
 - ◆ Maximums: Length 12', Width 3'
 - ◆ Maximum Span without support: 4'

Slab Shop Drawings Prepared by Architect because:

- Granite Fabricators would not be responsible for location of names under November 11, 1988 deadline.
- Granite Proposals stated that Shop Drawings to be provided by “Others”.
- Checking Shop Drawings requires the same effort as preparing them
- 327 Individual Shop Drawings
- 300+ Full Size Templates

Slab Joints...Dimensions



Names/Grid...Detail

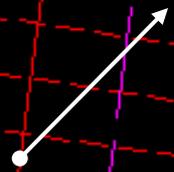
Sunline Sunline

AUGUST

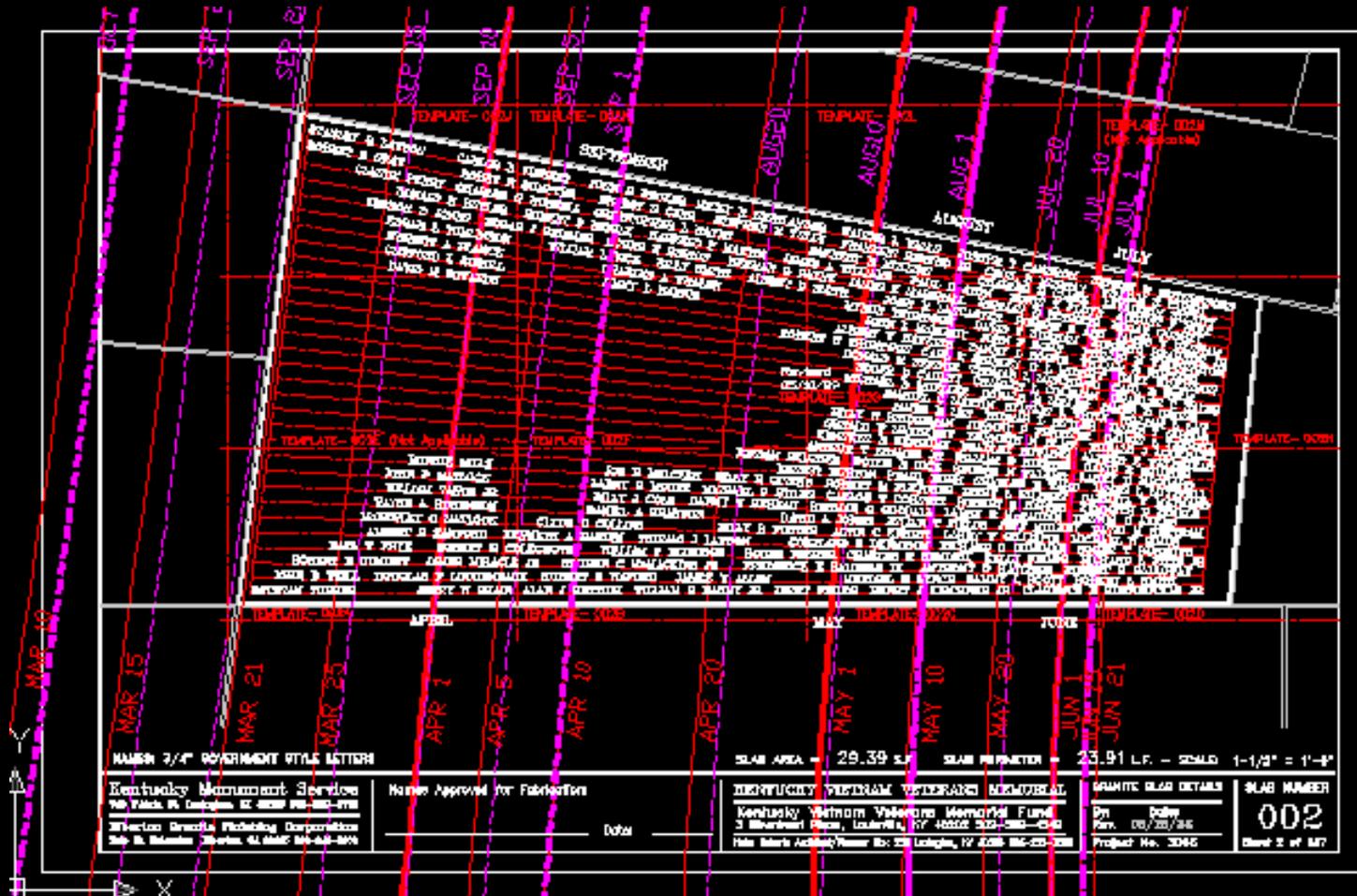
R	MICKY R	HIGHLANDER	WALTER L	WALLS	JOSEPH T	CAM
RR	STEPHEN M	TULLY	FRANKLIN	RENERO	CECIL S	
L	HAYES	EARNEST R	MULLINS	PAUL D	ATON	EDWIN
ELD	P MARTIN	JAMES A	WILLIAMS	JAMES E	MARSHALL	HERMAN D
SHOP	HERMAN G	PAYNE	JAMES E	MARSHALL	HERMAN D	ROBI
Y SMITH	ALBERT D	SMITH	JOHN M	LANCASTER	DAVID T	DI
VHALEN			MYRON	THOMPSON	JOHN F	B
ORIS			JOHN L	McELROY	DANNY L	BO
	ROBERT R	THOMPSON	ALBERT W	HAWKINS	CARL E	SHIRLEY O
	DONALD M	PERDUE	ROGER D	CAULEY	THOMAS L	I
	MICHAEL D	MUELLER	SAMUEL C	MARTIN	CHARLES L	L
	BILLY W	BRIDGEMAN	JAMES R	LEE	DONALD R	
	GERALD W	MAVRETT	JOHNNY D		SYLVA	

Revised
05/10/89
TEMPLATE - 0026

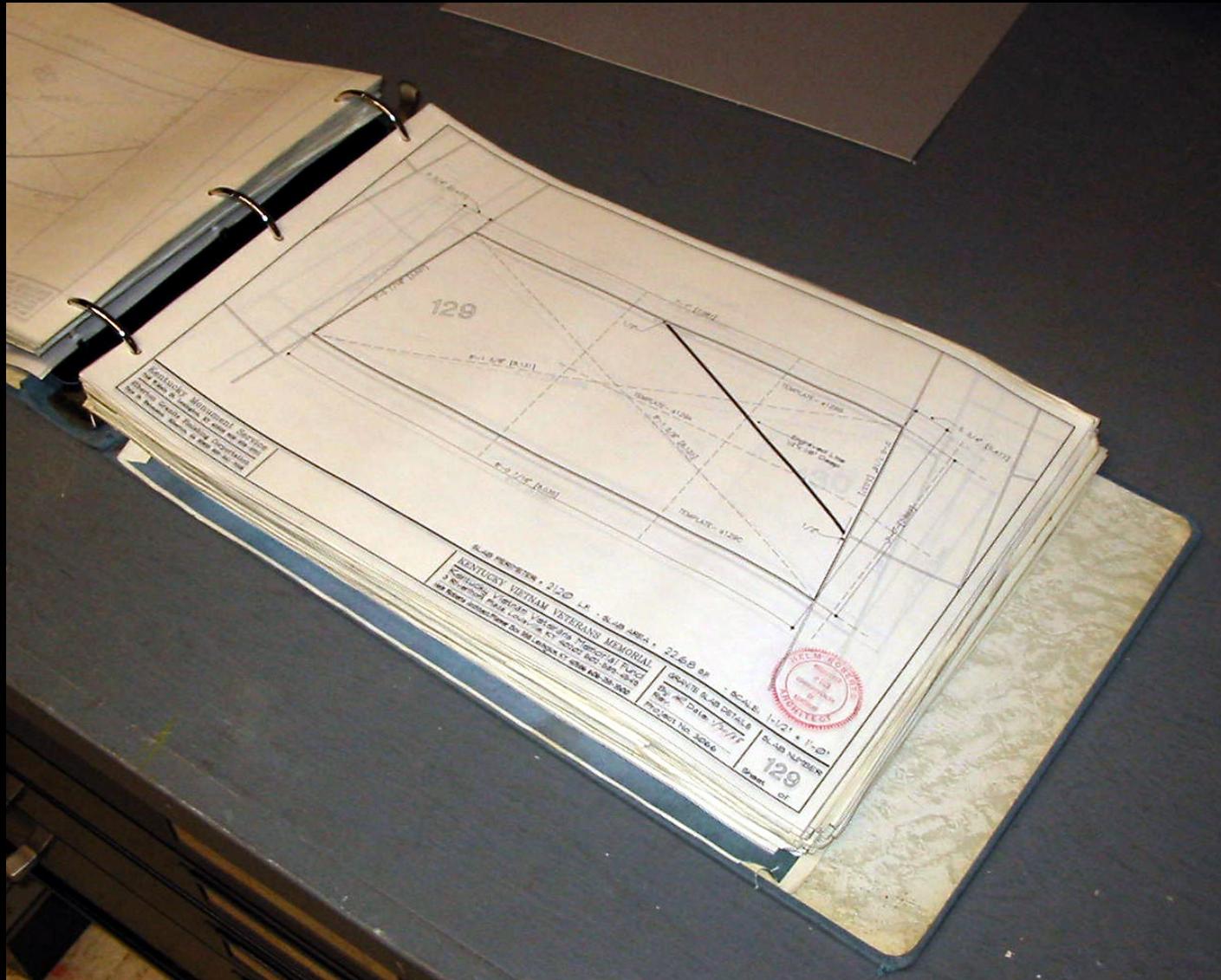
Radial
Lines



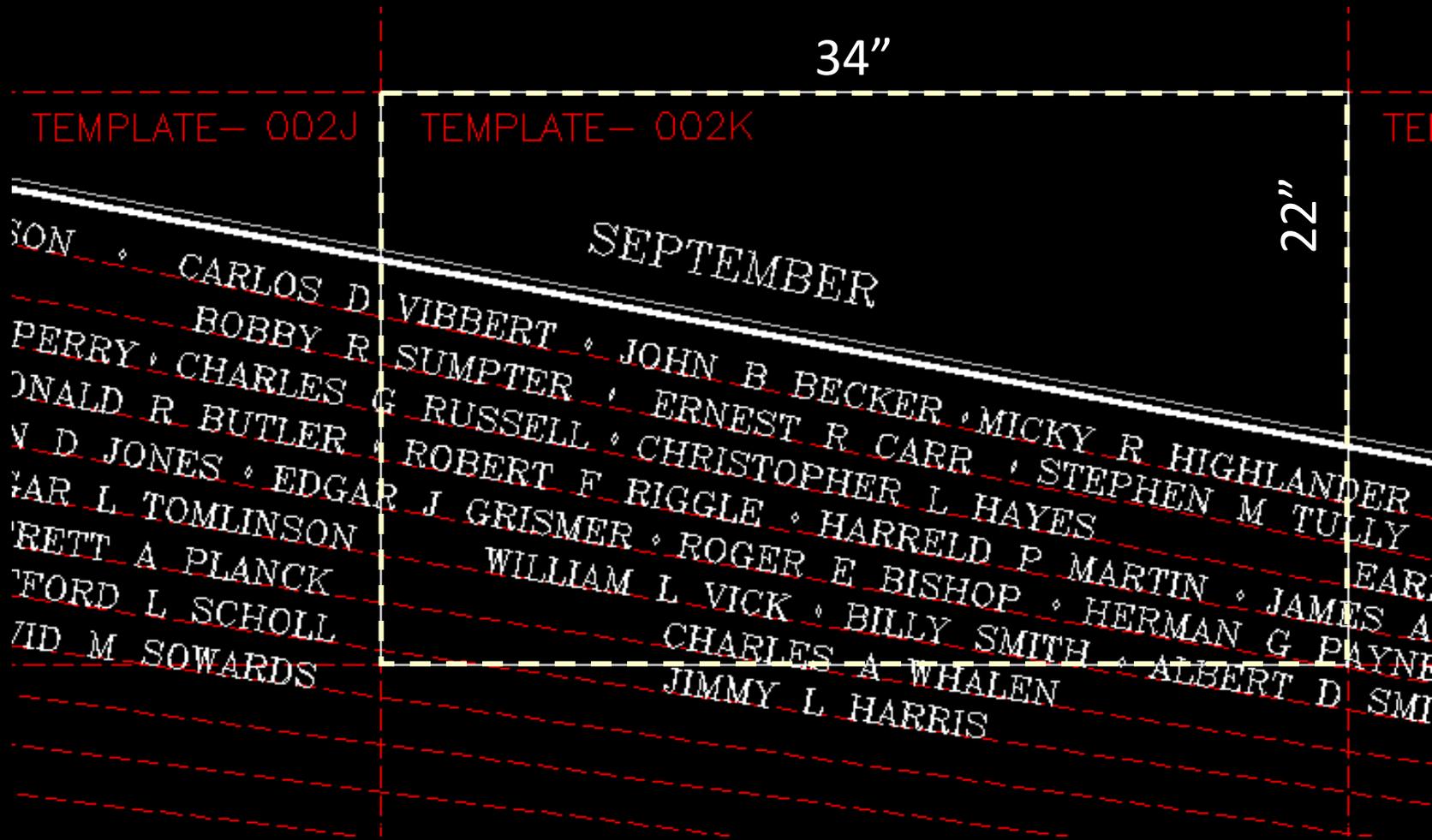
Names placed on Grid



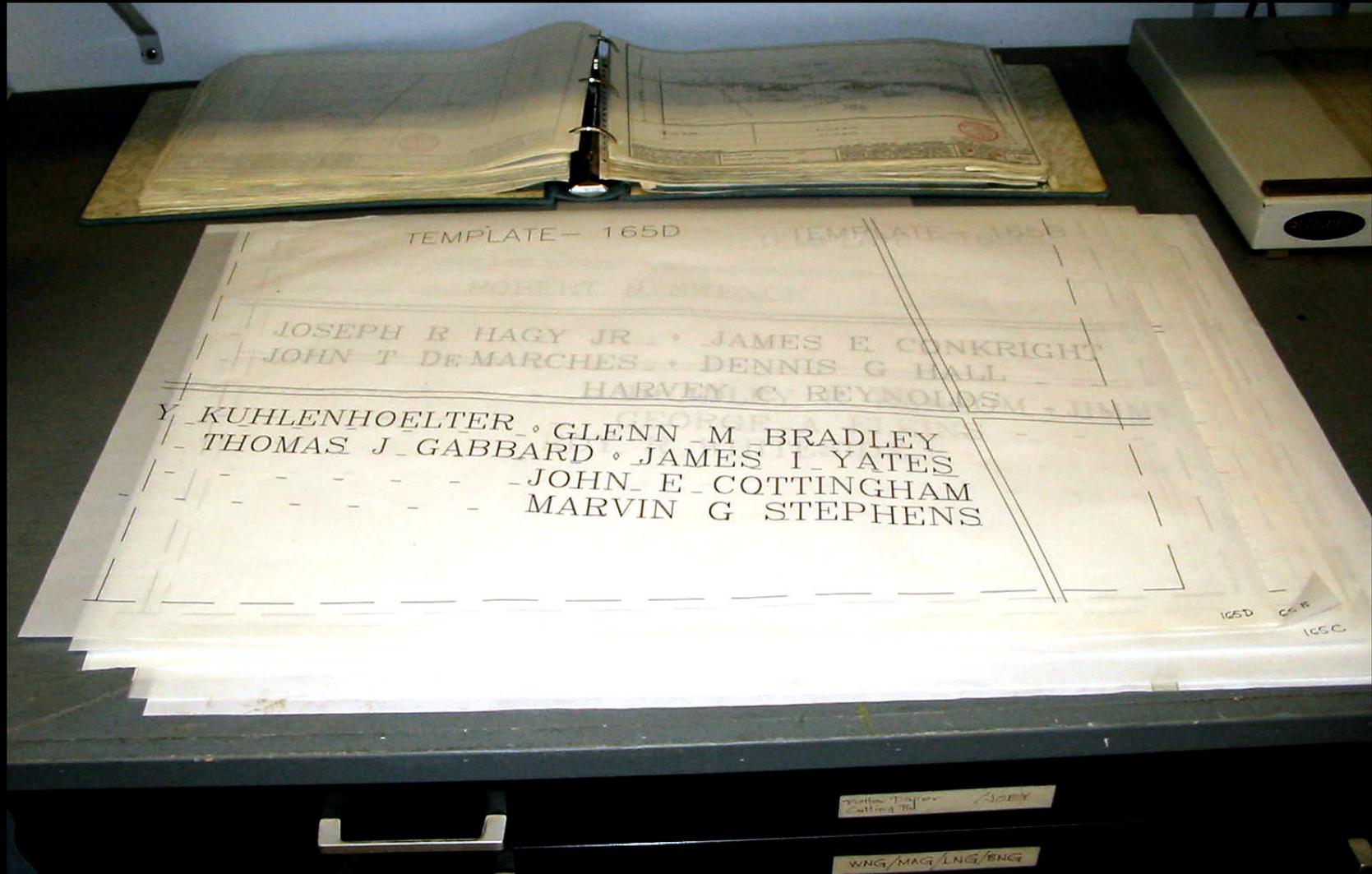
Binder: 327 Shop Drawings



Full Size Templates for exact Name Location 22"x 34" Sheets



Full Size Templates....300 + Sheets





Granite Fabrication

Granite Quarry, Elberton, GA





- From Quarry to the Yard





- Diamond Saw 8' diameter



- Stone Slices

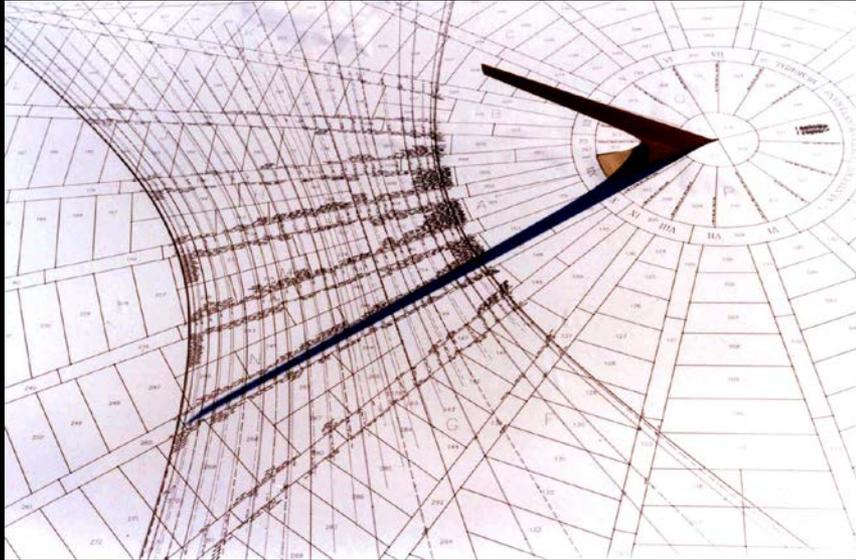


- Cutting the Rubber Stencil before Sandblasting

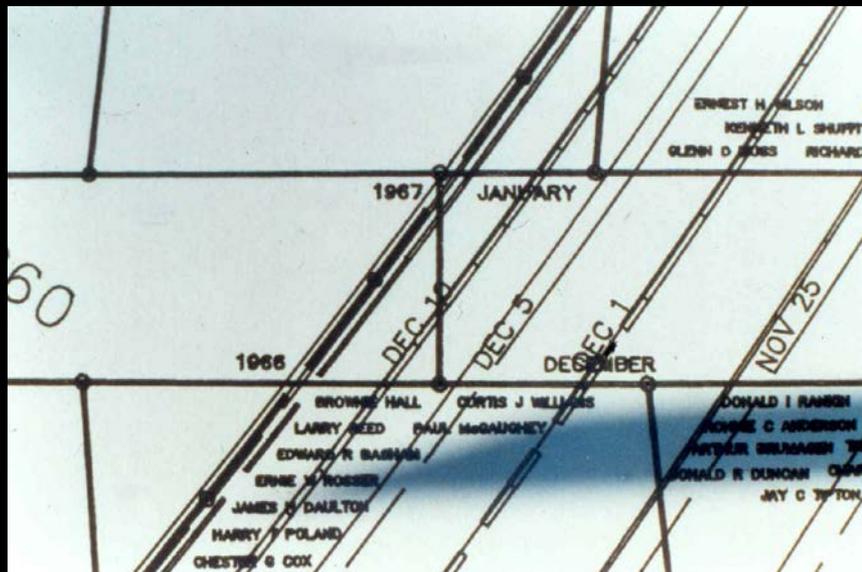


- Finished Slabs, Ready for delivery

Rechecking the Calculations



- Scale Model: $\frac{1}{2}'' = 1'' - 0''$
- November 1987 Observations of model on Site....OOPS!
- November readings on model seem to be off a scale 6''
- Why?.....



- A full-sized Gnomon Mockup was constructed and the discrepancy was confirmed.
- Reasons for Discrepancy:
 - ◆ Readings done in November 1987
 - ◆ Calculations done for 1988, a Leap Year
 - ◆ The Length varies by over 2” in November because of the Leap Year cycle.
 - ◆ Penumbra effect, “Fuzz Factor”, Sun is not a point source, Longer Shadows less precise.
- Fixing the Problem: Recalculate all Sunlines and revise the shop drawings not yet issued.

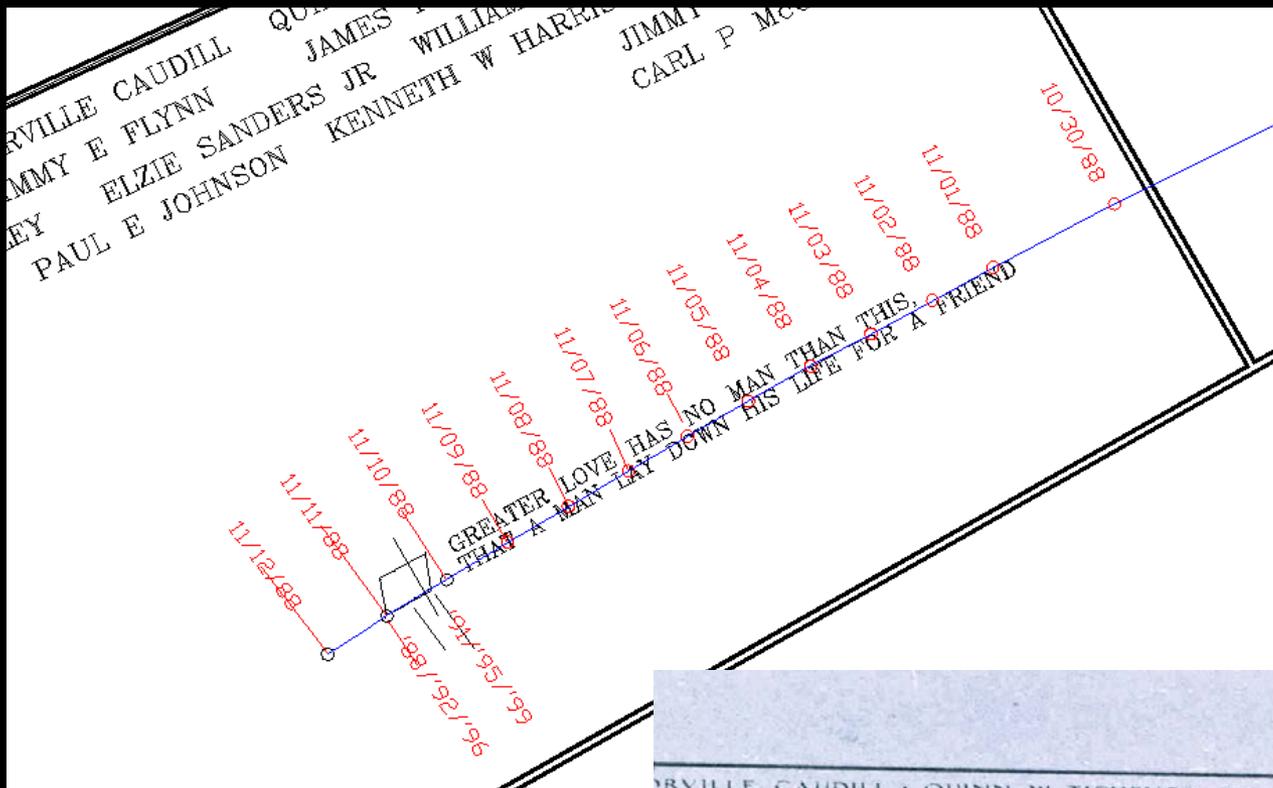
Confirming the discrepancy ...the Fix



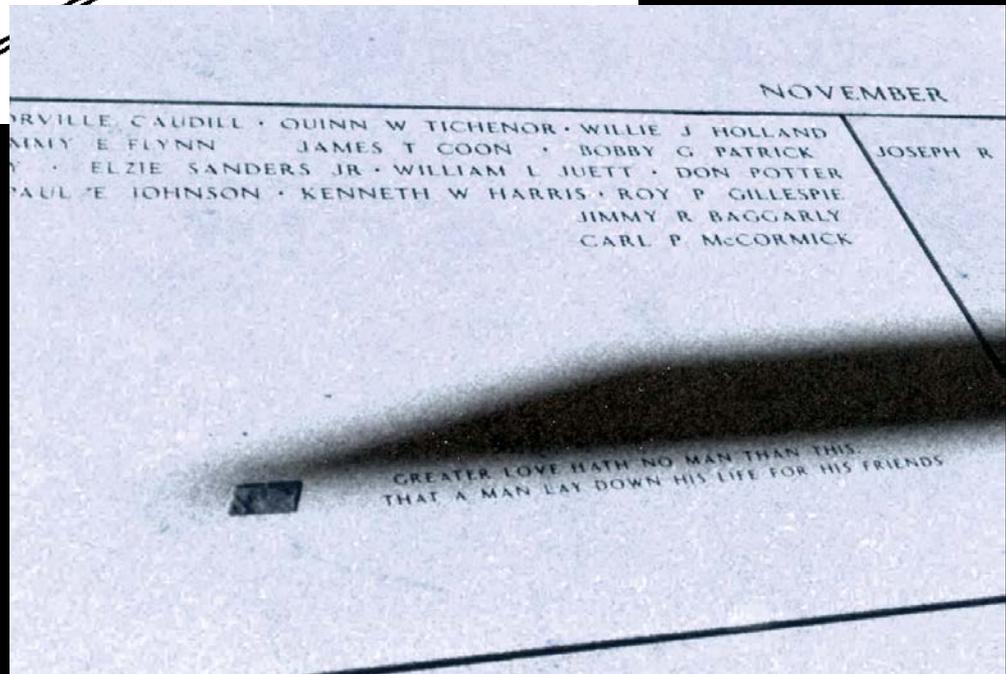
Remembering Veterans Day

- November 11, 1918
WWI Armistice Day
- Armistice signed at
11:11 AM
- After WWII Holiday
changed to Veterans
Day
- Shadow touches Mark
on Plaza at 11:11 on
Nov. 11





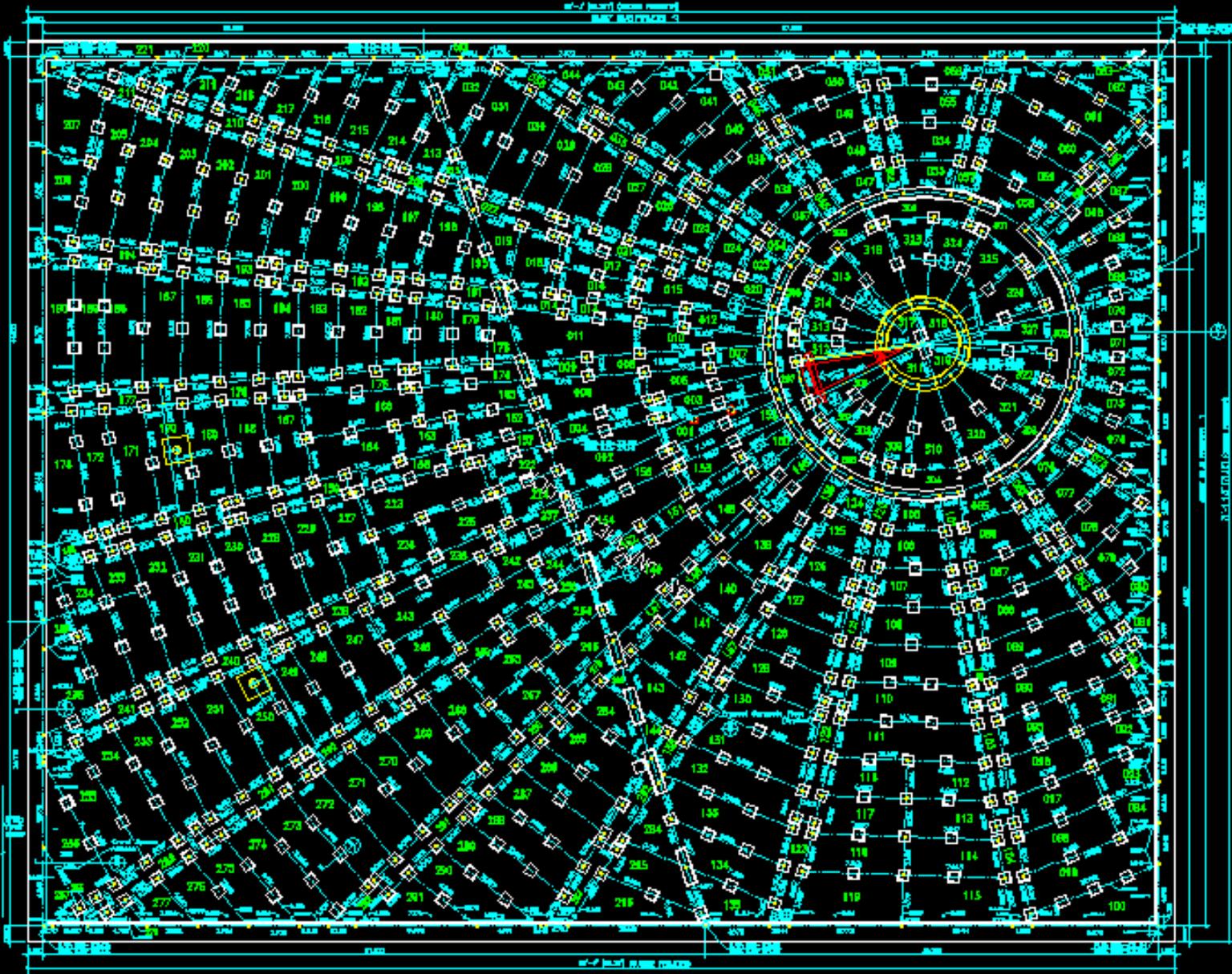
- Length determined by Leap Year cycle
- Width = 1 Minute



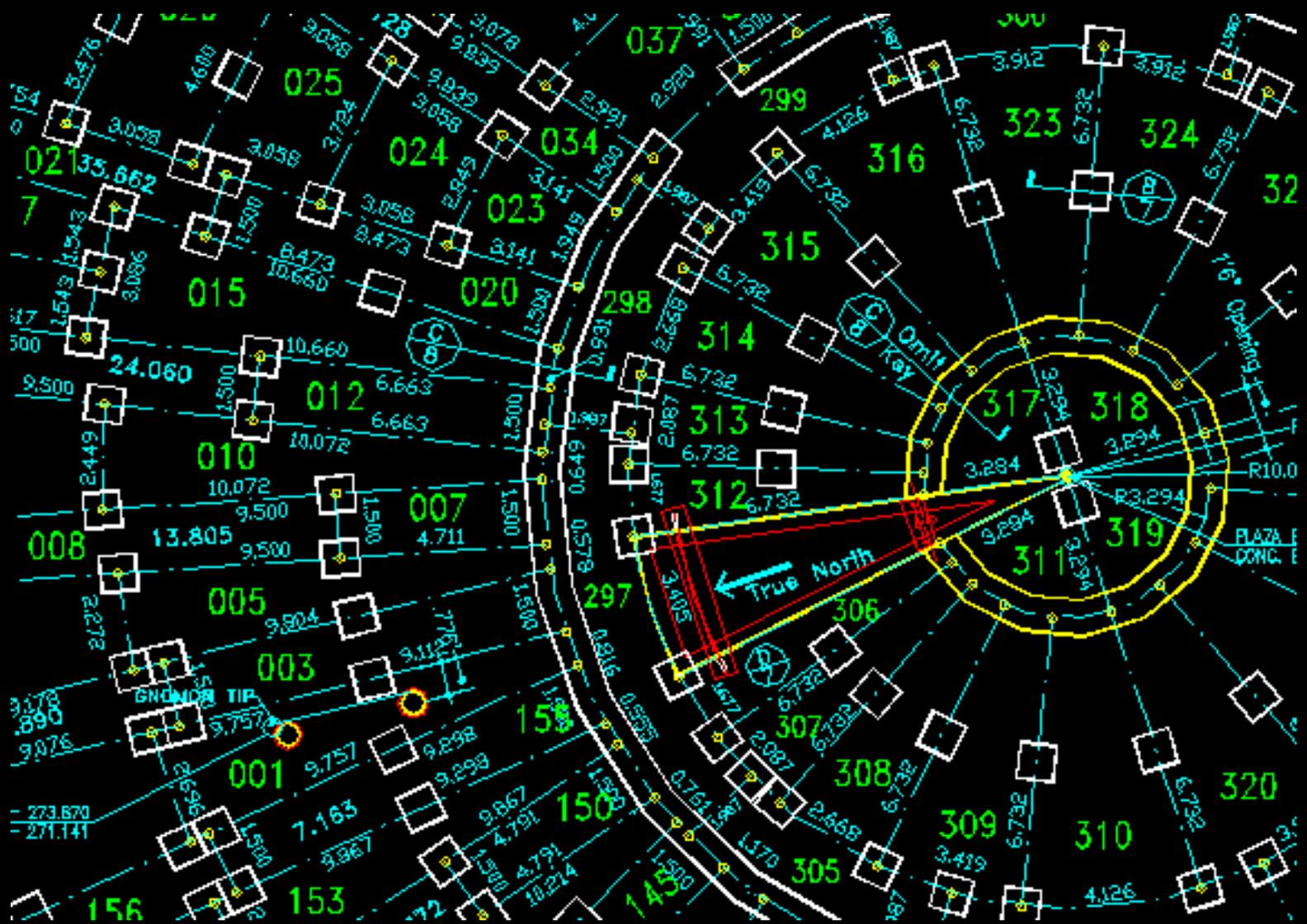


The Foundation and Plaza Stones

The Foundation Plan – Over 800 Piers



Foundation Plan Detail



Dimensions: Decimal Feet

Beginning the Foundation



- Laser Level set at 2% slab slope

- Foundation Slab,
- 6" Concrete



- Concrete Pier @ 4' Maximum Span for unreinforced Granite
- Note Slab Numbers





- Piers Started June, 1988

- First Slabs Set July 7, 1988





■ Slab Setting System

Moving the Gnomon



- Piers Complete
July 1988



- Slabs set To
Equinox Line



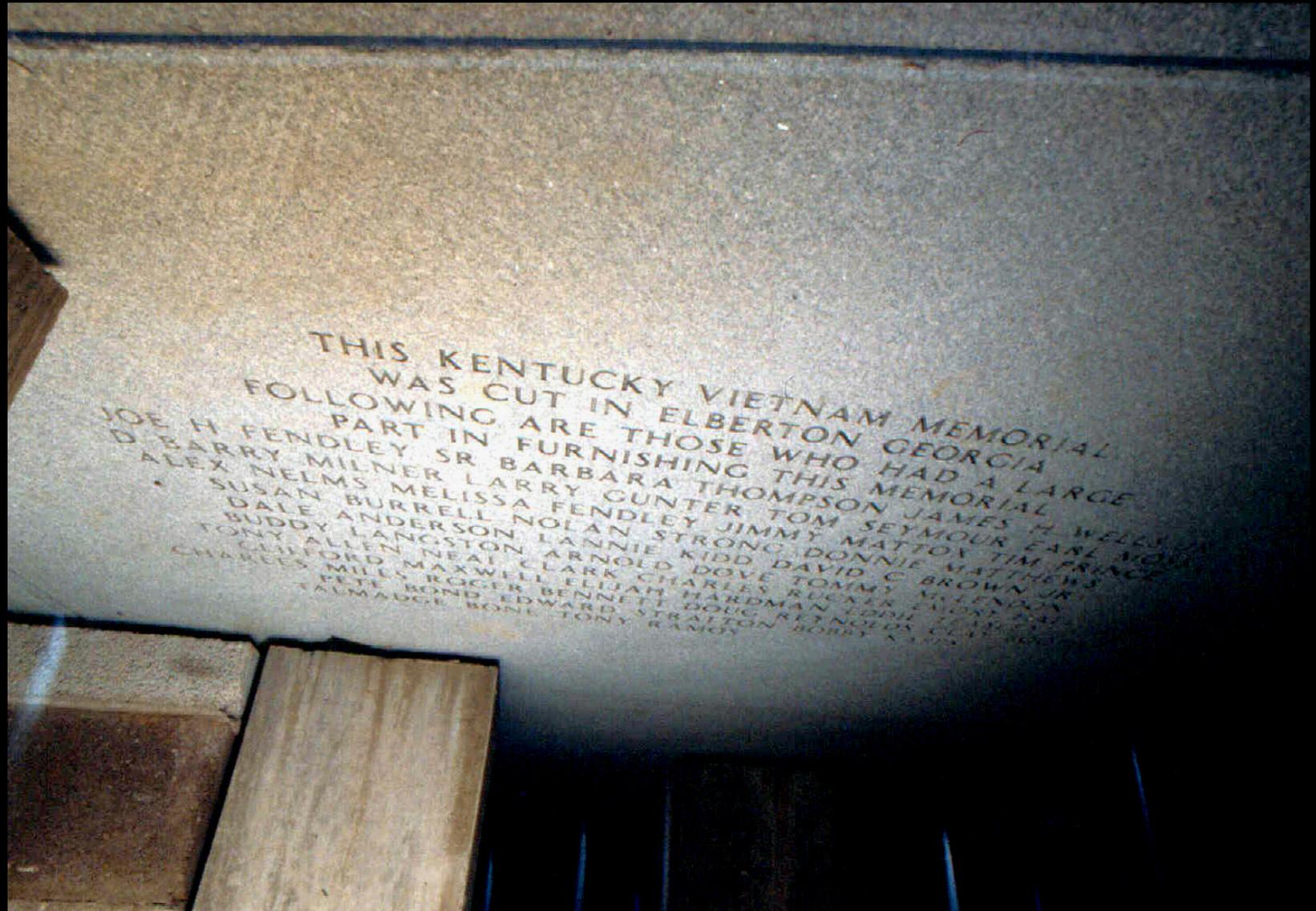
■ August 1988



■ Last Slabs
October 1988



Elberton, Full Credits...Under Slab 66



Almost Complete....September 1988



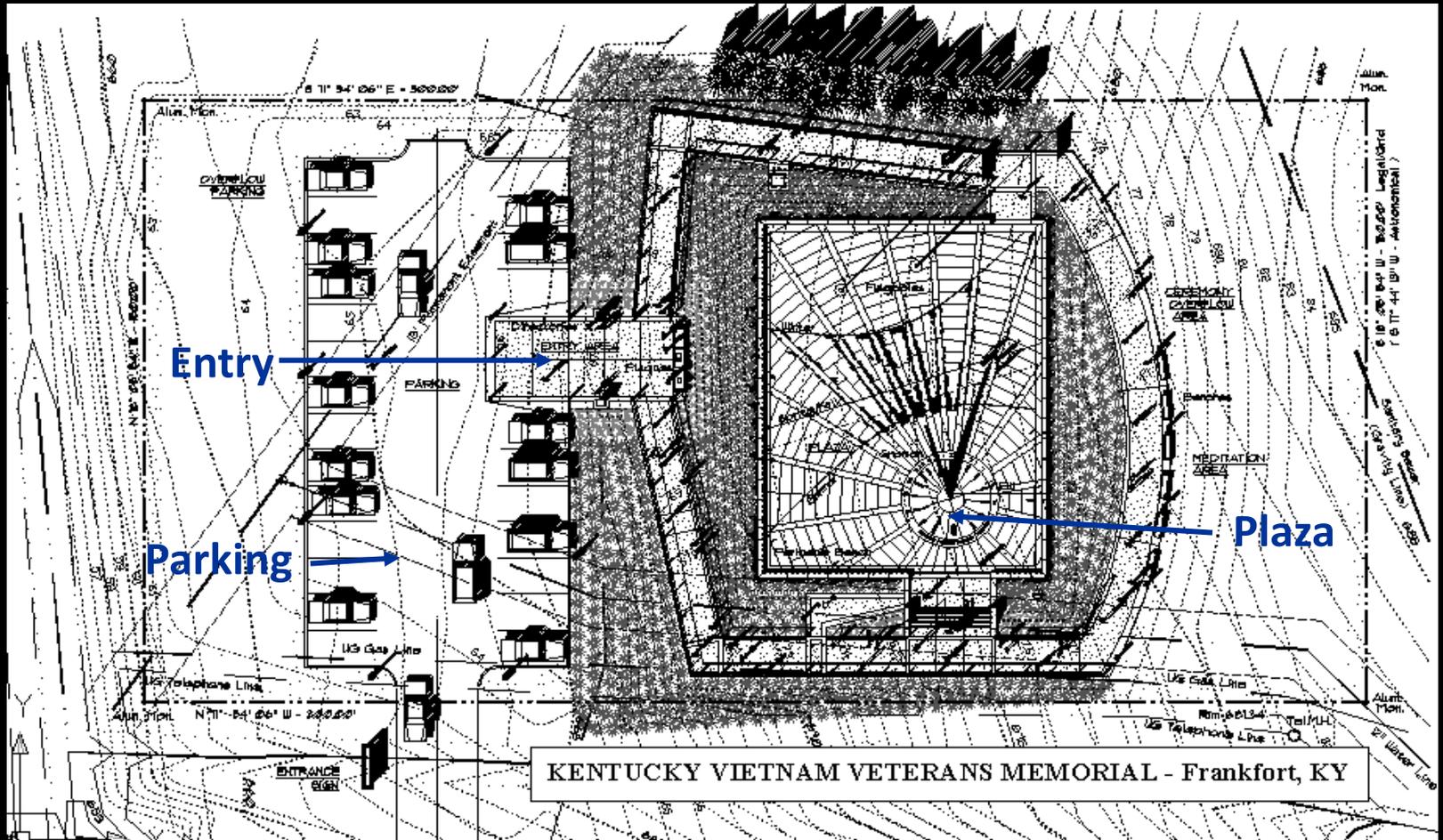
- Solstice Lines, cut in place
- Rubber Stencil
- Sandblasting to required depth





The Site Plan

Site Plan



- Parking, Walks, Lighting, Landscaping, Directories

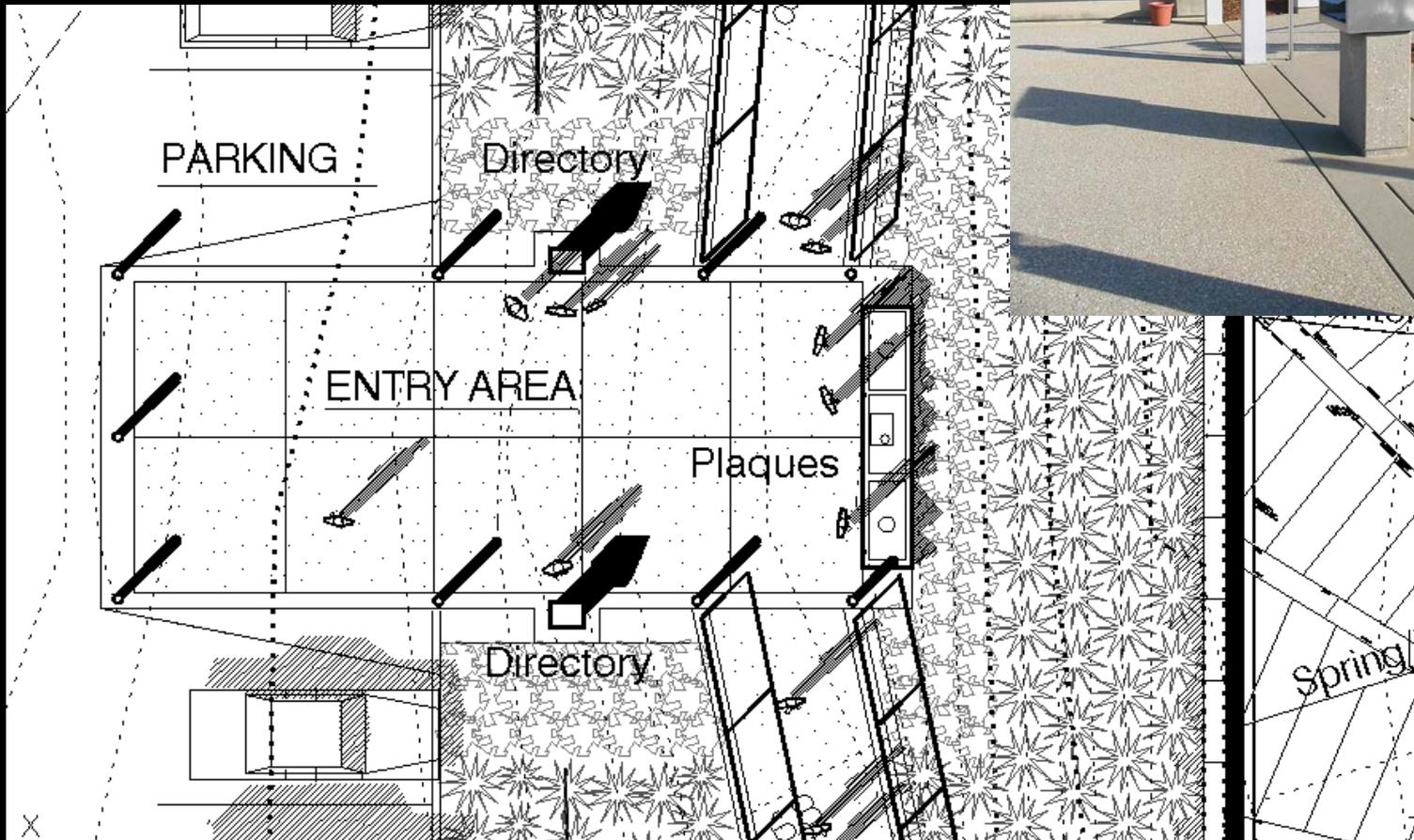
Walks



- Handrails
- Ramp to Plaza
- Handicap Access

Entry Area

- Plaques
- Directories



The Plaques



- History of the War



- Credits



- Design Data



Lighting



Floodlighting
for Flags

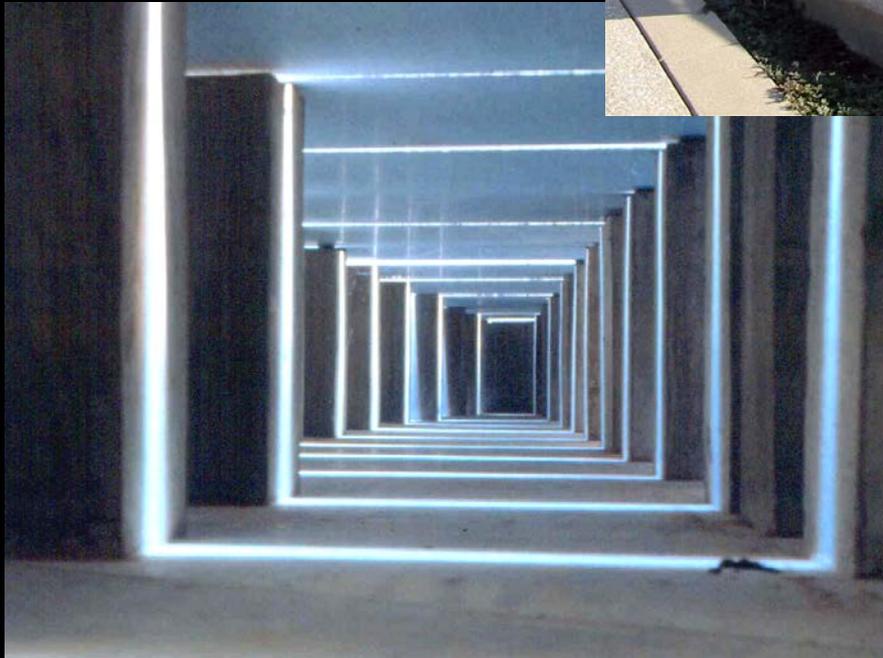


Walkway
Bollard



Walkway Light

Service Vault



- Vault to Crawlspace, Electrical, Sprinkler
- Crawl Space From Vault



- Last Day Before Dedication

Financing the Memorial

- Commonwealth of Kentucky: Land + \$100,000
- Private Donations: \$500,000 (Anonymous)
- In-Kind Donations: \$300,000
 - ◆ Labor and Materials
 - ★ Granite
 - ★ Concrete
 - ★ Electrical
 - ★ Grading & Drainage
 - ★ Parking Lot
 - ◆ Professional Fees
 - ◆ Services
- Total Cost: \$1,000,000 +



Lapel Pin



The Dedication November 11/12, 1988

- Over 7,000 at Dedication November 12, 1988



- Helicopter Flyover



- 21 Gun Salute for Medal of Honor Veterans



**Since the
Dedication**

Adding Names to the Memorial



- At Dedication, 1067 Names on Memorial
- 36 Names added at request of families.
- Because:
 - ◆ Enlisted or Drafted in another State
 - ◆ Born, Educated, Buried in KY
- At Present, there are 1103 names.

A Place for Remembrance



- Mementos Left at Memorial
- Family Remembrances

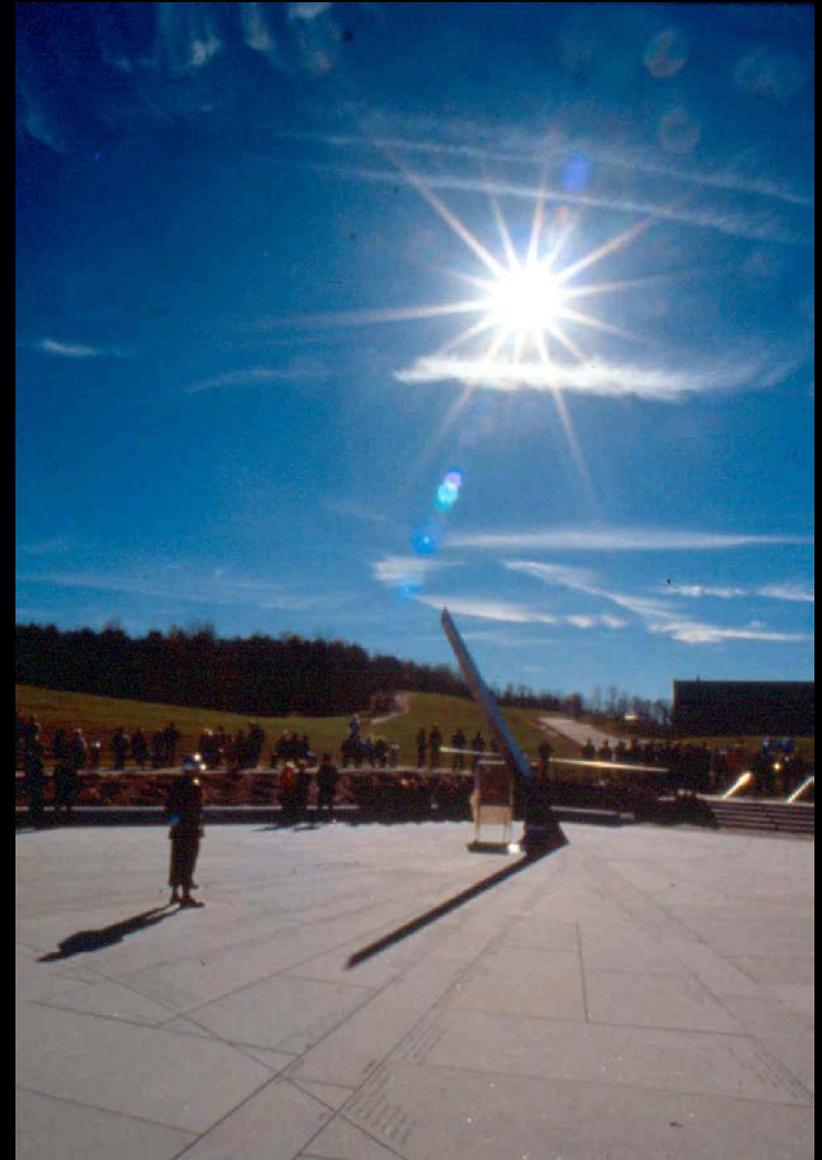


- “I love you, Eddie Combs, your pal Wilma”

A Place for Ceremony



- 10th Anniversary Ceremony, Veterans Day, 1998
- Military Honor Guard





- Regular Ceremonies:
 - ◆ Veterans Day
 - ◆ Memorial Day
 - ◆ “LZ Bluegrass”
 - ◆ “Rolling Thunder”



A Place for Healing



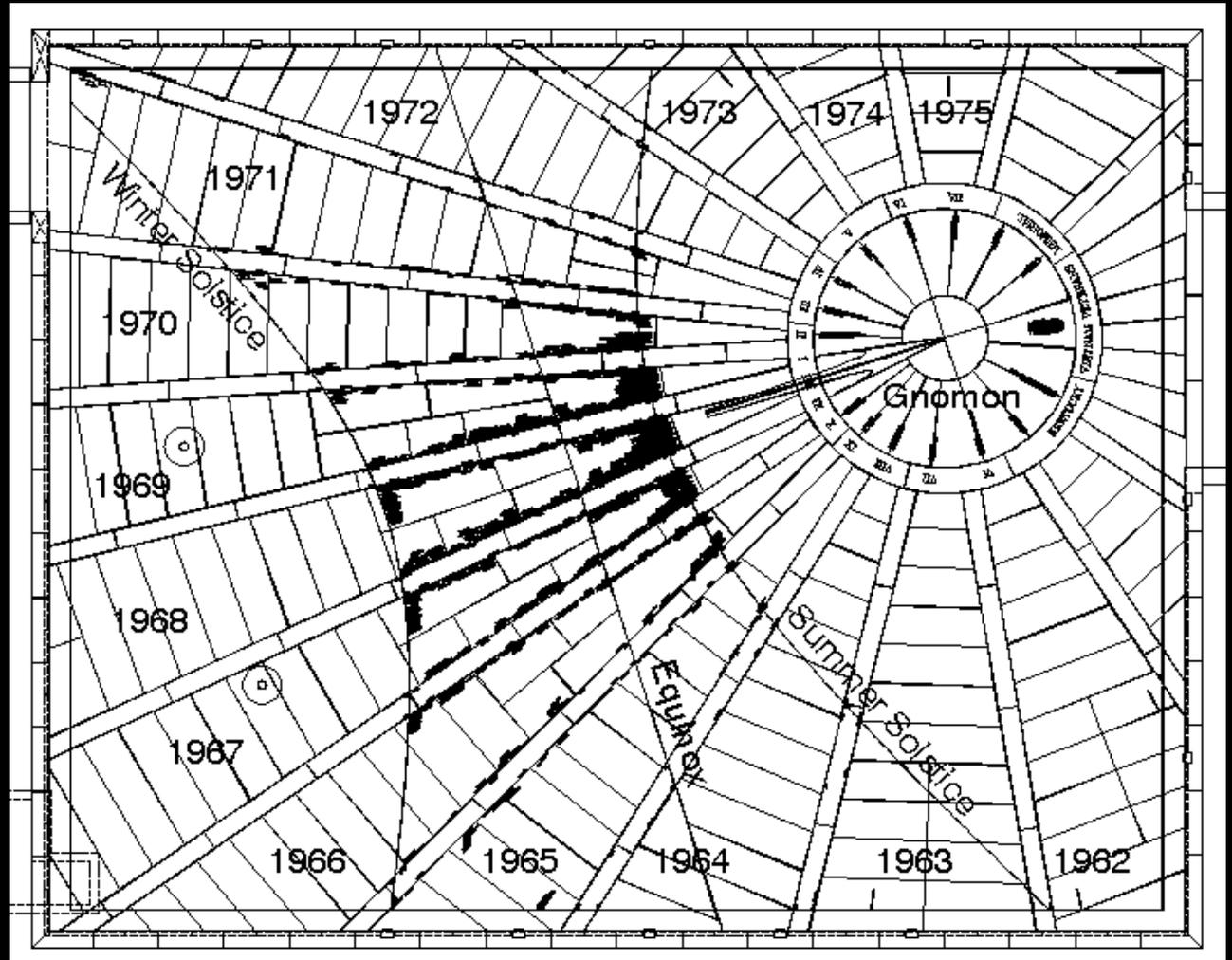
- Reunions
- “LZ Bluegrass”





- The “Run for the Wall”... “Rolling Thunder”

A Place for History



- A graphic history, in etched in stone, of Kentucky's sacrifice in the Vietnam War

A Place for Learning

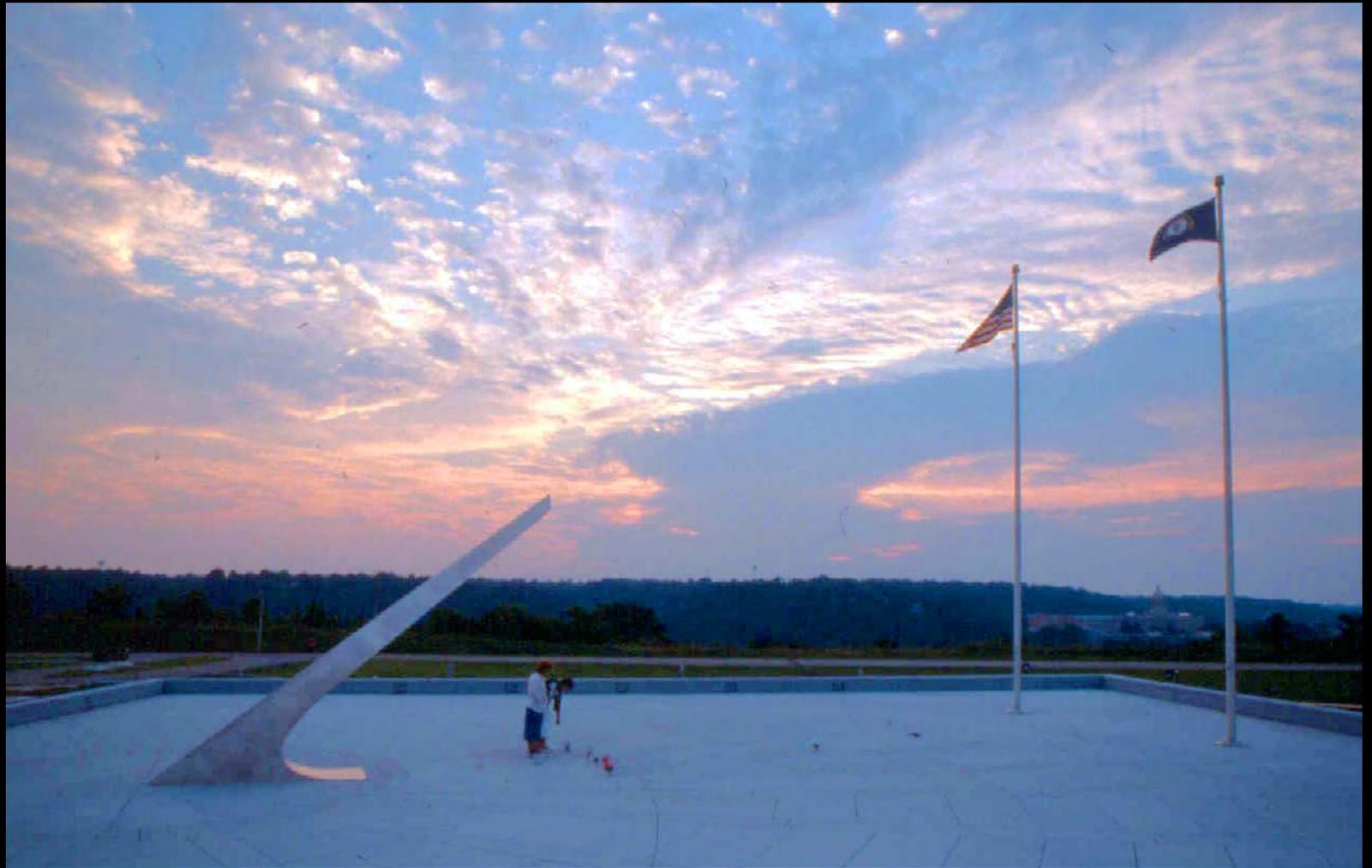


- Children at the Memorial



The Many Faces of the Memorial

At Sunset



In Winter



At Night





**Thank You....
Any Questions?**