APPENDIX A - SMAQMD ROAD CONSTRUCTION EMISSION MODEL, VERSION 5.1 DATA INPUTS

METHODOLOGY - INTERNATIONAL DRIVE EXTENSION PROJECT ROADWAY CONSTRUCTION EMISSIONS ANALYSIS

The International Drive Extension-Kilgore to Sunrise Project will be composed of three separate components: roadway widening, new roadway construction, and bridge construction. It is anticipated that each project component will begin construction concurrently and will reach completion at different times, each varying by approximately one month.

The emission estimates below were calculated using the Roadway Construction Emissions Model (version 5.2). Because the International Drive Extension Project is composed of three parts with varying construction periods, the analysis was broken down into three parts: **Months 1-4**, **Month 5**, and **Month 6**. Input information was overridden on Models 2-6 to ensure that the generated emission estimates pertained only to the portions overlapping with others within the same time period. The project analyses below assume that all construction begins at the same time.

SUMMARY OF MODELS	
Model 1	months 1-4 road widening
Model 2	months 1-4 new roadway
Model 3	months 1-4 bridge construction
Model 4	month 5 new roadway
Model 5	month 5 bridge construction
Model 6	month 6 bridge construction

Months 1-4

During the first four months of the project, all three project components are anticipated to be under construction concurrently. Below is a description of each component during this time frame.

Road Widening

Road widening for the proposed project is anticipated to last approximately 4 months. For the analysis, all items were entered as will be performed and no user overriding of the construction period was done in the model. The outputs projected in the model were then entered into **Model 1** and later combined into **'Months 1-4'**.

Emission Estimates for ->Model 1 – Months 1-4 of Road Widening					Exhaust	Fugitive Dust
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)
Grubbing/Land Clearing	8	40	42	7	2	5
Grading/Excavation	8	45	48	7	2	5
Drainage/Utilities/Sub-Grade	8	45	45	7	3	5
Paving	3	15	21	1	1	0
Maximum (pounds/day)	8	45	48	7	3	5
Total (tons/construction project)	0.33	1.55	2.06	0.10	0.10	0.00

Notes: *Project Start Year-2007*
Project Length (months)-4
Total Project Area (acres)-3.9
Maximum Area Disturbed/Day (acres)-0.98
Total Soil Imported/Exported (yd3/day)-116

New Roadway

New roadway construction is anticipated to last approximately 5 months. For the analysis, the true expected time for completion was entered, however user override of construction months were entered into the model in order to project the anticipated emissions for the first four months of construction. The first four months of new roadway construction would include 0.5 months of grubbing/land clearing, 2.25 months of grading/excavation, and 1.25 months of drainage/ utility/sub-grade work. The outputs projected in the model were then entered into **Model 2** and later combined into '**Months 1-4**'. The remaining emissions calculated for the additional month necessary to complete the new roadway construction portion of the project is entered into **Model 4** and analyzed in **"Month 5'**.

Emission Estimates for ->Model 2 – Months 1-4 of New Roadway Construction					Exhaust PM10	Fugitive Dust
Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**(lbs/day)**	**PM10 (lbs/day)**
Grubbing/Land Clearing	7	39	42	8	2	6
Grading/Excavation	8	42	45	9	2	6
Drainage/Utilities/Sub-Grade	8	44	45	9	3	6
Paving	0	3	0	0	0	0
Maximum (pounds/day)	8	44	45	9	3	6
Total (tons/construction project)	0.35	1.67	2.15	0.38	0.11	0.28

Notes: *Project Start Year-2007*
Project Length (months)-Months 1-4 of 5
Total Project Area (acres)-5.09
Maximum Area Disturbed/Day (acres)-1.26
Total Soil Imported/Exported (yd3/day)-33

Bridge Construction

Bridge construction is anticipated to last approximately 6 months. For the analysis, the true expected time for completion was entered into the model, however user override of construction months were entered into the model in order to project the anticipated emissions for the first four months of construction. The first four months of construction would include 0.6 months of grubbing/land clearing, 2.7 months of grading/excavation, and 0.7 months of drainage/ utility/sub-grade work. The outputs projected in the model were then entered into **Model 3** and later combined into **'Months 1-4'**. The remaining two months necessary to complete the bridge construction portion of the project are entered separately into **Model 4** and **Model 5** and analyzed in **Month 5** and **Month 6**.

Emission Estimates for ->Model 3 – Months 1-4 of Bridge Construction					Exhaust	Fugitive Dust
Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**
Grubbing/Land Clearing	7	38	41	3	2	1
Grading/Excavation	8	40	43	3	2	1
Drainage/Utilities/Sub-Grade	8	43	45	3	3	1

Paving	0	3	0	0	0	0
Maximum (pounds/day)	8	43	45	3	3	1
Total (tons/construction project)	0.35	1.61	2.08	0.13	0.10	0.03

Notes: *Project Start Year-2007*
Project Length (months)-Months 1-4 of 6
Total Project Area (acres)-.25
Maximum Area Disturbed/Day (acres)-0.06
Total Soil Imported/Exported (yd3/day)-0

Months 1-4 Analysis

The estimated construction emissions for the first four months of the International Drive Extension Project were calculated above and then added together to get the total estimated construction emissions for the time in which the three project components would be under construction concurrently. The SMAQMD threshold for short-term construction NOx emissions is 85 lb/day. The first four months of the proposed project would emit approximately 138 lb/day, thus exceeding the threshold by 53 lb/day.

Emission Estimates for ->Months 1-4 – Total Emissions					**Exhaust**	**Fugitive Dust**
Project Phases	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**
Grubbing/Land Clearing	22	117	125	18	6	12
Grading/Excavation	24	127	136	19	6	12
Drainage/Utilities/Sub-Grade	24	132	135	19	9	12
Paving	3	21	21	1	1	0
Maximum (pounds/day)	24	132	*138	19	9	12
Total (tons/construction project)	1.10	5.01	6.29	.35	.33	.02

Notes: *Project Start Year-2007*
Project Length (months)-Months 1-4 of 6 total
Total Project Area (acres)-3.9+5.05+0..25=9.2
Maximum Area Disturbed/Day (acres)-0.08+0.07+0.003=0.15
Total Soil Imported/Exported (yd3/day)-116+33+0=149
** Maximum lb/day is based on the highest actual emissions estimated to be released at one time, per Models 1-3.*

Mitigation:

Because the first four months of construction would result in emissions that exceed the SMAQMD threshold of 85 lb/day, the SMAQMD Standard Construction Mitigation would be applied to the project, which would result in a 20% reduction in daily emissions of NOx. After mitigation, the project's daily NOx emissions would be reduced to 110 lb/day, which is still above the 85 lb/day SMAQMD threshold.

To further reduce the project's impacts to less than the SMAQMD threshold of 8
5 lb/day, the project will contribute mitigation fees, as calculated by the SMAQMD Construction Emissions Mitigation Fee Calculator.

Month 5

During the fifth month of the project, the roadway widening portion of the project would be completed, leaving only two project components under construction at the same time. Below is a description of these two project components during this time frame.

New Roadway

New roadway construction is anticipated to last approximately 5 months. For the analysis, the true expected time for completion was entered; however user override of construction months were entered into the model in order to project the anticipated emissions for the last month of construction. The fifth and final month of new roadway construction would include 0.25 months of drainage/ utility/sub-grade work and 0.75 months of paving. The outputs projected in the model were then entered into **Model 4** and later combined into '**Month 5**'.

Emission Estimates for ->Model 4 – Month 4 New Roadway					Exhaust	Fugitive Dust
Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**
Grubbing/Land Clearing	0	2	1	6	0	6
Grading/Excavation	0	4	1	6	0	6
Drainage/Utilities/Sub-Grade	8	43	45	9	3	6
Paving	2	13	21	1	1	0
Maximum (pounds/day)	8	43	45	9	3	6
Total (tons/construction project)	0.05	0.20	0.42	0.03	0.02	0.02

Notes: Project Start Year ->2007
Project Length (months) ->Month 5 of 5
Total Project Area (acres) ->5.05
Maximum Area Disturbed/Day (acres) ->1.26
Total Soil Imported/Exported (yd^3/day)->33

Bridge Construction

Bridge construction is anticipated to last approximately 6 months. For the analysis, the true expected time for completion was entered into the model, however user override of construction months was entered into the model in order to project the anticipated emissions for the fifth month of construction. The fifth month of construction would consist entirely of drainage/ utility/sub-grade work. The outputs projected in the model were then entered into **Model 5** and later combined into **'Months 5'**. The remaining month necessary to complete the bridge construction portion of the project is entered separately into **Model 6** and analyzed in **'Month 6'**.

Emission Estimates for ->Model 5 – Month 5 Bridge Construction					Exhaust	Fugitive Dust
Project Phases (English Units)	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**
Grubbing/Land Clearing	0	1	0	1	0	1
Grading/Excavation	0	3	0	1	0	1
Drainage/Utilities/Sub-Grade	8	42	45	3	3	1
Paving	0	2	0	0	0	0
Maximum (pounds/day)	8	42	45	3	3	1
Total (tons/construction project)	0.10	0.43	0.64	0.04	0.03	0.01

Notes: Project Start Year ->2007
Project Length (months) ->Month 5 of 6
Total Project Area (acres) ->.25
Maximum Area Disturbed/Day (acres) ->.06
Total Soil Imported/Exported (yd^3/day)->0

Month 5 Analysis

The estimated construction emissions for the fifth month of the International Drive Extension Project were calculated above and then added together to get the total estimated construction emissions for the time in which the remaining two project components will be under construction

concurrently. The SMAQMD threshold for short-term construction NOx emissions is 85 lb/day. The fifth month of the proposed project would emit approximately 90 lb/day, thus exceeding the threshold by 5 lb/day.

Emission Estimates for ->Month 5 – Total Emissions						
Project Phases	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)
Grubbing/Land Clearing	0	3	1	7	0	7
Grading/Excavation	0	7	1	7	0	7
Drainage/Utilities/Sub-Grade	16	85	90	12	6	7
Paving	2	15	21	1	1	0
Maximum (pounds/day)	16	85	90	12	6	7
Total (tons/construction project)	.15	0.63	1.06	0.07	.05	0.03

Notes: Project Start Year ->2007

Project Length (months) ->Month 5 of 6

Total Project Area (acres) ->5.05+0.25=5.3

Maximum Area Disturbed/Day (acres) ->1.26+0.06=1.32

Total Soil Imported/Exported (yd^3/day)->33+0=33

Mitigation

Because the fifth month of construction would result in emissions that exceed the SMAQMD threshold of 85 lb/day, the SMAQMD Standard Construction Mitigation would be applied to the project, which would result in a 20% reduction in daily emissions of NOx. After mitigation, the project's daily NOx emissions would be reduced to 72 lb/day, which is less than the 85 lb/day SMAQMD threshold. Therefore, no mitigation fees are necessary for the fifth month.

Month 6

During the sixth month of the project, because the Roadway Widening and New Roadway construction components would be completed, only one project component is anticipated to be under construction. Below is a description of this project component during this time frame.

Bridge Construction

Bridge construction is anticipated to last approximately 6 months. For the analysis, the true expected time for completion was entered into the model; however overriding features were used in order to project the anticipated emissions for the sixth and final month of construction. The sixth month of construction would include 0.1 month of drainage/utility/sub-grade work and 0.9 months of paving. Because only one project component would be under construction during the last month, a **Model 6**, which is identical to **'Month 6'** is not included as a separate table. Instead, the outputs projected in the model are shown below as **'Month 6'**.

Month 6 Analysis

The total estimated construction emissions for the sixth month of the International Drive Extension Project were calculated to emit approximately 45 lb/day of NOx, and thus would not

exceed the SMAQMD threshold of 85 lb/day. Therefore, no mitigation fees are necessary for the sixth month.

Emission Estimates for -> Month 6 – Total Emissions					Exhaust	Fugitive Dust
Project Phases	**ROG (lbs/day)**	**CO (lbs/day)**	**NOx (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**	**PM10 (lbs/day)**
Grubbing/Land Clearing	0	1	0	1	0	1
Grading/Excavation	0	3	0	1	0	1
Drainage/Utilities/Sub-Grade	8	42	45	3	3	1
Paving	2	13	21	1	1	0
Maximum (pounds/day)	8	42	45	3	3	1
Total (tons/construction project)	0.04	0.15	0.37	0.01	0.01	0.00

Notes: Project Start Year ->2007
Project Length (months) ->Month 6 of 6
Total Project Area (acres) ->.25
Maximum Area Disturbed/Day (acres) ->.06
Total Soil Imported/Exported (yd^3/day)->0

Road Construction Emissions Model – Model #1

Version 5.2

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a
yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C28.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type					
Project Name	International Drive Extension from Kilgore to Sunrise				
Construction Start Year	2007	Enter a Year between 2000 and 2010 inclusive			
Project Type	2	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction			
Project Construction Time	4	months			
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock			
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 2. Emfac7G 3. Emfac2001	4. Emfac2002 (default)	or User Override	(for program calculated)
Project Length	0.93	miles			
Total Project Area	4	acres		Months	% Time
Maximum Area Disturbed/Day	0	acres		0.4	10
Water Trucks Used?	1	1. Yes 2. No			
Soil Imported	0	yd^3/day		1.8	45
Soil Exported	116	yd^3/day		1.2	30
Average Truck Capacity	20	yd^3 (assume 20 if unknown)		0.6	15

Road Construction Emissions Model– Model #2

Version 5.2

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C28.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	International Drive Extension from Kilgore to Sunrise			
Construction Start Year	2007	Enter a Year between 2000 and 2010 inclusive		
Project Type	1	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction		
Project Construction Time	5	months		
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock		
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 2. Emfac7G 3. Emfac2001	4. Emfac2002 (default)	
Project Length	0.27	miles		
Total Project Area	5	acres	Months	% Time
Maximum Area Disturbed/Day	0	acres	0.5	10
Water Trucks Used?	1	1. Yes 2. No		
Soil Imported	33	yd^3/day	2.3	45
Soil Exported	0	yd^3/day	1.3	30
Average Truck Capacity	20	yd^3 (assume 20 if unknown)	0.8	15

or User Override

(for program calculated)

Road Construction Emissions Model– Model #3

Data Entry Worksheet

Version 5.2

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C28.

Input Type

Project Name	International Drive Extension from Kilgore to Sunrise			
Construction Start Year	2007	Enter a Year between 2000 and 2010 inclusive		
Project Type	3	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction		
Project Construction Time	6	months		
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock		
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 4. Emfac2002 (default) 2. Emfac7G 3. Emfac2001	or User Override	(for program calculated)
Project Length	0.03	miles		
Total Project Area	0	acres	Months	% Time
Maximum Area Disturbed/Day	0	acres	0.6	10
Water Trucks Used?	2	1. Yes 2. No		
Soil Imported	0	yd^3/day	2.7	45
Soil Exported	0	yd^3/day	0.7	30
Average Truck Capacity	20	yd^3 (assume 20 if unknown)	0.9	15

Road Construction Emissions Model– Model #4

Data Entry Worksheet

Version 5.2

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C28.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type					
Project Name	International Drive Extension from Kilgore to Sunrise				
Construction Start Year	2007	Enter a Year between 2000 and 2010 inclusive			
Project Type	1	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction			
Project Construction Time	5	months			
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock			
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 2. Emfac7G 3. Emfac2001	4. Emfac2002 (default)	or User Override	(for program calculated)
Project Length	0.27	miles			
Total Project Area	5	acres		Months	% Time
Maximum Area Disturbed/Day	0	acres		0.5	10
Water Trucks Used?	1	1. Yes 2. No			
Soil Imported	33	yd^3/day		2.3	45
Soil Exported	0	yd^3/day		0.3	30
Average Truck Capacity	20	yd^3 (assume 20 if unknown)		0.8	15

Road Construction Emissions Model– Model #5

Data Entry Worksheet

Version 5.2

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C28.

Input Type

Project Name	International Drive Extension from Kilgore to Sunrise			
Construction Start Year	2007	Enter a Year between 2000 and 2010 inclusive		
Project Type	3	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction		
Project Construction Time	6	months		
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock		
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 2. Emfac7G 3. Emfac2001	4. Emfac2002 (default)	
			or User Override	(for program calculated
Project Length	0.03	miles		
Total Project Area	0	acres	Months	% Time
Maximum Area Disturbed/Day	0	acres	0.6	10
Water Trucks Used?	2	1. Yes 2. No		
Soil Imported	0	yd^3/day	2.7	45
Soil Exported	0	yd^3/day	1.0	30
Average Truck Capacity	20	yd^3 (assume 20 if unknown)	0.9	15

Road Construction Emissions Model– Model #6

Version 5.2

Data Entry Worksheet

Note: Required data input sections have a yellow background.
Optional data input sections have a blue background. Only areas with a yellow or blue background can be modified. Program defaults have a white background.
The user is required to enter information in cells C10 through C28.

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Input Type

Project Name	International Drive Extension from Kilgore to Sunrise			
Construction Start Year	2007	Enter a Year between 2000 and 2010 inclusive		
Project Type	3	1 New Road Construction 2 Road Widening 3 Bridge/Overpass Construction		
Project Construction Time	6	months		
Predominate Soil/Site Type: Enter 1, 2, or 3	2	1. Sand Gravel 2. Weathered Rock-Earth 3. Blasted Rock		
On-Road Emission Factors: Enter 1, 2, 3, or 4	4	1. Emfac7fv1.1 2. Emfac7G 3. Emfac2001	4. Emfac2002 (default)	
			or User Override	(for program calculated
Project Length	0.03	miles		
Total Project Area	0	acres	Months	% Time
Maximum Area Disturbed/Day	0	acres	0.6	10
Water Trucks Used?	2	1. Yes 2. No		
Soil Imported	0	yd^3/day	2.7	45
Soil Exported	0	yd^3/day	0.1	30
Average Truck Capacity	20	yd^3 (assume 20 if unknown)	0.9	15

Construction Emissons Mitigation Fee Calculation

PART 1: PROJECT INFORMATION

Project Name:	International Drive Extension Project		
Control/Application #:			
Single Family Dwelling Units:	N/A	*Note: Enter information only in blue bordered cells*	
Multi Family Dwelling Units:	N/A	Total Residential Acreage:	0
Non-residential Square Feet:	N/A	Total Non-residential Acreage:	5

PART 2: EMISSIONS INFORMATION

Year	Activity Phase	NOx (lbs/day) unmitigated	NOx (lbs/day) mitigated*	NOx over threshold (lbs/day)	duration (days)	Total significant NOx (lbs)
	Month 1	138.00	110.40	25.40	22	558.80
	Month 2	138.00	110.40	25.40	22	558.80
	Month 3	138.00	110.40	25.40	22	558.80
	Month 4	138.00	110.40	25.40	22	558.80
	Month 5	90.00	72.00	0	22	0.00
	Month 6	45.00	36.00	0	22	0.00
	Total project Nox over threshold (lbs)		*2235.20*			
	Total project Nox over threshold (tons)		*1.12*			

PART 3: MITIGATION FEE RESULTS

*MITIGATION FEE ($14,300/TON)***	*$15,982*
ADMINISTRATIVE FEE (5.0%)	*$799*
TOTAL FEE	***$16,781***

>>> *Fee is to be paid to the SMAQMD, either in total or on a by acre basis, prior to any ground disturbance.*

Mitigation Fee ($/acre)	**$3,196.34**

* Assumes a construction mitigation plan which achieves a 20% reduction in NOx from on-site, off-road equipment.

** Or the $/ton of NOx cost-effectiveness value in effect at the time the fee is collected.