Memorandum

ARUP

To	Jennifer Gallerani, Circlepoint	Date	March 2, 2012
Copies	John Cook, Circlepoint	Reference number	208838
From	Michael V. Iswalt (415-946-0748)	File reference	4-05
Subject	Traffic Forecasts for Central Estuary Implementation Guide EIR Air/Noise Analysis		

Arup has completed the traffic forecasting required for the air and noise analysis for the Central Estuary Implementation Guide (CEIG) Environmental Impact Report (EIR). This memorandum provides a summary of the traffic data.

The following data have been requested:

- Daily vehicle trip generation rate for each land use type
- Daily vehicle-miles traveled (VMT)
- Vehicle classification splits for the VMT and/or trip generation rates
- AADT and AM/PM peak hour directional volumes for each modeled roadway segment
- Map showing truck routes

Each of these items is addressed below. The traffic count data were collected during March 2009, when the Central Estuary project originally started. The City has determined that these counts are still appropriate for use in the EIR. Subsequent counts and a review of freeway volumes indicate that traffic volumes have not increased since the counts were collected.

For the purposes of the CEIG EIR, the "Project" consists of the land use/zoning changes identified in the *Notice of Preparation (NOP)* (City of Oakland, November 21, 2011). These changes are summarized for each sub-area in the "reasonably foreseeable" growth column in "Table C: Estimated Foreseeable Growth" of the NOP.

Trip Generation

Table 1 presents the estimated vehicle trip generation for the Project. The trip generation was calculated based on the "reasonably foreseeable" growth presented in Table C of the NOP. The vehicle trip estimate is based on trip rates published in *Trip Generation, 8th Edition* (Institute of Transportation Engineers (ITE), 2011). Table 1 presents the land use classifications, ITE Codes, quantities (i.e., "foreseeable growth" increment"), and the AM/PM peak hour and daily trip rates. ITE Codes 220 – "Apartment", 110 – "Light Industrial", 720 – "General Office", and 820 – "Shopping Center", were assumed in the estimate.

The estimated trip generation for each of the four sub-areas is shown, along with the reductions for "pass-by" trips (this affects the retail land uses only) and internal "non-auto" trip making.

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Table 1 – CEIG Vehicle Trip Generation

Zone 3598 - West							AM Peak			PM Peak			Daily		
Land Use	**ITE Code**	**Units**	**Quantity**	**AM Rate**	**PM Rate**	**Daily Rate**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Residential	220	du	0	0.51	0.62	6.65	0	0	0	0	0	0	0	0	0
Live/Work	220	du	11	0.51	0.62	6.65	1	4	6	4	2	7	37	37	73
Industrial	110	ksf	0	0.92	0.97	6.97	0	0	0	0	0	0	0	0	0
Retail	820	ksf	0	1	3.73	42.94	0	0	0	0	0	0	0	0	0
Office	710	ksf	83,713	1.55	1.49	11.01	114	16	130	21	104	125	461	461	922
					5% Pass-By Reduction		*0*	*0*	0	*0*	*0*	0	*0*	*0*	0
					% Internal Trip Capture		*23*	*4*	27	*5*	*21*	26	*99*	*99*	199
						Subtotal	**92**	**16**	**108**	**21**	**85**	**105**	**398**	**398**	**796**
Zone 3599 - Central West							**AM Peak**			**PM Peak**			**Daily**		
Land Use	**ITE Code**	**Units**	**Quantity**	**AM Rate**	**PM Rate**	**Daily Rate**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Residential	220	du	391	0.51	0.62	6.65	40	160	199	158	85	242	1,300	1,300	2,600
Live/Work	220	du	20	0.51	0.62	6.65	2	8	10	8	4	12	67	67	133
Industrial	110	ksf	0	0.92	0.97	6.97	0	0	0	0	0	0	0	0	0
Retail	820	ksf	0	1	3.73	42.94	0	0	0	0	0	0	0	0	0
Office	710	ksf	0	1.55	1.49	11.01	0	0	0	0	0	0	0	0	0
					5% Pass-By Reduction		*0*	*0*	0	*0*	*0*	0	*0*	*0*	0
					% Internal Trip Capture		*8*	*34*	42	*33*	*18*	51	*273*	*273*	547
						Subtotal	**34**	**134**	**168**	**133**	**71**	**204**	**1,093**	**1,093**	**2,187**
Zone 3600 - Central East							**AM Peak**			**PM Peak**			**Daily**		
Land Use	**ITE Code**	**Units**	**Quantity**	**AM Rate**	**PM Rate**	**Daily Rate**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Residential	220	du	0	0.51	0.62	6.65	0	0	0	0	0	0	0	0	0
Live/Work	220	du	0	0.51	0.62	6.65	0	0	0	0	0	0	0	0	0
Industrial	110	ksf	0	0.92	0.97	6.97	0	0	0	0	0	0	0	0	0
Retail	820	ksf	268071	1	3.73	42.94	164	105	268	490	510	1,000	5,755	5,755	11,511
Office	710	ksf	0	1.55	1.49	11.01	0	0	0	0	0	0	0	0	0
					5% Pass-By Reduction		*25*	*16*	40	*73*	*76*	150	*863*	*863*	1,727
					% Internal Trip Capture		*33*	*21*	54	*98*	*102*	200	*1,151*	*1,151*	2,302
						Subtotal	**106**	**68**	**174**	**318**	**331**	**650**	**3,741**	**3,741**	**7,482**
Zone 3601 - East							**AM Peak**			**PM Peak**			**Daily**		
Land Use	**ITE Code**	**Units**	**Quantity**	**AM Rate**	**PM Rate**	**Daily Rate**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Residential	220	du	0	0.51	0.62	6.65	0	0	0	0	0	0	0	0	0
Live/Work	220	du	0	0.51	0.62	6.65	0	0	0	0	0	0	0	0	0
Industrial	110	ksf	691558	0.92	0.97	6.97	560	76	636	80	590	671	2,410	2,410	4,820
Retail	820	ksf	0	1	3.73	42.94	0	0	0	0	0	0	0	0	0
Office	710	ksf	360,238	1.55	1.49	11.01	491	67	558	91	446	537	1,983	1,983	3,966
					5% Pass-By Reduction		*0*	*0*	0	*0*	*0*	0	*0*	*0*	0
					% Internal Trip Capture		*210*	*29*	239	*34*	*207*	242	*879*	*879*	1,757
						Subtotal	**841**	**115**	**956**	**137**	**829**	**966**	**3,515**	**3,515**	**7,029**
Total							**1,073**	**333**	**1,406**	**609**	**1,316**	**1,925**	**8,747**	**8,747**	**17,494**

Daily VMT

Daily VMT for the Project was calculated using trip data provided in the *2000 Bay Area Travel Survey* (MTC, ABAG; 2003). Table 2 presents the trip length data and the breakdown of trips by purpose. To calculate daily VMT, the vehicle trip generation estimate for each land use type was multiplied by the trip data presented in Table 2. Work commute trips are typically longer in length than other trips (shopping, recreation, school, etc.).

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Table 2: Trip Lengths and Trips by Purpose

Trip Lengths In Bay Area		Trips by Purpose	
Work Trips	12.1	Home-based Work Trips	22%
All Trips Average	7.3	All Other Trips (Incl non-home-bas	78%
Imputed Non-work Trip Length	6.8	Other Homebased Trips	57%
(1998, from ABAG 2004)		(BATS, 2000)	

The assumptions for the VMT calculations are summarized below:

- For residential, the vehicle trips are split between Home-Based Work (HBW) (22%) and Non-Home Based (NHB) trips (78%) (i.e., everything else). The HBW trips are assigned the work trip length of 12.1 miles, while NHB trips are assigned a trip length of 6.8 miles.

- Retail trips are associated with shorter non-work trips and are assigned the shorter trip length of 6.8 miles.

- Industrial and office trips are associated with longer commute HBW trips and are assigned a length of 12.1 miles.

Table 3 summarizes the calculations and assumptions. The total daily VMT for the Project is 182,527 vehicle-miles.

Table 3: VMT Calculations

					VMT Assumptions	
					HBW Trips	Non-HB Trips
		Reductions		Trip Share	22%	78%
		Pass-By	Internal	Trip Length (mi)	12.1	6.8
Land Use	**Gross Trips**	15%	20%	**Net Trips**	**HBW VMT**	**Non-HB VMT**
Residential	2,806		561	2,245	5,976	31,698
Industrial	4,820		964	3,856	46,659	0
Retail	11,511	1727	2302	7,482	0	50,878
Office	4,888		978	3,910	47,315	0
Total	**24,025**			**17,494**	**99,950**	**82,577**
					Total Daily VMT=	**182,527**

Vehicle Classification Splits

A vehicle classification machine count was collected on High Street between Jensen and Howard Streets during the overall data collection effort in March 2009. Table 4 presents the vehicle classification percentages along High Street for the three mid-week days (Tuesday, Wednesday, Thursday). The classifications represent Federal Highway Administration (FHWA) definitions for number of axles and units. Class #4 and higher are typically considered “trucks”. These counts indicate a truck percentage of 8 percent. These counts are not indicative of the entire study area because High Street serves the Tidewater industrial area. Caltrans truck counts for I-880 at 42nd Avenue indicate a truck percentage of 10 percent.

Table 4: Vehicle Classification Counts (High Street between Jensen and Howard)

Vehicle Class Type	
Mid-Week (T, W, R) Average	
Class	**%**
#1	1%
#2	83%
#3	8%
#4	2%
#5	2%
#6	0%
#7	0%
#8	3%
#9	1%
#10	0%
#11	0%
#12	0%
#13	0%

Traffic Volumes

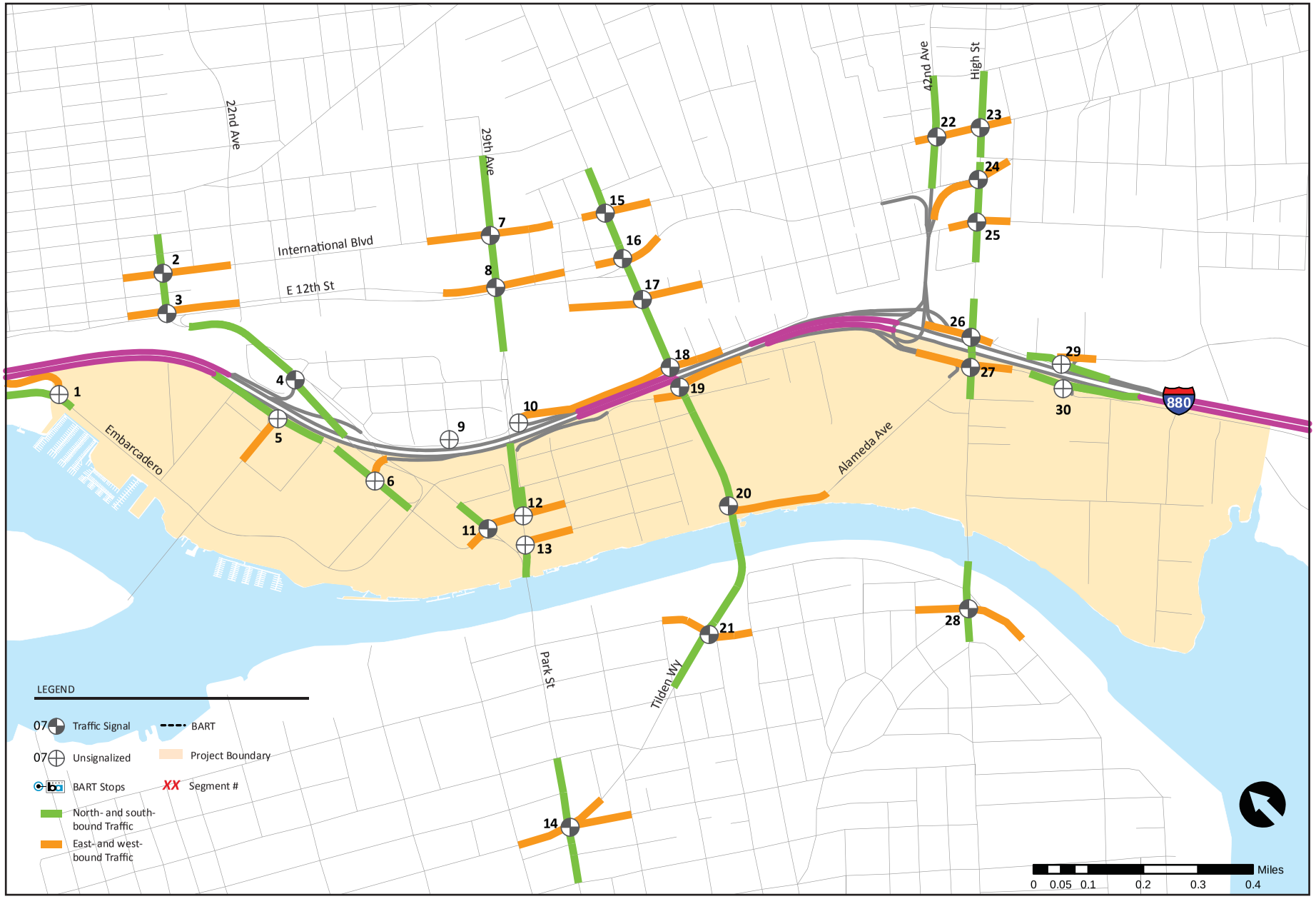
Figure 1 (see attached) identifies the study intersections and freeways on I-880 included in the EIR traffic analysis. The AM and PM peak hour turning movement volumes have been aggregated to develop directional link volumes for each leg (north, south, east, and west) of a study intersection. The ACCMA regional travel demand model and the peak hour counts were used to develop adjusted forecasts for the 2020 and 2035 scenarios.

The segment traffic volumes for each study location and four freeway segments on I-880 are provided in a spreadsheet that accompanies this memorandum. The spreadsheet contains No Project/With Project traffic forecasts for the Existing, 2020, and 2035 analysis scenarios.

Average Daily Traffic (ADT) volumes for each location were estimated by factoring the PM peak hour volumes and calculating the total two-way ADT on each segment. The factors were derived from 24-hour machine counts collected at four locations within the study area in March 2009 and data for I-880 from Caltrans' Performance Management System (PeMS). Using these sources of data, PM peak volumes were determined to represent 8 percent of the daily total on the local streets and 6.5 percent on I-880. These percentages are consistent with standard traffic engineering practice and our experience analyzing congested corridors in the Bay Area.

Truck Routes

Figure 2 (see attached) shows the City's designated truck routes.



Transportation Study Area - Segment Locations

Figure 1

Source: City of Oakland, Arup, 2012.

Figure 2: Truck Routes

Oakland Truck Routes and Prohibited Streets (City of Oakland, 2010)