Response to April 21, 2015, Questions from the Legislative Analyst's Office
Air Resources Board's Proposed Southern California Consolidation Project

LAO Alternative 4: Please evaluate a new alternative (LAO Alternative 4).
LAO Alternative 4 would maintain the existing El Monte facilities (Haagen-Smit Laboratory (HSL), Annex 4, and additional leased facilities) and continue testing in El Monte at roughly current levels. In LAO Alternative 4, testing would continue at the El Monte facilities with five emissions-based light-duty test cells (HSL) and three SHEDs (Annex 4). In addition, LAO Alternative 4 would add three light-duty test cells, one light-duty preparatory (prep) test cell, and one SHED to the new facility. The new facility would continue to include all the heavy-duty, motorcycle, and off-road testing capabilities identified in the COBCP. Based on this alternative, please respond to the following questions.

1. What is the cost for LAO Alternative 4?
2. Would this alternative allow ARB to meet its program needs (as identified in the COBCP)?
3. Would this allow for even greater testing capabilities than what was identified in the COBCP?
4. What are the variable costs associated with each additional light-duty test cell and each additional SHED (including new facility costs and equipment costs) added to the new facility?

Response: In responding to these questions, ARB followed the same general approach that was used in ARB's April 10, 2015, response to the LAO. In support of that response, we provided a series of tables. For each alternative, these tables identified the scope of testing, a summary of required test equipment, the number of tests conducted, a summary of equipment costs, and a detailed cost summary. For this response, ARB used this same table format and added several tables to address the question related to the variable costs associated with the addition of one light-duty test cell and one SHED. All of these tables and additional supporting information is presented in Attachment 1, which begins on page 6 of this document.

In this analysis, ARB included ARB's Preferred Alternative, LAO Alternative 3, and the new LAO Alternative 4. ARB's Preferred Alternative relocates and consolidates all operations and staff into a new facility. For both LAO Alternative 3 and LAO Alternative 4, light-duty vehicle exhaust and evaporative emissions testing operations are maintained at the existing El Monte facilities, together with supporting chemistry laboratory functions and staff that are not directly associated with the testing operations. All of the heavy-duty vehicle, motorcycle, small off-road equipment, OBD system, and PEMS testing would be moved to the new facility. In addition, the Environmental Chamber would be constructed at the new facility. The difference between LAO Alternative 3 and LAO Alternative 4 is just the addition of the three light-duty test cells, the one prep test cell, and the one SHED. Therefore, LAO Alternative 3 provides a baseline to compare the total cost differential for adding the light-duty testing at the new facility.

The response to the four questions is summarized below. Following these responses, ARB provides an analysis of LAO Alternative 4.

What is the cost for LAO Alternative 4? $335 million. The detailed costs are presented in Table 5 of Attachment 1.

Would this alternative allow ARB to meet its program needs (as identified in the COBCP)? Yes.

Would this allow for even greater testing capabilities than what was identified in the COBCP? Yes. This alternative would increase light-duty vehicle testing capacity by approximately 30 percent. The testing capabilities are presented in Table 3 of Attachment 1.

What are the variable costs associated with each additional light duty test cell and each additional SHED (including new facility costs and equipment costs) added to the new facility? The addition of one light-duty test cell to the new facility would result in some fixed costs. These fixed costs are associated with the space and equipment necessary to support the light-duty testing. These fixed costs include the space for a fueling room, a fuel drain office, a pre-check vehicle diagnostics area, an indoor lift area, and parts storage, and the associated equipment. ARB assumed that there are no additional fixed costs to install and operate a SHED once the infrastructure is in place for the light-duty test cell.

The variable costs are associated with the space and equipment necessary to conduct the light-duty testing. Space needs include the areas for the test cell and SHED, the chemical laboratory, staff and shared office space, and administration. Equipment needs include the dynamometer, SHED, miscellaneous testing equipment, and chemical laboratory equipment.

The details for the fixed and variable costs are presented in Tables 6 and 7 of Attachment 1 and are summarized in Table 8 of Attachment 1. In summary, the fixed cost to add a light-duty test cell or SHED would be approximately $5.8 million. The variable cost to add one light-duty test cell would be approximately $14.1 million; the cost to add one SHED is approximately $3.6 million.

Analysis: LAO Alternative 4 could theoretically increase testing by approximately 30 percent over ARB's Preferred Alternative at a total cost of approximately $335 million. The total project cost of LAO Alternative 4 is about 92 percent of the total project cost of ARB's Preferred Alternative. However, there are a number of considerations that make LAO Alternative 4 unworkable and undesirable. As discussed previously, the operational, management, and financial considerations associated with maintaining two facilities is still present with LAO Alternative 4. In fact, these issues are exacerbated in LAO Alternative 4. These considerations are discussed below.

- ***Operational Considerations***: Under LAO Alternative 4, ARB would likely move various light-duty programs to the new facility and leave other programs at the El Monte facilities. For example, ARB could keep the light-duty vehicle emission inventory, in-use compliance, new vehicle audit, and aftermarket parts evaluation programs at the existing facilities. These are more routine testing operations. Regulatory development, research, and OBD audits could be done at the new facility.

  However, maintaining two light-duty testing operations complicates the overall light-duty program. There is not always a clear distinction in staff assignments or programs. For example, some of the test vehicles that are brought in for emissions inventory or compliance programs are used for OBD audits or regulatory development. Thus, there

would be an operational inefficiency of transporting vehicles between facilities to conduct the necessary testing. In addition to the operational inefficiencies, there would be the increased risk of accidental damage to the test vehicles. LAO Alternative 4 would also compound the existing difficulties with transporting samples between the two laboratory operations unless you completely duplicated the capabilities of the chemical laboratory in both facilities.

LAO Alternative 4 also would continue the problems associated with maintaining and operating an aging and energy inefficient State building. This would include meeting the Governor's expectations for meeting LEED certification for existing buildings. Currently, the Haagen-Smit Laboratory is the least energy efficient State building in California. Furthermore, there would be a number of other issues and costs associated with maintaining the El Monte facilities that have been highlighted in previous submittals to the LAO and presented in the COBCP. These issues and costs would include necessary testing equipment and building upgrades.

Finally, the staff providing administrative support, such as human resources, would be in the existing El Monte facilities, whereas about one-third of the staff would be located in the new facility. This separation would make the day-to-day operations more difficult because access to administrative staff would be limited for the staff in the new facility. This complication would be true of any scenario involving two separate facilities.

- ***Management Considerations***: LAO Alternative 4 would exacerbate the management difficulties associated with maintaining two separate facilities by bifurcating the light-duty operations. Even routine functions would be more difficult. For example, managing compressed gases for light-duty operations must be duplicated, as must many other routine functions. Even the management of information technology and light-duty vehicle test data management systems must be duplicated. These management costs are not fully accounted for in the total project cost estimates due to the difficulty in estimating the cost impacts.

  The management of light-duty testing operations would be more difficult. It is critically important to ensure testing follows established test procedures that include defined quality control and quality assurance requirements. Testing in two locations makes it more difficult for management to ensure that the staff follows these established procedures on a daily basis.

  In addition, simply having a staff meeting would be more difficult and would require either staff to travel to one of the facilities or use video conferencing capabilities. Furthermore, the day-to-day staff communication would be adversely affected because the staff that conduct the tests and the staff that use the data are located in separate facilities. As indicated in the COBCP, about 90 percent of the total Southern California staff either conduct the testing or use the data generated from the testing.

  Under LAO Alternative 4, the new test facility would be approximately two-thirds the size of ARB's Preferred Alternative. However, the infrastructure needed to provide a cohesive management operation for all of ARB's Southern California operations would not be adequate in the new facility. For example, an auditorium capable of handling all staff in Southern California would still be not available at either the new facility or the existing El Monte facilities. Simple outreach activities such as workshops and meetings

would likely require staff to travel from one facility to the other depending on the topic. Even conducting an "all hands" meeting in Southern California would require the continued use of an external facility, as well as requiring potentially extensive travel for a large number of staff. ARB's Preferred Alternative would relocate and consolidate all staff and operations in a single location.

- ***Financial Considerations***: LAO Alternative 4 would require a significant duplication of staff, equipment, and support activities to support the light-duty vehicle testing at the new facility. The support activities that are necessary include, but are not limited to, the delivery, preparation, smog check testing, fueling, and storage of vehicles; cylinder and equipment shipping, receiving, and management; hazardous materials and waste management; and chemical analysis of samples. In addition, the information technology necessary to support the light-duty vehicle testing would need to be duplicated and linked between facilities. ARB estimates that adding four new test cells and one SHED to the new facility would result in a 12 percent increase in the overall cost of equipment.

  There is a relatively minor total project cost difference between ARB's Preferred Alternative and LAO Alternative 4. The small cost savings and limited increased testing does not justify the operational and management difficulties, difficulties that are not present with ARB's Preferred Alternative. ARB notes that ongoing lease payments to a private party are of no value to the State. Every year that ARB continues to lease the El Monte facilities results in additional costs. While Table 5 shows a present value of 25-year lease payments, there would still be lease costs beyond that time period. For example, the additional lease costs for a 40-year period could exceed $12 million dollars. In addition, there are estimated costs of at least $12 million dollars, potentially more, in upgrades and renovations necessary to meet the Governor's energy efficiency requirements for existing buildings and other safety and infrastructure requirements that would be necessary if ARB staff were to remain in the existing facilities.

  One other financial consideration would be the requirement for maintenance contracts. In LAO Alternative 4, there would be a requirement for additional contracts to support the light-duty testing, including the dynamometers, sampling and analytical equipment, and laboratory equipment. On an annual basis, ARB spends almost $4 million per year for contract services to support the testing operations. Adding the additional dynamometers would result in additional contract requirements. These costs may be on the order of $1 million to support the 30 percent increase in testing capabilities. This issue is presented just to highlight the fact that there are additional costs associated with the increased capacity.

  By adding light-duty testing operations at the new facility, dedicated light-duty testing staff and chemical laboratory staff would be needed at both the new facility and the existing El Monte facilities. ARB estimates that at least 20 additional staff would be required to support the light-duty testing at the new facility. This would translate into an annual cost of at least $2,500,000. These costs are not included in the total project cost estimate.

  Based on these considerations, ARB continues to believe that the most effective alternative is ARB's Preferred Alternative. A single facility eliminates the operational, management, and financial considerations highlighted above. The theoretical increased testing capabilities associated with LAO Alternative 4 are not justified given the

difficulties. Furthermore, the total project cost of LAO Alternative 4 is about 92 percent of the total project cost associated with ARB's Preferred Alternative. The testing capabilities of the El Monte facilities are not sustainable into the future due to the highlighted existing problems with the facilities. Finally, continuing to lease staff and test facilities is not in the long-term interest of the State.

ATTACHMENT 1

1. Overall Testing Capabilities: Table 1 summarizes the different testing capabilities between ARB's Preferred Alternative, LAO Alternative 3, and LAO Alternative 4. This table shows what functions are duplicated in each alternative. As with LAO Alternative 3, only staff directly associated with the testing operations and limited administrative staff is moved to the new facility under LAO Alternative 4.

Table 1
Scope of the ARB's Preferred Alternative and LAO Alternatives

Program Area	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
	New Facility	Existing Facility	New Facility	Existing Facility	New Facility	Existing Facility
Light-Duty Vehicles Exhaust Emissions	X	-	-	X	X	X
Light-Duty Vehicles Evaporative Emissions (SHED)	X	-	-	X	X	X
Motorcycles and Small Off-Road Equipment – Exhaust Emissions	X	-	X	-	X	-
Motorcycles and Small Off-Road Equipment – Evaporative Emissions	X	-	X	-	X	-
Environmental Chamber LD Vehicles, Motorcycles, SORE	X	-	X	-	X	-
Heavy-Duty Vehicles Exhaust and Evaporative Emissions	X	-	X	-	X	-
Onboard Diagnostic Systems	X	-	X	-	X	-
Portable Emissions Monitoring Systems	X	-	X	-	X	-
Chemistry Laboratory	X	-	X	X	X	X
Staffing	X	-	X	X	X	X

Table 2 lists the pieces of major testing equipment that would be required at the new facility and the existing El Monte facilities for ARB's Preferred Alternative, LAO Alternative 3, and LAO Alternative 4. This information forms the basis for determining the overall testing capabilities, as well as the basis for determining the specific equipment needs and overall costs.

Table 2
Summary of Major Test Equipment for ARB's Preferred Alternative and Two LAO Alternatives

Major Equipment Category	Current [1]	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		New Facility	Existing Facility	New Facility	Existing Facility	New Facility	Existing Facility
Light-Duty Emissions-Based Chassis Dynamometers/Test Cells	5	5	-	-	5	3	5
Light-Duty Chassis Dynamometers/Test Cells for Preparatory Work	-	2	-	-	-	1	-
Light-Duty Vehicle SHEDs	3	3	-	-	3	1	3
Environmental Chamber	-	1	-	1	-	1	-
Motorcycle and Small Off-Road Vehicle Emissions-Based Chassis Dynamometer and Test Cell, Including 3 Small Off-Road Engine Dynamometers	1	-	-	-	-	-	-
Motorcycle Emissions-Based Chassis Dynamometers and Test Cells	-	2	-	2		2	
Motorcycle Chassis Dynamometer and Test Cell for Preparatory Work	-	1	-	1	-	1	-
Small Off-Road Engine Test Cell, with 3 Small Off-Road Engine Dynamometers and Shared Emissions Equipment	-	1	-	1	-	1	-
Heavy-Duty Emissions-Based Chassis Dynamometers and Test Cells	1	2	-	2	-	2	-
Heavy-Duty Chassis Dynamometer and Test Cell for Preparatory Work	-	1	-	1	-	1	-
Heavy-Duty Engine Dynamometers and Test Cells	1	2	-	2	-	2	-
Heavy-Duty SHED Testing	-	1	-	1	-	1	-

1. ARB currently maintains a SHED that is used for conducting running loss testing. This running loss SHED would continue to be used in LAO Alternative 4. The Environmental Chamber replaces this unit in ARB's Preferred Alternative and LAO Alternative 3.

As discussed previously, the testing capabilities are a function of the space, equipment, and staffing available. To define terms, "current testing" means that ARB will continue to test at the levels that are currently conducted at the El Monte facilities. "Future testing" means that ARB can test at the levels identified in the COBCP, which will enable ARB to conduct testing that meets both our needs today and in the future. Table 3 summarizes the testing capabilities of ARB's Preferred Alternative, LAO Alternative 3, and LAO Alternative 4.

Table 3
Summary of Testing Capabilities for ARB's Preferred Alternative and Two LAO Alternatives

Major Equipment Category	Basis	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		New Facility	Existing Facility[1]	New Facility	Existing Facility[1]	New Facility	Existing Facility[1]
Light-Duty Chassis Dynamometer Testing	# of Tests	2,174	-	-	1,558	1,240	1,558
Light-Duty Vehicle SHED Testing (Sum of Hot Soak + Diurnal Tests)	# of Tests	288	-	-	288 [2]	96	288
Environmental Chamber Testing	# of Tests	180	-	180	-	180	-
Motorcycle and Small Off-Road Vehicle Testing	# of Tests	991	-	991	-	991	-
Heavy-Duty Emissions-Based Chassis Dynamometer Testing	# of Tests	700	-	700	-	700	-
Heavy-Duty Chassis Dynamometer Testing	# of Tests	160	-	160	-	160	-
Heavy-Duty Engine Dynamometer Testing	# of Tests	300	-	300	-	300	-
Heavy-Duty SHED Testing	# of Projects	8-10	-	8-10	-	8-10	-
PEMS Testing	Test-Hours	14,000	-	14,000	-	14,000	-
OBD Testing	Vehicle-Days	320	-	320	-	320	-

1. Testing capacity represents current testing capabilities.
2. Alternative 3 SHED testing increased over the analysis provided on April 10, as the SHEDs will be replaced anyway.

The primary difference between the alternatives is related to the light-duty testing capabilities. In LAO Alternative 4, there would be light-duty vehicle testing capabilities at both the new facility and the existing facilities. In determining the testing capacity at the existing facilities, ARB assumed that the testing would continue at current levels. Space limitations at the El Monte facilities would preclude any upgrades that would increase testing capabilities. Some of the test cells and dynamometers would need to be upgraded to allow for testing of all-wheel drive vehicles, but upgrading would not increase capacity. Similar logic applies to the evaporative emissions testing conducted in the SHEDs. Testing at the new facilities would simply be the ratio of the future testing levels per dynamometer.

Therefore, ARB could perform approximately 1,240 tests at the new facility. Testing in the SHED would also be done proportional to the number of SHEDs. Thus, the exhaust and evaporative emissions testing could theoretically be approximately 30 percent greater than ARB's Preferred Alternative.

2. Equipment Costs for the Alternative 4: ARB's Preferred Alternative identified $101.7 million in total equipment costs. Of this, approximately $54 million in equipment costs are categorized as "anyway" purchases within the next five years.

   ARB has estimated the equipment costs for LAO Alternative 4 and compared this to ARB's Preferred Alternative and LAO Alternative 3. These costs are detailed in Table 4.

Table 4
Summary of Equipment Costs for ARB's Preferred Alternative and Two LAO Alternatives

Category	Cost Per Unit	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		# of Units	Cost	# of Units	Cost	# of Units	Cost
Light-Duty Emissions-Based Chassis Dynamometers/Test Cells	$1,800,000	5	$9,000,000	2	$3,600,000	5	$9,000,000
Light-Duty Chassis Dynamometer Analytical Equipment	$1,700,000	5	$8,500,000	5	$8,500,000	8	$13,600,000
Light-Duty Chassis Dynamometers/Test Cells for Preparatory Work	$1,000,000	2	$2,000,000	0	$0	1	$1,000,000
Light-Duty Vehicle SHEDs-Standard Size	$600,000	3	$1,800,000	3	$1,800,000	4	$2,400,000
Light-Duty Vehicle SHEDs – Analytical Equipment	$400,000	3	$1,200,000	3	$1,200,000	4	$1,600,000
Light-Duty Environmental Chamber Testing	$5,000,000	1	$5,000,000	1	$5,000,000	1	$5,000,000
Light-Duty PEMS	$300,000	2	$600,000	2	$600,000	2	$600,000
Light-Duty Smog Check and Repair Equipment	$50,000	2	$100,000	2	$100,000	3	$150,000
Motorcycle and Small Off-Road Vehicle Emissions-Based Chassis Dynamometer and Test Cell, Including 3 Small Off-Road Engine Dynamometers	$1,100,000	0	$0	0	$0	0	$0

Category	Cost Per Unit	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		# of Units	Cost	# of Units	Cost	# of Units	Cost
Motorcycle Emissions-Based Chassis Dynamometers and Test Cells	$1,100,000	2	$2,200,000	2	$2,200,000	2	$2,200,000
Motorcycle Chassis Dynamometer Analytical and Other Sampling Equipment	$1,500,000	2	$3,000,000	2	$3,000,000	2	$3,000,000
Motorcycle Chassis Dynamometer and Test Cell for Preparatory Work	$300,000	1	$300,000	1	$300,000	1	$300,000
Small Off-Road Engine Test Cell, with 3 Small Off-Road Engine Dynamometers and Shared Emissions Equipment	$1,100,000	1	$1,100,000	1	$1,100,000	1	$1,100,000
Small Off-Road Engine Dynamometer Analytical and Other Sampling Equipment	$1,500,000	1	$1,500,000	1	$1,500,000	1	$1,500,000
SUBTOTAL Light-Duty Vehicles and Engines			**$36,300,000**		**$28,900,000**		**$41,450,000**
Heavy-Duty Emissions-Based Chassis Dynamometers and Test Cells	$4,300,000	2	$8,600,000	2	$8,600,000	2	$8,600,000
Heavy-Duty Chassis Dynamometer Analytical Equipment	$1,700,000	2	$3,400,000	2	$3,400,000	2	$3,400,000
Heavy-Duty Chassis Dynamometer and Test Cell for Preparatory Work	$3,800,000	1	$3,800,000	1	$3,800,000	1	$3,800,000
Heavy-Duty Engine Dynamometers and Test Cells	$3,800,000	2	$7,600,000	2	$7,600,000	2	$7,600,000
Emissions Dynamometer Analytical Equipment	$1,700,000	2	$3,400,000	2	$3,400,000	2	$3,400,000
Heavy-Duty SHED	$1,000,000	1	$1,000,000	1	$1,000,000	1	$1,000,000
Heavy-Duty SHED Analytical Equipment	$400,000	1	$400,000	1	$400,000	1	$400,000
Heavy-Duty PEMS Units	$300,000	8	$2,400,000	8	$2,400,000	8	$2,400,000

Category	Cost Per Unit	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		# of Units	Cost	# of Units	Cost	# of Units	Cost
Heavy-Duty PEMS – Room Support; Lifting Cranes	$200,000	1	$200,000	1	$200,000	1	$200,000
Test Engine Setup/ Teardown Area	$100,000	1	$100,000	1	$100,000	1	$100,000
OBD Setup/Teardown Area (HD/LD)	$200,000	1	$200,000	1	$200,000	1	$200,000
SUBTOTAL Heavy-Duty Vehicles and Engines			**$31,100,000**		**$31,100,000**		**$31,100,000**
QC Verification Equipment	$55,000	19	$1,045,000	19	$1,045,000	23	$1,265,000
VTS Data Acquisition Equipment	$500,000	15	$7,500,000	15	$7,500,000	18	$9,000,000
Machine Shop Equipment	$300,000	1	$300,000	2	$600,000	2	$600,000
Machine Shop Welding Hood	$40,000	1	$40,000	2	$80,000	2	$80,000
Electronics Shop/ Instrument and Dynamometer Repair	$250,000	1	$250,000	2	$500,000	2	$500,000
Canister Loading Bench with Piping	$60,000	15	$900,000	15	$900,000	18	$1,080,000
Underground Fuel Storage	$120,000	5	$600,000	10	$1,200,000	10	$1,200,000
Air Compressors with Piping	$125,000	2	$250,000	4	$500,000	4	$500,000
Zero Air Generators with Piping	$80,000	3	$240,000	6	$480,000	6	$480,000
Fire Suppression in Fueling Room	$20,000	1	$20,000	2	$40,000	2	$40,000
Fume Hoods with Monitoring System	$40,000	50	$2,000,000	40	$1,600,000	44	$1,760,000
Oxygen Detection System	$100,000	1	$100,000	2	$200,000	2	$200,000
CNG Fueling Station	$750,000	1	$750,000	1	$750,000	1	$750,000
Hydrogen Fueling Station	$1,500,000	1	$1,500,000	1	$1,500,000	1	$1,500,000
EV Chargers for Testing	$3,000	5	$15,000	5	$15,000	8	$24,000
Hazardous Materials Storage	$100,000	1	$100,000	2	$200,000	2	$200,000
SUBTOTAL Testing Support			**$15,610,000**		**$17,110,000**		**$19,179,000**
GC Laboratory	$1,500,000	1	$1,500,000	1.5	$2,250,000	1.75	$2,625,000
LC Laboratory	$500,000	1	$500,000	1.5	$750,000	1.75	$875,000

Category	Cost Per Unit	Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		# of Units	Cost	# of Units	Cost	# of Units	Cost
GHG + Lab Air Lab (CFR Part 1066)	$1,000,000	1	$1,000,000	1.5	$1,500,000	1.75	$1,750,000
Real-Time Laboratory	$1,500,000	1	$1,500,000	1	$1,500,000	1	$1,500,000
Sample Check/In-Out Laboratory	$200,000	1	$200,000	2	$400,000	2	$400,000
Gravimetric Laboratory Clean Room	$1,400,000	2	$2,800,000	2	$2,800,000	3	$4,200,000
Gravimetric Laboratory Equipment	$350,000	2	$700,000	2	$700,000	3	$1,050,000
GC/Mass Spec Laboratory	$1,750,000	1	$1,750,000	1	$1,750,000	1	$1,750,000
Aerosol Laboratory	$750,000	1	$750,000	1.5	$1,125,000	1.75	$1,312,500
Metals Laboratory Clean Room	$1,600,000	1	$1,600,000	1	$1,600,000	1	$1,600,000
Metals Laboratory Equipment	$400,000	1	$400,000	1	$400,000	1	$400,000
Extraction Laboratory IC/Carbon	$500,000	1	$500,000	1	$500,000	1	$500,000
SVOC/SOA Laboratory	$500,000	1	$500,000	1.5	$750,000	1.75	$875,000
Real-Time BC/AMS Laboratory	$2,000,000	1	$2,000,000	1	$2,000,000	1	$2,000,000
Fossil Fuels Laboratory	$2,000,000	1	$2,000,000	1	$2,000,000	1	$200,000
Alternative Fuels Laboratory	$1,000,000	1	$1,000,000	1	$1,000,000	1	$1,000,000
SUBTOTAL Chemical Laboratory			**$18,700,000**		**$21,025,000**		**$22,037,500**
TOTAL Equipment Costs			**$101,710,000**		**$98,135,000**		**$113,766,500**

The equipment cost for LAO Alternative 4 is approximately 12 percent higher than ARB's Preferred Alternative.

3. Cost Analysis for LAO Alternative 4: The cost estimate (including direct and indirect facility costs, equipment costs, and the present value of ongoing maintenance/operations costs) for LAO Alternative 4 is presented in Table 5. For comparison, the costs for ARB's Preferred Alternative and LAO Alternative 3 are also included in the Table.

   The costs are based on the following information.

   - The dollars per square foot are based on the IBI Program Summary, dated January 7, 2015. Note that the estimate for sitework is based on the total sitework costs ($19,497,585) divided by the acreage (14 acres). This results in an estimated cost per square foot of $31.97. This is also consistent with the data presented in the Clarke

Project Solutions Report that was used to support the IBI Program Summary Report (http://www.arb.ca.gov/socalfacility).

- For LAO Alternative 4, the light-duty vehicle square footage estimate was based on the square footage for the following categories: cold soak for 18 vehicles,[1] light-duty vehicle pre-check area and smog check, light-duty vehicle fueling and fuel draining operation, light-duty vehicle preparation, four light-duty test cells, one SHED, an indoor lift area, parts storage, a breezeway, an Environmental Chamber, all of the motorcycle test cells, the small off-road test cell, miscellaneous equipment storage, and miscellaneous other space.
- Note 1. The Other-New Facility Costs are estimated based on the ratio of the Total Estimated Project Costs for the preferred alternative stated in the Capital Outlay Budget Change Proposal Attachment 1 ($258,178,000) to the Direct Costs for the preferred alternative ($189,191,000). The calculation is as follows:

$$\text{Other Facility Costs} = \frac{258{,}178{,}000}{189{,}191{,}000} \times (\text{Direct Costs}) - \text{Direct Costs}$$

- Note 2. The HSL Modifications are those represented by the detailed information presented in ARB's April 10, 2015 response to the LAO. These costs total $12,585,000. These costs also apply to LAO Alternative 4. The implementation of these additional measures is necessary to reduce the facility's energy consumption and address safety and infrastructural issues. The energy-efficiency improvements are necessary to comply with the Governor's Executive Order for existing buildings. Currently, there is no exemption process to exclude existing State buildings from meeting energy goals. However, ARB is optimistic that if there is a new facility approved then the renovations and upgrades would not need to be done. These costs are preliminary; ARB must coordinate with DGS' Office of Sustainability, conduct extensive market research to ensure the various systems are compatible, and conduct an extensive assessment of the facility to ensure it can be adapted without endangering staff or causing significant interference to testing and research needs.
- Note 3. For LAO Alternatives 3 and 4, the Present Value of El Monte Lease Payments was based on existing annual lease costs of approximately $2,000,000, with the assumption that these costs would escalate at a minimum of two percent per year for 25 years. For LAO Alternative 3, the result was reduced by approximately 20 percent to account for the heavy-duty vehicle, chemistry laboratory, OBD system, PEMS, and administrative staff that would likely be assigned to the new facility. For LAO Alternative 4, ARB reduced the lease costs by an additional 10 percent to account for the additional staff that would be relocated to the new facility. Note, however, that no costs have been added to accommodate the additional staff that would be necessary to fully implement LAO Alternative 4 so the actual cost impacts of this alternative are higher than presented here.
- Note 4. The Equipment Costs are the same as those presented in Table 4.
- Note 5. The Site Assessment and Performance Criteria Costs are the same as those presented in the COBCP.

[1] The cold soak area for ARB's Preferred Alternative is designed for 30 vehicles. Under LAO Alternative 4, the new facility would have three emissions-based chassis dynamometers compared to five emissions-based chassis dynamometers in ARB's Preferred Alternative (60 percent of the capacity). Therefore, ARB assumed that the cold soak area would need to be 60 percent of the space needed under ARB's Preferred Alternative.

Table 5
Detailed Cost Calculations for ARB's Preferred Alternative and Two LAO Alternatives

		Preferred Alternative		LAO Alternative 3		LAO Alternative 4	
		Sq. Ft.[1]	Cost	Sq. Ft.	Cost	Sq. Ft.	Cost
Light-Duty Testing	487.05/sq.ft.	91,171	$44,404,800	10,000	$4,870,500	48,000	$23,378,400
Heavy-Duty Testing and OBD	650.75/sq.ft.	62,316	$40,552,100	62,300	$40,541,725	62,300	$40,541,725
Portable Emission Measurement Systems	382.17/sq.ft.	6,683	$2,553,900	6,700	$2,560,539	6,700	$2,560,539
Chemistry Laboratory	694.63/sq.ft.	48,016	$33,353,400	32,000	$22,228,160	43,500	$30,216,405
Offices and Shared Operation	407.82/sq.ft.	72,702	$29,649,300	15,000	$6,117,300	28,000	$11,418,960
Administrative Services	259.23/sq.ft.	18,365	$4,760,800	1,000	$259,230	10,000	$2,592,300
Parking	78.37/sq.ft.	184,000	$14,420,100	50,000	$3,918,500	80,000	$6,269,600
Site Footprint	31.97/sq.ft.	609,840	$19,496,600	217,800	$6,963,066	348,480	$11,140,906
Direct Costs – New Facility			$189,191,000		$87,459,020		$128,118,835
Other-New Facility Costs	Note 1		$68,987,000		$31,891,239		$46,717,518
Total New Facility Costs			**$258,178,000**		**$119,350,259**		**$174,836,353**
Environmental Chamber Installation			$0		$0		$0
HSL Facility Modifications	Note 2		$0		$12,585,000		$12,585,000
Present Value of El Monte Lease Payments	Note 3		$0		$31,237,530		$28,113,777
Total Facility Costs			**$258,178,000**		**$163,172,789**		**$215,535,130**
Equipment Costs	Note 4		$101,710,000		$98,135,000		$113,766,500
Site Assessment and Performance Criteria Costs	Note 5		$5,900,000		$5,900,000		$5,900,000
Total Project Costs			**$365,788,000**		**$267,207,789**		**$335,201,630**

Analysis: The cost of LAO Alternative 4 is 92 percent of ARB's Preferred Alternative when considering the total project cost. The cost of LAO Alternative 4 is approximately 25 percent higher than LAO Alternative 3, representing the addition of the three light-duty test cells, the one prep test cell, and the one SHED.

4. Incremental Cost Analysis for Light-Duty Test Cells and SHEDs: In this analysis, ARB estimated the cost to add one light-duty test cell and one SHED to a new facility. The costs are presented as fixed costs and variable costs. Fixed costs are those costs that would be required independent of the number of test cells or SHEDs added. Variable costs depend on the number of test cells and SHEDs that are added. Both fixed costs and variable costs include the costs for space and equipment. For this analysis, we assumed that there was an existing facility similar to what is available for LAO Alternative 3. Thus, some infrastructure and equipment is already available to support the other testing that is being done and may need to just be supplemented. For example, we assumed that there was already a machine shop at the new facility, but added equipment to support the light-duty testing.

   The fixed costs to add a light-duty test cell include the space for a fueling room, a fuel drain office, a pre-check vehicle diagnostics area, an indoor lift area, and parts storage, and the associated equipment. ARB estimated the fixed costs for equipment based on what would be needed to supplement the equipment that would already be present under LAO Alternative 3 to conduct the other testing. This equipment includes machine shop equipment, electronics shop equipment, air compressors, zero air generators, fire suppression equipment, oxygen detectors, electric vehicle chargers, hazardous materials storage, and laboratory equipment. ARB assumed that there are no additional fixed costs to install and operate a SHED once the infrastructure is in place for the light-duty test cell.

   For the light-duty test cell, the variable costs for space include the cold soak and breezeway areas, the test cell, and miscellaneous other space costs. Variable equipment costs include the test cell and associated analytical equipment, and equipment to supplement the chemical laboratory. For the SHED, the variable costs include the SHED and associated analytical equipment, and equipment to supplement the chemical laboratory.

   Tables 6, 7, and 8 present the results of the analysis.

Table 6
Estimate of Incremental Space Costs to Add a Light-Duty Test Cell and SHED

Category	Fixed Costs			Variable Costs		
	Sq. Ft.	Cost/ Sq. Ft.	Cost	Sq. Ft.	Cost/ Sq. Ft.	Cost
Space Costs Associated with the Addition of One Light-Duty Test Cell						
Light-Duty Vehicle Testing	6,399	$487.05	$3,116,633	8,553	$487.05	$4,165,738
Vehicle Coordinator's Office	--	--	--	*47*	--	--
Breezeway	--	--	--	*2,700*	--	--
Cold Soak	--	--	--	*1,148*	--	--
Fueling Room	*1,782*	--	--	--	--	--
Fuel Drain Office	*972*	--	--	--	--	--
Pre-Check Veh Diagnostics	*1,215*	--	--	--	--	--
Indoor Lift Area	*1,620*	--	--	--	--	--
Parts Storage	*810*	--	--	--	--	--
Vehicle Test Cell	--	--	--	*2,599*	--	--
Control Room	--	--	--	*1,114*	--	--
Equipment Mezzanine	--	--	--	*945*	--	--
Chemical Laboratory	--	--	--	2,665	$694.63	$1,851,189
Staff and Shared Office Space	--	--	--	3,165	$407.82	$1,290,750
Administration	--	--	--	1,500	$259.23	$388,845
Sitework	--	--	--	43,560	$31.97	$1,392,613
Total Costs-Light Duty Vehicle Test Cell	--	--	**$3,116,633**	--	--	**$9,089,135**
Space Costs Associated with the Addition of One SHED						
Light-Duty Vehicle Testing	--	--	--	970	$487.05	$472,439
SHED	--	--	--	*970*	--	--
Chemical Laboratory	--	--	--	890	$694.63	$618,220
Staff and Shared Office Space	--	--	--	1050	$407.82	$428,211
Administration	--	--	--	500	$259.23	$129,615
Sitework	--	--	--	--	--	--
Total Costs-SHED	--	--	**$0**	--	--	**$1,648,485**

Table 7
Estimate of Incremental Equipment Costs to Add a Light-Duty Test Cell and SHED

Category	Fixed Costs		Variable Costs	
	# Units	Cost	# Units	Cost
Equipment Costs Associated with the Addition of One Light-Duty Test Cell				
Light-Duty Emissions-Based Chassis Dynamometers/Test Cells	--	--	1	$1,800,000
Light-Duty Chassis Dynamometer Analytical Equipment	--	--	1	$1,700,000
Light-Duty Smog Check and Repair Equipment	1	$50,000	--	--
QC Verification Equipment	--	--	1	$55,000
VTS Data Acquisition Equipment Machine Shop Equipment	--	--	1	$500,000
Machine Shop Equipment	1	$150,000	--	--
Electronics Shop/ Instrument and Dynamometer Repair	1	$125,000	--	--
Canister Loading Bench with Piping	--	--	1	$60,000
Air Compressors with Piping	1	$125,000	--	--
Zero Air Generators with Piping	1	$80,000	--	--
Fire Suppression in Fueling Room	1	$10,000	--	--
Fume Hoods with Monitoring System	--	--	3	$120,000
Oxygen Detection System	1	$50,000	--	--
EV Chargers for Testing	5	$15,000	--	--
Hazardous Materials Storage	1	$50,000	--	--
Chemical Laboratory	--	$2,000,000	--	$750,000
Total Equipment Costs – Light-Duty Test Cell	--	**$2,655,000**	--	**$4,985,000**
Equipment Costs Associated with the Addition of One SHED				
Light-Duty Vehicle SHEDs-Standard Size	--	--	1	$600,000
Light-Duty Vehicle SHEDs – Analytical Equipment	--	--	1	$400,000
QC Verification Equipment	--	--	1	$55,000
VTS Data Acquisition Equipment Machine Shop Equipment	--	--	1	$500,000
Canister Loading Bench with Piping	--	--	1	$60,000
Fume Hoods with Monitoring System	--	--	3	$120,000
Chemical Laboratory	--	--	--	$250,000
Total Equipment Costs - SHED	--	**$0**	--	**$1,985,000**

There are fixed costs and variable costs associated with the incremental addition of a light-duty test cell and a SHED. The costs are influenced by both space and equipment needs. Staff costs are not considered in this analysis. If facilities were maintained in both locations. ARB would need additional staff to support the testing operations. In summary, the incremental fixed and variable costs are presented in Table 8.

Table 8
Estimate of Incremental Space and Equipment Costs
to Add a Light-Duty Test Cell and SHED

Category	Fixed Costs	Variable Costs
Light-Duty Test Cell		
Space Costs	$3,116,633	$9,089,135
Equipment Costs	$2,655,000	$4,985,000
Total Costs	**$5,771,633**	**$14,074,135**
SHED		
Space Costs	$0	$1,648,485
Equipment Costs	$0	$1,985,000
Total Costs	**$0**	**$3,633,485**