

Attachment C Design Deliverable Schedule, 30-60-90-100%

Record of Revision

Rev	Date	Description	POC	RM
0	2/1/06	Initial issue	Tobin Oruch, <i>ENG-CE</i>	Mitch Harris, <i>ENG-DO</i>
1	10/27/06	Added code analysis pg. 3 Arch design criteria	Tobin Oruch, <i>CENG</i>	Kirk Christensen, <i>CENG</i>
2	6/16/08	Added energy deliverables under Multi-Discipline heading.	Tobin Oruch, <i>CENG</i>	Kirk Christensen, <i>CENG</i>
3	5/21/09	Admin changes; was App. C	Tobin Oruch, <i>CENG</i>	Gary Read, <i>CENG</i>
4	8/25/10	FCN Criteria doc. 90% expectations.	Tobin Oruch, <i>CENG</i>	Larry Goen, <i>CENG</i>
5	5/16/13	Dropped 15% column. Added phasing, deferred design, spec expectations, IBC/IEBC forms, submittal schedule input, struct obs, arc-flash calcs, fire alarm, security, Cx, ML1-2, Title 3. Other minor updates.	Tobin Oruch, <i>ES-DO</i>	Larry Goen, <i>ES-DO</i>
6	3/23/15	Changes on threshold for use, specs maturity, electrical deliverables, pressure safety, telcom.	Tobin Oruch, <i>ES-DO</i>	Mel Burnett, <i>ES-DO</i>
7	11/28/18	Separated LANL instructions for usage/editing of template from design agency direction. Added design verification, test/acceptance, TIP, SE, and software expectations; other minor changes throughout.	Tobin Oruch, <i>ES-FE</i>	Larry Goen, <i>ES-DO</i>

Purpose

This document includes a template for the LANL project engineer to edit as necessary/allowed and impose on design agency (e.g., via AE task order, subcontract, etc.). *Guidance: ES-EPD, in conjunction with ASM, has standard task order Exhibit D templates intended to capture the information in this document, and these templates should facilitate the task of implementing this document in most cases.*

General Usage Requirements:

1. This schedule is required for construction-type projects with (a) a total cost of over \$500k¹, (b) a design cost over \$150k, or (c) as required by LANL AP-341-702, *Statements of Work*. It is intended for preliminary and final design and design support during/after construction, not conceptual design or studies. ES-EPD Group Leader may allow other approaches by written agreement. *Guidance: Other projects may adapt as desired.*
2. 30/60/90 refers to the typical, formal design review schedule used for a new, medium-sized GPP building, where the numbers represent the approximate percentage of design effort for the combined preliminary and final design effort. (For line item projects, this may not correlate precisely with the project's overall project design maturity timeline, so modify as needed per the "Modification" paragraph below²).

¹ GPP/IGPP lower limit; an appropriate threshold for use of this approach.

² With a line item, a CDR is produced for CD-1 (normally 30% of the overall project design effort), an AE performs CD-2/3 design, LANL wishes to review their effort at 3 points, and we call those 30/60/90 (same as we do with GPPs that don't do much conceptual). So for line items, 30/60/90 reviews are really a rough division of the given AE effort, not the overall project design effort/maturity; the reviews are probably closer to 50/70/90% of start-to-finish design effort, but we don't confuse matters by calling them that.

3. Modification: The LANL Project Engineer may add to or make this schedule more aggressive. To reduce or relax this schedule, the project shall obtain concurrence from the ES-EPD Group Leader or GL delegate (e.g., Team Leaders). Mark as N/A (preferred) or delete rows not applicable to given project.
4. Deliverables listed are Design Agency responsibility, both in-house and outside AE (unless noted otherwise in their contract). The project may also assign some tasks (e.g., telcom design, commissioning) to the LANL Facility Design Authority Representative (FDAR) organization or another LANL entity if not required of Design Agency by Z10 Attachment B or subcontract. *Design Agency should propose additional modification prior to entering into a contract for work.*

CAUTION (Guidance): *This document does not contain the entirety of Design Agency work, or all possible design work.*

Design Agency Scope of services during/after construction are addressed in ESM Chapter 1 Section Z10, and include such tasks as:

1. *Review and approval of submittals including shop drawings and “or equal” substitutions;*
2. *RFI and SDDR review and dispositioning;*
3. *Review/comment on change order requests affecting scope or quality;*
4. *Review and approval of nonconformance reports with a use-as-is or repair disposition;*
5. *Creation, review, and/or disposition of design revision documents (DRN, FCR, etc.; ref. AP-341-519, Design Revision Control);*
6. *Seismic anchorage and bracing design of architectural, mechanical and electrical components (if not completed in design phase);*
7. *Structural observation where required by ESM Chapter 16, and work in general for other disciplines for conformance to design*
8. *LEED submittal handling per ESM Chapter 14 where required, and delivery of final certification. Final reports on guiding principles, IECC compliance, and energy efficiency when LEED is not required.*
9. *Project close-out activities which include participating in the final inspection; preparation of record documents including updated drawings, MDL/documents for EDMS, Project Equipment Listing, ; and assisting in competing the certificate of occupancy.*

As required elsewhere in ESM Chapter 1 Section Z10, for ML-1 and ML-2 work and for priority drawings, also provide “as-built” record documents (not just as-found/documented) of key design outputs delivered [e.g., drawings, commercial grade dedications (CGD), specs (including changes as a result of switching from supplier qualification to CGD), vendor data, SDDs, databases, and final calculations with verified assumptions.

Endnotes

Guidance on expectations for design and other project documentation deliverables not addressed in ESM is available in (1) [DOE G 413.3-12, U.S. Department of Energy Project Definition Rating Index Guide](#) and (2) the maturity matrices at the end of AACE 56R-08: Cost Estimate Classification System - As Applied for the Building and General Construction Industries (Rev. Dec. 5, 2012) (www.aacei.org, by purchase or Chapter POC).

Design Deliverable Schedule, 30-60-90-100% Template

A. General Requirements

1. Deliverables listed are Design Agency responsibility, both in-house and outside AE (unless noted otherwise in their contract).
2. The percentage columns refer to project design review submissions required no later than when the design deliverable for permitting is at the completion percentages given³; the table indicates what is required at those percent-complete reviews (these may include final versions of some documents). This does not preclude phased design whereby a complete package (e.g., foundation design) is submitted before later packages.
3. These submittals are to be delivered to LANL STR for design or their designee (e.g., Project Engineer)—for in-house design, project engineer, or equivalent.
4. For each succeeding deliverable, previous LANL compliance-problem (“C”) comments shall have been resolved, and all others dispositioned.
5. The 60% submittal shall be the Design Agency’s understandable and thoroughly developed presentation of the 60% deliverables specified. Although the design is not complete at this stage of development, most technical content should be provided (rare exceptions as noted herein).
6. The 90% submittal shall be the Design Agency’s complete, QA-checked, and final-quality documents – i.e., either already PE-sealed or ready for PE seal (when required by Section Z10) and the designer willing to stand behind them.
 - a. *Guidance: LANL’s 90% review should merely be a final check of comment resolution from the 60% review and a review of the additional development from that time.*
7. The 100% submittal is the 90% submittal documents with all compliance comments resolved, all others dispositioned as necessary, and documents approved and issued for LANL acceptance by the design agency.
8. Deferred design for the fabrication of technical specialties (e.g., fire protection, controls) may be completed after the 100% submittal so long as this approach is consistent with the SOW/Subcontract and indicated on specs or drawings (e.g., delegated to construction Subcontractor). *LBO may treat first submission as a 60% document from a review maturity standpoint using Section 01 3300; see ESM Chapter 16 IBC-GEN for additional requirements on deferred/delegated design.*
9. The ESM contains additional detail on these deliverables as well as additional required deliverables. Project-specific documents such as SOWs, performance criteria, RCDs, and other design criteria documents may also contain deliverable requirements not contained here.
10. Spec maturity at 30%: Submit two things: (1) a listing of intended LANL master spec sections (numbers and titles) and (2) as a minimum, numbers and titles for addition sections to be written.
 - a. *Where applicable LANL Masters exist and will be used, submitting them unedited is unnecessary but listing communicates LANL Standards understanding, preliminary material choices (e.g., roofing type), fire and structural loading, energy efficiency, etc.*
 - b. *Outline specs are typically a one-page synopsis that communicate preliminary intentions on important material (and occasionally method) choices and are a good tool. A thorough preliminary project description (defined by [CSI](#), follows UniFormat) is another useful tool.*

³ Note: For nuclear projects over \$10M, DOE defines minimum maturity expectations for CD-2 (approval to construct) as a 90% deliverable (80-90% for non-nuclear); this recognizes that true 100% design is achieved when design activities during construction are complete. This LANL document does not conflict with that idea; when this gives percentages including 90 and 100%, it is referring to the completeness percentage of the package needed for the building official to permit construction start, recognizing that deferred design occurs afterwards. DOE mandates: DOE-STD-1189 and/or DOE O 430.1.

11. Spec maturity at 60%: Specs shall portray complete scope of work, have non-applicable sections removed. Some quality, manufacturer, and execution details may be TBD. Unedited masters are unacceptable.

DISCIPLINE	REVIEW (%)		
	30	60	90
GENERAL			
Formal written responses to review comments from previous phase ⁷	X	X	X
General (Division 01) Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval (including Section 01 3300 submittal schedule)			X
When IBC/IEBC, Design Professional in Responsible Charge designation form (ESM Chapter 16, IBC-GEN, Form 3) final	X		
When IBC/IEBC, (1) Test and Inspection Requirements (TIP or VIT) and (2) Statement of Special Inspections (ref LANL ESM Chapter 16, IBC-IP Att. B and I)			
Preliminary		X	
Final			X
Clearly-defined testing requirements and acceptance criteria for the safety and functionality of all subsystems			X
Design verification evidence document meeting NQA-1 or DOE O 414.1D, e.g., Design Verification Matrix and Design Verification Report including design review documentation, qualification test plans and results, and alternate calculations (When in-house, done per AP-341-620). Where DV approach includes individual design deliverables reflecting peer-type DV review, evidence of same should be on each final (e.g., 90% deliverable), including those listed herein. Projects subject to ESM Ch 20 have additional DV requirements.			X
Project Equipment List (MEL input, per Z10)			
ML levels for known SSCs	X		
Preliminary – major equipment pieces as a minimum with MLs		X	
Final including all known components (may lack unknown data for constructor-supplied SSCs)			X
Master Document List (per Z10)			
Documents in process to date		X	
Documents in process or issued to date			X
Facility Design Description and/or System Design Descriptions (if required for project by Z10 App B or ESM Chapters 10-Hazardous Process or 12-Nuclear)			
Preliminary – major systems described conceptually, preliminary design criteria and constraints, and other data indicated for this phase by Z10 App D, FDD.	X		
Updated – major system descriptions matching drawing representations and complete design criteria and constraints; minor systems described conceptually and have preliminary design criteria and constraints, other data per Z10 App D.		X	
Final – SDDs and all FDD information suggested by Z10 App D			X
For existing and new facilities requiring (re)configuration of floor plan(s) notify the ES-DE POC for Record Floor & Emergency Evacuation Plans updating			X
DEMOLITION			
Demo Drawings			
Demolition drawings, if applicable, prepared using digital photographs of existing facility structures, systems & components (including security) as base drawings to the maximum extent practicable. Items to be removed or demolished to be indicated by annotation or editing of the photographs (government camera, DC/RO approved-release)			

DISCIPLINE	REVIEW (%)		
	30	60	90
Preliminary layout drawings and elevations with pictures of existing inserted	X		
Fully annotated drawings with details for demolition of critical SSCs		X	
Fully annotated drawings with details for demo and/or temporary support of critical SSCs			X
Demo Calculations			
Preliminary structural calcs for any temporary shoring or structures required	X		
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance		X	
Demo Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
CIVIL			
Site survey to establish existing site grading, drainage, structure locations, existing overhead and underground utilities, and special site conditions and/or constraints	X		
Existing site conditions plan with locations of existing buildings, structures, existing contours, and drainage features	X		
Preliminary site grading and drainage plan with establish building location and orientation, access roads, parking location, and finish floor elevations	X		
Civil Calculations			
Preliminary, for topics described in ESM Chapter 3, Civil	X		
All design calcs, including, but not limited to, the following:		X	
Drainage calcs and hydrologic analysis, where applicable		X	
Earthwork calcs of cut and fill volumes with applicable cross sections		X	
Pressure, demand, and capacity analysis for sizing and material proposed in the utility system improvements		X	
Pavement design calcs		X	
Road design calcs including horizontal and vertical alignment, curve data, super elevation, minimum sight distances, and pavement thickness		X	
Traffic counts and future volume projections to a traffic impact analysis and to establish design parameters as required		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Civil Drawings			
Preliminary plan view of proposed improvements including geometry, typical sections, pavement sections, site grading and drainage, utility locations with applicable clearance offsets	X		
Plan view of proposed site grading and drainage improvements identifying locations of roads, curb and gutter, parking areas, sidewalks, buildings and structures		X	
Roadway or drainage structure plan and profile sheets with appropriate horizontal and vertical design information		X	
Utility plan sheets identifying the proposed improvements with existing utilities clearly identified in locations where conflicts could exist		X	
Profile for (gravity) sanitary sewer or steam and condensate lines		X	
Details if required		X	
Final			X
Civil Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
Commissioning Plan for utilities ready to issue for approval			X
ARCHITECTURAL			
Architectural Calculations			
Completed Design Criteria (Including Life Safety and IBC/IEBC Code Analysis, ADA requirements) (LANL will provide initial IEBC Alteration Level and ICSSC RP-8 seismic risk analysis determinations)	X		
Updated Design Criteria if required		X	

DISCIPLINE	REVIEW (%)		
	30	60	90
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance. See Fire section for code analysis.			X
Architectural Drawings			
Plan layouts and exterior elevations—preliminary	X		
Updated version of 30% plan layouts and exterior elevations; preliminary wall sections and details ADA requirements finalized		X	
Preliminary landscaping plans and schedules		X	
All plans, elevations, sections, details, interior elevations, and schedules completed, authorized, and ready to issue for approval			X
Architectural Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
Test and inspection requirements for arch systems including roofing			X
STRUCTURAL			
Design Basis Document (ref LANL ESM Chapter 5, Sect I)			
Draft with building function, design methodology, performance category, hazard category, acceptance criteria, etc.	X		
30% review comments addressed		X	
60% review comments addressed, complete			X
QA Plan for Structural Design (ref LANL ESM Chapter 5, Sect I)			
Final	X		
Statement of Special Inspections (see GENERAL above)			
Statement identifying the frequency and extent of the structural observation per IBC 1710		X	
Structural Calculations (ref LANL ESM Chapter 5, Sect I)			
Foundation description and preliminary sizing (e.g., footings, mats, slabs, piles, tie-beams, etc.)	X		
Superstructure description and preliminary sizing (e.g., concrete or steel, cast-in-place vs pre-stress, lateral force resisting system, demonstration of complete load path, etc.)	X		
Descriptions of special structural considerations	X		
Completed structural scheme with all members sized		X	
Calcs or manufacturer's catalog data validating sizing and selection of all components		X	
Secondary component designs (e.g., base-plates, seismic bracing, support stands, etc)		X	
Foundation design(s)		X	
Anchorage designs including nonstructural components and R&D equipment when required by ESM Chapter 5, Sect I		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Structural Drawings (ref LANL ESM Chapter 5, Sect I)			
Preliminary floor plans and cross-sections	X		
Complete and accurate with correct dimensions, tolerances, detail references, general and keyed notes and compatibility with other disciplines		X	
Beam, column and footing schedules as applicable		X	
Secondary component details		X	
Foundation details		X	
Anchorage details (including, for existing concrete, strength, thickness, and min. embedment depth as required by ICC-ESR). If being deferred to after procurement of major equipment, noted as such in design.		X	
Reinforcement and connection details, including bolt and weld sizes		X	
Final (ensure notes give accurate instructions)			X
Structural Specs (ref LANL ESM Chapter 5, Sect I)			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X

DISCIPLINE	REVIEW (%)		
	30	60	90
HVAC			
HVAC Calculations			
Preliminary HVAC heating and cooling loads corrected for altitude	X		
Preliminary ASHRAE 62 ventilation calcs with exhaust, outside air and building pressurization requirements	X		
Preliminary duct sizing calcs including system pressure drops	X		
Preliminary energy conservation/sustainable design analysis	X		
Updated and resolving/addressing comments from the 30% design		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
HVAC Drawings			
Preliminary mechanical symbols and legend	X		
Preliminary HVAC floor plans showing major equipment, duct runs, and VAVs/heating coils	X		
Preliminary HVAC plans showing office layout and equipment room, major equipment, penetrations, and pipe/duct runs	X		
Preliminary PFDs/airflow diagrams including major equipment, supply & return diffusers, transfer grills, dampers, VAV/reheat coils, airflow rates, and facility/room pressurization requirements	X		
Preliminary P&IDs including major system equipment, control devices, control wiring & logic, and sequence of operation – and revisions under change control.	X		
Preliminary equipment schedule including all major equipment with significant operating parameters and equipment specs	X		
Drawings updated and that resolve/address comments from the 30% design		X	
Preliminary mechanical sections, elevations, and details		X	
Complete P&IDs and PFDs, revisions under change control.		X	
All other drawings complete, authorized, and ready to issue for approval			X
HVAC Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%. Include commissioning requirements.		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
PIPING AND PLUMBING (not pressure-safety related)			
Piping Calculations			
Preliminary piping system calcs including flow rates, pipe sizing with friction factors, velocities, expansion/contraction and system equipment pressure drops for pump selection	X		
Preliminary plumbing systems calcs including the water supply and drainage fixture unit requirements per the UPC	X		
Preliminary roof drainage system calcs sized per the requirements of ESM, Chapter 6 §10A in Section D2040	X		
Preliminary natural gas system calcs including flow rates and pipe sizing per the requirements of UPC, UMC, and NFPA 54	X		
Preliminary steam/condensate system calcs incl. flow rates and pipe sizing	X		
Preliminary Plumbing Equipment Schedule including all major equip. and fixtures	X		
Updated and resolve/address comments from the 30% design		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Piping Drawings (refer to the LANL Standard Details for mechanical)			
Preliminary heating water P&ID – and revisions under change control	X		
Preliminary chilled water P&ID (as necessary) – and revisions under change control	X		
Preliminary Plumbing Symbols and Legend (see app. E1 to E3 of the LANL Drafting Manual)	X		
Preliminary Plumbing Floor Plans including office layout, restrooms, janitor's closets and equipment room, major equipment locations, fixture locations, and distribution and vent piping; enlarged plans may be required to clearly show the plumbing systems in certain areas, e.g. equipment rooms (coordinate with Architectural for ADA requirements)	X		
Preliminary Plumbing Diagrams including riser diagrams for the potable water system, sanitary waste/vent system, roof drainage, and make-up water system. Major equipment,	X		

DISCIPLINE	REVIEW (%)		
	30	60	90
fixtures, and piping included on the riser diagrams			
Preliminary HVAC Piping Plans including all major equipment, pipe runs, pipe sizes (including refrigerant), and water flow rates. Enlarged plans may be required to clearly show the systems in certain areas, e.g., equipment rooms	X		
Complete P&IDs		X	
Other drawings updated to resolve/address comments from the 30% design		X	
Preliminary Plumbing Details include major equipment requirements and specialties, e.g. backflow preventer installation assemblies, PRV piping details, floor drain details, and cleanout details		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
Piping Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
PRESSURE SAFETY			
Pressure Safety Implementation Plan (determination of code of record, roles and responsibilities, documentation requirements as defined in the ESM Chapter 17)			
Initial	X		
Final draft		X	
Final			X
Calculations			
Preliminary piping system calcs including flow rates, pipe sizing with friction factors, velocities, expansion/contraction and system equipment pressure drops for pump selection, compressor and pressurized gas systems (bottle or cryogen)	X		
Preliminary pressure systems calcs	X		
Preliminary equipment schedule including all major equip. and fixtures	X		
Preliminary natural gas system calcs including flow rates and pipe sizing per the requirements of 40 CFR 192 and ASME 31.8	X		
Updated and resolve/address comments from the 30% design		X	
Pressure safety calcs and other documentation for piping and vessels per ESM Chapter 17		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Piping Drawings (note, refer to the LANL Standard Details for mechanical)			
Preliminary Pressure Symbols and Legend (see app. E1 to E3 of the LANL Drafting Manual)	X		
Preliminary P&ID – and revisions under change control	X		
Preliminary Floor Plans	X		
Preliminary Piping Plans Enlarged plans may be required to clearly show the systems in certain areas, e.g., equipment rooms	X		
Other drawings updated to resolve/address comments from the 30% design		X	
Complete P&IDs – revisions under change control (locked down)		X	
Pressure Symbols and Legend (see app. E1 to E3 of the LANL Drafting Manual)		X	
Floor Plans – under change control (locked down)		X	
Piping Plans Enlarged plans may be required to clearly show the systems in certain areas, e.g., equipment rooms		X	
Piping Details include major equipment requirements and specialties, e.g. pressure vessels, boilers, air receivers, and pressure relief devices piping details,		X	
Other drawings updated to resolve/address comments from the 60% design			X
Pressure Symbols and Legend (see app. E1 to E3 of the LANL Drafting Manual)			X
P&ID – Final			X
Floor Plans – Final			X
Piping Plans; enlarged plans may be required to clearly show the systems in certain areas, e.g., equipment rooms			X
Piping Details include major equipment requirements and specialties, e.g. pressure vessels, boilers, air receivers, and pressure relief devices piping details,			X

DISCIPLINE	REVIEW (%)		
	30	60	90
Piping Specs			
See General note above for spec maturity at 30%	X		
Updated to resolve/address comments from the 30% design; see general note above for spec maturity at 60%		X	
Specs updated to resolve/address comments from the 60% design, complete, checked, cross-discipline coordinated, and ready for approval			X
FIRE PROTECTION			
NOTE: Detailed alarm and sprinkler system design, installation drawings, and calcs are typically prepared by the installing sub-contractor after the construction contract is let. These plans are reviewed and approved by LANL as required deferred design submittals. If being deferred/delegated, note as such in design.			
Summary of Scope	X		
Location, size, number of stories, construction, and occupancy of buildings and identification of locations to be provided with fire protection and fire alarm systems			
Fire Drawings			
Building Plan showing building layout, fire areas, and fire walls	X		
Site Plan showing size, type and location of underground water mains and location of hydrants, sprinkler system lead-ins, and sectional valves	X		
Building drawings, coordinated with the Arch drawings, showing: The architect's life safety analysis with applicable codes of record, IBC construction type, IEBC Alteration Level and IBC and NFPA 101 occupancy types Egress routes, common paths of travel, dead ends, exit widths, exit doors, etc. Location and rating of all fire walls, barriers, doors and dampers Location of all HVAC ducts with cfm ratings for intake and exhaust ducts for each HVAC unit, and duct smoke detectors All areas to be sprinklered, including features of construction and HVAC that could present obstructions of which the sprinkler contractor must be aware All fire alarm system areas of coverage Location and rating of emergency lights Fire extinguisher types and locations		X	
Final drawings incorporating previous review comments			X
Fire Specs			
See General note above for spec maturity at 30%. Include specs for architectural, site, civil, structural, roof, walls, doors, HVAC, sprinklers, fire alarms, testing, and other sections that relate to fire protection for the project	X		
See General note above for spec maturity at 60%		X	
Specs for fire related construction features including rated walls, doors, and dampers		X	
Specs for built-up roof construction, where used		X	
Sprinkler systems Specify type of system – (wet pipe, dry-pipe, deluge) how actuated; type, style, and temperature rating of sprinkler heads; hydraulic design criteria, (e.g., Ordinary Hazard, Group 2) Allowed types of pipe and fittings, backflow preventer, other equipment anticipated on the installation		X	
For alarm systems: type of system, type of detectors, what calcs will be required, what interlocks are to be provided		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
ELECTRICAL			
Electrical Calculations			
Preliminary electrical load estimate for component sizes	X		

DISCIPLINE	REVIEW (%)		
	30	60	90
Preliminary fault current calcs or 1 st approximation/estimate	X		
Interior lighting calcs complete	X		
Preliminary paging system sound distribution calcs (if being deferred/delegated, note that)	X		
Load study with best estimates; circuits sized and distribution components selected		X	
Fault current calcs with best estimates		X	
Voltage drop calcs with best estimates		X	
Preliminary coordination study		X	
Preliminary arc-flash hazard calculations		X	
Exterior lighting calcs with best estimates		X	
Paging system calcs complete; wiring sized and components selected (if being deferred/delegated, noted as such in design)		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Electrical Drawings			
Preliminary site plan includes power and telephone service connection points and routing to project	X		
Preliminary one-line diagram portrays service and distribution system arrangement	X		
Preliminary power plans include electrical rooms and major electrical equipment locations	X		
Preliminary enlarged electrical room plans show electrical service and distribution equipment and NEC required working spaces (if required)	X		
Preliminary lighting plans include luminaire locations, type designators, and control device locations	X		
Preliminary luminaire schedule includes basic descriptions of luminaires shown on the preliminary lighting plans	X		
Preliminary paging system plans show speaker locations	X		
Site plan further developed to include site lighting		X	
One-line diagram further developed to show all component sizes and calculated fault currents		X	
Power plans further developed to show receptacles, mechanical equipment, building equipment, user equipment, and preliminary branch circuiting		X	
Final enlarged electrical room plans (if required)		X	
Lighting plans further developed to show complete branch circuiting and lighting controls		X	
Luminaire schedule further developed to include complete descriptions and catalog numbers of all luminaires		X	
Paging system plans further developed to show speaker circuiting and equipment locations (if being deferred/delegated, noted as such in initial construction package and provided later)		X	
Preliminary paging system riser diagram include paging controllers, amplifiers, speakers, and interconnections		X	
Preliminary lightning protection system plans include locations of air terminals, main conductors, down conductors, ground ring, test wells, and surge protective devices (may not be delegated to construction Subcontractor)		X	
Preliminary grounding diagram include main grounding electrode, main electrode ground bar, supplemental ground bars, and bonding locations for piping and structural steel		X	
Preliminary motor control diagram created for typical each motor control configuration		X	
Preliminary Panel Schedules created for each panel not detailed on the one-line. Include load descriptions and values.		X	
Preliminary Nameplate Schedules including information required for equipment ID tags, category I nameplates, and arc-flash warning labels			X
All the above complete, checked, cross-discipline coordinated, and ready for approval			X
Electrical Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X

DISCIPLINE	REVIEW (%)		
	30	60	90
INSTRUMENTATION AND CONTROLS			
NOTE: Detailed control system design, installation drawings, and calcs are typically prepared by the installing subcontractor after the construction contract is let. If being deferred/delegated, note as such in design.			
I&C Calculations			
Preliminary device sizing calcs	X		
Preliminary calcs for all engineered instrumentation devices		X	
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
I&C Drawings			
Preliminary network drawing	X		
Preliminary control or P&ID drawing for each system, nearly final, under change control	X		
Preliminary sequence of operations	X		
Preliminary BAS I/O list	X		
Preliminary Instrument List	X		
Preliminary Control Schematics (as required)	X		
Preliminary instrument location drawing (may be on P&ID)	X		
Complete P&IDs under change control		X	
Drawings updated to portray complete scope of work and substantially complete		X	
Completed instrument point list		X	
Completed Instrument List		X	
Completed instrument location drawing (may be on P&ID; include critical distances/diameters from bends, etc.)		X	
Major control panels shown on mechanical and electrical drawings		X	
Control power feeds shown on electrical floor plans and panel schedules		X	
Finalized with Bill of Materials and ready to issue for approval			X
I&C Specs			
Outline or preliminary specs, to include commissioning requirements including pre-functional testing, functional testing, and checklists. Also, see General Note above for spec maturity at 30%	X		
See General Note above for spec maturity at 60%. Include start up and testing requirements.		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
Software QA/Control Documentation			
Development, operating, and verification documentation for any design agency developed process-operating software			X
PHYSICAL SECURITY			
Security Calculations			
Preliminary versions of any required calcs	X		
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Security Drawings (Note, device design/details normally by LANL PS-2)			
Prelim. Arrangement including fence, gate, barrier, PIDA(D)S, Limited Area, vault, VTR, and SCIF locations/boundaries	X		
Preliminary security plans include room locations and preliminary cable tray routing	X		
Updated security plans including rough-in/device locations, type designators, and circuiting		X	
Device schedule including basic descriptions of devices shown on the preliminary plans		X	
All the above complete, checked, cross-discipline coordinated, and ready for approval			X
Security Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X

DISCIPLINE	REVIEW (%)		
	30	60	90
TELECOMMUNICATIONS, including Secure (design normally by LANL NIE-TS)			
Telecom Calculations			X
Preliminary versions of any required calcs	X		
All calcs complete, checked, cross-discipline coordinated, and ready for LANL acceptance			X
Telecom Drawings			
Preliminary site plan includes service connection points and routing to project	X		
Preliminary plans including telecom room, rack locations, and preliminary cable tray routing	X		
Updated telecom room plans include cable trays, receptacles, grounding, and equipment racks		X	
Beyond-room plans showing telecom outlet locations and final conduit and cable tray routing		X	
Telecom system riser diagram includes system from service to station outlets		X	
All the above complete, checked, cross-discipline coordinated, and ready for approval			X
Telecom Specs			
See General note above for spec maturity at 30%	X		
See General note above for spec maturity at 60%		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
R&D AND PROGRAMMATIC			
Anchorage designs (see Structural)			
Services hookup design (see Piping, Mechanical, Electrical, etc.)			
SUSTAINABLE DESIGN (SD)			
LEED registration copy of application or USGBC webpage printout showing registered (when LEED is mandated; see ESM Chapter 14, Sustainable Design)	X		
LEED certification proposed credits worksheet (when LEED is mandated)	X	X	X
Energy calculation showing 30% better than ASHRAE 90.1-2004 per ESM Chapter 14	X	X	X
Specs modified as appropriate to incorporate SD acquisition requirements per ESM Ch. 14			X
High Performance Sustainable Building Report draft, when required by ESM Chapter 14		X	
HPSB Report final, when required by ESM Chapter 14, Sustainable Design			X
COMMISSIONING (when required by ESM Chapter 15 and SOW)			
Cx Plan			
Preliminary plan defining Cx authority, how authority will verify that design agency and constructor will implement the F&OR requirements, and addressing coordination of all disciplines from design through the construction and warranty periods (by LANL unless in SOW)		X	
Finalized and ready to issue including list of design checklists, list of all Cx spec sections			X
Cx Specs			
See note above for spec maturity at 30%	X		
Specs shall portray complete scope of work, non-applicable sections removed; unedited masters are unacceptable (Note: Cx submittal requirements shall be coordinated with project submittal procedures)		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
Cx Procedures			
Completed Cx procedures and construction requirements including those for Division 1 and all applicable disciplines		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval			X
Cx Schedule			
Proposed Cx Schedule			X

DISCIPLINE	REVIEW (%)		
	30	60	90
SYSTEMS ENGINEERING			
Projects subject to ESM Chapter 20 is applicable to capital projects over \$20M total project cost modifying or building hazard category 1–3 nuclear facilities. Also, projects below those thresholds but subject to DOE O 413.3 implement it in a tailored fashion to meet the Order. Ch 20 has a number of deliverables both during and at the conclusion of all project phases, and some correspond to the 30-60-90% design maturity deliverables (these are summarized in Ch 20's Table SE-PL-1 Summary for Chapter 20 Systems Engineering Deliverables). Projects subject to Ch 20 shall deliver all required deliverables, and those tied to 30-60-90% milestones at those points.			
SOFTWARE			
For Non-SSC software (e.g., design): Summaries for potentially safety affecting – preliminary (ref. Ch 21 SOFT-GEN r0 2.1)	X		
For Non-SSC software (e.g., design): Summaries for potentially safety affecting – Updated (ref. Ch 21 SOFT-GEN r0 2.1)		X	
For Non-SSC software (e.g., design): 2033 forms for potentially safety affecting – Final			X
For SSC software, all documents required by Ch 21, leaving approvals for LANL to complete -- Preliminary	X		
For SSC software, all documents required by Ch 21, leaving approvals for LANL to complete -- Updated		X	
For SSC software, all documents required by Ch 21, leaving approvals for LANL to complete -- Final			X
ML-1 AND 2 NUCLEAR WORK			
Drawings: ML and/or SS/SC boundaries indicated		X	
Specs			
See note above for spec maturity at 30%	X		
Specs portraying complete scope of work, non-applicable sections removed; unedited masters are unacceptable. Include preliminary safety functions and critical characteristics except where latter are being developed by third party dedicator.		X	
Specs complete, checked, cross-discipline coordinated, and ready for approval, including identification of safety functions and, where applicable, critical characteristics.			X