

PTSD

**Contractor: UC Berkeley
Contract # 07-716**

FUNDING FISCAL YEAR	FY 07/08	FY 08/09	FY 09/10	
TERM	02/01/08-04/31/09	02/01/08-01/31/09	02/01/08-04/31/09	
Amd 1	02/01/08-06/30/10	02/01/08-06/30/10	02/01/08-06/30/10	
PCA	72770	72770	72770	
LINE ITEM/OBJECT	398	398	398	TOTAL

DESCRIPTION	FY 07/08	FY 08/09	FY 09/10	TOTAL
Contract \$	\$ 100,046.00	\$ 100,045.00	\$	200,091.00
Revised 215 (03/31/08)	\$ (2,813.00)	\$ (2,812.00)	\$	(5,625.00) Guy to chk
Amd. #1 - Time & \$ (02/26/09)	\$	\$ 6,393.00	88,207.00	\$ 94,600.00

Total, Contract	\$ 97,233.00	\$ 103,626.00	\$ 88,207.00	\$ 289,066.00
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Payments to Contractor:

Inv. #	Inv. Date	Ser Per			C/S
77726-55047	7/25/2008	577/08-6/30/08	11,033.79	11,033.79	c080098 ✓
77726-77171	3/20/2009	10/29-12/31/08	85,651.16	85,651.16	C080643 ✓
77726-77169	3/20/2009	JUL 08	548.05	548.05	C080643 ✓
77725-77169				16,685.68	16,685.68 C080690 ✓
81138	1/31/2009			60,122.75	60,122.75 C090303 ✓
90885	2/1 - 6/30/09			4,482.52	4,482.52 C090303 ✓
100908	7/1 - 9/30/09			18,416.12	18,416.12 C090303 ✓

Total, Payments	\$ 97,233.00	\$ 99,707.07	\$	196,940.07
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Balance Available to Pay Contractor	\$ -	\$ 3,918.93	\$ 88,207.00	\$ 92,125.93
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Balance Must Be Spent By: 6/30/2010 6/30/2011

Notes:

Contract Manager: Jeff Weir

31

DUPLICATE

PTSD

Contractor: UC Berkeley

Contract # 07-716

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TERM	02/01/08-01/31/09	02/01/08-01/31/09	02/01/08-01/31/09	
Amd 1	02/01/08-06/30/10	02/01/08-06/30/10	02/01/08-06/30/10	
PCA	72770	72770	72770	
LINE ITEM/OBJECT	398	398	398	TOTAL
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Balance Must Be Spent By: 6/30/2010 6/30/2011

Notes:

Contract Manager: Jeff Weir

47



University of California Berkeley

Accounting Services
Extramural Funds Accounting

RCVD AUG 1 2008

Invoice To:

080098

Date: 7/25/2008

07-716

Air Resources Board
Accounting and Grants
P.O. Box 1436
Sacramento, CA 95812

INVOICE NO. 77726 - 55047

Contract/Grant/Agreement/Purchase Order Number: 07-716		PI/Director: Shaheen, Susan A	
Project Title Transportation Sector White Papers, Modeling and Stakeholder Workshop Support		Reference:	
	Period Billed 5/7/2008 - 6/30/2008		
	Cumulative	Current	
Salaries & Wages	8,620.00	8,620.00	
Employee Benefits	338.84	338.84	
Equipment & Facilities	0.00	0.00	
Supplies, Materials, & Services	1,924.36	1,924.36	
Travel	262.05	262.05	
Subcontract	0.00	0.00	
Indirect Cost	1,114.52	1,114.52	
TOTAL	\$12,259.77	12,259.77	
Less Withholding (10.0%):			1,225.98
Amount Now Due			11,033.79
<p>Refer to invoice # 77726 - 55047 and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA Extramural Funds Accounting 2195 Hearst Ave RM 130 MC 1103 Berkeley, California 94720-1103</p> <p>TIN # 94-6002123</p>		<p>It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.</p> <p><i>Shaheen</i> <i>Attended</i> <i>[Signature]</i></p>	
<p>Questions regarding this invoice should be directed to:</p>		<p>Jon Mirsky, Award Analyst Phone: (510) 642-0595 FAX: 510-643-8997 Email: mirsky@berkeley.edu</p>	



University of California Berkeley
Accounting Services
Extramural Funds Accounting

0080643

Invoice To:

Air Resources Board
Accounting and Grants
P.O. Box 1436
Sacramento, CA 95812

Date: 3/20/2009

INVOICE NO. 77726 - 77171

Contract/Grant/Agreement/Purchase Order Number: 07-716		PI/Director: Shaheen, Susan A Reference:	
Project Title TRANSPORTATION SECTOR WHITE PAPERS, MODELING AND STAKEHOLDER WORKSHOP SUPPORT			
		Period Billed 10/29/2008 - 12/31/2008	
		Cumulative	Current
Salaries & Wages		84,846.88	63,939.03
Employee Benefits		17,193.24	15,567.01
Equipment & Facilities		0.00	0.00
Supplies, Materials, & Services		5,993.20	3,294.69
Travel		7,465.13	4,144.66
Subcontract		0.00	0.00
Indirect Cost		11,077.88	8,222.57
TOTAL		\$126,576.33	95,167.96
Less Withholding (10.0%):			9,516.80
		Amount Now Due	85,651.16

Refer to invoice # 77726 - 77171
and make check payable to:
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
Extramural Funds Accounting
2195 Hearst Ave RM 130 MC 1103
Berkeley, California 94720-1103

TIN # 94-6002123

It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.

Shaheen
W. Shaheen
[Signature]

Questions r 000

to: Jon Mirsky, Award Analyst
Phone: (510) 642-0595 FAX: 510-643-8997
Email: mirsky@berkeley.edu

DUPLICATE 27 2009

0-006-

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0-006-

85-651-16

568-05

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85 199 216

Harman, Guy@ARB

From: Weir, Jeff@ARB
Sent: Monday, March 23, 2009 11:59 AM
To: Harman, Guy@ARB
Cc: Kavan-Bush, Marie@ARB
Subject: FW: Revised Invoices for 07-716
Attachments: 77726-77171.pdf, 77726-77169.pdf

Guy –

I received the amended invoices for contract 07-716 from UC Berkeley (attached). They look good -- no work showed during the stoppage, etc. So they are okay to pay. Void out the old one (77726-70190).

Any questions, just buzz. Thanks. JEFF

From: Jon Mirsky [mailto:mirsky@berkeley.edu]
Sent: Friday, March 20, 2009 4:57 PM
To: Weir, Jeff@ARB
Cc: 'John Li'
Subject: Revised Invoices

Hi Jeff,

Attached, please find 2 revised invoices for our ARB award # 07-716.

We had originally submitted an invoice that included a performance period that overlapped the stop work order. I have worked with the department to verify that all expenses that were incurred during the stop work order have been removed.

Thanks,
Jon

Jon Mirsky
Award Analyst
University of California, Berkeley
Extramural Funds Accounting
2195 Hearst Avenue, Room 130, MC 1103
Berkeley, California 94720-1103
mirsky@berkeley.edu
(510) 642-0595 phone
(510) 643-8997 fax

But goodbye is too good a word, gal
So I'll just say fare thee well

3/23/2009



University of California Berkeley
Accounting Services
Extramural Funds Accounting

Invoice To:

Air Resources Board
Accounting and Grants
P.O. Box 1436
Sacramento, CA 95812

Date: 3/20/2009

INVOICE NO. 77726 - 77169

Contract/Grant/Agreement/Purchase Order Number: 07-716		PI/Director: Shaheen, Susan A Reference:	
Project Title TRANSPORTATION SECTOR WHITE PAPERS, MODELING AND STAKEHOLDER WORKSHOP SUPPORT			
	Period Billed 7/1/2008 - 7/30/2008		
	Cumulative	Current	
Salaries & Wages	20,907.85	12,287.85	
Employee Benefits	1,626.23	1,287.39	
Equipment & Facilities	0.00	0.00	
Supplies, Materials, & Services	2,698.51	774.15	
Travel	3,320.47	3,058.42	
Subcontract	0.00	0.00	
Indirect Cost	2,855.31	1,740.78	
TOTAL	\$31,408.37	19,148.59	
Less Withholding (10.0%):		1,914.86	
Amount Now Due	☞	17,233.73	
<p>Refer to invoice # 77726 - 77169 and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA Extramural Funds Accounting 2195 Hearst Ave RM 130 MC 1103 Berkeley, California 94720-1103</p> <p>TIN # 94-6002123</p>		<p>It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.</p> <p align="right">07/08 548,05 <i>Approved</i> 08/09 14,485.68 <i>attached</i> </p>	
<p>Questions regarding this invoice should be directed to:</p>		<p>Jon Mirsky, Award Analyst Phone: (510) 642-0595 FAX: 510-643-8997 Email: mirsky@berkeley.edu</p>	

Harman, Guy@ARB

From: Weir, Jeff@ARB
Sent: Monday, March 23, 2009 11:59 AM
To: Harman, Guy@ARB
Cc: Kavan-Bush, Marie@ARB
Subject: FW: Revised Invoices for 07-716
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Guy –

I received the amended invoices for contract 07-716 from UC Berkeley (attached). They look good -- no work showed during the stoppage, etc. So they are okay to pay. Void out the old one (77726-70190).

Any questions, just buzz. Thanks. JEFF

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Sent: Friday, March 20, 2009 4:57 PM
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Thanks,

Jon

~~~~~  
 Jon Mirsky  
 Award Analyst  
 University of California, Berkeley  
 Extramural Funds Accounting  
 2195 Hearst Avenue, Room 130, MC 1103  
 Berkeley, California 94720-1103  
[mirsky@berkeley.edu](mailto:mirsky@berkeley.edu)  
 (510) 642-0595 phone  
 (510) 643-8997 fax

~~~~~  
 But goodbye is too good a word, gal
 So I'll just say fare thee well
 ~~~~~

3/23/2009



University of California Berkeley

Accounting Services

Extramural Funds Accounting

Invoice To:

Air Resources Board  
 Accounting and Grants  
 P.O. Box 1436  
 Sacramento, CA 95812

Date: 4/28/2009

INVOICE NO. 77726 - 81138

|                                                                                                                                                                                                                                    |                            |                                                                                                             |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------|-----------|
| Contract/Grant/Agreement/Purchase Order Number: 07-716                                                                                                                                                                             |                            | PI/Director: Shaheen, Susan A                                                                               |           |
| Project Title: TRANSPORTATION SECTOR WHITE PAPERS, MODELING AND STAKEHOLDER WORKSHOP SUPPORT                                                                                                                                       |                            | Reference:                                                                                                  |           |
|                                                                                                                                                                                                                                    | Period Billed To 1/31/2009 |                                                                                                             |           |
|                                                                                                                                                                                                                                    | Cumulative                 | Current                                                                                                     |           |
| Salaries & Wages                                                                                                                                                                                                                   | 132,639.02                 | 47,792.14                                                                                                   |           |
| Employee Benefits                                                                                                                                                                                                                  | 29,827.83                  | 12,634.59                                                                                                   |           |
| Equipment & Facilities                                                                                                                                                                                                             | 0.00                       | 0.00                                                                                                        |           |
| Supplies, Materials, & Services                                                                                                                                                                                                    | 0.00                       | 617.81                                                                                                      |           |
| Travel                                                                                                                                                                                                                             | 0.00                       | 0.00                                                                                                        |           |
| Subcontract                                                                                                                                                                                                                        | 0.00                       | 0.00                                                                                                        |           |
| Indirect Cost                                                                                                                                                                                                                      | 0.00                       | 5,758.52                                                                                                    |           |
| <b>TOTAL</b>                                                                                                                                                                                                                       |                            | 60,122.75                                                                                                   | 66,803.06 |
| Less Withholding (10.0%):                                                                                                                                                                                                          |                            | 18,416.12                                                                                                   | 6,680.31  |
| <b>Amount Due</b>                                                                                                                                                                                                                  |                            | 13,206.95                                                                                                   | 60,122.75 |
| Refer to invoice # 77726 - 81138 and make check payable to:<br>THE REGENTS OF THE UNIVERSITY OF CALIFORNIA<br>Extramural Funds Accounting<br>2195 Hearst Ave RM 130 MC 1103<br>Berkeley, California 94720-1103<br>TIN # 94-6002123 |                            | It is hereby certified for appropriate application of the applicable rules (requested) are set forth in     |           |
|                                                                                                                                                                                                                                    |                            | Victorino Soriano, Award Analyst<br>Phone: (510) 643-6539 FAX: 510-643-8997<br>Email: vsoriano@berkeley.edu |           |

Harman, Guy@ARB

---

From: Rogers, Jamesine@ARB  
Sent: Tuesday, November 03, 2009 8:38 AM  
To: Harman, Guy@ARB  
Cc: Ito, Doug@ARB; Kavan-Bush, Marie@ARB; Kirlis, Rachel@ARB  
Subject: RE: Invoice approval

Guy,

Hi there. I have spoken with my manager and we are approving the following invoices for payment:

#77726-81138  
#77726-90885  
#77726-100908

Invoice #77726-70190 should be voided per Jeff Weir's email below. It was replaced with 77169 and 77171, which have already been paid out.

Please let me know if you have any questions. Thanks!

Jamesine

-----Original Message-----

From: Weir, Jeff@ARB  
Sent: Thu 9/3/2009 9:11 AM  
To: Ly, Ginh@ARB  
Cc: 'dito@arb.ca.gov'; Rogers, Jamesine@ARB; Kavan-Bush, Marie@ARB  
Subject: FW: Revised Invoices for 07-716

Hi, Ginh -

Regarding your recent email about Invoice #77726-70190, as you can see by the email below to Guy Harman in March 2009, we had UCB amend that invoice and I asked Guy to void it out. 70190 was replaced with 77169 and 77171. So, please void 70190.

By the way, do you also keep track of the invoices paid for a particular contract, or does the managing division just do that?

Here's what our files say are the paid invoices so far on the contract:

55047 -- \$12,259

77169 -- \$19,148

77171 -- \$95,176

Cumulative: \$126,583

Any questions, just buzz Doug, Jamesine, or Marie. Thanks. JEFF

-----Original Message-----



# University of California Berkeley

Accounting Services  
Extramural Funds Accounting

Invoice To:

Air Resources Board  
Accounting and Grants  
P.O. Box 1436  
Sacramento, CA 95812

Date: 7/28/2009

PAID AUG 5 2009

INVOICE NO. 77726 - 90885

Contract/Grant/Agreement/Purchase Order

PI/Director: Shaheen, Susan A

Number: 07-716

Reference:

Project Title: Transportation Sector White Papers, Modeling and Stakeholder Workshop Support

|                                 | Period Billed<br>2/1/2009 - 6/30/2009 |                 |
|---------------------------------|---------------------------------------|-----------------|
|                                 | Cumulative                            | Current         |
| Salaries & Wages                | 136,326.78                            | 3,687.76        |
| Employee Benefits               | 29,731.20                             | -96.63          |
| Equipment & Facilities          | 0.00                                  | 0.00            |
| Supplies, Materials, & Services | 6,823.83                              | 212.82          |
| Travel                          | 7,917.63                              | 452.50          |
| Subcontract                     | 0.00                                  | 0.00            |
| Indirect Cost                   | 17,560.53                             | 724.13          |
| <b>TOTAL</b>                    | <b>\$198,359.97</b>                   | <b>4,980.58</b> |

Less Withholding (10.0%):

498.06

**Amount Now Due**

**4,482.52**

Refer to invoice # 77726 - 90885

and make check payable to:

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA  
Extramural Funds Accounting  
2195 Hearst Ave RM 130 MC 1103  
Berkeley, California 94720-1103

TIN # 94-6002123

It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.

*Approval*  
*W. Thach*

*Victorino Soriano*

Questions regarding this invoice should be directed to:

Victorino Soriano, Award Analyst  
Phone: (510) 643-6539 FAX: 510-643-8997  
Email: vsoriano@berkeley.edu

Harman, Guy@ARB

---

From: Rogers, Jamesine@ARB  
Sent: Tuesday, November 03, 2009 8:38 AM  
To: Harman, Guy@ARB  
Cc: Ito, Doug@ARB; Kavan-Bush, Marie@ARB; Kirlis, Rachel@ARB  
Subject: RE: Invoice approval

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#77726-90885  
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Invoice #77726-70190 should be voided per Jeff Weir's email below. It was replaced with 77169 and 77171, which have already been paid out.

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University of California Berkeley

Accounting Services

Extramural Funds Accounting

Invoice To:

Air Resources Board
Accounting and Grants
P.O. Box 1436
Sacramento, CA 95812

Date: 10/13/2009

INVOICE NO. 77726 - 100908

DUPLICATE

Contract/Grant/Agreement/Purchase Order
Number: 07-716
Project Title: Transportation Sector White Papers, Modeling and Stakeholder Workshop Support
PI/Director: Shaheen, Susan A
Reference:
Period Billed: 7/1/2009 - 9/30/2009
Table with columns: Salaries & Wages, Employee Benefits, Equipment & Facilities, Supplies, Materials, & Services, Travel, Subcontract, Indirect Cost, Cumulative, Current, TOTAL.
Amount Now Due: 18,416.12
Refer to invoice # 77726 - 100908 and make check payable to: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
TIN # 94-6002123
It is hereby certified that all expenditures reported (or payment requested) are for appropriate purposes and in accordance with the agreements set forth in the application and award documents.
Victorino Soriano, Award Analyst
Phone: (510) 643-6539 FAX: 510-643-8997
Email: vsoriano@berkeley.edu

**Harman, Guy@ARB**

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**From:** Rogers, Jamesine@ARB  
**Sent:** Tuesday, November 03, 2009 8:38 AM  
**To:** Harman, Guy@ARB  
**Cc:** Ito, Doug@ARB; Kavan-Bush, Marie@ARB; Kirlis, Rachel@ARB  
**Subject:** RE: Invoice approval

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#77726-100908

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-----Original Message-----

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**Subject:** FW: Revised Invoices for 07-716

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Cumulative: \$126,583

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-----Original Message-----

**STANDARD AGREEMENT AMENDMENT**

STD. 213 A (Rev 8/03)

 CHECK HERE IF ADDITIONAL PAGES ARE ATTACHED 4 Pages

AGREEMENT NUMBER

07-716

AMENDMENT NUMBER

1

REGISTRATION NUMBER: 39000508304180.1

1. This Agreement is entered into between the State Agency and Contractor named below:

STATE AGENCY'S NAME

Air Resources Board (ARB or State)

CONTRACTOR'S NAME

The Regents of the University of California, Berkeley (UC Berkeley, UCB, University, or Contractor)

2. The term of this

Agreement is May 7, 2008 through June 30, 2010

3. The maximum amount of this

\$289,066.00Agreement after this amendment is: Two Hundred Eighty-Nine Thousand Sixty-Six and No/100 Dollars

4. The parties mutually agree to this amendment as follows. All actions noted below are by this reference made a part of the Agreement and incorporated herein:

This amendment extends the term of the agreement by seventeen months, for additional tasks, as specified in Exhibit A, Attachment 2, Amendment to Scope of Work, attached hereto and incorporated herein.

This amendment extends the contract's original end date of January 31, 2009 by one year and five months.

The contract term shall now be from May 7, 2008 through June 30, 2010.

This amendment increases the original contract's dollar amount of \$ 194,466.00 by \$ 94,600.00, for additional budget items specified in Exhibit B, Attachment 2, Amendment Budget, attached hereto and incorporated herein.

The total maximum amount of this agreement shall now be \$ 289,066.00.

All other terms and conditions shall remain the same.

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

| CONTRACTOR                                                                                                                                                      |                                      | CALIFORNIA<br>Department of General Services<br>Use Only                                                                                            |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|
| CONTRACTOR'S NAME (If other than an individual, state whether a corporation, partnership, etc.)<br><b>The Regents of the University of California, Berkeley</b> |                                      | <div style="border: 1px solid black; padding: 10px; text-align: center;"> APPROVED<br/><br/> APR - 3 2009<br/><br/> DEPT OF GENERAL SERVICES </div> |  |
| BY (Authorized Signature)<br><i>Jyl Baldwin</i>                                                                                                                 | DATE SIGNED (Do not type)<br>4/17/09 |                                                                                                                                                     |  |
| PRINTED NAME AND TITLE OF PERSON SIGNING<br>Jyl Baldwin, Assistant Director, Compliance & Special Projects                                                      |                                      |                                                                                                                                                     |  |
| ADDRESS<br>Sponsored Projects Office, 2150 Shattuck Ave., Rm 313, Berkeley, CA 94720                                                                            |                                      |                                                                                                                                                     |  |
| STATE OF CALIFORNIA                                                                                                                                             |                                      | <input type="checkbox"/> Exempt per:                                                                                                                |  |
| AGENCY NAME<br>Air Resources Board                                                                                                                              |                                      |                                                                                                                                                     |  |
| BY (Authorized Signature)<br><i>Sharon Simmons</i>                                                                                                              | DATE SIGNED (Do not type)<br>3/26/09 |                                                                                                                                                     |  |
| PRINTED NAME AND TITLE OF PERSON SIGNING<br>for Socorro Watkins, Chief, Business Management Branch                                                              |                                      |                                                                                                                                                     |  |
| ADDRESS<br>P.O. Box 2815, Sacramento, CA, 95812                                                                                                                 |                                      | <i>Sharon Simmons</i><br>Contract Services Section Manager<br>Air Resources Board                                                                   |  |

ARB

**Exhibit A, Attachment 2  
Amendment to Scope of Work**

**Amendment 1 to Contract 07-716:  
Assembly Bill 32: Global Warming Solutions Act Transportation Sector  
White Paper and Stakeholder Workshops**

**Performance Metrics for SB 375 and  
Regional Target Advisory Committee Technical Support**

**Caroline J. Rodier, Ph.D.  
Senior Researcher, Transportation Sustainability Center  
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**December 31, 2008**

**INTRODUCTION**

On December 12, 2008, the California Air Resources Board (CARB) approved a Scoping Plan for AB 32 (California's Global Warming Solutions Act) that placed emphasis on SB 375 (Chapter 728, Statutes of 2008) processes to set regional passenger vehicle greenhouse gas (GHG) emission reduction targets. SB 375 requires CARB to appoint a Regional Targets Advisory Committee to recommend factors to be considered and methodologies to be used for setting targets. CARB's Scoping Plan resolution states that the "RTAC should recommend a method to evaluate the full potential for reducing greenhouse gas emissions in each major region of the state, and statewide, using improved land use patterns, indirect source rules, enhanced bike, walk and transit infrastructure, and pricing policies where applicable (including congestion, toll and parking pricing)." Moreover, "it is the board's intent that the greenhouse gas emissions reductions associated with the SB 375 regional targets represent the most ambitious achievable targets."

The objective of this scope of work is to assist the CARB, RTAC, and California Metropolitan Regional Planning Organizations (MPOs) in the development of recommended target setting and evaluation methods. Currently most operational modeling tools used by state, regional, and local governmental organizations in California have limited ability to represent the effects of land use, auto pricing, and bike, walk, and transit enhancements strategies, all of which are commonly thought to be critical to the reduction of VMT and GHG emissions required by AB 32 and SB 375. The major MPOs in California are in the process of developing more advanced modeling tools, such as micro-simulation activity-based travel models and land use models, however, it is likely to be years before all these models are fully operational. The tasks outlined below are aimed at providing near term guidance on consistent and accurate

performance metrics and tools (including model and off-model), based on the best available science, for different regions across the state to estimate and compare the GHG reduction potential of alternative regional land use and transportation scenarios.

## SCOPE OF WORK

**Task A1: Identify elasticity of VMT/GHG emissions with respect to change in land use, auto pricing, and transportation infrastructure investment from available advanced modeling and empirical literature.**

CARB and the California Department of Transportation has funded Rodier to evaluate the VMT and GHG effects of land use, pricing, and transit enhancement strategies based on the now large body of advanced modeling literature. Rodier has amassed this literature, which consists of approximately 50 studies representing approximately 200 policy scenarios conducted in California, the U.S. and internationally. Using this literature Rodier has developed a database in which the following are categorized: model type, key demographic characteristics of study areas, change in policy input variables (ranging from crude to specific depending on documentation), and the resulting change in output VMT and/or GHG emissions. This database was then used to extrapolate available data to project the magnitude of likely effects from these strategies by area type for 10, 20, 30, and 40 year time horizons.

Because of the limitations of study documentation, the elasticity of VMT/GHG emissions with respect to change in land use, auto pricing, and transportation infrastructure investment could only be approximately represented for many scenarios in the database. An important focus of this study, will be contacting agencies and researchers to obtain more precise representation of the magnitude of change introduced by the policy scenarios (e.g., new transit lane miles, roadway capacity expansion, auto pricing levels, land use density, and jobs and housing balance) where documentation is lacking. In addition, Rodier will compare the identified elasticity estimates to those found in syntheses of the empirical literature. Geographic variations of scenario effectiveness will also be noted to facilitate application to different California regions. Rodier will work closely with modeling staff at the Sacramento Area Council of Governments (SACOG) on this task as they have one of the most sophisticated modeling set in the U.S.

Deliverable: A white paper synthesis of results.

Timeline: February 1, 2009 to June 30, 2010

**Task A2: Conduct outreach to modeling staff in California MPOs to understand their current and near term modeling and data needs, resources, and capabilities.**

Outreach will be conducted with California MPOs to document regional visions for GHG reduction as part of the SB 375 process; existing and planned data and modeling resources including funding and staff; on-going monitoring capability; and relevant institutional barriers. Researchers will work with MPO staff to identify relevant elasticities implicit in their current modeling tools. These results will be examined in the context of elasticities suggested by more advanced models (like SACOG's) and the empirical literature as document in Task 1 above.

Deliverable: A white paper synthesis of results.

Timeline: February 1, 2009 to June 30, 2010

**Task A3: Identify and evaluate alternative metropolitan performance metrics.**

The literature will be reviewed and experts will be consulted to identify and evaluate metropolitan performance metrics, which may encompass both input and output measures, against criteria that include, for example, accurate representation of the environmental outcome; feasibility of measurement given current and future data and modeling tools; the cost of producing the measure; institutional/political acceptance; and potential negative indirect or perverse effects due to geographic and time scales of analysis. Recommendations will be made for metropolitan performance metrics in the context of the RTAC and SB 375, including on-going modeling and monitoring efforts, to achieve GHG goals for regional land use and transportation projects and policies. The results and recommendations will be peer reviewed.

Deliverable: A white paper synthesis of results.

Timeline: February 1, 2009 to June 30, 2010

**Task A4: Provide technical support to CARB during the RTAC and SB 375 process.**

Researchers will provide ongoing technical assistance to CARB during the RTAC and SB 375 process within the resources of the project budget to assist with specific questions that arise related to method that RTAC ultimately recommends to evaluate the GHG emission reduction potential from land use, auto pricing, and transportation infrastructure strategies.

Deliverable: Technical support.

Timeline: February 1, 2009 to June 30, 2010

Budget for Amendment 1: \$96,400

**Project Title: Amendment Budget 07-716**  
**Project Period: January 1, 2009 - June 30, 2010**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | 1st FY   | 2nd FY   | TOTAL    |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------|----------|------------------|--------|--------|----------|----------|----------|-----------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | 2/1/09 - | 7/1/09 - | BUDGET   |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Monthly Rate | Hourly Rate | # Months | Unit             | %      | #Hours | 06/30/09 | 06/30/10 |          |                 |
| <b>Personnel</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |             |          |                  |        |        |          |          |          |                 |
| Susan Shaheen, Assoc. Res. Engr., Step II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | \$8,617      | \$49.52     | 0        | cal. yr.         | 0.0%   | -      | \$0      |          | \$0      | 1               |
| Susan Shaheen, Assoc. Res. Engr., Step III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | \$8,958      | \$51.48     | 1        | cal. yr.         | 25.0%  | 43.50  |          | \$2,240  | \$2,240  |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | \$9,137      | \$52.51     | 0        | cal. yr.         | 0.0%   | -      |          | \$0      | \$0      | 2               |
| Caroline Rodier, Senior Development Engr.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | \$7,367      | \$42.34     | 4        | cal. yr.         | 7.0%   | 48.7   | \$2,063  |          | \$2,063  | 1               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | \$7,367      | \$42.34     | 3        | cal. yr.         | 20.0%  | 104.40 |          | \$4,420  | \$4,420  | 1               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | \$7,625      | \$43.82     | 9        | cal. yr.         | 25.0%  | 391.50 |          | \$17,156 | \$17,156 | 3               |
| TSRC Staff, TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | \$7,367      | \$42.34     | 0        | cal. yr.         | 0.0%   | -      | \$0      |          | \$0      | 1               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | \$7,367      | \$42.34     | 1        | cal. yr.         | 100.0% | 174.00 |          | \$7,367  | \$7,367  | 1               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | \$7,625      | \$43.82     | 0        | cal. yr.         | 0.0%   | -      |          | \$0      | \$0      | 3               |
| 1 Graduate Student Research, Step 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$2,912      | \$16.74     | 0        | acad mo          | 0.0%   | -      | \$0      |          | \$0      | 1               |
| 1 Graduate Student Research, Step 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$2,912      | \$16.74     | 0        | summer           | 0.0%   | -      | \$0      |          | \$0      | 1               |
| 1 Graduate Student Research, Step 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$2,912      | \$16.74     | 2        | summer           | 100.0% | 348.0  |          | \$5,824  | \$5,824  | 2               |
| 1 Graduate Student Research, Step 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$2,912      | \$16.74     | 1        | acad mo          | 49.5%  | 86.1   |          | \$1,441  | \$1,441  | 2               |
| 1 Graduate Student Research, Step 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$2,970      | \$17.07     | 8        | acad mo          | 49.5%  | 689.0  |          | \$11,761 | \$11,761 | 2               |
| 1 Graduate Student Research, Step 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | \$2,970      | \$17.07     | 1        | summer           | 100.0% | 174.00 |          | \$2,970  | \$2,970  | 2               |
| <b>TOTAL PERSONNEL</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |             |          |                  |        |        | \$2,063  | \$53,179 | \$55,242 | \$55,242        |
| <b>Employee Benefits</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |             |          |                  |        |        |          |          |          |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          | <b>Benefit %</b> |        |        |          |          |          |                 |
| Susan Shaheen, Assoc. Res. Engr., Step II & III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          | 17.32%           |        |        | \$0      | \$388    | \$388    | 5               |
| Caroline Rodier, Senior Development Engr.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |             |          | 35.63%           |        |        | \$735    | \$7,688  | \$8,423  | 5               |
| TSRC Staff, TBD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          | 35.63%           |        |        | \$0      | \$2,625  | \$2,625  | 5               |
| GSR & Under grad, Summer Months                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          | 3.00%            |        |        | \$0      | \$264    | \$264    | 5               |
| GSR & Under grad, Academic Months                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |             |          | 1.30%            |        |        | \$0      | \$172    | \$172    | 5               |
| 1 GSR (Residents), Full Fee Remission for FY 08-09 per semester is \$5,107                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |             |          |                  |        |        | \$0      | \$0      | \$0      | 6               |
| 1 GSR (Residents), Full estimated Fee Remission for FY 09-10 and after, per semester is (\$5,106.75 increased by 10.0% = \$5,617.43)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |             |          |                  |        |        |          | \$11,235 | \$11,235 | 6               |
| <b>TOTAL EMPLOYEE BENEFITS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |             |          |                  |        |        | \$735    | \$22,372 | \$23,107 | \$23,107        |
| <b>TOTAL PERSONNEL &amp; BENEFITS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |          |                  |        |        | \$2,798  | \$75,551 | \$78,349 | \$78,349        |
| <b>Equipment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |             |          |                  |        |        |          |          |          |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$0      | \$0      | \$0      |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$0      | \$0      | \$0      |                 |
| <b>Subcontract</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |             |          |                  |        |        |          |          |          |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$0      | \$0      | \$0      |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$0      | \$0      | \$0      |                 |
| <b>Travel</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |             |          |                  |        |        |          |          |          |                 |
| Travel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |             |          |                  |        |        | \$1,500  | \$1,500  | \$3,000  |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$1,500  | \$1,500  | \$3,000  | \$3,000         |
| <b>Other Direct Costs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |             |          |                  |        |        |          |          |          |                 |
| Research related communication and supplies (Includes materials, telephone, shipping, faxing, copying, Printing, Telephone)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |             |          |                  |        |        | \$500    | \$786    | \$1,286  |                 |
| Gael Insurance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |             |          |                  |        |        | \$14     | \$372    | \$387    |                 |
| Publications and web support                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |             |          |                  |        |        | \$500    | \$500    | \$1,000  | 7               |
| Computer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |             |          |                  |        |        | \$500    | \$0      | \$500    |                 |
| Peer Reviews (5 @ \$500 each)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |             |          |                  |        |        | \$0      | \$2,500  | \$2,500  |                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$1,514  | \$4,158  | \$5,673  | \$5,673         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$5,812  | \$81,209 | \$87,022 | \$87,022        |
| <b>Indirect Costs</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |             |          |                  |        |        |          |          |          |                 |
| 10% of Modified Total Direct Costs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |             |          |                  |        |        |          |          |          |                 |
| MTDC FY 08-09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | \$5,812      |             |          |                  |        |        | \$581    |          | \$581    | \$581.24        |
| MTDC FY 09-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | \$69,974     |             |          |                  |        |        |          | \$6,997  | \$6,997  | \$6,997.43      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |             |          |                  |        |        | \$6,393  | \$88,206 | \$94,600 | \$94,600 \$ 600 |
| 1 Current Salary Rate<br>2 Salary rate plus a projected 2% cost of living increase effective every October 1 <sup>st</sup> .<br>3 Salary rate plus a projected 3.5% cost of living increase effective every October 1 <sup>st</sup> .<br>4 Composite Benefit Rate<br>5 Benefit rates based upon average of actual costs from October 2008<br>Modified Total Direct Costs: Indirect costs calculated on first \$25,000 of each subcontract only; subcontracts to other UC campuses are not subject to indirect costs; also, tuition remission fees, equipment over \$5,000 and facility rental are excluded.<br>6 |              |             |          |                  |        |        |          |          |          |                 |

STATE OF CALIFORNIA  
**STANDARD AGREEMENT**  
 STD 213 (Rev 06/03)

|                                   |
|-----------------------------------|
| AGREEMENT NUMBER<br><b>07-716</b> |
| REGISTRATION NUMBER               |

1. This Agreement is entered into between the State Agency and the Contractor named below:

STATE AGENCY'S NAME

**Air Resources Board (ARB or State)**

CONTRACTOR'S NAME

**The Regents of the University of California, Berkeley (UC Berkeley, UCB, University, or Contractor)**

2. The term of this Agreement is: **February 1, 2008, or upon DGS approval** through **January 31, 2009**

3. The maximum amount of this Agreement is: ~~\$200,094.00~~ ~~\$194,466.00~~ **TWO HUNDRED THOUSAND, NINETY-ONE DOLLARS AND NO CENTS**  
ONE HUNDRED NINETY-FOUR THOUSAND, FOUR HUNDRED SIXTY-SIX DOLLARS AND NO CENTS

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement.

|                                                      |          |
|------------------------------------------------------|----------|
| Exhibit A – Scope of Work                            | 1 page   |
| Exhibit A, Attachment 1 – Technical Proposal         | 15 pages |
| Exhibit B – Budget Detail and Payment Provisions     | 2 pages  |
| Exhibit B, Attachment 1 – Budget Summary             | 8 pages  |
| Exhibit C* – General Terms and Conditions (GIA -101) | On-line  |
| Exhibit D Special Terms and Conditions               | 1 page   |
| Exhibit E – Additional Provisions                    | 8 pages  |
| Exhibit F – Final Report Format                      | 7 pages  |

Items shown with an Asterisk (\*), are hereby incorporated by reference and made part of this agreement as if attached hereto.  
 These documents can be viewed at [www.ols.dgs.ca.gov/Standard+Language](http://www.ols.dgs.ca.gov/Standard+Language)

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

|                                                                                                                                                                 |                                              |                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------|
| <b>CONTRACTOR</b>                                                                                                                                               |                                              | California Department of General Services Use Only<br><br><i>Kyate</i> |
| CONTRACTOR'S NAME (If other than an individual, state whether a corporation, partnership, etc.)<br><b>The Regents of the University of California, Berkeley</b> |                                              |                                                                        |
| BY (Authorized Signature)<br><i>J Baldwin</i>                                                                                                                   | DATE SIGNED (Do not type)<br><b>1/29/08</b>  |                                                                        |
| PRINTED NAME AND TITLE OF PERSON SIGNING<br><b>JYL BALDWIN, Assistant Director, Compliance &amp; Special Projects</b>                                           |                                              |                                                                        |
| ADDRESS<br><b>Sponsored Projects Office<br/>2150 Shattuck Ave, Room 313, Berkeley, CA 94720-5940</b>                                                            |                                              |                                                                        |
| <b>STATE OF CALIFORNIA</b>                                                                                                                                      |                                              |                                                                        |
| AGENCY NAME<br><b>Air Resources Board</b>                                                                                                                       |                                              |                                                                        |
| BY (Authorized Signature)<br><i>Socorro Watkins</i>                                                                                                             | DATE SIGNED (Do not type)<br><b>02.15.08</b> |                                                                        |
| PRINTED NAME AND TITLE OF PERSON SIGNING<br><b>SOCORRO WATKINS, Chief, Business Management Branch</b>                                                           |                                              |                                                                        |
| ADDRESS<br><b>P.O. Box 2815, Sacramento, CA 95812</b>                                                                                                           |                                              |                                                                        |

Exempt per:

**EXHIBIT A  
 Interagency Agreement**

**SCOPE OF WORK**

1. The Regents of the University of California, Berkeley (UCB, University, or Contractor) agrees to provide services to the Air Resources Board (ARB) in accordance with Exhibit A, Attachments Nos. 1 and 2, UCB's Technical Proposal and Abstract entitled, "Assembly Bill 32: Global Warming Solutions Act: Transportation Sector White Papers, Modeling, and Stakeholder Workshop Support."

ARB agrees to provide co-funding to this project as outlined in Exhibit A, Attachment 1. All terms of the attachment remain the same as originally proposed and dated December 20, 2007, except for the following two items:

- Start Date: ARB's support for this project begins on February 1, 2008 or upon approval by the Department of General Services (DGS), whichever occurs later.
- Timeline: The services to be supported by ARB's funding cannot begin prior to the agreement's approval by DGS. Consequently, all start dates that state, "February 1, 2008" will actually be the date that DGS approves the agreement. Services will end by January 31, 2009, unless a contract amendment extends the agreement's term.

2. The project representatives during the term of this Agreement will be:

|                                               |                                                                    |
|-----------------------------------------------|--------------------------------------------------------------------|
| <b>Requesting Agency: Air Resources Board</b> | <b>Providing Agency: Regents of the University of CA, Berkeley</b> |
| Name: Jeff Weir                               | Name: Arpad Horvath                                                |
| Air Resources Board                           | UCB                                                                |
| Planning & Technical Support Division         | Dept. of Civil and Environmental Engineering                       |
| Phone: (916) 445-0098                         | Phone: (510) 654-7300                                              |
| Fax: (916) 322-3646                           | Fax: (510) 643-8919                                                |
| Email: jweir@arb.ca.gov                       | Email: Horvath@ce.berkeley.edu                                     |

The ARB Contract Administrator is:

The University's Contract Administrator is:

|                                                |                                                                    |
|------------------------------------------------|--------------------------------------------------------------------|
| <b>Requesting Agency: Air Resources Board</b>  | <b>Providing Agency: Regents of the University of CA, Berkeley</b> |
| Name: Jeff Weir                                | Name: Ms. Jyl Baldwin                                              |
| Planning & Technical Support Division          | Sponsored Projects Office                                          |
| Address: 1001 I Street<br>Sacramento, CA 95814 | Address: 2150 Shattuck Ave., Ste #313<br>Berkeley, CA 94704-5940   |
| Phone: (916) 445-0098                          | Phone: (510) 642-8117                                              |
| Fax: (916) 322-3646                            | Fax: (510) 642-8236                                                |
| Email: jweir@arb.ca.gov                        | Email: jbaldwin@berkeley.edu                                       |

**EXHIBIT A, Attachment 1  
Interagency Agreement**

S. Shaheen  
Interagency Proposal, December 20, 2007

**TECHNICAL PROPOSAL**

*Assembly Bill 32: Global Warming Solutions Act:*

*Transportation Sector White Papers, Modeling, and Stakeholder Workshop  
Support*

Principal Investigator:  
Susan Shaheen, Ph.D.

Official Authorized to Bind this Proposal:

Name: Iyl Baldwin, Assistant Director Compliance & Special Projects

Signature: *Iyl Baldwin* 1/4/08

Prepared for:

State of California Air Resources Board  
Research Division  
PO Box 2815  
Sacramento CA 95812

Prepared by:

University of California, Berkeley  
Transportation Sustainability Research Center  
1301 S. 46<sup>th</sup> Street, Bldg. 190  
Richmond, CA 94804-4648

December 21, 2007

Check if applicable:

Animal subjects

Human subjects

**EXHIBIT A, Attachment 1  
Interagency Agreement**

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**EXHIBIT A, Attachment 1  
Interagency Agreement**

|                                |                                                                                                                                                                                                                                                                                             |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Title:</b>          | Assembly Bill 32: Global Warming Solutions Act:<br><br>Transportation Sector White Papers, Modeling, and Stakeholder Workshop Support                                                                                                                                                       |
| <b>Principal Investigator:</b> | Dr. Susan A. Shaheen<br>Institute of Transportation Studies<br>University of California, Berkeley<br>1301 S. 46 <sup>th</sup> Street, Building 190<br>Richmond, CA 94804<br>Ph/Fx: 510-665-3483/2183<br>Email: <a href="mailto:sashaheen@tsrc.berkeley.edu">sashaheen@tsrc.berkeley.edu</a> |
| <b>Other Investigators:</b>    | Dr. Caroline J. Rodier<br>Institute of Transportation Studies<br>University of California, Berkeley<br>1301 S. 46 <sup>th</sup> Street, Building 190<br>Richmond, CA 94804<br>Ph/Fx: 510-665-3524/2183<br>Email: <a href="mailto:caroline@tsrc.berkeley.edu">caroline@tsrc.berkeley.edu</a> |
| <b>Submitting Unit:</b>        | Transportation Sustainability Research Center<br>Institute of Transportation Studies<br>109 McLaughlin Hall<br>University of California – Berkeley<br>Berkeley, CA 94720-1720                                                                                                               |
| <b>Funding Requested:</b>      | \$200,091                                                                                                                                                                                                                                                                                   |
| <b>Start Date:</b>             | February 1, 2008                                                                                                                                                                                                                                                                            |
| <b>End Date:</b>               | January 31, 2009                                                                                                                                                                                                                                                                            |

## EXHIBIT A, Attachment 1 Interagency Agreement

### Assembly Bill (AB) 32: Global Warming Solutions Act

#### Transportation Sector White Papers, Modeling, and Stakeholder Workshop Support

Transportation Sustainability Research Center (TSRC)  
Institute of Transportation Studies (ITS-Berkeley)

#### Abstract

This interagency proposal provides expert support to the California Air Resources Board (CARB) for the proposed AB 32 study that seeks to: 1) further the understanding of the impact of Assembly Bill (AB) 32, California's *Global Warming Solutions Act*, on the transportation sector (building on Caltrans existing work in this area), and 2) commence a discussion among key transportation stakeholders regarding the implementation of the AB 32 regulations through the development of white papers and stakeholder workshops (Northern and Southern California, co-sponsored with the California Air Resources Board (CARB) and the California Energy Commission (CEC)) in 2008. Specifically, this effort would further explore: 1) a range of policy approaches (e.g., cap and trade, budgets, etc.); 2) mechanisms for reducing greenhouse gas (GHG) emissions (such as smart growth and intelligent transportation systems (ITS)); 3) a literature review of advanced modeling studies of the effects of land use, pricing, and alternative modal enhancement strategies; and 4) an interim method to assess GHG reductions from policy strategies. Results of this initiative would help to inform CARB, as it seeks to develop a plan for implementing the AB 32 regulations by January 1, 2009. The approach will be open to refinement among key project partners within the existing framework outlined.

The proposed study would augment an existing literature review and expert interview effort focused upon the transportation sector's role in AB 32 (funded by gift funds received by the University of California, Davis' (UC Davis) Energy Efficiency Center of \$40,000), as well as a Caltrans off-cycle proposal of approximately \$60,000.

As part of the workshops, an AB 32 overview would be developed/presented, along with three draft white papers focused on the transportation sector. The workshops would explore possible policy pathways for implementing AB 32 among the transportation sector, as well as tools and mechanisms for attaining GHG emission reductions (e.g., smart growth, cordon pricing, telecommuting, ITS strategies, etc.) and to inform the development of CARB's plan for implementing the AB 32 regulations. These workshops would be held in Spring 2008 and targeted at high-level stakeholders including: Caltrans, CARB, CEC, city and county representatives, Metropolitan Planning Organizations (MPOs), Air Quality Management Districts (AQMDs), transit operators, academics, and non-governmental organizations (NGOs). In-kind support and co-sponsorship for the workshops would be provided by CARB and CEC.

#### Problem Statement

Climate change is rapidly becoming known as a tangible issue that must be addressed to avoid major environmental consequences in the future. Recent change in public opinion has been caused by the physical signs of climate change—melting glaciers, rising sea levels, more severe storm and drought events, and hotter average global temperatures annually. Transportation is a major contributor of carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions from human activity, accounting for approximately 14 percent of total anthropogenic emissions globally and about 27 percent in the U.S.

Fortunately, transportation technologies and strategies are emerging that can help to meet the climate challenge. These include automotive and fuels technologies, ITS, and mobility and land use management strategies that can reduce the demand for private vehicles. While the climate change benefits of innovative engine and vehicle technologies are relatively well understood, there are fewer studies available on the energy and emission impacts of ITS and mobility and land use management strategies. In the future, ITS, mobility management, and smart growth will likely play a greater role in reducing fuel consumption. This proposal seeks to highlight these areas as mechanisms to reduce GHG emissions.

## EXHIBIT A, Attachment 1 Interagency Agreement

To date, the most dramatic policy measure at the U.S. state level has been the passage of the California Global Warming Solutions Act (AB 32), which seeks to limit GHG emissions from a wide range of industrial and commercial activities. AB 32 requires that California's GHG emissions be reduced to 1990 levels by 2020 (a 25 percent reduction) through an enforceable statewide cap and in a manner that is phased in starting in 2012 under rules to be developed by CARB. An 80 percent reduction in GHG emissions is targeted for 2050.

AB 32 requires that CARB use the following principles to implement the California GHG emissions cap:

- Distribute benefits and costs equitably;
- Ensure that there are no direct, indirect, or cumulative increases in air pollution in local communities;
- Protect entities that have reduced their emissions through actions prior to this regulatory mandate; and
- Allow for coordination with other states and countries to reduce emissions.

CARB is required to adopt the formal AB 32 regulations by January 1, 2008, and to produce a plan for achieving the targeted emission reductions, through market mechanisms and other actions, by January 1, 2009. The expectation is generally for a plan that includes a market-based emission credit-trading scheme under the statewide cap, marking the first serious effort to address climate change at a large scale in the U.S.

This proposal seeks to augment Dr. Shaheen's time leading this AB 32 effort, which includes an existing literature review, expert interviews focused upon the transportation sector's role in AB 32, and stakeholder workshops. Dr. Susan Shaheen is leading the existing research effort in which she is currently funded at approximately 10% time. This proposal would increase Dr. Shaheen's time in leading the proposed effort. This proposal will also call for two additional workshops to be conducted. As part of the workshops, an AB 32 overview would be developed/presented, along with three draft white papers. The purpose of the workshops is to explore possible policy approaches for implementing AB 32 in the transportation sector and tools and mechanisms to attain GHG emission reductions (e.g., smart growth, cordon pricing, telecommuting, ITS strategies, etc.), as well as to inform the development of the CARB AB 32 regulations with key stakeholders. The workshops to be held in Spring 2008 would be targeted at high-level stakeholders from transportation including: Caltrans, CARB, CEC, city and county representatives, MPOs, AQMDs, transit operators, academics, and NGOs. In-kind support and co-sponsorship for the workshops would be provided by CARB and CEC. The approach taken in key project steps will be open to refinement among key partners within the existing project framework.

This proposal will also support two additional research tasks including: 1) a literature review of advanced modeling studies of the effects of land use, pricing, and alternative modal enhancement strategies and 2) an interim method to assess GHG reductions from policy strategies.

### Need for Project Funding

The proposed project is intended to foster an informed discussion and deeper understanding of the role and impact of AB 32 (is the Governor's *Global Warming Solutions Act*) on the transportation sector (building on Caltrans' existing work on AB 32). AB 32 seeks to limit GHG emissions from a wide range of industrial and commercial activities in the State, including transportation. It requires that California's GHG emissions are reduced to 1990 levels (a 25 percent reduction) by 2020 through an enforceable cap and in a manner that is phased in starting in 2012. An 80 percent reduction in GHG emissions is targeted for 2050.

Dr. Shaheen's time on this effort would augment an existing effort (literature review, expert interviews, and two additional workshops) that will lead to: three white papers and stakeholder workshops to foster a deeper understanding and discussion of AB 32 among key transportation stakeholders. This funding will also support two additional research tasks including 1) a literature review of advanced modeling studies of the effects of land use, pricing, and alternative modal enhancement strategies and 2) an interim method to assess GHG reductions from policy strategies. The final white papers, resulting from the proposed study, would help to inform CARB in developing a plan for implementing the AB 32 regulations by January 1, 2009.

## EXHIBIT A, Attachment 1 Interagency Agreement

### Proposed Project

This interagency agreement contains nine key steps, which build upon funding received from the UC Davis Energy Efficiency Center (\$40,000) and potential funding of \$60,000 from Caltrans (as discussed earlier). The proposal seeks to support Dr. Shaheen's research on: 1) developing a deeper understanding of the impact of AB 32 on the transportation sector and 2) commencing a discussion among key transportation stakeholders regarding the implementation of the AB 32 regulations through the development of three white papers and stakeholder workshops (to be held in Northern and Southern California, co-sponsored with CARB and CEC in 2008). The proposed effort would explore: 1) possible policy processes (e.g., cap and trade, budgets, feebates, etc.) and 2) mechanisms for reducing GHG emissions (such as smart growth and ITS). This proposal also seeks to support Dr. Rodier's research including: 1) a literature review of advanced modeling studies of the effects of land use, pricing, and alternative modal enhancement strategies and 2) an interim method to assess GHG reductions from policy strategies. Furthermore, results of this initiative would inform CARB, as it seeks to develop the plan for implementing the AB 32 regulations by January 1, 2009. The approach taken in key project steps will be open to refinement among key partners within the existing project framework.

Below is an overview of the nine key project steps, designated by funding source and timeline.

- Step One: Literature Review (funded by UC Davis Energy Efficiency Center)  
(October 1, 2007 to June 30, 2008)
- Step Two: Expert Interviews (funded by UC Davis Energy Efficiency Center)  
(November 1, 2007 to June 30, 2008)
- Step Three: Develop Draft White Paper (proposed Caltrans off-cycle project)  
(January 1, 2008 to April 15, 2008; revised white draft paper on August 15, 2008)
- Step Four: Conduct Stakeholder Workshops (proposed Caltrans off-cycle project)  
(February 1, 2008 to June 30, 2008)
- Step Five: Literature Review of Advanced Modeling Studies of the Effects of Land Use, Pricing, and Alternative Modal Enhancement Strategies  
(February 1, 2008 to August 1, 2008)
- Step Six: Develop an Interim Method to Assess GHG Reductions from Policy Strategies  
(February 1, 2008 to August 1, 2008)
- Step Seven: Revise and Disseminate Final White Paper (proposed Caltrans off-cycle project) (July 1, 2008 to October 31, 2008)
- Step Eight: Develop Final Report (proposed Caltrans off-cycle project)  
(November 1, 2008 to January 31, 2009)
- Step Nine: Technical Support for AB 32 Scoping Plan Process  
(February 1, 2008 to January 31, 2009)

### Research Methodology

This project consists of nine steps. As indicated below, some of these steps are currently funded by the Energy Efficiency Center at UC Davis (literature review and expert interviews) and some will be funded by a Caltrans off-cycle proposal of \$60,000. The remaining tasks are funded by CARB. Below is a description of the nine research steps and timeline for each effort.

## EXHIBIT A, Attachment 1 Interagency Agreement

### Step One: Literature Review (funded by UC Davis Energy Efficiency Center)

This step entails augmenting an existing literature review consisting of: 1) a brief overview of climate change and the impacts of the transportation sector on GHG emissions; 2) understanding amassed from a range of policy strategies for reducing emissions/pollution, such as cap and trade, budgets for local and regional governments, emission taxes, pricing, and incentives; and 3) CO<sub>2</sub> reduction potential of various ITS, mobility management, and smart growth strategies (expanding existing literature review). Results from this literature will inform the development of three draft white papers. The approach taken in this step will be open to refinement among key partners.

*Timeline:* February 1, 2008 to June 30, 2008

*Outcome:* Literature review

### Step Two: Expert Interviews (funded by UC Davis Energy Efficiency Center)

Expert interviews will be conducted to gather a deeper understanding of the perspectives of various individuals in the transportation sector in California (i.e., Caltrans, CARB, CEC, city and county representatives, MPOs, AQMDs, transit operators, academics, and NGOs). Approximately 10 to 15 interviews will be conducted in person or via telephone. The interviews will explore barriers and opportunities for reducing GHG emissions from the transportation sector (e.g., policy, resources, research, education, performance measures and tools, etc.). They also will investigate a range of possible strategies (e.g., cap and trade, emission taxes, budgets, etc.). A synopsis of the expert interviews will inform the draft white papers. The approach taken in this step will be open to refinement among key partners.

*Timeline:* February 1, 2008 to March 30, 2008

*Outcome:* Summary of expert interview findings

### Step Three: Develop Draft White Papers

Three draft white papers will be developed that outline a variety of policy strategies and mechanisms for reducing GHG emissions from transportation. The purpose of these draft white papers is to present opportunities and obstacles for implementing AB 32 among the transportation sector and to inform the stakeholder workshops. The approach taken in this step will be open to refinement among key partners.

*Timeline:* February 1, 2008 to August 15, 2008

*Deliverable:* Draft and final transportation-sector white papers exploring AB 32 policy strategies, GHG emission tools/mechanisms, policy options, and models/tools for measurement

### Step Four: Conduct Stakeholder Workshops

In this step, researchers will work closely with Caltrans, CEC, and CARB to organize and co-host stakeholder workshops with high-level transportation professionals in Northern and Southern California. Invitees will include: Caltrans, CARB, CEC, city and county representatives, MPOs, AQMDs, transit operators, academics, and NGOs.

The workshops will consist of a brief introduction to AB 32, potential policy strategies, and mechanisms for reducing GHG emissions. Feedback will be recorded and reflected in the revised white papers. The approach taken in this step will be open to refinement among key partners, particularly as the project unfolds.

*Timeline:* February 1, 2008 to June 30, 2008

*Deliverable:* Stakeholder workshops

## EXHIBIT A, Attachment 1 Interagency Agreement

### Step Five: Literature Review of Advanced Modeling Studies of the Effects of Land Use, Pricing, and Alternative Modal Enhancement Strategies

Currently most operational modeling tools used by state, regional, and local governmental organizations in California have limited ability to represent the effects of land use, pricing, and alternative modal enhancements (e.g., transit and carpooling) strategies, all of which are commonly thought to be critical to the reduction of vehicle travel and GHG emissions as required by Assembly Bill 32. The major metropolitan planning organizations (SACOG, MTC, SANDAG, and SCAG) are in the process of developing more advanced modeling tools, such as micro-simulation activity-based travel models and land use models, however, it is likely to be at least three years before all these models are fully operational. The State of California is developing a statewide integrated land use and transportation model that is appropriate for analyzing large-scale projects and policies; however, this model will not be completed until at least 2009.

There is, nevertheless, a large body of empirical and modeling literature that evaluates the effects of land use, pricing, and alternative modal enhancement strategies. Susan Handy and Susan Shaheen are currently evaluating the empirical literature (as described in Step One). We propose an additional study that will summarize the body of advanced travel and land use modeling literature on these policy strategies. The results of this literature will assist in understanding the magnitude of likely effects from these strategies at city, county, and regional scales, by key geographic attributes, and due to synergistic interactions. National and international examples will be evaluated that use advanced travel and land use modeling tools. The literature would also be used, as possible, to set confidence bounds on estimated effects.

In addition, this effort will focus upon key performance indicators that identify isolated and synergistic effects (e.g., dwelling units/acreage, level of transit service) and quantifies impacts (using a range, for example). This step will summarize what the literature says about the actions that impact performance from models that have been used in California, the U.S., and internationally.

*Timeline:* February 1, 2008 to August 1, 2008

*Deliverable:* Literature Review

### Step Six: Develop an Interim Method to Assess GHG Reductions from Policy Strategies

Given the immediate need to assess the GHG effects of reduced vehicle travel, we propose to use the results from the empirical and modeling literature reviews, as described above, to develop an accounting method to estimate plausible GHG reductions from land use, pricing, and alternative modal enhancements (e.g., carpooling and transit) tailored to the key characteristics of cities, counties, or regions (e.g., levels of congestion, quality of transit, and patterns of land use development). This method would also include findings from the now relatively large body of literature on uncertainty in model forecasts to identify sources of bias and to set confidence intervals on baseline and alternative forecasts of vehicle travel. This method would enable CARB to use the best available research to estimate GHG reductions in the short term until more advanced modeling and monitoring systems are available. Researchers would develop a draft version of this method. A high level description may be presented at the workshops to gauge and incorporate stakeholders' response. The final version of this method would involve peer review by a panel that included CARB and leading academic experts.

To measure the reduction in GHG emissions from mobile vehicle sources, officials are currently planning to use change in per capita vehicle miles traveled (or VMT) as a predictor of change in GHG emissions. The sole dependence on per capita VMT begs the question of whether this is the appropriate travel reduction metric for GHG. We propose that the literature be evaluated to provide clear justification for use of the VMT metric or other travel reduction metric. We also propose that the application of the travel reduction metric and its justification be peer reviewed by CARB and leading academic experts. In addition, researchers will examine long-term or life-cycle effects of increased throughput resulting from added lane miles or intelligent transportation systems (traffic management) on VMT, such as induced demand.

## EXHIBIT A, Attachment 1 Interagency Agreement

*Timeline:* February 1, 2008 to August 1, 2008

*Deliverable:* Report summarizing finding, process, and method and/or tool.

### Step Seven: Revise and Disseminate White Papers

Based on the stakeholder workshops, researchers will revise the white papers. These papers will be disseminated through a webinar format and through postings on key web sites, as appropriate. The aim of the final papers is to inform transportation stakeholders about AB 32 options and strategies, along with CARB as it develops its plan for implementing the AB 32 regulations by January 1, 2009. The approach taken in this step will be open to refinement among key partners.

*Timeline:* July 1, 2008 to October 31, 2008

*Deliverable:* Webinar (reflecting final white papers/findings)

### Step Eight: Develop Final Report

As part of this final step, researchers will write a final report that includes a synopsis of the stakeholder workshops and the final white paper. In addition, researchers will develop a suggested set of next steps for proceeding from the white paper in conjunction with Caltrans, CARB, and CEC. Next steps might entail an interagency working group, research agenda, outreach plan, etc.

*Timeline:* February 1, 2008 to January 31, 2009

*Deliverable:* Final report

### Step Nine: Technical Support for AB 32 Scoping Plan Process

Researchers will provide technical support to AB 32 scoping plan workshops, modeling, technical strategies (e.g., road and parking pricing, carsharing, telecommuting, bus rapid transit, etc.), and policy development, as needed.

*Timeline:* February 1, 2008 to January 31, 2009

*Deliverable:* Summary of technical support efforts

### **Research Qualifications**

Dr. Susan Shaheen will lead the proposed research effort. She has over seventeen years of policy experience. Susan served as the Policy and Behavioral Program Leader for the California PATH program from 2003 to 2007. At present, she is the co-director of the transportation track of UC Davis' Energy Efficiency Center and a research director with the Transportation Sustainability Research Center of the Institute of Transportation Studies-Berkeley. Her research is focused on the energy and environmental aspects of transportation, with an emphasis on public policy and technology management. See the attached appendix for lead investigator CV.

Dr. Caroline Rodier is a Senior Researcher at the University of California at Berkeley. Her research has involved the application of integrated land use and transportation, regional travel demand, and emissions models to evaluate the effects of a wide range of transportation (traditional and innovative) and land use policies. Her recent research addresses key issues of uncertainty in land use, travel, and emissions modeling, in particular, model accuracy, population projections, and induced travel. See the attached appendix for CV.

### **Cost Justification**

Key resource needs for this project are staff support (Dr. Shaheen, Dr. Rodier, Ms. Allen, a graduate student researcher, and an undergraduate student assistant) for the expert interviews, literature reviews, interim method to assess GHG reductions, white paper development, and workshops. Additional costs include travel support.

**EXHIBIT A, Attachment 1  
 Interagency Agreement**

**Project Schedule**

Project Performance Period: February 1, 2008 through January 31, 2009

| Project Components                                  | 2/08-3/08<br>Feb-March | 4/08-6/08<br>April-June | 7/08-9/08<br>July-Sept                 | 10/08-1/09<br>Oct-Jan   | Outcomes/<br>Deliverables                     |
|-----------------------------------------------------|------------------------|-------------------------|----------------------------------------|-------------------------|-----------------------------------------------|
| 1) Literature Review                                | →                      | →                       |                                        |                         | Literature Review                             |
| 2) Expert Interviews                                | →                      |                         |                                        |                         | Summary of Expert Interviews                  |
| 3) Draft White Papers                               | →                      | →                       | Revised White Paper on August 15, 2008 |                         | Draft White Papers                            |
| 4) Stakeholder Workshops                            | →                      | →                       |                                        |                         | Stakeholder Workshops                         |
| 5) Literature Review of Advanced Modeling Studies   | →                      | →                       | →                                      |                         | Literature Review                             |
| 6) Interim Method to Assess GHG Reductions          | →                      | →                       | →                                      |                         | Summary Report                                |
| 7) Revise and Disseminate White Papers              |                        |                         | →                                      | →                       | Final White Papers                            |
| 8) Project Reporting and Final Report               | Quarterly Report       | Quarterly Report        | Quarterly Report                       | Draft Final Report<br>→ | Final Report                                  |
| 9) Technical Support for AB 32 Scoping Plan Process | →                      | →                       | →                                      | →                       | Summary of Efforts (included in final report) |

Note: shaded areas indicate periods of major activity for each step.

**EXHIBIT A, Attachment 1  
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**Estimated Cost Per Task**

| Project Components                                  | Source*                                                        |     | Amount   |          |
|-----------------------------------------------------|----------------------------------------------------------------|-----|----------|----------|
|                                                     |                                                                |     |          |          |
| 1) Literature Review                                | <i>Cost Share from Energy Efficiency Center &amp; Caltrans</i> | ARB | \$20,000 | \$10,000 |
| 2) Expert Interviews                                | Cost Share from Energy Efficiency Center & Caltrans            | ARB | \$20,000 | \$10,000 |
| 3) Draft White Papers                               | Cost Share from Energy Efficiency Center & Caltrans            | ARB | \$36,000 | \$20,000 |
| 4) Stakeholder Workshops                            | Cost Share from Caltrans                                       | ARB | \$14,000 | \$40,000 |
| 6) Literature Review of Advanced Modeling Studies   | ARB                                                            |     | \$40,000 |          |
| 6) Interim Method to Assess GHG Reductions          | ARB                                                            |     | \$55,000 |          |
| 7) Revise and Disseminate White Papers              | Cost Share from Energy Efficiency Center & Caltrans            | ARB | \$5,000  | \$5,000  |
| 8) Project Reporting and Final Report               | Cost Share from Energy Efficiency Center & Caltrans            | ARB | \$5,000  | \$5,000  |
| 9) Technical Support for AB 32 Scoping Plan Process | ARB                                                            |     | \$15,000 |          |

\*ARB's co-funding can only be used for work performed after an approved agreement is in place.

**EXHIBIT A, Attachment 1  
Interagency Agreement**

**SUSAN A. SHAHEEN, Ph.D.**

**RESEARCH DIRECTOR & SCIENTIST**

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Susan Shaheen holds a joint research appointment at the Transportation Sustainability Research Center (TSRC) and at the Institute of Transportation Studies-Davis. She is co-director of the transportation track of the Energy Efficiency Center at UC Davis and was honored as the first Honda Distinguished Scholar in Transportation in 2000. In October 2007, Susan became a Research Director at TSRC. She served as the Policy & Behavioral Research Program Leader at California Partners for Advanced Transit and Highways from 2003 to 2007, and as a special assistant to the Director's Office of the California Department of Transportation from 2001 to 2004. She has a Ph.D. in ecology, focusing on technology management and the environmental aspects of transportation, from the University of California, Davis and a MS in public policy analysis from the University of Rochester. She is the chair of the New Public Transportation Systems and Technologies (AP020) Committee of the Transportation Research Board and served as the founding chair of the Carsharing/Station Car TRB Subcommittee from 1999 to 2004.

**EDUCATION**

Ph.D., University of California, Davis, Ecology with major emphasis on Technology  
Management and Environmental Aspects of Transportation (3.8 GPA), September 1999.  
Dissertation: *Dynamics in Behavioral Adaptation to a Transportation Innovation: A Case Study of  
CarLink—A Smart Carsharing System.*  
Thesis Committee: Daniel Sperling (chair), Ryuichi Kitamura, and Richard Walters.

French Proficiency Certificate, University of Paris, Sorbonne, 1990

MS, University of Rochester, Public Policy Analysis, 1990

Graduate Certificate in Constitutional History, University of Oxford, 1988 (English Speaking Union's Eisenhower  
Scholarship)

BA, Nazareth College, Political Science and English, 1988 (Magna Cum Laude)

## EXHIBIT A, Attachment 1 Interagency Agreement

### SELECTED BOOKS, PAPERS, AND REPORTS

Shaheen, Susan, Elliot Martin, and Timothy Lipman (2007). "Dynamics in Behavioral Response to A Fuel Cell Vehicle Fleet and Hydrogen Fueling Infrastructure," Submitted to Transportation Research Board for 2008 Annual Meeting, Washington, D.C. August.

Shaheen, Susan and Charlene Kemmerer (2007). "Smart Parking Linked to Transit: Lessons Learned from the San Francisco Bay Area Field Test," Submitted to Transportation Research Board for 2008 Annual Meeting, Washington, D.C. August.

Rodier, Caroline, Susan Shaheen, and Ellen Cavanagh (2007). "Automated Speed Enforcement in the U.S.: A Review of the Literature on Benefits and Implementation," Submitted to Transportation Research Board for 2008 Annual Meeting, Washington, D.C., August.

Rodier, Caroline and Susan Shaheen (2007). "Commercial Vehicle Parking in California: Exploratory Evaluation of the Problem and Possible Technology-Based Solutions," Submitted to Transportation Research Board for 2008 Annual Meeting, Washington, D.C., August.

Rodier, Caroline and Susan Shaheen (2007). "Transit-Based Smart Parking: An Evaluation of the San Francisco Bay Area Field Test," *Transportation Research C*. Publication Forthcoming.

Shaheen, Susan and Elliot Martin (2007). "Demand for Carsharing Services in China: An Assessment of Shared-Use Vehicle Market Potential in Beijing," Submitted to *International Journal of Sustainable Transportation*.

Shaheen, Susan and Timothy Lipman (2007). "Reducing Greenhouse Gas Emissions and Fuel Consumption: Sustainable Approaches for Surface Transportation," *Journal of International Association of Traffic and Safety Sciences (IATSS) Research*. Vol. 31, No. 1, pp. 6-20.

Finson, Rachel, Cynthia McCormick, and Susan Shaheen (2007). *Innovative Corridors Initiative: Call for Submission Process and Evaluation*. UCB-CWP-2007-10. Berkeley, California. March, 84 pp.

Shaheen, Susan and Caroline Rodier (2007). "Smart Parking Management Linked to Transit," *Research Pays Off, TR News*. Forthcoming.

Shaheen, Susan and Caroline Rodier (2007). "Video Transit Training for Older Travelers: A Case Study of the Rossmoor Senior Adult Community, California," Submitted to Transportation Research Board, Washington, D.C. August. Paper No. 07-2541. Publication Forthcoming.

## EXHIBIT A, Attachment 1 Interagency Agreement

### CAROLINE J. RODIER, PH.D.

Senior Researcher, Transportation Sustainability Research Center, Institute of Transportation Studies, University of California, Berkeley

#### EDUCATION

Ph.D., University of California, Davis, Ecology with major emphasis on Environmental Policy Analysis and Transportation Planning, 2000

Dissertation: Uncertainty in Travel and Emissions Models: A Case Study in the Sacramento Region.

Dissertation Committee: Robert Johnston, Patricia Mokhtarian, James Cramer & David Layton

M.S., University of California, Davis, Community Development, 1994

B. A., Barnard College, Columbia University, U.S. History, 1989

#### EVALUATION RESEARCH, UNIVERSITY OF CALIFORNIA, BERKELEY (03-to present)

- Apply research evaluation methods (observational, focus groups, and surveys) and conduct analyses to evaluate the travel, economic, and environmental effects of new technologies linked to transit, including smart parking and low-speed modes.
- Conduct analysis of institutional barriers and steps to overcome those barriers (including literature reviews and expert and stakeholder interviews) to implement virtual control stations for trucks and automated enforcement.
- Investigate the transportation needs and preferences of diverse population groups, such as elderly, immigrants, and Native Americans, and explore innovative transportation programs to address those needs.

#### URBAN MODELING RESEARCH, UNIVERSITY OF CALIFORNIA, BERKELEY, DAVIS AND THE MINETA TRANSPORTATION INSTITUTE (92 to present)

- Modeled and evaluated the travel, economic, and air quality effects of intelligent transportation systems technologies, high occupancy vehicle lanes, transit improvements, and road pricing and land use control measures using the Sacramento travel and emissions models.
- Apply methods of uncertainty analysis to assess errors in land use, travel, and emissions models due to model structure, population projections, and induced travel in the Sacramento region.
- Assisted in the calibration of integrated land use and transportation demand models, TRANUS, MEPLAN, and PECAS, to the Sacramento region and applied the models to evaluate the travel and air quality effects of various transportation and land use scenarios.

#### SELECTED EXPERT SERVICE/PROFESSIONAL ACTIVITIES

- Transportation Research Board, New Public Transportation Technologies Committee, Friend, 2004 to present
- Transportation Research Board, Integrated Transportation and Land-Use Modeling Subcommittee, Member, 2001 to present

#### SELECTED PUBLICATIONS

Rodier, C.J., S.A. Shaheen, and E. Cavanagh (2006). Virtual Commercial Vehicle Compliance Stations for California: A Review of Legal and Institutional Barriers. *Transportation Research Record*, in press.

Rodier, C. J., S. A., Shaheen, and A. Eaken. (2005). Transit-based smart parking in the San Francisco Bay Area: an assessment of user demand and behavioral effects. *Transportation Research Record* (in press).

Shaheen, S.A., C.J. Rodier, and A. Eaken. (2005). Improving Bay Area Rapid Transit District connectivity and access with the Segway Human Transporter and other low-speed mobility devices. *Transportation Research Record* (in press).

**EXHIBIT A, Attachment 1  
Interagency Agreement**

Shaheen, S.A. and C.J. Rodier. (2005) Travel effects of suburban commuter-carsharing service: a CarLink case study. *Transportation Research Record* (in press).

Rodier, C. J. (2004). Verifying the Accuracy of Regional Models Used in Transportation and Air Quality Planning. *Transportation Research Record*, 1898, 45-51.

Rodier, C. J., R. A. Johnston, and D. R. Shabazian. (2003). Evaluation of advanced transit alternatives using consumer welfare. In *Transportation and Information Systems*. Cheltenham, England; Edward Elgar Publishing, 139-153.

Rodier, C. J. and R. A. Johnston. (2002). Uncertain socioeconomic projections used in travel and emissions models: could plausible errors result in air quality nonconformity? *Transportation Research A*, 36:613-631.

Hunt, J. D., R. A. Johnston, J. E. Abraham, C. J. Rodier, G. Garry, S. H. Putnam, and T. de la Barra. (2001). Comparisons from the Sacramento Model Testbed. *Transportation Research Record*, 1780, 53-63.

Johnston, R. A. and C. J. Rodier. (1998). Regional simulations of highway and transit. ITS: travel, emissions, and economic effects. *Journal of Mathematical and Computer Modeling*, 27: 9-11, 143-161.

**EXHIBIT B**  
**Interagency Agreement**

**BUDGET DETAIL AND PAYMENT PROVISIONS**

**1. Invoicing**

- A. For services satisfactorily rendered in accordance with this agreement and upon receipt and approval of the invoices which properly detail all charges the Air Resources Board agrees to compensate the Regents of the University of California, Berkeley for actual expenditures incurred in accordance with the rates specified herein or attached hereto.
- B. Invoices shall include the Agreement Number and shall be submitted in triplicate not more frequently than quarterly in arrears to

Air Resources Board  
Attn: Accounting Section  
P.O. Box 1436  
Sacramento, CA 95812

- C. University may rebudget funds up to a maximum of ten percent between major budget categories with prior notice to ARB's Contract Manager.
- D. Upon mutual agreement, ARB will give consideration to requests to rebudget funds in excess of ten percent; however, no rebudgeting in excess of ten percent and no rebudgeting of funds into the travel category may be performed without ARB's approval. The total Agreement cost will remain unchanged.

**2. Budget Contingency Clause**

- A. It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the program, this Agreement shall be of no further force and effect. In this event, the State shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.
- B. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, the State shall have the option to either cancel this Agreement with no liability occurring to the State, or offer an agreement amendment to Contractor to reflect the reduced amount.

**3. Payment**

- A. Costs for this Agreement shall be computed in accordance with State Administrative Manual Sections 8752 and 8752.1.

**EXHIBIT B**  
**Interagency Agreement**

- B. Nothing herein contained shall preclude advance payments pursuant to Article 1, Chapter 3, Part 1, Division 3, Title 2 of the Government Code of the State of California.
- C. ARB shall withhold payment equal to ten percent of the total Agreement cost until completion of all work and submission to ARB by University of a final report (including computer diskette copy) approved in accordance with Exhibit F, by ARB. It is the University's responsibility to submit an invoice in triplicate with the revised final report for ten percent withheld.
- D. University will be paid for the payment period completed upon receipt, by ARB, of an invoice and progress report satisfying the requirements of this Agreement. The invoice and progress report must be deemed by ARB to reflect reasonable work performed in accordance with the Agreement.
- E. The amount to be paid to University under this Agreement includes all sales and use taxes incurred pursuant to this Agreement. University shall not receive additional compensation for reimbursement of such taxes and shall not decrease work to compensate therefore.

**EXHIBIT B, Attachment 1  
Interagency Agreement**

# Budget Submittal Form

This form is supplied for presenting budget detail to the Air Resources Board.

**PLEASE TYPE OR PRINT:**

**Title of Proposal:** Assembly Bill 32: Global Warning Solutions Act: Transportation Sector White Papers, Modeling, and Stakeholder Workshop Support

**Total Budget Requested:** \$194,466.00

**Period Covered (months):** 12

**University:** University of California, Berkeley

**Address:** 2150 Shattuck Avenue, Suite #313, Berkeley, CA 94704-5940

**Name of person authorized to bind this bid:** Jyl Baldwin

**Title:** Assistant Director Compliance & Special Projects

**Phone:** (510) 642-8117

**Signature of person authorized to bind this bid:** \_\_\_\_\_

**EXHIBIT B, Attachment 1  
Interagency Agreement**

**Budget Summary**

Budget details must be supplied on pages 3-11 and on additional pages if necessary.  
Instructions and definitions of terms are provided in Attachment 1 of the Guidelines for Proposals.

*NOTE: Totals in categories in this summary are automatically updated from pages 3-11 when using Excel file.*

**Direct Costs**

|     |                                  |                  |
|-----|----------------------------------|------------------|
| 1.  | Labor & Employee Fringe Benefits | \$162,452        |
| 2.  | Subcontractor(s)/Consultant(s)   | \$0              |
| 3.  | Equipment                        | \$0              |
| 4.  | Travel & Subsistence             | \$9,000          |
| 5.  | Electronic Data Processing       | \$0              |
| 6.  | Photocopying & Printing          | \$1,100          |
| 7.  | Mail, Telephone, and Fax         | \$450            |
| 8.  | Materials & Supplies             | \$451            |
| 9.  | Analyses                         | \$0              |
| 10. | Miscellaneous                    | \$8,448          |
|     | <b>Total Direct Cost</b>         | <b>\$181,901</b> |

**Indirect Costs**

|     |                            |                 |
|-----|----------------------------|-----------------|
| 11. | Overhead                   | \$18,189        |
|     | <b>Total Indirect Cost</b> | <b>\$18,189</b> |

**Total Direct and Indirect Cost: \$200,091**

**EXHIBIT B, Attachment 1  
 Interagency Agreement**

**Budget Detail  
 I. Direct Costs**

**1a. Labor Charges for Universities and Other State Agencies**

*Note: Total Salary Requested cells automatically calculate when using Excel file*

|    | Individual's Name | Work Title                                | Mo. Salary        | Est. Months | % of Effort or % of Salary | Total Salary Requested |
|----|-------------------|-------------------------------------------|-------------------|-------------|----------------------------|------------------------|
| A. | Susan Shaheen     | Principal Development Engineer, PI        | \$9,421 & \$9,798 | 8 & 4       | 25.00%                     | \$28,640               |
| B. | Caroline Rodier   | Senior Development Engineer               | \$7,367 & \$7,661 | 8 & 4       | 44.00%                     | \$39,415               |
| C. | Denise Allen      | Public Administrative Analyst             | \$3,919 & \$4,076 | 8 & 4       | 30.00%                     | \$14,296               |
| D. | 1 TBN             | Graduate Student Res., Step 3, Resident   | \$3,229 & \$3,358 | 8 & 4       | 49.5% & 100.0%             | \$24,327               |
| E. | 1 TBN             | Assistant III (Undergraduate Student)     | \$2,610 & \$2,714 | 8 & 4       | 10.00% & 100.0%            | \$10,221               |
| F. | TBN               | Tech Transfer Director                    | \$8,496.00        | 1.00        | 18.50%                     | \$1,572                |
| G. | TBN               | Administrative Specialist (Tech Transfer) | \$4,089.00        | 1.00        | 77.00%                     | \$3,149                |
| H. | TBN               | Administrative Specialist (Tech Transfer) | \$3,734.00        | 1.00        | 45.00%                     | \$1,680                |
| I. |                   |                                           |                   |             |                            | \$0                    |

(use additional page if necessary)

**Subtotal: \$123,300**

*Cost justifications. Describe exactly why each individual listed in the Budget Detail is needed in this project (i.e., their role in the project), why this particular person was chosen for this role, and why their proposed level of effort is necessary. Describe, for each position listed, why the specified rate is reasonable or competitive. (Use additional page if necessary).*

Susan Shaheen is the Principal Investigator (PI) and is responsible for all aspects of the project. Her knowledge and skills in transportation and environmental policy in California make her uniquely qualified to lead this effort. Her rates are reasonable for a PI with her level of experience. Caroline Rodier will be responsible for the technical papers (step three), participating in stakeholder workshops (step four), step five (literature review of advanced modeling), step six (interim method for assessing GHG strategies), and contributing to steps seven (revise/finalize white paper), eight (develop final report), and step nine (providing technical support). Dr. Rodier is uniquely qualified in transportation and land use modeling in California to lead these efforts. Her rate is competitive for her level of knowledge and expertise. Denise Allen will support Dr. Shaheen in steps one (literature review), two (expert interviews), three (draft white paper), four (stakeholder

**EXHIBIT B, Attachment 1  
 Interagency Agreement**

workshops), seven (revise and disseminate final white paper), and eight (develop final report). Ms. Allen has been selected for this project given her extensive experience in institutional and stakeholder analysis in transportation policy in California; her rate is reasonable for her experience and expertise. Graduate and undergraduate students will support step four (workshops), step five (literature review of advanced modeling), step six (Interim method to assess GHG strategies), and step eight (develop final report) under Drs. Shaheen and Rodier's supervision. Finally, the Tech Transfer Director and Administrative Specialists will be largely responsible for organizing and administering the stakeholder workshops (step four). This team is highly qualified in administering high-level conferences in the State and their rates are competitive for their role on this project.

**1b. Fringe Benefits**

*Note: COST cells automatically calculate when using Excel file*

|    | Individual's Name                                                                           | BASE (\$)   | RATE (%) | COST     |
|----|---------------------------------------------------------------------------------------------|-------------|----------|----------|
| A. | Susan Shaheen                                                                               | \$28,640.00 | 24.30%   | \$6,960  |
| B. | Caroline Rodier                                                                             | \$39,415.00 | 35.63%   | \$14,044 |
| C. | Denise Allen                                                                                | \$14,296.00 | 38.02%   | \$5,435  |
| D. | Assistant III & GSR,<br>Academic Yr.                                                        | \$17,031.00 | 1.30%    | \$221    |
| E. | Assistant III & GSR,<br>Summer Yr.                                                          | \$17,517.00 | 3.00%    | \$526    |
| F. | Tech Transfer Director                                                                      | \$1,571.76  | 32.88%   | \$517    |
| G. | Administrative Specialist<br>(Tech Transfer)                                                | \$3,148.53  | 30.36%   | \$956    |
| H. | Administrative Specialist<br>(Tech Transfer)                                                | \$1,680.30  | 40.28%   | \$677    |
| I. | GSR (Residents) Full Fee<br>Remission for 2 semesters<br>(use additional page if necessary) | \$9,818.00  |          | \$9,818  |

**Subtotal: \$39,153**

*Cost justifications. Provide the Basis for the Fringe Benefit Rates. (Use additional page if necessary).*

The rates for each of the team members are assigned by their position level at UC Berkeley. These rates include benefits (medical, vacation) and reasonable within the context of those paid in California.

**2. Subcontractors & Consultants**

List all subcontractors and consultants. Also submit separate Budget Submittal Form for each subcontractor and consultant.

|    | Subcontractor or consultant | Cost |
|----|-----------------------------|------|
| A. |                             |      |
| B. |                             |      |

**EXHIBIT B, Attachment 1  
 Interagency Agreement**

C.  
 D.  
 (use additional page if necessary)

|                  |            |
|------------------|------------|
| <b>Subtotal:</b> | <b>\$0</b> |
|------------------|------------|

*Cost justifications. Describe exactly why each subcontractor is needed in this project (i.e., their role in the project). Describe, for each subcontractor, why the specified rate is reasonable or competitive. (Use additional page if necessary).*

**3. Equipment (Itemize)**

|    | Item | Cost |
|----|------|------|
| A. |      |      |
| B. |      |      |
| C. |      |      |
| D. |      |      |

|                  |            |
|------------------|------------|
| <b>Subtotal:</b> | <b>\$0</b> |
|------------------|------------|

*Cost justifications. Describe exactly why each listed equipment item is needed in this project, and why the cost is reasonable. (Use additional page if necessary). (Refer to Exhibit E, page 19)*

**4. Travel and Subsistence (Itemize). Use State Rates (Appendix IV). NO FOREIGN TRAVEL ALLOWED.**

|    | Description               | Cost    |
|----|---------------------------|---------|
| A. | Air transportation        | \$5,000 |
| B. | Ground transportation     | \$1,000 |
| C. | Per diem or subsistence   | \$1,500 |
| D. | Other (Lodging & Parking) | \$1,500 |

|                  |                |
|------------------|----------------|
| <b>Subtotal:</b> | <b>\$9,000</b> |
|------------------|----------------|

*Cost justifications. Describe the purpose and duration of each trip and explain why the travel is necessary. (Use additional page if necessary).*

**EXHIBIT B, Attachment 1  
 Interagency Agreement**

There will be five stakeholder workshops presented around the State of California for this effort. Each will require four to five team members to attend. This will include their air fare, ground transportation, hotel, and per diem. The estimate for this is approximately \$6,500 for three of the five workshops (another budget supported by Caltrans will cover the other two workshops). The remaining travel funds will be for in-state meetings (\$500) and one to two conferences to present results \$2,000.

**5. Electronic Data Processing (Itemize)**

| Description | Cost |
|-------------|------|
| A.          |      |
| B.          |      |
| C.          |      |
| D.          |      |

**Subtotal: \$0**

*Cost justifications. Explain the need for the expenditure and the basis for the costs.  
 (Use additional page if necessary).*

**6. Photocopying & Printing (Itemize)**

| Description of product             | Cost  |
|------------------------------------|-------|
| A. Research Communication copying  | \$450 |
| B. Research Communication printing | \$650 |

**Subtotal: \$1,100**

*Cost justifications. Explain the need for the expenditure and the basis for the costs.  
 (Use additional page if necessary).*

The printing and copying expenses are to support drafts of the white papers/reports and development of final report.

**7. Mail, Telephone & Fax (Itemize)**

| Item                                                      |  |
|-----------------------------------------------------------|--|
| A. Research Communication long distance & telephone calls |  |
| B. Research Communication faxing                          |  |
| C.                                                        |  |

**Subtotal:**

**EXHIBIT B, Attachment 1  
Interagency Agreement**

*Cost justifications. Explain the need for the expenditure and the basis for the costs.  
(Use additional page if necessary).*

Phone and fax expenses will be associated with workshops, stakeholder interviews, and other project communications.

**8. Materials & Supplies (Itemize)**

|    | Item                                                                | Cost  |
|----|---------------------------------------------------------------------|-------|
| A. | Research related software, office supplies, and other misc expenses | \$451 |
| B. |                                                                     |       |
| C. |                                                                     |       |
| D. |                                                                     |       |
| E. |                                                                     |       |
| F. |                                                                     |       |
| G. |                                                                     |       |
| H. |                                                                     |       |
| I. |                                                                     |       |

**Subtotal: \$451**

*Cost justifications. Describe exactly why each item listed above is needed in this project. Explain why the proposed cost is reasonable. (Use additional page if necessary).*

Software expenses are related to conducting project-end webinar are findings.

**9. Analyses (Itemize)**

|    | Description |
|----|-------------|
| A. |             |
| B. |             |
| C. |             |
| D. |             |
| E. |             |
| F. |             |
| G. |             |

**Subtotal:**

**EXHIBIT B: Attachment 1  
 Interagency Agreement**

Cost justifications. Describe the purpose of each different analysis and explain why it is needed in this project. Explain why the proposed rate is reasonable. (Use additional page if necessary)

**10. Miscellaneous (Itemize)**

| Item                                                 | Cost    |
|------------------------------------------------------|---------|
| A. GAEL Insurance                                    | \$493   |
| B. Workshop Catering (Tech Transfer)                 | \$5,625 |
| C. Workshop Materials (Tech Transfer)                | \$1,250 |
| D. Workshop Shipping (Tech Transfer)                 | \$450   |
| E. Workshop Supplies & Communication (Tech Transfer) | \$630   |
| <b>Subtotal: \$2,823 \$8,448</b>                     |         |

Cost justifications. Justify all costs not included in the categories above. Explain the need for the expenditure and the basis for the costs. (Use additional page if necessary)

Miscellaneous costs include insurance, catering for each of the three workshops covered by this budget, preparatory materials and mailing for each of the three workshops, and various supplies and phone expense for Tech Transfer in supporting the three workshops.

|                                                               |                        |
|---------------------------------------------------------------|------------------------|
| <b>Total Direct Costs (add subtotals for categories 1-10)</b> | \$484,904<br>\$176,276 |
|---------------------------------------------------------------|------------------------|

**II. Indirect Costs**

**11. Overhead and Other Indirect Costs**

|    | Base (Salaries, total direct costs, etc.) (\$) | Rate (%) | Cost                 |
|----|------------------------------------------------|----------|----------------------|
| A. | \$184,902.00 \$176,277.00                      | 10.00%   | \$48,189<br>\$17,628 |
| B. |                                                |          | \$0                  |
| C. |                                                |          | \$0                  |

|                  |                              |
|------------------|------------------------------|
| <b>Subtotal:</b> | <b>\$48,189<br/>\$17,628</b> |
|------------------|------------------------------|

|                             |                      |
|-----------------------------|----------------------|
| <b>Total Indirect Cost:</b> | \$48,189<br>\$17,628 |
|-----------------------------|----------------------|

**Total Project Cost: \$194,466 \$200,091**

INITIAL  
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INITIAL  
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**EXHIBIT D**  
**Interagency Agreement**

**SPECIAL TERMS AND CONDITIONS**

**1. Termination**

- A. This Agreement may be canceled at any time by either party, upon thirty (30) days written notice to the other party.
- B. In the case of early termination, the performing agency will submit an invoice in triplicate and a report in triplicate covering services to termination date, following the invoice and progress report requirements of this Agreement. A copy and description of any data collected up to termination date will also be provided to ARB.
- C. Upon receipt of the invoice, progress report, and data, a final payment will be made to the performing agency. This payment shall be for all ARB-approved, actually incurred costs in accordance with Exhibits A and B, and shall include labor, and materials purchased or utilized (including all noncancellable commitments) to termination date, and pro rata indirect costs as specified in the proposal budget.

**2. Disputes**

- A. ARB reserves the right to issue an order to stop work in the event that a dispute should arise, or in the event that the ARB gives the performing agency a notice that this Agreement will be terminated. The stop-work order will be in effect until the dispute has been resolved or this Agreement has been terminated.
- B. Any dispute concerning a question of fact arising under the terms of this Agreement which is not disposed of within a reasonable period of time by agency employees normally responsible for the administration of this agreement, shall be brought to the attention of the Executive Officer or designated representative of each agency for joint resolution.

**3. Amendments**

- ARB reserves the right to amend this agreement for additional time and/or additional funding.

**EXHIBIT E**  
**Interagency Agreement**

**ADDITIONAL PROVISIONS**

**1. Equipment Provisions**

- A. Equipment is defined as movable articles of nonexpendable property that meet the following requirements:
1. have a normal useful life (including extended life due to repairs) of at least one year;
  2. have a unit acquisition cost of at least \$5,000 for other than land and structures (for example, identical assets costing \$3,000 each for a \$12,000 total would not meet the requirements); and
  3. be used to conduct work under this contract, and/or
  4. any and all EDP equipment used to conduct work under this contract.
- B. The cost of equipment includes the purchase price plus all costs to acquire, install, and prepare equipment for its intended use.
- C. The ARB reserves the right to purchase total equipment whose cost is greater than \$25,000 and any and all EDP equipment for this contract, through the State procurement process. Contractor's proposed cost of this equipment will be deducted from the total amount payable to the Contractor. The equipment provided by ARB will be equivalent to Contractor's specifications, as described in Contractor's proposal.
- D. In the event Contractor purchases with ARB funds, procures, uses, or otherwise takes possession of equipment owned by ARB to perform work under this contract, title to such equipment shall remain with ARB and such equipment shall become ARB's equipment upon delivery thereof into the Contractor's control or possession.
- E. Contractor shall obtain written approval from ARB prior to the purchase of equipment that is not specifically identified and listed in the approved budget and which is valued at more than \$5,000. The contract funding shall be adjusted for any equipment or supplies furnished by ARB.
- F. ARB reserves the right to full and adequate access to ARB equipment.
- G. Contractor shall maintain and administer a program for the utilization, maintenance, repair, protection, and preservation of ARB equipment, whether acquired from the ARB or purchased with ARB funds from a third party, so as to assure its full availability and usefulness for performance of this contract or as long as this equipment remains in the control or possession of the Contractor.

## EXHIBIT E Interagency Agreement

The Contractor will install upon each item of equipment a tag identifying the equipment as belonging to the ARB and will maintain location records of all equipment. The Contractor shall take steps to comply with all appropriate directions or instructions that the ARB may prescribe for the protection of ARB equipment.

- H. Contractor shall provide to ARB, with the final invoice, a final equipment inventory. The final invoice shall contain an itemization of equipment purchased with ARB funds or procured through the State procurement process, including the type of equipment, manufacturer, serial number, and cost. All ARB equipment shall be returned to the ARB at ARB's expense in full operating condition upon termination of this contract, unless ARB approves a different disposition in writing. Disposition of the equipment shall be in accordance with the instructions from ARB, to be issued after receipt of the final inventory.

### 2. Reports and Data Compilations

- A. With respect to each invoice period, University shall forward to the ARB Contract Administrator, one (1) electronic copy of the progress report and mail one (1) copy of the progress report along with each invoice. (Do not use Express Mail). When emailing the progress report, the "subject line" should state the contract number and the billing period. Each progress report will begin with the following disclaimer:

*The statements and conclusions in this report are those of the University and not necessarily those of the California Air Resources Board. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products.*

- B. Each progress report will also include:

1. A brief narrative account of project tasks completed or partially completed since the last progress report;
2. A brief discussion of problems encountered during the reporting period and how they were or are proposed to be resolved;
3. A brief discussion of work planned, by project task, before the next progress report;
4. A graph or table showing allocation of the budget and amount used to date; and
5. A graph or table showing percent of work completion for each task.

**EXHIBIT E**  
**Interagency Agreement**

- C. If the project is behind schedule, the progress report must contain an explanation of reasons and how the University plans to resume the schedule.
- D. In accordance with Exhibit A, Attachment 1, University will deliver to ARB twenty (20) bound copies of a draft final report. The reports may be stapled or spiral bound, depending on size. The draft final report will conform to Exhibit F.
- E. Within thirty-days (30) days of receipt of ARB's comments on the draft Final Report (Exhibit F), University will deliver to ARB's Contract Manager two (2) copies of the Final Report incorporating all reasonable alterations and additions requested by ARB. Upon approval of the amended final report approved by ARB in accordance to Exhibit F, University will within two (2) weeks, deliver to ARB two (2) camera ready UNBOUND originals of a Final Report incorporating all final alterations and additions. The final report will conform to the Contract Final Report Format, Exhibit F.
- F. Together with the final report, University will deliver a copy of the report on diskette/CD, using any common word processing software (please specify the software used) and a set of all data compilations as specified by the ARB Contract Manager.
- G. University's obligation under this Agreement shall be deemed discharged only upon submittal to ARB of an acceptable final report in accordance to Exhibit F, report diskette/CD, all required data compilations, and any other project deliverables.
- H. Prior to completion of this Agreement, University shall be entitled to release or make available reports, information, or other data prepared or assembled by it pursuant to this Agreement, in scientific journals and other publications and at scientific meetings, provided however, that a copy of the publication be submitted to ARB for review and comment 30 days prior to such publication. Further, University shall place the disclaimer statement in a conspicuous place on all such reports or publications. Health related reports should include an acknowledgment to the late Dr. Friedman. Nothing in this provision shall be construed to limit the right of State to release information obtained from the University or to publish reports, information, or data in State publications.

**3. Copyrightable Materials**

In recognition of the policy of ARB and University to promote and safeguard free and open inquiry by faculty, students and the members of the public and in furtherance of such policy, both parties agree to the following with respect to rights in data and copyrights under this Agreement:

- A. The term "Subject Data" shall mean all original and raw research data, notes, computer programs, writings, sound recordings, pictorial reproductions, drawings

## **EXHIBIT E**

### **Interagency Agreement**

or other graphical representations, and works of any similar nature, produced by University in performance of this Agreement, but specifically excluding "Reports," as defined in this Agreement. Subject Data also excludes financial reports, cost analyses, and similar information incidental to contract administration.

- B. The term "Reports" shall have the meaning assigned to it in this Exhibit F of this Agreement.
- C. Ownership of all Subject Data and copyrights arising from Subject Data shall be vested in University while ownership of all Reports and copyrights arising from the Reports delivered under this Agreement shall be vested in ARB. University agrees to make available to the public for public benefit, to the extent the University shall have the legal right to do so, without license or fee, any scholarly articles which are published from the Subject Data.
- D. Nothing in this exhibit or Agreement shall be construed to limit the right of University faculty, students or staff to publish the Subject Data in the form of scholarly articles in academic journals nor to affect, abrogate or limit the right of University faculty, staff or students to make use of the Subject Data.

#### **4. Travel & Per Diem**

- A. Any reimbursement for necessary travel and per diem shall be at the University's approved travel rates.
- B. No foreign travel shall be reimbursed unless prior written authorization is obtained from ARB.

#### **5. Meetings**

- A. Initial meeting. Before work on the contract begins, the Principal Investigator and key personnel will meet with the ARB Contract Manager and other staff to discuss the overall plan, details of performing the tasks, the project schedule, items related to personnel or changes in personnel, and any issues that may need to be resolved before work can begin.
- B. Progress review meetings. The Principal Investigator and appropriate members of his or her staff will meet with ARB's Contract Manager at quarterly intervals to discuss the progress of the project. This meeting may be conducted by phone.

#### **6. Confidentiality**

- A. It is understood that in the course of carrying out this Agreement, State may wish to provide University with proprietary or confidential information of State (Proprietary Information). University agrees to use its best efforts to hold

## **EXHIBIT E**

### **Interagency Agreement**

proprietary information in confidence and shall return it to State upon the completion of the project.

- B. This obligation shall apply only to proprietary information that is designated or identified as such in writing by State prior to the disclosure thereof. All proprietary information shall be sent only to the Principal Investigator. Moreover, this obligation shall not apply to any proprietary information which: a) is or becomes publicly known through no wrongful or negligent act on the part of University; b) is already known to University at the time of disclosure; c) independently developed by University without breach of this agreement; or d) is generally disclosed to third parties by State without similar restrictions on such third parties.

#### **7. Studies Involving Human or Animal Subjects**

A copy of the Institutional Review Board (IRB) approval must be submitted to ARB upon receipt by the investigator.

#### **8. Patent Provisions**

These provisions apply only to non-state entity subcontractors that may be a part of this Agreement.

##### **A. Definitions**

1. "Invention" means any discovery or product of creative imagination, thought, mental synthesis, or purposeful experimentation conceived or first reduce to practice in the course of or under this Agreement. The term "invention" includes; but is not limited to, any art, method, process, device, machine, manufacture, design, or composition of matter, or any new and useful improvement or application thereof, or any variety of plant, that is or may be patentable under the patent laws of the United States of America.
2. "Agreement" means any legally enforceable agreement, covenant, compact grant, or other arrangement or subcontract setting forth terms and conditions to do or not to do something and entered into by or for the benefit of the State where a purpose of the agreement is the conduct of experimental, developmental, or research work.
3. "Subcontract" means an agreement under or subordinate to a previous or prime agreement, including this Agreement.
4. "Subcontractor" means an individual or firms that contract with Contractor to perform part or all of the prime Contractor's work under this Agreement.

**EXHIBIT E**  
**Interagency Agreement**

5. "To bring to the point of practical application" means to manufacture in the case of a composition or product, to practice in the case of a process, or to operate in the case of a machine, device, or system and, in each case, under such conditions as to establish that the invention is being worked, operated, or utilized, and that its benefits are reasonable accessible to the public.

**B. Rights Granted to the State**

Subcontractor agrees to grant to State all right, title, and interest in and to each invention discovered, conceived, or first reduced to practical application during performance of the Subcontract, subject to the reservation of a non-exclusive paid-up worldwide license to Subcontractor.

**C. Invention Disclosures and Reports**

With respect to each invention, Subcontractor shall furnish to ARB:

1. A written disclosure of each invention within six (6) months after conception or first actual reduction to practice, whichever occurs first under the Subcontract, sufficiently complete in technical detail to convey to one skilled in the art to which the invention pertains a clear understanding to the nature, purpose, and operation, and the physical, chemical, and electrical characteristics of the invention;
2. A final report listing all inventions, including all those previously disclosed, or certifying that there are no inventions prior to final payment under this Subcontract.
3. Information in writing, as soon as is practicable, of the date and identity of any public use, sale, or publication of any such invention made by or known to Subcontractor, or of any contemplated publication by Subcontractor;
4. Upon request, such duly executed instruments and other papers as deemed by ARB necessary to vest in State the rights granted it under this patent provision and to enable State to apply for and prosecute any patent application in any country covering such invention where State has the right under this patent provision to file such application; and
5. Upon request, an irrevocable power of attorney to inspect and make copies of any United States patent application filed by or on behalf of Subcontractor. This demand may also be made under subdivision 8.

**D. License Granted by Subcontractor to Others Subject to State's Rights**

Subcontractor recognizes that State may contract for property or services with respect to which the vendor may be liable to Subcontractor for royalties for the

**EXHIBIT E**  
**Interagency Agreement**

use of an invention on account of such a contract. Subcontractor further recognizes that it is the policy of State not to pay, in connection with its agreements, charges for use of patents in which the State holds title. In recognition of this policy, Subcontractor agrees to participate in and make appropriate arrangements for the exclusion of such charges from such agreements or for the refund of amounts received by Subcontractor with respect to any such charges not so excluded.

**E. Subcontracts**

1. Contractor shall, unless otherwise authorized or directed by State, include a patent rights clause containing all the terms of this patent provision in any Subcontract hereunder where the purpose of the subcontract is the conduct of experimental, developmental, or research work. In the event of refusal by a Subcontractor to accept this patent provision, Contractor:
  - (1) shall promptly submit a written report to the State setting forth the Subcontractor's reasons for such refusal or the reasons Contractor is of the opinion that the inclusion of this clause would be unacceptable, and other pertinent information that may expedite disposition of this matter; and
  - (2) shall not proceed with the Subcontract without the written authorization of State.
2. Contractor shall not, in any Subcontract or by using such a Subcontract as consideration thereof, acquire any rights to inventions for its own use (as distinguished from such rights as may be required solely to fulfill its agreement obligations to State in the performance of this Agreement).
3. Contractor, at the earliest practicable date, shall also notify State in writing of any Subcontract containing a patent rights clause, furnish to State a copy of such Subcontract, and notify State when such Subcontract is completed. It is understood that State is a third party beneficiary of any Subcontract clause granting rights to State in inventions, and Contractor hereby assigns to State all the rights that Contractor would have to enforce the Subcontractor's obligations for the benefit of State with respect to inventions. Contractor shall not be obligated to enforce the agreements of any Subcontractor to State with regard to inventions.

**F. Right to Disclose Inventions**

State may duplicate and disclose reports and disclosures of inventions required to be furnished by Subcontractor pursuant to this patent provision.

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**Interagency Agreement**

**G. Forfeiture of Rights in Unreported Inventions**

Subcontractor shall forfeit to State all rights in any invention which Subcontractor fails to report to State, at or prior to the time Subcontractor (1) files or causes to be filed a United States or foreign application thereon, or (2) submits the final report required by 3., B of this patent provision, whichever is later, provided that Subcontractor shall not forfeit rights in an invention if (a) contending that the invention is not an invention, it nevertheless reports the invention and all the facts pertinent to Subcontractor's contention to State, the time specified in 3. A above, or (b) Subcontractor establishes that the failure to report was due entirely to causes beyond Subcontractor's control and without Subcontractor's fault or negligence. Subcontractor shall be deemed to hold any such forfeited invention and the patent applications and patent pertaining thereto, in trust for State pending written assignment of the invention. The right accruing to State under this paragraph shall be in addition to and shall not supersede any other rights State may have in relation to unreported inventions.

**H. Examination of Records Relating to Inventions**

State shall, until the expiration of three years after final payment under this Agreement, have the right to examine any books, records, documents, and other supporting data of Subcontractor that State shall reasonably deem directly pertinent to the discovery or identification of inventions or to compliance by Subcontractor with the requirements of this patent provision.

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### FINAL REPORT FORMAT

The Final Report is a record of the project and its results, and is used in several ways. Therefore, the Report must be well organized and contain certain specific information.

**Note:** In partial fulfillment of the Final Report requirements, the Contractor shall submit a copy of the Report on a CD in PDF format and in a word-processing format, preferably in Word - Version 6.0 or later. This is in addition to the submission of any paper copies required. The diskette shall be clearly labeled with the contract title, ARB contract number, the words "Final Report", and the date the report was submitted.

**Legibility.** Each page of the approved Final Report must be legible and camera-ready.

**Binding.** The draft Report, including its appendices, must be either spiral bound or stapled, depending on size. The revised Report and its appendices should be spiral bound, except for two unbound, camera-ready originals.

**Cover.** Do not supply a cover for the Report. The ARB will provide its standard cover.

**One-sided vs. two-sided.** To conserve paper, both the draft Report and the revised Report, except for the unbound camera-ready copies, should be printed on both sides of the page. The unbound camera-ready copies must be printed on only one side of the page.

**Title.** The title of the Report should exactly duplicate the title of the contract unless a change is approved in writing by the contract manager.

**Spacing.** In order to conserve paper, copying costs, and postage, please use single or one-line (1) spacing.

**Page size.** All pages should be of standard size (8 ½" x 11") to allow for photo-reproduction.

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*Large tables or figures.* Foldout or photo-reduced tables or figures are not acceptable because they cannot be readily reproduced. Large tables and figures should be presented on consecutive 8 1/2" x 11" pages, each page containing one portion of the larger chart.

*Color.* Color presentations are not acceptable; printing shall be black on white only.

*Corporate identification.* Do not include corporate identification on any page of the Final Report, except the title page.

*Unit notation.* Measurements in the Reports should be expressed in metric units. However, for the convenience of engineers and other scientists accustomed to using the British system, values may be given in British units as well in parentheses after the value in metric units. The expression of measurements in both systems is especially encouraged for engineering reports.

*Section order.* The Report should contain the following sections, in the order listed below:

- Title page
- Disclaimer
- Acknowledgment (1)
- Acknowledgment (2)
- Table of Contents
- List of Figures
- List of Tables
- Abstract
- Executive Summary
- Body of Report
- References
- List of inventions reported and copyrighted materials produced
- Glossary of Terms, Abbreviations, and Symbols
- Appendices

*Page numbering.* Beginning with the body of the Report, pages shall be numbered consecutively beginning with "1", including all appendices and attachments. Pages preceding the body of the Report shall be numbered consecutively, in ascending order, with small Roman numerals.

*Title page.* The title page should include, at a minimum, the contract number, contract title, name of the principal investigator, contractor organization, date, and this statement: "Prepared for the California Air Resources Board and the California Environmental Protection Agency"

## EXHIBIT F Interagency Agreement

*Disclaimer.* A page dedicated to this statement must follow the Title Page:

The statements and conclusions in this Report are those of the contractor and not necessarily those of the California Air Resources Board. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products.

*Acknowledgment (1).* Only this section should contain acknowledgments of key personnel and organizations who were associated with the project. The last paragraph of the acknowledgments must read as follows:

This Report was submitted in fulfillment of [ARB contract number and project title] by [contractor organization] under the [partial] sponsorship of the California Air Resources Board. Work was completed as of [date].

*Acknowledgment (2).* Health reports should include an acknowledgment to the late Dr. Friedman. Reports should include the following paragraph:

This project is funded under the ARB's Dr. William F. Friedman Health Research Program. During Dr. Friedman's tenure on the Board, he played a major role in guiding ARB's health research program. His commitment to the citizens of California was evident through his personal and professional interest in the Board's health research, especially in studies related to children's health. The Board is sincerely grateful for all of Dr. Friedman's personal and professional contributions to the State of California.

*Table of Contents.* This should list all the sections, chapters, and appendices, together with their page numbers. Check for completeness and correct reference to pages in the Report.

*List of Figures.* This list is optional if there are fewer than five illustrations.

*List of Tables.* This list is optional if there are fewer than five tables.

*Abstract.* The abstract should tell the reader, in nontechnical terms, the purpose and scope of the work undertaken, describe the work performed, and present the results obtained and conclusions. The purpose of the abstract is to provide the reader with useful information and a means of determining whether the complete document should be obtained for study. The length of the abstract should be no more than about 200 words. Only those concepts that are addressed in the executive summary should be included in the abstract.

Example of an abstract:

A recently developed ground-based instrument, employing light detecting and ranging (lidar) technology, was evaluated and found to accurately measure ozone

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concentrations at altitudes of up to 3,000 meters. The novel approach used in this study provides true vertical distributions of ozone concentrations aloft and better temporal coverage of these distributions than other, more common methods, such as those using aircraft and ozonesonde (balloon) techniques. The ozone and aerosol measurements from this study, in conjunction with temperature and wind measurements, will provide a better characterization of atmospheric conditions aloft and the processes involved in the formation of unhealthy ozone concentrations than can be achieved with traditional ground-based monitors.

*Executive Summary.* The function of the executive summary is to inform the reader about the important aspects of the work that was done, permitting the reader to understand the research without reading the entire Report. It should state the objectives of the research and briefly describe the experimental methodology[ies] used, results, conclusions, and recommendations for further study. All of the concepts brought out in the abstract should be expanded upon in the Executive Summary. Conversely, the Executive Summary should not contain concepts that are not expanded upon in the body of the Report.

The Executive Summary will be used in several applications as written; therefore, please observe the style considerations discussed below.

Limit the Executive Summary to two pages, single spaced.

Use narrative form. Use a style and vocabulary level comparable to that in Scientific American or the New York Times.

Do not list contract tasks in lieu of discussing the methodology.

Discuss the results rather than listing them.

Avoid jargon.

Define technical terms.

Use passive voice if active voice is awkward.

Avoid the temptation to lump separate topics together in one sentence to cut down on length.

The Executive Summary should contain four sections: Background, Methods, Results, and Conclusions, described below.

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**THE BACKGROUND SECTION.** For the Background, provide a one-paragraph discussion of the reasons the research was needed. Relate the research to the Board's regulatory functions, such as establishing ambient air quality standards for the protection of human health, crops, and ecosystems; the improvement and updating of emissions inventories; and the development of air pollution control strategies.

**THE METHODS SECTION.** At the beginning of the Methods section, state what was done in general, in one or two sentences.

The methodology should be described in general, nontechnical terms, unless the purpose of the research was to develop a new methodology or demonstrate a new apparatus or technique. Even in those cases, technical aspects of the methodology should be kept to the minimum necessary for understanding the project. Use terminology with which the reader is likely to be familiar. If it is necessary to use technical terms, define them. Details, such as names of manufacturers and statistical analysis techniques, should be omitted.

Specify when and where the study was performed, if it is important in interpreting the results.

The findings should not be mentioned in the Methods section.

**THE RESULTS SECTION.** The Results section should be a single paragraph in which the main findings are cited and their significance briefly discussed. The results should be presented as a narrative, not a list. This section must include a discussion of the implications of the work for the Board's relevant regulatory programs.

**THE CONCLUSIONS SECTION.** The Conclusions section should be a single short paragraph in which the results are related to the background, objectives, and methods. Again, this should be presented as a narrative rather than a list. Include a short discussion of recommendations for further study, adhering to the guidelines for the Recommendations section in the body of the Report.

*Body of Report.* The body of the Report should contain the details of the research, divided into the following sections:

**INTRODUCTION.** Clearly identify the scope and purpose of the project. Provide a general background of the project. Explicitly state the assumptions of the study.

Clearly describe the hypothesis or problem the research was designed to address. Discuss previous related work and provide a brief review of the relevant literature on the topic.

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**MATERIALS AND METHODS.** Describe the various phases of the project, the theoretical approach to the solution of the problem being addressed, and limitations to the work. Describe the design and construction phases of the project, materials, equipment, instrumentation, and methodology. Describe quality assurance and quality control procedures used. Describe the experimental or evaluation phase of the project

**RESULTS.** Present the results in an orderly and coherent sequence. Describe statistical procedures used and their assumptions. Discuss information presented in tables, figures and graphs. The titles and heading of tables, graphs, and figures, should be understandable without reference to the text. Include all necessary explanatory footnotes. Clearly indicate the measurement units used.

**DISCUSSION.** Interpret the data in the context of the original hypothesis or problem. Does the data support the hypothesis or provide solutions to the research problem? If appropriate, discuss how the results compare to data from similar or related studies. What are the implications of the findings? Identify innovations or development of new techniques or processes. If appropriate, discuss cost projections and economic analyses.

**SUMMARY AND CONCLUSIONS.** This is the most important part of the Report because it is the section that will probably be read most frequently. This section should begin with a clear, concise statement of what, why, and how the project was done. Major results and conclusions of the study should then be presented, using clear, concise statements. Make sure the conclusions reached are fully supported by the results of the study. Do not overstate or overinterpret the results. It may be useful to itemize primary results and conclusions. A simple table or graph may be used to illustrate.

**RECOMMENDATIONS.** Use clear, concise statements to recommend (if appropriate) future research that is a reasonable progression of the study and can be supported by the results and discussion.

*References.* Use a consistent style to fully cite work referenced throughout the Report and references to closely related work, background material, and publications that offer additional information on aspects of the work. Please list these together in a separate section, following the body of the Report. If the Report is lengthy, you may list the references at the end of each chapter.

*List of inventions reported and publications produced.* If any inventions have been reported, or publications or pending publications have been produced as a result of the project, the titles, authors, journals or magazines, and identifying numbers that will assist in locating such information should be included in this section.

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*Glossary of terms, abbreviations, and symbols.* When more than five of these items are used in the text of the Report, prepare a complete listing with explanations and definitions. It is expected that every abbreviation and symbol will be written out at its first appearance in the Report, with the abbreviation or symbol following in parentheses [i.e., carbon dioxide (CO<sub>2</sub>)]. Symbols listed in table and figure legends need not be listed in the Glossary.

*Appendices.* Related or additional material that is too bulky or detailed to include within the discussion portion of the Report shall be placed in appendices. If a Report has only one appendix, it should be entitled "APPENDIX". If a Report has more than one appendix, each should be designated with a capital letter (APPENDIX A, APPENDIX B). If the appendices are too large for inclusion in the Report, they should be collated, following the binding requirements for the Report, as a separate document. The contract manager will determine whether appendices are to be included in the Report or treated separately. Page numbers of appendices included in the Report should continue the page numbering of the Report body. Pages of separated appendices should be numbered consecutively, beginning at "1".