MovingAhead

STREETS AND PLACES REIMAGINED

DRAFT FINAL Capital Cost Estimating Technical Report

Lane Transit District
City of Eugene

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

July 7, 2017

DRAFT FINAL Capital Cost Estimating Technical Report

MovingAhead Project

Prepared in accordance with the
National Environmental Policy Act of 1969, as amended 42 U.S.C. 4322
and the
Federal Transit Act of 1964, as amended 49 U.S.C. 1601 et seq.

July 7, 2017

Prepared for
Federal Transit Administration
Lane Transit District
City of Eugene

Prepared by
CH2M HILL, Inc.

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Acronyms, Abbreviations, and Terms

Acronyms and Abbreviations	Definitions
AA	Alternatives Analysis
ADA	Americans with Disabilities Act
BAT	business access and transit
BRT	bus rapid transit
Draft Eugene 2035 TSP	*DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016)
EA	each
EmX	Emerald Express
ft^2	square foot (feet)
FTA	Federal Transit Administration
FTN	Frequent Transit Network
I-5	Interstate 5
LCC	Lane Community College
LCOG	Lane Council of Governments
lf	linear foot (feet)
LTD	Lane Transit District
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321-4347
ODOT	Oregon Department of Transportation
qty	quantity
ROW	right of way
RRFB	Rectangular Rapid Flash Beacon
RTP	*Central Lane Metropolitan Planning Organization Regional Transportation Plan* (LCOG, 2007 and 2011, December)
SCC	*Standardized Cost Categories for Small Starts Capital Projects, SCC Workbook* (FTA, 2016, May)
SCC 10	Guideway and Track Elements SCC line item
SCC 20	Stations / Transit Stops SCC line item
SCC 30	Support Facilities SCC line item
SCC 40	Sitework SCC line item
SCC 50	Systems SCC line item
SCC 60	ROW SCC line item
SCC 70	Vehicles SCC line item
SCC 80	Professional Services SCC line item
SCC 90	Contingencies SCC line item

Acronyms and Abbreviations	Definitions
TSP	Transportation System Plan
WEEE	West Eugene EmX Extension
yd^2	square yard (yards)
yd^3	cubic yard(s)

Terms	Definitions
Alternatives Analysis	The process of evaluating the costs, benefits and impacts of a range of transportation alternatives designed to address mobility problems and other locally-defined objectives in a defined transportation corridor, and for determining which particular investment strategy should be advanced for more focused study and development. The Alternatives Analysis process provides a foundation for effective decision making.
Area of Potential Impact	Alternative specific corridor plus a 0.125-mile buffer area on either side of the corridor alternative centerline.
Boarding 4	Boarding is a term used in transit to account for passengers of public transit systems. One person getting on a transit vehicle equals one boarding. In many cases individuals will have to transfer to an additional transit vehicle to reach their destination and may well use transit for the return trip. Therefore, a single rider may account for several transit boardings in one day.
Bus Rapid Transit	A transit mode that combines the quality of rail transit and the flexibility of buses. It can operate on bus lanes, high occupancy vehicle lanes, expressways, or ordinary streets. The vehicles are designed to allow rapid passenger loading and unloading, with more doors than ordinary buses.
Business Access and Transit Lane	In general, a Business Access and Transit (BAT) lane is a concrete lane, separated from general-purpose lanes by a paint stripe and signage. A BAT lane provides bus rapid transit (BRT) priority operations, but general-purpose traffic is allowed to travel within the lane to make a turn into or out of a driveway or at an intersecting street. However, only the BRT vehicle is allowed to use the lane to cross an intersecting street.
Busway	Exclusive freeway lane for buses and carpools.
Capital Improvements Program	A Capital Improvement Plan or Program (CIP) is a short-range plan, usually four to 10 years, which identifies capital projects and equipment purchases, provides a planning schedule and identifies options for funding projects in the program.
Categorical Exclusion	A Categorical Exclusion (CE) means a category of actions which do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required.

Terms	Definitions
Corridor	A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways and transit route alignments.
Documented Categorical Exclusion	A Documented Categorical Exclusion (DCE) means a group of actions that may also qualify as CEs if it can be demonstrated that the context in which the action is taken warrants a CE exclusion; i.e., that no significant environmental impact will occur. Thus, these actions are referred to as Documented Categorical Exclusions. Such actions require some National Environmental Policy Act documentation, but not an Environmental Assessment or a full-scale Environmental Impact Statement. DCEs documentation must demonstrate that in the context(s) in which these actions are to be performed, they will have no significant environmental impact or that such impacts will be mitigated.
Effects	Effects include ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. Effects include: (1) direct effects that are caused by the action and occur at the same time and place, and (2) indirect effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use; population density or growth rate; and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8).
EmX	Lane Transit District's Bus Rapid Transit System, pronounced "MX", short for Emerald Express.
Environmental Justice	A formal federal policy on environmental justice was established in February 1994, with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." There are three fundamental environmental justice principles: To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.
Envision Eugene	The City of Eugene's Comprehensive Plan (latest draft or as adopted). Envision Eugene includes a determination of the best way to accommodate the community's projected needs over the next 20 years.

Terms	Definitions
Evaluation Criteria	Evaluation criteria are the factors used to determine how well each of the proposed multimodal alternatives would meet the project's Goals and Objectives. The Evaluation Criteria require a mix of quantitative data and qualitative assessment. The resulting data are used to measure the effectiveness of proposed multimodal alternatives and to assist in comparing and contrasting each of the alternatives to select a preferred alternative.
Fatal Flaw Screening	The purpose of a Fatal Flaw Screening is to identify alternatives that will not work for one reason or another (e.g., environmental, economic, community) By using a Fatal Flaw Screening process to eliminate alternatives that are not likely to be viable, a project can avoid wasting time or money studying options that are not viable and focus on alternatives and solutions that have the greatest probably of meeting the community's needs (e.g., environmentally acceptable, economically efficient, implementable).
Fixed Route	Service provided on a repetitive, fixed-schedule basis along a specific route with vehicles stopping to pick up and deliver passengers at set stops and stations; each fixed-route trip serves the same origins and destinations, unlike demand responsive and taxicabs.
Goals and Objectives	Goals and objectives define the project's desired outcome and reflect community values. Goals and objectives build from the project's Purpose and Need Statement. Goals are overarching principles that guide decision making. Goals are broad statements. Objectives define strategies or implementation steps to attain the goals. Unlike goals, objectives are specific and measurable.
Guideway	A transit right of way separated from general purpose vehicles.
Headway	Time interval between vehicles passing the same point while moving in the same direction on a particular route.
Impacts	A term to describe the positive or negative effects upon the natural or built environments as a result of an action (i.e., project).
Key Transit Corridors	Key Transit Corridors are mapped in Envision Eugene and are anticipated to be significant transit corridors for the City and the region
Level of Detail	The amount of data collected, and the scale, scope, extent, and degree to which item-by-item particulars and refinements of specific points are necessary or desirable in carrying out a study.
Level of Service	Level of service is a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure. Level of service is most commonly used to analyze highways, but the concept has also been applied to intersections, transit, and water supply.
Maintenance Facility	A facility along a corridor used to clean, inspect, repair and maintain bus vehicles, as well as to store them when they are not in use.

Terms	Definitions
Metropolitan Planning Organization	The organization designated by local elected officials as being responsible for carrying out the urban transportation and other planning processes for an area.
Mitigation	A means to avoid, minimize, rectify, or reduce an impact, and in some cases, to compensate for an impact.
Mode	A particular form or method of travel distinguished by vehicle type, operation technology and right of way separation from other traffic.
MovingAhead Project	The City of Eugene and LTD are working with regional partners and the community to determine which improvements are needed on some of our most important transportation corridors for people using transit, and facilities for people walking and biking. MovingAhead will prioritize transit, walking and biking projects along these corridors so that they can be funded and built in the near-term. The project will focus on creating active, vibrant places that serve the community and accommodate future growth. During Phase 1, currently underway, the community will weigh in on preferred transportation solutions for each corridor and help prioritize corridors for implementation. When thinking about these important streets, LTD and the City of Eugene refer to them as corridors because several streets may work as a system to serve transportation needs.
Multimodal	Multimodal refers to various modes. For the MovingAhead project, multimodal refers to Corridors that support various transportation modes including vehicles, buses, walking and cycling.
National Environmental Policy Act of 1969 (NEPA)	A comprehensive federal law requiring analysis of the environmental impacts of federal actions such as the approval of grants; also requiring preparation of an Environmental Impact Statement for every major federal action significantly affecting the quality of the human environment.
No Action or No-Build Alternative	An alternative that is used as the basis to measure the impacts and benefits of the other alternative(s) in an environmental assessment or other National Environmental Policy Act (NEPA) action. The No-Build alternative consists of the existing conditions, plus any improvements which have been identified in the Statewide Transportation Improvement Program.
Off-Peak Period	Non-rush periods of the day when travel activity is generally lower and less transit service is scheduled. Also called “base period.”
Park and Ride	Designated parking areas for automobile drivers who then board transit vehicles from these locations.
Peak Hour	The hour of the day in which the maximum demand for transportation service is experienced (refers to private automobiles and transit vehicles).
Peak Period	Morning and afternoon time periods when transit riding is heaviest.

Terms	Definitions
Preferred Alternative	An alternative that includes a major capital improvement project to address the problem under investigation. As part of the decision making process, the Preferred Alternative is compared against the No Action or No-Build Alternative from the standpoints of transportation performance, environmental consequences, cost-effectiveness, and funding considerations.
Purpose and Need	The project Purpose and Need provides a framework for developing and screening alternatives. The purpose is a broad statement of the project's transportation objectives. The need is a detailed explanation of existing conditions that need to be changed or problems that need to be fixed.
Ridership	The number of rides taken by people using a public transportation system in a given time period.
Right of Way	Publicly owned land that can be acquired and used for transportation purposes.
Study Area	The area within which evaluation of impacts is conducted. The study area for particular resources will vary based on the decisions being made and the type of resource(s) being evaluated.
Transitway	A BRT priority lane generally with a concrete lane, with or without concrete tracks with grass-strip divider, and a curb separation, traversable by general-purpose vehicles at signalized intersections.
Water Quality	Refers to the characteristics of the water, such as its temperature and oxygen levels, how clear it is, and whether it contains pollutants.

Capital Cost Estimating Summary

This Capital Cost Estimating Report presents results of the capital cost assessment for the Lane Transit District (LTD) and City of Eugene's MovingAhead Project in Eugene, Oregon. The purpose of the MovingAhead Project is to determine which high-capacity transit corridors identified in the adopted *Emerald Express (EmX) System Plan*, *Lane Transit District Long-Range Transit Plan* (LTD, 2014a) and the Frequent Transit Network are ready to advance to capital improvements programming in the near term. LTD and the City of Eugene initiated the MovingAhead Project in 2014 to identify and examine alternatives for improving multimodal safety, mobility, and accessibility in key transit corridors in the City. A main theme of the City's vision is to concentrate new growth along and near the key transit corridors and within core commercial areas while protecting neighborhoods and increasing access to services for everyone. LTD and the City of Eugene are jointly conducting the project to facilitate a more streamlined and cost-efficient process through concurrent planning, environmental review, and design and construction of multiple corridors.

LTD and the City of Eugene examined multimodal transit alternatives in five key transit corridors identified in the Draft *Envision Eugene Comprehensive Plan* (Envision Eugene, 2016) and the *DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016; Draft Eugene 2035 TSP), the region's highest growth centers, and downtown Eugene:

- Highway 99 Corridor
- River Road Corridor
- 30th Avenue to Lane Community College (LCC) Corridor
- Coburg Road Corridor
- Martin Luther King, Jr. Boulevard Corridor

No-Build, Enhanced Corridor, and EmX Alternatives were developed for each corridor, except the Martin Luther King, Jr. Boulevard Corridor, for which only No-Build and Enhanced Corridor Alternatives were developed. Figure S.1-1 shows the proposed corridors for the Enhanced Corridor Alternatives and Figure S.1-2 shows the proposed corridors for the EmX Alternatives.

The following items summarize the project alternatives evaluated, with details descriptions in the *MovingAhead Level 2 Definition of Alternatives* (CH2M et al., 2016):

- The **No-Build Alternatives** serve as reference points to gauge the benefits, costs, and effects of the Enhanced Corridor and EmX Alternatives in each corridor. Each No-Build Alternative is based on projected conditions in 2035. Capital projects are derived from the financially constrained project lists in the Draft Eugene 2035 TSP, *Lane County Transportation System Plan* (Lane County Public Works, 2004), *Lane Transit District Capital Improvement Plan* (LTD, 2015), and *Lane Transit District Long-Range Transit Plan* (LTD, 2014b).
- **Enhanced Corridor Alternatives** are intended to address the project's Purpose, Need, Goals, and Objectives without major transit capital investments, instead focusing on lower-cost capital improvements, operational improvements, and transit service refinements, including 15-minute service frequency. Features can include transit queue jumps (lanes for buses that allow the bus to "jump" ahead of other traffic at intersections using a separate signal phase), stop consolidation, and enhanced shelters. These features can improve reliability, reduce transit travel time, and increase passenger comfort, making transit service along the corridor more attractive.

Figure S.1-1. Enhanced Corridor Alternatives Overview

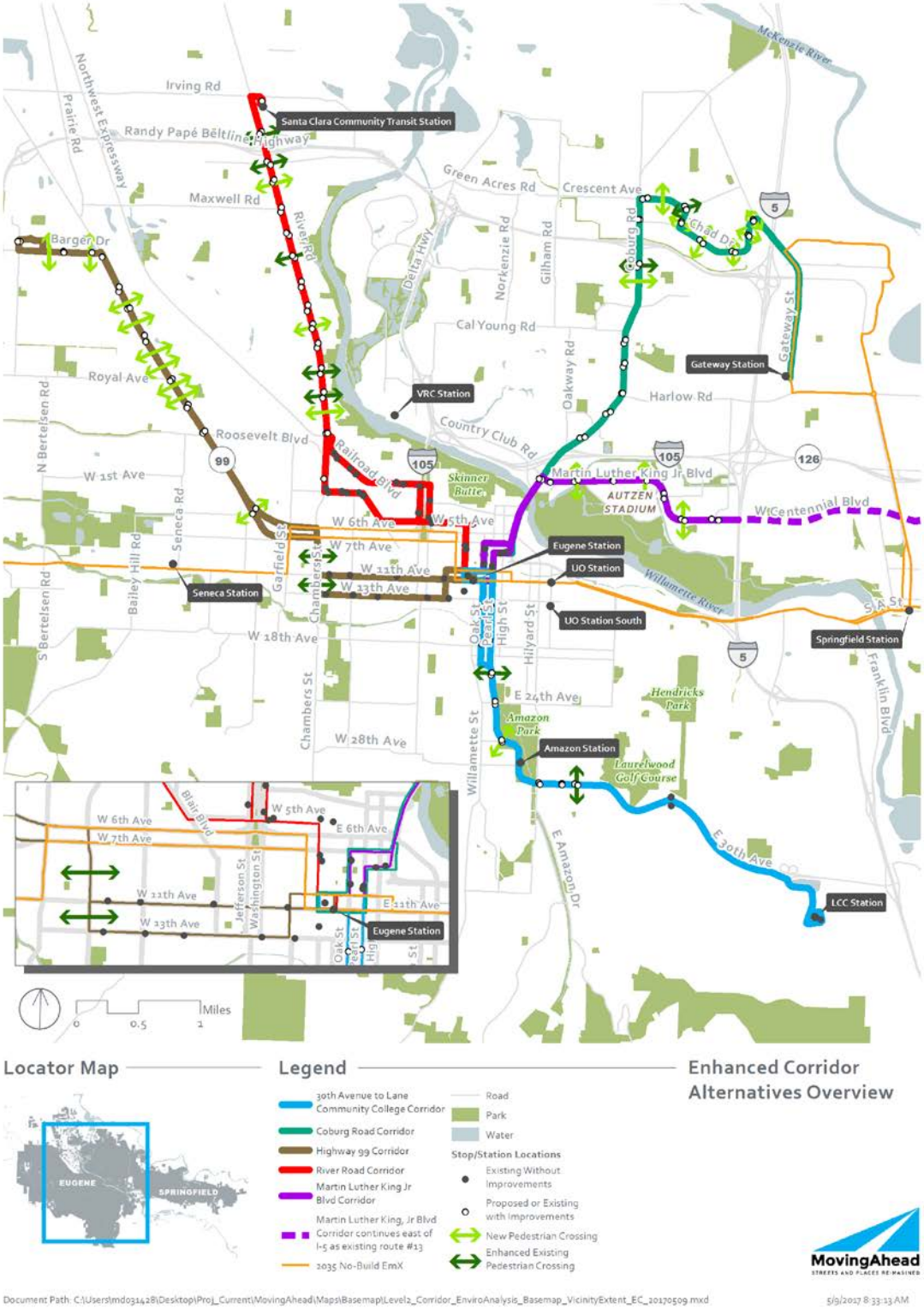
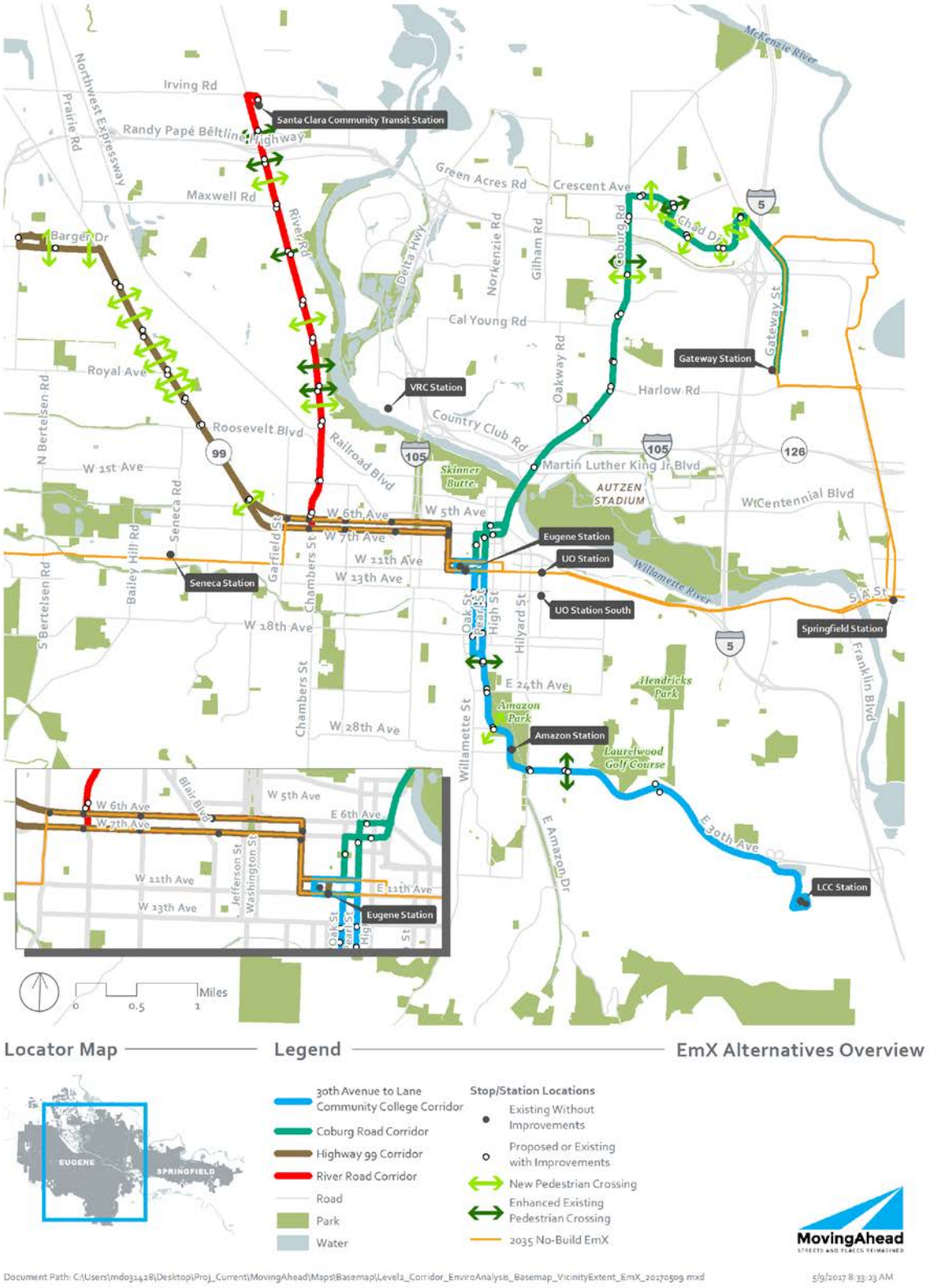


Figure S.1-2. EmX Alternatives Overview



- **EmX Alternatives** are characterized by sections of exclusive guideway, branded multi-door 60-foot-long bus rapid transit (BRT) vehicles, and enhanced stations with level boarding platforms instead of bus stops; off-board fare collection; transit signal priority; wider stop spacing; and 10-minute service frequencies. In general, EmX is a transit mode positioned between fixed-route bus service operating in mixed traffic and urban rail service operating in a separate right of way. EmX service is intended to improve transit speed, reliability, and ridership.

Figure S.1-1 shows the proposed corridors for the Enhanced Corridor Alternatives and Figure S.1-2 shows the proposed corridors for the EmX Alternatives.

This technical report provides the results of the Capital Cost Estimating analysis and enumerates the methods and data used to arrive at overall corridor costs at this level of design. This report was prepared in compliance with the National Environmental Policy Act (NEPA) and applicable state environmental policy legislation, as well as local and state planning and land use policies and design standards.

S.1. Affected Environment

The MovingAhead Project's five corridors are primarily located within the City of Eugene, with a portion of the River Road and 30th Avenue to LCC Corridors located within unincorporated Lane County, and a portion of the Coburg Road Corridor located in the City of Springfield.

The MovingAhead Project encompasses five corridors in the City of Eugene. The area of potential impact encompasses proposed construction within the construction footprint of the build alternatives within each corridor. It also includes the proposed expansion of an existing maintenance facility owned by LTD to accommodate its expanded fleet as a result of potential construction of multiple corridors.

S.2. Results by Corridor Alternative

Table S.2-1 summarizes the potential cost of each corridor by alternative. Sections 3 and 4 describe the estimation method used to arrive at these costs and summarize the differences in cost between each alternative, respectively. Appendix C contains detailed summaries of the unit costs compiled to arrive at each overall corridor cost.

The cost column of Table S.2-1 summarizes the overall cost of constructing a given corridor alternative. The cost/mile column summarizes the cost per mile of corridor to construct a given corridor alternative. The mileage of the corridor used to calculate the cost per mile is the overall physical length of the corridor and does not correspond to the round-trip distance either bus or EmX service would travel on a corridor. Some of the corridors, particularly Enhanced Corridor alternatives, propose little to no construction for large portions of the overall corridor, thus reducing their overall cost per mile as compared to alternatives with a large amount of construction proposed. Lengthier corridors may also see a reduced cost per mile of construction compared to shorter corridors. This metric is therefore best used as a tool of comparison between alternatives in a given corridor to gauge the relative level of investment required to construct the proposed improvements.

Table S.2-1. Capital Cost Summary

Corridor and Alternative	Cost (2016 Dollars)	Cost/Mile
Highway 99		
Enhanced Corridor Alternative	$38,000,000	$5,000,000
EmX Alternative	$67,000,000	$9,000,000
River Road		
Enhanced Corridor Alternative	$24,000,000	$4,000,000
EmX Alternative	$78,000,000	$12,000,000
30th Avenue to Lane Community College		
Enhanced Corridor Alternative	$21,000,000	$4,000,000
EmX Alternative	$53,000,000	$9,000,000
Coburg Road		
Enhanced Corridor Alternative	$41,000,000	$7,000,000
EmX Alternative	$113,000,000	$19,000,000
Martin Luther King, Jr. Boulevard		
Enhanced Corridor Alternative	$21,000,000	$6,000,000

Source: CH2M. (2016a).

Note:

The above cost estimate is in 2016 dollars to facilitate comparative evaluation of concepts. The cost does not include financing costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. The final project costs will vary from the estimate presented above. Because of these factors, cost refinement will be necessary during a later phase of the project(s) prior to establishing final project budgets or financing arrangements.

Table S.2-2 compares the estimated costs of Enhanced Corridor Alternatives by corridor to construct pedestrian and bicycle improvements. Table S.2-3 compares the estimated costs of EmX Alternatives by corridor to construct pedestrian and bicycle improvements.

Table S.2-2. Comparison of Estimated Costs to Construct Pedestrian and Bicycle Improvements, Enhanced Corridor Alternatives

Corridor	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost
Highway 99	$3,975,250	$13,234,750	30%
River Road	$807,000	$7,592,205	11%
30th Avenue to Lane Community College	$623,000	$7,783,800	8%
Coburg Road	$1,464,000	$14,260,232	10%
Martin Luther King, Jr. Boulevard	$526,000	$10,405,106	5%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

Table S.2-3. Comparison of Estimated Costs to Construct Pedestrian and Bicycle Improvements, EmX Alternatives

Corridor	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost
Highway 99	$4,145,500	$21,213,637	20%
River Road	$1,285,556	$24,604,308	5%
30th Avenue to Lane Community College	$1,165,000	$17,910,554	7%
Coburg Road	$1,963,000	$34,356,404	6%
Martin Luther King, Jr. Boulevard	N/A	N/A	N/A

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

S.3. Systemwide Cumulative Costs

The LTD existing maintenance facility can accommodate the projected bus and BRT vehicles anticipated under the No-Build Alternative with surplus capacity for 5 additional 60-foot buses or BRT vehicles. If any combination of Enhanced Corridor and EmX Alternatives advanced to construction requires acquisition of six or more BRT vehicles, the existing maintenance facility would require expansion to accommodate its fleet. LTD would add two maintenance bays, each capable of accommodating a 60-foot articulated bus or BRT vehicle. The cost of this expansion is estimated to be $2.5 million in 2016 dollars (Luftig, Sasha, and Joe McCormack, 2016, October 17 [Personal communication]). This cost is based on the cost of the LTD 2004 fleet expansion project in which four existing bays were extended to serve 60-foot articulated buses. LTD staff converted the overall construction cost to a square foot cost and escalated the cost to 2020 dollars. LTD staff added appropriate design, construction, permitting, administration, and contingency costs to arrive at the estimated value. The estimator de-escalated from 2020 dollars to 2016 dollars to match the rest of the estimated costs in this report. Table S.3-1 summarizes the total cost of expanding the maintenance facility in 2016 dollars.

Table S.3-1. Maintenance Facility Expansion Project Cost (2016 dollars)

Cost Component	Cost
Design	$310,000
Construction	$1,462,000
LTD Costs	$90,000
Permits	$90,000
Staff Time	$90,000
Contingency	$450,000
Total (rounded up):	**$2,500,000**

Source: Luftig, Sasha, and Joe McCormack. (2016, October 17) [Personal communication].

This cost was considered separate from any corridor alternative evaluated in this analysis because cumulative construction of multiple corridors exceeding the capacity of the existing facility would add this cost to the overall program. This cost does not contribute significantly to the overall cost of any single corridor because the EmX Alternatives cost in this analysis range from $60 million to $110 million, depending on the corridor. The resulting increase in the cost to construct a given EmX Alternative would range from 2 to 4 percent, which is within the unallocated contingency assumptions of any single alternative.

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1. Introduction

1.1. MovingAhead Technical Reports

A total of 20 technical reports have been prepared for the MovingAhead Project. The technical reports have been prepared to support the selection of preferred alternatives for the MovingAhead Project and subsequent environmental documentation. The technical reports assume 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 the technical evaluation but might not be fully covered by the technical evaluation.

Technical reports have been prepared for the following disciplines:

- Acquisitions and Displacements
- Air Quality
- Capital Cost Estimating
- Community Involvement, Agency and Tribal Coordination
- Community, Neighborhood, and Environmental Justice
- Cultural Resources
- Ecosystems (Biological, Fish Ecology, Threatened and Endangered Species, Wetlands and Waters of the U.S. and State)
- Energy and Sustainability
- Geology and Seismic
- Hazardous Materials
- Land Use and Prime Farmlands
- Noise and Vibration
- Operating and Maintenance Costs
- Parklands, Recreation Areas, and Section 6(f)
- Section 4(f)
- Street and Landscape Trees
- Transportation
- Utilities
- Visual and Aesthetic Resources
- Water Quality, Floodplain, and Hydrology

In general, each technical report includes the following information for identifying effects:

- Relevant laws and regulations
- Contacts and coordination
- Summary of data sources and analysis methods described in the *MovingAhead Environmental Disciplines Methods and Data Report* (CH2M HILL, Inc. [CH2M] et al., 2015)
- Affected environment
- Adverse and beneficial effects including short-term, direct, indirect and cumulative
- Mitigation measures
- Permits and approvals
- References

1.2. Capital Cost Estimating Technical Report and Purpose

This technical report presents the results of the capital cost estimation assessment for the MovingAhead corridor build alternatives. The cost of constructing improvements for each corridor alternative affects the capability of an agency and its partners to fund and construct a given design in a feasible timeframe. Cost therefore is considered during the selection of corridor preferred alternatives.

1.3. Discipline Experts

Discipline experts who contributed to the preparation of this report are identified in Table 1.3-1 including their area of expertise, affiliated organization, title and years of experience.

Table 1.3-1. Discipline Experts

Discipline	Technical Expert	Affiliated Organization	Title / Years of Experience
Capital Cost Estimating	Adrianna Stanley	CH2M	Engineer / 8 years
Editors	Scott Richman	CH2M	Senior Project Manager / 20 years
	Ryan Farncomb	CH2M	Senior Transportation Planner / 7 years
	Lynda Wannamaker	Wannamaker Consulting	President / 33 years
	Joe McCormack	LTD	Facilities Director / 17 years
	Sasha Luftig	LTD	Development Project Manager / 9 years

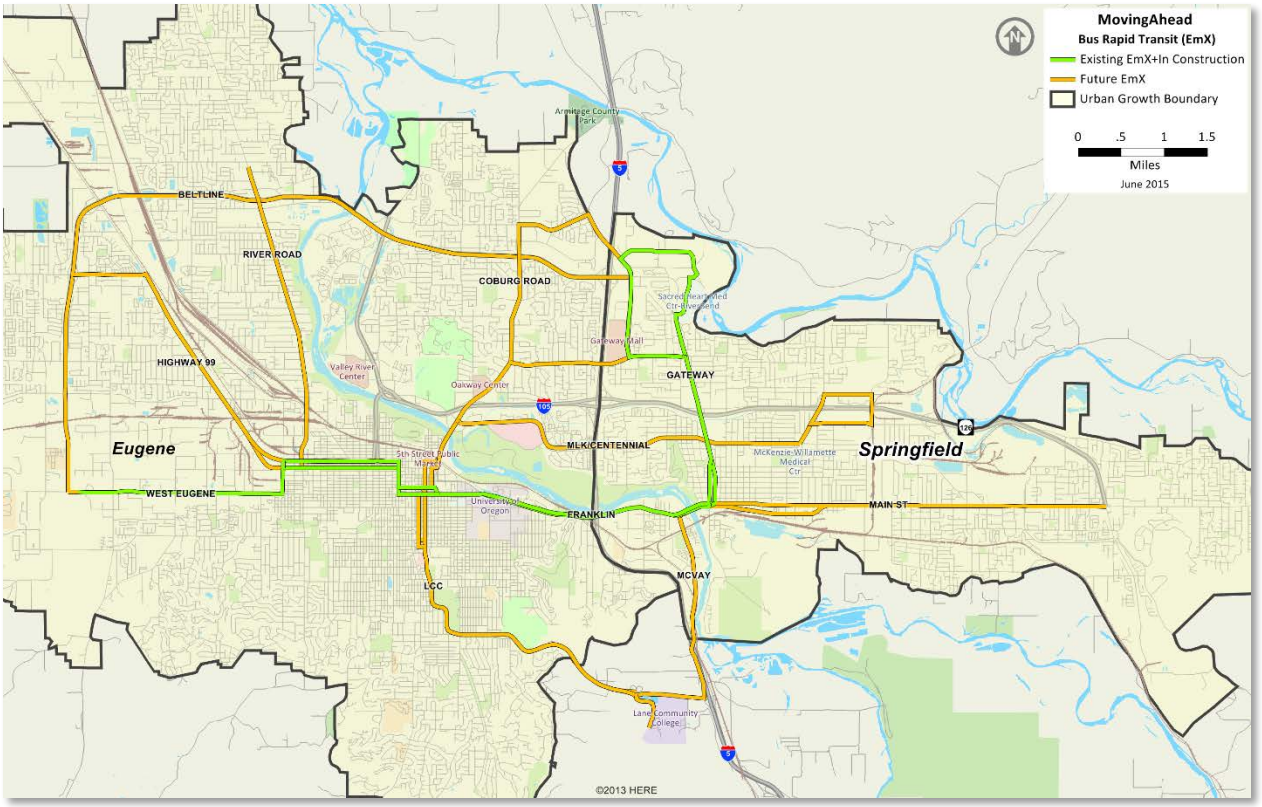
Source: MovingAhead Project Team. (2017).

1.4. Study Background

The purpose of the MovingAhead Project is to determine which high-capacity transit corridors identified in the adopted *Central Lane Metropolitan Planning Organization Regional Transportation Plan* (Lane Council of Governments [LCOG], 2011, December; RTP) and the *Lane Transit District Long Range Transit Plan* (Lane Transit District [LTD], 2014b) as part of the Frequent Transit Network (FTN) are ready to advance to capital improvements programming in the near term. The study is being conducted jointly with the City of Eugene and LTD to facilitate a streamlined and cost-efficient process through concurrent planning, environmental review, and design and construction of multiple corridors. The study area includes Eugene and portions of unincorporated Lane County.

The *Lane Transit District Long-Range Transit Plan* (LTD, 2014b) identifies the full Martin Luther King, Jr. Boulevard / Centennial Boulevard Corridor as a future part of the FTN. Initially, MovingAhead considered options on Centennial Boulevard to serve Springfield as part of this corridor. Because Springfield does not have the resources available to consider transit enhancements on Centennial Boulevard at this time, MovingAhead will only develop Emerald Express (EmX) and Enhanced Corridor Alternatives within Eugene. Figure 1.4-1 presents LTD's existing and future bus rapid transit (BRT) system.

Figure 1.4-1. Lane Transit District's Bus Rapid Transit (BRT) System



Source: LTD. (2015, Amended 2015, June).

1.5. Screening and Evaluation of Multimodal Options

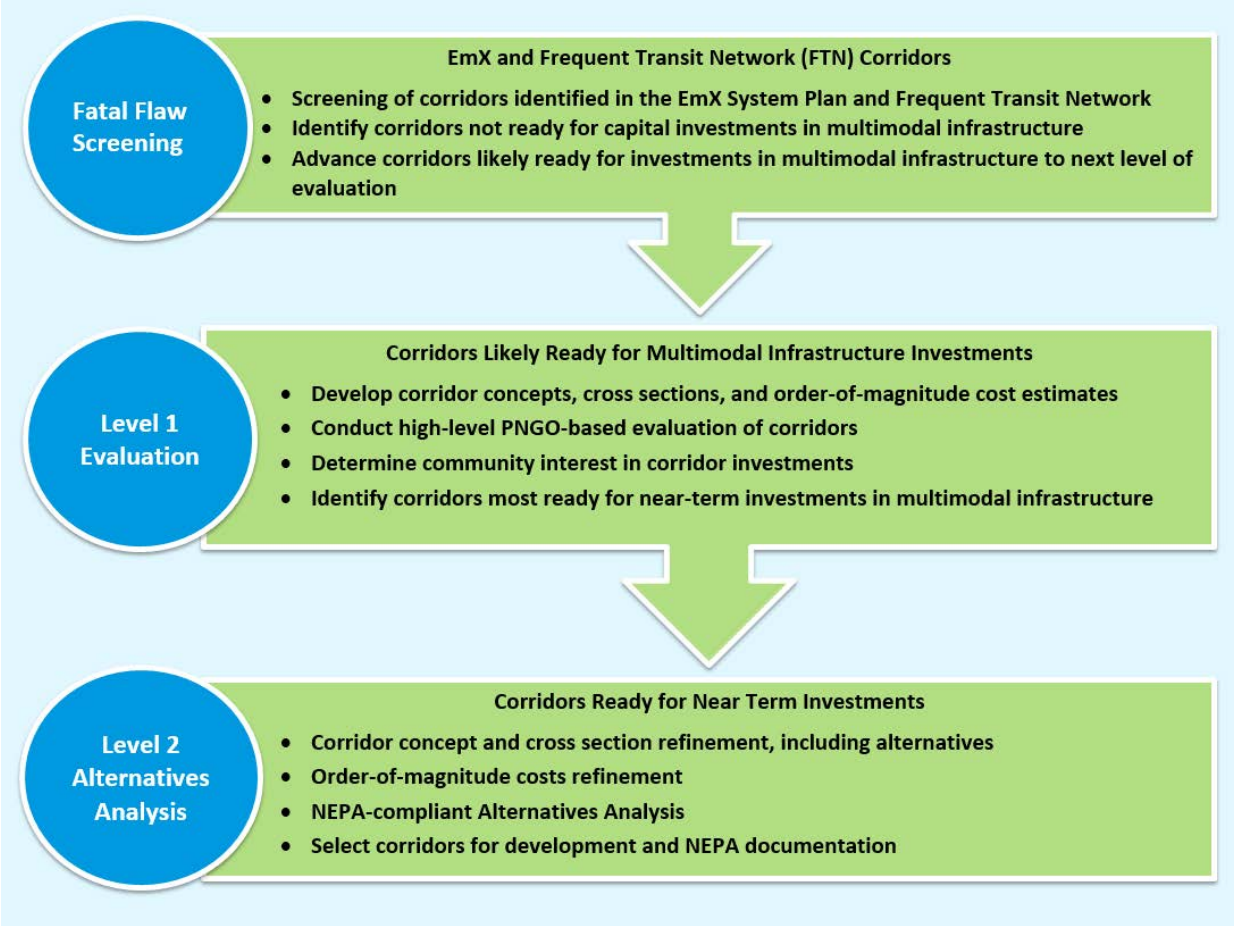
The MovingAhead Project process includes two phases. This first phase has three discrete but closely related tasks: identifying transit improvements; identifying improvements for bicyclists, pedestrians, and users of mobility devices; and preparing a NEPA-compliant evaluation of alternatives focused on the region's transportation system. Corridor options identified as part of the first phase were developed using multimodal cross sections that include variations on automobile, truck, and bus travel lanes; bicycle lanes; landscaping strips; and sidewalks. At the end of the first phase, the City of Eugene and LTD will select the corridors that are most ready for near-term capital improvements and prioritize improvements for funding. The selected corridors will be advanced to the second phase, which will focus on preparing NEPA environmental reviews (Documented Categorical Exclusions), and initiating the Federal Transit Administration (FTA) project development process.

1.5.1. Fatal Flaw Screening

The project team conducted a fatal flaw screening in February 2015 to identify which of the 10 corridors should not move forward to the Level 1 Screening Evaluation (Figure 1.5-1). This high-level evaluation used criteria based on MovingAhead's Purpose, Need, Goals, and Objectives (LTD, 2015, Amended 2015, June) and existing data to determine which corridors were not ready for capital investment in BRT or multimodal infrastructure in the next 10 years. The screening was conducted with local, regional, and state agency staff. Of the 10 corridors identified, the following three corridors were not advanced from

the fatal flaw screening to the Level 1 Screening Evaluation: 18th Avenue, Bob Straub Parkway, and Randy Papé Beltline Highway. Table 1.5-1 shows the results of the fatal flaw screening.

Figure 1.5-1. MovingAhead Phase 1 Steps



Source: Wannamaker Consulting. (2015).

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

Table 1.5-1. Results of the Fatal Flaw Screening

Corridor	Advanced to Level 1	Consider Later
Highway 99	✓	
River Road	✓	
Randy Papé Beltline		✓
18th Avenue		✓
Coburg Road	✓	
Martin Luther King Jr. Boulevard / Centennial Boulevard	✓	
30th Avenue to Lane Community College	✓	
Main Street-McVay Highway	✓	
Valley River Center	✓	
Bob Straub Parkway		✓

Source: LTD and City of Eugene. (2015).

The six remaining multimodal corridors were advanced to the Level 1 Screening Evaluation to determine how they compared with each other in meeting the Purpose, Need, Goals, and Objectives.

1.5.2. Level 1 Screening Evaluation

The Level 1 Screening Evaluation assessed how each corridor would perform according to the Purpose, Need, Goals, and Objectives of MovingAhead. The Level 1 Screening Evaluation used existing studies and readily available data to evaluate each corridor. Based on community input and technical analysis, the following corridors and alternatives were advanced from the Level 1 Screening Evaluation to the Level 2 Alternatives Analysis (AA) (Table 1.5-2):

- No-Build Alternatives: all corridors
- Enhanced Corridor and EmX Alternatives:
    - Highway 99 Corridor
    - River Road Corridor
    - 30th Avenue to Lane Community College (LCC) Corridor
    - Coburg Road Corridor
- Enhanced Corridor Alternative:
    - Martin Luther King Jr. Boulevard Corridor

The Valley River Center Corridor received the least public support during public outreach and was not carried forward to the Level 2 AA.

Table 1.5-2. Corridors and Transit Alternatives Advanced to the Level 2 Alternatives Analysis

Corridor	No-Build	Enhanced Corridor	EmX
Highway 99	✓	✓	✓
River Road	✓	✓	✓
30th Avenue to Lane Community College	✓	✓	✓
Coburg Road	✓	✓	✓
Martin Luther King, Jr. Boulevard	✓	✓	

Source: CH2M. (2016b).

For a detailed discussion of alternatives and design options considered for each corridor, but not carried forward to the Level 2 AA, please refer to the *Alternatives and Design Options Considered but Eliminated Technical Memorandum* (CH2M, 2016b).

1.5.3. Level 2 Alternatives Analysis

To guide the Level 2 AA, LTD prepared new ridership forecasts and related evaluation measures using the LCOG regional model. Base-year and future-year forecasts were prepared for corridor alternatives based upon updated inputs and transit networks specific to each corridor. The planning horizon year used for the Level 2 AA is 2035. The built and natural environments, transit operations, traffic, finance, historical resources, and other areas were also evaluated as part of the Level 2 AA. The findings from the Level 2 AA will aid LTD and the City of Eugene in determining how corridors should be prioritized for capital investments over the next 5 years. Selected corridors will be advanced to Phase 2.

1.6. Purpose and Need

The prioritization of capital investments in multimodal transit corridors is a powerful tool for implementing local and regional comprehensive land use and transportation plans, agency strategic plans, and other community planning documents. Capital investments in multimodal transit corridors can have a substantial impact on patterns of growth and development. By coordinating the timing of, and prioritizing the funding for, strategic multimodal capital investments, the MovingAhead Project (a multimodal transit corridor study) helps ensure that future development is consistent with our region's plans and vision.

The Purpose and Need Statement was refined based on public and agency input.

1.6.1. Purpose

The purpose of the MovingAhead Project is to:

- Develop a Capital Improvements Program that forecasts and matches projected revenues and capital needs over a 10-year period
    - Balance desired multimodal transit corridor improvements with the community's financial resources
    - Ensure the timely and coordinated construction of multimodal transit corridor infrastructure
    - Eliminate unanticipated, poorly planned, or unnecessary capital expenditures
- Identify the most economical means of financing multimodal transit corridor capital improvements

- Establish partnerships between LTD, City of Eugene, and other local agencies that prioritize multimodal transit infrastructure needs and promote interagency cooperation
- Ensure that multimodal transit corridor investments are consistent with local comprehensive land use and transportation plans

1.6.2. Need

The need for the MovingAhead Project is based on the following factors:

- LTD's and the region's commitment to implementing the region's vision for BRT in the next 20 years consistent with the RTP that provides the best level of transit service in a cost-effective and sustainable manner.
- Need for streamlined environmental reviews to leverage systemwide analysis.
- Need to build public support for implementation of the systemwide vision.
- Selection of the next EmX / FTN corridors is based on long-range operational and financial planning for LTD's service.

1.6.3. Goals and Objectives

Goal 1: Improve multimodal transit corridor service

Objective 1.1: Improve transit travel time and reliability
Objective 1.2: Provide convenient transit connections that minimize the need to transfer
Objective 1.3: Increase transit ridership and mode share in the corridor
Objective 1.4: Improve access for people walking and bicycling, and to transit
Objective 1.5: Improve the safety of pedestrians and bicyclists accessing transit, traveling in and along the corridor, and crossing the corridor

Goal 2: Meet current and future transit demand in a cost-effective and sustainable manner

Objective 2.1: Control the increase in transit operating cost to serve the corridor
Objective 2.2: Increase transit capacity to meet current and projected ridership demand
Objective 2.3: Implement corridor improvements that provide an acceptable return on investment
Objective 2.4: Implement corridor improvements that minimize impacts to the environment and, where possible, enhance the environment
Objective 2.5: Leverage funding opportunities to extend the amount of infrastructure to be constructed for the least amount of dollars

Goal 3: Support economic development, revitalization, and land use redevelopment opportunities for the corridor

Objective 3.1: Support development and redevelopment as planned in other adopted documents
Objective 3.2: Coordinate transit improvements with other planned and programmed pedestrian and bicycle projects
Objective 3.3: Coordinate transit improvements with other planned and programmed roadway projects
Objective 3.4: Minimize adverse impacts to existing businesses and industry
Objective 3.5: Support community vision for high capacity transit in each corridor
Objective 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
Objective 3.7: Improve transit operations in a manner that is mutually beneficial to vehicular traffic flow for emergency service vehicles

1.6.4. Evaluation Criteria

Evaluation criteria will be used during the Trade-off Analysis, which is part of the Level 2 AA, to aid in determining how well each of the corridor alternatives would meet the project's Purpose, Need, Goals, and Objectives. The evaluation criteria require a mix of quantitative data and qualitative assessment. The resulting data will be used to measure the effectiveness of each proposed corridor alternative and to assist in comparing and contrasting the alternatives and options. In Table 1.6-1, evaluation criteria are listed for each of the project's objectives. Some objectives have only one criterion for measuring effectiveness, while others require several criteria.

Table 1.6-1. Evaluation Criteria

Goals and Objectives		Evaluation Criteria
Goal 1: Improve multimodal transit corridor service		
Objective 1.1:	Improve transit travel time and reliability	• Round-trip p.m. peak transit travel time between select origins and destinations • On-time performance (no more than 4 minutes late) of transit service
Objective 1.2:	Provide convenient transit connections that minimizes the need to transfer	• Number of transfers required between heavily used origin-destination pairs
Objective 1.3:	Increase transit ridership and mode share in the corridor	• Average weekday boardings on corridor routes • Transit mode share along the corridor • Population within 0.5 mile of transit stop • Employment within 0.5 mile of transit stop
Objective 1.4:	Improve access for people walking and bicycling, and to transit	• Connectivity to existing pedestrian facilities • Connectivity to existing bicycle facilities
Objective 1.5:	Improve the safety of pedestrians and bicyclists accessing transit, traveling in and along the corridor, and crossing the corridor	• Opportunity to provide a safe and comfortable environment for pedestrians and bicyclists in the corridor
Goal 2: Meet current and future transit demand in a cost-effective and sustainable manner		
Objective 2.1:	Control the increase in transit operating cost to serve the corridor	• Cost per trip • Impact on LTD operating cost • Cost to local taxpayers
Objective 2.2:	Increase transit capacity to meet current and projected ridership demand	• Capacity of transit service relative to the current and projected ridership
Objective 2.3:	Implement corridor improvements that provide an acceptable return on investment	• Benefit / cost assessment of planned improvements
Objective 2.4:	Implement corridor improvements that minimize impacts to the environment and, where possible, enhance the environment	• Results of screening-level assessment of environmental impacts of transit solutions

Table 1.6-1. Evaluation Criteria

Goals and Objectives		Evaluation Criteria
Objective 2.5:	Leverage funding opportunities to extend the amount of infrastructure to be constructed for the least amount of dollars	• Number and dollar amount of funding opportunities that could be leveraged • Meet the FTA's Small Starts funding requirements
Goal 3: Support economic development, revitalization and land use redevelopment opportunities for the corridor		
Objective 3.1:	Support development and redevelopment as planned in other adopted documents	• Consistent with the BRT System Plan and FTN concept • Consistent with the *Regional Transportation System Plan* (Central Lane Metropolitan Planning Organization [MPO], 2007) • Consistent with local comprehensive land use plans
Objective 3.2:	Coordinate transit improvements with other planned and programmed pedestrian and bicycle projects	• Capability of transit improvement to coordinate with other planned and programmed pedestrian and bicycle projects identified in adopted plans and Capital Improvements Programs
Objective 3.3:	Coordinate transit improvements with other planned and programmed roadway projects	• Capability of transit improvement to coordinate with other planned and programmed roadway projects identified in adopted plans and Capital Improvements Programs
Objective 3.4:	Minimize adverse impacts to existing businesses and industry	• Impacts to businesses along the Corridor measured in number and total acres of properties acquired, parking displacements, and access impacts. • Impact on freight and delivery operations for Corridor businesses
Objective 3.5:	Support community vision for high capacity transit in corridor	• Community vision includes high capacity transit in corridor
Objective 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	• Impact on current and future year intersection level of service on state facilities • Impact on current and future year p.m. peak hour auto / truck travel times on state facilities
Objective 3.7:	Improve transit operations in a manner that is mutually beneficial to vehicular traffic flow for emergency service vehicles	• Qualitative assessment of potential impacts to emergency service vehicle traffic flow and access

Source: LTD and City of Eugene. (2015).

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2. Alternatives Considered

This section briefly reviews the major features of the alternatives considered in the Level 2 AA. For full details on each alternative and the five corridors described in this technical report – Highway 99, River Road, 30th Avenue to LCC, Coburg Road, and Martin Luther King, Jr. Boulevard – refer to the *MovingAhead Level 2 Definition of Alternatives* (CH2M et al., 2016). Each corridor location is shown on Figures 2.1-1 and 2.1-2 for the Enhanced Corridor Alternatives and the EmX Alternatives, respectively.

Figure 2.1-1. Enhanced Corridor Alternatives Overview

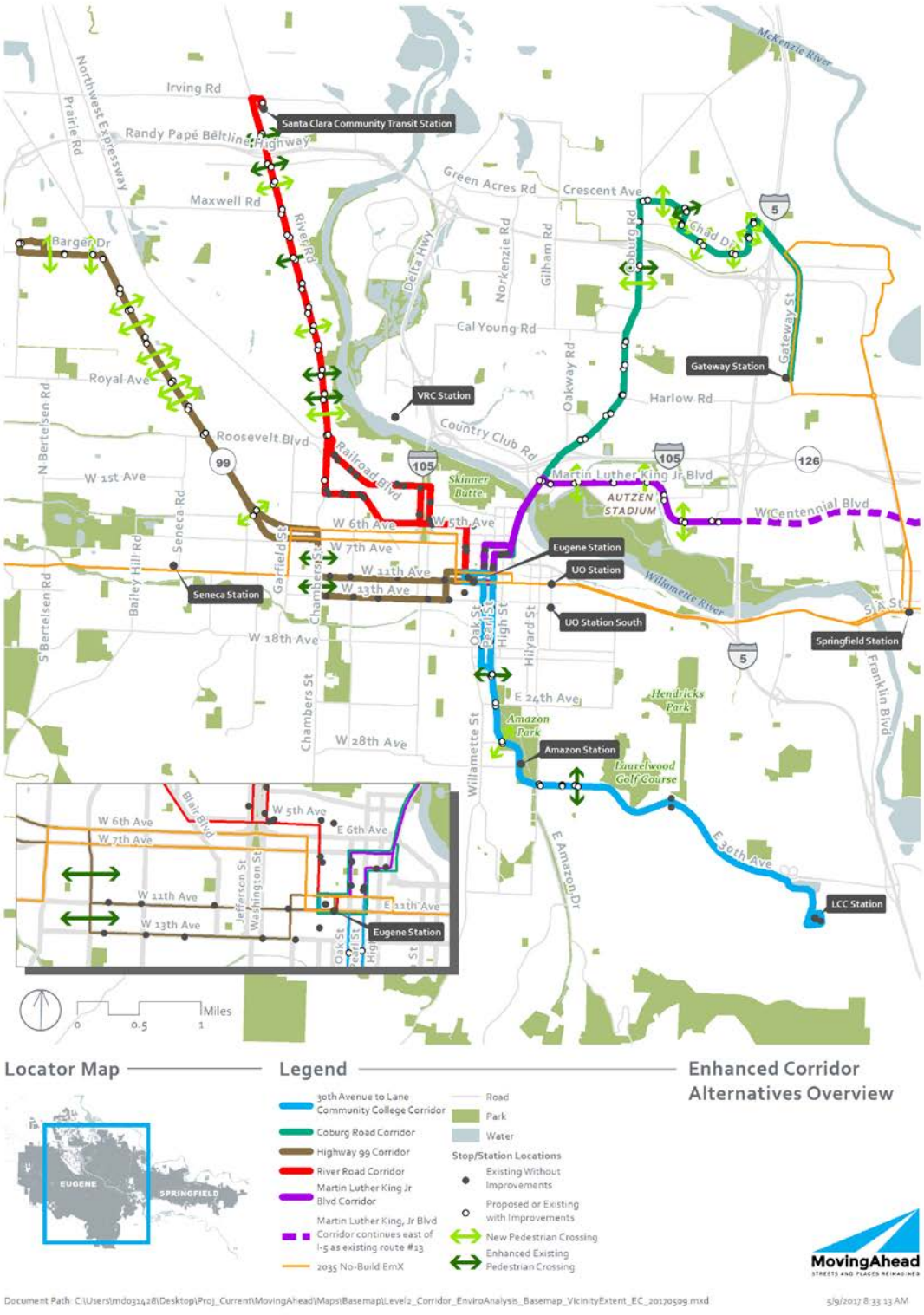
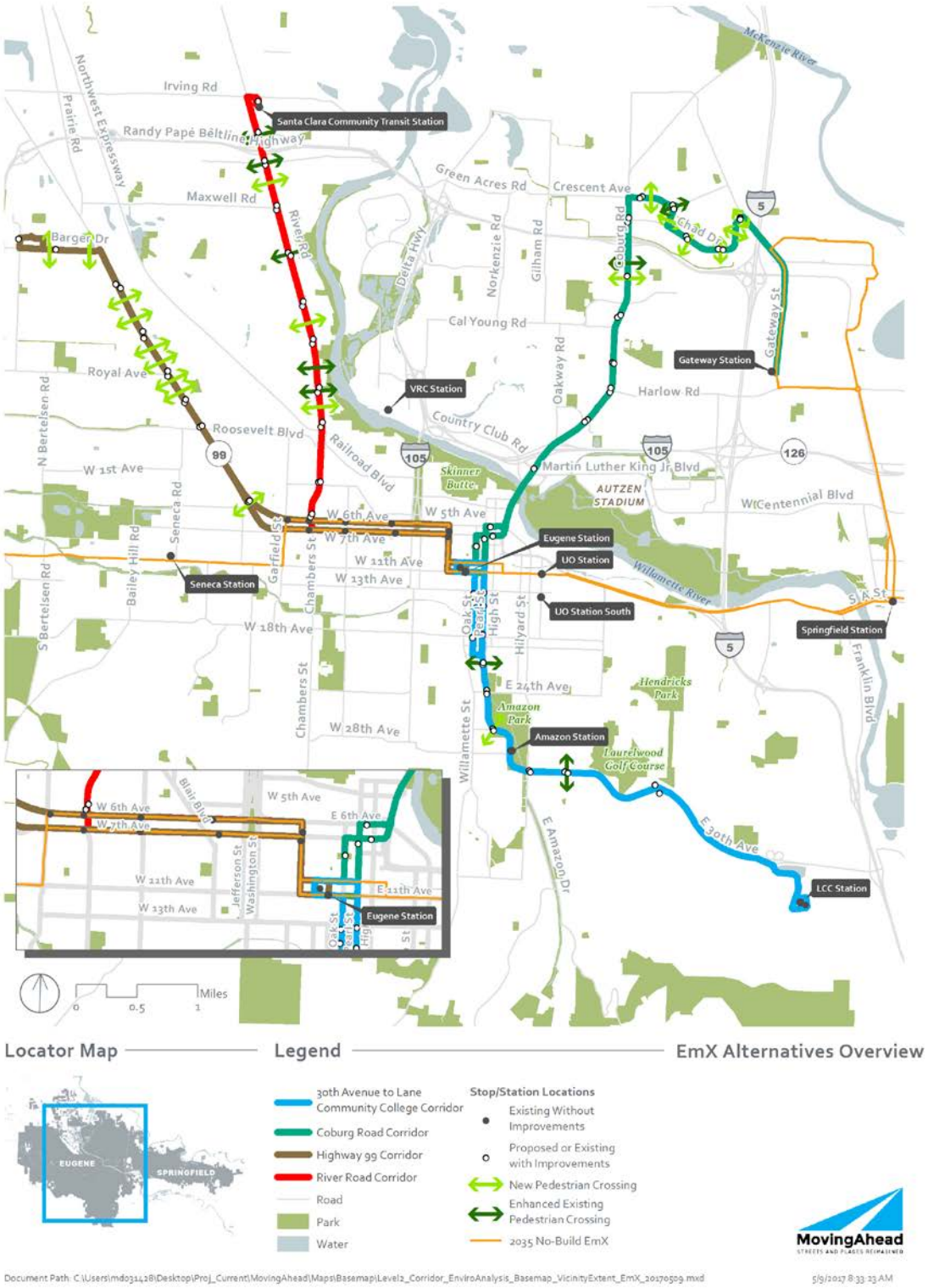


Figure 2.1-2. EmX Alternatives Overview



2.1. No-Build Alternative Transit Network

This section describes the No-Build Alternative transit network, which is based on projected conditions in the year 2035, the project's environmental forecast year. For each corridor, the No-Build Alternative serves as a reference point to gauge the benefits, costs, and effects of the build alternatives.

2.1.1. Capital Improvements

Under the No-Build Alternative, the following capital improvements are anticipated by 2035:

- **West Eugene EmX Extension**. Currently under construction, the West Eugene EmX Extension (WEEE) project and its associated capital improvements will be completed in 2017.
- **Santa Clara Community Transit Center**. The existing River Road Station is located at the southeast corner of the River Road / Randy Papé Beltline Highway interchange between the eastbound on-ramp and River Avenue. To meet growing demand and avoid the impacts of increasing congestion, LTD plans to relocate the River Road Station to a site north of the Randy Papé Beltline Highway at the southeast corner of River Road and Hunsaker Lane. Once relocated to the new site, the River Road Station would be renamed the Santa Clara Community Transit Center. This new transit center is planned to include a mix of uses including a park and ride lot, residential housing, community space, and commercial uses. The River Road Station relocation to the new site is anticipated to be completed by the end of 2018.
- **Main Street EmX Extension**. Included in the RTP and currently under study, the extension of the existing Franklin EmX line on Main Street from Springfield Station to Thurston Station and associated capital improvements (e.g., stations, bicycle and pedestrian facilities, and signal modifications) is anticipated to be completed within the 20-year planning horizon (2035). The No-Build Alternative transit network assumes EmX service on Main Street. However, the outcome of this study, and the ultimate improvements chosen, are uncertain at this time.
- **McVay Highway Enhanced Corridor**. Included in the RTP and currently under study, Enhanced Corridor service from Springfield Station on McVay Highway to LCC and associated capital improvements (e.g., improved stops, transit queue jumps, and improved bicycle and pedestrian crossings) is anticipated to be completed within the 20-year planning horizon (2035).

2.1.2. Transit Operations

The No-Build Alternatives for each corridor include changes to transit service anticipated as a result of the WEEE project, Main Street EmX Extension project, development of the Santa Clara Community Transit Center, and other changes to fixed route service. The following changes to the existing 2016 fixed route services are anticipated by 2035:

- Eliminated routes:
  - Route 11 (replaced by Main Street EmX service)
  - Route 32 (replaced by WEEE service)
  - Route 76 (replaced by WEEE service)
  - Route 85 (replaced by Enhanced Corridor service on the McVay Highway)
  - Route 43 (replaced by WEEE service)

- Other route modifications:
  - Add WEEE service (replaces Route 43 service on W. 11th Avenue) as extension of existing EmX service
  - Add Main Street EmX service from Springfield Station to Thurston Station
  - Add Route 2 with service from Barger Drive / Echo Hollow Road to Eugene Airport
  - Add Route 16 to connect north and south of Main Street with EmX service
  - Add Enhanced Corridor service on McVay Highway from Springfield Station to LCC (replaces Route 85)
  - Reroute Route 33 and extend to Amazon Parkway
  - Reroute Route 36 to extend north of W. 11th Avenue to Barger Drive (replaces Route 43)
  - Reroute Route 41 via Highway 99 / Royal Avenue / W. 11th Avenue
  - Reroute Route 40 via Royal Avenue / Elmira Road / Roosevelt Boulevard / Chambers Street / W. 2nd Avenue / Oak and Pearl Streets
  - Add Route 44 paralleling Route 40 above to serve West Eugene
  - Reroute Route 55 to extend to Santa Clara Community Transit Center
  - Reroute Route 93 with service continuing to Eugene Station via Seneca Station and service terminating at the WEEE terminus
- Change in service frequencies:
  - Increase service on Route 24 from 30-minute peak frequencies to 15-minute peak frequencies
  - Increase service on Route 28 from approximately 30-minute peak frequencies (varying 20- to 30-minute intervals) to 15-minute peak frequencies
  - Increase service on Route 41 from 30- and 15-minute peak frequencies to 15-minute peak frequencies
  - Increase service on Route 51 from 60-minute off-peak frequencies to 30-minute off-peak frequencies
  - Increase service on Route 52 from 60-minute off-peak frequencies to 30-minute off-peak frequencies
  - Increase service on Route 66 from 30- and 15-minute weekday a.m. peak, off-peak, and p.m. peak frequencies to 15-minute weekday a.m. peak, off-peak, and p.m. peak frequencies
  - Increase service on Route 67 from approximately 30-minute weekday a.m. peak, off-peak, and p.m. peak frequencies to 15-minute weekday a.m. peak, off-peak, and p.m. peak frequencies
  - Increase service on Route 78 from approximately 60-minute frequencies from 8 a.m. to 6 p.m. to 30-minute weekday a.m. peak, off-peak, and p.m. peak frequencies
  - Increase service on Route 79x from 30-minute peak frequencies to 10-minute peak frequencies, and modify off peak frequencies to 15 minutes from between 10 and 30 minutes currently
  - Decrease a.m. peak service on Route 93 from 60-minute frequencies to 120-minute frequencies during a.m. peak hours, and increase from no service between Veneta and the WEEE terminus

to 120-minute frequencies during p.m. peak hours (off-peak service is 120-minute frequencies between Veneta and the WEEE terminus)

- Decrease a.m. peak service on Route 96 from 30-minute frequencies to 60-minute frequencies, and increase off-peak service from no service between 8:20 a.m. and 3:40 p.m. to 60-minute off-peak frequencies

Key transportation improvements specific to each corridor are described under each corridor's No-Build Alternative.

2.2. Enhanced Corridor Alternatives

Enhanced Corridor Alternatives are intended to address the project's Purpose, Need, Goals, and Objectives without major transit capital investments, instead focusing on lower-cost capital improvements, operational improvements, and transit service refinements. Features could include transit queue jumps (lanes for buses that allow the bus to "jump" ahead of other traffic at intersections using a separate signal phase), stop consolidation, enhanced shelters, and redesigned service to improve cross-town connectivity. These features improve reliability, reduce transit travel time, and increase passenger comfort.

Enhanced Corridor service would run from 6:45 a.m. to 11:30 p.m. weekdays, 7 a.m. to 11 p.m. Saturdays, and 8 a.m. to 8 p.m. Sundays. Service frequencies are assumed to be 15 minutes during all periods.

2.3. EmX Alternatives

EmX (BRT) Alternatives are characterized by exclusive guideways (business access and transit lanes [BAT] or bus-only lanes); branded, multi-door 60-foot-long BRT vehicles; enhanced stations with level boarding platforms instead of stops; off-board fare collection; signal priority; wider stop spacing; and frequent and redesigned service to improve cross-town connectivity.

EmX service is assumed to run from 6:45 a.m. to 11:30 p.m. weekdays, 7 a.m. to 11 p.m. Saturdays, and 8 a.m. to 8 p.m. Sundays. Service frequencies are assumed to be 10 minutes during all periods.

2.4. Highway 99 Corridor

The Highway 99 Corridor begins at the Eugene Station, travels through downtown, then extends northwest along Highway 99 to Barger Drive, turning west at Barger Drive to terminate on Cubit Street north of the intersection of Barger Drive and Cubit Street east of the Randy Papé Beltline Highway. This corridor is approximately 10.5 round-trip miles.

2.4.1. No-Build Alternative

The Highway 99 Corridor No-Build Alternative includes existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the *DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016; Draft Eugene 2035 TSP). The No-Build Alternative would not include capital improvements on Highway 99. As part of the Draft Eugene 2035 TSP, the following transportation improvements are planned along or adjacent to the corridor:

- Upgrade Bethel Drive, from Highway 99 to Roosevelt Boulevard, to a two-lane urban facility with sidewalks on both sides of the road, bicycle lanes, and planting strips

- Widen Barger Drive immediately west of the Randy Papé Beltline Highway interchange to include an additional travel lane in each direction
- Add a shared-use path on the west side of Highway 99 from Roosevelt Boulevard south to the intersection of W. 7th Avenue and Garfield Street (the section of this project from Roosevelt to W. 5th Avenue has been completed)
- Add bicycle lanes on Garfield Street from Roosevelt Boulevard south to W. 6th Avenue
- Add a bicycle lane on W. 6th Avenue from Garfield Street to W. 5th Avenue
- Complete the sidewalk network on Highway 99 from Roosevelt Boulevard south to Garfield Street
- Add a shared-use path on Roosevelt Boulevard from Maple Street to Highway 99
- Add a bicycle lane on Roosevelt Boulevard from Highway 99 east to railroad tracks

Under the No-Build Alternative, Highway 99 Corridor service would remain at 15-minute headways during peak periods and 30-minute headways during off-peak periods and evenings. Under the No-Build Alternative, a slight change is also made to Route 93, which would stop at the Pearl Buck Center in the absence of Route 44.

2.4.2. Enhanced Corridor Alternative

Capital improvements under the Highway 99 Corridor Enhanced Corridor Alternative would include enhanced bicycle and pedestrian crossings; improvements to existing bus stops and the construction of new stops; construction of queue jumps at some intersections; traffic signal reconstruction; construction of bus-only left turn lanes; and roadway widening at some locations in the corridor.

Existing conventional fixed-service routes would remain the same as with the No-Build Alternative, with the exception of the elimination of Route 41. Service west of WinCo would also remain the same or be improved.

2.4.3. EmX Alternative

The Highway 99 Corridor EmX Alternative would include creating BAT lanes on segments of W. 7th Avenue and Highway 99; reconstructing the Highway 99 / Roosevelt Boulevard intersection (traffic signal, turn lanes, and queue jump); completing other intersection modifications in the corridor; roadway widening at some locations; and constructing nine new enhanced pedestrian and bicycle crossings, new sidewalks, and a pedestrian bridge across the railroad line from Highway 99 to the Trainsong neighborhood. Four existing bus stop locations would be improved to EmX stations, in addition to constructing new stations. Some existing EmX stations would be used for the Highway 99 Corridor EmX service.

Route 44 is a conventional service line added to this alternative only, providing coverage on 11th and 13th Avenues as well as service to the Pearl Buck Center on W. 1st Avenue, with 30-minute headways during all periods. This would be a decrease in service for the 11th and 13th Avenue corridors that currently have 15-minute peak service. Route 44 is primarily intended to replace conventional service lost with the removal of the existing Route 41. Route 41 would be replaced with the Highway 99 Corridor EmX service described in this alternative.

2.5. River Road Corridor

The River Road Corridor begins at the Eugene Transit Center, travels through downtown and then north to the Santa Clara Community Transit Center (intersection of Hunsaker Lane and River Road). This corridor is approximately 10.3 round-trip miles.

2.5.1. No-Build Alternative

The River Road Corridor No-Build Alternative would include existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. There would be no additional major bus capital improvements under the No-Build Alternative.

As part of the Draft Eugene 2035 TSP, the following transportation improvements are planned adjacent to and along the River Road Corridor:

- Upgrade the Hunsaker Lane / Beaver Street intersection to urban collector standards, including two travel lanes, a center turn lane, bicycle lanes, sidewalks on both sides of the road, and planting strips from River Road to Division Avenue
- Provide bicycle boulevards on Ruby Avenue, Horn Lane, Arbor Drive, and Park Avenue
- Include sidewalks on Hunsaker Lane, Howard Avenue, and Hilliard Lane
- Provide protected bicycle lanes on River Road from the Northwest Expressway to Division Avenue
- Under the No-Build Alternative, River Road Corridor service would remain at 30-minute headways for both Routes 51 and 52 (which together effectively provide 15-minute service during peak periods) and off-peak periods. After 6:15 p.m., there is no longer a combined 15-minute frequency, and headways return to 30 minutes.

2.5.2. Enhanced Corridor Alternative

Capital improvements constructed as part of the River Road Corridor Enhanced Corridor Alternative would include BAT lanes on River Road approaching the Randy Papé Beltline Highway and other roadway improvements, like traffic signal reconstruction at certain locations along the corridor. Improvements to existing bus stops and the construction of new stops would also occur.

Routes 51 and 52 would be eliminated, and Enhanced Corridor service for River Road includes a split alignment in order to serve portions covered by those routes at 30-minute headways. In this arrangement, the area from Railroad Boulevard to W. 1st Avenue is served by one Enhanced Corridor service as a replacement for the Route 51 service, while the area along Blair Boulevard and W. 2nd Avenue is served by the other alignment to replace service lost with removal of Route 52. Those alignments meet at Railroad Boulevard and River Road to serve the River Road Corridor with consistent 15-minute headways.

2.5.3. EmX Alternative

New construction under the River Road Corridor EmX Alternative would include lane repurposing on River Road for BAT lanes, constructing short sections of exclusive bus lanes near the Randy Papé Beltline Highway, reconstructing traffic signals and intersections at several locations, constructing new bicycle and pedestrian crossings, improving existing stops to EmX stations, and constructing new stations. Some existing EmX stations would be used with the River Road EmX service.

Transit service changes would also include modifying headways on Route 40 during the a.m. and p.m. peak hours to 15 minutes, developing a new Route 50 "River Road Connector" with 30-minute headways all day, and eliminating Routes 51, 52, and 55. These replacements ensure no loss in existing coverage or service.

2.6. 30th Avenue to Lane Community College Corridor

The 30th Avenue to LCC Corridor begins at Eugene Station and travels south along Pearl Street (outbound) to Amazon Parkway, then on E. 30th Avenue to its terminus at the LCC Station. The return trip travels on Oak Street (inbound), which is the northbound couplet to Pearl Street. This corridor is approximately 10.2 round-trip miles.

2.6.1. No-Build Alternative

2.6.1.1. Capital Improvements

The 30th Avenue to LCC Corridor No-Build Alternative would include existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. There would be no additional major bus capital improvements to the 30th Avenue to LCC Corridor under the No-Build Alternative.

The Draft Eugene 2035 TSP identifies the following transportation improvements along or adjacent to the corridor:

- Bicycle boulevard on Alder Drive

For the portion of E. 30th Avenue in unincorporated Lane County, Lane County does not plan to improve bicycle facilities along the road.

Under the No-Build Alternative, 30th Avenue to LCC Corridor service would remain at 30-minute headways on Route 81. The Route 82 service would remain at 10-minute headways during the a.m. peak, 15-minute headways during off-peak periods, and 20-minute headways during the p.m. peak, with no weekend service.

2.6.2. Enhanced Corridor Alternative

Capital improvements as part of the 30th Avenue to LCC Corridor Enhanced Corridor Alternative would include the construction of new bus stops, capital improvements to some existing bus stops, a new traffic signal on Amazon Parkway at E. 20th Avenue, and new bike facilities on Oak and Pearl Streets.

Under the 30th Avenue to LCC Corridor Enhanced Corridor Alternative, service to LCC provided by Routes 81 and 82 would be eliminated and replaced by Enhanced Corridor service. The direct connection between LCC and the University of Oregon Station along Route 81 would be eliminated. It would be replaced by connecting the 30th Avenue to LCC Corridor Enhanced Corridor Alternative to the Franklin EmX line with a transfer at Eugene Station.

2.6.3. EmX Alternative

The 30th Avenue to LCC Corridor EmX Alternative would include repurposing parking and general-purpose lanes to BAT lanes on Oak and Pearl Streets, constructing queue jumps, extending E. 20th Avenue, adding a new traffic signal on Amazon Parkway, and adding a new cycle track on High Street. In

addition to constructing new EmX stations, existing bus stops would be improved to EmX stations in certain locations.

Service to LCC provided by Routes 81 and 82 would be replaced with EmX service. The direct connection between LCC and the University of Oregon Station along Route 81 would be eliminated. It would be replaced by connecting the 30th Avenue to LCC Corridor EmX Alternative to the Franklin EmX line with a transfer at Eugene Station.

2.7. Coburg Road Corridor

The Coburg Road Corridor begins at Eugene Station and continues to Coburg Road using the Ferry Street Bridge. The corridor continues north on Coburg Road to Crescent Avenue, east on Crescent Avenue and Chad Drive to N. Game Farm Road, and south on N. Game Farm Road and Gateway Street to the existing Gateway Station at the Gateway Mall. Although service extends from N. Game Farm Road to the Gateway Station, capital improvements for the corridor terminate at Interstate 5 (I-5). This corridor is approximately 11.2 round-trip miles.

2.7.1. No-Build Alternative

The Coburg Road Corridor No-Build Alternative includes existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. There would be no additional major transportation improvements to the Coburg Road Corridor under the No-Build Alternative.

Under the No-Build Alternative, the Coburg Road Corridor service would remain at 15-minute headways on Routes 66 and 67 at all weekday times, 30-minute headways on Saturdays, and 60-minute headways on Sundays.

2.7.2. Enhanced Corridor Alternative

The Coburg Road Corridor Enhanced Corridor Alternative would include new traffic signal construction, intersection reconstruction at several locations on Coburg Road, the addition of queue jumps, and the addition of BAT lanes south of the Interstate 105 interchange. New crossings for bicyclists and pedestrians would be constructed. Existing bus stops would be improved and new stops would also be constructed.

Route 12 would be altered to serve Valley River Center and Marcola Road. A new route (Route 60) would be added to serve Valley River Center, and Routes 66 and 67 would be eliminated. This change would provide new service and coverage to the Cal Young neighborhood and along Hayden Bridge Way in Springfield. It would require current passengers along Harlow Road to transfer in order to get downtown.

2.7.3. EmX Alternative

Improvements to the corridor under the Coburg Road Corridor EmX Alternative would include construction of exclusive transit lanes at several locations on Coburg Road and intersection reconstruction at multiple locations. New bicycle and pedestrian crossings and EmX stations would be constructed, and some existing bus stops would be improved to EmX stations.

As in the Coburg Road Corridor Enhanced Corridor Alternative, Route 12 would be altered to serve Valley River Center and Marcola Road, and Route 60 would be added to serve Valley River Center, while Routes 66 and 67 would be eliminated. This change would provide new service and coverage to the Cal

Young neighborhood and along Hayden Bridge Way in Springfield. It would require current passengers along Harlow Road to transfer in order to get downtown.

2.8. Martin Luther King, Jr. Boulevard Corridor

The Martin Luther King, Jr. Boulevard Corridor begins at Eugene Station and travels through downtown Eugene on Oak and Pearl Streets and on 7th and 8th Avenues. The corridor uses the Ferry Street Bridge to reach Martin Luther King, Jr. Boulevard and continues east on Martin Luther King, Jr. Boulevard past Autzen Stadium to Centennial Boulevard. Although transit service continues along Centennial Boulevard, capital improvements for the corridor terminate at I-5. The corridor is approximately 6.0 round-trip miles.

2.8.1. No-Build Alternative

The Martin Luther King, Jr. Boulevard Corridor No-Build Alternative includes existing roadway, bicycle, pedestrian, and transit facilities in the corridor, as well as planned improvements in the Draft Eugene 2035 TSP. The Draft Eugene 2035 TSP identifies the following transportation improvements along or adjacent to the Martin Luther King, Jr. Corridor:

- Add a center turn lane along sections of Martin Luther King, Jr. Boulevard from Club Road to Leo Harris Parkway

Under the No-Build Alternative, the Martin Luther King, Jr. Boulevard Corridor service would remain at 30-minute headways.

2.8.2. Enhanced Corridor Alternative

Capital improvements associated with the Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative would include reconstructing traffic signals at the intersections of Coburg Road and Martin Luther King, Jr. Boulevard and of Martin Luther King, Jr. Boulevard and Centennial Loop; repurposing existing outside general-purpose lanes to BAT lanes on Martin Luther King, Jr. Boulevard; adding a new traffic signal at the intersection of Martin Luther King, Jr. Boulevard and Leo Harris Parkway; enhancing pedestrian crossings; constructing new bus stops; and improving existing bus stops. Existing Route 13 would be eliminated.

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3. Methods and Data

This section describes the analysis methodologies and data used for the capital cost estimating assessment for the MovingAhead Project.

3.1. Approach

The method of estimating capital costs was tailored to reflect the approximately 3 percent complete level of concept development for all corridors under consideration. As the corridors advance through the development process from broad concepts to specific analysis of the footprint of alternatives, the project's capital cost estimates will also become better defined due to the increasing level of detail and available data upon which to base the estimates.

3.2. Capital Cost Estimate Development

The development of the capital cost estimate for each alternative under study is outlined by phase under each subheading below. The project team compiled estimates in a format that meets FTA Small Starts reporting criteria as detailed in Section 3.3.

3.2.1. Level 1 Screening

The scope of design involved in the Level 1 Screening process was enough to provide a review of generalized order-of-magnitude cost estimates between corridors and to the No-Build alternatives. General cross sections were developed for proposed treatments that applied to multiple corridors and concepts. These cross sections were attributed an assumed capital cost based on experience and bid data from prior projects as provided by LTD. While not comprehensive in scope, the items quantified were intended to define the major construction elements needed to complete the work.

Corridors under consideration during the Level 1 Screening were reviewed at a high level to determine the estimated number of lane miles of the developed cross-section treatments. The general cost of each cross-section concept as estimated was multiplied by the number of assumed lane-miles to establish a baseline cost range of each corridor under consideration. Other major items with cost implications such as BRT stations, park and ride facilities, and new BRT vehicles were factored into the cost at this level of development to produce generalized order-of-magnitude cost estimates for each corridor considered.

3.2.2. Level 2 Alternatives Analysis

Order-of-magnitude cost estimates for corridor alternatives advanced to the Level 2 AA phase were updated based on the refined design in this phase. Right of way (ROW), parking, utility, and other impacts associated with the footprint were factored into the cost of each alternative. Transit operations and maintenance costs were not included in these capital cost estimates, but are documented in the *MovingAhead Operating and Maintenance Costs Technical Report* (LTD and City of Eugene, 2017).

The cost estimates for this phase of work were based on research into historic construction bid data from other similar projects, including existing EmX corridors in Lane County, for the various design and costing components of the MovingAhead Project. Using the construction bid data, available design and footprint information for each alternative, and appropriate contingencies based on the level of design refinement, a reasonable planning-level estimate of the expected project capital costs was determined.

The project team used several items produced in advance of the capital cost estimate to better inform its assumptions and quantifications. These included:

- Corridor AA conceptual plan roll plots, dated August 2016
- List of applicable construction bid items
- Base unit cost for each bid item
- Method of categorization for bid items (Section 3.3)
- Cost quantification CAD files for each alternative
- Microsoft Excel cost quantification spreadsheets for each alternative

3.3. Methodology of Cost Categories

FTA developed a spreadsheet to standardize the approach for estimating capital costs on transit projects called *Standardized Cost Categories for Small Starts Capital Projects, SCC Workbook* (SCC) (FTA, 2016). FTA traditionally updates the SCC spreadsheets in approximately May or June of each year. A methodology description accompanies the SCC spreadsheets. The cost estimates for the MovingAhead Project Level 2 AA have used and conform to the May 2016 Small Starts spreadsheets and methods. The spreadsheets and methodology are attached as Appendix D.

Based on the May 2016 FTA SCC spreadsheets and methodologies, the cost estimates for the Level 2 AA phase of work break down the capital cost estimates into nine specific line items:

10 Guideway and Track Elements
20 Stations / Transit Stops
30 Support Facilities
40 Sitework
50 Systems
60 Right of Way
70 Vehicles
80 Professional Services
90 Unallocated Contingencies

Following is a general description of each of these nine elements.

- **SCC 10 – Guideway and Track Elements.** For a BRT project, track is not a significant component. For purposes of these estimates. However, BRT work elements within the envelope of the exclusive bus lane or busway will be included in this item as guideway. For the Level 1 Screening, a unit cost per foot was developed for each general type of bus lane / busway and applied to the calculated quantity of each type within each plan sheet and capital cost segment. For the Level 2 AA, this cost was refined by estimating construction quantities directly from plan documents. This SCC is divided into subcategories for exclusive guideway (lanes used exclusively by transit vehicles), semi-exclusive guideway (lanes used primarily by transit only but with some provision for general traffic, such as BAT lanes), and mixed traffic guideway (roadway improvements in mixed traffic operations, including roadway widening). These subtotals were quantified and tracked.
- **SCC 20 – Stations / Transit Stops.** For purposes of determining stations and transit stops, the estimator developed a unit price for a generic EmX station and an Enhanced Corridor stop. Cost estimates for each station / stop type were dependent upon the amenities that would be included by station type, which were specified by LTD. No park and ride lots were designed as a part of any corridor alternative and therefore were not included in the cost estimate.

- **SCC 30 – Support Facilities.** Support facilities generally consist of operation and maintenance facilities needed to support transit revenue vehicles, such as buses or BRT vehicles. Support facilities include maintenance bays, storage area, and dispatch facilities. The estimator separated this cost category into an estimate independent of individual corridor cost estimates because LTD determined that construction of a maintenance facility would only occur if they chose to build multiple EmX corridors. LTD provided the cost information for this category. Discussion of this systemwide cost is contained in Section 4.
- **SCC 40 – Sitework.** Sitework encompasses all work outside of the bus lane / busway envelope needed to complete the project. This work can be categorized as three major elements of work: roadway widening not associated with guideway construction, signal reconstruction, and sidewalk reconstruction. The quantities were calculated based on the alternative concept plans and multiplied by appropriate unit costs. In some instances, other major work such as bridge construction was also estimated in the Level 2 AA. Operator break facility construction costs were also included in this cost category. Pedestrian accommodations designed as a part of each MovingAhead corridor are included under this cost category, because most are associated with sidewalk reconstruction. The estimates expressed utility relocation, erosion control, traffic control, and other construction-related costs as a percentage of overall civil construction costs because the level of design refinement and information available did not allow for more specific estimation of line items related to these activities.
- **SCC 50 – Systems.** This item includes installing conduit, vaults, and conductor / fiber-optic necessary to provide the communications backbone for such items as closed-circuit television cameras, next bus reader boards, and intercoms on the station platforms. It also includes the cost of constructing and modifying traffic signals to provide transit signal priority to transit vehicles on each corridor. The cost of communications system construction was estimated using a unit price per route mile based on unit bid analysis completed on other projects and provided by LTD.
- **SCC 60 – Right of way.** ROW costs were estimated by calculating the approximate area of acquisition needed to accomplish the construction required for each segment of each alternative as drawn in the August 2016 roll plots. The cost of this acquisition of property was based on a prorated cost per square foot provided by LTD staff based on experience from the WEEE project. Additional costs to cover legal, appraisal, and other administrative fees were applied on a per parcel basis. LTD staff provided data to derive these costs from the WEEE project.
- **SCC 70 – Vehicles.** Revenue vehicle needs were calculated based upon a peak load analysis by vehicle type for system configurations of the alternatives. Revenue vehicles include a 60-foot standard articulated bus and a standard BRT vehicle with a configuration similar to LTD's current BRT fleet. Unit costs for the vehicles were based on recent purchases by LTD.
- **SCC 80 – Professional Services.** Professional services were estimated on the basis of percentages of construction costs with allocated contingencies. The total work under this line item is 40 percent of construction costs with allocated contingencies. This cost item includes engineering costs, construction administration costs, and agency administration costs necessary to complete the project.
- **SCC 90 – Contingencies.** The estimator divided project contingencies into two types— allocated and unallocated. Allocated contingencies were applied to each major construction category listed above based on the level of design detail (Table 3.3-1). These contingencies accounted for the general level of detail available upon which to complete the estimate, cover items not quantified, or for which a cost cannot currently be determined. As the design progresses, these contingencies will decrease at

each step of project development. The level of allocated contingency was applied to the Level 2 AA cost estimates at the rates shown in Table 3.3-1.

Table 3.3-1. Contingency Percentages

Item	Percentage
Guideway	20%
Stations	25%
Systems	30%
Sitework	35%
ROW	20%
Vehicles	10%
Professional Services	15%

Source: McKenzie, John. (2016, August 23). [Personal communication].

Unallocated contingencies were included to cover unexpected changes in project scope, higher than predicted inflation, and any such items that the designer could not identify at this level of development. At this point for the project, the estimator used an unallocated contingency of 5 percent.

MovingAhead is a multi-modal project which requires a holistic examination of the cost to construct each build alternative. This includes understanding what proportion of construction costs would be dedicated to pedestrian and bicycle infrastructure. In addition to the federal SCCs for transit outlined above, the estimator designated certain unit cost items as pedestrian and/or bicycle improvements. These items include sidewalk improvements, shared-use path construction, construction of Americans with Disability Act (ADA) ramps, construction of new pedestrian signals and crossings, and pedestrian bridge construction. The raw cost of construction pre-application of contingency of these items was compared against the aggregate cost of construction for all other components of the project pre-contingency.

3.4. Methodology of Unit Cost Items

The FTA SCC workbook requires unit costs for each of its broad subcategories. To establish appropriate unit costs, the cost estimation team further broke down each subcategory into a series of aggregate bid items. These bid items reflect the level of information known about each corridor at the time of development of the cost estimates, thus are still relatively generic. Each item was priced based on a combination of 2015 Oregon Department of Transportation weighted average bid prices, recent WEEE EmX construction bid tabs, and senior cost estimation staff judgement.

To simplify quantification and calculation of costs at the limited level of design available to cost estimate staff, civil construction items were aggregated into single items. For example, the general bid item for concrete paving includes surface concrete, subaggregate, basic drainage features, clearing and demolishing existing structures and pavements, and earthwork. Table 3.4-1 describes each aggregate bid item, its unit cost, assumptions used in applying the unit costs to each design alternative, applicable SCC cost category(s), and identifies if the unit cost is considered part of the pedestrian and bicycle comparison estimate. Table 3.4-2 describes the subaggregate costs and assumptions used to create each aggregate unit cost.

Table 3.4-1. Estimate Item Unit Costs and Quantification Methodology

Item	Unit	Cost	Quantification Methodology	Applicable Federal SCCs and Pedestrian / Bicycle Component Designation
Curb, Gutter, and Enclosed Drainage	lf	$235.00	All new / reconstructed curb and gutter.	10.01, 10.02, 10.03
New Roadway Asphalt	ft^2	$10.00	All new / widened / reconstructed general purpose lanes.	10.3
New Roadway Concrete	ft^2	$15.00	All BAT and bus-exclusive lanes.	10.01, 100.2
Concrete Sidewalk	ft^2	$9.00	All new / widened / reconstructed sidewalk.	40.06, Pedestrian/Bicycle
Concrete Islands	ft^2	$12.00	All new / reconstructed median islands.	10.01, 10.02, 10.03
Overlay Existing Roadway	ft^2	$2.50	Assume overlay for all lanes adjacent to reconstructed lanes and for all re-striped roadway segments.	10.01, 10.02, 10.03
Interconnect Signal	Mile	$215,400.00	Measure distance between centers of intersection (miles).	50.02
New Signal	EA	$375,000.00	Red and blue dots on plans.	50.02
Modify Signal	EA	$75,000.00	Red halos on plans.	50.02
New Rectangular Rapid Flash Beacon[a]	EA	$47,000.00	Yellow dots on plans.	40.06, Pedestrian / Bicycle
Illumination	Mile	$143,000.00	**Enhanced Corridor:** Assume this cost for length of all new roadway and widening. Multiply by two for both sides of roadway. **EmX:** Assume this cost for length of entire corridor within construction footprint. Multiply by two for both sides of roadway.	40.06
Landscaping	Mile	$58,800.00	**Enhanced Corridor:** Assume this cost for length of all new roadway and widening. Multiply by two for both sides of roadway. **EmX:** Assume this cost for length of entire corridor within construction footprint. Multiply by two for both sides of roadway.	40.06
Bridges	ft^2	$185.00	Pedestrian bridge cost.	40.06, Pedestrian / Bicycle
Retaining Wall (Height ≥ 4 feet)	ft^2	$75.00	Assume this cost at steep slopes and where construction widens underneath existing structures.	40.06, Pedestrian / Bicycle

Table 3.4-1. Estimate Item Unit Costs and Quantification Methodology

Item	Unit	Cost	Quantification Methodology	Applicable Federal SCCs and Pedestrian / Bicycle Component Designation
Retaining Wall (Height < 4 feet)	ft^2	$50.00	Cost shown for reference only—assuming high retaining walls only at this level of design refinement.	40.06
Bus Pad	ft^2	$11,000.00	Concrete bus pad cost at stops / stations in mixed traffic. Cost not applied where bus stops on new concrete lanes.	20.01
EmX Station	EA	$350,000.00	All new stations constructed for EmX Alternatives. Assumes level boarding with premium shelter, tactile band at curb face, lighting improvements, on-platform fare collection, fiber and electric service, trash can, bike parking and in some cases bike storage lockers, routing bikes behind station locations, railings and ramps, signage pylon, and arrivals screen.	20.01
Enhanced Corridor Stop	EA	$80,000.00	All new stops constructed for Enhanced Corridor Alternatives. Assumes standard bus shelter, illumination, new electrical service, two bike staples, painted curb face, trash can, signage pylon, and no level boarding.[b]	20.01
BRT vehicle	EA	$1,100,000.00	Branded articulated bus.[c]	70.04
Enhanced Corridor Bus	EA	$1,025,000.00	Non-branded articulated bus.[c]	70.04
Pavement Removal	ft^2	$2.00	For demolished pavement not replaced by widened pavement.	10.01, 10.02, 10.03, 40.06
Remove Existing Curb and Drainage	lf	$10.00	Apply this cost for all widening / new construction that displaces existing curb line.	10.01, 10.02, 10.03, 40.06
Remove Existing Signal	EA	$25,000.00	Apply this cost for all widening / new construction at existing signalized intersections that displaces existing curb line (red dots on plans).	50.02
Thermoplastic Pavement Striping	lf	$1.00	All new striping.	10.01, 10.02, 10.03, 40.06
ADA Ramp	EA	$5,000.00	**Enhanced Corridor:** assume ramp reconstruction where other construction / overlay occurs.	40.06, Pedestrian/Bicycle

Table 3.4-1. Estimate Item Unit Costs and Quantification Methodology

Item	Unit	Cost	Quantification Methodology	Applicable Federal SCCs and Pedestrian / Bicycle Component Designation
			EmX: assume ramp reconstruction along entire corridor (except for downtown core) regardless of presence / absence of other construction.	
Communications Fiber	lf	$38.00	Multiply by overall project length (in feet) for EmX only.	50.05
Operator Break Facility[d]	EA	$350,000.00	Based on pricing for simple permanent restroom facility.	40.06

Source: CH2M. (2016a).

EA = each
ft2 = square foot (feet)
lf = linear foot (feet)

[a] Luftig, Sasha and Chris Henry. (2017, April 24). [Personal communication].
[b] Luftig, Sasha and Joe McCormack. (2015, December 15). [Personal communication].
[c] Luftig, Sasha and Joe McCormack. (2016, August 25). [Personal communication].
[d] Salt Lake City Corporation Parks and Public Lands Division (2013).

Table 3.4-2. Subaggregation of Unit Costs

Item	Unit	Amount	Unit Cost	Total	Comments
Curb, Gutter, and Enclosed Drainage (Unit: Miles) – per side of roadway affected					
Concrete Curb and Gutter	lf	5,280	$38.00	$200,640.00	For single side of roadway
15-inch Storm Sewer Pipe, 10 feet deep	lf	5,280	$170.00	$897,600.00	Long. storm pipe, including trenching / backfill
Storm Manhole	EA	21	$4,200.00	$88,200.00	Every 250 feet (21 in a mile)
Standard Catch Basin	EA	21	$1,500.00	$31,500.00	Every 250 feet (21 in a mile)
			SUBTOTAL	$1,217,940.00	
Clearing and Grubbing	0.6 percent			$7,307.64	Percentage-based for lineal foot values
Removal of Structures	1.2 percent			$14,615.28	Percentage-based for lineal foot values
			TOTAL UNIT COST	**$1,239,900.00**	
Curb, Gutter, and Enclosed Drainage (Unit: lf)					
Curb, Gutter, and Enclosed Drainage	lf	1	$234.83	$234.83	Lane-Mile unit cost reduced to linear foot value
			TOTAL UNIT COST	**$235.00**	
New Roadway Asphalt (Unit: Lane-Miles)					
Asphalt (Large quantity)	Tons	3,207	$100.00	$320,711.11	12-foot lanes, 5,280 feet long, depth=8 IN, density=2.050 tons/yd^3
Aggregate Base	Tons	4,341	$34.00	$147,605.33	12-foot lanes, 5,280 feet long, depth=12 IN, density=1.850 tons/yd^3
15-inch Storm Sewer Pipe, 10 feet deep	lf	130	$170.00	$22,100.00	Lateral culverts: 13 feet per lane, every 250 lf (21/mile)
			SUBTOTAL	$490,416.44	
Clearing and Demo	ft^2	63,360	$1.00	$63,360.00	$1/ft^2 of improvement per senior review
Earthwork	ft^2	63,360	$1.00	$63,360.00	$1/ft^2 of improvement per senior review
			TOTAL UNIT COST	**$617,100.00**	

Table 3.4-2. Subaggregation of Unit Costs

Item	Unit	Amount	Unit Cost	Total	Comments
New Roadway Asphalt (Unit: ft^2)					
New Roadway Asphalt	ft^2	1	$9.74	$9.74	See New Roadway Asphalt (Unit: Lane-Mile) for Breakdown—divided by 63,360 to generate ft^2 number
			TOTAL UNIT COST	**$10.00**	
New Roadway Concrete (Unit: Lane-Miles)					
Portland Concrete Cement Pavement, Plain Doweled - 12-inch	yd^2	7,040	$100.00	$704,000.00	12-foot lanes, 5,280 feet long, depth=12 IN
Aggregate Base	Tons	2,171	$34.00	$73,802.67	12-foot lanes, 5,280 feet long, depth=6 IN, density=1.850 tons/yd^3
15-inch Storm Sewer Pipe, 10 feet deep	lf	130	$170.00	$22,100.00	Lateral culverts: 13 feet per lane, every 250 lf (21/mile)
			SUBTOTAL	$799,902.67	
Clearing and Demo	ft^2	63,360	$1.00	$63,360.00	$1/$ft^2$ of improvement per senior review
Earthwork	ft^2	63,360	$1.00	$63,360.00	$1/$ft^2$ of improvement per senior review
			TOTAL UNIT COST	**$926,600.00**	
New Roadway Concrete (Unit: ft^2)					
New Roadway Concrete	ft^2	1	$14.62	$14.62	See New Roadway Concrete (Unit: Lane-Mile) for Breakdown—divided by 63,360 to generate ft^2 number
			TOTAL UNIT COST	**$15.00**	
Overlay Existing Roadway (Unit: Lane-Miles)					
Asphalt (Large quantity)	Tons	1,002	$100.00	$100,222.22	12-foot lanes, 5,280 feet long, depth=2.5 IN, density=2.050 tons/yd^3
Placing Bituminous Pavement	yd^2	7,040	$8.00	$56,320.00	Added per senior reviewer
			TOTAL UNIT COST	**$156,500.00**	
Overlay Existing Roadway (Unit: ft^2)					
Overlay Existing Roadway	ft^2	1	$2.47	$2.47	See New Roadway Concrete (Unit: Lane-Mile) for Breakdown—divided by 63,360 to generate ft^2 number.

Table 3.4-2. Subaggregation of Unit Costs

Item	Unit	Amount	Unit Cost	Total	Comments
Remove Existing Pavement (Unit: ft^2)					
Demolition	ft^2	1.00	$1.00	$1.00	Demolition of existing pavement
Earthwork	ft^2	1.00	$1.00	$1.00	Removal
			TOTAL UNIT COST	**$2.00**	
Interconnect Signal (Unit: Miles)					
3-inch Conduit	feet	5,280	$40.00	$211,200.00	Includes trenching, 3-inch conduit, and wire
Junction Boxes	EA	21	$200.00	$4,224.00	Assume 1 per 250 feet
			TOTAL UNIT COST	**$215,400.00**	
New Signal (Unit: Each)					
New Signal	EA	1	$300,000.00	$375,000.00	Includes signal system and all appurtenances (pole, wiring, detection devices, etc.) for one intersection. Assumes mast arm signal cost
			TOTAL UNIT COST	**$375,000.00**	
Signal Modifications (Unit: Each)					
Modify Signal	EA	1	$75,000.00	$75,000.00	Includes all evaluations and modifications to the signal at one intersection
			TOTAL UNIT COST	**$75,000.00**	
Earthwork - Large Quantity (Unit: yd^3)					
Earthwork (Cut/Fill)	yd^3	1	$10.00	$10.00	Unit cost for projects with greater than 1,000 yd^3
			TOTAL UNIT COST	**$10.00**	
Earthwork - Small Quantity (Unit: yd^3)					
Earthwork (Cut/Fill)	yd^3	1	$35.00	$35.00	Unit cost for projects with less than 1,000 yd^3
			TOTAL UNIT COST	**$35.00**	
Illumination (Unit: Miles)					
Luminaire and appurtenances	EA	26	$5,500.00	$143,000.00	Luminaire, pole, wiring, etc. (one pole every 200 feet) for one side of street
			TOTAL UNIT COST	**$143,000.00**	

Table 3.4-2. Subaggregation of Unit Costs

Item	Unit	Amount	Unit Cost	Total	Comments
Landscaping (Unit: Miles)					
Landscaping	Miles	1	$58,750.00	$58,750.00	Plantings, trees, topsoil, and irrigation sums up to approximately $117,500 per mile for both sides of street. Cost given in TOTAL column is per single side of street for flexibility
			TOTAL UNIT COST	**$58,800.00**	
Landscaping (Unit: ft^2)					
Landscaping	ft^2	1	$2.78	$2.78	Per mile landscaping cost divided by 1-4-feet planter width at 5,280 lf
			TOTAL UNIT COST	**$2.80**	
Bridges - Short Span (Unit: ft^2)					
	ft^2	1	$185.00	$185.00	Provided by structural engineer
			TOTAL UNIT COST	**$185.00**	
Walls (Unit: ft^2)					
Retaining Wall (Height ≥ 4 feet)	ft^2	1	$75.00	$75.00	
			TOTAL UNIT COST	**$75.00**	
Walls (Unit: ft^2)					
Retaining Wall (Height < 4 feet)	ft^2	1	$50.00	$50.00	
			TOTAL UNIT COST	**$50.00**	
EmX Station (Unit: EA)					
EmX Station	EA	1	$350,000.00	$350,000.00	
Enhanced Corridor Stop (Unit: EA)					
Enhanced Corridor Bus Station	EA	1	$200,000.00	$200,000.00	
Enhanced Corridor Bus (Unit: EA)					
Enhanced Corridor Bus	EA	1	$600,000.00	$600,000.00	New non-branded articulated bus
			TOTAL UNIT COST	**$600,000.00**	

Table 3.4-2. Subaggregation of Unit Costs

Item	Unit	Amount	Unit Cost	Total	Comments
EmX Bus (Unit: EA)					
EmX Bus	EA	1	$1,100,000.00	$1,100,000.00	New EmX bus (per LTD)
			TOTAL UNIT COST	**$1,100,000.00**	
ADA-compliant Ramp (Unit: EA)					
Reconstruct ADA Ramp	EA	1	$8,000.00	$5,000.00	Per senior design staff estimate
			TOTAL UNIT COST	**$5,000.00**	
Signal Removal (Unit: EA)					
Signal Removal	EA	1	$25,000.00	$25,000.00	
			TOTAL UNIT COST	**$25,000.00**	

Source: CH2M. (2016a).

EA = each
RRFB = Rectangular Rapid Flash Beacon
yd^2 = square yard(s)
yd^3 = cubic yard(s)

Due to the limited level of design development, several cost items were retained as percentage costs of the sum of all known construction unit costs as listed in Tables 3.4-1 and 3.4-2. These cost items all pertain to SCC 40 Sitework costs. A range of suggested percentages was developed based on consultation with senior cost estimation staff about past project experiences. These items, the contingency percentage range, and their applicable SCC subcategories are listed in Table 3.4-3. As design is refined in subsequent phases and more information about existing site conditions is acquired, some of these costs are expected to become unit-based.

Table 3.4-3. Percentage-Based Cost Items

Item	Percentage Range	SCC
Construction Surveying	1 to 2.5%	40.08
Traffic Control[a]	5 to 10%	40.08
Mobilization	8 to 10%	40.08
Erosion Control[a]	0.5 to 2%	40.08
Utility Relocation[a]	10 to 20%	40.02
Environmental Mitigation[a]	1 to 5%	40.04

Source: CH2M. (2016a).

[a] Will become unit-cost or lump-sum based in subsequent phases of design.

As noted in Section 3.3, ROW costs pertaining to SCC 60 were derived by consulting with LTD staff regarding their experiences on recent EmX construction on the WEEE project and applying a unit cost on a square footage basis for ROW acquisitions along with a per-parcel cost for each individual parcel impacted. The estimator took the average unit or per-parcel cost and multiplied it by the frequency that cost was applied on the WEEE project to obtain a probabilistic weighted average component price. The estimator summed these prices and then applied escalation and contingency factors to the derived costs to bring them into the context of 2016 dollars and market conditions. A breakdown of the derivation of these costs is shown in Table 3.4-4.

Table 3.4-4. SCC 60 Right of Way Cost Derivation

Item	WEEE Cost	WEEE Frequency	Probabilistic Weighted Average	Per ft^2 or Per Parcel Cost?
Fee Land	\$16-24 / ft^2	100 percent	\$20	Per ft^2
Site Improvements (landscaping, asphalt)	\$6 / ft^2	95 percent	\$6	Per ft^2
Sign Relocation	\$8,000-\$15,000 / sign	30 percent	\$3,450	Per parcel
Billboard Relocation	\$40,000 / board	Two on WEEE	\$435	Per parcel
Parking Space	\$10,000-\$25,000 / space	10 percent	\$1,750	Per parcel

Table 3.4-4. SCC 60 Right of Way Cost Derivation

Item	WEEE Cost	WEEE Frequency	Probabilistic Weighted Average	Per ft^2 or Per Parcel Cost?
Temporary Construction Easement (typically Fee and Site Improvements at 7 percent for the expected construction timeframe; WEEE used 2 years)	\$3.08-4.20 / ft^2 for 2 years	100 percent	4.00	Per ft^2
Impact of Settlement Negotiations (Increase acquisition estimate by 20 percent for impact of settlement negotiations)	20 percent		20%	Per ft^2
Appraisal Services (Appraisal and Review)	\$3,500 per parcel		\$3,500	Per parcel
Acquisition Firm Services	\$30,000 / month		\$3,913	Per parcel
Legal Services	\$250,000		\$1,359	Per parcel
Title Fees	\$1,000 / acquisition		\$1,000	Per parcel
LTD Staff Time	40 percent full-time equivalent	2 years	NOT IN ITEM – in administrative costs contingency	
Utility Easement	\$4.80-7.20 / ft^2		NOT IN ITEM – in utility contingency	
Price per parcel impacted plus 10 percent contingency and escalation			\$17,000.00	
Price per ft^2 impacted plus 50 percent contingency and escalation			\$60.00	

Sources: Luftig, Sasha, and Lisa VanWinkle. (2016, September 8) [Personal communication]; CH2M. (2016a).

For cases where a full acquisition or displacement of a business would be required, an additional \$20,000 was added to the per-parcel cost to account for additional appraisal and legal-services needs. The square footage of the entire parcel or business that would be acquired or displaced was multiplied by the price-per-square-foot value in Table 3.4-4. For large parcels where only a single business would be displaced, the square footage of the business was taken rather than the entire large parcel. For those alternatives where potential full acquisitions or displacements are anticipated, the value of these properties has been kept separate from strip acquisition right of way.

3.5. Capital Cost Estimate Development

The estimator developed capital cost estimates for each corridor alternative studied by the MovingAhead Project. The estimator used the following methodology:

1. A universal bid item list was developed for the MovingAhead Project as described in Sections 3.3 and 3.4. Bid item costs and categories were attributed to FTA SCC based on judgement and the level of design available at the time of estimate development. Bid item lists were developed based on

design alternative roll plots dated August 2016. Assumptions for developing bid item quantities were also developed and documented at this stage.

2. Unit prices for each bid item were derived from a combination of Oregon Department of Transportation historic bid data from 2015, historical data provided by LTD from the construction of its WEEE project, and input and judgement of senior cost estimation and design staff with national experience on BRT and other construction projects of similar scope to the alternatives analyzed.
3. Using the bid item list and the design alternative roll plots dated August 2016 representing approximately a 3-percent level of design completion, an estimate of bid item quantity and total cost were completed for each design alternative.
4. A summary of bid item quantity and cost were developed for each corridor alternative. Allocated and unallocated contingencies were applied to the total construction cost per the methodologies noted in Sections 3.3 and 3.4. These worksheets are included in Appendix C.
5. An aggregated spreadsheet comparing each corridor alternative on a total cost and a per-mile of construction cost were developed. Spreadsheets comparing corridor build alternatives based on a variety of metrics including cost by Federal SCC and cost of pedestrian and bicycle improvements as a proportion of the overall corridor construction cost before contingencies were also developed.

Inflation rates were not factored into cost estimate calculations. Financial costs and operations and maintenance costs were not included in any estimates. The final project costs will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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4. Capital Cost Estimate Results

This section includes a summary discussion of cost estimates for each corridor's build alternatives. More detailed cost estimate tables referenced in this section are available in Appendix C.

Table 4.1-1 provides a summary of the total cost of improvements by corridor alternative. Corridor build alternatives selected for design refinement may experience a fluctuation in cost from what is shown in Table 4.1-1. The costs shown are therefore most suited for determining the order-of-magnitude of difference between alternatives and contributing to the selection of designs to move forward into refinement. The mileage of the corridor used to calculate the cost per mile is the overall physical length of the corridor and does not correspond to the round-trip distance either bus or EmX service would travel on a corridor.

Table 4.1-1. Capital Cost Estimate Results

Corridor and Alternative	Cost (2016 Dollars)	Cost / Mile
Highway 99		
Enhanced Corridor Alternative	$38,000,000	$5,000,000
EmX Alternative	$67,000,000	$9,000,000
River Road		
Enhanced Corridor Alternative	$24,000,000	$4,000,000
EmX Alternative	$78,000,000	$12,000,000
30th Avenue to Lane Community College		
Enhanced Corridor Alternative	$21,000,000	$4,000,000
EmX Alternative	$53,000,000	$9,000,000
Coburg Road		
Enhanced Corridor Alternative	$41,000,000	$7,000,000
EmX Alternative	$113,000,000	$19,000,000
Martin Luther King, Jr. Boulevard		
Enhanced Corridor Alternative	$21,000,000	$6,000,000

Source: CH2M. (2016a).

Note:

The above cost estimate is in 2016 dollars to facilitate comparative evaluation of concepts. The cost does not include financing costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, cost refinement will be necessary during a later phase of the project(s) prior to establishing final project budgets or financing arrangements.

4.1. Highway 99 Corridor

Estimated costs for the Highway 99 Corridor build alternatives are summarized by SCC category in Tables 4.1-2 and 4.1-3. A comparison of cost to construct pedestrian and bicycle improvements versus overall build alternative cost before contingency is summarized in Table 4.1-4.

The primary contributor to cost for both Highway 99 Corridor build alternatives is Sitework (SCC 40). Both alternatives feature construction of a pedestrian bridge over railroad tracks at Ferry Street and Highway 99, an item unique to this corridor. The retaining wall required to construct the northbound to eastbound right-turn movement at Roosevelt Boulevard also contributes a large amount of cost to this category. At 30 to 32 percent of the overall project for both build alternatives, sitework costs make up the largest proportion of cost for any corridor, other than River Road Enhanced Corridor, due to this structural work, and sitework common to all corridors, such as landscaping, illumination, and ADA ramp reconstruction. Total sitework costs are $12 million for the Enhanced Corridor Alternative and $20 million for the EmX Alternative. $1.5 million of this cost pre-contingency is attributable to the bridge. Design refinement and profile optimization to limit the amount of retaining wall required on approach to the structure may reduce the overall structure cost and reduce this number in future iterations.

Table 4.1-2. Highway 99 Corridor Enhanced Corridor Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$4,134,840	11%
20	Stations	$2,233,750	6%
30	Support Facilities	$0	0%
40	Sitework	$12,275,675	32%
50	Systems	$4,517,500	12%
60	ROW	$5,019,456	13%
70	Vehicles	$0	0%
80	Professional Services	$7,935,000	21%
90	Unallocated Contingency	$1,805,811	5%
	Total Project Cost (Rounded Up)	**$38,000,000**	

Source: CH2M. (2016a).

Table 4.1-3. Highway 99 Corridor EmX Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$6,574,200	10%
20	Stations	$6,248,750	9%
30	Support Facilities	$0	0%
40	Sitework	$19,860,820	30%

Table 4.1-3. Highway 99 Corridor EmX Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
50	Systems	$5,999,500	9%
60	ROW	$5,791,776	9%
70	Vehicles	$6,050,000	9%
80	Professional Services	$12,880,000	19%
90	Unallocated Contingency	$3,170,252	5%
	Total Project Cost (Rounded Up)	**$67,000,000**	

Source: CH2M. (2016a).

Table 4.1-4 Highway 99 Corridor Pedestrian and Bicycle Costs Comparison

Alternative	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost versus Total
Enhanced Corridor	$3,975,250	$13,234,750	30%
EmX	$4,145,500	$21,213,637	20%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

4.2. River Road Corridor

Estimated costs for the River Road Corridor build alternatives are summarized by SCC category in Tables 4.2-1 and 4.2-2. A comparison of cost to construct pedestrian and bicycle improvements versus overall build alternative cost before contingency is summarized in Table 4.2-3.

Of the four corridors with Enhanced Corridor and EmX Alternatives, the River Road Corridor shows the second-largest cost differential between build alternatives. This cost differential is primarily due to the construction of a semi-exclusive transitway (BAT lanes) throughout most of the EmX Alternative length, whereas the Enhanced Corridor Alternative would primarily run in mixed traffic with little civil construction outside of new stop areas. This difference is reflected in the Guideway category (SCC 10): $2.5 million for the Enhanced Corridor Alternative and $14 million for the EmX Alternative. The Guideway category (SCC 10) comprises 19 percent of the overall project cost for the EmX Alternative, the second-highest of all EmX Alternatives for all corridors under consideration.

Sitework (SCC 40) is the primary cost contributor to overall project costs ($6 million for the Enhanced Corridor Alternative and $18 million for the EmX Alternative), followed by SCC 60 (ROW). The ROW costs for the River Road build alternatives are amongst the highest percentage of overall cost to construct of all of the corridors due to proposed potential full acquisitions near the Randy Papé Beltline. Systems (SCC 50) costs do not significantly contribute to the overall project cost in either alternative.

Table 4.2-1. River Road Corridor Enhanced Corridor Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$2,277,720	9%
20	Stations	$3,030,000	13%
30	Support Facilities	$0	0%
40	Sitework	$6,094,401	25%
50	Systems	$1,787,500	7%
60	ROW	$4,838,256	20%
70	Vehicles	$0	0%
80	Professional Services	$4,600,000	19%
90	Unallocated Contingency	$1,131,394	5%
	Total Project Cost (Rounded Up)	**$24,000,000**	

Source: CH2M. (2016a).

Table 4.2-2. River Road Corridor EmX Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$13,777,284	18%
20	Stations	$9,707,500	12%
30	Support Facilities	$0	0%
40	Sitework	$17,077,646	22%
50	Systems	$3,473,600	4%
60	ROW	$8,423,760	11%
70	Vehicles	$6,050,000	8%
80	Professional Services	$15,410,000	20%
90	Unallocated Contingency	$3,695,989	5%
	Total Project Cost (Rounded Up)	**$78,000,000**	

Source: CH2M. (2016a).

Table 4.2-3 River Road Corridor Pedestrian and Bicycle Costs Comparison

Alternative	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost vs. Total
Enhanced Corridor	$807,000	$7,592,205	11%
EmX	$1,285,556	$24,604,308	5%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

4.3. 30th Avenue to Lane Community College Corridor

Estimated costs for the 30th Avenue to LCC Corridor build alternatives are summarized by SCC category in Tables 4.3-1 and 4.3-2. A comparison of cost to construct pedestrian and bicycle improvements versus overall build alternative cost before contingency is summarized in Table 4.3-3.

The greatest contributors to the cost differential between build alternatives for the 30th Avenue to LCC Corridor are Stations (SCC 20) and Sitework (SCC 40), followed closely by Systems (SCC 50). Both the Enhanced Corridor and EmX Alternatives assume constructing an extension of E. 20th Avenue from Oak Street to Amazon Parkway, which contributes to a high mixed-traffic Guideway category (SCC 10) cost relative to other corridors. Reconstruction of portions of Oak and Pearl Streets in downtown Eugene to accommodate concrete BAT lanes increases the cost of the EmX Alternative Guideway category (SCC 10) relative to the Enhanced Corridor Alternative Guideway category (SCC 10). Despite this, only a small percentage of the overall project cost is directly contributable to Guideway costs for either alternative.

The higher Systems category (SCC 50) costs for these alternatives relative to other corridors is due to the density of signalized intersections in the downtown corridor that the build alternatives propose to modify as well as the number of new signals added to the grid for the extension of E. 20th Avenue from Oak Street to Amazon Parkway.

Table 4.3-1. 30th Avenue to Lane Community College Corridor Enhanced Corridor Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$3,223,680	15%
20	Stations	$1,820,000	9%
30	Support Facilities	$0	0%
40	Sitework	$5,211,424	25%
50	Systems	$3,217,500	15%
60	ROW	$1,624,872	8%
70	Vehicles	$0	0%
80	Professional Services	$4,600,000	22%
90	Unallocated Contingency	$984,370	5%
	Total Project Cost (Rounded Up)	**$21,000,000**	

Source: CH2M. (2016a).

Table 4.3-2. 30th Avenue to Lane Community College Corridor EmX Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$5,372,340	10%
20	Stations	$8,942,500	17%
30	Support Facilities	$0	0%
40	Sitework	$12,911,571	24%
50	Systems	$5,089,500	9%
60	ROW	$2,277,624	4%
70	Vehicles	$4,840,000	9%

Table 4.3-2. 30th Avenue to Lane Community College Corridor EmX Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
80	Professional Services	$10,810,000	20%
90	Unallocated Contingency	$2,487,477	5%
	Total Project Cost (Rounded Up)	**$60,000,000**	

Source: CH2M. (2016a).

Table 4.3-3 30th Avenue to Lane Community College Corridor Pedestrian and Bicycle Costs Comparison

Alternative	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost versus Total
Enhanced Corridor	$623,000	$7,783,800	8%
EmX	$1,165,000	$17,910,554	7%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

4.4. Coburg Road Corridor

Estimated costs for the Coburg Road Corridor build alternatives are summarized by SCC category in Tables 4.4-1 and 4.4-2. A comparison of cost to construct pedestrian and bicycle improvements versus overall build alternative cost before contingency is summarized in Table 4.4-3.

The Coburg Road Corridor has the greatest cost differential between its build alternatives. The significant difference in investment in civil construction and roadway widening between the two alternatives causes this difference. The Guideway (SCC 10) ($6 million Enhanced Corridor, $14 million EmX), Sitework (SCC 40) ($9 million Enhanced Corridor, $27 million EmX), and ROW (SCC 60) ($4 million Enhanced Corridor, $13 million EmX,) components of the cost estimates show the greatest difference in investment and impact.

Table 4.4-1. Coburg Road Corridor Enhanced Corridor Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$5,800,920	14%
20	Stations	$3,357,500	8%
30	Support Facilities	$0	0%
40	Sitework	$9,366,724	23%
50	Systems	$5,947,500	15%
60	ROW	$4,064,304	10%
70	Vehicles	$1,127,500	3%
80	Professional Services	$8,625,000	21%
90	Unallocated Contingency	$1,914,472	5%
	Total Project Cost (Rounded Up)	**$41,000,000**	

Source: CH2M. (2016a).

Table 4.4-2. Coburg Road Corridor EmX Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$13,876,920	12%
20	Stations	$12,511,250	11%
30	Support Facilities	$0	0%
40	Sitework	$26,885,869	24%
50	Systems	$11,018,800	10%
60	ROW	$13,492,152	12%
70	Vehicles	$7,260,000	6%
80	Professional Services	$22,425,000	20%
90	Unallocated Contingency	$5,373,500	5%
	Total Project Cost (Rounded Up)	**$113,000,000**	

Source: CH2M. (2016a).

Table 4.4-3 Coburg Road Corridor Pedestrian and Bicycle Costs Comparison

Alternative	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost versus Total
Enhanced Corridor	$1,464,000	$14,260,232	10%
EmX	$1,963,000	$34,356,404	6%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

4.5. Martin Luther King, Jr. Boulevard Corridor

Estimated costs for the Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative are summarized by SCC category in Table 4.5-1. A comparison of cost to construct pedestrian and bicycle improvements versus overall build alternative cost before contingency is summarized in Table 4.5-2.

This corridor alternative's primary cost contributor is Guideway (SCC 10) ($6 million) followed by Professional Services (SCC 80) ($5 million). This is due to the reconstruction of lanes along the corridor to accommodate concrete BAT lanes without moving the curbline of the roadway over almost the entirety of the corridor's construction footprint. ROW (SCC 60) costs are the lowest of any corridor due to the majority of the proposed work being constrained to existing pavement.

Table 4.5-1. Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
10	Guideway	$5,822,640	28%
20	Stations	$1,468,750	7%
30	Support Facilities	$0	0%
40	Sitework	$4,332,126	21%

Table 4.5-1. Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative Costs by SCC

SCC	SCC Description	Cost with Contingency	Percent Overall Cost
50	Systems	$1,722,500	8%
60	ROW	$264,792	1%
70	Vehicles	$1,127,500	5%
80	Professional Services	$4,830,000	23%
90	Unallocated Contingency	$978,415	5%
	Total Project Cost (Rounded Up)	**$21,000,000**	

Source: CH2M. (2016a).

Table 4.5-2 Martin Luther King, Jr. Boulevard Corridor Pedestrian and Bicycle Costs Comparison

Alternative	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost versus Total
Enhanced Corridor	$526,000	$10,405,106	5%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

4.6. Cost Comparisons

Comparing the cost of each corridor alternative of a specific classification (Enhanced Corridor Alternatives versus EmX Alternatives) against all others of the same classification may assist decision-makers in identifying which corridors to prioritize for advancement and programming.

Table 4.6-1 compares the estimated costs of Enhanced Corridor Alternatives by corridor and SCC. Table 4.6-2 compares the estimated costs of EmX Alternatives by corridor and SCC. Table 4.6-3 compares the estimated costs of Enhanced Corridor Alternatives by corridor to construct pedestrian and bicycle improvements. Table 4.6-4 compares the estimated costs of EmX Alternatives by corridor to construct pedestrian and bicycle improvements.

Table 4.6-1. Comparison of Estimated Costs of Enhanced Corridor Alternatives by Corridor and SCC

		Highway 99	River Road	30th Avenue to LCC	Coburg Road	Martin Luther King, Jr. Boulevard
SCC	**SCC Description**	**Cost with Contingency / Percent Overall Cost**				
10	Guideway	$4,134,840 / 11%	$2,277,720 / 9%	$3,213,600 / 15%	$5,800,920 / 14%	$5,822,640 / 28%
20	Stations	$2,233,750 / 6%	$3,030,000 / 13%	$1,820,000 / 9%	$3,357,500 / 8%	$1,468,750 / 7%
30	Support Facilities	$0 / 0%	$0 / 0%	$0 / 0%	$0 / 0%	$0 / 0%
40	Sitework	$12,275,675 / 32%	$6,094,401 / 25%	$5,211,424 / 25%	$9,366,724 / 23%	$4,332,126 / 21%

Table 4.6-1. Comparison of Estimated Costs of Enhanced Corridor Alternatives by Corridor and SCC

		Highway 99	River Road	30th Avenue to LCC	Coburg Road	Martin Luther King, Jr. Boulevard
SCC	**SCC Description**	**Cost with Contingency / Percent Overall Cost**				
50	Systems	$4,517,500 / 12%	$1,787,500 / 7%	$3,217,500 / 15%	$5,947,500 / 15%	$1,722,500 / 8%
60	ROW	$5,019,456 / 13%	$4,838,256 / 20%	$1,624,872 / 8%	$4,064,304 / 10%	$264,792 / 1%
70	Vehicles	$0 / 0%	$0 / 0%	$0 / 0%	$1,127,500 / %3	$1,127,500 / 5%
80	Professional Services	$7,935,000 / 21%	$4,600,000 / 20%	$4,600,000 / 22%	$8,625,000 / 2%1	$4,830,000 / 23%
90	Unallocated Contingency	$1,805,811 / 5%	$1,131,394 / 5%	$984,370 / 5%	$1,914,472 / 5%	$978,415 / 5%
	Total Project Cost	**$38,000,000**	**$24,000,000**	**$21,000,000**	**$41,000,000**	**$21,000,000**

Table 4.6-2. Comparison of Estimated Costs of EmX Alternatives by Corridor and SCC

		Highway 99	River Road	30th Avenue to LCC	Coburg Road	Martin Luther King, Jr. Boulevard
SCC	**SCC Description**	**Cost with Contingency / Percent Overall Cost**				
10	Guideway	$6,574,200 / 10%	$13,777,284 / 18%	$5,372,340 / 10%	$13,876,920 / 12%	N/A
20	Stations	$6,248,750 / 9%	$9,707,500 / 12%	$8,942,500/ 17%	$12,511,250 / 11%	N/A
30	Support Facilities	$0 / 0%	$0 / 0%	$0 / 0%	$0 / 0%	N/A
40	Sitework	$19,860,820 / 30%	$17,077,646 / 22%	$12,911,571 / 24%	$26,885,869 / 24%	N/A
50	Systems	$5,999,500 / 9%	$3,473,600/ 4%	$4,595,500 / 9%	$11,018,800 / 10%	N/A
60	ROW	$5,791,776/ 9%	$8,423,760 / 11%	$2,277,624 / 4%	$13,492,152 / 12%	N/A
70	Vehicles	$6,050,000 / 9%	$6,050,000 / 8%	$4,840,000 / 9%	$7,260,000 / 7%	N/A
80	Professional Services	$12,880,000 / 19%	$15,410,000 / 20%	$10,695,000 / 20%	$22,425,000 / 20%	N/A
90	Unallocated Contingency	$3,170,252 / 5%	$3,695,989 / 5%	$2,487,477 / 5%	$5,373,500 / 5%	N/A
	Total Project Cost	**$67,000,000**	**$78,000,000**	**$53,000,000**	**$113,000,000**	**N/A**

N/A = not applicable

Table 4.6-3. Comparison of Estimated Costs to Construct Pedestrian and Bicycle Improvements, Enhanced Corridor Alternatives

Corridor	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost
Highway 99	$3,975,250	$13,234,750	30%
River Road	$807,000	$7,592,205	11%
30th Avenue to Lane Community College	$623,000	$7,783,800	8%
Coburg Road	$1,464,000	$14,260,232	10%
Martin Luther King, Jr. Boulevard	$526,000	$10,405,106	5%

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

Table 4.6-4. Comparison of Estimated Costs to Construct Pedestrian and Bicycle Improvements, EmX Alternatives

Corridor	Cost of Pedestrian and Bicycle Improvements	Total Construction Cost, Pre-Contingency	Percent Pedestrian and Bicycle Improvements Cost
Highway 99	$4,145,500	$21,213,637	20%
River Road	$1,285,556	$24,604,308	5%
30th Avenue to Lane Community College	$1,165,000	$17,910,554	7%
Coburg Road	$1,963,000	$34,356,404	6%
Martin Luther King, Jr. Boulevard	N/A	N/A	N/A

Note:
All construction costs in this table are civil materials-only costs, pre-contingency.

4.7. Systemwide Analysis

4.7.1. Federal SCC Analysis

Generally, amongst all corridors, the most influential components of the overall cost of each alternative were as follows, listed in order of percentage of overall project cost:

1. **SCC 40 – Sitework.** Reconstructing existing roadways to accommodate exclusive bus lanes or movements in a built urban environment often requires rebuilding associated sidewalks, landscaping, illumination, utilities, and other components. These components do not directly contribute to transit operations, however, are vital to project success. Costs were significantly higher for EmX Alternatives where every ADA ramp on the design corridors was assumed to be reconstructed, and continuous landscaping and illumination were to be installed. For some alternatives, these construction costs contributed up to 32 percent of overall project costs.

2. **SCC 80 – Professional Services.** This category is estimated as a percentage of the overall project construction cost with the unallocated contingency, but does not include vehicle cost. This category accounts for the many costs to public agencies during the lifecycle of a project, including internal administration costs.
3. **SCC 10 – Guideway.** This cost category item was a contributor to very high overall project cost in the most reconstruction-intensive alternatives, such as the River Road Corridor and Coburg Road Corridor EmX Alternatives. Enhanced Corridor Alternatives generally saw smaller costs because there was less investment in construction of dedicated bus lanes for these alternatives.

The remaining cost categories either did not contribute significantly to the overall cost of the corridors or did so in a way that varied widely between Enhanced Corridor Alternatives and EmX Alternatives. Discussion of these cost categories follows below in numeric order.

1. **SCC 20 – Stations**, can vary in cost in later phases of design depending on the desired level of investment in amenities at different station or stop locations. The level of chosen investment in stations under EmX Alternatives versus stops under Enhanced Corridor Alternatives could significantly weight the perceived affordability of alternatives in the favor of Enhanced Corridor Alternatives. On average, there is almost a $7 million difference between Enhanced Corridor Alternative stop costs and EmX Alternative station costs. For those corridors with lighter investment in guideway and other infrastructure such as the Highway 99 Corridor alternatives, this proves to be a large contributor to the difference in costs between alternatives.
2. **SCC 30 – Support Facilities**, has no cost attributed to a single corridor. The LTD existing maintenance facility could accommodate the projected bus and BRT vehicles anticipated under the No-Build Alternative with surplus capacity for five additional 60-foot-long buses or BRT vehicles. If any combination of Enhanced Corridor and EmX Alternatives advanced to construction requires acquisition of six or more BRT vehicles, the existing maintenance facility would require expansion to accommodate its fleet. LTD would add two maintenance bays, each capable of accommodating a 60-foot-long articulated bus or BRT vehicle. The expansion cost is estimated to be $2.5 million in 2016 dollars (Luftig, Sasha, and Joe McCormack, 2016, October 17 [Personal communication]). This cost is based on the cost of the LTD 2004 fleet expansion project in which four existing bays were extended to serve 60-foot-long articulated buses. Staff converted the overall construction cost to a square foot cost and escalated the cost to 2020 dollars. LTD staff added appropriate design, construction, permitting, administration, and contingency costs to arrive at the estimated value. The estimator de-escalated from 2020 dollars to 2016 dollars to match the rest of the estimated costs in this report. Table 4.7-1 summarizes the total cost of expanding the maintenance facility in 2016 dollars.

Table 4.7-1. Maintenance Facility Expansion Project Cost (2016 dollars)

Cost Component	Cost
Design	$310,000
Construction	$1,462,000
LTD Costs	$90,000
Permits	$90,000
Staff Time	$90,000
Contingency	$450,000
Total (rounded up):	**$2,500,000**

Source: Luftig, Sasha, and Joe McCormack. (2016, October 17). [Personal communication].

This cost was considered separate from any corridor alternatives evaluated in this analysis because cumulative construction of multiple corridors exceeding the capacity of the existing facility would add this cost to the overall program. This cost does not contribute significantly to the overall cost of any single corridor because the EmX Alternatives in this analysis range in cost from $60 million to $110 million, depending on the corridor. The resulting increase in the cost to construct a given EmX Alternative would range from 2 to 4 percent, which is within the unallocated contingency assumptions of any single alternative.

SCC 50 – Communications, has a great cost differential between Enhanced Corridor and EmX Alternatives due to the differing assumption of investment in continuous fiber connections between alternatives. This cost category may fluctuate as design progresses because it assumes signal priority and modifications at most signals along the corridors. However, that may not be feasible based on further traffic analysis.

SCC 60 – Right of Way. Depending on the alternative selected, this cost varies widely from 1 percent of overall cost (Martin Luther King, Jr. Boulevard Corridor Enhanced Corridor Alternative) to 20 percent (River Road Corridor Enhanced Corridor Alternative). This cost is dependent on the type and level of investment along a corridor and the concentration of improvements requiring ROW as compared to other improvements along that same corridor.

SCC 70 – Vehicles, and SCC 90, Unallocated Contingencies, did not generate high costs in any alternative. These costs will vary directly in proportion to the length and investment in any corridor alternative and, therefore, are not stand-alone cost differentiators.

Tables detailing each unit cost item and contingency contributing to the overall costs are available in Appendix C.

4.7.2. Pedestrian and Bicycle Improvements Cost Analysis

Generally pedestrian and bicycle improvements costs as a proportion of materials only construction costs for corridor build alternatives ranged from 5 to 11 percent. A higher proportion of overall project cost can be attributed to pedestrian and bicycle improvements for the Highway 99 corridor build alternatives due to the propose construction of a pedestrian and bicycle bridge connecting the corridor to the Trainsong neighborhood. The construction costs related to this bridge increase the overall proportion of improvements dedicated to pedestrian and bicycle facilities for the corridor at 30 percent for the EmX alternative and 20 percent for the Enhanced Corridor alternative.

In general, EmX corridor alternatives invest more capital in pedestrian and bicycle improvements but that cost is a lower overall percentage of the overall project cost than Enhanced Corridor alternatives. This is generally because EmX corridor build alternatives propose more roadway reconstruction and have higher stations, signals, and other construction costs in addition to construction or reconstruction of pedestrian and bicycle facilities.

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Appendix A: Glossary and Naming Conventions

This appendix includes a detailed list of acronyms, abbreviations and technical terms used throughout this report. It also includes naming conventions used in the MovingAhead Project.

Acronyms and Abbreviations

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
/H-RCP	Historic Structures or Sites Combine Zone
/WP	Waterside Protection
/WQ	Water Quality
°C	degree(s) Celsius
µg/L	microgram(s) per liter
µg/m^3	microgram(s) per cubic meter
AA	Alternatives Analysis
AAC	all aluminum conductor
AASHTO	American Association of State Highway and Transportation Officials
AAI	All Appropriate Inquiry
ACS	American Community Survey
ADA	Americans with Disabilities Act
AEO	Annual Energy Outlook
APE	Area of Potential Effect
API	Area of Potential Impact
approx.	approximately
ARTS	All Roads Transportation Safety Program
ATR	Automated Traffic Recording
BAT	business access and transit
BEST	Better Eugene Springfield Transit
BFE	Base Flood Elevation
BMP	best management practice
BPA	Bonneville Power Administration
BRT	bus rapid transit

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
Btu	British thermal unit
c	circa
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CFR	Code of Federal Regulations
CFU	Colony-Forming Unit
CH2M	CH2M HILL, Inc.
CIG	Capital Investment Grant
CIP	Capital Improvements Program
City	City of Eugene
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COGP	County Opportunity Grant Program
Corps	U.S. Army Corps of Engineers
CRL	Confirmed Release List
CSZ	Cascadia Subduction Zone
CTR	commute trip reduction
CWA	Clean Water Act
CY	cubic yard
dB	decibel
dBA	A-weighted decibel
DBE	Disadvantaged Business Enterprise
DEIS	Draft Environmental Impact Statement. Also referred to as Draft EIS.
DEQ	Oregon Department of Environmental Quality
DKS	DKS Associates
DLS	Donation Land Claim
DOE	Determination of Eligibility
DOGAMI	Oregon Department of Geology and Mineral Industries
DOT	Department of Transportation
Draft EIS	Draft Environmental Impact Statement. Also referred to as DEIS.
Draft Envision Eugene	*Draft Envision Eugene Community Vision* (Envision Eugene, 2016, July)

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
Draft Eugene 2035 TSP	*DRAFT Eugene 2035 Transportation System Plan* (City of Eugene, 2016)
DSL	Oregon Department of State Lands
DU	dwelling unit
EA	Environmental Assessment or each
EC	City of Eugene Code
EC	eligible contributing
EC	Enhanced Corridor Alternative (in some tables)
ECLA	*Eugene Comprehensive Lands Assessment* (ECONorthwest, 2010, June)
ECSI	Environmental Cleanup Site Information database (Oregon DEQ, 2016)
EFH	essential fish habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EmX	Emerald Express, Lane Transit District's Bus Rapid Transit System
EmX	EmX Alternative (in some tables)
EOA	Equity and Opportunity Assessment
EPA	U. S. Environmental Protection Agency
ES	eligible significant
ES NR	eligible significant NRHP
ESA	Endangered Species Act or Environmental Site Assessment
ESH	essential indigenous anadromous salmonid habitat
ESU	Evolutionarily Significant Unit
EWEB	Eugene Water & Electric Board
FAST Act	Fixing America's Surface Transportation Act
FEIS	Final Environmental Impact Statement. Also referred to as Final EIS.
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act of 1974
Final EIS	Final Environmental Impact Statement. Also referred to as FEIS.
FOE	Finding of Effect
FPPA	Farmland Protection Policy Act, 7 U.S.C. 4201-4209 and 7 CFR 658
FRA	Federal Railroad Administration
ft	foot (feet)
ft^2	square foot (feet)
FTA	Federal Transit Administration
FTN	Frequent Transit Network
FY	fiscal year

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
GAN	Grant Anticipation Note
GARVEE	Grant Anticipation Revenue Vehicle
GHG	greenhouse gas
GIS	geographic information system
GLO	General Land Office
Heritage	Heritage Research Associates, Inc.
HGM	Hydro-geomorphic
HMTA	Hazardous Materials Transport Act of 1975, with amendments in 1990 and 1994
HOV	high-occupancy vehicle
HPNW	Historic Preservation Northwest
I-5	Interstate 5
I-105	Interstate 105
IOF	Immediate Opportunity Fund
ISA	International Society of Arboriculture
ISTEA	Intermodal Surface Transportation Efficiency Act
kV	kilovolt(s)
LaneACT	Lane Area Commission on Transportation
LCC	Lane Community College
LCDC	Land Conservation and Development Commission
LCOG	Lane Council of Governments
Ldn	day-night sound level
LE	Listed Endangered
LEP	limited English proficiency
L_{eq}	equivalent sound level
lf	lineal foot (feet)
LGAC	Local Government Affairs Council
LGGP	Local Government Grant Program
LID	Local Improvement District
L_{max}	maximum sound level
L_{min}	minimum sound level
LNG	liquefied natural gas
LOS	level of service
LPA	Locally Preferred Alternative
LRAPA	Lane Regional Air Protection Agency
LRFP	LTD's Long-Range Financial Plan
LRT	Light Rail Transit

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
LRTP	LTD's Long-Range Transit Plan
LT	Listed Threatened
LTD	Lane Transit District
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
m	meter(s)
MAP-21	Moving Ahead for Progress in the 21st Century
MBTA	Migratory Bird Treaty Act
Metro Plan	*Metro Plan, Eugene-Springfield Metropolitan Area General Plan* (LCOG et al., 1987, as updated on 2015, December 31)
mg/kg	milligram(s) per kilogram
MI	mile(s)
mL	milliliter(s)
MMA	Michael Minor and Associates, Inc.
MOA	Memorandum of Agreement
MOE	Measure of Effectiveness
MPC	Metropolitan Policy Committee
mpg	miles per gallon
mph	miles per hour
MPO	Metropolitan Planning Organization
MTIP	*Metropolitan Transportation Improvement Program Federal FY 2015 to Federal FY 2018* (Central Lane MPO, adopted 2014, October, as amended)
Mw	Earthquake moment magnitude
N/A	not applicable
NA	not applicable; no data available
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NAVD88	North American Vertical Datum of 1988
ND	nodal development
NEPA	National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321-4347
NFA	no further action
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO_2	nitrous dioxide
NO_x	nitrous oxides
NPDES	National Pollutant Discharge Elimination System

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
NPMS	National Pipeline Mapping System
NPS	Department of Interior's National Park Service
NR	Natural Resource
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NS	no standard established
NW Natural	Northwest Natural
O_3	ozone
O&M	operations and maintenance
OAR	Oregon Administrative Rule
OARRA	Oregon Archaeological Records Remote Access
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OHP	Oregon Highway Plan
OPA	Oil Pollution Act of 1990
OPRD	Oregon Parks and Recreation Department
OR	Oregon
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
OTIB	Oregon Transportation Infrastructure Bank
Pb	lead
PCB	polychlorinated biphenyl
PEM	Palustrine Emergent Wetland
PM	particulate matter
PM_{10}	particulate matter – 10 microns in diameter
$PM_{2.5}$	particulate matter – 2.5 microns in diameter
PMT	Project Management Team
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PROS	Parks, Recreation, and Open Space
PUC	Public Utilities Commission
Qls	landslide and debris avalanche deposits

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
Qtg	terrace and fan deposits
Qty	quantity
RCRA	Resource Conservation and Recovery Act of 1976
RFFA	reasonably foreseeable future action
ROW	right of way
RRFB	Rectangular Rapid Flash Beacon
RTP	*Central Lane Metropolitan Planning Organization Regional Transportation Plan* (LCOG, adopted 2007, November; 2011, December). (The RTP includes the Financially Constrained Roadway Projects List)
SARA	Superfund Amendments and Reauthorization Act of 1986
SARA III	Emergency Planning and Community Right to Know Act of 1986; part of the SARA amendments
SC	sensitive critical
SCC	Standard Cost Categories
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SDC	Systems Development Charge
SDWA	Safe Drinking Water Act
sec	second(s)
Section 4(f)	Section 4(f) of the Department of Transportation Act of 1966
Section 6(f)	Section 6(f) of the LWCF Act of 1965
Section 106	Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800.5)
SF	square foot (feet)
SHPO	Oregon State Historic Preservation Office
SIP	State Implementation Plan
SMU	Species Management Unit
SO_2	sulfur dioxide
SOC	species of concern
SSGA	Small Starts Construction Grant Agreement
STA	Special Transportation Area
STIP	Statewide Transportation Improvement Program
SV	Sensitive Vulnerable
SY	square yard(s)
TAP	Transportation Alternatives Program
TAZ	transportation analysis zone
TCE	Temporary Construction Easement
TD	transit-oriented development
TDM	Transportation Demand Management

Table A-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Definitions
TEA-21	Transportation Equity Act for the 21st Century
Teoe	siliciclastic marine sedimentary rocks
TESCP	Temporary Erosion and Sediment Control Plan
TIF	Tax Increment Financing
TIP	Transportation Improvement Program
TMDL	total maximum daily load
TOD	transit-oriented development
TPAU	Department of Transportation – Transportation Planning Analysis Unit
TPR	Transportation Planning Rule
TransPlan	*Eugene-Springfield Transportation System Plan* (City of Eugene et al., adopted 2002, July)
TRB	Transportation Research Board
TSI	Transportation System Improvement
TSM	Transportation System Management
TSP	Transportation System Plan
UGB	Urban Growth Boundary
UMTA	Urban Mass Transit Administration
Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, 42 U.S.C. 4601 et. seq., 49 CFR Part 24
URA	Urban Renewal Area
U.S.C.	United States Code
USDOT	U.S. Department of Transportation
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
v/c	volume-to-capacity
VHT	vehicle hours traveled
VMT	vehicle miles traveled
VOC	volatile organic compound
WEEE	West Eugene EmX Extension
WEG	wind erodibility group
yd2	square yard (yards)
yd3	cubic yard(s)
YOE	year of expenditure

Terms

Table A-2. Terms

Terms	Definitions
Accessibility	The extent to which facilities are barrier-free and useable for all persons with or without disabilities.
Action	An “action,” a federal term, is the construction or reconstruction, including associated activities, of a transportation facility. For the purposes of this Handbook, the terms “project,” “proposal,” and “action” are used interchangeably unless otherwise specified. An action may be categorized as a “categorical exclusion” or a “major federal action.”
Agricultural / Forest / Natural Resource	AG, EFU-25, EFU-30, EFU-40, F-1, F-2, and NR
Alignment	Alignment is the street or corridor that the transit project would be located within.
Alternative Fuels	Low-polluting fuels which are used to propel a vehicle instead of high-sulfur diesel or gasoline. Examples include methanol, ethanol, propane or compressed natural gas, liquid natural gas, low-sulfur or "clean" diesel and electricity.
Alternatives Analysis (AA)	The process of evaluating the costs, benefits, and impacts of a range of transportation alternatives designed to address mobility problems and other locally-defined objectives in a defined transportation corridor, and for determining which particular investment strategy should be advanced for more focused study and development. The Alternatives Analysis (AA) process provides a foundation for effective decision making.
Area of Potential Effect	A term used in Section 106 to describe the area in which historic resources may be affected by a federal undertaking.
Area of Potential Impact	An assessment’s Area of Potential Impact for the project is defined separately for each discipline.
Auxiliary Lanes	Lanes designed to improve safety and reduce congestion by accommodating cars and trucks entering or exiting the highway or roadway, and reducing conflicting weaving and merging movements.
Base Fare	The price charged to one adult for one transit ride; excludes transfer charges, and reduced fares.
Base Period	The period between the morning and evening peak periods when transit service is generally scheduled on a constant interval. Also known as "off-peak period."
Boarding	Boarding is a term used in transit to account for passengers of public transit systems. One person getting on a transit vehicle equals one boarding. In many cases, individuals will have to transfer to an additional transit vehicle to reach their destination and may well use transit for the return trip. Therefore, a single rider may account for several transit boardings in one day.
Bus Phase	An exclusive traffic signal phase for buses and/or BRT vehicles.

Table A-2. Terms

Terms	Definitions
Bus Rapid Transit (BRT)	A transit mode that combines the quality of rail transit and the flexibility of buses. It can operate on bus lanes, high-occupancy vehicle (HOV) lanes, expressways, or ordinary streets. The vehicles are designed to allow rapid passenger loading and unloading, with more doors than ordinary buses.
Business Access and Transit (BAT) Lane	In general, a BAT lane is a concrete lane, separated from general-purpose lanes by a paint stripe and signage. A BAT lane provides Bus Rapid Transit (BRT) priority operations, but general-purpose traffic is allowed to travel within the lane to make a turn into or out of a driveway or at an intersecting street. However, only the BRT vehicle is allowed to use the lane to cross an intersecting street.
Busway	Exclusive freeway lane for buses and carpools.
Capital Improvements Program (CIP)	A CIP is a short-range plan, usually 4 to 10 years, which identifies capital projects and equipment purchases, provides a planning schedule, and identifies options for funding projects in the program.
Categorical Exclusion (CE)	A CE means a category of actions that do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required.
Chambers Special Area Zone	S-C
Charter Tree	A tree defined by the Eugene Charter (City of Eugene, 2002, updated 2008) as "…(a living, standing, woody plant having a trunk 25 inches in circumference at a point 4-½ feet above mean ground level at the base of the trunk) of at least fifty years of age within publicly owned rights of way for streets, roads, freeways, throughways, and thoroughfares and within those portions of the city which were in the incorporated boundaries of the city as of January 1, 1915, shall be designated historic street trees and recognized as objects of high historic value and significance in the history of the city and deserving of maintenance and protection." These trees have special historic importance to the City and require special processes be followed if their removal is proposed, including a public vote on the project proposing the removal.
Charter Tree Boundary	Defined by the Eugene Charter (City of Eugene, 2002, updated 2008) as "…those portions of the city which were in the incorporated boundaries of the city as of January 1, 1915." Trees within this boundary may, if they meet certain criteria, be granted the special title and protective status of a Charter Tree, defined above.
City of Eugene Zoning Classifications	Industrial (I-2 and I-3), Commercial (C-3), Mixed-Use (C-1, C-2, GO, S-C, S-CN, S-DR, S-DW, S-E, S-F, S-HB, S-JW, S-RN, S-W, and S-WS), Single-Family Residential (R-1), Multi-Family Residential (R-2 and R-3), Institution (PL and PRO), Agricultural / Forest / Natural Resource (AG, EFU-25, EFU-30, EFU-40, F-1, F-2, and NR), Office (E-1 and E-2), Special Area Zone (Non-Mixed Use) (S-H and S-RP), Downtown Westside Special Area Zone (S-DW), Chambers Special Area Zone (S-C)

Table A-2. Terms

Terms	Definitions
Clean Air Act Amendments of 1990	The comprehensive federal legislation that establishes criteria for attaining and maintaining the federal standards for allowable concentrations and exposure limits for various air pollutants; the act also provides emission standards for specific vehicles and fuels.
Collector Streets	Collector streets provide a balance of both access and circulation within and between residential and commercial/industrial areas. Collectors differ from arterials in that they provide more of a citywide circulation function, do not require as extensive control of access, and are located in residential neighborhoods, distributing trips from the neighborhood and local street system.
Commercial	C-3
Commuter Rail	Commuter rail is a transit mode that is a multiple car electric or diesel propelled train. It is typically used for local, longer-distance travel between a central city and adjacent suburbs, and can operate alongside existing freight or passenger rail lines or in exclusive rights of way.
Compressed Natural Gas (CNG)	An alternative fuel; compressed natural gas stored under high pressure. CNG vapor is lighter than air.
Conformity	The ongoing process that ensures the planning for highway and transit systems, as a whole and over the long term, is consistent with the state air quality plans for attaining and maintaining health-based air quality standards; conformity is determined by metropolitan planning organizations (MPOs) and the U.S. Department of Transportation (U.S. DOT), and is based on whether transportation plans and programs meet the provisions of a State Implementation Plan.
Congestion Mitigation and Air Quality (CMAQ)	Federal funds available for either transit or highway projects that contribute significantly to reducing automobile emissions, which cause air pollution.
Cooperating Agency	Regulations that implement the National Environmental Policy Act define a cooperating agency as any federal agency, other than a lead agency, which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action significantly affecting the quality of the human environment.
Coordination Plan	Required under Moving Ahead for Progress in the 21st Century (MAP-21), the coordination plan contains procedures aimed at achieving consensus among all parties in the initial phase of environmental review and to pre-empt disagreements that can create delays later on in a project.
Corridor	A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways, and transit route alignments.
Corridor Transit Service Characteristics	The amount of transit service provided in each corridor, measured by daily vehicle hours traveled, daily vehicle miles traveled, and daily place-miles of service.

Table A-2. Terms

Terms	Definitions
Demand Responsive	Non-fixed-route service utilizing vans or buses with passengers boarding and alighting at pre-arranged times at any location within the system's service area. Also called “Dial-a-Ride.”
Diesel Multiple Unit (DMU)	Each unit carries passengers and can be self-powered by a diesel motor; no engine unit is required.
Documented Categorical Exclusion (DCE)	A DCE means a group of actions that may also qualify as Categorical Exclusions (CEs) if it can be demonstrated that the context in which the action is taken warrants a CE exclusion; i.e., that no significant environmental impact will occur. Thus, these actions are referred to as DCEs. Such actions require some National Environmental Policy Act documentation, but not an Environmental Assessment or a full-scale Environmental Impact Statement. DCEs documentation must demonstrate that, in the context(s) in which these actions are to be performed, they will have no significant environmental impact or that such impacts will be mitigated.
Downtown Westside Special Area Zone	S-DW
Draft Environmental Impact Statement (DEIS)	The DEIS is the document that details the results of the detailed analysis of all of the projects alternatives. The DEIS contains all information learned about the impacts of a project and alternatives.
Earmark	A federal budgetary term that refers to the specific designation by Congress that part of a more general lump-sum appropriation be used for a particular project; the earmark can be designated as a minimum and/or maximum dollar amount.
Effects	Effects include ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. Effects include: (1) direct effects that are caused by the action and occur at the same time and place, and (2) indirect effects that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use; population density or growth rate; and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8).
Electrical Multiple Unit (EMU)	The EMU is heavier than a light rail vehicle, but it is powered in the same way by an overhead electrical system.
EmX	Lane Transit District’s Bus Rapid Transit System, pronounced “MX,” short for Emerald Express.
Environmental Assessment (EA)	A report subject to the requirements of the National Environmental Policy Act (NEPA) demonstrating that an Environmental Impact Statement (EIS) is not needed for a specific set of actions. The EA can lead to a Finding of No Significant Impact (FONSI).

Table A-2. Terms

Terms	Definitions
Environmental Impact Statement (EIS)	A comprehensive study of likely environmental impacts resulting from major federally-assisted projects; EISs are required by the National Environmental Policy Act.
Environmental Justice	A formal federal policy on environmental justice was established in February 1994 with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations." There are three fundamental environmental justice principles: • To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations. • To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process. • To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.
Envision Eugene	The City of Eugene's Comprehensive Plan (latest draft or as adopted). Envision Eugene includes a determination of the best way to accommodate the community's projected needs over the next 20 years.
Evaluation Criteria	Evaluation criteria are the factors used to determine how well each of the proposed multimodal alternatives would meet the project's Goals and Objectives. The Evaluation Criteria require a mix of quantitative data and qualitative assessment. The resulting data are used to measure the effectiveness of proposed multimodal alternatives and to assist in comparing and contrasting each of the alternatives to select a preferred alternative.
Exclusive Right of Way	A roadway or other facility that can only be used by buses or other transit vehicles.
Fatal Flaw Screening	The purpose of a Fatal Flaw Screening is to identify alternatives that will not work for one reason or another (e.g., environmental, economic, community). By using a Fatal Flaw Screening process to eliminate alternatives that are not likely to be viable, a project can avoid wasting time or money studying options that are not viable and focus on alternatives and solutions that have the greatest probability of meeting the community's needs (e.g., environmentally acceptable, economically efficient, implementable).
Finding of No Significant Impact (FONSI)	A document prepared by a federal agency showing why a proposed action would not have a significant impact on the environment and thus would not require preparation of an Environmental Impact Statement (EIS). A FONSI is based on the results of an Environmental Assessment (EA).
Fixed Guideway System	A system of vehicles that can operate only on its own guideway constructed for that purpose (e.g., rapid rail, light rail). Federal usage in funding legislation also includes exclusive right of way bus operations, trolley coaches, and ferryboats as "fixed guideway" transit.

Table A-2. Terms

Terms	Definitions
Fixed Route	Service provided on a repetitive, fixed-schedule basis along a specific route with vehicles stopping to pick up and deliver passengers at set stops and stations; each fixed-route trip serves the same origins and destinations, unlike demand responsive and taxicabs.
Geographic Information System (GIS)	A data management software tool that enables data to be displayed geographically (i.e., as maps).
Goals and Objectives	Goals and objectives define the project's desired outcome and reflect community values. Goals and objectives build from the project's Purpose and Need Statement. • Goals are overarching principles that guide decision making. Goals are broad statements. • Objectives define strategies or implementation steps to attain the goals. Unlike goals, objectives are specific and measurable.
Guideway	A transit right of way separated from general purpose vehicles.
Headway	Time interval between vehicles passing the same point while moving in the same direction on a particular route.
Heritage Tree	The C*ity of Eugene Urban Forest Management Plan* (City of Eugene Public Works Department Maintenance Division, 1992) defines "Heritage Trees" as: "Any tree of exceptional value to our community based on its size (relative to species), history, location, or species, or any combination of these criteria." Such a tree cannot be removed "except when otherwise necessary for the public health, safety, or welfare."
Hydrology	Refers to the flow of water including its volume, where it drains, and how quickly it flows.
Impacts	A term to describe the positive or negative effects upon the natural or built environments as a result of an action (i.e., project).
In-vehicle Travel Time	The amount of time it takes for a transit vehicle to travel between an origin and a destination.
In-vehicle Walk and Wait Travel Time	The amount of in-vehicle travel time plus time spent walking to transit, initial wait time, transfer wait time (if any), and time walking from transit to the destination.
Independent Utility	A project or section of a larger project that would be a usable and reasonable expenditure even if no other projects or sections of a larger project were built and/or improved.
Industrial	I-2 and I-3
Institution	PL and PRO
Intergovernmental Agreement	A legal pact authorized by state law between two or more units of government, in which the parties contract for, or agree on, the performance of a specific activity through either mutual or delegated provision.

Table A-2. Terms

Terms	Definitions
Intermodal	Those issues or activities that involve or affect more than one mode of transportation, including transportation connections, choices, cooperation, and coordination of various modes. Also known as "multimodal."
Jefferson Westside Special Area Zone	S-JW
Joint Development	Ventures undertaken by the public and private sectors for development of land around transit stations or stops.
Key Transit Corridors	Key Transit Corridors are mapped in Envision Eugene and are anticipated to be significant transit corridors for the City and the region
Kiss & Ride	A place where commuters are driven and dropped off at a station to board a public transportation vehicle.
Land and Water Conservation Fund (LWCF) Act of 1965	16 U.S.C. 4601-4 et seq. The Land and Water Conservation Fund (LWCF) State Assistance Program was established by the LWCF Act of 1965 to stimulate a nationwide action program to assist in preserving, developing, and providing assurance to all citizens of the United States (of present and future generations) such quality and quantity of outdoor recreation resources as may be available, necessary, and desirable for individual active participation. The program provides matching grants to states and through states to local units of government, for the acquisition and development of public outdoor recreation sites and facilities.
Landscape Tree	A living, standing, woody plant having a trunk that exists on private property.
Lane Regional Air Protection Agency (LRAPA)	LRAPA is responsible for achieving and maintain clean air in Lane County using a combination of regulatory and non-regulatory methods
Layover Time	Time built into a schedule between arrival at the end of a route and the departure for the return trip, used for the recovery of delays and preparation for the return trip.
Lead Agency	The organization that contracts and administers a study. For transit projects, FTA would typically fill this role. The lead agency has the final say about the project's purpose and need, range of alternatives to be considered, and other procedural matters.
Level of Detail	The amount of data collected, and the scale, scope, extent, and degree to which item-by-item particulars and refinements of specific points are necessary or desirable in carrying out a study.
Level of Service (LOS)	LOS is a measure used by traffic engineers to determine the effectiveness of elements of transportation infrastructure. LOS is most commonly used to analyze highways, but the concept has also been applied to intersections, transit, and water supply.

Table A-2. Terms

Terms	Definitions
Light Rail Transit (LRT)	Steel wheel/steel rail transit constructed on city streets, semi-private right of way, or exclusive private right of way. Formerly known as "streetcar" or "trolley car" service, LRT's major advantage is operation in mixed street traffic at grade. LRT vehicles can be coupled into trains, which require only one operator and often are used to provide express service.
Limited (or Controlled) Access	Restricted entry to a transportation facility based upon facility congestion levels or operational condition. For example, a limited access roadway normally would not allow direct entry or exit to private driveways or fields from said roadway.
Liquefaction	A phenomenon associated with earthquakes in which sandy to silty, water saturated soils behave like fluids. As seismic waves pass through saturated soil, the structure of the soil distorts, and spaces between soil particles collapse, causing ground failure.
Liquefied Natural Gas (LNG)	An alternative fuel; a natural gas cooled to below its boiling point of 260 degrees Fahrenheit so that it becomes a liquid; stored in a vacuum bottle-type container at very low temperatures and under moderate pressure. LNG vapor is lighter than air.
Local Streets	Local streets have the sole function of providing direct access to adjacent land. Local streets are deliberately designed to discourage through-traffic movements.
Locally Preferred Alternative (LPA)	The LPA is the alternative selected through the Alternatives Analysis process completed prior to or concurrent with National Environmental Policy Act analysis. This term is also used to describe the proposed action that is being considered for New Starts or Small Starts funds.
Low-Income Persons	Those whose median household income is at or below the Department of Health and Human Services poverty guidelines. For a four-person household with two related children, the poverty threshold is $24,300 (year 2016 dollars).
Maintenance area	An air quality designation for a geographic area in which levels of a criteria air pollutant meet the health-based primary standard (national ambient air quality standard, or NAAQS) for the pollutant. An area may have on acceptable level for one criteria air pollutant, but may have unacceptable levels for others. Maintenance/attainment areas are defined using federal pollutant limits set by EPA.
Maintenance facility	A facility along a corridor used to clean, inspect, repair and maintain bus vehicles, as well as to store them when they are not in use.
Major Arterial	Major arterial streets should serve to interconnect the roadway system of a city. These streets link major commercial, residential, industrial, and institutional areas. Major arterial streets are typically spaced about one mile apart to assure accessibility and reduce the incidence of traffic using collectors or local streets for through traffic in lieu of a well-placed arterial street. Access control, such as raised center medians, is a key feature of an arterial route. Arterials are typically multiple miles in length.

Table A-2. Terms

Terms	Definitions
Major Investment Study (MIS)	An alternatives analysis study process for proposed transportation investments in which a wide range of alternatives is examined to produce a smaller set of alternatives that best meet project transportation needs. The purpose of the study is to provide a framework for developing a package of potential solutions that can then be further analyzed during an Environmental Impact Statement process.
Metro Plan Designations	Commercial, Commercial / Mixed Use, Government and Education, Heavy Industrial, High Density Residential / Mixed-Use, High Density Residential, Light-Medium Industrial, Low Density Residential, Medium Density Residential, Medium Density Residential / Mixed-Use, Mixed-Use, Parks and Open Space, Major Retail Center, Campus Industrial, University Research
Metropolitan Planning Organization (MPO)	The organization designated by local elected officials as being responsible for carrying out the urban transportation and other planning processes for an area.
Minimum Operable Segment	A stand-alone portion of the alternative alignment that has independent utility, allowed by FTA to be considered as interim termini for a project. A minimum operable segment (MOS) provides flexibility to initiate a project with available funding while pursuing additional funding to complete the remainder of the project.
Minor Arterial	A minor arterial street system should interconnect with and augment the urban major arterial system and provide service to trips of moderate length at a somewhat lower level of travel mobility than major arterials. This system also distributes travel to geographic areas smaller than those identified with the higher system. The minor arterial street system includes facilities that allow more access and offer a lower traffic mobility. Such facilities may carry local bus routes and provide for community trips, but ideally should not be located through residential neighborhoods.
Minority	A person who is one or more of the following: • Black: a person having origins in any of the black racial groups of Africa • Hispanic or Latino: a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race • Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent • American Indian and Alaskan Native: a person having origins in any of the original people of North America, South America (including Central America), and who maintains cultural identification through tribal affiliation or community recognition • Native Hawaiian and Other Pacific Islander: a person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands
Mitigation	A means to avoid, minimize, rectify, or reduce an impact, and in some cases, to compensate for an impact.
Mixed-Use	C-1, C-2, GO, S-C, S-CN, S-DR, S-DW, S-E, S-F, S-HB, S-JW, S-RN, S-W, and S-WS

Table A-2. Terms

Terms	Definitions
Modal Split	A term that describes how many people use different forms of transportation. Frequently used to describe the percentage of people using private automobiles as opposed to the percentage using public transportation, walking, or biking. Modal split can also be used to describe travelers using other modes of transportation. In freight transportation, modal split may be measured in mass.
Mode	A particular form or method of travel distinguished by vehicle type, operation technology, and right of way separation from other traffic.
Moving Ahead for Progress in the 21st Century (MAP-21)	Moving Ahead for Progress in the 21st Century (MAP-21) was signed by President Obama on July 6, 2012, reauthorizing surface transportation programs through FY 2014. It includes new and revised program guidance and regulations with planning requirements related to public participation, publication, and environmental considerations.
MovingAhead Project	The City of Eugene and LTD are working with regional partners and the community to determine which improvements are needed on some of our most important transportation corridors for people using transit, and facilities for people walking and biking. MovingAhead will prioritize transit, walking, and biking projects along these corridors so that they can be funded and built in the near-term. The project will focus on creating active, vibrant places that serve the community and accommodate future growth. During Phase 1, currently underway, the community will weigh in on preferred transportation solutions for each corridor and help prioritize corridors for implementation. When thinking about these important streets, LTD and the City of Eugene refer to them as corridors because several streets may work as a system to serve transportation needs.
Multi-Family Residential	R-2 and R-3
Multimodal	Multimodal refers to various modes. For the MovingAhead project, multimodal refers to Corridors that support various transportation modes including vehicles, buses, walking and cycling.
National Environmental Policy Act of 1969 (NEPA)	A comprehensive federal law requiring analysis of the environmental impacts of federal actions such as the approval of grants; also requiring preparation of an Environmental Impact Statement for every major federal action significantly affecting the quality of the human environment.
New Starts	Federal funding granted under Section 3(i) of the Federal Transit Act. These discretionary funds are made available for construction of a new fixed guideway system or extension of any existing fixed guideway system, based on cost-effectiveness, alternatives analysis results, and the degree of local financial commitment.
No Action or No-Build Alternative	An alternative that is used as the basis to measure the impacts and benefits of the other alternative(s) in an environmental assessment or other National Environmental Policy Act action. The No-Build Alternative consists of the existing conditions, plus any improvements that have been identified in the Statewide Transportation Improvement Program.

Table A-2. Terms

Terms	Definitions
Nonattainment Area	Any geographic region of the United States that the U.S. Environmental Protection Agency (EPA) has designated as not attaining the federal air quality standards for one or more air pollutants, such as ozone and carbon monoxide.
Notice of Intent	A federal announcement, printed in the *Federal Register*, advising interested parties that an Environmental Impact Statement will be prepared and circulated for a given project
Off-Peak Period	Non-rush periods of the day when travel activity is generally lower and less transit service is scheduled. Also called "base period."
Office	E-1 and E-2
Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP)	The 2013-2017 Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP), entitled *Ensuring Oregon's Outdoor Legacy* (OPRD, No Date), constitutes Oregon's basic 5-year plan for outdoor recreation. The plan guides the use of LWCF funds that come into the state; provides guidance for other OPRD-administered grant programs; and provides recommendations to guide federal, state, and local units of government, as well as the private sector, in making policy and planning decisions.
Park and Ride	Designated parking areas for automobile drivers who then board transit vehicles from these locations.
Participating Agency	A federal or non-federal agency that may have an interest in the project. These agencies are identified and contacted early-on in the project with an invitation to participate in the process. This is a broader category than "cooperating agency" (see Cooperating Agency).
Passenger Miles	The total number of miles traveled by passengers on transit vehicles; determined by multiplying the number of unlinked passenger trips times the average length of their trips.
Peak Hour	The hour of the day in which the maximum demand for transportation service is experienced (refers to private automobiles and transit vehicles).
Peak Period	Morning and afternoon time periods when transit riding is heaviest.
Peak/Base Ratio	The number of vehicles operated in passenger service during the peak period divided by the number operated during the base period.
Place-miles	Place-miles refers to the total carrying capacity (seated and standing) of each bus and is calculated by multiplying vehicle capacity of each bus by the number of service miles traveled each day. Place-miles highlight differences among alternatives caused by a different mix of vehicles and levels of service.
Preferred Alternative	An alternative that includes a major capital improvement project to address the problem under investigation. As part of the decision making process, the Preferred Alternative is compared against the No Action or No-Build Alternative from the standpoints of transportation performance, environmental consequences, cost-effectiveness, and funding considerations.

Table A-2. Terms

Terms	Definitions
Purpose and Need	The project Purpose and Need provides a framework for developing and screening alternatives. The purpose is a broad statement of the project's transportation objectives. The need is a detailed explanation of existing conditions that need to be changed or problems that need to be fixed.
Queuing	Occurs when traffic lanes cannot fit all the vehicles trying to use them, or if the line at an intersection extends into an upstream intersection.
Record of Decision (ROD)	A decision made by FTA as to whether the project sponsor receives federal funding for a project. The Record of Decision follows the Draft EIS and Final EIS.
Regulatory Agency	An agency empowered to issue or deny permits.
Resource Agency	A federal or state agency or commission that has jurisdictional responsibilities for the management of a resource such as plants, animals, water, or historic sites.
Revenue Hours	Hours of transit service available for carrying paying riders.
Ridership	The number of people using a public transportation system in a given time period.
Ridesharing	A form of transportation, other than public transit, in which more than one person shares the use of the vehicle, such as a van or car, to make a trip. Also known as "carpooling" or "vanpooling."
Right of Way	Publicly owned land that can be acquired and used for transportation purposes.
Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU)	SAFETEA-LU was passed by Congress July 29, 2005, and signed by the President August 10, 2005. Includes new and revised program guidance and regulations (approximately 15 rulemakings) with planning requirements related to public participation, publication, and environmental considerations. SAFETEA-LU covers FY 2005 through FY 2009 with a total authorization of $45.3 billion.
Scoping	A formal coordination process used to determine the scope of the project and the major issues likely to be related to the proposed action (i.e., project).
Screening Criteria	Criteria used to compare alternatives.
Section 4(f) of the Department of Transportation Act of 1966	23 U.S.C. 138 and 49 U.S.C. 303. Parks are subject to evaluation in the context of Section 4(f) of the Department of Transportation Act of 1966, which governs the use of publicly-owned/open to the public park and recreation lands, government-owned wildlife lands, and historic resources.
Section 4(f) resources	(i) any publicly owned land in a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or (ii) any land from a historic site of national, state, or local significance

Table A-2. Terms

Terms	Definitions
Section 6(f) of the LWCF Act of 1965	The LWCF's most important tool for ensuring long-term stewardship is its "conversion protection" requirement. Section 6(f)(3) strongly discourages conversions of state and local park, and recreational facilities to other uses. Conversion of property acquired or developed with assistance under the program requires approval of the Department of Interior's National Park Service (NPS) and substitution of other recreational properties of at least equal fair market value, and of reasonably equivalent usefulness and location.
Section 106	Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies take into account the effect of government-funded construction projects on property that is included in, or eligible for inclusion in, the NRHP.
Shuttle	A public or private vehicle that travels back and forth over a particular route, especially a short route or one that provides connections between transportation systems, employment centers, etc.
Single-Family Residential	R-1
Special Area Zone (Non-Mixed Use)	S-H and S-RP
Springfield 2030	Currently underway, this update to the City of Springfield's Comprehensive Plan will guide and support attainment of the community's livability and economic prosperity goals and redevelopment priorities.
Springfield Transportation System Plan (TSP)	The City of Springfield's Transportation System Plan looks at how the transportation system is currently used and how it should change to meet the long-term (20-year) needs of the City of Springfield's residents, businesses, and visitors. The Plan, which identifies improvements for all modes of transportation, will serve as the City of Springfield's portion of the Regional Transportation System Plan prepared by Lane Council of Governments (LCOG). It was prepared in coordination with Oregon Department of Transportation, LCOG, and the Oregon Department of Land Conservation and Development. The TSP was adopted March 11, 2014.
State Implementation Plan (SIP)	A state plan mandated by the Clean Air Act Amendments of 1990 that contains procedures to monitor, control, maintain, and enforce compliance with national standards for air quality.
Strategy	An intended action or series of actions which when implemented achieves the stated goal.
Street Tree	A living, standing, woody plant having a trunk that exists in the public right of way.
Study Area	The area within which evaluation of impacts is conducted. The study area for particular resources will vary based on the decisions being made and the type of resource(s) being evaluated.
Throughput	The number of users being served at any time by the transportation system.

Table A-2. Terms

Terms	Definitions
Title VI	This Title declares it to be the policy of the United States that discrimination on the ground of race, color, or national origin shall not occur in connection with programs and activities receiving federal financial assistance and authorizes and directs the appropriate federal departments and agencies to take action to carry out this policy.
Transit Oriented Development (TOD) or Nodal Development	A strategy to build transit ridership, while discouraging sprawl, improving air quality and helping to coordinate a new type of community for residents. TODs are compact, mixed-use developments situated at or around transit stops. Sometimes referred to as Transit Oriented Communities, or Transit Villages.
Transit System	An organization (public or private) providing local or regional multi-occupancy-vehicle passenger service. Organizations that provide service under contract to another agency are generally not counted as separate systems.
Transitway	A Bus Rapid Transit (BRT) priority lane generally with a concrete lane, with or without concrete tracks with grass-strip divider, and a curb separation, traversable by general-purpose vehicles at signalized intersections.
Transportation Demand Management (TDM)	Strategies to attempt to reduce peak period automobile trips by encouraging the use of high occupancy modes through commuter assistance, parking incentives, and work policies that alter the demand for travel in a defined area in terms of the total volume of traffic, the use of alternative modes of travel, and the distribution of travel over different times of the day.
Transportation Improvement Program (TIP)	A program of intermodal transportation projects, to be implemented over several years, growing out of the planning process and designed to improve transportation in a community. This program is required as a condition of a locality receiving federal transit and highway grants.
Travel Shed	Synonymous with “corridor” (see Corridor). A subarea in which multiple transportation facilities are experiencing congestion, safety, or other problems.
urban plaza	An urban plaza is a place that can be used for socializing, relaxation, and/or events.
v/c ratio	Used as a principal measure of congestion. The “v” represents the volume or the number of vehicles that are using the roadway at any particular period. The “c” represents the capacity of a roadway at its adopted level of service (LOS). If the volume exceeds the capacity of the roadway (volume divided by capacity exceeds 1.00), congestion exists.
Vehicle Hours of Delay	Cumulative delay experiences by transit vehicles during high traffic periods.
Water Quality	Refers to the characteristics of the water, such as its temperature and oxygen levels, how clear it is, and whether it contains pollutants.
Whiteaker Special Area Zone	S-W

Appendix B: Construction Activities and Methods

General Construction Methods

The following section describes how construction of the Locally Preferred Alternative (LPA) would likely be staged and sequenced. This description is based on Lane Transit District's (LTD's) experience with the Franklin, Gateway, and West Eugene EmX Corridors. The final plan for construction methods, sequencing, and staging will be determined in coordination with the contractor and permitting authorities.

Utility work will generally be completed before the transportation infrastructure is constructed. Utility work, often conducted by local utility companies, occurs separately from project-related construction. After completing required utility relocation and other preparatory site work, the contractor will begin with construction of new transit lanes, bike lanes, sidewalks, and any other "flatwork." The contractor will modify existing signals or construct new traffic signals as part of this work. In some cases, the contractor may construct the signal footings but install signal arms after initial work is complete. Flatwork for stations, including curbs, ramps, and station footings, will be completed as the work progresses along the alignment. Streets and street segments will be restored to normal operations after this work is complete. The contractor is expected to progress approximately two blocks every two 2 weeks, with additional time required –- up to two 2 weeks –- for each enhanced stop or EmX station. Additional time will be required at intersections that require new or substantially modified traffic signals. The construction sequencing will be determined through coordination between the contractor and local residents, businesses, and property owners regarding construction scheduling preferences. It is expected that, for each major segment, the work would start at one end of the segment and progress to the other end of the segment. All flatwork is expected to be completed in two construction seasons.

Stations will be fabricated during the second construction season and installed during the subsequent (final) construction season, along with landscaping, fare machines, real-time passenger information, enhanced stop or EmX station amenities, and other similar items.

The contractor and LTD will coordinate closely with the Oregon Department of Transportation (ODOT) and with the City of Eugene (as appropriate to the jurisdiction) on traffic control. Depending on the segment, ODOT or the City will review and approve traffic plans for construction.

On streets with multiple lanes in each direction (or multiple lanes in one direction for one-way streets), at least one lane of traffic will be open at all times. Flaggers will coordinate travel at intersections and other points of congestion, as necessary. On streets with a single lane, it may be necessary to close one direction of traffic for certain periods. In those situations, flaggers will be used to manage the traffic flow safely. The contractor and LTD will also coordinate with businesses to ensure that the project maintains access for patrons and deliveries.

Coordination with Businesses and Residents

LTD's Franklin, Gateway, and West Eugene EmX projects demonstrated LTD's commitment to communicating with impacted businesses, residences, and travelers, both before and during construction. As with those projects, LTD will contact all businesses and residents along the alignment well before construction begins to solicit local concerns, issues, and scheduling preferences. Businesses and residents will also be able to communicate with the contractor and LTD during construction. LTD's construction liaison will provide e-mail updates and serve as an ongoing point of contact to address

concerns and to provide information to affected businesses, residents, and other interested persons. LTD will provide a 24-hour hotline to quickly address construction concerns from businesses and residences.

LTD will also work to enhance activity at businesses affected by construction. This can be done through attractive signage, direct communications with the public (e.g., direct mail and advertising), and community events (e.g., street fairs). These techniques succeeded in keeping business areas active during previous EmX projects.

Appendix C: Cost Estimates by Corridor Alternative

Table C-1. Cost Estimate – Highway 99 Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *8.17*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Exclusive Guideway Costs (SCC 10.01)					
1	Curb, Gutter, and Enclosed Drainage	lf	2,600	$235.00	$611,000
2	New Roadway Asphalt	ft^2	14,000	$10.00	$140,000
3	New Roadway Concrete	ft^2	22,000	$15.00	$330,000
4	Overlay Existing Roadway	ft^2	99,000	$2.50	$247,500
5	Thermoplastic Pavement Striping	lf	10,000	$1.00	$10,000
6	Concrete Islands	ft^2	2,000	$12.00	$24,000
7	Remove Existing Curb and Drainage	lf	2,600	$10.00	$26,000
				Subtotal	**$1,388,500**
Semi-exclusive Guideway Costs (SCC 10.02)					
1	Curb, Gutter, and Enclosed Drainage	lf	1,200	$235.00	$282,000
2	New Roadway Asphalt	ft^2	3,200	$10.00	$32,000
3	New Roadway Concrete	ft^2	13,000	$15.00	$195,000
4	Overlay Existing Roadway	ft^2	26,000	$2.50	$65,000
5	Thermoplastic Pavement Striping	lf	2,100	$1.00	$2,100
6	Concrete Islands	ft^2	1,800	$12.00	$21,600
7	Remove Existing Curb and Drainage	lf	1,200	$10.00	$12,000
				Subtotal	**$609,700**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	Curb, Gutter, and Enclosed Drainage	lf	5,200	$235.00	$1,222,000
2	New Roadway Asphalt	ft^2	12,000	$10.00	$120,000
3	Overlay Existing Roadway	ft^2	9,000	$2.50	$22,500
4	Remove Existing Curb and Drainage	lf	5,200	$10.00	$52,000
5	Concrete Islands	ft^2	1,500	$12.00	$18,000
6	Thermoplastic Pavement Striping	lf	13,000	$1.00	$13,000
				Subtotal	**$1,447,500**
Station Costs (SCC 20.01)					
1	Bus Pad	each	17	$11,000.00	$187,000
2	Enhanced Corridor Station	each	20	$80,000.00	$1,600,000
				Subtotal	**$1,787,000**

Table C-1. Cost Estimate – Highway 99 Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *8.17*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Sitework Costs (SCC 40.06)					
1	Illumination	mile	1	$143,000.00	$143,000
2	ADA Ramp	each	68	$5,000.00	$340,000
3	Landscaping	mile	1	$58,800.00	$58,800
4	Concrete Sidewalk	ft^2	120,000	$9.00	$1,080,000
5	New RRFB	each	9	$47,000.00	$423,000
6	Retaining Wall (H ≥ 4')	ft^2	7,710	$75.00	$578,250
7	Bridges	ft^2	8,400	$185.00	$1,554,000
				Subtotal	**$4,177,050**
Systems Costs (SCC 50)					
1	New Signal	each	7	$375,000.00	$2,625,000
2	Remove Existing Signal	each	7	$25,000.00	$175,000
2	Modify Signal	each	9	$75,000.00	$675,000
				Subtotal, SCC 50.02	**$3,475,000**
Support Facilities (SCC 40)					
1	Operator Break Facility	each	1	$350,000.00	$350,000
				Subtotal, SCC 30	**$350,000**
				Subtotal, All Construction	***$13,180,750***

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$264,700
Traffic Control	5.0 to 10.0%	10.0%	$1,323,500
Mobilization	8.0 to 10.0%	8.0%	$1,058,800
Erosion Control	0.5 to 2.0%	1.5%	$198,500
		Subtotal, SCC 40.08	**$2,845,500**
Utility Relocation	10 to 20%	10.0%	$1,323,500
		Total Construction Cost	***$17,403,750***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	0	$1,025,000.00	$0
Environmental Mitigation, SCC 40.04	1 to 5%	3%		$397,042
Easements and ROW Acquisition	ft^2	57,248	$60.00	$3,434,880
ROW Acquisition Indirect Costs	each	44	$17,000.00	$748,000
			Subtotal, SCC 60.01	**$4,182,880**

Table C-1. Cost Estimate – Highway 99 Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *8.17*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$2,600,000
Agency Administration	15 to 30%	15.0%	$2,600,000
Construction Engineering	10 to 15%	10.0%	$1,700,000
Total Pre-Contingency Cost			$28,811,053

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$3,445,700	$689,140	$4,134,840
Stations	25%	$1,787,000	$446,750	$2,233,750
Systems	30%	$3,475,000	$1,042,500	$4,517,500
Sitework	35%	$9,093,093	$3,182,582	$12,275,675
Right of Way	20%	$4,182,880	$836,576	$5,019,456
Vehicles	10%	$0	$0	$0
Professional Services	15%	$6,900,000	$1,035,000	$7,935,000
			Total Applied Contingency Cost	***$36,116,221***
			5% Unallocated Contingency	***$1,805,811***
			TOTAL PROJECT COST	***$38,000,000***

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Table C-2. Cost Estimate – Highway 99 Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *7.83*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Exclusive Guideway Costs (SCC 10.01)					
1	Curb, Gutter, and Enclosed Drainage	lf	3,600	$235.00	$846,000
2	New Roadway Asphalt	ft^2	20,000	$10.00	$200,000
3	New Roadway Concrete	ft^2	16,000	$15.00	$240,000
4	Overlay Existing Roadway	ft^2	190,000	$2.50	$475,000
5	Thermoplastic Pavement Striping	lf	20,000	$1.00	$20,000
6	Concrete Islands	ft^2	1,300	$12.00	$15,600
7	Remove Existing Curb and Drainage	lf	3,600	$10.00	$36,000
				Subtotal	**$1,832,600**
Semi-exclusive Guideway Costs (SCC 10.02)					
1	Curb, Gutter, and Enclosed Drainage	lf	2,000	$235.00	$470,000
2	New Roadway Asphalt	ft^2	0	$10.00	$0
3	New Roadway Concrete	ft^2	27,000	$15.00	$405,000
4	Overlay Existing Roadway	ft^2	120,000	$2.50	$300,000
5	Thermoplastic Pavement Striping	lf	9,800	$1.00	$9,800
6	Concrete Islands	ft^2	3,700	$12.00	$44,400
7	Remove Existing Curb and Drainage	lf	2,000	$10.00	$20,000
				Subtotal	**$1,249,200**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	Curb, Gutter, and Enclosed Drainage	lf	1,700	$235.00	$399,500
2	New Roadway Asphalt	ft^2	41,000	$10.00	$410,000
3	Overlay Existing Roadway	ft^2	580,000	$2.50	$1,450,000
4	Remove Existing Curb and Drainage	lf	1,700	$10.00	$17,000
5	Concrete Islands	ft^2	2,600	$12.00	$31,200
6	Thermoplastic Pavement Striping	lf	89,000	$1.00	$89,000
				Subtotal	**$2,396,700**
Station Costs (SCC 20.01)					
1	Bus Pad	each	9	$11,000.00	$99,000
2	EmX Station	each	14	$350,000.00	$4,900,000
				Subtotal	**$4,999,000**

Table C-2. Cost Estimate – Highway 99 Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *7.83*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Sitework Costs (SCC 40.06)					
1	Illumination	mile	8	$143,000.00	$1,151,963
2	ADA Ramp	each	86	$5,000.00	$430,000
3	Landscaping	mile	8	$58,800.00	$473,674
4	Concrete Sidewalk	ft^2	99,000	$9.00	$891,000
5	New RRFB	each	9	$47,000.00	$423,000
6	Retaining Wall	ft^2	11,300	$75.00	$847,500
7	Bridges	ft^2	8,400	$185.00	$1,554,000
				Subtotal	**$5,771,137**
Systems Costs (SCC 50)					
1	New Signal	each	7	$375,000.00	$2,625,000
2	Remove Existing Signal	each	7	$25,000.00	$175,000
2	Modify Signal	each	9	$75,000.00	$675,000
				Subtotal, SCC 50.02	**$3,475,000**
1	Communications Fiber	lf	30,000	$38.00	$1,140,000
Support Facilities (SCC 30)					
1	Operator Break Facility	each	1	$350,000.00	$350,000
				Subtotal, SCC 30	**$350,000**
				Subtotal, All Construction	***$21,213,637***

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$424,300
Traffic Control	5.0 to 10.0%	10.0%	$2,121,400
Mobilization	8.0 to 10.0%	8.0%	$1,697,100
Erosion Control	0.5 to 2.0%	1.5%	$318,200
		Subtotal, SCC 40.08	**$4,561,000**
Utility Relocation	10 to 20%	10.0%	$2,121,400
		Total Construction Cost	***$27,825,037***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	5	$1,100,000.00	$5,500,000
Environmental Mitigation, SCC 40.04	1 to 5%	5%		$1,060,682
Easements and ROW Acquisition	ft^2	68,258	$60.00	$4,095,480
ROW Acquisition Indirect Costs	each	43	$17,000.00	$731,000
			Subtotal, SCC 60.01	**$4,826,480**

Table C-2. Cost Estimate – Highway 99 Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *7.83*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$4,200,000
Agency Administration	15 to 30%	15.0%	$4,200,000
Construction Engineering	10 to 15%	10.0%	$2,800,000
		Total Pre-Contingency Cost	***$50,483,198***

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$5,478,500	$1,095,700	$6,574,200
Stations	25%	$4,999,000	$1,249,750	$6,248,750
Systems	30%	$4,615,000	$1,384,500	$5,999,500
Sitework	35%	$14,711,718	$5,149,101	$19,860,820
Right of Way	20%	$4,826,480	$965,296	$5,791,776
Vehicles	10%	$5,500,000	$550,000	$6,050,000
Professional Services	15%	$11,200,000	$1,680,000	$12,880,000
			Total Applied Contingency Cost	***$63,405,046***
			5% Unallocated Contingency	***$3,170,252***
			TOTAL PROJECT COST	***$67,000,000***

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Table C-3. Cost Estimate – River Road Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *7.06*
Prepared by: *Adrianna Stanley*
Date: *8/25/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Semi-exclusive Guideway Costs (SCC 10.02)					
1	New Roadway Concrete	ft^2	27,000	$15.00	$405,000
2	New Roadway Asphalt	ft^2	21,000	$10.00	$210,000
3	Overlay Existing Roadway	ft^2	36,000	$2.50	$90,000
4	Concrete Islands	ft^2	2,800	$12.00	$33,600
5	Remove Existing Curb and Drainage	lf	1,500	$10.00	$15,000
6	Curb, Gutter, and Enclosed Drainage	lf	1,500	$235.00	$352,500
7	Thermoplastic Pavement Striping	lf	3,900	$1.00	$3,900
				Subtotal	**$1,106,100**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	New Roadway Asphalt	ft^2	11,000	$10.00	$110,000
2	Concrete Islands	ft^2	1,600	$12.00	$19,200
3	Curb, Gutter, and Enclosed Drainage	lf	2,700	$235.00	$634,500
4	Remove Existing Curb and Drainage	lf	2,700	$10.00	$27,000
5	Thermoplastic Pavement Striping	lf	1,300	$1.00	$1,300
				Subtotal	**$792,000**
Station Costs (SCC 20.01)					
1	Enhanced Corridor Station	each	27	$80,000.00	$2,160,000
2	Bus Pad	each	24	$11,000.00	$264,000
				Subtotal	**$2,424,000**
Sitework Costs (SCC 40.06)					
1	Concrete Sidewalk	ft^2	45,000	$9.00	$405,000
2	Illumination	mile	0	$143,000.00	$27,002
3	Landscaping	mile	0	$58,800.00	$11,103
4	Modify Signal	each	14	$75,000.00	$1,050,000
5	New RRFB	each	6	$47,000.00	$282,000
6	ADA Ramp	each	24	$5,000.00	$120,000
				Subtotal	**$1,895,105**
Systems Costs (SCC 50)					
8	New Signal	each	1	$375,000.00	$375,000
9	Remove Existing Signal	each	1	$25,000.00	$25,000
7	Modify Signal	each	13	$75,000.00	$975,000
				Subtotal, SCC 50.02	**$1,375,000**
				Subtotal, All Construction	***$7,592,205***

Table C-3. Cost Estimate – River Road Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *7.06*
Prepared by: *Adrianna Stanley*
Date: *8/25/2016*

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$151,800
Traffic Control	5.0 to 10.0%	10.0%	$759,200
Mobilization	8.0 to 10.0%	8.0%	$607,400
Erosion Control	0.5 to 2.0%	1.5%	$113,900
		Subtotal, SCC 40.08	**$1,632,300**
Utility Relocation	10 to 20%	10.0%	$759,200
		Total Construction Cost	***$9,983,705***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	0	$1,025,000	$0
Environmental Mitigation, SCC 40.04	1 to 5%	3%		$227,766
Easements and ROW Acquisition	ft^2	12,430	$60	$745,800
ROW Acquisition Indirect Costs	each	5	$17,000	$85,000
Potential Full Acquisition Indirect Costs	each	4	$20,000	$80,000
Potential Full Acquisition	ft^2	52,018	$60	$3,121,080
			Subtotal, SCC 60.01	**$4,031,880**

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$1,500,000
Agency Administration	15 to 30%	15.0%	$1,500,000
Construction Engineering	10 to 15%	10.0%	$1,000,000
		Total Pre-Contingency Cost	$18,24351

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$1,898,100	$379,620	$2,277,720
Stations	25%	$2,424,000	$606,000	$3,030,000
Systems	30%	$1,375,000	$412,500	$1,787,500
Sitework	35%	$4,514,371	$1,580,030	$6,094,401
Right of Way	20%	$4,031,880	$806,376	$4,838,256
Vehicles	10%	$0	$0	$0
Professional Services	15%	$4,000,000	$600,000	$4,600,000
			Total Applied Contingency Cost	***$22,627,877***
			5% Unallocated Contingency	***$1,131,394***
			TOTAL PROJECT COST	***$24,000,000***

Table C-3. Cost Estimate – River Road Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *7.06*
Prepared by: *Adrianna Stanley*
Date: *8/25/2016*

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Table C-4. Cost Estimate – River Road Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.86*
Prepared by: *Adrianna Stanley*
Date: *8/25/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Exclusive Guideway Costs (SCC 10.01)					
1	New Roadway Concrete	ft^2	2,400	$15.00	$36,000
2	New Roadway Asphalt	ft^2	5,000	$10.00	$50,000
3	Curb, Gutter, and Enclosed Drainage	lf	340	$235.00	$79,900
4	Thermoplastic Pavement Striping	lf	770	$1.00	$770
5	Remove Existing Curb and Drainage	lf	340	$10.00	$3,400
				Subtotal	**$170,070**
Semi-exclusive Guideway Costs (SCC 10.02)					
1	New Roadway Concrete	ft^2	450,000	$15.00	$6,750,000
2	New Roadway Asphalt	ft^2	93,000	$10.00	$930,000
3	Overlay Existing Roadway	ft^2	310,000	$2.50	$775,000
4	Concrete Islands	ft^2	7,000	$12.00	$84,000
5	Curb, Gutter, and Enclosed Drainage	lf	3,300	$235.00	$775,500
6	Thermoplastic Pavement Striping	lf	92,000	$1.00	$92,000
7	Remove Existing Curb and Drainage	lf	3,300	$10.00	$33,000
				Subtotal	**$9,439,500**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	New Roadway Asphalt	ft^2	130,000	$10.00	$1,300,000
2	Thermoplastic Pavement Striping	lf	8,000	$1.00	$8,000
3	Curb, Gutter, and Enclosed Drainage	lf	2,300	$235.00	$540,500
4	Remove Existing Curb and Drainage	lf	2,300	$10.00	$23,000
				Subtotal	**$1,871,500**
Station Costs (SCC 20.01)					
1	EmX Station	each	22	$350,000.00	$7,700,000
2	Bus Pad	each	6	$11,000.00	$66,000
				Subtotal	**$7,766,000**
Sitework Costs (SCC 40.06)					
1	Illumination	mile	7	$143,000.00	$991,846
2	Landscaping	mile	7	$58,800.00	$407,836
3	Concrete Sidewalk	ft^2	58,284	$9.00	$524,556
4	ADA Ramp	each	124	$5,000.00	$620,000
5	New RRFB	each	3	$47,000.00	$141,000
6	Retaining Wall (H ≥ 4')	ft^2	1,930	$75.00	$144,750
				Subtotal	**$2,829,988**

Table C-4. Cost Estimate – River Road Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.86*
Prepared by: *Adrianna Stanley*
Date: *8/25/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Systems Costs (SCC 50)					
1	New Signal	each	3	$375,000.00	$1,125,000
2	Modify Signal	each	10	$75,000.00	$750,000
4	Remove Existing Signal	each	3	$25,000.00	$75,000
				Subtotal, SCC 50.02	**$1,950,000**
1	Communications Fiber	lf	19,000	$38.00	$722,000
				Subtotal, All Construction	***$33,584,808***

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$492,100
Traffic Control	5.0 to 10.0%	10.0%	$2,460,400
Mobilization	8.0 to 10.0%	8.0%	$1,968,300
Erosion Control	0.5 to 2.0%	1.5%	$369,100
		Subtotal, SCC 40.08	**$5,289,900**
Utility Relocation	10 to 20%	15.0%	$3,690,600
		Total Construction Cost	***$33,584,808***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	5	$1,100,000.00	$5,500,000
Environmental Mitigation, SCC 40.04	1 to 5%	2.5%		$839,620
Easements and ROW Acquisition	ft^2	31,451	$60.00	$1,887,060
ROW Acquisition Indirect Costs	each	39	$17,000.00	$663,000
Potential Full Acquisition Indirect Costs	each	5	$20,000	$80,000
Potential Full Acquisition	ft^2	72,829	$60	$4,369,740
			Subtotal, SCC 60.01	**$7,019,800**

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$5,000,000
Agency Administration	15 to 30%	15.0%	$5,000,000
Construction Engineering	10 to 15%	10.0%	$3,400,000
		Total Pre-Contingency Cost	***$54,004,608***

Table C-4. Cost Estimate – River Road Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.86*
Prepared by: *Adrianna Stanley*
Date: *8/25/2016*

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$11,481,070	$2,296,214	$13,777,284
Stations	25%	$7,766,000	$1,941,500	$9,707,500
Systems	30%	$2,672,000	$801,600	$3,473,600
Sitework	35%	$12,650,108	$4,427,538	$17,077,646
Right of Way	20%	$7,019,800	$1,403,960	$8,423,760
Vehicles	10%	$5,500,000	$550,000	$6,050,000
Professional Services	15%	$13,400,000	$2,010,000	$15,410,000
			Total Applied Contingency Cost	***$73,919,790***
			5% Unallocated Contingency	***$3,695,989***
			TOTAL PROJECT COST	***$78,000,000***

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Table C-5. Cost Estimate – 30th Avenue to Lane Community College Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.26*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Exclusive Guideway Costs (SCC 10.01)					
1	Curb, Gutter, and Enclosed Drainage	lf	0	$235.00	$0
2	New Roadway Asphalt	ft^2	0	$10.00	$0
3	New Roadway Concrete	ft^2	0	$15.00	$0
4	Overlay Existing Roadway	ft^2	0	$2.50	$0
5	Thermoplastic Pavement Striping	lf	0	$1.00	$0
6	Concrete Islands	ft^2	0	$12.00	$0
7	Remove Existing Curb and Drainage	lf	0	$10.00	$0
				Subtotal	**$0**
Semi-exclusive Guideway Costs (SCC 10.02)					
1	Curb, Gutter, and Enclosed Drainage	lf	0	$235.00	$0
2	New Roadway Asphalt	ft^2	0	$10.00	$0
3	New Roadway Concrete	ft^2	0	$15.00	$0
4	Overlay Existing Roadway	ft^2	0	$2.50	$0
5	Thermoplastic Pavement Striping	lf	0	$1.00	$0
6	Concrete Islands	ft^2	0	$12.00	$0
7	Remove Existing Curb and Drainage	lf	0	$10.00	$0
				Subtotal	**$0**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	Curb, Gutter, and Enclosed Drainage	lf	6,000	$235.00	$1,410,000
2	New Roadway Asphalt	ft^2	61,000	$10.00	$610,000
3	Overlay Existing Roadway	ft^2	220,000	$2.50	$550,000
4	Remove Existing Curb and Drainage	lf	6,000	$10.00	$60,000
5	Concrete Islands	ft^2	1,500	$12.00	$18,000
6	Thermoplastic Pavement Striping	lf	30,000	$1.00	$30,000
				Subtotal	**$2,678,000**
Station Costs (SCC 20.01)					
1	Bus Pad	each	16	$11,000.00	$176,000
2	Enhanced Corridor Station	each	16	$80,000.00	$1,280,000
				Subtotal	**$1,456,000**
Sitework Costs (SCC 40.06)					
1	Illumination	mile	1	$143,000.00	$143,000
2	ADA Ramp	each	36	$5,000.00	$180,000
3	Landscaping	mile	1	$58,800.00	$58,800
4	Concrete Sidewalk	ft^2	44,000	$9.00	$396,000
5	New RRFB	each	1	$47,000	$47,000
				Subtotal	**$824,800**

Table C-5. Cost Estimate – 30th Avenue to Lane Community College Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.26*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Systems Costs (SCC 50)					
1	New Signal	each	4	$375,000.00	$1,500,000
2	Remove Existing Signal	each	0	$25,000.00	$0
2	Modify Signal	each	13	$75,000.00	$975,000
				Subtotal, SCC 50.02	**$2,475,000**
Support Facilities (SCC 30)					
1	Operator Break Facility	each	1	$350,000.00	$350,000
				Subtotal, SCC 30	**$350,000**
				Subtotal, All Construction	***$7,783,800***

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$155,700
Traffic Control	5.0 to 10.0%	10.0%	$778,400
Mobilization	8.0 to 10.0%	8.0%	$622,700
Erosion Control	0.5 to 2.0%	1.5%	$116,800
		Subtotal, SCC 40.08	**$1,673,600**
Utility Relocation	10 to 20%	10.0%	$778,400
		Total Construction Cost	***$10,235,800***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	0	$1,025,000.00	$0
Environmental Mitigation, SCC 40.04	1 to 5%	3%		$233,514
Easements and ROW Acquisition	ft^2	18,601	$60.00	$1,116,060
ROW Acquisition Indirect Costs	each	14	$17,000.00	$238,000
			Subtotal, SCC 60.01	**$1,354,060**

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$1,500,000
Agency Administration	15 to 30%	15.0%	$1,500,000
Construction Engineering	10 to 15%	10.0%	$1,000,000
		Total Pre-Contingency Cost	***$15,823,374***

Table C-5. Cost Estimate – 30th Avenue to Lane Community College Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.26*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$2,678,000	$535,600	$3,213,600
Stations	25%	$1,456,000	$364,000	$1,820,000
Systems	30%	$2,475,000	$742,500	$3,217,500
Sitework	35%	$3,860,314	$1,351,110	$5,211,424
Right of Way	20%	$1,354,060	$270,812	$1,624,872
Vehicles	10%	$0	$0	$0
Professional Services	15%	$4,000,000	$600,000	$4,600,000
			Total Applied Contingency Cost	***$19,687,396***
			5% Unallocated Contingency	***$984,370***
			TOTAL PROJECT COST	***$21,000,000***

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Table C-6. Cost Estimate – 30th Avenue to Lane Community College Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (Mile): *6.26*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Exclusive Guideway Costs (SCC 10.01)					
1	Curb, Gutter, and Enclosed Drainage	lf	300	$235.00	$70,500
2	New Roadway Asphalt	ft^2	0	$10.00	$0
3	New Roadway Concrete	ft^2	2,500	$15.00	$37,500
4	Overlay Existing Roadway	ft^2	700	$2.50	$1,750
5	Thermoplastic Pavement Striping	lf	200	$1.00	$200
6	Concrete Islands	ft^2	0	$12.00	$0
7	Remove Existing Curb and Drainage	lf	300	$10.00	$3,000
				Subtotal	**$112,950**
Semi-exclusive Guideway Costs (SCC 10.02)					
1	Curb, Gutter, and Enclosed Drainage	lf	1,100	$235.00	$258,500
2	New Roadway Asphalt	ft^2	0	$10.00	$0
3	New Roadway Concrete	ft^2	140,000	$15.00	$2,100,000
4	Overlay Existing Roadway	ft^2	170,000	$2.50	$425,000
5	Thermoplastic Pavement Striping	lf	8,000	$1.00	$8,000
6	Concrete Islands	ft^2	0	$12.00	$0
7	Remove Existing Curb and Drainage	lf	1,100	$10.00	$11,000
				Subtotal	**$2,802,500**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	Curb, Gutter, and Enclosed Drainage	lf	3,500	$235.00	$822,500
2	New Roadway Asphalt	ft^2	21,000	$10.00	$210,000
3	Overlay Existing Roadway	ft^2	180,000	$2.50	$450,000
4	Remove Existing Curb and Drainage	lf	3,500	$10.00	$35,000
5	Concrete Islands	ft^2	1,500	$12.00	$18,000
6	Thermoplastic Pavement Striping	lf	26,000	$1.00	$26,000
				Subtotal	**$1,561,500**
Station Costs (SCC 20.01)					
1	Bus Pad	each	14	$11,000.00	$154,000
2	EmX Station	each	20	$350,000.00	$7,000,000
				Subtotal	**$7,154,000**
Sitework Costs (SCC 40.06)					
1	Illumination	mile	6	$143,000.00	$871,325
2	ADA Ramp	each	66	$5,000.00	$330,000
3	Landscaping	mile	6	$58,800.00	$358,279
4	Concrete Sidewalk	ft^2	51,000	$9.00	$459,000
5	New RRFB	each	8	$47,000	$376,000
				Subtotal	**$2,394,604**

Table C-6. Cost Estimate – 30th Avenue to Lane Community College Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (Mile): *6.26*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Systems Costs (SCC 50)					
1	New Signal	each	4	$375,000.00	$1,500,000
2	Remove Existing Signal	each	0	$25,000.00	$0
3	Modify Signal	each	17	$75,000.00	$1,275,000
				Subtotal, SCC 50.02	**$2,775,000**
1	Communications Fiber	lf	30,000	$38.00	$1,140,000
Support Facilities (SCC 30)					
1	Operator Break Facility	each	1	$350,000.00	$350,000
				Subtotal, SCC 30	**$350,000**
				Subtotal, All Construction	***$17,910,554***

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$358,200
Traffic Control	5.0 to 10.0%	10.0%	$1,791,100
Mobilization	8.0 to 10.0%	8.0%	$1,432,800
Erosion Control	0.5 to 2.0%	1.5%	$268,700
		Subtotal, SCC 40.08	**$3,850,800**
Utility Relocation	10 to 20%	10.0%	$1,791,100
		Total Construction Cost	***$23,552,454***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	4	$1,100,000.00	$4,400,000
Environmental Mitigation, SCC 40.04	1 to 5%	5.0%		$1,177,623
Easements and ROW Acquisition	ft^2	25,967	$60.00	$1,558,020
ROW Acquisition Indirect Costs	each	20	$17,000.00	$340,000
			Subtotal, SCC 60.01	**$1,898,020**

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$3,500,000
Agency Administration	15 to 30%	15.0%	$3,500,000
Construction Engineering	10 to 15%	10.0%	$2,300,000
		Total Pre-Contingency Cost	***$40,428,097***

Table C-6. Cost Estimate – 30th Avenue to Lane Community College Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (Mile): *6.26*
Prepared by: *Marisa DeMull*
Date: *8/31/2016*

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$4,476,950	$895,390	$5,372,340
Stations	25%	$7,154,000	$1,788,500	$8,942,500
Systems	30%	$3,915,000	$1,174,500	$4,595,500
Sitework	35%	$9,564,127	$3,347,444	$12,911,571
Right of Way	20%	$1,898,020	$379,604	$2,277,624
Vehicles	10%	$4,400,000	$440,000	$4,840,000
Professional Services	15%	$9,400,000	$1,410,000	$10,810,000
			Total Applied Contingency Cost	***$49,749,535***
			5% Unallocated Contingency	***$2,487,477***
			TOTAL PROJECT COST	***$53,000,000***

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Table C-7. Cost Estimate – Coburg Road Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting*
Length (mile): *6.17*
Prepared by: *Adrianna Stanley/Julia Anderson*
Date: *9/1/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Semi-exclusive Guideway Costs (SCC 10.02)					
1	New Roadway Asphalt	ft^2	67,000	$10.00	$670,000
2	New Roadway Concrete	ft^2	18,000	$15.00	$270,000
3	Concrete Islands	ft^2	1,500	$12.00	$18,000
4	Curb, Gutter, and Enclosed Drainage	lf	1,400	$235.00	$329,000
5	Remove Existing Curb and Drainage	lf	1,400	$10.00	$14,000
6	Thermoplastic Pavement Striping	lf	4,000	$1.00	$4,000
				Subtotal	**$1,305,000**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	New Roadway Asphalt	ft^2	170,000	$10.00	$1,700,000
2	Overlay Existing Roadway	ft^2	38,000	$2.50	$95,000
3	Concrete Islands	ft^2	2,300	$12.00	$27,600
4	Curb, Gutter, and Enclosed Drainage	lf	6,900	$235.00	$1,621,500
5	Remove Existing Curb and Drainage	lf	6,900	$10.00	$69,000
6	Thermoplastic Pavement Striping	lf	16,000	$1.00	$16,000
				Subtotal	**$3,529,100**
Station Costs (SCC 20.01)					
1	Enhanced Corridor Station	each	30	$80,000.00	$2,400,000
2	Bus Pad	each	26	$11,000.00	$286,000
				Subtotal	**$2,686,000**
Sitework Costs (SCC 40.06)					
1	Concrete Sidewalk	ft^2	110,000	$9.00	$990,000
2	New RRFB	each	2	$47,000.00	$94,000
3	Illumination	mile	2	$143,000.00	$248,820
4	Landscaping	mile	2	$58,800.00	$102,312
5	ADA Ramp	each	76	$5,000.00	$380,000
6	Operator Break Facility	each	1	$350,000.00	$350,000
				Subtotal	**$2,165,132**
Systems Costs (SCC 50)					
1	Modify Signal	each	9	$75,000.00	$675,000
2	New Signal	each	10	$375,000.00	$3,750,000
3	Remove Existing Signal	each	6	$25,000.00	$150,000
				Subtotal	**$4,575,000**
				Construction Subtotal	***$14,260,232***

Table C-7. Cost Estimate – Coburg Road Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting*
Length (mile): *6.17*
Prepared by: *Adrianna Stanley/Julia Anderson*
Date: *9/1/2016*

Additional Const. Costs	**Suggested**	**Percentage**	**Cost**
Construction Surveying	1.0 to 2.5%	2.0%	$285,200
Traffic Control	5.0 to 10.0%	10.0%	$1,426,000
Mobilization	8.0 to 10.0%	8.0%	$1,140,800
Erosion Control	0.5 to 2.0%	1.5%	$213,900
		Subtotal, SCC 40.08	**$3,065,900**
Utility Relocation	10 to 20%	10.0%	$1,426,00
		Total Construction Cost	***$18,752,132***

Anticipated Items	**Unit**	**Quantity**	**Unit Cost**	**Cost**
Bus, SCC 70.04	each	**1**	$1,025,000.00	$1,025,000
Environmental Mitigation, SCC 40.04	1 to 5%	1.5%	$274,143.48	$281,282
Easements and ROW Acquisition	ft^2	43,132	$60.00	$2,587,920
ROW Acquisition Indirect Costs	each	47	$17,000.00	$799,000
			Subtotal, SCC 60.01	**$3,386,920**

Indirect Costs	**Suggested**	**Percentage**	**Cost**
Engineering/Design	15 to 30%	15.0%	$2,800,000
Agency Administration	15 to 30%	15.0%	$2,800,000
Construction Engineering	10 to 15%	10.0%	$1,900,000
		Total Pre-Contingency Cost	***$29,639,052***

Application of Contingency

Item	**Percentage**	**Cost**	**Contingency**	**Adj. Cost**
Guideway	20%	$4,834,100	$966,820	$5,800,920
Stations	25%	$2,686,000	$671,500	$3,357,500
Systems	30%	$4,575,000	$1,372,500	$5,947,500
Sitework	35%	$6,938,314	$2,428,410	$9,366,724
Right of Way	20%	$3,386,920	$677,384	$4,064,304
Vehicles	10%	$1,025,000	$102,500	$1,127,500
Professional Services	15%	$7,500,000	$1,125,000	$8,625,000
			Total Applied Contingency Cost	***$38,289,448***
			5% Unallocated Contingency	***$1,914,472***
			TOTAL PROJECT COST	***$41,000,000***

Table C-7. Cost Estimate – Coburg Road Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting*
Length (mile): *6.17*
Prepared by: *Adrianna Stanley/Julia Anderson*
Date: *9/1/2016*

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

Table C-8. Cost Estimate – Coburg Road Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.25*
Prepared by: *Julia Anderson*
Date: *9/1/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Exclusive Guideway Costs (SCC 10.01)					
1	New Roadway Concrete	ft^2	200,000	$15.00	$3,000,000
2	Overlay Existing Roadway	ft^2	83,000	$2.50	$207,500
3	New Roadway Asphalt	ft^2	350,000	$10.00	$3,500,000
4	Concrete Islands	ft^2	22,000	$12.00	$264,000
5	Curb, Gutter, and Enclosed Drainage	lf	11,000	$235.00	$2,585,000
6	Thermoplastic Pavement Striping	lf	62,000	$1.00	$62,000
7	Remove Existing Curb and Drainage	lf	11,000	$10.00	$110,000
				Subtotal	**$9,728,500**
Semi-exclusive Guideway Costs (SCC 10.02)					
1	New Roadway Concrete	ft^2	31,000	$15.00	$465,000
2	Overlay Existing Roadway	ft^2	34,000	$2.50	$85,000
3	Thermoplastic Pavement Striping	lf	3,600	$1.00	$3,600
				Subtotal	**$553,600**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	New Roadway Asphalt	ft^2	26,000	$10.00	$260,000
2	Thermoplastic Pavement Striping	lf	6,000	$1.00	$6,000
3	Concrete Islands	ft^2	3,000	$12.00	$36,000
4	Curb, Gutter, and Enclosed Drainage	lf	4,000	$235.00	$940,000
5	Remove Existing Curb and Drainage	lf	4,000	$10.00	$40,000
				Subtotal	**$1,282,000**
Station Costs (SCC 20.01)					
1	EmX Station	each	28	$350,000.00	$9,800,000
2	Bus Pad	each	19	$11,000.00	$209,000
				Subtotal	**$10,009,000**
Sitework Costs (SCC 40.06)					
1	Illumination	mile	10	$143,000.00	$1,413,208
2	Landscaping	mile	10	$58,800.00	$581,095
3	Concrete Sidewalk	ft^2	160,000	$9.00	$1,440,000
4	ADA Ramp	each	67	$5,000.00	$335,000
5	New RRFB	each	4	$47,000.00	$164,000
6	Operator Break Facility	each	1	$350,000.00	$350,000
7	Retaining Wall (H ≥ 4 feet)	ft^2	1,800	$75.00	$135,000

Table C-8. Cost Estimate – Coburg Road Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.25*
Prepared by: *Julia Anderson*
Date: *9/1/2016*

				Subtotal	**$4,307,304**
No.	**Item**	**Unit**	**Quantity**	**Unit Cost**	**Cost**
Systems Costs (SCC 50)					
1	New Signal	each	15	$375,000.00	$5,625,000
2	Modify Signal	each	21	$75,000.00	$1,575,000
3	Remove Existing Signal	each	10	$25,000.00	$250,000
				Subtotal, SCC 50.02	**$7,450,000**
1	Communications Fiber	lf	30,000	$38.00	$1,140,000
				Subtotal, All Construction	***$34,356,404***
Additional Const. Costs		**Suggested**		**Percentage**	**Cost**
Construction Surveying		1.0 to 2.5%		2.0%	$687,100
Traffic Control		5.0 to 10.0%		10.0%	$3,435,600
Mobilization		8.0 to 10.0%		8.0%	$2,748,500
Erosion Control		0.5 to 2.0%		1.5%	$515,300
				Subtotal, SCC 40.08	**$7,386,500**
Utility Relocation		10 to 20%		20.0%	$6,871,300
				Total Construction Cost	***$48,614,204***
Anticipated Items		**Unit**	**Quantity**	**Unit Cost**	**Cost**
Bus, SCC 70.04		each	6	$1,100,000.00	$6,600,000
Environmental Mitigation, SCC 40.04		1 to 5%	2.5%		$1,215,355
Easements and ROW Acquisition		ft^2	119,760	$60.00	$7,185,600
ROW Acquisition Indirect Costs		each	73	$17,000.00	$1,241,000
Potential Full Acquisition Indirect Costs		each	2	$20,000.00	$40,000
Potential Full Acquisition		ft^2	46,281	$60	$2,776,860
				Subtotal, SCC 60.01	**$11,243,460**
Indirect Costs		**Suggested**		**Percentage**	**Cost**
Engineering/Design		15 to 30%		15.0%	$7,300,000
Agency Administration		15 to 30%		15.0%	$7,300,000
Construction Engineering		10 to 15%		10.0%	$4,900,000
				Total Pre-Contingency Cost	***$87,308,019***

Table C-8. Cost Estimate – Coburg Road Corridor, EmX Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *6.25*
Prepared by: *Julia Anderson*
Date: *9/1/2016*

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$11,564,100	$2,312,820	$13,876,920
Stations	25%	$10,009,000	$2,502,250	$12,511,250
Systems	30%	$8,476,000	$2,542,800	$11,018,800
Sitework	35%	$19,915,459	$6,970,411	$26,885,869
Right of Way	20%	$11,243,460	$2,248,692	$13,492,152
Vehicles	10%	$6,600,000	$660,000	$7,260,000
Professional Services	15%	$19,500,000	$2,925,000	$22,425,000
			Total Applied Contingency Cost	***$107,469,991***
			5% Unallocated Contingency	***$5,373,500***
			TOTAL PROJECT COST	***$113,000,000***

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

Table C-9. Cost Estimate – Martin Luther King, Jr. Boulevard Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *3.00*
Prepared by: *Adrianna Stanley/Julia Anderson*
Date: *9/1/2016*

No.	Item	Unit	Quantity	Unit Cost	Cost
Semi-exclusive Guideway Costs (SCC 10.02)					
1	Overlay Existing Roadway	ft^2	180,000	$2.50	$450,000
2	New Roadway Concrete	ft^2	170,000	$15.00	$2,550,000
3	Thermoplastic Pavement Striping	lf	24,000	$1.00	$24,000
				Subtotal	**$3,024,000**
Mixed Traffic Guideway Costs (SCC 10.03)					
1	New Roadway Asphalt	ft^2	140,000	$10.00	$1,400,000
2	Concrete Islands	ft^2	500	$12.00	$6,000
3	Curb, Gutter, and Enclosed Drainage	lf	1,700	$235.00	$399,500
4	Remove Existing Curb and Drainage	lf	1,700	$10.00	$17,000
5	Thermoplastic Pavement Striping	lf	5,700	$1.00	$5,700
				Subtotal	**$1,828,200**
Station Costs (SCC 20.01)					
1	Enhanced Corridor Station	each	14	$80,000.00	$1,120,000
2	Bus Pad	each	5	$11,000.00	$55,000
				Subtotal	**$1,175,000**
Sitework Costs (SCC 40.06)					
1	New RRFB	each	2	$47,000.00	$94,000
2	Illumination	mile	0.2	$143,000.00	$24,310
3	Landscaping	mile	0.2	$58,800.00	$9,996
4	ADA Ramp	each	45	$5,000.00	$225,000
5	Concrete Sidewalk	ft^2	23,000	$9.00	$207,000
				Subtotal	**$560,306**
Systems Costs (SCC 50)					
1	Modify Signal	each	2	$75,000.00	$150,000
2	New Signal	each	3	$375,000.00	$1,125,000
3	Remove Existing Signal	each	2	$25,000.00	$50,000
				Subtotal	**$1,325,000**
				Construction Subtotal	***$7,912,506***

Table C-9. Cost Estimate – Martin Luther King, Jr. Boulevard Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *3.00*
Prepared by: *Adrianna Stanley/Julia Anderson*
Date: *9/1/2016*

Additional Const. Costs	Suggested	Percentage	Cost
Construction Surveying	1.0 to 2.5%	2.0%	$158,300
Traffic Control	5.0 to 10.0%	10.0%	$791,300
Mobilization	8.0 to 10.0%	8.0%	$633,000
Erosion Control	0.5 to 2.0%	1.5%	$118,700
		Subtotal, SCC 40.08	**$1,701,300**
Utility Relocation	10 to 20%	10.0%	$791,300
		Total Construction Cost	***$10,405,106***

Anticipated Items	Unit	Quantity	Unit Cost	Cost
Bus, SCC 70.04	each	**1**	$1,025,000.00	$1,025,000
Environmental Mitigation, SCC 40.04	1 to 5%	1.5%		$156,077
Easements and ROW Acquisition	ft^2	1,411	$60.00	$84,660
ROW Acquisition Indirect Costs	each	8	$17,000.00	$136,000
			Subtotal, SCC 60.01	**$220,660**

Indirect Costs	Suggested	Percentage	Cost
Engineering/Design	15 to 30%	15.0%	$1,600,000
Agency Administration	15 to 30%	15.0%	$1,600,000
Construction Engineering	10 to 15%	10.0%	$1,000,000
		Total Pre-Contingency Cost	$16,006,843

Application of Contingency

Item	Percentage	Cost	Contingency	Adj. Cost
Guideway	20%	$4,852,200	$970,440	$5,822,640
Station	25%	$1,175,000	$293,750	$1,468,750
Systems	30%	$1,325,000	$397,500	$1,722,500
Sitework	35%	$3,208,983	$1,123,144	$4,332,126
Right of Way	20%	$220,660	$44,132	$264,792
Vehicles	10%	$1,025,000	$102,500	$1,127,500
Professional Services	15%	$4,200,000	$630,000	$4,830,000
			Total Applied Contingency Cost	***$19,568,308***
			5% Unallocated Contingency	***$978,415***
			TOTAL PROJECT COST	***$21,000,000***

Table C-9. Cost Estimate – Martin Luther King, Jr. Boulevard Corridor, Enhanced Corridor Alternative

Kind of Work: *Roadway, Earthwork, Drainage, Lighting, Structures*
Length (mile): *3.00*
Prepared by: *Adrianna Stanley/Julia Anderson*
Date: *9/1/2016*

Assumptions:

- Existing pavement > 20 feet in width adjacent to new construction or widening is assumed to be overlaid. Roadways where less than 20 feet of existing pavement remains after full depth construction/widening are assumed to be full-depth reconstruction in the dominant material.
- Existing pavement where restriping of roadway only (no widening) is proposed is assumed to be overlaid.
- Intersections where full-depth reconstruction/widening of lanes runs adjacent are assumed to be fully reconstructed with the most expensive material (e.g., an intersection adjacent to a concrete BAT lane is assumed to be fully reconstructed as concrete).
- Miscellaneous items include signage, utility coordination, and miscellaneous ITS.
- Contingency costs include unknown construction conditions. Allowance for miscellaneous items includes costs for items not covered in preliminary estimate.
- ADA ramp reconstruction is assumed for all ramps along the corridor outside of the downtown core in EmX options. Enhanced Corridor options only reconstruct ADA ramps in areas of other construction or overlay.

Note:

The above cost estimate is in 2016 dollars for Comparative Level Evaluation of concepts. The cost does not include financial costs or operations and maintenance costs. In addition, there are no costs for the mitigation or remediation associated with the potential discovery of hazardous materials. The order-of-magnitude cost estimate shown has been prepared for guidance in project evaluation at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs will vary from the estimate presented above. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

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Appendix D: Federal Transit Administration Standard Cost Category Spreadsheets and Methodology

Table D-1. Standard Cost Categories for Small Starts Projects (Rev.18, May 2016)

10 GUIDEWAY AND TRACK ELEMENTS (route miles)	
10.01	Guideway: At-grade exclusive right of way
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)
10.03	Guideway: At-grade in mixed traffic
10.04	Guideway: Aerial structure
10.05	Guideway: Built-up fill
10.06	Guideway: Underground cut and cover
10.07	Guideway: Underground tunnel
10.08	Guideway: Retained cut or fill
10.09	Track: Direct fixation
10.10	Track: Embedded
10.11	Track: Ballasted
10.12	Track: Special (switches, turnouts)
10.13	Track: Vibration and noise dampening
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)	
20.01	At-grade station, stop, shelter, mall, terminal, platform
20.02	Aerial station, stop, shelter, mall, terminal, platform
20.03	Underground station, stop, shelter, mall, terminal, platform
20.04	Other stations, landings, terminals: Intermodal, ferry, trolley, etc.
20.05	Joint development
20.06	Automobile parking multi-story structure
20.07	Elevators, escalators
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	
30.01	Administration Building: Office, sales, storage, revenue counting
30.02	Light Maintenance Facility
30.03	Heavy Maintenance Facility
30.04	Storage or Maintenance of Way Building
30.05	Yard and Yard Track
40 SITEWORK AND SPECIAL CONDITIONS	
40.01	Demolition, Clearing, Earthwork
40.02	Site Utilities, Utility Relocation
40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments
40.04	Environmental mitigation, e.g. wetlands, historic/archeologic, parks
40.05	Site structures including retaining walls, sound walls

Table D-1. Standard Cost Categories for Small Starts Projects (Rev.18, May 2016)

40.06	Pedestrian / bike access and accommodation, landscaping
40.07	Automobile, bus, van accessways including roads, parking lots
40.08	Temporary Facilities and other indirect costs during construction
50 SYSTEMS	
50.01	Train control and signals
50.02	Traffic signals and crossing protection
50.03	Traction power supply: substations
50.04	Traction power distribution: catenary and third rail
50.05	Communications
50.06	Fare collection system and equipment
50.07	Central Control
60 ROW, LAND, EXISTING IMPROVEMENTS	
60.01	Purchase or lease of real estate
60.02	Relocation of existing households and businesses
70 VEHICLES (number)	
70.01	Light Rail
70.02	Heavy Rail
70.03	Commuter Rail
70.04	Bus
70.05	Other
70.06	Non-revenue vehicles
70.07	Spare parts
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	
80.01	Project Development
80.02	Engineering (not applicable to Small Starts)
80.03	Project Management for Design and Construction
80.04	Construction Administration and Management
80.05	Professional Liability and other Non-Construction Insurance
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.
80.07	Surveys, Testing, Investigation, Inspection
80.08	Start up
90 UNALLOCATED CONTINGENCY	
100 FINANCE CHARGES	

Table D-2. Standard Cost Categories for Small Starts Projects – Definitions (Rev.18, May 2016)

10 GUIDEWAY AND TRACK ELEMENTS (route miles)		Include guideway and track costs for all transit modes (heavy rail, light rail, commuter rail, BRT, rapid bus, bus, monorail, cable car, etc.) The unit of measure is route miles of guideway, regardless of width. As associated with the guideway, include costs for rough grading, excavation, and concrete base for guideway where applicable. Include all construction materials and labor regardless of whom is performing the work. In your written description of the scope, and in supporting graphic diagrams, indicate whether busway or rail track is single, double, triple, relocated, etc. Put guideway and track elements associated with yards in *30 Support Facilities* below.
10.01	Guideway: At-grade exclusive right of way	
10.02	Guideway: At-grade semi-exclusive (allows cross-traffic)	
10.03	Guideway: At-grade in mixed traffic	
10.04	Guideway: Aerial structure	Include foundation excavation; guideway structures including caissons, columns, bridges, viaducts, cross-overs, fly-overs.
10.05	Guideway: Built-up fill	Include construction of earthen berms.
10.06	Guideway: Underground cut and cover	Include excavation, retaining walls, backfill, underground guideway structure and finishes.
10.07	Guideway: Underground tunnel	Include tunneling by means of a tunnel boring machine, drill blasting, mining, and immersed tube tunneling; tunnel structure and finishes.
10.08	Guideway: Retained cut or fill	Include excavation, retaining walls, backfill, underground guideway structure and finishes.
10.09	Track: Direct fixation	Include rails, connectors.
10.10	Track: Embedded	Include rails, ties; ballast where applicable
10.11	Track: Ballasted	Include rails, ties and ballast.
10.12	Track: Special (switches, turnouts)	Include transitional curves.
10.13	Track: Vibration and noise dampening	Include upcharge for vib/noise dampening to any track condition above.
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number)		As associated with stations, include costs for rough grading, excavation, station structures, enclosures, finishes, equipment; mechanical and electrical components including HVAC, ventilation shafts and equipment, station power, lighting, public address/customer information system, safety systems such as fire detection and prevention, security surveillance, access control, life safety systems, etc. Include all construction materials and labor regardless of whom is performing the work.

Table D-2. Standard Cost Categories for Small Starts Projects – Definitions (Rev.18, May 2016)

		NOTE: Count paired inbound/outbound boarding platforms as one station – do not report the total number of boarding platforms. Put guideway and track associated with stations in *10 Guideway and Track Elements* above.
20.01	At-grade station, stop, shelter, mall, terminal, platform	
20.02	Aerial station, stop, shelter, mall, terminal, platform	Include station structures including caissons, columns, platforms, superstructures, etc.
20.03	Underground station, stop, shelter, mall, terminal, platform	Include retaining walls, backfill, structure.
20.04	Other stations, landings, terminals: Intermodal, ferry, trolley, etc.	
20.05	Joint development	Per FTA's Joint Development Guidance, "Joint development is any income-producing activity with a transit nexus related to a real estate asset in which FTA has an interest. … Joint development projects are commercial, residential, industrial, or mixed-use developments that are induced by or enhance the effectiveness of transit projects…"
20.06	Automobile parking multi-story structure	Include retaining walls, backfill, structure.
20.07	Elevators, escalators	
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS		As associated with support facilities, include costs for rough grading, excavation, support structures, enclosures, finishes, equipment; mechanical and electrical components including HVAC, ventilation shafts and equipment, facility power, lighting, public address system, safety systems such as fire detection and prevention, security surveillance, access control, life safety systems, etc. Include fueling stations. Include all construction materials and labor regardless of whom is performing the work. Where a support facility shares the structure with a station, its cost may be included with station cost. Identify this with a note. Except for guideway and track associated with a yard, include all guideway and track costs associated with support facilities in *10 Guideway and Track Elements* above.
30.01	Administration Building: Office, sales, storage, revenue counting	
30.02	Light Maintenance Facility	Include service, inspection, and storage facilities and equipment.
30.03	Heavy Maintenance Facility	Include heavy maintenance and overhaul facilities and equipment.
30.04	Storage or Maintenance of Way Building	
30.05	Yard and Yard Track	Include yard construction, guideway and track associated with yard.

Table D-2. Standard Cost Categories for Small Starts Projects – Definitions (Rev.18, May 2016)

40 SITEWORK AND SPECIAL CONDITIONS		Include all construction materials and labor regardless of whom is performing the work.
40.01	Demolition, Clearing, Earthwork	Include project-wide clearing, demolition and fine grading.
40.02	Site Utilities, Utility Relocation	Include all site utilities - storm, sewer, water, gas, electric.
40.03	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	Include underground storage tanks, fuel tanks, other hazardous materials and treatments, etc.
40.04	Environmental mitigation, e.g. wetlands, historic/archeologic, parks	Include other environmental mitigation not listed.
40.05	Site structures including retaining walls, sound walls	
40.06	Pedestrian / bike access and accommodation, landscaping	Include sidewalks, paths, plazas, functional landscaping, site and station furniture, site lighting, signage, bike facilities, permanent fencing.
40.07	Automobile, bus, van accessways including roads, parking lots	Include all on-grade paving.
40.08	Temporary Facilities and other indirect costs during construction	As a general rule and to the extent possible, appropriately allocate indirect costs among the construction costs in Categories 10 through 50. Where that is not possible, include in *40.08 Temporary Facilities* costs for mobilization, demobilization, phasing; time and temporary construction associated with weather (heat, rain, freezing, etc.); temporary power and facilities; temporary construction, easements, and barriers for storm water pollution prevention, temporary access and to mitigate construction impacts; project and construction supervision; general conditions, overhead, profit. NOTE: Include contractor's general liability and other insurance related to construction such as builder's risk in Cats. 10 - 50, not in 80 Professional Services below.
50 SYSTEMS		Include all construction materials and labor regardless of whom is performing the work.
50.01	Train control and signals	
50.02	Traffic signals and crossing protection	Include signal prioritization at intersections.
50.03	Traction power supply: substations	
50.04	Traction power distribution: catenary and third rail	
50.05	Communications	Include passenger information systems at stations and on vehicles (real time travel information; static maps and schedules). Include equipment to allow communications among vehicles and with central control.

Table D-2. Standard Cost Categories for Small Starts Projects – Definitions (Rev.18, May 2016)

50.06	Fare collection system and equipment	Include fare sales and swipe machines, fare counting equipment.
50.07	Central Control	
	Construction Subtotal (10–50)	
60 ROW, LAND, EXISTING IMPROVEMENTS		Include professional services associated with the real estate component of the project. These costs may include agency staff oversight and administration, real estate and relocation consultants, legal counsel, court expenses, insurance, etc.
60.01	Purchase or lease of real estate	If the value of right of way, land, and existing improvements is to be used as local match to the Federal funding of the project, include the total cost on this line item. In backup documentation, separate cost for land from cost for improvements. Identify whether items are leased, purchased or acquired through payment or for free. Include the costs for permanent surface and subsurface easements, trackage rights, etc.
60.02	Relocation of existing households and businesses	In compliance with Uniform Relocation Act.
70 VEHICLES (number)		Include professional services associated with the vehicle component of the project. These costs may include agency staff oversight and administration, vehicle consultants, design and manufacturing contractors, legal counsel, warranty and insurance costs, etc.
70.01	Light Rail	Include light rail and streetcar rail using electric, diesel or other power supply.
70.02	Heavy Rail	
70.03	Commuter Rail	Include locomotives (diesel, electric, or other), trailer cars, self-propelled multiple units (EMU electric or DMU diesel, or other power supply)
70.04	Bus	Includes “rubber-tired” buses and trolleys including new, used, historic replica, articulated, using electric, diesel, dual-power, or other power supply.
70.05	Other	Include Vans, Sedan/Station Wagon, Cable Car, People Mover, Monorail, Car/Inclined Railway, Ferry Boat, Transferred Vehicle
70.06	Non-revenue vehicles	
70.07	Spare parts	

Table D-2. Standard Cost Categories for Small Starts Projects – Definitions (Rev.18, May 2016)

80 PROFESSIONAL SERVICES (applies to Cats. 10–50)		Cat. 80 applies to Cats. 10–50. Cat. 80 includes all professional, technical and management services related to the design and construction of fixed infrastructure (Cats. 10–50) during the project development and construction phases of the project. This includes environmental work, design, engineering and architectural services; specialty services such as safety or security analyses; value engineering, risk assessment, cost estimating, scheduling, ridership modeling and analyses, auditing, legal services, administration and management, etc. by agency staff or outside consultants.
80.01	Project Development	
80.02	Engineering (not applicable to Small Starts)	
80.03	Project Management for Design and Construction	
80.04	Construction Administration and Management	Include professional liability insurance and other non-construction insurance on 80.05 unless insurance for the agency and its consultants is already included in other lines.
80.05	Professional Liability and other Non-Construction Insurance	Include costs associated with professional services related to real estate and vehicles in Cats. 60 and 70.
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	*(Note that costs for planning activities and NEPA work done before FTA approval to enter project development (PD), <u>regardless of funding source,</u> are not included in an SSGA and therefore, should not be included in the Standard Cost Category worksheets. For example, on one and the same grant, costs incurred prior to FTA approval to enter PD should be omitted from these worksheets whereas costs incurred after FTA approval to enter PD should be included.)*
80.07	Surveys, Testing, Investigation, Inspection	
80.08	Start up	Include start up and training. Include in Cats. 10 - 50 above access and protection work by agency staff or outside contractors.
	Subtotal (10–80)	
90 UNALLOCATED CONTINGENCY		Includes unallocated contingency, project reserves. Document allocated contingencies for individual line items on the BUILD Main worksheet.
	Subtotal (10–90)	
100 FINANCE CHARGES		Include finance charges expected to be paid by the project sponsor/grantee prior to either the completion of the project or the fulfillment of the Small Starts funding commitment, whichever occurs later in time. Finance charges incurred after this date should not be included in Total Project Cost. (See FFGA Circular FTA C5200.1A Chapter III for additional information.) Derive finance charges from the Small Starts project's financial plan, based on an analysis of the sources and uses of funds. The amount and type of debt financing required and revenues available determine the finance charges. By year, compute finance charges in year-of-expenditure (YOE) dollars. On the Inflation worksheet enter the finance charges for the appropriate years.
	Total Project Cost (10–100)	

Note:

The SCC cost breakdown is based on a traditional Design Bid Build model. If your project is Design Build, to the best of your ability, separate construction costs from design, administration, testing, etc. Put all construction costs in 10 through 50. Put design, administration, testing, etc. in *80 Professional Services*.

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