

Modelling the airplane: Globe Swift GC – 1A.

- Modelled wings as trapezoids.
- Modelled wing tips as half-ellipses.
- Modelled frontal fuselage as an equivalent circle
- The sections of fuselage drawing were used to measure the area at each section and named alphabetically (A – E).
- Two symmetric NACA airfoils were chosen for HT and VT. Names:
- Obtained aircraft gross weight and other data from: <https://swiftmuseumfoundation.org/wp-content/uploads/2019/02/Initial-Recurrent-Pilot-Training-Handbook.pdf>

All measurements were performed using a ruler reading in cm and converted to mm.

Scale factors:

Length of the airplane: 4.4640

Width of the airplane: 4.6364

Stock height (Found from above link: 6ft 1in): 7.3977

Length of fuselage: 4.7222

Note: I mainly used the first three scale factors for my length, width, and height estimations.

Airfoils:

Airfoil thicknesses were estimated by measured with a ruler. The $\frac{t}{c}$ was then calculated using root and tip chord measurements for the main wing, horizontal stabilizer, and vertical stabilizer. NACA airfoils 23015 for the root and 23009 for the tip chord of the main wing were chosen based on the plane specifications.

Reynolds Number:

Reynolds numbers were calculated by using the specific mean geometric chord lengths for the main wing, horizontal wings, and vertical wings. For the fuselage, the entire fuselage length (18 ft) was taken into consideration.

Gross Wetted Area:

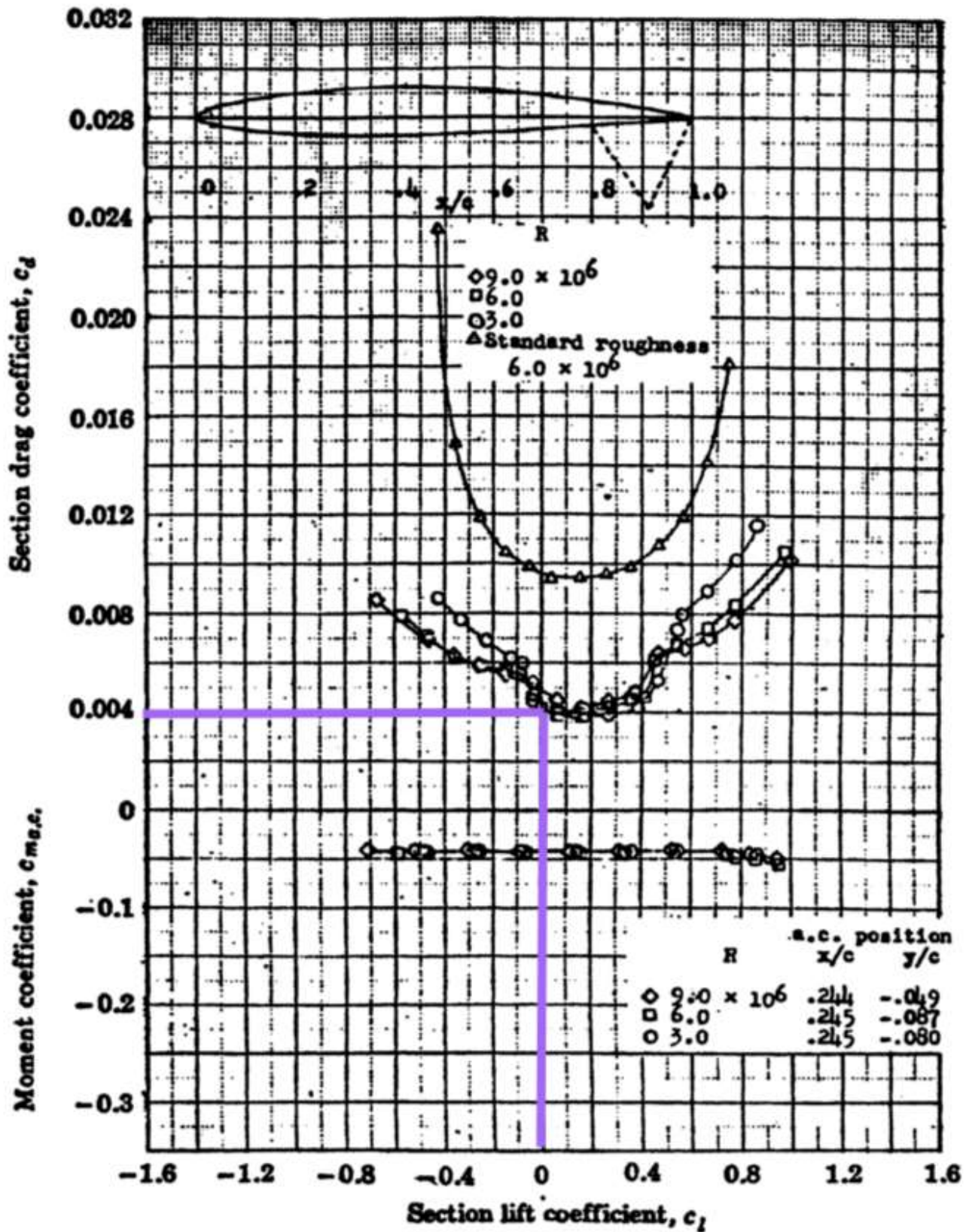
The gross wetted area for the main wing was taken as the entire surface area of the wing, on both sides - top and bottom. Same for horizontal and vertical tails. For the fuselage:

$$A_{wet} = 0.79 * D_{Max} * L$$

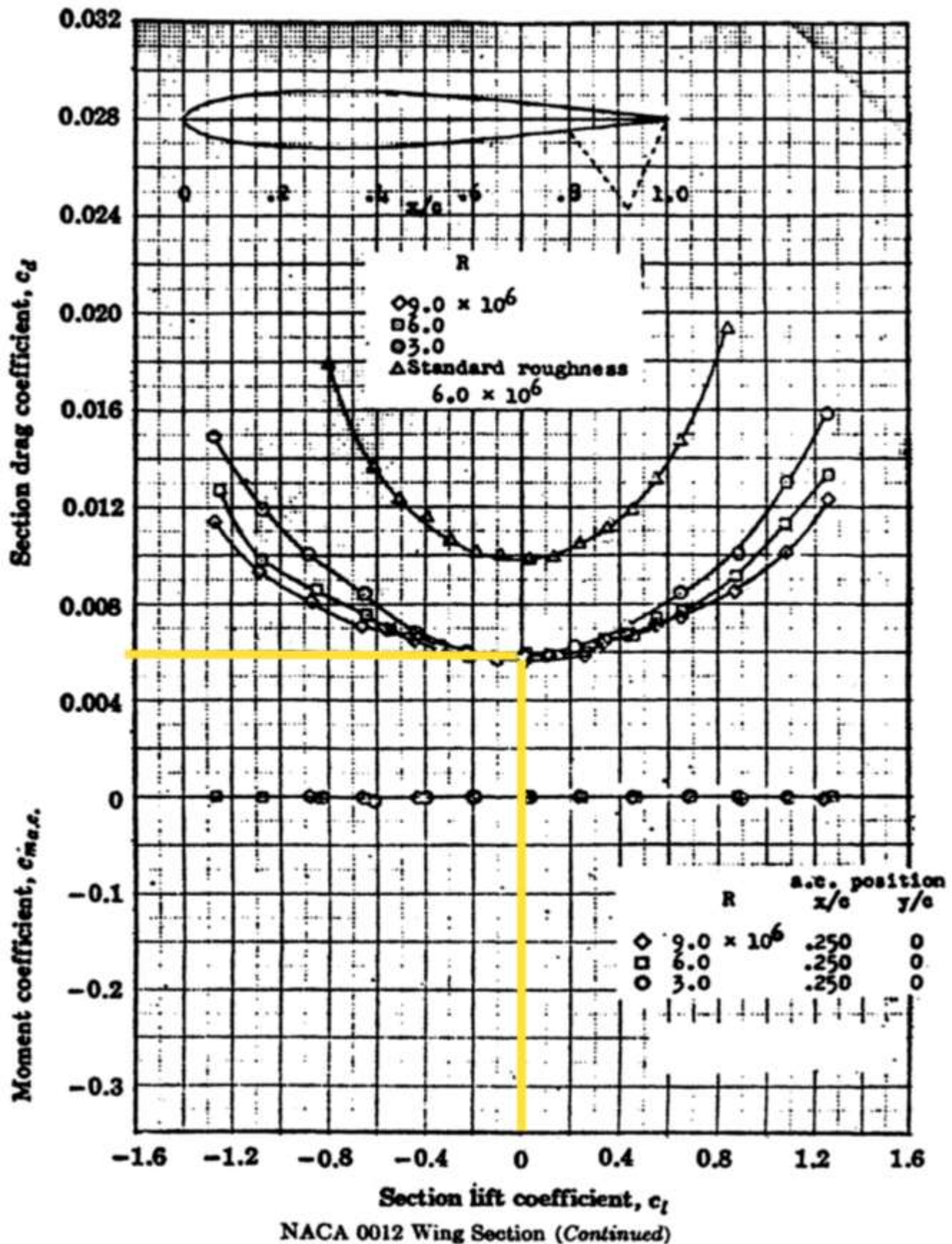
For values of C_d for 2D test from theory of wing sections for main wing, vertical and horizontal wings:

APPENDIX IV

461

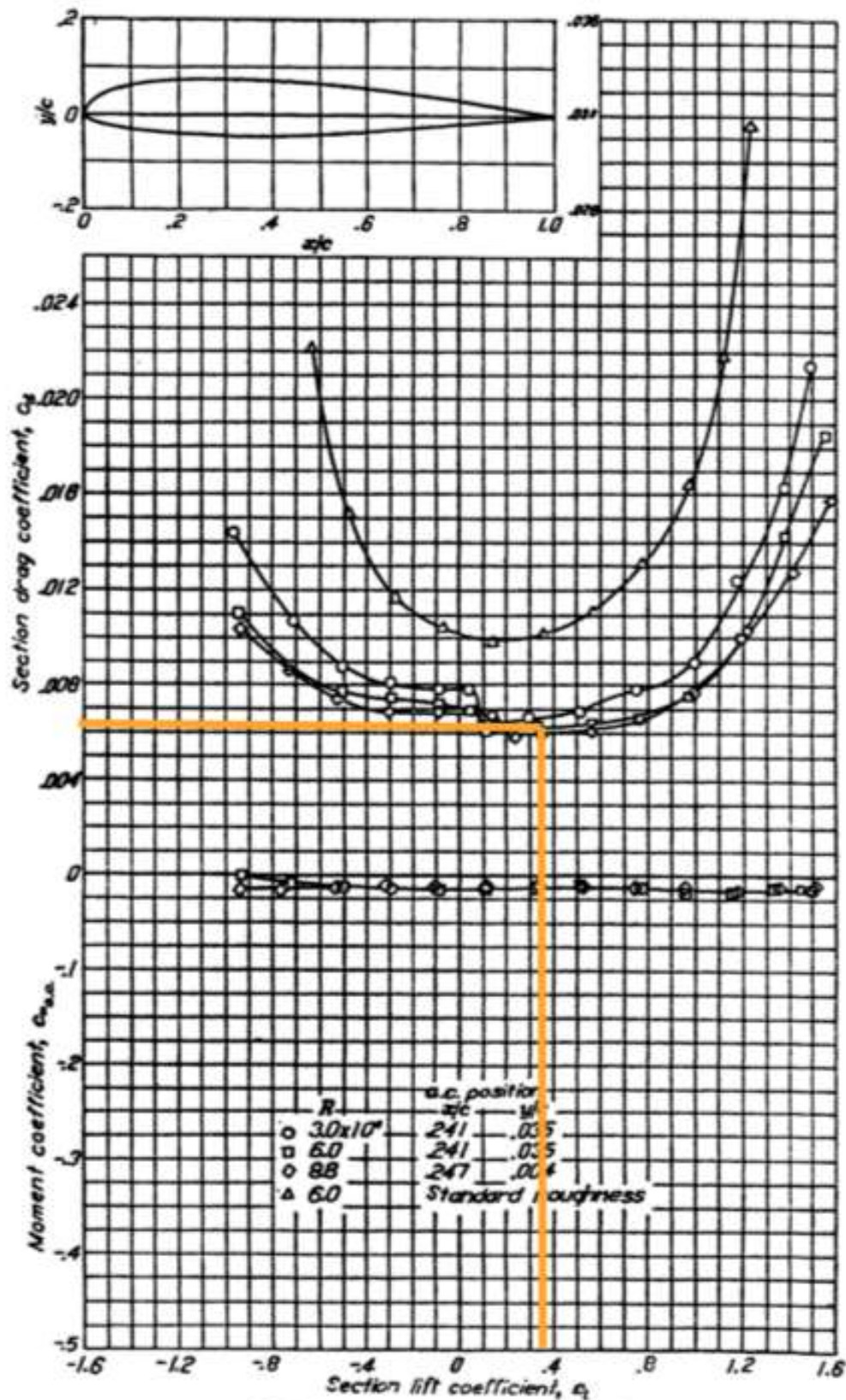


NACA 0010-34 Wing Section
 $\alpha = 0.8$ (modified), $c_{l_0} = 0.2$ (Continued)



APPENDIX IV

499

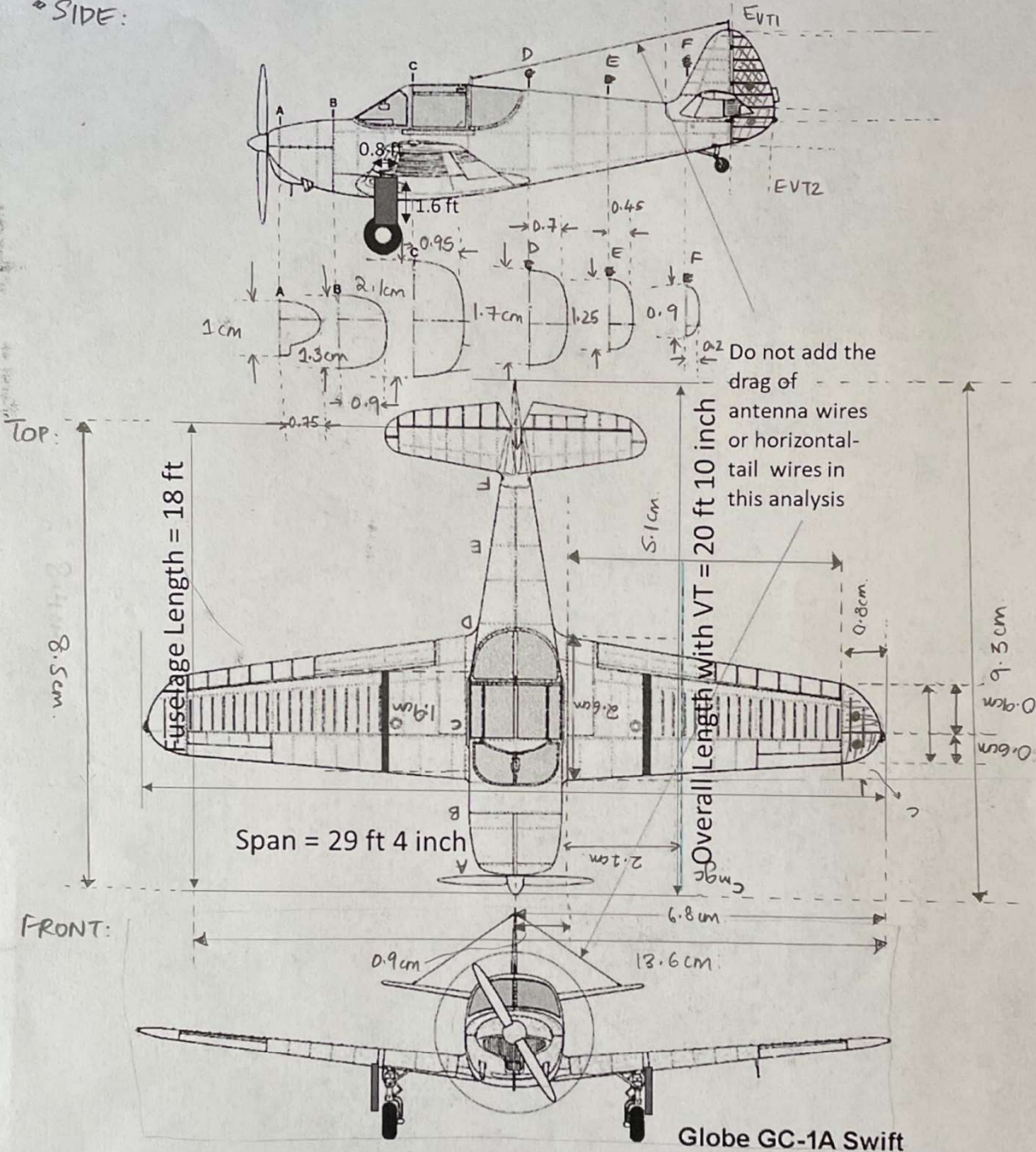


NACA 23012 Wing Section (Continued)

MAE 3306-001

Fall 2022

SIDE:



Globe GC-1A Swift

SCALE FACTORS [mm/ft]

- BASED ON FUSALAGE LENGTH: 4.72222
- BASED ON OVERALL LENGTH: 4.464
- BASED ON SPAN: 4.6363

Measurements:

- SIDE VIEW LENGTHS.
- WING SECTIONS
- OVERALL LENGTH, SPAN.

Vertical tail dimensions, full height of the aircraft.

Measurements:

- Extended wing tip
- Fuselage length \rightarrow Sections A-F
- Tail \rightarrow Horizontal, Vertical