

# Chapter 5: Demand and Alternatives Analysis

## Background

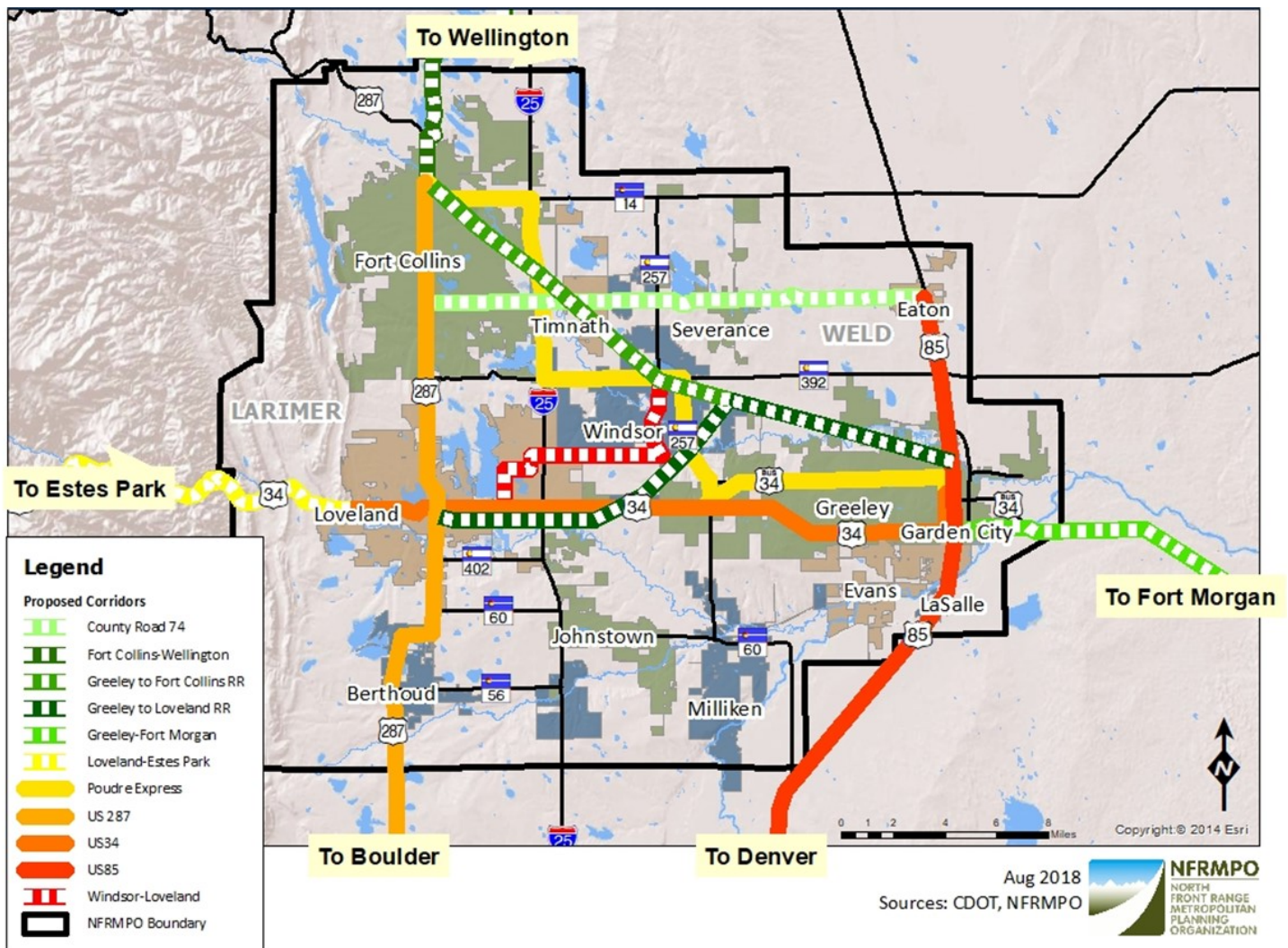
The *2045 RTE* uses various methods for determining transit demand in Larimer and Weld counties, combining quantitative measures, such as outputs from the NFRMPO's *Regional Travel Demand Model (RTDM)*, with qualitative measures, such as community input and feedback. This Chapter focuses on the potential demand for transit services in the proposed corridors, illustrated in **Figure 5-1**. The corridors evaluated in the *2045 RTE* have been updated from those in the *2040 RTE*, which were carried forward from the *North I-25 Final Environmental Impact Statement (FEIS)* and the *2035 RTE*.

The nine corridors proposed for evaluation are a mix of those evaluated in the *2040 RTE*, the *North I-25 FEIS*, and those gleaned from public outreach, discussions with staff from the NFRMPO communities, and routes proposed in local and State plans. The corridors proposed for further study in the *2045 RTE* are:

- Harmony Road/Weld County Road (WCR) 74
- Fort Collins to Wellington (SH1)
- Greeley to Fort Morgan
- Loveland to Estes Park (US 34)
- Poudre Express (Fort Collins to Windsor to Greeley)
- US 287 (Fort Collins to Longmont/Boulder)
- US 34 (Loveland to Greeley)
- US 85 (Eaton to Denver Region)
- Regional Rail (Great Western Railway right-of-way: Greeley to Fort Collins, Greeley to Loveland)

Tools for calculating future transit demand include basic demographic information and travel model outputs. For the *2045 RTE*, the NFRMPO used the *2040 RTDM* because the *2045 RTDM* is still under development. The NFRMPO *2040 RTDM* includes trips internal to the region, as well as trips originating or ending outside the region (internal-external or external-internal), and originating and ending outside of the region (external-external). The NFRMPO conducted a Household Travel Survey in 2010 and used this information to complete the 2014 update to both the regional land use model and *2040 RTDM*.

Figure 5-1. 2045 RTE Proposed Corridors



## Analysis Tool

Analyzing data is an important asset for establishing priority corridors. In addition to the public outreach done as part of the 2045 RTE, NFRMPO staff analyzed demographic and travel time data to establish corridors in need of investment. Demographic analysis was done using a Transit Propensity Index and Travel Time Reliability was based on the target-setting done as part of the NFRMPO’s 2045 Regional Transportation Plan’s Goals, Objectives, Performance Measures, and Targets (GOPMT). Additionally, an analysis of corridors from the 2040 RTE is also provided to provide an understanding of why certain corridors were carried forward.

## Transit Propensity Index

Certain populations are more likely to ride transit than others, whether by necessity or by choice. This phenomenon is referred to as transit propensity and may be used to predict locations producing a higher transit demand by identifying vulnerable and transit-dependent populations. According to the Centers for Disease Control<sup>1</sup>, vulnerable and transit-dependent populations include the following residents: those with low-economic

status, children (under 18), older adults (over 60), individuals with disabilities, renters, and households without automobiles. This definition was applied to develop a Transit Propensity Index, which shows the expected intensity of transit demand for each Census Tract in the region using the methodology described in the following section.

Demographic categories were chosen based on existing best practices at both the regional and national levels. Transfort uses its own Transit Propensity Index with many of the same categories. When calculating a Health Equity Index, the Larimer County Department of Health & Environment, Built Environment Program uses similar demographic categories. More in-depth analysis of demographics for the region are available in **Chapter 2**.

### Methodology

Upon discussion with various stakeholders, the NFRMPO identified the following five populations most likely to ride transit in the NFRMPO region. These populations will be discussed more in-depth in the following sections, and include:

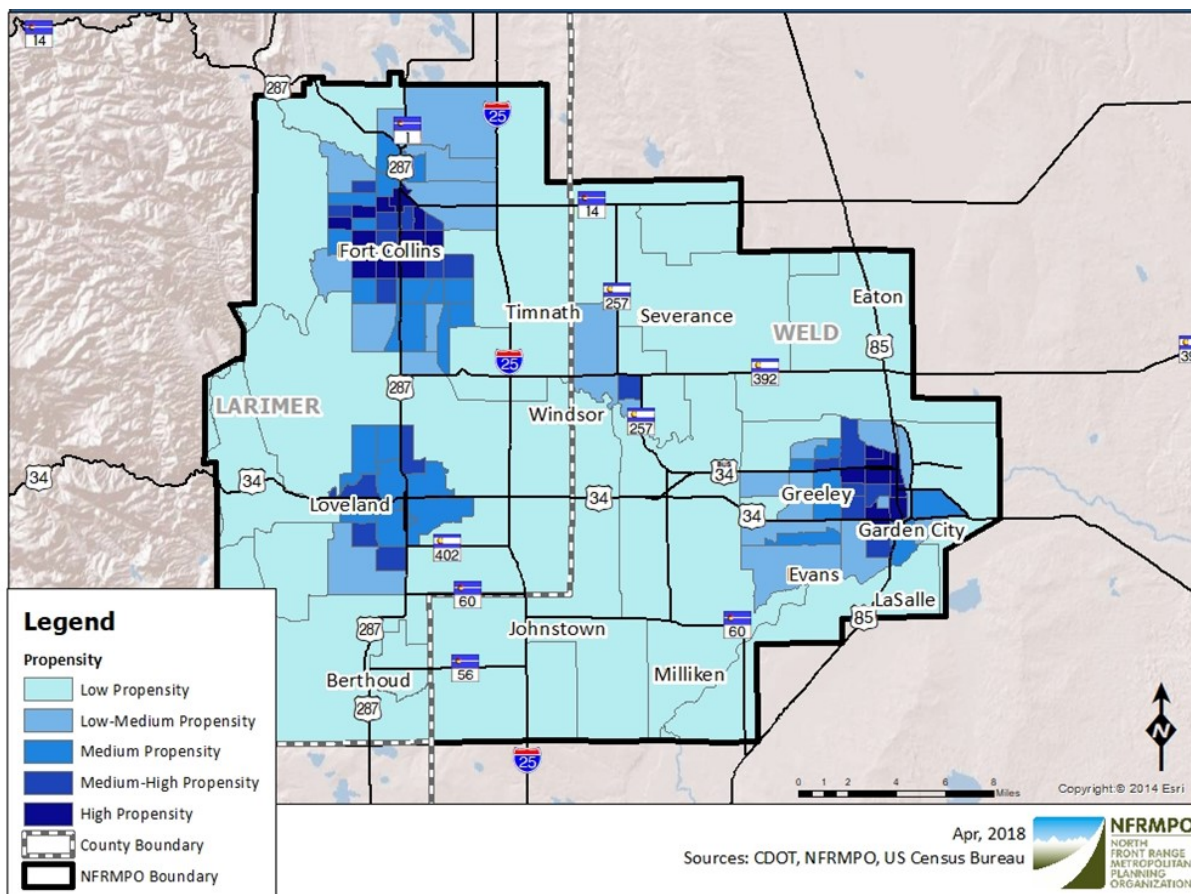
- Zero-vehicle households
- Population with a disability (as defined by the ACS)
- Senior (60+) population
- Population below federal poverty level
- College-aged (18-24) population

Based on density data for each of the above populations at the Census Tract level, a score (0-4) was assigned to each category: the higher the density of the specific population, the higher the score. For example, if there is a senior apartment complex within a small, urban Census Tract, the Tract would likely receive a score of 4 for “Senior Population” whereas a large, rural Tract with only a small number of seniors would most likely score a “0”. The highest possible score is 20 points.

### Results

**Figure 5-2** shows the results of the Transit Propensity Index scoring. The highest propensity exists within Fort Collins and Greeley, with other high scoring areas in Evans, Loveland, and Windsor. The areas with the lowest propensity exist in the unincorporated portions of the NFRMPO.

Figure 5-2. Transit Propensity Index



## Travel Time Reliability

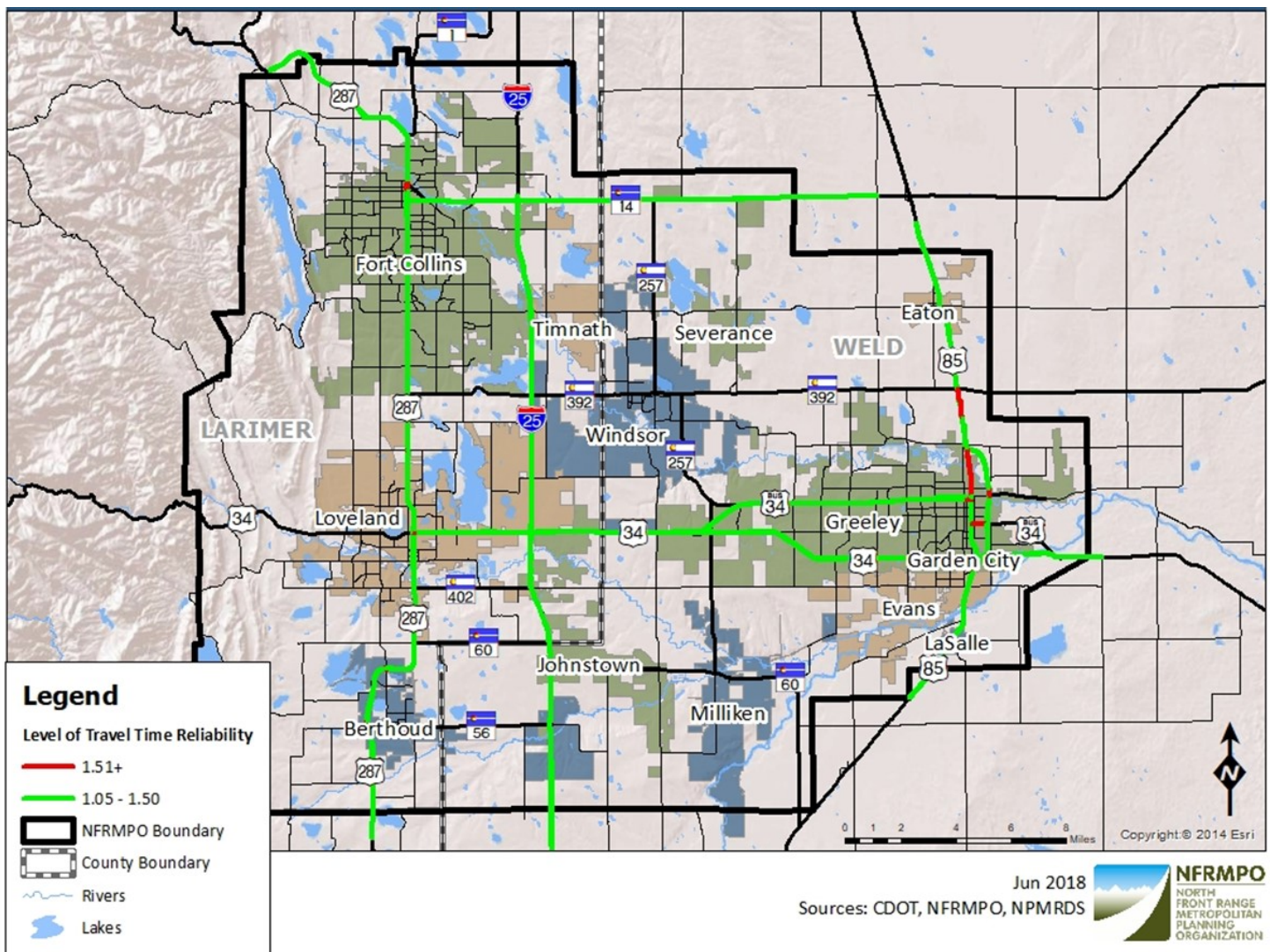
As part of the federal Transportation Performance Management program, the NFRMPO is required to set targets on certain performance measures. Two of these performance measures relate to travel time reliability on Interstate and non-Interstate National Highway System (NHS) segments. Travel time reliability is a comparison of the 80th percentile travel time to the 50th percentile travel time, written in a formula as:

$$\text{Travel Time Reliability} = \frac{\text{80th Percentile Travel Time}}{\text{50th Percentile Travel Time}}$$

This data is analyzed for non-holiday weekdays (Monday through Friday) 6:00 a.m. to 10:00 a.m., 10:00 a.m. to 4:00 p.m., and 4:00 p.m. to 8:00 p.m., and weekends from 6:00 a.m. to 8:00 p.m.

**Figure 5-3** shows the Level of Travel Time Reliability for the Interstate and non-Interstate NHS for the NFRMPO in 2017. According to these data, only short segments of the NHS are considered unreliable: portions of US85 between Eaton and Greeley, US34 Business in downtown Greeley, US287 in downtown Fort Collins, and the intersection of US287 and US34 in Loveland.

Figure 5-3. Level of Travel Time Reliability



## 2040 RTE Corridors

Analysis of corridors has been carried through different iterations of the RTE. Some of the demographic analysis may need to be updated, but the rationale used can lay the foundation for further study. The 2040 RTE proposed studying service on eight corridors:

- Evans to Milliken to Berthoud
- Greeley/Evans to Denver
- Greeley/Evans to Windsor to Fort Collins
- Greeley/Evans to Longmont
- Greeley/Evans to Loveland
- Fort Collins to Bustang
- Greeley/Evans to Bustang
- Loveland to Bustang

Of these, three are being carried forward (Greeley/Evans to Denver, Greeley/Evans to Windsor to Fort Collins, and Greeley/Evans to Loveland); two were absorbed into new proposed corridors (Fort Collins to Bustang and Loveland to Bustang); and two are not being proposed to carry

forward (Evans to Milliken to Berthoud and Greeley/Evans to Longmont). The corridors not being carried forward did not show a large demand in the NFRMPO's RTE survey.

## Survey Results

NFRMPO staff distributed a survey to transit- and non-transit riders and asked respondents to identify regional destinations to which they would like transit service. This was used as a subjective input into route and alternative selection. The routes mentioned most often included:

- Greeley to Loveland
- Loveland to Estes Park
- I-25 (Bustang from the NFRMPO region to the Denver region, with various destinations in both)
- Fort Collins to Wellington
- Greeley to Windsor to Fort Collins (Poudre Express)
- US85

## Service Level Options

In the 2035 and 2040 RTEs, four service level options were evaluated and were organized based on investment levels. Investment levels relate to needed funding. Each reflects a different vision for the level of regional transit services which could be provided by 2045 and the rate at which these services could be developed. The options for the 2045 RTE are Low, Medium, High, and Build Out. Build Out is not fiscally-constrained, but shows any and all investments. Investment levels are broken down as follows in **Table 5-1**, as shown by frequencies. Frequencies are how often a bus comes, in minutes.

*Table 5-1. Proposed Frequencies*

Route	Low		Medium		High		Build Out	
	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
Harmony Road/Weld County Road (WCR) 74					60	60	30	60
Fort Collins to Wellington (SH1)			30	90	30	60	30	45
Greeley to Fort Morgan							60	60
Loveland to Estes Park (US 34)							60	60
Poudre Express (Fort Collins to Windsor to Greeley)	30	90	30	60	30	60	20	60
US 287 (Fort Collins to Longmont/Boulder)	60	60	60	60	60	60	30	30
US 34 (Loveland to Greeley)	30	60	30	60	30	45	30	30
US 85 (Eaton to Denver Region)	30		30	90	30	60	30	45
Loveland to Windsor					60	60	60	60
Regional Rail (Greeley-Fort Collins)							20	30
Regional Rail (Greeley-Loveland)							20	30

Source: NFRMPO 2040 Regional Travel Demand Model, 2018

## Investment Alternatives

### Low Investment

The Low Investment scenario would be the existing transit services as planned to 2040 with the addition of service on US287, US34, and US85 (at peak times). This includes the Poudre Express. The corridors with proposed service as part of the Low Investment scenario are shown in **Figure 5-4**.

### Medium Investment

The Medium Investment scenario would build on the Low Investment scenario, adding additional service at peak and off-peak times, and add service on SH1 between Fort Collins and Wellington. The proposed route map is shown in **Figure 5-5**.

### High Investment

The High Investment Scenario adds additional services beyond the Low and Medium scenarios and provides

additional internal circulation of riders. Service is added on Harmony Road / Weld County Road (WCR) 74, and between Windsor and Loveland. Additional services are added on proposed corridors from the Low and Medium scenarios. Corridors are shown in **Figure 5-6**.

### Build Out Investment

The Build Out Investment scenario is what would occur if all corridors proposed in the 2045 RTE were built, regardless of cost. The proposal includes Regional Rail, which currently has not gone through any environmental or feasibility studies, and has no project sponsor. The Scenario also includes additional service on all routes, and intercity routes connecting the North Front Range region to Estes Park and Fort Morgan. Proposed corridors are shown in **Figure 5-7**.

Figure 5-4. Low Investment Scenario Corridors

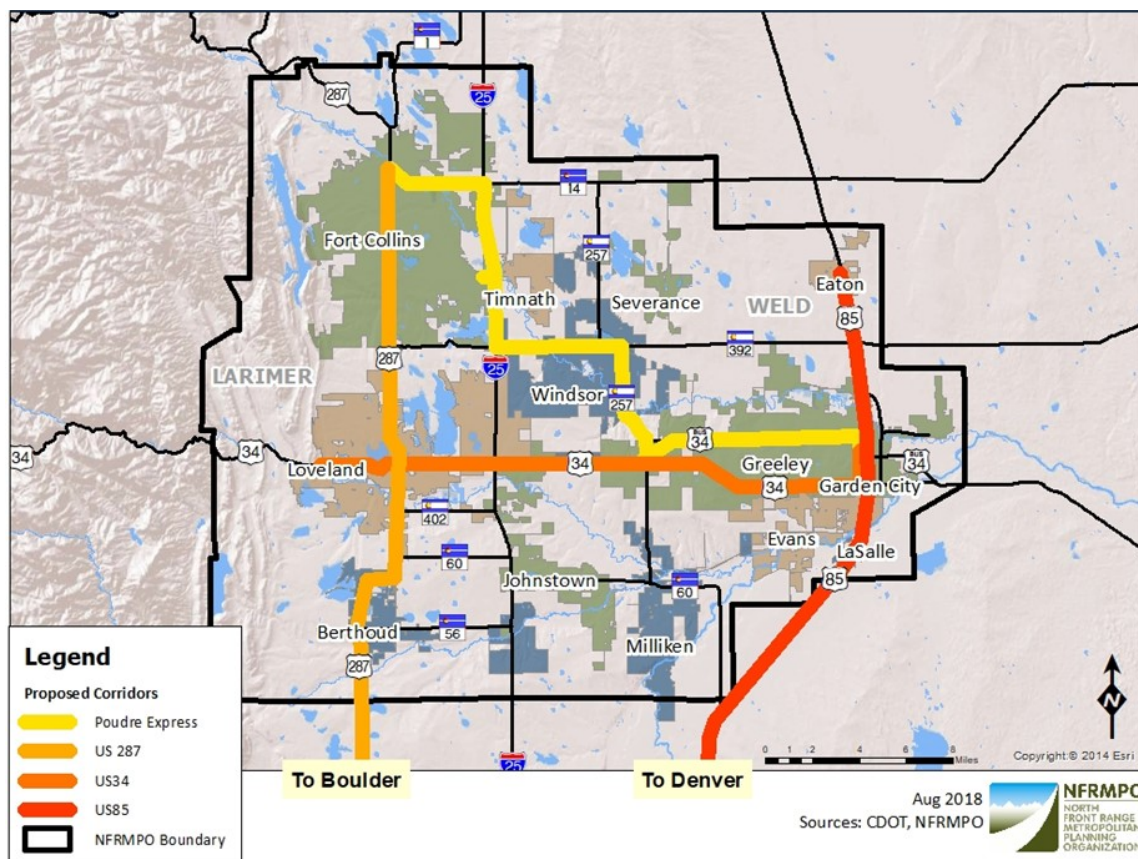


Figure 5-5. Medium Investment Scenario Corridors

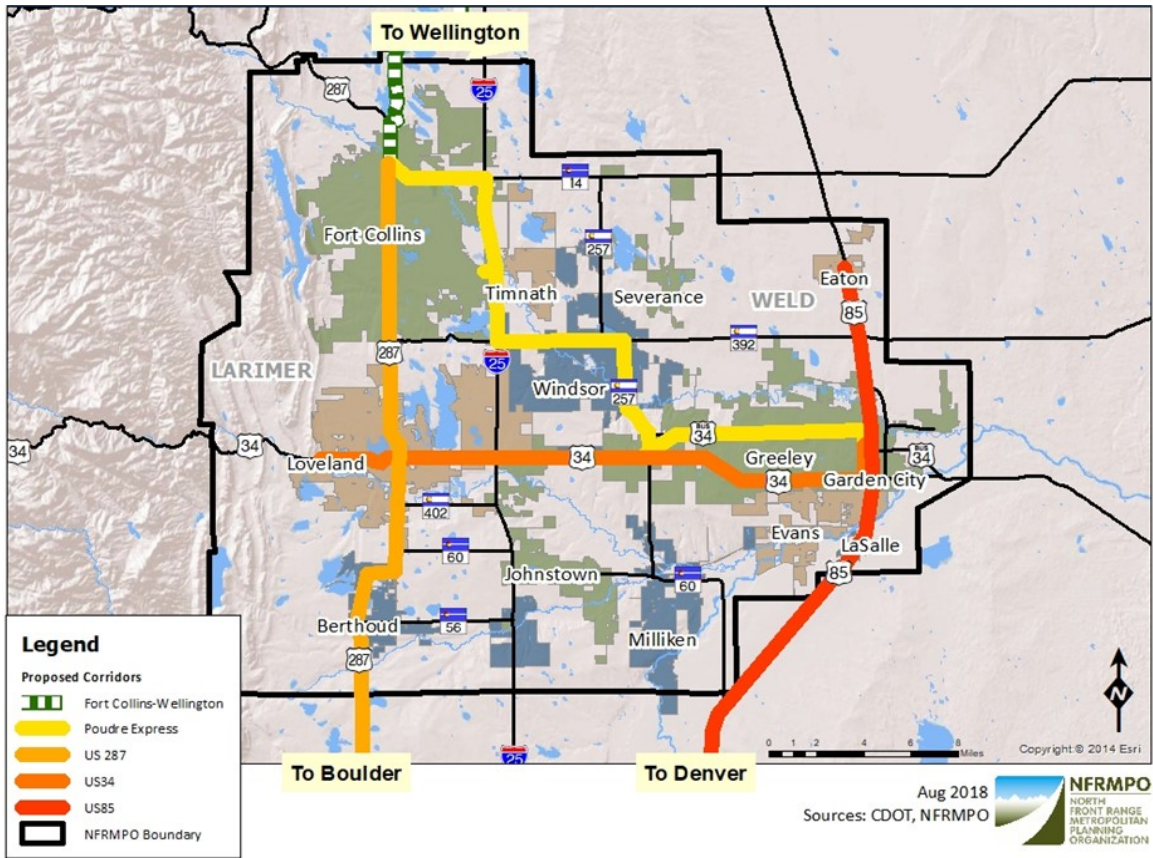


Figure 5-6. High Investment Scenario Corridors

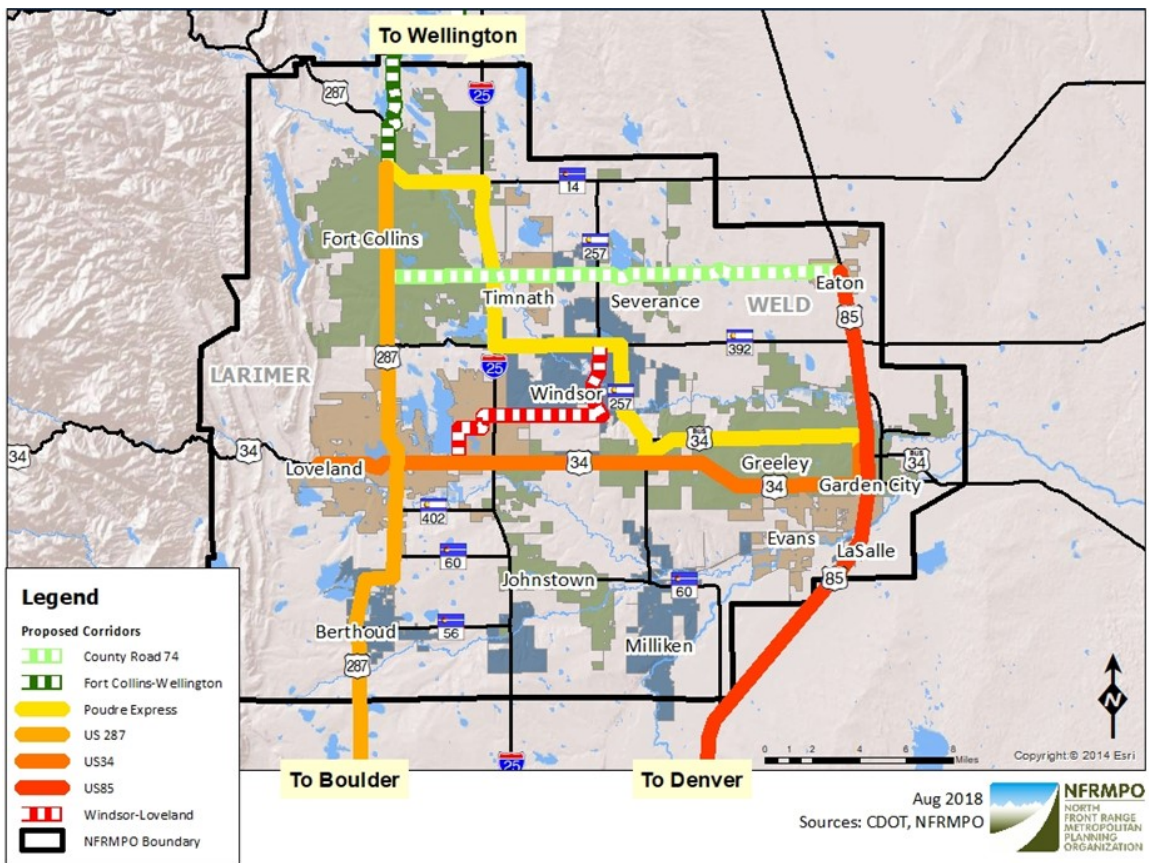
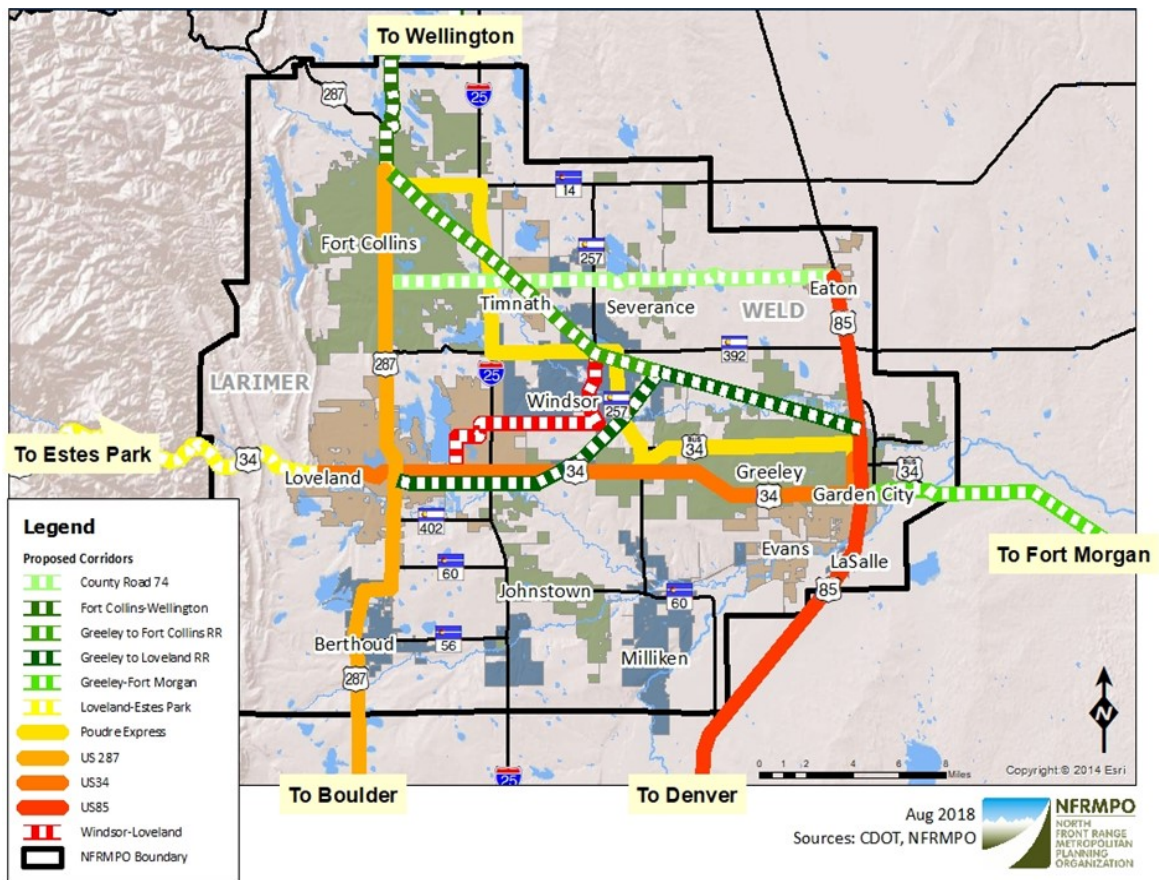


Figure 5-7. Build Out Investment Scenario Corridors



## Analysis

To function effectively in the transportation network, regional transit services must be integrated with local transit services, park-n-ride facilities, and with other travel modes including bicycle and pedestrian connections. In the Low, Medium, and High alternatives, vanpools and carpools will serve an important role in offering connections where transit services are limited, especially for areas without direct transit connections on one or both ends of the trip. Even with the Build Out alternative, vanpools and carpools would continue to play an important role in providing a diverse range of transportation options. Active promotion of the linkages between modes, Transportation Demand Management (TDM) techniques, and support for pedestrians and bicyclists is essential at all service levels.

Specialized transportation will continue to be provided at the local level, with local providers connecting individuals who require assistance to regional trips. Volunteer driver programs will also continue to be an important part of the regional system. For the Low alternative, only local connections and existing regional connections will be available for the general public. For the Medium and High alternatives, scheduled trips are included between the most common destinations within the North Front Range region.



## Financial Analysis

NFRMPO staff estimated the number of revenue hours based on distance and estimated travel times. An average cost per hour for buses was estimated based on 2016 costs per hour for the FLEX, the existing regional fixed-route service in Northern Colorado, while commuter rail was estimated based on costs reported by the Regional Transportation District (RTD) in Denver. The 2016 cost per revenue hour was then extrapolated out to 2045 based on a two percent annual inflation rate. These costs do not take into account the existing services, only the additional regional routes added. See **Table 5-2** below.

## Ridership Analysis

For this analysis, it is useful to compare the estimated ridership for the four alternatives. **Table 5-3** identifies each corridor and the estimates for daily ridership demand in both directions. The Poudre Express is reasonably expected to begin service within five years of the adoption of the 2045 RTE, and has been studied

extensively by GET with support from the cities of Fort Collins and Greeley and the Town of Windsor. Service along US85 and US34 have vocal proponents within the region, but do not have as much completed work to date. The Build Out scenario would build on these corridors under development and provide service on all proposed corridors. Ridership estimates are based on the RTDM, which is calibrated using real-world ridership and vehicle counts to ensure the ridership and traffic volumes predicted by the model match the observed volumes in the initial year. The difficulty with this method is that these are new transit service corridors with no ridership with which to compare. Many of these corridors have fewer trip producers and attractors, which makes it more difficult to estimate ridership than the existing local services. Additionally, these ridership numbers will be updated with the introduction of the 2045 RTDM and 2045 RTP.

*Table 5-2. Financial Analysis*

	Low	Medium	High	Build Out
<b>Revenue Hours</b>	32,997	36,891	57,8892	96,643
<b>Average Cost Per Hour (2045)</b>	\$206.14	\$206.14	\$206.14	\$206.14 (bus) or \$1,100.65 (rail)
<b>Total Operating Cost (2045)</b>	\$6,802,003	\$7,604,832	\$11,933,859	\$32,840,282

Source: NFRMPO Staff

*Table 5-3. Projected Daily Ridership*

Corridor	NFRMPO Travel Model Analysis for 2040			
	Low Investment	Medium Investment	High Investment	Build Out Investment
<b>Harmony Road/Weld County Road (WCR) 74</b>			1,308	2,068
<b>Fort Collins to Wellington (SH1)</b>		191	223	218
<b>Greeley to Fort Morgan</b>				52
<b>Loveland to Estes Park (US 34)</b>				41
<b>Poudre Express (Fort Collins to Windsor to Greeley)</b>	3,092	3,729	2,991	3,544
<b>US 287 (Fort Collins to Longmont/Boulder)</b>	1,292	1,267	1,228	780
<b>US 34 (Loveland to Greeley)</b>	424	376	490	477
<b>US 85 (Eaton to Denver Region)</b>	597	100	109	205
<b>Loveland to Windsor</b>			128	136
<b>Regional Rail (Greeley-Fort Collins)</b>				1,804
<b>Regional Rail (Greeley-Loveland)</b>				221
<b>TOTAL</b>	5,405	5,663	6,477	9,546

Source: NFRMPO 2040 Regional Travel Demand Model, 2018

## Cost/Benefit Analysis

Dividing the estimated costs in **Table 5-2** by the ridership projected by the NFRMPO RTDM in **Table 5-3** provides the cost per new rider shown in **Table 5-4**. The Low Investment level provides the most riders for the least amount of additional funding, while the Build Out investment level requires nearly five times the investment as the Low scenario. Based on this

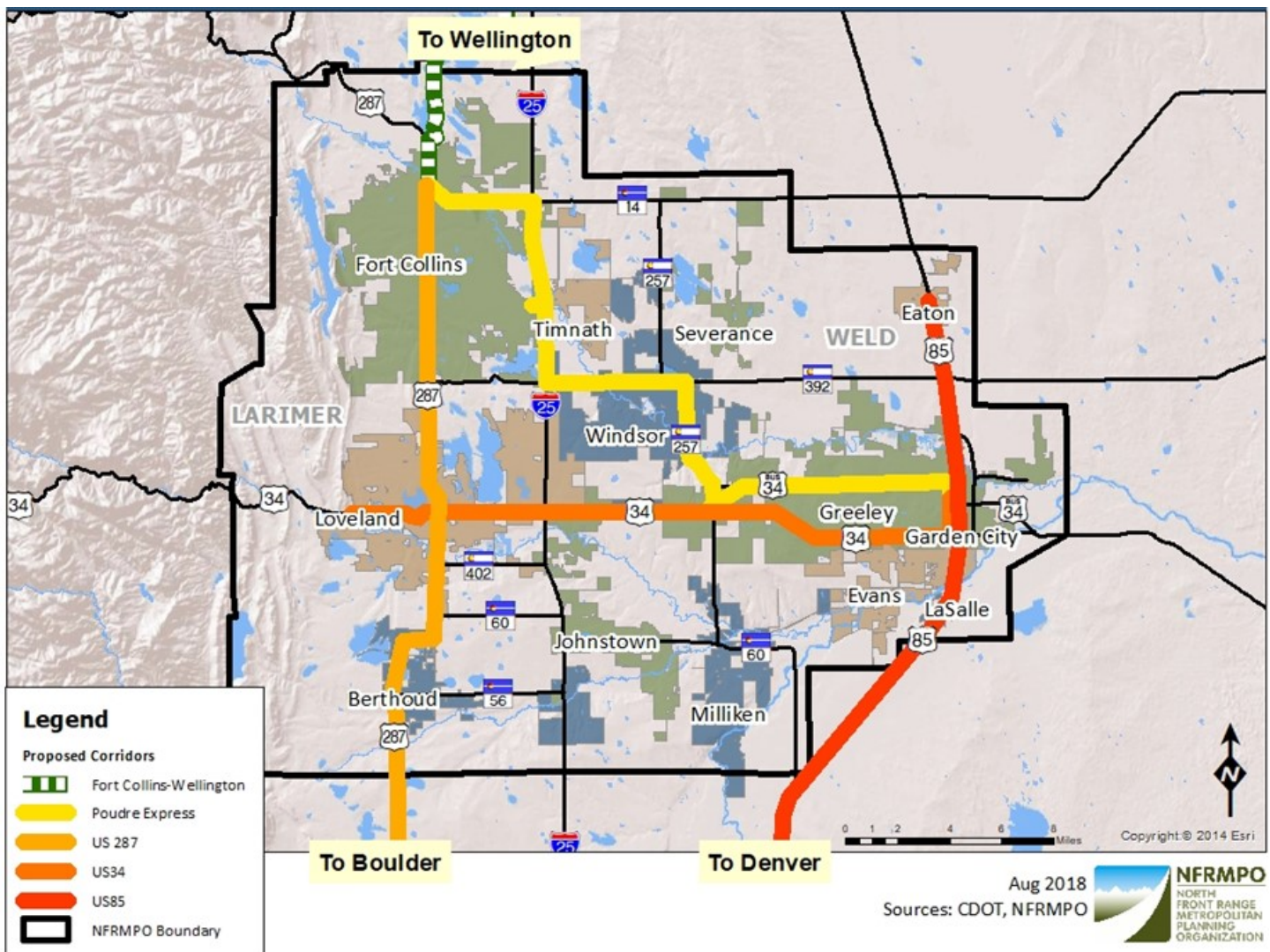
information, the Low and Medium scenarios provide similar benefits to the region in terms of cost-effectiveness and potential ridership. These scenarios will be carried forward to the 2045 RTP for further study and recommendations. **Figure 5-8** shows the recommended corridors for the 2045 RTP and for investment in the region.

**Table 5-4. Cost per New Rider**

	Low	Medium	High	Build Out
<b>Cost per new rider</b>	\$1,258.46	\$1,342.90	\$1,842.50	\$3,440.21

Source: NFRMPO Staff

**Figure 5-8. Recommended Investment Scenario Corridors**



## The Highlights

- A demographic analysis shows greatest need for transit in Fort Collins, Greeley, Loveland and Windsor
- Survey results indicated a desire for new or additional transit along I-25, US85, US34, and US287
- Based on projected costs and modeled ridership, investment along SH1, US34, US85, and US287, along with the Poudre Express between Fort Collins, Windsor, and Greeley, is recommended.

## References

1. Vulnerable population definition adapted from the Health Impact Assessment definition provided by CDC, 2018.  
[https://www.cdc.gov/healthyplaces/transportation/population\\_profile.htm](https://www.cdc.gov/healthyplaces/transportation/population_profile.htm)

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