MovingAhead

STREETS AND PLACES REIMAGINED

Travel Demand Forecasting Methodology Report

Lane Transit District
City of Eugene

In cooperation with
City of Springfield
Lane Council of Governments
Lane County
Oregon Department of Transportation

June 2015

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1. Introduction

1.1 Report and Purpose

This report describes the analysis methodologies and data to be used for the travel demand forecasting for the MovingAhead project's alternatives Level 1 screening, Level 2 alternatives analysis, and subsequent environmental documentation. This report assumes that any corridors advanced for environmental review will require a documented categorical exclusion under the National Environmental Policy Act (NEPA). Any corridors requiring a higher level of environmental review would be supported by this documentation but may not be fully covered by this documentation.

1.2 Discipline Experts

Discipline experts contributing to the preparation of this report are identified in Table 1.2-1 below including their area of expertise, affiliated organization, title and years of experience.

Table 1.2-1. Discipline Experts

Discipline	Technical Expert	Affiliated Organization	Title / Years of Experience
Travel Demand Forecasting	Jennifer John	John Parker Consulting	Principal / 22 yrs
Travel Demand Forecasting	Randy Parker	John Parker Consulting	Principal / 24 yrs

Source: MovingAhead Project Team. 2015.

1.3 Study Description

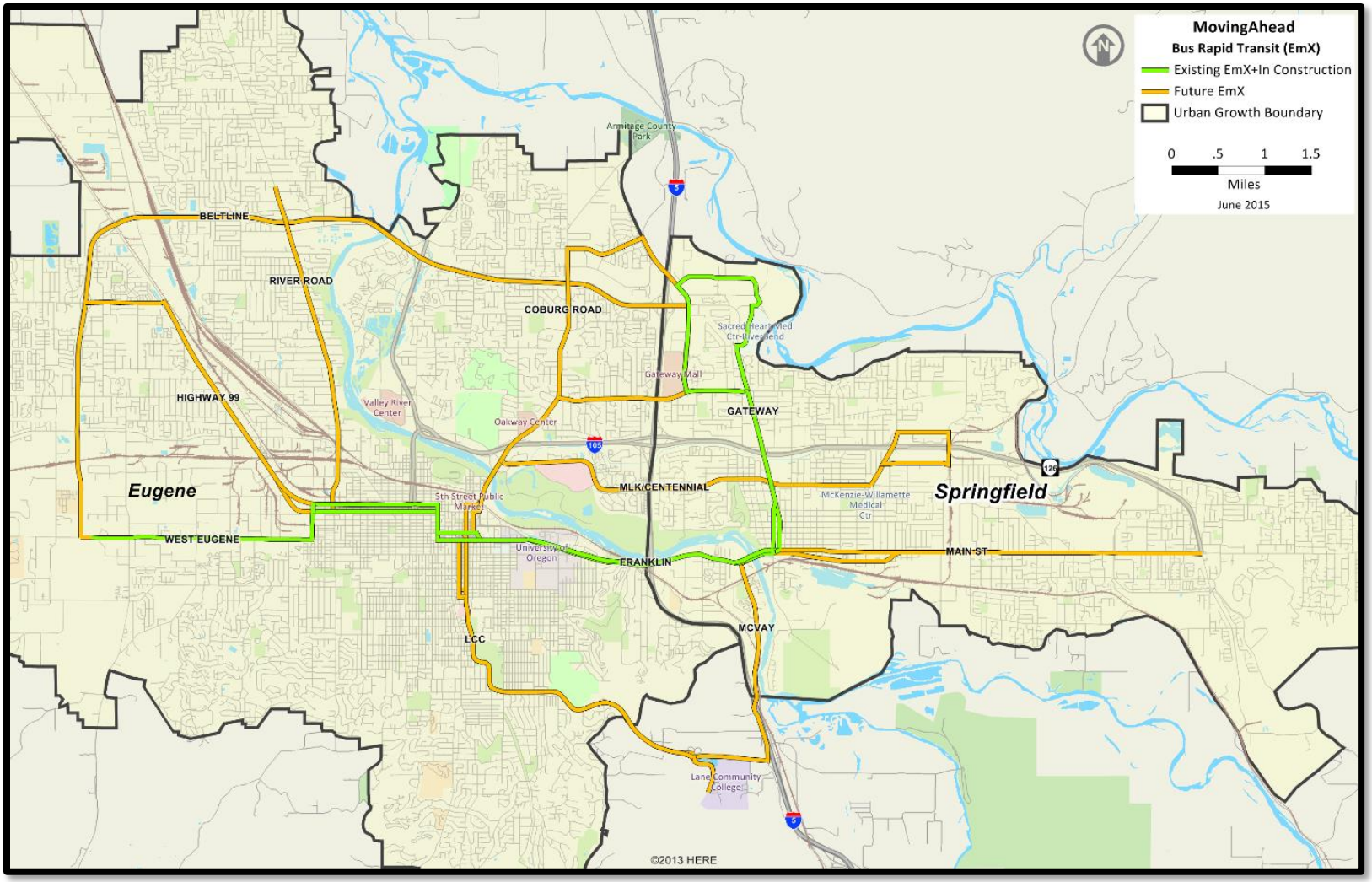
The MovingAhead project is a study to determine which of the high capacity transit corridors identified in the adopted EmX System Plan (Figure 1.3-1) and the Frequent Transit Network (FTN) (Figure 1.3-2) are ready to advance to capital improvements programming in the near term. The study is being conducted jointly with local agencies to facilitate a more streamlined and cost-efficient process through concurrent planning, environmental review, design and construction of multiple corridors.

The 10 corridors under consideration in this study are:

- Highway 99 Corridor
- River Road Corridor
- Randy Papé Beltline Corridor
- 18th Avenue Corridor
- Coburg Road Corridor
- Martin Luther King, Jr. Boulevard / Centennial Boulevard Corridor
- 30th Avenue – Lane Community College Corridor
- Main Street – McVay Highway Corridor
- Valley River Center Corridor
- Bob Straub Parkway Corridor

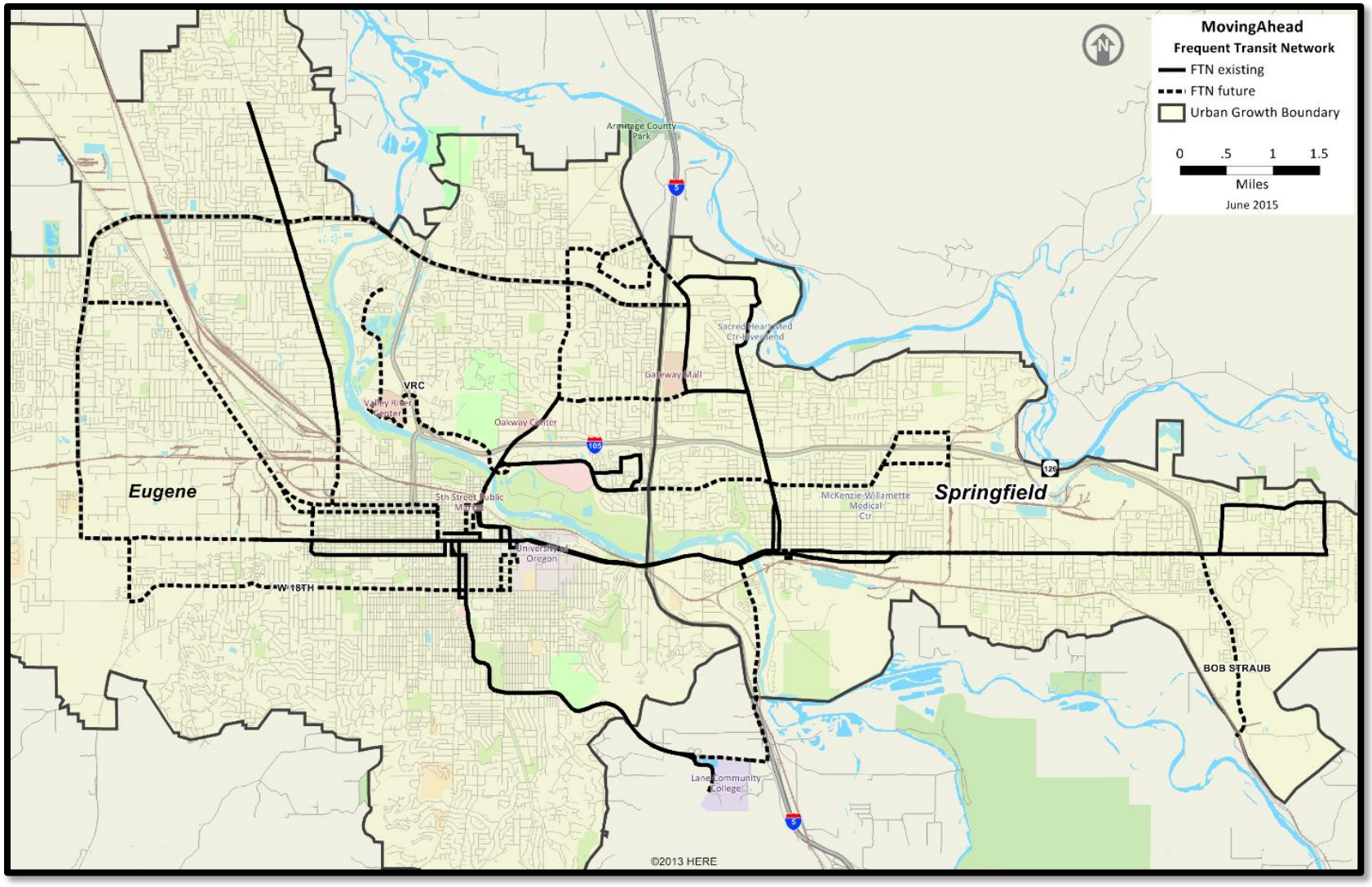
These corridors are illustrated in Figure 1.3-3.

Figure 1.3-1. Lane Transit District's EmX System



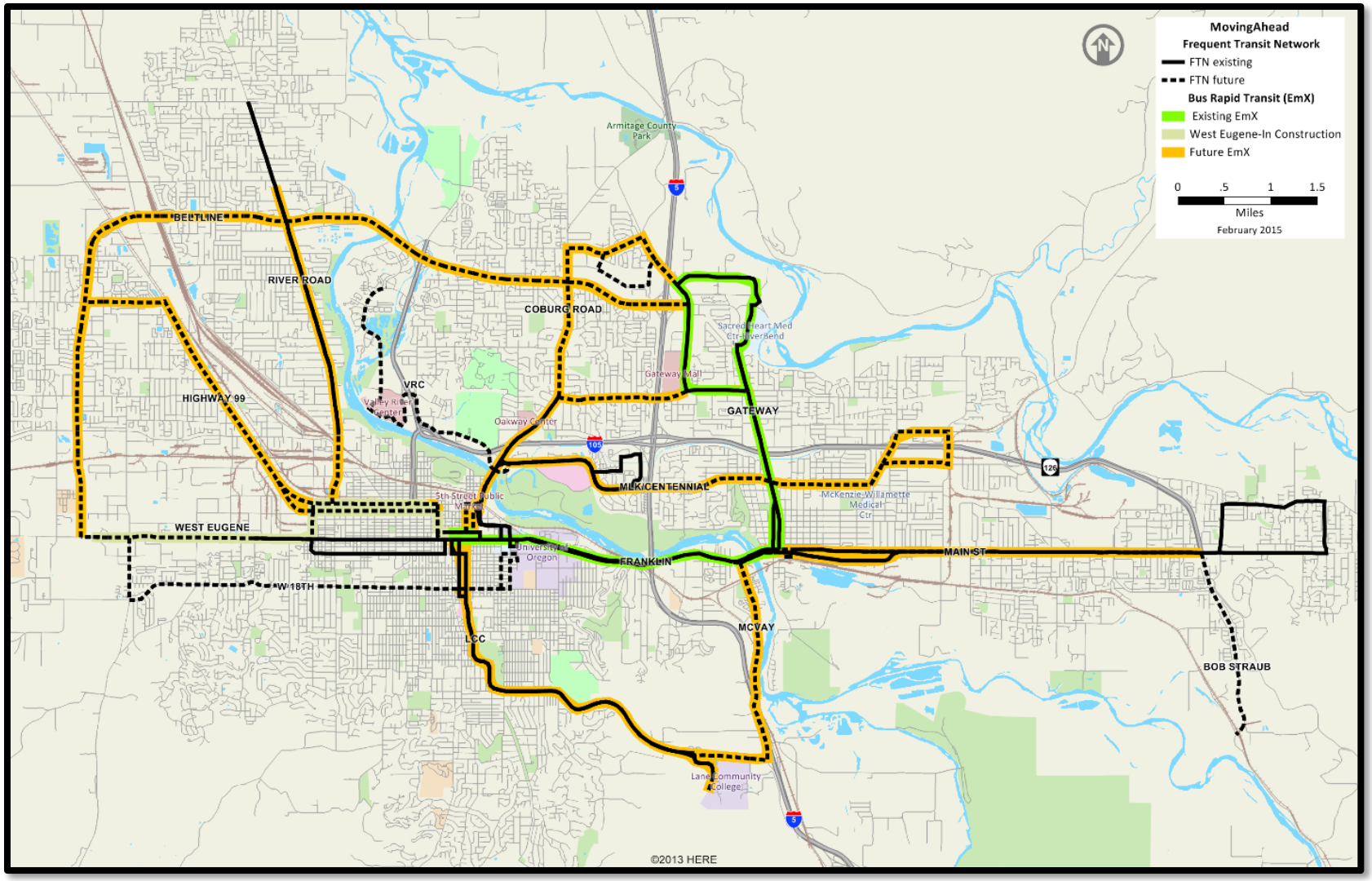
Source: Lane Transit District. 2015.

Figure 1.3-2. Lane County Regional Frequent Transit Network



Source: Lane Transit District. 2015.

Figure 1.3-3. 10 Corridors Considered in MovingAhead Project



Source: Lane Transit District. 2015.

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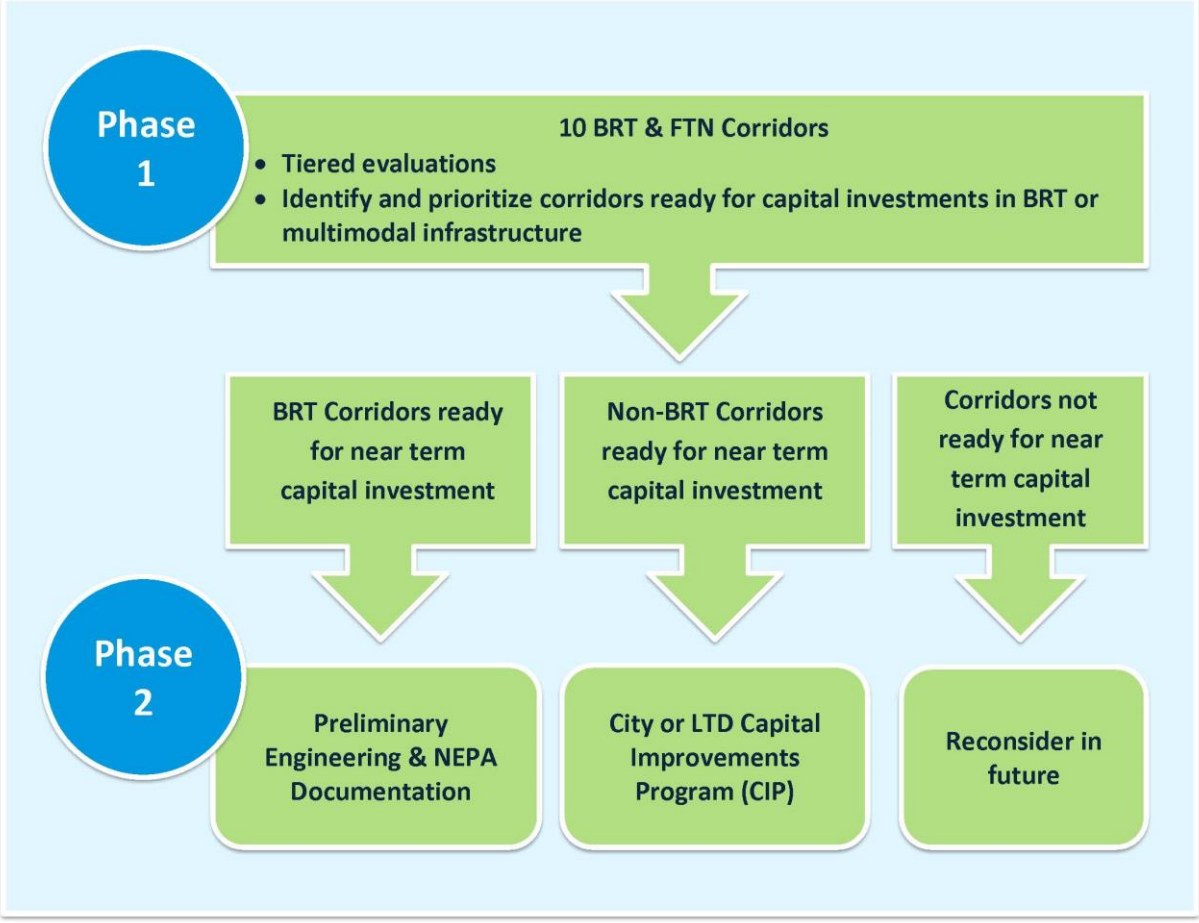
The MovingAhead project will be completed in two phases (Figure 1.3-4). Phase 1 will initially be focused on the region's transportation system. Corridor alternatives identified as part of this phase will be developed using multimodal cross sections that include variations on auto, truck and bus travel lanes, bicycle lanes and sidewalks (see examples in Figure 1.3-5). These multimodal cross section corridor alternatives will undergo a high-level screening (Level 1 Screening Evaluation) to determine the most promising alternatives to advance to a Level 2 Alternatives Analysis (Level 2 AA). Conceptual designs for corridor alternatives advanced to the Level 2 AA will be refined.

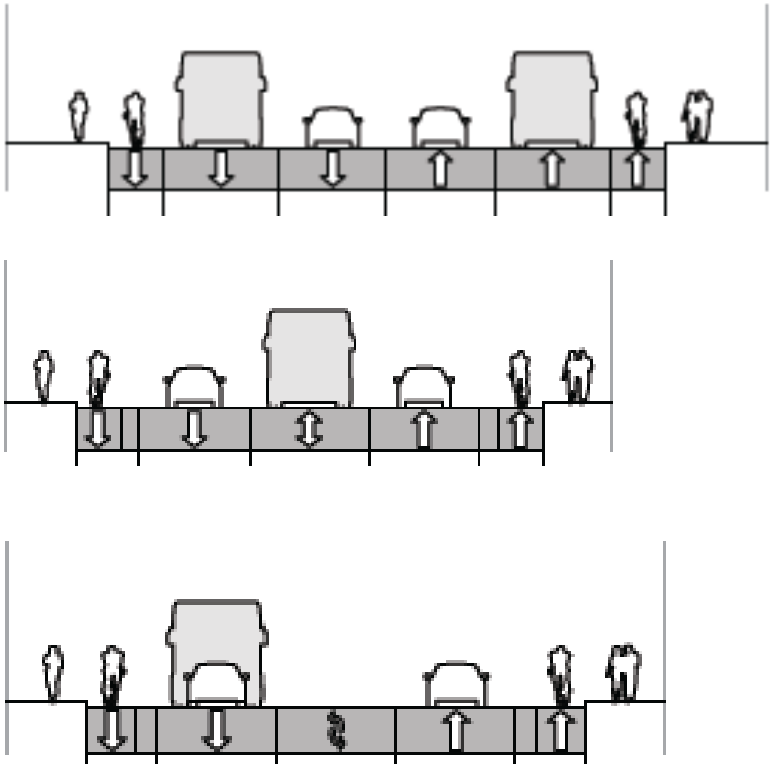
Phase 2 will complete preliminary engineering for one or more corridors and required environmental documentation. Only those corridors selected for bus rapid transit capital investments will advance to Phase 2.

Figure 1.3-4. MovingAhead Phases



Source: Wannamaker Consulting. 2015

Figure 1.3-5. Cross Section Examples



Source: CH2M. 2015

1.4 Phase 1 Organization

The purpose of Phase 1 of the MovingAhead project is to:

Define the role of transit in each of the multimodal corridors. The role of transit is defined in the context of the community's vision for the corridors (as informed by Envision Eugene, Springfield 2030, and LTD's Long-Range Transit Plan).

Define the pedestrian and bike needs in the multimodal corridors, generate multimodal cross sections for transit corridors, and develop strategies to improve multimodal access to transit stations including bike and pedestrian crossings of arterials.

Prioritize transit, pedestrian and bike improvements in the City of Eugene (including corridors that connect to and are located in the City of Springfield) with the aim of identifying the corridors that are most ready for transit investment and the accompanying multimodal improvements to support development of complete streets (see sidebar for definition of Complete Streets).

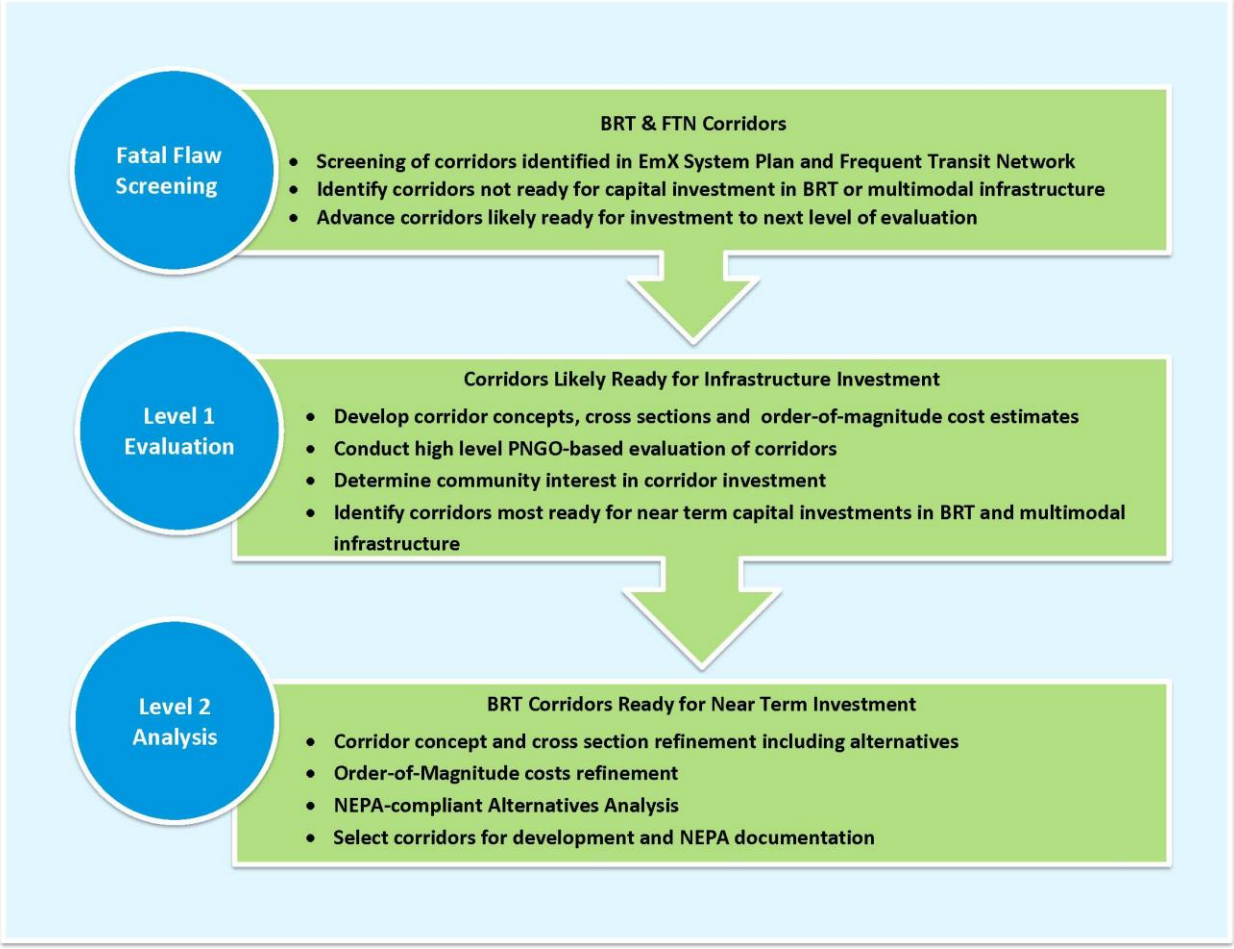
Complete Streets

"Complete Streets" is a transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation.

Complete environmental analysis for the corridors to support future NEPA documentation with particular focus on those elements of the environmental study that can be addressed at the system level (e.g. air quality).

The Phase 1 study will be broken into three discrete but closely related tasks: identification of transit improvements, identification of bike and pedestrian improvements, and preparation of a NEPA-compliant evaluation of alternatives (Figure 1.4-1). The outcome of Phase 1 will be a prioritized set of corridors and system-level and corridor-level NEPA documentation. The City of Springfield transit corridors will be included in the system-level NEPA documentation.

Figure 1.4-1. MovingAhead Phase 1 Steps



Source: Wannamaker Consulting. 2015.

Fatal Flaw Screening. The Fatal Flaw Screening was conducted in February 2015 and identified which of the 10 corridors should not move forward to the Level 1 Screening Evaluation (see Fatal Flaw Technical Memorandum in Appendix B). This high level evaluation used criteria based on the project's Purpose and Need, Goals and Objectives (PNGO) and existing data to determine which corridors will not be ready for any level of capital investment in bus rapid transit or multimodal infrastructure in the next 10 years. The screening was conducted with local, regional, and state agency staff (see sidebar for list of agencies). Each of the 10 corridors was evaluated and ranked.

Agencies Participating in Fatal Flaw Screening

- City of Coburg
- City of Eugene
- City of Springfield
- Lane County
- Lane Metropolitan Planning Organization
- Lane Transit District
- Oregon Department of Transportation

Three corridors were not advanced from the Fatal Flaw Screening to the Level 1 Screening:

18th Avenue

Bob Straub Parkway

Randy Papé Beltline Highway

The 18th Avenue and Bob Straub Parkway Corridors were determined to not be ready for any level of capital investment in bus rapid transit or multimodal infrastructure in the next 10 years. The Randy Papé Beltline Highway was not advanced as an independent corridor but will be considered as a frequent bus line that will serve as an east-west system connector.

Although originally advanced from the Fatal Flaw Screening, the Main Street-McVay Highway Corridor was not advanced to the Level 1 Screening because the Springfield City Council (on May 18, 2015) and LTD Board (on May 20, 2015) determined that this corridor is ready to advance into a study to select a locally preferred transit solution. At this time, the Main-Street-McVay Highway Corridor will continue to be studied on a schedule that is ahead of the MovingAhead project schedule. If in the near future, the Main Street-McVay Highway Corridor study schedule is delayed and its progress coincides with this project, then the Corridor could be reincorporated back into the MovingAhead project.

The six corridors advanced to Level 1 Screening Evaluation are illustrated in Figure 1.4-2 and listed below.

Highway 99 Corridor

River Road Corridor

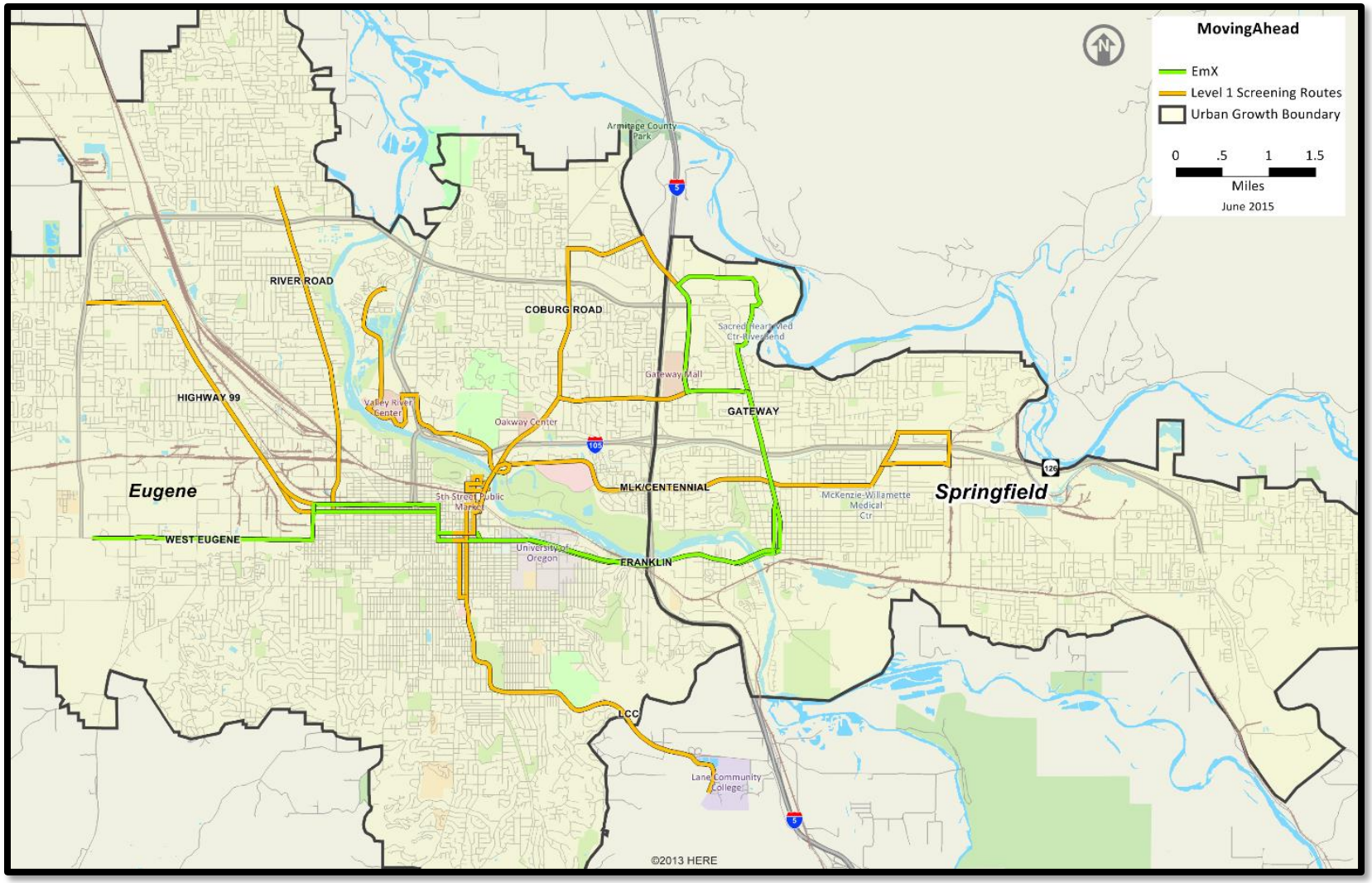
Coburg Road Corridor

Martin Luther King, Jr. Boulevard / Centennial Boulevard Corridor

30th Avenue – Lane Community College Corridor

Valley River Center Corridor

Figure 1.4-2. Corridors Advanced to Level 1 Screening



Source: Lane Transit District. 2015.

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Level 1 Screening. Prior to the Level 1 Screening, general cross section concepts will be developed for the various right of way widths of the corridors. Concept graphics will show a route, any relevant design options and color-coding to indicate transit treatments (e.g., Business Access and Transit (BAT) lanes, mixed traffic, separated running way). Data collection will be based on existing studies and readily available Geographic Information System (GIS) data. Screening criteria will be based on the PNGO. The Level 1 Screening Evaluation will be qualitative and will include order-of-magnitude cost estimates based on lane miles of each type of transit treatment, ridership potential and community input. The community will have the opportunity to provide input and comment through corridor workshops, online workshops, the project website, and direct input to partner agencies. Corridors that most effectively meet the criteria and are supported by the corridor community will be advanced to the Level 2 Alternatives Analysis (AA). Corridors without BRT improvement concepts will not be advanced to the Level 2 AA. Improvements needed in these corridors (bike or pedestrian projects or transit enhancements) would be advanced to capital improvements programming by either the City or LTD.

Transportation projects not advanced from the Level 1 Screening can be incorporated into the City of Eugene's capital improvements programming in several different ways. Larger projects such as shared use paths, significant sidewalk infill and protected bike lanes can be incorporated into the City of Eugene Transportation System Plan (TSP) through an amendment to the TSP. These types of larger projects are typically implemented through federal and state funded grants that the City will apply for in the future. Smaller projects, such as pedestrian crossing improvements, can be identified for implementation through existing funding programs (e.g., the pedestrian and bicycle component of the Street Bond) that are already in the City's Capital Improvements Program (CIP). These smaller projects will be put on a list to be considered for such funding in subsequent years.

Transit improvement projects not advanced from the Level 1 Screening can be incorporated into LTD's CIP, which is reviewed and adopted annually (see sidebar for a description of LTD's CIP). Staff will be responsible for determining which transit enhancement projects identified in MovingAhead will be advanced to the CIP. Staff will create the draft CIP and submit it to the public for a 30-day comment period. The public can submit in writing any comments or questions about the program and testify at a public hearing that is scheduled within the comment period. Once the public comment period is concluded, all comments or questions along with staff responses are submitted to the LTD Board of Directors. A revised draft program will then be submitted to the Board for adoption.

LTD's Capital Improvements Program

Lane Transit District's CIP is a 10-year framework that provides direction and guidance for LTD's capital investments. Annual revisions of the CIP consider new projects and reflect updates to the LTD Road Map and Long-Range Transit Plan. The CIP has two fundamental objectives: 1) to facilitate the efficient use of LTD's limited financial resources, and 2) to implement regional priorities that anticipate the need for public transportation in the future.

Level 2 Alternatives Analysis. Prior to conducting the Level 2 Alternatives Analysis (Level 2 AA), conceptual designs for corridor alternatives advanced from the Level 1 Screening will be developed for each corridor. These conceptual designs for corridor alternatives will define a mode, route, and transit treatment and will define a "footprint" for the multimodal improvement to allow for environmental impact assessments. Data collection will build on data from the Level 1 Screening and will include some field verification and data modeling. Evaluation will be a mix of qualitative and quantitative analysis including planning-level cost estimates, ridership using LCOG's regional model, environmental impact

analysis, and traffic analysis. The Level 2 AA will provide environmental analysis sufficient to support FTA's Documented Categorical Exclusion (DCE) NEPA classification. The findings from the Level 2 AA will aid LTD and its partner agencies in determining which high capacity transit corridors should be prioritized for capital investments over the next 10 years.

1.5 Phase 2

Selected corridors will be advanced to Phase 2 for NEPA-compliant evaluation and documentation. Preliminary engineering will be prepared to support the NEPA documentation. Additional technical analysis will be conducted, where needed to supplement analyses from the Level 2 AA, for the DCEs. Findings from the NEPA DCEs will be used to prioritize corridors advanced to capital improvements programming.

2. Travel Demand Forecasting Model Overview

2.1 Introduction

Below is a summary description of the travel demand models and input assumptions that Lane Transit District (LTD) proposes to use in preparing the travel demand forecasts and related evaluation measures for the MovingAhead Project Phase 1 alternatives development and evaluation process Level 1 Screening, and Level 2 Alternatives Analysis (AA). This report provides a general description of LCOG's travel demand forecasting models. Full documentation for the LCOG model is available in the *LCOG Travel Demand Forecasting Model Documentation Report 2007* and the *LCOG Trip-Based Demand Model Validation Report (2004 and 2007).*

LCOG, the Metropolitan Planning Organization for the Central Lane County area, maintains its own regional travel demand forecasting model. The model in use was developed by LCOG and PB Consult following the guidelines and procedures manual of the ODOT Transportation Planning Analysis Unit. The structure and assumptions are consistent with all Oregon MPO 4-step models except for the use of a gravity model in place of a destination choice model. The mode choice model was developed by PB Consult.

2.2 Model Characteristics

2.2.1 Transportation Analysis Zones (TAZ's): 666.

Trip Purposes: there are seven trip purposes within LCOG's model – home-based work (HBW), home-based other (HBO), home-based shopping (SHP), non-home-based work (NHW), non-home-based non-work (NHN), home-based school (HBSch) and home-based college (HBCol).

Household Characteristics: Trip Generation: household size (1, 2, 3, 4+), number of workers (0, 1, 2, 3+), age of head (4 classes), income group (less than $30K, more than $30K in 1994$), tenure, household structure type (Single-family, duplex, multi-family/apartment, mobile home/trailer), and University of Oregon (UO) district (3 districts based on distance from UO).

Auto Ownership: Person-weighted household vehicle ownership by transportation analysis zone (TAZ), (0, 1, 2, 3+)

Trip Distribution: Gravity model for each trip purpose uses the minimum of auto time and walk time.

Mode Choice Model: Nested Logit model with the following characteristics: Highway, Transit, and Non-motorized nests. This model was revised in 2010/2011 with the initiation of LTD's EmX bus rapid transit (BRT) service to include a "premium transit" nest and was based on survey data collected from the existing Franklin EmX route.

2.2.2 Trip Cost Data

Travel cost is an input to the mode choice model. All cost values are in 1994/1995 dollars:

- Auto Operating Cost – 12.5 cents per mile.
- Transit Fares – average fare weighted by cash and non-cash fares, and varies by transportation analysis zone.

Transit fares are based upon current LTD fare structure, summarized in the following table. Discounted ticket prices are available for disabled and school-aged children and free fares are available for seniors

and children five and under. A Group Pass program exists at business and government organizations that voluntarily subscribe to this program. The employees at these businesses receive a pass, paid for by the employer, which allows them to ride for free. At the end of 2010, a total of 86 organizations with 10,400 employees were participating. In addition, the University of Oregon and Lane Community College students receive transit passes that enable them to travel throughout the transit system for free. Total participants in the higher education pass programs totaled 35,500. A middle and high-school student transit pass program provided free transit travel to approximately 25,000 youth through the end of the 2010-2011 school year, when it was discontinued due to withdrawal of funding by the State, with no plans for renewal.

Table 2.2-1 LTD Transit Fares (2011)

FARES	Cash	Day Pass	Monthly Bus Pass	3-Month Bus Pass
Adult 19-64	$1.50	$3.00	$48.00	$130
Youth 6-18	75¢	$1.50	$24.00	$65
EZ Access (disabled)	75¢	$1.50	$24.00	$65
Children (5 &under)	FREE			
Honor Rider 65+	FREE			

Source: Lane Transit District. 2011.

Average fares within each transportation analysis zone were calculated for input to the model, based on the above listed values and percentages of patrons within each fare category and trip purpose. The percentages of patrons in each fare category by trip purpose were calculated based on the systemwide on-board survey completed in October 2011. Those patrons who receive employer paid or student passes see zero fare cost, and thus, the average fare in those zones was lowered. Fares input to the model are expressed in 1995 dollars in order to maintain consistency with the structure of the model. Transit fares in the model keep pace with inflation, based on LTD's fare policy.

- Parking Cost – varies by trip purpose and analysis zone.

The parking charge used as an input to auto cost varies by work and non-work trip purposes and by analysis zone:

- Home-based work (HBW), home-based college (HBcol), home-based school (HBsch), and Non-home based Work (NHW) use long-term parking cost.
- Home-Based Other (HBO), Home-base shopping (HBShop), and Non-home based Non-work (NHNW) use short-term parking cost.

2.3 Assignment Parameters

LCOG uses the EMME transportation planning software package for auto and transit assignments. The analyst has several parameters in the software to ensure that transit path choice matches up with how people use the current transit system. The parameters that are used reflect how a transit user perceives time for their path choice and include headways, wait times, walk times, boarding times and in-vehicle times. Below is a description of these parameters and the way they are set for the purposes of this model:

- Headway: Actual headways for each transit route are used. In the setup of the transit assignment these headways are capped at a maximum value of 60 minutes. This is done to reflect that people will generally plan their arrival to a longer headway route so as not to have to wait the full headway for routes that operate less frequently.
- Wait Time Factor: this factor is applied to the transit line headway to further reflect how people time arrival for their transit service. A value of 1 would indicate that people don't time their trip at all and see the full headway, where a value lower than 1 indicates that people time their arrival to transit service at some level. A factor of 0.50 is used at all transit stop locations meaning that one would see half the headway for transit routes in the system rather than the full headway again, reflecting that people generally time their arrival to transit.
- Wait Time Weight: this parameter is the coefficient applied to the wait time in order to quantify wait time with respect to in-vehicle time. A value of .5, which is a composite of an actual weight of 2 and a factor of .25, is used in the transit assignments for current application of the LCOG model.
- Auxiliary Time Weight: this parameter is the coefficient applied to the walk time to the transit line. A value of 1 is used for LCOG applications meaning that if it takes 5 minutes for someone to walk from their starting location to the transit system they would see a full 5 minutes in their travel time.
- Boarding penalty: a boarding penalty is used in the transit assignment to reflect that there is some value placed on boarding a transit vehicle. As one can imagine, this value, or penalty, goes up if one needs to transfer. A value of 3 minute is used for all transit stop locations in the LCOG model. Previous versions of the model used different, lower, values at transit centers but in the process of comparing travel patterns and boardings to onboard survey results and APC data it was determined that there were too many transfers happening in the system and this value was adjusted to be consistent throughout the system at a value of 3. This actual value does not get carried into the model but the number of transit boardings based on the assignment of trips for each O-D pair does get saved and input to the model. A value of 1 would mean that a person did not transfer where a value of 3 would mean they transferred twice after their initial boarding. A weight of 1 is used for LCOG applications.
- In-Vehicle Time Weight: this parameter is the coefficient applied to the in-vehicle time. By default, this value is 1.0.

The above parameters were derived during the model calibration process and direct the software to yield paths that are as precise and as realistic as possible without causing excessive transfers and without completely discounting the importance of capturing wait time elements.

3. Application of Travel Demand Model

3.1 Level 1 Screening

As previously noted the Level 1 Screening process is a high level evaluation based on existing studies and readily available data. Recently, the Lane Council of Governments (LCOG) completed forecasts for a base year (2011) and a 2035 forecast year in support of the Eugene and Springfield Transportation Systems Plans (TSPs). Region-wide land use and transportation system inputs were updated in support of this work and as such it was a logical project to pull information from in support of the Level 1 Screening analysis. Specifically regional model data including person trip, auto trip, and transit trip productions and attractions as well as transit mode share information were used to assess the transit market potential of each corridor. The Eugene and Springfield TSP modeling included a Base Year (2011) and a Future Year (2035) forecasts. The Base Year reflects all routes and frequencies that were in operation during the spring of 2011. The Future Year network is built off of the 2011 Base with any service adjustments that were made through fall of 2014 as well as planned changes to the transit system, including new BRT and Bus Plus service and adjustments in other routes to support these improvements in the system.

For future year corridors where BRT is included, the routes have been coded in a very generic way to reflect improvements throughout those corridors related to improvement in service that would be seen with BRT. Because specific station locations and intersection/travel time improvements have not been specifically defined through detailed analysis of these corridors yet, BRT service improvements have been reflected through the use of a separate travel time function that operates slightly faster than a bus would throughout the corridor (representing a 5% faster travel time for BRT over bus). In addition to the travel time savings, BRT is treated as a premium mode in the mode choice model. Similar to BRT, Enhanced routes are coded with a separate travel time function that is the same as BRT. Unlike BRT routes, Enhanced routes are not treated as a premium mode in the mode choice model.

The model uses AM peak and Off-Peak (midday) frequencies to represent the transit service in the mode choice model. Final assignments are completed at a peak (AM or PM) or daily level depending on the needs of a particular project. Corridors prioritized for capital improvements programming will be advanced to the Level 2 Alternatives Analysis (AA) for concept development and evaluation. There will be a follow up description of specifics related to the transit networks and methods as they are defined for the Level 2 AA at such a time as they are developed and to the extent that they differ from those defined above for Level 1.

3.2 Level 2 Alternatives Analysis

For the Level 2 Alternatives Analysis (AA) LTD will prepare new ridership forecasts and related evaluation measures using the LCOG regional model. Base Year and Future Year forecasts will be prepared for advancing corridor alternatives based upon updated inputs and transit networks specific to each corridor. Details will be provided upon selection of the advancing corridors. The findings from the AA will aid LTD and its partner agencies in determining how corridors should be prioritized for capital investments over the next five years. Selected corridors will be advanced to NEPA evaluation.