



Technical Memorandum

To: Aurora Jackson, Lane Transit District Director
Jon Ruiz, Eugene City Manager

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Subject: ***Moving Ahead Alternatives Analysis Review***

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I. ENGAGEMENT AND UNDERSTANDING OF THE DOCUMENT

CSA Planning Ltd. was engaged to provide a professional review and comment on the Draft Moving Ahead Alternatives Analysis document dated September 2018. Our scope of review for this engagement was to provide a brief *high-level* review. While our review process did identify some detailed technical issues, the purpose of the review is not an in-depth audit of all the technical underpinnings of the draft Alternatives Analysis. Because the review is intentionally *high-level*, it may be that some of the issues identified below are actually captured somewhere in the voluminous material in the Alternatives Analysis and where that is the case we think this review can be helpful to identify where citations are needed to the technical documentation so that readers can locate key technical elements more easily.

Our understanding is that the document is intended to serve two primary purposes. One purpose is a local community policy document. In that capacity, the document is intended to inform local policy-makers about major fixed-route transit service choices for the District. The second purpose appears to be a technical document intended to be the first step in the process to satisfy the Federal Transit Administration's (FTA) obligations under the National Environmental Policy Act (NEPA).

The review presented in this memo is focused on the document's purpose to inform local community transit policy. The review makes no attempt to evaluate the degree to which the Alternatives Analysis is adequate to satisfy FTA's rules for NEPA compliance. While that type of technical review may be an engagement in the future, that is beyond the scope and purpose for the review presented in this technical memo.

Except in a few instances described below where our review identified obvious errors, the review presented in this technical memo accepts the technical work in the Alternatives Analysis on its face. Analyses such as the Moving Ahead Alternatives Analysis apply a myriad of assumptions and analytic approaches. It is beyond the scope of this *high-level* review to determine the correctness of all these assumptions and analytic approaches¹.

II. BACKGROUND

CSA Planning has a working understanding of Lane Transit District operations. CSA evaluated the ridership performance of the Gateway EMX line in relation to the projected ridership in the NEPA document for the Gateway EMX line. In the Lane Transit District system, "EMX" stands for Emerald Express and is the branding for LTD's Bus Rapid Transit (BRT) service. The Gateway EMX performance evaluation project required study of the entire system to gain an understanding of how the Gateway EMX line interacted with the rest of the fixed-route LTD system. Since the Gateway EMX line performance review was conducted, LTD has opened and operates an additional EMX line, the West Eugene EMX.

¹ A complete and thorough evaluation of all the assumptions and analytic methods utilized in the Alternatives Analysis is beyond the scope of this *high-level* review engagement. This should not be interpreted to mean these assumptions or analytic methods are both appropriate and sufficient. A more detailed examination may reveal one or more are not.



The Alternatives Analysis document proposes up to 4 additional EMX lines and an additional “Enhanced Corridor”.

LTD has been working on the *Moving Ahead* project for many years. The planning project is a transit-mode focused implementation plan of the broader Central Lane Metropolitan Planning Organization (MPO) Regional Transportation Plan.

III. REVIEW APPROACH AND METHODOLOGY

The review in this technical memo takes two approaches to evaluating the Alternatives Analysis document in Sections IV and V below. The approaches taken and methodologies for each are explained in Section III herein.

Section IV examines the document itself and transit corridor alternatives from the perspective of LTD’s own stated Goals and Objectives for the project. This part of the review takes LTD’s own stated Goals and Objectives as the foundational policy framework upon which transit decisions in the analyzed corridors should be based. The review examines LTD’s stated Goals and Objectives to understand what they are intended to mean and seeks to score each Alternative based upon the degree to which it advances the stated Objective.

Section IV utilizes a quantitative structure for this part of the review. The quantitative analysis applies a score that ranges from -5 to 5 for each corridor alternative for each objective when compared to the no-build alternative, according to the following scoring system:

Scoring Description (when compared to the No-Build Alternative)	Associated Numerical Score
Very Significantly Detrimental	-5
Significantly Detrimental	-4
Detrimental	-3
Somewhat Detrimental	-2
Slightly Detrimental	-1
Neither Advanced nor Detrimental	0
Slightly Advanced	1
Somewhat Advanced	2
Advanced	3
Significantly Advanced	4
Very Significantly Advanced	5

While no “scoring system” for this type of exercise can be perfectly objective, it is a useful analytic approach. The very process of applying a score to something necessitates a critical assessment of the degree to which there is sufficient information upon which a score can reasonably be applied. Any goal or objective that lacked sufficient analysis in the Alternatives Analysis document was scored “NSD” for “Not-Sufficient-Data”. Any scoring process also requires some *a priori* framework upon which the scoring will be done. In this case, the scoring is in relation to the no-build scenario and the scoring is confined to the set of policy Goals and Objectives that are set forth in the Alternatives Analysis itself.

This framework requires the scorer to consider what is intended by each element being scored - in this instance the Goals and Objectives in the Alternatives Analysis and determining what each one means in the context of evaluating the build alternatives to the no-build alternative. A determination of meaning is a necessarily subjective matter, but this subjective dimension of the scoring process can illuminate two things: 1) is the goal or objective written in such a way that its intended meaning is well understood and 2) does the goal or objective provide a good basis upon which to evaluate the alternatives that are the purpose of the document. Finally, the scores themselves provide a relative comparison between the transit alternatives and is a framework that is repeatable by others; further evaluation may benefit from multiple stakeholders and policy makers conducting their own scoring in the manner suggested in this memo to assess the degree to which CSA’s individual scoring agrees with their own.

Section V expands the review considerations beyond the self-defined Goals and Objectives in the plan. The Goals and Objectives are, to some extent, an artificial analytic constraint. Section V takes a more qualitative approach to identify other questions not answered by the Alternatives Analysis. This part of the review is not intended to illuminate distinctions between alternatives or better understand the analytic details. Rather this section seeks to identify and describe important questions that are not answered by the Moving Ahead Alternatives Analysis document. It also identifies certain technical issues that were revealed as part of our review and scoring process that may warrant further analysis or explanation in any future versions of the Alternatives Analysis document.

IV. ADVANCEMENT OF LTD STATED GOALS & OBJECTIVES

The Goals and Objectives are the metrics identified in the Moving Ahead Alternatives Analysis document itself. Thus, the Alternatives Analysis document should explain how the alternatives being considered advance the Goals and Objectives set forth in the document. This analytic approach is consistent with Moving Ahead projects internal methodology, wherein certain transit alternatives were screened from further consideration based upon an evaluation of advancement of the Goals and Objectives.

Goal 1: Scoring and Analysis

		Alternative									
		Highway 99		River Road		30th Ave to LCC		Coburg Road		MLK Jr. Blvd	
		Enhanced	BRT	Enhanced	BRT	Enhanced	BRT	Enhanced	BRT	Enhanced	
Goal 1: Improve multimodal transit corridor service	1.1 Improve transit travel time and reliability	4	4	2	3	1	1	2	2	1	
	1.2 Provide convenient transit connections that minimize need to transfer	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	
	1.3 Increase transit ridership and mode share in corridor	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	
	1.4 Improve access for people walking, using mobility devices, and bicycling to transit	1	1	1	1	1	1	1	1	1	
	1.5 Improve safety of pedestrians, mobility device users, & cyclists accessing transit, traveling in and along the corridor, and crossing the corridor	1	3	1	3	2	1	2	2	1	

The first LTD goal concerns improving multi-modal transit service in the analyzed corridors. This goal is relatively straightforward to understand but is awkwardly worded; transit service is a single mode and is not “multimodal” itself. Transit trips are almost always multi-modal because they often begin and end with a biking or walking section. CSA’s scoring ignores the awkward wording and recognizes the purpose is to improve transit service in the corridor as well as other travel modes in the corridor because the other modes are often part of transit trips.

- Objective 1.1 is to improve transit travel time and reliability. There was relatively little analysis on the effects of the alternatives on reliability, but the build alternatives appear to improve reliability based upon the information provided. Of the four corridors, only the Highway 99 corridor significantly improved travel times, with 10 to 12-minute improvements respectively. The River Road corridor and Coburg Road corridors had travel time improvements in the 5 to 8-minute range. The other two corridors travel time improvements for the build alternatives were negligible.
- Objective 1.2 is to provide convenient transit connections that minimize the need to transfer. There is insufficient data to score the alternatives. While it appears the ridership estimate analysis has parameters that apply “costs” to transfers, this is not adequate to compare the alternatives. The build alternatives generally have similar route locations when compared to the no-build and the system design is not really changing (still hub and spoke) so it is not evidently clear how connections would be made more convenient or transfers would be avoided. This objective would benefit

from some sort of level-of-service outcome that is desirable for the District. In other words, how is the objective to provide service to many origins and destinations balanced against the trip time cost of numerous transfers necessary to serve a variety of destinations with limited routes. This could also be expressed in a measure of origin/destination convenience per dollar of additional transit investment.

- Objective 1.3 is to increase transit ridership and mode share. The alternatives analysis includes data on ridership changes, but the data is insufficient on mode share. It appears the regional model contains mode share data, but the impacts to mode share is not reported except in very generic ways in the supporting documentation. Again, some statement of performance for mode share would benefit the analysis. Simple improvement of mode share is not very meaningful. Is the goal a 1 percent shift or a 2 percent shift in the corridor for example? A more nuanced goal would be an increase in the mode share percentage per dollar of additional capital expense and per dollar of operating expense.
- Objective 1.4 is to improve access to people walking, using mobility devices and bicycling to transit. The general intent of this objective is evident, however its metrics are not. This type of objective is challenging to score. Ultimately, we scored all the build alternatives as slightly advancing the objective, because all the alternatives made improvements in this area but ***few (if any) of them appeared to be critical new connections in relation to the scale of the project.*** Nevertheless, these are the kind of improvements that tend to be detailed and occur on a scale that is difficult to measure at a corridor planning level. Design implementation of BRT, for example, would include accessibility improvements that are not really captured in this planning level analysis and while they may not make a big difference to large numbers of people they might make travel possible for a small number of people and that is valuable. Again, a lack of metrics of what is “desired” makes it difficult to score. A metric that relates disabled demographics to trips “made possible” by an alternative would be much more meaningful.
- Objective 1.5 is to improve safety of pedestrians, mobility device users, & cyclists accessing transit, traveling in and along the corridor, and crossing the corridor. The alternatives are reasonably well analyzed for this objective. The build alternatives advance this objective to varying degrees.

Goal 2: Scoring and Analysis

		Alternative								
		Highway 99		River Road		30th Ave to LCC		Coburg Road		MLK Jr. Blvd
		Enhanced	BRT	Enhanced	BRT	Enhanced	BRT	Enhanced	BRT	Enhanced
Goal 2: Meet current and future transit demand in a cost-effective and sustainable manner	2.1 Control the increase in transit operating cost to the corridor	1	-4	2	-3	1	1	0	-3	-1
	2.2 Increase transit capacity to meet current and projected ridership demand	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd
	2.3 Implement corridor improvements that provide an acceptable return on investment	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd
	2.4 Implement corridor improvements that minimize impacts to the environment and, where possible, enhance the environment	0	0	0	0	0	0	0	0	0
	2.5 Leverage funding opportunities to extend the amount of infrastructure to be constructed for the least amount of dollars	-2	-3	-2	-3	-1	-2	-3	-5	-1

The purpose of Goal 2 appears straightforward, but the necessary measurements to meet the objectives do not exist. Assessing the advancement of a Goal to meet transit demand requires a measure of transit demand upon which the reference can be made. Assessing the advancement of a Goal for cost-effectiveness and sustainability requires measures of cost effectiveness and sustainability. The Alternatives Analysis does not explain how transit demand is to be characterized in relation to capacity and no *a priori* measures are provided as to what constitutes “cost-effectiveness” and “sustainable manner”.

- Objective 2.1 is straightforward. Except for the 30th Avenue corridor, BRT is the alternative that increases costs the most. BRT does not advance Objective 2.1. Enhanced Corridor alternatives do appear to advance the objective modestly.
- Objective 2.2 is to increase transit capacity to meet current and future demand. There is insufficient data to score the alternatives. The analysis does not quantify what the capacity of the existing corridor is in relation to the existing demand. The analysis does not quantify future demand in relation to future capacity.
- Objective 2.3 is to implement transit corridor investments that provide an acceptable return on investment. The analysis does not explain what an acceptable return on investment would be. This objective implies the need for a thorough cost-benefit analysis of the various alternatives and this analysis is not provided. There is a major methodological issue that is not explained anywhere that CSA could find. The capital cost analysis is provided in 2016 dollars, but all the ridership appears to be at the end of the planning horizon (2035). ***The cost benefit analysis should include a build year (say 2022) that adjusts current dollars and current ridership at recent trends for three years and a future year look in 2035 future dollars (inflation adjusted construction dollars to the future year) and future ridership.***
- Objective 2.4 is to implement corridor improvements that minimize impacts to the environment and, where possible, enhance the environment. The Alternatives Analysis goes into great detail on potential environmental impacts. The analysis does identify some localized impacts that may affect localized environmental considerations or individual property owners or businesses. However, at a planning-level corridor analysis scale, the environmental impacts are small when compared to the no build alternatives. ***From a greenhouse gas and energy consumption standpoint, the full build alternative (all EMX + MLK EC) is worse than the no-build.***
- Objective 2.5 is to leverage funding opportunities to extend the amount of infrastructure to be constructed for the least amount of dollars. It is difficult to know what, exactly, this objective is intended to mean. It could mean to capture the



maximum amount of Federal funds regardless of the local capital match and O&M costs that must be borne by the community. Or it could mean a desire to leverage outside funding (Federal funding) for improvements that are otherwise cost-effective. CSA's scoring reflects the latter meaning. The build scores are negative due to the high costs overall and large share of expenses that are not construction related. Most of the projects have relatively small amounts of the total project budget devoted to actual construction and still assume a 50% local match. The build solutions appear to be detrimental to the goal.

Goal 3: Scoring and Analysis

		Alternative								
		Highway 99		River Road		30th Ave to LCC		Coburg Road		MLK Jr.
		Enhanced	BRT	Enhanced	BRT	Enhanced	BRT	Enhanced	BRT	Enhanced
Goal 3: Support economic development, revitalization, and land use redevelopment opportunities for the corridor	3.1 Support development and redevelopment	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd	nsd
	3.2 Coordinate transit improvements with other planned and programmed pedestrian, mobility device users, and bicycle projects	0	0	0	0	0	0	0	0	0
	3.3 Coordinate transit improvements with other planned and programmed roadway projects	0	0	0	0	0	0	0	0	0
	3.4 Minimize adverse impacts to existing businesses and industry	-1	-1	-2	-3	0	-1	0	-2	0
	3.5 Provide high-capacity transit that is consistent with community vision for the corridor	4	5	4	5	4	5	4	5	4
	3.6 Improve transit operations on state facilities in a manner that is mutually beneficial to vehicular and freight traffic flow around transit stops and throughout the corridor	1	2	1	1	0	0	-2	-5	0
	3.7 Improve transit operations in a manner that is mutually beneficial to vehicular traffic flow for emergency service vehicles	0	0	0	0	0	0	0	0	0

Goal 3's stated purpose is to support economic development, revitalization, and land use redevelopment opportunities for the corridor. This goal is open-ended and could mean a lot of different things to a lot of different people. The objectives under the goal provide little guidance on the intended meaning of the Goal and in several instances appear tangential to the Goal.

- Objective 3.1 is to support development and redevelopment. The Alternatives Analysis provides no meaningful analysis that CSA could identify that distinguished between the alternatives. This objective was scored Not-Sufficient-Data, accordingly.
- Objective 3.2 is to coordinate transit improvements with other planned and programmed pedestrian, mobility device users, and bicycle projects. This objective provides no meaningful way to distinguish between alternatives. Regardless of the alternative, improvements should be coordinated. It is scored as a "0" across the board, accordingly.
- Objective 3.3 is to coordinate transit improvements with other planned and programmed roadway projects. Again, this objective provides no meaningful way to distinguish between alternatives. Regardless of the alternative, improvements should be coordinated. It is scored as a "0" across the board, accordingly.
- Objective 3.4 is to minimize adverse impacts to existing businesses and industry. The meaning of this objective is straightforward. The build alternatives have negative impacts on businesses in the corridor according to the Alternatives Analysis. However, the overall scale of impact appears to be relatively localized to specific sites.
- Objective 3.5 is to provide high-capacity transit that is consistent with the community vision for the corridor. CSA scored the build alternatives with "4s" and "5s" based upon the significant increases in transit capacities in the corridors and consistency with the regional transportation plan. CSA's scoring reflects the community vision as being expressed by the regional transportation plan. Community vision is subjective.

Moreover, the purpose of the Alternatives Analysis document is to guide community vision for transit, so the objective is intertwined with the purpose of the document itself. For example, if the community were to reconsider its vision for these corridors then the scores would plummet even though nothing about the merits of the alternatives would have changed. Moreover, “high-capacity” transit is stated in the Objective as an end-in-itself and implies that more transit capacity is always a benefit. This is obviously untrue. Capacity that exceeds demand in a corridor, especially that far exceeds demand, is not positive because it is inefficient, and the wasted expenses could have been deployed for transportation that is efficient elsewhere in the District. ***Ultimately, Objective 3.5 is a poor basis upon which to choose build versus no-build transit alternatives.***

- Objective 3.6 is to improve transit operations on state facilities in a manner that is mutually beneficial to vehicular and freight traffic flow around transit stops and throughout the corridor. Many of the alternatives are neutral, with minimal negative or positive impact. Several negative impacts, such as on 30th Avenue, did not occur on state facilities and have thus been given a score of “0”. Of the alternatives, only one, the Coburg Road option, appears to be substantially detrimental to a state facility.
- Objective 3.7 is to improve transit operations in a manner that is mutually beneficial to vehicular traffic flow for emergency service vehicles. The Alternatives Analysis sought feedback from the relevant local and county emergency services. In general, no significant concerns were raised for either the Enhanced or BRT options. On the other hand, none of the stakeholders indicated that the alternatives would improve or benefit emergency service vehicles. It is scored as a “0” across the board, accordingly.

Goals and Objectives Scoring Analysis Results

The Moving Ahead Alternatives Analysis Goals and Objectives were utilized as the basis to eliminate potential alternatives from further consideration. Why then, are those same Goals and Objectives not applied in a manner that allows the reader to easily understand the trade-offs between the alternative choices? The type of scoring performed in this section should be straightforward. The document should identify which Goals and Objectives are significantly advanced by the build alternatives and should quantify it in easy to understand terms. The document should include a summary section that explains how different transit policy choices would balance the Goals and Objectives differently; this would guide the decision-making process. LTD and the Eugene City Council are now soliciting comments on investment packages without the benefit of a summary analysis that explains how LTD’s own Goals and Objectives are advanced by the package alternatives.

From the standpoint of advancing LTD’s stated Goals and Objectives, the Moving Ahead Alternatives Analysis was challenging to review. The structure of the document does not relate to the stated Goals and Objectives in a way that is easy for the reader to understand. Several of the Goals and Objectives are written with ambiguous language. Many of the Objectives beg for some sort of *a priori* measure of transit service success, but none are established in the Objective itself or in the supporting documentation. There is no comprehensive summary analysis that explains how the system would function when different service options are combined.

Five of seventeen Objectives lacked sufficient data to be scored. Another four of the seventeen Objectives were not meaningfully different from the no-build alternative. The Moving Ahead Alternatives Analysis consumes 362 pages (and the supporting documentation is many hundreds more pages) and yet fails to provide meaningful distinctions between the alternatives for 9 out of the 17 Objectives set forth in the policy section of the document itself.

The lack of analysis showing how various investment packages under consideration will perform against the stated goals is concerning. This lack of performance analysis introduces risk that the project is being advanced merely by virtue of “the amount of work performed and years of effort” rather than because it is advancing the goals and objectives set forth at the outset of the project. This type of bureaucratic inertia without review against project fundamentals is the same type of environment that caused the CoverOregon disaster, where project managers lost sight of the fundamental purpose of the project. This does not mean that the Moving Ahead alternatives are destined for such an epic failure, but the risk of such an epic failure could be substantially reduced or eliminated by completing the analysis in a way that makes it easy to determine the benefits of the alternatives in relation to each Goal and Objective set out for the project.

V. ADDITIONAL CONSIDERATIONS

This section expands the review beyond the objectives in the Moving Ahead Alternatives Analysis document. Even one of the BRT projects in the analysis is a major commitment on the type and location of future transit service. If all the BRT projects were implemented, that would have the effect of committing large sums of capital and O&M revenues on a particular type of transit system configuration. This commitment would extend years into the future.

The Moving Ahead alternatives represent a major set of transit policy choices for the community and the document presenting those choices should describe and analyze the fundamental implications of those choices. It should also be technically sound. This section of the review points up weaknesses in the technical work and identifies major policy choices in the form of questions that are not analyzed in the Moving Ahead document.

Major Policy Issues Not Analyzed

1. A policy decision that selects the build alternatives, especially the multiple BRT corridor alternatives, would cause a long-term commitment to the existing “hub and spoke” system configuration. Why is there no alternative for a “cross-town” configuration?

Once a system has 15-minute headways on significant numbers of bus routes, a cross-town configuration that utilizes the existing BRT as the east-west “backbone” of the system would seem to be worth exploring - geographically. Before a major, and essentially permanent, choice is made that binds the District to a hub and spoke system configuration, it seems like a cross-town system option should at least be analyzed. This type of configuration should be analyzed in a way that assumes similar levels of “build” investment in capital and operations when compared to the Enhanced Corridor and BRT alternatives respectively to tease out the net benefit. Moreover, it would be interesting to have some sensitivity analysis that looks at which system configuration would be most responsive as transportation technology changes; such as automated vehicles?

2. What are the negative impacts of the “no-build”? In other words, what transportation problems will be created or made worse if none of the build alternatives were selected?

Section IV above examined how the Moving Ahead Alternatives perform with respect to its own Goals and Objectives. This is a different question. The Moving Ahead Alternatives Analysis appears to assume that these alternatives are advancing the regional transportation plan for transit in the planning area and the projects are, therefore, “needed”. It may be that the transportation problems are well articulated in the Regional Transportation Plan (RTP). If that is the case, then a summary at least should be provided in the document to explain the negative consequences of doing nothing. If that analysis is not in the RTP then it should be added to the Alternatives Analysis document. There are reasonable arguments to be made that a basic level of transit service is “intrinsically good”, because it provides people with a

viable means to get around who may have no other options. However, the District and the cities of Eugene and Springfield already has such a system. ***The Moving Ahead alternatives go far beyond a basic system and the reason for making such significant investments should be based upon improvements that solve real transportation problems. Those problems are not well articulated in the document.***

3. Why is there no summary of the “rolled-up” costs and ridership for all the projects? If BRT were done for all four corridors and EC for MLK then what would the total O&M and capital costs required and what would the ridership be?

The analysis treats each corridor individually. This is good, but some part of the document should really show what all the build alternatives represent from a cost standpoint and some expression of existing revenues vs. required revenues would be helpful. The analysis should have a hypothetical “build year” (for example 2022) and show what would happen to revenues and ridership if these projects were all online in 2022. This is especially true now that the Council and LTD are requesting comments on investment packages.

4. Why is there no “level of service” efficiency objectives that are normalized?

There should be some goal and objectives concerning the efficiency of the system that are normalized: cost per mile ridden; percent of riders where the origin and destination matched to provide a 35-minute or less trip; bus capacity objectives like number of passengers who must stand during the peak hour; etc. Normalizing data is critical to creating any meaningful analysis. Because the analysis is comparing “build” versus “no-build” options, at least some of the normalization should be expressed as per “net additional trip”. Fundamentally, this is the policy choice presented by the document.

As an example, consider the River Road Corridor EMX alternative. The capital cost is \$78 million. It costs an additional \$2 million per year to operate. It nets 820 additional transit trips per weekday. Over twenty years, that is an additional \$20 million in operating costs. Over twenty years, that is 4,296,800 net additional transit trips. If one allocates the capital expense over twenty years of net additional trips and allocates the operating cost per net additional trip then the cost of the River Road EMX Alternative per net additional weekday ***transit trip is approximately \$27.46 on average over 20 years.*** When normalized to represent the actual policy choice of investment per net additional transit trip, the costs are considerable.

Technical Issues

While the purpose of this review was not to perform a peer review of all the technical assumptions in the Moving Ahead Alternatives Analysis, CSA’s review did identify some technical concerns worth pointing out, as follows:

- The labels on the “Corridor Summary Tables” do not appear to be correct. They refer to “Annual” Corridor and Systemwide Trips. This does not appear to be correct. The DKS report indicates these are typical “Daily” weekday trips. This must be the case. Otherwise, for example, the River Road EMX project would cost \$7,195 per net additional transit trip. These tables are labeled incorrectly.
- Some of the corridor summary tables explain the differences in service frequencies and others do not. These are useful tables and should be made consistent to show service frequencies between the different alternatives in all the summary tables.

- Some of the ridership differences between the EC and BRT alternatives are not intuitive and are not explained. In many of the corridors, the differences in transit travel times is negligible between the two build alternatives. The EC headways are longer (therefore wait times are greater) and thus total travel time is greater. However, there are instances where the amount of time savings is just not well correlated with the estimated ridership changes. For example, the Coburg Road alternatives have the same in-transit travel times between the EC and the BRT and they both save 5 minutes over the No Build. Thus, the EC saves 5 minutes on every single full-length trip over the No-Build but increases ridership by just 210 trips. The additional headways on the BRT can only save 5 minutes as a maximum - (when you just miss the bus). On average, the time savings will be less per trip assuming stochastic arrival distributions at the bus stops. Yet, this smaller time savings yields an additional 550 trips per day. From a purely transport efficiency standpoint, this is not an intuitive result. CSA is not saying this math is incorrect, but it is a big difference that must be driven by something other than travel convenience. ***This is something that should be explained in readily understandable terms.***
- As a corollary to the above issue, there is a significant reason to question ridership increase assumptions due to travel time savings from a frequency change from 15-minute headways to 10-minute headways in the modern age (assuming the busses are not full and the additional headways are not necessary to meet demand). As time goes forward, an ever-higher percentage of riders will be smartphone users. Even with current smartphone technology, Google Maps makes transit trip planning convenient. If someone is the type of person who wants to avoid wasting 5 minutes by just missing the bus, Google Maps makes it easy to avoid wasting that time. 15-minute headways are frequent enough that most users would essentially consider the bus to “always be available” and gaps between busses are not so great that people need to rearrange their daily routine around the bus schedule to any meaningful degree.
- There is little discussion about the cost of federalizing the capital projects. This is especially true for the Enhanced Corridor alternatives. Federal capital projects cost more, sometimes much more, than they would if they are funded with local dollars. Considering the analysis assumes a 50 percent local match and would come with significant service commitments with the FTA that would be difficult to manage in any lean financial times or as transportation technologies evolve, is it worth it to Federalize all the Enhanced Corridor alternatives? As a related matter, it appears that some aspects of the Enhanced Corridor capital construction concepts could be phased and implemented within the existing route and service structure. This would present even greater ability to manage cash flows and reduce downside risks. Some technical analysis in this area would be helpful.



- The ridership forecasts assume considerable “background growth”. CSA compared the background ridership growth assumptions to the “full-build” project alternative ridership forecasts in the below table:

	Average Daily Ridership on Existing Routes	2035 No-Build Ridership Forecasts	2035 EMX Ridership Forecast (EC for MLK)	Change in Transit Trips in Corridor from Build Alternative	Trip Growth Assumed by 2035	Corridor Trip Compound Average Growth Rate Existing 2016 to No Build 2035	Corridor Trip Compound Average Growth Rate Existing 2016 to Full Build 2035	Build Growth Rate minus No Build Growth Rate
Hwy 99 w/ W Eugene EMX	7,320	9,365	10,406	1,041	3,086	1.239%	1.774%	0.535%
Hwy 99 w/o W Eugene EMX	1,351	9,365	10,406	1,041	9,055	10.165%	10.747%	0.582%
River Rd	2,490	9,575	10,615	1,040	8,125	6.966%	7.519%	0.553%
30th Ave	1,893	10,850	11,575	725	9,682	9.122%	9.476%	0.353%
Coburg	3,735	10,060	11,200	1,140	7,465	5.079%	5.644%	0.566%
MLK	2,444	10,120	10,800	680	8,356	7.363%	7.713%	0.350%

The accounting for the Highway 99 corridor ridership is anomalous. The Analysis should make some attempt to describe which existing trips on the West Eugene EMX would be captured by the build projects and which trips would be unchanged. The above table analyzes it both ways, but the actual “existing trips” number that might be affected by a coincident route is likely somewhere in between.

Aside from the Highway 99 data anomaly, the ridership growth forecast of the other four routes point up a significant issue. No margin of error of the baseline trip growth assumed to occur by 2035 is provided, that we could find. Long-term forecasts typically have relatively large margins of error. The average annual compound growth rate that is being forecast between the existing routes and the 2035 No-Build is aggressive. The rates are assuming ridership growth at over **5.5% per year every year for 20 years**. The net benefit from the “full-build” projects represents only a tiny fractional increase in growth rate. In other words, the ridership increases being assumed to occur from “doing nothing” far exceed the net increases from any of the build alternative policy choices. The projected net ridership increase from the build alternatives are likely well within any reasonable margin of error of the baseline ridership growth forecast. Put more simply, the build ridership forecast alternatives do not appear to be statistically different from the No-Build.

The aggressive ridership growth forecasts introduce a major source of risk that is not analyzed in the Alternatives Analysis. Consider a scenario where all five “full-build” alternatives are selected and constructed, but the actual ridership only grows at a 3.5 percent annual rate for 20 years. The costs will not change but the ridership will be approximately half. This scenario would dramatically increase the average cost per trip calculated in the Alternatives Analysis while also slashing in half the return on capital investment. Failure to fully disclose the risks that relatively small marginal benefits have in relation to much larger-scale forecasted trends is inappropriate and should never be done by a public entity proposing large-scale public investments.

More statistical work should be provided based upon past forecasts vs. actual ridership changes from prior projects as well as an analysis of ridership trends over the last 5 to 10 years to determine some statistically observed ranges of background growth. This should be used to estimate a range of ridership forecasts that can be used to calculate cost benefit of the capital projects as well as the cost per trip and to fully explain forecast ridership risks according to normalized cost-per-trip metrics.

VI. CONCLUSIONS AND REVIEW SUMMARY

For a document weighing in at 362 pages, not counting all the technical appendices, it is hard to imagine any major questions being left unanswered. This document manages to accomplish this monumental task. At least these fundamental areas are lacking analysis:

- The Alternatives Analysis fails to provide Goals and Objectives that distinguish between alternatives in a manner that truly aids decision-making and then fails to provide complete answers to its own stated objectives. ***The performance of the proposed investment packages should be rated in relation to the Goals and Objectives set forth at the outset of the project. Completing this analysis in a robust way would reduce the type of project risk that befell CoverOregon.***
- The analysis does not analyze a revised cross-town system configuration. The build alternatives would lock the District into the hub and spoke system for the foreseeable future. ***This may limit system flexibility, especially to adapt to future technologies.***
- The analysis does not identify what transportation problems will occur if none of the build alternatives are selected nor does it explain if the transit system is over capacity under the “No-Build” scenario. ***The capacity expansions in the build scenarios seem to make about as much sense as planning a 30,000-seat expansion for Reser Stadium. How does that use of funds compare to alternatives like adding rural service areas or expanding weekend and evening transit services?***
- There is no summary of how the system would look if all the build alternatives were selected, especially the full-build alternatives, and how much that would all cost. The document talks about investment packages but does not explain how different options will function if they are packaged together and what the impacts would be cumulatively. ***For example, a summary would explain that the EMX alternatives plus the MLK EC alternative is the Greenhouse Gas emission equivalent of ~66 more Cadillac Escalades on the road on an average weekday.***
- The cost per net additional trip appears to be very high for some of the build alternatives. A twenty-year amortized analysis, that includes both capital and operating expenses, should explain each alternative’s total cost per net additional trip.
- The forecast background ridership growth assumptions are large relative to the forecast net ridership increases from the build alternatives. This introduces serious operational and financial risks under the build alternatives- especially for the BRT. ***The forecast ridership increases for the Build alternatives could easily turn out to be zero or less than the No-Build ridership forecasts. To reduce potential Goodwin/Kahneman-type misrepresentations, a robust analysis and disclosure of the MovingAhead Alternatives Analysis ridership forecast risks is required.***
- The cost of Federalizing the Enhanced Corridor alternatives should be analyzed. The District should explore the creation of a fund exchange with ODOT and FTA to de-federalize some projects and create opportunities for cost savings. This may require policy and administrative changes within those agencies, but given the time frames and dollars involved, effort in this area appears worthwhile. This approach would allow the phasing of improvements which leads to greater flexibility for financial resource management and adaptations to future transportation technologies.

The Alternatives Analysis attempts to serve two masters - local policy document and NEPA compliance document. All the NEPA details detract from communicating key policy issues. The Executive Summary does not tackle key issues in an informative way. The document fails to analyze risk. It lacks normalized data metrics so that the “net benefits” of the build alternatives are related to the net additional costs of the build alternatives.

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