Washington Memorial Alignments


Location: 38 º 53' 22" North

77º 02' 08" West

1) **Calculation of the declination angle of the height of the Obelisk as viewed from Lincoln Memorial.**

Standing at Lincoln Memorial at the base of the water causeway facing directly due east ,one looks straight to the Washington obelisk. The angle between the viewer and the tip of the obelisk makes:

Distance to the obelisk = 1126 meters

Height of the obelisk = 169.294 meters (555 feet 5⅛ inches)

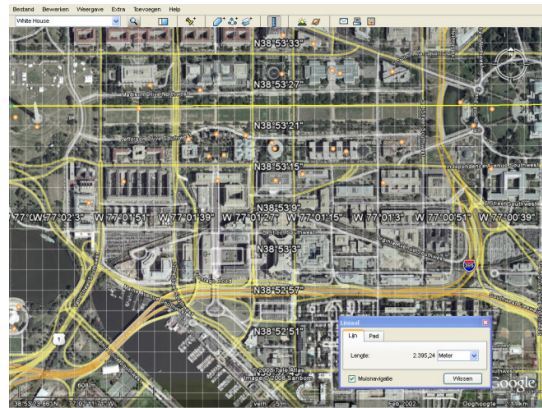Declination = arc tan (169.3 / 1126 = 0.15035) = 8.6 degrees = 8 º 36'
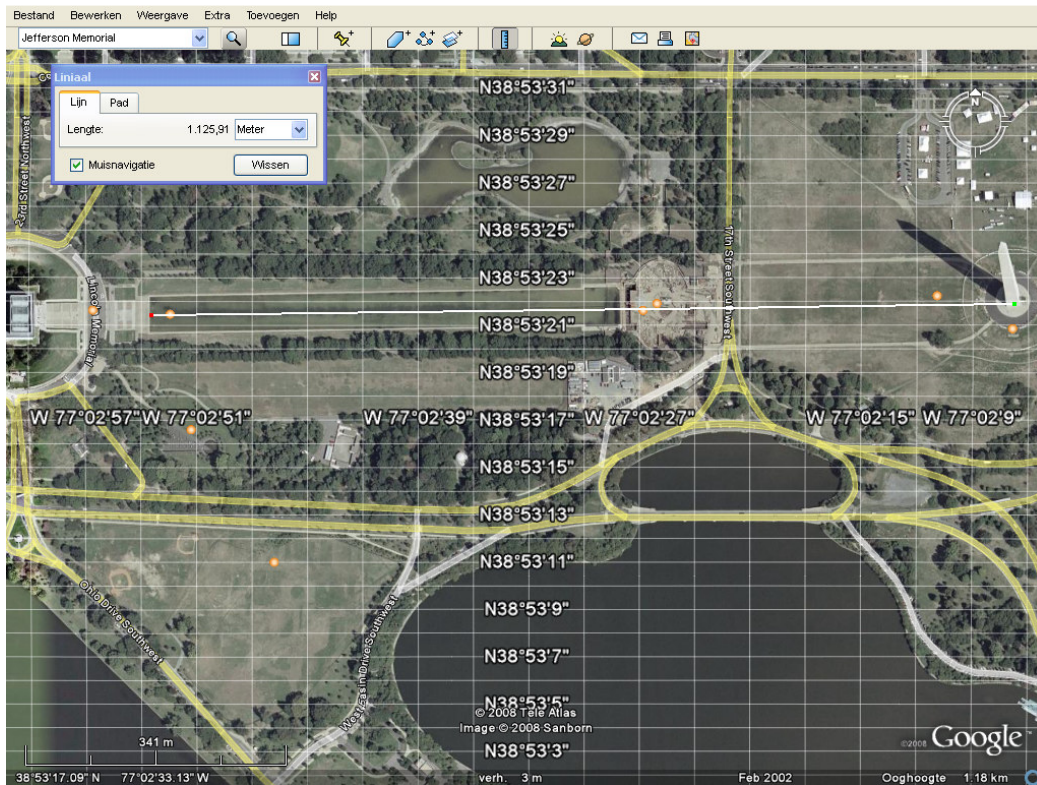
A viewer at the base of the water causeway views the tip of the obelisk under an angle of 8 º 36'

This means that when a viewer at the base of the water causeway is viewing the Sun exactly over the tip of the obelisk, the Sun must have reached an altitude of 8 º 36'.

2) Calculation of the angle between the Capitol and Jefferson Memorial
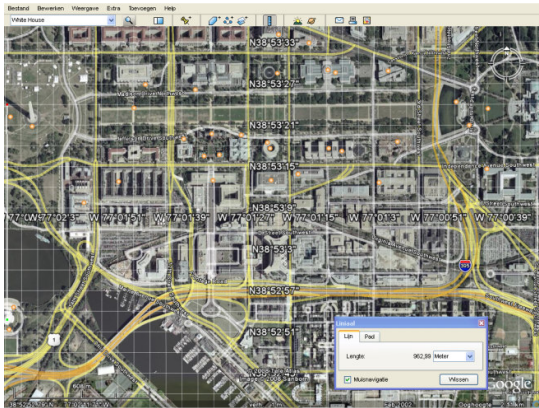
*Distance Capitol to Jefferson memorial = 963 meters*   *Obelisk to Jefferson Memorial = 2395 meters*

The distance between the Capitol and Jefferson Memorial in East-West direction = 963 meters. The distance between the Capitol and Jefferson Memorial in North South direction = 2392 meters.

The azimuth at which Jefferson Memorial is seen from the Capitol = 270° - arc tan (963/2395) = 248°

This means that a viewer at the Capitol will see Jefferson Memorial in South West direction exactly at azimuth = 248°

3) Determine the azimuth of the Sun on the fourth of July when it has reached the height of the tip of the obelisk
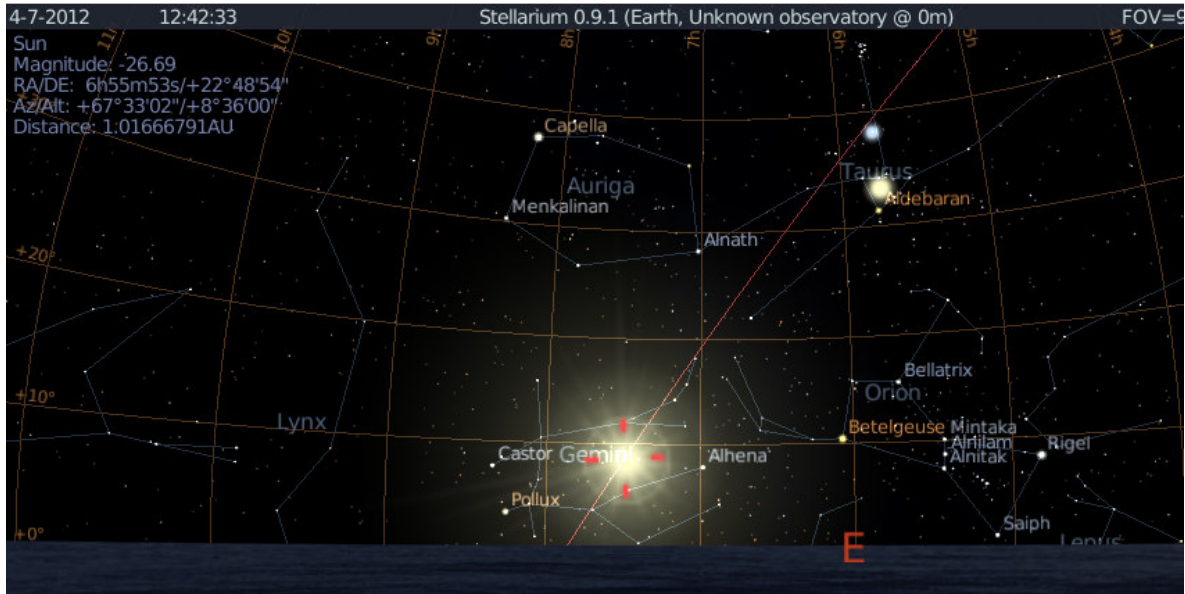
Sky with the Sun at altitude of 8° 36' at the 4th July

The azimuth of the Sun on the 4th July when it has reached the altitude of the tip of the obelisk for a viewer standing at the base of the water causeway (altitude = 8° 36') is 67 ° 33'. From this azimuth of the Sun, the Sun the Capitol and Jefferson Memorial are exactly aligned since the azimuth of Jefferson Memorial from

the Sun's vantage point = 67 ° 33' + 180° = 247° 33' = 248° which is exactly the azimuth of Jefferson Memorial as viewed from the Capitol (see 2) !
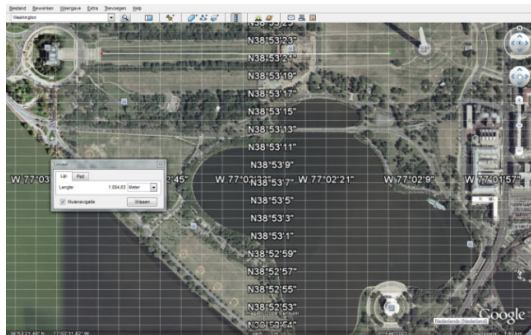
RESUME 1:

On July 4th when the Sun has reached the height of the tip of the obelisk for a viewer viewing the obelisk from the base of the water causeway at Lincoln Memorial looking East, the Capitol and Jefferson Memorial align exactly with the Sun!
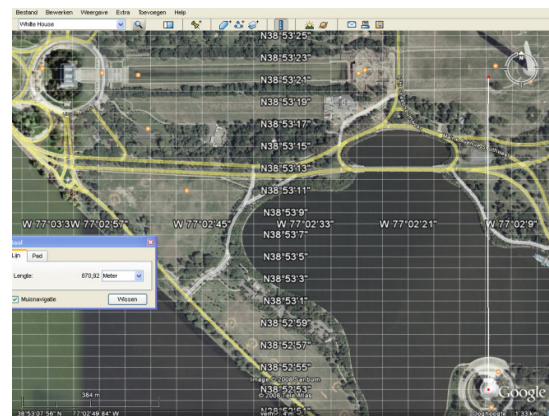
The viewer at the water causeway will see the Sun left of the obelisk but at exactly the same height as the obelisk! The alignments occurs within an accuracy < 1 °.

4) Determine the azimuth of Jefferson Memorial as viewed from Lincoln Memorial

Jefferson Memorial can be viewed from Lincoln Memorial by a spectator standing at the base of the water causeway looking into the South East direction. Let's determine the azimuth at which Jefferson Memorial is viewed from this position.

Distance in Eastern direction = 1005 meters   *Distance in Southern direction = 871 meters*

The distance from Lincoln Memorial in East-West direction = 1005 meters. The distance in North-West direction = 871 meters.

Azimuth of Jefferson Memorial as viewed from Lincoln Memorial = 90 + arc tan (871 / 1005) = 130° 54'

Winter solstice sunrise at 129°39' azimuth and Sun's altitude of 8° 36'

RESUME 2:
At winter solstice sunrise when the Sun has reached the height of the tip of the obelisk for a viewer viewing the obelisk from the base of the water causeway,   the Sun Lincoln Memorial and Jefferson Memorial align with an accuracy of <= 1.25°!

Tools

Measurements where taking using:

- Google Earth   4.3.7284.3916 (beta)
- Stellarium Software release 0.9.1