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MEMORANDUM

TO: Peter McGee

FROM: Joe Mehra, P.E.

SUBJECT: Klingle Road Feasibility Study

DATE: July 26, 2002 **JOB:** J-356

The comments in this memorandum are based on a review of Appendix D, Klingle Road Transportation Study, prepared by The Louis Berger Group, Inc.

1. The overall methodology for conducting the analysis is O.K. However, there are several issues that need to be clarified:

a. The base year or existing conditions data is year 2000, the Highway Capacity Software (HCS) Version 4 was released at that time. The analysts have used HCS 3.2 for signalized intersections.

b. The selection of intersections for analysis is reasonable, however, the specific movements that may be impacted have not been analyzed. For example, in the build condition, the left turn traffic on westbound Porter Street at Connecticut Avenue, should decrease in comparison to the no-build condition. The reason for this is that some traffic may use Klingle Road to cross Connecticut Avenue and then turn right to go south on Connecticut Avenue.

c. A 1 percent per year growth rate was used for traffic on Klingle Road between 1988 and 2000, but the source of this rate was not reported. The 1 percent growth rate that was stated in the report is for future traffic growth from 2000 to

2017.

2. The report concludes that the accidents in the study area would be reduced in the build conditions due to the diversion of traffic from the intersection of Connecticut Avenue and Porter Street.

3. MCV utilized the traffic counts and traffic delay data from the report to estimate travel delays or travel time savings driving through the study area for the build condition Scenario 1. The data is summarized in Exhibit 1. This Exhibit shows the peak hour traffic volumes and the delays in seconds per vehicle for the four intersections. The fifth intersection (Woodley/32nd was not included since it did not have an overall delay data). The total delays during the AM and PM peak hours were calculated by multiplying traffic volume and delay numbers for the build and no-build conditions. The travel time savings for the build condition were estimated by subtracting the total delay for the no-build condition from the total delay for the build condition. As noted in the Exhibit, the intersections of Connecticut Avenue and Porter Street and Cleveland Avenue and Garfield Street show a travel time savings in the build condition, whereas, the two intersections of 34th Street and Woodley Road and Woodley Road and Klingle Road show a travel time savings in the no-build condition over the build condition. The total travel time savings in the study area is 108.5 hours and 131.3 hours for the AM and PM peak hours, respectively for the build condition over the no-build condition. Assuming, the peak period lasts for three hours in the morning and three hours in the evening, the total travel time savings during the peak periods is 719 hours. The annual travel time savings (based on 250 work days in a year) during the peak periods is estimated at 179,837 hours. This computation shows that using the data from the report, the annual travel time savings in the study area due to the opening of Klingle Road is a significant 179,837 hours during the AM and PM peak periods. This estimate is conservative, since travel time savings may also be achieved during the non-peak periods.

MCV obtained idling emission factors for the Washington Metropolitan Area for the years 1999 and 2010 from the Council of Governments. These emission rates (grams per hour) were utilized along with the estimated travel time savings (due to reduction in stopped or idling delay) to compute reduction in emissions for the Build Scenario 1. The emission rates for hydrocarbons, carbon monoxide and nitrogen oxides and the total emission reductions annually are shown in Exhibit 2. As noted in year 2017, the total emission reductions are estimated to be in tons per year, HC - 1.537; CO - 18.306 and Nox - 0.741.

The travel time savings, benefits and reduction in emissions were also estimated for the existing conditions (year 2000) assuming a one percent per growth rate. As shown in Exhibits 1 and 2, the existing travel time savings is estimated to be

124,025 hours and the total emission reductions are estimated to be (in tons per year), HC - 1.621; CO - 18.211 and Nox - 0.777.

The Louis Berger Report presented cost estimates for the build and no-build alternatives and are as follows: $ 3,610,000 for build condition Scenario 1 (Option E) and $ 858,000 for the no-build alternative. These cost data was used to estimate benefit-cost ratio for the build condition Scenario 1 using the methodology presented in the American Association of State Highway and Transportation Officials document, "A Manual on User Benefit Analysis of Highway and Bus Transit Improvements". The user benefits include reduction in delays or travel time, reduction in vehicle operating costs and reduction in accident costs. Adequate information was not available to calculate accident savings. The travel time cost of $ 3.00 per vehicle-hour and the vehicle running costs of $ 4.60 per 1,000 vehicles were in 1975 dollars and these were converted to current dollars using the Department of Labor's CPI Index from May 2002 and January 1975. These values were applied to the vehicles and delays computed above. This calculation showed that the annual benefits in year 2017 is estimated to be $ 1,926,400. This was converted to present value based on a 1 percent per year growth rate, a 4 percent discount rate and a 20 year life for the improvement. The present value of the benefits is estimated at $ 19.928 million. The benefits based on the project (Build Scenario 1) being implemented in year 2000 is estimated to be $ 1.328 million.

The cost of the build condition Scenario 1 is $ 3,610,000 in current dollars. The cost of the no-build option is $ 858,000. Therefore, the net cost of the build condition Scenario 1 is $ 2,752,000 (cost of build condition Scenario 1 minus no-build cost). The benefit-cost ratio for the build condition Scenario 1 is 7.24 (19.928/2.752). The net present value of the build condition Scenario 1 is the difference between the present value of benefits and the present value of costs. The net present value is $ 17.176 million (19.928-2.752).

The basic criterion for economic desirability is that the present value of the stream of annual benefits resulting from the project exceeds the present value of the stream of costs associated with implementing the project. This project has a net present value of over $ 17 million and a benefit-cost ratio of 7.24. This project, build condition Scenario 1, is economically desirable.

	2017 NO BUILD				2017 BUILD SCENARIO 1				TRAVEL TIME SAVINGS	
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		Build minus No Build	
Intersection	Volume	Delay	Volume	Delay	Volume	Delay	Volume	Delay	AM Peak	PM Peak
Connecticut/Porter	5466	160.1	3625	204.7	5170	77.3	3269	67.4	132.07	144.92
Cleveland/Garfield	1557	167.8	1122	51.7	1473	142.9	1031	47.7	14.10	2.45
34th St./Woodley	2102	80.9	1665	21.8	2426	124.6	2063	43.2	-36.73	-14.67
Woodley/Klingle	13	6.9	29	7.1	407	8.9	498	10.4	-0.98	-1.38
Total	9138	415.7	6441	285.3	9476	353.7	6861	168.7	108.46	131.32

Note: Delay is in seconds per vehicle
Source: Tables 8 through 13

Travel Time Savings	**2017**	**2000**
AM + PM Peak Hour	239.78	165.37
AM + PM Peak Period	719.35	496.10
Annual Peak Periods	179837	124025

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TRAVEL TIME ANALYSIS FOR THE BUILD VERSUS THE NON - BUILD CONDITION

Exhibit-1

	2000			2017		
	Emission Rates(1)	Delay Hours	Total Emissions(3)	Emission Rates(2)	Delay Hours	Total Emissions
Hydrocarbons	13.073	124025	1.621	8.544	179837	1.537
Carbon monoxide	146.831	124025	18.211	101.79	179837	18.306
Nitrogen Oxide	6.261	124025	0.777	4.119	179837	0.741

1. Idlling emissions for 1999 in gms per hour

2. Idlling emissions for 2010 in gms per hour

3. Emissions in metric tons (1000 of kilograms) Annualy

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ESTIMATES OF EMISSION REDUCTIONS

DUE TO BUILD SCENARIO 1

Exhibit-2

JAWAHAR (JOE) MEHRA, P.E.

President, MCV Associates, Inc.

Education

- State University of New York, Buffalo, M.S. Industrial Engineering/Operations Research, 1972
- Indian Institute of Technology, Bombay, India, B.S. Mechanical Engineering, 1969

Previous Positions

- Callow Associates, Inc., Principal, 1988 - 1990
- Kellerco, Inc., Vice President, 1982 - 1988
- BKI Associates, Inc., Senior Transportation Engineer, 1978 - 1982
- Alan M. Voorhees and Associates, Associate Engineer, 1970 - 1978

Experience

He has over thirty years experience in the areas of traffic engineering and transportation planning. He has managed several traffic engineering/operations studies including traffic analysis, impact studies, accident analysis and data collection. He has extensive experience with SHA standards and procedures having participated in several SHA contracts and related studies.

- **Traffic Analysis**. He has managed several traffic engineering studies in Maryland using SHA approved procedures including BCS 97-29H for District 5, the Georgetown Branch Transitway MIS/DEIS for MTA (traffic forecasts, traffic impact, capacity/levels of service, queue jumper analysis) , the Route 28 Corridor in Montgomery County (existing conditions, traffic forecasts, capacity/levels of service, geometric improvements, conceptual plans), Post Office Road Study in Charles County, MD (data collection, capacity/levels of service, traffic forecasts, signal design, pavement marking, signing), Suitland Parkway Study (Prince George's County MD), etc. He has conducted numerous traffic impact studies in Maryland using SHA format. All these studies were reviewed and approved by SHA. Some of these studies include the Villages of Piscataway Study (1000 acres), The Clinton/Townshend Property (800 acres), Expansion of Clinton Plaza, The Shady grove Life Sciences Center Traffic Study, The Heards Estates Traffic Study in St. Mary's County, College Park TDOZ, Waters Landing Corporate Park in Germantown, Milestone Property in Germantown, MD, etc. He was the Project Manager on two traffic engineering retainers -- with Montgomery County and Prince George's County. These studies include traffic analysis, signal design, data collection, capacity/levels of service, TCPs, etc. Other traffic engineering studies that he has managed include the Route 58 Traffic Engineering Study, Route 123 Corridor study in Fairfax City, TOPICS study for Buffalo, New York; TSM study for East End of Pittsburgh, etc.
- **Traffic Signal Design/Operations**. Most of the studies related to traffic signal design were prepared using SHA standards and specifications and include Middlebrook Road, Post Office Road and currently preparing as-built signal plans for twenty intersections in Montgomery County using SHA standards. He has managed the Route 30 corridor study that included the TRANSYT-7F analysis for the signal system study and timing development for 11 signals and the NETSIM analysis for the Springfield Mall subarea to conduct queuing and timing analysis.
- **Traffic Control Plans**. He has managed the preparation of traffic control plans for 46th Avenue Reconstruction in the Town of Edmonston (MD), TCP for Boyds Road in Calvert County, etc.
- **Traffic Data Collection/Analysis**. He has managed eight contracts to conduct various types of traffic data collection activities for SHA. Mr. Mehra is the Project Manager for SHA Contract BCS 97-02 to conduct portable machine counts for Maryland.

Professional Affiliations

- Fellow, Institute of Transportation Engineers, Chairman, ITE Technical Council Committee 6A35, "Use of Transportation Planning Models to Monitor and Review Growth Impacts";

Publications

"People Mover System for New Towns/Communities" Presented at the Second International Conference on Automated People Movers (APM's) in Miami, Florida, March, 1989.

"The Public Presentation of Traffic Impacts: Strategies and Procedures", presented at the Development Impact Analysis Conference, Washington, D.C., May, 1986.

"Site Impact Traffic Evaluation Handbook", co-authored with C.R. Keller. Prepared for Federal Highway Administration, January, 1985.

"Development and Application of Trip Generation Rates", co-authored with C.R. Keller. Prepared for Federal Highway Administration, January, 1985.

"Crisis Relocation Movement Plan for the Tidewater Risk-Host Conglomerate", co-authored with D. Takacs and C.R. Keller. Prepared for presentation at the TRB meeting in January, 1984.

"A Cost-Effectiveness Model for the Analysis of Trade-Offs of Stationary Vs. Transportation Emissions Control in Baltimore", co-authored with A. Lago et al. Presented at the TRB Meeting in January, 1984.

"Study of Alternative Methodologies for Apportionment of Air Quality Control Requirements", co-authored with K. Hollenbeck et al. U.S. DOT, February, 1983.

"Study of the Cost-Effectiveness of Stationary Source, Mobile Source and Transportation Controls to Improve Air Quality", co-authored with S. Bellomo. U.S. DOT, November,1981.

"Traffic Problems in the Bombay CBD." Presented at the ASCE International Conference in New York, held in May, 1981.

"Energy Impacts of Transportation: Some Relationships and Results", Prepared for presentation at the ASCE Portland Convention Energy Considerations in Transportation, 1980.

"Stationary and Mobile Source Controls and Trade-Offs". Prepared for presentation at the ASCE Speciality Conference Transportation and 1977 Clean Air Act Amendment, San Francisco, November, 1979.

"Evaluating Options in Statewide Transportation Planning/Programming Techniques and Applications;" co-authored with S. Bellomo, et al. NCHRP Report 199, March, 1979.

"Fuel Consumption and Emissions as Related to Vehicle Operations and Highway Design;" co-authored with P. Brach. Presented at the ASCE Speciality Conference on Energy Conversation, May, 1978.

"An Overview of a Methodology to Determine Fuel Consumption and Emissions as a Function of Traffic Operations and Road Geometry", co-authored with P. Brach. Presented at TRB Meeting, January, 1978.

Mehra, Continued

"Evaluation and Application of Priority Programming Methodologies in Maryland", co-authored with M. Stein, J. Cichy and S. Bellomo. TRR 610, 1979.

"Evaluating Options in Statewide Transportation Planning/Programming. Issues Techniques, and Their Relationships", co-authored with S. Bellomo, et al. NCHRP Report 179, 1977.

"Analysis of Weekend Travel", co-authored with S. Bellomo. Prepared for presentation to the Committee on Statewide Transportation of the Transportation Research Board, Washington, D.C., 1975.

"Statewide Travel Forecasting Procedures, Including Activity, Allocation and Weekend Travel - Phase II Weekend Travel Mode", co-authored with S. Bellomo, U.S. DOT, Federal Highway Administration, Washington, D.C., 1974.

"Statewide Travel Forecasting Procedures, Including Activity Allocation and Weekend Travel - Phase II Statewide Activity Allocation Model", co-authored with C. Schlappi and S. Bellomo. U.S. DOT, Federal Highway Administration, Washington, D.C., 1974.

"Simplified Statewide Travel Forecasting Procedures, Including Supply-Demand Relationships", co-authored with A. Lemer et al. U.S. DOT, Federal Highway Administration, Washington, D. C., 1973.