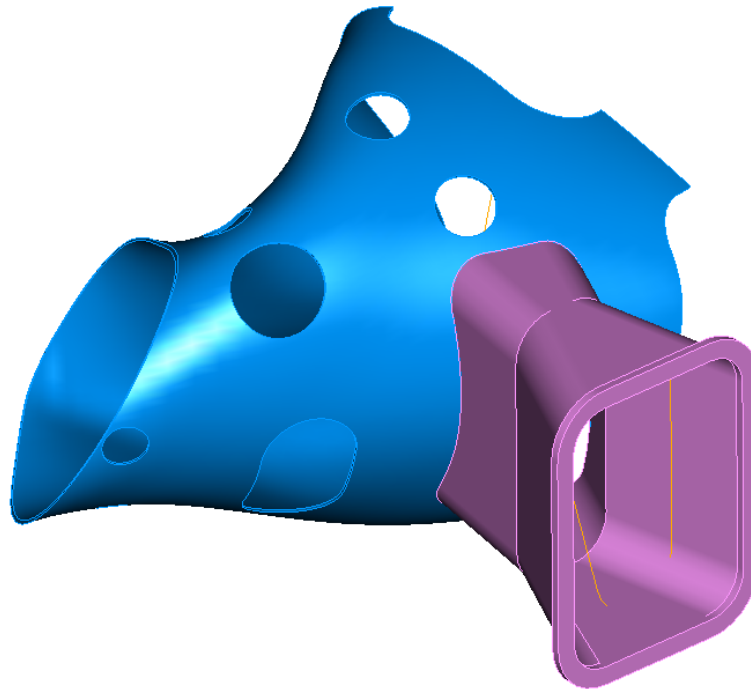


NCSX Diagnostic Port Optimization of Port 4

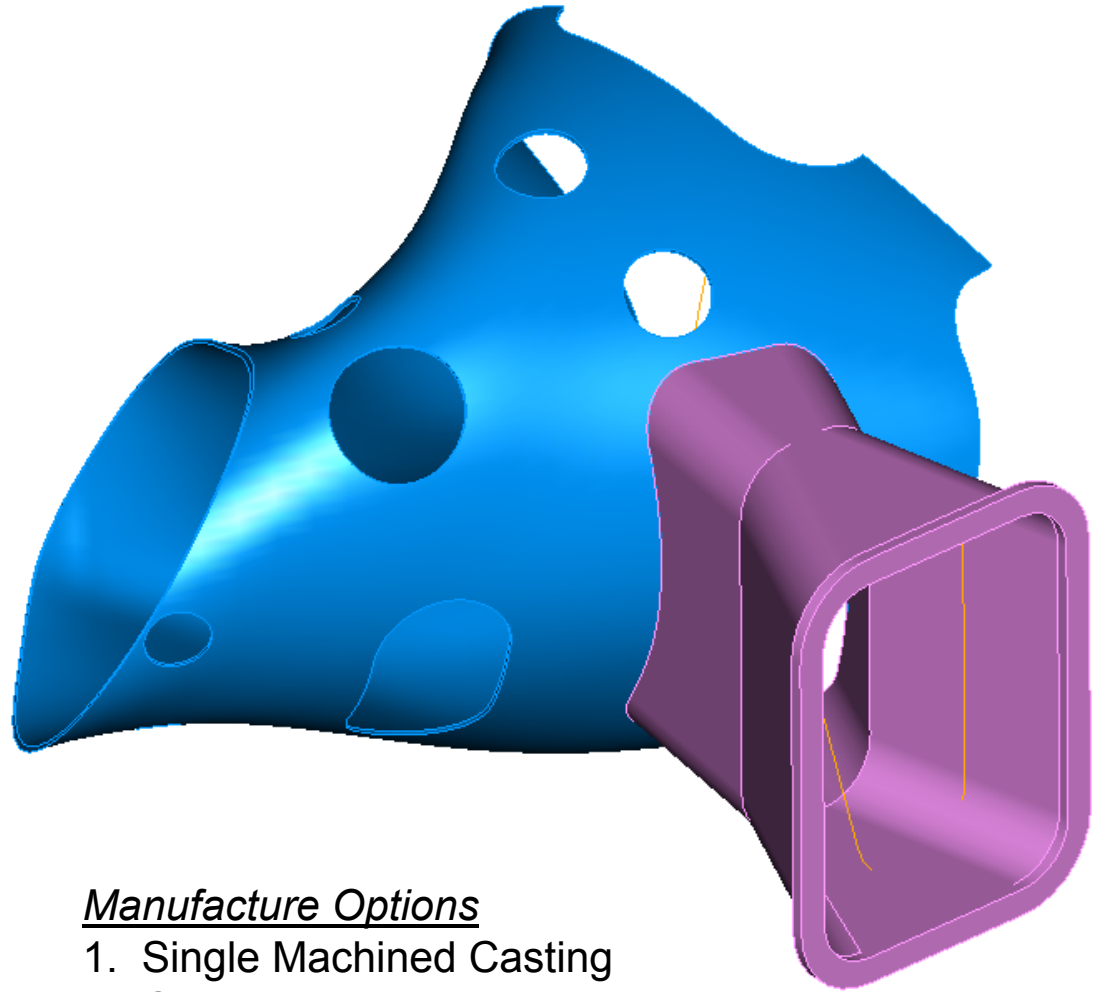
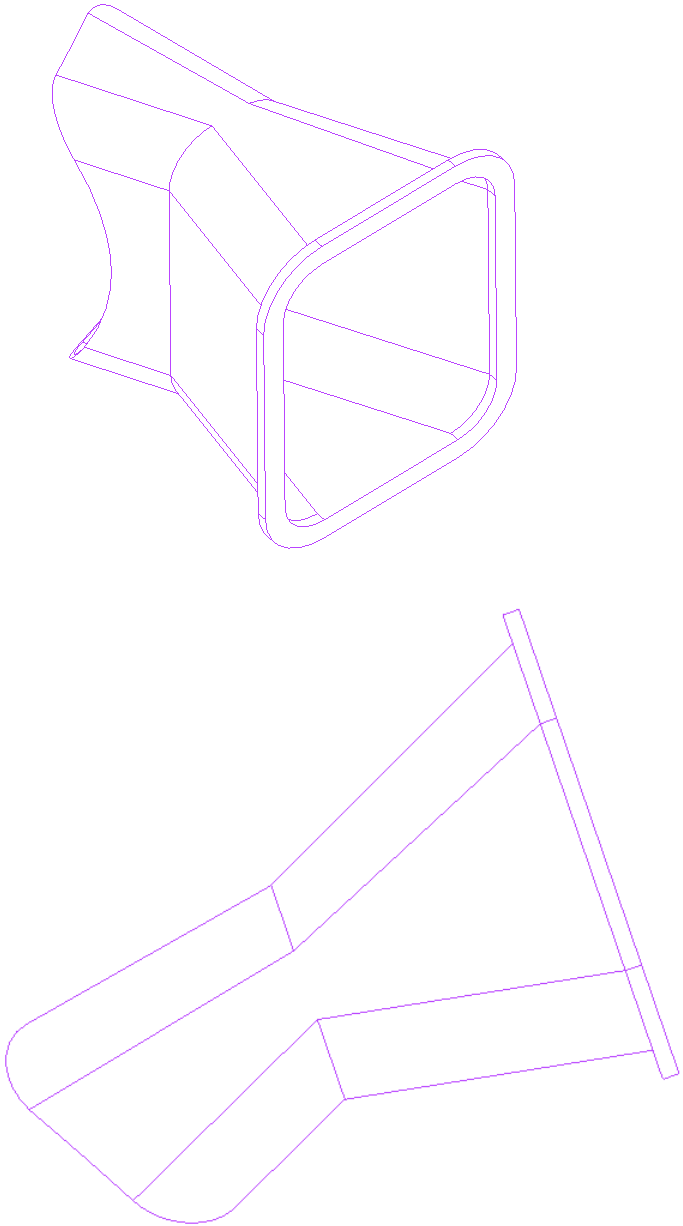
Optimize port for good spatial resolution and optical throughput for MSE, CHERS and Thomson Scattering

Provides maximum flexibility for other, future diagnostics as the machine evolves over its life.

Minimize impact on machine assembly



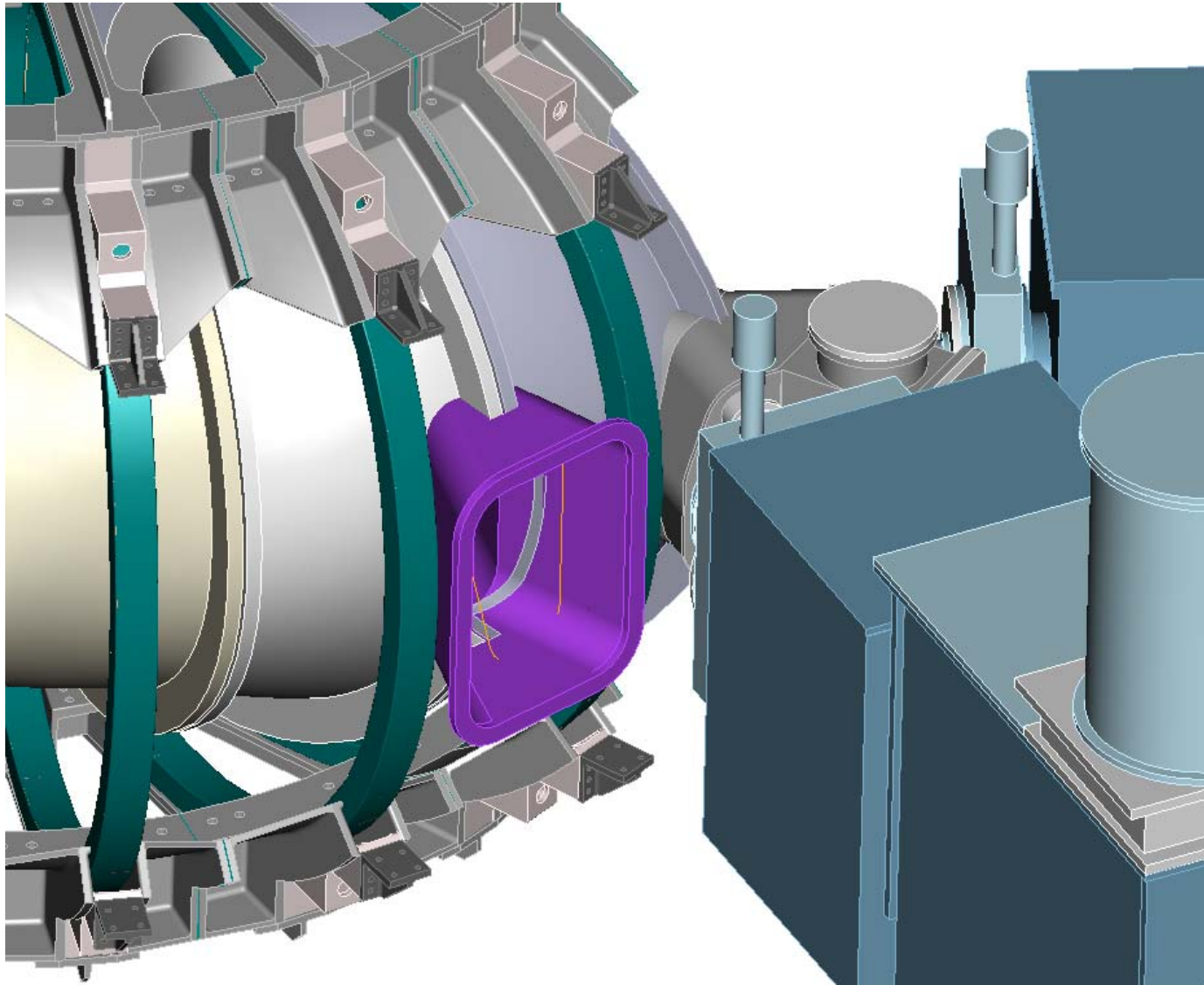
Optimized Port 4



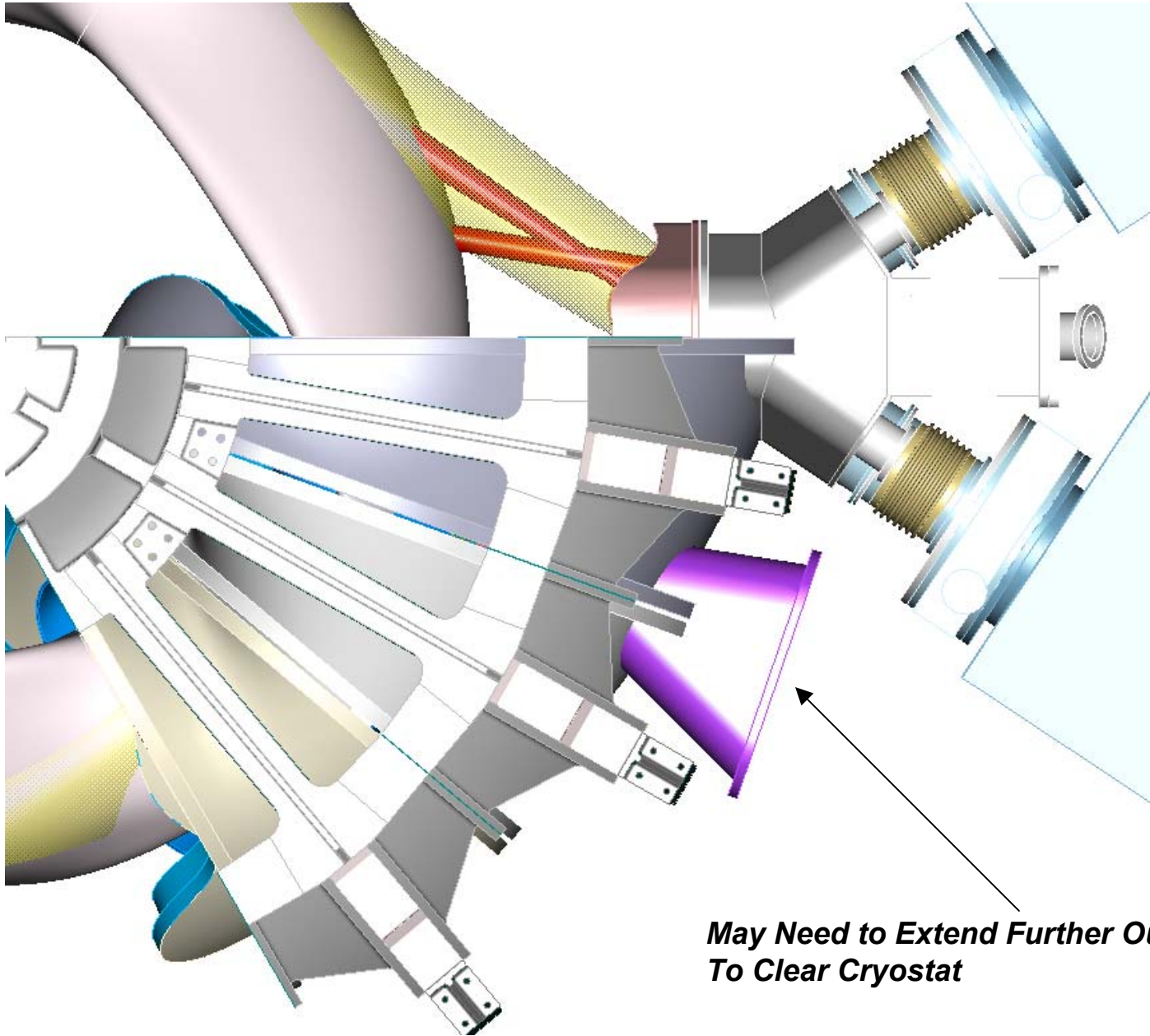
Manufacture Options

1. Single Machined Casting
2. Casting Weldment
3. Plate Weldment

Optimized Port 4

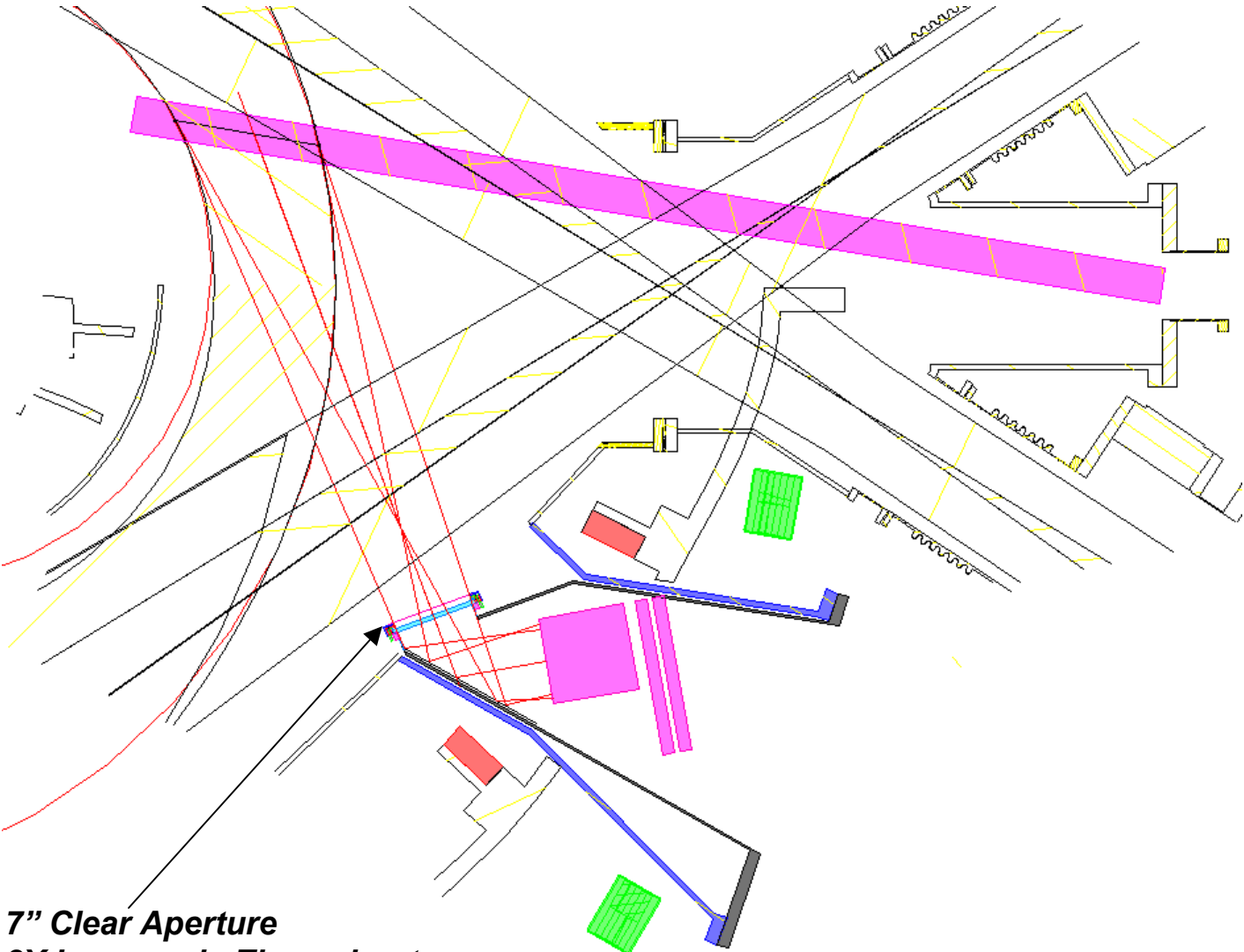


Optimized Port 4



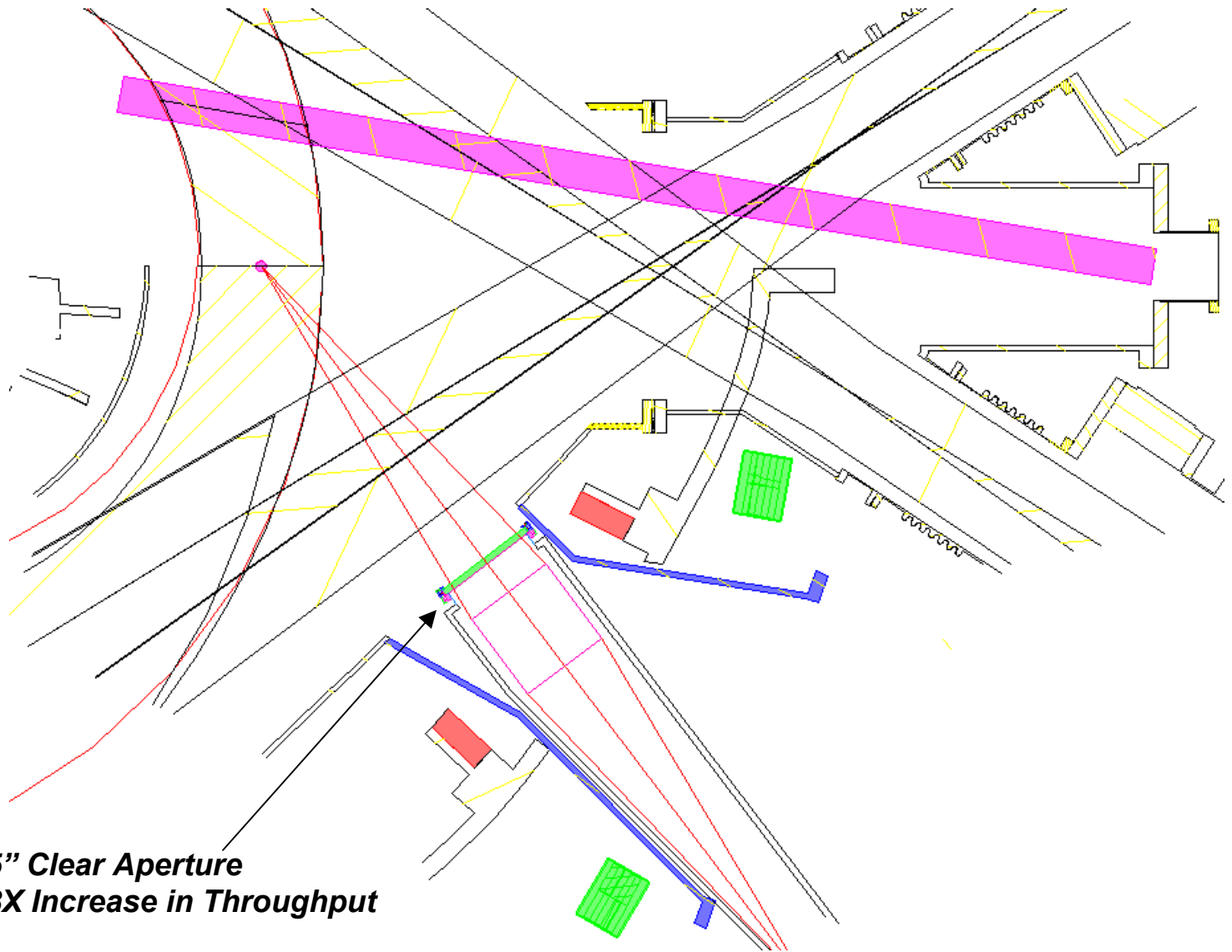
*May Need to Extend Further Out
To Clear Cryostat*

MSE/CHERS: Views Tangent to Flux Surfaces At DNB Crossing



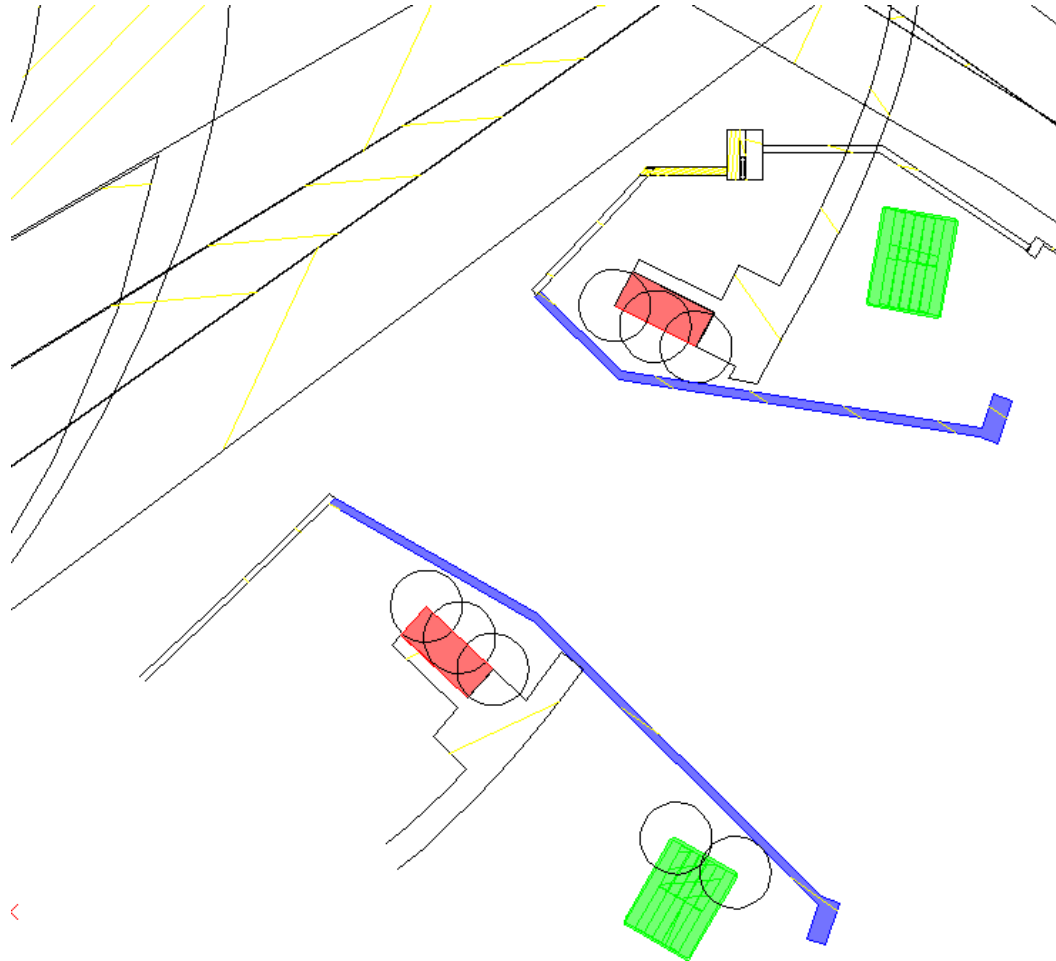
7" Clear Aperture
2X Increase in Throughput

Thomson Scattering: Views Vertical Laser Beam



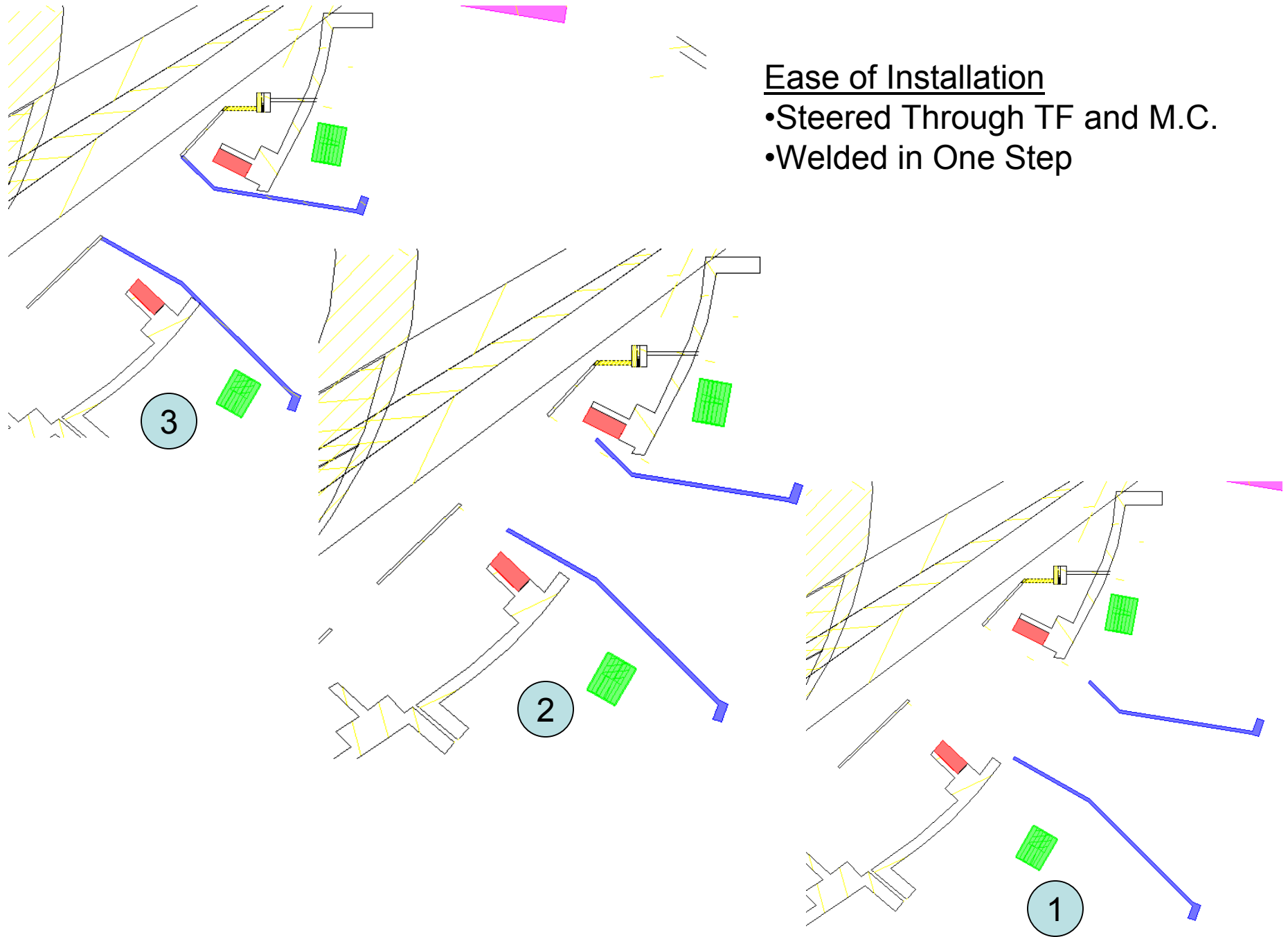
8.5" Clear Aperture
1.8X Increase in Throughput

Design Allows For 2" Clearance Around Coils



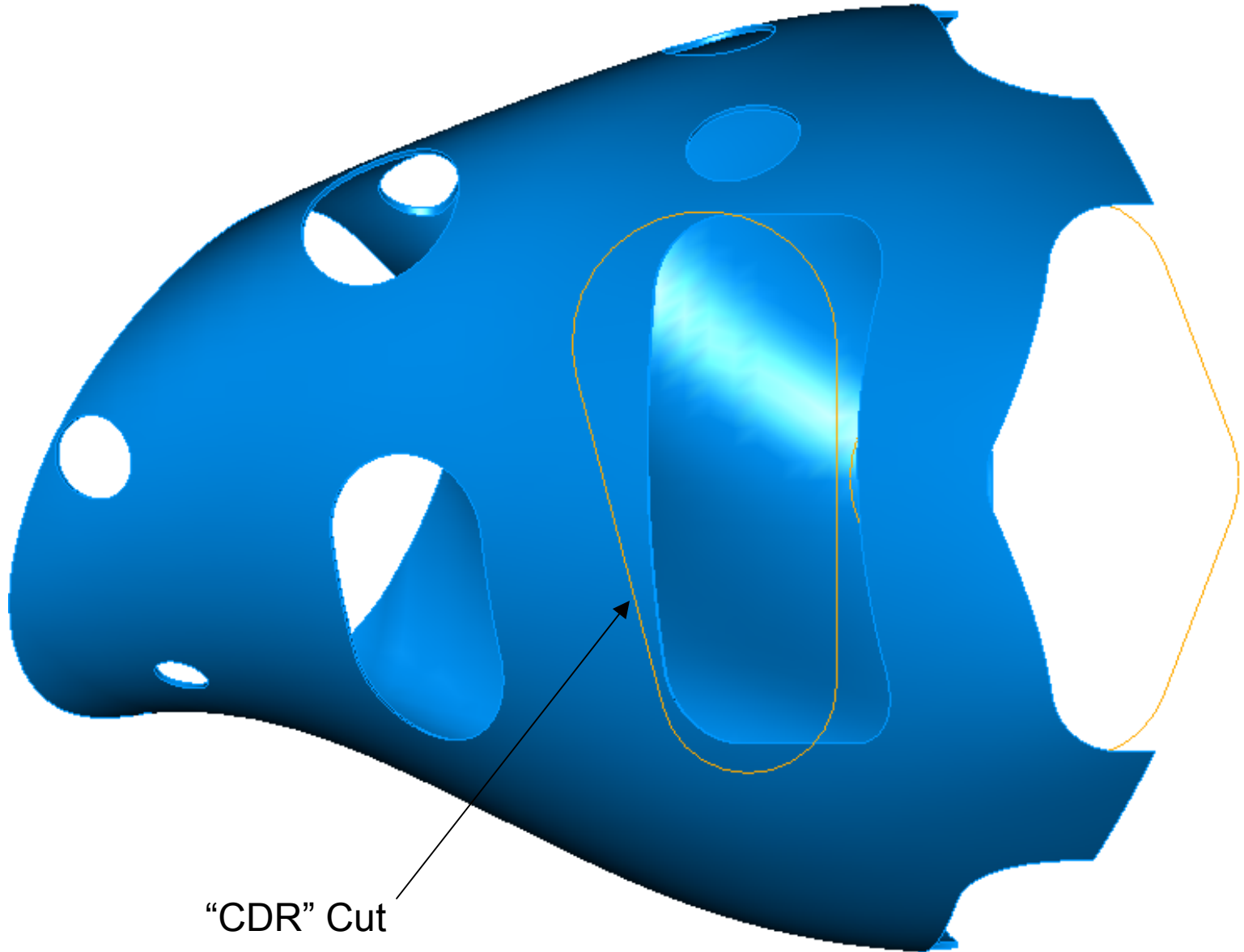
Ease of Installation

- Steered Through TF and M.C.
- Welded in One Step



Vacuum Vessel Cut

Similar In Size to Original Port 4 Cut



"CDR" Cut

NCSX Diagnostic Port Optimization

- Maximizes throughput for MSE/CHERS and Thomson Scattering for given DNB and laser power levels. This is cheap compared to factor of two increases in DNB and laser power.
- Provides flexible platform for other future diagnostics
- New Design Is “Easy” To Install And Provides 2” Clearance On TF and M.C.
- Vacuum Vessel Cut Not Much Larger than Original Port 4 Cut

Further Study Needed

- Evaluate Cut in Winding Form and Interference (if any) with Poloidal Break
- Evaluate Port Support and Other Stress Issues (Need for Ribs)
- Evaluate Impact on Cryostat Design
- Gather quotes on cost and fabrication options