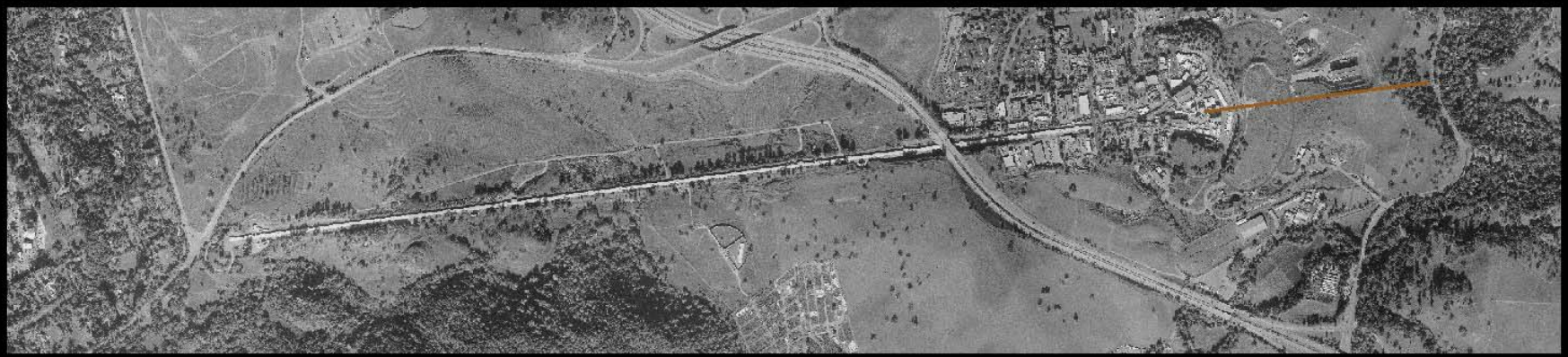
Preliminary Layout for LCLS



Direction Stake-out

Scope of the Job – Part 1

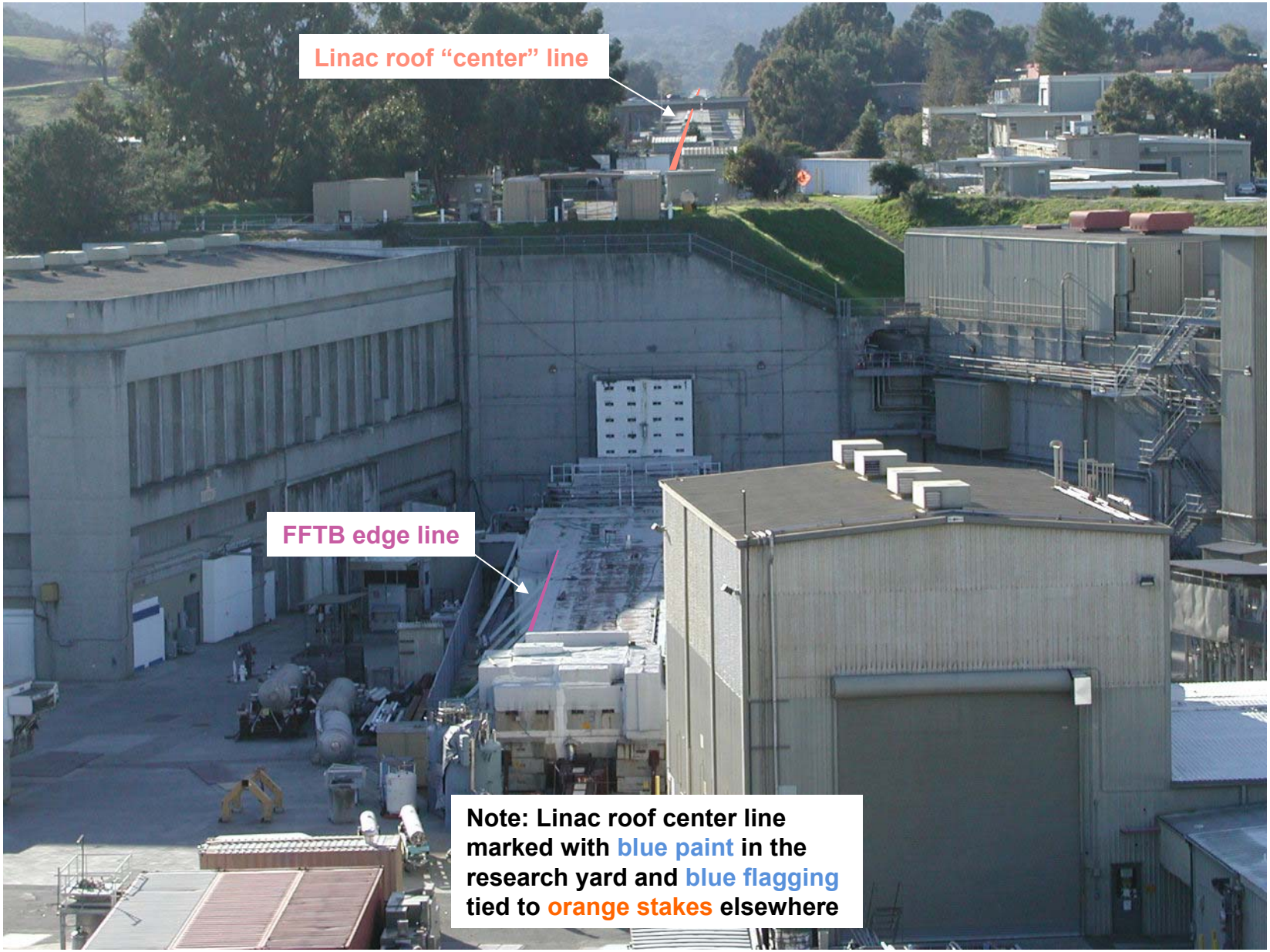
- Mark the direction of the accelerator in the research yard and to the radiation fence.
- Chosen solution:
  - Use existing feature such as FFTB housing or roof of klystron gallery to get the direction.
  - For each chosen feature, set-up a TC2002 near tower 20 and stake every 50 feet in both directions.
  - Run a GPS/RTK survey of all stakes.
  - Best fit a line to assess each staking process.


Step1: Find a direction to buck-in

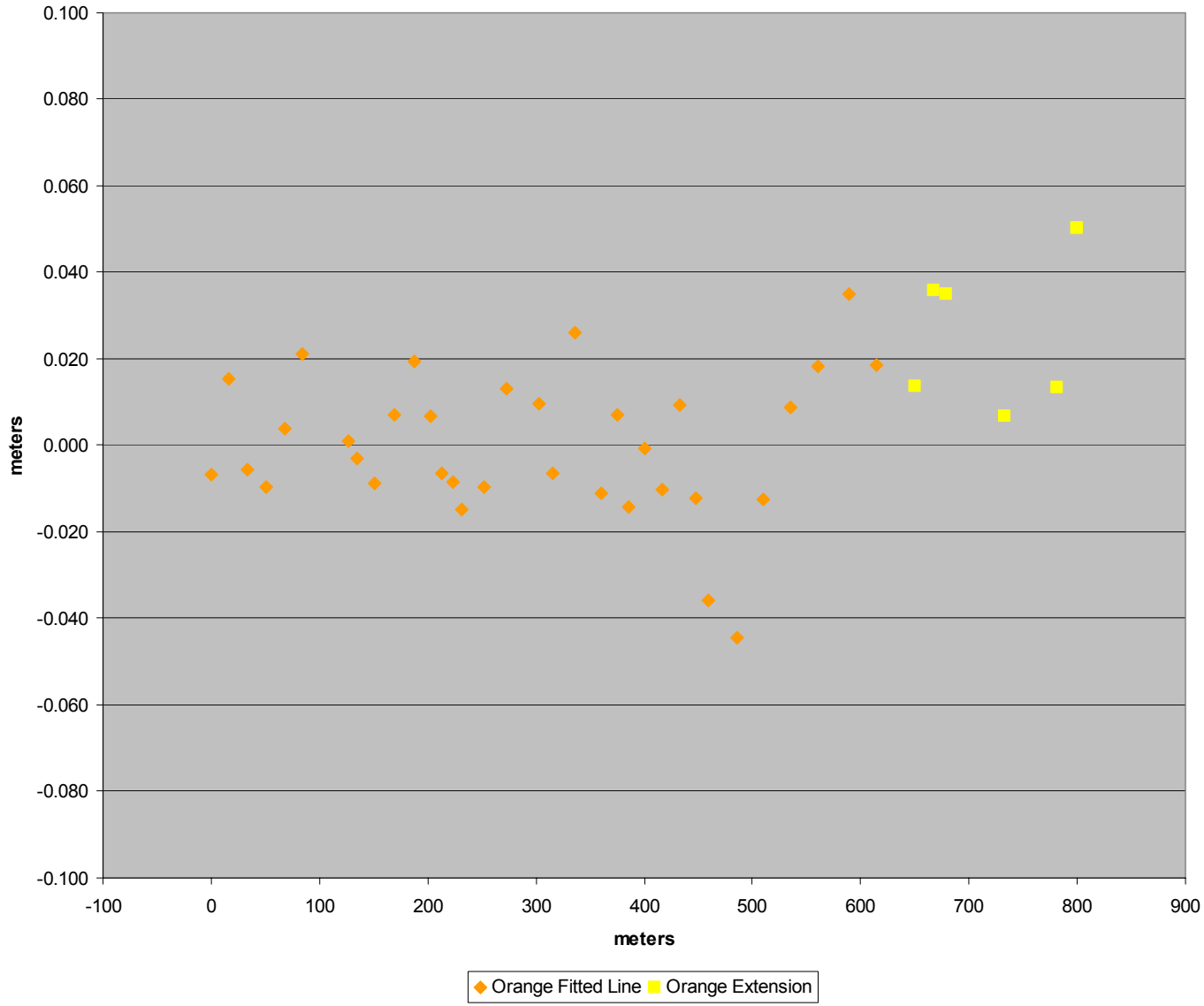

415
Step2: Set-up the instrument


Step3: Move prism to line of sight and stake

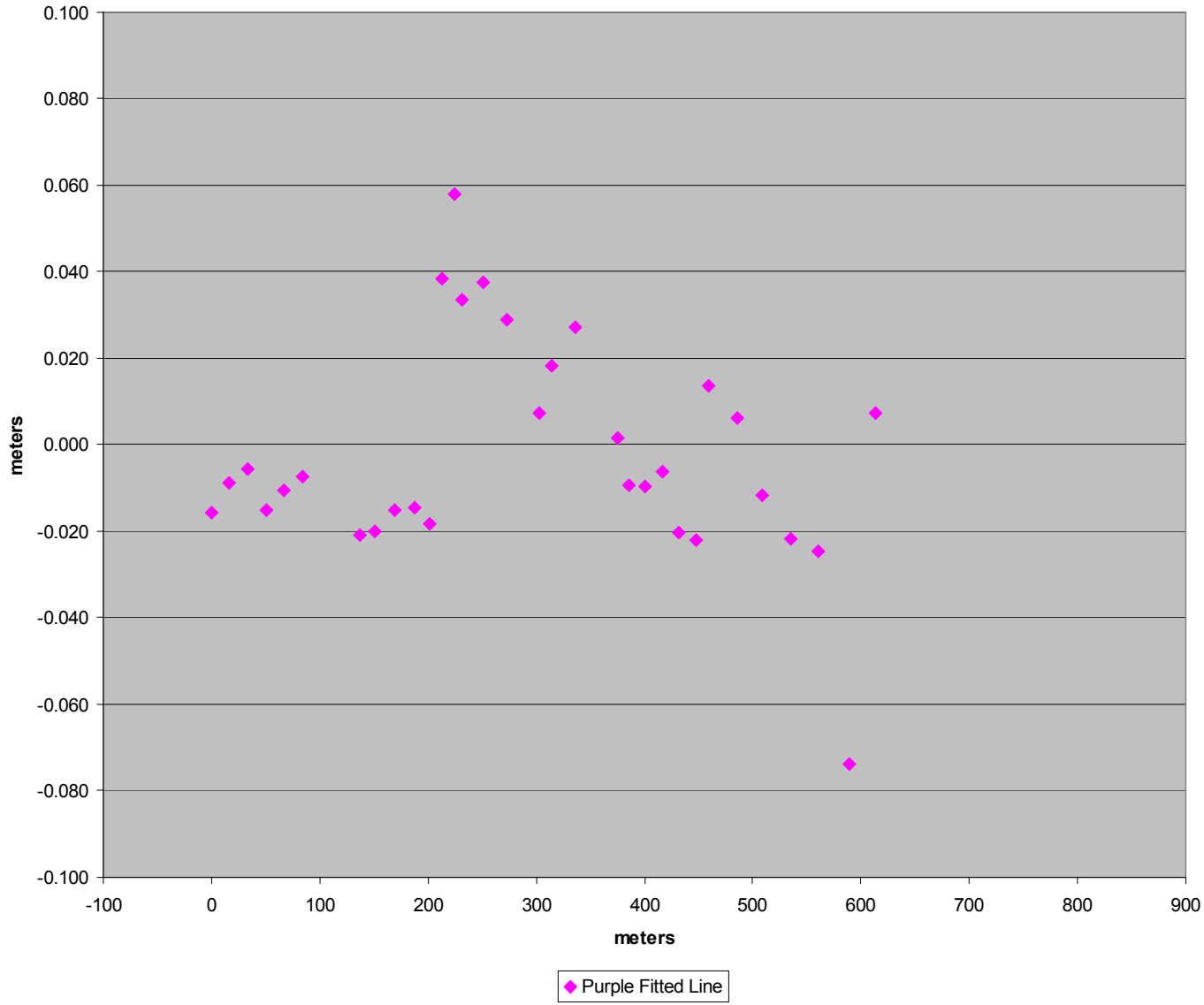

Step4: Survey all stakes using GPS/RTK


Linac roof “center” line
FFTB edge line
Note: Linac roof center line marked with blue paint in the research yard and blue flagging tied to orange stakes elsewhere

Residuals to Orange Best Fitted Line



Residuals to Purple Best Fitted Line



Scope of the Job – Part 2

- Determine the offset of the two painted lines to the accelerator tube line.
- Chosen solution:
  - Select some brass plates in the klystron galley and install a PK nail in the road for each plate.
  - Set-up a TC2002 on each chosen brass plate, back-sight on one of the neighboring plate and survey the PK nail in the road.
  - Run a GPS/RTK survey of all the PK nails on the road.
  - Correct for the nominal offset of the klystron brass plates with respect to the accelerator tube and fit a line to these values.

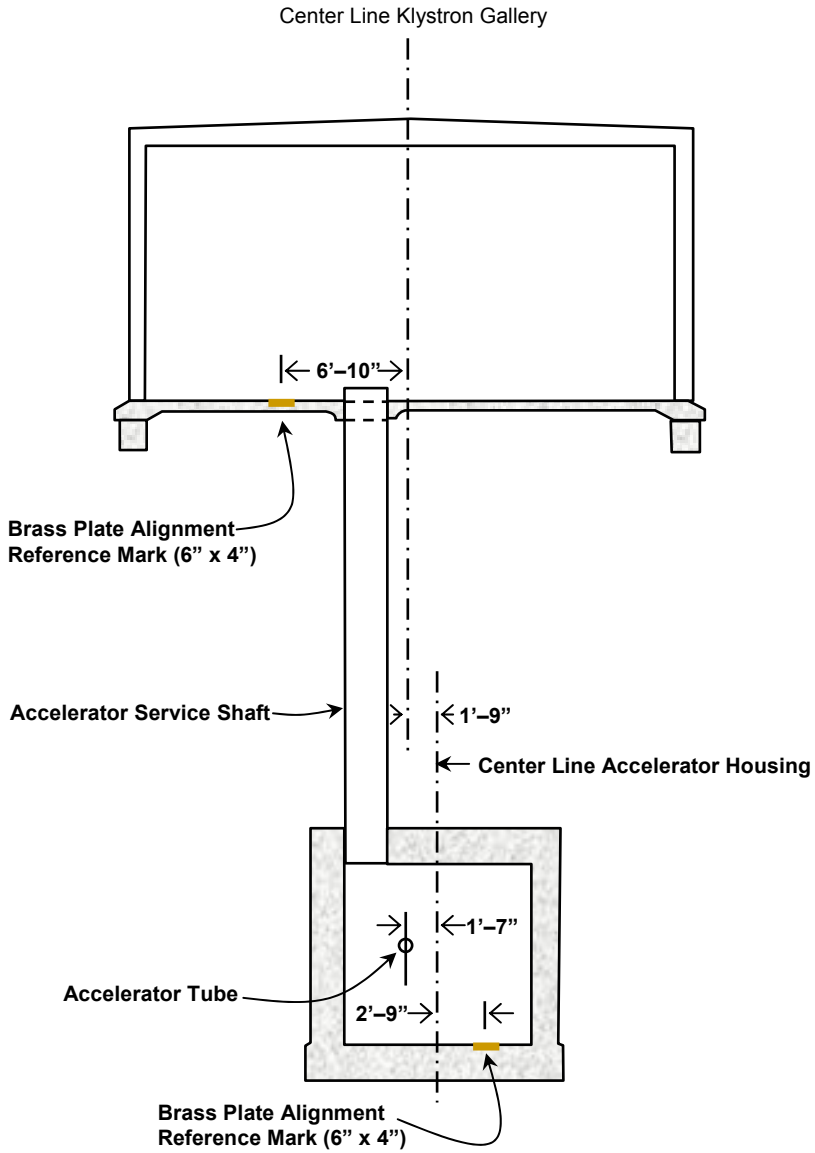
End of Part 2

  - Transform the 2 painted lines into this new line system and evaluate the offset of each stake.
- External Check:
  - Perform a local survey of M20 with respect to both lines and transform both results into the accelerator line to compare with the published SLC values.
  - Select SLC survey monuments directly observable by GPS/RTK and perform similar transformation and comparison.
- Remaining Field Work as of 2/25
  - Stake out the actual accelerator tube line using a new GPS/RTK survey based on above calculated offsets.

PK nails versus

Klystron Gallery Brass Plates

Sector	Dx (m)	Dz (m)
1	9.999	-1.516
2	10.017	-3.263
3	9.996	-3.254
21	10.012	-1.786
28	10.002	-3.253
29	10.004	-3.253
29	10.004	-3.253
30	9.999	-1.943



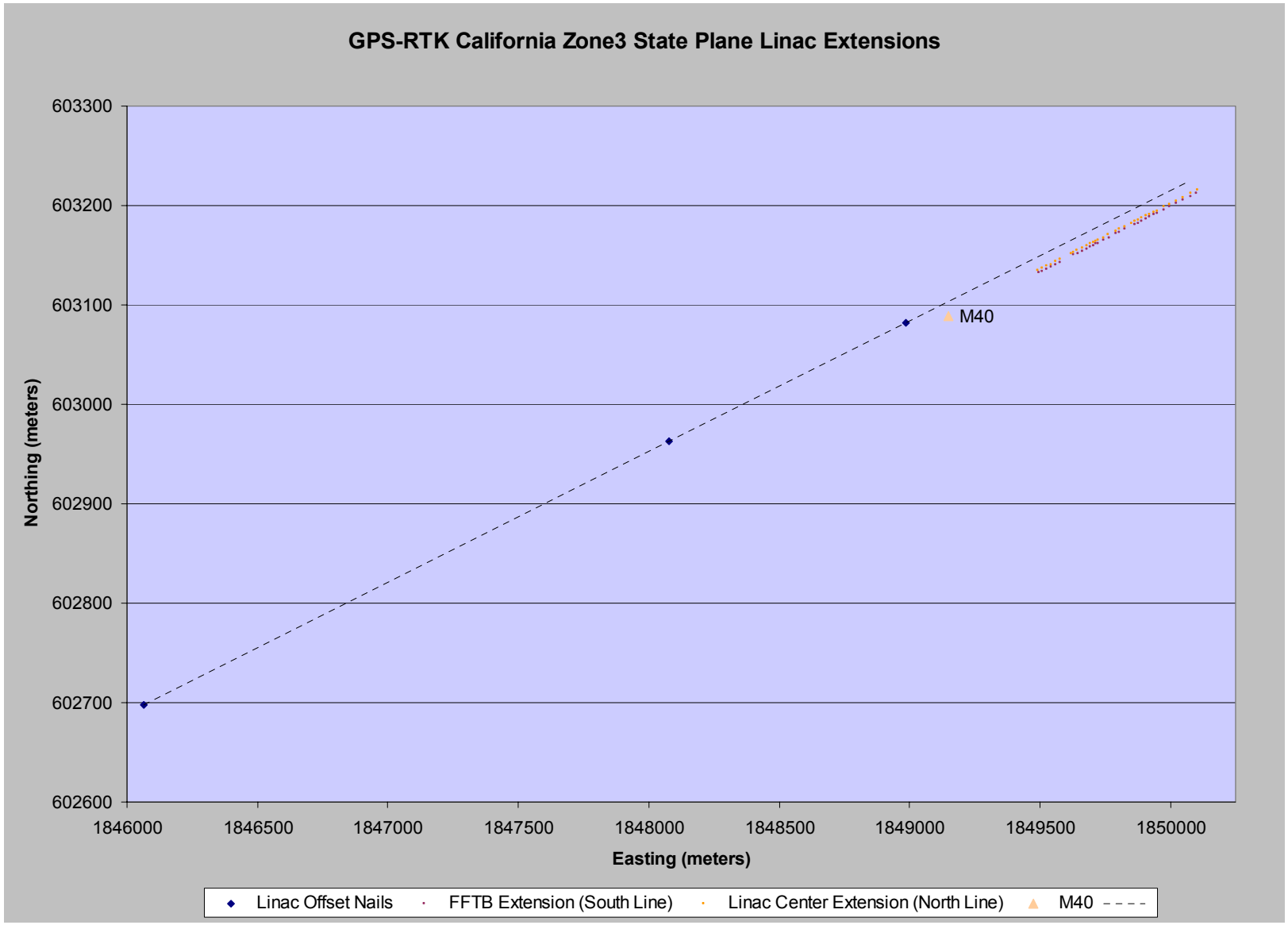
Typical Section of Klystron Gallery and Accelerator Housing Looking East

SLAC Drawing # SK - GE 5153 - A

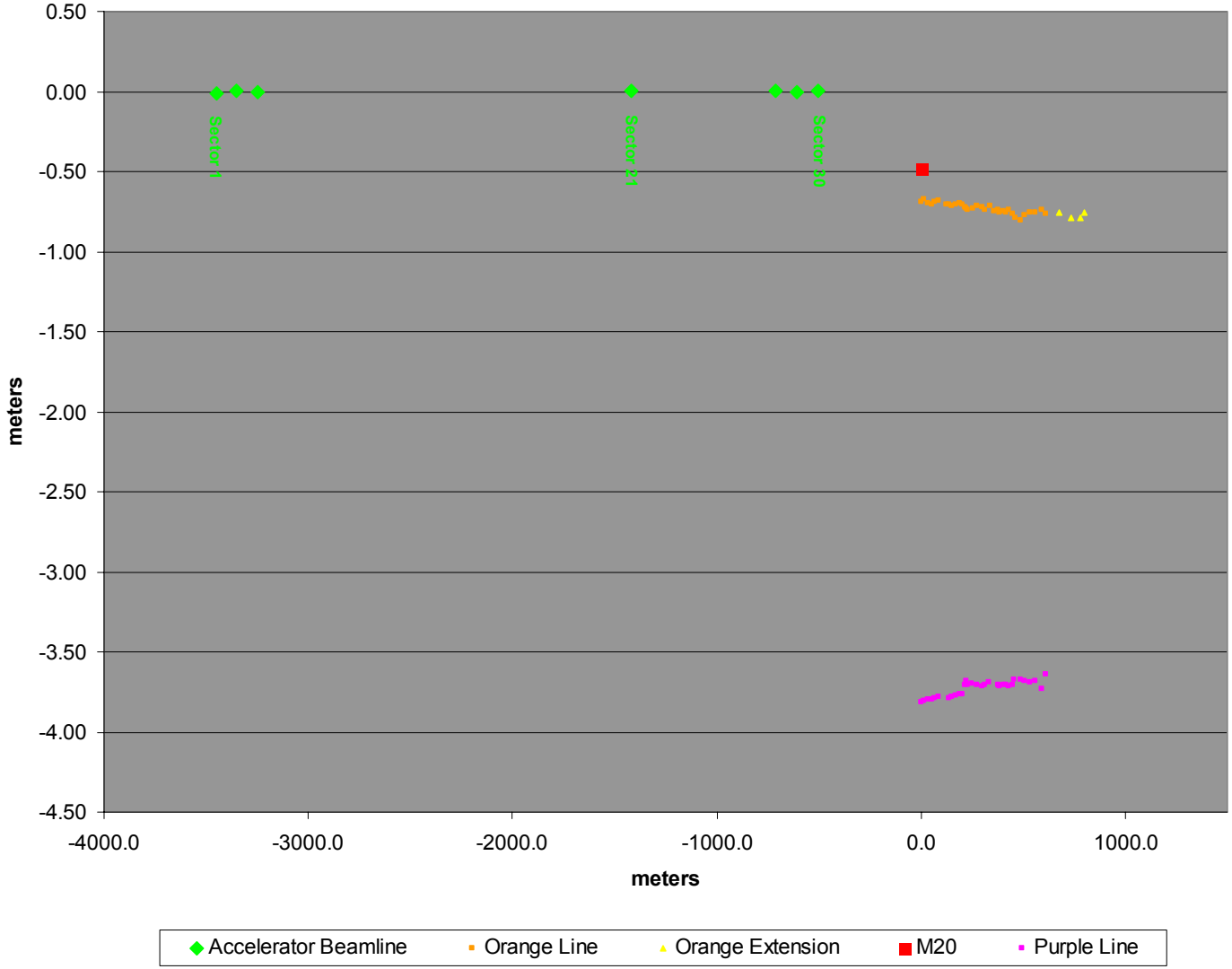
The nominal X offset of all klystron gallery brass plates to the accelerator tube is:

6'10'' + 1'9'' – 1'7" = 7'

PK nail at Sector #	X Offset to Acc.(m)
1	12.133
2	12.151
3	12.130
21	12.146
28	12.136
29	12.138
30	12.133


GPS-RTK California Zone3 State Plane Linac Extensions
Northing (meters)
603300
603200
603100
603000
602900
602800
602700
602600
1846000
1846500
1847000
1847500
1848000
1848500
1849000
1849500
1850000
Easting (meters)
M40
Linac Offset Nails
FFTB Extension (South Line)
Linac Center Extension (North Line)
M40

LCLS Preparation Survey



Tower 20 / M20 survey mark

SLC published values on March 26, 1986

X = -0.48673 m Z = 533.44932 m

Transformed fitted offset on February 17, 2004

d = -0.483 m

Miscellaneous

- 2/13/04: Extend the orange line to Alpine road and locate on this line elevation 245’ above sea level.
- 2/24/03: Determine distance from end of LINAC to end of pavement in the research yard.

Location of Elevation 245’ above sea level using GPS/RTK set in NAD83 coordinates

Given

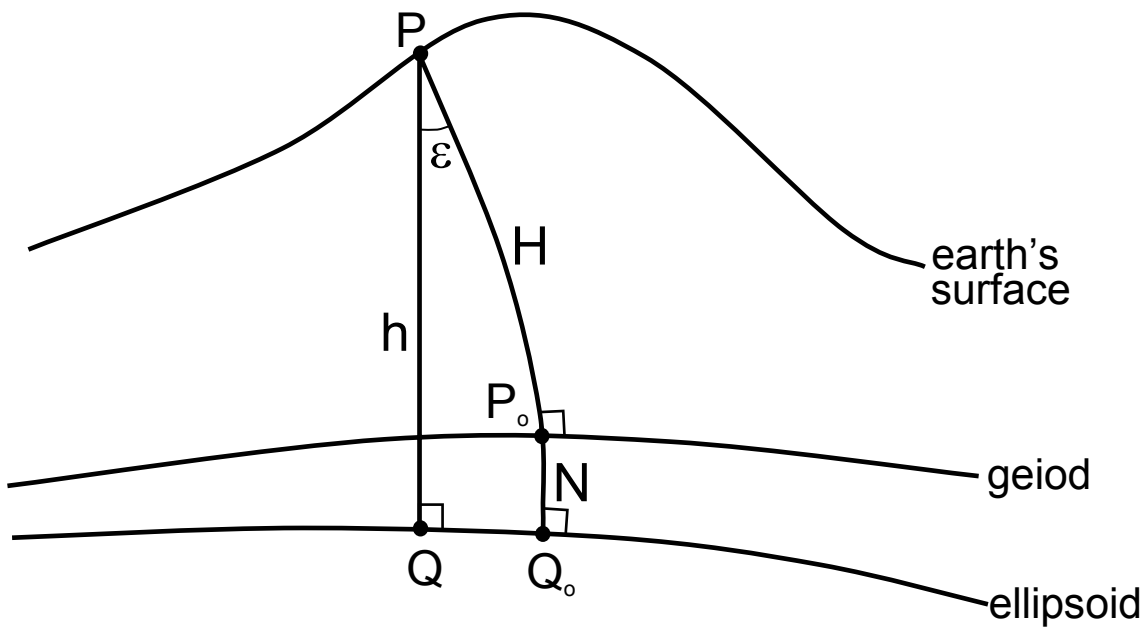
H = 245’ = 74.676 m

Knowing from model GEOID99
at latitude 37° 25’ and
longitude -122° 12’ 15’’

N = -32.508 m

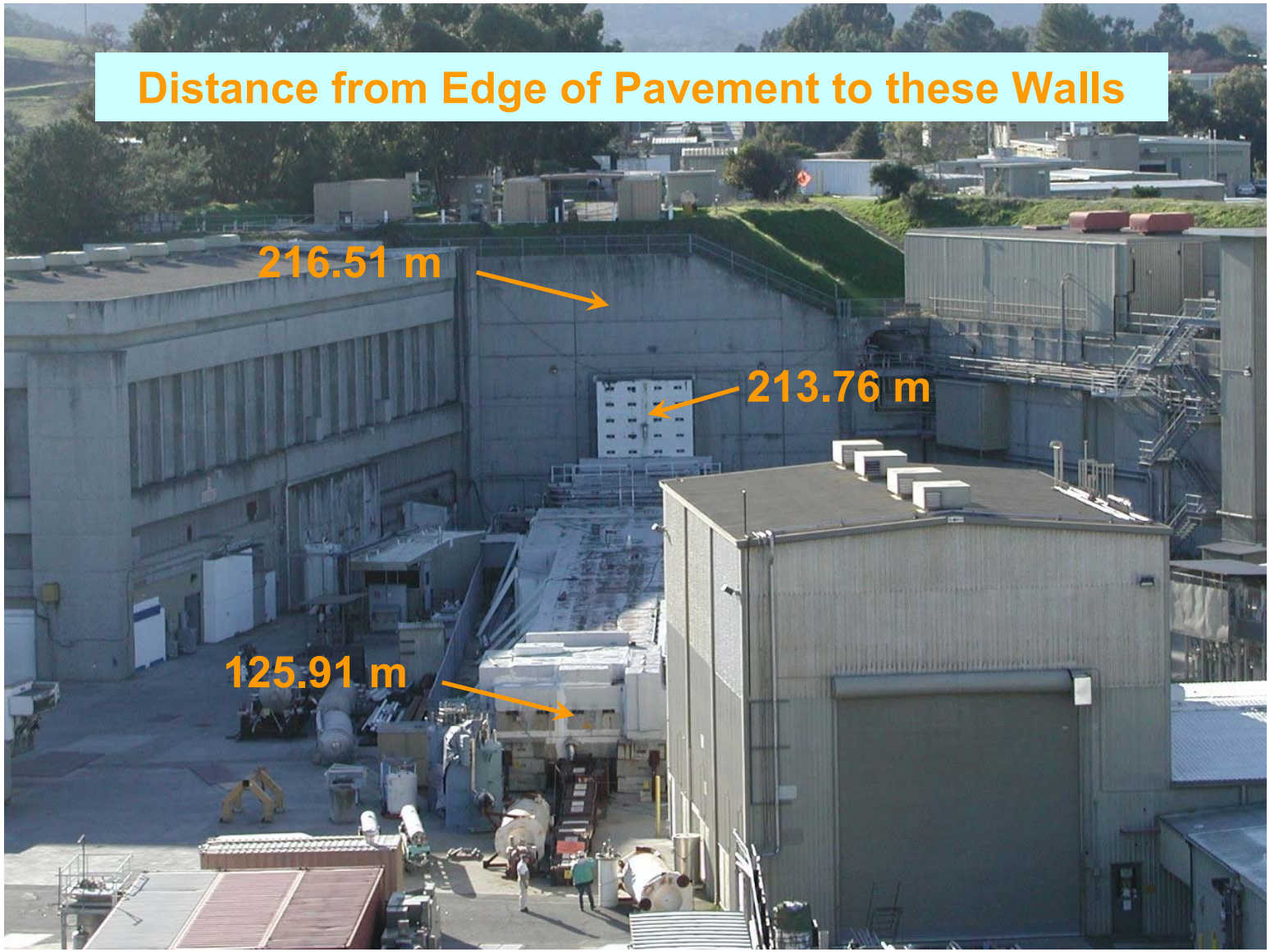
Found

h = 42.168 m



Last Orange Stake at Alpine Road

Start of the Orange Line Extension


Distance from Edge of Pavement to these Walls
216.51 m
213.76 m
125.91 m

Point Name	Horizontal Distance (m)
Grey Wall	151.141
White Wall	148.389
End FFTB	60.537
PK O36	16.679
PK O35	0
PK O32	51.013
Pavement	65.368