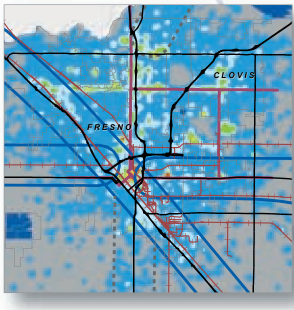

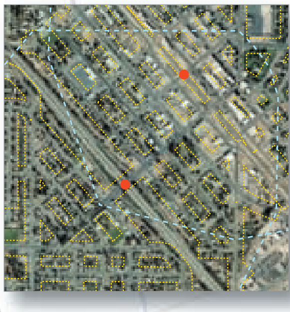

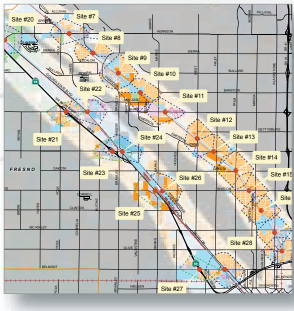

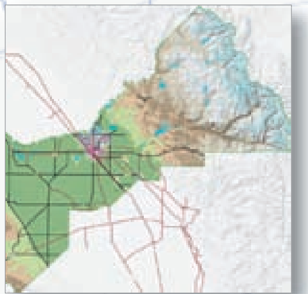

Fresno Public Transportation Infrastructure Study (PTIS)

Technical Memo #3: Potential Transit Corridor Analysis and Recommendations

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Prepared for:

Council of Fresno County Governments

February 14, 2006

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Introduction

Task Objectives

The assessment of land use and infrastructure conditions in Fresno County is the largest and most complex task of the Public Transportation Infrastructure Study. The outcomes and recommendations of this task can set the agenda for future studies and help the county move towards successful implementation of enhanced transit services. The methodologies used in assessing the transportation and land use infrastructure of the study corridors also establish a model for further study of these and other potential transit corridors in the County.

The work for this task was undertaken with a broad range of objectives. The key goal for this process was to create a work product that was not only valuable for understanding existing and planned conditions in the county, but could also be a model for future public transportation implementation studies:

- Work with the PTIS Steering Committee to develop a methodology for assessment that can be replicated in future studies;
- Gather consistent base information on land use and infrastructure conditions in the county;
- Develop comprehensive county-wide mapping of key land use and infrastructure patterns (see Figure 1, below);
- Identify corridors within Fresno County with the potential for future enhanced transit services;
- Develop detailed assessment of land use and infrastructure conditions within identified corridors; and
- Develop detailed recommendations for implementation steps necessary for enhanced transit services on identified corridors.

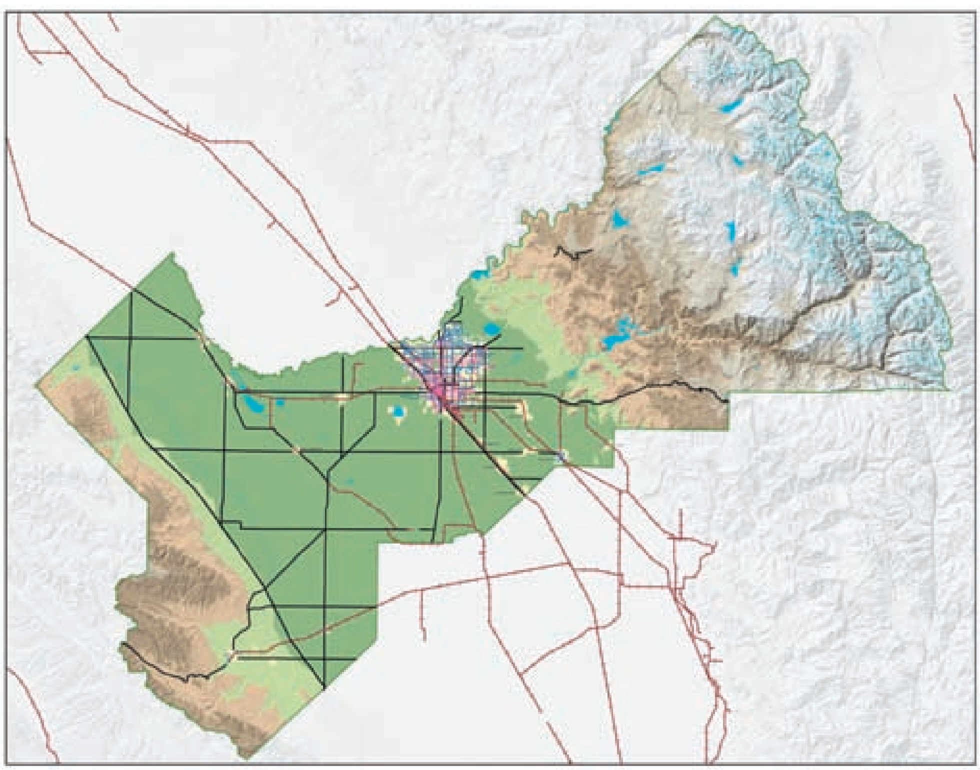


Figure 1: The Study Area included all of Fresno County.

Task Process—Overview Only

To meet these objectives, the consultant team worked for nine months to gather and analyze base information, receive input on progress and methodology from the Steering Committee, and draft the recommendations contained in this report. The following outlines the process of this task:

- Collect base information and begin countywide analysis of land use and infrastructure conditions [initial presentation to Steering Committee in May 2005 and presentation of draft mapping in June 2005];
- Finalize countywide analysis, recommend corridor framework, and identify pilot study corridors [presentation to Steering Committee in July 2005];
- Develop corridor analysis methodology, pilot corridor assessment, and approach to remaining study corridors [presentation to Steering Committee in September 2005];
- Complete assessment of study corridors, draft land use and infrastructure recommendations [presentation to Steering Committee in November 2005]; and
- Finalize land use and infrastructure recommendations [Final Task 3 report January 2006].

Key Findings

The assessment of existing and planned land use and infrastructure in Fresno County was used to develop a county-wide approach to enhancing transit. The following are a summary of the key findings at the county and corridor levels, which are explained in greater detail later in this report:

Countywide Findings

- Residential and employment uses outside of the cities of Fresno and Clovis are largely concentrated in small, distinct nodes of activity;
- Outside of the existing nodes both residential and employment uses are so dispersed as to be difficult to serve with transit, especially in the western part of the county;
- Within the cities of Fresno and Clovis, both residential and employment uses are clustered around major transportation corridors; and
- Commute patterns in the outlying communities do not demonstrate a dominant geographic draw to the Fresno/Clovis core, but do support transit corridors oriented towards serving the core.

Corridor Findings

- Detailed analyses of smaller outlying communities, such as Reedley, Sanger, and Selma, suggest these community cores already possess relatively transit/pedestrian supportive infrastructure and land use contexts;
- The BNSF corridor in Fresno has good potential for transit with several activity nodes along the corridor;
- The Southeast Corridor (Sanger, Parlier, Reedley, and Orange Cove) has good existing conditions for transit supportive development and potential for future transit supportive growth;
- The Highway 99 Corridor in both Selma and North Fresno presents challenges in terms of transit supportive infrastructure and likely high costs for quality transit stop and access infrastructure;
- The Highway 99 and UP Corridors in Fresno lack basic infrastructure and land use to be pedestrian-oriented transit corridors in the short term; and
- Service to outlying areas should be focused on existing cores, with potential future expansion to growth areas.

Overview of Recommendations

The nine months of assessment and analysis has produced valuable recommendations for how to support the development of potential transit corridors and transit-supportive transportation and land use infrastructure in Fresno County. This study recommends the following actions, which are explained in greater detail later in this report:

- Develop a countywide framework of corridors allowing future flexibility and building from previous planning efforts;
- Focus County planning efforts on connecting the Fresno/Clovis core with outlying community centers;
- Focus initial implementation efforts on corridors that show the most transit-supportive existing conditions and future growth potential;
- Focus on outlying downtowns and other relatively dense, mixed-use centers, rather than park-and-ride lots or other land use contexts, to anchor transit corridors;
- Utilize a flexible framework of different "Place Types" to provide policy direction that focuses on the unique conditions in transit corridors;
- Support substantial increases in residential densities and encourage infill development that includes vertical mixed-use (residential over retail or office) at transit-supportive densities (minimum 30 dwelling units/acre) within town centers in areas outside of the Fresno-Clovis core;
- Integrate commercial and service uses into residential and employment areas to support transit access by providing services within walking distance of home and work;
- Improve existing arterial streets to provide safe, comfortable pedestrian and bicycle access;
- Improve pedestrian and bicycle safety by retrofitting existing grade separations and providing new multi-modal (pedestrian and bicycle) separations near potential transit stops (such as Highway 99 and rail corridors);
- Provide more direct pedestrian and bicycle circulation choices by connecting disconnected street networks in suburban-style developments (e.g. using cul-de-sac cut-throughs or pedestrian and bicycle trail networks);
- Continue to develop the methodology employed in this study for detailed further study of potential transit corridors;
- Provide local governments with technical assistance in the form of guidelines for transit-supportive land use plans and analysis of the potential for and barriers to transit-supportive infill development; and
- Develop ongoing funding streams to make transit-supportive pedestrian and bicycle infrastructure improvements and to support land use planning in potential transit corridors.

Study Process, Methodology, and Findings

This section describes the process carried out by the consultant team in analyzing current Fresno County conditions and needs in order to arrive at the recommendations to better serve future growth and improved transit service.

Compiling Data and Analyzing Current and Future Conditions

CD+A and Spatial Dynamics compiled data on existing and future land use, transportation infrastructure conditions, demographic information, and existing travel patterns from a variety of sources. The existing data allows analysis that assisted the Steering Committee and consultant team in identifying potential future transit corridors by highlighting existing transportation and land use patterns, as well as future activity centers and anticipated transportation demands. The base information is not all at the same level of geographic detail, ranging from parcel data to aggregated traffic analysis zone (TAZ) data. An important component of the work was to achieve consistency and accuracy in data and determine the appropriate scale for detailed analysis (see Figure 2). Table 1 (on following page) shows some of the data that was collected and processed.

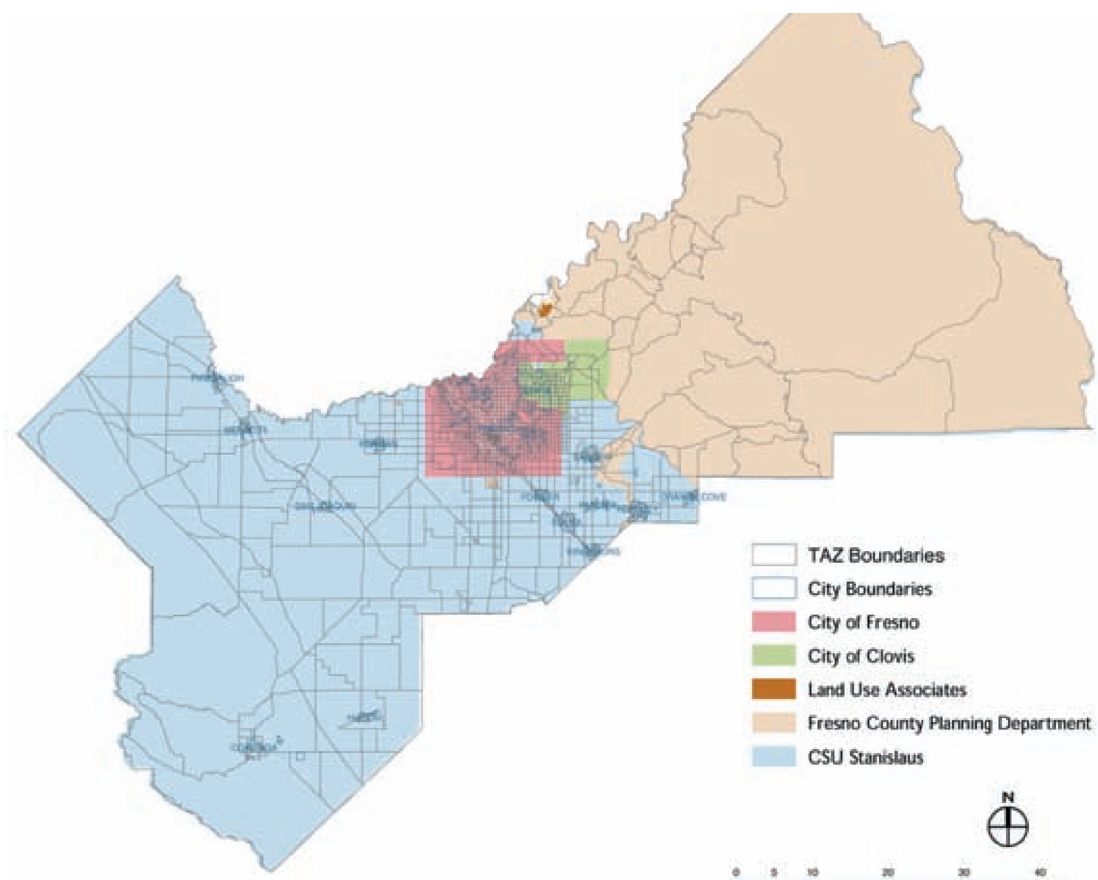


Figure 2: Sources of Countywide Land Use Data

Table 1: Mapping Data Collected

Data	Source	Geography
Existing Land Use	County Assessor	Parcel
General Plan Land Use	City of Fresno (City Only)	Parcel
	City of Clovis (City Only)	Parcel
	Land Use Associates (Millerton Only)	GP Land Use Category
	Fresno County (Eastern County)	GP Land Use Category
	CSU Stanislaus (remainder of county)	GP Land Use Category
Demographic Data	COFCG/US Census	TAZ
Travel / Origin-Destination Data	COFCG Traffic Model/US Census CTPP	TAZ
Employment Data	InfoUSA	Parcel (Geocoded to 90% accuracy)
Base/Infrastructure Information	CaSIL/Caltrans	Varies
	Regionally Significant Roadway Network (COFCG)	Roadways
Existing Transit Network	FAX/Caltrans/Digitized Information	Transit Routes

Data Notes:

The Steering Committee had concerns about the reliability of employment figures from the Census Transportation Planning Package (CTPP) from the 2000 Census. A comparison of the CTPP data to the data from the CoG traffic model data shows the variance of data is pervasive, particularly in areas outside the core of the cities of Fresno and Clovis, but varies in significance.

After consultation with CoG staff, the consultant team decided to use the CoG's traffic model for existing employment trips and future trips, and use the CTPP for household demographic data related to travel characteristics, etc . The CTPP remains the only available data for origin-destination analysis. Although the origin-destination data in the CTPP varies significantly from the CoG model employment data, it can still be valuable to assess trips on a corridor-wide scale.

Based on the collected and processed data, CD+A and Spatial Dynamics generated the mappings outlined in Table 2 (below) to illustrate important land use, demographic, and transportation characteristics of Fresno County.

Table 2: Countywide Mappings

Title	Information	Geography	Purpose
Land Use Information by source	Source of General Plan Data	Various	Show source of General Plan land use data
Existing Transportation Infrastructure	Existing transit lines, rail corridors, bike routes, major streets, topography	Various	Show existing and potential transit corridors
Existing Residential Density (see Figure 3)	Assessor's data for existing residential density	Parcel	Identify residential concentrations that could be served by transit
Existing Employment Density (see Figure 4)	Employment from InfoUSA database and Assessor's data for existing employment density	Parcel	Identify employment concentrations that could be served by transit
Existing Employment Centers	Major employers from InfoUSA database	Parcel	Identify employment areas that could be served by transit
Existing Employment Concentrations	Total employment per Census information	TAZ	Identify employment concentrations that could be served by transit
Future Employment Concentrations	2025 projected employment trips	TAZ	Identify future employment areas that could be served by transit
Future Land Use (see Figure 5)	General Plan designations	Parcel/Other	Identify future land uses that could be served by transit
Existing Transit/Carpool Usage	Shows % of residents who do not commute by single-occupancy automobile (from 2000 Census)	TAZ	Identify potential transit market
Income Distribution	Shows % of residents below poverty line (from 2000 Census)	TAZ	Identify potential transit-dependent population
Auto-Ownership	Shows % of households with zero and % of households with 1 or fewer vehicles available (from 2000 Census)	TAZ	Identify potential transit market
Environmental Justice Populations (see Figure 6)	Shows concentrations of minority, low-income, elderly, and disabled populations	TAZ	Identify transportation equity concerns.
Existing Commute sheds	Samples of linked origins & destinations (from 2000 Census)	TAZ/TAZ Groups	Shows existing travel behavior

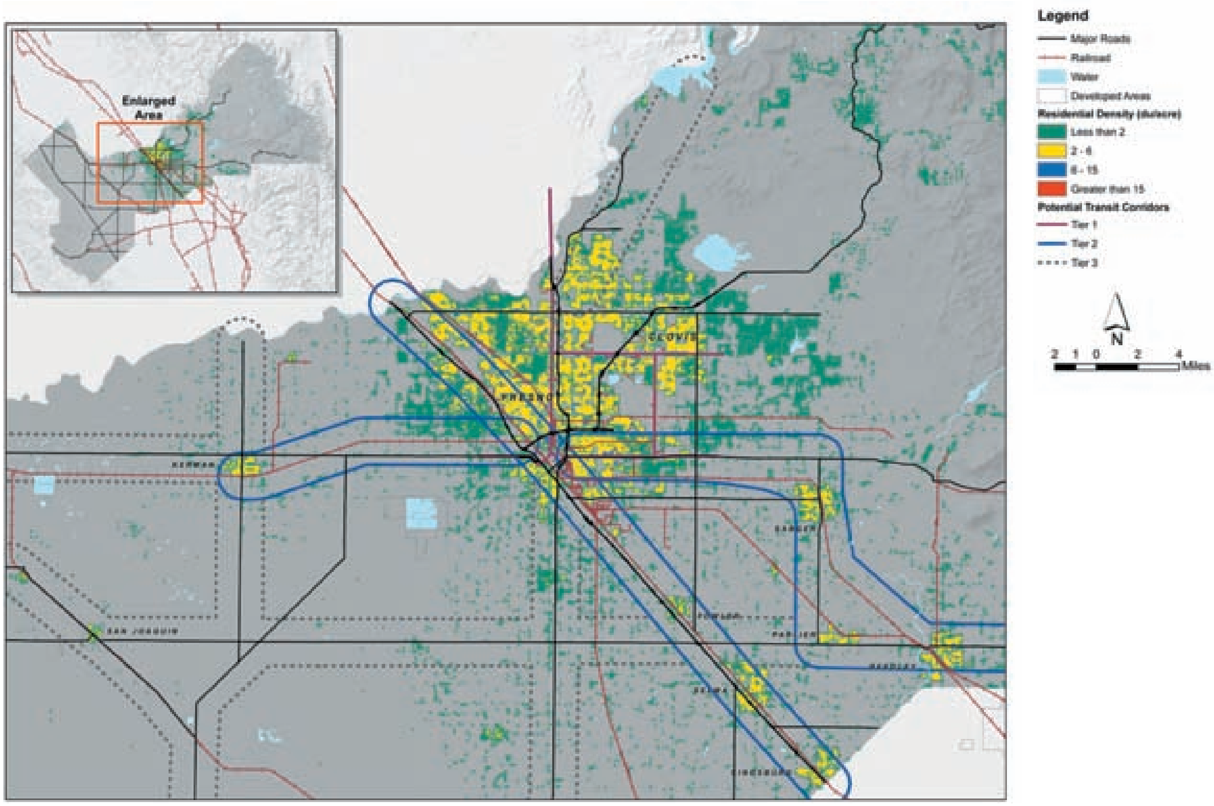


Figure 3: Existing Residential Density

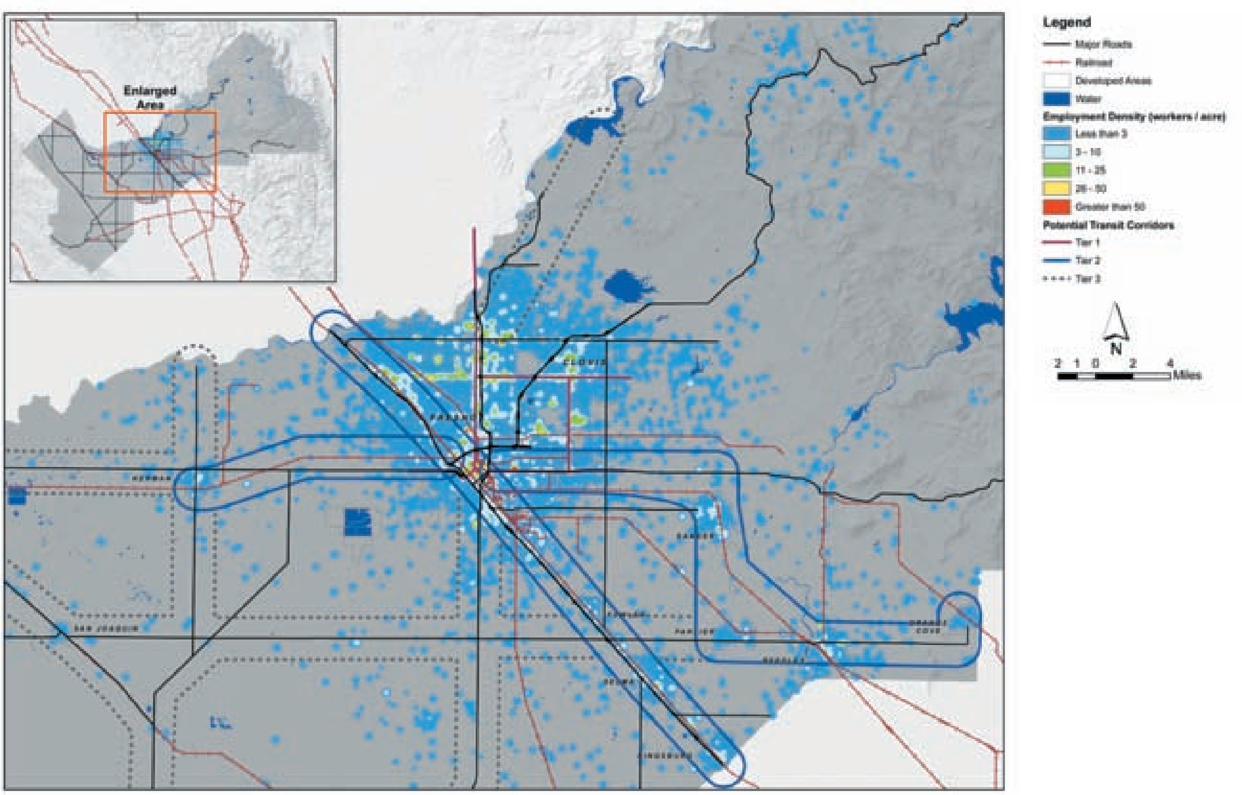


Figure 4: Existing Employment Density

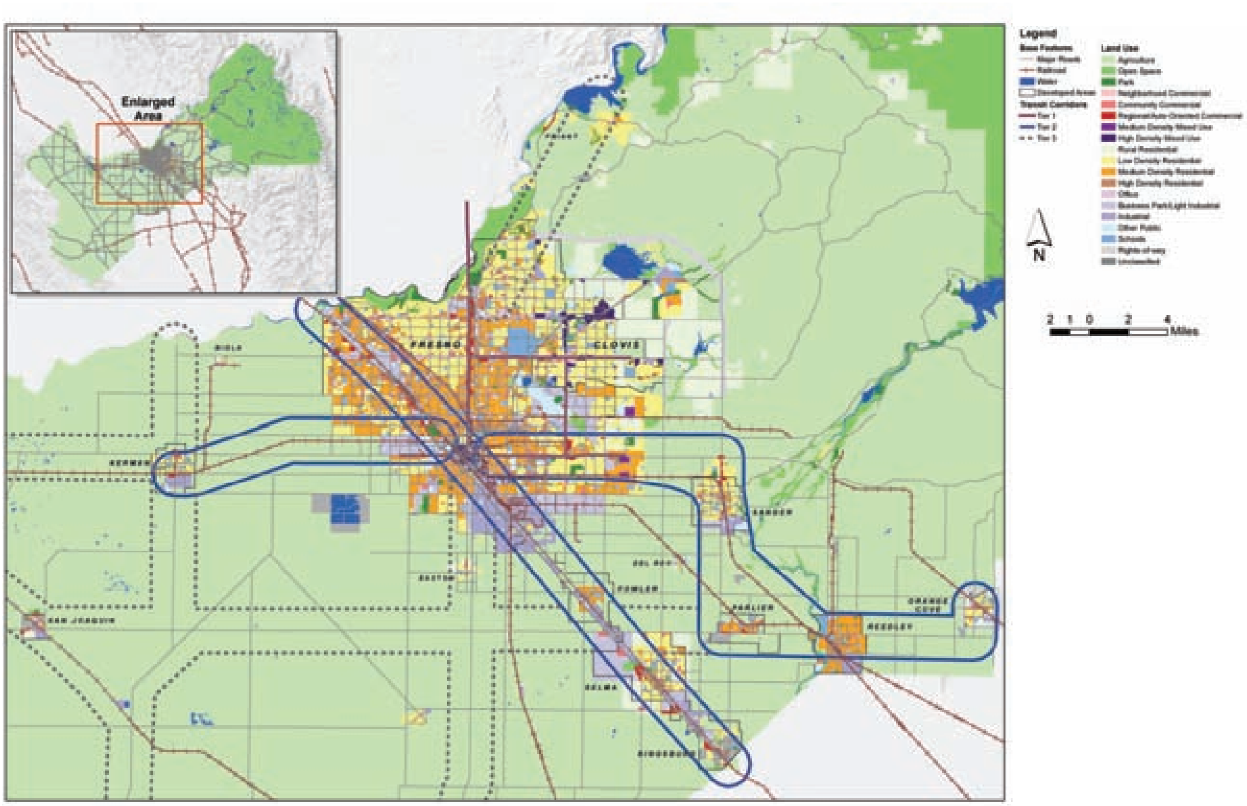


Figure 5: General Plan Land Use

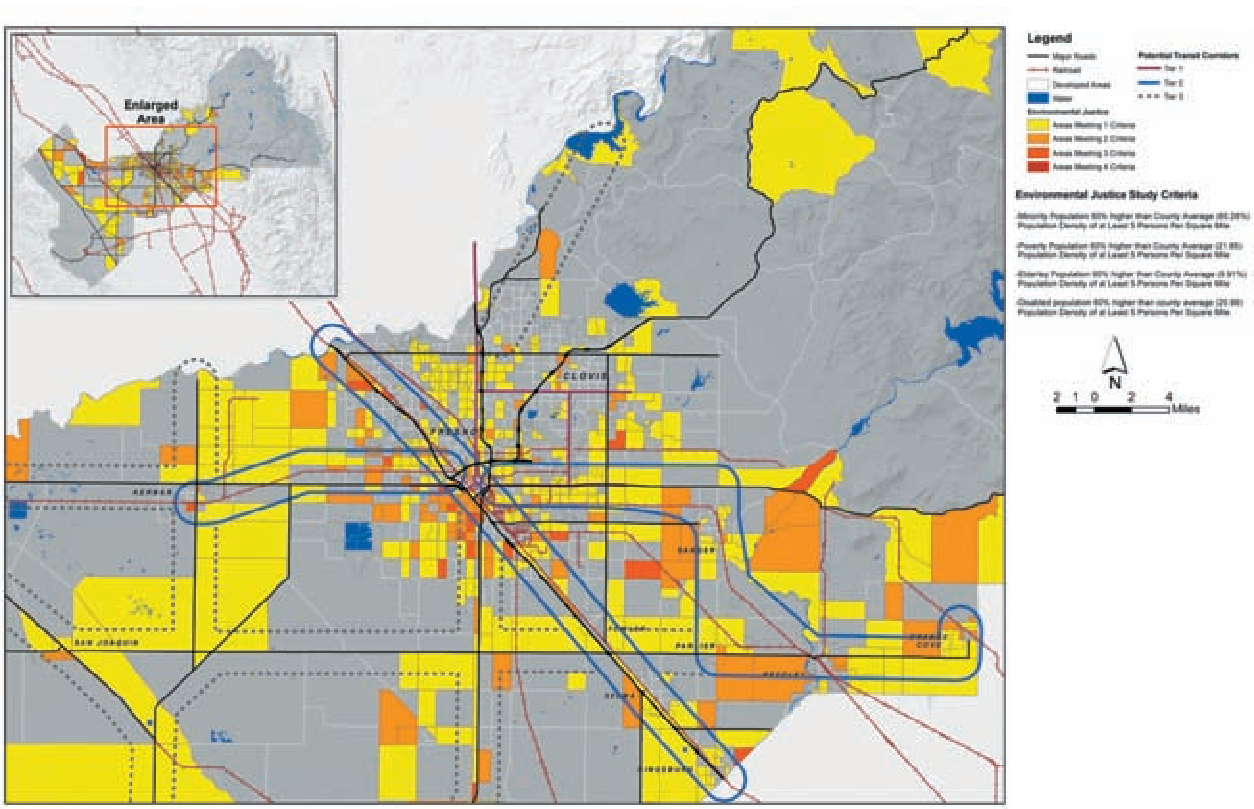


Figure 6: Environmental Justice Populations (from CoFCG Environmental Justice study, March 2005)

These maps were used to analyze and then identify potential transit corridors. Future transit corridors should be planned for areas where they can generate the highest ridership levels while maximizing service to people who rely on transit for mobility.

Identifying the Proposed Corridor Framework

The consultant team used the following considerations along with countywide mappings to develop a conceptual framework for potential transit corridors in Fresno County.

Countywide Assessment and Findings

Initial GIS mapping of land use and demographic characteristics yielded important qualitative assessments of conditions within the Study Area that influence the potential for future transit corridors. The following is an overview of key findings from the initial assessment:

- Residential and employment uses outside of the cities of Fresno and Clovis are largely concentrated in small, distinct nodes of activity—primarily historic town centers, but also including population or job concentrations—especially in the southeastern area of the county.
  Outlying communities such as Reedley, Kingsburg, Selma, Sanger, and Fowler are all examples of these nodes.
- Outside of the existing nodes both residential and employment uses are so dispersed as to be difficult to serve with transit, especially in the western part of the county.
  Outlying communities such as Coalinga, San Joaquin, Huron, and Firebaugh are existing nodes of development, but are not proximate enough to larger job or population concentrations to support significant transit enhancements.
- Within the cities of Fresno and Clovis, both residential and employment uses are clustered around major transportation corridors, such as Ventura/Kings Canyon, Shaw Avenue, and the Blackstone corridor, with lower densities in between.
  These corridors have been studied in past efforts and are not the focus of this study.
- Planned growth over the next 25 years will mainly reinforce the existing pattern of development, with most growth concentrated in existing nodes or new growth centers adjacent to the cities of Fresno and Clovis, and the preservation of agriculture and agricultural-related employment activities in the County.
  New growth areas in Fresno and Clovis are primarily clustered around existing transportation corridors, while many of the outlying communities plan for incremental growth with substantial preservation of agriculture.
- Analysis of origin-destination information from the 2000 US Census shows that commute patterns in the outlying communities do not demonstrate a dominant geographic draw to the Fresno/Clovis core.
  This suggests that the countywide framework should provide comprehensive, interconnecting network of corridors linking the outlying centers to each other as well as connecting the smaller centers to the Fresno/Clovis.However, existing commute patterns from outlying centers do support corridors oriented towards serving the Fresno-Clovis core, and the continued growth of the Fresno/Clovis core and intensification of existing outlying centers will likely create increased demand for connections to the core in the future.
- Serving the "Environmental Justice" communities (defined in the CoG study as concentrations of low-income, disabled, elderly or minority populations) is a challenge.
  While minority and elderly concentrations are often located near population nodes, low-income and disabled concentrations are often more dispersed in less populated areas that are difficult to serve with transit. This does not mean that transit corridors will not serve members of these various communities, but that improving service in transit corridors will need to be supplemented with improving paratransit and non-traditional service to the more dispersed members of the transit-dependent community.

Countywide Framework Considerations

The identification of potential transit corridors takes into account three considerations related to demand for transit:

(1) existing and planned residential population patterns and clustering;

(2) existing and planned employment destinations patterns and clusters; and,

(3) the location of target transit-dependent populations.

In addition to these factors, there were some additional considerations, including:

- Consideration of connections to previously identified potential high-capacity transit corridors in Fresno and Clovis;
- Potential regional connections to population and employment concentrations in adjacent counties; and,
- Making use of existing infrastructure (major roads and rail rights-of-way).

Conceptual Corridor Network

The key characteristics above, lead to the development of the conceptual transit corridor network described below. Providing transit service in a large, dispersed, and rapidly growing region with a strong agricultural employment base such as Fresno County is a challenge. Yet, the anticipated residential and employment growth in Fresno County presents interesting opportunities for enhancing transit service. The county-wide commitment to preserving agricultural lands means that new growth is fairly well focused on existing developed areas and new growth nodes.

This study recommends a three-tiered approach to transit corridors in Fresno County (see Figures 7 & 8):

- **Tier 1 Corridors:** The primary corridors within Fresno and Clovis—defined in the San Joaquin Growth Response Study building off of the results of the Pre-Major Investment Study (Pre-MIS) for Fresno—including the Highway 41/Blackstone corridor, Ventura/Kings Canyon corridor, Shaw Avenue (east and possibly west), and Clovis Avenue. These corridors have the potential for high-capacity transit and significant land use intensification.
- **Tier 2 Corridors:** These are secondary corridors serving outlying communities and connecting to Tier 1 Corridors at key endpoints. These corridors would serve the potential service nodes concentrated in the southeastern portion of the county, along Highway 99, as well as towns such as Sanger, Parlier, Reedley, and Orange Cove. Highway 180, to the west of Fresno as far as Kerman, is also a potential Tier 2 corridor due to the concentration of both residential and employment activity west of 99 and within Kerman. Tier 2 corridors are defined by their interaction with the Fresno/Clovis core, as well as the size of the activity nodes. Tier 2 corridors are likely to have sufficient ridership potential to be served by traditional fixed-route transit systems with some significant investments. Where existing rail alignments exist linking some of these communities to the core, there could be the potential for relatively economical rail service.
- **Tier 3 Corridors:** Tertiary corridors serving mainly agricultural and rural residential areas, particularly in the western part of the county. These corridors would link to Tier 2 corridors to provide access to Fresno and Clovis, but have more dispersed residential and employment activities. Tier 3 corridors could likely be most effectively served by non-traditional, point-to-point transit systems that do not rely on residential and employment intensity to provide ridership. Some Tier 3 corridors could intensify sufficiently over time to warrant Tier 2 levels of transit service.

The Corridor Framework outlined in Figure 8 (below) is the recommended approach for initial efforts to enhance transit service in the County. The final determination of the Corridor Framework should be made through collaboration between Countywide and local decision-makers and the public. Over time, with the implementation of transit-oriented development patterns and continued residential and employment growth in the county, some corridors may warrant further transit investment. The tiered approach to the corridor framework will allow Tier 3 corridors the possibility to develop into Tier 2 levels of service, and Tier 2 corridors to develop to Tier 1 levels. This flexibility will allow corridors to develop over time, and will allow recommendations from this study to be tailored to corridors at different stages of development.

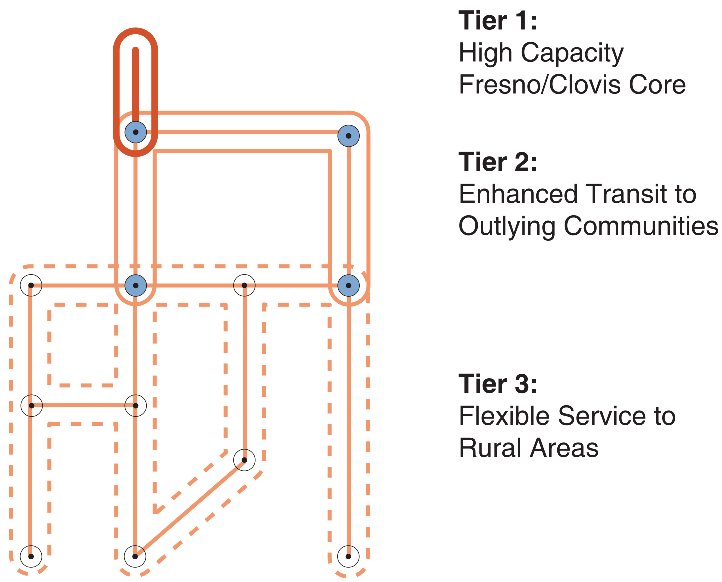


Figure 7: Conceptual Corridor Heirarchy

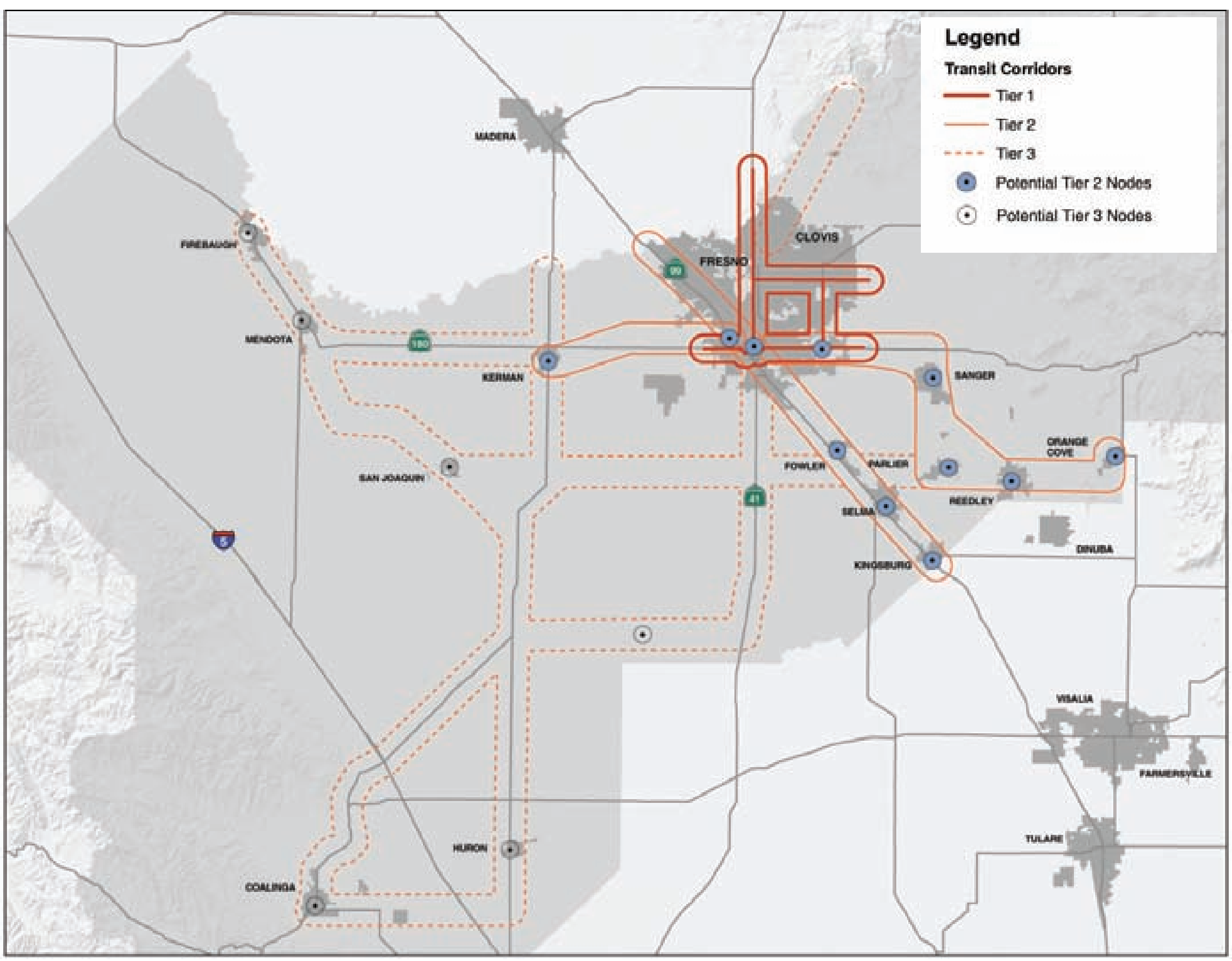


Figure 8: Proposed Countywide Corridor Network

Corridor Assessment Methodology

The conceptual corridor network was used to by the Consultant Team and the PTIS Steering Committee to select a set of Tier 2 pilot corridors for initial study and testing of the assessment methodology. This assessment was subsequently expanded to include additional areas, including some Tier 3 nodes.

The methodology developed for assessing the study corridors is described below. This methodology was successful in yielding a broad range of data on land use and infrastructure conditions, and can be applied to assessing additional potential transit locations in the future. The following outlines the steps taken during the corridor analysis stage.

1. Set stop locations

CD+A, with input from the team, identified potential stop locations along each corridor (see Figure 9). Because the PTIS project remains neutral on the subject of appropriate transit technology, stop locations were located close to selected geographic features, rather than by undertaking a detailed analysis of existing and required infrastructure. For the Highway 99/UP corridors, stops were located at key interchanges/arterial crossings at approximately 1/2 mile spacing and at arterial cross streets that have existing interchanges on Highway 99. Due to the context of the BNSF corridor, stops were spaced slightly closer (approximately 1 mile apart). The stop locations and spacing do not preclude any eventual transit technologies, but are rather a tool to develop a realistic understanding of infrastructure and land use conditions as they may relate to future transit operations, rather than a blanket analysis of the corridor in its entirety.

2. Analyze 1/2-mile stop area walking distance

In order to realistically assess the pedestrian catchment area of each stop, CD+A and Spatial Dynamics developed 1/2-mile walking distance radii from each stop location using the existing street network (see Figure 10). This analysis highlights issues of pedestrian connectivity and can be compared visually on each map with the "true" 1/2-mile walking distances from the stops.

3. Analyze infrastructure and land use conditions in 1/2-mile stop areas

Using the 1/2-mile walking distance, CD+A and SD were able to identify all parcels within accessible walking distance of the stop location. The Assessor's database and General Plan designations for the parcels were then used to compile existing and future land use profiles for each station (see Figures 11-22). Tables 5 and 6 (on following pages) present key data for each station, as well as station, corridor, and countywide averages, for studied station areas.

Infrastructure analysis included several measures of existing conditions related to transit accessibility outlined in Table 3 (on following page). Land use assessment in the corridors included analysis of both existing and planned land uses and looked at both the 1/2-mile and 1/4-mile walking radii, outlined in Table 4 (following).

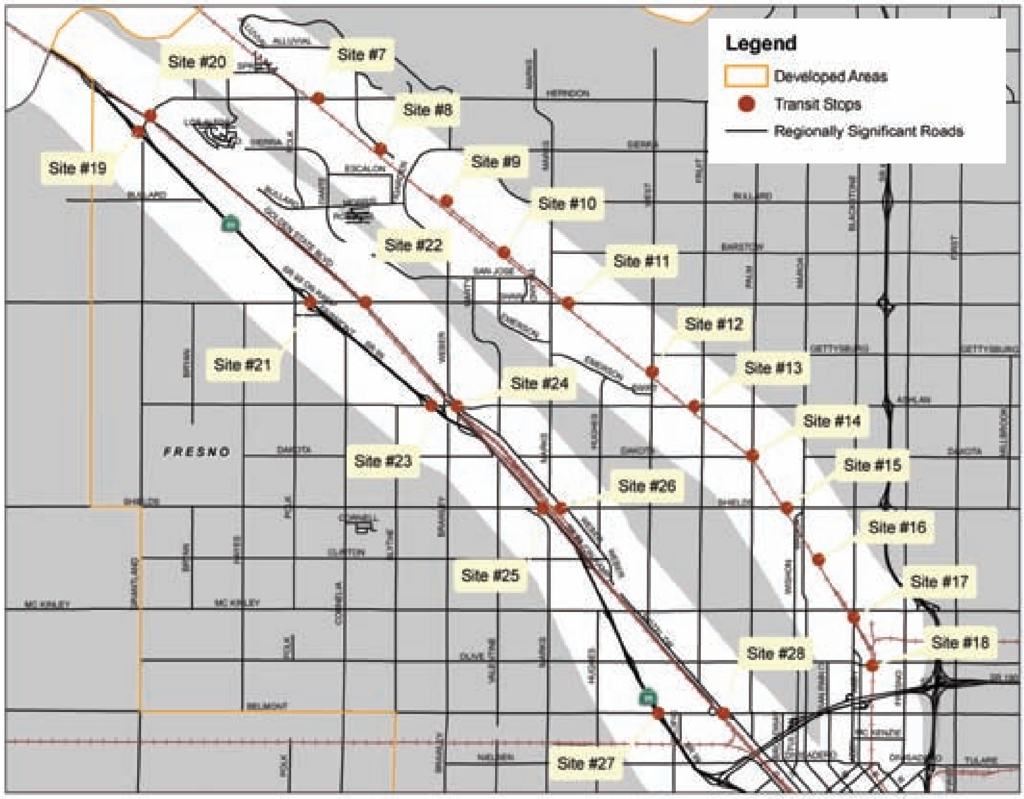


Figure 9: Step 1 of the assessment was to set stop locations and 1/2-mile corridor buffers.

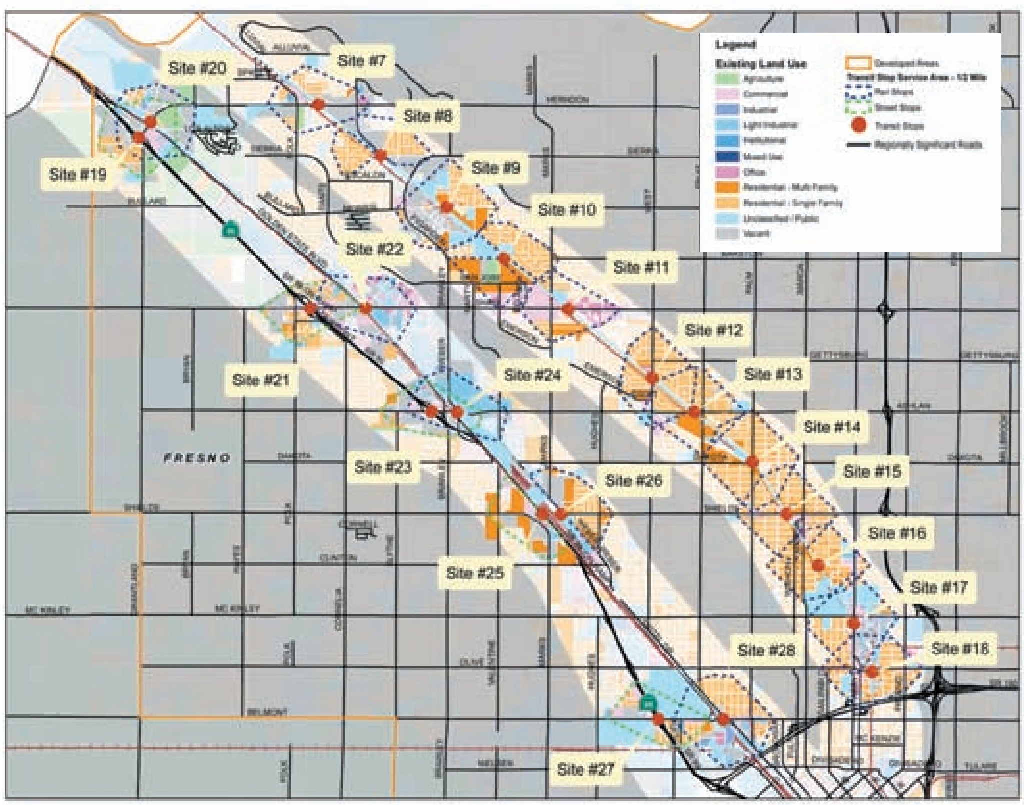


Figure 10: Step 2 and 3 analyzed the 1/2-mile walking distance and existing and planned land uses within the 1/2-mile area.

Table 3: Infrastructure Assessment Measures

1/2-Mile Infrastructure Condition	Assessment Measure	Importance and Key Data Points
Street Connectivity	▪ Street segments/street intersections ▪ Street length/street intersection	▪ Measures accessibility and "grain" of street network. ▪ ≤2.0 street segments/intersection and ≤750 feet/intersection = good connectivity ▪ >3.0 segments/intersection and >1,500 feet/intersection = bad connectivity
Sidewalk Connectivity	▪ street sides with sidewalks/total street length (2.0 max)	▪ Measures continuity of pedestrian access ▪ >1.5 feet of sidewalk/foot of street = good pedestrian facility connectivity ▪ ≤1.0 feet of sidewalk/foot of street = bad pedestrian facility connectivity
Intersection Conditions	▪ Pedestrian amenities (including crosswalks, pedestrian signals, protected medians, bicycle loops/ push buttons)	▪ Assesses ease of pedestrian access ▪ ≥50% of intersections with crosswalks = good intersection conditions ▪ <25% of intersections with crosswalks = bad intersection conditions
Bike Lane Density	▪ Bike lane length/total street length	▪ Measures continuity of bike facilities ▪ >25% of streets with bike facilities = good bike connectivity ▪ <10% of streets with bike facilities = bad bike connectivity

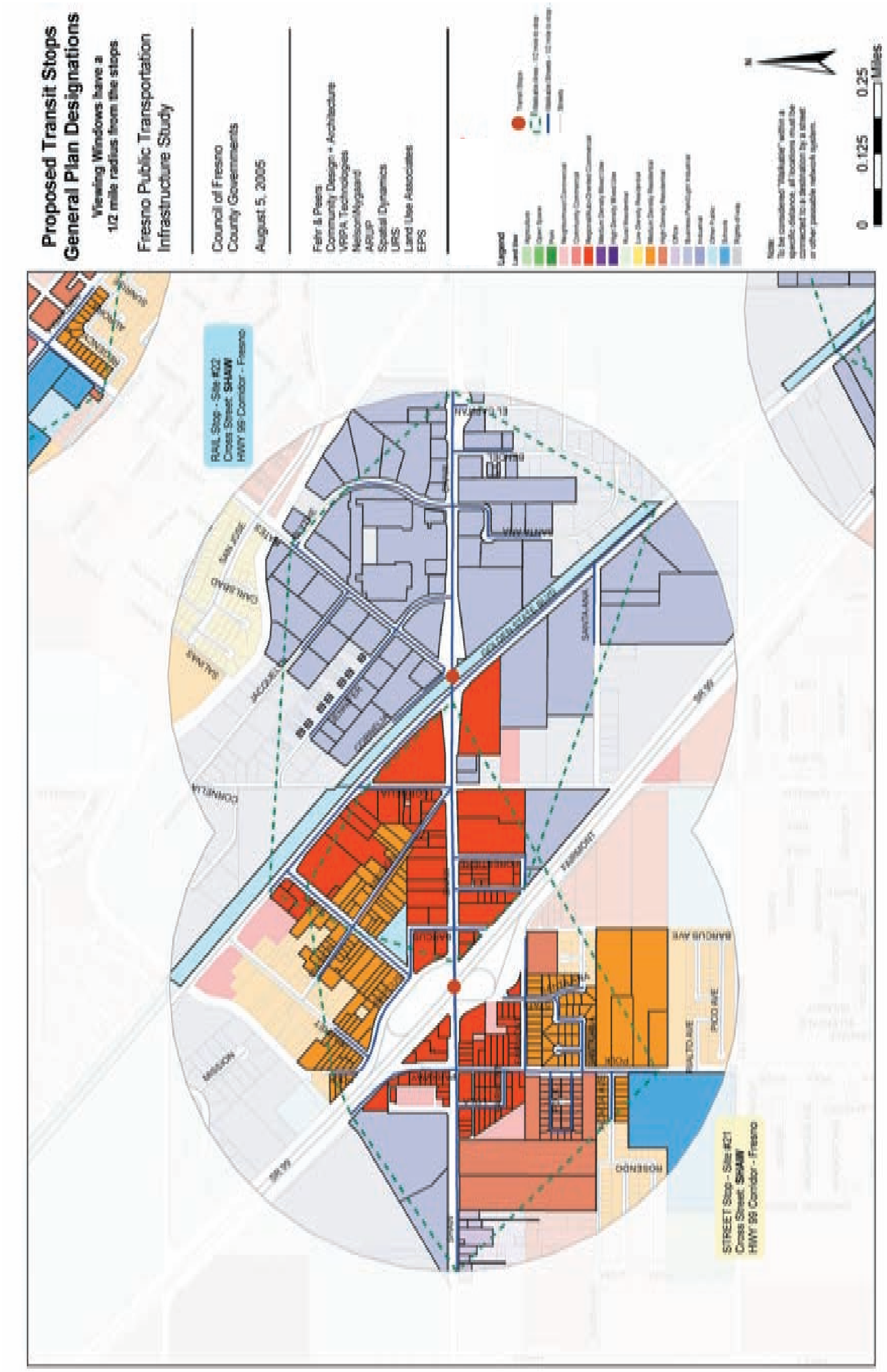
Table 4: Land Use Assessment Measures

1/4-mile and 1/2-mile Land Use Conditions	Assessment Measure	Importance and Key Data Points
Station Area Existing Built and Existing Policy Land Uses	▪ Summary of single-family residential units, multi-family residential units, residential density, commercial and office uses.	▪ Measures potential origin and destination catchment for each stop and each full corridor
1/2-mile Walking Distance Residential Focused Station Areas	▪ Residential net density ▪ Total residents ▪ Walkability index	▪ Measures residential density and origin catchment ▪ >12.0 du/acre or ≥4,000 residents = good intensity level ▪ ≤6.0 du/acre or ≤ 500 residents = bad intensity level (or employment-focused stop area)
1/4-mile Walking Distance Employment Focused Station Areas	▪ Total jobs ▪ Walkability Index	▪ Measures employment activity and potential destination trips ▪ >500 jobs = good employment level ▪ <250 jobs = bad employment level (or residential-focused stop area).
"Walkability Index" (Land use mix)	▪ Commercial uses as a percentage of residential + office	▪ Measures proportion of commercial use to indicate potential for residents and workers to walk to services [mix of uses indicates some measure of "walkability" and access to services] ▪ 0.1 – 0.5 = optimal Walkability Index score ▪ 0.05-0.1 or 0.5-1.0 = acceptable Walkability Index scores ▪ 0.0-0.05 or >1.0 = poor Walkability Index scores
Corridor land use attributes	▪ Aggregate and average stop-area residential and employment uses along corridor to prioritize corridors	▪ Assesses relative existing and planned development level of different corridor catchment areas

Data notes:

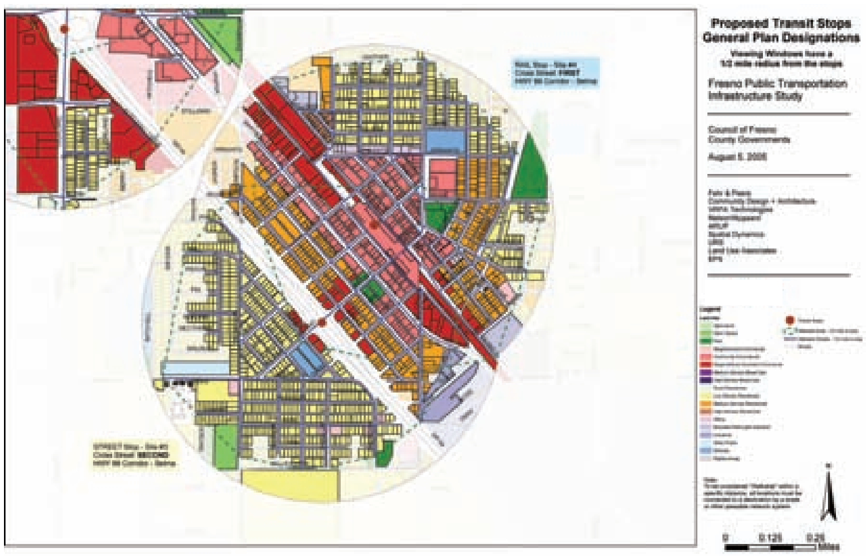
- Land use data was prioritized at the 1/2-mile radius for residential uses and at the 1/4-mile radius for employment uses, since employment-end trips are more sensitive to distance from stops than residential uses.
- CoFCG conversion factors for unit, resident, and job yields were used to develop the future land use figures. In some cases, where planned land uses are less intense than existing uses, this may result in growth figures that slightly underestimate future capacity of station areas. However, the analysis conducted is to a level of detail that is sufficient for the purposes of this project.

Figures 11: Step 3 resulted in existing land use, General Plan land use, and infrastructure maps for stop locations. This figure shows existing land use for the Highway 99 Corridor at Shaw Avenue in Fresno.

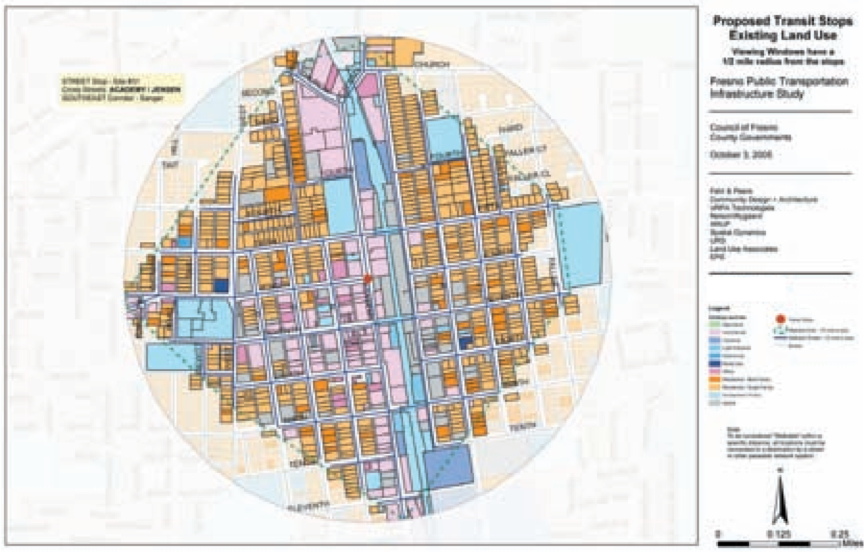


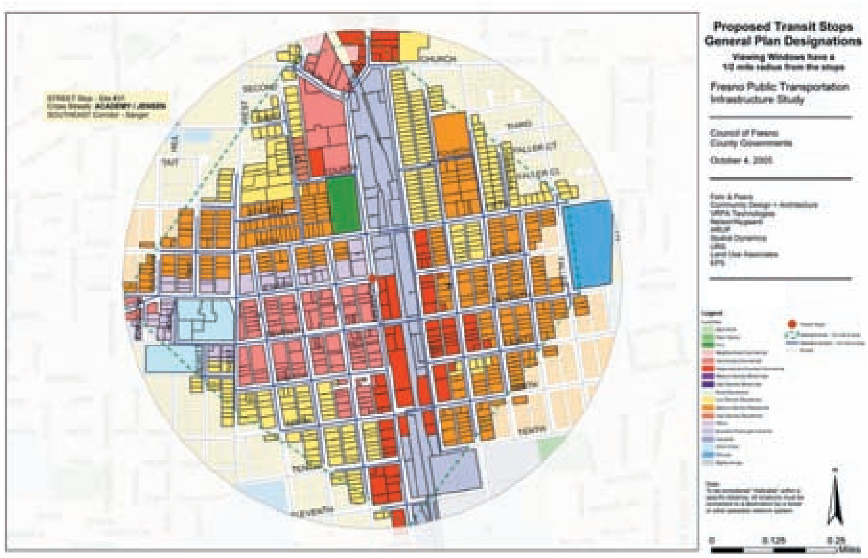
Figures 12: General Plan land use for the Highway 99 corridor at Shaw Avenue in Fresno.

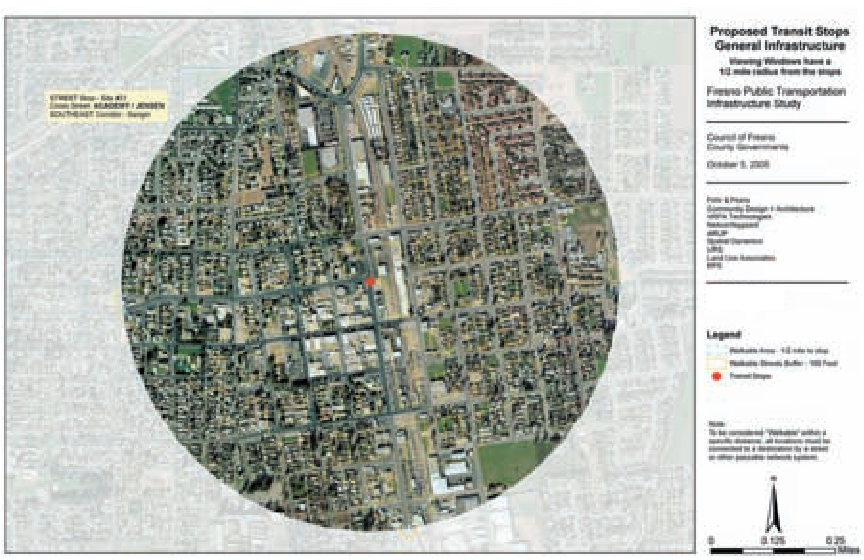
Figures 13: Aerial photo showing existing infrastructure and 1/2-mile walking distance for the Highway 99 corridor at Shaw Avenue in Fresno.



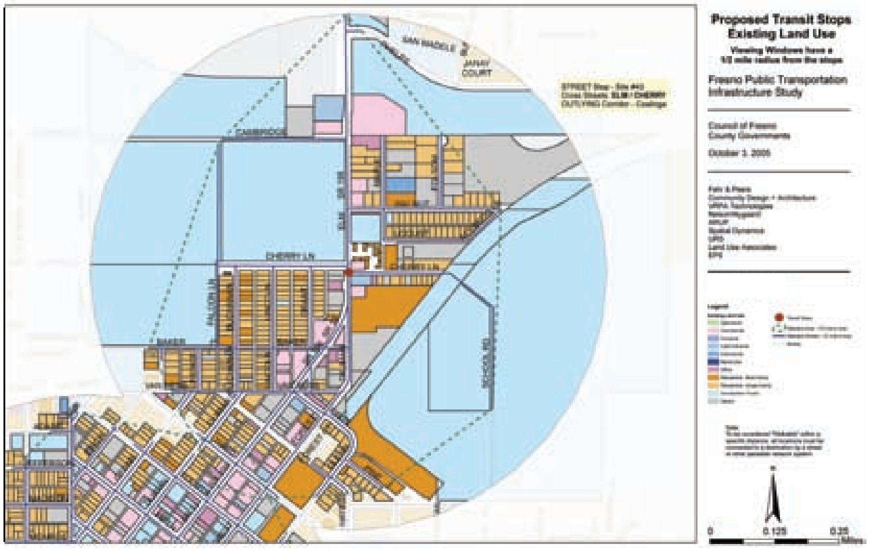
Figures 14-16: Step 3 resulted in existing land use, General Plan land use, and infrastructure maps for stop locations. These figures show maps for the Highway 99 Corridor at Second Street in Selma.

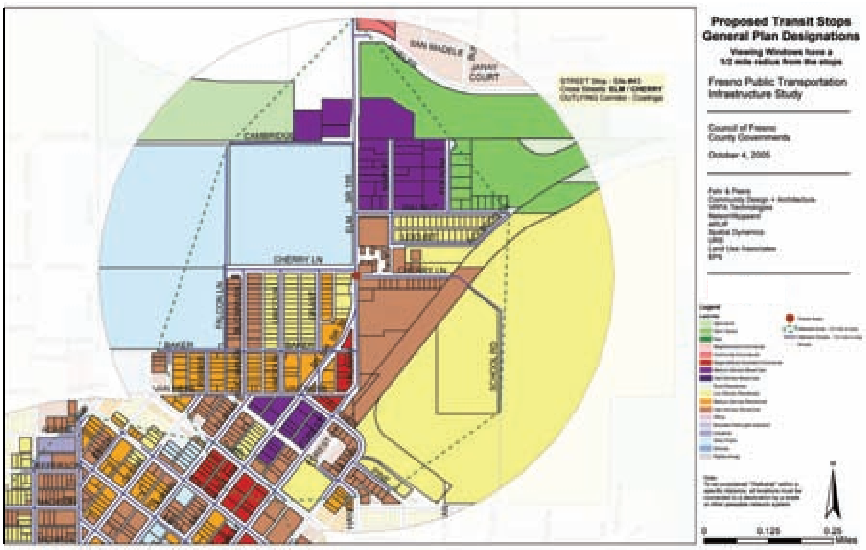






Figures 17-19 : Step 3 resulted in existing land use, General Plan land use, and infrastructure maps for stop locations. These figures show maps for the Southeast Corridor at Academy Avenue and Jensen Avenue in Sanger.





Figures 20-22: Step 3 resulted in existing land use, General Plan land use, and infrastructure maps for stop locations. These figures show maps for the stop locationsat Elm Avenue and Cherry Lane in Coalinga.

Figure 23: Site analysis helped confirm assessment of aerial photographs (Orange Cove).

4. Detailed infrastructure analysis

Working from aerial photographs, CD+A developed detailed infrastructure assessments of sidewalks and intersection improvements for a subset of stations (see Figure 23). The sample of stops gave the team the ability to assess additional stations based on basic visual assessment and other place type characteristics while developing the final infrastructure needs analysis. This basic visual assessment included a windshield survey of the 1/2-mile walking distance to field check the aerial survey. Current, high-quality aerial photographs are essential for accurately assessing existing infrastructure, which can be difficult in rapidly growing or changing areas.

Figure 24: Step 4 included analysis of the presence of sidewalks in a sampling of station areas.

Figures 25-26: Field checking helped identify gaps in the assessment and identify areas for future study (Sanger, top; Kerman, bottom).

5. Field checking and adjustments

Following initial analysis, CD+A and VRPA conducted field assessments of stops to assess the reliability of the aerial photographs and better understand existing conditions. After this fieldwork, the team decided to modify several stop locations slightly in order to fit better with existing land use and infrastructure conditions (for example all three Fresno corridors originally had stations located at Olive, but the Belmont stations provide better access to the west and to Roeding Park when compared with Olive).

6. Defining and assigning Place Types

CD+A outlined a series of idealized "place types" and a set of ranges for various criteria that can be used as a tool for assessing future infrastructure needs at each stop where detailed infrastructure analysis is not feasible. The place types are also used to structure the detailed land use and infrastructure recommendations for the Study Area later in this report.

Land Use and Infrastructure Assessment

Corridor/Study Findings

- Detailed analyses of smaller outlying communities, such as Reedley, Sanger, and Selma, suggest these community cores already possess relatively transit/pedestrian supportive infrastructure and land use contexts.
  The cores of these outlying communities are characterized by a highly connective street network with nearly continuous pedestrian facilities, pedestrian street crossing improvements, and some areas of pedestrian-oriented streetscape design. The community cores are also generally characterized by a mix of land uses including residential densities over 6 du/acre and some substantial employment uses.

- The BNSF corridor in Fresno has good potential for transit with several activity nodes along the corridor.
  The BNSF corridor has a generally connective street and pedestrian facility network and substantial residential densities surrounding potential stop locations when compared with other study corridors. The 1/2-mile walking distance is planned for substantial growth, as well, and average General Plan densities in station areas will be in excess of 10 du/acre at build-out.

- The Southeast Corridor (Sanger, Parlier, Reedley, and Orange Cove) has good existing conditions for transit supportive development and potential for future transit supportive growth.
  This study assessed two stop locations each in Sanger, Parlier, and Reedley, and one in Orange Cove. In each location, one stop location was set at the core of the community, with a secondary location in a potential growth area or near potential activity generators. The primary stop locations, excluding Orange Cove, have good pedestrian infrastructure conditions and existing residential densities over 6 du/acre.

- The Highway 99 Corridor in both Selma and North Fresno presents challenges in terms of transit supportive infrastructure and likely high costs for quality transit stop and access infrastructure.
  The interchanges on Highway 99 are generally older and present challenges for vehicular access, as well as environments that do not provide good access for pedestrians or bicyclists.

- The Highway 99 and UP Corridors in Fresno lack basic infrastructure and land use to be pedestrian-oriented transit corridors in the short term.
  The Highway 99 corridor, as stated above, lacks adequate pedestrian infrastructure, and existing land uses are not at transit-supportive intensity levels. However, planned growth along these corridors,

if coupled with improvements in pedestrian infrastructure and improvements in connectivity, may support future transit service along the corridor. For example, future improvements to interchanges along Highway 99 should include improved pedestrian and bicycle access and safety improvements along the arterials that pass through the interchange. Similarly, the Union Pacific corridor in areas north of Olive has a challenging pedestrian environment with generally large intersections with the closely adjacent Golden State Boulevard north of Ashlan and Weber Avenue south of Ashlan. Closer to downtown Fresno, the UP Corridor does not suffer from as many of these issues as the Highway 99 corridor.

- Rural or outlying centers that are not part of a cohesive corridor, such as Coalinga, Mendota, and Orange Cove, can serve as nodes for Tier 3 corridors.
  These centers possess some of the characteristics of more transit supportive outlying communities, but are not tied to potential corridors (as in Coalinga) or do not yet possess transit supportive infrastructure and land use, but have future potential to develop into transit supportive places (as in Mendota and Orange Cove).

- Rural areas that do not have characteristics of nodal development (such as Friant) should not be prioritized, but can be effectively served as part of a Tier 3 corridor connecting rural nodes.
  Friant and Orange Cove, the only examples of this type of stop location assessed as part of this study, do not possess existing residential intensity (<6 du/are) to be a focus for transit service. In Friant, there is also no discernable community core or transit supportive infrastructure that could be used to focus short-term transit improvements with the goal of long-term transit supportive development patterns. However, this assessment does not mean that places like Friant cannot be served effectively as part of a larger corridor, such as any potential transit to the casino further to the east, especially if conceived as a Tier 3 corridor with more flexible, non-traditional transit service. Orange Cove, on the other hand, has planned residential intensities that could support transit in the future, as well as a community core that could support transit service with some significant infrastructure investments.

- Service to outlying areas should be focused on existing cores, with potential future expansion to growth areas.
  The stop locations studied outside of the outlying community cores often lack substantial existing pedestrian infrastructure of transit-supportive land use (the Mountain View locations in Selma, are a good example). While these areas are planned for substantial growth in the future, the planned use types and intensity levels may not support future transit investment. This suggests that an approach connecting the outlying cores to Fresno and high-capacity transit corridors within Fresno and Clovis should be prioritized over serving trips within outlying communities, until growth warrants expansion of transit service. If needed, stations outside of existing community cores, on corridors linking the cores with Fresno, could provide park-and-ride access outside of the core areas.

Detailed Infrastructure Assessment of Study Corridors

Table 5 (below) summarizes the infrastructure data for the study corridors. For all data, green shading indicates data points within the preferred range of values, yellow shading indicates data points within the acceptable range of values, and red shading indicates data points outside of the acceptable range of values (the value ranges are indicated at the bottom of the table). Corridor-by-corridor assessment of the data is provided below.

Table 5: Infrastructure Summary Data

Corridor Overview					Infrastructure Summary					
ID	City	Stop Type	Cross Street	Corridor	Street Segment/ Intersection	Street Length/ Intersection	% Int. w/ Crosswalks	Sidewalk Length/ Street Length	% Bike Lanes	% Bike Infra
1	Selma	ROAD	HIGHLAND	HWY 99	2.53	1,078 ft	21%	1.02	0.00%	0.00%
2	Selma	RAIL	HIGHLAND	HWY 99	2.24	1,085 ft	14%	0.77	0.00%	0.00%
3	Selma	ROAD	SECOND	HWY 99	1.94	605 ft	26%	1.74	0.00%	0.00%
4	Selma	RAIL	FIRST	HWY 99	1.96	588 ft	38%	1.69	0.00%	0.00%
5	Selma	ROAD	MOUNTAIN VIEW	HWY 99	4.50	2,870 ft	0%	0.00	0.00%	0.00%
6	Selma	RAIL	MOUNTAIN VIEW	HWY 99	4.75	3,214 ft	0%	0.00	0.00%	0.00%
7	Fresno	RAIL	HERNDON	BNSF	2.24	957 ft	10%	1.07	23.97%	24.72%
8	Fresno	RAIL	SIERRA	BNSF	1.85	615 ft	N.A.	N.A.	19.37%	19.37%
9	Fresno	RAIL	BULLARD	BNSF	1.77	709 ft	N.A.	N.A.	10.38%	10.38%
10	Fresno	RAIL	BARSTOW	BNSF	1.74	621 ft	N.A.	N.A.	32.20%	32.20%
11	Fresno	RAIL	SHAW	BNSF	2.04	807 ft	15%	1.58	0.00%	0.00%
12	Fresno	RAIL	WEST	BNSF	2.03	758 ft	N.A.	N.A.	15.89%	15.89%
13	Fresno	RAIL	ASHLAN	BNSF	2.25	841 ft	N.A.	N.A.	8.88%	8.88%
14	Fresno	RAIL	PALM	BNSF	1.87	614 ft	N.A.	N.A.	4.58%	4.58%
15	Fresno	RAIL	SHIELDS	BNSF	2.76	900 ft	N.A.	N.A.	7.76%	11.56%
16	Fresno	RAIL	CLINTON	BNSF	3.13	1,078 ft	N.A.	N.A.	2.11%	2.11%
17	Fresno	RAIL	BLACKSTONE	BNSF	2.15	761 ft	N.A.	N.A.	0.00%	0.31%
18	Fresno	RAIL	OLIVE	BNSF	1.89	582 ft	11%	1.40	0.00%	0.55%
19	Fresno	ROAD	HERNDON	HWY 99	2.38	1,272 ft	0%	0.00	0.00%	0.00%
20	Fresno	RAIL	HERNDON	HWY 99	2.22	1,067 ft	0%	0.00	0.00%	0.00%
21	Fresno	ROAD	SHAW	HWY 99	1.76	769 ft	10%	0.49	0.00%	0.00%
22	Fresno	RAIL	SHAW	HWY 99	2.15	1,200 ft	15%	0.50	2.93%	2.93%
23	Fresno	ROAD	ASHLAN	HWY 99	2.00	984 ft	N.A.	N.A.	13.39%	13.39%
24	Fresno	RAIL	ASHLAN	HWY 99	3.20	1,742 ft	N.A.	N.A.	28.82%	28.82%
25	Fresno	ROAD	SHIELDS	HWY 99	1.36	1,140 ft	N.A.	N.A.	0.00%	0.00%
26	Fresno	RAIL	SHIELDS	HWY 99	2.00	720 ft	N.A.	N.A.	28.13%	34.76%
27	Fresno	ROAD	BELMONT	HWY 99	2.03	722 ft	3%	0.66	0.00%	0.00%
28	Fresno	RAIL	BELMONT	HWY 99	1.90	731 ft	10%	1.22	0.00%	0.00%
31	Sanger	ROAD	ACADEMY / JENSEN	SOUTHEAST	1.93	718 ft	28%	1.32	0.00%	0.00%
32	Sanger	ROAD	ACADEMY / NORTH	SOUTHEAST	2.00	908 ft	N.A.	N.A.	0.00%	0.00%
33	Parlier	ROAD	PARLIER / MENDCINO	SOUTHEAST	1.58	675 ft	N.A.	N.A.	0.00%	0.00%
34	Parlier	ROAD	PARLIER / NEWMARK	SOUTHEAST	1.75	750 ft	N.A.	N.A.	0.00%	0.00%
35	Reedley	ROAD	"I" ST. / 11th ST.	SOUTHEAST	2.08	690 ft	32%	1.68	11.32%	0.00%
36	Reedley	ROAD	MANNING / REED	SOUTHEAST	1.90	827 ft	N.A.	N.A.	9.83%	0.00%
37	Orange Cove	ROAD	PARK / CENTER-JACOBS	SOUTHEAST	1.78	661 ft	13%	0.42	0.00%	0.00%
38	Kerman	ROAD	RT 180 / MADERA	RT 180	1.84	901 ft	13%	1.09	0.00%	0.00%
39	Kerman	RAIL	"A" ST. / MADERA	RT 180	2.16	719 ft	N.A.	N.A.	0.00%	0.00%
40	Mendota	ROAD	NAPLES / 6th St.	RT 180	1.74	638 ft	N.A.	N.A.	0.00%	0.00%
41	Mendota	RAIL	MARIE / 6th St.	RT 180	1.71	628 ft	N.A.	N.A.	0.00%	0.00%
42	Coalinga	ROAD	ELM / POLK	OUTLYING	1.79	608 ft	2%	1.32	2.07%	0.00%
43	Coalinga	ROAD	ELM / CHERRY	OUTLYING	2.02	795 ft	N.A.	N.A.	0.00%	0.00%
44	Friant	ROAD	FRIANT / PARKER	OUTLYING	1.30	601 ft	N.A.	N.A.	0.00%	0.00%
				Corridor Averages: *Selma Road*	*2.12*	*758 ft*	*25%*	*1.35*	*0.00%*	*0.00%*
				Selma Rail	*2.08*	*741 ft*	*33%*	*1.27*	*0.00%*	*0.00%*
				Fresno BNSF	*2.08*	*744 ft*	*3%*	*0.29*	*9.57%*	*10.24%*
				Fresno Road	*1.93*	*907 ft*	*6%*	*0.51*	*2.68%*	*2.68%*
				Fresno Rail	*2.08*	*896 ft*	*4%*	*0.27*	*11.98%*	*13.30%*
				Southeast	*1.86*	*721 ft*	*0%*	*0.00*	*1.91%*	*1.91%*
				Station Average	2.15	932 ft	7%	0.46	5.28%	7.52%
				Standard Deviation	0.67	532 ft	10%	0.60	9.08%	11.00%
				Countywide Data						
				Value Ranges	≤2.0	≤750 ft	<25%	<1.00	<10%	<10%
					2.0-3.0	750 ft - 1500 ft	25%-50%	1.0-1.25	10-25%	10-25%
					>3.0	>1500 ft	≥50%	≥1.50	>25%	>25%

Notes: sampled stops

Figure 27: Pedestrian conditions in some parts of Selma include continuous sidewalks and pedestrian street crossings, but with no buffer between traffic and pedestrians. (Selma)

Figure 28: In other areas, sidewalks are discontinuous. (Selma)

Figure 29: Some basic pedestrian improvements are present, but could be improved to provide better pedestrian safety. (Selma)

Selma—Highway 99 Corridor

Pedestrian conditions vary widely between the three stop locations. The core stop (at Second Street) had high connectivity of the street network (just over 600 feet of street per intersection) and good sidewalk coverage (a sidewalk connectivity index of 1.65). The stop at Highland lacks some of the connectivity and pedestrian amenities of the core stop (1,078 feet of street/intersection, sidewalk connectivity index of less than 1.0 and only 21% of intersections with pedestrian improvements). The southern stop (at Mountain View) is almost entirely lacking in pedestrian infrastructure. However, there is little existing development at this location, and future development, if proper policies are in place, could bring pedestrian improvements and improved connectivity. Selma lacks any bike lanes or multi-use facilities within the 1/2-mile stop areas of both corridors.

Pedestrian facilities are present at each stop location where land has been developed, but vary in character depending on proximity to the downtown core. The Highland Avenue stop at Highway 99 has generally acceptable pedestrian facilities that serve larger automobile-oriented retail centers and parking lots; while sidewalks are generally only on one side of the street around the interchange ramps there are protected medians in many locations as well as crosswalks at freeway ramps. Arterials are wide and there are often substantial parking lots separating retail and commercial buildings from the pedestrian facilities along the arterials. In the downtown, the stops have better pedestrian facilities, and serve more pedestrian-oriented development patterns, with street-fronting retail uses and streets with fewer lanes. There are few curb bulb-outs at corners on streets with diagonal parking, more bulb-outs would improve pedestrian safety and convenience.

Selma—UP Right-of-Way

The Union Pacific right-of-way stops were roughly comparable to the Highway 99 stops, which is not surprising because of the close spacing of the two corridors. The core stop (at First Street) has slightly better connectivity and pedestrian crossing improvements, but roughly the same sidewalk connectivity as the core Highway 99 stop. Yet, the more immediate area around the transit stop has better connectivity and general pedestrian conditions than exist at the interchange on Highway 99. Also, the built environment is more transit-supportive, see land use discussion. The northern stop (at Highland) has similar characteristics to the comparable Highway 99 stop, and the southern stop is similarly lacking in pedestrian infrastructure.

Pedestrian improvements are sparse and poor around these stops, with the exception of the downtown stop. At the outer edges of Selma, retail and commercial development focuses mainly along Highway 99 leaving little activity in and around the Union Pacific right-of-way stops. There is nearby residential that provides opportunities for needed pedestrian connections and facilities that would allow movement to the retail and commercial developments along Highway 99.

Fresno—Highway 99 Corridor

The Highway 99 corridor in Fresno has poor existing pedestrian infrastructure, with an average of over 900 feet of street per intersection. Pedestrian amenities, such as sidewalks and crossing improvements are entirely lacking in some places and merely adequate in others. Existing amenities are not continuous and are products of the few newer developments. There are almost no pedestrian facilities at and near the interchange exits and entrances giving little freedom of movement. Existing development is mainly industrial in character and does not have extensive pedestrian infrastructure. Recent residential and commercial developments have adequate pedestrian facilities. Ensuring that high-quality pedestrian improvements is provided in future development will be essential if this corridor is to support pedestrian access to transit. Detailed assessment and field work around three stop locations (Herndon, Shaw, and Belmont) was used to verify the assessments made using aerial photographs and GIS data.

The 1/2-mile Herndon stop area is currently largely undeveloped. Existing developments are often separated by large undeveloped parcels, resulting in a fragmented pedestrian network. The Shaw Avenue stop location is also characterized by fragmented pedestrian facilities and the Belmont stop, while surrounded by more developed land, also lacks some connectivity in the pedestrian network mainly in the industrial area to the south and west of the potential station location.

Fresno—UP Right-of-Way

The UP corridor in Fresno generally has conditions that are similar to those along the Highway 99 corridor in terms of existing infrastructure. Many of the stop locations have very few pedestrian amenities while several have none, due to the industrial character of much of the corridor. Most existing pedestrian facilities are present around Golden State Boulevard which runs parallel to the rail line. The Union Pacific has slightly better coverage of sidewalks and pedestrian crossing improvements at the stops near Downtown Fresno,

Figure 30: Pedestrian facilities in the Highway 99 corridor are limited or, as in this case, they do not exist. (Reedley)

Figure 31: Arterial intersections highlight the problems with existing pedestrian infrastructure. (Fresno)

Figure 32: These problems lead to challenging conditions for those who do walk along these streets. (Fresno)

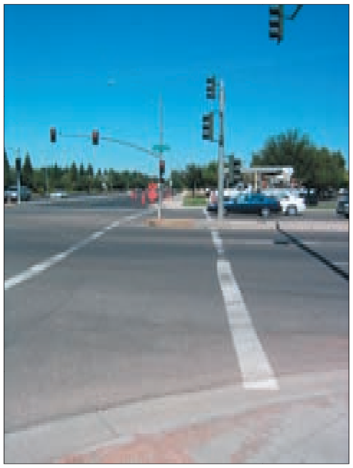


Figure 33: The BNSF corridor has slightly better pedestrian conditions than the Highway 99 corridor in Fresno. (Fresno)

Figure 34: But major infrastructure improvements such as sidewalks and safe arterial crossings are still necessary in parts. (Fresno)

Figure 35: The Southeast Corridor has a number of station areas with quiet tree-lined streets with good pedestrian infrastructure. (Reedley)

and several of the stop locations (Ashlan and Shields) have substantial bicycle infrastructure. The Herndon stop lacks any pedestrian facilities, while the Shaw Avenue stop has significant gaps in the pedestrian network. The Belmont stop is located in a fairly intensely developed area, and the pedestrian facilities reflect this context. The existing pedestrian network is fairly connective, with 1.22 feet of sidewalk for every foot of street (2.0 is the maximum possible).

Fresno BNSF Corridor

The BNSF corridor in Fresno has good existing pedestrian infrastructure, with fairly continuous sidewalks and pedestrian crossing improvements. Arterial crossings are an issue, as pedestrians must navigate across multiple traffic lanes and often multiple turn lanes without adequate median refuges. but this is an issue at almost all stops within the five corridors. Still understanding the needs for improvement to arterial intersection crossings will be an important aspect of the PTIS effort. In general, this corridor has a more intense levels of development and a fairly good existing pedestrian infrastructure. The stops at the northern edges of Fresno, such as the Herndon stop, and near industrial uses have less existing pedestrian infrastructure, as development is less dense or not currently designed for pedestrian use. However, these stops have potential for improvement and connected pedestrian networks as future growth and development occur.

Southeast Corridor

The Southeast Corridor assessment included two stops each located in Sanger, Reedley, and Parlier, and one stop in Orange Cove. In each community, one stop was located near the "core" while the second was located near potential growth areas or existing activity generators. In general, the "core" stop locations have good pedestrian infrastructure conditions, with good street connectivity, and acceptable levels of pedestrian and bicycle infrastructure. Orange Cove, as well as some of the growth area stop locations, lacks sidewalks and other pedestrian infrastructure in many locations, but recent public improvements have been aimed at improving pedestrian conditions in the public realm. Downtown Reedley has a very high level of connectivity for both sidewalks and bicycle lanes, and has a multi-use path that provides pedestrian and bicycle access within the downtown. Sanger and Parlier have both made some substantial infrastructure improvements in their downtown areas.

All of the communities in the Southeast Corridor have the potential to improve the conditions along arterial streets and at intersections. Because these areas are not served by the County's limited access freeways, the arterial street network is expected to carry high volumes of auto traffic. Balancing this need with the potential for future multi-modal improvements is an important consideration when discussing infrastructure conditions.

Route 180 Corridor

The Route 180 includes stop locations in Kerman and Mendota. In Kerman, two stops were analyzed, one along Route 180, and one along the existing Union Pacific rail line. In Mendota, the rail line acts as a major barrier to street connectivity. One of the stop locations includes the rail line as a barrier, while the other does not. The stops are located between Route 180 and the rail line, near the center of the town. Infrastructure conditions in the Route 180 corridor are similar to those in the Southeast Corridor or Selma. Kerman has some substantial streetscape improvements and public amenities, especially near the Union Pacific right-of-way. Some newer streets in Kerman include bicycle lanes and good pedestrian conditions. In Mendota, the rail line acts as a major barrier to pedestrian and bicycle circulation, as only a few streets connect across the rail line. These streets are expected to carry significant volumes of auto traffic, but, to date, do not include pedestrian improvements that create pedestrian-supportive conditions.

Outlying Centers

The infrastructure assessment also included several outlying stop locations, two in Coalinga, and one in Friant. The Coalinga stops have adequate pedestrian infrastructure, although they have issues that are similar to those in Kerman in terms of the pedestrian treatment along arterials. Friant is more rural in character and lacks basic pedestrian facilities such as sidewalks and marked crosswalks. Friant is a good example of how a Tier 3 node would need to be improved to support transit access. The connectivity of the street network is fairly good, but pedestrian circulation is fairly difficult because of the rural infrastructure conditions.

Future Infrastructure Improvements

In general, for all the study areas, there is the need to go beyond basic improvements to sidewalk connectivity and intersection treatments, there are some potential improvements

Figure 36: Some cities (such as Reedley) have made off-street pedestrian and bicycle connections.

Figure 37: This street in Kerman has recently been improved to provide safe pedestrian and bicycle facilities.

Figure 38: Outlying centers, such as Coalinga, have relatively good pedestrian environments.

Figure 39: Some locations in all corridors require basic improvements, such as sidewalks. (Orange Cove)

Figure 40: The Highway 99 corridor in Selma has some auto-oriented land uses, particluarly along arterial streets, as well as convoluted pedestrian improvements.

to connectivity that would make additional area around stops accessible to the stops themselves. Pedestrian and bicycle connections through cul-de-sacs or paralleling the transitways on the UP and BNSF corridors can make additional areas accessible and improve potential ridership. Developments throughout the corridors, but especially in growth areas should be required to link to existing street networks as much as possible and provide high-quality multi-modal infrastructure, including an interconnected street system and pedestrian and bicycle network.

Detailed Land Use Assessment of Study Corridors

Table 6 (opposite) summarizes the existing and planned land use data for the study corridors. Green shading indicates data points within the preferred range of values, yellow shading indicates data points within the acceptable range of values, and red shading indicates data points outside of the acceptable range of values. For some analysis, light blue and purple shading are used to indicate data thresholds useful in applying the place types described below (the value ranges are indicated at the bottom of the table). Corridor-by-corridor assessment of the data is provided below.

Selma—Highway 99 Corridor

Existing land uses around the Selma stop locations are similar to the existing infrastructure conditions. The core stop location has fairly high residential density (7+ du/acre) but limited employment uses. The northern stop location has limited existing residential uses, but more substantial employment uses (600+ within the 1/4 mile walking distance). The southern location has very little existing uses (some limited employment) and plans for employment expansion. The Walkability Index scores for the three stops shows the differences between these three areas. The core stop has an index of 0.18 (approximately 1/5 as much commercial land as residential, office, and industrial) while the northern stop has a score of over 4 (four times as much commercial land as other types). These differences underscore the potential for daily convenience needs to be met in the context of each stop, but also indicate that the northern stop may mostly serve transit-dependent employees and patrons of the retail commercial uses that are expected to develop in the area as we expect that most of the development will be auto-oriented retail. Riders at the core stop will likely be able to walk from home or work to meet daily needs, while at other stops workers and residents are less likely to be able to walk to convenience services.

Table 6: Land Use Summary Data

Corridor Overview					Residential Uses								Employment Uses					
					Existing 1/2 Mile [1]			Future 1/2 Mile [2]			1/2 Mile Change		Existing 1/4 Mile [1]		Future 1/4 Mile [2]		1/4 Mile Growth/Change	
ID	City	Stop Type	Cross Street	Corridor	Res. Density (du/acre)	Total Residents [3]	Walkability Index [5]	Res. Density (du/acre) [4]	Total Residents [4]	Walkability Index	Res. Growth (People)	Change in Walkability	Total Jobs [4]	Walkability Index [5]	Total Jobs [4]	Walkability Index	Emp.Growth (Jobs)	Change in Walkability
1	Selma	ROAD	HIGHLAND	HWY 99	5.64	295	4.11	4.20	181	11.93	-114	7.82	642	10.00	670	106.35	28	96.35
2	Selma	RAIL	HIGHLAND	HWY 99	3.82	477	1.23	5.39	869	1.10	392	-0.13	1,420	4.96	1,121	6.03	-299	1.07
3	Selma	ROAD	SECOND	HWY 99	7.04	2,523	0.18	5.60	2,783	0.38	260	0.20	78	0.16	162	0.61	84	0.45
4	Selma	RAIL	FIRST	HWY 99	7.45	2,410	0.29	7.24	2,207	0.87	-203	0.58	333	1.52	546	12.48	213	10.96
5	Selma	ROAD	MOUNTAIN VIEW	HWY 99	0.57	16	0.78	4.50	290	6.40	273	5.62	250	0.87	480	N.A.	229	N.A.
6	Selma	RAIL	MOUNTAIN VIEW	HWY 99	0.07	7	0.32	4.50	312	3.72	306	3.40	125	0.26	419	0.82	294	0.55
7	Fresno	RAIL	HERNDON	BNSF	5.76	582	0.22	11.80	3,113	0.24	2,531	0.02	14	0.89	212	0.23	198	-0.66
8	Fresno	RAIL	SIERRA	BNSF	6.09	1,820	0.00	9.54	3,856	0.06	2,036	0.06	0	0.00	0	0.00	0	0.00
9	Fresno	RAIL	BULLARD	BNSF	8.53	2,788	0.10	15.72	7,610	0.18	4,822	0.08	18	0.00	617	0.30	599	0.30
10	Fresno	RAIL	BARSTOW	BNSF	5.87	3,411	0.10	13.24	8,214	0.07	4,803	-0.04	0	0.00	222	0.00	222	0.00
11	Fresno	RAIL	SHAW	BNSF	6.80	1,794	0.67	12.44	2,954	0.55	1,161	-0.12	517	N.A.	537	0.96	20	N.A.
12	Fresno	RAIL	WEST	BNSF	5.38	3,150	0.10	7.02	4,351	0.09	1,201	-0.01	123	0.06	124	0.06	1	0.00
13	Fresno	RAIL	ASHLAN	BNSF	5.89	3,214	0.11	9.21	5,607	0.10	2,394	-0.01	0	0.00	4	0.01	4	0.01
14	Fresno	RAIL	PALM	BNSF	6.47	4,180	0.01	8.55	5,211	0.01	1,031	0.00	2	0.00	0	0.00	-2	0.00
15	Fresno	RAIL	SHIELDS	BNSF	7.09	4,463	0.06	9.83	5,318	0.09	855	0.03	168	0.15	326	0.20	158	0.05
16	Fresno	RAIL	CLINTON	BNSF	8.92	4,171	0.09	13.12	5,541	0.20	1,370	0.11	31	0.07	63	0.13	32	0.06
17	Fresno	RAIL	BLACKSTONE	BNSF	8.25	1,754	0.51	9.42	1,609	1.09	-145	0.58	301	1.25	480	2.67	179	1.42
18	Fresno	RAIL	OLIVE	BNSF	8.60	2,740	0.23	14.17	3,807	0.76	1,067	0.53	198	0.39	272	0.84	74	0.45
19	Fresno	ROAD	HERNDON	HWY 99	0.84	138	0.39	6.10	1,884	0.47	1,746	0.08	114	1.20	716	1.85	602	0.65
20	Fresno	RAIL	HERNDON	HWY 99	2.50	235	0.68	9.13	2,392	0.69	2,156	0.02	274	6.53	900	0.90	626	-5.63
21	Fresno	ROAD	SHAW	HWY 99	4.43	916	0.45	12.83	3,038	0.77	2,122	0.32	160	2.03	368	13.38	208	11.35
22	Fresno	RAIL	SHAW	HWY 99	1.82	131	1.65	9.00	184	7.23	53	5.58	289	6.45	806	N.A.	517	N.A.
23	Fresno	ROAD	ASHLAN	HWY 99	4.89	331	0.42	17.96	3,296	0.50	2,965	0.08	84	N.A.	317	0.67	234	N.A.
24	Fresno	RAIL	ASHLAN	HWY 99	0.00	0	0.20	11.38	2,471	0.23	2,471	0.04	1,035	0.07	1,289	0.00	254	-0.07
25	Fresno	ROAD	SHIELDS	HWY 99	4.52	1,204	0.17	19.12	4,139	1.01	2,934	0.84	170	0.26	240	1.24	70	0.98
26	Fresno	RAIL	SHIELDS	HWY 99	12.02	3,091	0.12	14.39	3,952	0.00	861	-0.12	63	0.06	640	0.00	578	-0.06
27	Fresno	ROAD	BELMONT	HWY 99	6.03	791	0.64	9.00	1,010	1.03	219	0.40	87	0.66	84	0.81	-3	0.15
28	Fresno	RAIL	BELMONT	HWY 99	7.32	2,397	0.12	9.00	2,441	0.26	44	0.14	363	0.24	464	0.85	100	0.62
31	Sanger	ROAD	ACADEMY / JENSEN	SOUTHEAST	7.13	2,668	0.35	7.05	2,415	0.49	-252	0.14	268	1.52	600	2.04	332	0.51
32	Sanger	ROAD	ACADEMY / NORTH	SOUTHEAST	6.40	1,780	0.15	5.40	2,588	0.33	808	0.18	563	0.99	476	3.52	-88	2.53
33	Parlier	ROAD	PARLIER / MENDCINO	SOUTHEAST	5.89	2,652	0.04	9.08	3,911	0.08	1,259	0.04	41	0.09	78	0.17	38	0.08
34	Parlier	ROAD	PARLIER / NEWMARK	SOUTHEAST	6.35	1,580	0.17	10.77	3,011	0.26	1,430	0.09	141	0.76	313	0.33	172	-0.44
35	Reedley	ROAD	"I" ST. / 11th ST.	SOUTHEAST	7.12	2,038	0.27	11.43	3,050	0.46	1,012	0.19	210	0.67	572	0.79	362	0.13
36	Reedley	ROAD	MANNING / REED	SOUTHEAST	4.34	1,056	0.10	9.75	2,241	0.30	1,185	0.20	36	0.25	657	0.82	621	0.57
37	Orange Cove	ROAD	PARK / CENTER-JACOBS	SOUTHEAST	5.73	2,530	0.10	7.51	4,132	0.10	1,603	0.00	168	0.32	284	0.34	116	0.03
38	Kerman	ROAD	RT 180 / MADERA	RT 180	5.66	1,080	0.78	12.68	2,136	1.22	1,056	0.44	472	15.65	428	20.49	-44	4.84
39	Kerman	RAIL	"A" ST. / MADERA	RT 180	7.29	1,904	0.31	6.54	1,838	0.50	-66	0.19	422	1.11	357	1.38	-66	0.27
40	Mendota	ROAD	NAPLES / 6th St.	RT 180	7.43	1,381	0.38	8.95	1,748	0.58	367	0.20	112	0.50	334	1.54	223	1.03
41	Mendota	RAIL	MARIE / 6th St.	RT 180	5.39	1,712	0.30	6.36	2,579	0.20	867	-0.09	115	0.18	580	0.38	465	0.20
42	Coalinga	ROAD	ELM / POLK	OUTLYING	8.44	2,844	0.31	9.52	6,544	0.19	3,699	-0.11	226	1.01	275	0.81	49	-0.20
43	Coalinga	ROAD	ELM / CHERRY	OUTLYING	9.37	2,016	0.21	7.36	5,569	0.08	3,553	-0.13	106	0.20	15	0.01	-91	-0.19
44	Friant	ROAD	FRIANT / PARKER	OUTLYING	4.16	662	0.33	4.83	1,566	0.29	905	-0.04	159	0.84	90	0.40	-69	-0.44
Corridor Averages				*Selma Road*	*6.46*	*945*	*1.69*	*5.32*	*1,085*	*1.29*	*140*	*-0.40*	*323*	*3.36*	*437*	*35.66*	*114*	*32.30*
				Selma Rail	*5.36*	*965*	*0.61*	*6.38*	*1,130*	*1.03*	*165*	*0.42*	*626*	*2.25*	*695*	*6.44*	*69*	*4.20*
				Fresno BNSF	*6.94*	*2,536*	*0.18*	*11.06*	*4,257*	*0.14*	*1,721*	*-0.05*	*114*	*0.33*	*238*	*0.45*	*124*	*0.12*
				Fresno Road	*4.10*	*676*	*0.42*	*12.80*	*2,673*	*0.39*	*1,997*	*-0.03*	*123*	*1.04*	*345*	*3.59*	*222*	*2.55*
				Fresno Rail	*6.58*	*1,171*	*0.55*	*10.95*	*2,288*	*0.98*	*1,117*	*0.42*	*405*	*2.67*	*820*	*0.35*	*415*	*-2.32*
				Southeast	*6.16*	*2,043*	*0.17*	*7.16*	*3,050*	*0.32*	*1,006*	*0.16*	*204*	*0.66*	*426*	*1.14*	*222*	*0.49*
				Station Average	5.79	1,784	0.42	9.54	3,142	1.07	1,415	0.93	236	1.52	408	4.61		4.96
				Standard Deviation	2.55	1,238	0.67	3.58	1,904	2.27	1,376	2.05	278	3.01	295	17.02		19.76
				Countywide Data	*2.32*	*808,143*	*0.06*	*5.23*	*1,908,211*	*0.09*	*1,100,068*	*0.02*	*325,714*	*0.06*	*863,329*	*0.09*	*537,615*	*0.02*
Value Ranges					≥6.0	<500	0-0.05	≥6.0	<500	0-0.05	>1000		<250	0-0.05	>250	0-0.05	>500	
					6.0-12.0	>4000	0.05-0.1	6.0-12.0	>4000	0.05-0.1			>500	0.05-0.1	>500	0.05-0.1		
					>12.0		0.1-0.5	>12.0		0.1-0.5				0.1-0.5		0.1-0.5		
							.5-1.0			.5-1.0				.5-1.0		.5-1.0		
							>1.0			>1.0				>1.0		>1.0		

Notes: [1] From County Assessor's Data
[2] From General Plan Data
[3] Based on conversions of 3.28 people/SFD and 2.78 people/MFD (COFCG figures)
[4] Estimated from mid-point densities from COFCG model
[5] Walkability is measured by commercial land area within 1/2 mile walking distance/(residential + office + industrial land area)

Figure 41: The core area of Selma includes a compact, walkable commerical district with the potential for future infill development, and additional pedestrian improvements such as curb extensions at corners.

Figure 42: The Highway 99 corridor in Fresno is predominantly characterized by auto-oriented development and isolated residential pockets.

Figure 43: The Highway 99 corridor does, however, have a great deal of potential for planned residential growth.

Selma—UP Right-of-Way

Existing land uses around the UP right-of-way in Selma are similar to those around Highway 99. The core stop has a good mix of residential and employment uses, with slightly more employees (both existing and planned) in the vicinity of the UP stop. The Walkability Index score of 0.29 for the existing 1/2 mile shows the existing mixture of uses, while the future score of 0.87 shows the trend towards additional employment uses. The future score is approaching a level where many future workers may not be able to walk to services which can discourage transit use. The Highland stop has substantial planned residential growth and significant existing and planned employment (over 1,400 current employees). The Mountain View stop likely lacks existing and planned activity to support major transit investments. At build-out of the General Plan, there would be less than 500 workers within 1/4 mile of the stop and the area is only planned to have 312 residents within the 1/2 mile area. The future Walkability Index score of 3.72 at the 1/2-mile shows the dominance of commercial uses in planning for the area.

Fresno—Highway 99 Corridor

The Highway 99 corridor in Fresno lacks substantial existing residential or employment uses. An average of only 650 existing residents (at a density of just over 4 du/acre) live within a 1/2-mile walk of each stop. Existing uses are fairly balanced (as evidenced by a corridor-wide average Walkability Index of 0.43). What the corridor lacks in existing land uses, it makes up in planned growth, particularly in residential uses. The corridor is expected to add over 2,200 residents per stop at General Plan build-out, with substantial employment growth at several stations as well. Until this growth comes to fruition, though, existing land uses will not support significant transit investment. Planned growth in the corridor, especially closer in towards downtown Fresno, includes substantial residential development (an average of over 2,000 new residents per stop) and a resulting change in the Walkability Index brining non-employment uses more in line with commercial uses (future Walkability Index score of 0.36 for the whole corridor).

Fresno—UP Right-of-Way

The UP right-of-way in Fresno is similar to the Highway 99 corridor, with some more substantial existing residential uses, particularly at the southern end of the corridor (at Belmont and Shields). The northern stops along both corridors (Herndon and Shaw) lack existing residential uses. The stop at Ashlan has substantial existing employment activity (over 1,000 jobs) and is planned for significant residential growth as well. The UP corridor would have some transit-supportive stops currently, but would also require substantial development to become a fully supportive corridor in the future. Steps to make sure this growth is designed to support transit ridership will be important as development occurs.

Figure 44: The UP corridor in Fresno remains an important industrial and trucking corridor which could limit its potential for future transit-oriented development.

Planned development around the UP right-of-way is more mixed. While a great deal of residential growth is planned at fairly high densities (future use corridor-wide is planned to yield an average residential density of 11.5 du/acre) the Walkability Index score is 0.85, or higher than optimal. This is partly due to the planned employment growth in the corridor, mostly concentrated at the northern edge of the corridor, around Herndon (growth of 626 jobs) and Shaw (growth of 517 jobs).

Fresno BNSF Corridor

The BNSF corridor has the most supportive existing and planned land use pattern of the five corridors studied to date. An average of 2,500 people live within a 1/2-mile walk of the stops, at a density of nearly 7 du/acre. With future growth, this figure could grow to over 4,000 per stop. The BNSF is not as strong of an employment corridor as the Highway 99 and UP corridors, but the connections to Tier 1 transit corridors within Fresno and Clovis and the employment concentration in downtown Fresno mean that the lack of employment along the BNSF right-of-way will not be a significant issue.

Figure 45: The BNSF corridor has substantial existing residential density and the potential for future infill.

Figure 46: The cores of the communities in the Southeast corridor have dense, walkable commercial districts with the potential for residential and mixed-use infill. (Reedley)

Figure 47: The commercial districts in the Southeast corridor have a fine, walkable grain and are surrounded by dense residential uses (Sanger).

Southeast Corridor

The existing land uses in the core stop areas in Sanger, Parlier, and Reedley are characterized by generally transit supportive intensities and a walkable mix of uses with a corridor-wide average density of over 6 du/acre (and over 2,000 residents) and a Walkability Index of 0.17 in the 1/2-mile stop areas. Residential intensities range between 6.35 du/acre at the Parlier/Newmark stop in Parlier to 7.13 du/acre at the Academy/Jensen stop in Sanger. At the secondary stop locations and in Orange Cove, existing residential densities are lower. The potential for growth is good, with planned growth of over 1,000 residents at a number of stations. The secondary stop in Sanger also has existing substantial employment uses, and the secondary location in Reedley is adjacent to Reedley College, which has the potential to be a primary activity generator.

Orange Cove has low levels of existing development, suggesting it could be classified more as a Rural Center that could be Tier 3 node, rather than the terminus of a Tier 2 corridor. However, current plans call for substantially increased residential density (growth of over 4,000 residents in the stop area) which, if coupled with targeted infrastructure improvements, could justify the level of investment of a Tier 2 corridor. Orange Cove is a good example of a location where existing plans call for the implementation of a transit supportive development pattern in a place that is not currently supportive of high transit ridership. Orange Cove also has a relatively high concentration of “Environmental Justice” population based on the Council of Fresno County Governments March 2005 study. The immediate vicinity of the Orange Cove stop location assessed in this study includes concentrations of high poverty, minority populations, and elderly populations. Understanding the implementation steps necessary to actually achieve transit supportive intensity and to provide enhanced transit service to transit-dependent populations will be important considerations moving forward.

Route 180 Corridor

The Route 180 is an interesting blend between Tier 2 and Tier 3 nodes. Both stop locations in Kerman have existing and planned intensities that could support enhanced transit in the near term. The Route 180/Madera stop location is planned for substantial growth, but already has some significant levels of both residents and jobs in the stop area. The A Street/Madera stop location has an existing residential intensity of over 7 du/acre and some employment activity, as well as a good mix of uses, as evidenced by the 1/2-mile Walkability Index score of 0.38.

Mendota, on the other hand, has somewhat lower existing intensities (only 5.39 du/acre if both sides of the UP rail line are considered) and only limited planned growth potential. Due to the distance of Mendota from Kerman, a potential approach to public transportation enhancements would be to extend a Tier 2 corridor to Kerman, while focusing on Mendota as a Tier 3 node with connections to the Tier 2 corridor in Kerman and the long term potential for extension of the Tier 2 corridor to Mendota.

Figure 48: Parts of the Southeast corridor have lower residential densities. (Orange Cove)

Figure 49: Parts of the Route 180 corridor have significant residential density in proximity to potential transit stops. (Kerman)

Figure 50: Commercial uses in the Route 180 corridor have less intensity and activity than the Southeast corridor. (Kerman)

Figure 51: Downtown Coalinga has a mix of commercial and residential uses in close proximity.

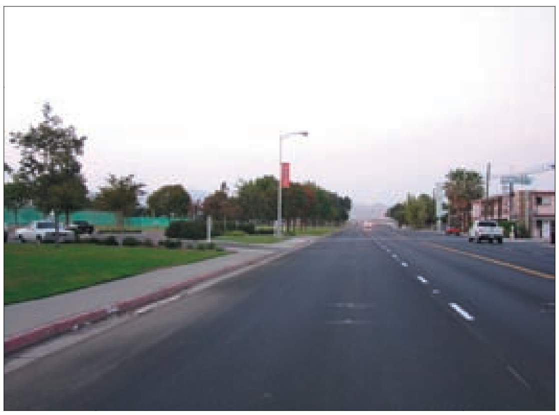


Figure 52: Parts of Coalinga such as the area around West Hills Community College are lower intensity and more auto-oriented.

Outlying Centers

Coalinga and Friant were the primary outlying stop locations assessed in this study. Coalinga has good existing and planned land use intensities, with significant planned residential growth at both stop locations (over 5,500 residents at each). The Elm/Cherry stop is also located adjacent to West Hills Community College, a potential activity generator. The key consideration in planning for public transportation connections to Coalinga is the distance to any other major concentrations of population or employment. For this reason, Coalinga will likely remain a Tier 3 node for the foreseeable future.

Friant is a good example of rural area that lacks transit supportive intensity currently and may lack the long-term potential to develop into a Tier 3 node as well. The existing residential intensity in the 1/2-mile walking area is only slightly over 4 du/acre, and existing employment is insignificant. However, Friant is along a corridor that could extend as far as Millerton New Town, which could provide a Tier 3 node. In this way, it might be more helpful to think of Friant as a potential area that could be served on a Tier 3 corridor but not one that could provide a node for service.

Future Land Use Improvements

Land use patterns follow the observed infrastructure patterns closely. In existing core areas (Selma, the BNSF corridor, and southern stops along the three Fresno corridors) existing and planned land use are relatively transit supportive. At the edges, existing land uses are less supportive. While planned growth often would bring substantial residents and jobs, until the growth comes on line, there may not be a substantial market for transit service at these stops. However, if steps can be taken to ensure new development is designed to support transit ridership, these may develop into strong transit corridors in the future. In future development areas, there will be the need to provide a mix of uses and services within walking distance of each transit stop, including commercial uses that provide daily and convenience needs to area residents and workers. Providing residential and office/industrial employment adjacent to key commercial centers can also help encourage transit ridership.

Place Types and Transit-Supportive Planning

A set of place types is a useful tool to help categorize the individual areas around potential transit stops and stations in the study corridors as well as structure the land use and infrastructure recommendations in a way that will be valuable for future studies of this nature. This study has developed six place types to describe the diverse conditions in the study corridors. These place types are somewhat idealized and are not meant to perfectly characterize every location in Fresno County—many locations are a hybrid of the basic place types. However, the place types provide a useful framework for understanding the existing and planned conditions in the county and methods for improving the land use and infrastructure conditions for enhanced transit service.

Five place types describe areas of the study corridors whose primary character is defined by existing development. A sixth type describes areas of the study corridors that will see major growth within the planning horizon of current General Plans that will substantially change their character. While the existing General Plan designations for these areas begin to define them in terms of place types, existing policies give relatively little consideration of their potential relationship to transit and their function in relation to the larger future transit corridors. For these Growth Areas, their final place type should be the result of future transit corridor and land use planning; several of the Growth Area station areas in Fresno are identified as "Potential Activity Centers" or "Potential Linear Intensity Corridors" in the General Plan and this implies an intent for a more intense and potential mixed use character with the potential to support investment in transit. This type of analysis is particular to the Study Corridors assessed in this study. If future studies are expanded to include Tier 1 corridors, the place type discussion will need to be expanded to include the Fresno/Clovis core as well.

The following explanations of the Place Types developed for this study give an overview of the idealized conditions of each:

Town Center

Town centers are vital centers of activity. Town Centers blend community-serving commercial uses (grocery stores, drug stores, and larger retail stores) with local-serving retail (shops, restaurants, and entertainment), office, and residential uses. The residential uses transition from apartments over ground floor retail uses near the transit stop to condominiums and apartments to townhomes and stand alone houses at the perimeter of the 1/2-mile walking distance. This transition allows a range of households and affordability with access to transit.

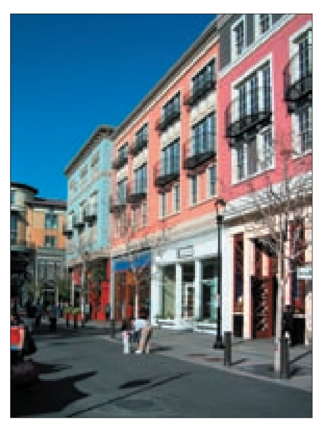


Figure 53: Example oof a mixed-use development typical of the Town Center place type. (San Jose, California)

Town Centers are walkable and bikeable places. Sidewalks provide enough space for pedestrians, and landscaping, and other streetscape elements that make for an interesting pedestrian environment. Intersections have pedestrian signals, crosswalks, and curb ramps. Streets provide space for bicycles as well as autos and transit. Off-street paths provide additional connections for pedestrians and bicycles and provide access to important open space amenities. Residents and workers can reach all of their daily needs on foot or transit, if they choose.

Downtown Reedley and the Shaw Avenue location on the BNSF right-of-way are good examples of locations discussed in this study that could become transit-supportive Town Centers with intensification of land use and pedestrian infrastructure improvements.

Figure 54: Example of residential development typical of the Neighborhood Center Place Type. (Hillsboro, Oregon)

Neighborhood Center

Neighborhood Centers differ from Town Centers in that they are oriented primarily towards residential uses. Retail uses meet local needs (shops, restaurants, small groceries) and there are a variety of housing types (apartments, condominums, townhomes, and single-family homes. Residential densities in Neighborhood Centers are equal to those in Town Centers, but Neighborhood Centers do not contain a substantial employment component or entertainment uses that would draw from a much larger area than the neighborhoods that surround the center. Residential amenities (parks, schools, and playfields) are critical for a successful Neighborhood Center.

Neighborhood Centers are walkable and bikeable places. Streets have landscaping between the sidewalks and the street. The sidewalks also have ample room for pedestrians to stroll and sit outside at the local café. Some residential side streets incorporate traffic calming measures, such as neckdowns, chicanes, or roundabouts (see Table 12 for more detailed information on traffic calming measures)) to allow for easy access from the neighborhood to the center, but to discourage fast cut-through traffic. Off-street paths connect to open spaces and other community uses. Residents can reach all of their daily needs on foot, if they choose, but may need to travel a short distance to meet shopping and employment needs.

The Belmont Avenue location along the UP right-of-way and Barstow Avenue along the BNSF right-of-way within Fresno are good examples of locations that could become transit-supportive Neighborhood Centers.

Commercial Center

Commercial Centers are locations of intense employment activity. Retail uses (both community- and local-serving) as well as office and even industrial uses provide a high number of workers. Some low intensity residential uses are present at the perimeter of the 1/2-mile walking distance from transit. Some more intense residential uses may be mixed in with retail or employment activities at the "core" of the Commercial Center. Office uses are densely built to be served effectively by transit.

Figure 55: Example of office over retail use typical of the Commercial Center Place Type. (Oakland, California)

Commercial Centers have good pedestrian and bicycle access. Sidewalks are wide, to accommodate large flows of pedestrians as well as landscaping and other pedestrian amenities. Streets provide bicycle access as well as local transit amenities. Intersections have pedestrian amenities such as pedestrian signals, curb ramps, crosswalks, and pedestrian "refuges" within the medians of larger streets.

The Highland Avenue (Selma) location at Highway 99 and the Academy/North location in Sanger are good examples of locations that could become transit-supportive Commercial Centers with land use intensification and pedestrian infrastructure improvements.

Institutional Center

Often, an institution (such as a college or hospital) provides a dominant activity generator in a station area. Institutional uses provide good transit ridership, and are often a focus of transit service. Uses surrounding Institutional Centers include a mix of local-serving retail and residential uses, and may include some employment areas that are associated with the institutional uses, such as doctors offices. Residential uses can range from intense student apartments to lower density single-family houses.

Figure 56: Example of development typical of the Institutional Center Place Type. (Tempe, Arizona)

Institutional Centers have similar pedestrian infrastructure needs to Commercial Centers, with a focus on access to open space amenities, which are often incorporated into institutional campuses. Streets in Institutional Centers need to provide access for all modes, with an emphasis on pedestrian and bicycle access, as well as local transit. Transfer centers may be an important aspect of transit service to Institutional Centers in order to facilitate regional access to the institutional use as well as access to other regional destinations.

The Manning Avenue location in Reedley (near Reedley College) and the Cherry Avenue location in Coalinga (near

West Hills Community College) are good examples of locations that could become transit-supportive Institutional Centers with pedestrian infrastructure improvements and some land use intensification.

Figure 57: Example of small-scale mixed-use development typical of the Rural Center Place Type. (Flagstaff, Arizona)

Rural Center

Rural Centers provide local-serving retail uses at the center of an area with a range of residential uses. Rural Centers often lack the intensity to be traditionally considered transit-supportive places, but pedestrian and bicycle infrastructure improvements can support transit ridership. Rural Centers have residential uses that range from some apartments over ground floor retail to some larger lot single-family residential uses at the perimeter of the 1/2-mile walking distance. Residential intensity is primarily concentrated within 1/4-mile of the transit stop.

Rural Centers often have low auto traffic volumes, but still require pedestrian infrastructure (sidewalks, safe crossings, curb ramps) to support transit ridership. Rural highways often pass through Rural Centers, and the design of these roads should reflect the pedestrian scale and intensity of use rather than the design that results from the application of typical rural highway standards. Rural Centers sometimes lack the population concentration to make extensive infrastructure improvements economically feasible, so improvements should first be made to primary routes and the areas immediately surrounding the transit stop.

The Park/Center location in Orange Cove is an example of a location that could become a transit-supportive Rural Center with land use intensification and infrastructure improvements. The Friant/Parker location is an example of a location that will require substantial improvements in both land use and infrastructure if there is a desire for it to become a transit-supportive Rural Center.

Growth Area

Some areas on many potential transit corridors in the County have not yet developed. These areas can become any of the place types identified in this study, and require coordinated land use and transportation planning to develop into transit-supportive places. Prior to initiating planning for a growth area, some analysis of the overall transit corridor and the relationship of the 1/2-mile station areas to each other is required. By understanding the place types that already existing along a corridor, the community can decide what place type a Growth Area should become so that it best complements the mix of other place types on the corridor.

Growth Areas usually require substantial infrastructure improvements to support transit-ridership. New development must be intense enough to make infrastructure improvements feasible and support transit ridership.

The Herndon Avenue location along the BNSF right-of-way and the Route 180/Madera location in Kerman are good examples of Growth Areas that could become transit-supportive places in the future with careful planning and development.

The Place Type Table, Table 7, has the following fields, which were used to categorize the study stop locations:

- **Walkability Range:** This range is used to classify stop locations in terms of their existing walkability index rating. The classifications are broad because the place types are intended to be inclusive (this category is not applicable to Growth Areas until its ultimate place type has been selected);
- **Residential Intensity:** Different place types have different levels of residential intensity. This measure is intended to classify existing stop locations rather than recommend future conditions (this category is not applicable to Growth Areas until its ultimate place type has been selected);
- **Jobs:** Different place types have different levels of employment. This measure is again intended to classify existing stop locations rather than recommend future conditions (this category is not applicable to Growth Areas until its ultimate place type has been selected);
- **Minimum Growth (Growth Areas only):** Growth areas are characterized by their potential growth. The station areas identified as Growth Areas are those stop locations that are primarily categorized by their growth potential.
- **Case Study Examples:** These are provided to illustrate the Place Types and are real-world examples along the corridors that have been assessed in this study;
- **Place Character:** This row describes the basic characteristics of each Place Type both in terms of the existing land use and access characteristics and in terms of the proposed transit framework discussed previously; and,
- **Transit Infrastructure Needs:** This row identifies minimal transit infrastructure need for each Place Type. The needs are broadly defined and may not be reflective of existing conditions at all locations. Transportation investment plans can, and should, exceed these recommendations whenever feasible.

Table 7: Place Type Table

The place types can be applied to the study corridors to better understand the land use and infrastructure needs of each stop area, and to assess the balance of uses along a corridor in terms of origins and destinations for potential transit riders.

	Place Type	Town Center	Neighborhood Center	Commercial Center	Institutional Center	Rural Center	Growth Area
Existing Characteristics	**Walkability Range** (mix of uses)	0.1-0.7	0.0-0.5	0.7-4.0	0.0-0.5	0.0-0.25	N.A.
Existing Characteristics	**Residential Intensity** (1/2-mile)	5-12 du/acre	5-12 du/acre	3-8 du/acre	3-12 du/acre	4-6 du/acre	N.A.
Existing Characteristics	**Jobs** (1/4-mile)	100-600 jobs	0-400 jobs	400-1,400 jobs	100-1,000 jobs	50-250 jobs	N.A.
	Study Corridor Examples (Stop Number)	Reedley—Downtown (*35*) Shaw—BNSF (*11*)	Belmont—Rail (*28*) Barstow—BNSF (*10*)	Highland/Selma—Hwy 99 (*1*) Sanger—Academy/North (*32*)	Reedley—Manning (*36*) Coalinga—Cherry (*43*)	Friant (*44*) Orange Cove (*37*)	Herndon—BNSF(*7*) Kerman—Route180(*38*)
	Minimum Growth	N.A.	N.A.	N.A.	N.A.	N.A.	> 1,000 residents or > 500 jobs
Assessment	**Place Character**	▪ Walkable core of retail uses with surrounding multi-family residential and small-lot single-family residential uses; ▪ Historic cores of outlying communities in Fresno County; ▪ Nodes for Tier 2 corridors but also anchors for Tier 3 corridors	▪ Residential districts with mix of multi-family and single-family housing; ▪ Retail and commercial uses predominantly local-serving and dispersed; ▪ Nodes on Tier 2 corridors, not connected to Tier 3 corridors	▪ Office or retail districts, usually lack traditional "center" to development; ▪ Pockets of residential uses, but lacking residential identity; ▪ Primarily located along Tier 1 corridors, potential to be well-served by Tier 2 corridors with increased intensity	▪ Large institutional use (such as college or hospital) serves as primary activity generator; ▪ Surrounding uses can be residential or commercial in character; ▪ Nodes on Tier 2 corridors, could be anchors for Tier 3 corridors as well	▪ Small scale residential concentrations, often with local-serving retail; ▪ Located at historic rural crossroads; ▪ Anchors for Tier 3 corridors	▪ Planned concentrations of residential, commercial or employment uses, often at periphery of existing communities; ▪ Can eventually develop into Town, Neighborhood, Commercial, or Institutional Centers, depending on the surrounding context and the context of the corridor as a whole – place type to be determined through land use and transportation planning efforts; ▪ Should be developed at intensities appropriate for Tier 2 corridors
Assessment	**Transit Infrastructure Needs**	▪ Minor pedestrian improvements (including street crossings); ▪ Potential for increased housing intensity and vertical mixing of uses	▪ Improvements to connectivity of sidewalks; ▪ Crossing enhancements (especially at arterials); ▪ Integration of mixed-use and neighborhood retail	▪ Sidewalk connectivity and pedestrian crossing improvements; ▪ Integration of non-commercial uses in commercial-intensive areas	▪ Improvements to connectivity of sidewalks; ▪ Crossing enhancements (especially at arterials); ▪ Integration of mixed-use and neighborhood retail	▪ Basic pedestrian improvements (sidewalks, pedestrian crossings); ▪ Community-serving retail integrated with residential; ▪ Potential increased housing intensity around key nodes	▪ Major pedestrian infrastructure improvements; ▪ Improvements to connectivity of street network; ▪ Vertical and horizontal mixture of uses and integration of new uses into already developed areas

Table 8: Study Corridor Place Type Classifications

Corridor Overview					
ID	City	Stop Type	Cross Street	Corridor	Place Type
1	Selma	ROAD	HIGHLAND	HWY 99	Commercial Center
2	Selma	RAIL	HIGHLAND	HWY 99	Commercial Center
3	Selma	ROAD	SECOND	HWY 99	Town Center
4	Selma	RAIL	FIRST	HWY 99	Town Center
5	Selma	ROAD	MOUNTAIN VIEW	HWY 99	Growth Area
6	Selma	RAIL	MOUNTAIN VIEW	HWY 99	Growth Area
7	Fresno	RAIL	HERNDON	BNSF	Growth Area
8	Fresno	RAIL	SIERRA	BNSF	Neighborhood Center
9	Fresno	RAIL	BULLARD	BNSF	Neighborhood Center
10	Fresno	RAIL	BARSTOW	BNSF	Neighborhood Center
11	Fresno	RAIL	SHAW	BNSF	Town Center
12	Fresno	RAIL	WEST	BNSF	Neighborhood Center
13	Fresno	RAIL	ASHLAN	BNSF	Neighborhood Center
14	Fresno	RAIL	PALM	BNSF	Neighborhood Center
15	Fresno	RAIL	SHIELDS	BNSF	Neighborhood Center
16	Fresno	RAIL	CLINTON	BNSF	Neighborhood Center
17	Fresno	RAIL	BLACKSTONE	BNSF	Neighborhood Center
18	Fresno	RAIL	OLIVE	BNSF	Neighborhood Center
19	Fresno	ROAD	HERNDON	HWY 99	Growth Area
20	Fresno	RAIL	HERNDON	HWY 99	Growth Area
21	Fresno	ROAD	SHAW	HWY 99	Growth Area
22	Fresno	RAIL	SHAW	HWY 99	Growth Area
23	Fresno	ROAD	ASHLAN	HWY 99	Growth Area
24	Fresno	RAIL	ASHLAN	HWY 99	Growth Area
25	Fresno	ROAD	SHIELDS	HWY 99	Growth Area
26	Fresno	RAIL	SHIELDS	HWY 99	Neighborhood Center
27	Fresno	ROAD	BELMONT	HWY 99	Growth Area
28	Fresno	RAIL	BELMONT	HWY 99	Neighborhood Center
31	Sanger	ROAD	ACADEMY / JENSEN	SOUTHEAST	Town Center
32	Sanger	ROAD	ACADEMY / NORTH	SOUTHEAST	Commercial Center
33	Parlier	ROAD	PARLIER / MENDCINO	SOUTHEAST	Neighborhood Center
34	Parlier	ROAD	PARLIER / NEWMARK	SOUTHEAST	Town Center
35	Reedley	ROAD	"I" ST. / 11th ST.	SOUTHEAST	Town Center
36	Reedley	ROAD	MANNING / REED	SOUTHEAST	Institutional Center
37	Orange Cove	ROAD	PARK / CENTER-JACOBS	SOUTHEAST	Rural Center
38	Kerman	ROAD	RT 180 / MADERA	RT 180	Growth Area
39	Kerman	RAIL	"A" ST. / MADERA	RT 180	Town Center
40	Mendota	ROAD	NAPLES / 6th St.	RT 180	Town Center
41	Mendota	RAIL	MARIE / 6th St.	RT 180	Town Center
42	Coalinga	ROAD	ELM / POLK	OUTLYING	Town Center
43	Coalinga	ROAD	ELM / CHERRY	OUTLYING	Institutional Center
44	Friant	ROAD	FRIANT / PARKER	OUTLYING	Rural Center

Corridor Analysis Recommendations

The recommendations from the Land Use and Infrastructure Assessment are divided into four sections:

- **Place Type Improvement Recommendations** includes identified needs and targets for each Place Type;
- **Corridor Recommendations** include priorities for enhanced service and further study;
- **Land Use Recommendations** include priorities for land use intensities and initiatives to support increased intensity; and
- **Infrastructure Recommendations** includes priorities for transit-supportive infrastructure and opportunities to leverage public investments.

While it is useful to consider the recommendations for each separately, it is essential that implementation coordinate all corridors and infrastructure into a comprehensive approach to creating the urban and rural conditions necessary to support transit ridership.

Place Type Recommendations

The description of the Place Types in the previous section included a discussion of the land use and infrastructure classifications for each Place Type. This section provides recommendations for improvements for each place type. The Place Type Recommendation Table has the following fields providing recommendations for improvements for each place type:

- **Connectivity:** This row identifies the ideal range of connectivity for each place type. For built out places, improving connectivity can be achieved by adding street connections, creating pedestrian and bicycle cut-throughs of cul de sacs, and other methods;
- **Land Use Intensities:** This row identifies recommended land use intensities for each Place Type; and,
- **Infrastructure Improvements:** This row identifies recommended improvements to the pedestrian realm for each Place Type. These recommendations are not intended to de detailed or exhaustive for individual stop areas, but give an order of magnitude sense of what is necessary to improve transit access.

Table 9: Place Type Recommendations

	Place Type	Town Center	Neighborhood Center	Commercial Center	Institutional Center	Rural Center	Growth Area
Recommendations	Connectivity (ft of streets/ intersection)	500-800 ft.	500-1000 ft.	600-1000 ft.	600-1000 ft.	600-1000 ft	500-800 ft.
Land Use Intensities	Target 1/2 Mile Density	▪ Target 1/2-mile net residential density of 18 du/acre	▪ Target 1/2-mile net residential density of 12 du/acre	▪ Target non-residential FAR of 0.5	▪ Supportive uses (depending on existing character, but can be residential or commercial) should be intensified in keeping with other place types	▪ Target 1/2-mile net residential density of 6 du/acre	▪ N.A.; depends on planned uses
Land Use Intensities	Minimum Density for new Development	▪ Min. density of 30 du/acre for new residential developments or 20 du/acre for residential component of mixed-use developments; ▪ Min. non-residential FAR of 0.5	▪ Min. density of 30 du/acre for new residential developments within 1/4 mile of transit stops and 12 du/acre between 1/4 and 1/2-mile from transit stops	▪ Minimum FAR for all new development of 1.0	▪ Min. FAR for all new development of 1.0	▪ Min. density of 12 du/acre for individual developments within 1/2 mile	▪ N.A.; depends on planned uses
Land Use Intensities	Additional Considerations	▪ Reduced parking requirements for private development; ▪ Reduced parking requirements for private development	▪ Reduced residential parking requirements within 1/4 mile of station	▪ Reduced parking requirements within 1/4-mile of station and parking maximums for non-residential uses; ▪ Develop parking districts to provide shared parking	▪ Institutional uses should infill and increase in intensity without becoming single-use district; ▪ Target institutional surface parking for replacement with other uses	▪ Allow secondary units on existing single-family lots; ▪ Encourage horizontal or vertical mixed-use development at transit stop to provide local services	▪ Identify potential and need for different types of centers; ▪ Adopt appropriate standards and targets for identified center type; ▪ Implement a variety of strategies to reduce parking provision within 1/2-mile of stop location
	Walkability Index Target	0.2-0.4	0.1-0.3	0.3-0.5	0.1-0.3	0.1-0.3	N.A.;depends on planned uses
	Infrastructure Improvements	▪ Pedestrian crossing improvements at all intersections within 1/4 mile of stop; ▪ Continuous sidewalks within 1/2-mile of stop; ▪ Retrofit of arterial streets as multi-modal corridors with bicycle and pedestrian improvements	▪ Pedestrian crossing improvements at arterial streets; ▪ Continuous pedestrian network within 1/2-mile of stop; ▪ Create multi-modal network by retrofitting arterials with bicycle and pedestrian improvements ▪ Improve pedestrian and bicycle connectivity (e.g. cul-de-sac pedestrian cut-throughs)	▪ Pedestrian crossing improvements at arterial streets; ▪ Continuous pedestrian network within 1/2-mile of stop; ▪ Create multi-modal network by retrofitting arterials with bicycle and pedestrian improvements; ▪ Improve pedestrian and bicycle connectivity (e.g. pedestrian pathways through existing surface parking lots)	▪ Pedestrian crossing improvements at arterial streets; ▪ Continuous pedestrian network within 1/2-mile of stop; ▪ Create multi-modal network by retrofitting arterials with bicycle and pedestrian improvements ▪ Improve pedestrian and bicycle connectivity	▪ Pedestrian crossing improvements at arterial streets; ▪ Continuous pedestrian network within 1/4-mile of stop and along all arterials; ▪ Design arterials to allow multi-modal access with bicycle and pedestrian improvements ▪ Improve pedestrian and bicycle connectivity by creating parallel roadway and non-roadway connections with new development	▪ Pedestrian crossing improvements at all intersections within 1/4 mile of stop; ▪ Continuous sidewalks within 1/2-mile of stop; ▪ Retrofit or build new arterial streets as multi-modal corridors with bicycle and pedestrian improvements; ▪ Improve pedestrian and bicycle connectivity in already developed areas

Corridor Recommendations

One of the primary goals of the PTIS process has been to identify potential corridors for more detailed transit feasibility study. The PTIS Corridor Analysis has focused on corridors that connect the Fresno/Clovis core with the outlying community centers in the County (termed Tier 2 corridors in this effort). An important element of these corridors is the connection between them and the Tier 1 corridors (those corridors within the Fresno/Clovis core that have already been identified for potential enhanced transit service in the course of previous planning efforts). Additionally, Tier 3 corridors were identified to provide basic coverage countywide and to craft an approach that provides opportunities to plan for future enhancement of transit service, while improving baseline service in the near term. The following are summary recommendations to be applied at the corridor level:

- Connect dense outlying centers with the Fresno/Clovis core along identified Tier 2 corridors.
  This will help reinforce ongoing revitalization efforts in many cores and preserve agriculture areas from development pressures.
- Connect outlying town centers with surrounding rural centers.
  The PTIS project identified "Tier 2" and "Tier 3" corridors for further study. While Tier 2 corridors may support enhanced transit sooner, improvements to Tier 3 centers, as well as the integration with Tier 2 corridors are important and merits attention in the near-term.
- Focus initial implementation efforts on Tier 2 corridors that show the most transit-supportive existing conditions and future growth potential along with the Tier 1 corridors in Fresno and Clovis that have been identified in other studies.
  The BNSF corridor within Fresno has the most transit-supportive land use intensities of the corridors studied in this process. The Southeast Corridor communities (including Sanger, Parlier, and Reedley) have relatively supportive land uses currently, and most have good transit-supportive infrastructure conditions in core areas. These core areas also have relatively high-quality access to the BNSF corridor. The Highway 99 corridor, with either road- or rail-based transit, lacks pedestrian infrastructure and intensity of existing uses, but with future growth and infrastructure investment, could be a valuable transit corridor, both within Fresno and to the southeast.
- Utilize a similar methodology to this study in assessing future transit corridors.
  The methodology employed in this study has provided important information about existing conditions around potential transit stops. Building from this, future studies can look at alternative land use scenarios and potential infrastructure improvements to address questions of ridership for enhanced transit. These methodologies can assist the county's stakeholders in identifying transit corridors as well as station locations. Future studies should include more detailed assessment of existing infrastructure (including detailed sidewalk data, roadway conditions, exact ROW info, etc.) and opportunities for transit-supportive development (including market analysis, development capacity analysis, and development policies to facilitate implementation).
- Focus detailed transit corridor planning on corridors with several stops that will be located in existing or planned Place Types that support transit ridership.
  Town Center, Neighborhood Center, and Institutional Center locations will likely be more supportive of transit ridership (especially in outlying county locations) than other Place Types. Commercial Centers have the potential to support transit ridership in localized areas, but the Fresno/Clovis core will be the primary employment node for service to outlying areas. Rural Centers can provide limited ridership along a corridor, but should not be considered anchors for Tier 2 corridors.
- Work with local jurisdictions to develop transit-supportive land use plans.
  Fresno COG and other county-wide agencies can support future transit ridership by encouraging local development policies to support denser, transit-worthy development, and setting countywide targets for development.
- Improve infrastructure conditions by working closely with local jurisdictions on street enhancements.
  Countywide agencies can develop a set of guidelines for transit-supportive infrastructure improvements.

- Coordinate detailed corridor planning among the local jurisdictions along the transit corridor and provide detailed land use targets to support enhanced transit service.
  Interjurisdictional cooperation is essential to develop transit corridors that serve supportive land uses. Corridor-wide land use targets can help the development of local land use plans that respond to unique conditions at each location while creating the desired mix of transit-supportive land use at the corridor level. MTC, in the San Francisco Bay Area, has recently adopted this type of policy for transit expansion corridors and is funding coordination efforts to ensure close coordination among local jurisdictions; additional grants are also supporting the creation of transit station area plans that will implement desired land uses.

Land Use Recommendations

The following are recommendations for improving transit-supportive land uses in the study corridors in order to support enhanced transit:

- Focus on outlying downtowns and other relatively dense, mixed-use centers, rather than park-and-ride lots or other land use contexts, to anchor transit corridors.
  The downtown cores in all of the communities studied in this process have the basis for TOD. Additional intensification and land use policies that reinforce the downtown cores as centers of community activity will strengthen the transit potential of these areas. A target of 30 du/acre for all new residential development within 1/4-mile of a transit stop and 12 du/acre between 1/4 and 1/2-mile from a transit stop and 0.5 FAR for all non-residential developments within 1/2-mile of transit stops should be a goal.
- Draft model development guidelines and regulation to help facilitate implementation of transit-supportive development.
  The county-wide agencies can take a lead role in providing technical assistance to small local governments around the county that are trying to implement TOD plans.
- Encourage mixed-use infill in downtown areas.
  This should include vertical and horizontal mixed-use depending upon location and market support. Countywide agencies can support this effort through model guidelines, publicizing successful projects, and providing technical assistance to local jurisdictions looking to increase infill development activity.
- Encourage gradual intensification in residential districts within target transit corridors and station areas.
  Strategies such as new, compatible housing types, encouraging in-law or second-units in designated areas, and encouraging neighborhood-scale mixed-use projects can increase densities substantially while maintaining the existing character of a neighborhood.
- Integrate mix of commercial and employment uses into residential districts.
  Nearly 20% of stop locations scored lower than the desired range on the "Walkability Index" for the existing 1/2-mile walking area. Integrating small-scale, neighborhood-serving retail, as well as community-serving commercial uses into these areas will improve the potential for transit.
- Integrate commercial and service uses into employment areas to improve transit and pedestrian access between place of work and services.
  Workers need to have easy access to convenience retail and services during the day to support transit as a viable commute choice.

- Provide adequate civic infrastructure (parks, schools, etc.) to support increased density.
  Providing parks and other amenities is essential for making livable places that are also dense. This study has not quantified this important aspect of existing and planned places, but studies have shown that the provision of civic infrastructure is important to creating highly-valued denser places.

- Channel low-density growth away from potential transit corridors in outlying areas.
  It is likely that lower density neighborhoods and employment areas will be necessary given the market and demographic conditions of Fresno County, but these less transit supportive areas should not be located along transit corridors when possible.

Infrastructure Recommendations

The following are recommendations for improving transit-supportive infrastructure in the study corridors in order to support enhanced transit:

- Retrofit existing arterial streets to provide safe, comfortable pedestrian and bicycle access.
  Multi-modal design of streets, incorporating transit, bicycle, and pedestrian needs, and creating safe pedestrian street crossings are an essential infrastructure consideration in creating transit-supportive places.

- Develop street standards for new and retrofitted transit corridors and station areas to improve pedestrian mobility.
  County and regional agencies can take a lead role in drafting street standards for new streets and street improvements in transit areas to help guide multi-modal planning efforts.

- Assist local jurisdictions, either financially or logistically, with implementing pedestrian and bicycle access improvements.
  There are examples of "Transportation for Livable Communities" (TLC) programs around the state where MPOs use a portion of their funding to provide TLC planning and capital grants to local agencies to support the creation of transit-supportive environments.

- Utilize existing civic infrastructure, such as central squares and plazas as the future focus for transit activities.
  Many of the outlying centers already have public open spaces that could be the focus for transit activity in the future. Where this civic infrastructure does not exist, future planning can identify future locations for civic uses.

- Improve connectivity of the street and pedestrian network by addressing grade separations (such as Highway 99 and rail corridors) and disconnected street networks in suburban-style developments.
  Highway 99 and active, at-grade rail rights-of-way are the two greatest barriers to pedestrian circulation in the study corridors. Developing strategies to address these connectivity barriers can expand the accessible area within 1/2-mile of transit stops. Similarly, many suburban-style developments are not oriented to connect with the surrounding street network. Pedestrian enhancements, such as cul de sac cut-throughs and multi-use trail systems can also increase the effective 1/2-mile radius. This study did not look at these opportunities in any detail, but future studies should take this possibility into account.

Parking Management Strategies

The assessment of land use and infrastructure conditions in Fresno County has been primarily concerned with existing uses and infrastructure, and existing plans for growth. Public and private parking policy has not been an area of study. However, the land use and infrastructure improvements recommended above often require steps to overcome barriers posed by existing parking policies. Table 10 outlines important considerations for addressing parking policies. The listed policies should be treated as a menu of possible approaches, rather than a detailed set of recommendations. These strategies have been provided to provide an overview of potential solutions as more detailed land use and transportation plans are developed for enhanced transit corridors in Fresno County.

Table 10: Transit-Supportive Infrastructure - Parking Management Strategies

Tailored Minimum Parking Requirements	
Most minimum parking requirements levied by local jurisdictions take into account only two variables, namely land use and the size of development. They are typically expressed in terms of number of spaces required per 1,000 square feet of a particular land use, or per residential unit or (for restaurants and stadiums) number of seats. In reality, however, parking demand is affected by many more variables. In particular, the geographic location of a development – encompassing factors such as the quality of the local pedestrian environment, the number of other land uses within walking distance, and the availability of transit – has a considerable impact on parking demand. Other important factors affecting parking demand include the demographic characteristics of residents, and the existence of demand management programs such as parking pricing and car-sharing. It is important to stress that tailoring minimum parking requirements in this way would not force developers to provide less parking. They would still be free to respond to market demands. What this change would accomplish, however, is to more closely match parking requirements to actual demand.	
Smaller Units	Smaller households tend to own fewer vehicles. Tailored requirements based on unit size.
Affordable Housing	There is a strong link between vehicle ownership and income, which means that less parking is needed when housing is targeted to low-income households. Put another way, parking requirements that do not account for income introduce additional barriers to the development of affordable housing.
Senior Housing	Senior citizens tend to own fewer vehicles than younger adults, meaning that parking requirements can be reduced for senior housing facilities. Many cities already reduce parking requirements for assisted living and convalescent care facilities. However, reductions are also warranted for independent living housing targeted at seniors. The precise reduction will depend on the age and characteristics of the expected residents.
Rental Units	Households that rent their homes own fewer vehicles, on average, than owner-occupiers. This means that less parking needs to be provided, particularly in multi-family units where parking can easily be shared between different units.
Transit Corridors/ Downtown	Vehicle ownership is lower in areas that are well served by transit, and in downtowns that offer employment and services within walking distance. In addition, automobile mode share tends to be lower, allowing parking requirements to be reduced for non-residential as well as residential uses. The level of reduction that is appropriate can easily be determined from fine-grained census data at the block group level. This policy is primarily applicable along transit corridors with frequent service; around transit hubs in downtown areas; and in any mixed-use, walkable downtown, although the amount of the reduction may be lower.

Table 10: Transit-Supportive Infrastructure - Parking Management Strategies (continued)

	Tailored Minimum Parking Requirements, cont.
Parking Pricing	While parking is often provided at no cost to the user, it is never truly free. Rather, it is subsidized by the employer or business (for non-residential uses), or bundled into the rent or sale price of a residential unit. Charging for parking is one of the most effective ways to encourage employees, customers and visitors to use alternatives to the single occupant automobile. Market-rate parking charges reduce vehicle trips by more than 30%, while even nominal charges reduce vehicle trips by an average of 18%. There is, however, a large range of reported results, from 8% to 38%, and the precise impact varies depending on factors such as the level of charges, and the availability of alternatives.[1] Charging for residential parking separately from rents and sale prices ("unbundling") also reduces demand. Although there is less data on the impacts, at least when compared to non-residential parking, a $50 monthly charge is likely to reduce demand by 8-15%.[2] As well as the direct effect of pricing in reducing demand, developments that charge for parking will also attract residents with fewer cars in a "self selection" process. Parking requirements can therefore be reduced substantially for developments that commit to charging for parking (or offering comparable alternatives, such as parking "cash out"), for example through a development agreement. A pre-requisite for the success of this policy is the introduction of measures to combat spillover, in order to prevent users simply parking elsewhere to avoid the charges.
Car-Sharing	Car-sharing provides households with access to a fleet of shared vehicles, allowing them to avoid owning a car, or a second or third car. It can also provide employees with access to shared vehicles during the working day, meaning they can avoid driving their own car to work. A recent study of San Francisco's City CarShare found that each shared vehicle takes 6.9 private cars off the road, as members sell or give up their vehicles.[3] This allows parking requirements to be reduced accordingly in developments that incorporate car-sharing. Such reductions are common in cities with car-sharing programs, such as Seattle and San Francisco. Reduced parking requirements for developments that incorporate car-sharing would be most appropriate in more dense neighborhoods with good transit, where car-sharing is more likely to be economically viable.
Other TDM Programs	In addition to parking pricing and car-sharing, there are several other Transportation Demand Management programs that reduce parking demand. These include: EcoPass Programs. These involve the bulk-purchase of transit passes by employers or property managers, for free provision to employees or residents. EcoPass programs in Santa Clara County, for example, have reduced vehicle trips to work among participants by 19%, and they can often be a cheaper alternative to providing parking.[4] Bicycle Parking. Require bicycle parking to be provided at new developments. One logical further step may be to allow bicycle parking to substitute for a portion of required automobile parking, as is currently done in Palo Alto's code. Other TDM Programs. Other measures that reduce parking demand include changing facilities for cyclists, Guaranteed Ride Home programs, and carpool matching programs. All these TDM programs may warrant reductions in vehicle parking requirements, if developers provide suitable commitments (e.g. through a development agreement). They will be most effective in reducing parking demand in communities with frequent transit and a good environment for pedestrians and cyclists.

Table 10: Transit-Supportive Infrastructure - Parking Management Strategies (continued)

Flexibility in Meeting Standards	
In addition to tailoring parking requirements to more closely match demand, other parking policies can increase the efficiency with which parking is provided. In general, the policies in this section allow the same demand to be satisfied with fewer spaces, or a smaller area of land.	
Shared Parking	Most land uses have different times of peak demand, allowing them to share the same physical parking spaces. For example, demand from uses such as residential and bars is lowest during the day, allowing those spaces to be used by office workers. Most local jurisdictions in California already allow reductions in parking requirements for complementary uses that share parking. In many cases, the lease or other agreement between the parking facility owner and the developer must be filed with the town or city. Shared parking is appropriate in any community where a mix of land uses exists or is planned.
In-Lieu Fees	In-lieu fees are a special form of shared parking. Rather than constructing parking on-site, the developer pays a fee to the town or city to cover the cost of providing the spaces in public parking facilities, which provide a shared resource for the entire neighborhood. In-lieu fees can overcome many of the barriers to shared parking, such as the need to find a nearby parking facility with surplus spaces. They can also improve urban design, as in many cases on-site parking must be awkwardly squeezed into a parcel. In addition, economies of scale may be realized through centralizing the supply and management of parking, and the town or city gains increased control over pricing and management. The policy is particularly useful where on-site parking is physically difficult or expensive, but can be used in any situation where the town or city wishes to actively promote shared parking.
Parking Assessment District	Parking assessment districts raise revenue from assessments on property owners to finance common, shared parking facilities. The concept is similar to in-lieu fees, but assessments are made annually on all property owners, rather than just a one-time payment for new developments. Parking assessment districts work best in downtowns, and may be combined with other property assessments (for example, for streetscape improvements or marketing).
Tandem Parking/Other Flexible Solutions	Many local jurisdictions in California provide detailed specifications for the layout and design of parking areas, making it difficult to introduce flexible solutions such as tandem parking, automated parking lifts, and valet parking. Other jurisdictions explicitly prohibit tandem parking. While many of these flexible options are less convenient for users, they often allow more parking in less space, helping to reduce housing costs and environmental impacts, and improve urban design.
Off-Site Parking Permitted	Parking does not need to be located on the same parcel as the use it serves in order to be useful to motorists. Indeed, providing developers with the option of offsite parking can often be desirable, for example to reduce urban design impacts and promote shared parking, or if the parcel is small or awkwardly shaped.
Credit for On-Street Parking	Zoning ordinances can recognize that on-street spaces are functionally the same as off-street parking, by allowing spaces along the property's frontage to count towards parking requirements. Indeed, motorists often prefer curb parking spaces.
Landscape Reserves	Estimating parking demand is not an exact science. Landscape reserves acknowledge these uncertainties, by allowing developers to set aside land that can be converted to parking if demand is higher than expected, or to cope with future expansions. The strategy also allows the number of spaces constructed to be set at the "best estimate" of demand, without including a margin of error. Landscaping can be used to turn this set-aside land into an attractive amenity. In most cases the developers never need to utilize that land and it can be kept as a park or landscape reserve for public enjoyment.

Table 10: Transit-Supportive Infrastructure - Parking Management Strategies (continued)

Other Potential Policies	
Waive Minimums (e.g. in downtown)	Minimum parking requirements are intended to achieve specific goals, most commonly avoiding overspill and congestion of on-street parking. In some cases, however, these goals can be achieved through other policies, such as Residential Permit Parking programs or other on-street parking regulation. Eliminating parking requirements would not mean that no new parking would be constructed. Rather, it would mean that developers would determine the appropriate level of supply, based on market demands.
Maximum Parking Requirements	In contrast to minimum parking requirements, parking maximums restrict the total number of spaces that can be constructed. Reasons for setting maximum requirements may include a desire to: Restrict traffic from new development, for example through relating parking provision to roadway capacity Promote alternatives to the private automobile Limit the amount of land that is devoted to parking, for example to preserve open space or limit stormwater runoff
Design Requirements	Design requirements aim to minimize the impact of parking on safety (both traffic safety and safety from crime), visual amenity, pedestrian friendliness and traffic flow. For example, they may regulate surface lots and blank walls of parking structures, which are particularly damaging to efforts to create an attractive pedestrian environment, with retail frontages and windows facing the street. Design controls can reduce the amount of land devoted to parking (even if the number of spaces remains the same), and screen it from the main pedestrian street, with access via a side street or alley.
Replacement Parking for Joint Development	When developing the parking and land parcels around an existing transit station for housing, services or other uses, the amount of parking that should be replaced is often a contentious issue. The prevalent practice among transit agencies is to replace parking according to a 1:1 ratio. The analysis given in Richard Willson's Replacement Parking for Joint Development: An Access Policy Methodology examines the amount of parking that should be replaced around a transit station (this analysis is for BART specifically but can be applied to other transit agencies), showing that less parking needs to be offered due to the proximity of housing and services. The methodology takes into account issues such as ridership, fiscal health, access mode split, system capacity, supporting comprehensive station plans, and local and regional context to determine the replacement ratio. For more detailed analysis and spread sheet templates, refer to: Willson, Richard. Replacement Parking for Joint Development: An Access Policy Methodology, BART Departments of Planning and Real Estate, April, 2005. http://www.bart.gov/docs/planning/BART%20Access%20Policy%20Methodology.pdf

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Implementation and Cost Considerations

Directions for Future Study

The Public Transportation Infrastructure Study serves as an example for future studies that will help arrive at a comprehensive and clear understanding of the transit implementation needs for the County. Related directly to the recommendations and work products of this study, further study of the major corridors, such as BNSF and Southeast Corridor, is the next step in reaching transit goals. Future studies should focus on priority Tier 2 corridors in more detail, looking at appropriate modes and technology, linkages to Tier 1 corridors, station locations opportunities, and detailed infrastructure assessment related to the corridor sites and the specific demands of the selected transit technology. In addition to looking at the corridors and their infrastructure, it is important to also look at land use and infill opportunities. Infill capacity analysis, market assessment, and local area plans all help coordinate land use planning with infrastructure development, which is critical in creating successful transit networks.

The following are recommended directions for future study:

- Further study of Tier 2 Priority Corridors (potential examples include the BNSF corridor in Fresno and Southeast Corridor) focusing on:
  - Appropriate transit technology;
  - Linkages to Tier 1 corridors;
  - Station location and supportive land use opportunities; and
  - Identification of priority capital improvements
- Infill capacity analysis
  - Market analysis of potential for infill, mixed-use, and TOD;
  - Analysis of barriers and opportunities for infill, mixed-use, and TOD; and
  - Detailed countywide policy directions with a focus on Tier 1 and Tier 2 communities.
- City of Fresno Activity Center Planning
  - Consideration of relationship of these areas to Tier 1 and Tier 2 corridors and the function of potential station areas to support the overall functionality of corridors
- Potential Tier 1 Corridor Studies
  - Consideration of linkages to Tier 2 and Tier 3 corridors in terms of place types, transit technology, and design of transfer facilities at connection points between corridors, as necessary

Potential Sources of Funding

Funding for coordinated land use and transportation planning is an important consideration. All of the recommended steps above require substantial short- and long-term funding to be successful. Incorporating the recommendations from the PTIS into ongoing countywide planning activities is an important first step in implementing enhanced transit in the county. The following are potential sources for additional funding for future planning studies:

- Measure C Reauthorization (Countywide sales tax measure for transportation).
  The proposed expenditure plan identifies funding for detailed study of priority corridors as well as funding for pedestrian and bicycle improvements (both for local projects and for technical assistance from COFCG) and funding for regional transportation projects and transit improvements.
- Regional Blueprint Study
  Several Central Valley counties have jointly applied for Caltrans grant funding for regional planning. This effort could be leveraged to highlight infill opportunities in Tier 1 and Tier 2 corridors and identify the land use steps necessary to achieve transit-supportive regional growth patterns. This study could also be used to examine connections between Fresno County potential transit corridors and potential nodes in adjacent counties, which this study was only able to examine at a cursory level.
- The Council of Fresno County Governments (CFCOG) could look to start program similar to Transportation for Livable Communities (TLC) Grant Program in Bay Area and Sacramento to fund local multi-modal planning and capital improvements that increase pedestrian and bicycle safety and access to transit.
  The three-tiered transit network could be effectively applied to prioritize projects, with funding targeted towards Tier 1 and Tier 2 corridors, but also supporting enhancements to Tier 3 nodes.
- The Metropolitan Transportation Commission (MTC) in the Bay Area recently introduced a planning grant program funding station area plans (and CEQA compliance) for station areas around transit expansion projects to encourage the implementation of transit-supportive land uses.
  This grant program supports MTC's requirements for transit expansion projects that require compliance with land use thresholds for station-area housing units in order for the corridor to qualify for capital funding.

Infrastructure Cost Information

This study focuses on the broad issues of identifying current transit infrastructure conditions and needs within Fresno County rather than the details of transit cost and technology. The recommendations made are general to serve as a starting point in identifying what issues are pertinent for further study. Thus, there is no determination of any specific types of transit or technology that should be implemented. With further studies of Fresno County's current transit conditions and needs, consideration of various costs and specific methods of reaching transit goals should be analyzed in detail. Below are tables that introduce important transit topics that should be evaluated in further studying the County's transit needs. The tables that show cost estimates should be used as general tools and not as accurate estimates, as they are not related to any specific site in Fresno County and are derived from industry estimates unrelated to this project. For a more realistic reflection of costs, further studies should be conducted at a stage when details of this scale can more carefully be considered. The following tables give an idea of what issues should be analyzed in future stages of developing the Fresno Region's transit network such as:

- Table 11 describes implementation methods of improving bicycle and pedestrian conditions, such as sidewalk, crossing, and landscaping improvements;
- Table 12 describes recommended traffic calming standards for residential streets (including measures to narrow roadways and change intersection configurations);
- Table 13 outlines amenities at transit stops (such as signage, shelters, and benches) that improve and encourage usage of transit networks;
- Table 14 outlines the cost implications of various transit technologies, including BRT, LRT, and heavy rail) [Note: Additional information on Advanced Technologies will be included in the Final PTIS Report];
- Table 15 describes real time arrival information that helps make efficient and successful transit; and
- Table 16 outlines parking infrastructure costs to consider for station sites that would include a parking component.

(Unless otherwise noted, all information in the Infrastructure Cost Information tables is estimated in 2005 dollars.)

Table 11: Transit-Supportive Infrastructure - Bicycle and Pedestrian Infrastructure

Improvement	Description	Approximate Unit Cost
Sidewalks	The area between the curb or roadway edge and the property line, whether or not it is improved. **Basic**: Includes sidewalks, curb/gutters, curb ramps, removal of obstacles, street lighting **Upgraded**: Includes basic sidewalks plus wider sidewalks, curbs with gutters, street trees/landscaping, benches at bus stops **Premium**: Includes upgraded sidewalks plus wider sidewalks, wayfinding signs and kiosks, street furniture, outdoor eating areas, shade/shelter structures	Costs/Linear Foot for: Basic/Upgraded/Premium sidewalks **Drainage Modifications**: ▪ $30 for new construction ▪ $15/$22/$30 for modifications (per category) **Demolition**: ▪ $0 for new construction ▪ $3/$6/$18 for modifications **Curb/Gutter**: ▪ $22 for new construction ▪ $11/$16/$22 for modifications **Sidewalk Installation**: ▪ $83/$118/$323 for new construction ▪ $41/$89/$323 for modifications **Curb Ramps**: ▪ $2,000 (assuming two curb ramps installed at each end of a segment at a cost of $500 per ramp) (Source: Fehr & Peers Associates)

Table 11: Transit-Supportive Infrastructure - Bicycle and Pedestrian Infrastructure (continued)

Improvement	Description	Approximate Unit Cost
Bicycle lane	Bicycle facilities are comprised of the following: ▪ Bike paths (Class I) – paved trails that are separated from roadways. ▪ Bike lanes (Class II) – lanes typically on roadways designated for use by bicycles through striping, pavement legends, and signs. ▪ Bike routes (Class III) – roadways that are designated for bicycle use by signs only and may or may not include additional pavement width for cyclists. Class II and III bicycle facilities described above could function as Bicycle Boulevards, although Bicycle Boulevards are typically Class III facilities. Bicycle Boulevards are roadways where motorized travel is discouraged and bicycle travel is promoted by encouraging bicyclists to control the roadway. Bicycle Boulevards generally carry less than 4,000 vehicles per day.	Varies: ▪ $3,000 for 300 linear feet for projects with low or medium complexity (Includes signing, striping, and installation of bicycle-sensitive loop detectors). ▪ $48,000 – 96,000 for 300 linear feet for projects with high complexity and assumes road widening is involved. (High estimate covers widening on both sides of the street, but does not include costs for ROW acquisition). (Source: Fehr & Peers Associates)
Crosswalk	A crosswalk is the area of a roadway where pedestrians have the right of way. Crosswalks may be "marked" or "unmarked." If painted white or yellow lines on the pavement of a street do not exist, the crosswalk is considered unmarked.	Varies: ▪ $3,000 for new marked crosswalk (with advanced signage and pavement legend) ▪ $125,000 for state-of-the-art model (with LED pavement flashers on a multi-lane street with advanced signs). (Source: Fehr & Peers Associates)
Raised Crosswalk	Raised crosswalks are Speed Tables outfitted with crosswalk markings and signage to channelize pedestrian crossings, providing pedestrians with a level street crossing. By raising the level of the crossing, pedestrians are more visible to approaching motorists. Raised crosswalks are good for locations where pedestrian crossings occur at haphazard locations and vehicle speeds are excessive.	$4,000 (Source: TrafficCalming.org)

Table 11: Transit-Supportive Infrastructure - Bicycle and Pedestrian Infrastructure (continued)

Improvement	Description	Approximate Unit Cost
Textured Pavement	Textured and colored pavement includes the use of stamped pavement or alternate paving materials to create an uneven surface for vehicles to traverse. They me be used to emphasize either an entire intersection or a pedestrian crossing, and are sometimes used along entire street blocks. Textured pavements are good for "main street" areas where there is substantial pedestrian activity and noise is not a major concern.	Varies by materials used and the amount of area covered (Source: TrafficCalming.org)
Raised Intersections	Raised intersections are flat raised areas covering an entire intersection, with ramps on all approaches and often with brick or other textured materials on the flat section. They usually raise to the level of the sidewalk, or slightly below to provide a "lip" that is detectable by the visually impaired. By modifying the level of the intersection, the crosswalks are more readily perceived by motorists to be "pedestrian territory". Raised intersections are good for intersections with substantial pedestrian activity, and areas where other traffic calming measures would be unacceptable because they take away scarce parking spaces.	$12,500 (Source: TrafficCalming.org)
Street Trees	Street trees are trees planted within the public right-of-way along sidewalks and in median strips. Street trees help to create a distinct character for specific streets and neighborhoods. They are especially valuable to pedestrians at intersections, as they may otherwise seem like overwhelming expanses of asphalt. Tree placement at intersections should be balanced with concerns for sight distance and clear views of traffic lights, but these issues can be addressed with strategic placement and diligent pruning. The recommended size for a tree well depends on the selected tree species. The optimal area of a sidewalk tree well is 36 square feet, but a typical size is 5 x 5 feet or 4 x 6 feet for locations with width constraints. A landscape strip between a street and sidewalk or as a street median should have a minimum width of 6 feet, and an optimal width of 8 feet. In order to create a continuous canopy, street trees should be planted 15 to 25 feet on center. Street trees require ongoing maintenance to remain healthy. Maintenance costs should be accounted for in planning capital improvements.	All estimates include: tree, tree stake, installation, some initial maintenance costs **New Construction:** <u>Tree in Tree Grate: $1,600 per tree</u> Includestree grate(with steel frame) <u>Tree in Landscape Strip or Landscaped Median: $600 per tree</u> **Retrofit Construction:** <u>Tree in Tree Grate: $1,900 per tree</u> Includes: sidewalk demolition ($3.00 /SF), Soil Improvements ($2.00 /SF), tree grate (with steel frame) <u>Tree in previously hardscaped Median: $900 per tree</u> Includes: sidewalk demolition ($3.00 /SF), Soil Improvements ($2.00 /SF) (source: Community Design + Architecture)

Table 12: Transit-Supportive Infrastructure - Traffic Calming

Improvement	Description	Approximate Unit Cost
Speed Humps	Speed humps are rounded raised areas placed across the roadway. Speed humps are generally 10 to 14 feet long (in the direction of travel), making them distinct from the shorter "speed bumps" found in many parking lots, and are 3 to 4 inches high. The profile of a speed hump can be circular, parabolic, or sinusoidal. They are often tapered as they reach the curb on each end to allow unimpeded drainage. Speed humps are good for locations where very low speeds are desired and reasonable, and noise and fumes are not a major concern.	$2,000 (Source: TrafficCalming.org)
Speed Table	Speed tables are flat-topped speed humps often constructed with brick or other textured materials on the flat section. Speed tables are typically long enough for the entire wheelbase of a passenger car to rest on the flat section. Their long flat fields give speed tables higher design speeds than speed humps. The brick or other textured materials improve the appearance of speed tables, draw attention to them, and may enhance safety and speed-reduction. Speed tables are good for locations where low speeds are desired but a somewhat smooth ride is needed for larger vehicles.	$2,000 (Source: TrafficCalming.org)
Traffic Circle	Traffic circles are raised islands, placed in intersections, around which traffic circulates. They are good for calming intersections, especially within neighborhoods, where large vehicle traffic is not a major concern but speeds, volumes, and safety are problems.	Costs range by degree that intersection has to be rebuilt: ▪ $50,000-$75,000 for traffic circle to be installed in existing intersection with minimal improvements (no splitter islands or landscaping, no change in grading or drainage) ▪ $250,000-$350,000 for new installations over bare ground Costs do not include acquisition of right-of-way (Source: TrafficCalming.org)

Table 12: Transit-Supportive Infrastructure - Traffic Calming (continued)

Improvement	Description	Approximate Unit Cost
Roundabouts	Roundabouts require traffic to circulate counterclockwise around a center island. Unlike traffic circles, roundabouts are used on higher volume streets to allocate right-of-way between competing movements.	Same estimated cost ranges as traffic circles. (Source: TrafficCalming.org)
Chicanes	Chicanes are curb extensions that alternate from one side of the street to the other, forming S-shaped curves. Chicanes can also be created by alternating on-street parking, either diagonal or parallel, between one side of the street and the other. Each parking bay can be created either by restriping the roadway or by installing raised, landscaping islands at the ends of each parking bay. Good for locations where speeds are a problem but noise associated with Speed Humps and related measures would be unacceptable.	$14,000 (Source: TrafficCalming.org)
Neckdowns	Neckdowns are curb extensions at intersections that reduce the roadway width from curb to curb. They "pedestrianize" intersections by shortening crossing distances for pedestrians and drawing attention to pedestrians via raised peninsulas. They also tighten the curb radii at the corners, reducing the speeds of turning vehicles. They are good for intersections with substantial pedestrian activity and areas where vertical traffic calming measures would be unacceptable because of noise considerations.	$40,000 - $80,000 for four corners (Source: TrafficCalming.org)
Center Island Narrowings	center island narrowing is a raised island located along the centerline of a street that narrow the travel lanes at that location. Center island narrowings are often landscaped to provide a visual amenity. Placed at the entrance to a neighborhood, and often combined with textured pavement, they are often called "gateway islands." Fitted with a gap to allow pedestrians to walks through at a crosswalk, they are often called "pedestrian refuges." Center Island Narrowings are good for entrances to residential areas, and wide streets where pedestrians need to cross.	$8,000 - $15,000 (Source: TrafficCalming.org)
Chokers	Chokers are curb extensions at midblock locations that narrow a street by widing the widewalk or planting strip. If marked as crosswalks, they are also known as safe crosses. Two-lane chokers leave the street cross section with two lanes that are narrower than the normal cross section. One-lane chokers narrow the width to allow travel in only one direction at a time, operating similarly to one-lane bridges. They are good for areas with substantial speed problems and no on-street parking shortage.	$7,000 - $10,000 (Source: TrafficCalming.org)

Table 13: Transit-Supportive Infrastructure - Transit Amenities

Improvement	Description	Approximate Unit Cost
Sign and Sign Post	Bus stop signs should be placed at the location where riders will board the front door of the bus. The sign also assists the operator in positioning the vehicle at the stop. Sign placement should be consistent with current ADA requirements. The information that should be included on the sign, in declining order of priority, and declining order of prominence if present, comprise of the following: ▪ Route number ▪ Route name ▪ Destination (distinguished from route name, less prominent, identical to that used on overhead signs) ▪ Transit agency information phone number (although a good sign, like a good brochure, will reduce the need for these calls) ▪ Span information (when it operates, e.g., 7am – 7pm) ▪ Schedule	Total Cost (sign & post with 2 decals): $800 ▪ Product Cost: $300 ▪ Installation: $500
Information Holder	System information, schedules and maps can be displayed at bus stops by mounting an information holder to the signpost or on the side panel of a shelter.	Total Cost: $500-$2,000 ▪ Product Cost: $300 - $1,500 ▪ Installation: $200 - $500 (Source: Nelson\Nygaard Consulting Associates)
Benches	A bench at a bus stop provides patrons with comfort and convenience. Benches are usually installed at a bus stop based on the number of boardings and alightings. Additional benches may be installed where there is a sponsor for both bench installation AND maintenance. Bus stop benches also help identify the stop and add to the urban landscape. In most cases, benches are the first amenity to add to a bus stop as they tend to cost less than shelters and still provide added comfort for patrons. Important factors in determining bench locations: ▪ The width of the bus stop location ▪ Stops where transit agency can maintain general ADA mobility clearances ▪ Locations where transit riders frequently sit on nearby structures and/or curbs ▪ Bus stops with a high number of disabled and elderly riders ▪ Ridership	Total Cost: $1,250 ▪ Product Cost: $1,000 ▪ Installation: $250 (Source: Nelson\Nygaard Consulting Associates)

Table 13: Transit-Supportive Infrastructure - Transit Amenities (continued)

Improvement	Description	Approximate Unit Cost
Shelters	Bus stop shelters provide protection from the outside elements and inclement weather. In most cases, shelters are accompanied by benches, which provide additional comfort for transit patrons.	Total Cost: $6,000 ▪ Product Cost: $5,000 ▪ Installation: $100 (Source: Nelson\Nygaard Consulting Associates)
Trash Receptacle	Trash receptacles can help maintain the overall appearance and cleanliness of a bus stop. Not all bus stops will require a trash receptacle, however bus stops with high ridership should be considered a priority.	Total Cost: $200 ▪ Product Cost: $200 ▪ Installation: N/A (Source: Nelson\Nygaard Consulting Associates)
i-Stops	The i-STOP™ solar-powered LED transit stop is a completely self-contained unit that offers three distinct features: an on-demand flashing bus signaling device; a security down light, and; an illuminated schedule. I-STOP pricing as of March 28-2005. i-STOP™ (F3) – I-STOP head, white; I-SIGNAL flashing beacon; crystalline solar panel, Energy Management System (EMS); security down lighting; edge lit schedule and schedule housing; button assembly; wiring harness. http://www.transitlights.com/content/products/i-STOP/Default.aspx	Total Cost: $1,300 iStop F3: $1,200.00 Octagonal Poles: $100.00, includes sleeve, wedge, hole drilling and brackets (Source: Carmanah Technologies Corporation)
Bike Storage	Bike racks should be provided at major bus stops, Metro Rapid stops and BRT/LRT stations.	Total Cost: $200 ▪ Product Cost: $100 ▪ Installation: $100 (Source: Nelson\Nygaard Consulting Associates)

Table 13: Transit-Supportive Infrastructure - Transit Amenities (continued)

Improvement	Description	Approximate Unit Cost
Fare Machines	Barrier-Free (self-service) or Proof-of-Payment (POP) system: Requires the rider to carry a valid (usually by time and day) ticket or pass when on the vehicle and is subject to random inspection by roving personnel. It typically requires ticket vending and/or validating machines. The advantage of this less restrictive system is that it supports multiple door boarding and thus lower dwell times. The disadvantage is the increased risk of fare evasion. When implementing proof-of-payment, transit agencies should consider how passenger loads, passenger turnover and interior layout may affect the ability and ease of inspection onboard vehicles.	Total Cost: $30,000 to $60,000 ▪ Product Cost: $30,000 to $60,000 ▪ Installation: N/A Cost includes labor costs for roving personnel. May include validate equipment and/or additional station hardware and software costs. (Source: Federal Transit Administration *"Characteristics for Bus Rapid Transit for Decision-Making"*, 2004)
Shopping Cart Storage	A shopping cart storage area can reduce the haphazard placement of carts at stops located near commercial shopping centers and grocery stores.	Total Cost: $500 ▪ Product Cost: $300 ▪ Installation: $200 (Source: Nelson\Nygaard Consulting Associates)

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Table 14: Transit-Supportive Infrastructure - Transit Infrastructure Costs

Improvement	Description	Approximate Unit Cost
Metro Rapid Station	Metro Rapid, or BRT Light stations are a cross between regular bus stops and BRT stations, and support express bus services. The stations are located on the sidewalk and do not require a separated right-of-way. Several Metro Rapid systems have been implemented in California, including Los Angeles (pictured below) and Oakland. Metro Rapid may benefit from a traffic signal control system and real time information.	Total Cost: $ 42,050 Includes cost for i-Stop, bench, shelter, trash receptacle, NextBus, bike storage and fare machines (Source: Los Angeles Metro; Nelson\Nygaard Consulting Associates)
Bus Rapid Transit (BRT)	BRT systems possess a mixture of the following characteristics: ▪ Traffic signal priority—signal lights turn green for buses as they approach. ▪ Boarding and fare collection improvements—low floors for quick, easy access and off vehicle ticket purchasing to reduce boarding times. ▪ Limited Stops—fewer stops means faster trip times. ▪ Improved stations and shelters—distinguish BRT from standard bus service and like LRT, generate potential for transit-oriented development. ▪ Intelligent Transportation Systems (ITS)—provides travelers with real time information on next bus and improves dispatching of vehicles. ▪ Cleaner and quieter vehicles—high tech vehicles can be quieter than LRT and run on alternative fuels. ▪ Flexible right of way—BRT can capture the speed advantages of exclusive right of way (a lane dedicated solely to transit) or high occupancy freeway lanes, but can also run amid other traffic at street level. ▪ ROW Exclusivity: Exclusive ROW (Busway) Separate traffic lanes or Shared traffic lanes ▪ Right-of-Way Dimensions: 30 feet for exclusive ROW, 24-25 feet with automated guideway ▪ Station Requirements: Traveler information Off vehicle ticket sales	Station Costs (basic infrastructure): $244,000 - 1.2 Million at grade Vehicle Costs: Advanced BRT vehicle = $1 million + Articulated transit bus = $420,000 40' transit bus = $283,000 Construction Costs: Exclusive busway = $13.5 M per mile HOV lanes = $9M per mile Shared traffic = $680K per mile Maintenance Yard Costs: BRT maintenance can be performed in existing bus facilities, depending on buses chosen ▪ NOTE: All costs in 2000 Dollars unless stated otherwise. (Source: Nelson\Nygaard; FTA 2000 National Transit Database; FTA Characteristics of Urban Transportation Systems - Revised Edition September 1992; BRT Shows Promise (GAO Mass Transit Report to Congressional Requesters September 2001))

Table 14: Transit-Supportive Infrastructure - Transit Infrastructure Costs (continued)

Improvement	Description	Approximate Unit Cost
Light Rail Transit (LRT)	Typical light rail systems possess a similar mixture of characteristics as bus rapid transit: ▪ Traffic signal priority—signal lights turn green for vehicles as they approach. ▪ Boarding and fare collection improvements—low floors for quick, easy access and off vehicle ticket purchasing to reduce boarding times. ▪ Limited stops at stations—fewer stops means faster trip times and more amenities at each station. ▪ Improved stations and shelters—greater safety and comfort and helps catalyze transit oriented development. ▪ Intelligent Transportation Systems (ITS)—provides travelers with real time information on next train and improves dispatching of vehicles. ▪ Cleaner and quieter vehicles—reduces noise and air pollution. ▪ Exclusive Right of Way—reduces trip time because trains do not have to run with traffic. ▪ ROW Exclusivity: Exclusive ROW (Busway) Separate traffic lanes or Shared traffic lanes ▪ Right-of-Way Dimensions: 24 feet ▪ Station Requirements: Passenger boarding area (platform) Traveler information Off vehicle ticket sales	Station Costs (basic infrastructure): $244,000 - 1.2 Million at grade Vehicle Costs: $1.7 - 2.5 Million per vehicle Construction Costs: $13.5 - 60 Million per mile Maintenance Yard Costs: $108,000 - $980,000 per unit of capacity NOTE: All costs in 2000 Dollars unless stated otherwise. Vehicle Costs: $1.7 - 2.5 Million per vehicle (Source: Nelson\Nygaard; FTA 2000 National Transit Database; FTA Characteristics of Urban Transportation Systems - Revised Edition September 1992; BRT Shows Promise (GAO Mass Transit Report to Congressional Requesters September 2001))

Table 15: Transit-Supportive Infrastructure - Real Time Arrival Information

Initial Cost Items	Cost
Set up two websites One for riders One for CCCTA management	$6,000 per route
LED signage at a stop	$3,100 per stop
Electrify each LED location	Varies
Bus tracking equipment (on the bus)	$3,100 per bus
Software license fee	$5,000 for three buses
Set up and training	$1,000
Recurring Monthly Fee	**Cost**
Communication fee for each bus	$60 per bus
Communication fee for each LED sign	$60 per sign
Note: These estimated costs includes installation of equipment on buses and at stops, but do not include provision of electricity for LED signs at stops	

Table 16: Transit-Supportive Infrastructure - Parking Infrastructure Costs

Parking costs can vary tremendously according to the following factors:

- Land value
- Construction costs
- Project Cost
- Debt Service
- Operations and Maintenance
- Insurance
- Security and Enforcement
- Shape of parcel
- Architecture
- Landscaping and pedestrian amenities

Type of Facility	Land Costs	Land Costs	Construction Costs	O & M Costs[1]	Total Cost[2]	Monthly Cost
	Per Acre	*Per Space*	*Per Space*	*Annual, Per Space*	*Annual, Per Space*	*Per Space*
Suburban, Surface, Free Land	$0	$0	$1,500	$100	$1,742	$145
Suburban, Surface	$50,000	$455	$1,500	$100	$2,239	$187
Suburban, 2-Level Structure	$50,000	$227	$6,000	$200	$7,015	$585
Urban, Surface	$250,000	$2,083	$2,000	$150	$4,618	$385
Urban, 3-Level Structure	$250,000	$694	$8,000	$250	$9,765	$814
Urban, Underground	$250,000	$0	$20,000	$350	$22,238	$1,853
CBD, Surface	$1,000,000	$7,692	$2,500	$200	$11,354	$946
CBD, 4-Level Structure	$1,000,000	$1,923	$10,000	$300	$13,348	$1,112
CBD, Underground	$1,000,000	$0	$22,000	$400	$24,288	$2,024

This table illustrates the financial costs of providing parking facilities under various conditions. (CBD = Central Business District)

1 Operations and Maintenance

2 Total cost is based on the loan payments on total capital costs, annual O & M costs and annual tax and includes land and construction costs.

Source: Victoria Transportation Institute, Parking Evaluation: Evaluating Parking Problems, Solutions, Costs, and Benefits, 2004.
http://www.vtpi.org/tdm/tdm73.htm#_Toc18599154