Appendix E
Transportation Analysis

Transportation Analysis

Travel Demand Forecasting Process

The analysis of future travel demands along the Harmony Road is based on the NFRMPO's 2035 travel demand model, as modified by the City of Fort Collins for the development of the 2011 *Transportation Master Plan* to represent the City's 2035 Fiscally Constrained transportation network. The household and employment forecasts described in **Appendix D** were used as input in the travel demand model. Analyses focused on the development of daily traffic volumes and transit ridership for the Harmony Road corridor.

The 2009 NFR model was used as the basis for post-processing the 2035 model results. Due to the complexity of real-world driver behavior and individual roadway characteristics, travel demand forecasting models cannot be expected to result in precise representations of traffic volumes on each roadway. A common technique used to improve the reliability of travel demand forecasts is referred to as post-processing adjustment. This technique uses comparisons of the base year (2009) model's predicted traffic volumes versus actual traffic counts. These comparisons provide estimations of the error associated with the model's representation of travel conditions. The model-produced forecasts can then be adjusted to account for the errors found in the model to provide more reliable forecasts. This post-processing adjustment process, as prescribed in the Transportation Research Board's publication NCHRP 255, was applied to the study area forecasts.

Evaluation Process

The evaluation process used to select the Locally Preferred Alterative (LPA) for the Harmony Road Alternatives Analysis (AA) was conducted consistent with FTA regulations, which proscribes a process to narrow all reasonable options into a LPA. In summary, this consisted of:

- Identifying the range of potentially promising alternatives (Tier 1 alternatives)
- Screening the range of potentially promising alternatives into a short-list of alternatives (Tier 2 alternatives)
- Detailed evaluation of Tier 2 alternatives
- Selection of the LPA based on the results of the detailed evaluation

The Tier 1 process consisted of screening at the level of detail necessary to produce a shortlist of alternatives, but would not produce all of the information required to fully evaluate alternatives. That more detailed evaluation was conducted as part of the Tier 2 evaluation, which examined many of the same criteria as the Tier 1 screening, plus additional criteria, and at a much more detailed level.

Because of the unique travel characteristics, adjacent land uses and corridor constraints (such as right-of-way) that exist along Harmony Road, the corridor was divided into three distinct segments for the purpose of alternatives evaluation:

- West Segment (Shields Street to College Avenue)
- Central Segment (College Avenue to Ziegler Road)
- East Segment (Ziegler Road to I-25)

The alternatives screening process is depicted on **Figure E-1**. Because potential alternatives involve multiple travel modes, each of which implemented in a number of ways, a single step Tier 1 screening process could involve up to 80 alternatives. To avoid the complexity that would be involved in the screen of this many alternatives, Tier 1 was divided into two parts. Modal elements were screened in Tier 1a, then those modal

elements that were retained were combined to a more manageable list of multimodal options. In Tier 1b, the multimodal options were compared separately for each of the three corridor segments. The most promising alternatives went through a more detailed evaluation in Tier 2. The strongest alternative for each of the three corridor segments was then selected as the LPA.

No Action

The No Action transportation network includes those improvement projects which are expected to be funded by 2035. These transportation projects would be built regardless of any other improvements that are identified as part of the Harmony Road Alternatives Analysis. The No Action alternative is uses as a baseline for comparison of the Tier 1 and Tier 2 alternatives. The No Action scenario includes implementation of some roadway and transit projects, as described in the following sections. Bicycle and pedestrian accommodation would remain as they exist today in the No Action scenario.

Roadway

Planned Roadway Improvements

Along Harmony Road, the No Action roadway network includes the recently completed widening project (Timberline Road to Boardwalk Drive). The inventory and analysis of existing conditions was completed in early 2012, prior to construction of this widening project. Therefore, the existing data and operational analyses reflect conditions prior to this widening project. The No Action alternative also includes three widening projects in close proximity to the Harmony Road ETC:

- The Town of Timnath's Harmony Road widening project (four lane widening from CR 3 to CR 5)
- College Avenue widening to six lanes from Harmony Road to Carpenter Road
- Timberline Road widening to six lanes from Vine Drive to Harmony Road

Traffic Operations

While the volume to capacity ratios shown on **Figure 5** in Chapter 3 provide a planning-level comparison of the level of congestion on the corridor, more detailed operational analyses of the study area intersections has also been conducted for the 2035 No Action scenario. The 2035 daily traffic volumes along Harmony and the major cross-streets are shown on **Figure E-2**. PM peak hour turning movements for the 2035 No Action scenario were estimated at the 11 study area intersections (using the methodology outlined in NCHPR Report 255) and are also shown on **Figure E-2**.

The intersection operational analysis results for the 2035 No Action scenario during the PM peak hour are presented on **Figure E-3**. The analyses include the widening of Harmony Road from Boardwalk Drive to Timberline Road to a six lane section and optimization of the signal timing along the corridor. As shown, most of the study area intersections are projected to operate at LOS E or F during the PM peak hour in the 2035 No Action scenario.

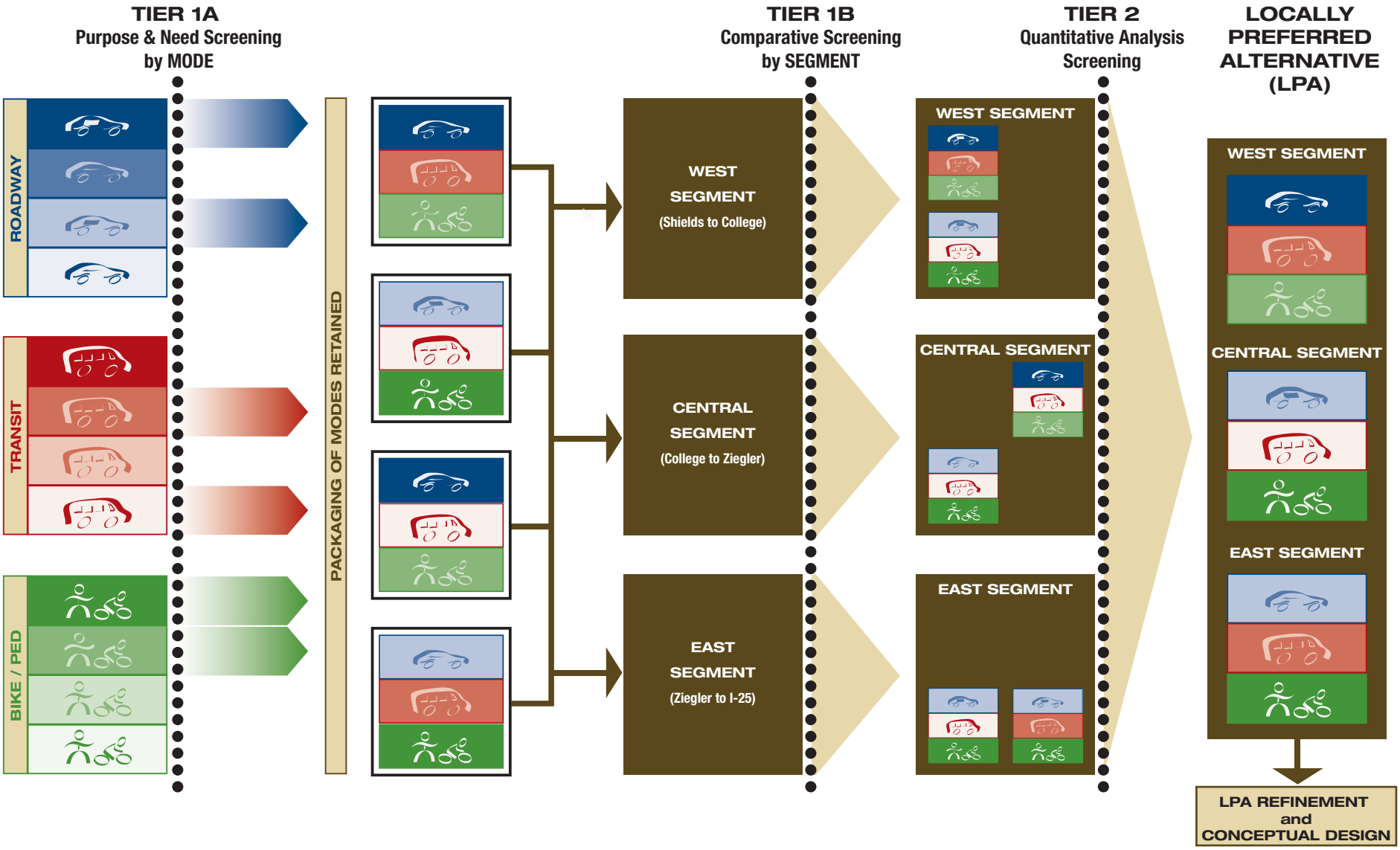
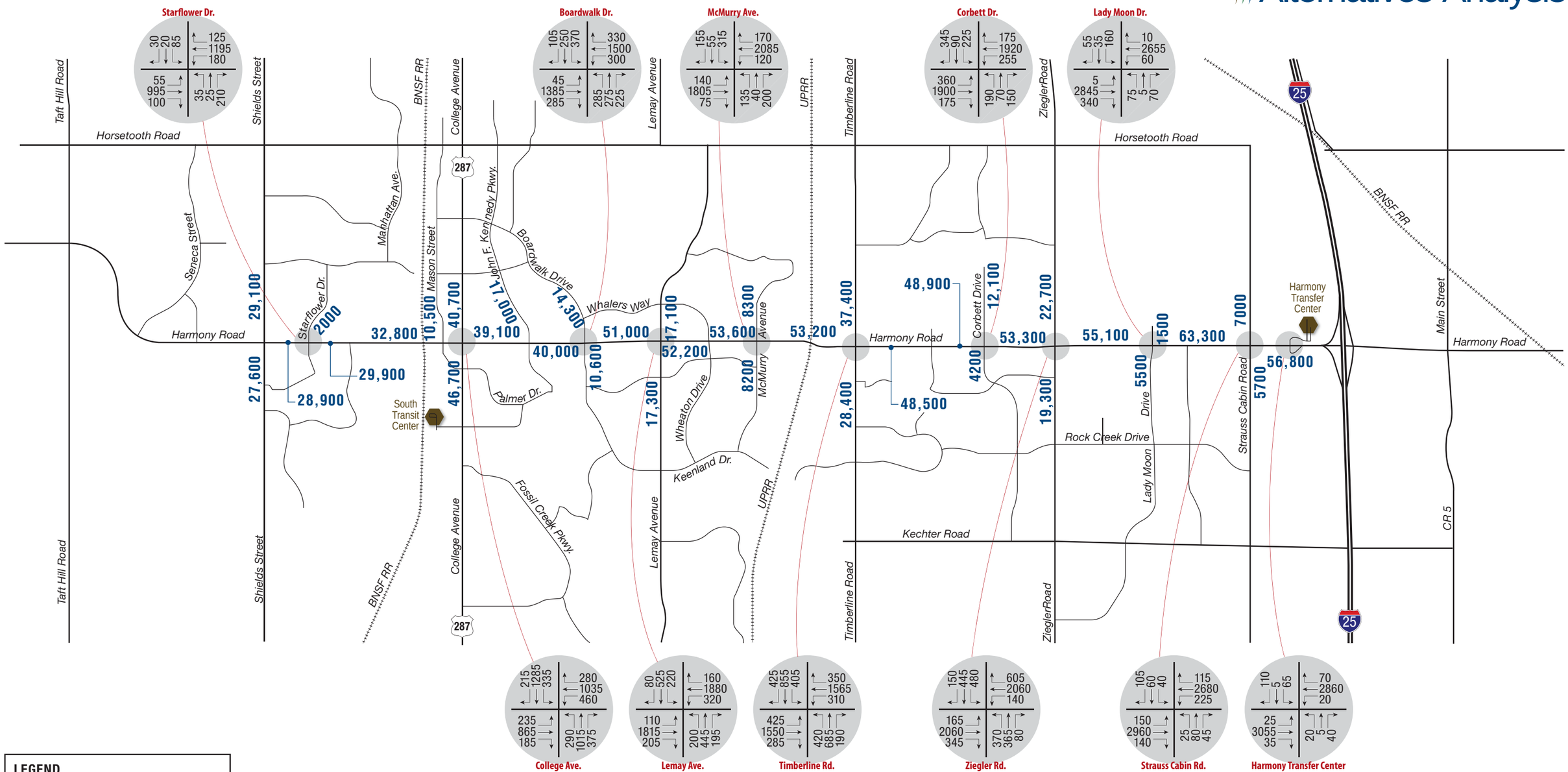


Figure E-1

Alternatives Screening Process

Harmony Road ENHANCED TRAVEL CORRIDOR Alternatives Analysis



LEGEND

XXX PM Peak Hour Traffic Volumes

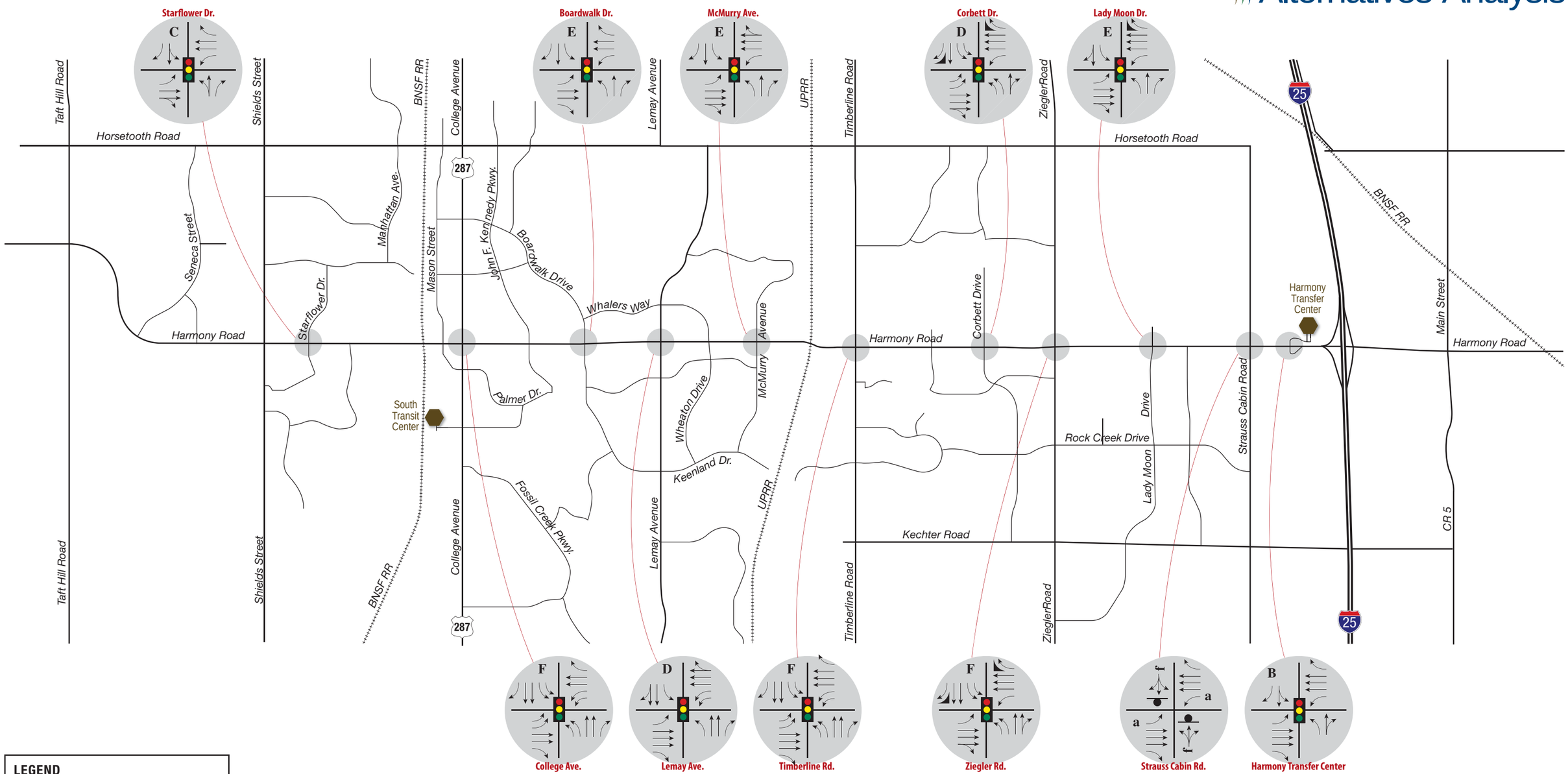
XXXX Daily Traffic Volumes

NORTH

Figure E-2

2035 No Action Traffic Forecasts

Harmony Road ENHANCED TRAVEL CORRIDOR Alternatives Analysis



LEGEND

- X PM Peak Hour Level of Service
- Stop Sign
- Traffic Signal

NORTH

Figure E-3

2035 No Action Intersection Operations

Transit

Planned Transit Improvements

The No Action transit network includes the transit operational improvements recommended in the *Transfort Strategic Operating Plan* (August 2009). Key aspects of this plan include the construction of the Mason Corridor Bus Rapid Transit (BRT), construction of a new South Transit Center southwest of Harmony Road and College Avenue, and general realignment of the transit system around this new transit center designed to provide better service to areas of demand in 2035. Along Harmony Road, it includes route extensions around the Poudre Valley Hospital. Additionally, the No Action includes the transit recommendations in the North I-25 EIS Record of Decision, which includes Express Bus service along I-25 connecting Fort Collins to other Front Range destinations, including Loveland and Denver.

The transit routes in the study area used to represent the No Action alternative are shown in **Figure E-4**. As shown, five of the six routes are either entirely or largely designed to provide north-south service. None of the routes would provide continuous service along the length of the study corridor, but Route 16 would provide service along the length of most of it (Lady Moon Drive to Front Range Community College). Weekday service would operate with the spans of service and service frequencies shown in **Table E-1**.

Table E-1. No Action Transit Operating Statistics

	Span of Service		Headways		
	Begin	End	Peak	Off-Peak	Night
MAX (DTC – STC)	5:00	24:00	10	15	30
Route 7 (STC – CSU via Mall)	6:00	19:00	30	30	-
Route 16 (FRCC – Fossil Ridge HS via Harmony)	6:00	18:30	60	60	-
Route 17 (CSU – PVH Harmony Campus via Timberline and Prospect)	6:00	19:30	60	60	-
Route 19 (STC – CSU via FRCC and Shields)	6:00	19:30	30	60	-
FLEX (Fort Collins – Longmont)	6:30	19:30	30	60	-

Travel Patterns

Using the 2009 base year model and the 2035 No Action model, two figures have been developed to demonstrate the travel demand throughout the City of Fort Collins. **Figures E-5 and E-6** show the person-trips between travel corridors in the 2009 and 2035 models, respectively. These figures demonstrate the general demand for travel between key travel corridors defined by half-mile buffers around four different segments of Harmony Road and the interaction with the City's five other ETCs. These figures are based on the origins and destinations for person-trip demand and are not specific to any mode of travel. The goal for the future transit system is to provide competitive, well designed transit alternatives designed to capture as many trips in the region as possible. In order to focus on travel corridor connections which show substantial demand, and therefore have the most potential to yield the greatest transit ridership, only pairs with at least 1,500 trips per day between travel corridors have been shown.

Generally speaking, **Figure E-5** demonstrates the significant number of trips originating and destined for two key segments along Harmony Road, between Shields Street and College Avenue and between College Avenue and Timberline Road. In 2035 (**Figure E-6**), the model indicates significant demand in a third segment of Harmony Road, between Timberline Road and I-25. These figures are meant to stress the relationship between Harmony Road and the other five ETCs, as well as emphasize the amount of trip making that will occur between and

within Harmony Road travel corridors. Based on these figures, greater attention can be paid to developing transit alternatives that connect corridors in Fort Collins with significant trip making demand.

Based on the transit system changes included in the 2035 NFR travel demand model, a measure of the No Action transit ridership along the Harmony Road corridor has been developed. This analysis serves as the baseline when comparing future transit alternatives along the corridor. In 2009, transit travel surveys were completed for the Transfort system which included stop-level transit ridership data. These data were analyzed to determine the magnitude of transit ridership along the Harmony Road corridor. Specifically, the portions of any transit lines designed to serve east-west travel along the Harmony Road corridor have been summarized by totaling the number of boardings and alightings occurring in the Harmony Road corridor. In 2012, there were approximately 260 boardings per day along the Harmony Road corridor on Route 16. It is forecast that approximately 650 riders per day would board along the Harmony Road corridor in the 2035 No Action scenario, suggesting a 250 percent increase in transit ridership over existing conditions.

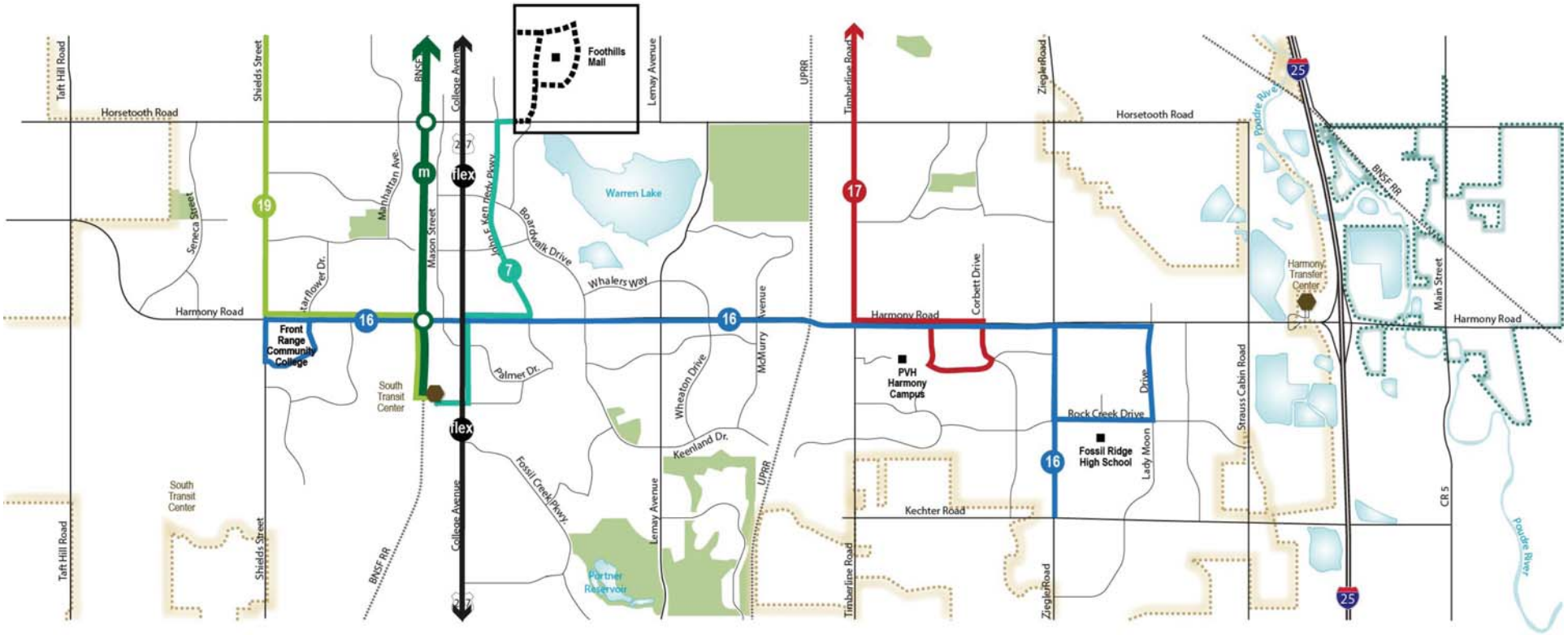


Figure E-4

No Action Transit Routes

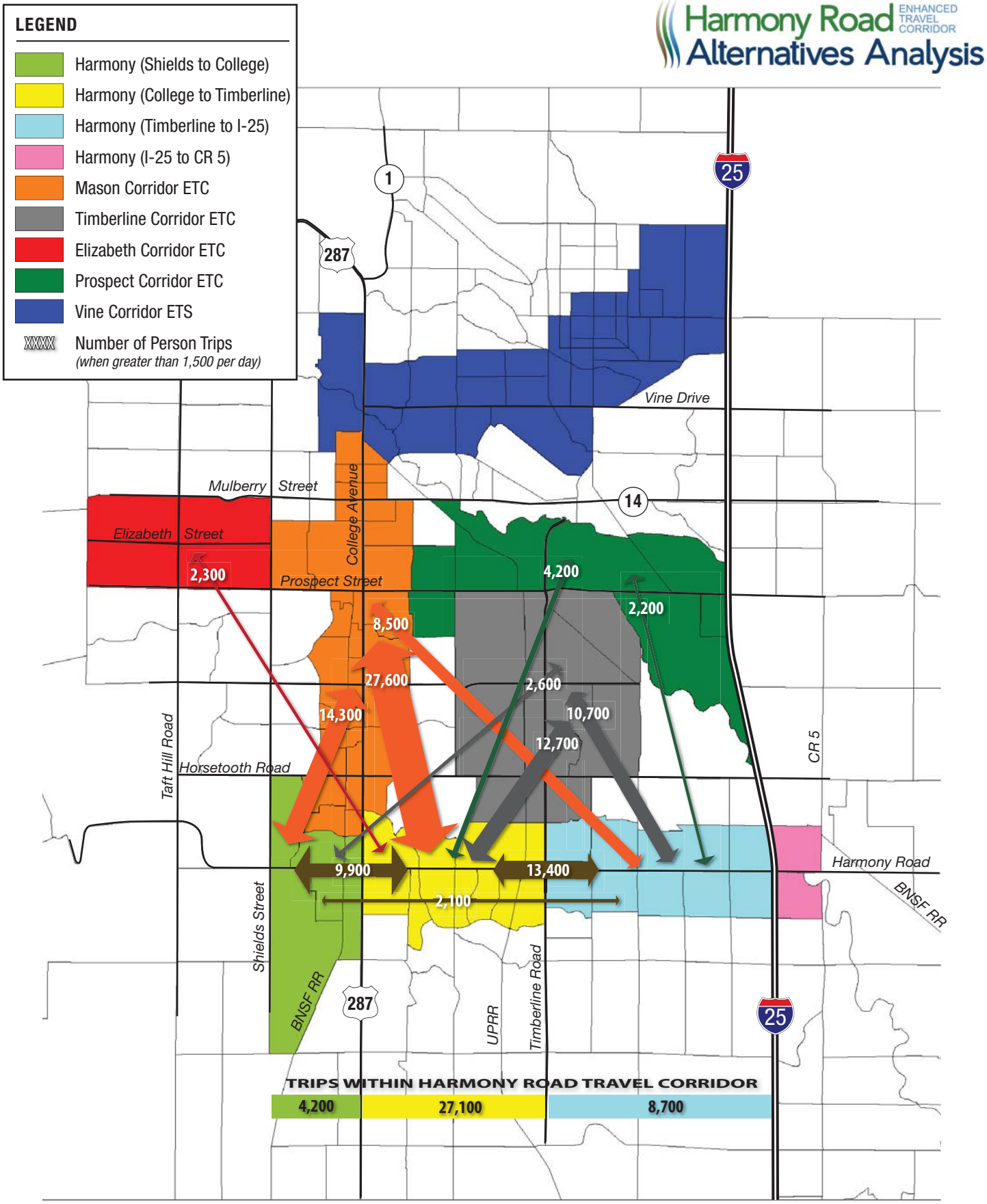
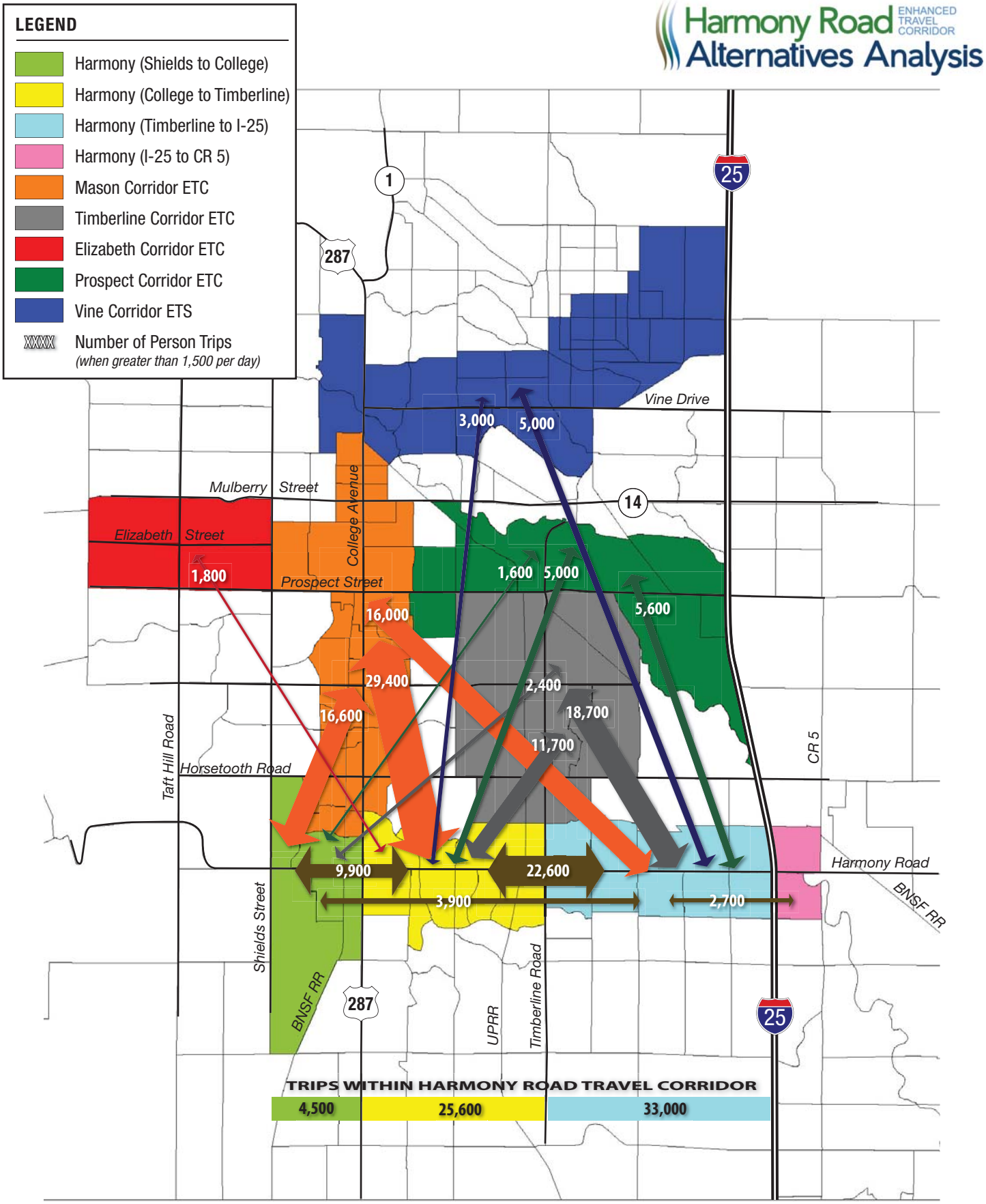


Figure E-5

2009 Person-Trips between Travel Corridors



NORTH

Figure E-6

2035 Person-Trips between Travel Corridors

Tier 1 Alternatives Evaluation

The alternatives development process began with the development of 18 corridor-wide elements, including a broad range of improvements by travel mode (roadway, transit, bicycle, and pedestrian) that were identified to potentially address the project needs. The intent of identifying these Tier 1 elements by mode was not that any single element would necessarily address all of the project needs as stand-alone improvements, but that they could be combined with other elements as part of packaged alternatives.

The Tier 1a screening criteria were based on a variety of measures that are directly tied to the project's Purpose and Need and goals and objectives. The evaluation criteria described in Chapter 3 which could be used to assess a single travel mode were used in the Tier 1a screening. The modal elements were screened using primarily qualitative measure, with a focus on assessing how well each element would meet the project's goals and objectives relative to the others.

The Tier 1b alternatives were developed by combining modal elements from Tier 1a into cross-section alternatives, as shown in **Table E-2**. A more detailed description of each Tier 1b alternative is provided in **Table E-3**. The Tier 1b alternatives were evaluated for the three corridor segments using the applicable evaluation criteria described in Chapter 3. This approach was designed to better evaluate each alternative's merit based on its overall ability to meet the entire spectrum of criteria, recognizing that some alternatives may support some goals more strongly than others, and that different stakeholders weigh individual measures differently. To accommodate this, the evaluation was summarized according to the alternative's overall score for each of the four project goals:

- Potential to improve multimodal mobility
- Potential to enhance accessibility
- Potential to improve safety
- Potential to integrate sustainability.

The results of the Tier 1a and Tier 1b screening are shown on **Figures E-7, E-8, and E-9** for the West, Central, and East Segments, respectively. The full evaluation matrices are included in **Appendix G**.

Table E-2. Tier 1b Alternatives[1]

	General Purpose Lanes		2 GP Lanes				3 GP Lanes			
	Additional Lanes		None	+ BRT Lane	+ BRT/ HOV Lane	+ BRT/ Bike Lane	None	+ BRT Lane	+ BRT/ HOV Lane	+ BRT/ Bike Lane
Transit Service	**Local Bus**		Alt. 1W *No Action West*	-	-	-	Alt. 1E *No Action East*	-	-	-
	Enhanced Bus (with Transit Priority Treatments)		Alt. 2W	-	-	-	Alt. 2E	-	-	-
	BRT	**Curbside**	-	Alt. 3	Alt. 4	Alt. 5	-	Alt. 7	Alt. 8	Alt. 9
		Median	-	Alt. 6	-	-	-	Alt. 10	-	-
Bike Facility Options	**No Additional**		-	-	-	✓	-	-	-	✓
	Bike Lanes (A)		✓	✓	✓	-	✓	✓	✓	-
	Shared Use Paths (B)		✓	✓	✓	✓	✓	✓	✓	✓
	Cycle Tracks (C)		✓	✓	✓	-	✓	✓	✓	-

[1] "W" refers to Harmony Road west of College Avenue and "E" refers to Harmony Road east of College Avenue

Table E-3. Description of Tier 1b Alternatives

Alternative[1]	Description	Approximate Width (Curbline to Curbline)[2]	Outside of Curbline
Alt. 1E/W-A	**No Action**	78 feet (W)/114 feet (E)	Buffer + Sidewalk
Alt. 2E/W-A	**Existing Lanes + Enhanced Bus Service** + Bike Lanes + Detached Sidewalks	78 feet (W)/114 feet (E)	Buffer + Sidewalk
B	+ Shared Use Paths	62 feet (W)/98 feet (E)	Buffer + Shared Use Path
C	+ Cycle Tracks + Detached Sidewalks	62 feet (W)/98 feet (E)	Buffer + Cycle Track + Buffer + Sidewalk
Alt. 3-A	**2 GP + Curbside BRT Lane** + Bike Lane + Detached Sidewalks	114 feet	Buffer + Sidewalk
B	+ Shared Use Path	98 feet	Buffer + Shared Use Path
C	+ Cycle Track + Detached Sidewalks	98 feet	Buffer + Cycle Track + Buffer + Sidewalk
Alt. 4-A	**2 GP + Curbside BRT/HOV Lane** + Bike Lane + Detached Sidewalks	114 feet	Buffer + Sidewalk
B	+ Shared Use Path	98 feet	Buffer + Shared Use Path
C	+ Cycle Track + Detached Sidewalks	98 feet	Buffer + Cycle Track + Buffer + Sidewalk
Alt. 5	**2 GP + Curbside BRT/Bike Lane** + Detached Sidewalks	98 feet	Buffer + Sidewalk
B	+ Shared Use Path	98 feet	Buffer + Shared Use Path
Alt. 6-A	**2 GP + Median BRT Lane** + Bike Lane + Detached Sidewalks	100 feet	Buffer + Sidewalk
B	+ Shared Use Path	84 feet	Buffer + Shared Use Path
C	+ Cycle Track + Detached Sidewalks	84 feet	Buffer + Cycle Track + Buffer + Sidewalk
Alt. 7-A	**3 GP + Curbside BRT Lane** + Bike Lane + Detached Sidewalks	138 feet	Buffer + Sidewalk
B	+ Shared Use Path	122 feet	Buffer + Shared Use Path
C	+ Cycle Track + Detached Sidewalks	122 feet	Buffer + Cycle Track + Buffer + Sidewalk
Alt. 8-A	**3 GP + Curbside BRT/HOV Lane** + Bike Lane + Detached Sidewalks	138 feet	Buffer + Sidewalk
B	+ Shared Use Path	122 feet	Buffer + Shared Use Path
C	+ Cycle Track + Detached Sidewalks	122 feet	Buffer + Cycle Track + Buffer + Sidewalk
Alt. 9	**3 GP + Curbside BRT/Bike Lane** + Detached Sidewalks	122 feet	Buffer + Sidewalk
B	+ Shared Use Path	122 feet	Buffer + Shared Use Path
Alt. 10-A	**3 GP + Median BRT Lane** + Bike Lane + Detached Sidewalks	124 feet	Buffer + Sidewalk
B	+ Shared Use Path	108 feet	Buffer + Shared Use Path
C	+ Cycle Track + Detached Sidewalks	108 feet	Buffer + Cycle Track + Buffer + Sidewalk

[1] "W" refers to Harmony Road west of College Avenue and "E" refers to Harmony Road east of College Avenue

[2] For comparison purposes, assumes the following dimensions: 12 foot travel lanes, 26 foot median, 8 foot bike lanes, 6 foot buffers on either side of Median BRT, 6 foot one-way cycle tracks with 4 foot buffer

ALTERNATIVE	DESCRIPTION	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Retained for Additional Analysis in Tier 2						
Alt. 1	No Action	✗	◑	○	◑	Retained for additional evaluation.
Alt. 2-B	2 GP + Transit Priority + Shared Use Path	○	◑	●	●	Retained for additional evaluation.
Alt. 2-C	2 GP + Transit Priority + Cycle Tracks + Detached Sidewalk	◑	◑	●	●	Retained for additional evaluation.

KEY

poor	fair	good	best
✗	○	◑	●

ALTERNATIVE	DESCRIPTION	Public Input	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Eliminated in 1A Screening							
Alt. 5, Alt. 9	Curbside Bus/Bike Lane	✗	○	na	✗	○	Shared BRT/Bike Lane would not improve comfort or safety of bike travel along Harmony and therefore would not address the Purpose and Need.
Alt. 6, Alt.10	Median Bus Lane	○	●	✗	na	○	Median BRT would result in the widest cross section for pedestrians and impede pedestrian connectivity and therefore does not address Purpose and Need.
Alt. 7, Alt. 8, Alt. 9	3 GP	○	●	✗	✗	✗	3 GP lanes would not balance the multimodal needs along the west segement of the corridor, is not consistent with the City's Sustainability Focus or the Transportation Master Plan, and therefore would not address the Purpose and Need.

ALTERNATIVE	DESCRIPTION	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Eliminated in 1B Screening						
Alt. 2-A	2 GP + Transit Priority + Bike Lanes	◑	◑	○	●	Comparable alternatives with shared use paths and cycle track had more potential to improve safety along this segment and therefore, this alternative was eliminated.
Alt. 3-A	2 GP + Curbside Bus Lane + Bike Lane + Detached Sidewalk	◑	○	○	◑	Does not have as much potential to improve safety and enhance accessibility along this segment and therefore, this alternative was eliminated.
Alt. 3-B	2 GP + Curbside Bus Lane + Shared Use Path	◑	○	●	○	Does not have as much potential to enhance accessibility or integrate sustainability along this segment and therefore, this alternative was eliminated.
Alt. 3-C	2 GP + Curbside Bus Lane + Cycle Track + Detached Sidewalk	●	○	●	○	Does not have as much potential to enhance accessibility or integrate sustainability along this segment and therefore, this alternative was eliminated.
Alt. 4-A	2 GP + Curbside Bus/HOV Lane + Bike Lane + Detached Sidewalk	●	○	✗	◑	Does not have as much potential to improve safety and enhance accessibility along this segment and therefore, this alternative was eliminated.
Alt. 4-B	2 GP + Curbside Bus/HOV + Shared Use Path	◑	○	◑	◑	Does not have as much potential to enhance accessibility and therefore, this alternative was eliminated.
Alt. 4-C	2 GP + Curbside Bus/HOV + Cycle Track + Detached Sidewalk	●	○	◑	○	Does not have as much potential to enhance accessibility or integrate sustainabiity and therefore, this alternative was eliminated.

Figure E-7

Tier 1 Evaluation Summary
West Segment (Shields Street to College Avenue)

Harmony Road ENHANCED TRAVEL CORRIDOR Alternatives Analysis

ALTERNATIVE	DESCRIPTION	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Retained for Additional Analysis in Tier 2						
Alt. 1	No Action	✗	○	✗	○	Retained for additional evaluation.
Alt. 2-C	3 GP + Transit Priority + Cycle Track + Det SW	●	○	◑	●	Retained for additional evaluation.
Alt. 4-B	2 GP + Curbside Bus/HOV+ Shared Use Path	◑	○	●	●	Retained for additional evaluation.
Alt. 4-C	2 GP + Curbside Bus/HOV + Cycle Track + Det SW	●	○	●	●	Retained for additional evaluation.

KEY

poor	fair	good	best
✗	○	◑	●

ALTERNATIVE	DESCRIPTION	Public Input	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Eliminated in 1A Screening							
Alt. 5, Alt. 9	Curbside Bus/Bike Lane	✗	○	na	✗	○	Shared BRT/Bike Lane would not improve comfort or safety of bike travel along Harmony and therefore would not address the Purpose and Need.
Alt. 6, Alt.10	Median Bus Lane	○	●	✗	na	○	Median BRT would result in the widest cross section for pedestrians and impede pedestrian connectivity and therefore does not address Purpose and Need.
Alt. 7, Alt. 8, Alt. 9	4 GP	○	●	✗	✗	✗	4 GP lanes would not balance the multimodal needs along the west segement of the corridor, is not consistent with the City's Sustainability Focus or the Transportation Master Plan, and therefore would not address the Purpose and Need.
Alt. 2-10-A	Bike Lanes	○	○	○	✗	○	High speeds and traffic volumes make bike lanes along Harmony unable to address the need to provide comfortable and convenient multimodal travel options and therefore would not address the Purpose and Need.

ALTERNATIVE	DESCRIPTION	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Eliminated in 1B Screening						
Alt. 2-B	3 GP + Transit Priority + Shared Use Path	◑	○	◑	●	The comparable alternative with Cycle track had more potential to improve multi-modal mobility therefore, this alternative was eliminated.
Alt. 7-B	3 GP + Curbside Bus Lane + Shared Use Path	◑	✗	◑	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic - Result in more potential ROW and environmental impacts. Capital investment would not be compatible with anticipated demand. This alternative was eliminated.
Alt. 7-C	3 GP + Curbside Bus Lane + Cycle Track + Det SW	●	✗	◑	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic - Result in more potential ROW and environmental impacts. Capital investment would not be compatible with anticipated demand. This alternative was eliminated.
Alt. 8-B	3 GP + Curbside Bus/HOV + Shared Use Path	◑	✗	○	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic - Result in more potential ROW and environmental impacts. This alternative was eliminated.
Alt. 8-C	3 GP + Curbside Bus/HOV + Cycle Track + Det SW	●	✗	○	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic Result in more potential ROW and environmental impacts. This alternative was eliminated.

Figure E-8

Tier 1 Evaluation Summary
Central Segment (College Avenue to Ziegler Road)

ALTERNATIVE	DESCRIPTION	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Retained for Additional Analysis in Tier 2						
Alt. 1	No Action	✗	○	✗	○	Retained for additional evaluation.
Alt. 2-C	3 GP + Transit Priority + Cycle Track + Det SW	●	○	◑	●	Retained for additional evaluation.
Alt. 4-B	2 GP + Curbside Bus/HOV+ Shared Use Path	◑	○	●	●	Retained for additional evaluation.
Alt. 4-C	2 GP + Curbside Bus/HOV + Cycle Track + Det SW	●	○	●	●	Retained for additional evaluation.

KEY

poor	fair	good	best
✗	○	◑	●

ALTERNATIVE	DESCRIPTION	Public Input	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Eliminated in 1A Screening							
Alt. 5, Alt. 9	Curbside Bus/Bike Lane	✗	○	na	✗	○	Shared BRT/Bike Lane would not improve comfort or safety of bike travel along Harmony and therefore would not address the Purpose and Need.
Alt. 6, Alt.10	Median Bus Lane	○	●	✗	na	○	Median BRT would result in the widest cross section for pedestrians and impede pedestrian connectivity and therefore does not address Purpose and Need.
Alt. 7, Alt. 8, Alt. 9	4 GP	○	●	✗	✗	✗	4 GP lanes would not balance the multimodal needs along the west segement of the corridor, is not consistent with the City's Sustainability Focus or the Transportation Master Plan, and therefore would not address the Purpose and Need.
Alt. 2-10-A	Bike Lanes	○	○	○	✗	○	High speeds and traffic volumes make bike lanes along Harmony unable to address the need to provide comfortable and convenient multimodal travel options and therefore would not address the Purpose and Need.

ALTERNATIVE	DESCRIPTION	Potential to Improve Multi-modal Mobility	Potential to Enhance Accessibility	Potential to Improve Safety	Potential to Integrate Sustainability	NOTES
Eliminated in 1B Screening						
Alt. 2-B	3 GP + Transit Priority + Shared Use Path	◑	○	◑	●	The comparable alternative with Cycle track had more potential to improve multi-modal mobility therefore, this alternative was eliminated.
Alt. 7-B	3 GP + Curbside Bus Lane + Shared Use Path	◑	✗	◑	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic - Result in more potential ROW and environmental impacts. Capital investment would not be compatible with anticipated demand. This alternative was eliminated.
Alt. 7-C	3 GP + Curbside Bus Lane + Cycle Track + Det SW	●	✗	◑	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic - Result in more potential ROW and environmental impacts. Capital investment would not be compatible with anticipated demand. This alternative was eliminated.
Alt. 8-B	3 GP + Curbside Bus/HOV + Shared Use Path	◑	✗	○	○	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic - Result in more potential ROW and environmental impacts. This alternative was eliminated.
Alt. 8-C	3 GP + Curbside Bus/HOV + Cycle Track + Det SW	●	✗	○	◑	Eight lanes would result in a wider cross section than other alternatives therefore would: - Not enhance accessibility for all abilities and a broad demographic Result in more potential ROW and environmental impacts. This alternative was eliminated.

Figure E-9

Tier 1 Evaluation Summary
East Segment (Ziegler Road to I-25)

Tier 2 Alternatives Evaluation

The results of the Tier 1 evaluation process were presented to and discussed with the TAC, corridor stakeholder groups, and the public. After considering and reflecting upon the input received during this outreach effort, the Project Management Team discussed how to efficiently and effectively package the remaining cross-section alternatives for the more detailed analysis required in Tier 2. The Tier 2 Alternatives include improvements for all travel modes; however, because the transit elements are the key differentiators between the alternatives, the Tier 2 Alternatives are titled based on the transit service, as shown in **Table 4** of the report. The following sections provide detailed transit and traffic operational analysis results as well as comparative unit costs for transit and bicycle and pedestrian improvements for the Tier 2 alternatives.

Transit

Description of Transit Alternatives

Four separate transit alternatives (in addition to the No Action alternative) were evaluated as part of the Tier 2 evaluation: Transportation Systems Management (TSM), Enhanced Bus service, Bus Rapid Transit (BRT), and BRT with interlined service between Mason Street (MAX) and Harmony Road (BRT Interlined). The key characteristics of each Tier 2 alternative are described below followed by more detailed information about the headways and transit routing changes completed within the NFR travel demand model for this analysis.

Transportation System Management (TSM)

This alternative focuses on modest, lower cost local bus service improvements to the Harmony Road corridor. The TSM alternative includes extension of Route 16 east from the current termination point at Fossil Ridge High School to the Harmony Transfer Center, providing service along the full length of the Harmony ETC, and the extension of Route 17 from the Poudre Valley Hospital Harmony Campus west to the South Transit Center. Routes 17 and 18 are interlined in this alternative. Headways have been improved along Route 7 and Route 19 compared to the No Action alternative. These improvements are based on recommendations in Phase 1 of the *Transfort Strategic Operating Plan Update*. The TSM transit routes are shown on **Figure E-10**, and the weekday service operating statistics are shown on **Table E-4**.

Table E-4. TSM Alternative Transit Operating Statistics

	Span of Service		Headways		
	Begin	End	Peak	Off-Peak	Night
MAX (DTC – STC)	5:00	24:00	10	15	30
Route 7 (STC – CSU via Mall)	6:00	20:30	30	30	60
Route 16 (FRCC – HTC via STC)	6:00	18:30	60	60	--
Route 17 (CSU – PVH Harmony Campus)	6:00	19:30	60	60	--
Route 19 (STC – CSU via FRCC and Shields)	6:00	19:30	30	30	--
FLEX (Fort Collins – Longmont)	6:30	19:30	30	60	-

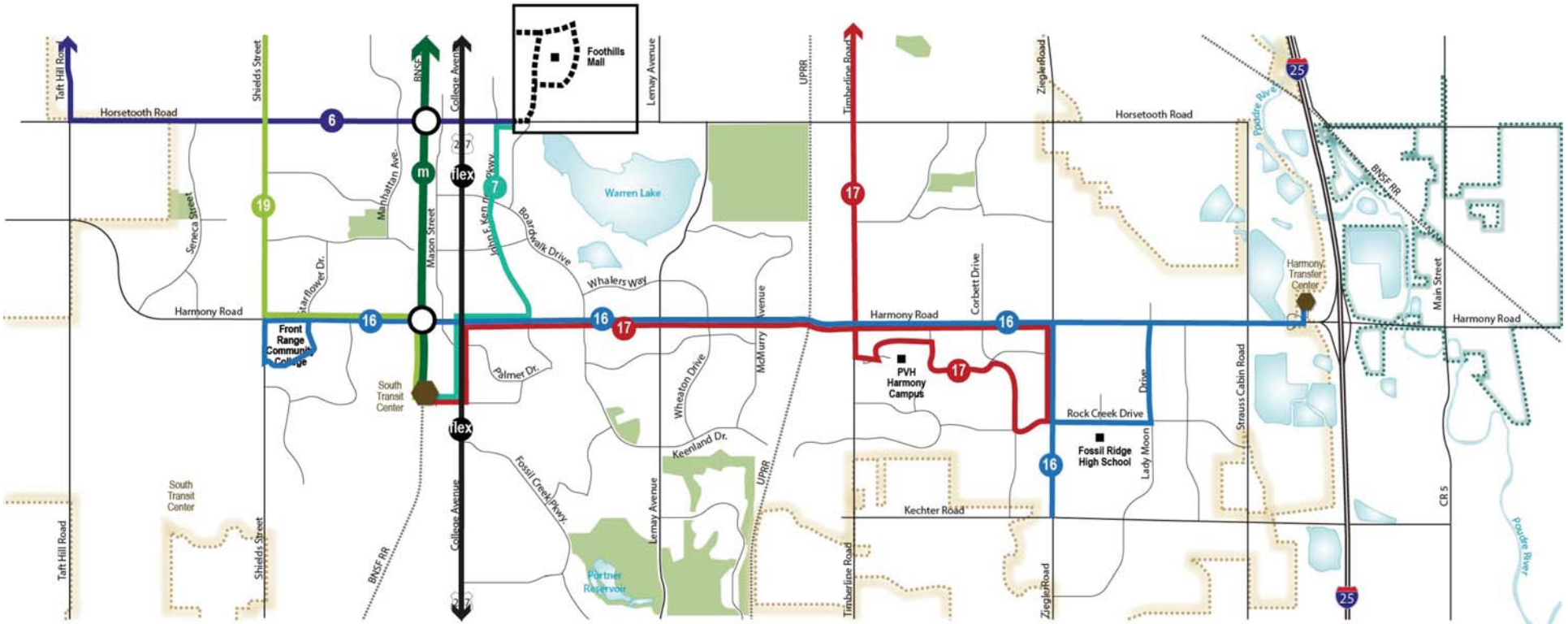


Figure E-10
Alternative Transit Routes

Enhanced Bus

The Enhanced Bus alternative would have similar service and physical characteristics as BRT, except that it would operate in mixed-traffic with queue jumps at select intersections instead of in dedicated lanes. A new Harmony Enhanced Bus route would be developed that would operate from Harmony Transfer Center to FRCC via Harmony Road (see **Figure E-11**). For trips to and from downtown, passengers would transfer to MAX. Route 17 would be extended from its current termination point at Poudre Valley Hospital Harmony Campus east to Fossil Ridge High School. Routes 17 and 18 are interlined in this alternative. Headways have been improved along Route 7, Route H (formerly Route 16), and Route 19 compared to the No Action alternative.

As shown in **Table E-5**, the span of service and service frequencies for Harmony Road Enhanced Bus service would be from 5:00 AM to 10:00 pm, every 20 minutes during the peak periods, every 30 minutes in the off peak periods and every 60 minutes after 10:00 pm.

Table E-5. Enhanced Bus Alternative Transit Operating Statistics

	Span of Service		Headways		
	Begin	End	Peak	Midday	Night
MAX (STC – DTC)	5:00	24:00	10	15	30
Route H (Harmony Road Enhanced Bus)	6:00	22:00	20	30	60
Route 7 (STC – CSU via Mall)	6:00	20:30	30	30	60
Route 17 (Midpoint – PVH Harmony via Timberline)	6:00	19:30	60	60	--
Route 19 (STC – CSU via FRCC and Shields)	6:00	19:30	30	30	--
FLEX (Fort Collins – Longmont)	6:30	19:30	30	60	-

End-to-End BRT/HOV

Two transit alternatives would provide BRT service that would operate in curbside Bus/HOV lanes. Service would operate more frequently and over a longer time span than local service, and would include a number of associated physical improvements. In addition to the Bus/HOV lanes, these would include arterial BRT elements such transit signal priority (TSP) and BRT-type stations, with similar stop spacing as MAX. In total, these improvements would speed service and improve passenger comfort in a similar manner as MAX but without the exclusive right-of-way.

In the End-to-End BRT Alternative, the bus would run end-to-end along Harmony Road, from the HTC to FRCC. In this alternative, riders would transfer from the Route H to MAX to get from the Harmony corridor to downtown, as shown on **Figure C-12**. Route 17 would be extended from its current termination point at Poudre Valley Hospital Harmony Campus east to Fossil Ridge High School. Routes 17 and 18 are interlined in this alternative. Headways have been improved along Route 7, Route H (formerly Route 16), and Route 19 compared to the No Action alternative. Operating statistics for BRT are shown in **Table C-6**. Holly – do we NEED MORE TEXT HERE?

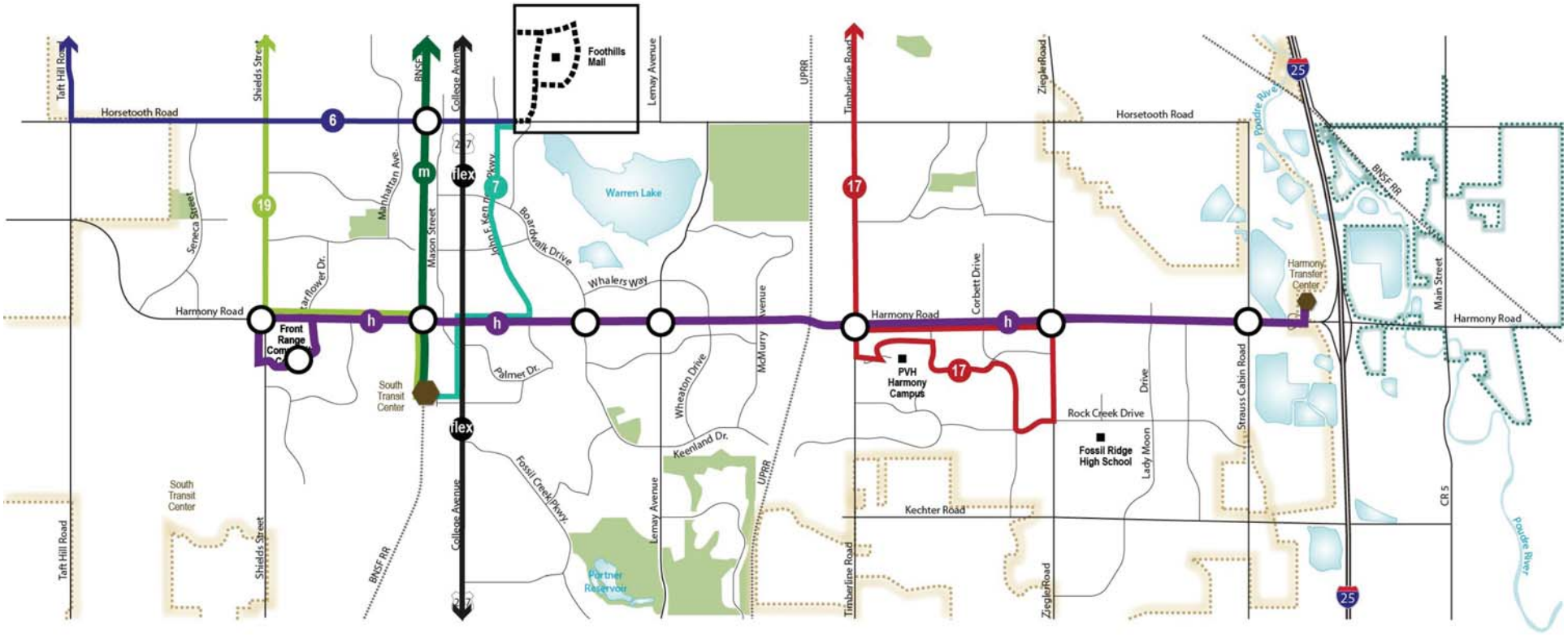


Figure E-11

Enhanced Bus Alternative Transit Routes

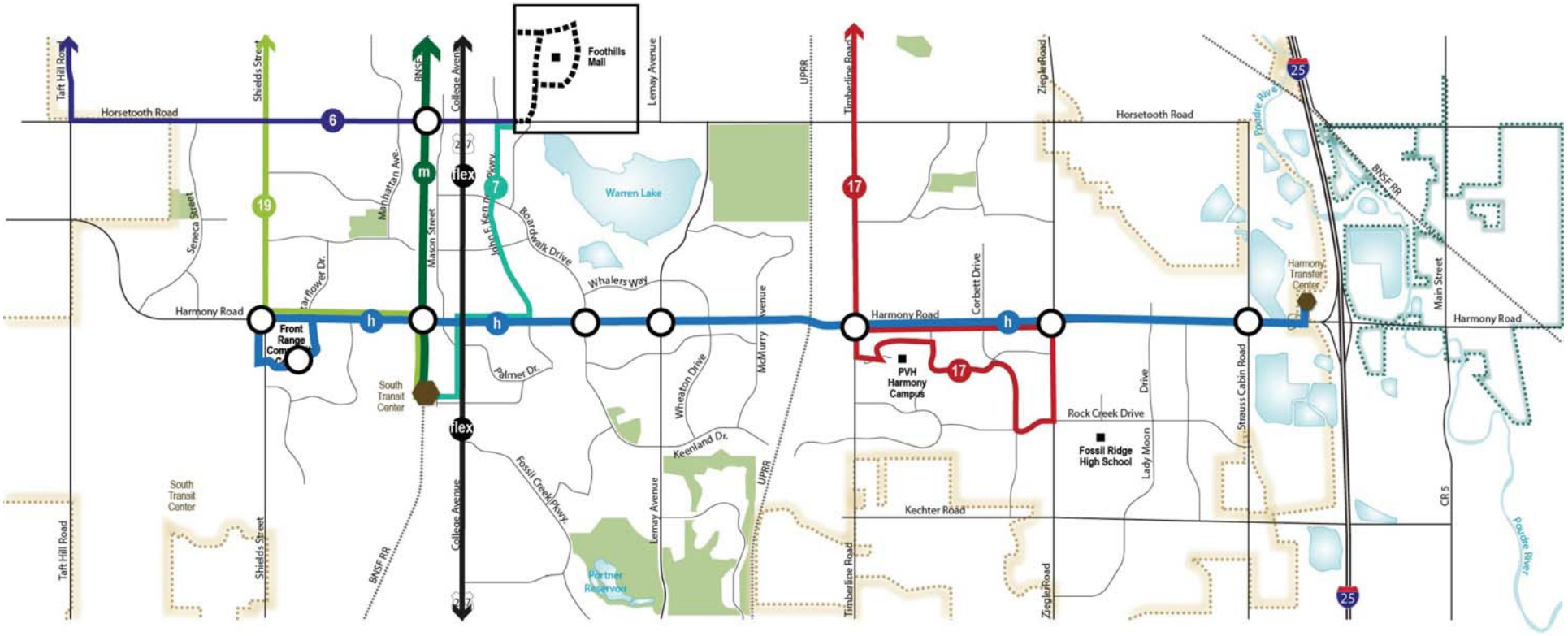


Figure E-12

End-to-End BRT/HOV Alternative Transit Routes

Table E-6. End-to-End BRT Alternative Operating Statistics

	Span of Service		Headways		
	Begin	End	Peak	Midday	Night
MAX (STC – DTC)	5:00	24:00	10	15	30
Route H (Harmony Road Bus Rapid Transit)	6:00	22:00	20	30	60
Route 7 (STC - CSU via Mall)	6:00	20:30	30	30	60
Route 17 (Midpoint - Fossil Ridge HS via Timberline)	6:00	18:30	60	60	--
Route 19 (STC - CSU via FRCC and Shields)	6:00	18:30	30	30	--
FLEX Fort Collins - Longmont	6:30	19:30	30	60	-

Interlined BRT/HOV

In the Interlined BRT scenario, to provide one-seat service along most of Harmony Road, and to and from downtown, MAX service would be extended to both the Harmony Transfer Center and FRCC. However, because MAX service would still need to serve the South Transit Center, there would be some backtracking involved, and the service would operate as follows (see **Figure E-13**):

- From downtown, all trips would operate directly to the South Transit Center.
- At the South Transit Center, all service would reverse direction back to Harmony Road.
- At Harmony Road, 50% of trips would operate east to the Harmony Transit Center (for the purposes of this document, called Route M1), and 50% would operate west to FRCC (for the purposes of this document, called Route M2).
- Inbound service would operate in the reverse of outbound service. Trips from HTC would operate back to STC and then to DTC, and trips from FRCC would operate back to STC and then also to DTC.
- With this configuration, operating patterns would be as follows:
- **Route M1 - DTC to HTC via STC:** Outbound: DTC to STC to HTC; Inbound: HTC to STC to DTC
- **Route M2 - DTC to FRCC via STC:** Outbound: DTC to STC to FRCC; Inbound: FRCC to STC to DTC

Route 17 is extended from its current termination point at Poudre Valley Hospital Harmony Campus east to Fossil Ridge High School. Routes 17 and 18 are interlined in this alternative.

MAX service will operate from 5:00 AM to midnight, and will operate every 10 minutes during the day and every 15 to 30 minutes at night. With 50% of trips operating to each end of Harmony Road, those services would operate every 20 minutes during the day and every 60 minutes at night. It is likely that service would not need to operate as late at night, and could shut down shortly after 10:00 PM after most stores close. In that case, downtown – South Transit Center MAX service would operate from 10:00 PM until midnight, as is currently planned. The service hours and headways for the Interlined BRT Alternative are shown in **Table E-7**.

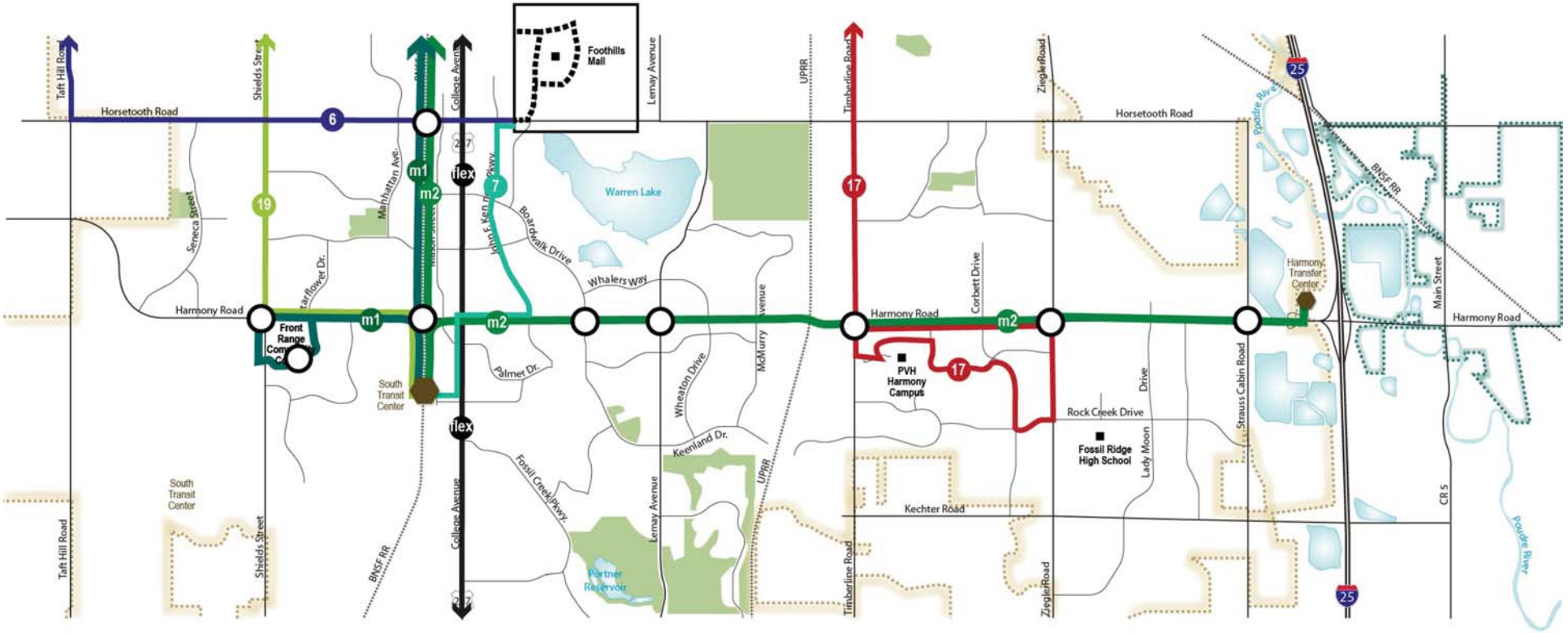


Figure E-13

Interlined BRT/HOV Alternative Transit Routes

Table E-7. Interlined BRT Alternative Transit Operating Statistics

	Span of Service		Headways		
	Begin	End	Peak	Midday	Night
MAX HTC/FRCC - DTC via STC					
M1 HTC - DTC via STC	5:00	22:00	20	30	60
M2 FRCC - DTC via STC	5:00	22:00	20	30	60
M3 STC - DTC	22:00	24:00	--	--	30
Total/Combined	5:00	24:00	10	15	30
Route 7 (STC - CSU via Mall)	6:00	20:30	30	30	60
Route 17 (Midpoint - Fossil Ridge HS via Timberline)	6:00	18:30	60	60	--
Route 19 (STC - CSU via FRCC and Shields)	6:00	18:30	30	30	--
FLEX Fort Collins - Longmont	6:30	19:30	30	60	-

Transit Modeling Details

Table E-8 summarizes each of the transit routes and headways along Harmony Road affected by the Tier 2 transit alternatives. The NFR model allows separate peak and off-peak headways to be coded.

Table E-8. Summary of Transit Route Headways

	Headways (Peak/Off-Peak)				
Route No.	No Action	TSM	Enhanced Bus	End-to-End BRT/HOV	Interlined BRT/HOV
7	60/60	30/30	30/30	30/30	30/30
16/H	60/60	60/60	20/30	20/30	
17	60/60				
18	60/60				
17/18		60/60	60/60	60/60	60/60
19	30/60	30/30	30/30	30/30	30/30
MAX	10/15	10/15	10/15	10/15	
MAX1					20/30
MAX2					20/30

During the modeling effort, coding techniques were used to develop the alternative model runs. The following descriptions include the issue, remedy, and any further post processing techniques used after the model runs were completed to refine the study results.

- BRT Coding Details – The vision for BRT alternatives along the Harmony Road corridor includes a shared HOV/BRT lane in each direction along Harmony Road. The coding for this HOV/BRT lane is not available in the NFR travel demand model. In order to simulate the operating characteristics of this facility, an additional parallel facility was added to the travel demand model to separate BRT traffic from vehicular traffic. It is anticipated that the shared HOV/BRT lane would operate at higher speed than the general purpose lanes due to decreased volumes, the newly coded BRT lanes in the model were coded to

operate at the speed limit within the corridor simulating a higher level of service on the BRT facility than the adjacent general traffic lanes which include speed decreases due to congestion.

- A separate Synchro level of service analysis was completed to better understand the operations of the BRT alternatives. This effort required specific lane use assignments to account for the 23 percent HOV vehicle share experienced along Harmony Road during the peak hours which are eligible for the shared HOV/BRT lane. The results of this analysis are incorporated into the main report.

- Transit Stops coding –For this modeling effort, transit stops were included for all route types (e.g., local, enhanced bus, and bus rapid routes) at all centroid connectors and road network intersections along each route. This allows for direct comparison between the alternatives in evaluating the impact of the routing changes on ridership between different alternatives. The model stop locations and spacing deviate from what the stop locations will be for the built system. It was important for the model runs to be set on an even ground for the transit analysis in order for transit coding idiosyncrasies to have as negligible impact on the results as possible. In reality, as transit routes are designed along the corridor, decisions will be made as to the spacing and location of all stops along the corridors with the understanding that stop placement will have a significant impact on the ease of access to the transit system, and proportionately, the ridership.

Transit Performance Measures

All transit modeling alternatives were evaluated using the NFR travel demand model and the results have been organized into two key summary statistics, ridership and transfers. All of these alternatives are meant to serve similar ridership areas resulting in system-wide results which can be easily compared. **Table E-9** provides the ridership details for each alternative.

Table E-9. 2035 System-Wide Transit Users

Route	2035 No Action Alternative	2035 TSM Alternative	2035 Enhanced Bus Alternative	2035 End-to-End BRT/HOV Alternative	2035 Interlined BRT/HOV Alternative
2	509	356	385	357	358
3	547	635	613	542	543
5	211	214	210	197	188
6	179	120	112	96	97
7	400	1,836	1,573	1,384	1,367
8	696	731	735	704	748
9	368	370	372	362	379
11	1,073	1,023	1,060	979	981
14	353	397	426	434	453
16/H	651	755	2,127	2,383	
17	679				
18	733				
17/18		1,064	669	729	700
19	1,717	1,576	1,726	1,167	1,159
81	452	477	482	484	456

Route	2035 No Action Alternative	2035 TSM Alternative	2035 Enhanced Bus Alternative	2035 End-to-End BRT/HOV Alternative	2035 Interlined BRT/HOV Alternative
MAX*	5,243	5,481	6,054	7,073	
MAX1*					3,464
MAX2*					5,464
Total**	**13,812**	**15,035**	**16,542**	**16,892**	**16,356**
Transfers***	3,738	4,162	4,738	3,844	3,132
Total Users	**10,075**	**10,874**	**11,804**	**13,048**	**13,224**

* Includes a correction to 2035 Alt BRT and 2035 Alt Interlined BRT of 2,000 trips to correct for unexplained ridership increase on MAX between EBS to BRT

** Totals include person-trips using each transit line per day and are unadjusted, raw model results

*** Assumes at most one transfer per ride; Transfers have been subtracted from Total Ridership to calculate Total Users

In order to establish the Total Users for the transit system, as shown on the transit ridership table, an assumption about the number of transfers completed by riders using the system was needed. It was assumed that at most, riders transferred only once to complete trips within the system. Therefore, by removing the number of transfers completed in the system from the total ridership, the total number of users in the system was attainable. This number is especially important when considering the increase in ridership of interlining transit routes and providing one seat rides for users compared to when transfers are necessary.

Text and explanation of time calculation -HOLLY

Table E-10. 2035 PM Peak Hour Transit Travel Times[1] (minutes)

	Transit[1]
No Action	NA
TSM Alternative	23
Enhanced Bus Alternative	21
End-to-End BRT/HOV Alternative	21
Interlined BRT/HOV Alternative	26[2]

[1] *Average travel time Harmony Transfer Center to Front Range Community College*

[2] *Five minute transfer time added to interlined service due to transfer required at the South Transit Center*

Holly – this table is straight from the 12/19/12 TAC meeting – is it up to date?

Holly: Text – brief summary of cost calculations

Table E-11. Transit Cost Comparison

Alternative	Annual O and M		Fleet		Shelters		Roadway Modifications		Total
	Hours Over No Action	Cost over No Action	Buses Over No Action	Cost Over No Action	Shelters Over No Action	Cost Over No Action	Striping/ queue jumps	Cost Over No Action	Cost Over No Action
No Action	0	$0	0	$0	0	$0	0	$0	$0
TSM	6,296	$586,000	2	$800,000	0	$0	0	$0	$1,386,000
Enhanced Bus	14,454	$1,344,000	4	$1,600,000	20	$100,000	Queue jumps (8 intersection)	$9,000,000	$12,044,000
End-to-End BRT	14,454	$1,344,000	4	$1,600,000	20	$240,000	Striping (5 miles)	$11,150	$3,195,000
Interlined BRT	13,840	$1,287,000	3	$1,183,871	20	$240,000	Striping (5 miles)	$11,150	$2,722,000

Table E-12. Transit Cost Effectiveness Comparison of Alternatives Over No Action

Alternative	Annualized Capital Cost	Annual O&M Cost	Annual Harmony /Mason Riders	OandM$/ Rider	Annualized Capital +OandM/Rider
No Action	$0	$0	0	0	0
TSM	$95,440	$586,000	108,500	$5.40	$5.47
Enhanced Bus	$851,540	$1,344,000	713,000	$1.88	$1.98
End-to-End BRT	$210,000	$1,344,000	899,000	$1.49	$1.51
Interlined BRT	$160,000	$1,287,000	945,500	$1.36	$1.37

Roadway

Following is a description of the key physical and operational differences in the roadway and vehicular traffic:

- No Action Alternative
  - Harmony Road would remain as it is today
- TSM Alternative
  - Widen Harmony Road to six lanes – College Avenue to Boardwalk Drive
  - Intersection improvements at Boardwalk Drive, Timberline Road, Ziegler Road, Lady Mood Drive
- Enhanced Bus Alternative
  - Widen Harmony Road to six lanes – College Avenue to Boardwalk Drive
  - Intersection improvements at Boardwalk Drive, Timberline Road, Ziegler Road, Lady Mood Drive
  - Queue jump lanes at major intersections (minimal impact to automobile travel)
- BRT/HOV Alternatives (End-to-End and Interlined)
  - Widen Harmony Road to six lanes – College Avenue to Boardwalk Drive
  - Intersection improvements at Boardwalk Drive, Timberline Road, Ziegler Road, Lady Mood Drive
  - Outside travel lanes (one in each direction) used for HOV (and buses) only; SOV limited to use of inside travel lanes

Traffic Forecasts and Operations

As described and illustrated in Chapter 3, the TSM, Enhanced Bus, and BRT/HOV Alternatives are expected to carry higher traffic volumes (approximately 10 to 20 percent higher) than the No Action Alternative between College Avenue and McMurry Avenue as a result of the increased capacity (six-lane widening from College to Boardwalk). The traffic forecasts on the remainder of the corridor are expected to remain approximately consistent with the 2035 No Action forecasts. With the increased traffic forecasts between College Avenue and McMurry Avenue associated with the build alternatives, and the physical and operational differences between in each alternative as described above, the intersection operations are expected to vary between Alternatives, as shown in **Table E-13**. The roadway widening and intersection improvements would result in lower delays and improved levels of service at several corridor intersections in the TSM and Enhanced Bus Alternatives. Because SOV traffic (estimated to be 77 percent of the total traffic) would be restricted to the use of the inside travel lanes, there would be additional delays at several corridor intersections, most notably at the Harmony Road/College Avenue intersection, which is projected to operate at LOS F during the PM peak hour.

Table E-13. 2035 PM Peak Hour Traffic Operations Summary[1]

Corridor Segment	Intersection	Existing	2035 No Action	2035 TSM Alternative[4]	2035 Enhanced Bus Alternative[4]	2035 HOV/BRT Alternatives[4]
West	Starflower	B (14.9)	C (22.2)	C (22.2)	C (22.2)	D (41.1)
	College[2]	E (59.8)	E (64.8)	E (75.5)	E (75.5)	F (144.2)
Central	Boardwalk	D (35.4)	E (69.3)	D (45.9)	D (45.9)	D (51.5)
	Lemay	D (47.6)	D (42.5)	D (54.6)	D (54.6)	E (59.5)
	McMurry	C (33.0)	D (43.2)	D (37.1)	D (37.1)	D (39.5)
	Timberline[3]	E (58.2)	E (65.5)	E (60.1)	E (60.1)	E (61.0)
	Corbett	C (32.2)	D (41.4)	D (44.5)	D (44.5)	D (50.3)
East	Ziegler	C (34.7)	F (97.3)	D (46.8)	D (46.8)	D (51.7)
	Lady Moon	B (18.9)	E (72.1)	C (34.7)	C (34.7)	D (44.0)
	Strauss Cabin	Stop control	Stop control	Stop control	Stop control	Stop control
	Harmony TC	A (7.1)	B (15.9)	B (15.9)	B (15.9)	B (19.4)

[1] *Overall intersection control delay shown in parentheses*
[2] *College Avenue widening to 6 lanes south of Harmony Road is included in all 2035 alternatives (including No Action)*
[3] *Timberline Road widening to 6 lanes north of Harmony Road is included in all 2035 alternatives (including No Action); this includes 6 lanes through the Harmony Road/Timberline Road intersection*
[4] *Build Alternatives (TSM, Enhanced Bus and BRT/HOV) include intersection improvements at Boardwalk, Timberline, Ziegler, and Lady Moon*

The average corridor travel times for vehicular traffic are shown for each Tier 2 alternative in **Table E-14**. These travel times are for the 2035 PM peak hour; they represent the average for eastbound and westbound travel, accounting for intersections delays. The TSM and Enhanced Bus Alternatives represent a nearly two minute reduction in the corridor travel time compared to the No Action Alternative. The BRT/HOV Alternatives show a three minute increase in corridor travel time compared to the No Action Alternative because the SOV traffic is limited to use of the inside travel lanes. The table is broken down by corridor segments, revealing that the largest increase in travel time for the BRT/HOV Alternatives is in the West Segment – specifically, at the Harmony Road/College Avenue intersection.

Table E-14. 2035 PM Peak Hour Auto Travel Times[1] by Segment (minutes)

Tier 2 Alternatives	West Segment	Central Segment	East Segment	Total
No Action Alternative	2.9	6.7	4.9	14.4
TSM Alternative	3.2	6.4	2.9	12.5
Enhanced Bus Alternative	3.2	6.4	2.9	12.5
BRT/HOV Alternatives	7.2	6.9	3.3	17.4

[1] *Average of eastbound and westbound total travel time*


Bicycle and Pedestrian

Planning-level unit costs were developed for each of the bicycle and pedestrian options, as shown in **Table E-16**. These per lane-mile costs would be in addition to the cost to complete missing sidewalk segments along the Harmony Road corridor. As shown, the cycle tracks represent the highest unit cost of the build alternatives. Since the buffered bike lanes could generally fit within the existing roadway cross-section, the unit cost is for striping and pavement markings only.

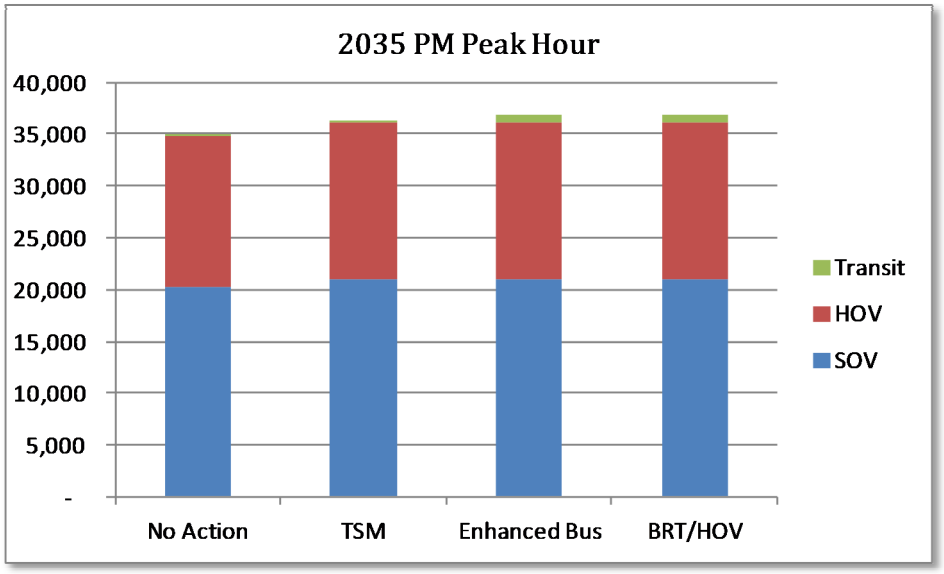
Table E-15. Bicycle and Pedestrian Cost Comparison

Bike/Ped Options	Per lane-mile Cost	Nature of Cost
Bike lanes + detached sidewalks	-	-
Buffered bike lanes + detached sidewalks	$18,000	Epoxy pavement marking (green) for full width of bike lane (5 foot lane); epoxy pavement marking (white) for lane markings and chevrons (3 foot buffer)
Cycle tracks + detached sidewalks	$440,000	Removal of asphalt material, curb and cutter, median cover material (4 foot raised separation); replacement asphalt (6 foot wide cycle track)
Shared use paths	$185,000	10 foot wide concrete path and associated earthwork

Tier 2 Evaluation Summary

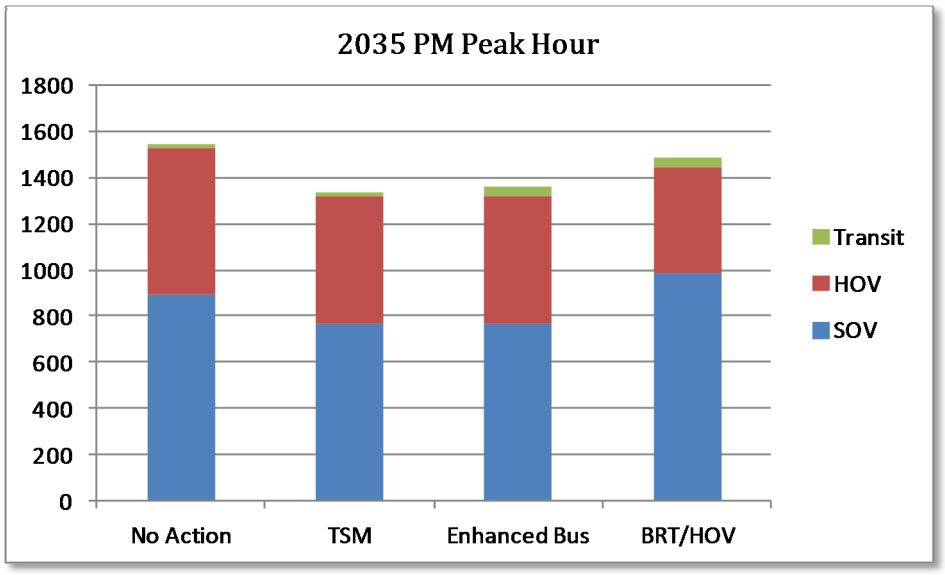
It is generally desirable to increase person-miles of travel (PMT) as an indication of improved mobility. Overall, the PMT remain relatively consistent between alternatives. The PMT for single occupancy vehicles (SOV) and high occupancy vehicles (HOV) increase for the build alternatives (TSM, Enhanced Bus and BRT/HOV) because of increase demand associated with widening Harmony from Boardwalk to College. The PMT for transit increase slightly in the Enhanced Bus and BRT/HOV alternatives because of increased ridership (approximately 3 to 4 times higher than No Action).

Figure E-14. Person-Miles of Travel



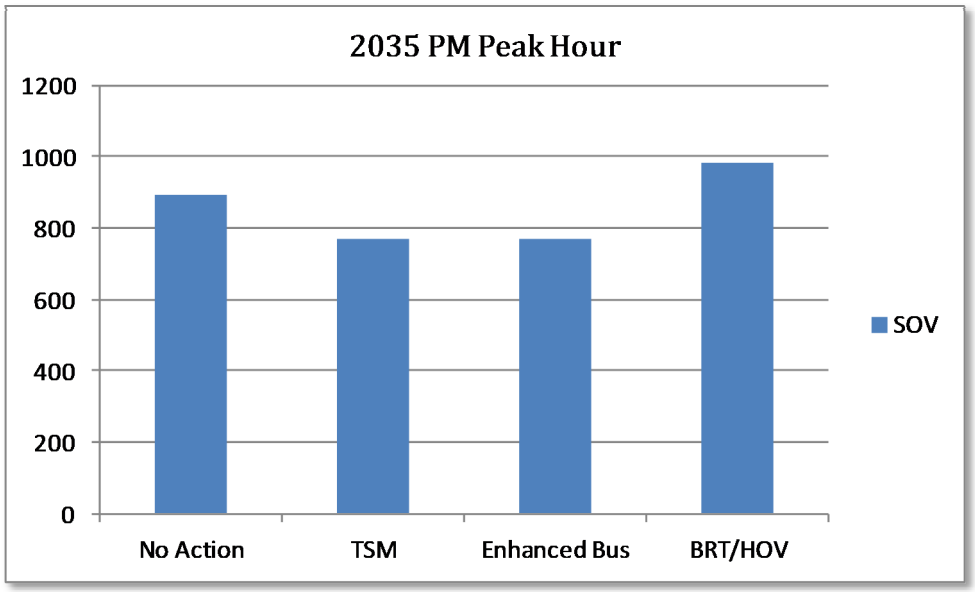
It is generally desirable to reduce person-hours of travel (PHT). The PHT for the build alternatives (TSM, Enhanced Bus and BRT/HOV) decrease as a result of intersection improvements at key locations along the corridor. The PHT for TSM and Enhanced Bus Alternatives are the lowest. The PHT for the BRT/HOV Alternative is higher than the other build alternatives primarily because of long delays at the College Avenue intersection for SOVs. A breakdown of PHT by mode is shown on the following page.

Figure E-15. Person-Hours of Travel



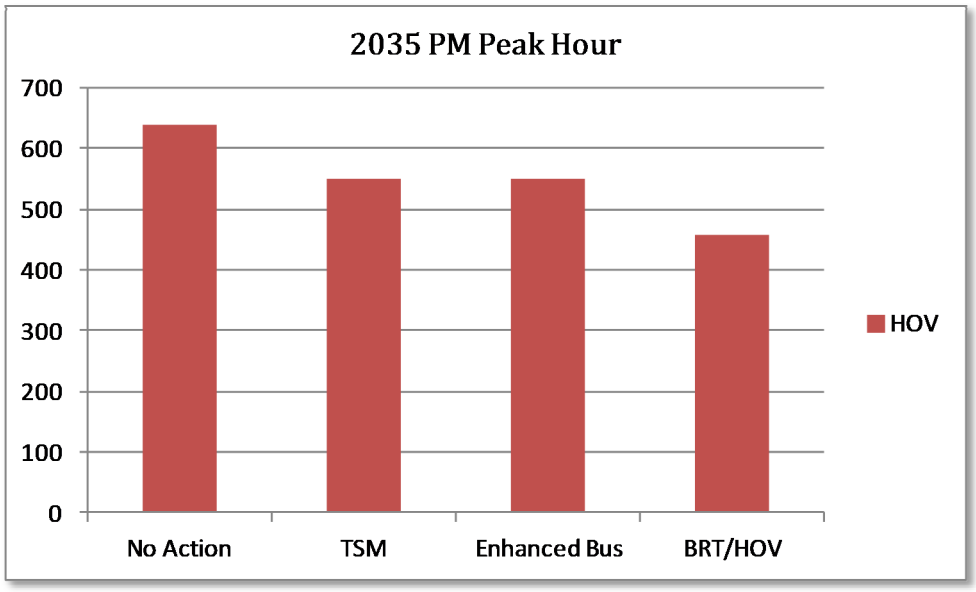
For SOVs, the PHT is reduced in the TSM and Enhanced Bus Alternatives as a result of intersection improvements at key locations along the corridor. In the BRT/HOV Alternative, the PHT increases for SOVs primarily because of increased delays at the College Avenue intersection. With the outside lanes being used exclusively for BRT/HOV, all SOVs use the inside lanes (only one in each direction through the College Avenue intersection). There is a moderate increase in PHT for SOVs in the remainder of the corridor (5 to 10% increase).

Figure E-16. Person-Hours of Travel (SOV)



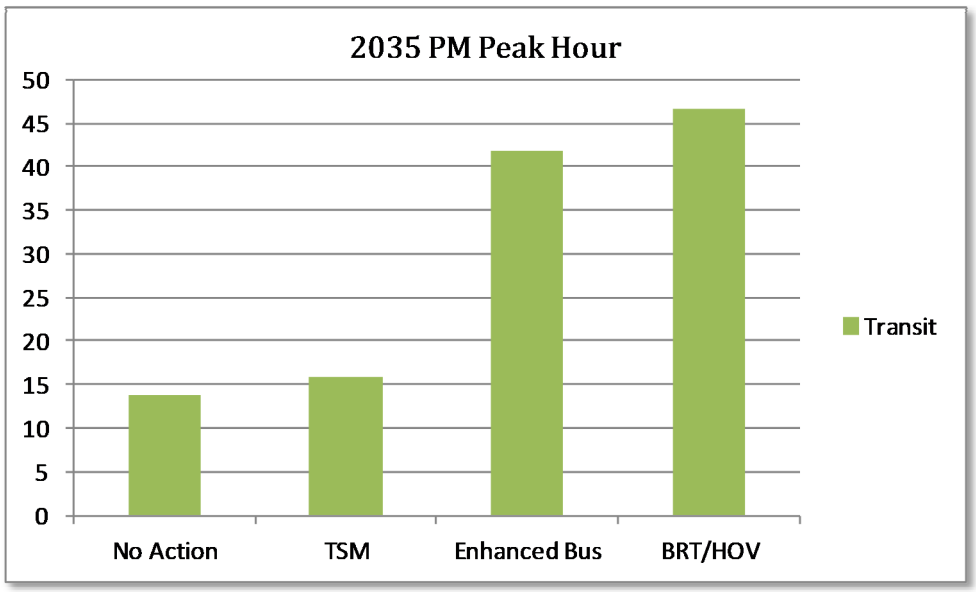
For HOVs, the delays in the No Action, TSM, and Enhanced Bus Alternatives are commensurate with those for SOVs, since carpool vehicles use the general purpose lanes. The PHT is reduced in the TSM and Enhanced Bus Alternatives (compared to No Action) as a result of intersection improvements at key locations along the corridor. In the BRT/HOV Alternative, the PHT is reduced for HOVs (compared to SOVs and compared to the other alternatives) since they are able to travel in the exclusive outside lanes (with transit).

Figure E-17. Person-Hours of Travel (HOV)



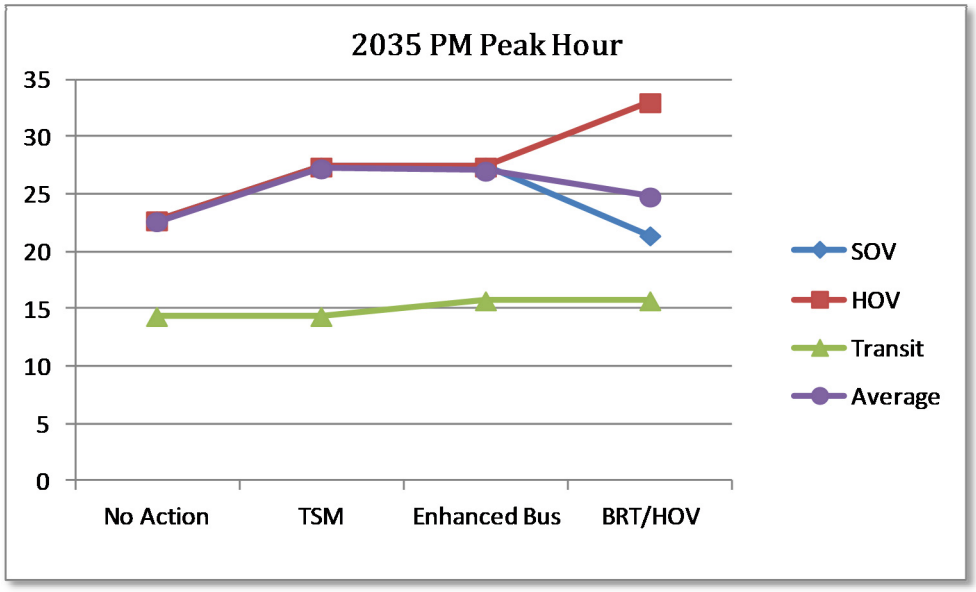
Although it is generally desirable to reduce PHT, that is not necessarily the case for transit. And increase in PHT for transit could be a result of increased delays or increased ridership. In this case, the increased PHT for the Enhanced Bus and BRT/HOV Alternatives is a result of increased ridership (the travel times are lower in these alternatives).

Figure E-18. Person-Hours of Travel (Transit)



Corridor travel speeds (average per person) for SOVs are the highest in the TSM and Enhanced Bus Alternatives; speeds decrease in the BRT/HOV Alternative (primarily as a result of delays at the College Avenue intersection). Corridor travel speeds for HOVs are the highest in the BRT/HOV Alternative because they have exclusive use of the outside lanes (with transit). Corridor travel speeds for transit are highest in the Enhanced Bus and BRT/HOV Alternatives. The average corridor travel speeds (average for all people in the corridor, regardless of mode) are highest in the TSM and Enhanced Bus Alternatives, followed by the BRT/HOV Alternative.

Figure E-19. Average Speeds

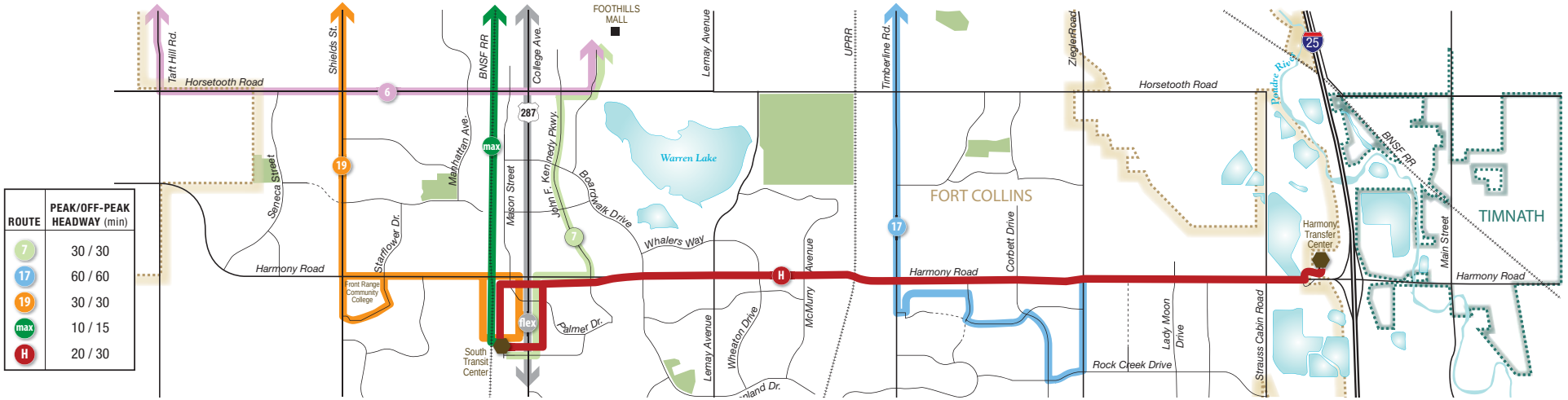


Locally Preferred Alternative

The Locally Preferred Alternative was developed to provide the best multi-modal operating characteristics for the Harmony Road corridor. As part of this process, the decision was made to pursue enhanced bus, including the use of queue jumps at select locations along the corridor. Bus routing on Harmony Road west of College Avenue was determined to be best handled by Route 19 for the connection between Front Range Community College and the South Transit Center. Two separate route configurations have been evaluated for the Locally Preferred Alternative. These are shown in **Figure E-20**.

- **Route Configuration Option 1: Along Harmony** – This option is characterized by enhanced bus service along Harmony Road between the South Transit Center and the Harmony Transit Center including queue jumps at select intersections along the corridor. Route 17 is extended from its current termination point at Poudre Valley Hospital Harmony Campus east to Fossil Ridge High School. Routes 17 and 18 are interlined in this alternative. Headways have been improved along Route 7, Route H (formerly Route 16), and Route 19 compared to the No Action alternative. No additional service is recommended along Harmony Road west of College Avenue.

OPTION 1 - Along Harmony



OPTION 2 - Mason / Harmony Interline

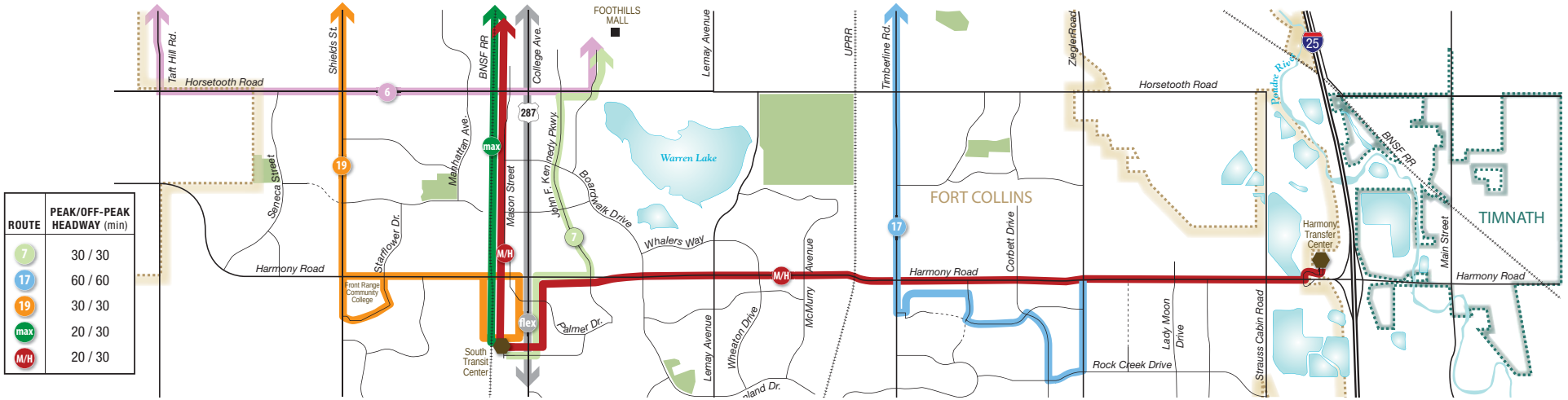


Figure E-20

Transit Routing Options
Locally Preferred Alternative

- **Route Configuration Option 2: Mason/Harmony Interline** – This option is characterized by interlined enhanced bus services along Harmony Road and the Mason Street corridor. The Harmony Road service includes the same queue jump locations as Option 1. To interline the Harmony and MAX services, two separate MAX route patterns were developed. One provides north-south service (the existing MAX routing) and the second interlines MAX service with Route 16, connecting east to the Harmony Transfer Center, which taken as a whole maintain the same headways along Mason Street and Harmony Road as provided in Option 1. Route 17 is extended from its current termination point at Poudre Valley Hospital Harmony Campus east to Fossil Ridge High School. Routes 17 and 18 are interlined in this alternative. Headways have been improved along Route 7, Route M/H (formerly Route 16), and Route 19 compared to the No Action alternative.

Table E-17 lists each of the transit routes along Harmony Road affected by the Locally Preferred Alternative. The NFR model allows separate peak and off-peak headways to be coded; key headway assumptions can be seen in the table.

Table E-16. Locally Preferred Alternative - Transit Route Headways

	Headways (Peak/Off-Peak)		
Route No.	No Action	LPA Option 1	LPA Option 2
7	60/60	30/30	30/30
16/H	60/60	20/30	
17	60/60		
18	60/60		
17/18		60/60	60/60
19	30/60	30/30	30/30
MAX	10/15	10/15	20/30
M/H			20/30