VI. APPENDIX

APPENDIX A

Definitions and Acronyms

"A" Minor Arterials - Roadways within the metropolitan area which are more regionally significant than others. These roadways are classified into the following groups:

> **Relievers -** Minor arterials which provide direct relief for metropolitan highway traffic. These roads include the closest routes parallel to the principal arterials within the urban and transitional areas. These roadways are proposed to accommodate medium length trips (less than 8 miles) as well as providing relief to congested principal arterials. Approximately 395 miles have been identified. Improvement focus is on providing additional capacity for through traffic.
>
> **Expanders -** Routes which provide a way to make connections between developing areas outside the interstate ring or beltway. These routes are located circumferentially beyond the area reasonably served by the beltway. These roadways are proposed to serve medium to long suburb to suburb trips. Approximately 190 miles have been identified.
>
> **Connectors -** This subgroup of "A" minor arterials are those roads that would provide good, safe connections among town centers in the urban reserve and rural areas within and near the seven counties. Approximately 300 miles have been identified. Improvement focus is on safety and load-carrying capacity.
>
> **Augmenters -** The fourth group of "A" minor arterials are those roads that augment principal arterials within the interstate ring or beltway or within Freestanding Growth Centers. The principal arterial network in this area is mature. However, the network of principal arterials serving the area is not in all cases sufficient relative to the density of development that network serves. In these situations, these key minor arterials serve many long-range trips. The improvement focus is on providing additional capacity for through traffic.

Applicant - The applicant is the agency, organization, or government submitting the application.

Congestion Management System - A process for developing, evaluating, implementing and monitoring transportation strategies and plans that address existing and future traffic congestion. The individual components of the system will consist of:

1. An inventory and tracking program.
2. A congestion evaluation program.
3. Locally developed congestion standards.
4. Short and long range strategies and actions that address present and future congestion.

Areas in which strategies can be pursued are: ITS, incident management, HOV lanes, ridesharing, transit operations, transit pricing, road pricing, access management, site design, parking management, flextime, and other TDM and TSM strategies.

Construction - Roadway improvements directed toward increasing the capacity of the facility either by the addition of new through lanes or new construction.

Design Capacity- The assumed maximum number of vehicles per lane which pass any given point in an hour on an average day during good operating conditions. For the purposes of responding to criteria in this solicitation packet, the following capacities shall be used:

- metered freeway - 1,950 vehicles per hour;
- unmetered freeway - 1,750 vehicles per hour;

- HOV lane (concurrent) - 1,400 vehicles per hour;
- expressway through lane - 700 vehicles per hour;
- arterial through lane - 600 vehicles per hour;
- left-turn lane - 300 vehicles per hour;
- right-turn lane - 200 vehicles per hour;
- dedicated bike lane or joint use trail - 60 vehicles per hour.

Integrated Traffic Management System - The development and application of network wide, data collection and sharing traffic information system. The system can integrate data and control systems from freeways, arterials and city streets in order to provide real-time proactive traffic information and control. Implementation of the system would facilitate congestion management over the entire network across multi-jurisdictional boundaries. The system could provide incident detection, transit and emergency vehicle priority, and advance traveler information.

Intelligent Transportation Systems (ITS) - The development or application of technology (electronics, communications, or information processing) used to improve the efficiency and safety of surface transportation systems. ITS is subdivided into five categories that reflect the major emphasis of application:

Advanced Traffic Management Systems
Advanced Traveler Information Systems
Advanced Public Transportation Systems
Automatic Vehicle Control Systems
Commercial Vehicle Operations

Projects designed to improve surface transportation systems involve integrating electronics, communications and computer and control systems into both vehicles and public roadways. Some operational examples include Highway Advisory Radio, On-line Computer controlled freeway ramp metering and in-vehicle cruise control. Future projects could include real-time traveler information systems for buses, advanced driver information systems, in-vehicle collision warning devices and integrated traffic control systems.

Intermodal Transportation Facility - Any fixed facility designed to expedite the movement of people or goods from one mode of travel to another. For example, transit hubs or park-and-ride lots are intermodal facilities that connect auto drivers and passengers to public transit. A truck/rail terminal where containers are unloaded from railroad flatcars to tractor trailers is an intermodal facility that makes freight movement more efficient.

Major Traffic Generator - A geographic area with concentrated land use development such that a significant amount of trips are generated. "Regional Business Concentrations" as defined and depicted in the Transportation Development Guide Chapter/Policy Plan meet this definition. Other concentrated developments may also be included.

Operational Improvement - A capital improvement for installation of traffic surveillance and control equipment, computerized signal systems, motorist information systems, integrated traffic control systems, incident management programs, and transportation demand and system management facilities, strategies, and programs.

Principal Arterials - The high-speed, high-capacity highways that constitute the regional highway system. About 660 miles in total length, these routes carry the longest trips in the region and provide the highest speeds available during peak traffic periods. They connect the Metropolitan Urban Service Area (MUSA) with urban areas and major cities in Minnesota and other states. And, within the MUSA, they interconnect the metropolitan centers, regional business concentrations, important transportation terminals, and large institutional facilities.

Project - A group of tasks or methods designed to accomplish a specific purpose. For example a roadway construction project would be defined by the location, cross section and intersection treatment. A TSM project would define the scope, methods, location, and duration of the tasks.

Reconstruction - Roadway improvements that are intended to improve the cross section and grade of sections of the highway system. These projects are intended to include as needed, HOV lane and ramps, metering, addition of turn lanes, channelization, widening of lanes and/or shoulders, improving horizontal and/or vertical sight distances, upgrading pavement to minimize load restrictions, interchanges, bridges, and signals.

Rehabilitation - Roadway improvements intended to correct conditions identified as deficient without major changes to the cross section. These projects should consist of removal and replacement of base and pavement, shouldering and as needed widening and drainage correction.

Routine Maintenance - Roadway maintenance consisting of periodic applications of bituminous overlays, seal treatments, milling, crack routing and filling and base repair. These treatments are intended to help ensure the roadway can be used to the end of its design life. These projects are ineligible for federal funding.

Throughput - The amount of vehicles/persons which can pass a point on a roadway or pass through an intersection over a specified period of time. Can be equated to capacity if considering vehicles alone.

Traffic Analysis Zone - A geographic area of land containing socioeconomic data (population, households, employment, etc.) used primarily in traffic forecasting. The seven-county metropolitan area is divided into 1165 traffic analysis zones.

Traffic Signal Control Systems - For the purposes of this solicitation, the degree of traffic management of an arterial is grouped and defined as follows:

> **Fixed Time -** The traffic signals on an arterial are controlled locally through a time clock system. In general, the progression of a through band (the amount of green time available along an arterial at a given speed) along the arterial in the peak direction is determined by past experience and is not a function of immediate traffic demand.
>
> **Semi-Actuated -** The traffic signals along the arterial are designed to maximize the green time on the major route in the major direction. Timing and through band are based upon historical records. Use of green time on the minor routes is dependent upon real-time demand and maximized based upon total intersection delay.
>
> **Interconnection -** A traffic signal system in which data collected at individual signals is shared with a central processor or controller. Adjustments in traffic signal control can be made based upon incoming data as opposed to historical data.
>
> **Optimization -** The process in which a traffic signal or system is modified to maximize the amount of vehicles passing through the intersection for all approaches or on the major road in the peak direction.
>
> **Real-Time Adaptive Control -** An advanced traffic control system which incorporates current technologies in communications, data analysis, and traffic monitoring to provide real-time traffic control of arterials, corridors or roadway networks.

Transportation Demand Management - Programs and methods to reduce effective demand. In the broadest sense, any activity or facility that reduces person trips would fall within project classification. The highest priority in the region is given to reducing single-occupant vehicle trips in the peak periods. Techniques that might be utilized are carpooling, vanpooling, telecommuting, transit, alternative work hours, transportation management association, and land development or ordinances that discourage vehicle trips and encourage walk, bike, rideshare and transit trips.

Transportation System Management - Programs and methods to improve the efficiency and effective capacity of the transportation system. Techniques that might be utilized are signalization, metering, HOV ramps and lanes, one-way streets and transit system improvements.

ACRONYMS

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
CAAA	Clean Air Act Amendment (of 1990)
CBD	Central Business District
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon Monoxide
EPA	US Environmental Protection Agency
EQB	Environmental Quality Board
DNR	Department of Natural Resources
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HCADT	Heavy Commercial Average Daily Traffic
HOV	High Occupancy Vehicle
ISTEA	Intermodal Surface Transportation Efficiency Act
MN	Minnesota
MN/DOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MUSA	Metropolitan Urban Service Area
NAAQS	National Ambient Air Quality Standard
NEPA	National Environmental Protection Act
PA	Principal Arterial
PS&E	Plan Specification and Estimate
SIP	State Implementation Plan (for Air Quality)
SOV	Single Occupancy Vehicle
STP	Surface Transportation Program
TAC	Technical Advisory Committee
TAB	Transportation Advisory Board
TAZ	Traffic Analysis Zone
TCM	Transportation Control Measures
TDM	Transportation Demand Management
TE	Transportation Enhancements
TEA-21	Transportation Equity Act for the 21st Century
TIP	Transportation Improvement Program
TPP	Transportation Policy Plan
TSM	Transportation System Management

APPENDIX B

Technical Assistance Contacts

The list below is intended to provide contacts for technical assistance in providing necessary data in order to address various criteria. Before contacting a technical expert listed below, please use existing local sources. Local experts in many cases are the appropriate contact for much of the data needed to respond to criteria. In some instances, it may take five or more workdays to provide requested data. Please request data as soon as possible.

Applicants should contact experts as soon as possible to avoid delays in obtaining data.

SUBJECT	NAME	ORGANIZATION	PHONE
GENERAL	Kevin Roggenbuck Don Koski Carl Ohrn	Transportation Advisory Board Metropolitan Council Metropolitan Council	(651) 602-1728 (651) 602-1721 (651) 602-1719
TRAFFIC VOLUMES Freeways State Roads Heavy Commercial 2030 Projections	 Len Palek Dudley Gjersvig Tom Nelson Mark Filipi	 MN/DOT MN/DOT MN/DOT Metropolitan Council	 (651) 582-1474 (651) 296-1664 (651) 297-1194 (651) 602-1725
CRASHES	Jolene Servatius	MN/DOT	(651) 634-2373
FREEWAY MANAGEMENT	Len Palek	MN/DOT	(651) 582-1474
TRUNK HIGHWAY TRAFFIC SIGNALS Existing Signals Signal Improvements	 Steve Misgen John Bieniek	 MN/DOT MN/DOT	 (651) 634-2130 (651) 634-2152
STATE-AID STANDARDS	Colleen VanWagner	MN/DOT	(651) 582-1369
BIKEWAY/WALKWAY STANDARDS	Kristie Billiar	MN/DOT	(651) 296-5269
DEMOGRAPHICS by TAZ	Robert Paddock	Metropolitan Council	(651) 602-1340
TRANSIT RIDERSHIP	Elaine Koutsoukos	Metropolitan Council	(651) 602-1717

APPENDIX C

Metropolitan Division Typical Schedule for Projects Processed Through State Aid

Note: For estimating purposes only. Time will vary due to district staffing, workload, complexity, funding availability, etc.

A.1. ENVIRONMENTAL DOCUMENTATION: Assumes one return to agency for clarification, additional information or revision.

____ weeks for agency preparation.
2 to 4 weeks for District State Aid review.
2 to 4 weeks for Central Office State Aid review.

____ weeks for agency revision.
1 to 2 weeks for District State Aid review and signature
2 to 4 weeks for Central Office State Aid review and signature.
3 to 5 weeks for FHWA approval.

Total A.1 = _____ Weeks

A2. OPPORTUNITY FOR PUBLIC HEARING: Not necessary for project memorandum.

30 days minimum to advertise for public hearing.
_____ weeks to hold public hearing.

Total A2 = _____ Weeks

A3. FINAL ENVIRONMENTAL ASSESSMENT: Only necessary for Environmental Assessment.

_____ weeks to prepare Final Environmental Assessment.
1 to 2 weeks for District State Aid review and signature.
2 to 4 weeks for Central Office State Aid review and signature.
3 to 5 weeks for FHWA Finding Of No Significant Impact (FONSI).

Total A3 = _____ Weeks

A4. STUDY REPORT: Required for Project Path Report and Environmental Assessment Only. Assumes one return to agency for clarification, additional information, or revision.

_____ weeks for agency preparation.
2 to 4 weeks for District State Aid review.
2 to 4 weeks for Central Office State Aid review.

_____ weeks for agency revision.
1 to 2 weeks for District State Aid review and signature.
2 to 4 weeks for Central Office State Aid review and approval.

Total A4 = _____ Weeks

Total A = _____ Weeks

B. PLAN REVIEW AND RIGHT-OF-WAY ACQUISITION: Assumes one return to agency for clarification, additional information, or revision.

NOTE: Right-of-way acquisition and MN/DOT right-of-way engineer review of local process may happen concurrently and may take longer than plan review. Letting does not begin until a Right-Of-Way Certificate is received and, therefore, may decide earliest letting date.

ACQUISITION IS ESTIMATED AT _____ WEEKS.

_____ weeks for Preliminary Bridge Plan preparation if necessary.
2 to 4 weeks for Bridge Office preliminary review if necessary.
_____ weeks Roadway/etc. and Final Bridge Plan preparation.
1 to 3 weeks for District State Aid review.
_____ weeks for agency revision.
1 to 2 weeks for District State Aid review and signature.
2 to 6 weeks for Central Office State Aid and Bridge Office review.
_____ weeks for agency revision.
1 to 2 weeks for Central Office State Aid and Bridge Office review/signature.

TOTAL B = _____ WEEKS

C. LETTING: Assumes Disadvantaged Business Enterprise (DBE) goal is required and local funds match.

1 week for DBE goal decision.
2 weeks for project funding ********Obligation******** by FHWA.
1 week to advertise in local papers and Construction Bulletin.
3.5 weeks to advertise for bid and bid opening.
1 to 2 weeks to certify DBE participation (about 50 percent of projects).
1 to 3 weeks for recommendation of award.
0.5 weeks to prepare contract and bond and send to contractor.
1 week for contractor to respond.
2 weeks for contract approval.

TOTAL C = _____ WEEKS

TOTAL TIME UNTIL CONSTRUCTION = _____ WEEKS

APPENDIX D

Adopted 10-20-04

Criteria for meeting Sunset Date requirement for all TAB-selected projects:

Construction Projects through the FHWA Process

- Environmental document approved
- Right of way certificate approved or condemnation proceedings have been formally initiated
- District State Aid Engineer approval of plans
- Engineer's estimate
- Special provision information
- Utility relocation certificate
- Permit applications submitted
- Letting date can be set within 90 days

Construction Projects through the FTA Process

- Environmental document completed; reviewed by Metro State Aid for completeness
- Satisfactory review by Metro State Aid that project plans are complete and reflect the project that was selected
- Letting date can be set within 90 days
- FTA notification that grant approval imminent

Right of Way Only Projects through FHWA Process

- Environmental document approved
- OIM/SALT authorization to proceed

Right of Way Only Projects through FTA Process

- Environmental document completed; reviewed by Metro State Aid for completeness
- Appraisals over $250,000 approved by FTA; under $250,000 reviewed by MnDOT Metro State Aid/Right of Way Section
- FTA notifies that grant approval is imminent
- OIM transfers funds
- Offers made/condemnation initiated if offers refused

Program Project

- Grant application submitted to FTA; includes workplan
- Notification from FTA that grant approval is imminent
- Work will begin within 90 days after grant approval
- Agreement executed between MnDOT and proposer once funds are transferred

APPENDIX E

"A" Minor Reliever (B.1.), Expander (B.1.), Connector (B.1.), Augmenter (B.1.) and Principal Arterial (B.1.) - Expected Number of Crashes Reduced

A calculation will be made of the total number of crashes over three years, the expected percent reduction in crashes, and the total number of crashes reduced expected from the project. This information will also be used in calculating the cost per crash reduced criterion ("A" Minor Reliever C.1., Expander C.1., Connector C.1., Augmenter C.1., and Principal Arterial C.1.)

Submittal Requirements:

Submittals May Use Mn/DOT TIS Data Only

- Years 2000 – 2002
- If crash is on TIS, but in the wrong location, then the agency should contact Loren Hill at Mn/DOT to have it changed
- If a crash is not on the TIS, it cannot be included in the analysis or the submittal
- If an agency has a large number of crashes not on the TIS, then they should be working to solve that problem, and may not use those crashes not on the TIS for these calculations

Crash Diagrams Required

- Whether intersection or corridor, a crash diagram must be included
- Applicants must provide the summary list of crashes identified by TIS number

Crash Reduction Factor

- Proposers may use one of three crash reduction options for utilizing appropriate factors for crash reduction based on the strategies :
    - Kentucky Report (available from http://www.ktc.uky.edu/Reports/KTC_96_13.pdf)
    - Mn/DOT Chart (attached)
    - Local Experience (should be rare)
        - If using local experience, proposer must provide before- and after- documentation from local experience with a similar type of project (i.e., comparing "apples to apples")
        - The proposer acknowledges that the review committee may reject local experience based on insufficient data.

Methodology

The applicant must obtain data on crashes for the existing section scheduled for improvement from Mn/DOT's TIS system for the three years of 2000 though 2002. Calculate the total number of crashes over the three-year period. If only one strategy (e.g. signal rebuild) is included in the proposed project, the Crash Reduction factors can be read from the "Total Crashes" row in the "% Change in Crashes" tables on the attached Mn/DOT chart or from the Table 3 in the above-referenced Kentucky Report. If two improvements (e.g. signal rebuild and double left turn lanes) are included in the proposed project, the overall crash reduction factor is determined using the following formula. An example calculation is provided below. Applicants can use any combination of factors from the Mn/DOT chart or Table 3 of the Kentucky Report, but cannot use more than two. Raters will verify that the improvements referenced for this calculation are included in the description of the proposed project.

Applicants using factors from the Mn/DOT chart must separate the crashes into F&PI and PD totals, in order to apply the appropriate factor as shown on the chart, and then combine the two resulting

combinations into a total crash reduction. Because the Kentucky Report does not distinguish between F&PI and PD crashes, all reported crashes can be lumped into one and calculated against the crash reduction factor shown for that improvement.

APPLICANTS MUST SHOW THEIR WORK

FOR ONE IMPROVEMENT/STRATEGY:

CR = [1-(1-CR1)] * (Total # of Crashes)

FOR TWO IMPROVEMENTS/STRATEGIES:

CR = [1-(1-CR1) x (1-CR2)] * (Total # of Crashes)

DO NOT ASSUME MORE THAN TWO IMPROVEMENTS FOR THE ENTIRE PROJECT.

EXAMPLE CALCULATION OF A CRASH REDUCTION – MN/DOT CHART, TWO FACTORS
Suppose a project includes two improvements: signal rebuild and double left-turn lane. From the "% Change in Crashes" table, the crash reduction factors for fatal and personal injury and property damage for total crashes are:

Signal Rebuild: -0.25 (F&PI) -0.30 (PD) Dbl Left-Turn Lane: -0.30 (F&PI) -0.25 (PD)

The combined crash reduction factor is expressed as:

CR (F&PI) = 1-(1-.25) x (1-.30)
CR = 1-(0.75 x 0.70)
CR = 1 - 0.53, or 0.47 (reduction)
F&PI Cr. Reduced = 0.47 * (# F&PI Crashes)

CR (PD) = 1-(1-.30) x (1-.25)
CR = 1-(0.70 x 0.75)
CR = 1 - 0.53, or 0.47 (reduction)
PD Cr. Reduced = 0.47 * (# PD Crashes)

Total Crash Reduction = Total of two above

Note that the CR factor, when used in the above formula, is expressed as a positive number when there is an assumed reduction in the number of crashes and negative when there is an assumed increase.

EXAMPLE CALCULATION OF A CRASH REDUCTION– KENTUCKY REPORT TABLE 3, TWO FACTORS
Suppose a project includes two improvements: add right-turn lane and widen shoulder. From Table 3, the crash reduction factors for total crashes are:

Add Right Turn Lane: -0.25 Widen Shoulder: -0.20

The crash reduction factor is expressed as:

CR = 1-(1-.25) x (1-.20)
CR = 1-(0.75 x 0.80)
CR = 1 - 0.60, or 0.40 (reduction)
Total Cr. Reduced = 0.40 * (Total Crashes)

Contact Don Koski, Metropolitan Council, with any questions at 651-602-1721 or donald.koski@metc.state.mn.us.

Glossary of Before/After Study Reduction Factor Terms

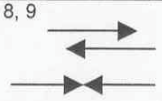
- Adding Lanes: Addition of traffic lanes.
- AWF (Advance Warning Flashers): Addition of amber flashers mounted on a warning sign to caution motorists "Be Prepared to Stop When Flashing".
- Cross-Street Intersection Turn and Bypass Lanes: Addition of right turn and/or bypass lanes to a four legged intersection.
- Double Left Turn Lanes: Marking a roadway to provide two left-turn-only lanes.
- New Signal, Channelization In Place: Permanently installed signals at an intersection with turn or bypass lanes and/or medians already in place.
- New Signal, No Channelization: Permanently installed signals at a new location without addition of turn or bypass lanes or medians.
- New Signal, Plus Channelization: Permanently installed signals at a new location with added lanes(turn or bypass) and/or medians.
- Signal Rebuild: Signal revision plus a change of signal location at an intersection. A complete revamping of signal system.
- T-Intersection Turn and Bypass Lanes: Addition of right turn and/or bypass lanes to a three legged intersection.
- Two Way Left Turn Lanes: Continuous turn lane delineated in the center of the roadway for left- turn-action-only from either direction.

% Change in Crashes

(from Mn/DOT before/after studies)

All numbers indicate percentages

Updated: April 1999

Diagram	New Signal No Channel	New Signal + Channel	New Signal w/Chan Impl	AWF	Signal Rebuild	Dbl Left Turn La	2Way LT Turn La	T-Int Turn & Bypass La	+Int Turn & Bypass La	Add Lanes
1 	+35 -15	0 -15	+120 +30	+80 -15	-20 -30	-30 -30	-30 -40	-20 -20	-15 -15	-55 -55
2 	0 +150	+60 +10	-55 0	-35 -85	-50 -30	-50 +90	-30 -35	0 -30	+35 -10	-35 -65
3 	+435 +270	-40 -5	+25 -25	-65 -80	-25 -20	-45 -70	-15 -40	-35 -30	-35 -35	-70 -65
5 	+65 +35	-55 -60	-65 -65	-75 -60	-30 -30	-20 -10	-30 -25	-25 -55	-15 -45	-15 -45
4, 7 	+65 -55	-30 0	-35 0	-40 -55	-35 -50	-10 -15	-90 -15	0 -40	-25 -25	-25 -50
8, 9 	0 +35	-65 -50	+20 -25	-65 0	-45 -60	-75 +35	-65 -65	+35 -15	-15 0	-95 -50
TOTAL CRASHES	+55 +15	-35 -30	-25 -30	-40 -55	-25 -30	-30 -25	-40 -35	-20 -15	-20 -25	-50 -50
NUMBER OF STUDIES	10	70	65	10	105	25	5	40	45	10
% ADT CHANGE	+15%	+15%	+15%	+30%	+5%	+20%	+10%	+15%	+15%	+10%

Box Legend: Top Factor = F & PI
Bottom Factor = PD

Before/After studies based on 3 calendar years prior to construction and 3 calendar years after construction completion.
(Before crashes adjusted for growth in ADT)

APPENDIX F

"A" Minor Reliever (B.3.) and Expander (B.3.) - Increase in peak hour average speed.

The applicant must estimate the current speed of through-traffic on the "A" minor arterial with existing management features (median barriers, signal spacing, channelization, signal coordination, etc.) and the increased speed after implementation of the proposed project. Calculations must reflect traffic conditions in the peak direction during the peak period of travel.

Speed is calculated simply as "distance divided by time". Travel time on any roadway is a combination of the time it takes to travel a given distance at a given speed plus any delays encountered along the way. The methodology to estimate average peak period speed is derived from Chapter 9, Urban Streets, of the Highway Capacity Manual (1994). Follow these basic steps to estimate arterial speed in the existing condition and after implementation of the project:

- Estimate project length, in miles. Applicants should try to define the project length using signalized or stop-controlled intersections where vehicle delay will be calculated in the table below, or any other intersecting minor street or driveway where midblock delay is assumed.
- Estimate the free-flow travel time, in minutes, along the project length based on the posted speed limit using the following equation:

free-flow travel time (minutes) = [project length (miles)/speed (mph)] * 60

- Estimate the volume/capacity ratio of the through-traffic lane(s) on the "A" minor arterial approach at each signalized and stop-controlled intersection in the peak direction and peak period of travel along the project length.
- Estimate average vehicle delay for "A" minor arterial through movements at all signalized and stop-controlled intersections using the table below and express the sum in minutes.

Average Vehicle Delay at Stop-Controlled and Signalized Intersections	
approach volume/capacity	average vehicle delay
< 0.8	30 seconds
0.8 to 0.9	50 seconds
> 0.9	75 seconds

- In some cases, there may be midblock delays caused by pedestrian crossings, bus stops, turning movements to and from minor streets and driveways, or due to on-street parking. Assume 10 seconds of delay for each example and express the sum in minutes.
- Estimate the arterial speed of through-traffic on the "A" minor arterial over the entire project length using the following equation:

$$\text{ARTERIAL SPEED (mph)} = \frac{\text{project length (miles)}}{\text{free-flow travel time + intersection delay + midblock delay}} * 60$$

Reminder: When computing the arterial speed, the free-flow travel time, intersection delay and midblock delay in the denominator of the equation must be expressed in minutes.

- If the proposed project will improve traffic progression through signal coordination in the "after" condition, the average vehicle delay derived from the table on the previous page should be factored by 0.77 to show a further reduction in intersection delay. This factor should be applied only to independently timed signals that will be coordinated with other signalized intersections.

Sample calculation.

Existing two lane, undivided arterial, 4.0 miles in length, with four pre-timed signalized intersections and four more intersections with stop sign control on the minor approaches. The posted speed limit is 40 mph. Two of the four signalized intersections have a volume capacity ratio < 0.80, one is between 0.80 and 0.90, and one is > 0.90. Midblock delays due to left turns at the minor intersections and driveways add 60 seconds to the travel time.

free-flow travel time (minutes) = (4.0 / 40) * 60 = 6.00 minutes

intersection delay = 30 + 30 + 50 + 75 = 185 seconds or 3.08 minutes

midblock delay = 40 seconds or 0.80 minute

$$\text{ARTERIAL SPEED} = \frac{4.0}{6.00 + 3.08 + 0.80} * 60 = \frac{4.0}{9.88} * 60 = 0.40 * 60 = 24.0 \text{ mph}$$

Proposed improvements include construction of left turn lanes at the four existing signalized intersections, implementation of a coordinated signal timing plan and channelization for the entire length of the arterial. The posted speed limit will be raised to 45 mph. The project will increase free-flow travel speed and reduce intersection delay.

free-flow travel time (minutes) = (4.0 / 45) * 60 = 5.33 minutes

intersection delay = (30 + 30 + 30 + 30) * 0.77 = 92.4 seconds or 1.54 minutes

midblock delay = 40 seconds or 0.80 minute

$$\text{ARTERIAL SPEED} = \frac{4.0}{5.33 + 1.54 + 0.80} * 60 = \frac{4.0}{7.67} * 60 = 0.52 * 60 = 31.2 \text{ mph}$$

contact person: Don Koski, Met Council, 602-1721

APPENDIX G

Methodologies to Evaluate Congestion Mitigation and Air Quality (CMAQ) Emissions Reductions for Projects Submitted for Funding

The Federal CMAQ Program Guidance is in Appendix L. The guidance specifies the "Projects funded under the CMAQ program must be expected to result in tangible reductions in CO, ozone precursors emissions, or PM-10 pollution". Applications for CMAQ funding are encouraged to use the suggested emission reduction methodologies by major CMAQ project type. Adherence to methodologies will be the basis for evaluating the emission reduction estimates submitted for each project or program proposed for funding. Applicants can use their own methodology but must provide supporting documentation on its validity. Without adequate documentation, the validity of the emission values submitted may be seriously questioned during the scoring process. The example methodologies provided in the appendix are based in part on similar off – model methodologies available in other regions. A list of the resources containing these methodologies is listed in the reference section at the end of the examples.

Some projects may not lend themselves to quantitative analysis because of the projects structure or it is found to not adequately analyze the project. In those submittals, a qualitative assessment based on a reasoned logical examination of how the project or program will decrease emissions is acceptable. Documentation supporting the logic used is encouraged. The information provided is essential in determining the reasonableness of the emission reductions presented by the applicant. Do not enclose copies of studies, reports etc. cited, but a description of the source and copies of relevant page(s) is preferred.

For CMAQ eligible projects where a methodology is not provided, the applicant or their representative are encouraged to consult with the Metropolitan Council (see staff contact list) for guidance on an appropriate approach prior to preparing the application.

The appendix is organized into five sections:

1. **EXAMPLES OF EMMISSION CALCULATION METHOLOGY BY MAJOR PROJECT TYPES**
2. **ASSUMPTIONS, FACTORS AND DEFAULT VALUES TO BE USED IN EMISSION REDUCTION CALCULATIONS**
3. **ESTIMATION OF AVERAGE SPEEDS BY HIGHWAY LINKS**
4. **CO, NOx AND VOC EMISSION TABLES FOR AUTO AND BUS BY SPEED**
5. **PARK-and- RIDE DEMAND ESTIMATION METHODOLOGY**

1. EXAMPLES OF EMISSION CALCULATION METHODOLOGY BY MAJOR PROJECT TYPES

The examples outline a series of steps to calculate emissions for CO, NOx and VOC by project types. A hypothetical CMAQ project follows each outline to illustrate the necessary calculations to complete each step to prepare emissions reductions estimates for CO, NOx and VOC. Similar approaches can be applied to other CMAQ eligible projects. The April 28, 1999 Guidance Document in Appendix L of this document describes eligible CMAQ projects. Supplements to the guidance also listed, extend the eligibility to include Idle-reduction measures, eligibility of freight projects and diesel engine retrofit programs.

- PURCHASE BUSES FOR NEW TRANSIT SERVICE
- CONSTRUCT PARK-AND-RIDE TRANSIT FACILTY
- TRAFFIC CONTROL MEASURE

PURCHASE OF BUSES FOR NEW TRANSIT SERVICE

Project description:

- Purchase of buses New bus service or service expansion of existing service may require the purchase of additional buses to compliment the existing fleet or provide specially equipped vehicles for targeted transit market segments. The daily emission reduction from the new service is estimated based on the difference between the emissions from the auto trips replaced by transit and the sum of the bus emissions from the new service and auto emissions from people driving to reach transit.

Estimate the potential for emission reductions:

Purchase of buses for fleet expansion to provide new service or expand existing service can reduce emissions by attracting commuters who normally have driven alone and switched to transit service for their commutes.

Information needed to prepare estimates of CO, NOx and VOC emissions

- ✓ Total project cost;
- ✓ Number of SOV trips before and after the project is built
- ✓ Average trip lengths and VMT for SOV's, buses, to transit access;
- ✓ Projected bus ridership and profile such as new transit riders and existing riders using new service;
- ✓ Factors for emission look up tables in the appendix;
- ✓ Average daily peak period speeds for autos and buses

Steps and Formulas:

***STEP 1*: Determine the number of SOV trips to be converted to transit trips. This figure is also the BASELINE or current travel conditions.**

- **SOV VMT Replaced = R∗ F∗ trip length**

  Where: R = the ridership on the bus per operating day after one year of service
  F = the fraction of the riders on bus who previously drove
  Trip length = the average trip length for each driver who previously drove

***STEP 2*: Calculate total (CO+ NOx+ VOC) SOV emissions using number of SOV trips determined in STEP 1**

- **SOV Emissions Replaced = SRV∗EF∗ 1/1000 = kilograms** (cal. for CO, NOx and VOC)
  Day

  Where:

  SRV = SOV VMT emissions replaced
  EF = Emission factor for each pollutant. Calculate average speed from methodology described in Section 3. Use average speed to find emissions factor from tables in Section 4 for each pollutant
  1/1000 = Conversion of grams to kilograms

***STEP 3*: Calculate total (CO+NOx+VOC) emissions from buses to used in providing new service**

- **Bus Emissions = Bus VMT ∗ EF∗ 1/1000 = kilograms** (calculate for CO, NOx and VOC)
  day

  Where:

  Bus VMT = daily bus VMT
  EF = Emission factor for each pollutant. Calculate average speed from Exhibit 1
  Use speed to find emission factors from tables for each pollutant.
  1/1000 = Conversion of grams to kilograms

***STEP 4*: Net emission reductions for the proposed project is the total emissions of SOV trips converted to transit trips less the total emissions of the transit vehicle(s) used to provide the service.**

- **Calculation of proposed project emission reductions**

BASELINE – WITHOUT PROJECT (NO BUILD)

Average Speed		EF		Daily VMT		Daily Emissions
	=		X		÷ 1000 =	Kgs/day

BUILD –WITH PROJECT

Average Speed		EF		Daily VMT		Daily Emissions
	=		X		÷ 1000 =	Kgs/day

NET PROJECT EMISSION REDUCTIONS

Baseline Auto Emissions		**Bus Emissions**		**Total project Emission Reductions**
	—		=	Kgs/day

EXAMPLE: Purchase Buses for New Transit Service –

A CMAQ eligible entity proposes to purchase three 40-foot buses to start new transit service. The cost of the to purchase the three buses is $900,000. The cost of each bus is estimated in 2009$. The 20% local share of the total project cost is $180,000 to be paid by the entity leaving the $720,000 project cost to be funded using CMAQ funds.

STEP 1*: *Determine the number of SOV trips and related VMT to be converted to transit trips

***FORMULA* : SOV VMT Replaced = R*F* Trip Length**

R = **the estimated and tabulated bus ridership** is based on market studies which shows a bus in daily service would carry 375 passengers at an average interurban passengers per day per bus or 1125 daily riders after a year of service.

F = the fraction of the riders using the new bus service who previously drove is assumed at 60% of the riders.

Trip length = For current transit riders within the beltway use 5 miles and for daily auto work trip use 11 miles.

SOV VMT Replaced = 1125 **x** .60 **x** 11 = 7,425 miles per day

STEP 2*: *Calculate total (CO +NOx+VOC) SOV emissions using number the number of SOV determined in STEP 1.

***FORMULA*: SOV Emissions Replaced = SVR x EF x 1/1000 = <u>kilograms</u>**
Day

Where: **SVR =** SOV VMT replaced
EF = Emission factor for each pollutant. Using 35 mph as the average daily Auto speed, from emission factor tables:

SOV (auto) Emissions Replaced = 7,425 x 35mph emission factor for CO, NOx and VOC
CO = 7,425 x 17.61 = 130,754 grams/day
NOx = 7,425 x 0.670 = 4,975 grams/day
VOC = 7,425 x 0.614 = 4559 grams/day

140,288 grams/day x 1/1000 = 140 kgs/day

STEP 3* : *Calculate bus emissions from buses that will be used to provide the new service

***FORMULA*: Bus Emissions = Bus VMT x EF x 1/1000 = kgs/day**

Where:

Bus VMT = daily bus VMT of 150 miles x three buses = 450 miles
EF = Emission factor for CO, NOx and VOC using an average speed of 22mph
Speed for bus operations within beltway .
1/1000 = Conversion of grams to kilograms

CO = 450 miles x 2.282 grams = 1027 grams
NOx = 450 miles x 6.731 grams = 3029 grams
VOC = 450 miles x 0.515 grams = 232 grams

4,288 grams x 1/1000 = 4.3 kgs/day
(current bus emissions)

STEP 4*: *Calculate net emissions benefit by subtracting bus emissions calculated in Step 3 from the auto emissions calculated in Step 2.

140 kgs – 4.3 kgs = 137 (rounded) kgs/day net emissions benefit

- **Calculation of proposed project emission reductions**

BASELINE – daily SOV trips estimated to be removed

Average Speed	EF		Daily VMT		Daily Emissions
35 MPH	CO= 17.61 NOx=0.670 VOC=0.614	**X**	7,425 miles	**÷ 1000 =**	140 kgs/day

BUS EMISSIONS

Average Speed	EF		Daily VMT		Daily Emissions
22 MPH	CO=2.282 x 10% ***** NOx=6.73 x 10% VOC=0.515 x 5%	**X**	450 miles	**÷ 1000 =**	.4 kgs/day

***** See calculations of future bus emissions on page 11.

NET PROJECT EMISSION REDUCTIONS

Baseline Auto Emissions		Bus Emissions		Total project Emission Reduction Benefits
140 kgs/day	—	.4 kgs/day	=	139.6 kgs/day

EXAMPLE 2: CONSTRUCT TRANSIT FACILITY

Project Description:
Construction a new 350 spaces Park-and-Ride lot built in conjunction with peak hour transit commute service. The estimated total project cost of the facility is $875,000. The facility will be built adjacent to and serve a major transportation corridor.

Information needed to prepare estimates of emissions for CO, NOx and VOC

- ✓ Total project cost
- ✓ Number of SOV trips before project that will be converted to transit trips
- ✓ Average trip lengths and VMT for SOV's and buses
- ✓ Projected bus ridership that includes assumptions of new net transit riders or carpoolers
- ✓ Calculation of average speeds for auto and bus
- ✓ Emission factors from tables in Section 4 by average speed for CO, NOx and VOC

Determine the net reduction of SOV trips and the net new transit riders if the facility were built

- Determine the number of SOV trips diverted to transit users by the new parking facility using the Park-and-Ride Demand Estimation Methodology found in Appendix N of the Metropolitan Council's 2030 Transportation Policy Plan

- It is not reasonable to assume that all the parking stalls will immediately be used by new transit riders so a utilization factor of .75 as a default should be applied to total number of new parking provided and estimated to become transit users. This factor assumes that some transfers of current transit users to the new facility will occur. Applying a utilization factor also accounts for some stalls remaining empty during the day. Under certain circumstances if parking demand can be demonstrated that is approximately equal to or greater than the number of spaces to be provided, a higher utilization factor can be applied, but documentation must be provided by the applicant.

***STEP 1*: Calculate the baseline emissions without the project**

- Daily total VMT = number of SOV's from Step 1 X Average trip length for each SOV using the corridor. A corridor can be a principal arterial such as I-35W, I-94 or Cedar Avenue.
- Daily CO, NOx and VOC emissions = SOV trips X 2 X emission factor from emission tables (average speeds for principle arterials in a mixed use lane are provided as references in Section 3).

***STEP 2*: Calculate emission reductions if the proposed project is constructed**

- *Calculate number of daily SOV conversion to transit*

  Daily SOV= 350 spaces X .75 (utilization rate) = 263 SOV's

- *Calculate Auto and express bus VMT and emissions*
  Daily total SOV VMT = 263 X 16 miles (trip from home to P&R lot + work trip) X 2
  VMT = 8416 miles
  Daily total Bus VMT = 11miles (trip length from P&R to CBD) X 7 bus trips = 77 miles

  SOV Emissions @ 32 mph (applicant must identify corridor served)

CO = 13.65 gms/mile (Table 1) X 8416 miles = 114878 gms/mile X 1/1000 = 115 kgs/day
NOx = 1.69 gms/mile (Table 3) X 8416 miles = 14223 gms/mile X 1/1000 = 14 kgs/day
VOC = 1.31 gms/mile (Table 5) X 8416miles = 11025 gms/mile X 1/1000 = 11 kgs/day

Bus Emissions @ 33 mph (average bus speed could be lower than auto of downtown travel is included)
CO = 6.59 gms/mile (Table 2) X 77 miles = 507 gms/mile X 1/100 = .5 kg/day
NOx = 7.78 gms/mile (Table 4) X 77 miles = 599 gms/mile X 1/1000 = .6 kgs/day
VOC = 1.38 gms/mile (Table 6) X 77 mile = 106 gms/mile X 1/1000 = .1 kgs/day

- *Subtract bus emissions from total baseline emissions for CO, NOx and VOC calculated in Step 2 to arrive at a total net emission reductions if the project is implemented*

Calculation of Emission Reductions of Proposed Project

BASELINE –WITHOUT PROJECT (NO BUILD)

Average Speed	EF		Daily VMT		Daily Emissions
32 mph	CO = 13.65 NOx = 1.69 VOC = 1.31	**X**	8416 miles	**÷ 1000 =**	140 kgs/day

BUILD –WITH PROJECT REDUCTION FOR BUS EMISSIONS

Average Speed For bus	EF for bus		Daily bus VMT		Daily Emissions
33 mph	CO = 6.59X10% NOx= 7.78X10% VOC = 1.38X5%	**X**	77 miles	**÷ 1000 =**	.12 kgs/day

NET EMISSION REDUCTIONS

Baseline Emission Reductions		Bus Emissions		Net Emission Reductions
140 kgs/day	—	.12 kgs/day	=	139.9 kgs/day

EXAMPLE 3: INSTALL ADAPTIVE TRAFFIC SIGNAL CONTROL SYSTEM

Project Description:
Install an adaptive traffic signal system to control 35 intersections in a designated traffic management area of a muncipality. The adaptive signal system will allow the municipal traffic signal control system to better manage day-to-day traffic flows, peak flows and special events that occur within the manage area. The estimated total project cost of the system is estimated to be $2,200,000.

Information needed to prepare estimates of emissions for CO, NOx and VOC

- ✓ Total project cost
- ✓ Total daily VMT though the intersections controled
- ✓ Average week day speed though the intersections before installation (baseline)
- ✓ Average week day speed calculated after installation of system (build)
- ✓ Emission factors from tables in Section 4 by average speed for CO, NOx and VOC

Determine the net reduction of SOV trips and the net new transit riders if the facility were built

- Determine the number of SOV trips diverted to transit users by the new parking facility using the Park-and-Ride Demand Estimation Methodology found in Appendix N of the Metropolitan Council's 2030 Transportation Policy Plan

Average daily vehicle miles through the signals to be controlled is estimated to 73,000 miles. Present average daily speed through the intersections that will receive the new system is 20 miles per hour. The average daily speed has been calculated to increase to 21 miles per hour after installation. The increase in the average daily speed will reduce total CO, NOx and VOC emissions.

STEP 1: Calculate the baseline emissions without the project

- Baseline emissions = VMT X emission factors @ 20 miles per hour
  CO = 73,000 X 24.67 (auto CO Table 1) = 1800910 gms/mile X 1/1000 = 1801 kgs/day
  NOx = 73,000 X 1.61 (auto NOx Table 3) = 117530 gms/mile X 1/1000 = 118 kgs/day
  VOC = 73,000 X 2.03 (auto VOC Table 5) = 148190 gms/mile X 1/1000 = 148 kgs/day
  Total build emissions = **2067 kgs/day**

STEP 2: Calculate emission reductions if the proposed project is constructed

- Calculate emissions with project and subtract from baseline

  Emissions after project is completed will increase average daily speed to 21 miles per hour:
  CO = 73,000 X 23.27 (auto CO Table 1) = 1727910 gms/mile X 1/1000 = 1728 kgs/day
  NOx = 73,000 X 1.62 (auto NOx Table 3) = 118260 gms/mile X 1/1000 = 118 kgs/day
  VOC = 73,000 X 1.94 (auto VOC Table 5) = 141620 gms/mile X 1/1000 = 142 kgs/day
  Total build emissions = **1988 kgs/day**

BASELINE –WITHOUT PROJECT (NO BUILD)

Average Speed	EF		Daily VMT		Total Daily Emissions
20 mph	CO = 24.67 NOx = 1.61 VOC = 2.03	**X**	73,000 miles	÷ **1000** =	2067 kgs/day

BUILD –WITH PROJECT REDUCTION FOR BUS EMISSIONS

Average Speed For bus	EF		Daily VMT		Total Daily Emissions
21 mph	CO = 23.27 NOx= 1.62 VOC = 1.94	**X**	73,000 miles	÷ **1000** =	1988 kgs/day

NET EMISSION REDUCTIONS

Baseline Emission Reductions		Build Emissions		Net Emission Reductions
2067 kgs/day	—	1988 kgs/day	=	79 kgs/day

REFERENCES

California Environmental Protection Agency – Air Resources Board, 2003 ed. *Methods to Find the Cost-Effectiveness of Funding Air Quality Projects; For Evaluating Motor Vehicle Registration Fee Projects and Congestion Mitigation and Air Quality Improvement (CMAQ) Projects*

Federal Highway Administration Resource Center. *Off-Model Air Quality Analysis A Compendium of Practice* -www.dot.gov/resourcecenter/teamaq_pubs2.htm

Maricopa Association of Governments [Phoenix] 2001. *Methodology for Evaluating Congestion Mitigation and Air Quality Improvement Projects.*

2. DEFAULT VALUES and ASSUMPTIONS

The following default values and assumptions are to be used in preparing the calculations in responding to the CMAQ Prioritizing Criteria. If the default value needed by the applicant is not listed below, Jim Barton at 651.602.1735, should be contacted to determine an appropriate value to apply in the applicant's calculation.

- ***Average Trip Speeds by Vehicle Type (also see average trip speed map EXHIBIT 1 if specific routes or corridor are known)***
  - Urban local route bus – 13.5 MPH
  - Suburban local route bus – 18.6 MPH
  - Express bus (from suburban transit center or park-and-ride lot to a downtown)– 40 MPH
  - Auto(weekday) – 35 MPH for the regional highway system
  - Van – same as autos
- ***Average Trip Length (Average travel distance in miles – Home Base Work Trips ;2000 Regional Travel Behavior Inventory)***
  - Auto (SOV) - 11.10
  - Auto with passenger (HOV) – 9.43
  - Public Transit – 7.68
  - School bus – 4.29
  - Taxi – 7.34
  - Walk – 1.26
  - Bicycle – 3.85
  - From home to a park and ride facility by auto – 4.9
  - Van – 38.8

- ***Mode Choice as percentage of daily commute trip – Home Based Work Trips (2000 Regional Travel Behavior Inventory)***
  - Auto – drove alone 83.5%
  - Auto – drove with passenger (HOV) 3.0%
  - Public Transit – 4.8%
  - Walk – 1.9%
  - Bicycle – 1.8%

- ***Bus Passenger load factors***
  - *Regional load factors (info to be provided)*
- ***Auto & Van Occupancy rate***
  - Auto – 1.06 (work trip)
  - Regional average vehicle occupancy by all destinations – 1.35
  - Van – 7.74 passenger for a nine passenger van. For other sizes, assume a 75% load factor
- ***Average annual miles driven by vehicle type***
  - Auto - 15,000
  - Bus - Regular route service
    Express service
  - Van used in van pools – 22,152

- ***Park and Ride transit facilities***
  - A **daily utilization rate** of spaces available and or additional parking capacity provided is 75% after first year of operation;
  - Document Demand -Use "Metro Transit Park-n-Ride Demand Estimation Methodology" (Appendix N in the 2030 Transportation Policy Plan) for documentation guidance or the facility needs assessment in the 2005 Regional Park-n-Ride Site /Facility Location Plan.

- ***Calculating Vehicle Miles Traveled (VMT)***
  - Annual VMT (commute trips) ÷ 250 (number of work days in a year) = miles/day
  - Daily Transit vehicle VMT is total daily trip lengths the vehicle travels
  - Daily SOV VMT is total daily auto trip lengths

- ***Tips on Avoiding Double Counting of Emission Reduction Benefits***
  Avoid double counting of air quality benefits by including the emission reduction benefits from a component of the project also expected to be funded with CMAQ or other federal funds and applied for in a separate application in the 2005 solicitation. All of the estimated emission reduction benefit quantified and listed in the application must be attributed to the proposed project described in the application.

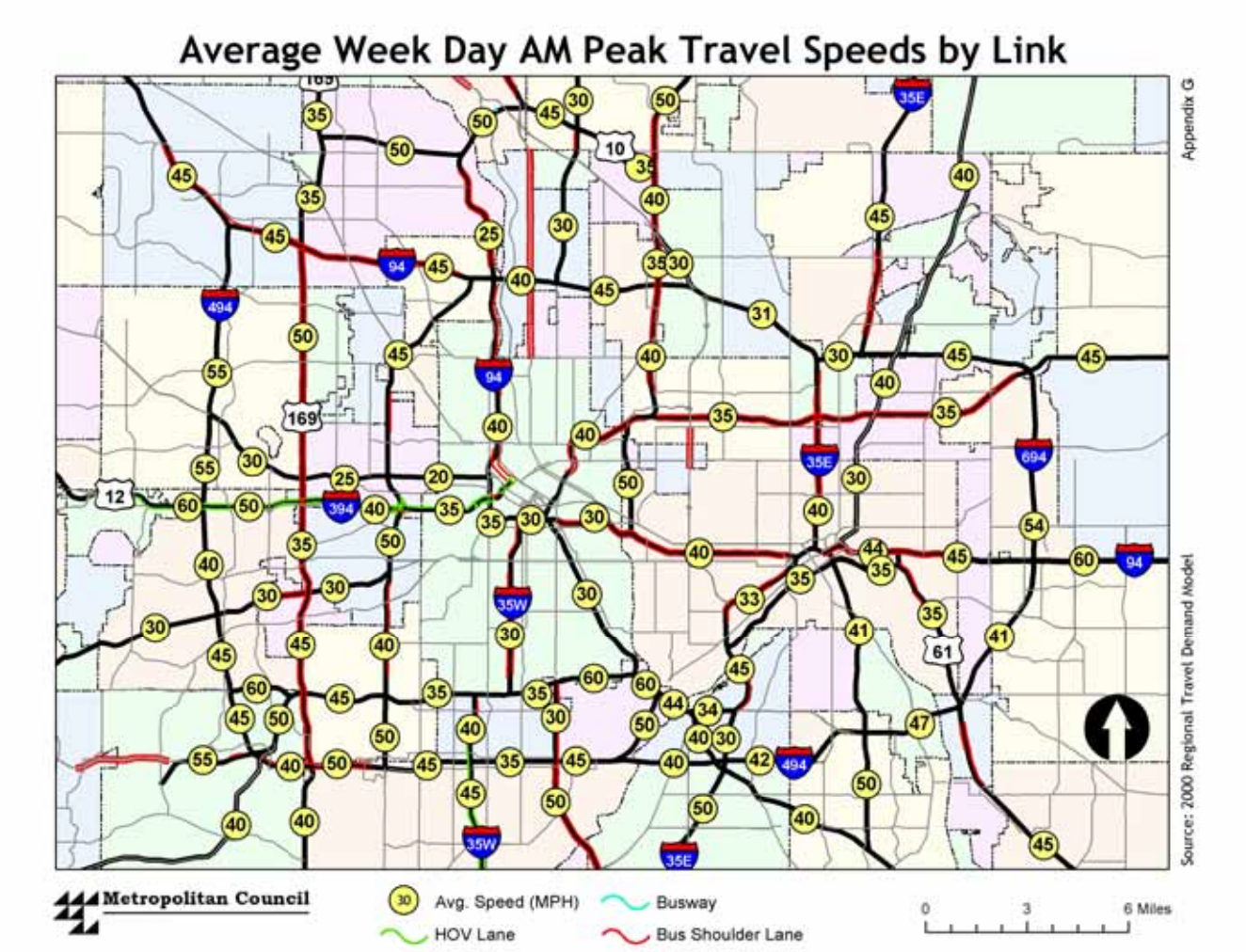
- ***Calculation of future Emission Reductions from Hybrid and conventional diesel Buses***
  Hybrid buses emissions are currently substantially lower than conventional diesel. However, with the introduction of the new federal diesel emission standards in 2007, the differences between the emissions of a conventional diesel powered bus and a hybrid bus will significantly reduced. Given the operational characteristics of hybrids, the vehicles should only be used for service on fixed or regular transit routes to fully utilize their emission reduction capabilities and higher initial capital cost. To calculate a total rate of future bus emissions post 2007, use a percentage of the baseline diesel emissions for CO, VOC and NOx at the following rates:
  CO = total CO baseline emission X 10%
  VOC = total VOC baseline emission X 10%
  NOx = total NOx baseline emission X 5%

3. CALCULATION OF AVERAGE SPEEDS

To calculate average week day speed by a corridor, follow the highway links that form the corridor benefited by the proposed project and average the speed shown in the yellow circle for each link. The speeds are automobile speeds listed as miles per hour. An average of the speeds shown on each link along the corridor is the average speed value used to find the emission factors for CO, NOx and VOC from the tables in section 4 . Each factor for the average speed is multiplied by VMT to calculate daily emissions. Daily emissions are measured initially in grams and converted to kilograms per day. Note that emission reductions used in the scoring are in kilograms per day.

Average bus speeds -Links with HOV lanes, use 55 MPH as average speed for buses using the HOV. Some links have bus shoulder lanes, for those links, use 35 MPH as the average speed for buses. By state statute, buses cannot travel on shoulders greater than 15 MPH of the adjourning congested moving traffic. For links without bus shoulder lanes, use the average speed shown as the bus speed.

EXHIBIT 1



4. EMISSION FACTORS TABLES BY SPEED

The following tables provide emission rates for CO, NOx and VOC by speed. For auto's and diesel powered buses. Guidance on the application of emission rates for hybrid buses are provided in Section 2. The emission rates are in grams per mile. A conversion to kilograms is required by dividing the daily emission (VMT X emission rate) calculated by 1000.

TABLE 1
AUTO CARBON MONOXIDE (CO) EMISSION FACTORS

Speed (MPH)	Emission Factor (Grams/Mile)	Speed (MPH)	Emission Factor (Grams/Mile)
3	93.20	35	12.08
4	73.17	36	11.61
5	61.15	37	11.17
6	53.14	38	10.75
7	47.42	39	10.36
8	43.13	40	9.98
9	39.79	41	9.62
10	37.12	42	9.28
11	34.94	43	8.96
12	33.11	44	8.65
13	31.57	45	8.35
14	30.25	46	8.07
15	29.11	47	7.79
16	28.11	48	7.53
17	27.22	49	7.53
18	26.44	50	7.53
19	25.74	51	7.53
20	24.67	52	7.53
21	23.27	53	7.53
22	22.00	54	7.53
23	20.84	55	7.53
24	19.77	56	8.22
25	18.79	57	8.91
26	17.89	58	9.60
27	17.05	59	10.29
28	16.27	60	10.98
29	15.55	61	11.67
30	14.88	62	12.36
31	14.24	63	13.05
32	13.65	64	13.74
33	13.10	65	14.43
34	12.57		

TABLE 2
BUS AND HEAVY DUTY DIESEL VEHICLES CARBON MONOXIDE (CO) EMISSION FACTORS

Speed (MPH)	Emission Factor (Grams/Mile)	Speed (MPH)	Emission Factor (Grams/Mile)
3	34.54	35	6.25
4	31.83	36	6.11
5	29.39	37	5.98
6	27.18	38	5.86
7	25.19	39	5.75
8	23.39	40	5.66
9	21.25	41	5.58
10	20.27	42	5.51
11	18.92	43	5.45
12	17.69	44	5.41
13	16357	45	5.37
14	15.55	46	5.34
15	14.62	47	5.32
16	13.78	48	5.32
17	13.00	49	5.32
18	12.29	50	5.33
19	11.64	51	5.35
20	11.04	52	5.38
21	10.50	53	5.42
22	10.00	54	5.47
23	9.54	55	5.53
24	9.12	56	5.61
25	8.73	57	5.69
26	8.37	58	5.78
27	8.05	59	5.89
28	7.75	60	6.01
29	7.47	61	6.15
30	7.22	62	6.30
31	6.99	63	6.46
32	6.78	64	6.64
33	6.59	65	6.84
34	6.41		

TABLE 3
AUTO NITROGEN OXIDE (NOx) EMISSION FACTORS

Speed (MPH)	Emission Factor (Grams/Mile)	Speed (MPH)	Emission Factor (Grams/Mile)
3	2.26	35	1.70
4	2.07	36	1.71
5	1.95	37	1.71
6	1.87	38	1.71
7	1.82	39	1.72
8	1.78	40	1.72
9	1.74	41	1.72
10	1.72	42	1.72
11	1.70	43	1.73
12	1.68	44	1.73
13	1.66	45	1.73
14	1.65	46	1.73
15	1.64	47	1.73
16	1.63	48	1.74
17	1.62	49	1.79
18	1.61	50	1.84
19	1.61	51	1.89
20	1.61	52	1.94
21	1.62	53	1.99
22	1.63	54	2.04
23	1.64	55	2.09
24	1.65	56	2.14
25	1.65	57	2.18
26	1.66	58	2.23
27	1.67	59	2.28
28	1.67	60	2.33
29	1.68	61	2.38
30	1.68	62	2.43
31	1.69	63	2.48
32	1.69	64	2.53
33	1.70	65	2.58
34	1.70		

TABLE 4

BUS AND HEAVY DUTY DIESEL VEHICLES NITROGEN OXIDE (NOx) EMISSION FACTORS –

Speed (MPH)	Emission Factor (Grams/Mile)	Speed (MPH)	Emission Factor (Grams/Mile)
3	15.26	35	7.79
4	14.62	36	7.81
5	14.02	37	7.84
6	13.47	38	7.88
7	12.96	39	7.93
8	12.48	40	8.00
9	12.04	41	8.07
10	11.63	42	8.16
11	11.25	43	8.26
12	10.90	44	8.38
13	10.58	45	8.50
14	10.28	46	8.65
15	10.00	47	8.80
16	9.74	48	8.98
17	9.51	49	9.17
18	9.29	50	9.37
19	9.09	51	9.60
20	8.91	52	9.84
21	8.74	53	10.11
22	8.59	54	10.39
23	8.45	55	10.70
24	8.33	56	11.04
25	8.22	57	11.40
26	8.12	58	11.79
27	8.04	59	12.21
28	7.97	60	12.67
29	7.91	61	13.15
30	7.86	62	13.68
31	7.82	63	14.25
32	7.80	64	14.87
33	7.78	65	15.53
34	7.78		

TABLE 5
AUTO VOLATILE ORGANIC COMPOUNDS(VOC) EMISSION FACTORS

Speed (MPH)	Emission Factor (Grams/Mile)	Speed (MPH)	Emission Factor (Grams/Mile)
3	7.90	35	1.20
4	6.18	36	1.17
5	5.15	37	1.14
6	4.47	38	1.12
7	3.98	39	1.09
8	3.61	40	1.07
9	3.32	41	1.04
10	3.09	42	1.02
11	2.91	43	1.00
12	2.75	44	0.98
13	2.62	45	0.96
14	2.51	46	0.94
15	2.41	47	0.92
16	2.32	48	0.90
17	2.25	49	0.90
18	2.18	50	0.90
19	2.12	51	0.90
20	2.03	52	0.90
21	1.94	53	0.90
22	1.86	54	0.90
23	1.78	55	0.90
24	1.71	56	0.94
25	1.65	57	0.97
26	1.59	58	1.00
27	1.53	59	1.03
28	1.48	60	1.06
29	1.43	61	1.10
30	1.39	62	1.13
31	1.35	63	1.16
32	1.31	64	1.19
33	1.27	65	1.23
34	1.24		

TABLE 6
BUS AND HEAVY DUTY DIESEL VEHICLES VOLATILE ORGANIC COMPOUNDS (VOC) EMISSION FACTORS –

Speed (MPH)	Emission Factor (Grams/Mile)	Speed (MPH)	Emission Factor (Grams/Mile)
3	4.48	35	1.32
4	4.25	36	1.29
5	4.04	37	1.26
6	3.84	38	1.23
7	3.66	39	1.20
8	3.49	40	1.18
9	3.32	41	1.16
10	3.17	42	1.14
11	3.03	43	1.12
12	2.90	44	1.10
13	2.77	45	1.08
14	2.66	46	1.06
15	2.55	47	1.05
16	2.44	48	1.03
17	2.35	49	1.02
18	2.25	50	1.01
19	2.17	51	1.00
20	2.09	52	0.99
21	2.01	53	0.98
22	1.94	54	0.97
23	1.87	55	0.97
24	1.81	56	0.96
25	1.75	57	0.96
26	1.70	58	0.95
27	1.64	59	0.95
28	1.59	60	0.95
29	1.55	61	0.94
30	1.50	62	0.94
31	1.46	63	0.94
32	1.42	64	0.94
33	1.38	65	0.95
34	1.35		

5. "Park-and-Ride Demand Estimation Methodology" (2030 Transportation Policy Plan -Appendix N.)

Described below is the regional methodology for estimating park-and-ride demand. This methodology must be used for estimating facility need for all proposals submitted to the Metropolitan Council for funding consideration.

Five Step Process

1. Document the utilization of each existing park-and-ride facility within a 5-mile radius of the proposed site. Contact Metropolitan Council staff for the most recent annual park-and-ride utilization survey. If the survey was conducted prior to a significant recent change, such as the closure or opening of a nearby park-and-ride facility, or the reduction or addition of transit service to a nearby park-and-ride facility, then a follow-up survey of affected facilities should be conducted by the applicant in coordination with Council staff.

2. Map the market area of each of the existing park-and-ride facilities within a 2.5-mile radius of the proposed site. Contact Metropolitan Council staff for the most recent park-and-ride user license plate survey information. Council staff will either be able to provide the applicant with a map of the market areas of the facilities requested (non-governmental organizations) or the actual user home origin data files (governmental organizations only). If the survey was conducted prior to a significant recent change, such as the closure or opening of a nearby park-and-ride facility, or the reduction or addition of transit service to a nearby park-and-ride facility, then the applicant should conduct a follow-up survey of affected facilities in coordination with Council staff. The applicant will need to collect the license plates. Council staff will run the license plates and either provide a map (non-governmental organizations) or data files (governmental organizations).

3. Using pre-calculated tables (see below), develop near-term (2010), mid-term (2020) and long-term (2030) park-and-ride demand estimates by identifying and selecting TAZs within a 2.5-mile radius of the proposed site (primary market area). Nationally accepted research indicates that within a 2.5-mile radius of a given site, 50 percent of the total demand for the site can be found. (Note: The demand within this defined area is not equally distributed and is heavily oriented upstream from the site with typically single digit percentages backtracking from downstream to the site.) Because there is no standard shape for the 100 percent market area of a site, for purposes of estimating total demand, the demand estimates for the 2.5-mile radius should be doubled to get a total demand estimate for the proposed site. In addition to this approach, applicants can attempt to define and make a case for a custom market area for a proposed site.

   Contact Metropolitan Council staff to obtain pre-calculated tables containing demand estimates for Years 2000, 2010, 2020, and 2030 at the TAZ-level. The tables were generated from a regional model that generates park-and-ride demand estimates as a function of employable population, home-based transit work trips to the two central business districts, park-and-ride mode split, and programmed capacity.

4. If the proposal does not include the closure of nearby competing facilities, then develop near-term, mid-term and long-term demand estimates that would be attracted from those facilities' primary market areas (2.5-mile radius) which overlap with the proposed facility's primary market area (2.5-mile radius) using the pre-calculated tables described above.
    - If the new facility will be relatively more attractive (better access, better service, more capacity) than the nearby competing facilities, then assume that the new facility will attract 100 percent of the potential park-and-ride users from the overlap area(s).
    - If the new facility will be relatively as attractive (comparable access, comparable service, comparable capacity) as the nearby competing facilities, then assume that the new facility will attract 50 percent of the potential park-and-ride users from the overlap area(s).
5. Subtract the corresponding near-term, mid-term and long-term competing facilities' demand estimates that would be attracted to the proposed facility from the proposed facility's corresponding near-term, mid-term and long-term total demand estimates to get the proposed facility's corresponding near-term, mid-term and long-term net demand estimates.

APPENDIX H

"A" Minor Reliever (B.4.), Expander (B.4.), Augmenter (B.4.), and Principal Artieral (B.4.) - Improved AM and PM volume/capacity ratios.

The applicant must obtain current peak hour volumes and use the vehicle capacities in Appendix A to calculate the AM and PM peak hour volume/capacity ratios in the peak direction at the most congested location in the project area. Existing volumes should be used in both the current and post-improvement AM and PM peak hour conditions. The improvement in the volume/capacity ratio could be due to an increase in vehicular capacity or a reduction in vehicle trips due to the project.

The project applicant must calculate the volume/capacity ratio in the peak direction at the most congested location within the project area following these steps:

- Collect current AM and PM peak hour volumes from existing data sources or by conducting traffic counts.
- Using the capacity figures in Appendix A, estimate the existing capacity of the congested location.
- Calculate the existing volume/capacity ratio in both the AM and PM peak hour.
- Revise the vehicle capacity of the roadway segment or the vehicle demand, as appropriate to the project, and calculate the volume/capacity ratios after implementation of the project.

Sample calculation.

Existing two lane arterial.

- AM peak hour volume = 550
- Vehicle capacity = 600
- AM volume/capacity ratio = 550/600 = 0.92

Proposed improvement: add left turn lanes at the major intersections and shifting of a transit route to serve the project area. The decrease in AM peak hour volume (20) reflects the expected number of new transit riders in the project area.

- AM peak hour volume = 550 - 20 = 530
- Vehicle capacity = 600 + 300
- Vehicle capacity = 900
- AM volume/capacity ratio = 530/900 = 0.59

PROJECT BENEFIT = 0.92 - 0.59 = 0.33 (AM peak)

contact person: Don Koski, Met Council, (651) 602-1721

APPENDIX I

"A" Minor Reliever (C.2.), Expander (C.3.), Augmenter (C.3.), and Principal Arterial (C.3.) - Increase in hourly person throughput.

The applicant must calculate the increase in hourly person throughput in the AM peak hour, in the peak direction of travel, at the most congested location in the project area using the following equation:

Hourly Person Throughput = (vehicle capacity of the roadway segment * AM peak hour vehicle occupancy) + AM peak hour bus ridership.

- Compute the existing vehicle capacity of the roadway segment (the approach to the intersection in the peak direction of travel) using the design capacity figures in Appendix A.
- Factor in the appropriate AM peak hour vehicle occupancy rate (See Appendix T).
- Add in the current AM peak hour bus ridership. This information can be obtained from Metro Transit or other appropriate service provider. The Metropolitan Council can provide contact person(s).
- Calculate the existing hourly person throughput.
- Revise the vehicle capacity, AM peak hour vehicle occupancy and AM peak hour bus ridership for the proposed project, as appropriate, and calculate the hourly person throughput after implementation of the project.

Sample calculation.

Existing two lane arterial.

- Vehicle capacity = 600
- AM peak hour vehicle occupancy = 1.12
- AM peak hour bus ridership = 100
- Hourly person throughput = (600 * 1.12) + 100
- Hourly person throughput = 772

Proposed improvement: add a left turn lane at the major intersections and construct a bus shelter that will slightly increase transit ridership.

- Vehicle capacity = 600 + 300
- AM peak hour vehicle occupancy = 1.12
- AM peak hour bus ridership = 100 + 10 = 110
- Vehicle capacity = 900
- Hourly person throughput = (900 * 1.12) + 110
- Hourly person throughput = 1118

HOURLY THROUGHPUT INCREASE = 1118 – 772 = 346

contact person: Don Koski, Met Council, 602-1721

APPENDIX J

Metro Intermodal/Freight Terminals

The list of major intermodal freight facilities begins on the following page. The map of intermodal freight terminals on p. 134 is available in a separate document from the Metropolitan Council's Regional Solicitation webpage: http://www.metrocouncil.org/planning/transportation/regsolicit.htm

Or from Don Koski at the Metropolitan Council, 651-602-1721 or donald.koski@metc.state.mn.us

Major Intermodal Freight Facilities in the Metro Area

2004-01-04

RAIL/TRUCK INTERMODAL FACILITIES	ADDRESS	CITY
FRIDLEY-7XXX UNIVERSITY/CENTRAL		
COMMERCIAL TRANSLOAD FRIDLEY	7151 UNIVERSITY AVE NE	FRIDLEY
MURPHY WAREHOUSE FRIDLEY	7033 CENTRAL AVE NE	FRIDLEY
MINNEAPOLIS NORTHEAST		
CP SHOREHAM TRANSFER AND RELOAD	2800 CENTRAL AVE NE	MINNEAPOLIS
CP SHOREHAM YARD	615 30TH AVE NE	MINNEAPOLIS
DISTRIBUTION CENTERS OF MINNESOTA	600 30TH AVE NE	MINNEAPOLIS
ROSEVILLE-COUNTY ROAD B		
COMMERCIAL TRANSLOAD ROSEVILLE	2508 COUNTY RD B W	ROSEVILLE
DLI (CP) ST PAUL LUMBER RELOAD	2323 TERMINAL RD	ROSEVILLE
TRIANGLE WAREHOUSE INC.	2500 N WALNUT ST	ROSEVILLE
TWIN CITIES RELOAD	2517-A COUNTY RD B W	ROSEVILLE
LAKEVILLE-AIRLAKE		
PROGRESSIVE RAIL, INC.	21790 HAMBURG AVE	LAKEVILLE
PROGRESSIVE RAIL, INC.	21778 HIGHVIEW AVE	LAKEVILLE
OTHERS		
BNSF MIDWAY YARD	1701 PIERCE BUTLER ROUTE	SAINT PAUL
BNSF ST PAUL AUTO RELOAD	90 FISH HATCHERY RD	SAINT PAUL
COMMERCIAL TRANSLOAD ST PAUL	MNNR HUMP YARD	SAINT PAUL
CP COTTAGE GROVE AUTO RELOAD	9250 IDEAL AVE S	COTTAGE GROVE
MID AMERICA DISTRIBUTION CENTER	4607 HUMBOLDT AVE N	MINNEAPOLIS
MURPHY WAREHOUSE MINNEAPOLIS	4700 MAIN ST NE	COLUMBIA HEIGHTS
TRANSPLASTICS	508 CLEVELAND AVE N	SAINT PAUL
TRIPLE CROWN SERVICES/ROADRAILER	525 KASOTA AVE	MINNEAPOLIS
TYSON COMPANY - CARDIGAN JCT RELOAD	1300 GRAY FOX ROAD	ARDEN HILLS
UP AUTO RELOAD	560 DRAKE ST	SAINT PAUL
WORLD TRANSLOAD AND LOGISTICS	5101 BOONE AVE N	NEW HOPE

RIVER/TRUCK TERMINALS	ADDRESS	CITY
PINE BEND		
CF INDUSTRIES, ROSEMOUNT FERTILIZER WAREHOUSE DOCKS #1,2; AMMONIA TERMINAL DOCK	5300 PINE BEND TRAIL	ROSEMOUNT
FLINT HILLS RESOURCES DOCKS #1,2,3,5,6	JUNCTION OF STATE HIGHWAYS 52 AND 55	INVER GROVE HEIGHTS
MINNEAPOLIS - Upper		
HOLCIM, MINNEAPOLIS CEMENT TERMINAL	3939 NORTH 1ST STREET	MINNEAPOLIS
RIVER SERVICES, MINNEAPOLIS BULK-LOADING DOCK, NORTH, SOUTH	3750 WASHINGTON AVENUE, NORTH	MINNEAPOLIS
MINNEAPOLIS - Lower		
AGGREGATE INDUSTRIES YARD D	65 NORTH 26TH AVENUE	MINNEAPOLIS
AMERICAN IRON & SUPPLY CO. DOCK	2800 PACIFIC STREET NORTH	MINNEAPOLIS
SAINT PAUL - West of Mississippi		
AGRILIANCE, SAINT PAUL WHARF	50 CHESTER STREET	SAINT PAUL
ALTER MINNESOTA WHARF/ST. PAUL RIVE	751 BARGE CHANNEL ROAD	SAINT PAUL
HAWKINS CHEMICAL, TERMINAL #2 DOCK	701 BARGE CHANNEL ROAD	SAINT PAUL
SAINT PAUL - East of Mississippi (Red Rock)		

	AMG RESOURCES CORPORATION DOCK	1303 RED ROCK RD	SAINT PAUL
	BARTON ENTERPRISES DOCK	1359 RED ROCK ROAD	SAINT PAUL
	HAWKINS CHEMICAL RED ROCK TERMINAL #3 DOCK	1425 RED ROCK ROAD	SAINT PAUL
	LAFARGE CORP., RED ROCK CEMENT TERM	1363 RED ROCK ROAD	SAINT PAUL
	PEAVEY CO., RED ROCK RIVER TERMINAL, LOADING DOCK; UNLOADING DOCK	1061 RED ROCK ROAD	SAINT PAUL
SAINT PAUL - East of Mississippi (Childs)			
	AGGREGATE INDUSTRIES YARD A	1177 CHILDS ROAD	SAINT PAUL
	CENEX HARVEST STATES COOPERATIVES, TERMINAL #2	935 CHILDS ROAD	SAINT PAUL
	GREAT WESTERN DOCK & TERMINAL	1031 CHILDS ROAD	SAINT PAUL
	HAWKINS CHEMICAL, TERMINAL #1 DOCK	1125 CHILDS ROAD	SAINT PAUL
	KOCH MATERIALS COMPANY-SAINT PAUL WHARF	2209 CHILDS ROAD	SAINT PAUL
	LAFARGE CORP., ST. PAUL CEMENT TERM	2145 CHILDS ROAD	SAINT PAUL
	WESTWAY TERMINAL COMPANY-SAINT PAUL TERMINAL #1 WHARF	2175 CHILDS RD	SAINT PAUL
	WESTWAY TRADING CORP., ST. PAUL TERMINAL #2	2225 CHILDS ROAD	SAINT PAUL
SAVAGE			
	CARGILL WEST, SAVAGE ELEVATOR WHARF	12100 DAKOTA AVENUE	SAVAGE
	CENEX HARVEST STATES COOPERATIVE SAVAGE ELEVATOR WHARF	6200 WEST HIGHWAY 13	SAVAGE
	PORT BUNGE SLIP AND LOADING DOCK	12100 YOSEMITE AVENUE	SAVAGE
	PORT CARGILL, EAST DOCK (ELEVATOR C)	12101 LYNN AVENUE SOUTH	SAVAGE
	PORT CARGILL, MOSAIC CROP NUTRITION DOCK	12101 LYNN AVENUE	SAVAGE
	SUPERIOR MINERALS COMPANY-PORT RICHARDS DOCK	12051 YOSEMITE AVE	SAVAGE
	U.S. SALT, PORT MARILYN DOCK	1020 BLACK DOG ROAD	BURNSVILLE
GREY CLOUD			
	AGGREGATE INDUSTRIES-LARSON PLANT DOCK	10120 GREY CLOUD ISLAND DR S	SAINT PAUL PARK
	AGGREGATE INDUSTRIES-NELSON PLANT DOCK	11250 GREY CLOUD TRAIL	COTTAGE GROVE
OTHERS			
	ARCHER DANIELS MIDLAND/GROWMARK, SAINT PAUL ELEVATOR D WHARF	575 DRAKE STREET	SAINT PAUL
	DAKOTA BULK TERMINAL	925 HARDMAN AVENUE SOUTH	SOUTH ST. PAUL
	MARATHON/ASHLAND PETROLEUM-SAINT PAUL REFINERY DOCK	300 W 3RD ST	SAINT PAUL PARK
	PIPELINE/TRUCK TERMINALS	**ADDRESS**	**CITY**
ROSEVILLE - County Road C			
	BP AMOCO	2288 W COUNTY RD C	ROSEVILLE
	WILLIAMS PIPELINE	2728 PATTON ROAD	ROSEVILLE
	WILLIAMS PIPELINE	2451 W COUNTY RD C	ROSEVILLE
OTHERS			
	ERICKSON PETROLEUM CORPORATION DOCK	50 21ST ST	NEWPORT
	FERRELLGAS	10825 COURTHOUSE BLVD	INVER GROVE HEIGHTS
	AIR/TRUCK TERMINALS	**ADDRESS**	**CITY**
SAINT PAUL			
	MSP INTERNATIONAL	4330 GLUMACK DRIVE	SAINT PAUL

App. J: Map – Major Intermodal Freight Facilities in Metro Area

Map is available to download at http://www.metrocouncil.org/planning/transportation/regsolicit.htm

APPENDIX K

Project Implementation Schedule

Please check those that apply and fill in anticipated completion dates

1) Project Scope

____Stake Holders have been identified
____Meetings or contacts with Stake Holders have occurred

2) Layout or Preliminary Plan

____Identified Alternates
____Selected Alternates
____Layout or Preliminary Plan started
____Layout or Preliminary Plan completed
Anticipated date or date of completion _____

3) Environmental Documentation

____EIS _____EA ____PM
Document Status
____Document not started
____Document in progress; environmental impacts identified
____Document submitted to State Aid for review (date submitted _____)
____Document approved (need copy of signed cover sheet)
Anticipated date or date of completion/approval _____

4) R/W

____No R/W required
____R/W required, parcels not identified
____R/W required, parcels identified
____R/W has been acquired
Anticipated date or date of acquisition _____

5) Construction Documents/Plan

____Construction plans have not been started
____Construction plans in progress
Anticipated date or date of completion _____
____Construction plans completed/approved

6) Letting

Anticipated Letting Date _____

APPENDIX L

Congestion Mitigation and Air Quality Improvement (CMAQ) Program

Guidance Documents: Since the April 1999 federal program guidance below, the FHWA published the following supplemental guidance documents that are available from the FHWA website (http://www.fhwa.dot.gov/environment/cmaqpgs.index.htm):

- Guidance on Federal-aid Eligibility of Operating Costs for Transportation Management System - January 3, 2000
- FHWA Program Guidance on HOV Lanes - March 28, 2001
- CMAQ Notice on High Speed Rail Eligibility - January 18, 2002
- Eligibility of Freight Projects and Diesel Engine Retrofit Programs - January 29, 2003
- Eligibility of Transit Station Rehabilitation for CMAQ Funding - January 30, 2003
- Eligibility of Truck Stop Electrification (TSE) and Other Idle-Reduction Measures - August 25, 2003
- **EPA Guidance:** For information on using emission reductions from truck idling reduction projects view EPA's "Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity" (EPA420-B-04-001, January 2004). Available as PDF at www.epa.gov/smartway/idlingimpacts.htm

Federal Program Guidance – April 1999

VII. PROJECT ELIGIBILITY PROVISIONS

Projects Not Eligible for CMAQ Funding

As was the case under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), certain projects may not be funded under the CMAQ program under any circumstances. Activities which are legislatively prohibited, including scrappage programs and highway capacity expansion projects, may not be funded under the CMAQ program. Similarly, rehabilitation and maintenance activities, as noted below, show no potential to make further progress in achieving the air quality standards and may not be funded under the CMAQ program. Program funds may also not be used for projects which are outside of nonattainment or maintenance area boundaries except in cases where the project is located in close proximity to the nonattainment or maintenance area and the benefits will be realized primarily within the nonattainment or maintenance area boundaries. (Note: The use of CMAQ funds under the flexibility provisions discussed in Section V are an exception). Public-private partnerships involving the implementation of statutorily mandated measures (e.g., phase-in of alternatively fueled fleets) may not be funded with CMAQ funds. Finally, projects not meeting the specific eligibility requirements under titles 23 or 49 of the United States Code may also not be funded under this provision.

Highway and Transit Maintenance and Reconstruction Projects: Routine maintenance projects are not eligible for CMAQ funding. Routine maintenance and rehabilitation on existing facilities maintains the existing levels of highway and transit service, and therefore maintains existing ambient air quality levels. Thus, no progress is made toward achieving the NAAQS. Rehabilitation projects only serve to bring existing facilities back to acceptable levels of service. Other funding sources, like the STP and FTA's Section 5307 program, exist for reconstruction, rehabilitation and maintenance activities. Replacement-in-kind of track or other equipment, reconstruction of bridges, stations and other facilities, and repaving or repairing roads are also ineligible for CMAQ funding.

Construction of SOV Capacity: Construction projects which will add new capacity for SOV are not eligible under this program unless the project consists of a high-occupant vehicle (HOV) facility that is available to SOV *only* at off-peak travel times. For purposes of this program, construction of added

capacity for SOV means the addition of general purpose through lanes to an existing facility which are not HOV lanes, or construction of a highway at a new location. However, projects to plan, develop, assess, or construct new High Occupancy Toll lanes are an eligible CMAQ expense so long as they are part of the Value Pricing Program under TEA-21.[7]

Project Eligibility-General Conditions

All projects and programs eligible for CMAQ funds must come from a conforming transportation plan and TIP, and be consistent with the conformity provisions contained in section 176(C) of the CAA and the Transportation Conformity Rule[8] Projects need to be included in TIPs or state-wide transportation improvement projects developed by MPOs or States respectively, under the metropolitan or statewide planning regulations.[9] Projects also need to complete the National Environmental Policy Act (NEPA) requirements and meet basic eligibility requirements for funding under titles 23 and 49 of the United States Code.

In cases where specific guidance is not provided, the following should guide CMAQ eligibility decisions.

Capital Investment: CMAQ funds should be used for establishment of new or expanded transportation projects and programs to help reduce emissions. In many cases this is likely to be capital investment in transportation infrastructure or establishment of a new demand management strategy or other program.

Operating Assistance: There are several general conditions which must be met in order for any type of operating assistance to be eligible under the CMAQ program.

- In extending the use of CMAQ funds to operating assistance, the intent is to help start up viable new transportation services which can demonstrate air quality benefits and eventually will be able to cover their costs to the maximum extent possible. Other established funding sources should supplement and ultimately supplant the use of CMAQ funds for operating assistance.
- Operating assistance includes all costs related to ongoing provision of new transportation services including, but not limited to, labor, administrative costs and maintenance.
- When using CMAQ funds for operating assistance, local share requirements still apply.
- Operating assistance is limited to new transit services and new or expanded transportation demand management strategies.
- Operating assistance under the CMAQ program is limited to 3 years, except as noted elsewhere in this guidance.

Emission Reductions: Projects funded under the CMAQ program must be expected to result in tangible reductions in CO, ozone precursor emissions, or PM-10 pollution. This can be demonstrated by the assessment of anticipated emission reductions that is required under this guidance for most projects. The FHWA and FTA strongly encourage State and local governments to use CMAQ funds for their primary purpose which is to assist nonattainment and maintenance areas to reduce transportation-related emissions.

Public Good: CMAQ funded projects should be for the good of the general public. Public-private partnerships may be eligible, however, so long as a public good (i.e., reduced emissions) results from the project (see discussion of public-private partnerships below).

Eligible Activities and Projects

Eligibility information on activities and projects and program areas is provided below, together with any restrictions. All possible requests for CMAQ funding are not covered; this section provides particular cases where guidance can be given and rules of thumb applied to assist decisions regarding CMAQ eligibility.

1. **Transportation Activities in an Approved SIP or Maintenance Plan**: Transportation activities in approved SIPs and maintenance plans are likely to be eligible activities and, if so, must be given the highest priority for CMAQ funding. Their air quality benefits will generally have already been documented. If not, such documentation is necessary before CMAQ funding can be approved. Further, the transportation improvement must contribute to the specific emission reductions necessary to bring the area into attainment.

2. <u>TCMs</u>: The TCMs included in 42 U.S.C. §7408(f)(1) are the kinds of projects intended by the TEA-21 for CMAQ funding, and generally satisfy the eligibility criteria. As above, and consistent with the statute, air quality benefits for TCMs must be determined and documented before a project can be considered eligible. One CAA TCM, xvi - programs to encourage removal of pre-1980 vehicles is specifically excluded from the CMAQ program by the TEA-21 legislation. Eligible TCMs are listed below as they appear in 42 U.S.C. §7408 (f)(1).

(i) programs for improved public transit;
(ii) restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or HOV;
(iii) employer-based transportation management plans, including incentives;
(iv) trip-reduction ordinances;
(v) traffic flow improvement programs that achieve emission reductions;
(vi) fringe and transportation corridor parking facilities serving multiple-occupancy vehicle programs or transit service;
(vii) programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration particularly during periods of peak use;
(viii) programs for the provision of all forms of high-occupancy, shared-ride services;
(ix) programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
(x) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
(xi) programs to control extended idling of vehicles;
(xii) reducing emissions from extreme cold-start conditions (newly eligible);
(xiii) employer-sponsored programs to permit flexible work schedules;
(xiv) programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for SOV travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
(xv) programs for new construction and major reconstructions of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest. For purposes of this clause, the Administrator shall also consult with the Secretary of the Interior; and
(xvi) programs to encourage remove of pre-1980 vehicles (EXCLUDED FROM ELIGIBILITY).

3. <u>Extreme Low-Temperature Cold Start Programs</u>: Projects intended to reduce emissions from extreme cold-start conditions are now eligible for CMAQ funding. This TCM is listed in 42 U.S.C. §7408 (f)(1) and was heretofore excluded from eligibility for CMAQ funding. Examples of such projects include:

• Retrofitting vehicles and fleets with water and oil heaters; and
• Installing electrical outlets and equipment in publicly-owned garages or fleet storage facilities (see also section below on public-private partnerships for a possible expansion to privately-owned equipment and facilities).

4. <u>Public-Private Partnerships</u>: The TEA-21 provides greater access to CMAQ funds for projects which are cooperatively implemented under agreements between the public and private sectors and/or non-profit entities. The new statutory language leads to several important changes regarding the eligibility of joint public-private initiatives. Nevertheless, it remains the responsibility of the cooperating public agency to apply for CMAQ funds through the metropolitan planning process and to oversee and protect the investment of Federal funds in a public-private partnership.
The TEA-21 requires that a legal, written agreement be in place between the public agency and private or non-profit entity before implementing a CMAQ-funded project. This provision supersedes the requirement under previous guidance that private entities have public agency sponsors before

participating in CMAQ-funded projects. These agreements should clearly specify the use to which CMAQ funding will be put; the roles and responsibilities of the participating agencies; cost-sharing arrangements for capital investments and/or operating expenses; and how the disposition of land, facilities and equipment will be effected should the original terms of the agreement be changed, such as insolvency or a change in the ownership of the private entity.

While the new statute provides greater latitude in funding projects initiated by private or non-profit entities, it also raises concerns about the use of public funds to benefit a specific private entity. Since the public benefit is air quality improvement, it is expected that future funding proposals involving private entities will demonstrate strong emission reduction benefits. Furthermore, this new flexibility requires that greater emphasis be placed on an open, participatory process leading up to the selection of projects for funding. Because of concerns about the equitable use of public funds, FHWA and FTA consider it essential that all interested parties have full and timely access to the process of selecting projects for CMAQ funding. This should involve open solicitation for project proposals; objective criteria developed for rating candidate projects; and announcement of selected projects.

The TEA-21 also contains some restrictions and special provisions on the use of CMAQ funds in public-private partnerships. Eligible costs under this section may not include costs to fund an obligation imposed on private sector or non-profit entities under the CAA or any other Federal law. For example, CMAQ funds may not be used to fund mandatory control measures such as Stage II Vapor Recovery requirements placed on fuel sellers. Energy Policy Act requirements which apply to private sector entities are not eligible for CMAQ funds. However, if the private or non-profit entity is clearly exceeding its obligations under Federal law, CMAQ funds may be used for that incremental portion of the project.

Decisions over which projects and programs to fund under CMAQ should continue to be made through a cooperative process involving the State departments of transportation, affected MPOs, transit agencies and State and local air quality agencies. All projects funded with CMAQ funds must be included in conforming transportation plans and TIPs in accordance with the metropolitan planning regulations (23 CFR 450.300), the transportation conformity requirements (40 CFR parts 51 and 93), and NEPA requirements.

Activities eligible to be considered as meeting the local match requirements under the public-private partnership provisions include:

- Ownership or operation of land, facilities or other physical assets;
- Carrying out construction or project management; and
- Other forms of participation approved by the U.S. DOT Secretary.

The TEA-21 also contained special provisions for alternative fuel projects that are part of a public-private partnership. For purchase of privately-owned vehicles or fleets using alternative fuels, activities eligible for CMAQ funding are limited to the Federal share of the incremental cost of an alternative fueled vehicle compared to a conventionally fueled vehicle. Further, if other Federal funds are used for vehicle purchase in addition to CMAQ funds, such Federal funds must be applied to the incremental cost before CMAQ funds are applied.

Cost sharing of total project expenses, both capital and operating, is a critical element of a successful public-private venture. This is even more important if the private entity is expected to realize profits as part of the joint venture. State and local officials are urged to consider a full range of cost-sharing options when developing a public-private partnership, including a larger State/local match than the usual 20 percent required under Federal law.

5. Alternative Fuels: The purchase of publicly-owned, alternative fuel vehicles is eligible for CMAQ funding (for information on eligible public-private sector alternative fuel projects see the discussion on public-private partnerships above).

Since all alternative fueled vehicles are not necessarily good for air quality, proposals for alternative fuel conversion should be coordinated with the State air agency and be aimed primarily at air quality improvement. As with all CMAQ proposals, it must be demonstrated that the proposed switch to alternative fuels is effective in reducing the specific pollutant(s) causing the air quality violation. Fleet conversions no longer need to be specifically identified or included in the SIP or maintenance plan in order to be eligible for CMAQ funding. Consideration of such projects should be coordinated with air quality agencies prior to selection for funding under the CMAQ program. This coordination will ensure that such projects are consistent with SIP strategies to attain the NAAQS or in maintenance plans to ensure continued maintenance of the NAAQS.

The establishment of publicly-owned, on-site fueling facilities and other infrastructure needed to fuel alternative-fuel vehicles are also eligible expenses. If privately-owned fueling stations are in place and are reasonably accessible and convenient, then CMAQ funds may not be used to construct or operate publicly-owned fueling stations except under a public-private partnership. Such an activity would interfere with private enterprise, and needlessly use transportation/air quality funds for services duplicated in the area.

6. Traffic Flow Improvements: The metropolitan planning provisions of TEA-21 (23 U.S.C. §134(i)(3) and 49 U.S.C. §5305) require that the metropolitan planning process in all Transportation Management Areas (metropolitan areas of 200,000 or more in population) include a congestion management system.

Projects to develop, establish, and implement the congestion management system for both highway and transit facilities, whether under the provisions of 23 U.S.C. §§134 or under a State's own procedures, remain eligible for CMAQ funds where it can be demonstrated that such use is likely to reduce transportation-related emissions.

In addition to traffic signal modernization, coordination, or synchronization projects designed to improve traffic flow within a corridor or throughout an area like a central business district, Intelligent Transportation Systems (ITS), traffic management and traveler information systems can be effective in reducing traffic congestion, enhancing transit bus performance and improving air quality. The following have the greatest potential for improving air quality:

- regional multi-modal traveler information systems;
- traffic signal control systems;
- freeway management systems;
- transit management systems;
- incident management programs;
- electronic fare payment systems; and
- electronic toll collection systems.

While interconnected traffic signal control systems and freeway management systems have been recognized for their air quality improvement benefits, other user services like electronic fare and toll collection systems can be useful in reducing or eliminating air quality "hot spots". Individually, these core infrastructure elements can reduce emissions and therefore qualify for CMAQ funding. However, when linked together in a system, their benefits are likely to be greater.

Agencies seeking to implement ITS projects must demonstrate consistency with the National ITS Architecture. This is address in separate guidance.

Operating expenses for traffic flow improvements are eligible for CMAQ funding where they can be shown to: 1) have air quality benefits, 2) the expenses are incurred from new or additional services, and 3) previous funding mechanisms, such as fares or fees for services, are not displaced.

Since CMAQ-funded projects should contribute to the attainment or maintenance of a NAAQS, it must be found that these operating costs are necessary for the overall system to contribute to attainment or maintenance of an ambient air quality standard. It is reasonable to assume that, after several years, a transportation service may no longer be considered to be an air quality improvement project, but that it has become a part of the existing transportation network. Hence, FHWA and FTA field offices are advised to use the consultation process with EPA to make a determination that

operating assistance for traffic management systems, traveler information systems and other ITS projects or programs, beyond the initial 3-year period of eligibility, will assist in the attainment or maintenance of an air quality standard. (Also see operating assistance eligibility discussion earlier in this guidance.)

7. Transit Projects: Improved public transit is one of the TCMs identified in section 108(f)(1)(A) of the CAA. However, not all transit improvements are eligible under the CMAQ program. The general guideline for determining eligibility is whether an increase in transit ridership can reasonably be expected to result from the project. As with all CMAQ-funded projects, this must be supported by a quantified estimate of the emissions effects due to the project.

Facilities: New transit facilities are eligible if they are associated with new or enhanced mass transit service. If the project is rehabilitation, reconstruction, or maintenance of an existing facility, it is not eligible since there would be no change in emissions caused by the project. Other FTA grant programs can be used for upgrading existing facilities.

Vehicles: Acquisition of new transit vehicles (bus, rail, van) to expand the fleet are eligible. New vehicles acquired as replacements for existing fleet vehicles are also eligible; however, diesel-powered replacement vehicles will have minimal impact on attaining the ozone, PM, and CO standards. For these projects in particular, emissions effects must be documented so that they can be arrayed with other CMAQ proposals and allow informed decisions on the best use of available funds.

Operating Assistance: CMAQ funding can be used to support the start-up of new transit services. In order to be eligible, the service must be a discrete new addition to the system so that operating costs can be easily identified. Operating assistance is for a maximum of 3 years, after which other sources of funding must be used if the service is to be continued.

Fare subsidies: CMAQ funds may be used to subsidize regular transit fares, but only if the reduced or free fare is part of an overall program for preventing exceedances of a national air quality standard during periods of high pollutant levels. Examples include metropolitan areas that have implemented voluntary mobile source emission reduction programs which promote a range of measures individuals can take to reduce ozone-forming emissions. "Ozone-action" programs, designed to avoid exceedances when ozone concentrations are high, are bolstered by more permanent measures aimed at discouraging SOV driving. Refer to section VII.12 for additional discussion of fare/fee subsidies.

8. Bicycle and Pedestrian Facilities and Programs: Bicycle and pedestrian facilities and programs are included as a TCM in section 108(f)(1)(A) of the CAA. Included as eligible projects are:

- construction of bicycle and pedestrian facilities;
- non-construction projects related to safe bicycle use; and
- establishment and funding of State bicycle/pedestrian coordinator positions, as established in the ISTEA, for promoting and facilitating the increased use of non-motorized modes of transportation. This includes public education, promotional, and safety programs for using such facilities.

9. Travel Demand Management: Travel demand management encompasses a diverse set of activities ranging from traditional carpool and vanpool programs to more innovative parking management and road pricing measures. Many of these measures are specifically referenced in the legislation creating the CMAQ program. Travel demand management projects meeting the basic eligibility requirements of the FHWA and FTA funding programs are eligible for CMAQ funding. Eligible activities include: market research and planning in support of travel demand management (TDM) implementation; traffic calming measures; capital expenses required to implement TDM measures; operating assistance to administer and manage TDM programs for up to 3 years; as well as marketing and public education efforts to support and bolster TDM measures.

Experience to date suggests that new transportation service has the greatest chance of success if offered along with complementary measures which discourage SOV use, such as parking restrictions or differential parking fees. Several provisions in TEA-21 require metropolitan areas to consider TDM measures in the planning process and this guidance seeks to encourage their development and implementation.

With respect to traffic calming measures, such projects should be examined on a case-by-case basis to assess eligibility. Not all traffic calming measures will lead to reduced emissions and States and MPOs should analyze these projects in the local context in which they would be implemented.

10. Outreach and Rideshare Activities: Outreach activities, such as public education on transportation and air quality, advertising of transportation alternatives to SOV travel, and technical assistance to employers or other outreach activities relating to promoting non-SOV travel options have been, and continue to be, eligible for CMAQ funds. Such outreach activities may be funded under the CMAQ program for an indefinite period.

Outreach activities differ fundamentally from the establishment of transportation services. They are communication services that are critical to successful implementation of transportation measures and may equally affect new and existing transit, shared ride, I/M, traffic management and control, bicycle and pedestrian, and other transportation services. As such, they are intended to continue reaching new audiences each time they are implemented, and restrictions on the length of time they may be funded seems contrary to one of the program's goals of effecting behavioral changes to reduce transportation emissions.

Marketing Programs: Marketing programs to increase use of transportation alternatives to SOV travel and public education campaigns involving the linkage between transportation and air quality are eligible operating expenses. Transit "stores" selling fare media and dispensing route and schedule information which occupy leased space are also eligible. In addition, programs to promote the recently enacted Tax Code[10] change related to commute benefits are eligible for CMAQ funding.

Carpooling and Vanpooling: Carpool and vanpool programs include computer matching of individuals seeking to carpool and employer outreach to establish rideshare programs and meet CAA requirements. These activities, even if they are part of an existing rideshare program, are eligible for CMAQ funding. New or expanded rideshare programs, such as new locations for matching services, upgrades for computer matching software, etc. are also eligible and may be funded for an indefinite period of time for both carpool and vanpool services.

The implementation of a vanpool operation entails purchasing or leasing vehicles and providing a transportation service. Therefore, proposals for vanpool activities such as these must be for new or expanded service to be eligible and are subject to the 3-year limitation on operating costs.

Under the CMAQ program, the purchase price of a publicly-owned vehicle for a vanpool service does not have to be paid back to the Federal Government. Requiring payback would place an additional constraint to wider implementation and usage of vanpool programs. Nonetheless, CMAQ funds should not be used to buy or lease vans that would be in direct competition with and impede private sector initiatives. Consistent with the statewide and metropolitan planning regulation, [11] States and MPOs should consult with the private sector prior to using CMAQ funds to purchase vans, and if local private firms have definite plans to provide adequate vanpool service, CMAQ funds should not be used to supplant that service.

Transportation Management Associations: Transportation Management Associations (TMAs) are comprised of groups of individuals, firms or employers who organize to address the transportation issues in their immediate locale. The CMAQ funds may be used for the establishment of TMAs provided that the TMA performs a specified purpose in the project agreement that will be part of any air quality improvement strategy. The TMAs can play a useful role in brokering transportation services to private employers, and CMAQ funds may be used to contract with TMAs for this purpose. Eligible costs include coordinating and marketing rideshare programs, providing shuttle services, developing parking management programs, etc. Eligible expenses for reimbursement of associated TMA start-up costs are limited to 3 years.

11. Telecommuting: The DOT supports the establishment of telecommuting programs. Planning, technical and feasibility studies, training, coordination, marketing and promotion are eligible activities under CMAQ. Physical establishment or construction of telecommuting centers, computer and office equipment purchases and related activities are not eligible.

12. Fare/Fee Subsidy Programs: The CMAQ program allows funding for user fare or fee subsidies in order to encourage greater use of alternative travel modes (e.g., carpool, vanpool, transit, bicycling and walking). This policy has been established to encourage areas to take a more comprehensive approach--including both supply and demand measures--in reducing transportation emissions.
Transit Services: CMAQ funds can be used to subsidize transit fares only if the reduced fare is offered as a component of a comprehensive, targeted program to reduce SOV use during episodes of high pollutant concentrations. (Also see Transit Project eligibility section.)
Other Demand Management Strategies: CMAQ funds can be used to subsidize fares or fees for vanpools, shuttle services, flat-fare taxi programs and other demand management strategies. Examples of how the fare/fee subsidy might be used include: a program subsidizing empty seats during the formation of a new vanpool; reduced fares for shuttle services within a defined area, such as a flat-fare taxi program; or providing financial incentives for carpooling, bicycling, and walking in conjunction with a commuter choice or other program such as those described under Outreach and Rideshare Activities above.
Other components of fare/fee subsidy programs include public information and marketing of non-SOV alternatives, parking management measures, employer-based commuter choice programs, and better coordination of existing transportation services. Fare/fee subsidies under the CMAQ program are intended as short-term incentives. As with operating assistance, there is a maximum 3-year time limit.
13. Intermodal Freight: The CMAQ funds have been, and continue to be, used for improved intermodal freight facilities where air quality benefits can be shown. Capital improvements as well as operating assistance meeting the conditions of this guidance are eligible.
14. Planning and Project Development Activities: Project development activities that lead to construction of facilities or new services and programs with air quality benefits, such as preliminary engineering or project planning studies are eligible. This includes studies for the preparation of environmental or NEPA documents and related transportation/air quality project development activities. Project development studies directly related to a TCM are also eligible. In the event that air quality monitoring is necessary to determine the air quality impacts of a proposed project which is eligible for CMAQ funding, the costs of that monitoring are also eligible. As is the case with all CMAQ funded activities, all projects proposed for funding must be included in the MPO Plan and TIP and must meet the metropolitan planning requirements.
General planning activities, such as economic or demographic studies, that do not directly propose or support a transportation/air quality project or are too far removed from project development to ensure any emission reductions are not eligible for funding. Funding for preparation of NEPA or other environmental documents that are not related to a transportation project to improve air quality is also ineligible. Such activities should be funded with other appropriate title 23 or title 49 FTA funds.
Region- or area-wide air quality monitoring is not eligible because such projects do not themselves yield air quality improvements nor do they lead directly to projects that would yield air quality benefits. Air quality monitoring is normally a State air quality agency responsibility which is funded under section 105 of the CAA. If the MPO or State chooses, air quality monitoring could also be funded as a transportation planning activity and appropriate title 23 funds used.
15. I/M Eligibility: Emission I/M programs and related activities show strong potential for improving air quality and are cost-effective uses of CMAQ funds. Recognizing this, construction of facilities and purchase of equipment for I/M stations are eligible for CMAQ funds. Projects necessary for the development of these I/M programs and one-time start-up activities, such as updating quality assurance software or developing a mechanic training curriculum, are also eligible activities.
Operating expenses are eligible for CMAQ funding subject to the general conditions applying to all new transportation services. Specifically, the I/M program must constitute new or additional efforts; existing funding (including inspection fees) should not be displaced, and operating expenses are only eligible for 3 years.

Funds under the CMAQ program may be used for the establishment of I/M programs at publicly-owned I/M facilities. Publicly-owned I/M facilities may be constructed, equipment may be purchased, and the facility operated for up to 3 years with CMAQ funds, provided that the conditions covering operations described above are met.

The establishment of I/M programs at privately-owned stations, such as service stations that own the equipment and conduct emission test-and-repair services, can only be funded under the CMAQ program under the provisions covering "public-private partnerships" contained in this guidance. However, if the State relies on private stations, State or local administrative costs for the planning and promotion of the State's I/M program may be funded under the CMAQ program.

The establishment of "portable" I/M programs is also eligible under the CMAQ program, provided that they are public services, contribute to emission reductions and do not conflict with statutory I/M requirements or EPA implementing regulations. Like all CMAQ-funded projects, these programs must meet any relevant NEPA requirements and must be included in the area's plan and TIP before they can be funded.

16. Magnetic Levitation Transportation Technology Deployment Programs: CMAQ funds may be used to fund a portion of the full project costs (including planning, engineering, and construction) pursuant to section 1218 -Magnetic Levitation Transportation Technology Deployment Program of TEA-21 and in accordance with the provisions of section 1218.

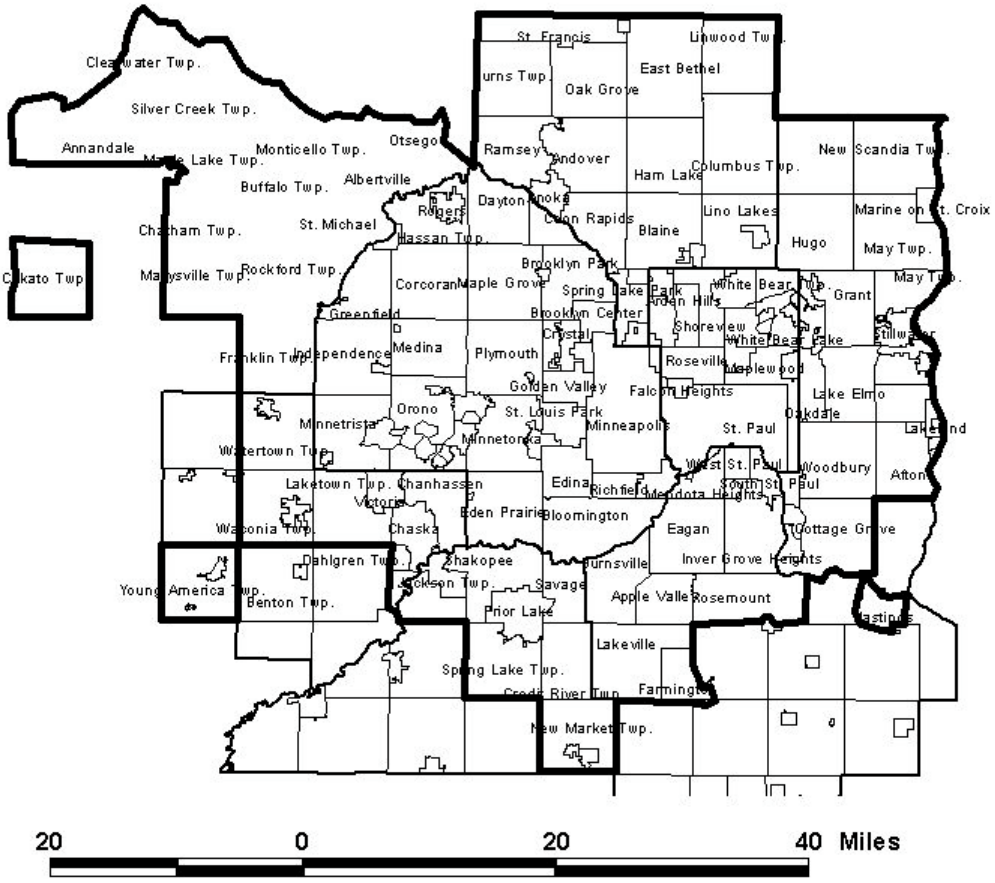
17. Experimental Pilot Projects: States and local areas have long experimented with various types of transportation services--and different means of employing them--in an effort to better meet the travel needs of their constituents. These "experimental" projects may not meet the precise eligibility criteria for Federal and State funding programs, but they may show promise in meeting the intended public purpose of those programs in an innovative way. The FHWA and FTA have supported this approach in the past and funded some of these projects as demonstrations to determine their benefits and costs.

The CMAQ provisions of TEA-21allow experimentation provided that the project or program can reasonably be defined as a "transportation" project and that emission reductions can reasonably be expected "through reductions in vehicle miles traveled (VMT), fuel consumption or through other factors." This guidance encourages States and MPOs to creatively address their transportation/air quality problems and to experiment with new services, innovative financing arrangements, public-private partnerships and complementary approaches that constitute comprehensive strategies to reduce emissions through transportation programs. The CMAQ program can be used to support a well conceived project even if the proposal may not otherwise meet the eligibility criteria of this guidance. Proposals submitted for funding under this provision should show promise in reducing transportation emissions in nonattainment or maintenance areas and should have the concurrence of the MPO, State transportation agency and the FHWA/FTA. Such proposals must also be coordinated with EPA and State/local air quality agencies.

While the CMAQ provisions of TEA-21 were written broadly to encourage an innovative approach, the principles of sound program management must still be followed. Under this approach, there will likely be proposals for funding with which transportation agencies have little experience. As such, before-and-after studies are required to determine the actual project impacts on the transportation network (measured in VMT or trips reduced, or other appropriate measure) and on air quality (emissions reduced). An assessment of the project's benefits should be forwarded to FHWA or FTA documenting the immediate impacts as well as a projection of the project's long-term benefits.

All projects funded under this section should be explicitly identified in the annual report of CMAQ activities as required under section IX of this guidance. In future years, when before-and-after studies are complete, a summary of the actual project benefits should also be included in the annual report. The amount obligated for proposals made pursuant to this section should not exceed 25 percent of a State's yearly CMAQ apportionment.

Appendix M
Twin Cities Carbon Monoxide Maintenance Area



Based on Federal Register Notice November 6, 1991

APPENDIX N

CMAQ (B.1.) - Increase in hourly person throughput.

The applicant must calculate the increase in hourly person throughput in the AM peak hour, in the peak direction of travel, at the most congested location in the project area using the following equation:

Hourly Person Throughput = (vehicle capacity of the roadway segment * AM peak hour vehicle occupancy) + AM peak hour bus ridership.

- Compute the existing vehicle capacity of the roadway segment (the approach to the intersection in the peak direction of travel) using the design capacity figures described in Appendix A.
- Factor in the appropriate AM peak hour vehicle occupancy rate (See Appendix T).
- Add in the current AM peak hour bus ridership. This information can be obtained from Metro Transit or other appropriate service provider. The Metropolitan Council can provide contact person(s).
- Calculate the existing hourly person throughput.
- Revise the vehicle capacity, AM peak hour vehicle occupancy and AM peak hour bus ridership for the proposed project, as appropriate, and calculate the hourly person throughput after implementation of the project.

Sample calculation.

Existing four-lane expressway.

- Vehicle capacity = 1400
- AM peak hour vehicle occupancy = 1.12
- AM peak hour bus ridership = 100
- Hourly person throughput = (1400 * 1.12) + 100
- Hourly person throughput = 1668

Proposed improvement: funding for a transportation management organization that is expected to increase carpooling and transit ridership along the expressway.

- Vehicle capacity = 1400
- AM peak hour vehicle occupancy = 1.15
- AM peak hour bus ridership = 200
- Hourly person throughput = (1400 * 1.15) + 200
- Hourly person throughput = 1810

INCREASED HOURLY PERSON THROUGHPUT = 1810 - 1668 = 142

contact person: Don Koski, Met Council, 602-1721

APPENDIX O

CMAQ (B.2.) – Location of AM and PM Peak Period Congestion

Applicants should illustrate that the project will reduce congestion in a congested corridor, using the following two congested arterial maps or the 2003 Congestion Report (http://www.dot.state.mn.us/trafficeng/otepubl/CongestionReport-2003.pdf). If you have an electronic copy of this document and the pdf maps are not shown on the next two pages, or for color copies of the maps, contact Don Koski (651-602-1721 or donald.koski@metc.state.mn.us) at the Metropolitan Council. If the applicable corridor is not listed, and there is a congestion problem, see the criteria in the main document for an explanation of how to illustrate congestion reduction.

Map: AM Peak Period Congestion

Map available at http://www.metrocouncil.org/planning/transportation/regsolicit.htm

Map: PM Peak Period Congestion

Map available at http://www.metrocouncil.org/planning/transportation/regsolicit.htm

APPENDIX P

Calculation of net operating costs for new service

For applicants who use a contracted service provider

1) The cost per platform hour (garage pull-out to garage pull-in) for your 2005 contracted services for vehicles of the same type as the ones in this proposal – or – an estimate from a private transit provider for the provision of this service: _____ (Cost/Platform Hour)
   Name of provider: _____

2) The number of platform hours proposed in the "Service Description Summary" section.

   _____

3) Take line One times Line Two to get gross operating cost: _____

4) Estimated fare box revenue based on projected ridership: _____

5) Subtract Line Three from Line Four to get net operating cost: _____

   (This is the net annual operating cost for your new service.)

For applicants who provide service directly

1) Total agency 2005 transit operating budget, less any non-transportation costs, allocations, or accruals (costs must be comparable whether contracted or direct service provider): _____

2) Agency budget minus maintenance, fuel, and parts costs: _____
   (Maintenance includes mechanics, tools, and other mechanics-related costs)

3) Agency budget for maintenance, fuel, and parts: _____
   (Line Two plus Line Three should equal Line One)

4) Annual projected vehicle platform hours for 2005 for your agency: _____

5) Annual projected vehicle platform miles for 2005 for your agency _____

6) Divide Line Two by Line Four to get your agency's fixed cost per platform hour

   _____

7) Divide Line Three by Line Five to get your agency's variable cost per platform mile

   _____

8) The number of platform hours proposed in the "Service Description Summary" section.

   _____

9) Multiply Line Six by Line Eight to get your total cost for platform hours proposed for this project

   _____

10) Multiply Line Seven by the number of service miles proposed _____

11) Add Line Nine and Ten. (This is the gross operating cost for this service.) _____

12) Estimated fare box revenue based on projected ridership: _____

13) Subtract Line Twelve from Line Eleven to get net operating cost for this proposal:

_____

(This is the net annual operating cost for your new service.)

For agencies with a mix of directly provided and contracted services

If the vehicles in this proposal will be assigned to a contractor, use the contracted service section of this form. If the vehicles will be used in direct service, complete that section of the form, using only the portion of your budget and service hours that are used in direct service.

APPENDIX Q

Technical Advisory Committee and Transportation Advisory Board Membership

Technical Advisory Committee	
Name	**Representing**
Tim Henkel, Chair Pat Bursaw (alt.)	Mn/DOT
Jon Olson	Anoka County
Lyndon Robjent (alt.)	Anoka County
Roger Gustafson	Carver County
Kristine Elwood Mark Krebsbach (alt.)	Dakota County
Tom Johnson James Grube (alt.)	Hennepin County
Tim Mayasich Ken Haider (alt.)	Ramsey County
Lezlie Vermillion Greg Felt (alt.)	Scott County
Sandy Cullen Joe Lux (alt.)	Washington County
John Sutter	Assoc. of Metro Munic.
Lee Gustafson	Assoc. of Metro Munic.
Chuck Ahl	Assoc. of Metro Munic.
Craig Gray	Assoc. of Metro Munic.
Brian Bachmeier	Assoc. of Metro Munic.
Charles Honchell	Assoc. of Metro Munic.
Kimberly Lindquist	Assoc. of Metro Munic.
Jason Wedel	Assoc. of Metro Munic.
Pamela Miner Don Elwood	City of Minneapolis
Mike Klassen Allen Lovejoy	City of St. Paul
Susan Moe	Federal Hwy. Admin.
Beverley Miller	MN Valley Transit Auth.
Jon Larsen	MN Planning Agency
Innocent Eyoh	Minnesota Pollution Control Agency
Robert Vorphal	Metropolitan Airports Commission
Arlene McCarthy	Metropolitan Council (Metro Transit)
Ann Braden	Metropolitan Council
Carl Ohrn Connie Kozlak (alt.)	Metropolitan Council
Kevin Roggenbuck	Transportation Advisory Board
Jim Barton	TAC Secretary

Transportation Advisory Board	
Name	**Representing**
Donn Wiski	Chair
Dennis Berg	Anoka County
Tom Workman	Carver County
Paul Krause	Dakota County
Linda Koblick	Hennepin County
Jim McDonough	Ramsey County
Jon Ulrich	Scott County
Myra Peterson	Washington County
William Hargis	Assoc. of Metro Munic.
Charles Crichton	Assoc. of Metro Munic.
David Luick	Assoc. of Metro Munic.
Sandy Hewitt	Assoc. of Metro Munic.
Robert Lilligren	Assoc. of Metro Munic.
Dan Bostrom	Assoc. of Metro Munic.
Julia Whalen	Assoc. of Metro Munic.
Chuck De Vore	Assoc. of Metro Munic.
Jim Hovland	Assoc. of Metro Munic.
Steven Billings	Assoc. of Metro Munic.
Robert Gorg	District A
Dick Allendorf	District B
James Meyers	District C
Sally Carlson-Bancroft	District D
Kris Sanda	District E
Donn Wiski (Chair)	District F
Jill Smith	District G
Ken Johnson	District H
Peggy Leppik	Metropolitan Council
Carol Molnau Pat Hughes (alt.)	Mn/DOT
Ann Seha	Minnesota Pollution Control Agency
Richard Long	Metropolitan Airports Commission
Lori Fritts	Transit
Glenn Olson	Transit
Ron Lifson	Freight Movement
David Gepner	Non-Motorized Transportation
Kevin Roggenbuck	Transportation Advisory Board
LuAnne Major	TAB Secretary

APPENDIX R

Qualifying Criteria Review and Challenge Procedures

Recorded below are the procedures the TAC have adopted for review and challenge of qualifying criteria.

- The cover letter transmitting the solicitation package emphasizes the need to carefully address the qualifying criteria. The letter notes staff is available to answer questions about the qualifying criteria and emphasizes that projects will be disqualified if they do not meet the qualifying criteria.

- The instructions state that a project qualified in a past solicitation does not necessarily qualify now due to changes in the criteria or changes to the Council plans or procedures.

- Staff reviews the responses to the qualifying criteria for all applications received and identifies any responses that may not meet the qualifying criteria.

- Staff will try to determine if errors were made in applications which the applicant should be allowed to correct (such as miscalculating the 20% local match), but it is the applicant's responsibility to correctly complete the application.

- The scoring sub-committee chairs from the past solicitation will work with staff to develop recommendations on project qualification. The problems and concerns identified by staff would be reviewed with the scoring sub-committee chair from the past solicitation.

- Staff will prepare a report to the Funding and Programming Committee on qualifying criteria recommendations. For any application that may not meet the qualifying criteria the following will be provided to the committee at least one week before the committee meeting: the appropriate parts of the application, the staff analysis, if any, and the staff recommendations. This report will also be made available to the affected project applicants.

- Project applicants are invited to attend the Funding and Programming Committee meeting and defend their applications.

- The Funding and Programming Committee will make the final determination on qualifications. No appeal beyond this committee shall occur.

APPENDIX S

Process and Procedures to Review Challenges to Criteria Scores for the 2005 Solicitation

Recorded below is the process to handle challenges to criteria scores adopted by the Technical Advisory Committee (TAC). Section I is the generic schedule the process follows. The schedule starts at the time the scoring subcommittees present scores to the Funding and Programming Committee (F&PC). Section II records the process to review challenges to scores and Section III records some procedures that must be followed. The specific dates are recorded in the schedule in the main body of the solicitation package (beginning on p. 2).

I. Schedule Relative to Challenging Criteria Scores

1. F&PC approves project scores submitted by scoring sub-committees and staff makes them available on the Council web site within three working days.

2. All applicants are notified via electronic mail that scores are available on the web site. Their scores will be faxed or mailed if requested.

3. Applicants are reminded that they can request further review of the individual criteria scores given to their project. The notification to the applicants describes the process to request re-scoring of a criterion. Staff receives a lot of phone calls and emails at this point in the process from applicants asking why their project received X amount of points. Staff uses the scorers' methodology reports to answer their questions.

4. Applicants will have approximately two weeks to submit a written request to the TAB Coordinator to challenge one or more criteria scores. This request may be by facsimile, postal mail, electronic mail, or hand delivered. (The material to be submitted is described below)

5. Staff reviews project score challenges. (Process described in Section II.)

6. Funding and Programming Committee and the applicants are mailed copies of the letter challenging the scores and staff review of the challenge and recommendations at least one week before the committee meeting

7. The F&PC holds a meeting open to the public and the applicants. No testimony will be allowed. F&PC votes on each challenge. The result of score reviews are reported to TAC.

8. The TAC reports the results of the score reviews to TAB Programming Committee.

II. Staff Process to Review Score Challenges.

1. The letter from the applicant must specify the criteria score being challenged and why the applicant thinks the score is incorrect.

2. Staff reviews the reasons given to suspect the criteria scores.
   A. Staff discusses the score and evaluation with Chair of subcommittee and/or individual scorer.
      - Review methodology of scoring.
      - Review the answers given to criteria questions. Does answer conform to directions provided? Is answer clear?
   B. Staff checks to make sure math is correct for calculating the score.
   C. Staff compares score to similar projects

D. Staff records conclusion/recommendation and reasons. This is sent to F&PC and project sponsor at least one week prior to F&PC meeting, which is open to the public.

3. Staff presents analysis and recommendation to F&PC.
   A. Staff notes if the change in score will change the order and/or priority of projects.
   B. Staff makes change and ranking of projects.
   C. No testimony is allowed by project sponsor. Questions may be asked by F&PC Chair.

III. Procedures

1. No new material will be accepted as part of the score challenge unless requested by staff.

2. No one may challenge the score of projects they do not officially represent.

3. If a problem is discovered in the solicitation package or scoring methodology the F&PC will work to correct it prior to the next solicitation.

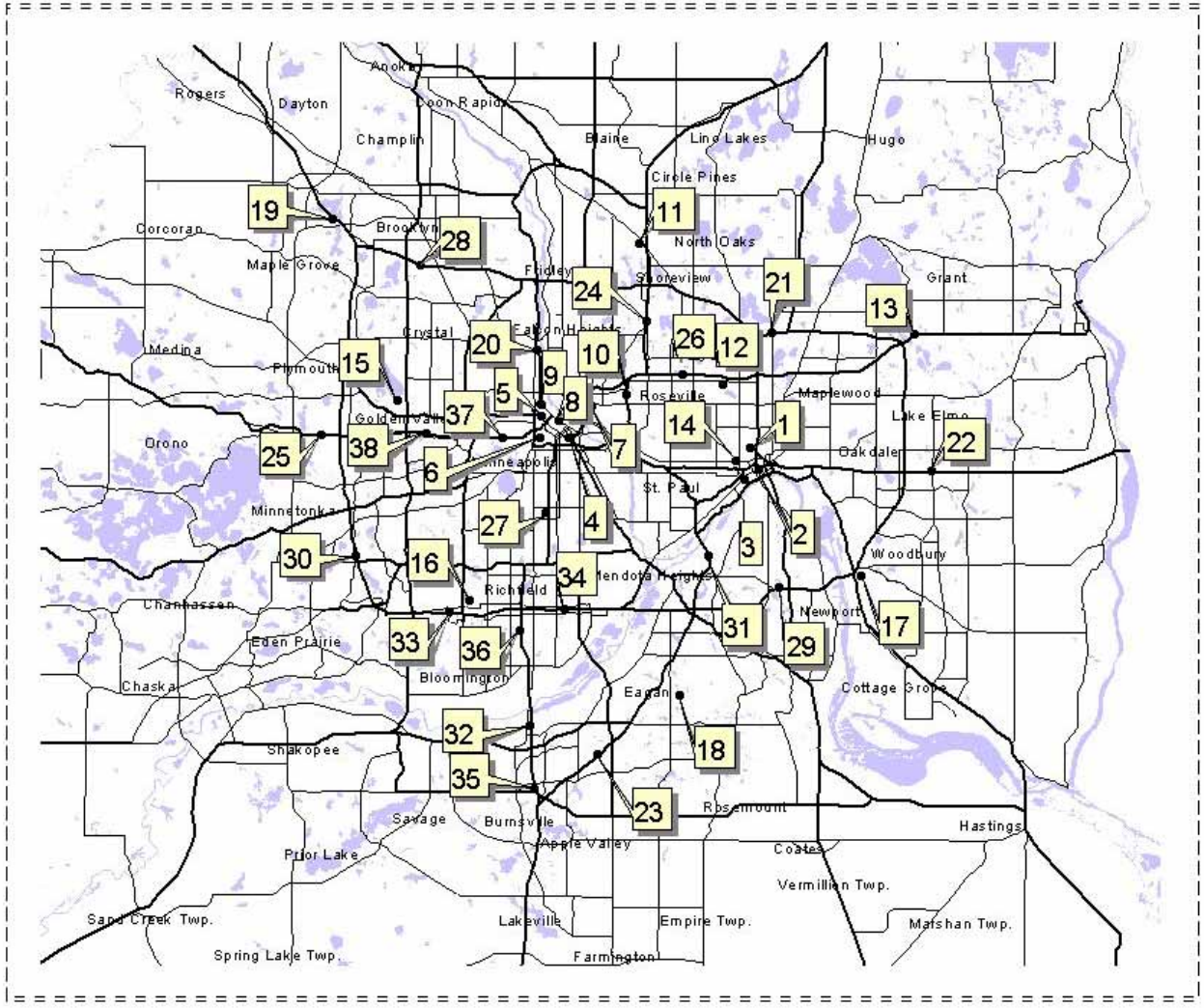
APPENDIX T

AM Metro Area Peak Hour Vehicle Occupancy Rates (for Appendix I and Appendix N)

The calculations for Increase in Hourly Throughput (App. I for roadway projects and App. N for CMAQ projects) require the applicant to factor the appropriate AM peak hour vehicle occupancy rate. Instructions in previous solicitation packages for making these calculations referenced the attached site location data (attached is Appendix C from the 2001 Regional Solicitation). Updated rates are still not available. Applicants should again use the data on the following pages for making these calculations using the most appropriate site location given the location of the project, under the assumption that vehicle occupancy rates remain relatively flat over time. If, however, the applicant or another entity known to the applicant has conducted a more recent study on the applicable section of roadway and collected AM vehicle occupancy rates, those rates may be used as long as the applicant documents the source of the data. (Map and Table appear on the pages below.)

Contact: Don Koski, Metropolitan Council, 651-602-1721, or donald.koski@metc.state.mn.us.

Appendix C
1997 Vehicle Occupancy Summary: Twin Cities Metropolitan Area



AM Metro Area Peak Hour Vehicle Occupancy Rates

Site Number (correspond to map on previous page)	1995 Rate (7:15 - 8:15 AM)	1996 Rate (7:15 - 8:15 AM)	1997 Rate (7:00 - 8:00 AM)
1	1.15	1.17	1.12
2	1.23	1.26	1.22
3	1.09	1.09	1.08
4	1.16	1.14	1.15
5	1.21	1.33	1.35
6	1.18	1.15	1.15
7	1.19	1.17	1.20
8	1.14	1.15	1.17
9	1.16	1.17	1.16
10	1.07	1.08	1.08
11	1.05	1.09	1.10
12	1.16	1.14	1.15
13	1.05	1.05	1.08
14	1.14	1.18	1.12
15	1.07	1.07	1.07
16	1.05	1.06	1.05
17	1.11	1.12	1.10
18	1.04	1.10	1.08
19	1.09	1.09	1.07
20	1.10	1.10	1.10
21	1.10	1.10	1.07
22	1.08	1.09	1.07
23	1.06	1.08	1.06
24	1.08	1.07	1.09
25	1.11	1.12	1.13
26	1.03	1.07	1.06
27	1.10	1.14	1.12
28	1.09	1.10	1.09
29	1.11	1.07	1.05
30	1.07	1.06	1.07
31	1.09	1.07	1.08
32	1.03	1.16	1.14
33	1.10	1.08	1.08
34	1.06	1.06	1.06
35	1.13	1.12	1.10
36	1.13	1.13	*
37	1.24	1.23	1.27
38	1.17	1.19	1.22
Average Rate	1.11	1.12	1.12

* site 36 data not collected in 1997.

Source: MN/DOT Vehicle Occupancy Summary: Twin Cities Metropolitan Area, July, 1998