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Target Assembly Project Management

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Second Target Station



U.S. DEPARTMENT
of **ENERGY**

ORNL IS MANAGED BY UT-BATTELLE LLC
FOR THE US DEPARTMENT OF ENERGY



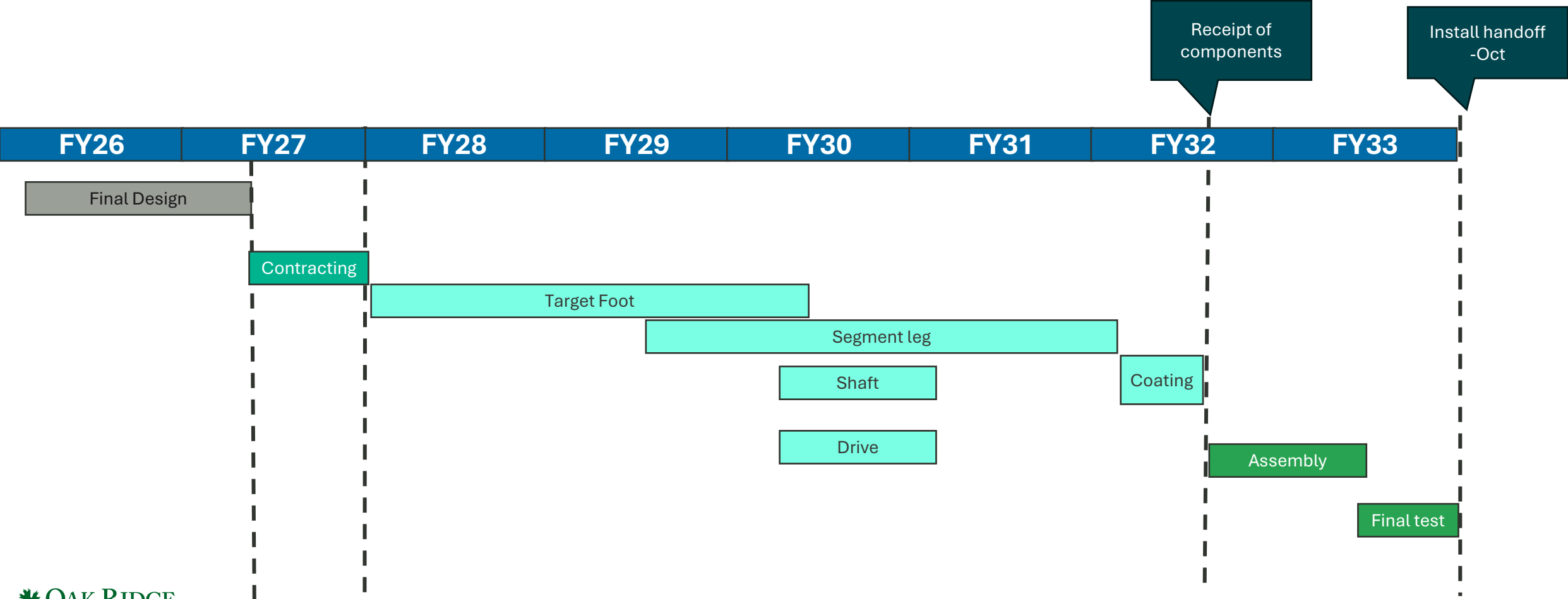
Charge Question 3: Do DACs and other supporting documentation adequately support the final design?

Charge Question 4: Are the acquisition and manufacturing plans feasible?

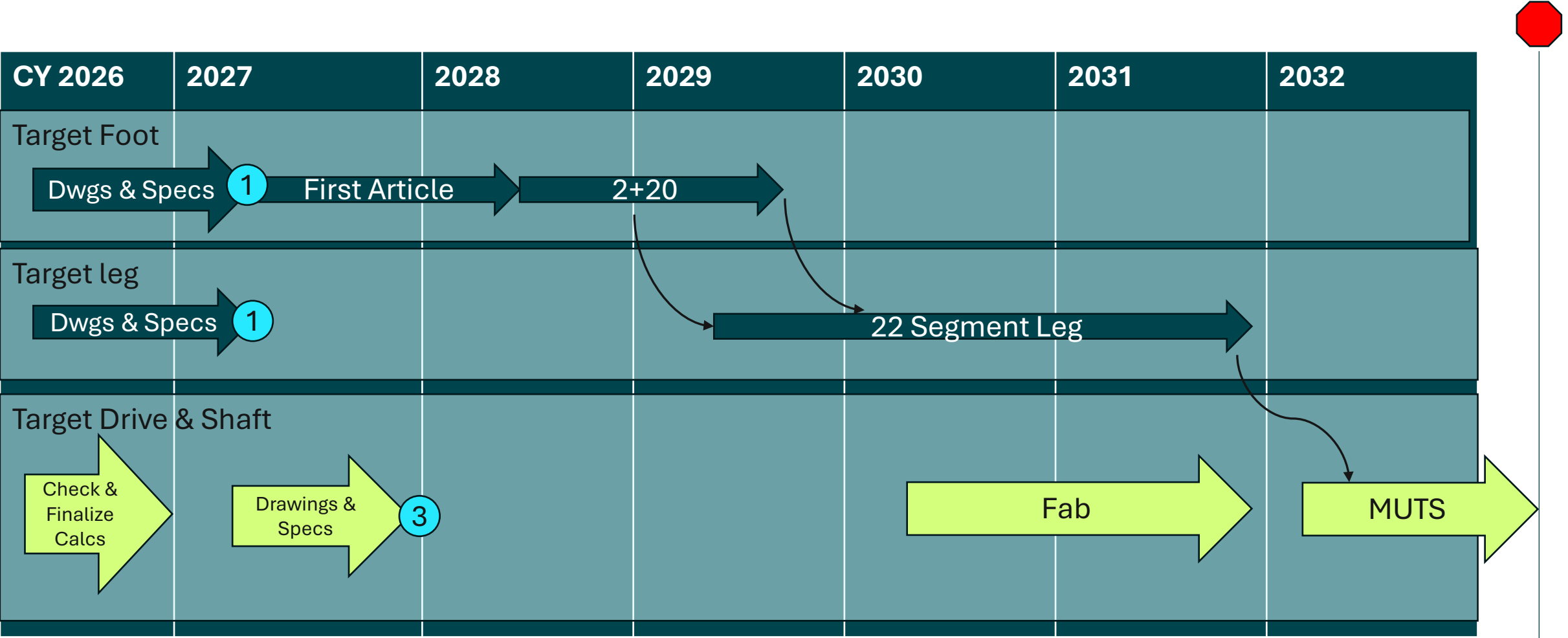
Charge Question 5: Is the design sufficiently mature to proceed with finalizing the procurement package?

Schedule (P6)

- Fabrication release to follow upon completion and checking of drawings and calculations



The target assembly will be released with two production readiness reviews (PRR)



Budget

	Material	Labor
Final Design	-	\$1.3M
Drive Fabrication	\$5.0M	\$250K
Target Foot	\$6.7M	\$659K
Segment Fabrication	\$5.7M	\$409K
Shaft Fabrication	\$1.4M	\$40K
Assembly	-	\$528K
Acceptance Testing	-	\$250K

Target related items on the risk register

ID	WBS Title	WBS	Activity ID	Subproject	Current Status	Threat / Opportunity	Risk Owner	Risk Title	Risk Statement
030	Target Systems	S.03	TS08IPL950	SP1	Active	Threat	Lyngh	Critical target system component damage	If a critical target system component (MRA, target, etc.) is damaged late in manufacturing, shipping, installation, then repair or replacement would be required resulting in additional costs and schedule.
126	Target Systems	S.03	TS153525	SP1	Active	Threat	Strong	CV design changes	If a target systems component to be accommodated in the CV changes late in CV design, then redesign will be necessary resulting in increased cost and schedule
149	Target Systems	S.03	TS0KD2390	SP1	Active	Threat	Lyngh	Remote Handling post-CD-2/3 design completion	If Remote Handling design that is completed after CD-2/3 reveals design change is required for serviced components/systems that have completed design prior to CD-2/3, then unplanned redesign will be necessary resulting in increased cost and schedule
150	Target Systems	S.03	TS0KD2370	SP1	Active	Threat	Strong	Process Systems post-CD-2/3 design completion	If Process Systems design that is completed after CD-2/3 reveals design change is required for serviced components/systems that have completed design prior to CD-2/3, then unplanned redesign will be necessary resulting in increased cost and schedule
151	Target Systems	S.03	TS159425	SP1	Active	Threat	Strong	Core Vessel Critical target system component damage	If the Core Vessel is damaged late in manufacturing, shipping, installation, then repair or replacement would be required resulting in additional costs and schedule.

Document Status

		In Process Draft Complete In Review Backcheck Recheck Review Complete EDRM Signatures							
Deliverable Title	Document Number								
Target Assembly CAD model	0000004343.asm								
Interface Documents									
Process Systems Interface	S01020500-IST10211	X	X	X	-	-	X	X	
Core Vessel Interface	S01020500-IST10209	X	X	X	-	-	X	X	
TVP Interface	S01020500-IST10212	X	X	X	-	-	X	X	
Controls Interface	S03020000-IST10000	X	X	X	-	-	X		
Target Protection Systems Interface	S01020500-IST10104	X	X	X	-	-	X	X	
Remote Handling Interface	S01020500-IST10208	X	X	X	-	-	X	X	
MRA Interface	S01020500-IST10207	X	X	X	-	-	X	X	
Proton Beam Interface	S01020500-IS0002	X	X	X	-	-	X	X	
Conventional Facilities Interface	S01020500-IST10069	X	X	X	-	-	X	X	
Systems Requirements Document									
Target Assembly Requirements	S03020000-SR0001	X	X	X	-	-	X	X	
Target Drive Requirements	S03020300-SRD10000	X	X	X	-	-	X	X	
Target Shaft Requirements	S03020300-SRD10001	X	X	X	-	-	X	X	
Target Segment Requirements	S03020400-SRD10000	X	X	X	-	-	X	X	
System Design Description									
Design Description Document	S03020000-DES10001	X	X		-	-	-		
Configuration Level Determination									
Target Assembly Configuration and Quality Le	S03020100-CMT10000	X	X	X	X	X	X	X	
Design Analysis Calculations									
CALC - Energy Deposition & DPA Report	S00000000-CAC10001	X	X	X	X				
Clearance Budget	S03000000-CAC10000	X	X						
Fatigue Assesment (incl. Offset beams)	S03020400-DAC100000	X	X	X	X	X	X	X	
Material Models	S03020000-DAC100000	X	X	X	X	X	X	X	
Structural Analysis	S03020000-DAC10002	X	X	X					
Neutronics - Beam On doses	S03120100-TRT10017	X	X	X	X	X			
Neutronics Analysis - Beam off Dose	S03120100-TRT10015	X	X	X	X	X			
Neutronics Analysis - Decay Heat & radionucl	S03120100-TRT10025	X	X						
PHAR - Loss of Cooling Analysis (No beam, No	S03020000-DAC10001	X	X	X	X	X	X	X	
Maintenance Stress Analysis (Debond)	S03020400-DAC10001	X	X	X	X	X	X	X	
Seismic Design Loads	S03020000-CAC10001	X	X	X	X	X	X	X	
Tritium exposure dose during maintenance a	S03020000-TRT10000	-	-	-	-	-	-	-	
Blow Down Assesment	0000019063	-	-	-	-	-	-	-	
CFD - Assembly, Segment, Drive, Shaft	S03020000-DAC10003	X	X	X	X				
ESH&Q Analysis - Transportation Assessment	S03020000-ESH10000								
ESH&Q Analysis - Disposal Assessment	S03020000-ESH10001	X	X	X	X	X	X	X	
Drive - Machine Design	S03020000-DAC10005	X	X						

FDR (per S01020500-PCD10001)

Final Design (PRR) (per S01020500-PCD10001)

		In Process Draft Complete In Review Backcheck Recheck Review Complete EDRM Signatures							
Deliverable Title	Document Number								
Plans									
Target Manufacturing & Acquisition Strategy	S03020000-PLN10000	X	X		-	-	-		
Target Assembly Installation Plan	S03020000-TDO10000	X	X		-	-	-		
Target Assembly Verification Plan	S03020000-TAC10000	X	X		-	-	-		
Drawings									
Target Assembly Drawings	0000004343	X							
Segment & Foot Drawings	000005039	X							
Foot Drawings	0000077806	X							
Drive Assembly Drawings	000001787	X							
Shaft Drawings	000004930	X							
Technical Specifications									
Tungsten material specification	0000001253	X							
Inconel, Forged, Target	0000020000 (S03020000-TS	X	X	X	-	-	X	X	
HIP Joining specification	S03020100-TS0002	X	X	X	-	-	X	X	
HIP Cleaning specification	0000001356 (S03020100-TS	X	X						
VHP joining specification	0000020001 (S07030100-TS	X	X						
Electron Beam Welding	0000017745	X							
General Cleaning	0000017725	X							
Welding, General	0000017743	X							
Machining, General	0000017673	X							
Leak testing, General	0000017680	X							
Acceptance Criteria List									
Acceptance Criteria List, Segment									
Acceptance Criteria List, Drive									
Acceptance Criteria List, Shaft									
Statements of Work									
Target Drive Statement of Work		X							
Target Segment Statement of Work		X							
Target Foot Statement of Work		X							
Target Lower Shaft Weldment Statement of Work		X							
Target Shaft Forgings Statement of Work		X							
Factory & Site Acceptance Testing									
Factory Acceptance Test, Drive		X							
Site Acceptance Test Plan									

Notable details from early calc checking and FDR preparation

Document	Description	Segment PRR	Drive & Shaft PRR
S00000000-CAC10001	CALC - Energy Deposition & DPA Report	Clerical - 57cm ²	N/A
S03000000-CAC10000	Clearance Budget	Check Document, Update as required with CV deflection, Global deflection model?	
Seismic Design Loads & Calculations/Signatures by Consultant		Scoping Study → Calcs	Risk external to Target Assembly
S03020000-DAC10002	Structural Analysis	Extract & clarify deflections Add normal operation load cases Extract weld results Coordinate scope with drive calcs	Done in previous release
S03020400-DAC10000	Target Segment Thermostructural Analysis	Clerical - 57cm ² fatigue	None
S03020000-DAC10003	CFD - Assembly, Segment, Drive, Shaft	None	Update segment attachment interface Update pressure drop for Staubli fittings
S03020000-ESH10000	ESH&Q Analysis - Transportation Assessment	Clarify with vendor about Neutron requirement	None
S03020000-DAC10005	Drive – Machine Design calcs	Check segment attachment	Modify drive calcs



Lead engineer desires independent simplified calc (Mathcad or beam elements)

This will expand as small details/failure modes are “seen” by drafting team (thread pullout, etc)

What is left to do? (Beyond checking and drawings)

Target Assembly

- Develop precise inspection specs for target foot
- (update bearing details) to ensure bearing stiffness
- Update simulations for:
 - Segment attachment (CFD & FEA; hands calcs done)
 - Jumpers (CFD)
- Add test port to segment attachment water lines
- Verify lifting via crown for bearing replacement
- Keep up with minor calcs (thread pullout, O-ring insertion force, etc.) as detailing progresses
- Dive deep into drawings! (and associated details)

External

- Resolve seismic load definition (when available)
- Implement Air cooling (risk of non-implementation due to accelerated schedule)

Summary:

Target Segment

Well designed; ready for detailed drawings; proceed to PRR to meet project critical path

Target Drive

Well designed; ready for detailed drawings and associated iterations of tolerances. Close attention bearing details

Target Shaft

Well designed; ready for detailed drawings; release with drive PRR

Charge Questions

	Segment	Drive & shaft
Have the recommendations from PDR been appropriately addressed?		✓
Has the design been shown to meet the requirements?	✓	✓
Do DACs and other supporting documentation adequately support the final design?	✓	✓*
Are the acquisition and manufacturing plans feasible?	✓	✓
Is the design sufficiently mature to proceed with finalizing the procurement package?	✓	✓**

*Structural calculations need to be checked and updated.

**Bearing details need to be fully implemented

