APPENDIX D

Air Quality Conformity Document and Air Quality Analysis

Air Quality Conformity Document

Draft Conformity Document for Public Review

New Seward Highway Rabbit Creek to 36th Avenue
Project No. FRAF-CA-MGS-NH-0A3-1(27)/52503

Prepared for

Alaska Department of Transportation and Public Facilities

January 2006

Prepared by
CH2MHILL
301 West Northern Lights Boulevard, Suite 601
Anchorage, Alaska 99503-2662
(907) 278-2551

DRAFT CONFORMITY DOCUMENT for PUBLIC REVIEW

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New Seward Highway Rabbit Creek to 36th Avenue
Project No. FRAF-CA-MGS-NH-0A3-1 (27)/52503

Introduction

Pursuant to 40 CFR 93.104(d), Federal Highway Administration (FHWA) funded projects must be found to conform with State or Federal air quality implementation plans. This action is required under section 176(c)(4) of the Clean Air Act, as amended in 1990. 40 CFR 93.105 requires that the state implementation plan for air quality include procedures for interagency consultation (Federal, State, and local) and resolution of comments. The implementation plan revision is also required to include procedures to be undertaken by Metropolitan Planning Organizations (MPO), State and Federal departments of transportation, with State and local air quality agencies and the U.S. Environmental Protection Agency (EPA) before making conformity determinations. With respect to project conformity determinations, inter-agency consultation is required in the evaluation and selection of a model (or models) and associated methods and assumptions to be used in hot-spot analyses and regional emissions analyses (40 CFR 93.105(c)(1)(i)).

The State of Alaska has developed procedures for inter-agency consultation (18 AAC 50.715). These procedures require that before issuing a final conformity determination, a local planning organization or local government entity, that is recipient of funds designated under the authority of Title 23 U.S.C. (Highways) or 49 U.S.C. 5301-5338 (Federal Transit Act), shall prepare a draft conformity determination. This conformity determination is to be prepared in consultation with the Alaska Department of Environmental Conservation (DEC), local air quality planning agency, Alaska Department of Transportation and Public Facilities (ADOT&PF), local transportation agency, any agency created under state law that sponsors or approves transportation projects, the EPA, FHWA, and Federal Transit Agency (FTA). These regulations also require that the responsible agency shall consult with the staff of agencies listed above in evaluating and choosing methods and assumptions to be used in a hot-spot analysis. The responsible agency is also required to prepare a discussion draft of the conformity determination and provide a copy of the document to the consulting agencies.

Project Background

The Alaska Department of Transportation and Public Facilities (ADOT&PF) has proposed roadway improvements along New Seward Highway between Rabbit Creek and 36th Avenue. The purpose is to accommodate 2035 travel demand; improve traffic circulation by linking east-west road segments that are currently separated by the New Seward Highway corridor; provide more transportation choices, including bicycle and pedestrian facilities; and improve transportation safety by bringing New Seward Highway up to current roadway design standards and by reducing congestion. Planned improvements consist of adding lanes, adding intersections, reconfiguring existing intersections, and changing ramp locations. This conformity document will be included in the Draft EIS for this project.

The proposed project is within the Anchorage maintenance area for carbon monoxide (CO), consequently, a project level conformity determination is required by new state and federal air quality regulations. To comply with these regulations, the ADOT&PF contracted with CH2M HILL to prepare a hot-spot analysis of the proposed project. The hot-spot analysis was conducted for the intersections that are presently at or below Level of Service (LOS) 'D' or an being reconfigured including the intersection of New Seward Highway with Tudor Road and the intersection of New Seward Highway with International Road. The models used for the hot-spot analyses, model input and assumptions, and results are documented in the May 2005, Air Quality Conformity Analysis of the New Seward Highway Project, prepared by CH2M HILL.

Project Conformity Criteria

40 CFR 93.109(b) sets forth the applicable project conformance criteria;

Section	Criteria
93.110	The conformity determination must be based on the latest planning assumptions.
93.111	The conformity determination must be based on the latest emission estimation model available.
93.112*	The MPO must make the conformity determination according to the consultation procedures of this rule and the implementation plan revision required by Section 51.390.
93.114	There must be a currently conforming transportation plan and conforming TIP at the time of project approval.
93.115	The project must come from a conforming transportation plan and program.
93.116	The FHWA/FTA project must not cause or contribute to any new localized CO or PM10 violations or increase the frequency or severity of any existing CO or PM10 violations in CO or PM10 nonattainment and maintenance areas.
93.117	The FHWA/FTA project must comply with PM10 control measures in the applicable implementation plan.
93.121**	The FHWA/FTA project must eliminate or reduce the severity and number of localized CO violations in the area substantially affected by the project (in CO nonattainment areas).

* Consultation procedures provide that the MPO makes the conformity determination for transportation plans and programs. Project level conformity determinations are made during the environmental phase of the project by the sponsoring agency.

** This criteria only applies during the Transitional Period.

Agency Review Comments

The Air Quality Conformity Analysis of the New Seward Highway Project was presented to concerned agencies. The following comments were received.

I have reviewed the subject air quality analysis and I don't have any comments. - DEC

I looked over the analysis, and I don't have any comments. - FHWA

I have reviewed the air quality analysis for the New Seward Highway. I agree with the assumptions, methodology and conclusions derived from the analysis. - MOA

No changes were made to the document a result of the agency review process.

Public Involvement Process

(to be written upon completion of the public involvement process)

Project Conformity Determination

(to be written upon completion of the conformity process)

Approved by:	______________________ ADOT&PF	__________ Date
Concurred by:	______________________ FHWA	__________ Date

Air Quality Analysis

Draft

Air Quality Analysis New Seward Highway Rabbit Creek to 36th Avenue Anchorage, Alaska

Project Number: FRAF-CA-MGS-NH-0A3-1(27)/52503

Prepared for

Alaska Department of Transportation and Public Facilities

June 2005

CH2MHILL
301 West Northern Lights Boulevard, Suite 601
Anchorage, Alaska 99503-2662
(907) 278-2551

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Contents

Introduction

The New Seward Highway, Rabbit Creek Road to 36th Avenue, project is a federally funded transportation project located partially in a carbon monoxide (CO) maintenance area. See Figure 1.

The Anchorage area had been classified as a CO non-attainment area (an area that does not meet the requirements of the National Ambient Air Quality Standards [NAAQS]). On February 18, 2004, the Alaska Department of Environmental Conservation (ADEC) requested that the U.S. Environmental Protection Agency (EPA) redesignate the Anchorage area as attaining the NAAQS for CO and submitted a plan for maintenance compliance. On June 23, 2004, the EPA approved the maintenance plan submitted by the ADEC and designated the area as attaining the NAAQS for CO.

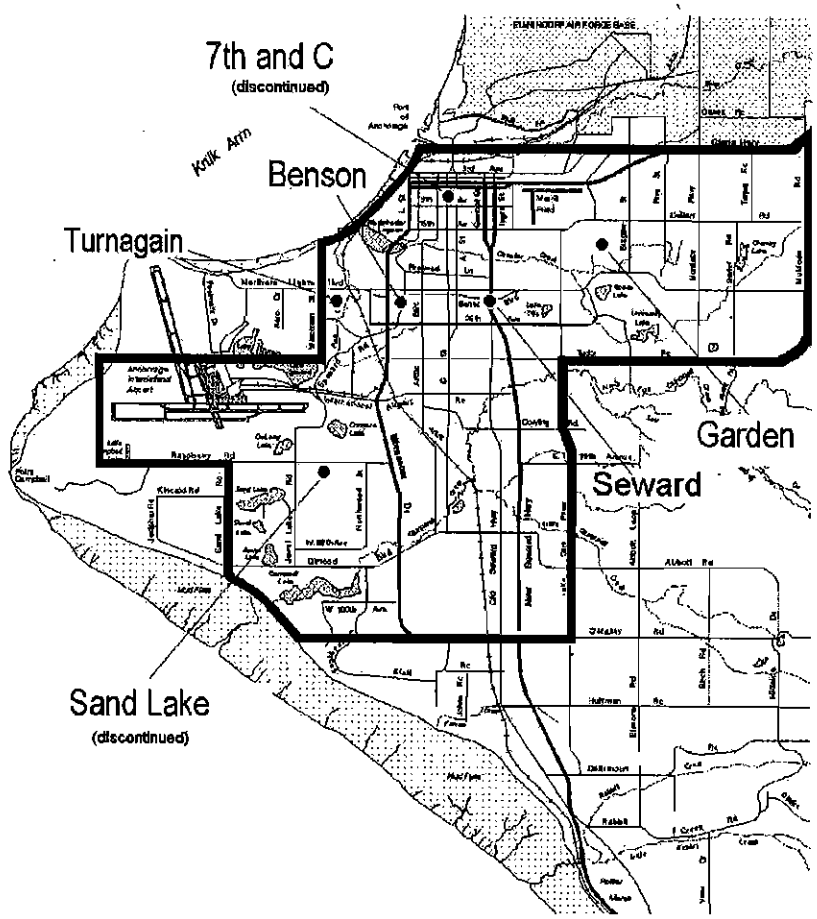

Figure 1
Boundary of Anchorage
Carbon Monoxide Maintenance Area
Source: Municipality of Anchorage, 2000 (Figure 2-2)

As a result of the maintenance area status, a demonstration of conformity with state or federal implementation plans, as described in Title 40, Part 93, Subpart A, of the *Code of Federal Regulations* (CFR) is required. As part of the demonstration of conformity, a hot-spot analysis must be conducted to demonstrate that the project would not cause any new localized CO violations or increase the frequency or severity of any existing CO violations. This document presents the methodology and results of the hot-spot analysis for the proposed New Seward Highway project. The results indicate the project conforms to the Clean Air Act as well as federal and state requirements.

Project Description

The purposes of the New Seward Highway, Rabbit Creek Road to 36th Avenue, project are as follows:

- Accommodate 2035 travel demand
- Improve traffic circulation by linking east-west road segments that are currently separated by the New Seward Highway corridor
- Provide more transportation choices, including bicycle and pedestrian facilities
- Improve transportation safety by bringing New Seward Highway up to current roadway design standards and by reducing congestion

The project is in an area that has recently demonstrated to be attaining the NAAQS, see Table 1, for CO and has been designated as a CO maintenance area. A federally funded transportation project in a CO maintenance area must demonstrate that the project is included in a conforming regional transportation plan and transportation improvement program (TIP). The New Seward Highway project is included in the 2004-2006 TIP for the Anchorage and Chugiak/Eagle River area (MOA, 2003), and the 2004-2006 TIP has been determined to conform with the Alaska State Implementation Plan and the Clean Air Act.

Because the project involves adding intersections and reconfiguring existing intersections at which level of service (LOS) is D or lower, and the project is a maintenance area, a hot-spot analysis of the project area is required in accordance with 40 CFR 93.116. An analysis for PM_{10} impacts is not required because the Anchorage area is in compliance with the NAAQS for PM_{10}. The following sections present the methodology and results of conducting a CO hot-spot analysis of the proposed project.

TABLE 1
Federal and State of Alaska National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary (Health)	Secondary (Welfare)
Particulate matter less than 2.5 µm diameter ($PM_{2.5}$)	Annual arithmetic mean	15.0 µg/m^3	15.0 µg/m^3
	24 hours	65 µg/m^3	65 µg/m^3
Particulate matter less than 10 µm diameter (PM_{10})	Annual arithmetic mean	50 µg/m^3	50 µg/m^3
	24 hours	150 µg/m^3 [c]	150 µg/m^3 [c]
Ozone (O_3)	1 hour	0.12 ppm[c]	0.12 ppm[c]
Carbon monoxide (CO)	8 hours	9 ppm[b]	N/A
	1 hour	35 ppm[b]	N/A
Sulfur dioxide (SO_2)	Annual arithmetic mean	0.030 ppm[a]	N/A
	24 hours	0.14 ppm[b]	N/A
	3 hours	N/A	0.5 ppm[b]
Nitrogen dioxide (NO_2)	Annual arithmetic mean	0.053 ppm	0.053 ppm
Lead (Pb)	Calendar quarter average	1.5 µg/m^3	1.5 µg/m^3
Reduced sulfur compounds (as SO_2)	30-minute average	50 µg/m^3 [b]	50 µg/m^3 [b]
Ammonia	8-hour average	21 mg/m^3 [b]	21 mg/m^3 [b]

[a]Not to be exceeded.
[b]Not to be exceeded more than once per calendar year.
[c]Not to be exceeded more than one day per calendar year.
µg/m^3 = micrograms per cubic meter
mg/m = milligrams per meter
µm = micrometer
N/A = not applicable
ppm = parts per million

Hot-Spot Analysis

The proposed project was analyzed for impacts to air quality resulting from motor vehicle exhaust. The impact analysis involved estimating the CO emissions generated in the project area and then using a dispersion model to estimate ambient concentrations at specific points, or receptors. An interagency consultation meeting involving representatives of the Municipality of Anchorage (MOA) and concerned agencies—Alaska Department of Transportation and Public Facilities, ADEC, EPA, and Federal Highway Administration—was held to discuss the project and determine the approach to conducting the conformity determination. It was determined in this meeting that 2015 is expected to be the worst-case year, and this year needed to be included for conformity purposes. During the meeting, an acceptable approach and model input parameters were determined. The work plan is provided in Attachment 1.

Hot-Spot Analysis Methodology

The purpose of the hot-spot analysis is to demonstrate that the project would not cause any new localized CO violations or increase the frequency or severity of any existing CO violations. The accepted approach to a hot-spot analysis is to conduct a project-level analysis by predicting concentrations of CO for the following scenarios:

1. Existing conditions
2. Opening year no-build scenario
3. Opening year build scenarios
4. Design year no-build scenario
5. Design year build scenarios

For the proposed project, opening year and design year are projected to be 2015 and 2035, respectively. Existing conditions were analyzed by using 2005 traffic volumes. The two build alternatives for the project each incorporate two options. See Attachment 2 for the full description of the alternatives.

The hot-spot analysis was conducted according to guidelines provided in the EPA *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (1992). The analysis is a two-step process, consisting first of estimating vehicle emission factors and then using a dispersion model to calculate CO concentrations in the vicinity of the project site. Vehicle emissions were estimated by using the EPA-approved model MOBILE6, Version 2.0 (EPA, 2003), and projected traffic speeds. MOBILE6 calculates emission factors in grams per vehicle mile traveled for gasoline and diesel-fueled motor vehicles. This model accounts for progressively more stringent vehicle emission standards over the vehicle model years evaluated, the effects of inspection and maintenance programs, and the use of reformulated and oxygenated fuels.

Table 2 lists the MOBILE6 model input options chosen for this analysis. These input data are consistent with those used for the regional emissions modeling performed for the Anchorage area, and were obtained from the MOA, Department of Health and Human Services, Environmental Services Division. The data include parameters used to define the vehicle inspection/maintenance (I/M) program, which is a biennial, test and repair program required for gasoline-fueled vehicles only and for the anti tampering program (ATP). Details of the I/M program and ATP program are listed in Tables 3 and 4, respectively.

Because CO emissions are dependent on travel speed, MOBILE6 calculates emission factors for each user-specified travel speed and idling. For the purposes of this analysis, emission factors were calculated for the posted travel speeds. According to current guidance, the idling emission factor is the MOBILE6 2.5-miles-per-hour (mph) factor, in grams per mile, multiplied by 2.5 mph (EPA, 1993). The model was run assuming an ambient temperature of 20°F to simulate an average winter day. Emission factors were calculated for years 2005, 2015, and 2035. The MOBILE6 input and output files are included in Attachment 3.

TABLE 2
MOBILE6-Input Values

Description	Value
Fraction of vehicle miles traveled by vehicle type	Vehicle miles traveled specific to Alaska (see model input file)
Annual mileage accumulation and registrations by vehicle age	Both are specific to Alaska (see model input file)
Basic exhaust emission rates	Model default values
Emission rate corrections	No corrections made for air conditioning, extra load, trailer towing, or humidity
Anti-tampering program (ATP)	Emission credit taken for ATP
Refueling emission factors	None calculated
Temperature correction	Ambient temperature of 20°F used to correct emission factors
Reid vapor pressure (RVP) of gasoline	14.7
Region	Low altitude
Soak distribution	Anchorage-specific data provided by MOA

TABLE 3
MOBILE6 I/M Program Input Parameters

Description	Value
I&M start year	1985
Pre-1981 stringency rate	23%
First/last model year covered	1968/2050
Waiver rate (pre-1981)	0%
Waiver rate (1981 and newer)	0%
Compliance rate	90%
Inspection type	Test and repair—2500 revolutions per minute/idle
Frequency	Biennial
Vehicle types subject to I/M	LDGV, LDGT1, LDGT2, LDGT3, LDGT4, HDGV2B, HDGV3, HDGV4, GAS BUS

TABLE 4
MOBILE6 ATP Program Input Parameters

Description	Value
ATP start year	1985
First/last model year covered	1975/2050
Compliance rate	90
Program type	Test and repair
Frequency	Biennial
Vehicle types subject to ATP	LDGV, LDGT1, LDGT2, LDGT3, LDGT4, HDGV2B, HDGV3, HDGV4, GAS BUS
Inspections performed	Air pump system, catalyst, exhaust gas recirculation (EGR) system, evaporative system, positive crankcase ventilation (PCV) system

After calculating the vehicle emission factors, the second step of the process, dispersion modeling, was conducted. With the emission factors from MOBILE6, the CAL3QHC dispersion model was used to calculate CO concentrations at specific receptor locations. Receptors were placed around the intersections at a distance of 3 meters from the edge of the road and 25 meters apart, according to model guidance. Receptors were also located along the frontage roads from 36th Avenue to Dimond Boulevard. The locations of each receptor are shown in Figures 2 through 6 (included at the end of this report). Each alternative has a different number of receptors because of lane configuration. Concentrations were calculated at a receptor height of 1.8 meters. Other CAL3QHC model inputs are summarized in Table 5.

TABLE 5
Summary of CAL3QHC Inputs

Description	Value
Surface roughness coefficient	175 centimeters (commercial/residential)
Background carbon monoxide (CO) concentration (1 hour)	4.14 parts per million
Signal type	Actuated
Intersection arrival rate	Average progression
Saturation flow rate	Various depending on roadway segment
Clearance lost time	Various depending on roadway segment

The traffic data used for the air quality analysis were obtained from the MOA Traffic Department. The department provided trip tables for 2002, 2013, and 2035. Trips for 2005 and 2015 were estimated by using MOA-accepted growth procedures based on the given trip tables. The 2005 trip data were interpolated from the 2002 and 2013 tables, and the 2015 trip data were interpolated from the 2013 and 2035 tables. The model takes the trip information and uses a gravity model to distribute the trips along the roadway network (Attachment 4).

As indicated in the EPA guidelines (EPA, 1992), the model used a meteorological condition of 1 meter per second for wind speed, 1,000-meter mixing height, and a moderately stable (Class E) atmosphere. Wind directions were evaluated in 5-degree increments.

CO concentrations of 4.14 parts per million (ppm) and 2.9 ppm were used for the 1-hour and 8-hour backgrounds for all analysis years. The 8-hour background value of 2.9 ppm was calculated in accordance with the methodology recommended in the document "Estimation of Background Concentration for New Seward Highway Corridor" prepared by MOA (see Attachment 1). This approach uses background values measured by MOA in 1998 and adjusts them to 2005 by using the decrease in actual monitoring results over the same period of time. The 1-hour background of 4.14 ppm was then calculated from the 8-hour background by using the EPA-recommended persistence factor of 0.7. This approach to determining background values was agreed to in the interagency consultation meeting.

Peak-hour vehicle volumes were used to calculate maximum hourly CO concentrations. The maximum hourly concentrations were converted to an 8-hour average for comparison to the 8-hour NAAQS by using a conversion factor of 0.7, as recommended by regulatory guidance. CAL3QHC model input and output files and background calculations are included in Attachment 5.

Hot-Spot Analysis Results

The CAL3QHC modeling results show that for Build Alternative 1, Option 1, Receptor 29 at International Airport Road would have the highest CO concentration for the project area in 2015. The same alternative shows Receptor R-71 on the Tudor Road bridge would have the highest average CO concentration in 2035. Receptor R-71 on the Tudor Road bridge would also have the highest average CO concentration for both Build Alternative 1, Option 2, and Build Alternative 2, Option 1, in 2015 and 2035. Build Alternative 2, Option 2, shows Receptors R-47 and R-38, respectively, at International Airport Road to have the highest CO concentration for 2015 and 2035. The locations of these high values are true for both the 1-hour and 8-hour concentrations. These results are presented in Table 6. Complete lists of the maximum 1-hour and 8-hour average CO concentrations for all receptors are presented in Tables 7 and 8 (provided at the end of the report).

TABLE 6
Maximum Carbon Monoxide Concentrations

Scenario	1-Hour Concentration (ppm)	8-Hour Concentration (ppm)
2005 – Existing	13.14	9.20
2015 – No-Build Alternative	9.34	6.54
2035 – No-Build Alternative	10.24	7.17
2015 – Build Alternative 1, Option 1	8.54	5.98
2035 – Build Alternative 1, Option 1	8.94	6.26
2015 – Build Alternative 1, Option 2	9.04	6.33
2035 – Build Alternative 1, Option 2	9.34	6.54
2015 – Build Alternative 2, Option 1	10.04	7.03
2035 – Build Alternative 2, Option 1	10.34	7.24
2015 – Build Alternative 2, Option 2	9.64	6.75
2035 – Build Alternative 2, Option 2	10.74	7.52

Notes: 1-hour National Ambient Air Quality Standard for carbon monoxide (CO) is 35 ppm.
8-hour National Ambient Air Quality Standard for carbon monoxide (CO) is 9 ppm.

Discussion and Conclusions

For the two build alternatives with the two options for both years (2015 and 2035), the modeled maximum 1-hour concentrations are below the CO 1-hour NAAQS of 35 ppm and the modeled 8-hour concentrations are below the 8-hour CO NAAQS of 9 ppm. Therefore, the analysis demonstrates that the proposed project would not cause any new localized CO violations. In addition, because all results were below the CO NAAQS, the project will not increase the frequency or severity of any existing CO violations. Therefore, the project is determined to conform with the Anchorage TIP, the purpose of the current EPA approved Alaska State Implementation Plan, and the requirements of the Clean Air Act.

References

Municipality of Anchorage, Department of Health and Human Services, Environmental Services Division, Air Quality Program. May 2000. *Air Quality in Anchorage: A Summary of Air Monitoring Data and Trends (1980-1999).*

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U.S. Environmental Protection Agency. 1992. *Guideline for Modeling Carbon Monoxide from Roadway Intersections*. EPA-454/R-92-005.

U.S. Environmental Protection Agency. 1993. MOBILE5 Information Sheet #2. *Estimating Idle Emission Factors Using MOBILE5.*

U.S. Environmental Protection Agency. 2003. *Users Guide to MOBILE6.1 and MOBILE6.2: Mobile Source Emission Factor Model.*

U.S. Environmental Protection Agency, Federal Highway Administration, Alaska Department of Environmental Conservation, Municipality of Anchorage, Alaska Department of Transportation and Public Facilities, and CH2M HILL. 2005. Interagency Consultation Meeting.

TABLE 7
1-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
1	7.1	5.7	5.7	5.8	5.8	5.9	6.1	6.3	6.0	6.1	6.1
2	7.4	5.6	5.8	5.7	6.1	6.0	6.0	6.0	6.0	6.1	6.1
3	6.6	5.9	5.8	5.8	5.8	5.8	6.4	6.1	5.9	6.0	6.2
4	6.2	5.9	5.6	5.7	5.6	5.7	6.1	5.7	5.7	5.8	5.8
5	7.6	6.3	6.1	6.3	6.2	6.2	7.2	6.6	6.4	6.6	6.5
6	7.4	6.2	6.1	6.2	6.2	6.5	6.6	6.6	6.4	6.7	6.6
7	7.7	6.5	6.5	6.6	6.6	6.6	6.8	6.8	6.6	6.6	6.7
8	7.3	6.2	6.1	6.3	6.3	6.2	6.5	6.6	6.5	6.4	6.4
9	8.2	6.7	6.8	6.8	6.9	7.0	7.7	7.3	6.8	7.3	7.2
10	7.1	6.0	5.9	6.0	6.1	6.1	6.4	6.3	6.3	6.3	6.4
11	7.5	6.5	6.5	6.5	6.5	6.3	7.0	7.1	7.0	6.8	6.8
12	7.4	6.3	6.4	6.4	6.5	6.6	6.8	6.9	6.9	6.7	6.7
13	7.2	6.3	6.4	6.3	6.4	6.4	6.9	6.7	6.8	6.8	6.9
14	7.2	6.1	6.2	6.2	6.3	6.2	6.7	6.5	6.7	6.7	6.6
15	7.3	6.3	6.4	6.4	6.4	6.3	6.6	6.7	6.6	6.7	6.8
16	8.5	7.0	7.0	7.1	7.1	6.8	7.6	7.3	7.7	7.4	7.4
17	7.0	6.1	6.1	6.1	6.3	6.1	6.4	6.4	6.6	6.4	6.4
18	8.2	6.9	7.2	7.2	7.2	7.2	7.2	7.4	7.7	7.6	7.5
19	8.8	7.4	7.5	7.6	7.6	7.4	8.1	8.0	8.0	8.0	7.9
20	8.5	7.3	7.5	7.5	7.5	7.4	8.0	7.9	7.8	7.8	7.6
21	8.5	7.3	7.6	7.5	7.6	7.5	7.9	8.0	7.8	8.1	9.9
22	8.3	7.4	7.6	7.6	7.5	7.5	7.9	8.0	7.7	7.9	9.3
23	8.5	7.2	7.3	7.2	5.9	5.8	7.6	7.9	7.5	6.1	6.2
24	7.9	6.4	7.1	6.8	6.7	6.3	6.9	6.8	6.9	6.8	7.5
25	7.9	6.7	7.0	6.8	6.0	5.9	7.0	7.4	7.1	6.2	6.4
26	7.7	6.0	6.6	6.5	7.8	7.2	6.3	6.7	6.9	8.0	7.6
27	7.9	6.3	6.6	6.7	7.6	7.2	6.5	6.6	6.8	7.6	8.0

TABLE 7
1-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
28	8.0	6.4	6.7	7.0	7.8	7.1	6.7	6.9	7.2	7.8	8.5
29	8.5	6.7	8.5	7.4	8.2	7.7	7.2	7.3	7.6	8.4	9.9
30	7.9	6.1	8.1	6.2	6.6	6.1	6.5	6.2	6.5	6.8	8.1
31	7.2	5.7	7.9	5.9	6.6	5.8	5.8	5.9	6.1	6.7	6.8
32	6.8	5.7	7.9	6.0	7.0	5.8	5.7	5.8	6.0	7.2	6.2
33	7.7	6.1	8.0	6.3	6.8	5.8	6.1	6.1	6.5	7.1	6.9
34	8.6	6.8	8.3	7.1	8.6	8.3	7.0	7.0	7.3	8.5	10.3
35	7.9	6.4	7.2	7.1	8.4	8.0	6.8	7.0	7.3	8.5	10.2
36	8.0	6.4	6.9	6.9	8.2	7.6	6.8	7.0	7.3	8.3	9.3
37	N/A	N/A	8.1	7.5	8.5	8.4	N/A	7.3	7.6	8.5	10.4
38	N/A	N/A	8.3	7.7	8.8	8.7	N/A	7.4	7.8	8.7	10.7
39	N/A	N/A	8.1	7.0	8.4	7.8	N/A	7.1	7.4	8.4	8.7
40	8.1	6.1	6.2	6.4	8.7	8.8	6.3	6.5	6.5	8.7	8.8
41	8.0	6.1	6.4	6.5	9.7	9.5	6.5	6.6	6.6	9.5	9.7
42	8.5	6.3	8.1	6.6	10.0	9.4	6.6	6.8	6.8	10.3	10.4
43	7.3	5.9	7.7	6.0	7.8	6.7	6.0	6.2	6.3	8.3	8.3
44	7.1	5.6	7.7	5.9	7.5	6.7	5.6	5.9	6.2	8.0	8.1
45	6.5	5.4	7.6	5.9	6.6	6.0	5.6	5.9	6.0	7.0	7.2
46	7.0	5.7	7.7	6.0	6.7	6.6	5.9	6.1	6.2	7.0	7.1
47	8.2	6.2	7.9	6.7	9.4	9.6	6.6	6.6	6.8	9.8	10.4
48	7.8	6.2	6.6	6.4	8.7	9.1	6.5	6.6	6.6	9.0	9.3
49	7.9	6.2	6.4	6.6	7.6	8.2	6.3	6.5	6.5	8.2	8.4
50	N/A	N/A	7.9	7.0	8.3	8.4	N/A	6.9	7.3	8.5	8.9
51	8.5	6.6	6.6	7.1	7.9	7.1	7.2	7.2	7.4	8.2	8.7
52	9.5	7.0	6.6	7.2	7.3	6.5	7.5	7.1	7.4	7.4	7.7
53	8.6	7.0	7.0	8.0	7.7	5.2	7.4	7.9	8.0	7.8	5.7
54	8.7	6.6	6.5	6.7	8.5	7.9	6.8	6.7	7.0	8.5	8.3

TABLE 7
1-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
55	9.3	6.8	6.5	6.5	7.0	6.4	7.1	6.8	6.9	7.3	7.0
56	9.7	6.9	6.6	7.0	7.2	6.5	7.7	7.3	7.3	7.3	7.2
57	8.1	6.5	6.6	7.0	6.6	5.6	6.7	7.0	7.4	6.7	6.0
58	9.0	6.8	6.8	7.2	6.6	5.9	7.0	7.0	7.2	6.8	6.0
59	11.6	8.2	7.2	7.5	7.5	6.6	8.4	7.7	7.4	7.8	7.0
60	11.1	7.8	7.1	7.1	7.1	6.5	8.0	7.3	7.1	7.3	7.0
61	10.6	7.8	6.8	7	7.0	6.4	7.5	7.3	6.9	7.2	6.8
62	10.4	7.6	6.9	7.4	7.0	6.9	7.6	7.0	7.2	7.1	7.2
63	10.0	7.5	7.0	7.2	7.1	6.8	7.4	7.1	7.0	7.2	7.1
64	10.0	7.1	7.4	7.6	7.1	6.6	7.5	7.3	7.8	7.3	7.1
65	9.1	7.0	7.1	7.4	7.0	5.8	7.1	7.2	7.8	6.7	6.3
66	8.6	6.6	6.9	7.4	6.6	5.7	7.2	7.1	7.9	6.7	6.2
67	8.7	6.6	6.8	7.1	6.7	5.4	7.1	6.9	7.4	6.7	5.9
68	8.9	6.8	7.0	7.6	6.8	5.8	7.2	7.1	7.5	6.9	6.2
69	10.2	7.3	7.1	7.7	7.4	6.6	7.4	7.2	7.6	7.5	7.1
70	11.2	8.0	7.4	7.8	8.0	6.7	8.0	7.8	8.2	8.1	7.2
71	12.2	8.8	8.3	9.0	8.0	6.8	9.3	8.9	9.3	7.9	7.3
72	13.1	9.3	8.0	8.5	7.7	6.6	10.2	8.6	8.8	7.7	7.2
73	12.2	8.9	7.8	7.7	7.9	6.5	8.5	8.2	7.7	7.9	7.0
74	11.4	8.2	7.2	7.3	7.6	6.5	8.1	7.5	7.4	7.6	6.9
75	8.6	6.9	7.0	7.3	6.6	5.7	6.8	7.1	7.4	6.6	6.0
76	8.0	6.3	7.0	7.2	6.7	5.4	6.8	7.0	7.3	6.7	5.6
77	N/A	N/A	N/A	N/A	N/A	7.9	N/A	N/A	N/A	N/A	8.5
78	N/A	N/A	N/A	N/A	N/A	8.1	N/A	N/A	N/A	N/A	8.8
79	8.5	6.3	6.3	6.4	6.2	5.8	6.9	6.4	6.6	6.2	6.2
80	8.3	6.4	6.1	6.4	6.2	6.1	6.7	6.3	6.5	6.1	6.4
81	11.1	8.0	6.9	6.9	7.2	7.3	7.8	7.2	7.1	7.3	8.0

TABLE 7
1-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
82	10.9	8.3	6.9	7.1	7.2	7.2	8.2	7.5	7.3	7.3	7.9
83	12.2	8.9	7.6	7.9	7.3	7.7	9.1	7.9	8.3	7.3	8.1
84	11.9	8.4	7.8	N/A	7.4	7.7	9.0	8.5	N/A	7.7	8.3
85	10.5	7.7	7.0	N/A	7.4	7.0	8.1	6.9	N/A	7.4	7.6
86	10.2	7.7	7.2	N/A	7.3	7.0	7.8	7.3	N/A	7.4	7.6
87	9.1	6.7	6.2	N/A	6.6	6.5	7.0	6.7	N/A	6.6	6.7
88	8.5	6.6	6.2	N/A	6.2	6.0	6.6	6.7	N/A	6.3	6.5
89	8.9	6.7	6.7	N/A	6.8	6.4	7.0	6.8	N/A	6.7	6.6
90	9.5	6.7	6.9	N/A	7.4	6.7	7.1	7.2	N/A	7.0	7.1
91	10.4	8.0	7.2	N/A	7.3	7.2	7.7	7.3	N/A	7.3	7.5
92	9.9	7.8	7.1	N/A	7.5	7.4	7.4	7.0	N/A	7.3	7.4
93	9.6	7.7	7.1	N/A	7.3	7.5	7.3	7.2	N/A	7.1	7.5
94	10.6	7.7	6.8	6.8	7.1	7.7	7.5	7.5	6.7	7.0	7.6
95	10.4	7.6	6.6	6.7	7.1	7.3	7.4	6.9	6.7	6.9	7.4
96	10.0	7.4	6.6	6.8	6.9	6.9	7.5	6.8	6.9	6.8	7.5
97	8.3	6.4	6.0	6.1	6.7	6.1	6.6	6.3	6.5	6.6	6.5
98	8.0	6.2	6.0	6.0	6.3	5.9	6.5	6.2	6.2	6.4	6.1
99	N/A	N/A	N/A	6.7	N/A	N/A	N/A	N/A	6.8	N/A	N/A
100	N/A	N/A	N/A	6.8	N/A	N/A	N/A	N/A	6.6	N/A	N/A
101	N/A	N/A	N/A	6.7	N/A	N/A	N/A	N/A	6.4	N/A	N/A
102	N/A	N/A	N/A	6.5	N/A	N/A	N/A	N/A	6.6	N/A	N/A
103	N/A	N/A	N/A	6.8	N/A	N/A	N/A	N/A	6.5	N/A	N/A
104	N/A	N/A	N/A	6.9	N/A	N/A	N/A	N/A	6.6	N/A	N/A
105	N/A	N/A	N/A	7.0	N/A	N/A	N/A	N/A	6.8	N/A	N/A
106	N/A	N/A	N/A	6.1	N/A	N/A	N/A	N/A	6.3	N/A	N/A
107	N/A	N/A	N/A	5.8	N/A	N/A	N/A	N/A	5.8	N/A	N/A
108	N/A	N/A	N/A	5.8	N/A	N/A	N/A	N/A	5.9	N/A	N/A

TABLE 7
1-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
109	N/A	N/A	N/A	6.1	N/A	N/A	N/A	N/A	5.9	N/A	N/A
110	N/A	N/A	N/A	7.0	N/A	N/A	N/A	N/A	6.8	N/A	N/A
111	N/A	N/A	N/A	6.9	N/A	N/A	N/A	N/A	6.9	N/A	N/A
112	N/A	N/A	N/A	7.2	N/A	N/A	N/A	N/A	7.0	N/A	N/A

Shaded cell indicates location of maximum concentration for the alternative.

N/A = Not applicable because the receptor location is not included as part of the alternative and option.

TABLE 8
8-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
1	5.0	4.0	4.0	4.1	4.1	4.1	4.3	4.4	4.2	4.3	4.3
2	5.2	3.9	4.1	4.0	4.3	4.2	4.2	4.2	4.2	4.3	4.3
3	4.6	4.1	4.1	4.1	4.1	4.1	4.5	4.3	4.1	4.2	4.3
4	4.3	4.1	3.9	4.0	3.9	4.0	4.3	4.0	4.0	4.1	4.1
5	5.3	4.4	4.3	4.4	4.3	4.3	5.0	4.6	4.5	4.6	4.6
6	5.2	4.3	4.3	4.3	4.3	4.6	4.6	4.6	4.5	4.7	4.6
7	5.4	4.6	4.6	4.6	4.6	4.6	4.8	4.8	4.6	4.6	4.7
8	5.1	4.3	4.3	4.4	4.4	4.3	4.6	4.6	4.6	4.5	4.5
9	5.7	4.7	4.8	4.8	4.8	4.9	5.4	5.1	4.8	5.1	5.0
10	5.0	4.2	4.1	4.2	4.3	4.3	4.5	4.4	4.4	4.4	4.5
11	5.3	4.6	4.6	4.6	4.6	4.4	4.9	5.0	4.9	4.8	4.8
12	5.2	4.4	4.5	4.5	4.6	4.6	4.8	4.8	4.8	4.7	4.7
13	5.0	4.4	4.5	4.4	4.5	4.5	4.8	4.7	4.8	4.8	4.8
14	5.0	4.3	4.3	4.3	4.4	4.3	4.7	4.6	4.7	4.7	4.6
15	5.1	4.4	4.5	4.5	4.5	4.4	4.6	4.7	4.6	4.7	4.8
16	6.0	4.9	4.9	5.0	5.0	4.8	5.3	5.1	5.4	5.2	5.2
17	4.9	4.3	4.3	4.3	4.4	4.3	4.5	4.5	4.6	4.5	4.5
18	5.7	4.8	5.0	5.0	5.0	5.0	5.0	5.2	5.4	5.3	5.3
19	6.2	5.2	5.3	5.3	5.3	5.2	5.7	5.6	5.6	5.6	5.5
20	6.0	5.1	5.3	5.3	5.3	5.2	5.6	5.5	5.5	5.5	5.3
21	6.0	5.1	5.3	5.3	5.3	5.3	5.5	5.6	5.5	5.7	6.9
22	5.8	5.2	5.3	5.3	5.3	5.3	5.5	5.6	5.4	5.5	6.5
23	6.0	5.0	5.1	5.0	4.1	4.1	5.3	5.5	5.3	4.3	4.3
24	5.5	4.5	5.0	4.8	4.7	4.4	4.8	4.8	4.8	4.8	5.3
25	5.5	4.7	4.9	4.8	4.2	4.1	4.9	5.2	5.0	4.3	4.5
26	5.4	4.2	4.6	4.6	5.5	5.0	4.4	4.7	4.8	5.6	5.3
27	5.5	4.4	4.6	4.7	5.3	5.0	4.6	4.6	4.8	5.3	5.6

TABLE 8
8-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
28	5.6	4.5	4.7	4.9	5.5	5.0	4.7	4.8	5.0	5.5	6.0
29	6.0	4.7	6.0	5.2	5.7	5.4	5.0	5.1	5.3	5.9	6.9
30	5.5	4.3	5.7	4.3	4.6	4.3	4.6	4.3	4.6	4.8	5.7
31	5.0	4.0	5.5	4.1	4.6	4.1	4.1	4.1	4.3	4.7	4.8
32	4.8	4.0	5.5	4.2	4.9	4.1	4.0	4.1	4.2	5.0	4.3
33	5.4	4.3	5.6	4.4	4.8	4.1	4.3	4.3	4.6	5.0	4.8
34	6.0	4.8	5.8	5.0	6.0	5.8	4.9	4.9	5.1	6.0	7.2
35	5.5	4.5	5.0	5.0	5.9	5.6	4.8	4.9	5.1	6.0	7.1
36	5.6	4.5	4.8	4.8	5.7	5.3	4.8	4.9	5.1	5.8	6.5
37	N/A	N/A	5.7	5.3	6.0	5.9	N/A	5.1	5.3	6.0	7.3
38	N/A	N/A	5.8	5.4	6.2	6.1	N/A	5.2	5.5	6.1	7.5
39	N/A	N/A	5.7	4.9	5.9	5.5	N/A	5.0	5.2	5.9	6.1
40	5.7	4.3	4.3	4.5	6.1	6.2	4.4	4.6	4.6	6.1	6.2
41	5.6	4.3	4.5	4.6	6.8	6.7	4.6	4.6	4.6	6.7	6.8
42	6.0	4.4	5.7	4.6	7.0	6.6	4.6	4.8	4.8	7.2	7.3
43	5.1	4.1	5.4	4.2	5.5	4.7	4.2	4.3	4.4	5.8	5.8
44	5.0	3.9	5.4	4.1	5.3	4.7	3.9	4.1	4.3	5.6	5.7
45	4.6	3.8	5.3	4.1	4.6	4.2	3.9	4.1	4.2	4.9	5.0
46	4.9	4.0	5.4	4.2	4.7	4.6	4.1	4.3	4.3	4.9	5.0
47	5.7	4.3	5.5	4.7	6.6	6.7	4.6	4.6	4.8	6.9	7.3
48	5.5	4.3	4.6	4.5	6.1	6.4	4.6	4.6	4.6	6.3	6.5
49	5.5	4.3	4.5	4.6	5.3	5.7	4.4	4.6	4.6	5.7	5.9
50	N/A	N/A	5.5	4.9	5.8	5.9	N/A	4.8	5.1	6.0	6.2
51	6.0	4.6	4.6	5.0	5.5	5.0	5.0	5.0	5.2	5.7	6.1
52	6.7	4.9	4.6	5.0	5.1	4.6	5.3	5.0	5.2	5.2	5.4
53	6.0	4.9	4.9	5.6	5.4	3.6	5.2	5.5	5.6	5.5	4.0
54	6.1	4.6	4.6	4.7	6.0	5.5	4.8	4.7	4.9	6.0	5.8

TABLE 8
8-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
55	6.5	4.8	4.6	4.6	4.9	4.5	5.0	4.8	4.8	5.1	4.9
56	6.8	4.8	4.6	4.9	5.0	4.6	5.4	5.1	5.1	5.1	5.0
57	5.7	4.6	4.6	4.9	4.6	3.9	4.7	4.9	5.2	4.7	4.2
58	6.3	4.8	4.8	5.0	4.6	4.1	4.9	4.9	5.0	4.8	4.2
59	8.1	5.7	5.0	5.3	5.3	4.6	5.9	5.4	5.2	5.5	4.9
60	7.8	5.5	5.0	5.0	5.0	4.6	5.6	5.1	5.0	5.1	4.9
61	7.4	5.5	4.8	4.9	4.9	4.5	5.3	5.1	4.8	5.0	4.8
62	7.3	5.3	4.8	5.2	4.9	4.8	5.3	4.9	5.0	5.0	5.0
63	7.0	5.3	4.9	5.0	5.0	4.8	5.2	5.0	4.9	5.0	5.0
64	7.0	5.0	5.2	5.3	5.0	4.6	5.3	5.1	5.5	5.1	5.0
65	6.4	4.9	5.0	5.2	4.9	4.1	5.0	5.0	5.5	4.7	4.4
66	6.0	4.6	4.8	5.2	4.6	4.0	5.0	5.0	5.5	4.7	4.3
67	6.1	4.6	4.8	5.0	4.7	3.8	5.0	4.8	5.2	4.7	4.1
68	6.2	4.8	4.9	5.3	4.8	4.1	5.0	5.0	5.3	4.8	4.3
69	7.1	5.1	5.0	5.4	5.2	4.6	5.2	5.0	5.3	5.3	5.0
70	7.8	5.6	5.2	5.5	5.6	4.7	5.6	5.5	5.7	5.7	5.0
71	8.5	6.2	5.8	6.3	5.6	4.8	6.5	6.2	6.5	5.5	5.1
72	9.2	6.5	5.6	6.0	5.4	4.6	7.1	6.0	6.2	5.4	5.0
73	8.5	6.2	5.5	5.4	5.5	4.6	6.0	5.7	5.4	5.5	4.9
74	8.0	5.7	5.0	5.1	5.3	4.6	5.7	5.3	5.2	5.3	4.8
75	6.0	4.8	4.9	5.1	4.6	4.0	4.8	5.0	5.2	4.6	4.2
76	5.6	4.4	4.9	5.0	4.7	3.8	4.8	4.9	5.1	4.7	3.9
77	N/A	N/A	N/A	N/A	N/A	5.5	N/A	N/A	N/A	N/A	6.0
78	N/A	N/A	N/A	N/A	N/A	5.7	N/A	N/A	N/A	N/A	6.2
79	6.0	4.4	4.4	4.5	4.3	4.1	4.8	4.5	4.6	4.3	4.3
80	5.8	4.5	4.3	4.5	4.3	4.3	4.7	4.4	4.6	4.3	4.5
81	7.8	5.6	4.8	4.8	5.0	5.1	5.5	5.0	5.0	5.1	5.6

TABLE 8
8-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
82	7.6	5.8	4.8	5.0	5.0	5.0	5.7	5.3	5.1	5.1	5.5
83	8.5	6.2	5.3	5.5	5.1	5.4	6.4	5.5	5.8	5.1	5.7
84	8.3	5.9	5.5	N/A	5.2	5.4	6.3	6.0	N/A	5.4	5.8
85	7.4	5.4	4.9	N/A	5.2	4.9	5.7	4.8	N/A	5.2	5.3
86	7.1	5.4	5.0	N/A	5.1	4.9	5.5	5.1	N/A	5.2	5.3
87	6.4	4.7	4.3	N/A	4.6	4.6	4.9	4.7	N/A	4.6	4.7
88	6.0	4.6	4.3	N/A	4.3	4.2	4.6	4.7	N/A	4.4	4.6
89	6.2	4.7	4.7	N/A	4.8	4.5	4.9	4.8	N/A	4.7	4.6
90	6.7	4.7	4.8	N/A	5.2	4.7	5.0	5.0	N/A	4.9	5.0
91	7.3	5.6	5.0	N/A	5.1	5.0	5.4	5.1	N/A	5.1	5.3
92	6.9	5.5	5.0	N/A	5.3	5.2	5.2	4.9	N/A	5.1	5.2
93	6.7	5.4	5.0	N/A	5.1	5.3	5.1	5.0	N/A	5.0	5.3
94	7.4	5.4	4.8	4.8	5.0	5.4	5.3	5.3	4.7	4.9	5.3
95	7.3	5.3	4.6	4.7	5.0	5.1	5.2	4.8	4.7	4.8	5.2
96	7.0	5.2	4.6	4.8	4.8	4.8	5.3	4.8	4.8	4.8	5.3
97	5.8	4.5	4.2	4.3	4.7	4.3	4.6	4.4	4.6	4.6	4.6
98	5.6	4.3	4.2	4.2	4.4	4.1	4.6	4.3	4.3	4.5	4.3
99	N/A	N/A	N/A	4.7	N/A	N/A	N/A	N/A	4.8	N/A	N/A
100	N/A	N/A	N/A	4.8	N/A	N/A	N/A	N/A	4.6	N/A	N/A
101	N/A	N/A	N/A	4.7	N/A	N/A	N/A	N/A	4.5	N/A	N/A
102	N/A	N/A	N/A	4.6	N/A	N/A	N/A	N/A	4.6	N/A	N/A
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105	N/A	N/A	N/A	4.9	N/A	N/A	N/A	N/A	4.8	N/A	N/A
106	N/A	N/A	N/A	4.3	N/A	N/A	N/A	N/A	4.4	N/A	N/A
107	N/A	N/A	N/A	4.1	N/A	N/A	N/A	N/A	4.1	N/A	N/A
108	N/A	N/A	N/A	4.1	N/A	N/A	N/A	N/A	4.1	N/A	N/A

TABLE 8
8-hour Concentration of Carbon Monoxide by Receptor

Receptor	Concentration (parts per million)										
	2005	2015	2015	2015	2015	2015	2035	2035	2035	2035	2035
	Existing	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2	No Build	Alt. 1 Option 1	Alt. 1 Option 2	Alt. 2 Option 1	Alt. 2 Option 2
109	N/A	N/A	N/A	4.3	N/A	N/A	N/A	N/A	4.1	N/A	N/A
110	N/A	N/A	N/A	4.9	N/A	N/A	N/A	N/A	4.8	N/A	N/A
111	N/A	N/A	N/A	4.8	N/A	N/A	N/A	N/A	4.8	N/A	N/A
112	N/A	N/A	N/A	5.0	N/A	N/A	N/A	N/A	4.9	N/A	N/A

Shaded cell indicates location of maximum concentration for the alternative.

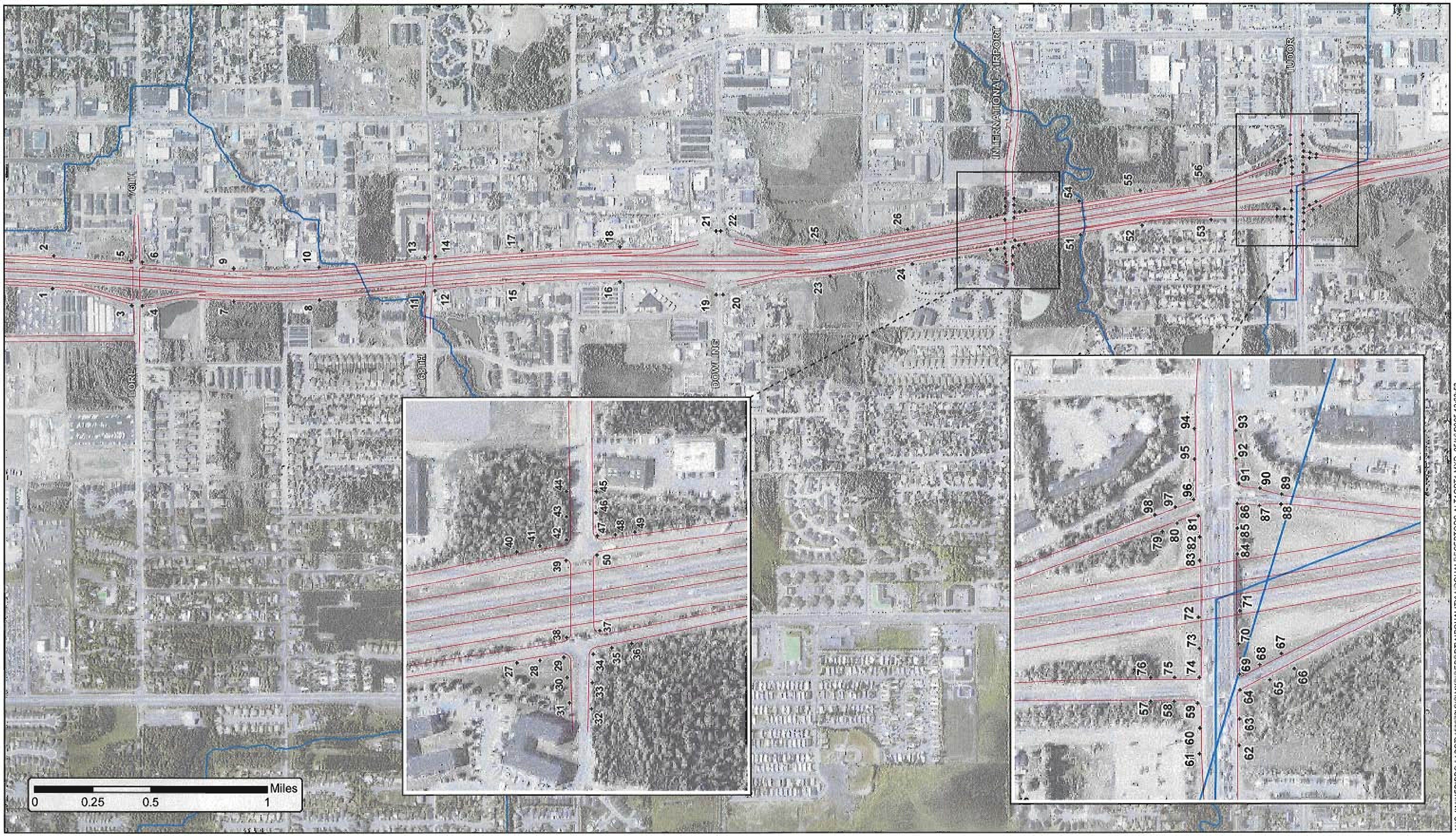
N/A = Not applicable because the receptor location is not included as part of the alternative and option.

ANC \\MINERPROJ\ADOT\159972\GIS\MXD\REPORT\AIRQUALITY\AIRQUALRECEPTORS-EXISTING.MXD 05/16/2005 12:37:54

Legend
102 + Air Quality Receptor

New Seward Highway
Rabbit Creek Road to 36th Avenue
Environmental Impact Statement

Figure 2
Receptor Locations
Existing / No Build



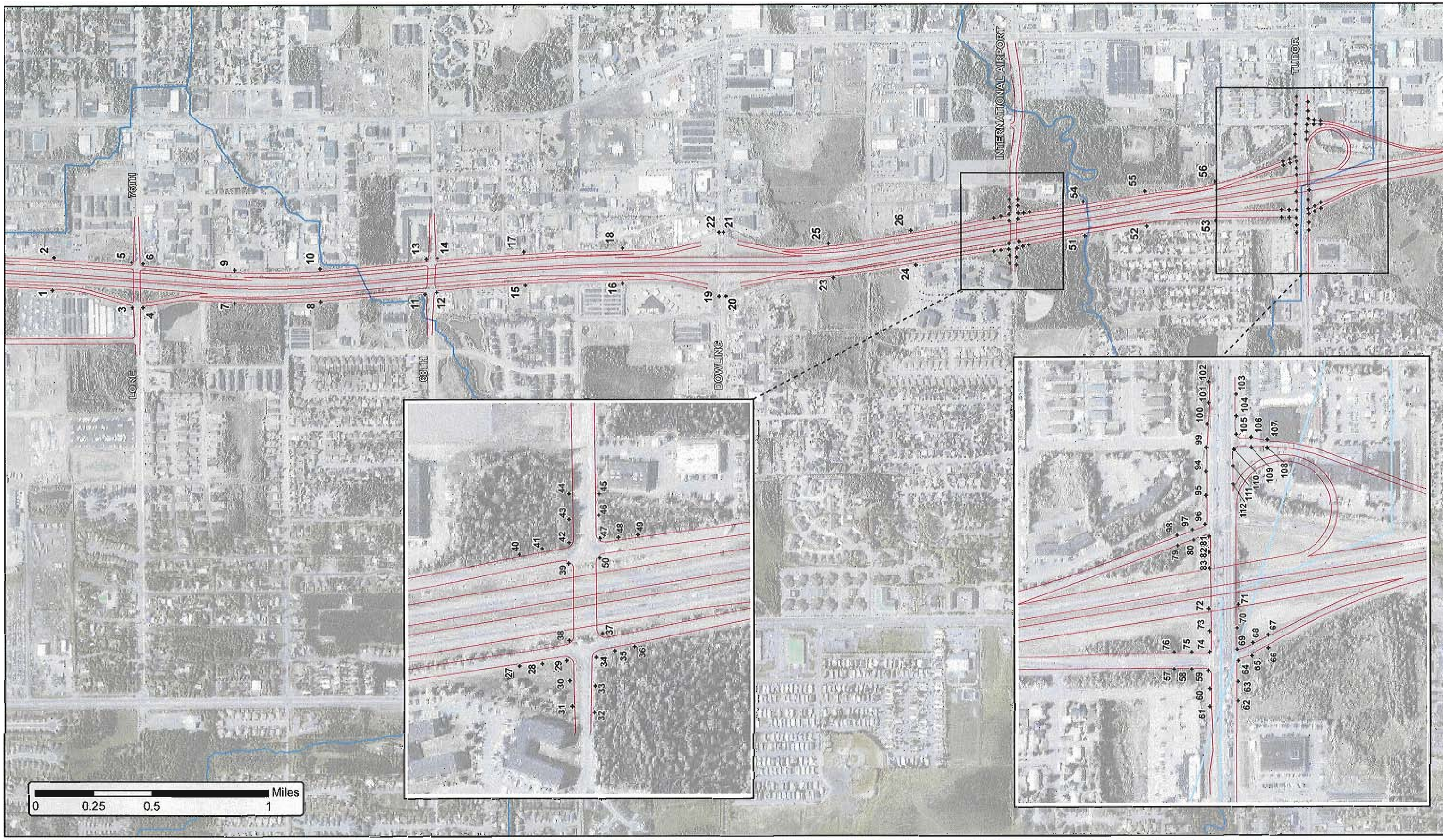
Legend

102 ✚ Air Quality Receptor

Edge of Pavement

New Seward Highway
Rabbit Creek Road to 36th Avenue
Environmental Impact Statement

Figure 3
Receptor Locations
Alternative 1, Option 1



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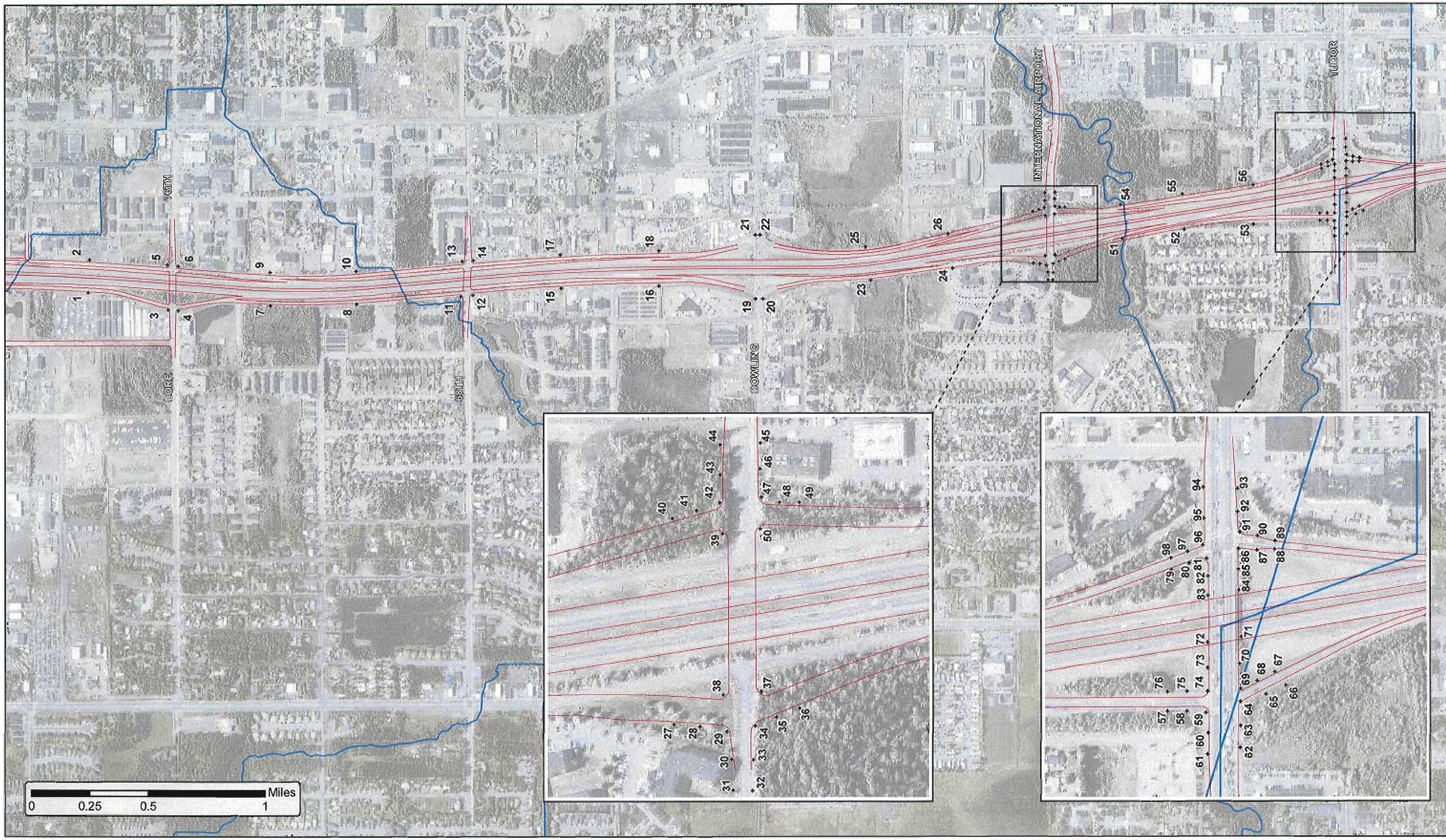
102 + Air Quality Receptor
Edge of Pavement

New Seward Highway
Rabbit Creek Road to 36th Avenue
Environmental Impact Statement

Figure 4
Receptor Locations
Alternative 1, Option 2



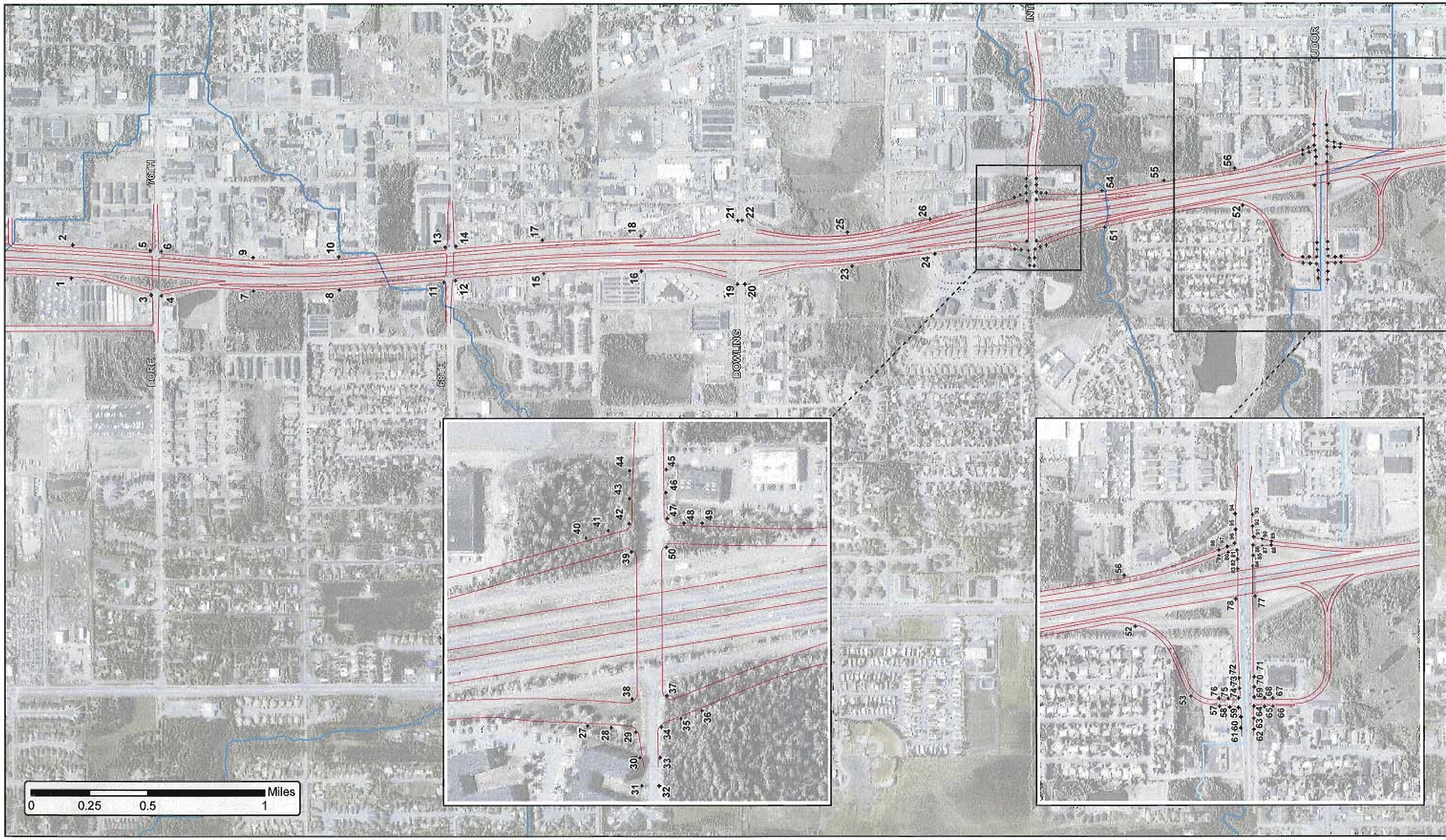
Legend

✚ Air Quality Receptor

Edge of Pavement

New Seward Highway
Rabbit Creek Road to 36th Avenue
Environmental Impact Statement

Figure 5
Receptor Locations
Alternative 2, Option 1



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Air Quality Receptor
Edge of Pavement

New Seward Highway
Rabbit Creek Road to 36th Avenue
Environmental Impact Statement

Figure 6
Receptor Locations
Alternative 2, Option 2

Attachment 1
Work Plan to Develop
Air Conformity Document

Work Plan to Develop Air Conformity Document New Seward Hwy: Rabbit Creek Road to 36th Ave.

TO: Jim Childers/ADOT&PF

CC: Jerry Ruehle/ADOT&PF Dan Sterley/CH2M HILL
Susan Wick/ADOT&PF Sonja Burks/CH2M HILL

FROM: Ed Powell/CH2M HILL

DATE: April 8, 2005

In accordance with Section B15.5.1 of the Scope of Services, the following Air Conformity Document work plan has been prepared to show how project emissions levels will be analyzed to demonstrate the project conforms with Section 170(c)(4) of the Clean Air Act. This work plan reflects information discussed in the Interagency Consultation meeting of March 4, 2005, and includes follow-up information received from the Municipality of Anchorage (MOA).

1. Conduct carbon monoxide (CO) hot spot analysis. With the use of the U.S. Environmental Protection Agency (EPA) computer model MOBILE6.2, the emission rate of CO per average vehicle mile will be determined. Inputs to the model will be the same as those used for the regional analysis, with the following exceptions:

- The soak 45 option will be used. This option involves the greatest number of warm starts, which is appropriate for vehicles in the project area.
- The temperature will be the low temperature of the range used in the regional analysis.
- Emission rates will be determined for all speeds anticipated in the project study area for all alternatives.

With the use of the EPA computer model CAL3QHC, the project impacts at receptor locations throughout the study area will be determined. Inputs to the model will include the emission rate information from MOBILE6.2 and traffic volumes, signal information, and project layouts from the design team. Receptor locations will include locations the public can access, including the EPA-recommended locations around signalized intersections as well as locations between signalized intersections and along frontage roads.

The analysis will include all portions of the project that are below level of service (LOS) C. The mainline from Dimond Boulevard to 36th Avenue and the Tudor Road intersection are presently below LOS C during the PM peak hour. As a result, all alternatives will be studied in this area. In summary, both options of the two build alternatives and the no-build alternative involving the New Seward Highway intersections with Tudor Road and with International Airport Road will be studied. In addition, the mainline and associated frontage roads from Dimond Boulevard to 36th Avenue will be included in the analysis of all alternatives.

The analysis will be conducted for years 2005 (no-build alternative only), 2015, and 2035. It was determined in the Interagency Consultation meeting that 2015 is expected to be the worst-case year and needed to be included for conformity purposes. The design year, 2035, and the existing year, 2005, will need to be analyzed for environmental impact statement (EIS) purposes.

Background CO values will be determined by adjusting background values taken by the MOA in 1998 to present-day values by using the decrease in actual monitoring results over the same period of time. Steve Morris/MOA sent the document "Estimation of Background Concentration for New Seward Highway Corridor" (see Appendix A), which demonstrates this calculation for 2004. Use of the same approach for 2005 results in an 8-hour background value of 2.9 parts per million (ppm). This value will be used for all years of the analysis.

2. Prepare draft Conformity Analysis Report. This draft report will present a description of the hot-spot analysis, including the models used, the inputs to the models, and any assumptions. Diagrams will be included presenting the relative locations of all receptors. The highest results will be presented for all options of all alternatives, including the no-build alternative. All input files and output files will be included in attachments to the report. The report will include a discussion about why the project meets federal conformity requirements.

3. Prepare a draft Conformity Document for agency review. This document will accompany the Conformity Analysis Report and will be used to record comments and responses to comments on the report. After including comments and responses to agency comments, the document will become the draft Conformity Document for Public Comment and will be used to record the public's comments. The Final Conformity Document will include a discussion of how the project and the analysis conform to requirements of the Clean Air Act.

4. Issue a final Conformity Analysis Report. The final Conformity Analysis Report prepared will include any changes as a result of the review process.

5. Prepare a description of the "Affected Environment" for the EIS. The text prepared for the EIS will include a description of the air quality regulatory status as well as the results of previous monitoring conducted in the area.

6. Prepare a description of the "Environmental Consequences" for the EIS. This text will include a summary of the analysis conducted as well as a qualitative discussion of other impacts such as construction impacts and cumulative impacts. The final Conformity Analysis Report will be included as an appendix of the EIS.

Appendix A

Estimation of Background Concentration for Seward Highway Corridor

Selected Background CO Sites

Site	Measurement Method	Site Type	Description	2^{nd} Max 8-hour [CO] measured during study
BP	Drager	parking lot	BP employee parking lot, approx. 300 m SE of intersection of Seward Highway and Benson Blvd.	2.8
Vassar Dr.	Drager	neighborhood	residential, 3584 Vassar Drive, east of Seward Highway, south of Benson	5.5
Old Seward & Dimond	Drager	micro	on Dimond Blvd., 35 m west of intersection with Old Seward Highway, SW quadrant of intersection, ADT = 50,500	5.2
Dimond Ctr Mall	Drager	parking lot	parking areas south and east of Dimond Center, approx. 75 m west of Old Seward Highway	3.6

Estimate CO Background Concentration (8-hour) in 2004

1. Use highest 2^{nd} max concentration (Vassar Drive) from 'background sites' along Seward corridor.

   1998 background [CO] = 5.5 ppm

2. Examine ambient monitoring trends between to determine rate of decline in CO concentrations along Seward Highway Corridor since the 1998 study year.

   Trend in 2^{nd} max 8-hour [CO] at Seward Hwy and Benson Blvd station since 1988 is described by following regression equation:

   [CO] = -0.5002(year) + 1006.8; thus the expected [CO] in 1998 and 2004 can be computed as follows:

   [CO in 1998] = -0.5002(1998) + 1006.8 = = 7.40 ppm

   [CO in 2004] = -0.5002(2004) + 1006.8 = = 4.39 ppm

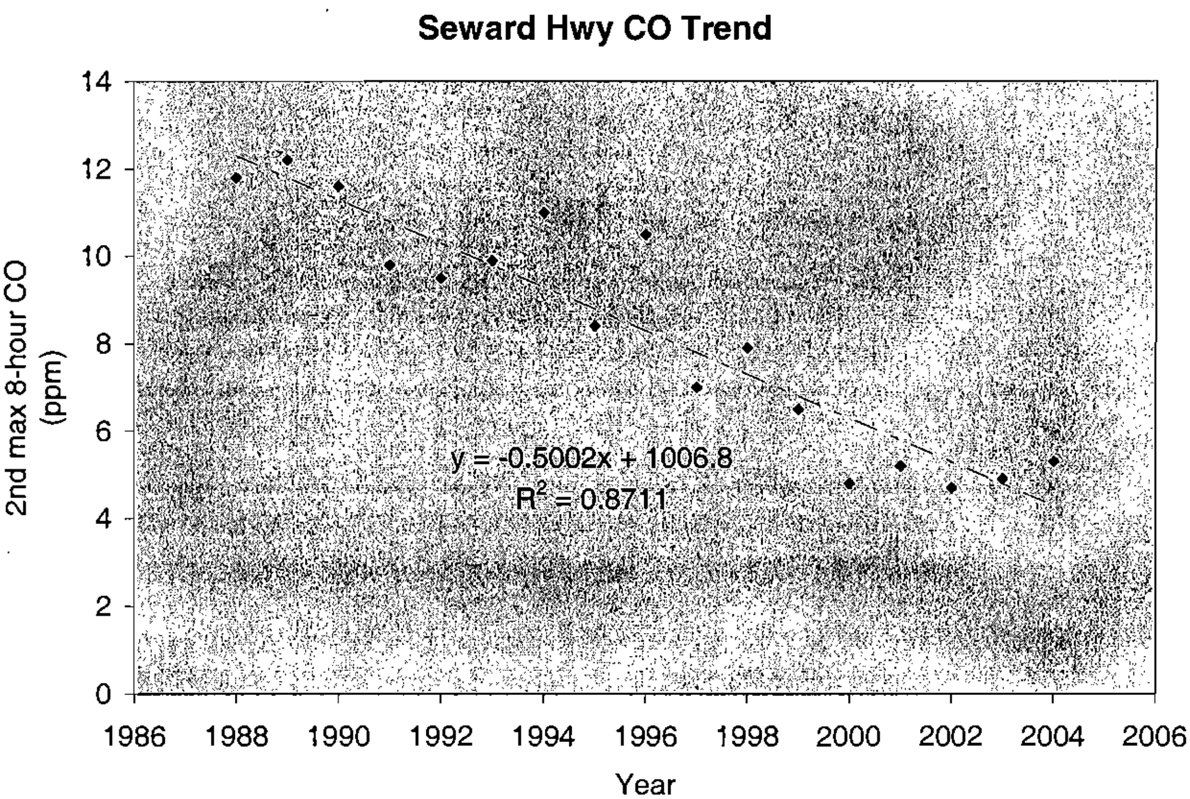
   % decline in CO between 1998 and 2004 = 40.7%

3. Assume same 40.7% decline in background concentration.

   [CO bkg 1998] = 5.5 ppm

   [CO bkg 2004] = 5.5 ppm (1 – 0.407) = 3.3 ppm

4. Assume background concentration = 3.3 ppm


Seward Hwy CO Trend
2nd max 8-hour CO (ppm)
14
12
10
8
6
4
2
0
y = -0.5002x + 1006.8
R2 = 0.8711
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
Year

Attachment 2
Description of Alternatives

ATTACHMENT 2

Description of Alternatives

The study area, the New Seward Highway corridor from Rabbit Creek Road to 36th Avenue, is shown in Figure A2-1. The following alternatives are described below:

- No-Build Alternative (through 2035) (required by National Environmental Policy Act)
- Build Alternative 1—Mainline expansion with grade separations and Tudor Road interchange improvements
- Build Alternative 2—Mainline expansion with grade separations and International Airport Road interchange

Appendix B of the Preliminary Engineering Report (CH2M HILL, 2004) provides the design criteria for the mainline, frontage roads, ramps, and cross streets. The design criteria were established to conform with guidance provided in Chapter 11 of the *Alaska Preconstruction Manual* (ADOT&PF, 2003) and the *Policy on Geometric Design of Highways and Streets* (American Association of State Highway and Transportation Officials [AASHTO], 2000).

No-Build Alternative

The No-Build Alternative maintains the existing four-lane divided highway from Rabbit Creek Road to 36th Avenue. No improvements to the mainline, interchanges, or frontage roads within the corridor would be performed. Although major facility improvements would not be made, maintenance of the facilities would require activities such as resurfacing, reconstruction of deteriorated shoulders on frontage roads, and illumination replacement and additions.

The No-Build Alternative does include consideration of the effects of projects expected to be built in the corridor during the next 30 years, as specified in the 2001 Long-Range Transportation Plan (LRTP) (Municipality of Anchorage [MOA], 2001), including the following arterial improvements:

- O'Malley Road—widening the segment between New Seward Highway and Lake Otis Parkway from two to four lanes with capacity improvements at major intersections
- Huffman Road—widening the segment between Old Seward Highway and Lake Otis Parkway to provide two travel lanes in each direction

Build Alternative 1—Freeway Expansion with Grade Separations and Tudor Road Interchange Improvements

Rabbit Creek Road to O'Malley Road. In this segment, the existing New Seward Highway mainline, which is four lanes (two each traveling north and south) with a center grassed median, remains unchanged. Minor safety and capacity enhancements may be incorporated at the Rabbit Creek, DeArmoun, and Huffman road interchanges.

Pedestrian and bicycle improvements consist of a separated multi-use pathway east of New Seward Highway, along the Brayton Drive frontage road. A commuter bicycle route is also included along the right shoulder of Brayton Drive. At the Rabbit Creek Road Elementary School pedestrian overcrossing, Americans with Disabilities Act (ADA) upgrades include ramp access improvements. (Details about pathway and pedestrian facilities are described in the 2003 *New Seward Highway Pathway and Pedestrian Facilities* report by Land Design North and CH2M HILL.)

O'Malley Road to Dimond Boulevard. In this segment, the New Seward Highway mainline is widened from the existing four lanes to six lanes. The grass median is retained.

Improvements consisting of a multi-use path and commuter bicycle route along Brayton Drive are included for the east side of the highway. A commuter bicycle route is planned for the west side along the Homer Drive frontage road where a multi-use path already exists. Like the existing path, the proposed path along Brayton Drive is separated from the roadway as much as possible where right-of-way is available. In areas of limited space, the pathway is adjacent to the roadway, separated only by curb and gutter.

On the west side, the Homer Drive frontage road is extended south from Dimond Boulevard to O'Malley Road, providing a one-way frontage road system from O'Malley Road to Tudor Road.

This segment includes interchange improvements. At O'Malley Road, minor interchange modifications include widening of the southbound ramp exiting from New Seward Highway to two lanes to accommodate transition of the mainline lane from three to two lanes in the southbound direction.

A half-diamond interchange constructed at 92nd Avenue[1] includes slip ramps between the New Seward Highway mainline and the frontage roads. In the northbound direction, a slip ramp allows traffic from New Seward Highway to "slip" onto Brayton Drive just south of 92nd Avenue. In the southbound direction, a slip ramp allows traffic from Homer Drive to "slip" onto New Seward Highway just south of 92nd Avenue. This grade-separated interchange raises the New Seward Highway mainline on a bridge above 92nd Avenue. The work also includes extension of 92nd Avenue from Homer Drive (west frontage road) to Brayton Drive (east frontage road). This portion of 92nd Avenue is four lanes, providing a through lane in each direction and side-by-side left-turn lanes between intersections with the frontage roads. (The turn lanes in this configuration are constructed inside the through lanes.)

In addition, 92nd Avenue is extended as a two-lane road west to Old Seward Highway, where auxiliary turn lanes are incorporated for the turning movements.

[1] The half-diamond interchange at 92nd Avenue actually is constructed on a short segment of road between Old Seward Highway and the New Seward Highway that aligns with 92nd Avenue but is labeled Abbott Road. The alignment of four east-west road segments is generally the same. From east to west, the segments are (1) Abbott Road; (2) Academy Road from Vanguard to Brayton drives; (3) Abbott Road, on the west side of the New Seward Highway and extending to Old Seward Highway; and 92nd Avenue, on the west side of Old Seward Highway. A portion of Abbott Road on the east side of the New Seward Highway deviates from the alignment and curves to join Dimond Boulevard. This report follows the naming practices used in previous transportation documents such as LRTPs and refers to both road segments west of Old Seward Highway as "92nd Avenue."

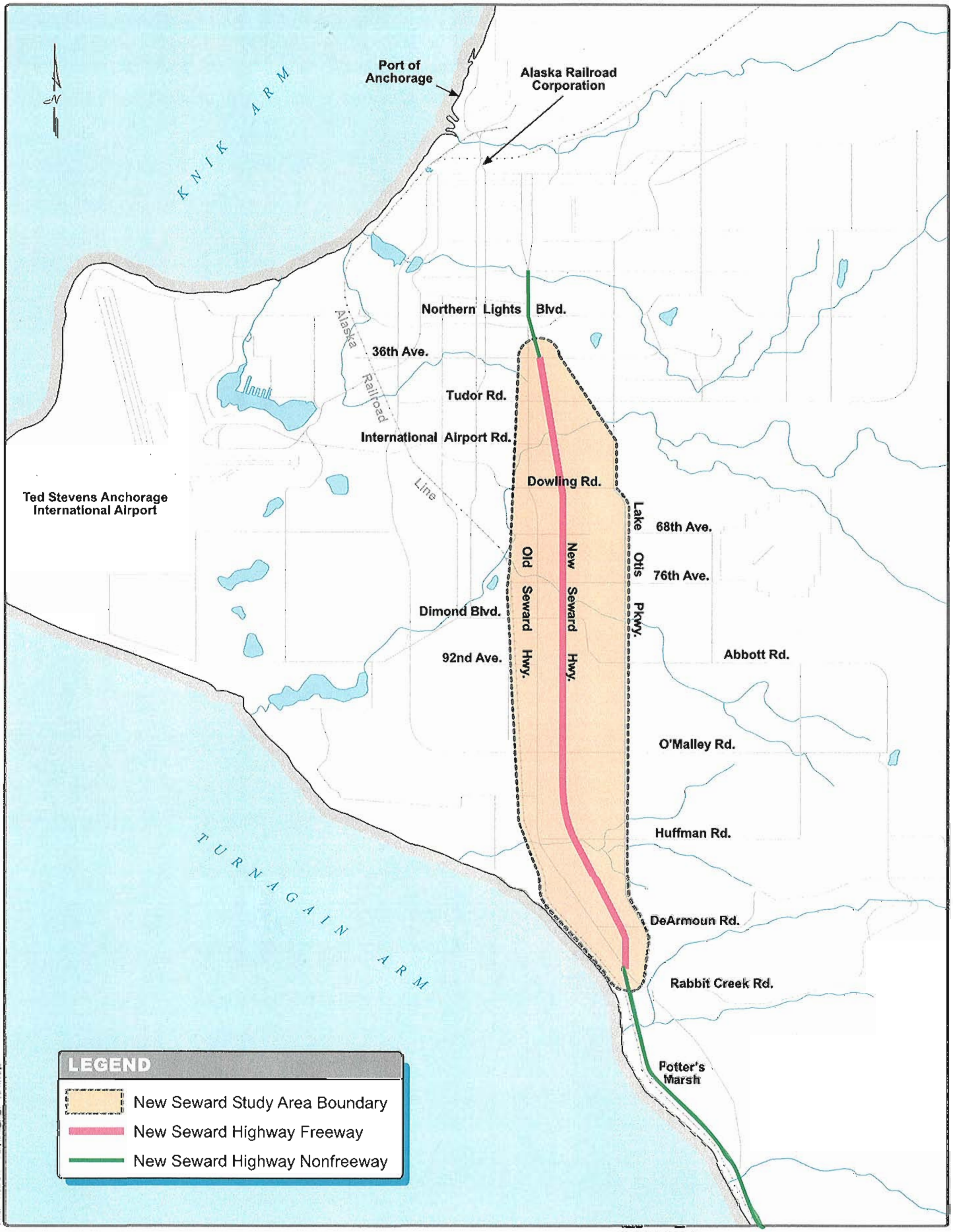


FIGURE A2-1

New Seward Highway Corridor, Rabbit Creek Road to 36th Avenue, Study Area

New Seward Highway
Rabbit Creek Road to 36th Avenue
Environmental Impact Statement

Dimond Boulevard to Dowling Road. In this segment, the widened, six-lane New Seward Highway mainline continues. Multi-use pathways are included adjacent to the mainline, and commuter bicycle routes are included along the right shoulders of both Brayton Drive and Homer Drive frontage roads. The pathways are separated from the roadways as much as possible where right-of-way is available. In areas of limited space, the pathways are adjacent to the roadway, separated only by curb and gutter.

As part of new grade separations at 76th and 68th avenues, the existing frontage roads are reconstructed to achieve the grade changes. To accommodate a southbound two-lane exit ramp to Dimond Boulevard, the Homer Drive frontage road turns west toward Old Seward Highway at 80th Avenue. Access to the existing businesses farther south on Homer Drive is retained. Homer Drive begins again with the southbound ramp for the New Seward Highway.

Improvements at the Dimond Boulevard interchange include ramp upgrades, channelization between ramp intersections, and bridge replacement. As part of the ramp upgrades, the southbound ramp exiting New Seward Highway is expanded to two lanes and the ramp intersection is relocated to accommodate the extension of Homer Drive from Dimond Boulevard to O'Malley Road. The work requires rechannelization of Dimond Boulevard to remove the eastbound left-turn pocket to Brayton Drive, where replacement access is provided with the Sandlewood Place extension.

Sandlewood Place on the east side of New Seward Highway is reconstructed and extended between Dimond Boulevard and Lore Road (76th Avenue). The new road is 30 feet wide with sidewalks on each side. The extension provides continuity to the north for Brayton Drive and replacement access to the properties along Brayton Drive in conjunction with the removal of the uncontrolled eastbound left-turn pocket from Dimond Boulevard.

A new half-diamond interchange joins 76th Avenue with New Seward Highway. The improvement incorporates grade separation and maintains the existing slip ramps to and from the north. New Seward Highway is raised on a bridge over 76th Avenue to allow the extension of 76th Avenue to Brayton Drive. As it passes below New Seward Highway, 76th Avenue consists of four lanes, providing a through lane in each direction and side-by-side left-turn bays between intersections with the frontage roads.

Grade separation at 68th Avenue raises New Seward Highway, but does not include ramps for highway access. The extension of 68th Avenue consists of four lanes between Homer and Brayton drives.

Dowling Road to Tudor Road. In this segment, the widened, six-lane New Seward Highway mainline continues. Multi-use pathways are included adjacent to the mainline, and commuter bicycle routes are included along the right shoulders of both Brayton and Homer drives. The pathways are separated from the roadways as much as possible where right-of-way is available. In areas of limited space, the pathways are adjacent to the roadway, separated only by curb and gutter.

At the Dowling Road interchange, the ramps require reconstruction for the lane added to the outside of the New Seward Highway mainline.

At International Airport Road, grade separation incorporates raising New Seward Highway by bridge. Extension of International Airport Road connects Homer and Brayton drives. The International Airport Road roadway extension consists of four lanes, providing a through lane in each direction and side-by-side, left-turn auxiliary lanes between intersections with the frontage roads. Between Homer Drive and Old Seward Highway, International Airport Road is reconstructed to three lanes. As part of elevating the mainline over International Airport Road, the bridges over the nearby Campbell Creek for the mainline and frontage roads also are reconstructed. Replacement of the Campbell Creek bridges provides adequate clearance for a future trail extension under New Seward Highway.

Tudor Road to 36th Avenue. The existing six-lane New Seward Highway mainline in this segment is basically unchanged. Because the additional through lanes on the mainline match the existing auxiliary lanes south of the 36th Avenue intersection, the intersection does not require reconstruction. Roadway improvements at 36th Avenue may include minor channelization enhancements.

Bicycle and pedestrian improvements consist of a new multi-use separated pathway on the west side of the road, adjacent to the mainline, and ADA upgrades for the existing pathways at 36th Avenue and along Tudor Road.

For the Tudor Road interchange improvement, two options are being considered:

- Option 1—Upgrade the existing diamond interchange to provide dual left-turn lanes on Tudor Road serving westbound-to-southbound traffic. The addition of a left-turn lane between the ramp intersections requires reconstruction of the Tudor Road bridge.
- Option 2—Construct a loop ramp in the northwest quadrant of the interchange to serve westbound to southbound traffic. This improvement requires acquisition of right-of-way in the northwest quadrant. In addition, this option adds a lane between ramp intersections and requires reconstruction of the Tudor Road bridge.

The current five-lane configuration of Tudor Road west to Old Seward Highway is retained.

Illumination. From Huffman Road to 36th Avenue, continuous illumination is added to New Seward Highway to augment the existing high-mast lighting at the interchanges.

Transportation System Management and Travel Demand Management Components. The transportation system management elements of Build Alternative 1 include advanced traffic management focus at 36th Avenue and selected auxiliary lane treatment for the critical sections of the New Seward Highway mainline where bottlenecks have been identified.

The transportation system management elements and deployment of advanced traffic management at the signalized intersections where New Seward Highway ramps terminate and along the mainline are intended to improve traffic flow and reduce congestion. The key transportation system management improvements on the New Seward Highway corridor are as follows:

- Modernization of the traffic signal control system at 24 intersections in the corridor—As a smart corridor, the New Seward Highway corridor incorporates a system to optimize traffic signal system management. The signalized ramp intersections are instrumented with state-of-the-art controller technologies, real-time video monitoring, automated data collection, real-time communications to a traffic management center, incident monitoring and management, and adaptive traffic controls responsive to specific traffic conditions. The MOA, which is responsible for all traffic signal operations in Anchorage, controls the traffic management system through its traffic management center.

- Strategic traffic control focus at the intersection of New Seward Highway and 36th Avenue as a network hot spot—Advanced traffic management and engineering initiatives implemented at this intersection include advanced traffic signal timing and traffic engineering approaches consisting of signing, striping, and operation monitoring to maximize intersection throughput and improve safety.
- Use of video traffic monitoring and incident management capabilities on the mainline and at ramp terminals and cross streets
- Access management on the frontage roads and use of these roads as reliever routes for excess congestion and incident conditions
- Provision of park-and-ride facilities near the New Seward Highway freeway, initially at DeArmoun and O'Malley roads for ride-sharing participants and future bus service passengers

The initiatives implemented as part of a travel demand management program include the following:

- Expansion of transit service, including vanpool operations
- Promotion of employer-based support and implementation of incentives for shifting travel times
- Encouragement of voluntary travel reduction
- Promotion of expanded use of telecommuting in normal business practices

Build Alternative 2—Freeway Expansion with Grade Separations and International Airport Road Interchange

Improvements in the first three segments of the study area—Rabbit Creek Road to O'Malley Road, O'Malley Road to Dimond Boulevard, and Dimond Boulevard to Dowling Road—are the same as those described for Build Alternative 1. The illumination and the transportation system management and travel demand management improvements for Build Alternative 2 are also identical to those under Build Alternative 1.

Dowling Road to Tudor Road (with International Airport Road interchange). For this segment, the mainline and pathway improvements are the same as those for Build Alternative 1.

At the Dowling Road interchange, the northern entrance and exit ramps connecting Dowling Road to New Seward Highway are removed. (AASHTO recommends 1-mile spacing between intersections.) As a result of this change, southbound traffic on New Seward Highway traveling to Dowling Road must exit at the new International Airport Road interchange and travel on Homer Drive south to Dowling Road. Northbound traffic from Dowling Road travels on Brayton Drive to International Airport Road, where a ramp is available to enter New Seward Highway.

The new interchange at International Airport Road consists of a diamond configuration. New Seward Highway is raised over International Airport Road on a bridge. International Airport Road is extended east to meet Brayton Drive and is four lanes, providing a through lane in each direction and side-by-side left-turn lanes between intersections with the frontage roads. International Airport Road continues as a three-lane road from New Seward Highway to Old Seward Highway where it joins the existing five-lane configuration. Elevating the New Seward Highway mainline over International Airport Road also requires replacement of the bridges over Campbell Creek. Replacement of the Campbell Creek bridges will provide adequate clearance for a future trail extension under New Seward Highway, Brayton Drive, and Homer Drive.

Tudor Road to 36th Avenue. The New Seward Highway mainline, pathway, and 36th Avenue intersection improvements are the same as those described for Build Alternative 1.

Two options are considered for use at the Tudor Road interchange:

- Option 1—The existing diamond interchange is upgraded to provide dual left-turn lanes on Tudor Road, serving westbound-to-southbound traffic. The addition of a left-turn lane between the ramp intersections requires reconstruction of the Tudor Road bridge. Also, to accommodate the International Airport Road interchange, the southbound ramp for traffic entering New Seward Highway from Tudor Road and the northbound ramp for traffic exiting New Seward Highway at Tudor Road are removed.
- Option 2—To accommodate the International Airport Road interchange, the southbound ramp for traffic entering New Seward Highway from Tudor Road and the northbound ramp for traffic exiting New Seward Highway at Tudor Road are removed. To serve northbound traffic from Brayton Drive to Tudor Road, "hook" ramps are constructed in the northeast and southeast quadrants of the Tudor Road and New Seward Highway interchange. This configuration provides adequate distance between the two ramp intersections with Tudor Road to maintain traffic flow and eliminates the need to replace the Tudor Road bridge.

The current four-lane configuration of Tudor Road west to Old Seward Highway is retained.

References

American Association of State Highway and Transportation Officials. 2000. *Policy on Geometric Design of Highways and Streets.*

Alaska Department of Transportation and Public Facilities. June 16, 2003. *Alaska Preconstruction Manual.*

CH2M HILL. September 2004. *New Seward Highway, Rabbit Creek to 36th Avenue, Preliminary Engineering Report.*

Municipality of Anchorage, Traffic Department, and Anchorage Metropolitan Area Transportation Study. 2001. *2001 Anchorage Bowl Long-Range Transportation Plan.*