

**Improved Theory and Computing Sciences Capability
at Argonne National Laboratory**

Acquisition Strategy including Alternative Analysis

**Project Type: Non-Major Systems Acquisition
Lead Program Office: Office of Science (SC)
Total Project Cost (TPC) Range: \$30M-\$60M**

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Desired Outcome and Requirements Definition

CD-0 Approval Date, Approving Official and Any Material Changes

The CD-0 for the Theory and Computing Sciences Capability was approved on October 12, 2004, by Dr. Raymond L. Orbach, Director, Office of Science, U.S. Department of Energy.

No material changes were noted.

Summary Project Description and Scope

The development of an infrastructure that effectively and efficiently supports the DOE theory and computational activities is key to successfully accomplishing the DOE science and technology mission. The present capability to house the ANL computer sciences facilities is severely strained. Based on ANL core competencies, ANL will continue to play an integral role in the DOE and SC advanced scientific computing research vision. The need for even more advanced computational capabilities continues to grow with the development of increasingly sophisticated theories, such as in the areas of nanotechnology, climate change, protein modeling and structural biology. It also continues to grow because of the considerable amounts of data from tests performed with the increasing complex scientific instruments. To achieve the DOE and SC science and technology goals at ANL requires more centralization of large scale and complex computing capabilities and other information management resources, and modern infrastructure that will support the existing and expected computational needs.

The SC goals included in the SC Strategic Plan are dependant on the nature and breadth of theory and computational sciences within the SC complex. SC scientific programs and progress in many other areas of science depend critically on advances in computational modeling and simulation. The recognition and realization that SC must reconfigure and modernize its basic infrastructure, including its computational capabilities, has been documented as a SC priority in the "2001 Frontier Report: Lab Modernization Investment Plans."

In order to meet the DOE mission needs, as documented in the SC program goals, ANL was directed to develop a Strategic Facilities Plan that identifies the required ANL and SC programmatic goals, and prerequisite basic infrastructure changes, such as facility additions and upgrades. This Strategic Facilities Plan included a systems review which used the SC goals and a more complete set of facility requirements. The result was the identification of facilities and upgrades that would resolve systems issues such as consolidation of functions, collocation of organizations, adequate space, and improvement in operational efficiencies and effectiveness. These studies identified an immediately critical need that had not been identified previously and had not been included in prior year planning. This requirement has been documented as a SC priority in the "2001 Frontier Report: Lab Modernization Investment Plans."

One of the identified critical needs, to meet these SC goals, is the development of an ANL infrastructure capability sufficient to host diverse computer servers, as well as large-scale computer systems. This is needed to meet current and near-term planned programs. The existing computational facilities at ANL reached maximum capacity in 2004, and must be restructured and supplemented in order to support current and continued growth and demand for computational support across the Laboratory. As discussed in strategic planning sessions, it is estimated that the computational capability at ANL will need to increase significantly, with some estimates indicating the need to at least double over a 10-year timeframe in order to support and enable the related programmatic goals.¹

¹ Detailed discussion regarding the growth of computational requirements to support scientific mission is included in **SECTION 1-8** of this documentation.

As part of the MNS, the following specific performance parameters were identified and prioritized for this capability:

1. Centralization of large-scale computing capabilities to support present and expected computational needs.
2. Collocation of computer scientists, mathematicians, computational scientists, and theoreticians, to form a critical theory and computational capability with immediate access to the computational capability.
3. Provision of adequate space on the ANL site to accommodate ANL staff located in off-site, leased space.
4. Improvement of operational efficiencies by creating space that consolidates common functions, such as the library function, and is more energy efficient than existing space for high demand systems.

In early 2003, a cross-functional leadership team at ANL, in coordination with DOE programmatic representatives (e.g. BES, OSCR) was organized to focus on the achievement of the targeted objectives. Over the course of 2003 to 2004, this team assimilated and prioritized key user capability requirements for the improved infrastructure. At several stages of this process, external expertise (primarily architectural design and construction) was contracted to validate and refine the preliminary assumptions. The results from this interaction and guidance form the functional and technical foundation for meeting the mission performance parameters supporting the improvement of the theory and computing capabilities at ANL. These technical requirements are documented in the TCS Facility Statement of Work, included in SECTION 1-5 of this package. The following table highlights the key functional and technical requirements:

PRELIMINARY TCS FACILITY FUNCTIONAL AND TECHNICAL REQUIREMENTS	ESTIMATED SF (prior to CDR)²
Primary Office Flexible research units, or "POD"s of approximately 20-30 persons per unit. Each research unit will share adjacent small and medium-sized conference rooms and copy/coffee/work areas.	40,000-45,000
Labs Low-hazard, flexible, and sub-dividable computer-intensive laboratories intended to accommodate multiple uses and reconfiguration.	6,000-9,000
Supercomputer Support Facility Must support from 400 to 750 computer cabinets including adequate power, cooling and cable management space for densely racked computing equipment.	20,000
Conference Center Meeting spaces with built-in infrastructure suitable for distance conferencing, training, meetings, and public education, suitable for small and large groups.	5,000-7,000
Library Including information commons in the staff entrance lobby, the library proper, and an office/backroom processing area.	22,000-25,000
Building Support Area	~40,000-46,000
TOTAL ESTIMATED AREA	~133,000-150,000

² NOTE: the estimates provided are pre-CDR and are expected to vary under the formal design process.

In summary, the centralization of the theory, math, and computation capabilities and their required infrastructure at ANL are necessary to support large-scale computation, high-end visualization, and the integration of computers, people, information and instruments over high-speed networks. This setting, the framework for which has been outlined above, will uniquely enable prioritized interdisciplinary interactions among researchers spanning theory, computing science, and experimental validation, as well as optimize any potential operating efficiencies.

Mission Performance Parameters Required to Obtain Desired Outcome

The Mission Need Statement (MNS) confirmed the following four parameters as mandatory performance measures for this initiative to be successful:

1. Centralization of large-scale computing capabilities in a facility appropriate to current systems technology requirements.
2. Collocation of the computer scientists, mathematicians, computational scientists, and theoreticians, providing immediate access to the computational capability.
3. Accommodation of ANL staff onsite (located in off-site, leased space).
4. Achievement of operational efficiencies through consolidation of space associated with common functions (e.g. library).

In light of the priority of the drivers for this capability, the targeted building occupancy (both staff and equipment) for 2007 has been included as a critical performance parameter.

The mission performance parameters provided the basis for the analysis contained in the Acquisition Strategy, as well as in the assessment and compilation of the project functional and technical requirements.

2. Cost and Schedule Range

Total Project Cost (TPC) Range

The estimated TPC for this initiative ranges from \$30 – \$60 million. The range allows for all of the funding alternative profiles under review.

A high level of confidence in this estimate exists in light of the comprehensive research, market analysis and planning conducted to date including:

- Limited conceptual design work and validation of the feasibility of the preliminary statement of work by independent architectural and construction firms³,
- facility renovation estimates,
- cost management success-rate under a design-build project methodology, and
- leasing market estimates, feedback and analysis⁴.

It is important to note that the final TPC will be highly dependant upon the chosen acquisition strategy (AS) and the recommended third party, design build partner selected as a result of a competitive procurement.

³ Including OWP&P and Lane Construction Consulting Services LLC. These estimates are provided in SECTION 1-6.

⁴ Including a report commissioned by Globetrotters Engineering Corporation in March 2004.

Funding Profile

As discussed in the MNS, four acquisition alternatives have been identified and are analyzed in this Acquisition Strategy. The alternatives are:

1. Base Case: this is the “no action” scenario, allowing for minimal changes
2. Modify Existing Facilities: Argonne, with DOE’s support, seeks to modify or rehab existing facilities to address the requirements as outlined.
3. DOE Line Item New Construction Effort: Argonne, with DOE’s support, undertakes this effort either by design/bid/build (3a) or a design/build approach (3b).
4. Leasing 3rd Party Facility (Offsite; Onsite/Ground Lease; Onsite/Land Transfer): Argonne leases space within close proximity of the site or Argonne leases space in a facility on campus that is constructed/owned by a third party entity (4a-4c)⁵.

The funding profile for these options follows:

Funding Profile for Alternative Scenarios

Scenario	Earliest Possible Occupancy	Gross Funding Amount (estimated)	Funding Source
#1. Base Case (No action)	Current	~\$3.27M/year	Operating funds
#2. Modify/Rehab Existing Facilities	Suitable space not currently available	~\$14.0-\$32.9M (estimated costs if space were available)	Programmatic budget or line item (if available)
#3a. DOE Line Item New Construction Traditional	FY10	~\$61.77M (design/bid/build).	<u>Line Item</u> FY07--~\$7.7M FY08--~\$29.0M FY09--~\$25.1M
#3b. DOE Line Item New Construction Design/Build	FY09	~\$50.65M (design/build)	<u>Line Item</u> FY07--~\$25.30M FY08--~\$25.35M
#4a. Leasing 3rd Party Facility: Offsite	FY07	~\$4.8-\$5M/year	Operating funds
#4b. Leasing 3rd Party Facility: Onsite-Ground Lease	FY07	\$4.6M/year	Operating funds
#4c. Leasing 3rd Party Facility: Onsite- Land Transfer	FY08	\$5.3M/year	Operating funds

Detailed discussion of the financial feasibility of each scenario is presented under Risk and Alternatives (Technical, Location & Acquisition Approach) of this document

⁵ NOTE: Scenario 4c was added to the analysis at the request of DOE-HQ in August 2005.

Key Milestones and Events

The following outlines the key milestones associated with the alternative scenarios under review. As occupancy of the facility is time sensitive in light of current requirements, the following schedules played a critical role in the prioritization of the alternatives.

Alternatives/ Decision Matrix	Base Case (No action)	Modify/Rehab Existing Facilities	DOE Line Item Construction (3a and 3b)	Leasing 3 rd Party Facility (4a-4c)
CD#0	September 2004	September 2004	September 2004	September 2004
CD#1	N/A	N/A	October 2005	October 2005
CD#2	N/A	N/A	Fall 2006	N/A
CD#3	N/A	N/A	Spring 2008	N/A
CD#4	N/A	N/A	Spring 2010	N/A

Under the recommended acquisition strategy, Leasing 3rd Party Facility Onsite-Land Transfer, the schedule allows for construction to begin in Spring 2006 with an operational date for FY 2007. The milestones and events assume an 18 to 24 month construction schedule.

Note that under the preferred acquisition strategy, the following additional milestones have been identified:

- Execution of the Ground Lease – Fall 2005 (anticipated)
- Evaluation and review of actual TPC – late Fall 2005 (anticipated)
- Review of the FUA – Spring 2006 (anticipated).

3. Major Applicable Conditions and Constraints

Environmental, Regulatory and Political Sensitivities

The selected alternative will meet the requirements for overall space, electrical load, heating, cooling, schedule, and life cycle cost. The project will meet both the near-term and longer term projections for these requirements. DOE will comply with the requirements of the National Environmental Policy Act (NEPA) and its implementing regulations (10 CFR 1021 and 40 CFR 1500-1508) prior to taking any action on the proposed project that could have adverse environmental effects or that would limit the choice of reasonable alternatives.

In October 2004, DOE made a Categorical Exclusion (CX) Determination based on the anticipated TCS parameters. This CX determination will be revisited if the final TCS design differs significantly from the anticipated parameters.

Safety and Security Considerations

The TCS Project will not include or impose any undue hazards that will change the safety envelope for the site. The site is categorized as a low hazard non-nuclear facility.

The project will also not change the safeguards and security requirements at ANL. Currently the site is fenced and access is controlled. This control ensures worker and public safety and property protection.

Infrastructure and Site Planning

Under the recommended acquisition strategy, the building will be located on the ANL site consistent with the approved Land Use Plan and the Ten Year Site Plan.

Renovation of existing infrastructure would be extremely difficult in light of current facility availability. Existing campus facilities are less than one-half percent vacant in terms of potential locations for renovation/modification to suit this capability. The site wide space constraints also preclude relocation to vacant space on site; there is no space available for staff to relocate to during renovations

Other

The technical risks associated with this endeavor are low, and there are no known operational constraints or ES&H issues that cannot be addressed responsibly and economically.

Timing and the federal budget cycle is a major issue associated with constructing a new building on the ANL site.

4. Risk and Alternatives Analysis (Functional/Technical, Economic, Location & Acquisition Approach)

This alternative analysis evaluates and compares the four acquisition alternatives in terms of life-cycle cost, ability to meet schedule constraints, ability to meet functional requirements and operational efficiencies, as well as other assumptions and constraints as noted below:

- Potential to achieve the mission performance parameters,
- Ability to address the facility functional and technical requirements (as defined on a preliminary basis in the TCS Statement of Work dated February 2004)⁶,
- Cost Range,
- Schedule Range (earliest occupancy),
- Location and site conditions,
- Funding and Budget considerations, and
- Potential for lifecycle cost savings.

Prioritization of the alternative acquisition strategies depended largely on the ability each scenario represented to address the mission performance parameters, including target facility occupancy date, coupled with funding feasibility.

Functional/Technical Requirements Analysis

The functional/technical requirements analysis reviews each scenario as to whether the targeted facility specifications, necessary to providing the improved theory and computing sciences capability, are adequately addressed. The summary of these requirements follows:

- Accommodate a population of approximately 260-290 people (including ANL staff and students, visiting researchers, and other short-term visitors) with offices;
- Provide a supercomputer support facility (further defined below) for centralized computing resources;
- Provide advanced digital conferencing areas for both small and large meetings;
- Provide computer-intensive laboratory spaces; and
- Provide appropriate facilities to house a centralized ANL library.

⁶ Refer to SECTION 1-5 for the full draft requirements.

The “Base Case” scenario does not provide for these requirements. This, coupled with the failure to meet the performance parameters eliminates this option from further consideration.

Modifying existing facilities could potentially address some of these requirements, assuming budget availability and appropriate space/site availability in coming years, but is not a feasible alternative in the near-term.

A DOE line item new construction effort could successfully address these requirements, but is fully dependent on budget availability and related funding schedules. Current estimates suggest delay to the targeted occupancy date and risk to the programs dependent on this critical infrastructure capability.

Only the Leasing approach offers the potential to address the function/technical requirements within the targeted timeframe.

Funding and Budget Considerations (including Economic Analysis)

The following table summarizes the estimated cost ranges associated with each scenario (further financial detail supporting this discussion has been included in the Economic Analysis detail in SECTION 1-2 of this documentation package):

Summary of Funding and Budget Considerations			
Scenario	Annual Funding Amount (estimated)	DOE Total Project Costs (estimated)	PV
#1. Base Case (No action)	~\$3.27M/year	NA	\$44.0M
#2. Modify/Rehab Existing Facilities	NA	~\$14.0-\$32.9M	NA
#3a. DOE Line Item New Construction Traditional	FY06--~\$7.7M FY07--~\$29.0M FY08--~\$25.1M	~\$61.77M	\$64.9M
#3b. DOE Line Item New Construction Design/Build	FY07--~\$25.00M FY08--~\$25.65M	~\$50.65M	\$55.0M
#4a. Leasing 3 rd Party Facility: Offsite	\$4.8-5M/year	NA	NA
#4b. Leasing 3 rd Party Facility: Onsite-Ground Lease	\$4.6M/year	NA	\$43.9M
#4c. Leasing 3 rd Party Facility: Onsite- Land Transfer	\$5.3M/year	NA	NA

The costs for base case have been established through a review of current ANL expenditures, and provide a baseline for this analysis.

Under the Modify/Rehab Existing Facilities scenario, a thorough review of the potential locations to renovate on Argonne campus was prepared by Argonne PFS, including cost estimates, in accordance with the facilities requirements previously described. The following table outlines the estimates provided.

Modify/Rehab Existing Facilities – Options and Cost Estimates (as of March 2004)		
Options	COST FY2004 (estimated)	Issues
<ul style="list-style-type: none"> • Occupy Open Space in Bldg 362 • Build Office and Research Space 	\$22.58M	<ul style="list-style-type: none"> • Does not meet performance parameter 5 • Will not create space for Library consolidation • NOTE: Bldg 362 no longer vacant.
<ul style="list-style-type: none"> • Occupy Open Space in Bldg 362 • Use Bldg 221 for Office Space 	\$14.02M	<ul style="list-style-type: none"> • Does not meet performance parameter 5 • Will not create space to support Bldg 900 relocation • Will not create space for Library consolidation • NOTE: Bldg 362 no longer vacant.
<ul style="list-style-type: none"> • Occupy entire Bldg 362 	\$25.95M	<ul style="list-style-type: none"> • Does not meet performance parameter 5 • Will not create space to support Bldg 900 relocation • Will not create space for Library consolidation • NOTE: Bldg 362 no longer vacant.
<ul style="list-style-type: none"> • Use Bldg 221 for Office Space and Build Additional Structure 	\$32.92M	<ul style="list-style-type: none"> • Does not meet performance parameter 5 • Will not create space to support Bldg 900 relocation • Will not create space for Library consolidation
<ul style="list-style-type: none"> • Use Bldg 221 for Machine Room and Build Attachment 	\$29.39M	<ul style="list-style-type: none"> • Does not meet performance parameter 5 • Will not create space to support Bldg 900 relocation

As there currently is no space available appropriate to modify/rehab under the technical and functional requirements defined, this scenario was not evaluated further in the economic model.

As both of the DOE New Line Item Construction scenarios have the potential to address most of the mission performance parameters, these were integrated into the economic analysis as a basis of comparison with the preferred approach, Leasing Third Party Facility Onsite-Ground Lease.

The NPV, using the 18 year Facilities Use Agreement term and a 4.90% rate, of the DOE Line Item Construction scenarios (at \$64.9M and \$55.0M) exceeded the NPV for the preferred approach (at \$43.9M). The break-even, as compared to the base case, calculated to be 21 years for DOE Line Item Traditional Construction, and 17.5 years for DOE Line Item Design Build Construction. The Leasing Third Party Facility Onsite-Ground Lease scenario offers break-even at 14.5 years.

Scenarios 3a and 3b fall short from a funding/budget perspective in that these alternatives would require the engineering design, construction and relocation of equipment, staff and other resources to span three years starting in FY2007 and culminating in an operating facility in FY2010. This funding profile is based upon a traditional M&O-led procurement with engineering and design beginning in the fourth quarter of CY2007 and operations beginning the last quarter of CY2009. Currently, the earliest possible budget request submittal would be for the FY07 budget, which precludes achievement of the required occupancy.

The alternative for leasing offsite (#4b) would require only operating funds beginning in FY2007. The leasing offsite option impacts the funding and budget considerations as follows:

- Offsite leasing rates (gross) range from \$32/SF to \$35/SF for available facilities (costs reflect high-tech facility capability at upper range and basic office space at lower range).

- Total lease costs for a 10-year commitment would range from \$41.1M-\$45.0M, with an average annual cost range between \$4.1M-\$4.6M.
- Total lease costs for a 20-year commitment would range from \$97.2M-\$107M, with an average annual cost range between \$4.8M-\$5.3M.
- Escalation factors of 3-5% per year play a key role in the cost range for this alternative.
- Upgrading existing facilities to accommodate the functional and technical requirements add substantial costs (akin to the estimates noted under Scenario #2).

Scenario #4c, the leasing alternative involving a land transfer of the site, is a significantly more costly alternative. Preliminary analysis noted increased expense in the following three categories:

1. Purchase price for the land and related fees (~\$4M one-time);
2. Improvements required under private ownership (~\$1.5-\$5M one-time); and,
3. Property taxes assessed on the land and on the improvements (\$700K-\$900K annually).

The costs associated with the purchase price and the improvements would necessitate increasing the TPC, triggering a greater annual rent (possibly \$200K-\$300K). The property taxes would increase the rent annually as well, as a key component of the gross rent.

From a schedule perspective, the anticipated delay this scenario presents is a minimum of 12 months. This is largely attributable to factors associated with private ownership of the land including the re-zoning process, required public notifications associated with the disposal of government property, and possible infrastructure-related negotiations and transactions.

The following table summarizes the estimated gross rent rate (including O&M, capital reserve contribution, and management) for each of the leasing options under Scenario 4.

Scenario #4a-#4c – Estimated Leasing Rates ⁷		
Scenario	\$/SF (estimated)	Notes
#4a. Leasing 3rd Party Facility: Offsite	\$32-\$35/SF	<ul style="list-style-type: none"> • 3% escalation factor per year (largely due to anticipated increases in tax rate and overhead). • Includes upgrade considerations
#4b. Leasing 3rd Party Facility: Onsite-Ground Lease	\$31-\$33/SF	<ul style="list-style-type: none"> • No escalation factor for taxes and overhead • Flat base rent established.
#4c. Leasing 3rd Party Facility: Onsite- Land Transfer	\$39-\$45/SF	<ul style="list-style-type: none"> • Potential tax escalation to consider • Includes assumption for increased project financing.

Scenario #4b, the leasing alternative using 3rd-party financing to construct a facility onsite under a ground lease, would have similar funding requirements to the scenario involving leasing existing facilities offsite. Input from local developers through a market assessment conducted in mid-2004 confirmed strong interest to support the TCS facility meeting the technical requirements on the preferred site, at the

⁷ These leasing rates have been estimated based upon current market data. It is often that such estimates will vary when compared to negotiated terms.

targeted TPC, with targeted occupancy in the 2007. This has been further detailed in SECTION 1-7 (Competitive Environment for the TCS Facility to be Privately Developed on the Grounds of Argonne National Laboratory).of the documentation set.

Location Alternatives Analysis

The analysis explores the economics of the proposed TCS facility against several location alternatives, bearing in mind that three of the performance parameters involve collocation and consolidation of key Argonne staff onto the existing campus.

It is important to note that as of early 2004, existing campus facilities were less than one-half percent vacant in terms of potential locations for renovation/modification to suit this capability. It was determined, and reconfirmed more recently, that no existing building on campus could be modified to accommodate the TCS facility in terms of the technical and functional requirements, in particular-

- Support of the combination of power availability, cooling capacity, and computer room functionality necessary to meet the identified program requirements; and
- Providing needed office and meeting facility space to accommodate 260-290 occupants.

The remaining scenarios involved reviewing potential locations on the Argonne campus for new construction. Argonne evaluated several site options throughout the conceptualization and refinement of the TCS acquisition strategy. This evaluation included the following locations:

- the utility-rich 360 Area,
- the East and West (800) Areas, due to their obvious road access,
- the undeveloped areas of the site adjacent and west of APS, and
- a location along the north fence east of the main entrance.

The following factors were considered in this process:

- Programmatic considerations and interactions including functionality for other (library, conferencing) supporting uses;
- Financing considerations (e.g. marketability for alternative financing; other requirements such as frontage and access);
- Infrastructure considerations including utility services (related to the estimated requirements – capacity and length of service run), cooling and water access;
- Environmental impact;
- Public access, including roads; and
- Site security and access control.

The preferred site location for the TCS facility is adjacent to the Argonne Information Center, just west of the Northgate entrance and north of Outer Circle Road. Under each of the foregoing considerations, the preferred site location proved to be equal or superior to other potential locations.

DOE completed the NEPA determination for this location in October 2004.

Acquisition Alternatives Analysis Summary

The following tables summarize the results of the four acquisition alternatives reviewed.

Table 4.1 – ACQUISITION STRATEGY ALTERNATIVES ANALYSIS – PRIMARY CONSIDERATIONS

SCENARIO	SELECTION CRITERIA						
	Mission Performance Parameters	Facility Functional/Technical Requirements	Cost Range	Location and Site Conditions	Schedule Range (earliest occupancy)	Funding & Budget Management	Lifecycle Costs
(1) Base Case	Fails 4/4	Cannot address functional/technical requirements	~\$3.27M/yr ⁽¹⁾	Fails to meet performance parameters and functional requirements – not an active scenario for consideration through remaining evaluation. Economic analysis does include lifecycle cost considerations associated with Base Case			
(2) Modify Existing Facilities	Potential to address #1	Cannot address functional/technical requirements	TPC \$14.00 M-\$32.00 M(2)	No facilities available to be modified	Lack of appropriate, available existing facilities to meet performance parameters, as well as functional requirements removes this scenario from further evaluation.		
(3) DOE Line Item New Construction Effort: <u>Option A – Design/Bid/Build</u> <u>Option B – Design/Build</u>	Meets #1-#4	Can meet functional/technical requirements	TPC \$61.77M ⁽³⁾	Preferred site meets conditions	FY10	Earliest possible funding target is FY2007 budget	Refer to <u>SECTION 1-2– Economic Evaluation of Financial Models</u>
	Meets #1-#4	Can meet functional/technical requirements	TPC \$50.65M ⁽³⁾	Preferred site meets conditions	FY09	Earliest possible funding target is FY2007 budget	Refer to <u>SECTION 1-2– Economic Evaluation of Financial Models</u>
(4) Leasing 3 rd Party Facility: <u>Option A- Offsite facilities</u> <u>Option B- Onsite facilities/ Ground Lease</u> <u>Option C- Onsite facilities/ Land Transfer</u>	Potential to address 3/4	Could meet functional requirements with upgrades/rehab	Gross lease rate – \$32-35/SF plus 3% escalation ⁽⁴⁾	No local offsite space meets requirements	Fails to meet performance parameters – not an active scenario for consideration through remaining evaluation. Lack of economically viable and functionally appropriate local facilities to lease (based upon reasonable market rental rates and conditions) also factored into evaluation.		
	Meets #1-#4	Can meet functional/technical requirements	Gross lease rate \$31-33/SF	Preferred site meets conditions	FY07	Lease payments could begin in FY2007	Refer to <u>SECTION 1-2– Economic Evaluation of Financial Models</u>
	Meets #1-#4	Can meet functional/technical requirements	Gross lease rate \$39-45/SF plus escalation	Preferred site meets conditions	Fails to meet programmatic timeline and not an economically viable alternative.		

Table 4.2 - ACQUISTION STRATEGY ALTERNATIVES ANALYSIS – OTHER CONSIDERATIONS

SCENARIO	SELECTION CRITERIA				
	Interfaces and Integration Requirements	Safeguards and Security	Legal and Regulatory	ES&H	Stakeholder Issues
(1) Base Case	(Refer to Performance Parameters)				
(2) Modify Existing Facilities	(Refer to Performance Parameters)				
(3) DOE Line Item New Construction Effort: <u>Option A – Design/Bid/Build</u>	Performance parameters prioritize FY07 for facility occupation (based upon programmatic requirements), making this scenario not viable.				
<u>Option B – Design/Build</u>	Performance parameters prioritize FY07 for facility occupation (based upon programmatic requirements), making this scenario not viable.				
(4) Leasing 3 rd Party Facility: <u>Option A- Offsite facilities</u>	(Refer to Performance Parameters)				
<u>Option B- Onsite facilities/ Ground Lease</u>	<ul style="list-style-type: none"> ▪ Federal permitting ▪ Notice of construction (to be led by DOE) 	<ul style="list-style-type: none"> ▪ Requirements have been integrated into construction performance requirements ▪ Setbacks and related vulnerabilities have been addressed. 	<ul style="list-style-type: none"> ▪ A-11 Analysis ▪ Ground Lease approval ▪ NEPA ▪ Establishment of and Relationship to Trust (3rd Party) 	<ul style="list-style-type: none"> ▪ Davis Bacon applies ⁽⁶⁾ ▪ DOE Oversight of Construction 	State and local communities have been supportive in preliminary discussions
<u>Option C- Onsite facilities/ Land Transfer</u>	Fails to meet programmatic timeline and not an economically viable alternative				

NOTES

- (1) Noted in CD-0 as likely “most expensive” option, as the impact on the science and technology mission will be significant and pervasive
- (2) The costs of renovation were estimated by PFS during the analysis in accordance with the facilities requirements previously described. It should be noted that as of January 2004, existing campus facilities are less than one-half percent (0.5%) vacant in terms of potential locations.
- (3) Refer to detailed discussion **SECTION 1-6: Construction Estimates.**
- (4) Based upon independent market research (conducted by Globetrotters Engineering Corporation) analyzing related facilities within geographic proximity to ANL site. Costs reflect high-tech facility capability at upper range and basic office space at lower range.
- (5) N.B. - The estimates included in the foregoing tables use conservative parametrics (because of the level of design) to ensure that the cost estimate arrived at provides an upper bound. This methodology is appropriate to use in comparing potential benefits between constructions methodologies. However, by its nature, this estimating approach cannot take into account the effect of competitive procurement, the use of alternative methods of construction, nor the process of value engineering.
- (6) Per DOE General Counsel guidance, Davis-Bacon will apply.
- (7) The alternatives analysis was revisited in July/August 2005, and all existing base data was revalidated.

The following summarizes the key conclusions resulting from the detailed analysis of each of the potential scenarios as outlined in the preceding sections:

Summary of Key Conclusions from the Analysis of Alternatives	
Scenario	Conclusion
Overarching Considerations	<ul style="list-style-type: none"> • The overall costs, both estimated TPC and ongoing costs, associated with each alternative vary significantly. • Any of the construction alternatives could address the functional requirements for the capability, and offer the potential for lifecycle cost savings. • The location and site conditions and method of acquisition are critical to meeting the performance parameters. • Funding and budget considerations, along with schedule range, eliminate the possibility for a new construction project under government procurement in light of near-term programmatic needs.
#1. Base Case (No action)	<ul style="list-style-type: none"> • Fails to address four mission performance parameters outlined in the Acquisition Strategy, including targeted occupancy date. • Fails to meet the functional and technical requirements for the targeted capability.
#2. Modify/Rehab Existing Facilities	<ul style="list-style-type: none"> • Retrofitting is currently not possible in light of existing ANL space and site utilization. • The cost of retrofitting existing facilities presents little, if any, cost savings as compared to new construction. • Fails to meet the targeted occupancy date.
#3a. DOE Line Item New Construction Traditional	<ul style="list-style-type: none"> • The funding schedule for a DOE line item construction project does not accommodate the construction and occupancy dates required. • The proposed cost of a new facility, under design/bid/build line-item financing, is still more costly than the budget outlined under the recommended Acquisition Strategy.
#3b. DOE Line Item New Construction Design/Build	<ul style="list-style-type: none"> • The funding schedule for a DOE line item construction project does not accommodate the construction and occupancy dates required. • More costly than the leasing alternative (using a Design/Build approach). Savings attributable to a private-sector-led construction effort contribute to this delta.
#4a. Leasing 3rd Party Facility: Offsite	<ul style="list-style-type: none"> • Cannot address three priority performance parameters: <ol style="list-style-type: none"> (1) centralization of computing resources, (2) collocation of key research staff onsite, and (3) achieving related operational efficiencies associated with consolidation. • Preliminary analysis of available offsite space failed to locate appropriate facilities, though this is subject to change. • Potential to meet functional and technical requirements with upgrades, incurring a more expensive cost per square foot. • Escalation factor increases costs associated with this alternative..
#4b. Leasing 3rd Party Facility: Onsite-Ground Lease	<ul style="list-style-type: none"> • Meets all of the mission performance parameters, including the targeted occupancy date. • Funding profile is consistent with objectives.

Summary of Key Conclusions from the Analysis of Alternatives	
Scenario	Conclusion
#4c. Leasing 3 rd Party Facility: Onsite- Land Transfer	<ul style="list-style-type: none"> Land transfer represents a lifecycle cost increase of approximately \$16M over the ground lease approach. Delays to project timeline of a minimum of 12 months are likely.

The financial estimates and projections used to support this analysis are provided in SECTION 1-2: Economic Evaluation of Financial Models as part of this Acquisition Strategy documentation.

Sensitivity Analysis

The impact that numerous factors have on the successful completion of this effort under the recommended Acquisition Strategy must be considered as a part of this evaluation.

Potential Impact of Key Variables	
Consideration	Impact on recommended Acquisition Strategy
DOE Approval Process	<ul style="list-style-type: none"> Delays in the DOE acquisition approval process, may adversely impact the entire Argonne TCS Building Process Timeline, including the ability to secure project financing at acceptable rates, and the ability to confirm a TPC GMP within an affordable range. Delays in the DOE acquisition approval process exacerbate current computational support facility capacity issues, likely impacting programmatic endeavours.
Construction Schedule	<ul style="list-style-type: none"> Delays in the construction schedule may incur higher materials costs in light of current economic conditions. Delays in the construction schedule, delaying occupancy, may adversely impact the ability of the Program to meet critical research and development objectives. Delays in the construction schedule present potential conflicts with the Argonne site facilities planning, in particular the ability to leverage common site development infrastructure.
Interest Rate Fluctuation	<ul style="list-style-type: none"> Increasing interest rates (per current market conditions) may adversely impact the available funding, after financing costs, for the project.
Project Budget	<ul style="list-style-type: none"> Increasing construction materials costs may impact the TPC. The alternative is that the project scope will be modified, risking the achievement of the performance parameters. Increases in the TPC may impact the affordability of the facility for Argonne tenants, as it is assumed there will be an increase in related rents. Increases in the TPC may impact the marketability of the facility, and the related interest/commitment of the private sector to pursue this endeavor.
Site Location	<ul style="list-style-type: none"> The current site location meets the accessibility requirements necessary for the alternative financing as recommended, and has passed the NEPA review. Any changes to this location may impact the efficacy of this funding approach.

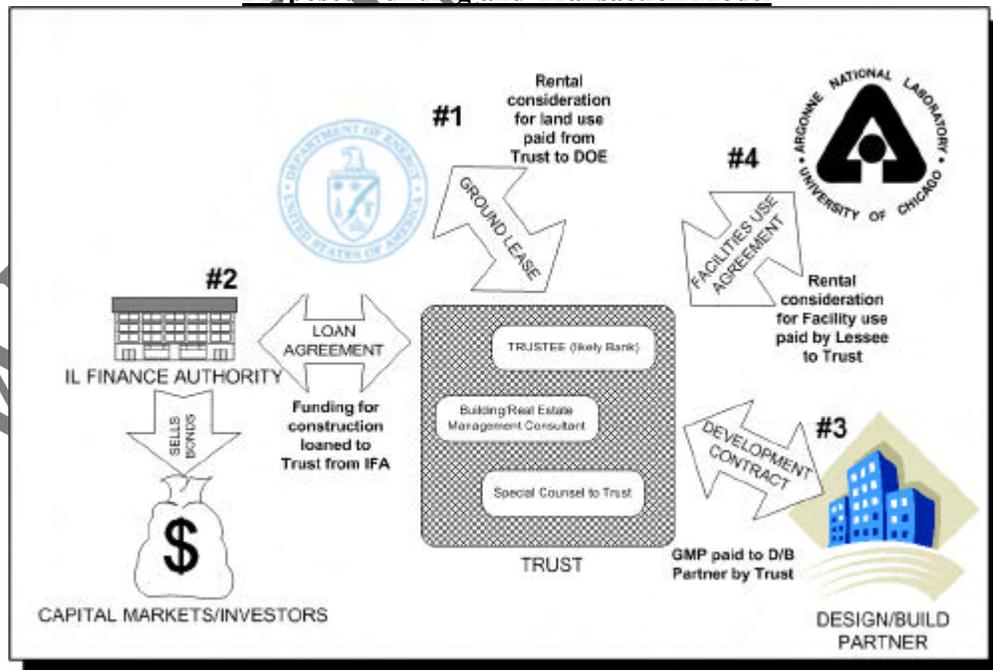
Potential Impact of Key Variables	
Consideration	Impact on recommended Acquisition Strategy
Establishment of Owner/Trust	<ul style="list-style-type: none"> This is contingent on the approval of the acquisition strategy. Delays in this action may impact the ability for the Third Party to initiate critical final negotiations related to the transaction, potentially increasing the costs and expenses and reducing the available project funding. Establishment of the Owner/Trust positively impacts the initiative by providing the corporate entity responsible for the project and the related transactions.

5. Preferred Acquisition Strategy

The following outlines the preferred acquisition strategy for the proposed Theory and Computing Sciences Building (TCS Facility). The building will be a privately owned, financed and developed on a site located on the perimeter of the Argonne campus. The building, which will be constructed to local requirements, will be leased for its use as offices and research facilities. The current estimate for the construction of the TCS Facility is approximately \$40 million, inclusive of financing, transaction and project management costs, design fees and related contingencies, site improvements, and building construction.

The transaction, as illustrated in the following diagram, contemplates that the TCS Facility will be developed on a parcel on the Argonne campus that will be leased by DOE to a private entity (“Trust”) established for this purpose, through a 37-year, unsubordinated ground lease (term to be defined as construction period plus 35 years). Lessee, Trust, shall pay to DOE an annual fixed rent, based on the fair market value of the parcel as determined by Lessor, DOE, as indicated by an appraisal or other appropriate means. The ground lease will also permit the Trust to construct the TCS Facility on the parcel and to occupy, use, assign, sublease, or otherwise transfer a portion of the facility for certain commercial uses should the facility cease to be used in connection with the current or any future DOE mission.

Proposed Funding and Transaction Model



The Trust, which will be established as a statutory trust under the laws of the State of Delaware, will be the lessee under the Ground Lease (as hereinafter described), the Borrower under the Loan Agreement, and the owner of the Facility. (Title to the Project will vest in Owner until the end of the Ground Lease. Co-beneficiaries of the Trust will be the Bond Trustee (acting on behalf of Bondholders) and either the M&O Contractor, a 501(c)(3) non-profit, or a state or local government entity. Substantive control over the activities of the Trust and the Trustee for the Trust, where not specified in the Trust Agreement establishing the trust, will be exercised by the Bond Trustee so as to avoid the M&O Contractor's having to consolidate with the Trust for financial reporting purposes. Having a non-profit or a state or local government entity as co-beneficiary of the Trust will avoid payment of income taxes on incidental income generated by the trust's activities.

The trust estate, initially, will be Trust's right and obligation to enter into the Ground Lease, the Loan Agreement, the Development Agreement, and a Facilities Use Agreement ("FUA"). The transaction contemplates that the Trust will enter into an 18-year FUA with the M&O Contractor. Under the FUA, operations and maintenance of the facility will be contracted by the Trust to a manager at a competitive market rate.⁸ Revenues derived from the payments of rent under the FUA will be deposited directly with the Bond Trustee on a monthly basis and will be disbursed by the Bond Trustee pursuant to the flow of funds provisions of the Trust Indenture.

The Trust will be an entirely non-Federal party and no federal entity will be involved in its establishment, corporate decision-making or as a partner or beneficiary

The Trust, supported by an experienced real-estate consultant and advisor, will be solely responsible for selecting a developer. The development opportunity will be competed nationally, with the selected developer to design and construct the facility under a Development Agreement including a Guaranteed Maximum Price (GMP). It is anticipated that the construction period will be 18-24 months (based upon existing assumptions regarding the technical and functional requirements for the Facility).

Project financing will be assumed entirely by the lessee, the Trust. It is anticipated that project financing will come from a series of taxable revenue bonds issued by the Illinois Finance Authority (formerly IDFA, the Illinois Development Finance Authority). Other forms of financing are also being considered to determine the best possible financing arrangement available. The proceeds of the issue will be loaned to the Trust, pursuant to a loan agreement. The loan will be secured by a leasehold interest on the Facility and an assignment of all rental revenues derived from the Facility, consistent with commercial transactions of this nature. DOE will not be a party to the loan or any of the loan agreements.

The acquisition strategy as outlined in the foregoing is the most economical and efficient approach to address the capability and infrastructure requirements needed to meet the programmatic objectives of Argonne and the DOE Office of Science.

Acquisition and Contract Types

There are two primary commercial documents involving DOE and/or the M&O Contractor in the recommended acquisition strategy. These have been detailed below in terms of the parties involved in each, and the term.

(1) Ground Lease

Parties: DOE as lessor; Trust as lessee

Term: 37 years

Provisions: Security and Access_Requirements; Rental Payments; Access to site Infrastructure; Utilities and Services at cost; Final Disposition at the End of Term

⁸ Detail for the TCS Facility Operations & Maintenance cost elements are provided in SECTION 1-11.

(2) Facilities Use Agreement

Parties: Trust as Lessor, M&O contractor as Lessee

Term: 18-year Facilities Use Agreement (FUA) with the M&O Contractor as operator of the Argonne National Laboratory.

The following table summarizes the Roles and Responsibilities for each party involved in the proposed transaction.

WORKING DRAFT

TCS Facility Acquisition Strategy Overview of Roles and Responsibilities (revised September 2005)

Phase	Party	Role and Responsibility	Potential Liability
Establishment of Trust	DOE	Sign letter of intent regarding Ground Lease to Trust	Environmental, site owner
	M&O Contractor	Develop draft performance specifications for Building, model commercial RFP, develop programmatic plan and receive programmatic buy in	None
		Validate transaction structure with respect to accounting treatment	None
	Trust and Trustee	Conduct diligence and establish team to manage subsequent trust actions	Contractual
Ground Lease	DOE	Execute Ground Lease, contingent on closing of financing	Contractual
	M&O Contractor	As M&O Contractor, as may be directed by DOE	Contractual
	Trust and Trustee	Execute Ground lease, contingent on closing of financing	Contractual
Raise Capital	DOE	Provide information regarding DOE leasing authority, National Laboratories and ongoing M&O Contract.	None
	M&O Contractor	State intent to lease building under FUA	None
	Trust and Trustee	Enter into loan agreement with Bond trustee (IFA)	Contractual
	IFA	Prepare offering circular and retain bond counsel and underwriter	None
	Rating Agency	Rate the Bonds	None
	Bond Insurer	Insure repayment of Bonds	Contractual
	Underwriter	Market the Bonds	Contractual
	Bond Holders	Buy bonds	Investment Risk
	Bond Trustee	Receive offering proceeds and represent bond holders	Contractual
Solicit and Procure Developer	DOE	NA	None
	M&O Contractor	Provide opinion regarding developers to Trust (in capacity as tenant of proposed building)	None
	Trust and Trustee	Issue RFP and evaluate offers and select Developer	None
Manage Construction	DOE	Construction oversight	None
	M&O Contractor	Inspect and consult with Trustee's consultant	None
	Trust and Trustee	Deliver Building per specification on time, pay developer	Contractual
	Developer	Build Building per specification on time; provide warranty	Contractual
Occupy Building	DOE	Review FUA in light of Argonne occupancy	None
	M&O Contractor	Inspect and move in, pay rent	Contractual
	Trust and Trustee	Complete punch list	None
	Developer	Complete punch list	Contractual
Maintenance and Operation	DOE	NA	None
	M&O Contractor	Provide maintenance if cost effective	Contractual
	Trust and Trustee	Collect rent; provide maintenance if cost effective	Contractual

A-11 Summary

Per OMB Circular A-11, the transaction as described has been evaluated in the context of the criteria and guidelines governing capital and operating leases defined in Appendix B.

As per the Circular, it is mandatory to meet six criteria in order to rate approval. Our preliminary scoring indicates that the Facility Use Agreement does meet all of the A-11 criteria therefore would be considered an operating lease. Discussion for each of these mandatory provisions follows. For clarification during this discussion, “lease” shall mean the Facility Use Agreement (FUA) and “lessor” shall represent the Owner/Trust.

The assumptions used in this analysis are:

- Bond issuance of \$40M
- The annual cost of the land lease at FMV of \$213,444.
- Analysis was completed using laddered treasuries as well as OMB rate.
- Budget Authority was calculated as two years of rental payments (one year plus the one-year cancellation penalty).
- FMV of the asset is based upon the government construction estimate plus the value of the land.

It is important to note that independent counsel reviewed this analysis and confirmed that the transaction as outlined herein meets fits the approval parameters of OMB Circular A-11.

1. *Ownership of asset remains with the lessor during the term of the lease and is not transferred to the Government at or shortly after the end of the lease term.*

- During the FUA term, the ownership of the asset remains with the lessor (Owner/Trust) and is not transferred to the DOE, or its M&O contractor. The ownership of the asset remains with Owner/Trust for at least 7 years before full payment is made against the project financing.
- No DOE use nor DOE ownership of the facility and/or other improvements during the FUA.
- Title to the improvements remains with Owner/Trust throughout the term of the 35-year plus construction term ground-lease.

2. *The lease does not contain a bargain-price purchase option.*

- FUA (between Owner/Trust and M&O Contractor) does not contain any bargain-price purchase option.

3. *The lease term does not exceed 75 percent of the estimated economic life of the asset.*

- Economic life of a commercial office complex = 26 years (per Bureau of Economic Analysis, U.S. Department of Commerce)
- Term of FUA (18 years) does not exceed 75 percent of the economic life

4. *The present value of the minimum lease payments over the life of the lease does not exceed 90 percent of the fair market value of the asset at the beginning of the lease term.*

- Fair market value (FMV) per the government construction estimate is ~\$62M.
- Present value of the est. minimum lease payments represents 58% of TCS FMV

5. *The asset is a general-purpose asset rather than being for a special purpose of the Government and not built to the unique specifications of the Government as lessee. (Per OMB guidance, projects on Government land are presumed to be for a special purpose of the Government.)*

- Specs are modern-day commercial complex – not special-purpose

- ~70% general office, meeting/conference and related support space.
 - SSF specs are comparable to 21st century data center (common to “information economy” work environments).
 - Library requirements match legal libraries, document repositories, knowledge management locations.
 - Asset is to be built under local requirements, zoning and specifications, not to federal constructions specifications.
- Development/design led by a 3rd party, private sector entity, acting as FUA lessor (Owner/Trust).

6. *There is a private sector market for the asset.*

- Owner/Trust has validated marketability of asset (Class A office and research center) with independent real estate counsel at the projected lease rates.
- With cancellation provision of one year, Owner/Trust must ensure facility is marketable to potential alternative tenants in the Chicago area.
- Private sector funding sources – including capital markets, underwriters, and bond insurers- would not support loan (with only a 18-year rental agreement as collateral) if the facility itself had low marketability.
- Geographic location has strong appeal.

Incentive Approach/Linkage to Performance Metrics

Performance-based contracting methods are preferred and will be used to the maximum extent practicable. Thus far, these have been incorporated into the existing project requirements and related documentation.

Competition

All major contracts associated with the recommended Acquisition Strategy have been or will be competitively solicited and awarded.

Based upon initial marketing analysis, it has been determined that there is interest from the private sector in the development and construction and the financing for this project.

Detailed discussion regarding Owner Trust acquisition process has been provided in SECTION 1-7: Competitive Environment for the TCS Facility to be Privately Developed on the Grounds of Argonne National Laboratory.

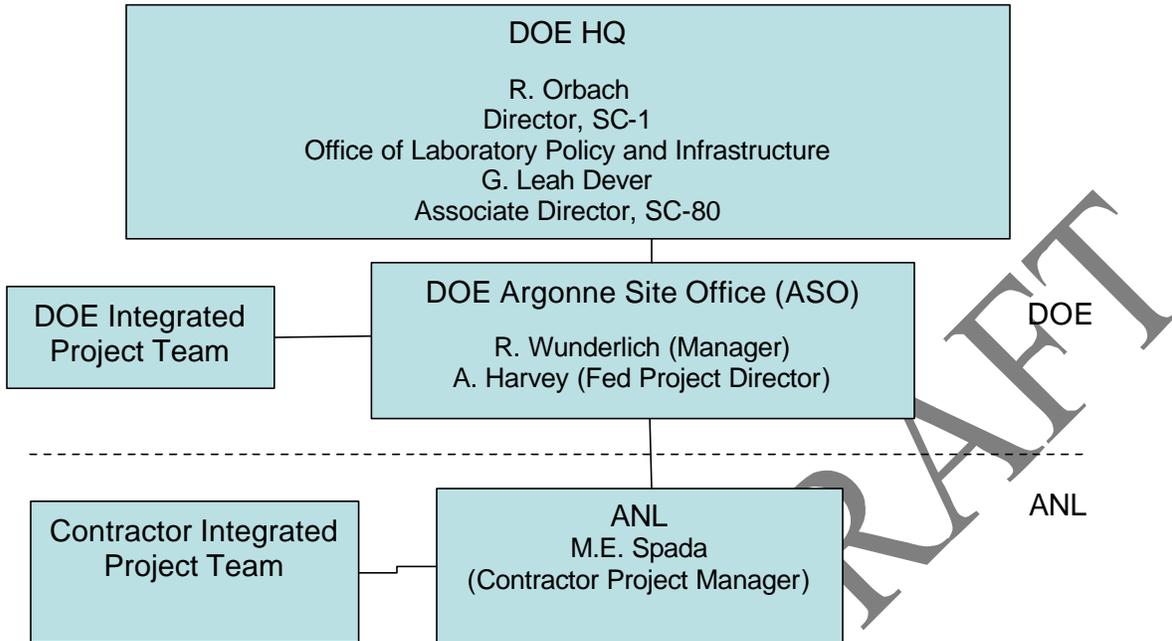
6. Management Structure and Approach

IPT, Organization Structure and Staffing Skills

Consistent with the Project Management Organization at ANL, an Integrated Project Team has been established. The TCS Project will be integrated with site management activities that will include a broad range of DOE and Laboratory expertise in areas such as computer science, facilities operation and management, project management, legal, budget and finance, and ES&H.

If the preferred acquisition strategy is selected then the role of DOE on the integrated project team will cease. DOE will perform the execution and oversight of the ground lease. DOE will approve the FUA for M&O occupancy in accordance with DOE requirements.

Integrated Project Team – Organization Structure



Approach to Performance Evaluation and Validation

It will be necessary to validate that the proposed budget is in line with the actual financing, development and other project costs. This evaluation is planned for August/September 2005, once sufficient progress has been made following AS approval.

Interdependencies and Interfaces

It is planned that the contractor(s) will be required to coordinate with appropriate ANL representatives at designated milestones throughout the process. In particular, contractors will be required to obtain safeguards and security support from the M&O contractor and certain essential services, e.g., utilities and water.