

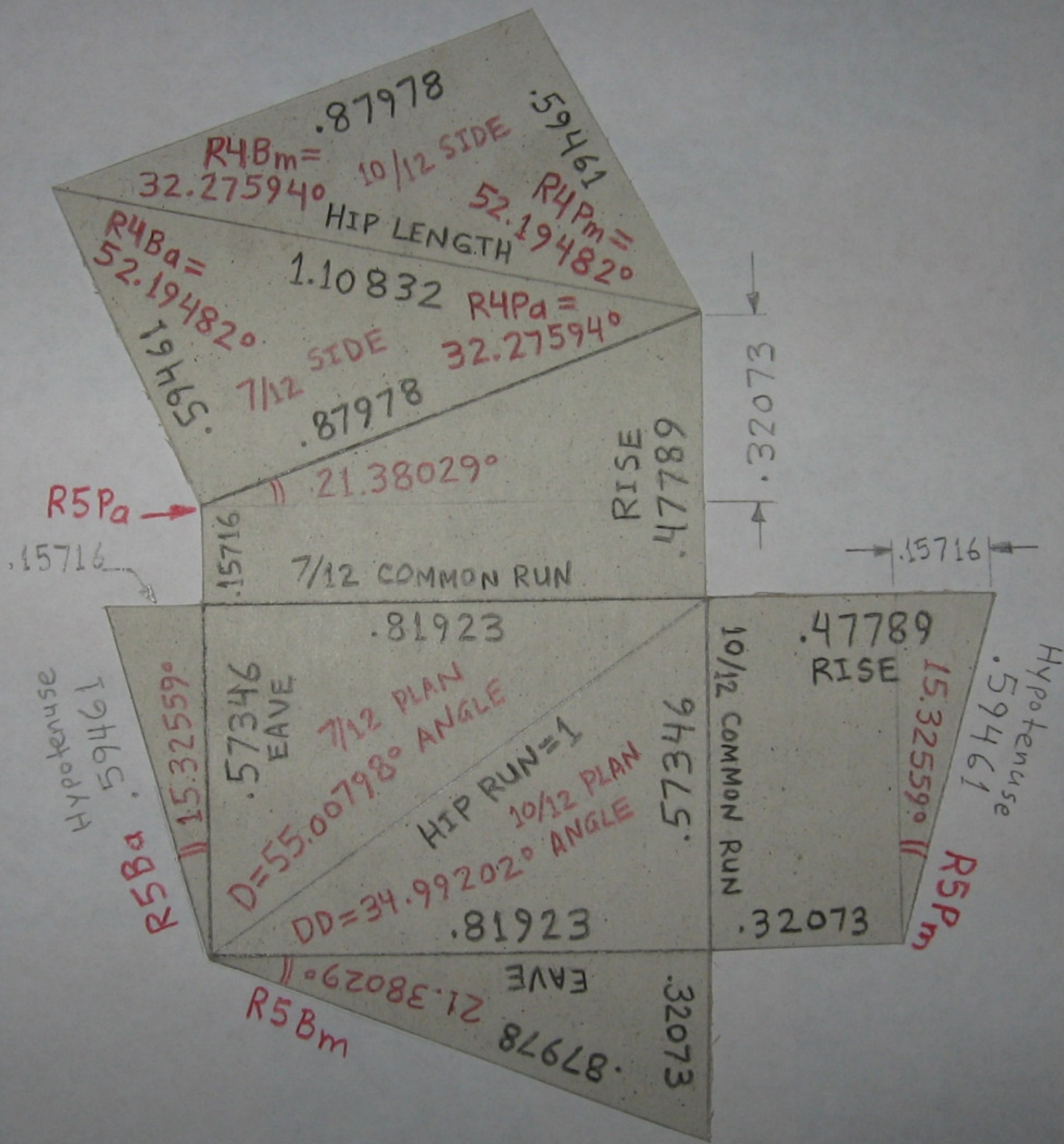
Study of Tangent Handrail Geometry

Unequal Slopes, Rectangular Footprint (90° Corner Angle)

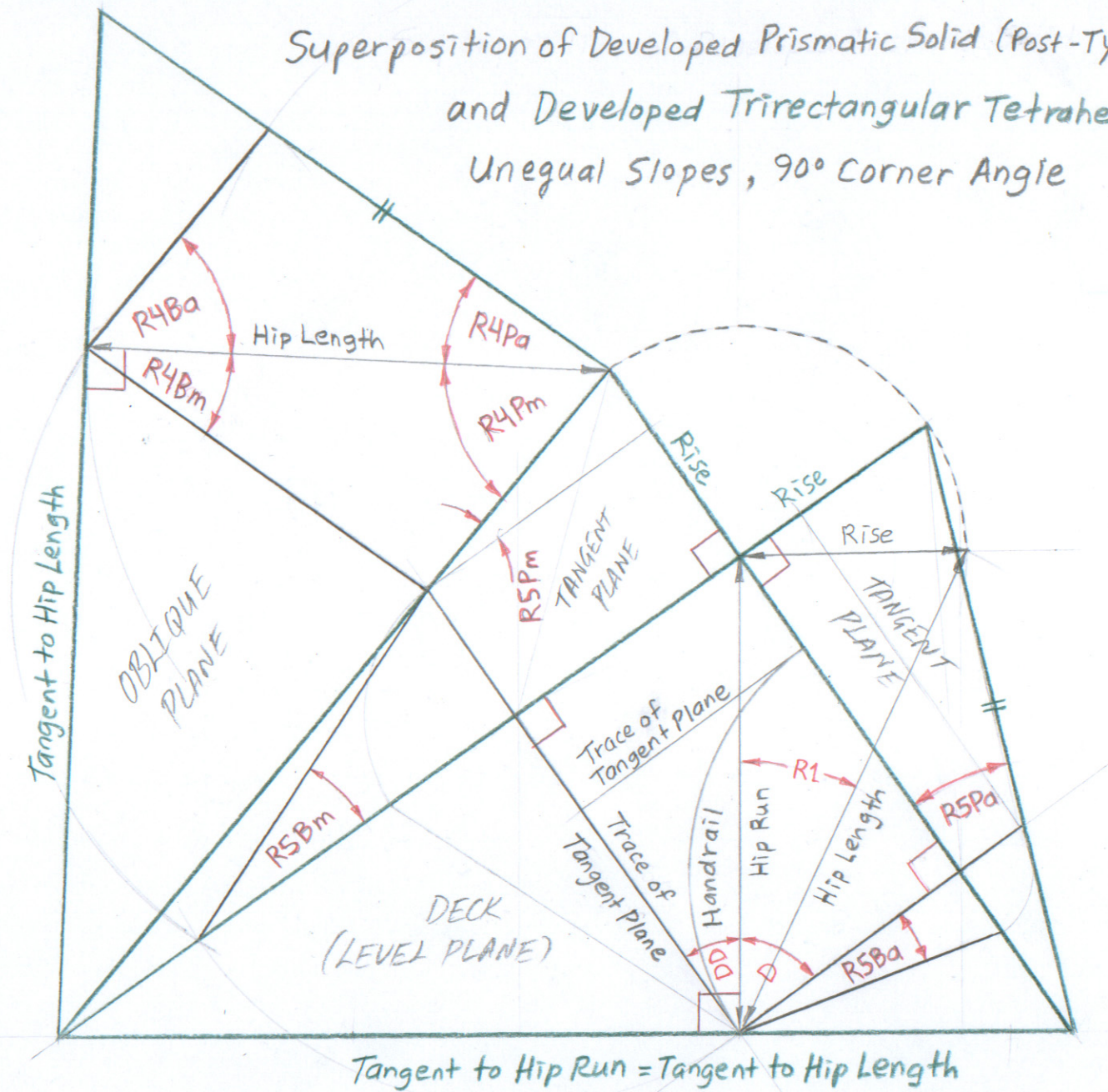
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Supplementary: Images of Prismatic Solids Comparison of Tetrahedral and Post Type Models

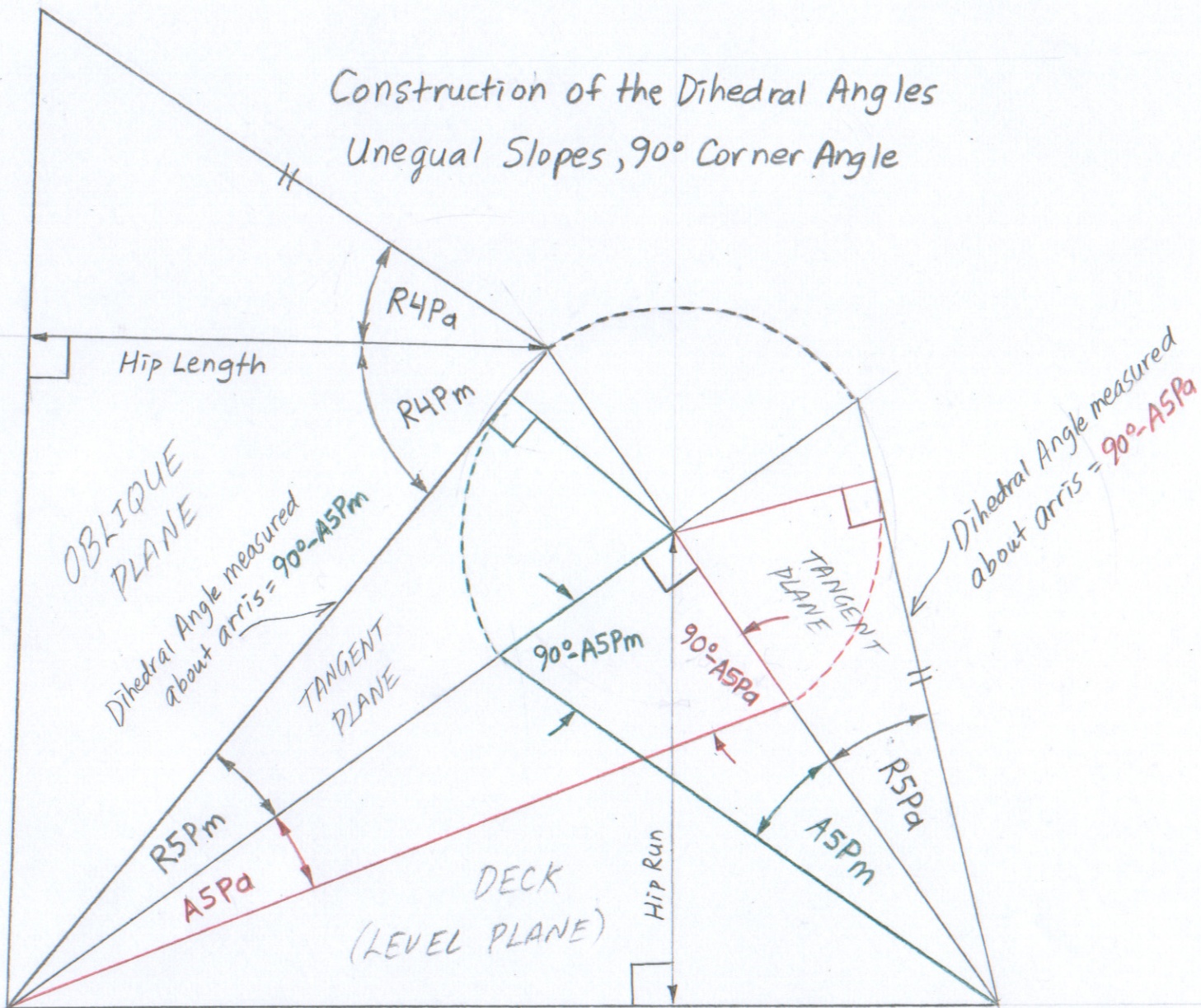
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Superposition of Developed Prismatic Solid (Post-Type Model)
 and Developed Trirectangular Tetrahedron
 Unequal Slopes, 90° Corner Angle



Construction of the Dihedral Angles Unequal Slopes, 90° Corner Angle



Superposition of Level Plane and Oblique Plane: Unequal Slopes, 90° Corner Angle.

Hip Run = 10, Hip Length = 11.08321
 Unless otherwise noted, the Centroid of the ellipse is the origin

Semi-minor Axis = Radius = 5.73462
 Semi-major Axis = 6.35580
 Foci: $F1 = (0, 2.74049)$, $F2 = (0, -2.74049)$

External Point: $P = (-7.98658, 1.56206)$

Points of Tangency:

$T1 = (-3.28859, 5.20688)$

$T2 = (-4.69799, -3.64481)$

From circle center...

$T2 = (-4.69799, -3.28859)$

Slope of $PT1 = .77582$

$\arctan(.77582) = 37.80518^\circ$

Slope of $PT2 = -1.58332$

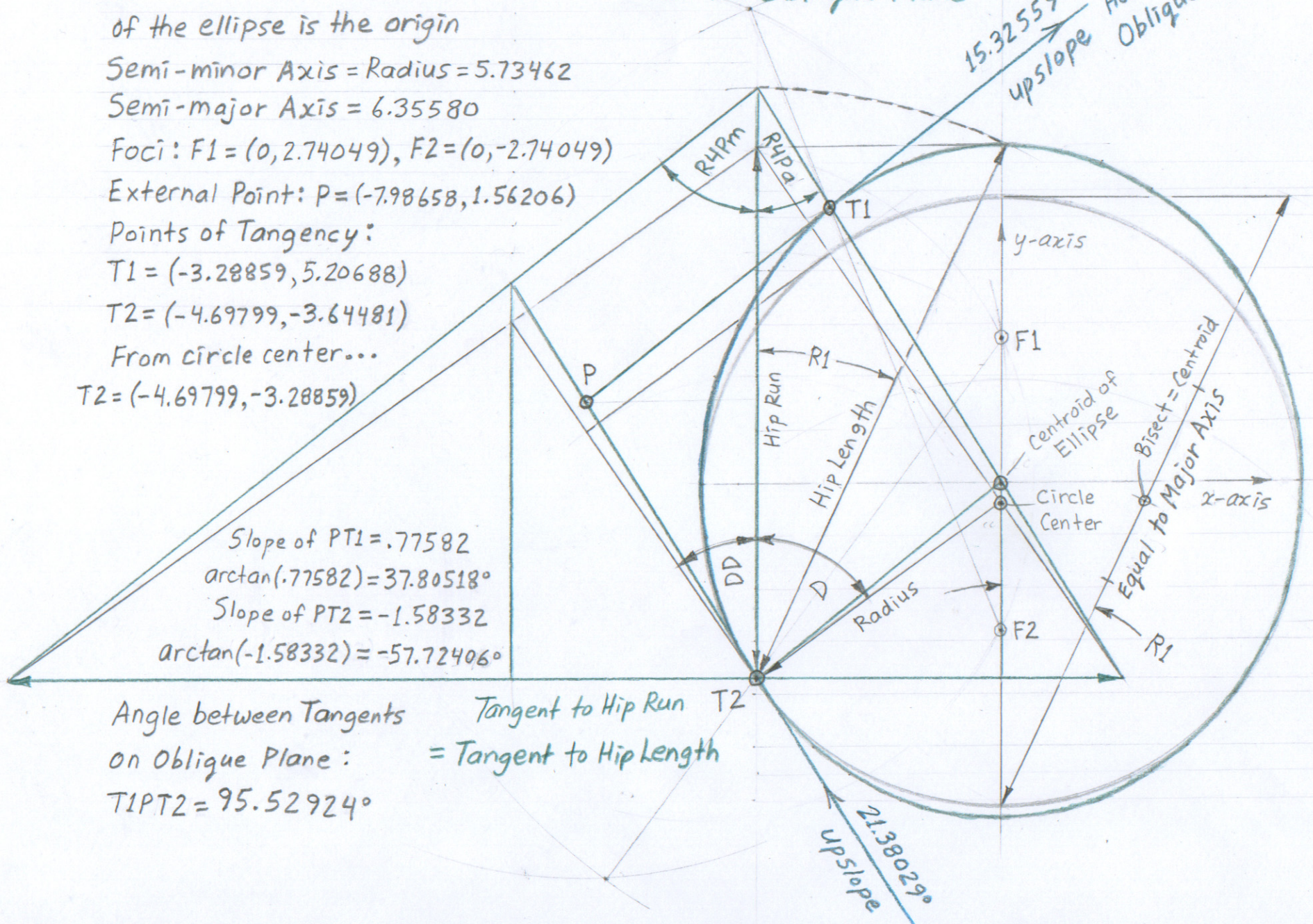
$\arctan(-1.58332) = -57.72406^\circ$

Angle between Tangents on Oblique Plane:

$T1PT2 = 95.52924^\circ$

Tangent to Hip Run $T2$ = Tangent to Hip Length

Construction of the Ellipse on the Oblique Plane



15.32559° Trace of Handrail on Oblique Plane upslope

21.38029° upslope

Table of Angles used in Developments and Construction of Models

10/12 Side

$$\mathbf{SS} = 39.80557^\circ$$

$$\mathbf{DD} = 34.99202^\circ$$

$$\mathbf{R1} = 25.54245^\circ$$

$$\mathbf{R4Bm} = 32.27594^\circ$$

$$\mathbf{R4Pm} = 52.19482^\circ$$

$$\mathbf{R5Bm} = 21.38029^\circ$$

$$\mathbf{R5Pm} = 15.32559^\circ$$

$$\mathbf{A5Bm} = 14.31575^\circ$$

$$\mathbf{A5Pm} = 20.68538^\circ$$

7/12 Side

$$\mathbf{S} = 30.25644^\circ$$

$$\mathbf{D} = 55.00798^\circ$$

$$\mathbf{R1} = 25.54245^\circ$$

$$\mathbf{R4Ba} = 52.19482^\circ$$

$$\mathbf{R4Pa} = 32.27594^\circ$$

$$\mathbf{R5Ba} = 15.32559^\circ$$

$$\mathbf{R5Pa} = 21.38029^\circ$$

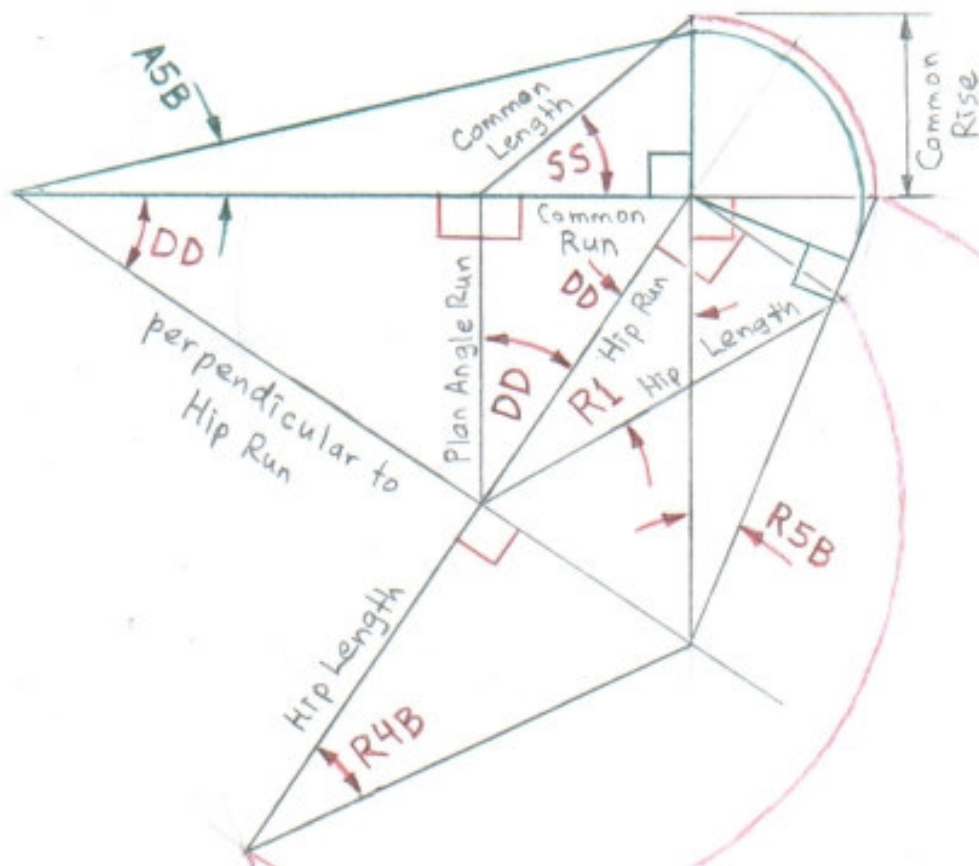
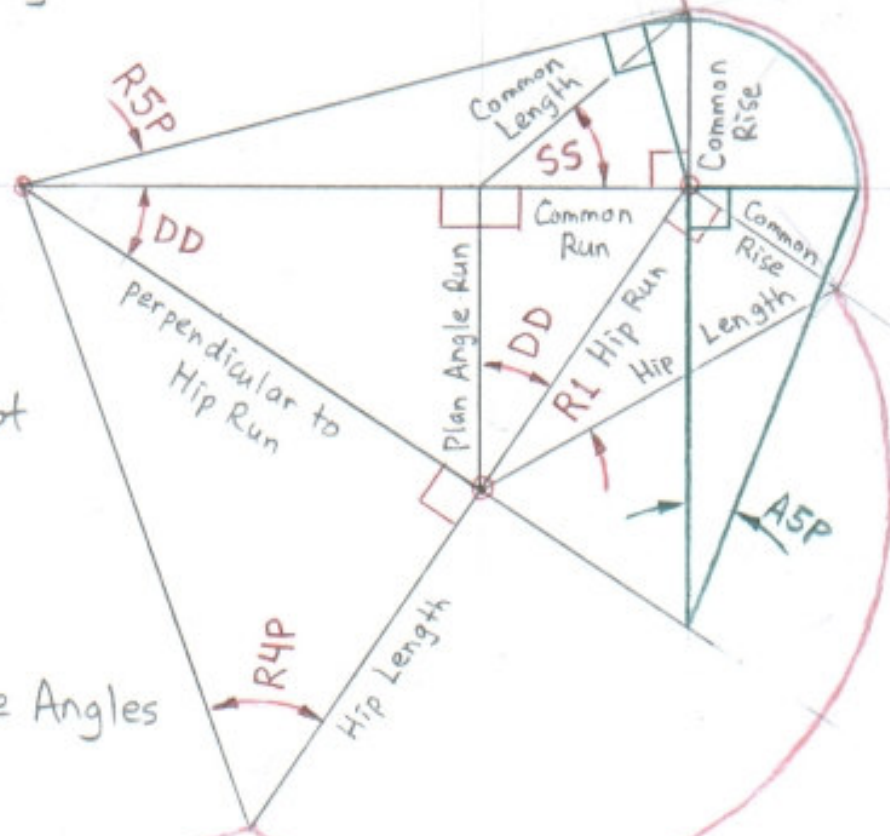
$$\mathbf{A5Ba} = 20.68538^\circ$$

$$\mathbf{A5Pa} = 14.31575^\circ$$

Main Slope = 10/12 Adjoining Slope = 7/12
 Corner Angle = 90°

Development of Hip Rafter Side Cut and Compound Angle at Hip Rafter Peak or Valley Rafter Foot

Developments of Main (10/12) Side Angles



Development of Hip Rafter Side Cut and Compound Angle at Hip Rafter Foot or Valley Rafter Peak

