Project Planning
MARK SETTING and RECOVERY

Brian Ward
NOAA, National Geodetic Survey
Brian.Ward@noaa.gov

Project Planning

- ✓ Mark Setting
- ✓ Line ties to the NSRS
- ✓ Project Proposal

DSWorld

Windesc

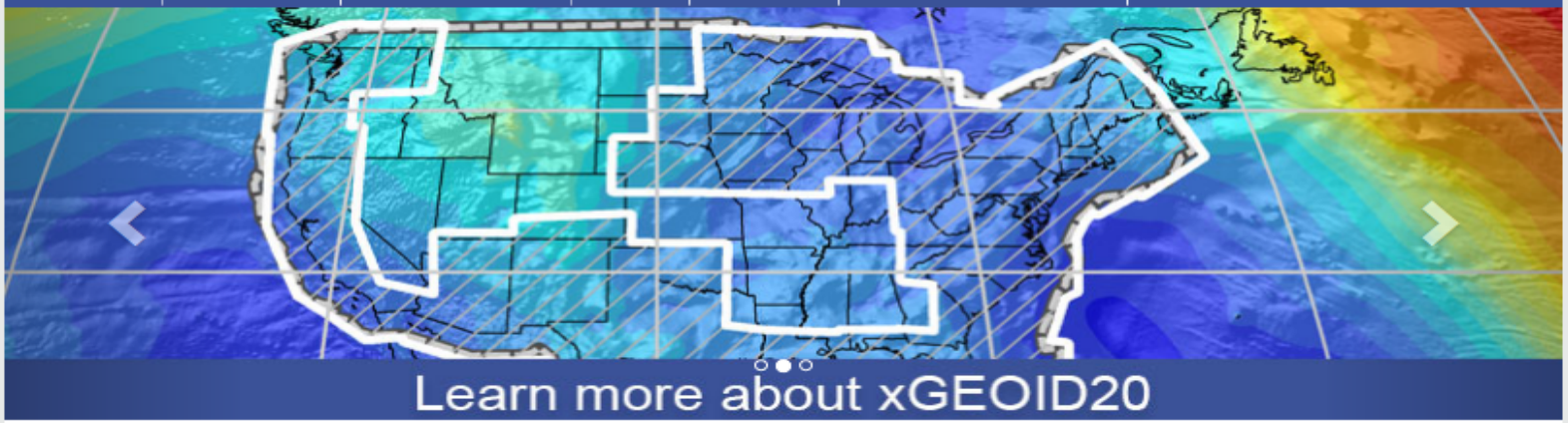
Translev

Bluebooking

National Geodetic Survey

Positioning America for the Future

NGS Home | About NGS | Data & Imagery | Tools | Surveys | Science & Education | Search



NOAA's National Geodetic Survey (NGS) provides the framework for all positioning activities in the Nation. The foundational elements of latitude, longitude, elevation, and shoreline information impact a wide range of important activities.

Process GPS Data (OPUS) | NGS Data Explorer | Looking for Bench Marks | Conversion & Transformation (NCAT) | NOAA CORS Network | New Datums

Popular Links | New Visitor

Stay Informed: Subscribe

Storm Imagery

Aerial imagery aids safe navigation and captures damage to coastal areas caused by a storm.

State Plane Coordinates

Large-scale conformal map projections to support surveying, engineering, and mapping activities.

Antenna Calibration

GNSS antenna calibrations for specific antenna types

Geodetic Toolkit

On-line interactive computation of geodetic values.

Updates

Important Updates:

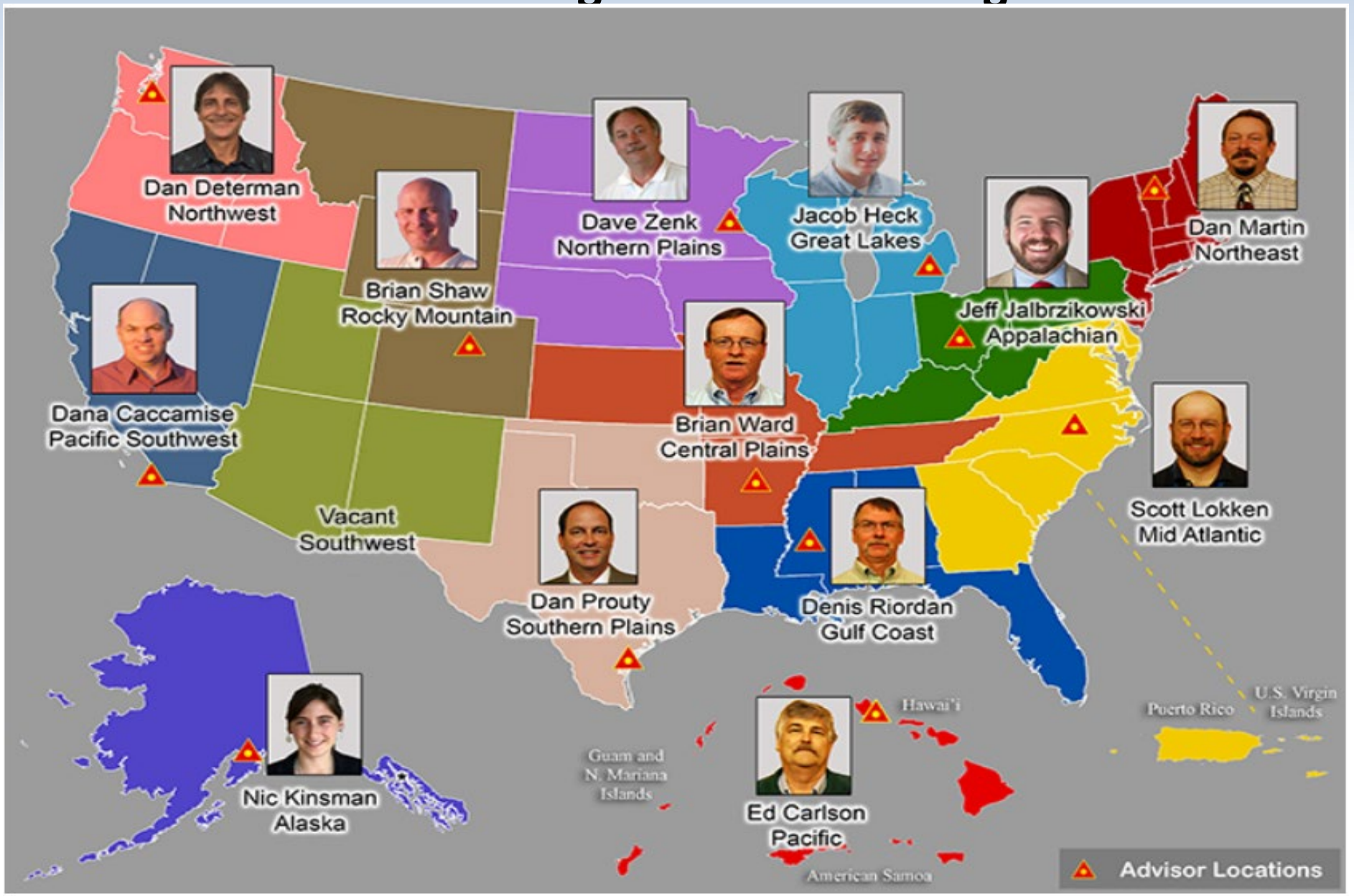
- NSRS Modernization Delay Message
- Deprecation of the U.S. Survey Foot

Beta Release:

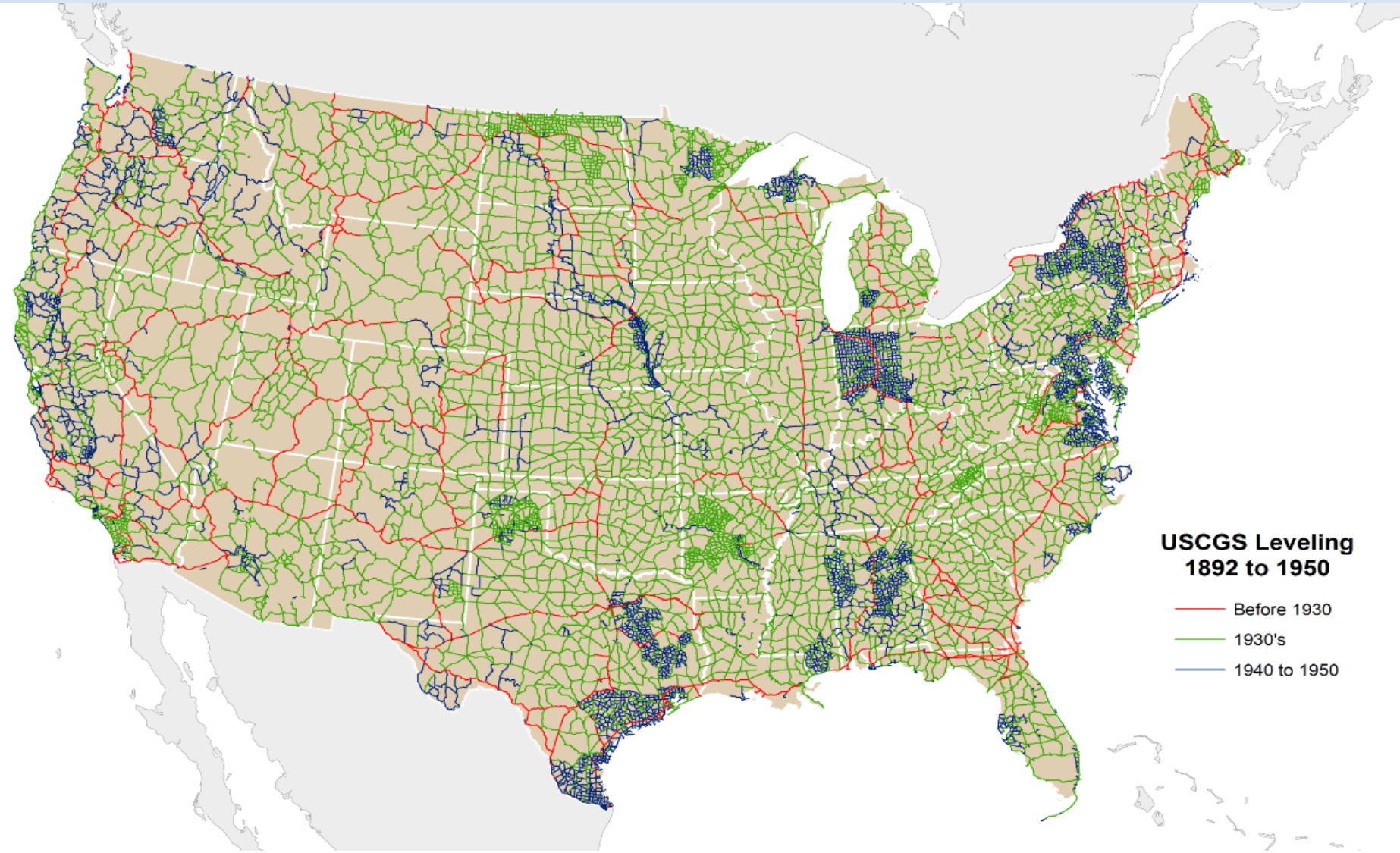
- Leveling Projects Page
- Passive Mark Page

In the News

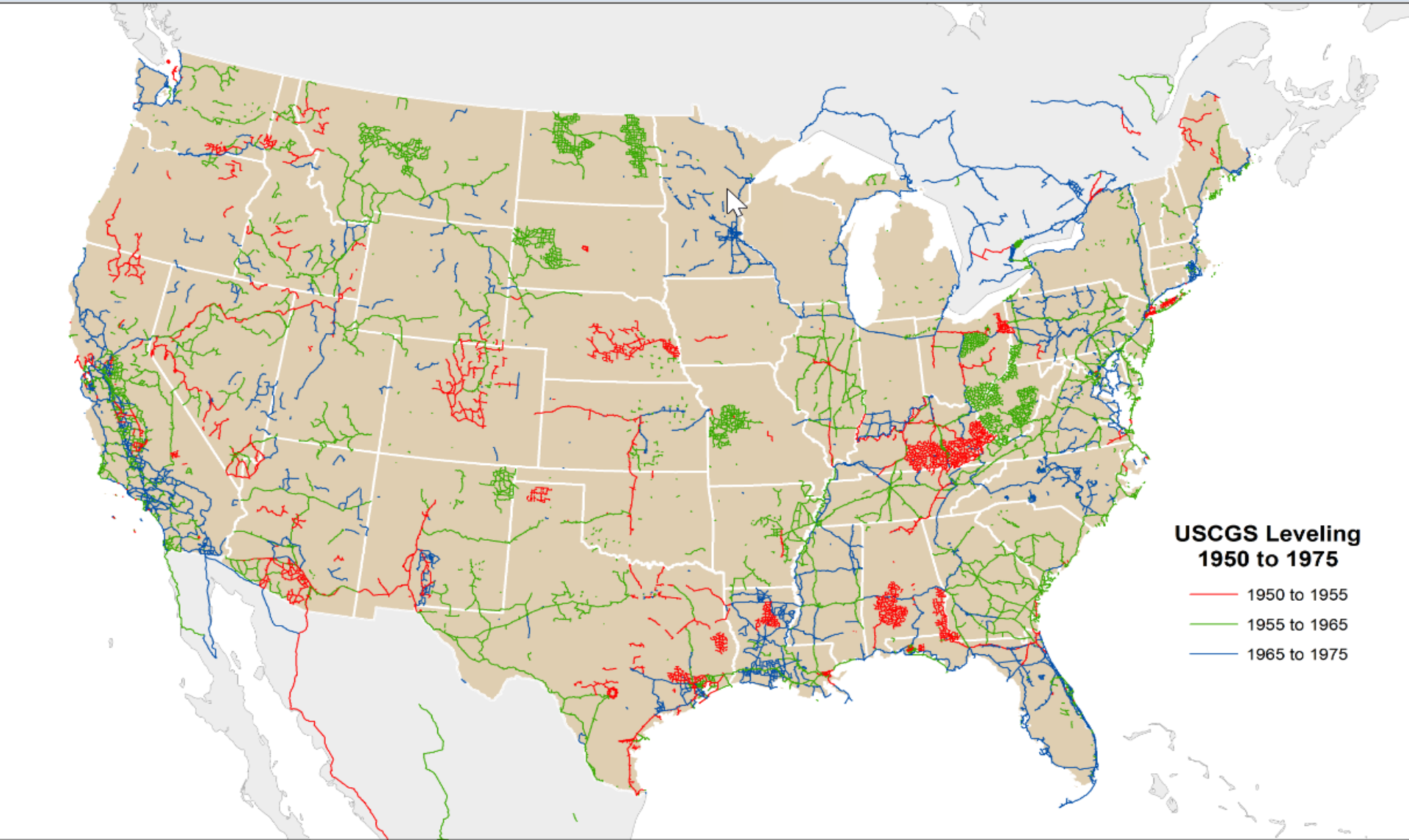
NGS Regional Advisor Program



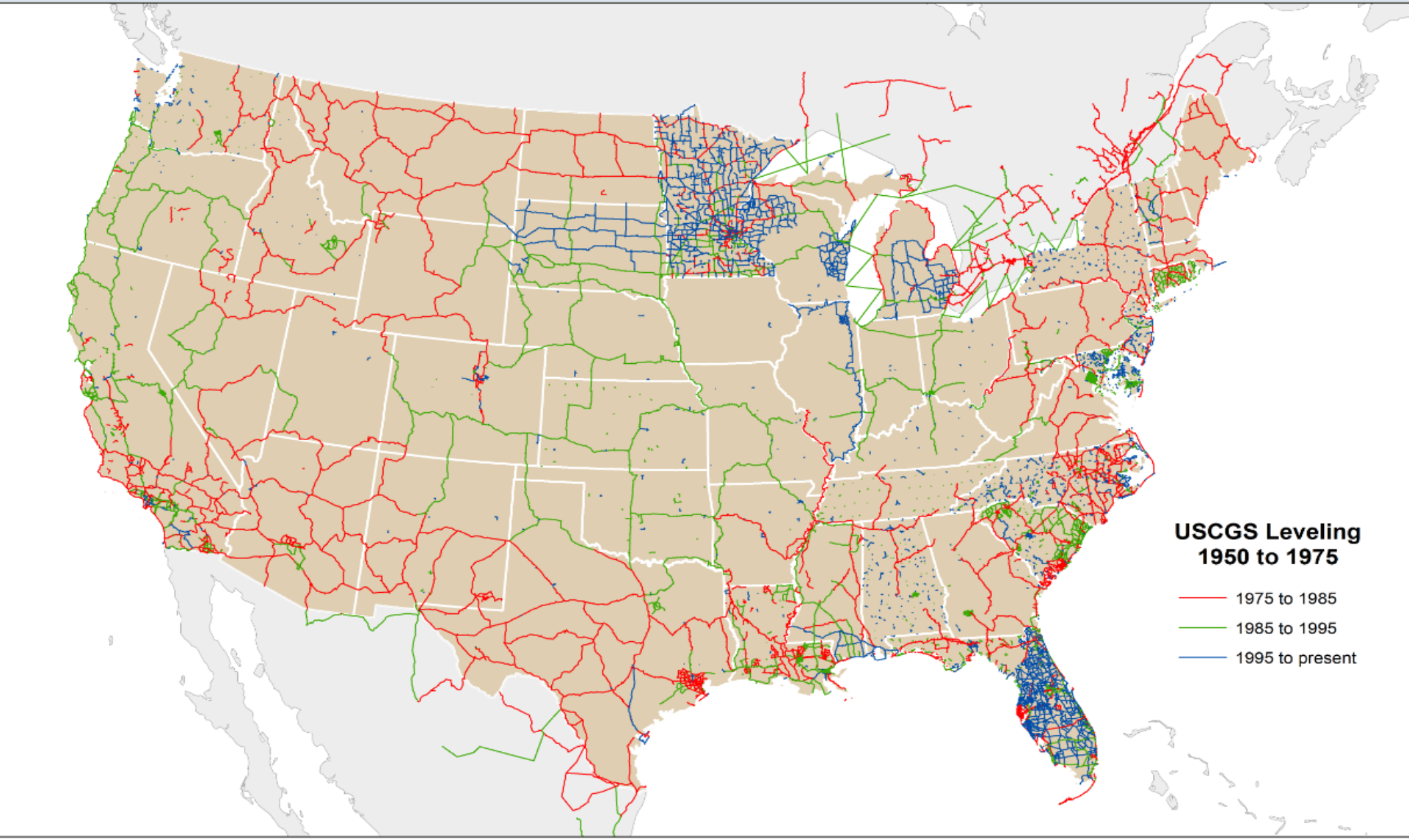
1892 to 1950



1950 to 1975

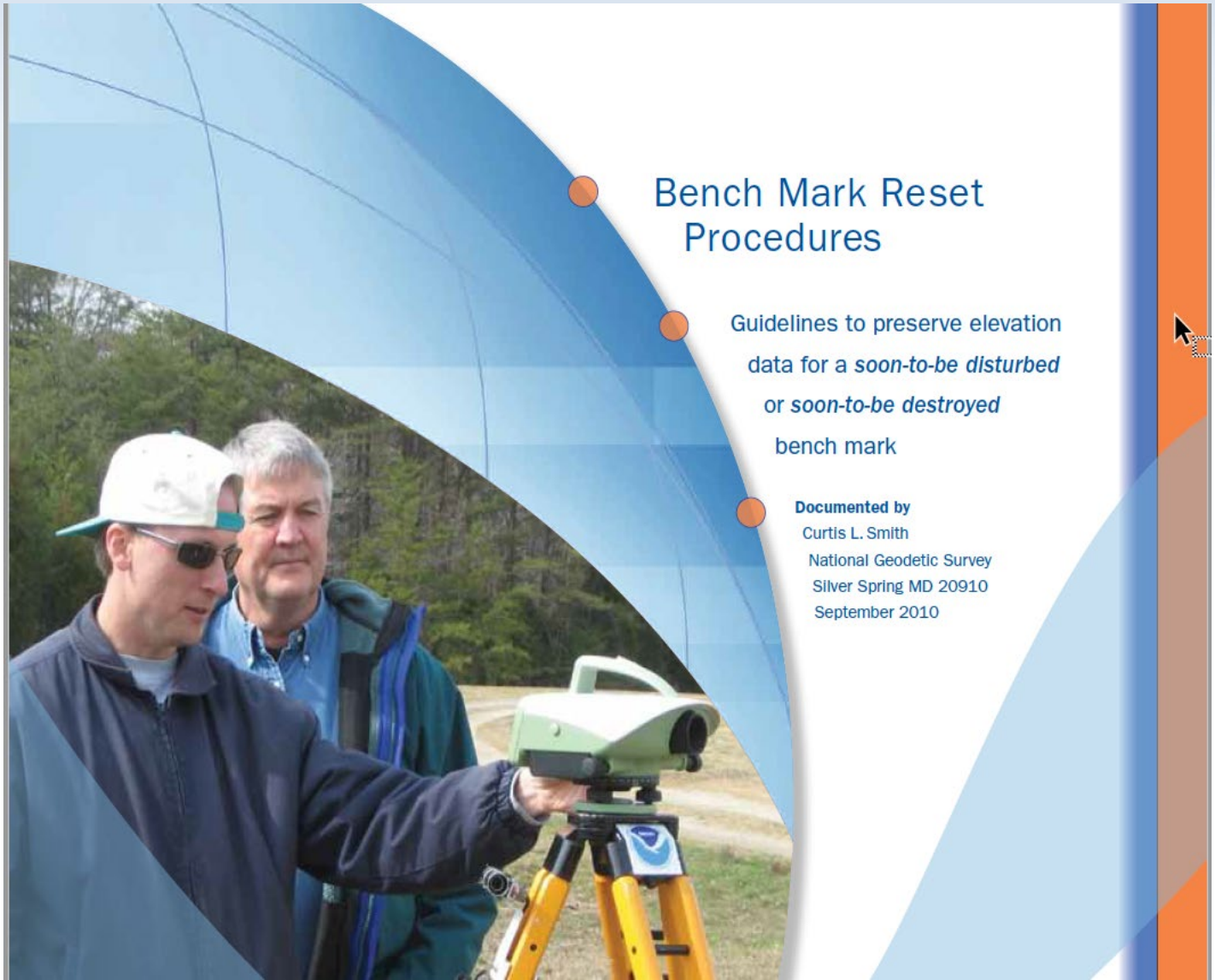

USCGS Leveling
1950 to 1975
1950 to 1955
1955 to 1965
1965 to 1975

1975 to Present



Geodetic 1st Order Levels

Bench Mark Reset Document



Mark Setting Information

Stability Order

A = MOST RELIABLE AND EXPECTED TO HOLD POSITION/ELEVATION WELL
In a rock outcrop or ledge, exposed bedrock, large foundations on bedrock, rod drilled and cemented into bedrock...
*the **most reliable**, are expected to hold well*

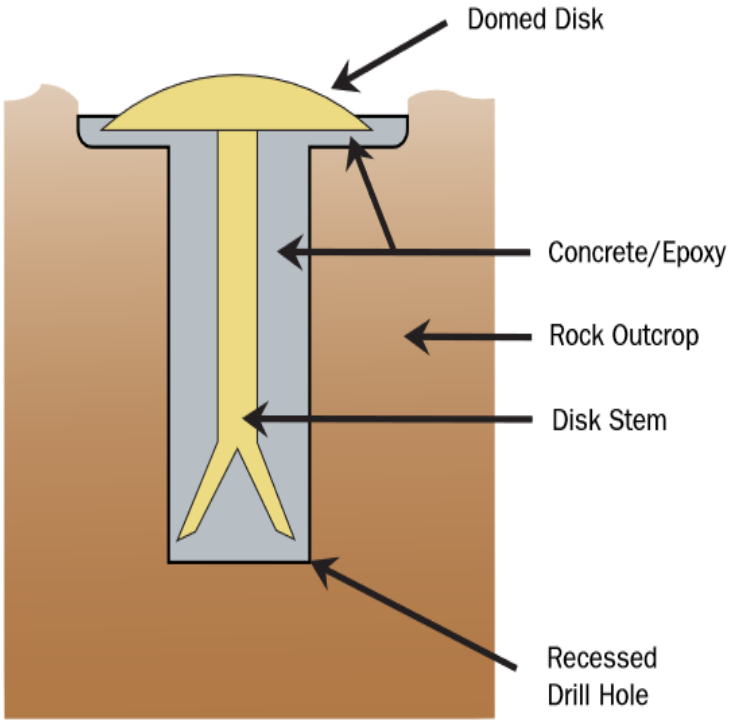
B = PROBABLY HOLD POSITION/ELEVATION WELL
Deep driven stainless steel rod mark in +10' Ft. in sleeve, massive structures and retaining walls, abutment of pier or large bridge..
***will probably hold** well.*

C = MAY HOLD, BUT OF TYPE COMMONLY SUBJECT TO SURFACE MOTION
Concrete monument, footing of small or medium structures, retaining wall or concrete ledge..
***may hold** well, are commonly*
subject to movement

D = MARK OF QUESTIONABLE OR UNKNOWN STABILITY
Light structures, prefabricated concrete post, sidewalk, curb..
*of **questionable or unknown** reliability*

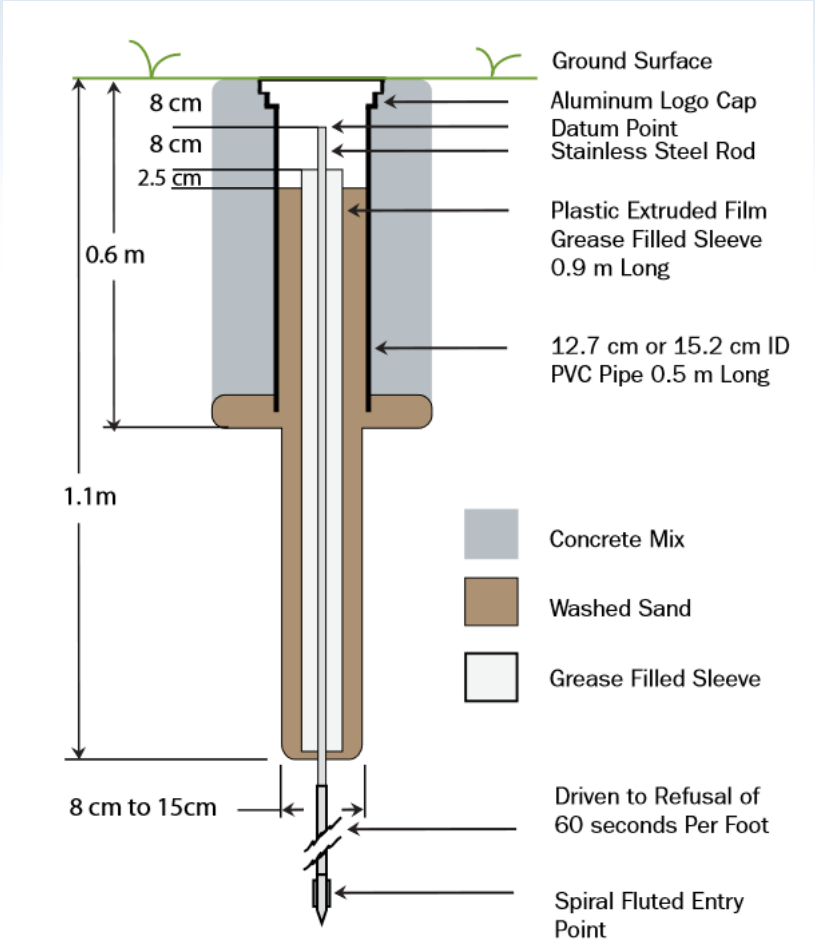
Bedrock Monuments

"A" Order Stability



Deep Driven Rod Mark

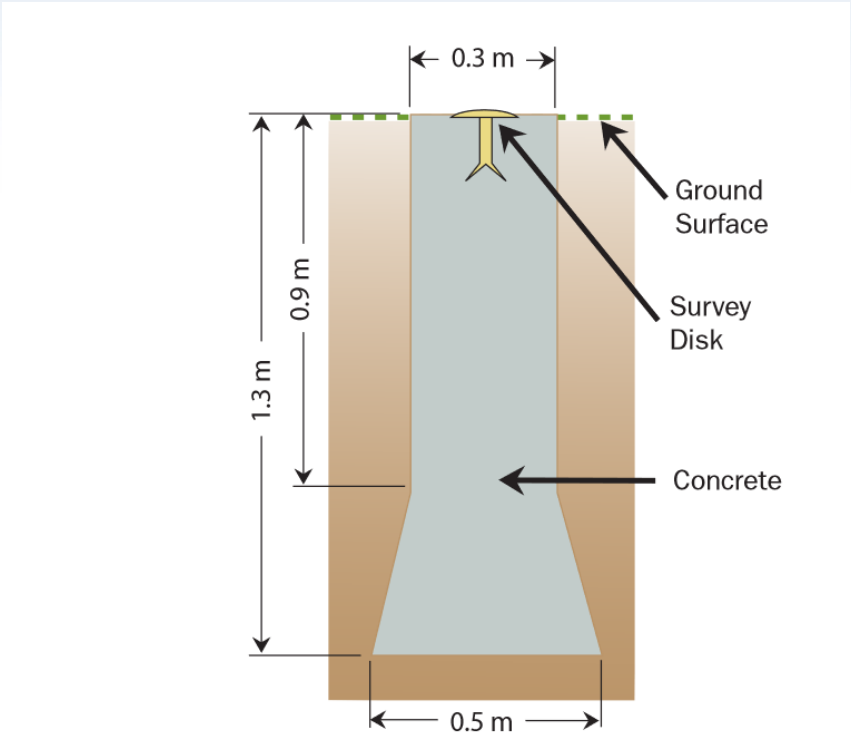
"B" Order Stability



Access Cover to Datum Point

Concrete Monument

"C" Order Stability



Concrete Monument

Unknown Stability

STABILITY D

*of **questionable or unknown** reliability.*

⇩ *browse*

Light structures

Project Planning

- Preparation Before Setting Marks

Locate ties to the NSRS.

Decide route and number of marks to set.

Decide what type of marks to set.

Closely estimate distance of total line, including ties to NSRS.

Closely estimate distance between marks.

Design in DSWorld or other mapping app.

*Contact Utilities before you dig.

*All this information will be needed for Project Proposal.

Desk Top Recon

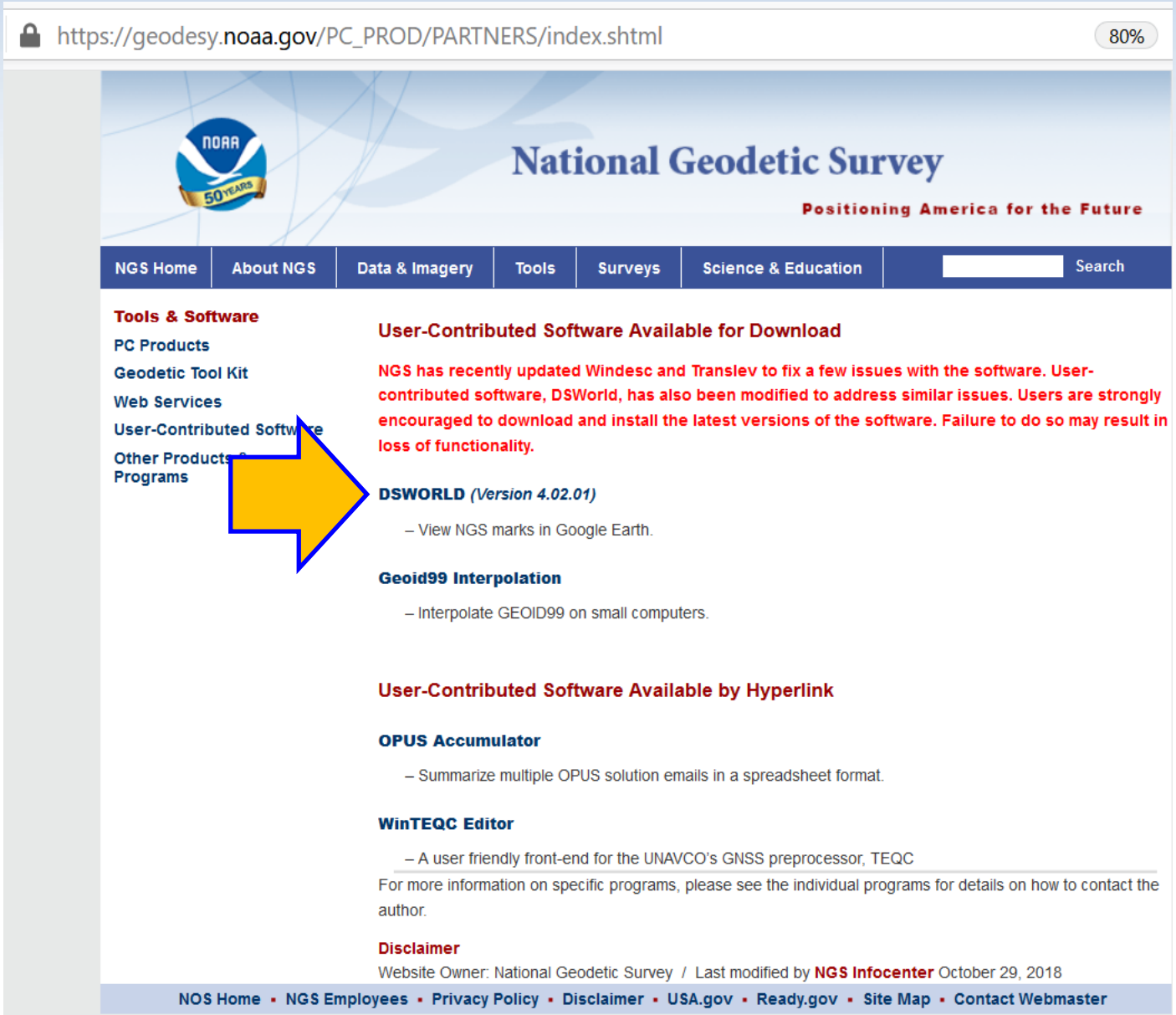
- View Project Area
- Selecting NSRS Tie Marks
- Select approximate location of new marks

✓ NSRS ties must be published, leveled and adjusted orthometric heights for Order & Class you are trying to achieve.

Mark Recovery Tools

- DSWorld
- NGS Data Explorer
- Mark Recovery App

DSWORLD


https://geodesy.noaa.gov/PC_PROD/PARTNERS/index.shtml
80%
National Geodetic Survey
Positioning America for the Future
NGS Home
About NGS
Data & Imagery
Tools
Surveys
Science & Education
Search
Tools & Software
PC Products
Geodetic Tool Kit
Web Services
User-Contributed Software
Other Products & Programs
User-Contributed Software Available for Download
NGS has recently updated Windesc and Translev to fix a few issues with the software. User-contributed software, DSWorld, has also been modified to address similar issues. Users are strongly encouraged to download and install the latest versions of the software. Failure to do so may result in loss of functionality.
DSWORLD (Version 4.02.01)
– View NGS marks in Google Earth.
Geoid99 Interpolation
– Interpolate GEOID99 on small computers.
User-Contributed Software Available by Hyperlink
OPUS Accumulator
– Summarize multiple OPUS solution emails in a spreadsheet format.
WinTEQC Editor
– A user friendly front-end for the UNAVCO's GNSS preprocessor, TEQC
For more information on specific programs, please see the individual programs for details on how to contact the author.
Disclaimer
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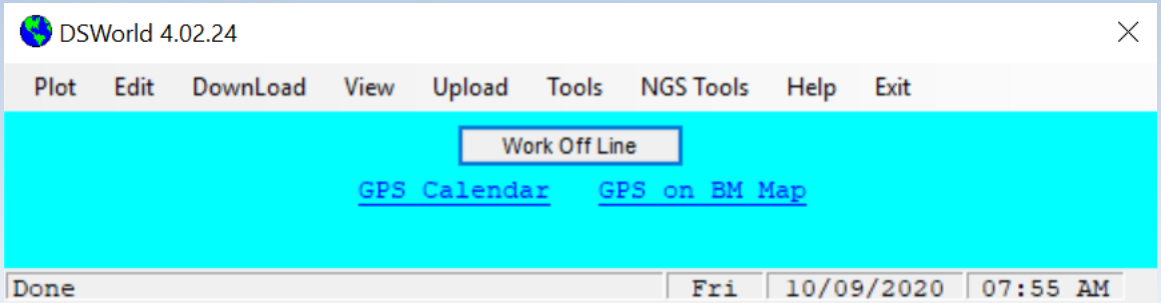
DSWorld 4.02.24
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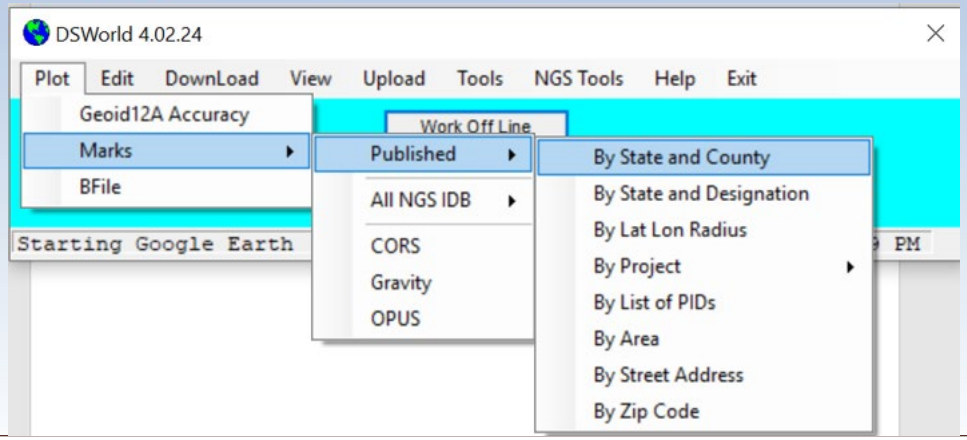
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By Street Address
By Zip Code
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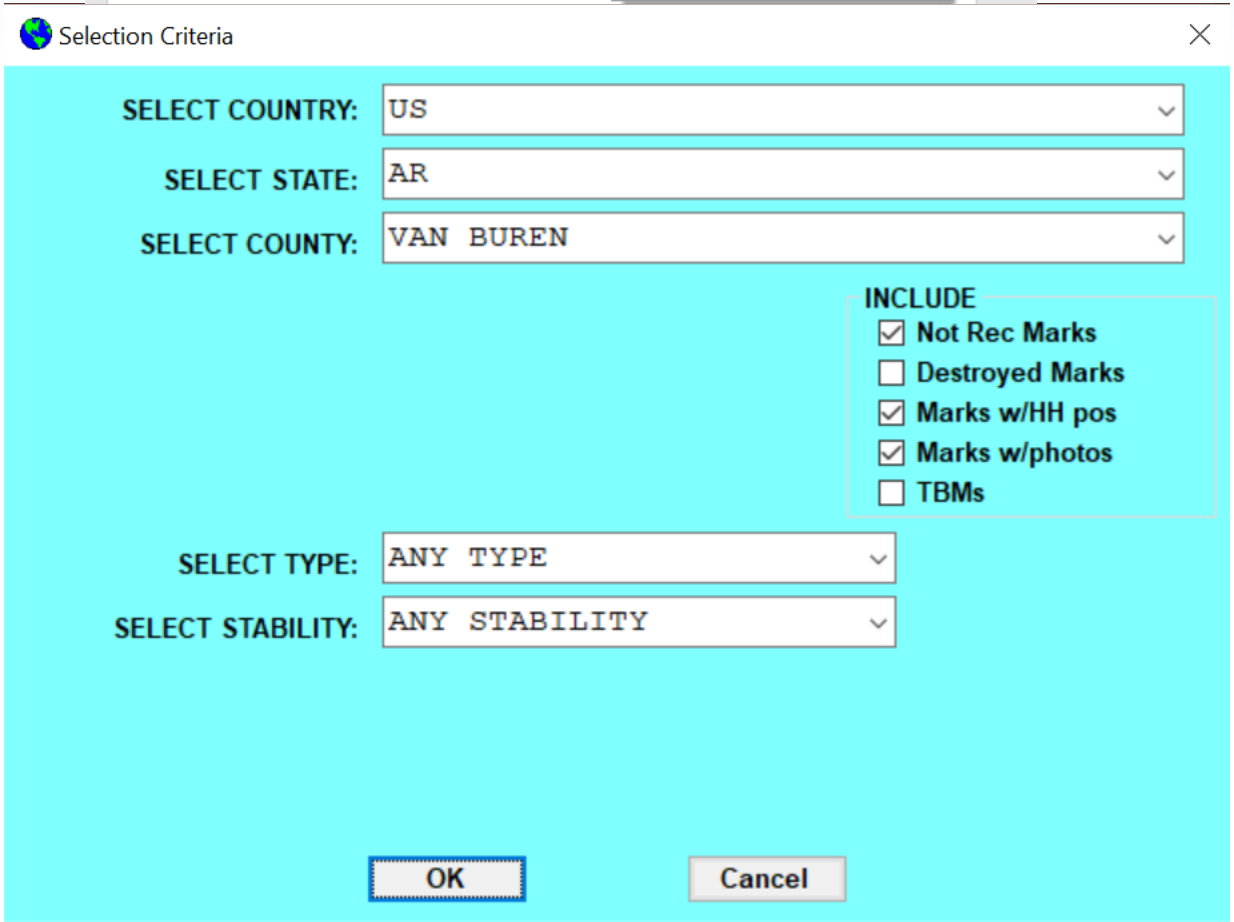
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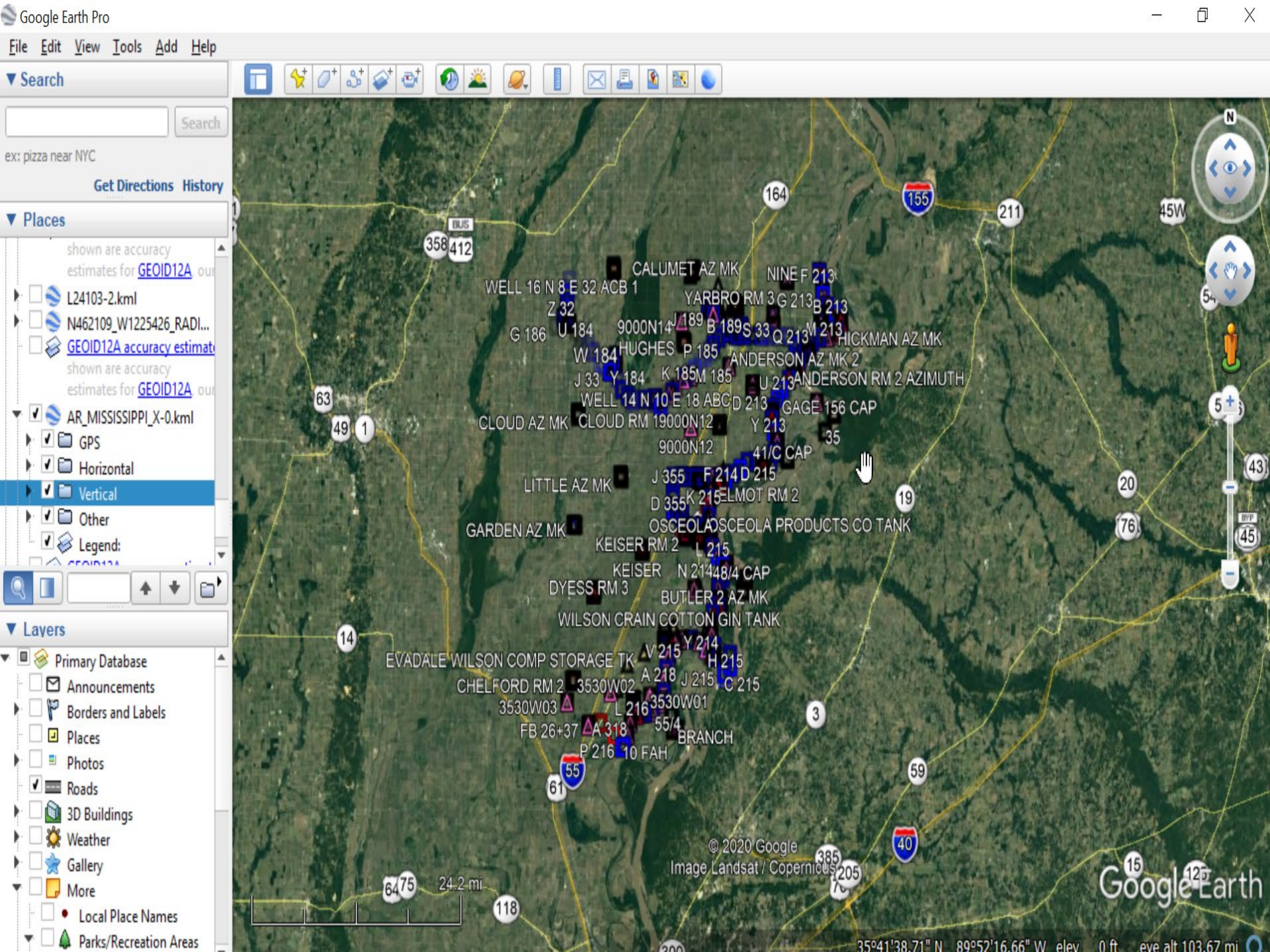
OK
Cancel


Google Earth Pro
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Search
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Get Directions History
Places
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Layers
Primary Database
Announcements
Borders and Labels
Places
Photos
Roads
3D Buildings
Weather
Gallery
More
Local Place Names
Parks/Recreation Areas
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WELL 16 N 8 E 32 ACB 1
YARBRO RM 3
G 213
B 213
Z 32
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CLOUD AZ MK
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DYESS RM 3
BUTLER 2 AZ MK
WILSON CRAIN COTTON GIN TANK
V 215
Y 214
EVADALE WILSON COMP STORAGE TK
H 215
A 218
J 215
C 215
CHELFORD RM 2
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© 2020 Google
Image Landsat / Copernicus
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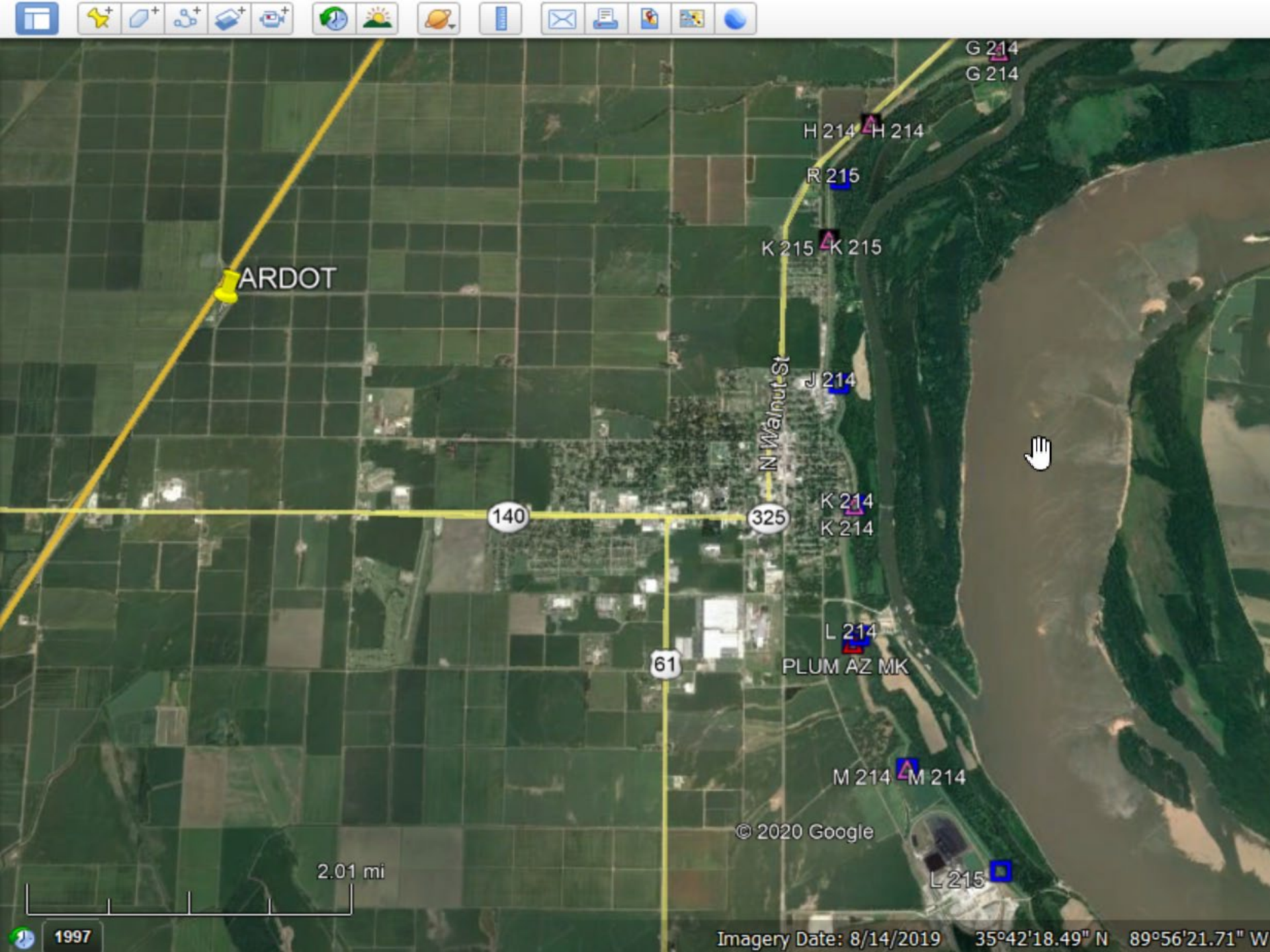
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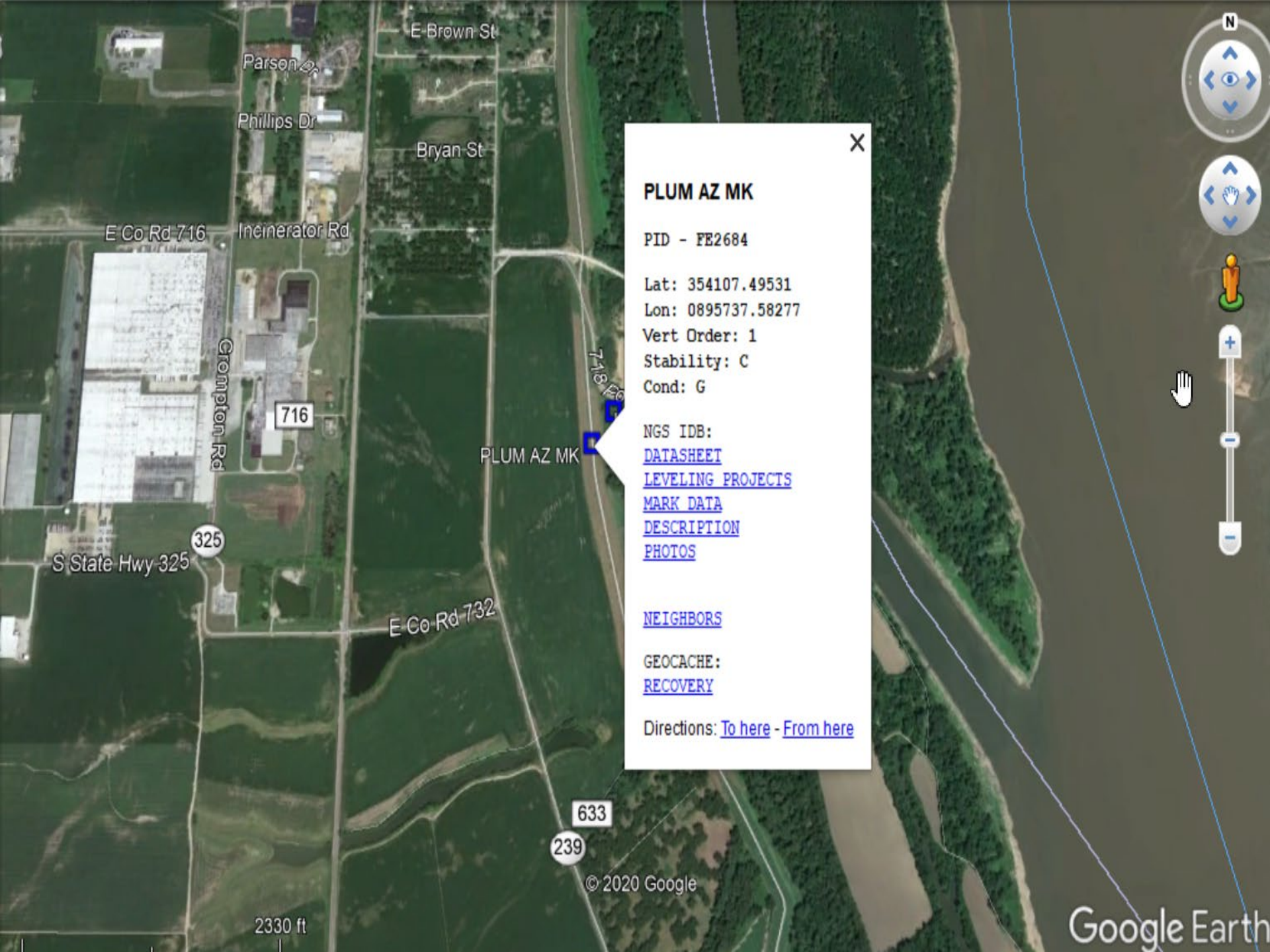
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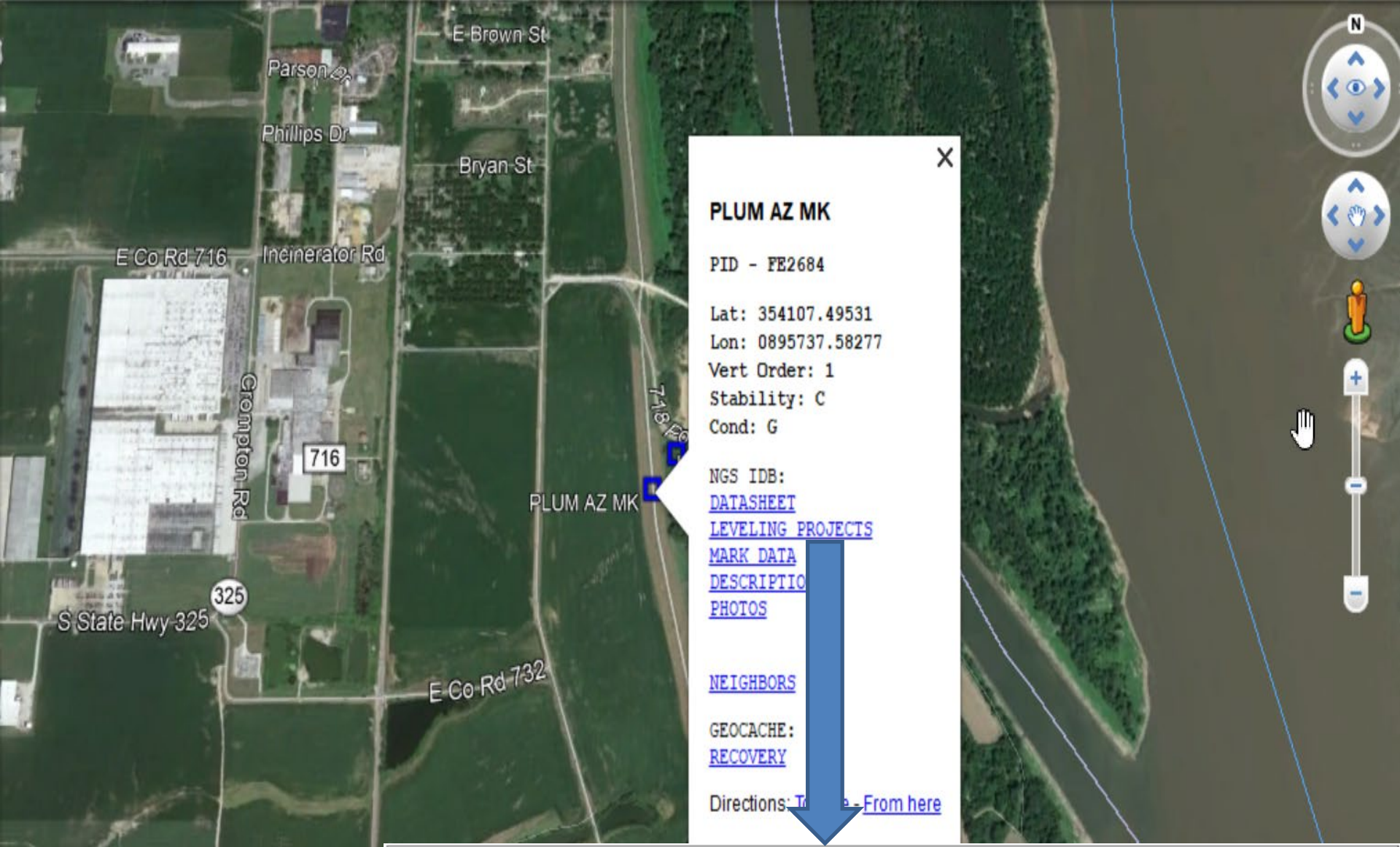
© 2020 Google
2330 ft
Google Earth
PLUM AZ MK
PID - FE2684
Lat: 354107.49531
Lon: 0895737.58277
Vert Order: 1
Stability: C
Cond: G
NGS IDB:
DATASHEET
LEVELING PROJECTS
MARK DATA
DESCRIPTION
PHOTOS
NEIGHBORS
GEOCACHE:
RECOVERY
Directions: To here - From here



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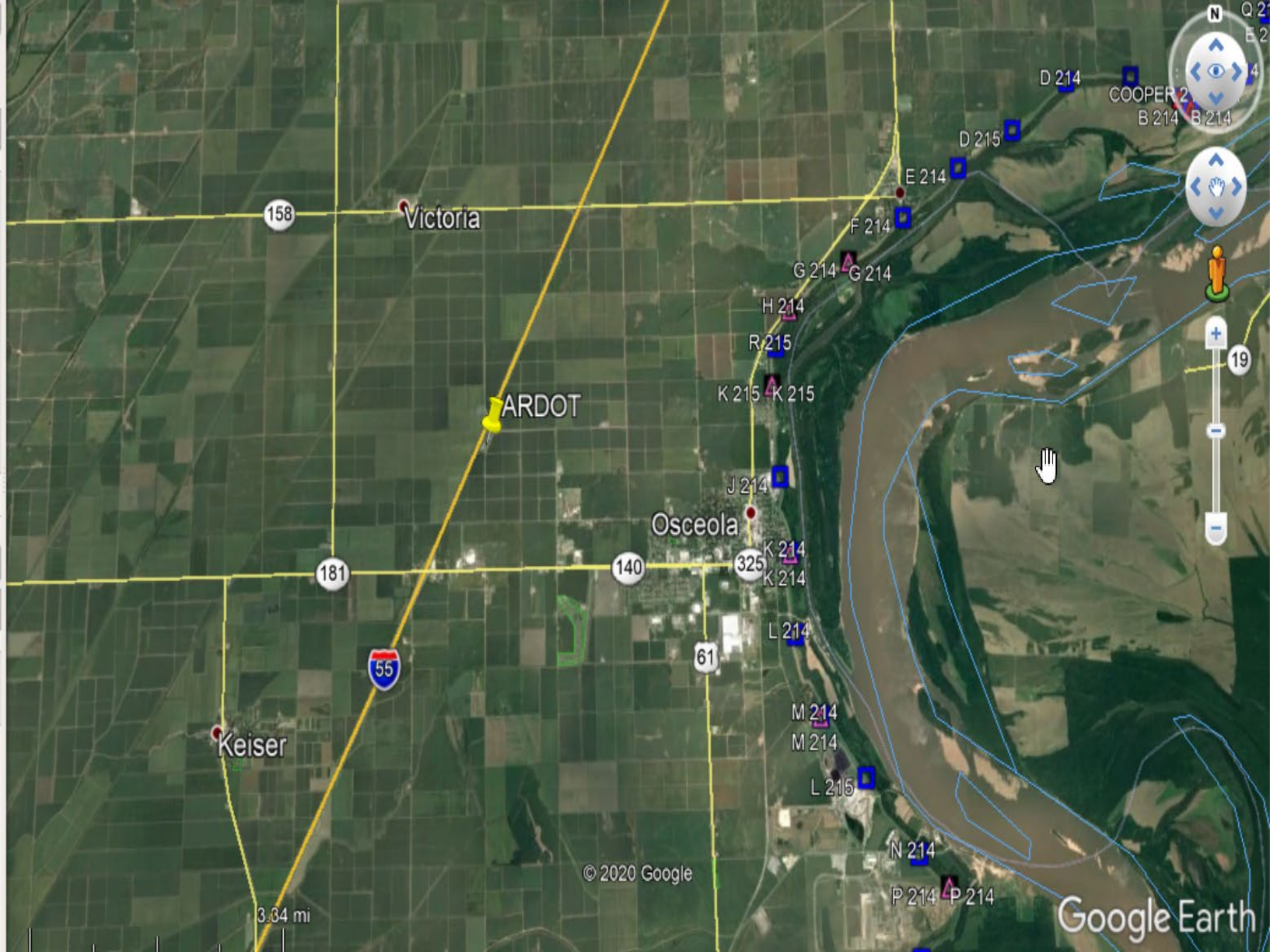
LEVEL_OBS	STAND_MARK	L24103/2	BIRDS POINT MO VIA OSCEOLA AR TO MEMPHIS TN
LEVEL_OBS	FORE_POINT	L24103/2	MEMPHIS DISTRICT CORPS OF ENGINEERS AREA
LEVEL_OBS	FORE_POINT	L24103/2	BIRDS POINT MO VIA OSCEOLA AR TO MEMPHIS TN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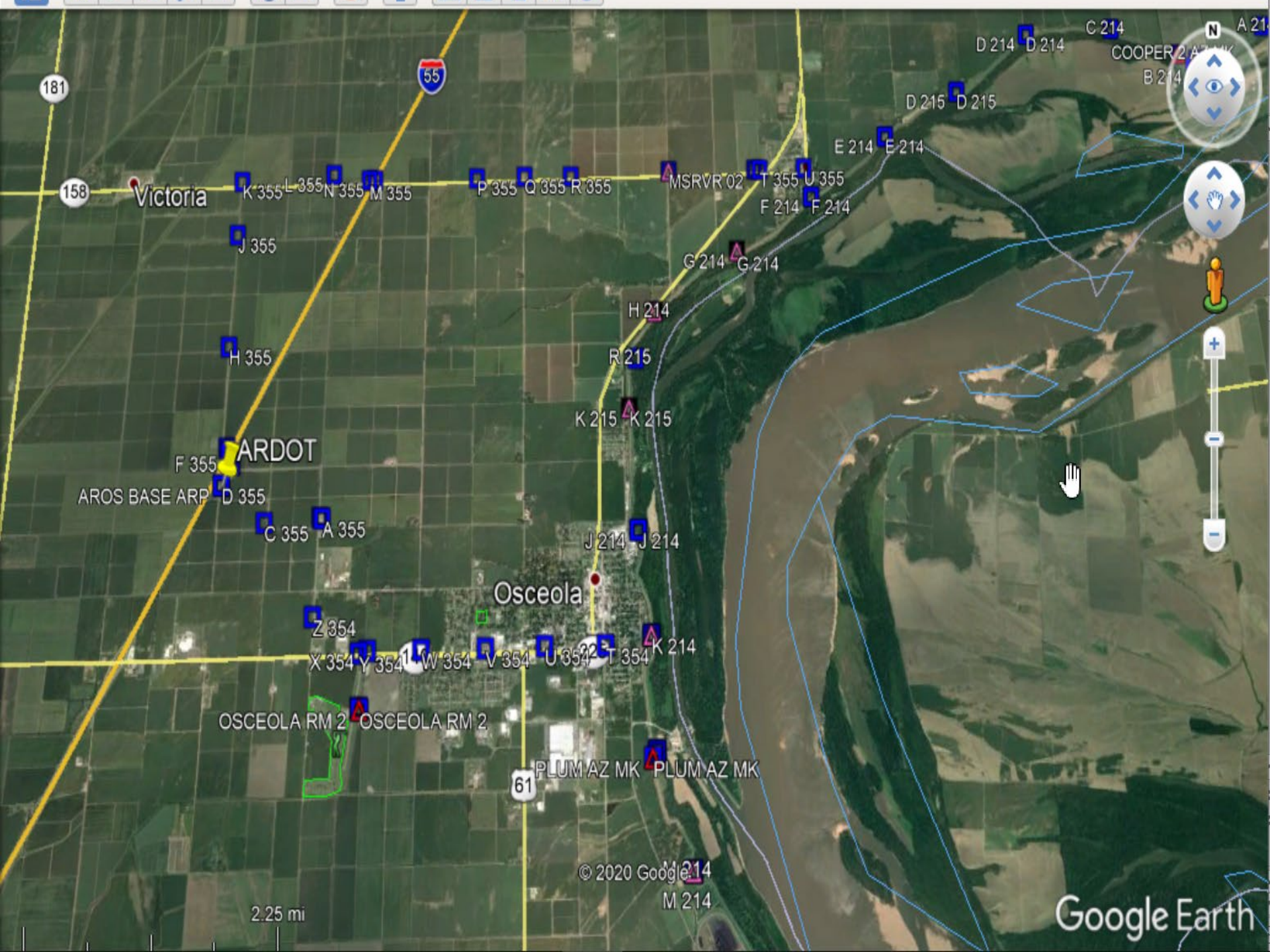
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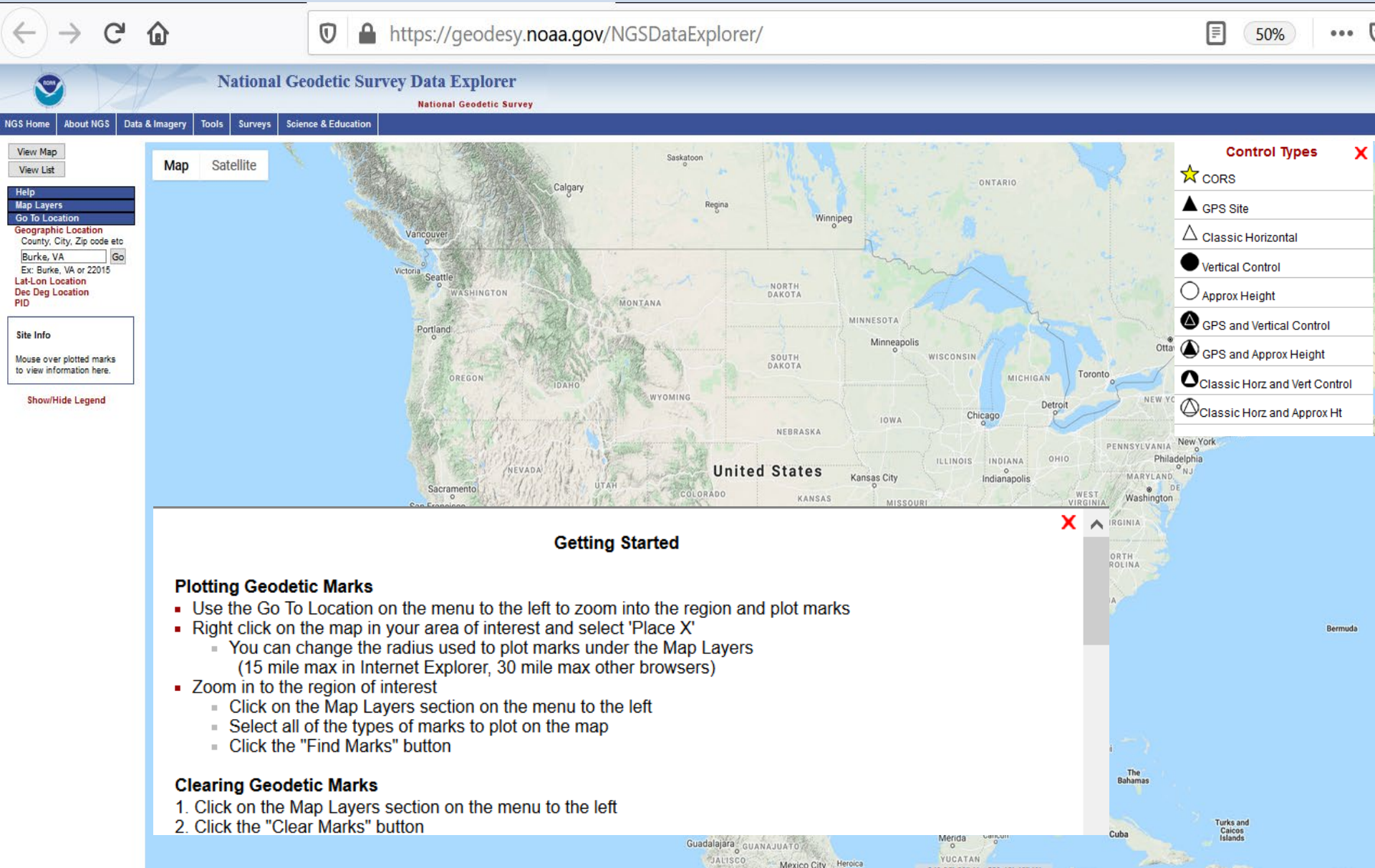
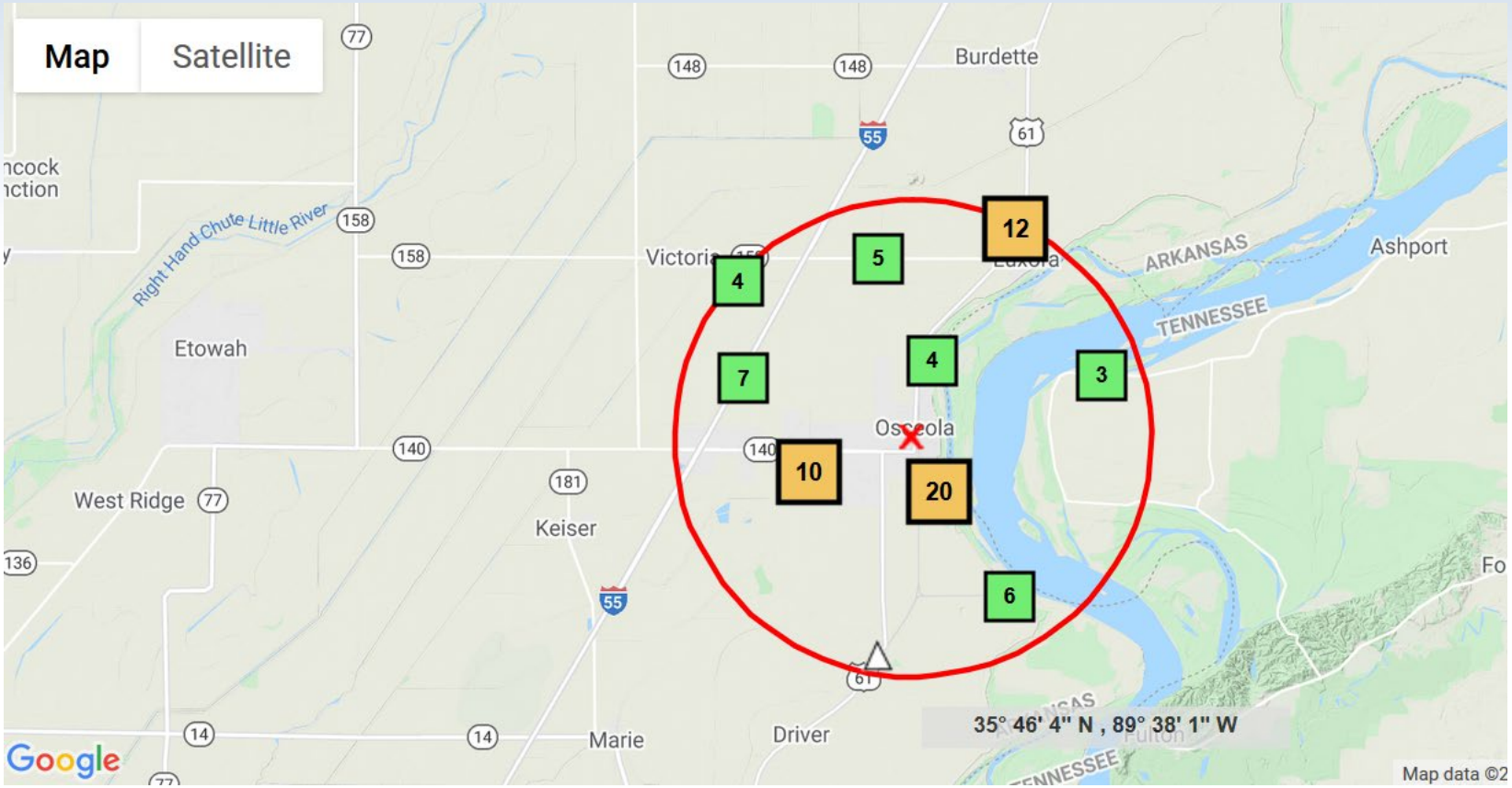
NGS DATA EXPLORER

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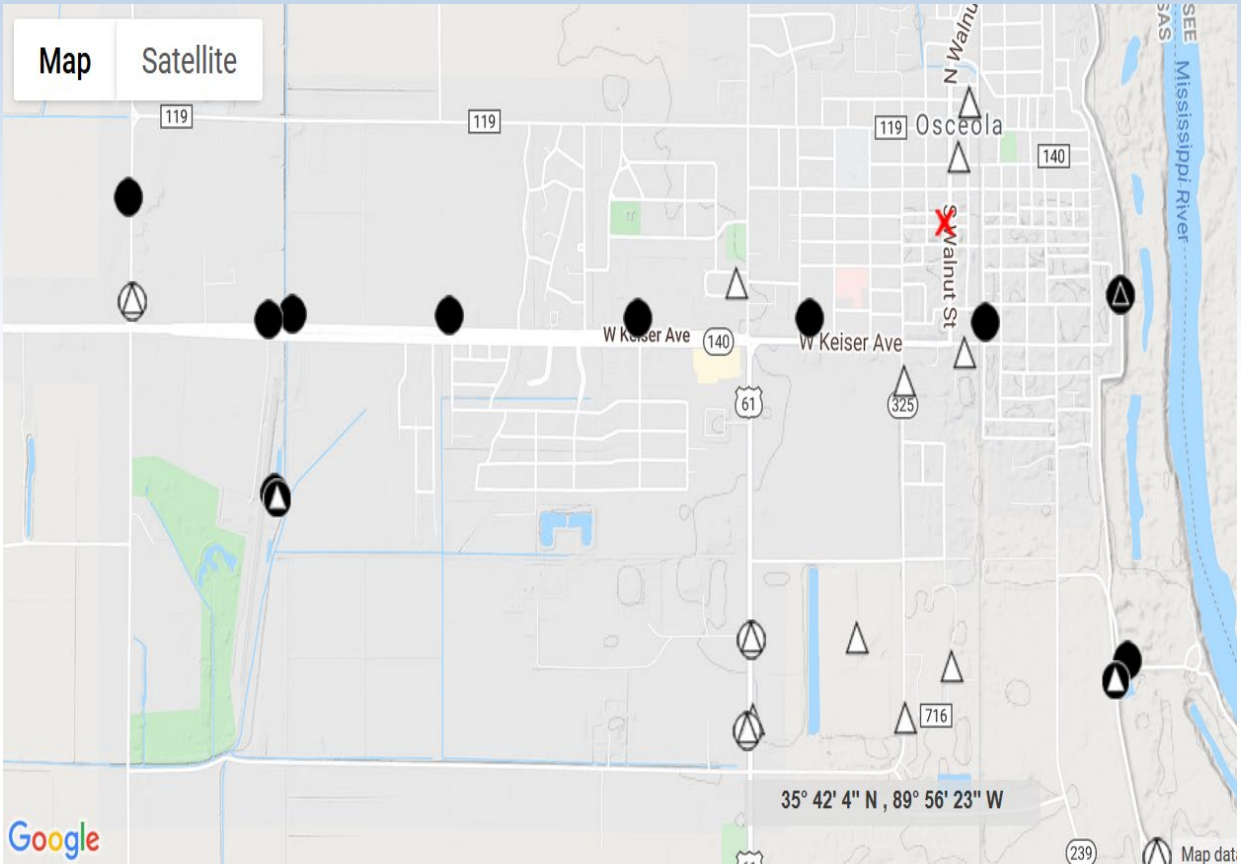
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35° 42' 4" N , 89° 56' 23" W
Google
Map dat

View Map | View List

Help
Map Layers
Go To Location

Geographic Location
County, City, Zip code etc
Burke, VA Go
Ex: Burke, VA or 22015

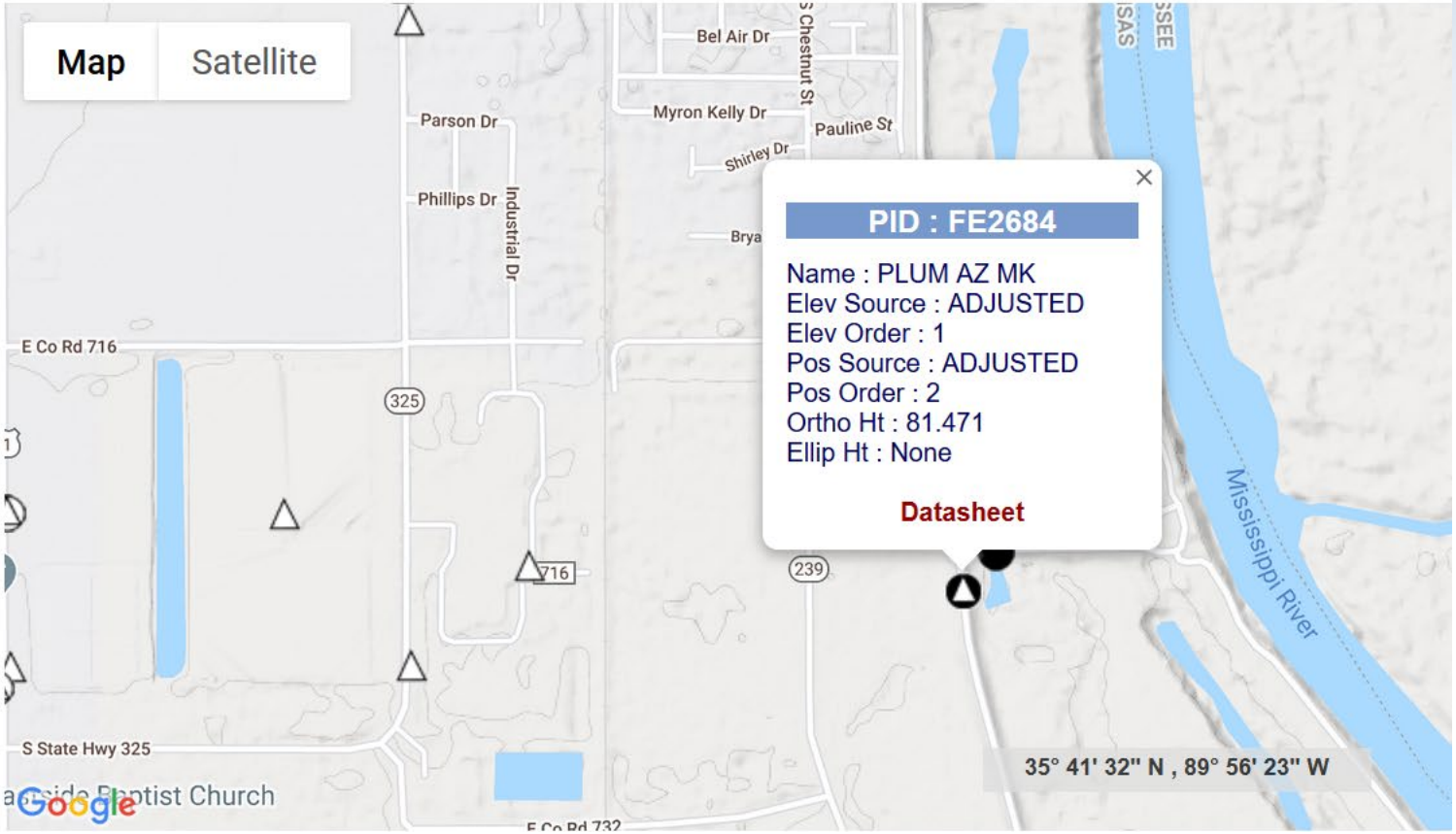
Lat-Lon Location
Dec Deg Location
PID

PID : FE2684

Name : PLUM AZ MK
Elev Source : ADJUSTED
Elev Order : 1
Pos Source : ADJUSTED
Pos Order : 2
Ortho Ht : 81.471
Ellip Ht : None

Datasheet

Show/Hide Legend



View Map | View List

Help
Map Layers
Go To Location

Geographic Location
County, City, Zip code etc
Burke, VA Go
Ex: Burke, VA or 22015
Lat-Lon Location
Dec Deg Location
PID

PID : FE2684

Name : PLUM AZ MK
Elev Source : ADJUSTED
Elev Order : 1
Pos Source : ADJUSTED
Pos Order : 2
Ortho Ht : 81.471
Ellip Ht : None

Datasheet

Show/Hide Legend

MARK RECOVERY FORM

https://geodesy.noaa.gov/surveys/mark-recovery/index.shtml 67%

National Geodetic Survey

Positioning America for the Future

NGS Home | About NGS | Data & Imagery | Tools | Surveys | Science & Education | Search

Mark Recovery Links

- Survey Mark Recovery Home
- NGS Data Explorer
- NGS Photo Submission Guidelines
- Survey Mark Datasheets
- Preserving Marks During Railroad Abandonment

Mark Descriptions Help

- Mark Position
- Mark Condition
- Mark Descriptive Notes
- Mark Photos
- Mark Stamping & Designation
- Mark Type
- Mark Setting & Specific Setting
- Rod/Sleeve Depths
- Magnetic Property
- Mark Stability

Related Links

- USACE's U-SMART Tool
- Geocaching

Survey Mark Recovery

Survey mark refers to any permanent marks or disks placed in the ground or attached to a permanent structure with known latitude, longitude or height information. Its utility depends on the surveyor's ability to recover the mark in good condition. If a mark has been damaged or destroyed, the positional information may have been compromised. If the mark has been completely removed, it's no longer useful.

In an effort to maintain updated records on more than 800,000 survey marks set around the country and its territories, the National Geodetic Survey encourages the public to submit the current mark recovery information.

Submit Survey Mark Recovery Data

To submit your survey mark data to NGS, please use our online **Mark Recovery Form**.

Mark Recovery Form

Mark Recovery Form Instructions:

1. In the first field under the **Marker ID** section, enter the recovered mark's Permanent Identifier (PID) to auto-populate existing mark descriptive fields from the NGS database. Please review and update the fields as needed. If you don't know the mark's PID, please use the **Survey Mark Datasheets** tool to find it.
2. In the **Recoverer ID** section, enter your user information including Agency Code and Agency. An individual can use the code "M" (non-specific designators) and recovery agency "INDIV".

   Tools: Recovery Agency | Register an Agency | More Info
3. In the **Recovery Information** and **Advanced** sections, include all appropriate **mark condition** descriptors.
4. Click "Submit" to send your mark recovery information to NGS for processing.

Mark Recovery Form

Lite Version: On

Find marks near me

PID: ⓘ EX. AC7026

Designation: ⓘ ex. ROBERT PACKARD

Your Agency Type: ⓘ Select agency code

Recovery Agency: ⓘ

Date mark was recovered: ⓘ YYYYMMDD Use today's date

Name: ⓘ ex. John Smith

Email: ⓘ ex. JohnSmith@gmail.com

Privacy Statement: Your name and email address will be used only to contact you if there is a problem in loading your recovery. They will not be used for any other purpose.

Suitable for GPS?: ⓘ

Condition: ⓘ

Photo Submissions (Optional)

Close-up Photo: ⓘ Browse... No file selected.

Eye-level Photo: ⓘ Browse... No file selected.

Horizon Photo 1: ⓘ Direction: - Browse... No file selected.

Add another photo

Captcha (required)

What is 0 + 1

This is required to submit the form

Submit Reset

Lite Version: On

Find marks near me

PID: ⓘ EX. AC702

Designation: ⓘ ex. ROBER

Your Agency Type: ⓘ Select ager

Date mark was recovered: ⓘ YYYYMMD

Name: ⓘ ex. John Sm

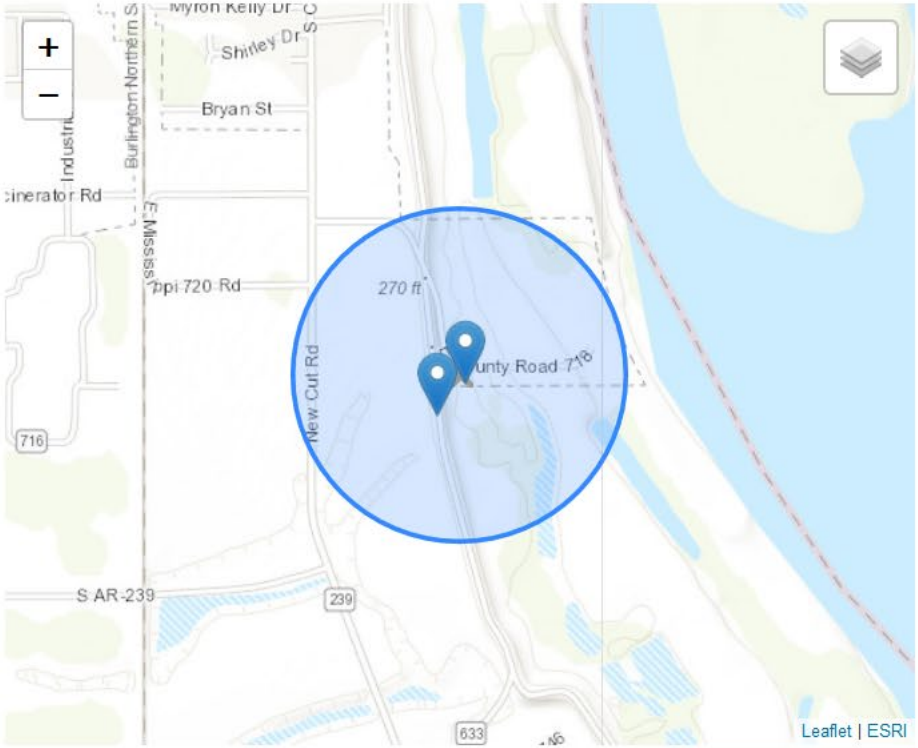
Email: ⓘ ex. JohnSm

Privacy Statement: Your name and … be used for any other purpose.

Suitable for GPS?: ⓘ

Condition: ⓘ

Close-up Photo: ⓘ Browse...



Draw New Center

PID	Designation	Position	Vertical	Distance	Direction
FE1869	L 214	SCALED	ADJUSTED	90 ft.	SSE
FE2684	PLUM AZ MK	ADJUSTED	ADJUSTED	370 ft.	SSW

Mark Recovery Form

Lite Version: On

Find marks near me

Info found for PID- FE2684

PID: FE2684

Designation: PLUM AZ MK

Your Agency Type: A - National Agencies

Recovery Agency: NGS

Date mark was recovered: 20200923 Use today's date

Name: Brian Ward

Email: brian.ward@noaa.gov

Privacy Statement: Your name and email address will be used only to contact you if there is a problem in loading your recovery. They will not be used for any other purpose.

Suitable for GPS?: Y-YES, MARK IS SUITABLE FOR GPS USE

Condition: G-RECOVERED IN GOOD CONDITION

Photo Submissions (Optional)

We do not have any photos for this mark. Please take photos.

Close-up Photo: Browse... No file selected.

Eye-level Photo: Browse... No file selected.

Horizon Photo 1: Direction: - Browse... No file selected.

Add another photo

Captcha (required)

What is 1 + 5

This is required to submit the form

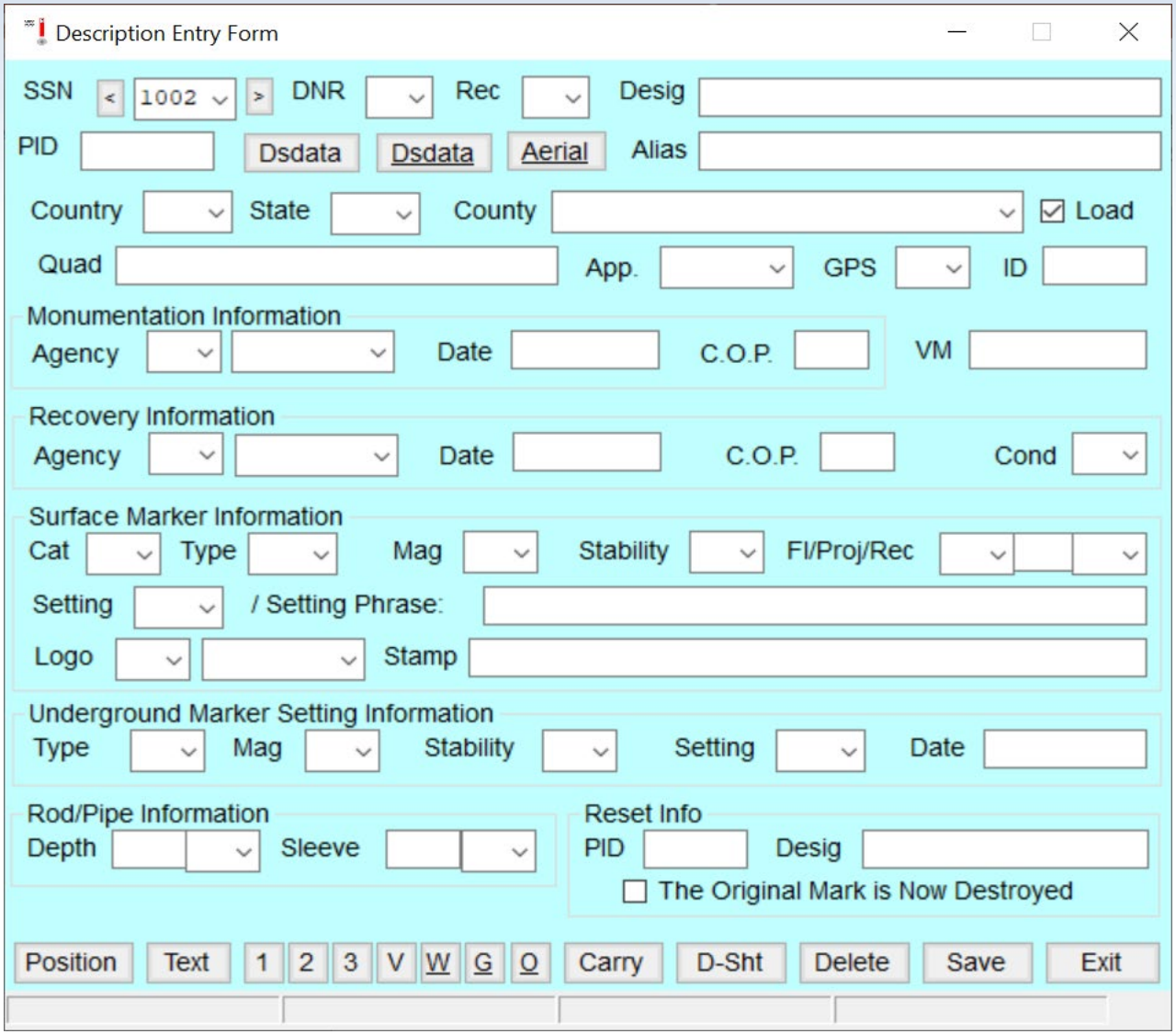
Submit Reset

Information you need to gather

- https://www.ngs.noaa.gov/surveys/mark-recovery/index.shtml

- Contact underground utilities with mark locations before digging.

Windesc Information



Mark Recovery

https://geodesy.noaa.gov//surveys/mark-recovery/

- Logbook or Notebook (computer, tablet or paper with pen or pencil)
- Datasheets (paper or computer)
- Tape measure (100m tape preferred) or EDM laser
- Compass
- Brush hook or Machete
- Flagging (to help relocate the mark for future observation)
- Spray Paint (can paint arrow and "BM" on road towards bench mark)
- Probe (useful for finding benchmarks that might be buried with an inch or two of soil)
- Camera/Phone (for mark recover pictures)
- Survey grade or hand held GPS receiver or GPS enabled phone
- Garden gloves
- Shovel or Trowel
- Paper towel, packaged wiping cloths, rags, napkins, or other such material to clean off disks
- Flat blade screwdriver (for digging and for opening rod covers)
- First aid kit
- Metal detector

Mark Position

Mark Position

↓next ↑top [x]

Many older bench marks were positioned using only scaled map coordinates. If you have a more accurate position, please report it. Acceptable positions to supersede SCALED come from the following sources:

- ±10 m = "handheld 2" consumer-grade GPS with or without WAAS correction.
- ± 3 m = "handheld 1" engineer-grade GPS with differential or kinematic correction in NAD 83.
- ADJUSTED = A least squares adjustment of geodetic survey project data.

"handheld 2"

Scaled Position

```
FE1876 ***********************************************************************
FE1876  DESIGNATION -  S 215
FE1876  PID         -  FE1876
FE1876  STATE/COUNTY-  AR/MISSISSIPPI
FE1876  COUNTRY     -  US
FE1876  USGS QUAD   -  OSCEOLA (2017)
FE1876
FE1876                        *CURRENT SURVEY CONTROL
FE1876 ______________________________________________________________________
FE1876* NAD 83(1986) POSITION- 35 37 38.     (N) 089 56 31.     (W)    SCALED
FE1876* NAVD 88 ORTHO HEIGHT -    74.684 (meters)      245.03   (feet) ADJUSTED
FE1876 ______________________________________________________________________
FE1876  GEOID HEIGHT    -        -27.587 (meters)                      GEOID18
FE1876  DYNAMIC HEIGHT  -         74.620 (meters)      244.82   (feet) COMP
FE1876  MODELED GRAVITY -    979,775.3   (mgal)                        NAVD 88
FE1876
FE1876  VERT ORDER      -  FIRST     CLASS I
FE1876
FE1876.The horizontal coordinates were scaled from a map and have
FE1876.an estimated accuracy of +/- 6 seconds.
FE1876.
FE1876.The orthometric height was determined by differential leveling and
FE1876.adjusted by the NATIONAL GEODETIC SURVEY
FE1876.in June 1991.
FE1876
FE1876.Significant digits in the geoid height do not necessarily reflect accuracy.
FE1876.GEOID18 height accuracy estimate available here.
```

Mark Condition

Mark Condition

↓next ↑top [x]

GOOD

No evidence of tampering, subsidence, frost heave, etc. It is likely where it was when first observed.

POOR

*Damage or movement excessive for the designated **stability** &/or **accuracy**.*

NOT FOUND

Existence doubtful; recovery unlikely without extraordinary effort.

DESTROYED

Irrefutable evidence of destruction. Absent such first-hand evidence, report as "not found"

Mark Photos

Mark Photos

↓next ↑top [x]

CLOSE-UP

highlight stamping with chalk or crayon, use macro mode to reduce blur, oblique angle to reveal mark condition, avoid shadows

EYE-LEVEL

remove dirt & debris to show extents of monument, open the logo cap, add a placard to identify mark and demonstrate scale

HORIZON

include witnesses &/or visibility obstructions to aid in recovering mark & identifying within aerial imagery, show equipment used to document your work & clarify mark location

Please only share photos which add unique and unambiguous views of a mark's location, condition, or utility for future surveys.

Tools:

- see also **photo guidelines for DSWORLD/WinDesc** and **contracting SOW**.
- consider also other recovery note and photo archives, e.g., **geocaching websites** and **mark descriptors**.

Mark Descriptive Notes

Mark Descriptive Notes

↓next ↑top [x]

Provide details to help future users recognize disturbance, and confidently locate marks hidden by overgrowth or within aerial imagery.

NEW MARKS:
Describe by noting distance and direction from local witnesses (curbs, posts, trees, etc.) along with any other salient features (recommended approach, hazards, etc.)

Example: *The mark is at the highest point of a small hill, known locally as Hassler's hill, a 5 minute hike west from a parking lot at 1843 Bache St, Peirce City.*

Located in the SW corner of a 2 ft square concrete flag base projecting 0.3 ft above ground, 3.3 ft S from S edge of sidewalk, 6.6 ft NE from a 15" oak tree, 9.9 ft W (bearing 282) from utility pole 123A.

PUBLISHED MARKS:
Briefly update prior descriptions.

Example: *Recovered as described in 1983, except utility pole 123A is gone. Mark is 32.1 ft south from centerline of gravel drive leading to 1874 Patterson Ave, now known as Hilgard Park.*

Example: *Recovered as described.*

HINT: Avoid the traditional turn-by-turn to reach paragraphs if a dashboard GPS will direct users to the vicinity.
No reference objects nearby? Consider adding and describing your own witness post, rock cairn, or gravel collar.

Tools:

- **mark description / recovery forms** [optional]
- consider other recovery note and photo archives, e.g., **geocaching websites**.

Mark Stamping & Designation

Mark Stamping & Designation

↓next ↑top [x]

Stamping is the unique ID, if any, that the original marksetter struck into the tablet.

Example: "*MEADES RANCH 1891*" as shown at right.

Do not physically alter an existing mark unless you are conducting a formal **mark reset**.

Designation (aka "name") is a user-friendly identier, unique for the area and *usually* descriptive of the mark stamping &/or location.

Examples: *MEADES RANCH*
WASHINGTON MONUMENT
Q 132 RESET

Tools:

- **search our database by mark designation** to ensure your proposed designation is unique
- **see bluebook annex D** for historic naming conventions

Mark Type

Mark Type

↓next ↑top [x]

Type describes the surveyed object:

browse ⇒ (I) Metal rod

Knowing what to look for improves mark recovery and may explain stability problems.

Mark Setting & Specific Setting

Mark Setting & Specific Setting

↓next ↑top [x]

Setting is the mark's underlying structure:

browse ⇒ 30 (D) Light structures (other than listed below)

Specific setting allows you to add comments about the setting, e.g., "*4x8 ft concrete storm drain*". These improve mark recovery and may explain stability problems.

Survey marks should be **stable**, permanent, **unique**, **recoverable**, and safe-to-use. Improve the network by finding & re-using **existing marks** whenever practicable.

Tools:

- see mark setting guidelines at **bench mark reset**, **NOAA Manual NOS NGS 1**, and **contract attachments T, U, and V**

Special Application Marks

Special Application

↓next ↑top [x]

PLSS CORNER

Cadastral boundary corner of US Public Land Survey System

WATER LEVEL / TIDAL BENCH

A reference mark for a water level measuring gauge

FAULT MONITORING

Established to monitor local or regional crustal instability

OTHER

*Rarely used. Explain the application in **notes***

We highlight just a few common uses, to aid in organization and search.

Some historic applications are implied by the **designation format (annex D)**.

Magnetic Property

Magnetic Property

↓next ↑top [x]

Cadastral surveyors occasionally include magnetic material in or alongside the setting to aid in mark recovery. This is generally avoided for geodetic marks.

NOT MAGNETIC: Copper, brass, aluminum, and stainless steel

MAGNETIC: Iron, cobalt or nickel alloys

UNSURE: Use a magnet to test.

See list of magnetic codes and definitions.

Mark Stability

Mark Stability

↓next ↑top [x]

STABILITY A

*the **most reliable**, are expected to hold well.*

⇓ browse

In rock outcrop or ledge

STABILITY B

***probably hold** well.*

⇓ browse

Stainless steel rod in sleev

STABILITY C

***may hold** well, are commonly subject to movement.*

⇓ browse

Set in top of concrete mor

STABILITY D

*of **questionable or unknown** reliability.*

⇓ browse

Light structures

Stability is your best estimate of the mark's ability to maintain a long-term, constant position relative to other local features.
Consider the setting quality, soil type, threats from construction or traffic, etc.

Windesc will assign a stability code based on the “setting” selected.

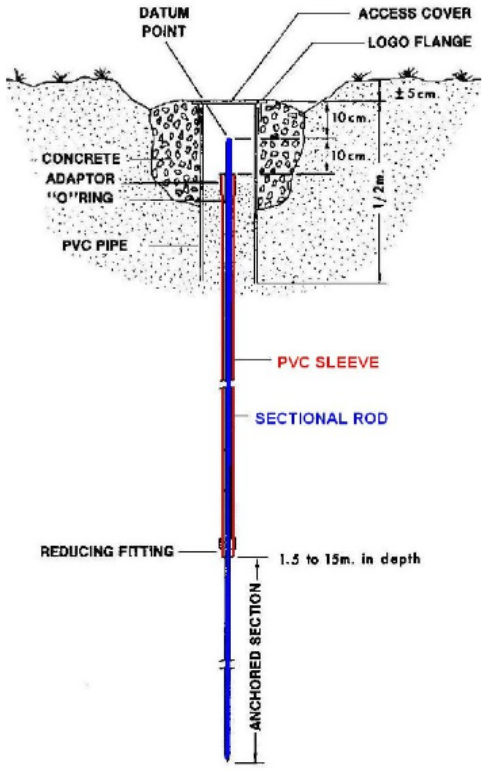
Rod and Sleeve Depths

Rod and Sleeve Depths

↓next ↑top [x]

Rod and sleeve depths refer to the lengths of material used to **construct a rod mark**, useful in judging stability and subsidence. Don't report depth values unless you set the mark &/or have specific knowledge of the lengths.

⚠ **User note:** Rods may flex during installation, the true "depth" below ground may be less than the recorded length.



Project Proposal

Information Needed

Leveling Ties to the NSRS

- First Order -Three mark tie required
- Second Order-Two mark tie required

Agreement of Observed Elevation Differences, Observed Backward and Forward During:				
Condition	1st Order, Class II	2nd Order, Class I	2nd Order, Class II	3rd Order
One-setup section	+/- 0.50 mm	+/- 1.00 mm	+/- 1.50 mm	+/- 2.00 mm
2-runnings of section < 0.10 km in length	+/- 1.26 mm	+/- 1.90 mm	+/- 2.53 mm	+/- 3.79 mm
2-runnings of section of one-way length D: $T*\sqrt{D}$ mm, T =	+/- 4.00	+/- 6.00	+/- 8.00	+/- 12.00

Table 1. Tolerances for Geodetic Leveling

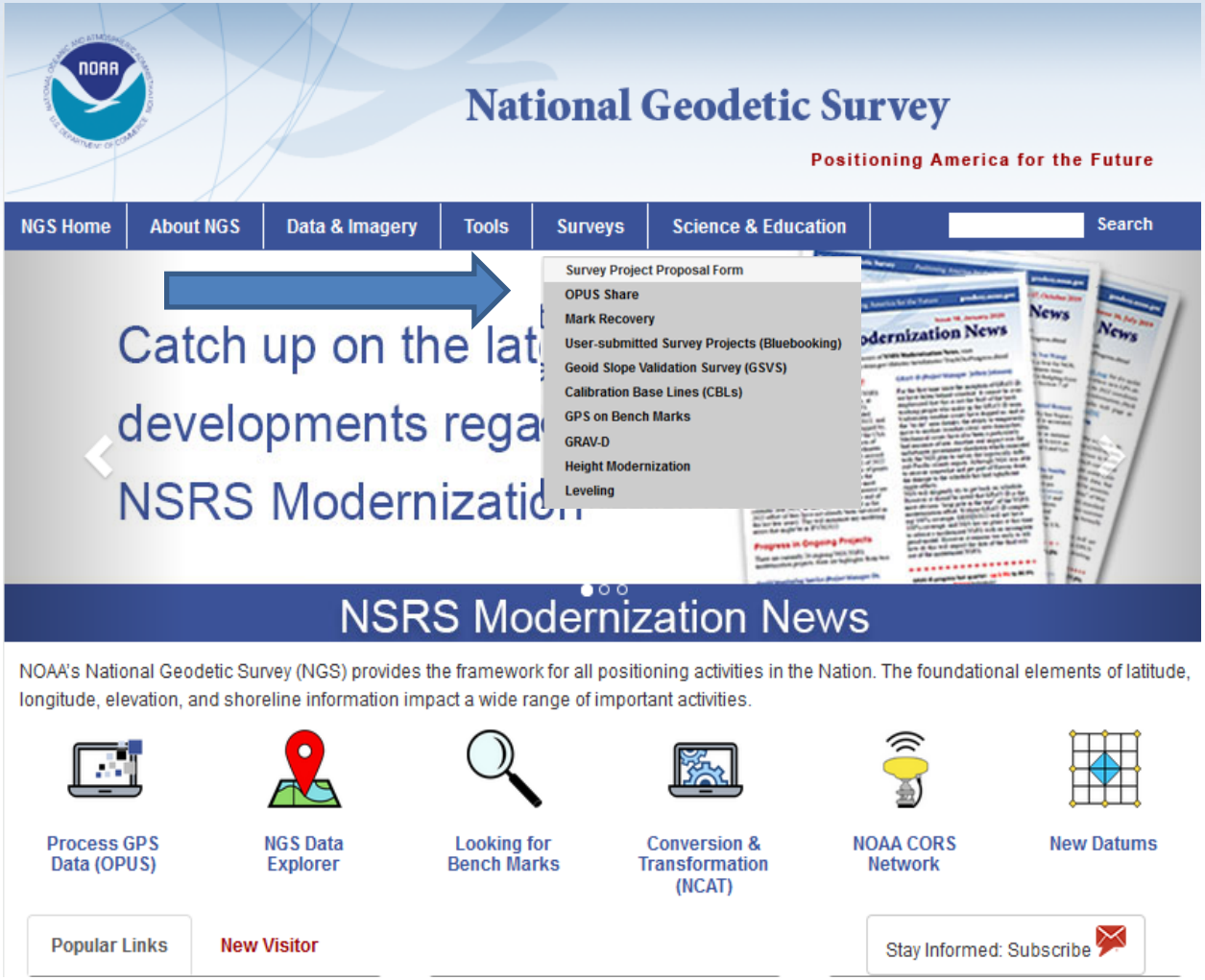
DSWORLD

- Note Tie Marks-Pid's & Take Pics of stamping
- Note approximate number of new marks
- Note type of marks to be set
- Note distance of total run
- Note route to be taken, start, finish, road names, State, County and Towns
- Take a screen shot of project area

Submit Project Proposal

- Project Title
- Order and Class of leveling
- Beginning and approximate end date
- Contact information
- Photos and Sketches

Project Proposal



L12345

Survey Proposal

We publish high-accuracy GPS and/or differential leveling observations which meet our criteria.
Describe your project below to receive helpful data files and advice about your project.

- Read NGS Bluebook
- NGS Bluebook Policy

(Fields marked with an asterisk (*) are required)

Survey Proposal
Bluebook Project
Adjust Guidelines
Leveling Project
NOS NGS-58
NOS NGS-59
FAA AC16
OPUS-Projects Get Started Info
Sample Project Report

PROJECT INFORMATION:

Project Title: * NGS Test Project

State: * AR -- ARKANSAS

Survey Type: Leveling

GPS: -- N/A --

Leveling: 1st Order Class II

Beginning on or about : * 10/01/2020

Ending on or about : * 10/31/2020

CONTACT INFORMATION:

Adjusted by Agency: NGS

Click here to register an agency. Problems with this link? Email ngs.helpdesk@noaa.gov to have your mailto client setup in your browser. Click here to search for agency code.

Email: * brian.doe@noaa.gov

Confirm Email: * brian.doe@noaa.gov

Phone: 123-456-7890

ADDITIONAL COMMENTS: (305 characters remaining)

Request a new line number and bench mark sequence numbers for this project.
NGS Advisor (Name) is assisting with all phases of this project.
See Leveling Survey plan for additional information.

PHOTOS AND SKETCHES:

(Acceptable File Type: gif, jpg, png, pdf, txt)

Choose Mark type, typical (<4mb) [Help]

Choose Network/Level line sketch: (<4mb) [Samples]

Choose Observation Schedule or Leveling Survey plan: (<4mb) [Sample1; Sample2; Sample3]

I'm not a robot reCAPTCHA Privacy - Terms

Submit Reset

Leveling Survey Plan

The level line is located west of the Mississippi River in Osceola, Arkansas and east of U.S. Interstate 55, Mississippi County Arkansas.
The line will follow the Mississippi River levee in Osceola and surface roads State Hwy 158 west from the levee to the Jct of County Road 22, turning south to the ARDOT field office. Line Proceeds South on CR 22 to junction with State Hwy 140, then east on Hwy 140 back to the levee and south to the tie marks.
Total length of the line one way is: 36.0 KM.

NSRS BM Line Tie Marks:
FE1867
FE1868
FE1869
FE2684
FE1870
FE1871
DE9692
FE1872
FE1947
FE1946
FE1945
FE1944
FE1943
An additional 25 new bench marks will be set along the line. They will consist of "A" order stability marks in bedrock, "B" order stability marks in bridge abutments and "C" order stability concrete monuments.

Level Line Example

L12345

- Line number should be used to name all files.
- l12345.hgz, l12345.abs, l12345.nmo, l12345.des,,etc.
- When you get your line number and sequence numbers, your project has been approved.
- If an Advisor or other NGS person is assisting you, don't hesitate to reach out.
- Your ready to go!

LOCUS

LOCUS
Leveling Online Computations User Service
National Geodetic Survey

NGS Home | About NGS | Data & Imagery | Tools | Surveys | Science & Education | Search

LOCUS menu

- Upload data file
- About LOCUS
- Description of Output Files
- Corrections
- Sample files
- Help
- Contact LOCUS

Upload data file

Browse PC for HGZ file: Browse... No file selected. Run LOCUS

Upload your vertical observation (*.hgz) file to LOCUS to receive a least-squares adjustment of orthometric heights with all available corrections applied. The file must have no errors after being checked by **Translev** (v4.16.07 or later). Translev is available from the **Download NGS PC Software** web page.

If the file contains PIDs of published bench marks, there is the option to select one or more PIDs to constrain from a dropdown list. Constraining a single PID produces a free adjustment if the leveling data in the *.hgz file form one or more loops. Marks occupied more than once introduce redundancy, and the resulting misclosures are distributed through the loop(s) as corrected and weighted observations to obtain the most likely unique heights on all bench marks.

Constraining multiple PIDs produces a partially or fully constrained adjustment. Tools for analyzing the statistical results of a constrained adjustment are not currently available in LOCUS, but such functionality will be developed for a future version.

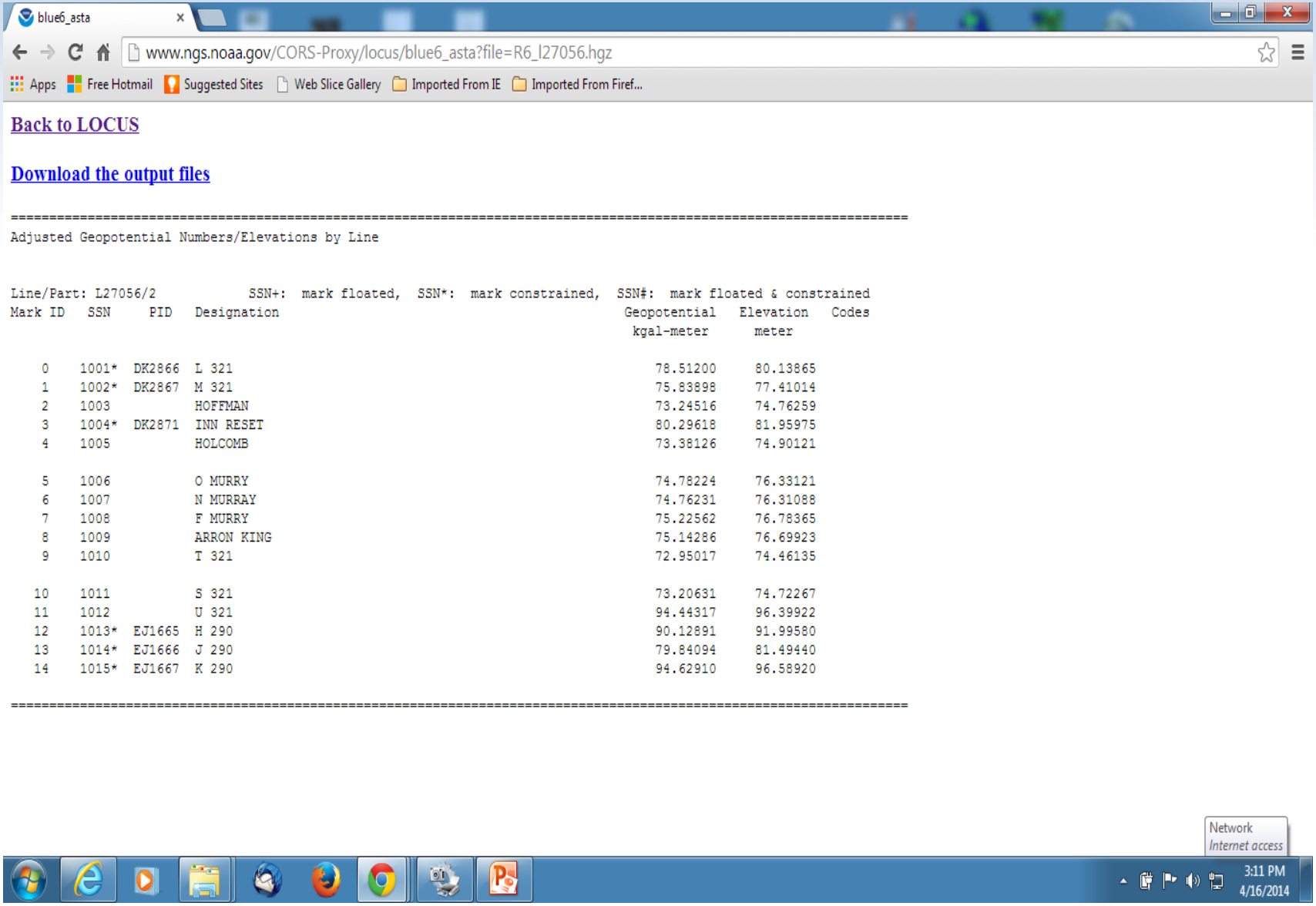
For a single (spur) level line with no loops, the heights are not actually adjusted (all residuals are zero), even when the line includes forward leveling and backward leveling. This occurs because in the reduction process for leveling data, the set of field observations between two bench marks are combined into a single "observation" for performing the least-squares adjustment. Thus a leveled spur line consists of only single (averaged) observations between adjacent bench marks. Because of this, such a spur has no redundancy, and in a free adjustment (constrained to a single mark), the heights will not be adjusted. However, the corrections applied to the leveled height differences can still be substantial, and the leveled height differences observed in the field typically do not equal the corrected height differences.

The default vertical datum used by LOCUS is the North American Vertical Datum of 1988 (NAVD 88), but others may be selected. The vertical datums available in LOCUS are listed below, as abbreviated in the LOCUS datum selection pull-down menu.

88	NAVD 88 (North American Vertical Datum of 1988)
29	NGVD 29 (National Geodetic Vertical Datum of 1929)
AS	ASVD 02 (American Samoa Vertical Datum of 2002)
G1	GUVD 63 (Guam Vertical Datum of 1963)
GU	GUVD 04 (Guam Vertical Datum of 2004)
LT	LMSL (Local Tidal Datum)
NM	NMVD 03 (Northern Marianas Vertical Datum of 2003)
PR	PRVD 02 (Puerto Rico Vertical Datum of 2002)
VI	VIVD 09 (Virgin Islands Vertical Datum of 2009

Website Owner: National Geodetic Survey / Last modified by **ngs.locus** May 19 2020

LOCUS Results



Adj_ID: 0000 Adj_Title: xxxx
HGZ: L27056/2 Obs: 2012/12/05 - 2013/01/02
Agency: ARHD Tol: 4.0 MM O/C: 1/2 State: AR

BIG DAM BRIDGE CROSSING NORTHWEST OF LITTLE ROCK ARKANSAS

COLLIMATION CHECK TAKEN DAILY AND STORED INTERNALLY IN DNA03
AND USED TO CORRECT EACH ROD READING
CREATED BY TRANSLEV VERSION 04.17.11 20130213
CHECKED BY TRANSLEV VERSION 04.17.11 20130213 - OKAY

* = Constrained Height

PID	Designation	--NAVD 88-- Adjusted Orthometric Height - StdDev meters - mm		Height - StdDev USft - USft		Approx Position Latitude ddmmss	Longitude dddmmss
*DK2866	L 321	80.139	0.0	262.92	0.000	N344728	W0922153
*DK2867	M 321	77.410	0.0	253.97	0.000	N344723	W0922126
DO7488	HOFFMAN	74.763	0.7	245.28	0.002	N344721	W0922115
*DK2871	INN RESET	81.960	0.0	268.90	0.000	N344714	W0922057
DO7489	HOLCOMB	74.901	1.7	245.74	0.005	N344742	W0922111
DO7490	O MURRAY	76.331	1.8	250.43	0.006	N344744	W0922124
DO7491	N MURRAY	76.311	1.9	250.36	0.006	N344744	W0922124
DO7492	F MURRAY	76.784	1.9	251.91	0.006	N344752	W0922122
DO7493	ARRON KING	76.699	2.0	251.64	0.006	N344749	W0922123
DO7494	T 321	74.461	2.2	244.30	0.007	N344727	W0921950
DO7495	S 321	74.723	2.1	245.15	0.007	N344729	W0921859
DO7496	U 321	96.399	1.6	316.27	0.005	N344749	W0921809
*EJ1665	H 290	91.996	0.0	301.82	0.000	N344819	W0921729
*EJ1666	J 290	81.494	0.0	267.37	0.000	N344857	W0921847
*EJ1667	K 290	96.589	0.0	316.89	0.000	N345006	W0921958

LOCUS	BM	ADJUSTED
0 80.13865	*DK2866 L 321	80.139
1 77.41014	*DK2867 M 321	77.410
2 74.76259	DO7488 HOFFMAN	74.763
3 81.95975	*DK2871 INN RESET	81.960
4 74.90121	DO7489 HOLCOMB	74.901
5 76.33121	DO7490 O MURRAY	76.331
6 76.31088	DO7491 N MURRAY	76.311
7 76.78365	DO7492 F MURRAY	76.784
8 76.69923	DO7493 ARRON KING	76.699
9 74.46135	DO7494 T 321	74.461
10 74.72267	DO7495 S 321	74.723
11 96.39922	DO7496 U 321	96.399
12 91.99580	*EJ1665 H 290	91.996
13 81.49440	*EJ1666 J 290	81.494
14 96.58920	*EJ1667 K 290	96.589

Project Planning

- ✓ Mark Setting
- ✓ Line ties to the NSRS
- ✓ Project Proposal

Demo!

DSWorld

- Overview
- County search
- Project ID search

Windesc

- Overview
- Des.file

Translev

- Overview
- HGZ.file
- Bluebook

https://geodesy.noaa.gov/PC_PROD/index.shtml

National Geodetic Survey

Positioning America for the Future

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Tools & Software

- PC Products
- Geodetic Tool Kit
- Web Services
- User-Contributed Software
- Other Products & Programs

Download Free Geodetic Software Developed by NGS

ADJUST & UTILITIES	DEFLEC99	HTDP	PCVOBS
CALIBRATE	DMEX97	INV/FWD3D	PROMPTER
CARIB97	DSWIN	LOOP	TOLADD
COMPGB	DSFILES	LVL_DH	Translev
COMPVECS	DSUPDATE	MEXICO97	USGG2003
CORPSCON	ENHANCEMENTS	MTEN4	USGG2009
CR8BB	G99SSS	NA2VBBK	VDatum
CR8SER	GEOID	NCAT	WinDesc
DCAR97	Gethvlst		

*** These software/tools have been superseded and replaced by the NGS Coordinate Conversion and Transformation Tool (NCAT) and have been retained for historical context. For comments or questions please contact the NGS Infocenter ***

GPPCGP	UTMS
NADCON	XYZWIN
NADCON 5	VERTCON
SPCS83	VERTCON3
USNG	

If you have questions, refer to the Software Download FAQ.
If you have download problems, contact the NGS Webmaster.

DSWORLD

User-Contributed Software is also available to perform related functions.

DSWORLD DEMO

Digital Leveling
WINDESC

Preparing Descriptions for Passive Marks

Purpose of Writing Descriptions

- To make geodetic data available to surveyors, engineers, cartographers and general public
- To facilitate finding the mark
- To correctly identify the mark
- To use the mark for new surveys
- To preserve the mark for future generations

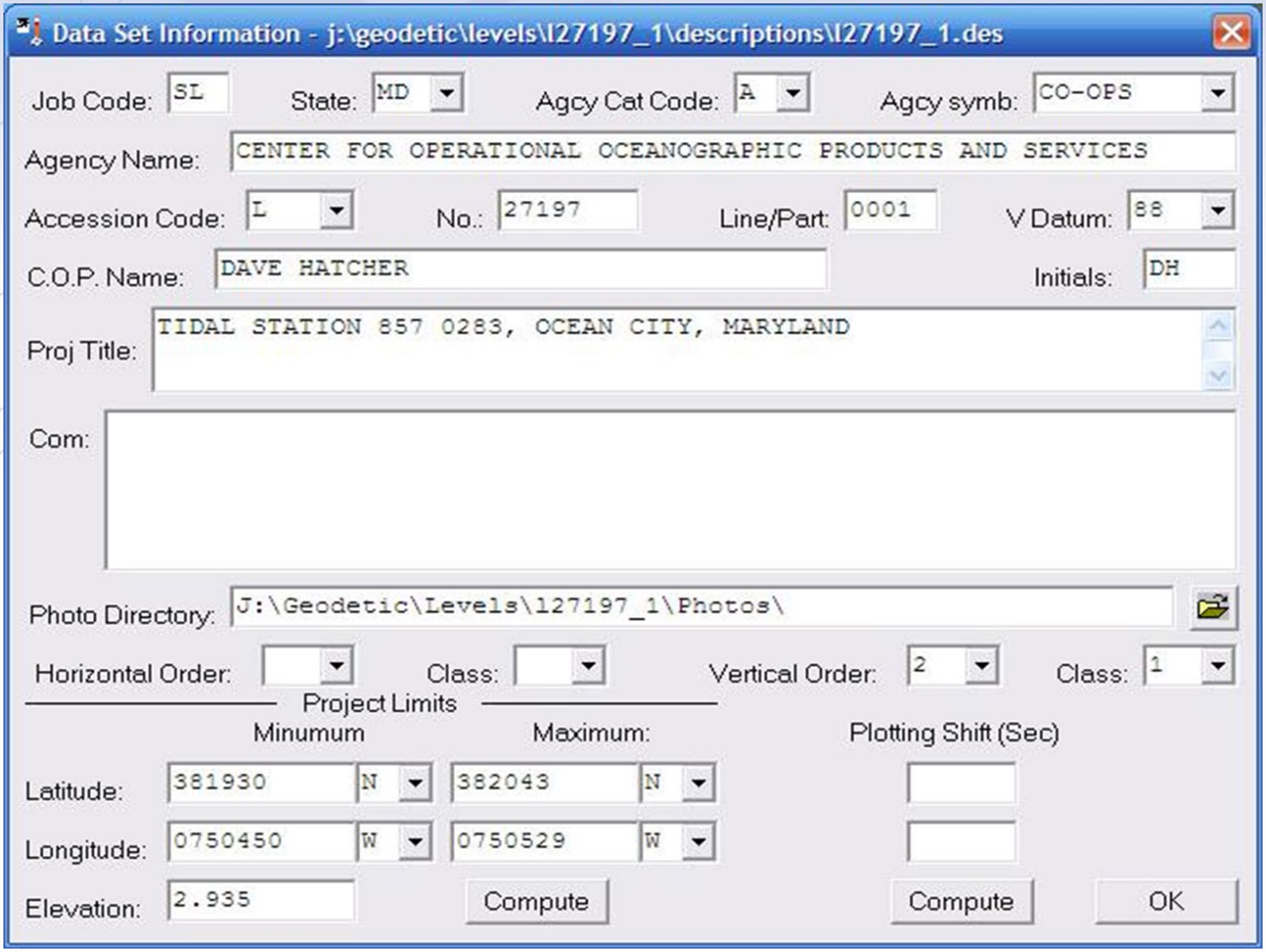
Processing Sequence

- Copy digital photos to photo directory
- Create a new .des file and enter project info
- Import description data from NGS
- Renumber points if needed
- Create or edit descriptions
- Spell check all descriptions
- Format all descriptions
- Run neighbor and discrep

History

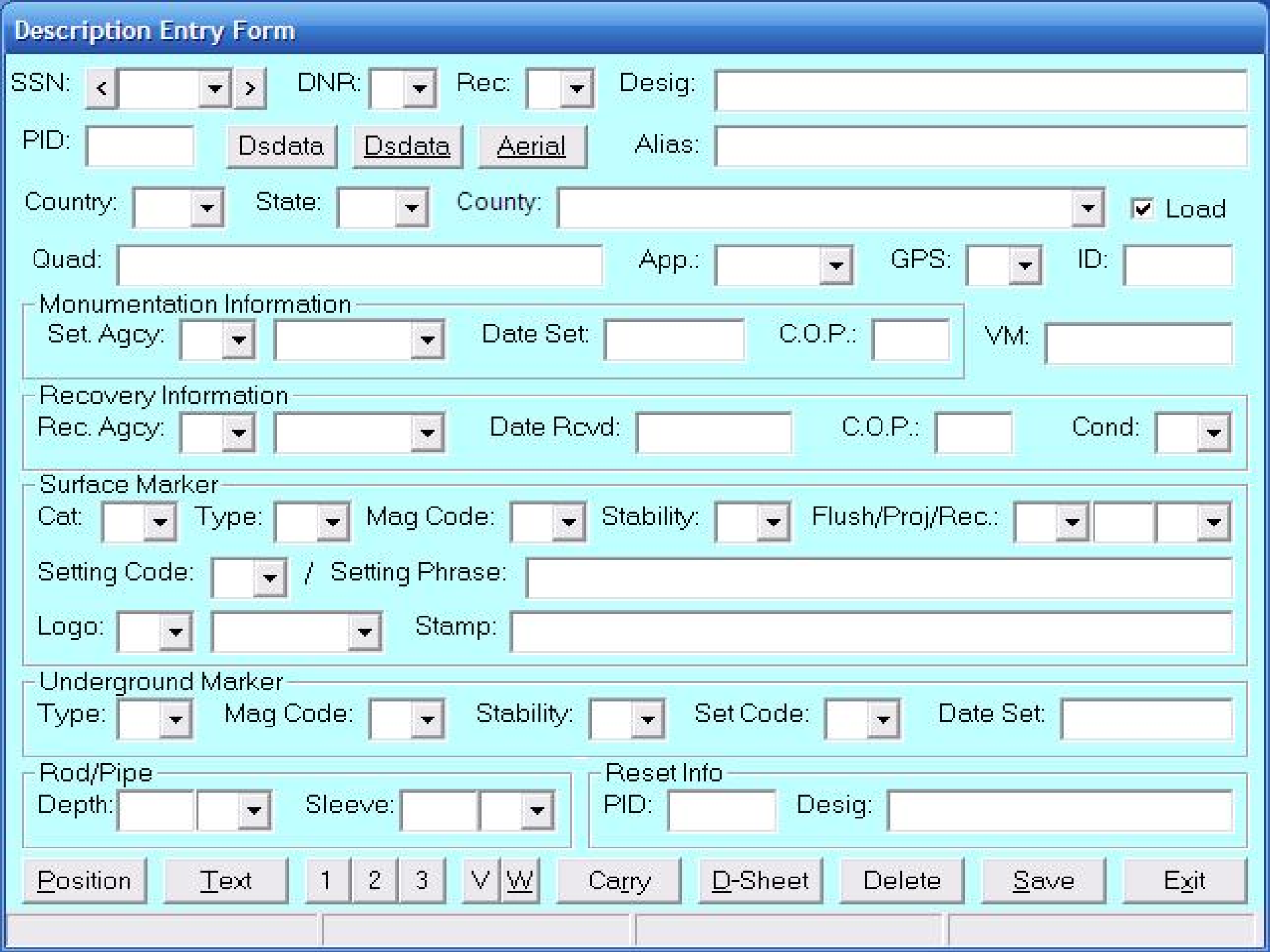
- Hand-written/typed-different formats for horizontal and vertical control points
- WDDProc-DOS-unified format-printed
- WinDesc-Windows-D-File format-web

Project Header Information



The Description Header

- Key fields: SSN, DNR code, Rec code
- Enter from left to right from the top down
- Some boxes populate subsequent boxes
- Contains most mark attributes
- Data must meet stringent NGS standards
- Data will be loaded and stored in separate tables/fields in the NGS IDB
- Used to generate the official NGS Datasheet


Description Entry Form
SSN:
DNR:
Rec:
Desig:
PID:
Dsdata
Dsdata
Aerial
Alias:
Country:
State:
County:
Load
Quad:
App.:
GPS:
ID:
Monumentation Information
Set. Agcy:
Date Set:
C.O.P.:
VM:
Recovery Information
Rec. Agcy:
Date Rcvd:
C.O.P.:
Cond:
Surface Marker
Cat:
Type:
Mag Code:
Stability:
Flush/Proj/Rec.:
Setting Code:
/ Setting Phrase:
Logo:
Stamp:
Underground Marker
Type:
Mag Code:
Stability:
Set Code:
Date Set:
Rod/Pipe
Depth:
Sleeve:
Reset Info
PID:
Desig:
Position
Text
1
2
3
V
W
Carry
D-Sheet
Delete
Save
Exit

Descriptive Text

- Must be easily readable
- Use 3-paragraph format-location, to reach, reference distances/mark details
- Go from the most general to the most specific
- Use proper grammar
- Check spelling
- Avoid personal phone numbers
- May contain special notes

Descriptive text for SCHWANINGER

Edit Insert Template Options Close Help

Historical Descriptive Text | **New Descriptive Text**

THE MARK IS LOCATED ABOUT 2.5 MILES (4.0 KM) SOUTH OF EASTON AND 5.7 MILES (9.2 KM) NORTH OF TRAPPE. OWNERSHIP--MARYLAND STATE HIGHWAY ADMINSTRATION.

TO REACH THE MARK FROM THE INTERSECTION OF MARYLAND STATE HIGHWAY 331 (DOVER ROAD) AND U.S.HIGHWAY 50 IN EASTON, PROCEED SOUTH ALONG U.S.HIGHWAY 50 FOR 2.5 MILES (4.0 KM) TO THE JUNCTION OF MARYLAND STATE HIGHWAY 322 AND THE MARK ON THE RIGHT.

IT IS 21.0 FEET (6.4 M) EAST OF THE CENTERLINE OF MARYLAND STATE HIGHWAY 322, 140.2 FEET (42.7 M) WEST-NORTHWEST OF THE CENTER LINE OF THE EASTBOUND LANES OF U.S.HIGHWAY 50, 94.0 FEET (28.7 M) SOUTH OF THE EAST END OF A PIPE RUNNING UNDER MARYLAND STATE HIGHWAY 322, 128.3 FEET (39.1 M) NORTH-NORTHWEST OF A 12 INCH (30 CM) TREE, SET IN THE TOP OF A 10-INCH (25 CM) ROUND CONCRETE POST FLUSH WITH THE GROUND AND LEVEL WITH MARYLAND STATE HIGHWAY 322.

Clear | Format | Spelling | Close

Caps | Num Lock | Char: 851 | Free: 4049

Descriptive Text - Do

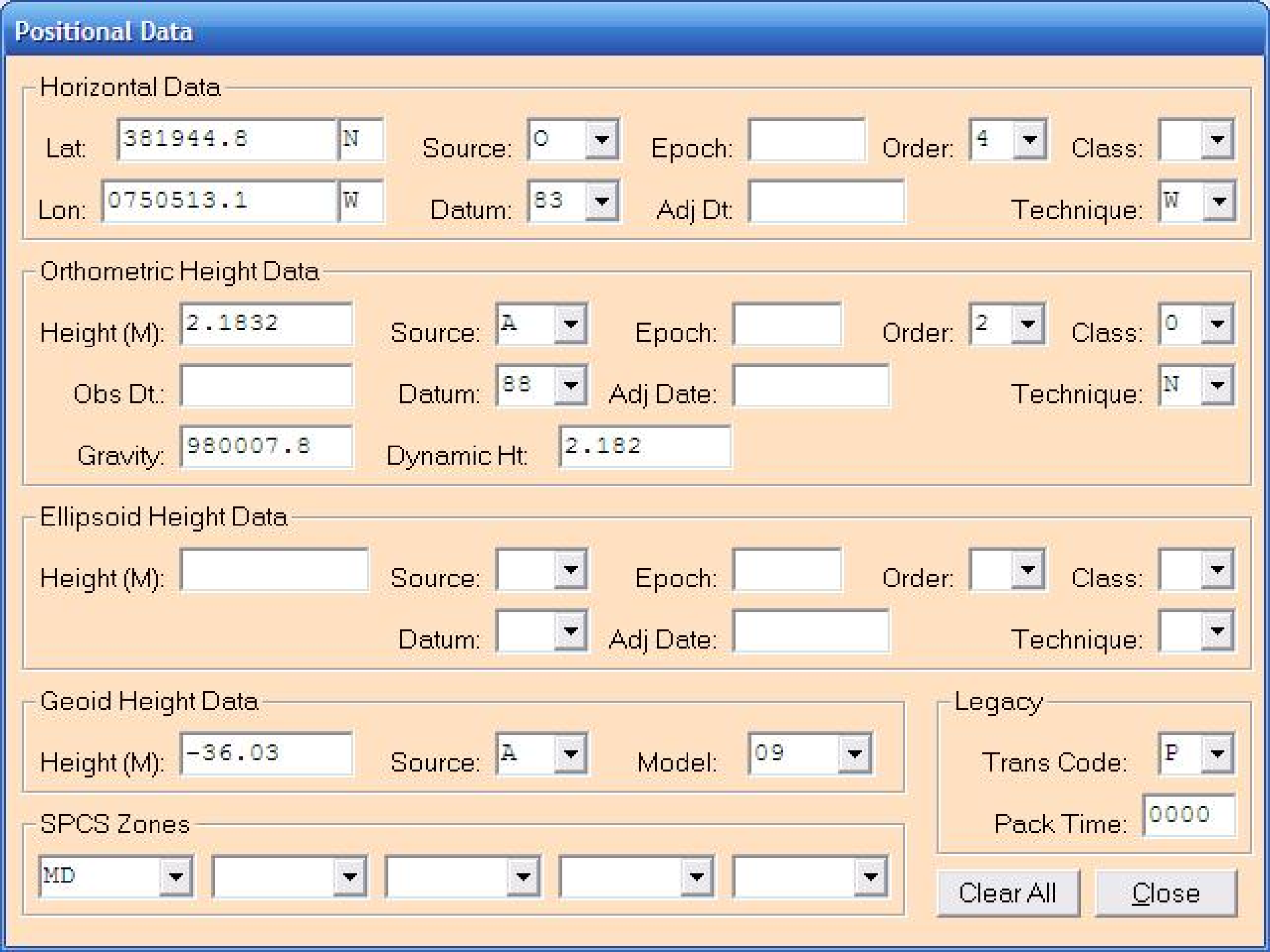
- Get at least 4 reference distances
- Format all descriptions
- Spell check all descriptions
- Use Windesc tools to help create descriptive text

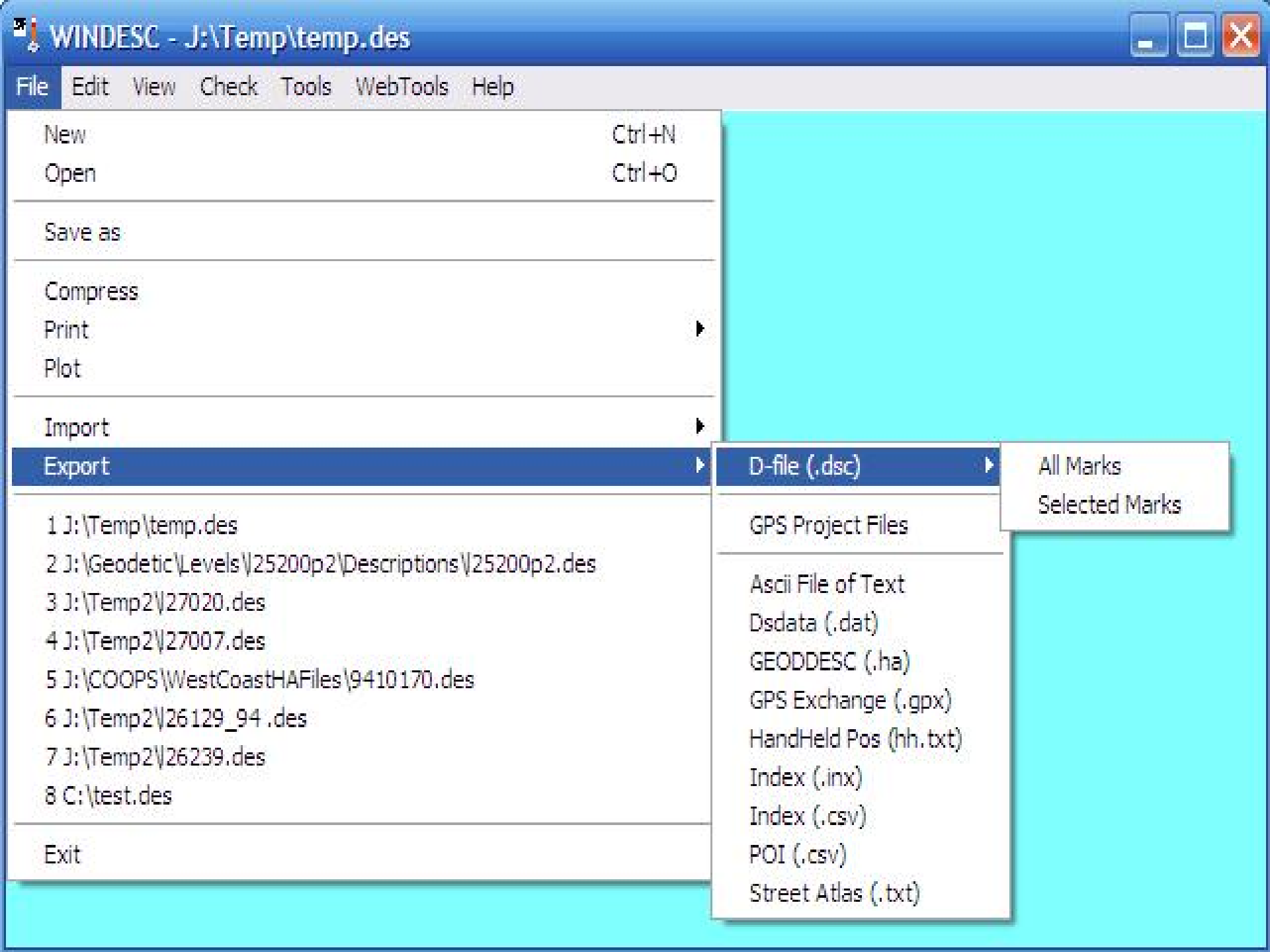
Descriptive Text – Don't

- Don't use slang
- Don't omit articles (a, an, the, etc.)
- Don't duplicate text
- Don't use the term 'standard disk'
- Don't put positions in descriptive text

Positional Information

- Latitude and Longitude to 0.1 seconds for bench marks via hand-held GPS measurement
- Include horizontal datum
- Include source, order and technique
- May include other information for use with other geodetic software such as Translev
- Used for geodetic computations and corrections
- Used to plot mark in Google Earth and other plotting software


Positional Data
Horizontal Data
Lat: 381944.8 N
Source: O
Epoch:
Order: 4
Class:
Lon: 0750513.1 W
Datum: 83
Adj Dt:
Technique: W
Orthometric Height Data
Height (M): 2.1832
Source: A
Epoch:
Order: 2
Class: 0
Obs Dt.:
Datum: 88
Adj Date:
Technique: N
Gravity: 980007.8
Dynamic Ht: 2.182
Ellipsoid Height Data
Height (M):
Source:
Epoch:
Order:
Class:
Datum:
Adj Date:
Technique:
Geoid Height Data
Height (M): -36.03
Source: A
Model: 09
Legacy
Trans Code: P
Pack Time: 0000
SPCS Zones
MD
Clear All
Close


WINDESC - J:\Temp\temp.des
File
Edit
View
Check
Tools
WebTools
Help
New Ctrl+N
Open Ctrl+O
Save as
Compress
Print
Plot
Import
Export
1 J:\Temp\temp.des
2 J:\Geodetic\Levels\25200p2\Descriptions\25200p2.des
3 J:\Temp2\27020.des
4 J:\Temp2\27007.des
5 J:\COOPS\WestCoastHAFiles\9410170.des
6 J:\Temp2\26129_94 .des
7 J:\Temp2\26239.des
8 C:\test.des
Exit
D-file (.dsc)
GPS Project Files
Ascii File of Text
Dsdata (.dat)
GEODDESC (.ha)
GPS Exchange (.gpx)
HandHeld Pos (hh.txt)
Index (.inx)
Index (.csv)
POI (.csv)
Street Atlas (.txt)
All Marks
Selected Marks


WINDESC - C:\Test.des
File
Edit
View
Check
Tools
WebTools
Help
D-File (.dsc File)
HH Discrepancies Via www
Recovery Dates For All Marks

Wrap -up

Run through with Windesc

TRANSLEV

Digital Leveling

Translev

Bluebooking

Purpose

- To insure leveling observations meet FGCS specifications and procedures
- To reduce raw leveling data into standard .lvl format and finally to .hgz format for submission to NGS

Translev Program Overview

- Program installation and configuration
- File naming conventions
- Processing leveling data
- Tools
- Web tools
- Project submission

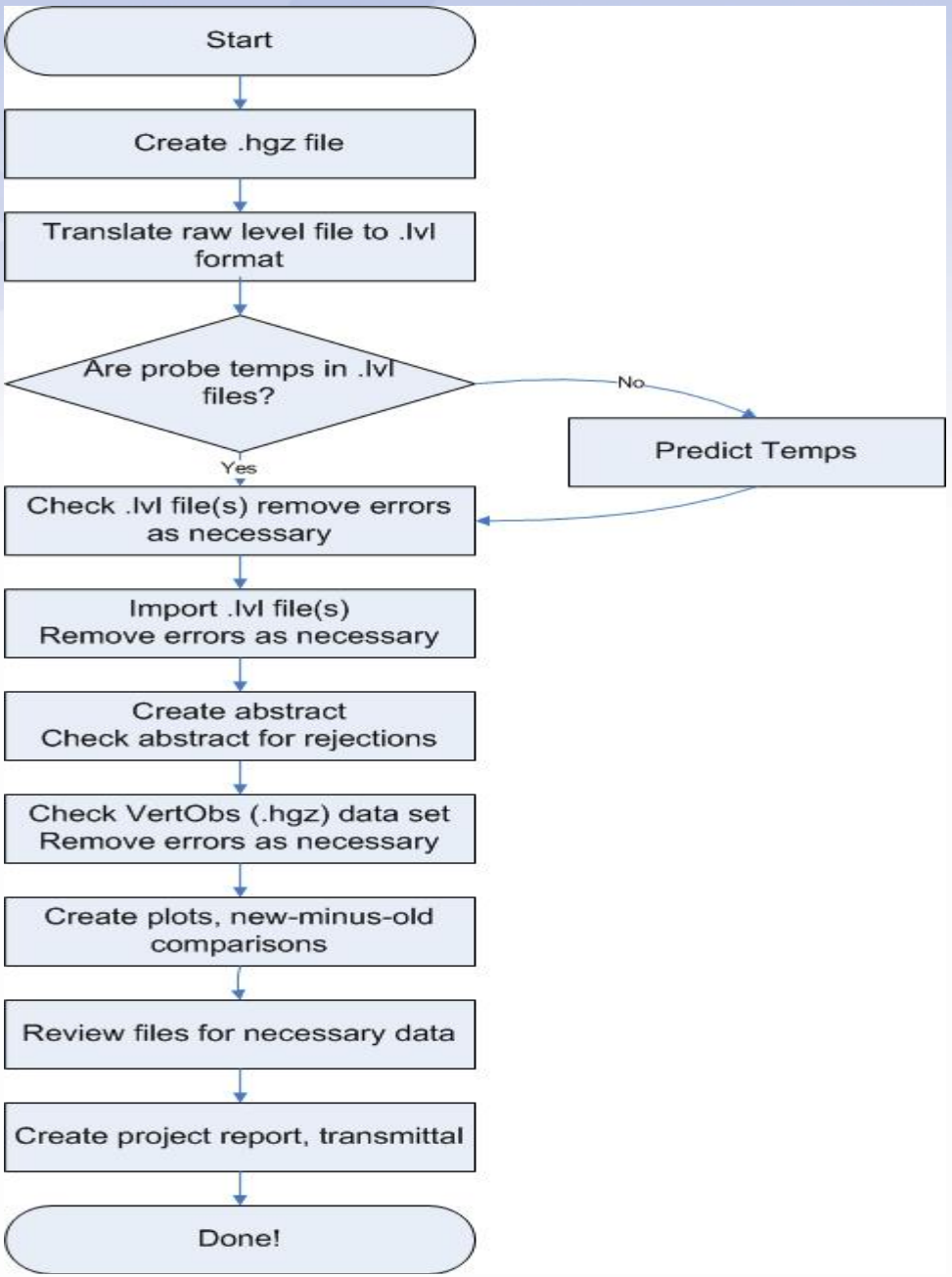
Program Installation

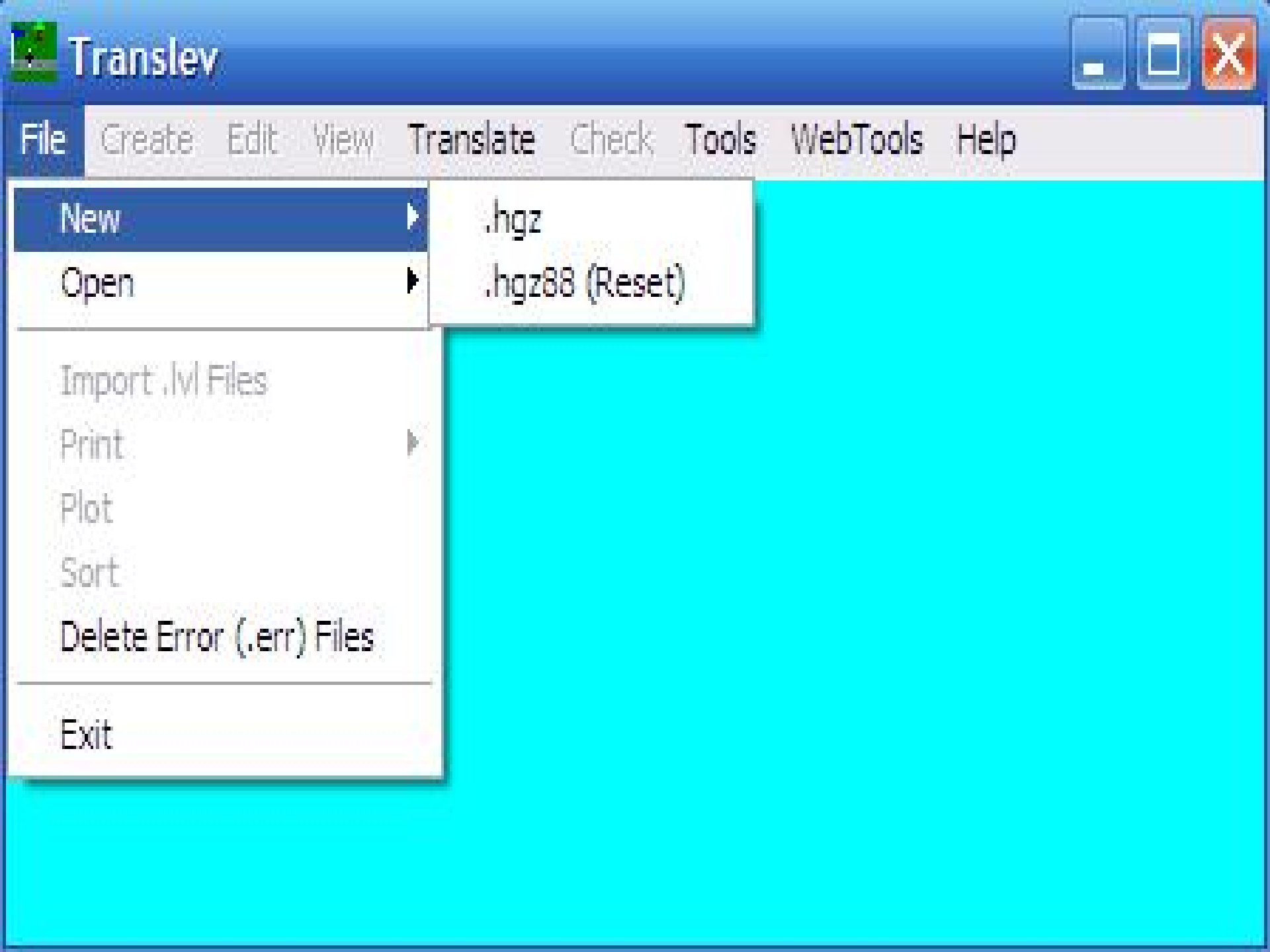
- WindowsNT, Windows2000, WindowsXP Professional – Must have administrative privileges
- Version numbering-current 5.03.02
- Remove old version before installing the new
- After installing, change permissions to read/write for all users

File Naming Conventions

- Blue Book (.hgz)
- Raw (.lev, .raw, .dat, .gsi)
- Error Files (.err)
- Abstracts (.abs)
- Report (.rpt)
- Lvl/Bok (.lvl, .bok)
- New-minus-old (.nmo)
- Statistics (.stt)

FLOW CHART


Start
Create .hgz file
Translate raw level file to .lvl format
Are probe temps in .lvl files?
No
Predict Temps
Yes
Check .lvl file(s) remove errors as necessary
Import .lvl file(s)
Remove errors as necessary
Create abstract
Check abstract for rejections
Check VertObs (.hgz) data set
Remove errors as necessary
Create plots, new-minus-old comparisons
Review files for necessary data
Create project report, transmittal
Done!


Translev
File
Create
Edit
View
Translate
Check
Tools
WebTools
Help
New
Open
Import .lvl Files
Print
Plot
Sort
Delete Error (.err) Files
Exit
.hgz
.hgz88 (Reset)

J:\Geodetic\Levels\L27001-BWI\Obs\L27001.hgz

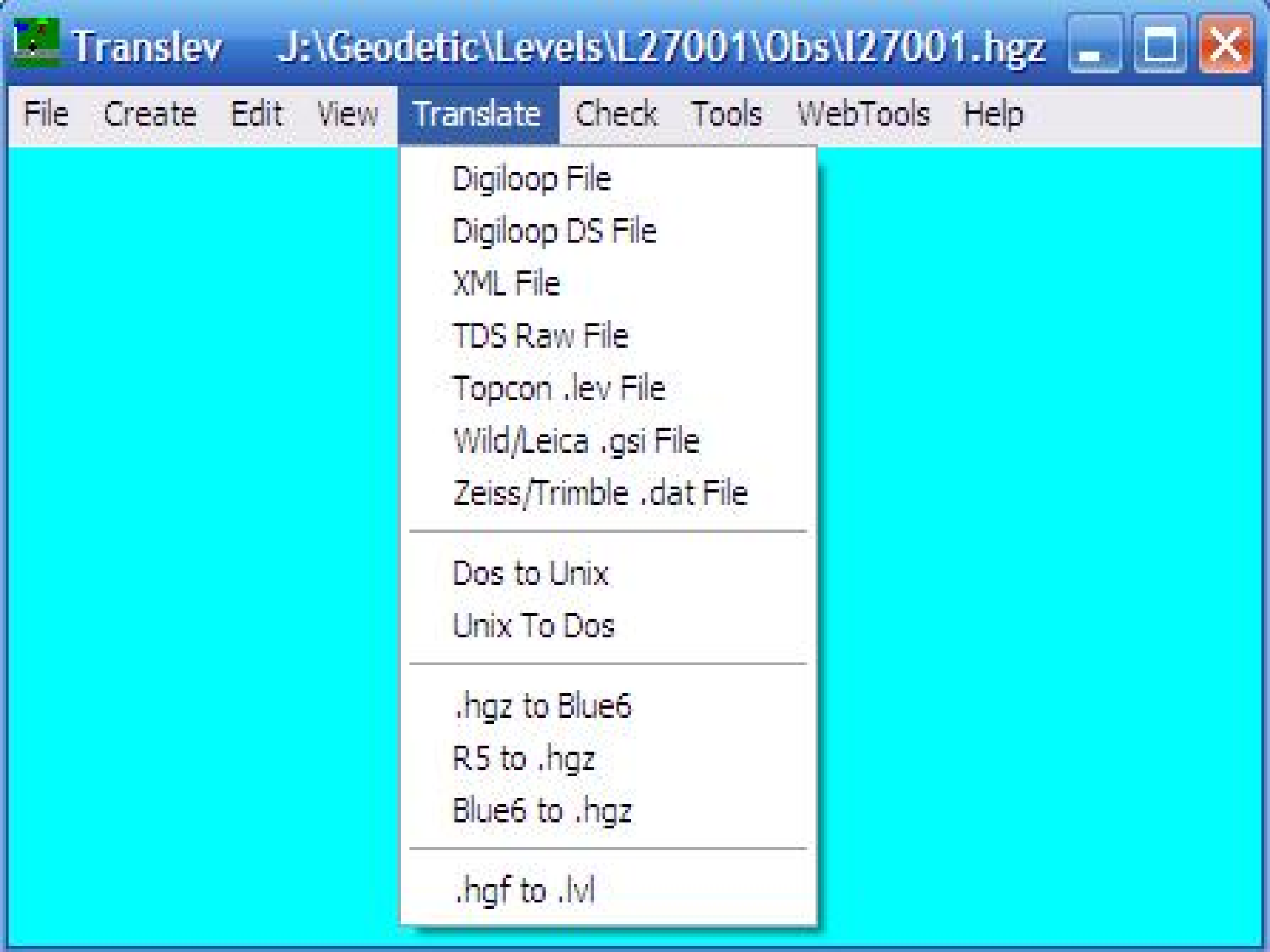
File Edit

```
000010*BW*VERTOBS JARICEJ A RICE INC                                    88    20080108
000020*10*L27001  1   R20071108200712l9MM4.0 12MD    MRAJARICE                  2B1
000030*11*BALTIMORE WASHINGTON INTERNATIONAL AIRPORT BENCH MARK DENSIFICATION
000040*15*COLLIMATION CHECK TAKEN DAILY AND STORED INTERNALLY IN DL-101C
000050*15*AND USED TO CORRECT EACH ROD READING
000060*15*CREATED BY TRANSLEV VERSION 4.10
000070*30*1026U 121                      KM0.000   MT17.93790  JV3774390929076371 5
000080*30*1001T 121                      KM2.681   MT23.35099  JV0706390956076383 3
000090*30*1004FRIEND                    KM4.204   MT29.88962  JV6656390942076392 7
000100*30*10322036                      KM5.949   MT48.23768        3909450764025
000110*30*1029MON 101                   KM7.380   MT40.54275        3910180764034
000120*30*1025BWI H                     KM8.610   MT40.46290        3910220764124
000130*30*1027JA 1                      KM3.903   MT26.36725        3910220763850
000140*30*1005BWI F                     KM5.717   MT47.70088  AA9297391018076395 6
000150*30*1028JA 2                      KM5.110   MT40.03975        3910570763907
000160*30*1002Q 121                     KM6.502   MT36.25233  JV0709391140076392 0
000170*30*1006GPS LR 3                  KM7.247   MT42.71857  JV6455391131076394 2
000180*30*1007BWI D                     KM8.049   MT47.06859  AB6219391111076395 4
000190*30*1008562                       KM8.348   MT46.91988        3911030764001
000200*30*1009561                       KM8.894   MT42.85498        3910580763944
000210*30*1010560                       KM9.150   MT41.77237        3910520763938
000220*30*1011559                       KM9.341   MT41.78751        3910470763941
000230*30*1012558                       KM9.445   MT41.91137        3910440763943
000240*30*1023BWI G                     KM9.246   MT50.71913        3911070764029
000250*40*0711082|44UG1432   39816294   39816295   150130030      .016R0925
000260*41*07110810021006R09441122C6.6612  01 14            KM0.745MT6.46696   DMR
000270*43*0711081002100609440.000          C9.2  9.5        P                0.807
000280*40*071114244UG1151   39816294   39816295   150130030      .037R0930
000290*41*0711141002102 8R10001200C8.888.8810 28            KM1.392MT3.78796   DMR
000300*43*0711141002102810000.000          C8.8  8.9        P                0.000
000310*41*0711141028100 2R13301330C10.515.510 28            KM1.408MT-3.78688  DMR
000320*43*0711141028100213300.000          C13.0 13.1       P                0.000
000330*40*071119244UG1153   39816294   39816295   150130030      .007 R1217
000340*41*0711191009101 0R12431305C6.276.7210  4            KM0.256MT-1.08244  DMR
```

Line 25 | Col 18 | Num Lock | | Insert

Translating Raw Files

- Raw digital level formats - .gsi, .dat, .lev
- Other formats-TDS, Digiloop, xml
- Must have description file containing names, PIDs, elevations and geographic positions
- Entering defaults
- Rod/Instrument supporting files


Translev J:\Geodetic\Levels\L27001\Obs\l27001.hgz
File Create Edit View Translate Check Tools WebTools Help
Digiloop File
Digiloop DS File
XML File
TDS Raw File
Topcon .lev File
Wild/Leica .gsi File
Zeiss/Trimble .dat File
Dos to Unix
Unix To Dos
.hgz to Blue6
R5 to .hgz
Blue6 to .hgz
.hgf to .lvl

The .lvl File

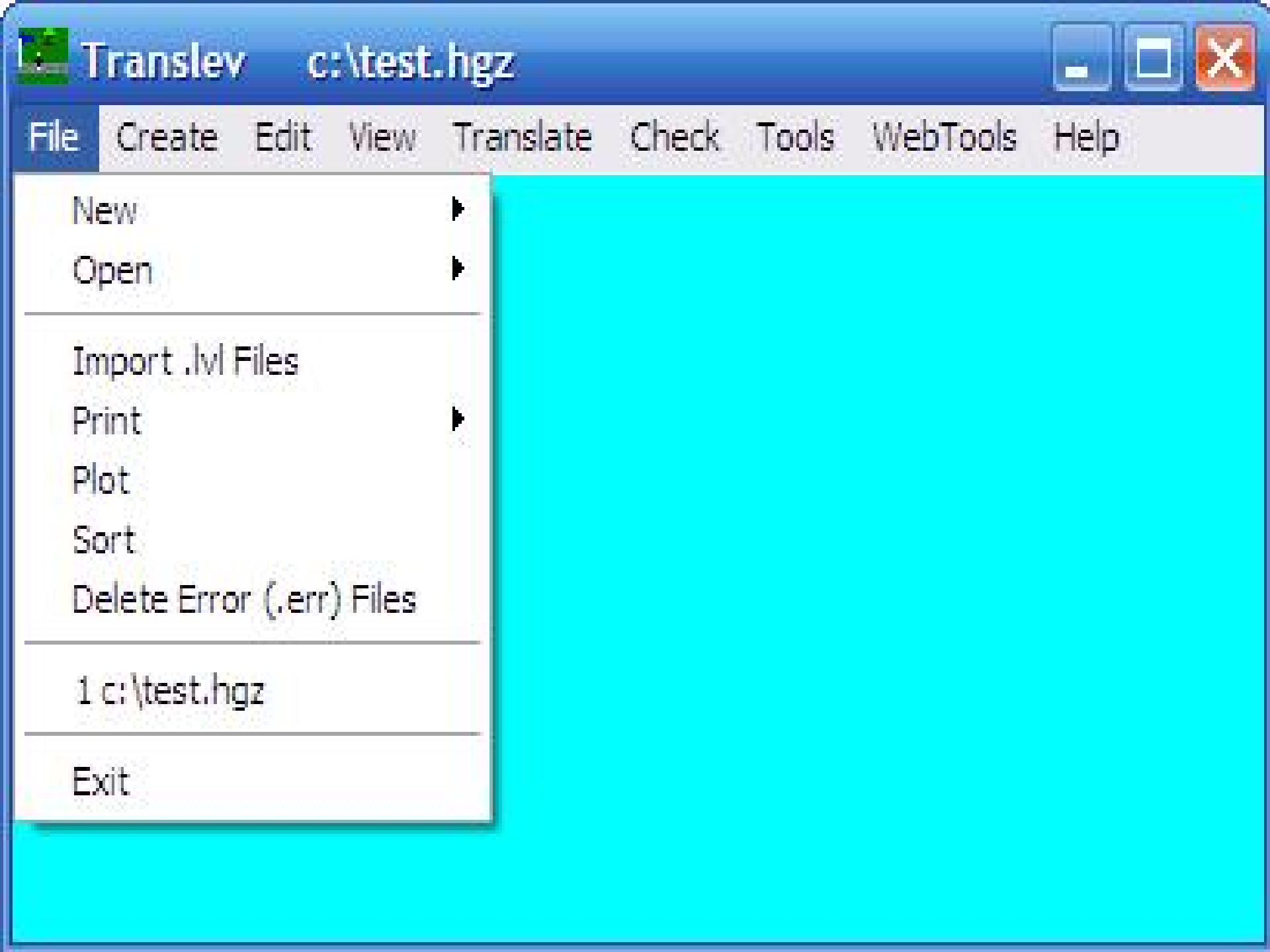
- Editing the .lvl file
- Checking the .lvl file
- Fixing errors in the .lvl file
- Importing the .lvl file to create the *40* series records in the .hgz file

F:\Geodetic\Levels\l26744\L2674419.lvl

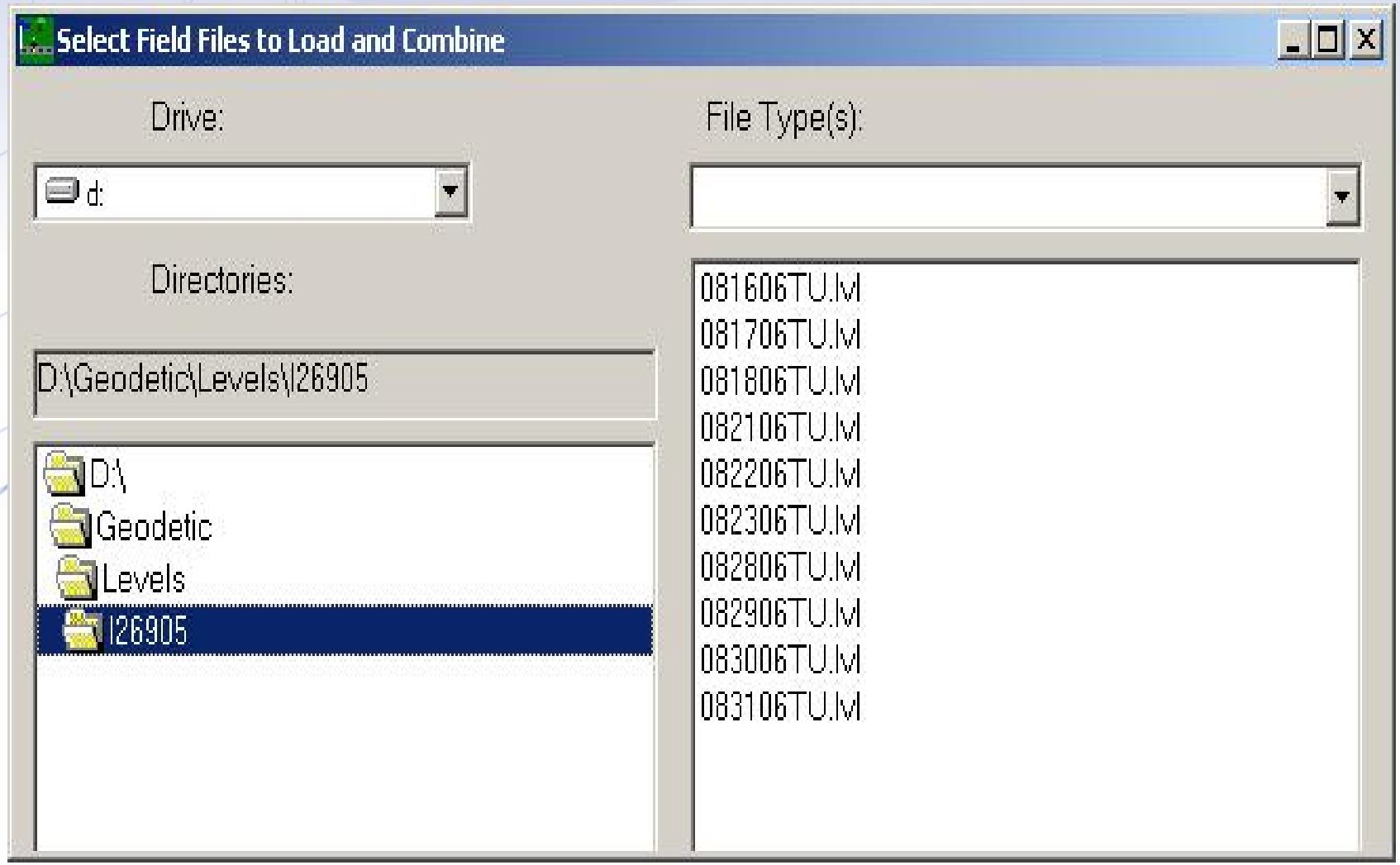
File Insert Delete Edit

```
I 246 103252   100 F 397 12975    000.00 397 12976    000.00 CM 1.60 C R 1 2
C 246 103252   0927 050819  0.047
B DBC DBC    8 A 197                        30.6 1 1 0927 050819 1  1.6 0.3 1.3 O
S  1 1.32111  2 0.00 14.13 0.77597  2 0.00 14.05  31.0  30.6
S  2 1.99745  2 0.00 29.91 1.57096  2 0.00 29.82  30.9  30.2
S  3 0.66877  2 0.00 19.80 2.05142  2 0.00 20.24  31.2  30.9
S  4 1.14563  2 0.00 54.38 1.72425  2 0.00 53.02  30.8  30.1
S  5 1.17755  2 0.00 56.39 1.23374  3 0.00 53.87  30.0  29.8
S  6 1.59182  3 0.00 54.55 1.27429  2 0.00 54.85  32.4  31.6
S  7 1.84539  2 0.00 51.31 1.13796  2 0.00 52.17  32.4  31.6
S  8 1.61006  2 0.00 15.61 0.80282  2 0.00 16.48  32.4  31.6
S  9 2.40639  2 0.00 15.34 0.52047  2 0.00 14.36  32.7  31.5
S 10 2.16700  2 0.00 10.96 0.52200  2 0.00 10.86  32.0  31.2
S 11 2.24860  2 0.00  9.36 0.66166  2 0.00  8.79  32.4  31.6
S 12 2.26211  2 0.00  9.31 0.53972  2 0.00  8.48  32.2  31.6
S 13 2.30139  2 0.00  8.30 0.49637  2 0.00  9.32  33.0  31.8                    16
S 14 1.94922  2 0.00 11.18 1.85400  2 0.00 13.19  33.6  32.6
E    9 RENA 2                     32.6 0 2 1011  14   1.0  720.0    9.52686  31.9  31.2
B DBC DBC    9 RENA 2                       31.8 0 2 1014 050819 1  1.6 0.3 1.3 O
S  1 2.10742  2 0.00 33.98 1.45811  2 0.00 34.94  32.3  31.8
S  2 1.36621  2 0.00 52.08 1.38630  2 0.00 51.84  31.2  30.7
S  3 1.60108  2 0.00 52.12 1.32500  2 0.00 52.21  32.6  32.0
S  4 1.39914  2 0.00 53.13 1.14017  2 0.00 52.94  32.2  31.6
S  5 1.55089  2 0.00 52.62 1.44655  2 0.00 50.65  32.4  31.8
S  6 1.50269  2 0.00 58.84 2.03648  3 0.00 59.62  32.2  31.4
E   10 F 346                     31.4 0 2 1037   6   0.6  605.0    0.73482  32.2  31.5
```

Line 14 | Col 30 | Num Lock | | Insert


Translev c:\test.hgz
File Create Edit View Translate Check Tools WebTools Help
New
Open
Import .lvl Files
Print
Plot
Sort
Delete Error (.err) Files
1 c:\test.hgz
Exit

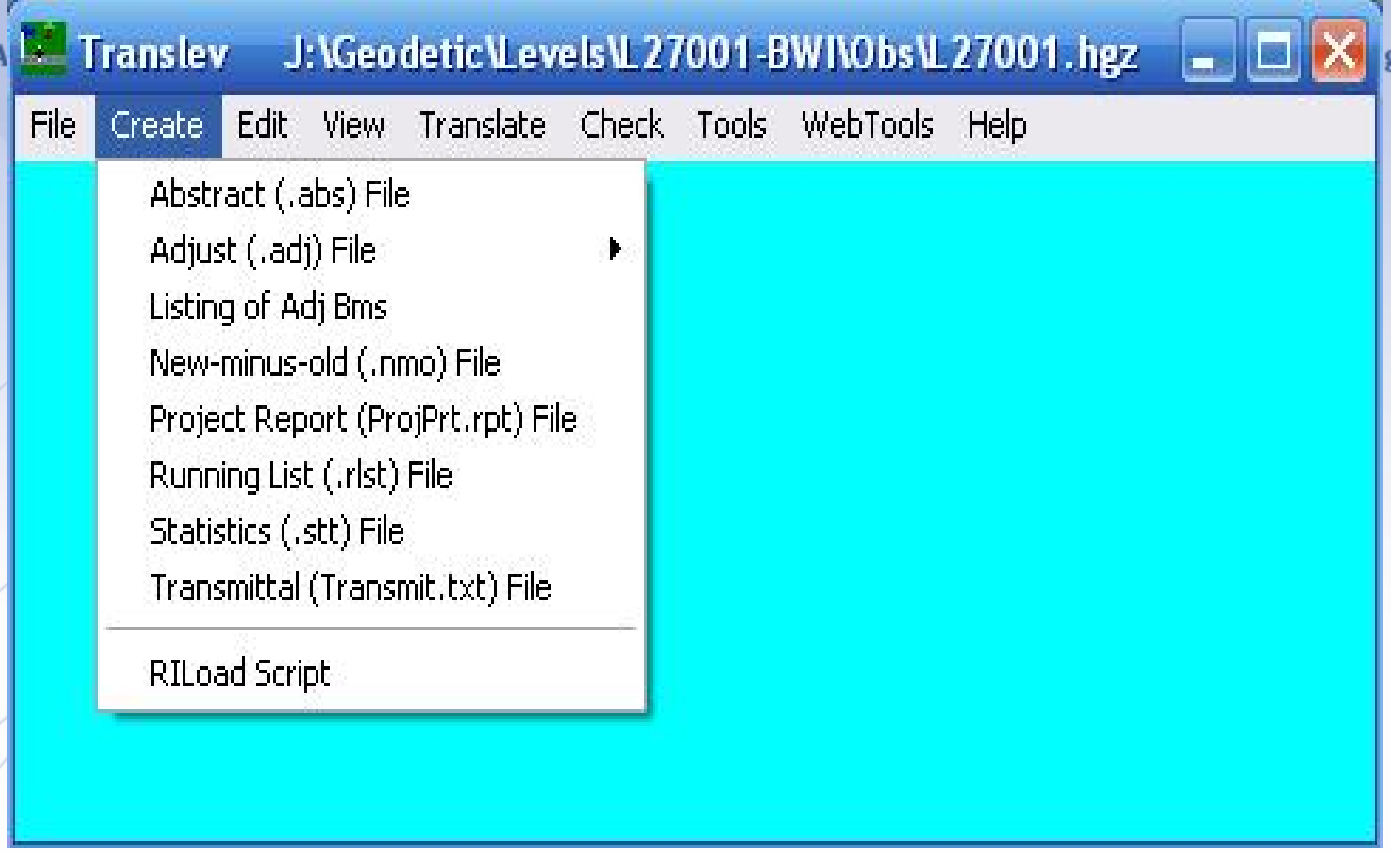
Importing .lvl Files

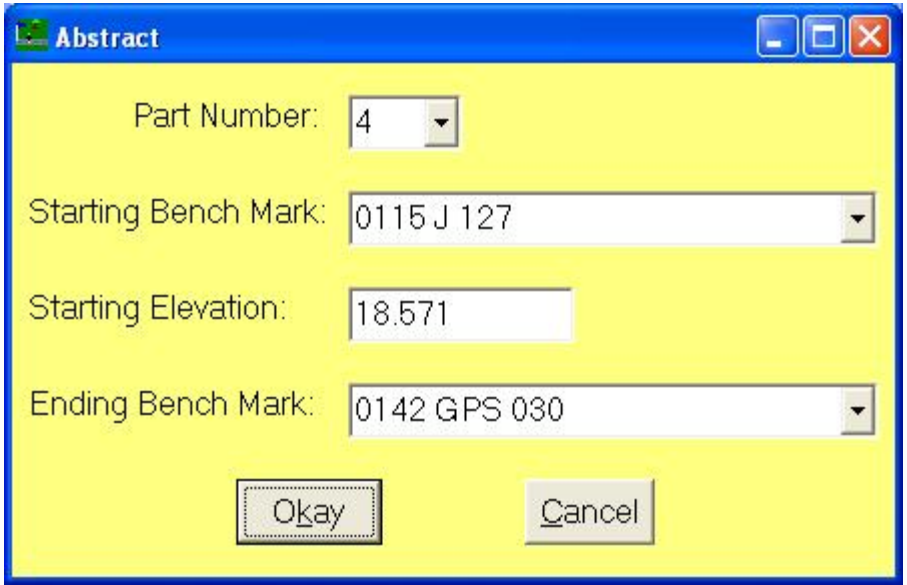


```
000010*G5*VERTOBS NGS   NATIONAL GEODETIC SURVEY                    88    20090209
000020*10*L27236  1    20081118 20081118MM4.0 12VA    KLFNGS                    2B1
000030*11*L
000040*15*COLLIMATION CHECK TAKEN DAILY AND STORED INTERNALLY IN DNA03
000050*15*AND USED TO CORRECT EACH ROD READING
000060*15*CREATED BY TRANSLEV VERSION 4.13
000070*30*10010BSERVATORY                KM0.000   MT68.20050  HV784338120707722222
000080*30*10027550002                    KM0.062   MT68.20690  HV783938120707722225
000090*30*1003FLAGPOLE                   KM0.161   MT67.54222  HV818138120607722229
000100*30*1004GPS 1                      KM0.423   MT68.81579        3812030772239
000110*30*1005INTERSECTION               KM0.716   MT68.00658  HV311538120107722250
000120*30*1006INTERSECTION RM 1          KM0.736   MT68.29726  HV311638120207722249
000130*40*08111824333427 1   39627226   39627227   155130030     0.003R1350
000140*41*0811181001100 2R1350135 8C0.5 0.5 02  2          KM0.062MT0.00640   SEB
000150*43*0811181001100 213500.000          C0.6  0.5       0                 0.012
000160*41*0811181002100 3R1405141 2C0.5 0.4 01  2          KM0.099MT-0.66468  SEB
000170*43*0811181002100 314050.000          C0.5  0.5       0                 2.697
000180*41*0811181003100 4R1416143 2C0.4 0.6 01  4          KM0.262MT1.27406   SEB
000190*43*0811181003100 414160.000          C0.5  0.5       0               138.610
000200*41*0811181004100 5R1436144 7C0.6 0.5 01  4          KM0.293MT-0.80952  SEB
000210*43*0811181004100 514360.000          C0.5  0.5       0               -46.842
000220*41*0811181005100 6R1452145 3C0.5 0.5 01  1          KM0.020MT0.29067   SEB
000230*43*0811181005100 614520.000          C0.5  0.5       0                 0.938
000240*41*0811181006100 5R1455145 9C0.5 0.5 01  1          KM0.020MT-0.29069  SEB
000250*43*0811181006100 514550.000          C0.4  0.5       0                -0.964
000260*41*0811181005100 4R1500151 6C0.5 0.5 01  4          KM0.294MT0.80890   SEB
000270*43*0811181005100 415000.000          C0.5  0.5       0                66.478
000280*41*0811181004100 3R1518153 0C0.5 0.6 01  4          KM0.263MT-1.27309  SEB
000290*43*0811181004100 315180.000          C0.6  0.6       0               -39.337
000300*G5*
```

Creating Abstracts

- Date discontinuity errors
- Rejections
- Rod/Instrument data
- Inverse-running length differences
- Refraction corrections
- The Neighbor File
- The Segment File


Translev J:\Geodetic\Levels\L27001-BWI\Obs\L27001.hgz
File
Create
Edit
View
Translate
Check
Tools
WebTools
Help
Abstract (.abs) File
Adjust (.adj) File
Listing of Adj Bms
New-minus-old (.nmo) File
Project Report (ProjPrt.rpt) File
Running List (.rlst) File
Statistics (.stt) File
Transmittal (Transmit.txt) File
RILoad Script


Abstract
Part Number:
4
Starting Bench Mark:
0115 J 127
Starting Elevation:
18.571
Ending Bench Mark:
0142 GPS 030
Okay
Cancel

TRANSLEV Version 4 . 13 Mon Feb 09 11:20:28 2009

-*- FIELD ABSTRACT -*-

081118-081118 L27236/1 4.0 MM ORDER 1 CLASS 2 PAGE 1

L

SSN	PID	MARK DESIGNATION	STARTING DATE	START TIME	START TEMP	DIST (KM)	ELEV DIFF (METERS)	CODE	-(F+B) (MM)	FIELD ELEV (METERS)	PUB ELEV (METERS)	I	S	L
1001	HV7843	OBSERVATORY								68.20050	68.2005			
1001	HV7843	OBSERVATORY	20081118	13:50	F 0.5	0.062	0.00640	*	0.00	0.00640		1	M	
1002	HV7839	7550002												
						0.062			0.00	68.20690	68.2069			
1002	HV7839	7550002	20081118	14:05	F 0.5	0.099	-0.66468	*	0.00	-0.66468		1	M	
1003	HV8181	FLAGPOLE												
						0.161			0.00	67.54222	67.5421			
1003	HV8181	FLAGPOLE	20081118	14:16	F 0.5	0.262	1.27406	*	-0.97	1.27358		1	M	
1004		GPS 1	20081118	15:18	B 0.6	0.263	-1.27309	*				1	M	
						0.423			-0.97	68.81579				
1004		GPS 1	20081118	14:36	F 0.6	0.293	-0.80952	*	0.62	-0.80921		1	M	
1005	HV3115	INTERSECTION	20081118	15:00	B 0.5	0.294	0.80890	*				1	M	
						0.716			-0.35	68.00658	68.0080			
1005	HV3115	INTERSECTION	20081118	14:52	F 0.5	0.020	0.29067	*	0.02	0.29068		1	M	
1006	HV3116	INTERSECTION RM 1	20081118	14:55	B 0.5	0.020	-0.29069	*				1	M	
						0.736			-0.33	68.29726	68.3162			

□

ELEVATION REJECTION AND ERROR CODES

* - section elevation difference does not include rod and orthometric corrections

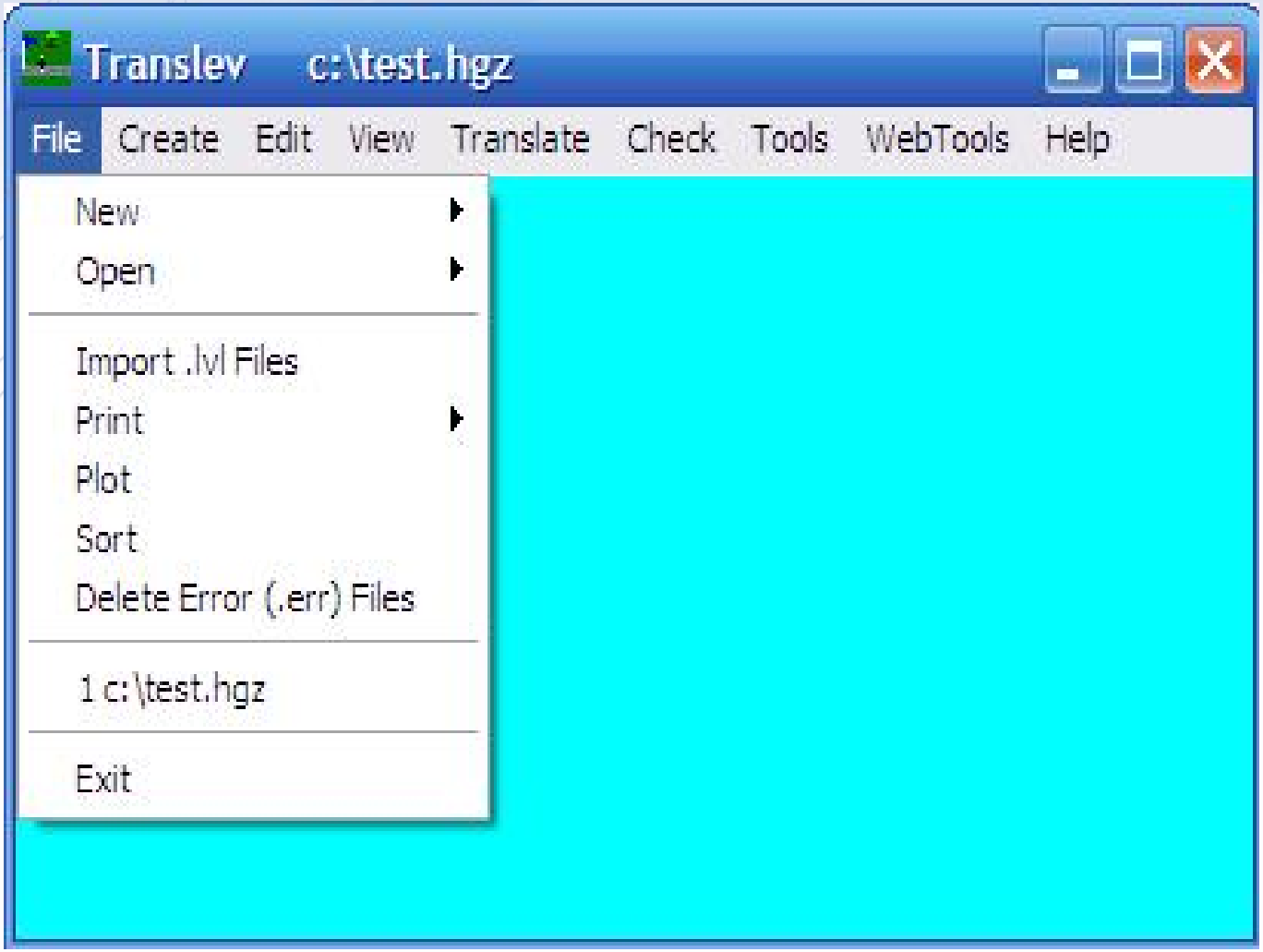
INSTRUMENT CODE	INSTRUMENT	RODS	
1	243 - 334271	396 - 27226	396 - 27227

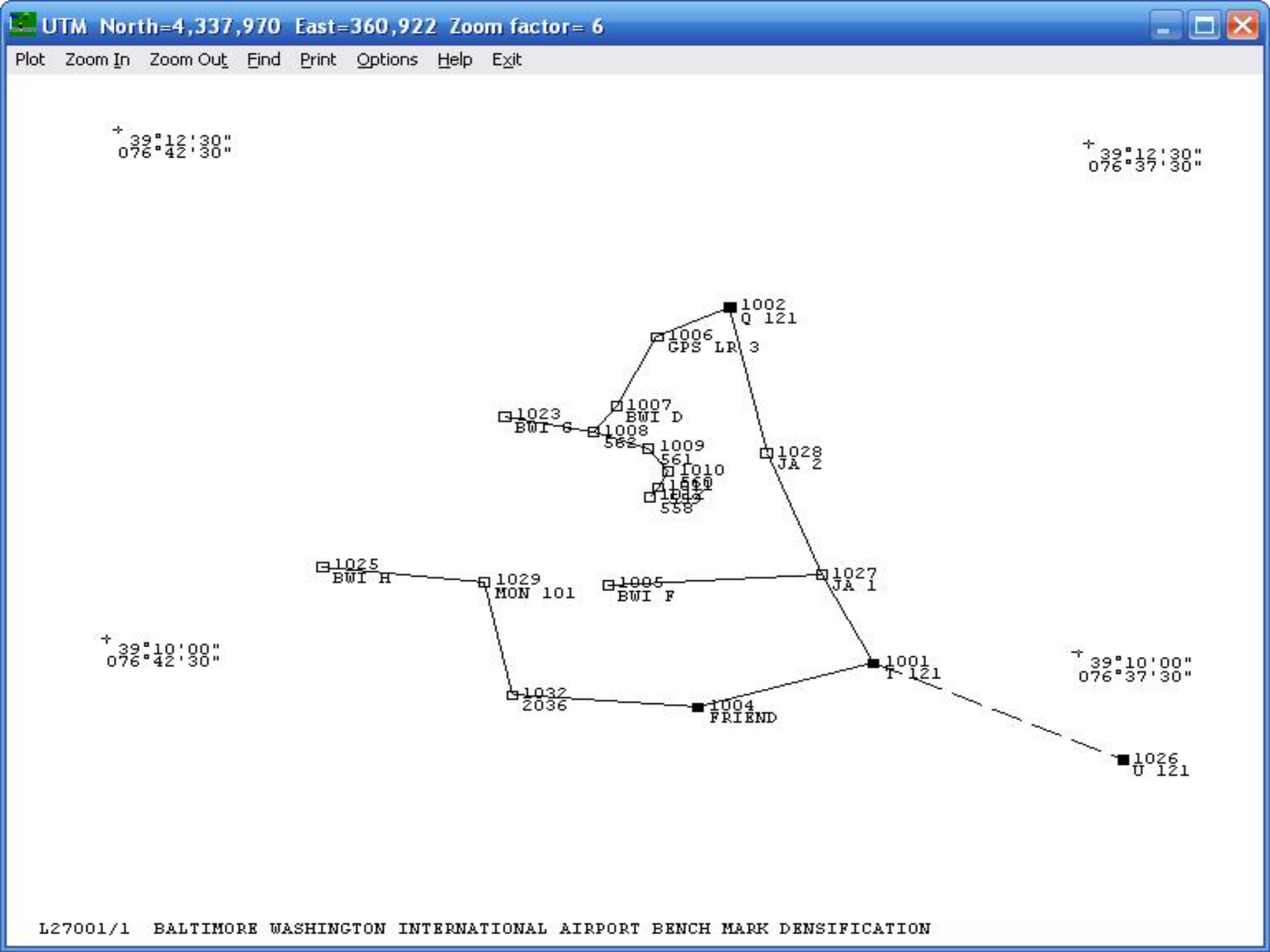
```
000010*G5*VERTOBS NGS   NATIONAL GEODETIC SURVEY                    88    20090209
000020*10*L27236  1    20081118 20081118MM4.0 12VA    KLFNGS                    2B1
000030*11*L
000040*15*COLLIMATION CHECK TAKEN DAILY AND STORED INTERNALLY IN DNA03
000050*15*AND USED TO CORRECT EACH ROD READING
000060*15*CREATED BY TRANSLEV VERSION 4.13
000070*30*10010BSERVATORY                KM0.000   MT68.20050  HV784338120707722222
000080*30*10027550002                    KM0.062   MT68.20690  HV783938120707722225
000090*30*1003FLAGPOLE                   KM0.161   MT67.54222  HV818138120607722229
000100*30*1004GPS 1                      KM0.423   MT68.81579        3812030772239
000110*30*1005INTERSECTION               KM0.716   MT68.00658  HV311538120107722250
000120*30*1006INTERSECTION RM 1          KM0.736   MT68.29726  HV311638120207722249
000130*40*08111824333427 1   39627226   39627227   155130030     0.003R1350
000140*41*0811181001100 2R1350135 8C0.5 0.5 02  2          KM0.062MT0.00640   SEB
000150*43*0811181001100 213500.000          C0.6  0.5       0                 0.012
000160*41*0811181002100 3R1405141 2C0.5 0.4 01  2          KM0.099MT-0.66468  SEB
000170*43*0811181002100 314050.000          C0.5  0.5       0                 2.697
000180*41*0811181003100 4R1416143 2C0.4 0.6 01  4          KM0.262MT1.27406   SEB
000190*43*0811181003100 414160.000          C0.5  0.5       0               138.610
000200*41*0811181004100 5R1436144 7C0.6 0.5 01  4          KM0.293MT-0.80952  SEB
000210*43*0811181004100 514360.000          C0.5  0.5       0               -46.842
000220*41*0811181005100 6R1452145 3C0.5 0.5 01  1          KM0.020MT0.29067   SEB
000230*43*0811181005100 614520.000          C0.5  0.5       0                 0.938
000240*41*0811181006100 5R1455145 9C0.5 0.5 01  1          KM0.020MT-0.29069  SEB
000250*43*0811181006100 514550.000          C0.4  0.5       0                -0.964
000260*41*0811181005100 4R1500151 6C0.5 0.5 01  4          KM0.294MT0.80890   SEB
000270*43*0811181005100 415000.000          C0.5  0.5       0                66.478
000280*41*0811181004100 3R1518153 0C0.5 0.6 01  4          KM0.263MT-1.27309  SEB
000290*43*0811181004100 315180.000          C0.6  0.6       0               -39.337
000300*G5*
```

Tools

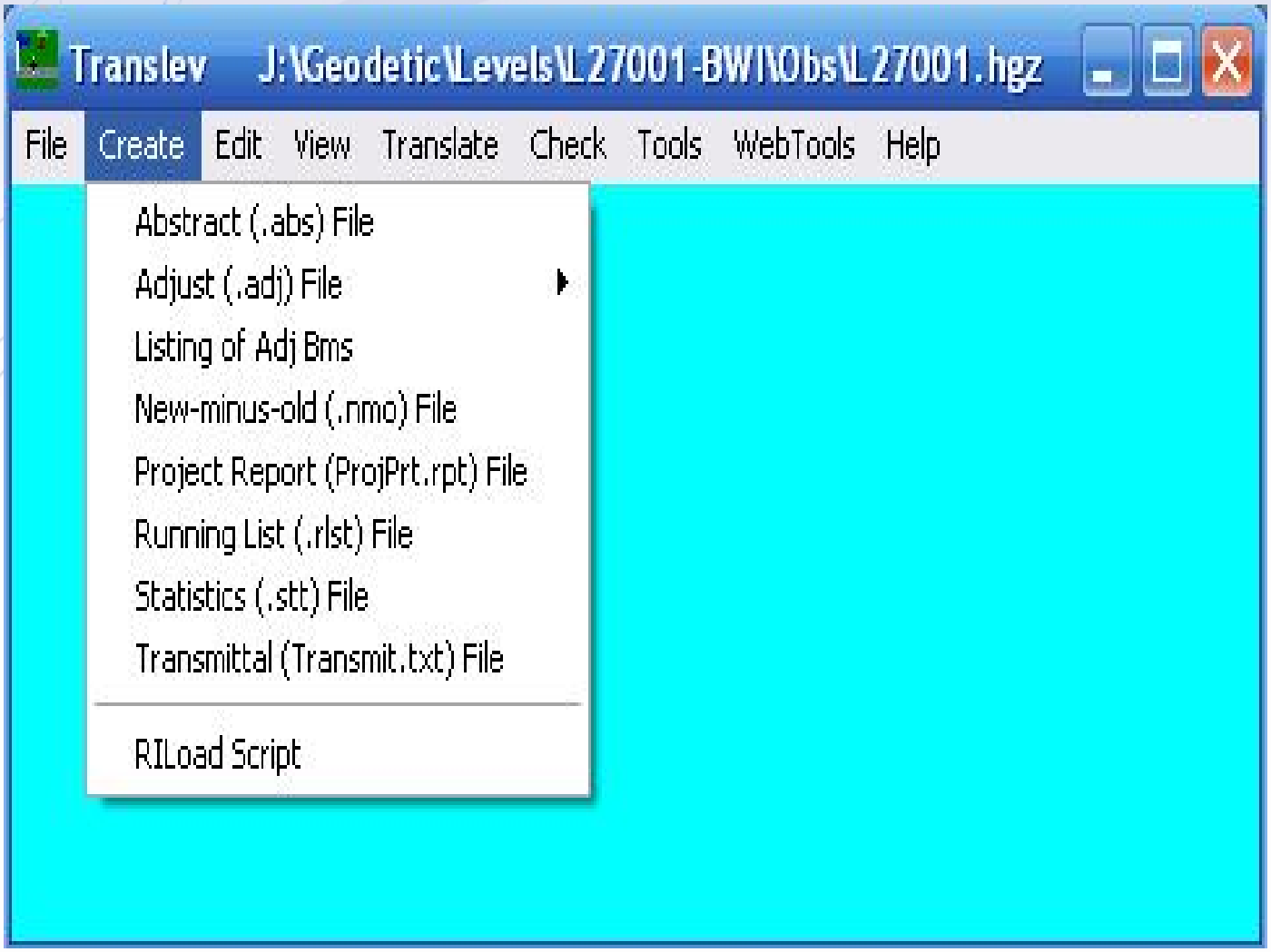
- Plotting
- Creating statistical reports
- Creating new-minus-old reports
- Astronomic positions
- Temperature profile prediction
- Renumbering
- Time zone calculator

Creating a Plot




UTM North=4,337,970 East=360,922 Zoom factor= 6
Plot
Zoom In
Zoom Out
Find
Print
Options
Help
Exit
39°12'30"
076°42'30"
39°12'30"
076°37'30"
1002
Q 121
1006
GPS LR 3
1007
BWI D
1023
BWI G
1008
562
1009
561
1010
1028
JA 2
558
1025
BWI H
1029
MON 101
1005
BWI F
1027
JA 1
39°10'00"
076°42'30"
1001
T 121
39°10'00"
076°37'30"
1032
2036
1004
FRIEND
1026
U 121
L27001/1 BALTIMORE WASHINGTON INTERNATIONAL AIRPORT BENCH MARK DENSIFICATION

Creating a Statistical File



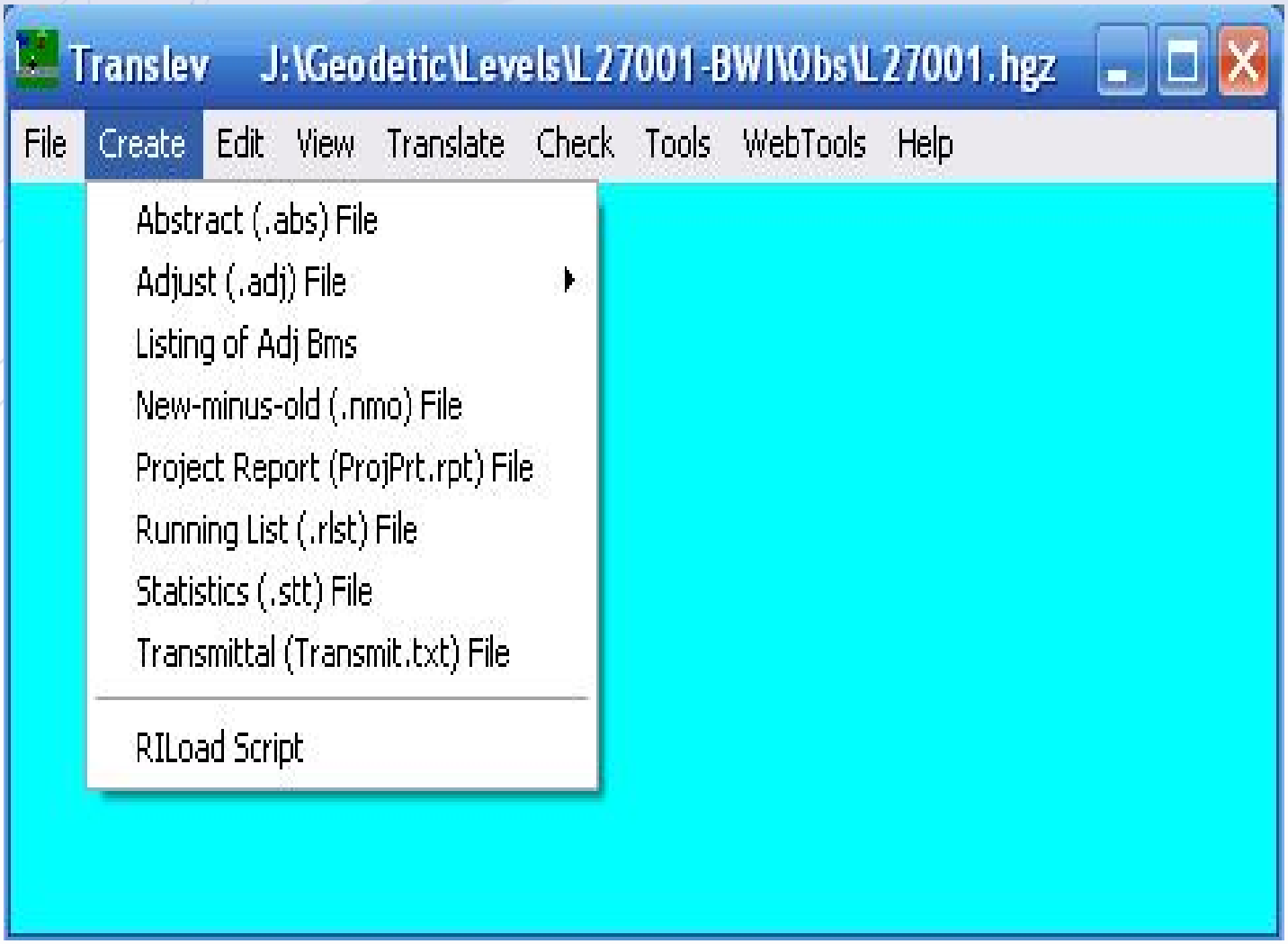
TALBOT COUNTY BENCH MARK DENSIFICATION MARYLAND
STATE HIGHWAY 33

Total No. Runnings:	113
Total Distance (km):	80.18
Avg Running Dist (km):	0.71
Avg Sight Dist (m):	41.9
Total Time (Hr.):	69.2
Total Time (Days):	21
Setups/Hour:	14
Kilometers/Hour:	1.16
Kilometers/Day:	3.8

Runnings

Date YYMMDD	Start Time	End Time	Run Time	From SPSN	To SPSN	Start Temp	End Temp	W	S	Su	Dist (km)	Delta Ht (Meters)	Obs
000725	13:22	14:07	0:45	0135	0110	24.4	24.4	1	0	10	0.94	4.51984	SFK
000725	14:07	14:59	0:52	0110	0135	24.4	24.4	1	0	10	0.90	-4.51779	SFK
000815	7:43	8:41	0:58	0135	0136	25.6	26.7	0	2	10	0.67	-0.79816	SFK
000815	8:42	9:05	0:23	0136	0134	26.7	26.7	0	2	6	0.35	0.03821	SFK
000815	9:06	9:33	0:27	0134	0136	26.7	26.7	0	2	6	0.32	-0.03833	SFK
000815	9:33	10:24	0:51	0136	0135	26.7	26.7	0	2	10	0.59	0.79975	SFK
000815	13:01	13:57	0:56	0137	0134	26.7	27.8	0	2	14	1.06	8.37053	SFK
000815	13:58	15:07	1:09	0134	0137	27.8	28.9	1	2	14	1.09	-8.36732	SFK
010904	13:43	14:22	0:39	0301	0137	26.7	28.3	0	0	6	0.50	-2.61920	GAD
010904	14:23	14:52	0:29	0137	0301	28.3	27.8	0	0	6	0.50	2.61750	GAD
010905	12:38	13:34	0:56	0304	0302	26.7	26.7	0	0	8	0.81	0.87230	GAD
010906	8:42	9:51	1:09	0302	0301	21.1	25.6	1	0	12	1.11	0.19260	GAD
010906	9:52	10:47	0:55	0301	0302	25.6	25.6	1	0	12	1.09	-0.18990	GAD
010906	12:14	12:38	0:24	0304	0305	26.7	26.7	1	0	4	0.44	0.02840	GAD
010906	12:40	13:03	0:23	0305	0304	26.7	26.7	1	0	4	0.44	-0.02850	GAD
010906	13:12	14:21	1:09	0305	0306	26.7	26.7	1	0	12	1.16	-2.20440	GAD
010907	8:25	9:16	0:51	0306	0307	24.4	26.1	1	0	10	0.97	1.32570	GAD
010907	9:17	10:03	0:46	0307	0306	26.1	31.1	1	0	10	0.94	-1.32650	GAD
010907	10:04	11:07	1:03	0306	0305	31.1	31.1	1	0	12	1.14	2.20700	GAD
010917	9:46	10:59	1:13	0308	0307	21.1	24.4	1	0	12	1.16	-0.11080	GAD
010917	11:00	11:50	0:50	0307	0308	24.4	25.6	1	0	12	1.16	0.11210	GAD
010917	13:06	14:02	0:56	0309	0308	26.7	27.2	1	0	12	1.09	0.29150	GAD

Creating the New-minus-old File



L27236/1
ORDER 1 CLASS 2

NEW MINUS OLD COMPARISON

SSN	PID	MARK DESIGNATION	-DIST-	---NEW----	---OLD----	DIF (MM)	ALLOWABLE
1001	HV7843	OBSERVATORY		68.20050	68.2005	0.00	
			0.062	0.00640	0.0064	0.00	1.26
1002	HV7839	7550002		68.20690	68.2069	0.00	
			0.099	-0.66468	-0.6648	0.12	1.26
1003	HV8181	FLAGPOLE		67.54222	67.5421	0.12	
			0.555	0.46436	0.4659	-1.54	2.98
1005	HV3115	INTERSECTION		68.00658	68.0080	-1.42	
			0.020	0.29068	0.3082	-17.52	1.26 *
1006	HV3116	INTERSECTION RM 1		68.29726	68.3162	-18.94	
		Mean difference				-4.05	

* - Exceeds allowable for order and class of survey.

CLOSURE ANALYSIS BETWEEN PUBLISHED BENCH MARKS

FROM BENCH MARK	TO BENCH MARK	DIST,KM	PUB ELEV DIFF, M	OBS ELEV DIFF, M	PUB-OBS DIFF,MM	O/C
1001 OBSERVATORY	1002 7550002	0.062	0.0064	0.00640	0.00	1 1
1001 OBSERVATORY	1003 FLAGPOLE	0.161	-0.6584	-0.65828	-0.12	1 1
1001 OBSERVATORY	1005 INTERSECTION	0.716	-0.1925	-0.19392	1.42	1 1
1001 OBSERVATORY	1006 INTERSECTION RM 1	0.736	0.1157	0.09676	18.94	4
1002 7550002	1003 FLAGPOLE	0.099	-0.6648	-0.66468	-0.12	1 1
1002 7550002	1005 INTERSECTION	0.654	-0.1989	-0.20032	1.42	1 1
1002 7550002	1006 INTERSECTION RM 1	0.674	0.1093	0.09036	18.94	4
1003 FLAGPOLE	1005 INTERSECTION	0.555	0.4659	0.46436	1.54	1 1
1003 FLAGPOLE	1006 INTERSECTION RM 1	0.575	0.7741	0.75504	19.06	4
1005 INTERSECTION	1006 INTERSECTION RM 1	0.020	0.3082	0.29068	17.52	4

2020 NEW DEEP ROD MONUMENTS AND LEVELING TO TIDE STATIONS IN CALIFORNI
TEST
L28874/
ORDER 1 CLASS 2

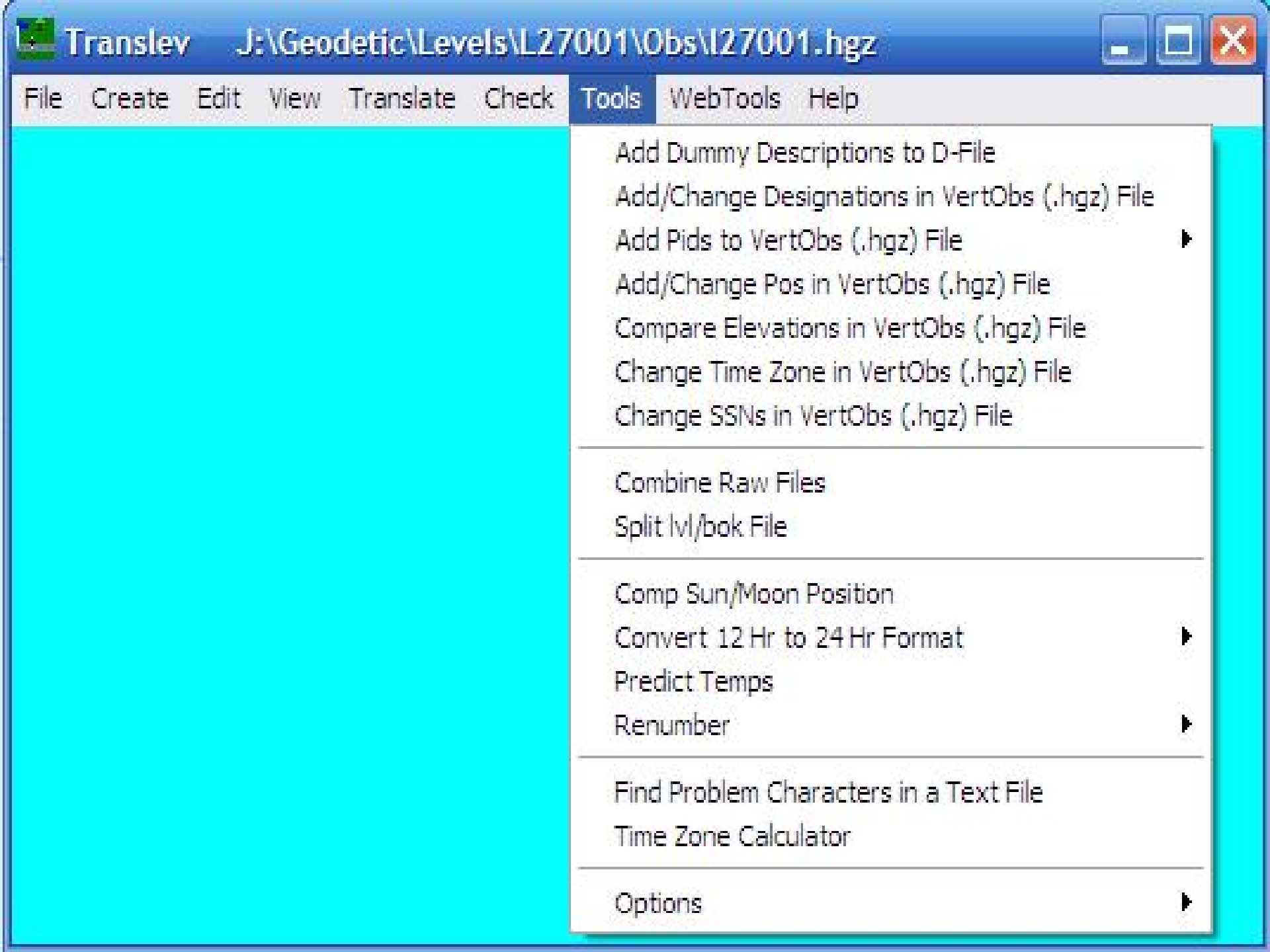
---------- NEW MINUS OLD COMPARISON ----------

SSN	PID	MARK DESIGNATION	-DIST-	---NEW----	---OLD----	DIF (MM)	ALLOWABLE
2101	DC1315	B 1313		93.89400	93.89400	0.00	
			0.871	22.97296	22.97820	-5.24	3.73 *
2102	DC1297	A 1313		116.86696	116.87220	-5.24	
			0.512	-12.02033	-12.01720	-3.13	2.86 *
2103	DC0982	L 895		104.84663	104.85500	-8.37	
			1.904	-95.55694	-95.55200	-4.94	5.52
2116	DC1313	941 0230 M TIDAL		9.28969	9.30300	-13.31	
			0.447	2.09107	2.08900	2.07	2.67
2121	DC1310	941 0230 TIDAL 10		11.38076	11.39200	-11.24	
			0.085	-0.48292	-0.48070	-2.22	1.26 *
2122	DC0986	941 0230 TIDAL 7		10.89784	10.91130	-13.46	
		Mean difference				-2.35	

* - Exceeds allowable for order and class of survey.
Note: Only marks along the main line are included in the above analysis.

---------- CLOSURE ANALYSIS BETWEEN PUBLISHED BENCH MARKS ----------

FROM BENCH MARK	TO BENCH MARK	DIST,KM	PUB ELEV DIFF, M	OBS ELEV DIFF, M	PUB-OBS DIFF, MM	O/C	TIE
2101 B 1313	2102 A 1313	0.871	22.97820	22.97296	5.24	2 1	
2101 B 1313	2103 L 895	1.383	10.96100	10.95263	8.37	2 2	
2101 B 1313	2116 941 0230 M TIDAL	3.287	-84.59100	-84.60431	13.31	2 2	
2101 B 1313	2122 941 0230 TIDAL 7	3.819	-82.98270	-82.99616	13.46	2 2	
2102 A 1313	2103 L 895	0.512	-12.01720	-12.02033	3.13	2 1	
2102 A 1313	2116 941 0230 M TIDAL	2.416	-107.56920	-107.57727	8.07	2 1	
2102 A 1313	2122 941 0230 TIDAL 7	2.948	-105.96090	-105.96912	8.22	2 1	
2103 L 895	2116 941 0230 M TIDAL	1.904	-95.55200	-95.55694	4.94	1 2	Y
2103 L 895	2122 941 0230 TIDAL 7	2.436	-93.94370	-93.94879	5.09	1 2	Y
2116 941 0230 M TIDAL	2122 941 0230 TIDAL 7	0.532	1.60830	1.60815	0.15	1 1	Y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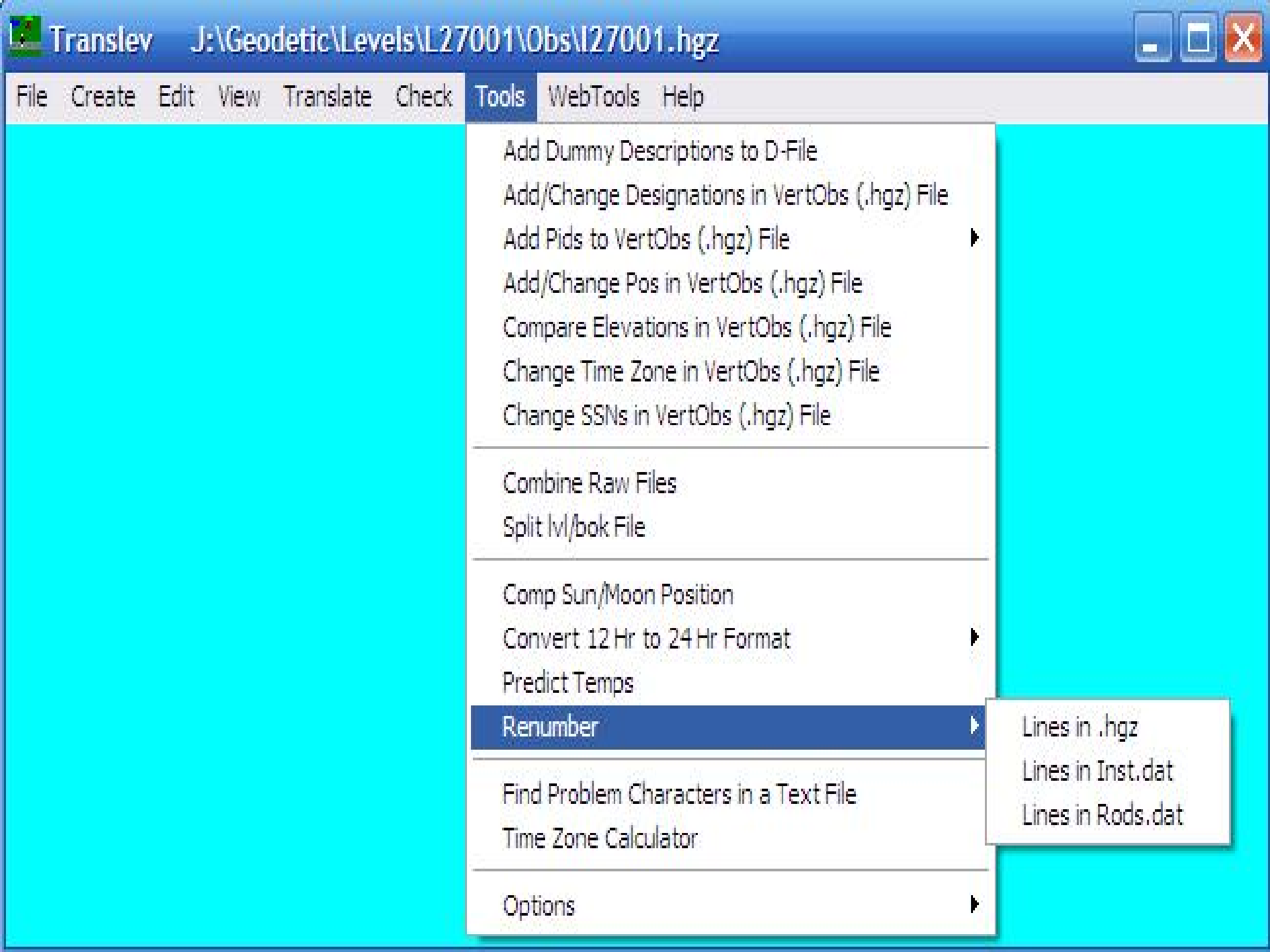
File
Create
Edit
View
Translate
Check
Tools
WebTools
Help
Add Dummy Descriptions to D-File
Add/Change Designations in VertObs (.hgz) File
Add Pids to VertObs (.hgz) File
Add/Change Pos in VertObs (.hgz) File
Compare Elevations in VertObs (.hgz) File
Change Time Zone in VertObs (.hgz) File
Change SSNs in VertObs (.hgz) File
Combine Raw Files
Split lvl/bok File
Comp Sun/Moon Position
Convert 12 Hr to 24 Hr Format
Predict Temps
Renumber
Find Problem Characters in a Text File
Time Zone Calculator
Options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File Create Edit View Translate Check Tools WebTools Help
Add Dummy Descriptions to D-File
Add/Change Designations in VertObs (.hgz) File
Add Pids to VertObs (.hgz) File
Add/Change Pos in VertObs (.hgz) File
Compare Elevations in VertObs (.hgz) File
Change Time Zone in VertObs (.hgz) File
Change SSNs in VertObs (.hgz) File
Combine Raw Files
Split lvl/bok File
Comp Sun/Moon Position
Convert 12 Hr to 24 Hr Format
Predict Temps
Renumber
Find Problem Characters in a Text File
Time Zone Calculator
Options
Lines in .hgz
Lines in Inst.dat
Lines in Rods.dat

Web Tools

- Aerial view (Google Earth)
- Level projects
- Updating files

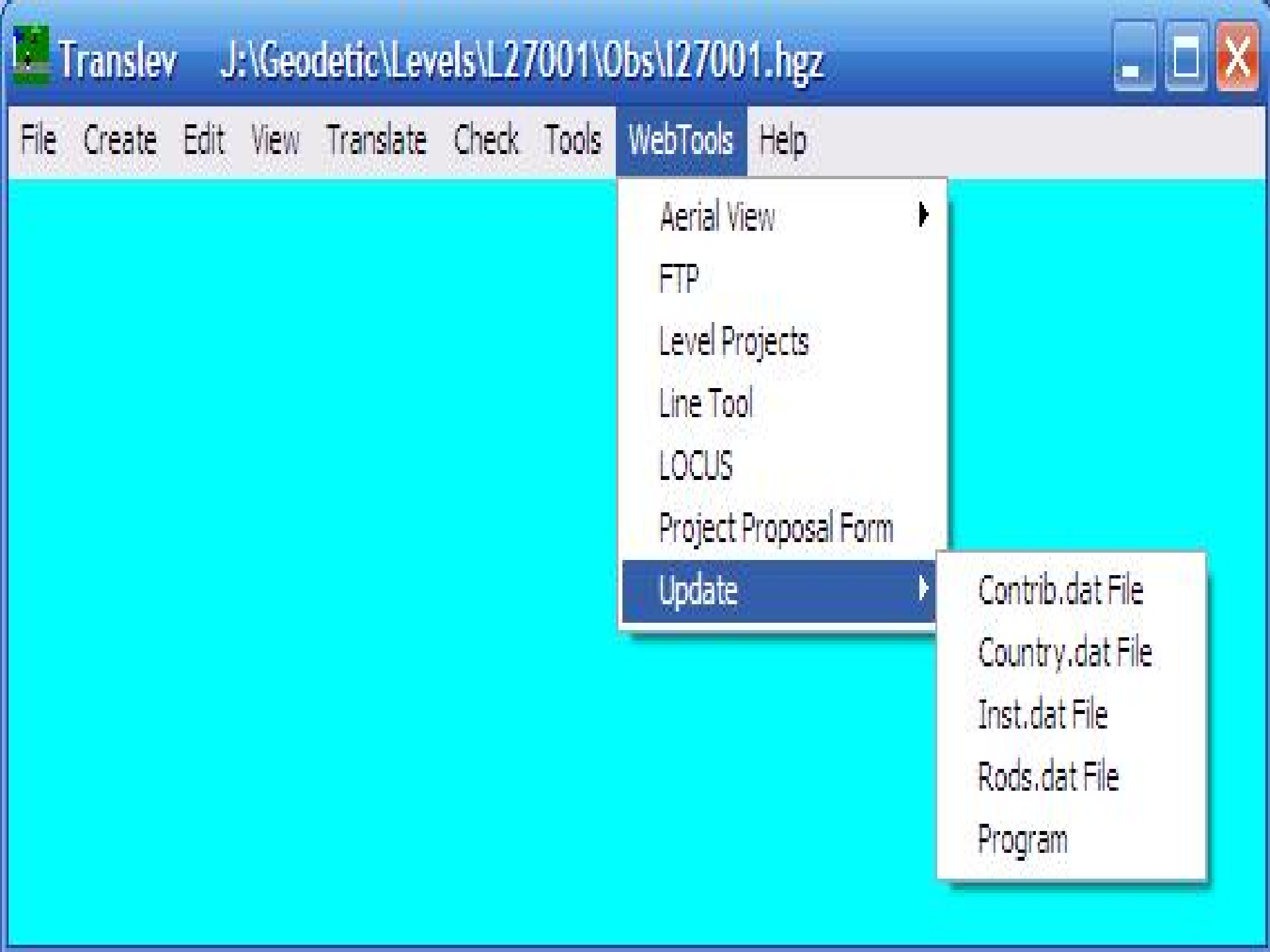

N
7550002
FLAGPOLE
OBSERVATORY
Magnetic Ln
Observatory Rd
GPS 1
INTERSECTION RM 1
INTERSECTION
Hood Dr

Level Projects for Marks

File

PID	DESIGNATION	ACCESSION
JV0706	T 121	L22570 L25256/10 L25357 L27001
JV0709	Q 121	L22570 L25256/10 L27001
JV6656	FRIEND	L25256/10 L27001
AA9297	BWI F	L27001
JV6455	GPS LR 3	L27001
AB6219	BWI D	L27001
JV3774	U 121	L22570 L27001
JV0707	S 121	L22570 L25256/10
JV3830	L 136	L24045 L25256/10
JV0713	A 21	L17659 L22570
JV0712	HH	L17659 L22570
JV0717	J 4	L17659 L22564 L740/A
JV3831	M 137	L24045

Num Lock Insert


Translev J:\Geodetic\Levels\L27001\Obs\l27001.hgz
File Create Edit View Translate Check Tools WebTools Help
Aerial View
FTP
Level Projects
Line Tool
LOCUS
Project Proposal Form
Update
Contrib.dat File
Country.dat File
Inst.dat File
Rods.dat File
Program

Project Checklist

- .hgz file created and checked
- .lvl file(s) created, checked, combined
- Abstract file created & checked
- New-minus-old file created
- Ties checked
- Project report created

Files for Submittal

- Description (.dsc) file
- Combined raw (.gsi, .lev, or .dat) file
- Combined (.bok) file
- VERTOBS (.hgz) file
- Abstract (.abs) file
- Project report (.rpt) file
- CD of photos

Run TRANSLEV

End of Line-24 K!!