PERISCOPE

John Dunn

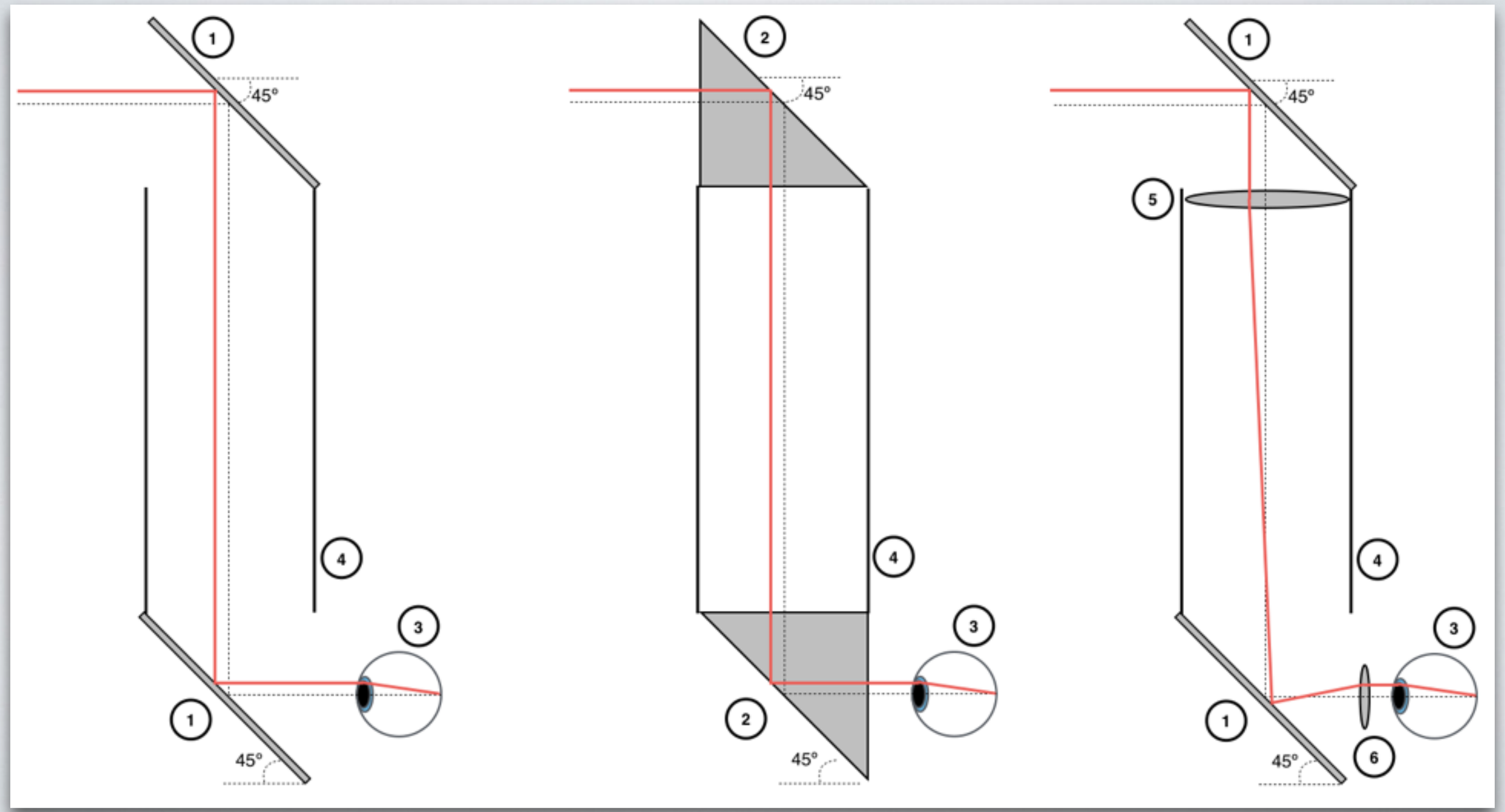
"PassionFord - View Single Post - Atomic Explosion under the Sea." *PassionFord RSS*. N.p., n.d. Web. 27 Apr. 2016.

WHAT IS A PERISCOPE?

- View objects from a taller point of view.
- Can have magnification
- Can be simple or very complex.

"About Us." Periscope Digital. N.p., n.d. Web. 26 Apr. 2016.

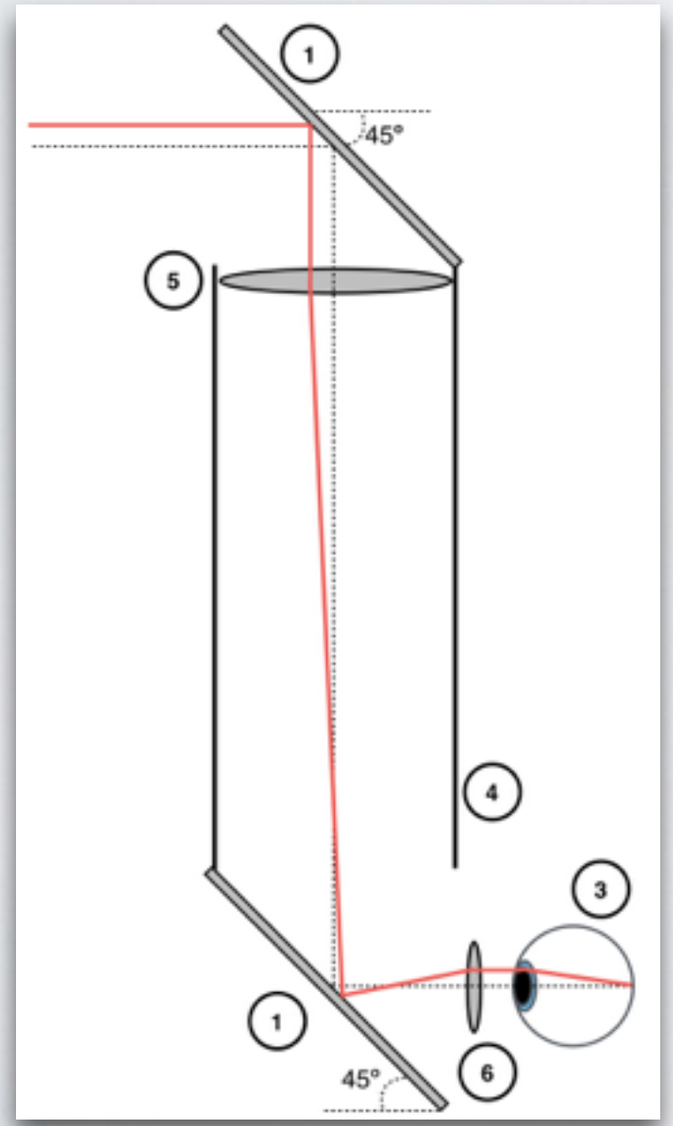
SOME DESIGNS

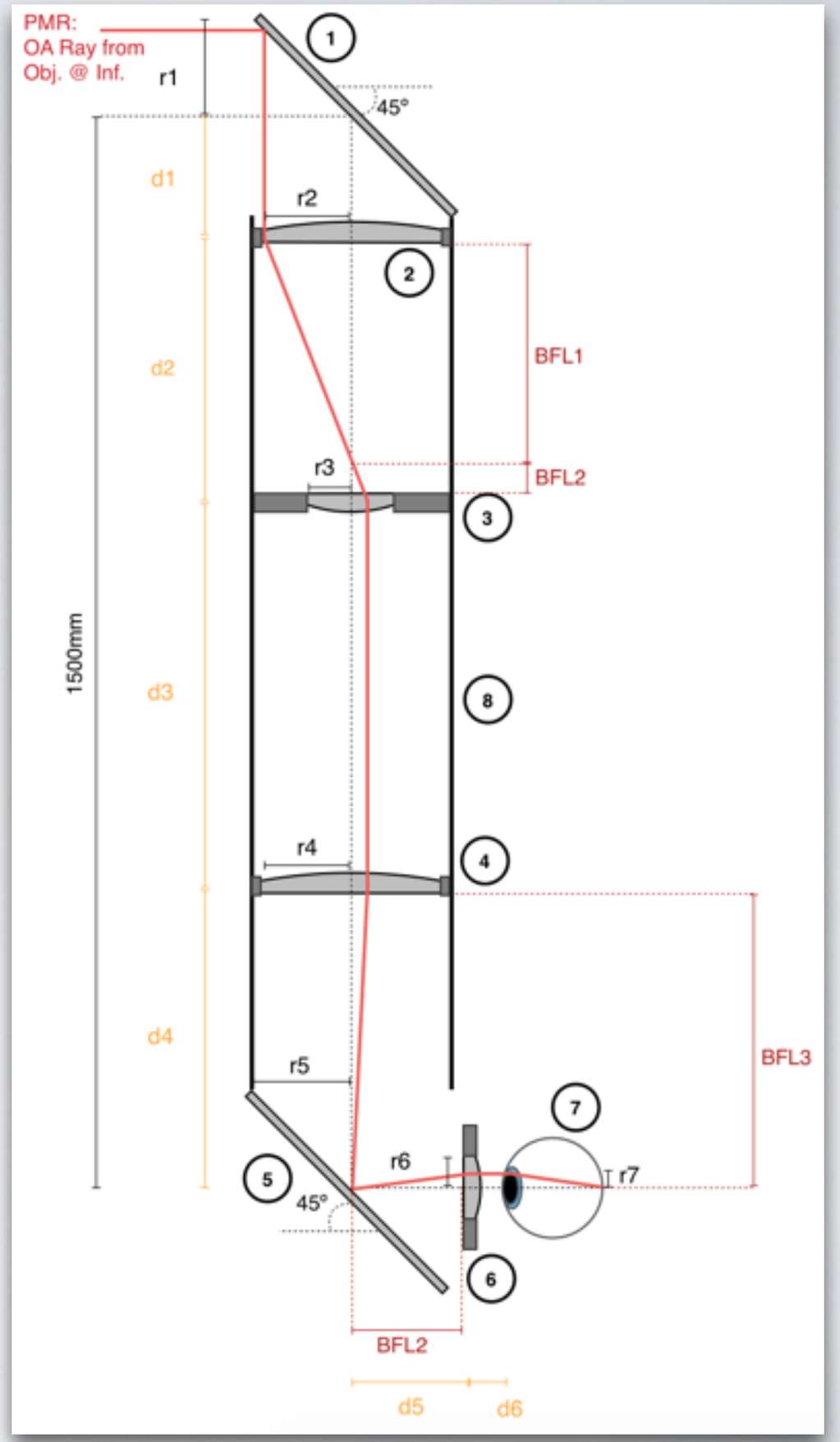


DESIGN SPECIFICATIONS

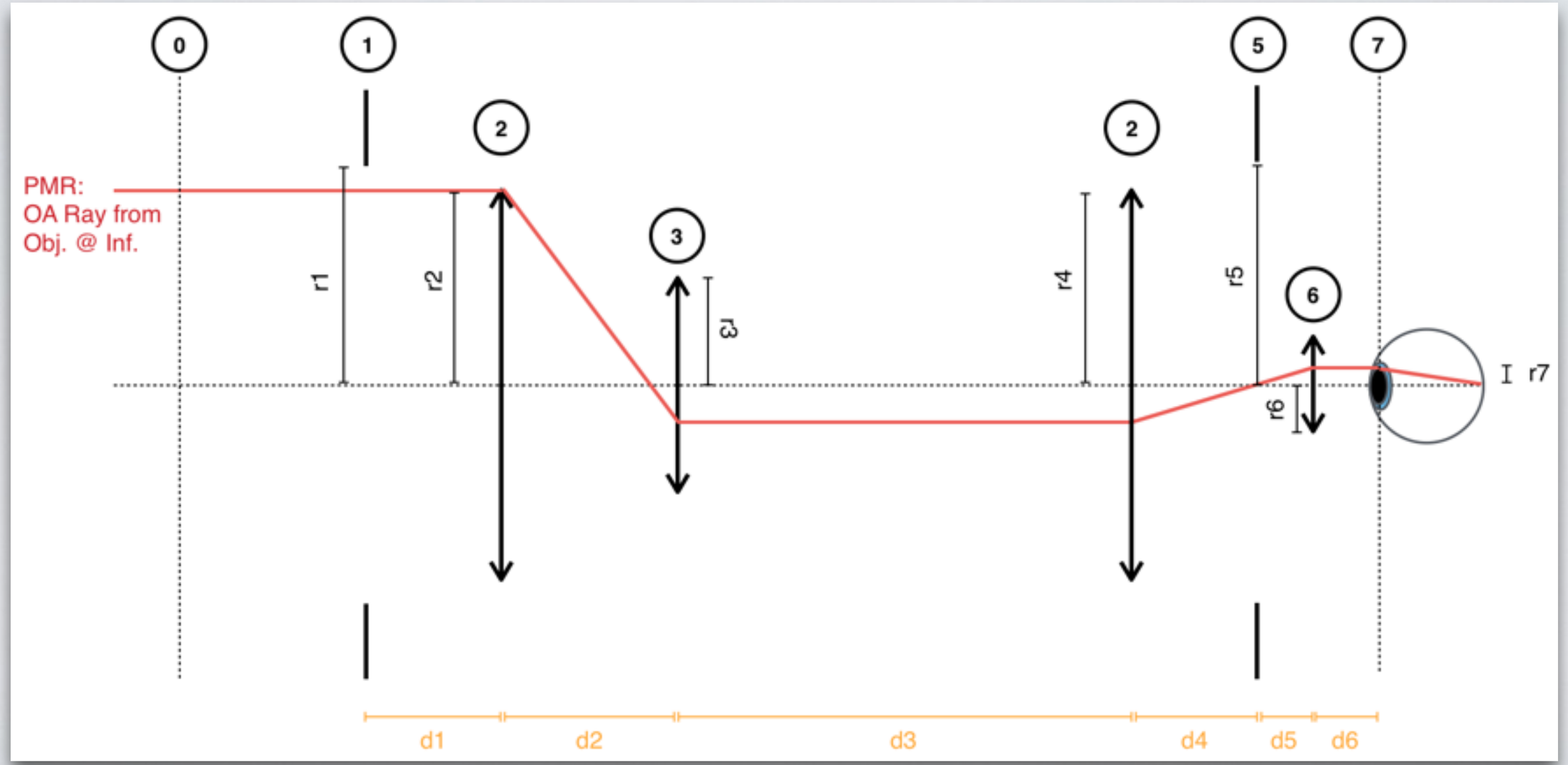
- For use in the daytime
- Should be 1.5m in height
- Should have angular magnification of 20X

CHOSEN DESIGN





UNFOLDED DESIGN

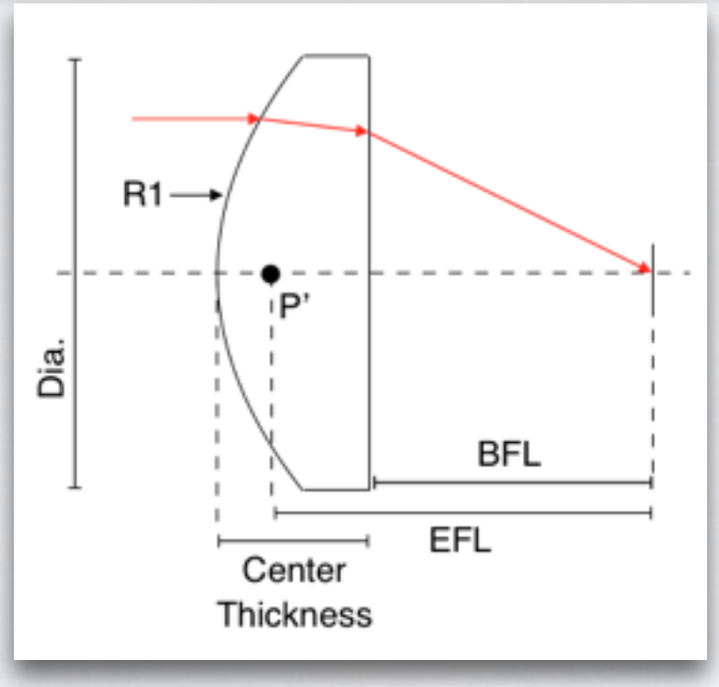


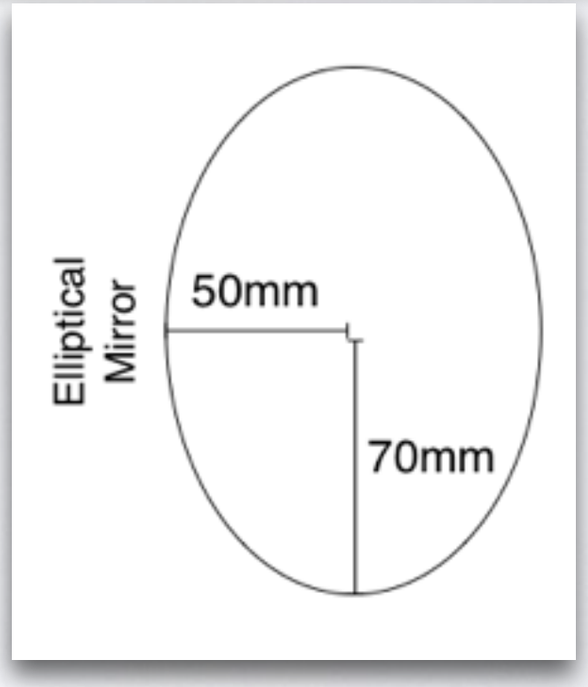
SPECIFICATION

- Pupil Diameter Approximation
  - Human Pupil Radius is approx. 1.5-4mm. So set **r7 = 2mm**.
- Observation Distance
  - Distance between Eye Lens and Eye. **d6 = 2cm = 20mm.**
- Refractive Indicies
  - Air: **N = 1**

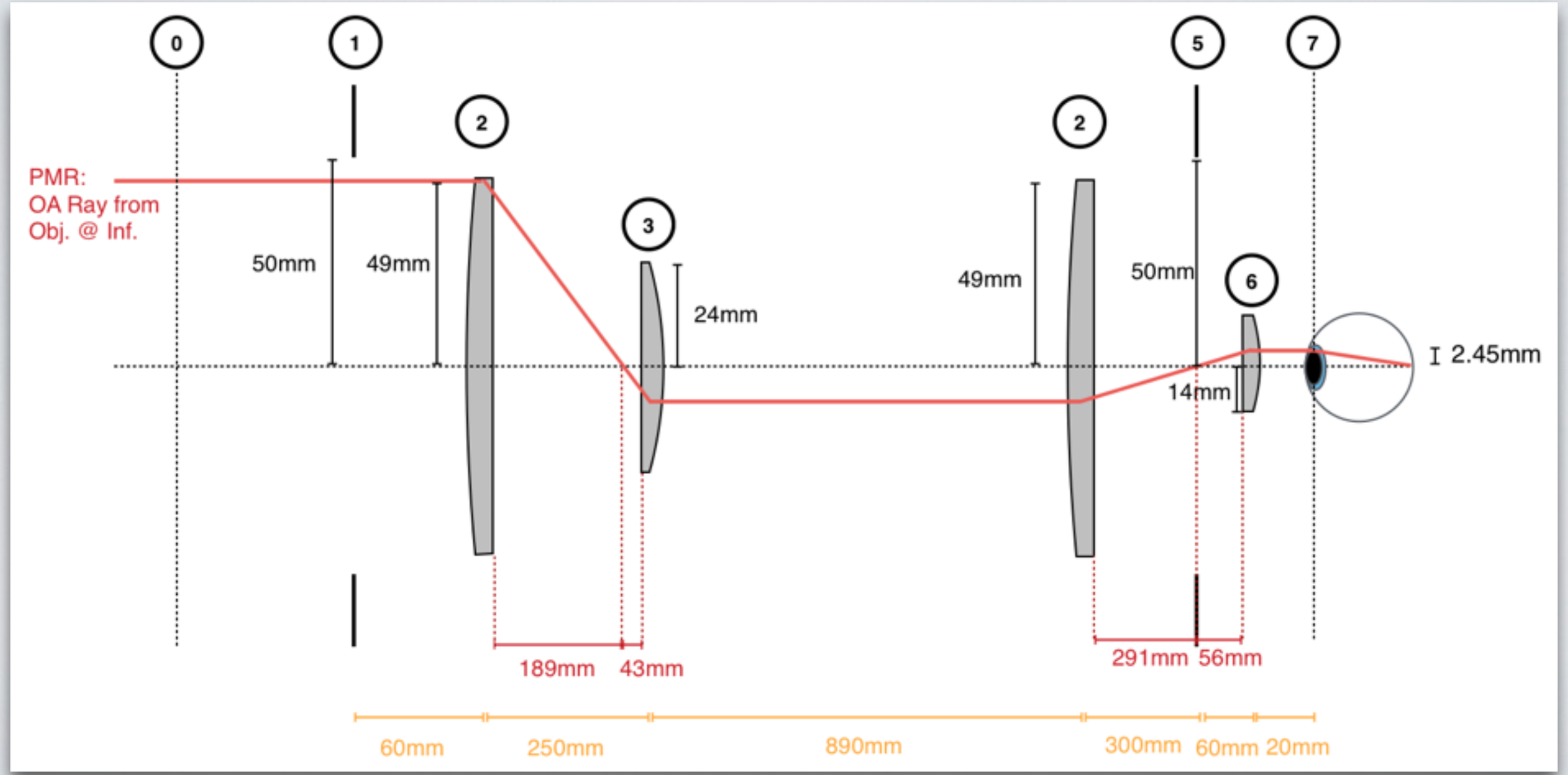
ELEMENTS

	Objective Lens [4]	Relay Lens 1 [5]	Relay Lens 2 [6]	Eye Lens [7]
Type	Plano-Convex	Plano-Convex	Plano-Convex	Plano-Convex
Diameter (mm)	100.0000	50.0000	100.0000	30.0000
EFL (mm)	200.0000	50.0000	300.0000	60.0000
K (m^-1)	5.0000	20.0000	3.3333	16.6667
BFL (mm)	189.0000	43.2800	291.0000	56.0300
Center Thickness (mm)	17.0000	12.0000	12.5000	6.0000
Radius R2	103.5000	39.2400	155.0000	31.0100
f/#	2.0000	1.0000	3.0000	2.0000
NA	0.2500	0.5000	0.1700	0.2500

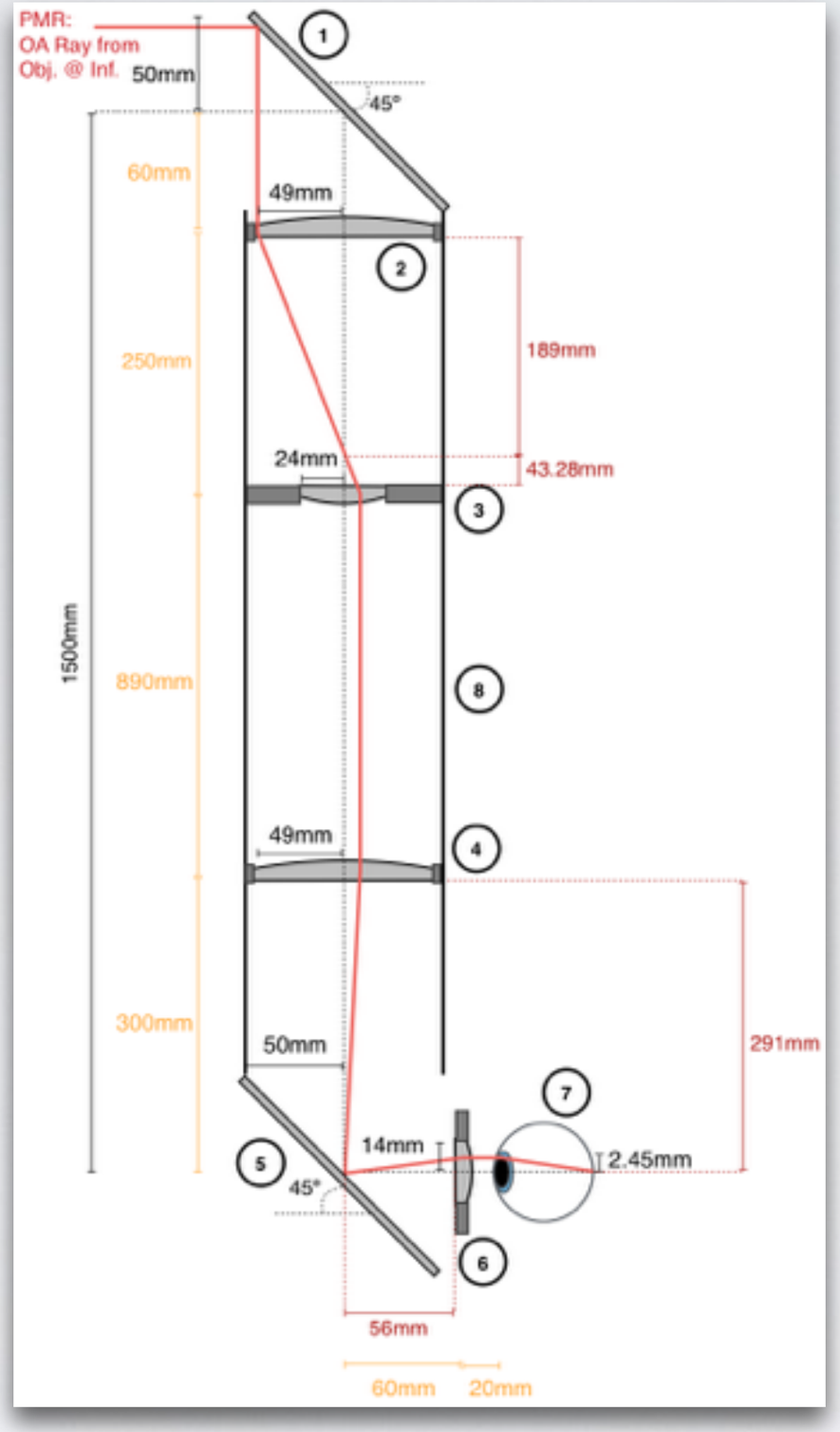




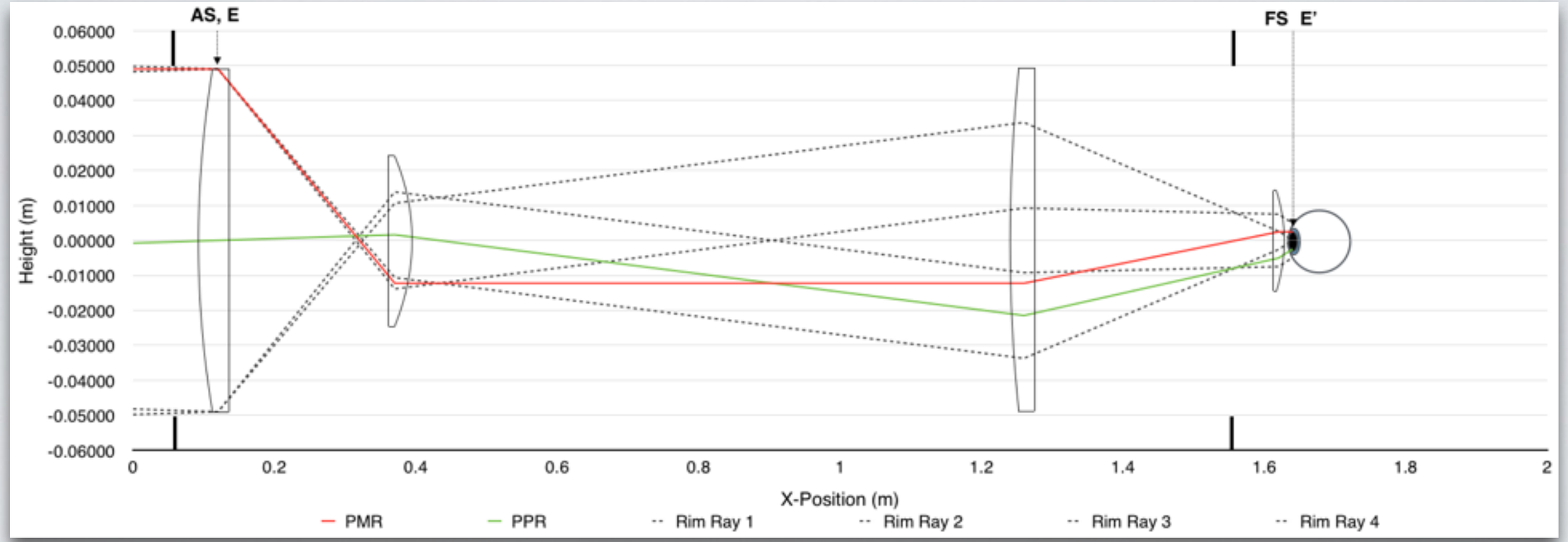
SPECIFICATION



SPECIFICATION



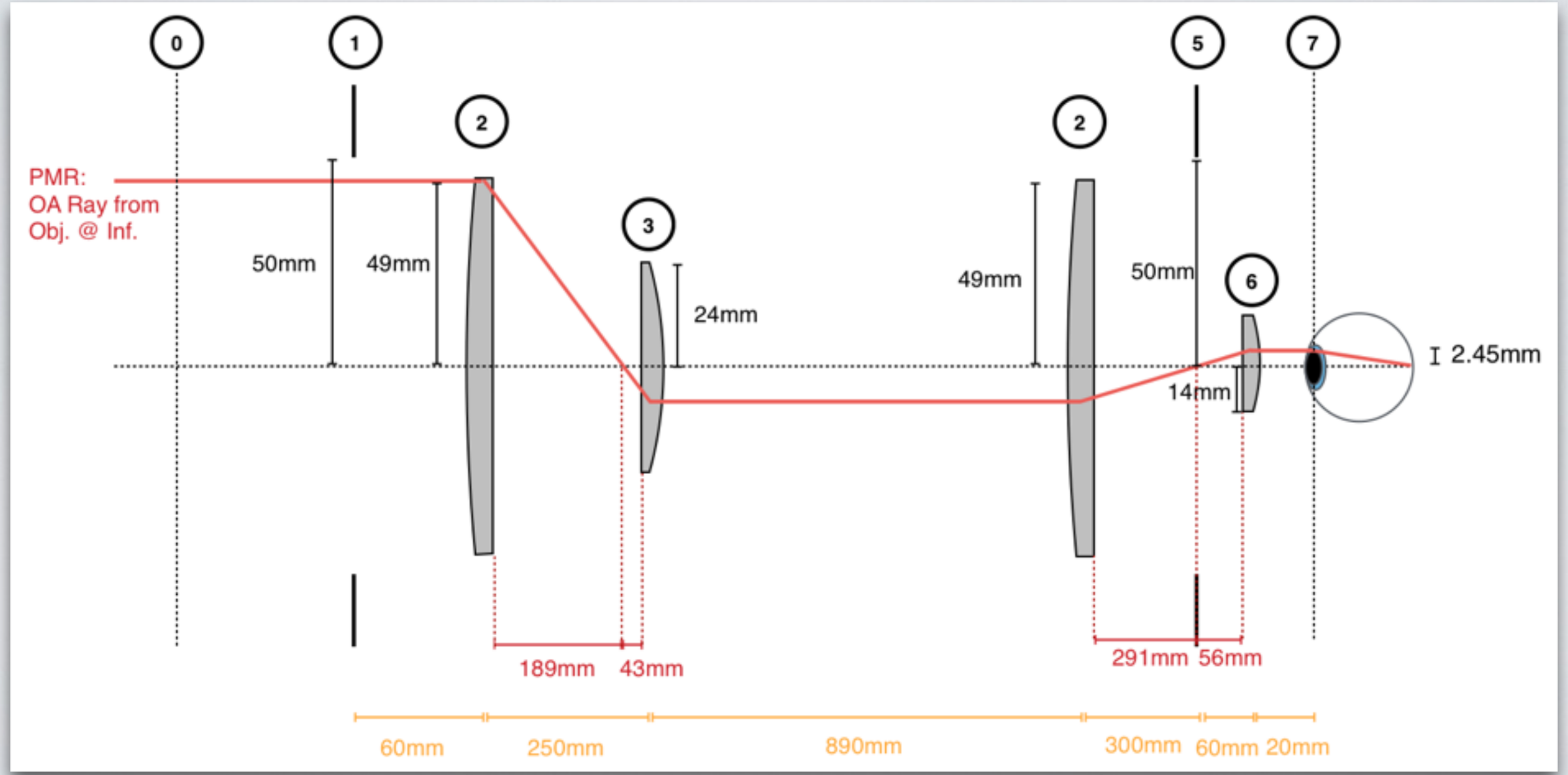
RAY TRACE


AS, E
FS E'
0.06000
0.05000
0.04000
0.03000
0.02000
0.01000
0.00000
-0.01000
-0.02000
-0.03000
-0.04000
-0.05000
-0.06000
Height (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
X-Position (m)
PMR
PPR
Rim Ray 1
Rim Ray 2
Rim Ray 3
Rim Ray 4

SYSTEM SUMMARY

Specification	Value
Angular Magnification	20.00000
Linear Magnification	0.05000
Angular Field of View (rad)	0.01298
Angular Field of View (deg)	3.67001
Height of System (m)	1.5

THANK YOU!


0
1
2
3
5
7
6
PMR:
OA Ray from
Obj. @ Inf.
50mm
49mm
24mm
49mm
50mm
14mm
I 2.45mm
189mm
43mm
291mm
56mm
60mm
250mm
890mm
300mm
60mm
20mm

APPENDIX

RAY TRACE TABLES

PMR

Plane Name	Start Plane	Mirror Aperature	Objective Lens	Relay Lens 1	Relay Lens 2	Mirror Aperature	Eye Lens	Eye
	0	1	2	3	4	5	6	7
K	0.00000	0.00000	5.00000	20.00000	3.33333	0.00000	16.66667	N/A
di	0.06000	0.06000	0.25000	0.89000	0.30000	0.06000	0.02000	N/A
hi	0.04900	0.04900	0.04900	-0.01225	-0.01225	-0.00000	0.00245	0.00245
ui'	0.00000	0.00000	-0.24500	-0.00000	0.04083	0.04083	0.00000	N/A
ri	N/A	0.05000	0.04900	0.02400	0.04900	0.05000	0.01400	0.00245
hi/ri	N/A	0.98000	1.00000	-0.51042	-0.25000	-0.00000	0.17500	N/A

PPR

Plane Name	Start Plane	Mirror Aperature	Objective Lens	Relay Lens 1	Relay Lens 2	Mirror Aperature	Eye Lens	Eye
	0	1	2	3	4	5	6	7
K	0.00000	0.00000	5.00000	20.00000	3.33333	0.00000	16.66667	N/A
di	0.06000	0.06000	0.25000	0.89000	0.30000	0.06000	0.02000	N/A
hi	-0.00078	-0.00039	0.00000	0.00162	-0.02148	-0.00779	-0.00505	-0.00245
ui'	0.00649	0.00649	0.00649	-0.02596	0.04565	0.04565	0.12980	N/A
ri	N/A	0.05000	0.04900	0.02400	0.04900	0.05000	0.01400	0.00245
hi/ri	N/A	-0.00779	0.00000	0.06760	-0.43841	-0.15576	-0.36066	N/A