

The Guideway Saga

Jack Mallinckrodt, Engr., Ph.D.
AJM Engineering
1 January, 2006

The only — and by default, best — evidence of transit guideway effectiveness in Orange County, is that building such a system would make traffic *worse* than doing nothing. The adverse impacts of the guideway itself on street traffic is several times larger than the benefit from the transit ridership.

This is a chronological log of milestones in a multi-year — but so far fruitless — effort to persuade OCTA to take into account the *overall* (including *adverse* as well as beneficial) street traffic impacts in evaluating the performance of any exclusive transit guideway system.

Sept 1999.

OCTA published the first conceptual engineering and environmental study and report (EIR) on the proposed 26 mile, CenterLine fixed guideway light rail system. Among its findings were this astounding benefits summary¹.

“Compared to the No Build Alternative, all three build alternatives *would have more adverse impacts* on the environment (without mitigation) for *traffic circulation*, displacements, public services, visual quality, cultural resources, noise/vibration, hazardous materials, water resources, natural resources, parks/trails, and environmental justice.” (emphasis added)

In short, this purported transportation *improvement* would actually make traffic congestion *worse*.

The reason was apparent from the Traffic Analysis in EIR Appendix A. At the time the EIS was done, the route alignment had been totally laid out, taking 2 lanes from mod=st of Bristol Street. It was clear that mitigation (i.e. more street capacity building) would need to be done but it had not been designed in detail. Consequently, the analysis modeled and took into account the rail ridership and corresponding reduced street traffic demand benefit *and* the three street traffic disruption adverse impacts:

1. Taking 2 prior street lanes for CenterLine ROW
2. Permanently blockading 40 prior crossing intersections
3. Partial green light preemption in favor of the rail cars at the remaining crossing intersections.

In other words, by accident — never to be repeated — the analysis revealed the true net benefit of the light rail itself, including all of its unavoidable, inseparable, traffic impacts.

The results are summarized in this table, in terms of link and intersection Volume/Capacity (V/C) ratios, under no-build (i.e. do-nothing)and build alternatives.

1999 Appendix A Traffic Modeling Results, Street Level A1t 1

¹ “The CenterLine”, Draft Environmental Impact Statement/Report, OCTA, Sept 1999. p. S-27

	Links	Intersections	
		AM	PM
Avg (V/C Build) / (V/C No-Build)	1.21	1.24	1.25
Number of places where (Build) found worse than (No-Build)	57/73	49/59	51/59

A transportation improvement *should reduce* V/C and congestion if it is built. But in spite of the demand reduction due to rail ridership, here, by all measures, the build alternative was found uniformly *more* congested. This means that the traffic disruption due to the three listed adverse guideway impacts was *greater* than the traffic relief afforded by the rail ridership. In spite of its \$1.3 Billion projected cost, the overall traffic impact of the light rail system was found *worse* than doing nothing.

September-November 2003

A new draft CenterLine EIR ² for a truncated 9.3 mile CenterLine was published and formal comments invited.

AJM Engineering (“AJM”) submitted comments, including

1. that the 2003 Draft EIR ², had redefined the CenterLine Project as the *bundle* of CenterLine light rail
 - + An approximately 11 lane mile Bristol Street Widening, and
 - + An approximately 12% expansion of Bus Service
2. that the performance modeling analysis, showing a moderate overall traffic improvement, was done *only* on the tri-part bundle, not on its separable parts.
3. that this effectively *hid* the performance of the light rail system *per se*, which might well be counterproductive to county mobility, as it had been shown to be in the 1999 EIR.
4. that an “unbundled” analysis should be done of the separate marginal impacts of the three essentially independent *elements* of the CenterLine *Project* to establish the real marginal benefit of the light rail system including its inseparable adverse street traffic impacts.

The board tasked staff to look into and either affirm or refute AJM’s analysis and claims.

January-March 2004

A lead engineer was assigned and several productive working meetings were held between OCTA staff and AJM. A report was written and submitted by the lead engineer but never approved or released.

July 2004

In the absence of any proper modeling analysis of the issue, and lacking modeling capability, AJM produced and sent to the Board of Directors a “second best” spreadsheet capacity analysis, taking into account *only* one of the three loss terms listed above, the

² “CenterLine Supplemental Draft Environmental Impact Statement / Report” October 2003.

Street lane taking, (ignoring cross street traffic impacts because there is no way of estimating them short of a full traffic model) and thus providing only a *lower limit* estimate of the adverse impacts. Those estimates include that

- The loss of capacity due to street traffic disruption by the light rail guideway guideway was (some amount) *more than* three times its beneficial ridership.
- Simply *dropping* light rail (and its inherent street traffic disruption) from the tri-part CenterLine Project predictably would result in:
 - more than 60% *more net project capacity*, and associated mobility, travel-time, air quality, and energy consumption benefits,
 - eliminating or significantly reducing *half* of the eighty adverse environmental impacts tabulated in Section 4 of the EIS, and
 - *cost saving* of over a billion dollars.

The letter further urged the directors to either excise light rail from the CenterLine *project*, or authorize a “first best” competent modeling study of the issue.

August 2004

OCTA (Leahy/Taylor) prepared and presented a rebuttal of the AJM 16 July submittal, dated August xx 2004, addressed to the Transit Operations Committee.

AJM submitted a second rebuttal to that paper including the complete OCTA rebuttal with AJM responses interspersed. That entire combined response is attached hereto as Appendix A. In short, the OCTA rebuttal seriously misstated and exaggerated the AJM positions and avoided and failed to address the substantial AJM findings.

December 2004

OCTA agreed to undertake the recommended study. AJM was asked to submit specific criteria for the study and did so on December 6, 2004, attached as Appendix B. The gist of the criteria was

- *Light rail*” was carefully defined for the purpose of this document as “the currently preferred light rail element ... *including* its inseparable impacts of ROW taking, ... cross street blockading, and partial preemption of crossing intersections” (emphasis added)
- first model the CenterLine project performance as defined in the EIR, including *light rail*
- second, the same except excluding *light rail*
- The difference would be the marginal performance benefit (or disbenefit) of *light rail*.

AJM offered and requested to participate in the initial setup and oversight of that study but the offer was not taken up.

February, 2005

In view of FTA having declined to support CenterLine on the basis of questionable effectiveness, OCTA Board acts to put CenterLine light rail on indefinite “hold”.

March 2005

OCTA Releases the results of the PBQD conducted “Marginal Benefit” study³. The study evaluated three alternatives, quoting:

- “1. Light Rail Transit alternative (LRT) - the current Locally Preferred Alternative (LPA) for CenterLine which includes the light rail component.
2. Bristol Street Widening alternative - which consists of the CenterLine highway network modified to reflect a Bristol Street widening from 6-lanes to 8-lanes between Civic Center Drive and Warner Street. This alternative uses the Baseline transit network for the transit element, so there is no light rail.
3. Bus Rapid Transit (BRT) alternative - similar to the LPA except a BRT is added in place of light rail. It has same alignment and station stops as the LRT in the LPA.”

Whether by accident or design, whether by OCTA or PBQD interpretation, this misses or avoids the central issue of the marginal benefit (or disbenefit) of light rail including its **“inseparable impacts of ROW taking,... cross street blockading, and partial preemption of crossing intersections”** which of course was the entire point of the AJM advocated and defined study. Nowhere in the study were these adverse impacts modeled or taken into account. The so called “light rail marginal benefit” is not the marginal benefit of *“light rail including its inseparable adverse traffic impacts”* as carefully defined in the AJM criteria. With respect to this central issue, the study was totally irrelevant.

It is worth noting, however, that the results for Alternative 3, the rubber tire and pavement (bus) equivalent of CenterLine light rail guideway, did find that bus ridership would be only half of the CenterLine light rail ridership. The adverse traffic impacts, of the guideway, of course, would be the same. Therefore the total net impact of the CenterLine Bus Guideway would be even worse than that for the light rail, a potentially important finding with respect to future rapid busway proposals.

November 2005

OCTA approved proposal to undertake \$225 million financing responsibility for the Bristol Street Widening Project. Santa Ana to be responsible for implementation. Preliminary plans call for widening Bristol to 6 lanes from 17th to Warner, add 14 ft median, two outer lanes to be 19 ft wide including a 7 foot landscaped parkway. Total widening: $14 + 2*(19-12) = 28$ ft. It will take about 110 residential properties. These are almost exactly the dimensions required for the CenterLine guideway, suggesting that this project may be undertaken in anticipation of a reborn CenterLine guideway

January , 2006

OCTA published draft “Expenditure Plan for Measure M Extension”.

³ “Marginal Benefits Report”, Task No. 21.05, Agreement C-1-2345, Parsons Brinkerhof Quade and Douglas, Inc., March 14 , 2005.

This plan would define the Measure M 30 year extension to be voted on in November 2006. Most of the \$11 billion anticipated revenue is allocated to very specific defined projects or programs. Project S is a notable, blank check exception, defined only as .

Project S of the plan reads as follows

Project S High Capacity Transit Extensions to Metrolink.

Description: Frequent service in the Metrolink corridor provides a high capacity transit system linking communities within the central core of Orange County. This project will establish a competitive program for local jurisdictions to broaden the reach of the rail system to other activity centers and communities. Proposals for extensions will be evaluated against clear criteria such as congestion relief, project readiness, local funding commitment, private investment, connectivity, compatible land uses, proven technology and a sound operating plan. These connections may include a variety of transit technologies such as conventional bus, bus rapid transit or high capacity rail transit systems as long as they can be fully integrated and provide seamless transition for the users.

Cost: The estimated cost to implement this program over thirty years is \$1,000. million. “

CenterLine, guideway rail or “bus rapid transit” fits this description, including its cost perfectly. It is hardly possible to avoid the implication that, oblivious to all the above adverse findings, Project S, and the Bristol Street Widening project above, are or later may be found to support CenterLine guideway transit to be built independent of Federal aid. Irrespective of present intentions, there is nothing here to preclude OCTA deciding at a later date to use it, along with the separately authorized BSW widening, for CenterLine.

January 2006 Current Status Summary

In order to maximize speed and consequent ridership, a transit *system* may be accommodated in an exclusive, street-level, fixed guideway. Any such guideway *system* will, in general, have three adverse impacts on street traffic:

- Taking of capacity of right-of-way from what would or could otherwise be productive street lanes.
- Blockading of some otherwise cross-streets
- Traffic signal green-time preemption at signalized crossings.

These adverse impacts detract from the beneficial capacity afforded by the transit ridership diverted from streets. Thus the overall net benefit of the transit guideway *system* (including the above three adverse impacts) may be either positive or negative, (beneficial or detrimental), depending on the relative magnitude of the impacts. Note that the adverse impacts depend only on guideway design parameters, independent of whether the wheels are steel on steel or tires on pavement; that is, the same for rail or bus.

Whether any such a project is beneficial or detrimental can best be estimated by competent traffic modeling study. Only once, in the 1999-2000 EIR, has OCTA done such a study. The overall, net traffic impact was clearly shown and stated to be adverse to county traffic congestion.

The 2003 CenterLine EIR evaded doing such an analysis by bundling the guideway system with two much larger, but independent⁴ street and bus system expansions and analyzing only the bundle.

However a “debundled” AJM analysis has shown that the one adverse impact that can be estimated without modeling, the loss of street capacity due to right-of-way taking, *can* be estimated, and that one impact alone is estimated to cause a loss of street capacity three times the beneficial ridership capacity.

Thus because of the persistent reluctance of OCTA to properly study the issue, the evidence bearing on the issue of overall net marginal benefit of Orange County guideway transit is limited. But it is unanimous in finding that guideway traffic makes Orange County traffic worse.

OCTA must bear a clear and absolute burden of proof that any future proposed guideway transit system, including its inseparable adverse street traffic impacts, would have an overall positive transportation mobility impact.

Appendix A

AJM Rebuttal comments interspersed in OCTA Original 9 November 2004

October xx, 2004

To: Transit Planning and Operations Committee
From: Arthur T. Leahy, Chief Executive Officer
Subject: Issues Raised by Drivers for Highway Safety

Overview

The Board received a table prepared by Mr. Jack Mallinckrodt of Drivers for Highway Safety at their July 16, 2004, meeting. The table challenged the air quality analysis of CenterLine; additionally, Mr. Mallinckrodt later informed the Board that he believed the CenterLine draft environmental documents wrongly credited to that project benefits that actually should have been credited to several other improvements. He requested that the Orange County Transportation Authority conduct technical studies to assess the performance of widening Bristol Street to an eight-lane arterial highway without light rail.

⁴ The term “independent” here is used in the economic sense of “independent utility”, referring to parts which could be implemented individually and the sum of the independent part utilities would be essentially equal to the utility of the combined parts.

AJM: No. This seriously misstates and exaggerates our recommendation which was simply to carry out one more specific OCTAM (traffic modeling) case run, the same as the latest, most representative CenterLine "Project" alternative, MINUS light rail and its inseparable street taking, blocking and preemption, and to report detailed performance comparisons, with the "Project". This comparison defines the marginal benefit of light rail in the project.

Recommendation

Staff recommends that the Board of Directors consider whether it wishes to authorize a major investment study of highway-only alternatives to CenterLine. If directed to conduct such an alternatives analysis, staff would proceed with a scope of work budget estimate and source of funds, and a request for proposals from qualified consultants, and return to the Board for selection of a study consultant in approximately four months.

AJM: We did not and do not recommend anything like this. This has the appearance of a strawman, set up to be shot down by the board.

Background

At the July 16, 2004, meeting of the Board of Directors, Mr. Wayne King of Roads Work Best presented to the Board a table prepared by Mr. Jack Mallinckrodt. On August 6, 2004, Board Members received a communication from Mr. Mallinckrodt, which he said demonstrated that draft environmental documents on the CenterLine wrongly credited to that project benefits accruing to several other improvements, such as adding service to Metrolink and the Orange County Transportation Authority (OCTA) bus system.

AJM: OK

On several occasions in recent months, staff has met with Mr. Mallinckrodt, Mr. David Mootchnik, and others with similar interests to discuss their materials and concerns about the environmental impact analysis. At a recent meeting of the Transit Planning and Operations Committee, staff presented an analysis of the projected air quality benefits of CenterLine that had been called into question by Mr. Mallinckrodt's table. Subsequent to that meeting, Mr. Mallinckrodt gave staff a detailed point-by-point rebuttal, dated August 28, 2004, and two days later staff met once again with Mr. Mallinckrodt and others to review his rebuttal. Since staff was in discussions with Mr. Mallinckrodt about the issues he raised to the Committee, the Committee Report has not been presented to the Board. More recently, staff has met with Mr. Mallinckrodt to review this report.

AJM: OK

Discussion

Mr. Mallinckrodt's extensive technical analyses raise two issues for Board consideration:

Issue 1: Have the technical analyses been appropriate and conducted responsibly?

The technical analyses use different assumptions, which make it difficult to compare results from one report to another. However, these differences are mandated by the federal reviewing agencies.

Mr. Mallinckrodt's analyses note differences in the air quality benefits between various reports prepared by OCTA. However, these differences arise because the reports are prepared for different purposes and different government agencies. For example, the Federal Transit Administration (FTA) New Starts Report requires OCTA to assume that the additional lanes for cars that are proposed on Bristol Street as part of The CenterLine Project will be built even if the CenterLine Light Rail Transit (LRT) is not built, while in the Final Environmental Impact Study (FEIS), these are assumed to be built only if the CenterLine LRT is built.

AJM: We don't question that the analysis was done in accordance with FTA guidelines. Our point is simply that the FTA air quality guideline for emissions calculations as simply proportional to VMT, while perhaps justifiable for their purposes of comparing pure transit alternatives, is in general, erroneous and misleading for our purpose of local decision making. Both Federal (MOBILE) and State (EMFAC) emissions models represent emissions as proportional to VMT TIMES A SPEED CORRECTION FACTOR. These speed factors are significant in situations such as street level Light Rail where road capacity is significantly decreased.

In the 1995-97 OCTA Major Investment Study, a preliminary draft, based on the FTA stipulated VMT approximation found the roads alternative to induce a 12.9% increase of emissions, worst among all alternatives. In the final report, corrected at my urging to use the full EMFACS model with speed correction factors, the finding was more than reversed to a 1.6% emissions reduction, best of all alternatives.

There is no federal regulation that prohibits an agency from doing any calculation they see fit for the added purpose of correctly and fully informing local decision makers.

A second issue raised by Mr. Mallinckrodt about the analyses are that they do not address how Bristol Street, widened to eight lanes but without a light rail component, would perform. He refers to this as a "debundled" approach, in

which the light rail system and the additional auto lanes would each be assessed independently.

AJM: No. This is a straw bogey-man. It is not our issue. More below.

Staff concurs that the recent round of analyses did not address an eight-lane Bristol Street arterial project, but believes that this is consistent with both Board direction and FTA requirements. Since this Environmental Impact Analysis began in 2001, the Board has defined The CenterLine Project alternatives as integrated systems of road, bus, and rail improvements that work together. Since the conclusion of the Major Investment Study in 1997, the Board has directed staff to proceed with a light rail project. The Board reaffirmed this direction at several key milestones, including at its July 21, 2003, meeting, when it rejected an opportunity to change direction and evaluate a highways-only focus. Further, the analytical methodology proscribed by the FTA precludes stand-alone assessments of each mode because – in the real world – that is simply not the way a multi-modal system would perform.

Therefore, the analyses conducted to date have been both appropriate and responsible. While some assumptions may differ, each report is comprehensive and informative, and the differences in their conclusions are not significant.

***AJM: Again, this is not what we proposed, and it seriously misstates the meaning and significance of our recommendation. The bottom line of our analysis, our issue, was this:
"removing Light Rail from the CenterLine Project bundle would increase overall multimodal project capacity, (person-miles/day) by about 60% with corresponding transportation benefits such as travel-time and emissions reduction while reducing project cost by a billion dollars."
In other words, the marginal contribution of the Light Rail element in the CenterLine Project is negative. it would make***

Issue 2: Do the analyses and technical reports yield sufficient information that the Board can rely on to make informed decisions?

At the August 30, 2004, meeting with staff, Mr. Mallinckrodt stated that an eight-lane Bristol Street arterial project without light rail would be a more cost-effective transportation improvement than the present CenterLine project and that the Board should be presented with this analysis at this time.

AJM: Again misstating our conclusion and recommendation

Staff notes that a federally approved Environmental Impact Report (EIR) for a six-lane Bristol Street Widening Project without a light rail project has been available and been factored into the technical analyses for this project. In fact, the City of Santa Ana conducted this EIR, but in recent years has pursued The CenterLine Project planning – not additional lanes for autos or buses. The Board concluded previously that it had sufficient information on which to make a decision to move forward with a light rail project. No new information has surfaced to contest the basis of that decision; there have not been any substantive changes in forecast indicators, costs, safety, reliability, or any other previously established performance criteria, nor has there been any change in known funding availability. The preliminary engineering and environmental work have not revealed unexpected challenges.

Therefore, staff concludes that the Board has sufficient information to make informed decisions consistent with its prior policy direction to continue to pursue a multimodal strategy and program with a light rail component. However, if the Board wishes to reevaluate this direction, the only way to corroborate or refute the analyses performed by Mr. Mallinckrodt would be for OCTA to conduct a new major investment study of alternatives to CenterLine that would include highway-only improvements.

AJM: No. Exaggerated for the reasons stated above.

Summary

The Drivers for Highway Safety (DHS) analyses differ radically from the analyses performed by OCTA in the major investment study of alternatives, upon which the decision to implement CenterLine was based. It is not possible to make changes within the present analytical framework to accommodate the DHS analysis.

AJM: Disagree for the reasons stated above. The recommended effort is small, limited to one rerunning of OCTAM with a network database that is a subset of that already used for the CenterLine Project. Probably less than one month of effort of a small (2-3) team of analysts. In context of a billion dollar program that's nothing.

The DHS analysis is also inconsistent with the techniques mandated by the FTA and the Southern California Association of Governments (SCAG) for judging the cost-effectiveness and environmental impacts of major transit investments.

AJM: We are not suggesting OCTA not comply with those mandates. But there is no law or regulation against OCTA doing an analysis

beyond those mandates as necessary for full information to local decision makers.

It assumes that the light rail system replaces two lanes of Bristol Street capacity

AJM: As designed the light rail would sit in the place where there used to be regular street lanes. The light rail system DOES replace two lanes of Bristol Street. That's not an assumption it's a fact. Except for the light rail those street lanes would still be there.

and argues that "street capacity sacrificed" results in worsened air quality.

Mr. Mallinckrodt indicates that for him and DHS, at issue is whether widening Bristol Street to eight lanes is more cost-effective than building CenterLine.

AJM: No. And we never stated that. The issue is whether Light Rail adds to or subtracts from the benefits of the CenterLine Project.

Staff concludes that the Board has addressed the policy issue of light rail frequently since 1997, has repeatedly reaffirmed its desire to pursue a light rail program, and **no new information** has surfaced that would contradict that policy direction.

AJM: Our finding is that Light Rail adds no multimodal transportation capacity to the CenterLine project, rather, it loses three times more street capacity than it provides in terms of rail ridership. That means the congestion, travel-time, accidents, air-quality and energy consumption will predictably all be worse because of light rail. The board has never been told that by the staff. THAT IS NEW INFORMATION.

Board alternative decisions are naturally made on the presumption that staff would not propose alternatives that would not to some degree benefit Orange County mobility. That presumption is now in question. That's NEW INFORMATION.

As to its credibility, technical staff has had the analysis leading to this finding under detailed review for four months and does not pointed out nor claim any error or correction. (See Taylor's appendix A). Our analysis and conclusion stands uncontradicted by any OCTA publication or by staff review. At this point, the best evidence is that the our finding is correct.

Indeed the board has repeatedly addressed the policy issue of light rail since 1997. But those policy decisions have all been based on critically incomplete information.

Satisfying the concern of DHS requires a major investment study of highway-only alternatives to CenterLine. If authorized by the Board, such an alternatives analysis could be completed in about one year.

AJM: Exaggerated. See comments above.

Attachment

A. Overview of Key Analytical Issues

Submitted/Approved by:

Paul C. Taylor, P.E.
Executive Director, Planning,
Development and Communications
(714) 560-5431

ATTACHMENT A

OVERVIEW OF KEY ANALYTICAL ISSUES

Definitions

- **No-Build Alternative as included in the Final EIS/EIR - Bus, commuter rail, and non-Bristol highway improvements; no CenterLine LRT.**

AJM: Question: At our meeting on August 26 OCTA/Tim Byrne accepted an action item to confirm from examination of the run coding sheets, whether or not the 12% bus system expansion was included in the no-build alternative for the 2003 EIR. We request the result of that action.

- **The CenterLine Project as included in the Final EIS/EIR - All elements of No-Build, Bristol Street Widening Project (BSWP), and CenterLine LRT.**
- **FTA New Starts Analysis - Uses the term "Baseline" (comprised of Bristol Street Widening Plan and bus and commuter rail improvements) instead of**

“No-Build.” Note: does not include highway improvements, other than those on Bristol Street.

Capacity and Technical Methodology Issues

In meetings with staff and written correspondence, Mr. Mallinckrodt acknowledges that the crucial issue for him and for DHS is that bus-only transit improvements, combined with Bristol Street widening to eight lanes, should be included in an analysis of alternatives.

AJM: Yes

He stated that decision makers should be informed if the road capacity “sacrificed” for the sake of light rail exceeds the beneficial ridership capacity of light rail and asserted that: “removing the Light Rail in a ‘No-Light Rail’ alternative (compared to an alternative of six lanes plus LRT) would predictably result in:

- *60% greater congestion, travel-time, emissions, and energy consumption relief.*
- *Eliminating or significantly reducing half of the 80 identified adverse impacts.*
- *A cost savings of over a billion dollars.*

AJM: Yes

Staff Response: *Mr. Mallinckrodt’s analyses assume that the light rail system replaces two lanes of Bristol Street capacity – lanes that would be built if light rail were not. It is staff’s position that this is a hypothetical assumption at best. The known facts are that the Bristol Street widening to six lanes as proposed will increase present street capacity by 50%, and the CenterLine light rail system will add additional travel choice and capacity without reducing street capacity.*

AJM: Yes. Hypothetical. Not a proposal. It is a hypothetical construct essential to understanding or computing the critical issue of “What is the marginal benefit provided by the Light Rail in the CenterLine Project context?” The marginal benefit of a component B of A is by definition, the benefit of A minus the benefit of (B without A) (i.e. CenterLine Project minus Light Rail) even if (B without A) is hypothetical.

If the marginal benefit so computed is less than zero, you’re better off not to include it.

Mr. Mallinckrodt addressed his secondary issue of air quality by arguing that cost-effectiveness should be a more important criterion for OCTA than air quality. Secondly, he argues that, even if air quality were considered a high

priority, "street capacity sacrificed" results in worsened air quality. It is staff's position that it is debatable whether simply reducing street capacity would worsen air quality, but that is not at issue.

AJM: Agree. That's debatable. I can't prove it absolutely. Never claimed so. Neither can OCTA prove otherwise without running our recommended LIGHT RAIL marginal benefit analysis. Short of that simple analysis, our results stand as the only and best estimate of the of the matter.

Mr. Mallinckrodt suggests that OCTA pursue such an analysis evaluating travel time, congestion, air emissions, and energy consumption of two alternatives: (1) the widening of Bristol Street without light rail and (2) the CenterLine project as currently defined.

AJM: Yes, almost exactly right. However, because of the still ambiguous status of the 12% bus system expansion in the Project as modeled, it may be less ambiguous to state that as "(1) CenterLine Project as currently defined, and (2) same as 1, minus CenterLine and all its inseparable street disruption consequences."

Appendix B

Draft Recommended Criteria for Modeling Study of Light Rail Marginal Benefit

Jack Mallinckrodt
(714) 544 3200
December 6, 2004

Objective: To define and specify a minimal traffic modeling analysis to determine the marginal transportation and environmental benefit attributable to the Light Rail element of the CenterLine project. This is a draft proposal including a number of TBDs to be finalized in further discussion with technical staff to establish feasibility and prior agreement on any eliminations, shortcuts or simplifications that can be made without compromising this essential objective.

Definitions:

As used herein, italicized:

Region: means the CenterLine analysis area

Trips: means the linked, or end-to-end, origin-destination person-trips matrix for the region. To be held constant throughout the A and B analyses.

Light Rail means the currently preferred light rail element of the Locally preferred CenterLine alternative, *including* its inseparable impacts of ROW taking from what would otherwise be functional street lanes, cross street blockading and partial preemption of crossing intersections.

Benefit: means the fundamental measures of transportation benefit defined in Measures section below.

Impact: A negative benefit

Vehicle Type: means automobile, bus, and rail

Approach: Carry out and analyze two traffic analysis runs, and their difference, with transportation networks corresponding to:

Run A. the current preferred alternative (presumably the 2003 "IOS"), **including** *light rail*, deriving and reporting certain fundamental measures of overall transportation net *impacts* and *benefits* to be defined below, denoted *benefit(A)*

Run B. the identical network with the identical Bristol street widening, implying eight traffic lanes in some places, but **without** *light rail* and deriving the same fundamental *impact* and *benefit* measures, denoted *benefit (B)* .

C. For each such measure, derive

$$\text{LR Marginal } \textit{benefit} = \textit{benefit} \text{ (A) minus } \textit{benefit} \text{ (B)}$$

The A run *may* not be necessary *if* and only if all the essential network input definition data and *benefit* measures are available from the retained data from the analysis of that preferred alternative in the 2003 EIR.

The two runs must use the identical origin-destination *trips* table. (No feedback to the trips generation and distribution steps.)

Measures to be reported for each, (A and B) alternative:

1. *Trips: Regional* aggregate number = sum of all elements of O-D *trip* matrix.
2. PHT, person-hours/day, *Regional* total end-to-end travel-time including out-of-vehicle wait and walk. This is NOT the SUMMIT surrogate but actual person travel time.
3. VHT, *Regional* aggregate vehicle-hours/day, by *vehicle type*.
4. VMT, *Regional* aggregate vehicle-miles/day, by *vehicle type*.
5. PMT, *Regional* aggregate person-miles/day, by *vehicle type*.
6. Average speed calculated as PMT/PHT, by *vehicle type*.
7. Point-to-point travel times for a small number (5-10?) of representative trips within the *region*, AM and PM peak hours, by *vehicle type*.
8. Screenline automobile vehicle count and mean speed (TBD), AM pk and PM pk, for two, 2 mile long screenlines, running generally EW and NS, centered on Bristol Street at McFadden, (TBD)
9. *Regional* aggregate emissions, tons/day, for CO (? others TBD), calculated including average speed correction factors, (e.g. EMFACS) reported by *vehicle type* and total
10. *Regional* aggregate energy consumption, BTU/day or fuel equivalent calculated including average speed correction factors for the automotive components, by *vehicle type* and total.

The speed correction factors prescriptions represent procedures that are not incorporated or reported in the most recent EIR's but were, in the 1997 Major Investment Study.

Reporting

The report of results should as a minimum:

1. Quote this specification and affirm that the analysis was done as specified except as may be noted.
2. For each specified *benefit* measure, document:

benefit (A),
benefit (B), and
marginal *benefit* of LR = *benefit* (A) minus *benefit* (B)
