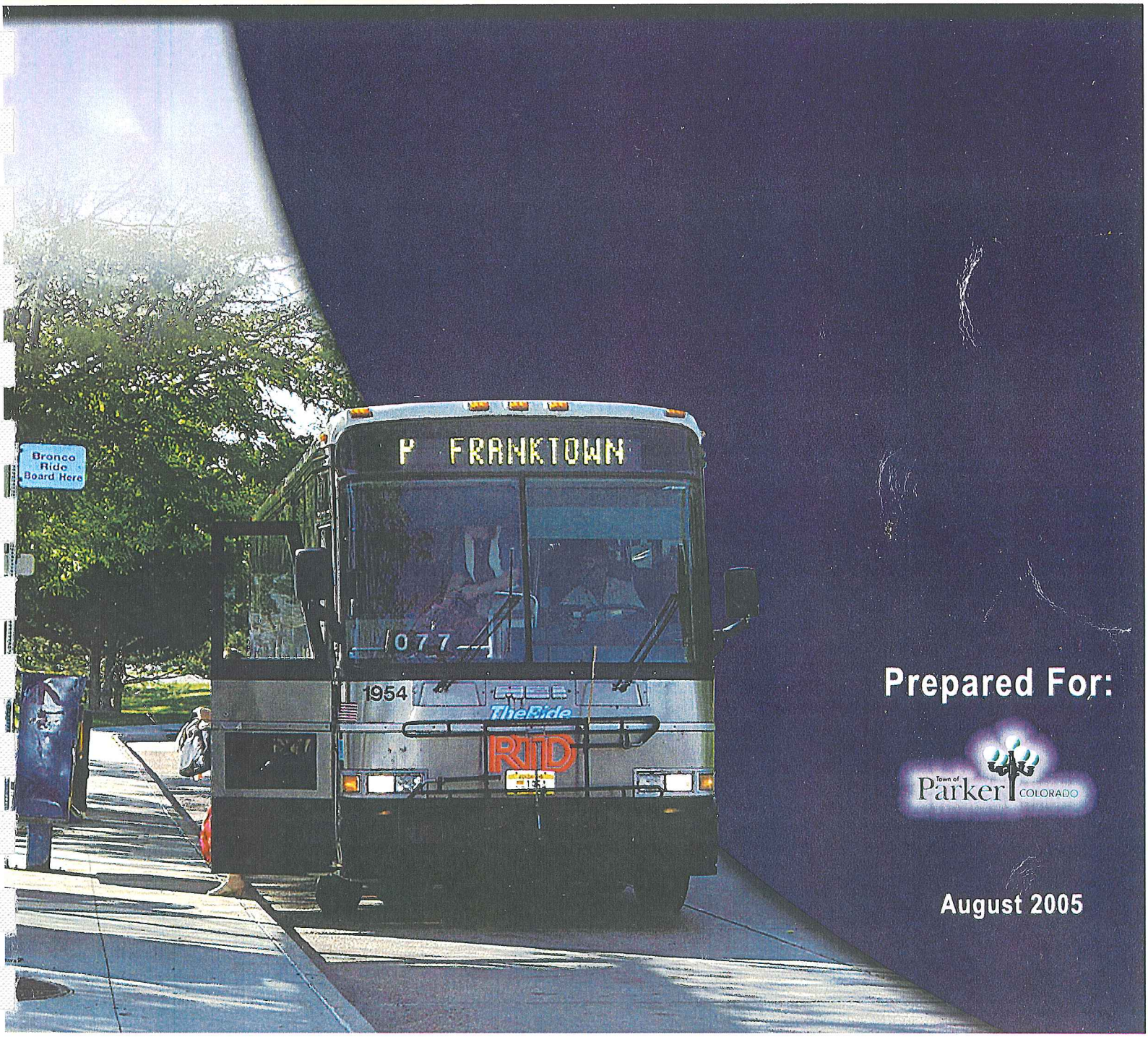
ixed Guideway Transit Study

Town of Parker
Fixed Guideway Transit Study

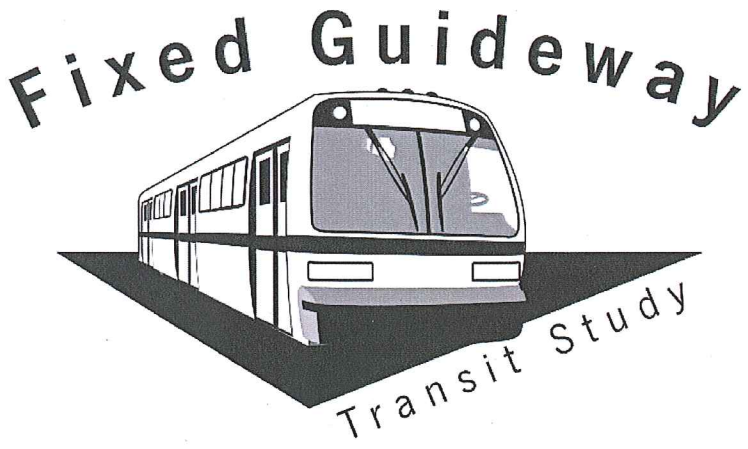


Prepared For:

Town of Parker COLORADO

August 2005

Town of Parker



Prepared by:

Carter Burgess

August 2005

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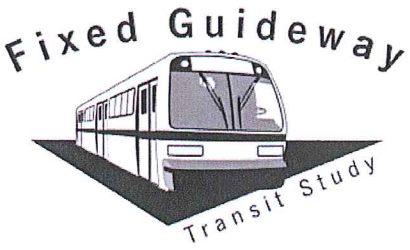


1. Study Overview

In March 2004 the Parker Town Council adopted the recommendations of the *Transit Feasibility Study,* which examined options for:

- connecting the Town of Parker to the regional transit system,
- bringing employees and visitors to Parker, and
- expanding local bus service.

As a result of the study, the Town was able to bring transit service into Parker from the Aurora area by working with the Regional Transportation District (RTD) to restructure local bus service, and the RTD agreed to conduct an origin and destination survey for the Parker area to further refine bus service into the area. Most importantly, the *Transit Feasibility Study* provided a vehicle for the Town of Parker to form an on-going partnership with RTD and the Parker Economic Development Council (PEDC). This partnership led to RTD working cooperatively with the Town to examine additional fixed guideway options into Parker, and to an RTD Board Resolution in July of 2004 that supported continued analysis of fixed guideway options, commitment to continue to provide appropriate transit services to Parker and to pursue incorporation of the Town and County lands into the RTD District.

This *Fixed Guideway Transit Study* was initiated by the Town to build upon previous analyses and to examine the feasibility of a fixed guideway line from the planned Southeast Corridor light rail terminus at RidgeGate, in the City of Lone Tree, to downtown Parker, and to develop plans for related transit improvements, such as park-n-Rides. The study area included the Town of Parker's Future Urban Service Area, the area within the City of Lone Tree's Future Urban Growth Limit, and the master planned developments in between. **Figure 1, Study Area**, depicts the study area boundaries.

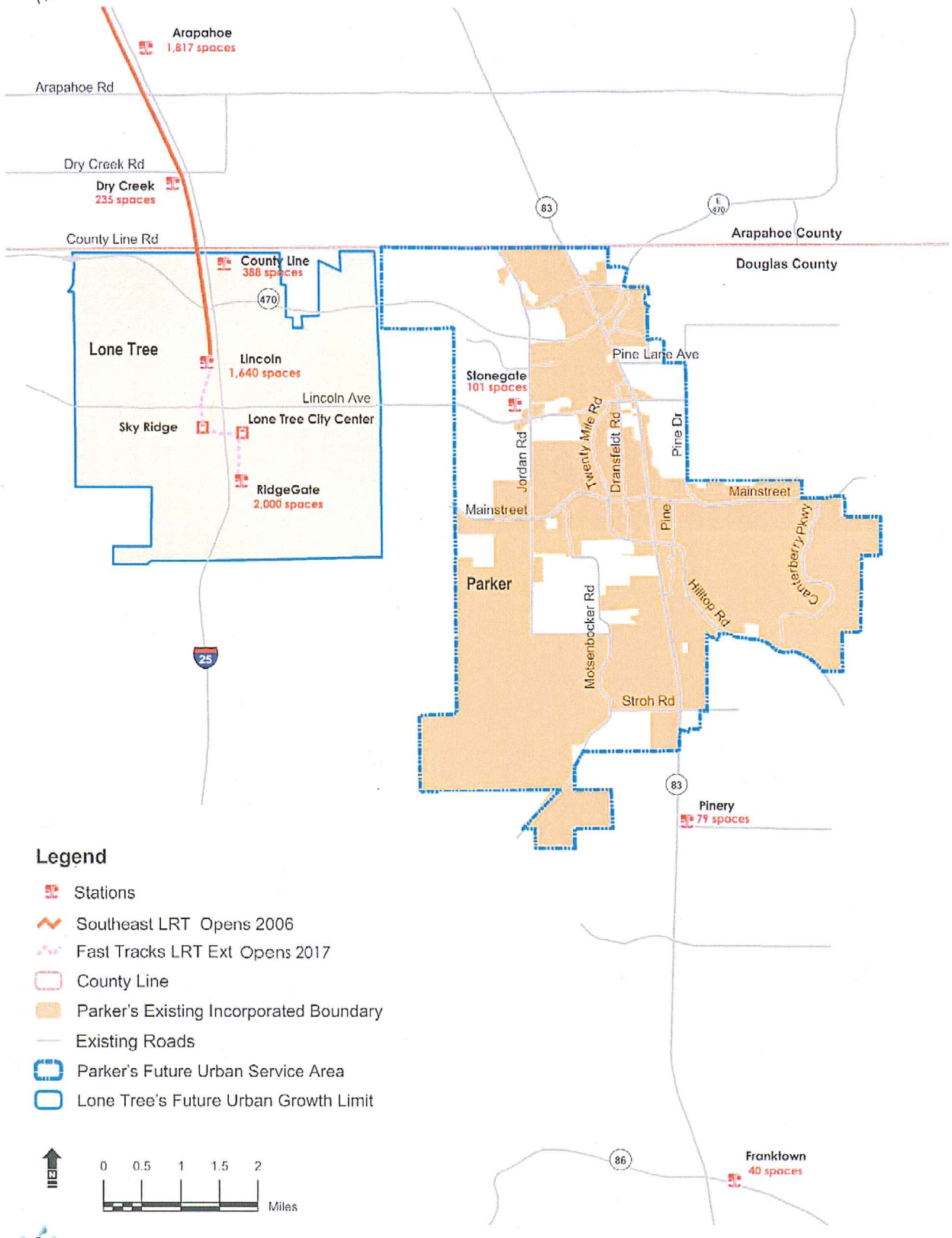
1.1 Study Process

To guide the data collection, alternatives development and evaluation criteria, stakeholders from all affected organizations, property owners and agencies were identified and an initial kick-off meeting was held in November 2004. The stakeholders consisted of representatives of:

- Town of Parker staff
- Parker Planning Commission
- Parker Town Council
- Parker Economic Development Council

Study Area

Figure 1



- Regional Transportation District
- Colorado Department of Transportation
- Parker Planning Commission
- City of Lone Tree
- DEN Enterprises
- Denver Regional Council of Governments
- Faestel Properties
- Douglas County
- Southeast Business Partnership

At this meeting, previous studies and current planning efforts were reviewed, and information on population, employment, travel patterns, transportation services and facilities, and land use and development plans were presented. The stakeholders were asked to:

- Confirm the goals for transit improvements in Parker,
- Identify corridor opportunities and constraints for transit service and facilities,
- Agree upon evaluation criteria for the transit alternatives.

Based on stakeholder input, fixed guideway alternatives and station and park-n-Ride locations and transit operating plans were identified for further analysis. The alternatives were further refined based on coordination with Parker and RTD staff, and the alternatives were evaluated based on ridership, travel times, capital, operating and maintenance costs and compatibility with the community's vision for the corridor.

A second meeting of the stakeholder group was held on June 15, 2005 to present results of the evaluation. At the stakeholder meeting, the group recommended Bus Rapid Transit (BRT) service along West Mainstreet. The recommended alternative is described more fully in Chapters 5 and 6, Alternatives Development and Alternatives Analysis, as well as in Chapter 7: Findings and Recommendations.

1.2 Related Planning Efforts

The study took place concurrent with the Town of Parker's Master Plan Update as well as the *West Mainstreet Urban Design Study*, providing ample opportunity to assess how transit planning should be informed by current public opinion and priorities, as well as by the design priorities and right-of-way constraints along Mainstreet.

Prior planning efforts by the Town of Parker and RTD made the following conclusions:

- *Town of Parker Transit Feasibility Study*: Conducted by Carter & Burgess in 2002 on behalf of the Town of Parker, the study identified potential for a light rail transit (LRT) service on Mainstreet, or a bus

rapid transit (BRT) service on Mainstreet that could connect to the light rail extension to Lone Tree in 2017.

- *Prior Regional Transportation District (RTD) Studies*: In response to the recommendation for a future fixed guideway system in Parker, RTD assessed potential alignments to determine what could be most cost-effective. Their findings recommended that an alignment along Mainstreet be retained for consideration. The study concluded that alignments along E-470, Lincoln Avenue, or Parker Road would be cost-prohibitive, as well as unsuited to the automobile-oriented land use patterns, large traffic volume and high speeds along those roadways.

Other related planning efforts affecting the study area include:

- *Douglas County Right-of-Way Easement*: In April of 2004, Douglas County agreed to dedicate up to 30 feet of right-of-way for transit along the proposed new West Parker Road (Mainstreet west of Chambers.)

- *Town of Parker Master Plan*: Beginning in March 2004 and scheduled for completion in February 2006, the Town of Parker Master Plan includes extensive public outreach activities such as working groups, neighborhood and community meetings, mail-in surveys, phone surveys, and a website. At the time of this study, the Town had initiated many of the public outreach activities, and received input that there was a high level of community interest in:

  - public transportation, especially in light rail;
  - connections to the greater regional transit system;
  - centralized transit centers, and
  - additional park-n-Rides.

- *West Mainstreet Study:* Initiated in 2004 to determine design guidelines for making Mainstreet between Parker Road and Twenty Mile Road a walkable corridor. Initial study efforts resulted in a public and stakeholder preference for retaining on-street parking to benefit Mainstreet merchants, as well as to enable a future conversion of one lane of parking to a transit lane. The study will be completed after the Town of Parker *Fixed Guideway Feasibility Study* recommends a specific fixed guideway system.

2. Data Review

The Town of Parker has experienced rapid growth in recent years, changing from primarily ranchettes and large single family homes to a more suburban community interested in attracting and concentrating development along Mainstreet. By the time light rail service is extended to Lone Tree in 2016, the Town of Parker will be surrounded by new housing and commercial developments that will add to the transportation needs that already exist in the area.

This section describes the characteristics of the Town of Parker that could contribute to a new transit ridership base.

2.1 Demographics and Development

Existing and future population and employment in the study area was obtained from the Denver Regional Council of Governments (DRCOG) data. The DRCOG data reflects local community input and regional economic projections from the State of Colorado. Population and employment densities were mapped to provide an indication of the changes in concentrations between 2001 and 2030.

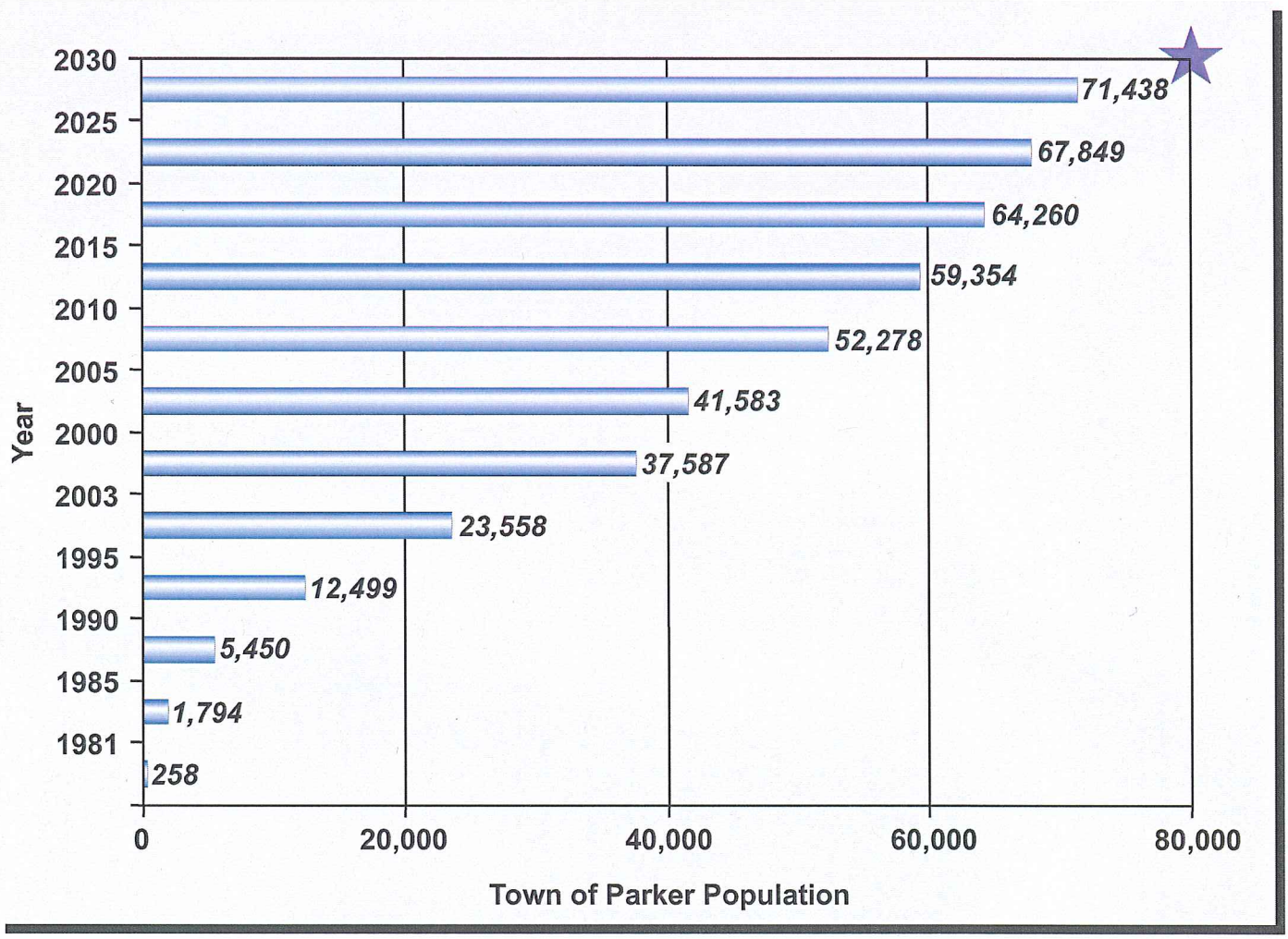
2.1.1. Population

The Town of Parker is a community of approximately 40,000 residents and is expected to grow to almost 81,000 by 2030, as shown in **Figure 2, Historic and Future Population Growth**. Population growth has surged in the Parker area—growing by over 50 percent in the last five years, and expected to grow by over an additional 80 percent by 2030.

Current population density is highest between Lincoln Avenue and Mainstreet west of Twenty Mile Road, and north of Hilltop Road east of Parker Road. In these locations, population density is a minimum of five people per acre. Existing population density is depicted in **Figure 3, 2001 Population Density**. By 2030, population densities will increase west of Twenty Mile Road from Stroh Road to C-470, and east of Parker Road between Hilltop Road and Lincoln Avenue. As shown in **Figure 4, 2030 Population Density**, significant growth is identified along the West Mainstreet between I-25 and Parker Road. The population distribution is directly related to the changing land use in the Parker area. The growth expected by 2030 will occur as more land is incorporated into Parker and more residential developments are completed.

Historic & Future Population Growth

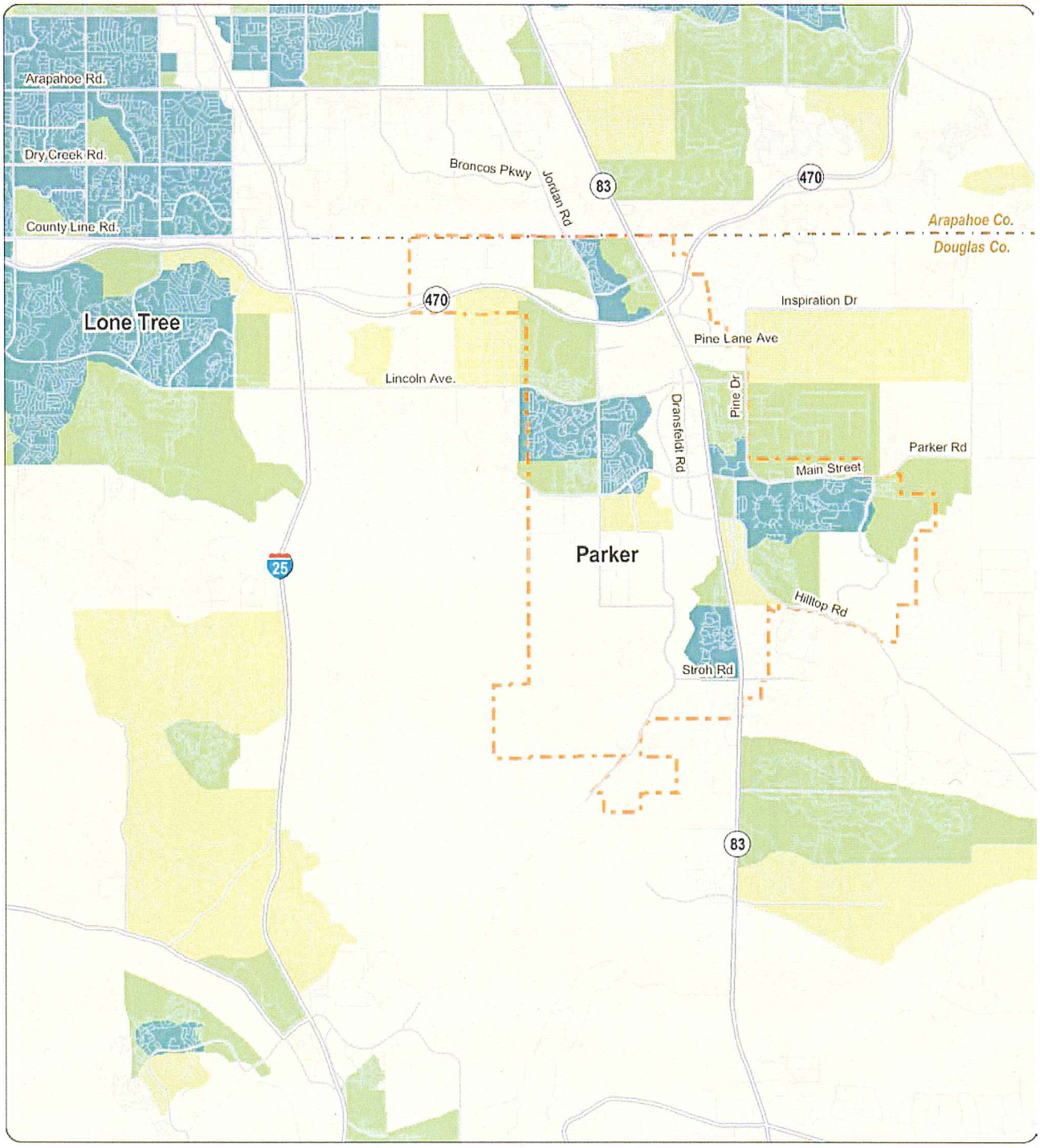
Figure 2



★ *Actually 80,733 assuming that existing residential units in unincorporated areas but within the Urban Service Area are annexed into Town.*

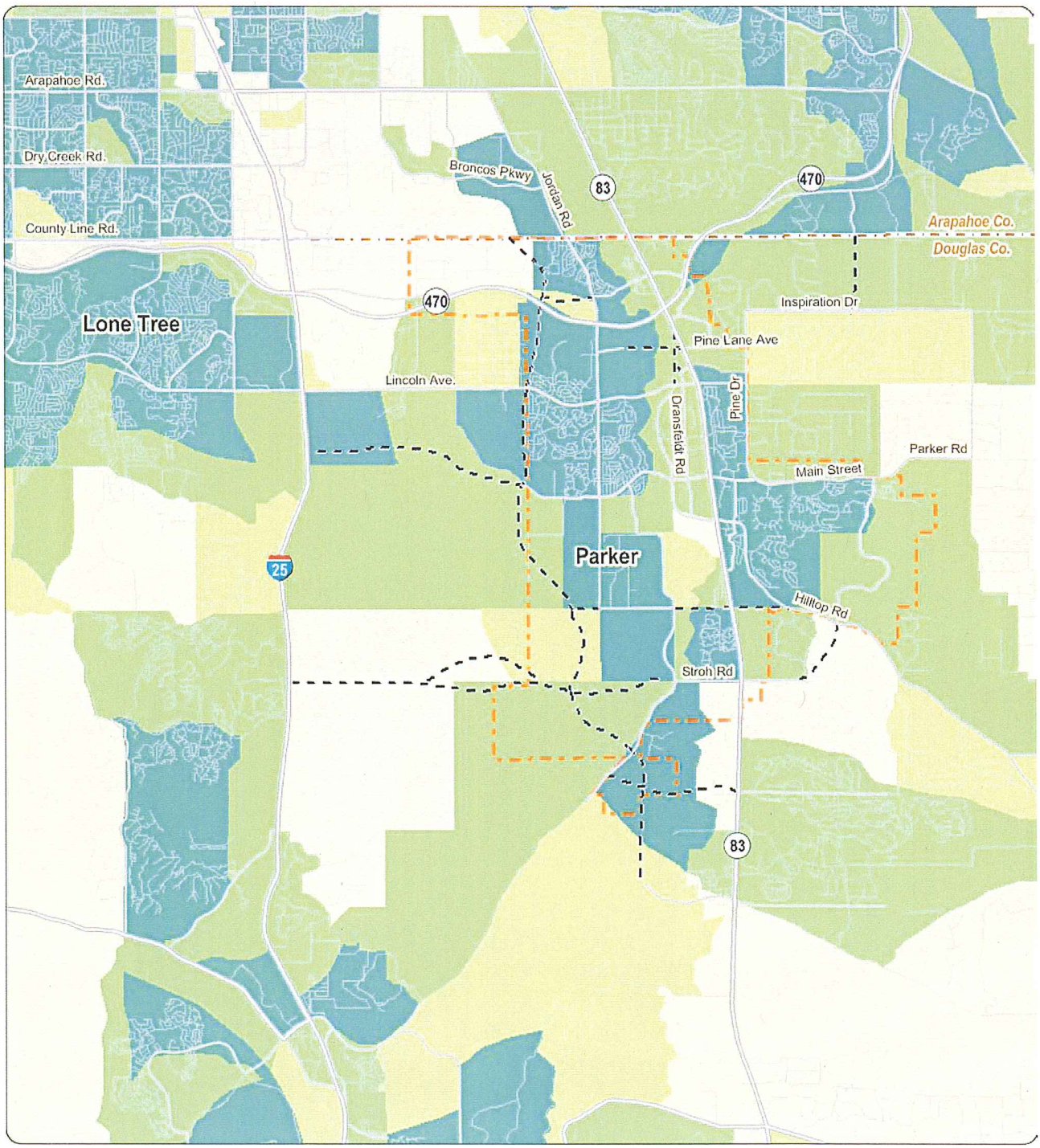
2001 Population Density

Figure 3



2030 Population Density

Figure 4



2.1.2. Employment

Employment in the Town has grown significantly in the past ten years. Today, primary jobs account for only 14% while secondary jobs account for 86%. Today, there are an estimated 15,729 jobs in Parker. This number is expected to grow to between 33,554 and 38,799 by 2030, at a rate of 713 to 923 jobs per year. Even with this increase, and the many commercial developments either planned or under construction, Parker residents will continue to need to travel outside of the community for work trips. Current employment density is highest along Parker Road from Mainstreet to Lincoln Avenue, and along Mainstreet from Twenty Mile Road to Pine Drive as shown in **Figure 5, 2001 Employment Density**. As shown in **Figure 6, 2030 Employment Density**, future employment will increase along Parker Road from C-470 to Stroh Road and in the area between Lincoln Avenue and south of West Mainstreet between Parker Road and Twenty Mile Road. Another area of fairly significant increase is in the planned town center at RidgeGate, in the City of Lone Tree.

2.1.3. Land Use and Development

The Mainstreet Corridor is Parker's "activity center". The current land uses adjacent to Mainstreet and RidgeGate Parkway are depicted on **Figure 7, Parker and Lone Tree Development**. East of Parker Road, Mainstreet is one lane in each direction with a landscaped median and on-street parallel parking. It is fronted by small, independently-owned shops and has retained its historic character. West of Parker Road, Mainstreet is currently fronted by commercial centers—one anchored by a grocery store, one by a movie theater, and one by a crafts center. There are also mixed use developments already planned in between and adjacent to the existing commercial centers. In addition, the Town of Parker has initiated an urban design study to encourage a walkable corridor and would like to relocate the Parker park-n-Ride to a site south of Mainstreet and east of Dransfeldt Road.

By 2013, Mainstreet will extend west to I-25. As shown in **Figure 8, Mainstreet Corridor Development,** west of Chambers, it will serve a 1430-acre business park development owned by Meridian International Business Center. West of the Meridian development, Mainstreet is referred to as RidgeGate Parkway, and will serve the 3500-acre planned RidgeGate development. RidgeGate will include 20 to 23 million feet of commercial space, 10,000 to 12,000 residential units, 64,000 employees, and a "city center" which will have its own connection to the light rail system when light rail is extended to Lone Tree in 2017.

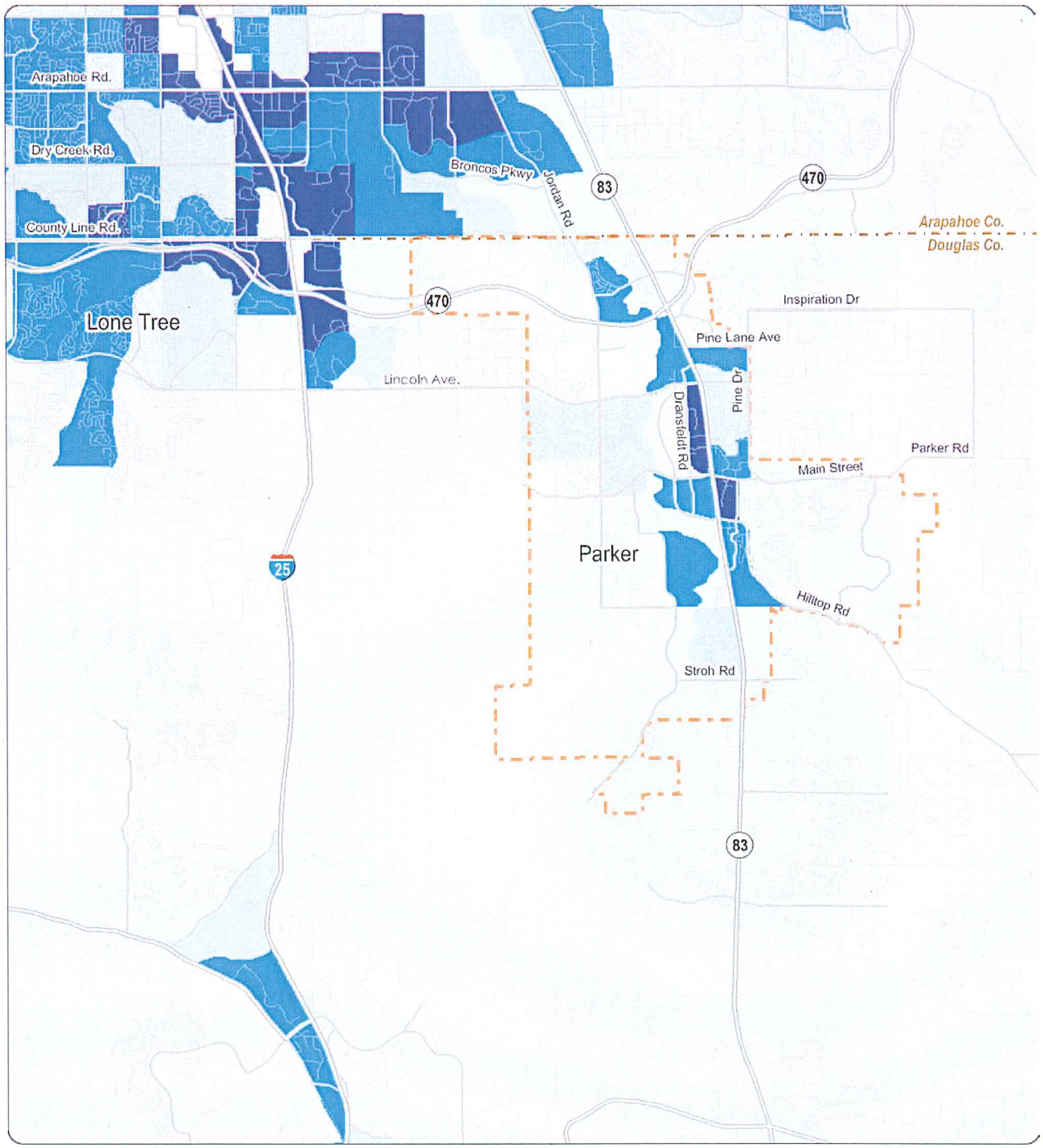
2.1.4. Transit Oriented Development

The variety of land uses served by Mainstreet will increase in the future, ranging from small scale commercial and retail east of Parker Road to large scale corporate business parks west of Chambers. Mainstreet will also eventually connect two activity centers—areas envisioned with mixed land uses that create jobs and housing, but also entertainment and leisure opportunities. The Parker Town Center is evolving just west of Parker Road. The Lone Tree City Center will develop north of RidgeGate Parkway, east of I-25.

Extending a fixed guideway service creates potential for additional development in station areas along Mainstreet. This includes public development of landscaped sidewalks and medians, bike lanes, parks, shade and weather structures and other pedestrian amenities. It also includes private sector development, such as additional housing, mixed use/retail areas, and shopping centers. With so much planned business park development, owners and developers might also want to fund private shuttles or encourage streetside development such as coffee shops, dry cleaners and other services that attract commuters.

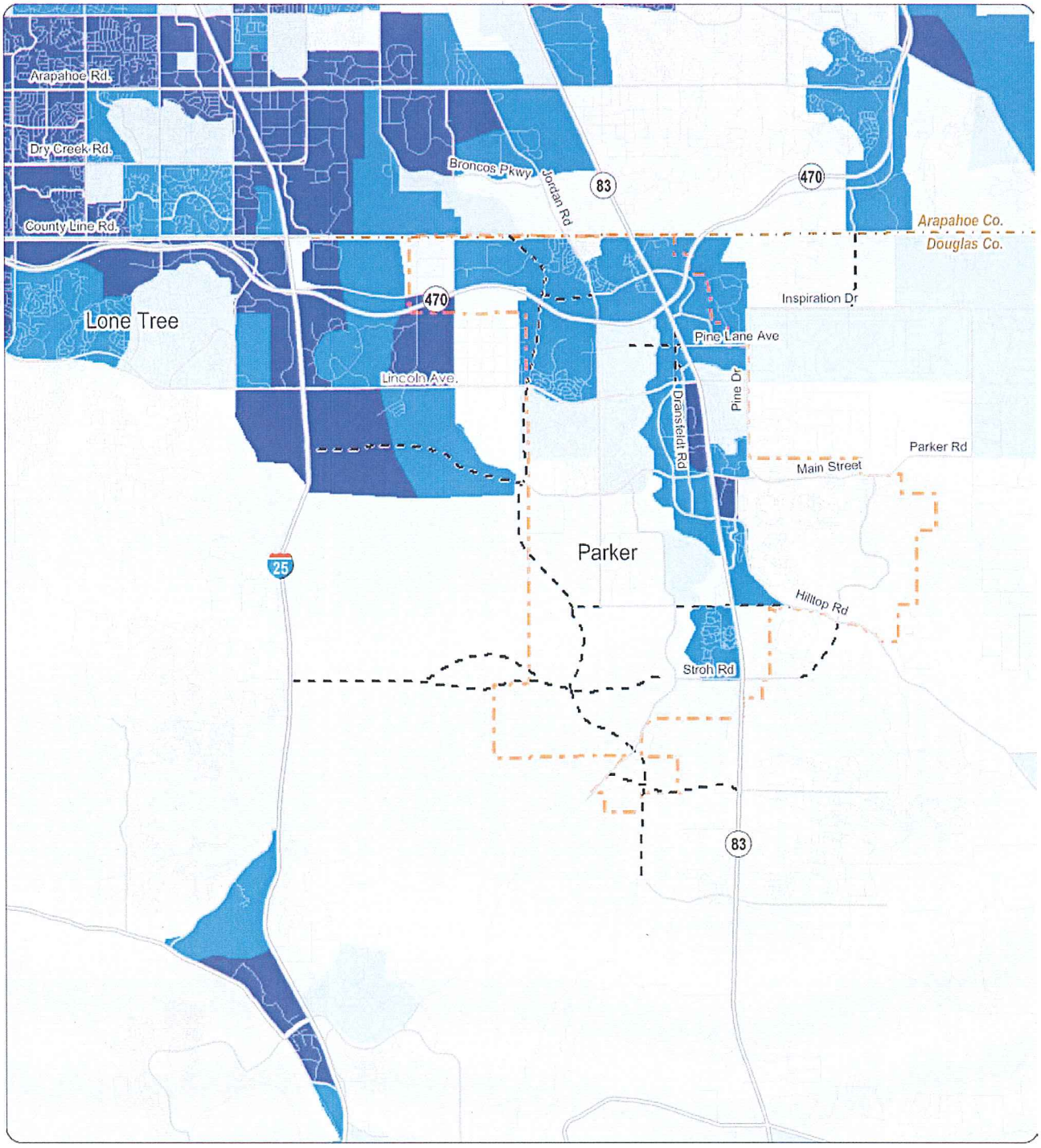
2001 Employment Density

Figure 5



2030 Employment Density

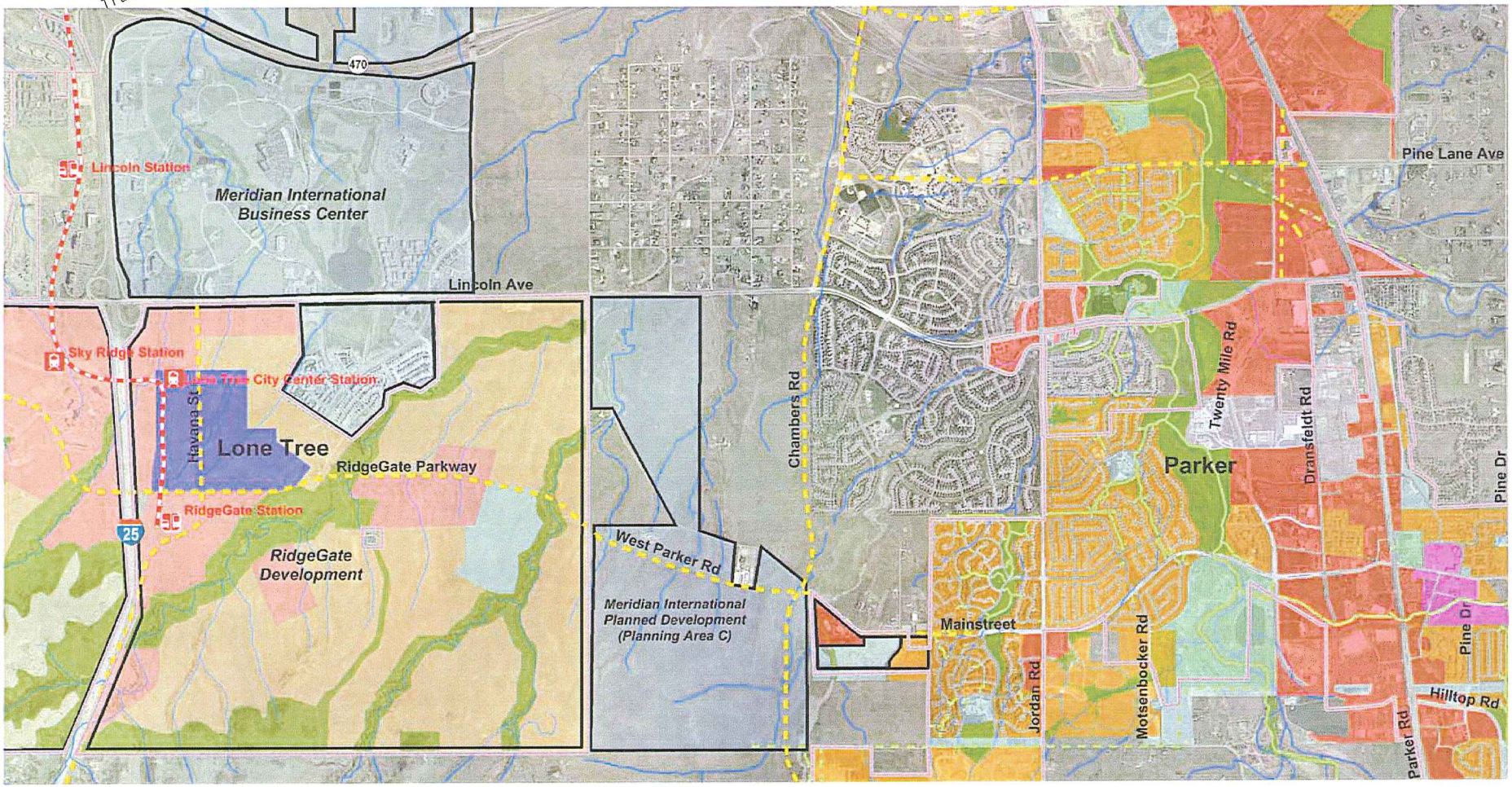
Figure 6



Fixed Guideway Transit Study

Parker and Lone Tree Development

Figure 7

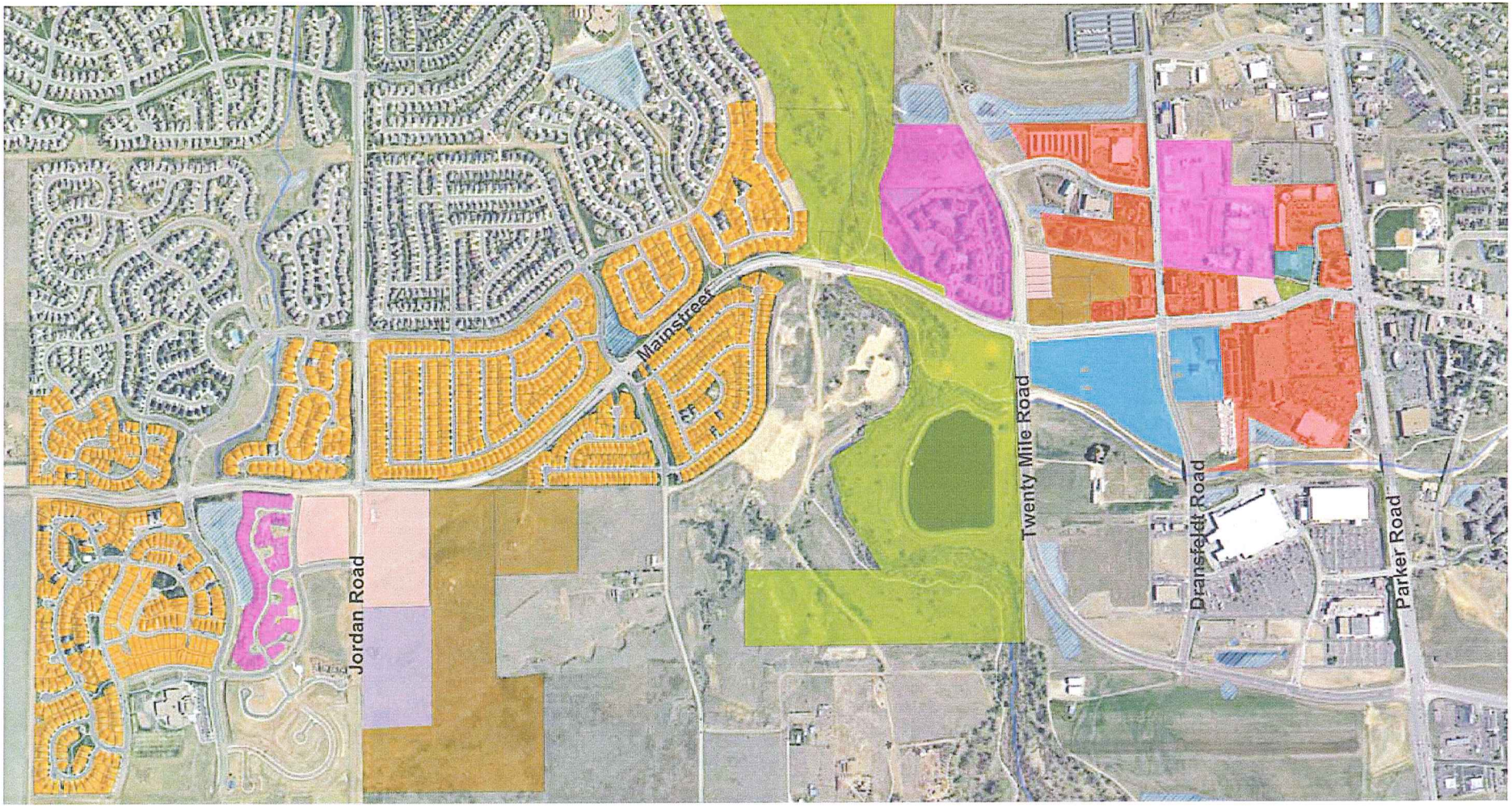


Sources: Town of Parker and the Lone Tree Rail Extension LMIS

Town of Parker COLORADO

Mainstreet Corridor Development

Figure 8



2.2 Travel Patterns

The regional travel model was utilized to depict the current (2004) and future (2030) travel patterns.

Existing Travel Patterns

- Currently, most work trips that begin in Parker travel north to Aurora, east along C-470 or northwest to the Denver Tech Center and Downtown Denver to go to work. **Figure 9, 2000 Work Trip Destinations from Parker,** depicts the existing work trip destinations from Parker (beginning in Parker.)

- By contrast, most of the work trips that end in Parker come from the immediate surrounding area. There is a slight south to north travel pattern, however, with greater trip densities coming from the south to Parker than from the north. **Figure 10, 2000 Work Trip Destinations to Parker,** depicts the existing work trip origins to Parker.

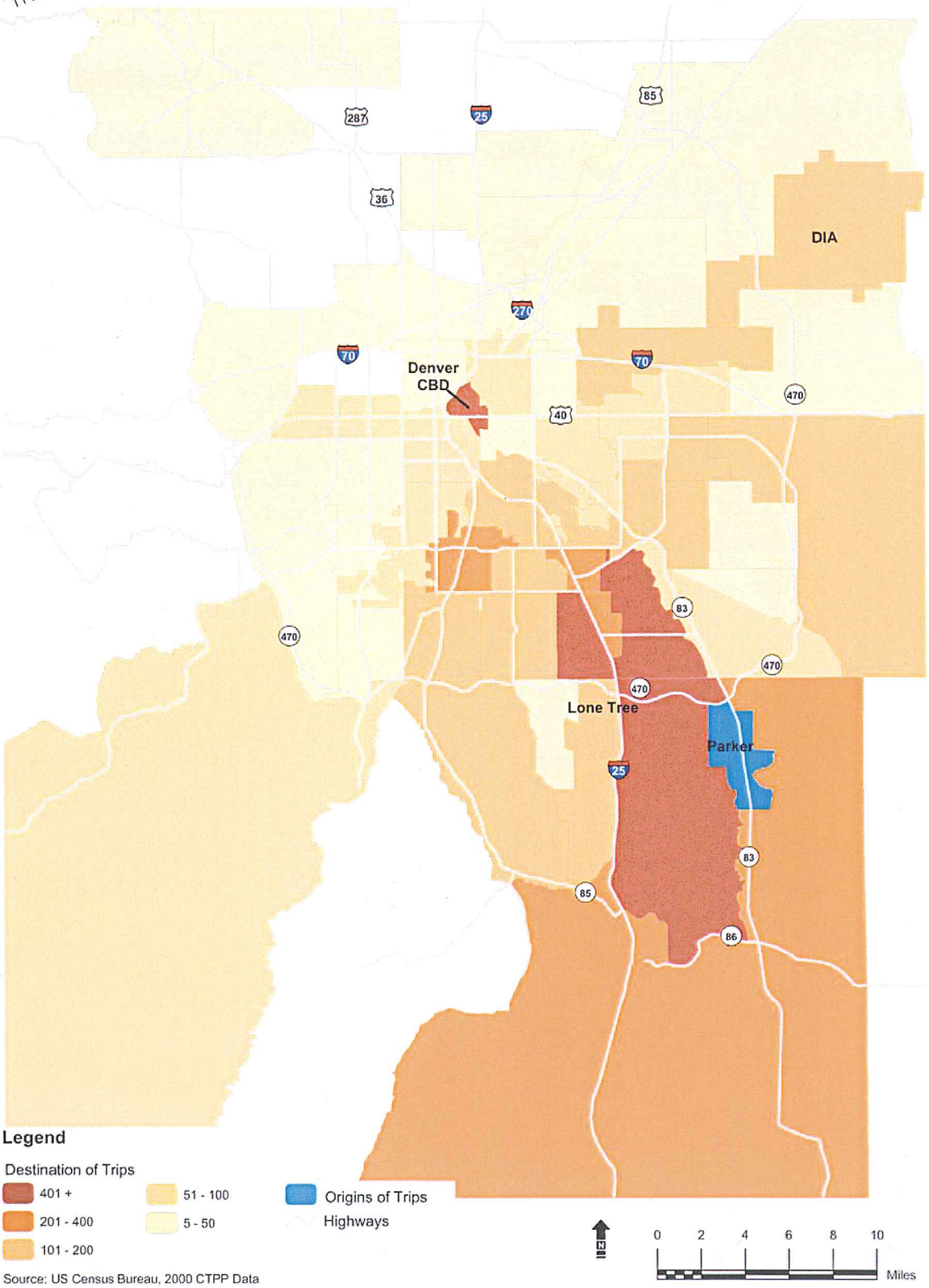
Future Travel Patterns

By 2030, work trips beginning in Parker will have more dispersed destinations, with additional concentrations east of C-470 as well as greater (denser) concentrations north along Parker Road and northwest along I-25. **Figure 11, 2030 Work Trip Destinations from Parker,** depicts future work trip destinations from Parker.

By 2030 there will be more work trips coming to Parker, but they will also be coming from more dispersed locations. More trips to Parker will continue to come from the south than the north, but greater concentrations of trips will be coming from Aurora and the C-470 corridor north and northeast of the Parker area. **Figure 12, 2030 Work Trip Destinations to Parker,** depicts future work trip origins to Parker.

2000 Work Trip Destinations from Parker

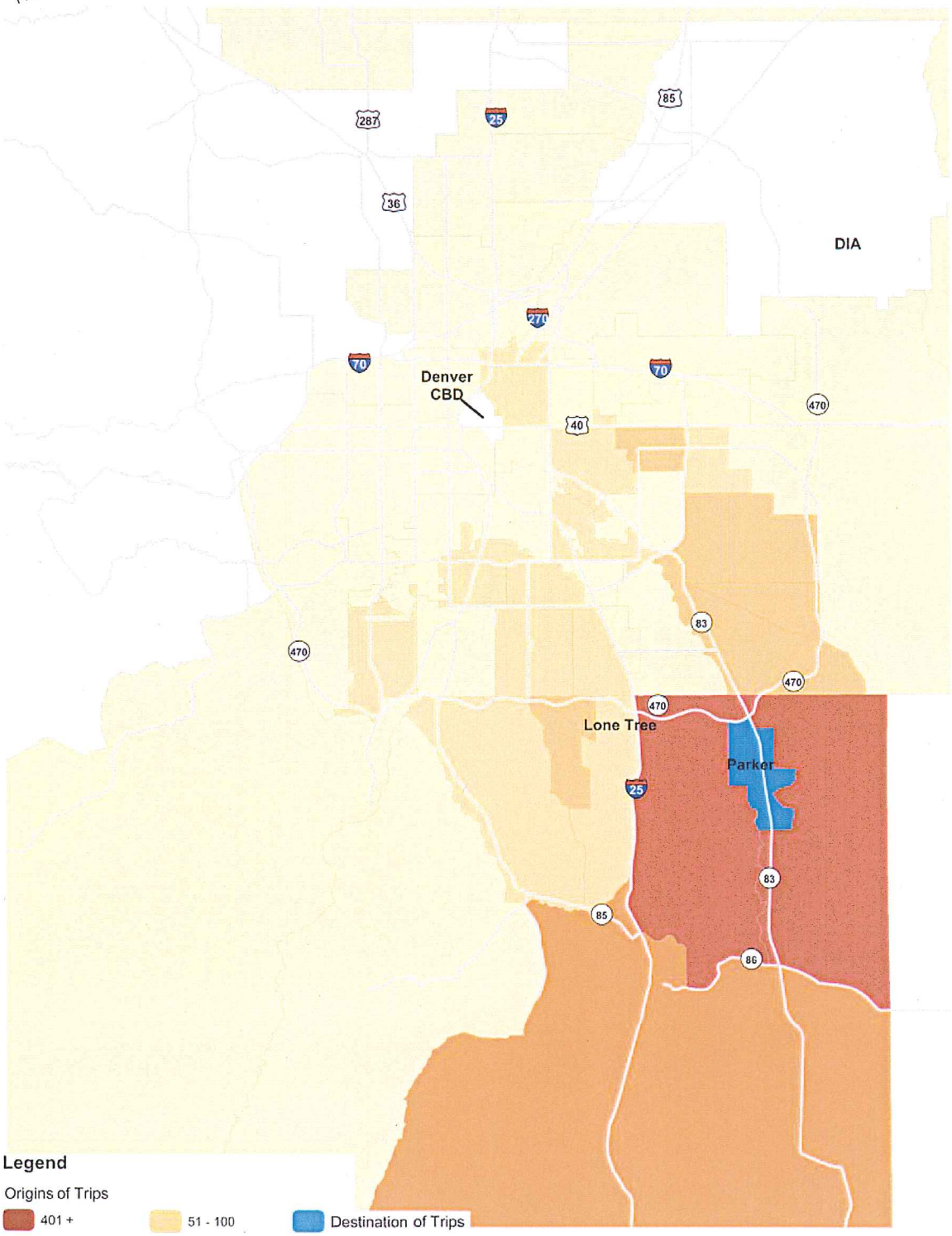
Figure 9



Source: US Census Bureau, 2000 CTPP Data

2000 Work Trip Origins to Parker

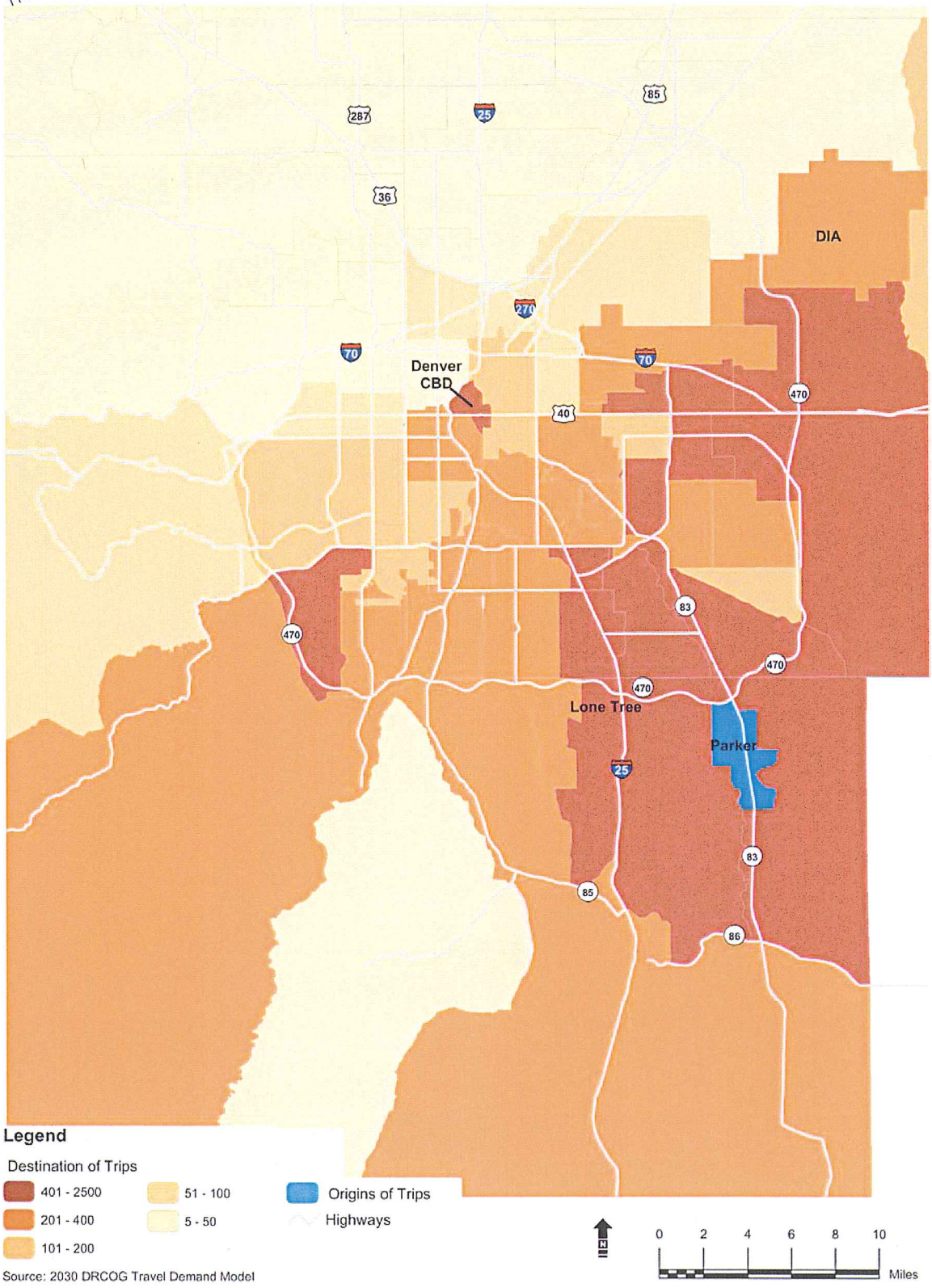
Figure 10



Source: US Census Bureau, 2000 CTPP Data

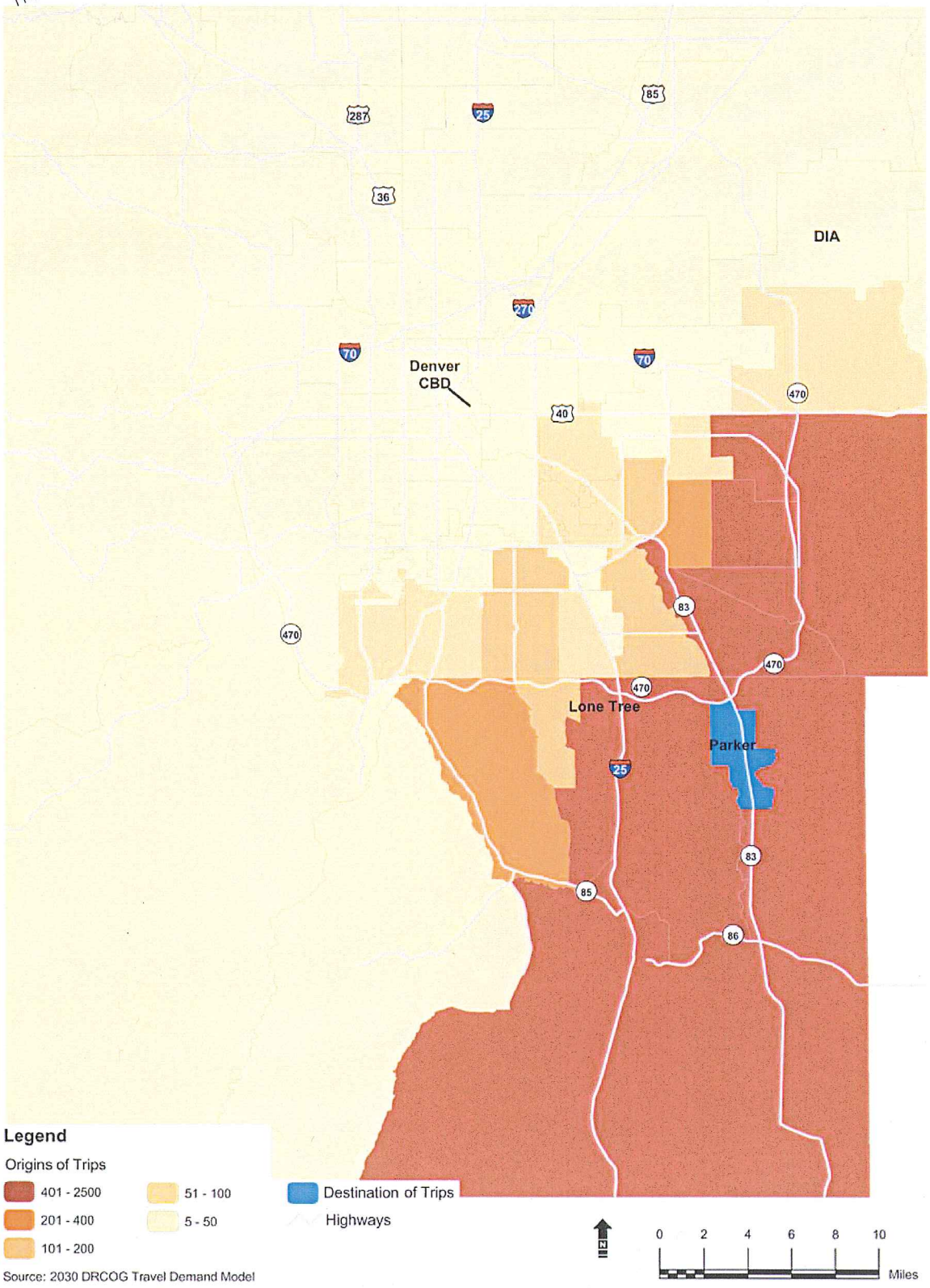
2030 Work Trip Destinations from Parker

Figure 11



2030 Work Trip Origins to Parker

Figure 12



2.3 Transportation Facilities and Services

2.3.1. Existing Conditions

Roads

Parker Road is the most significant north-south facility serving the Parker area, and it runs north-south, effectively bisecting the Parker urban service area. East-west facilities include Lincoln Avenue, on the north side of Parker, which connects to I-25, and Mainstreet, running through the center of Parker and curving upward to join Lincoln west of Jordan Road. **Figure 13, Existing Roads,** depicts the current roadway facilities in the study area.

Transit

RTD currently operates three bus routes in the Parker area. Existing transit service is shown on **Figure 14, Existing Transit Facilities and Services**.

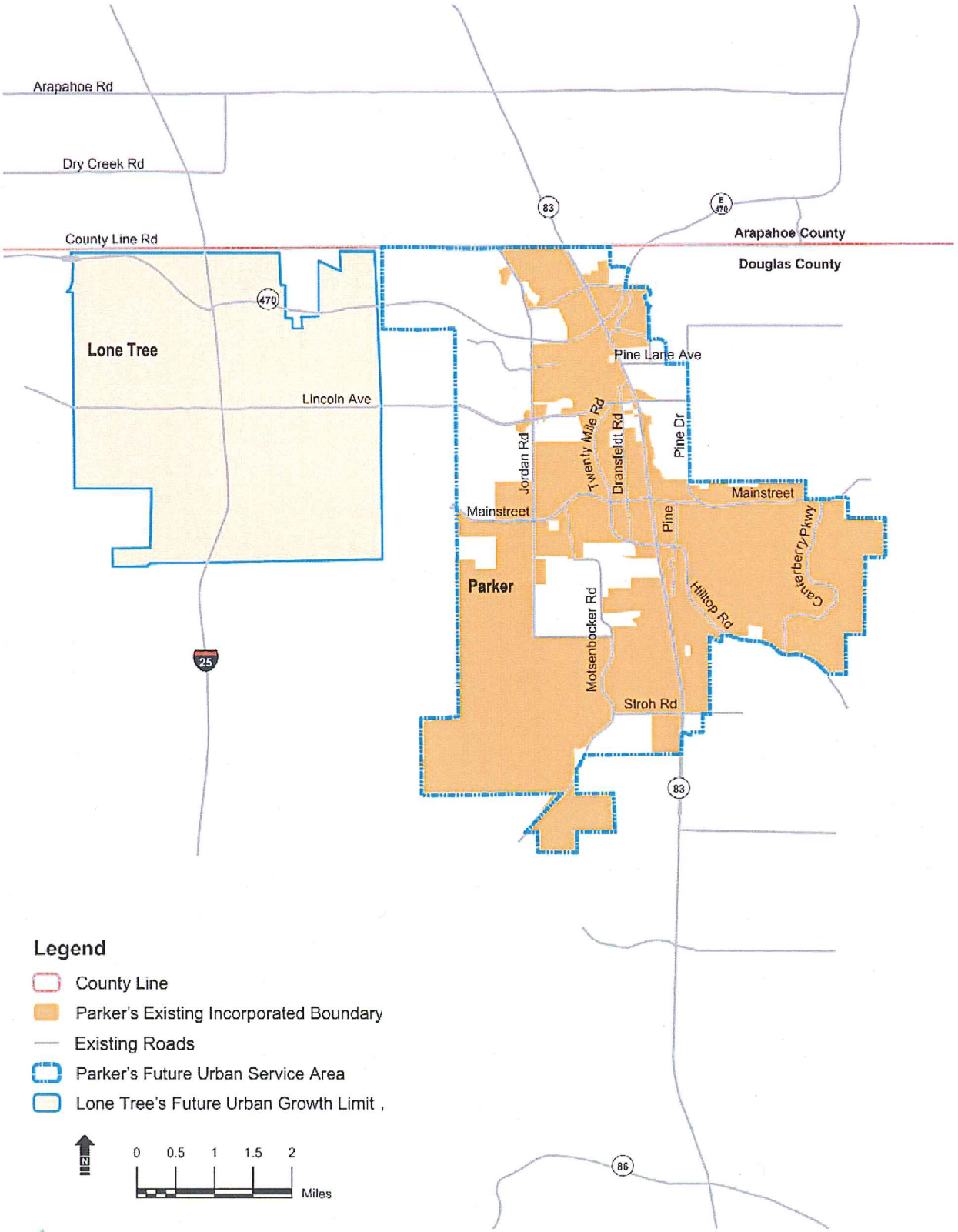
The P, a Regional bus route, operates from Parker to downtown Denver during peak periods. It begins at the Franktown park-n-Ride and stops at Pinery between Franktown and Parker. In Parker, it serves the Parker park-n-Ride, which on average is over 75% utilized. The P also serves the Stonegate park-n-Ride on Lincoln Avenue. Parking demand at Stonegate park-n-Ride typically exceeds the capacity.

Route 66 connects Parker with shopping, service and employment destinations along Arapahoe Road, but operates only on select trips during peak periods.

Route 153 is a north-south route connecting Parker to Aurora. It operates hourly during peak periods.

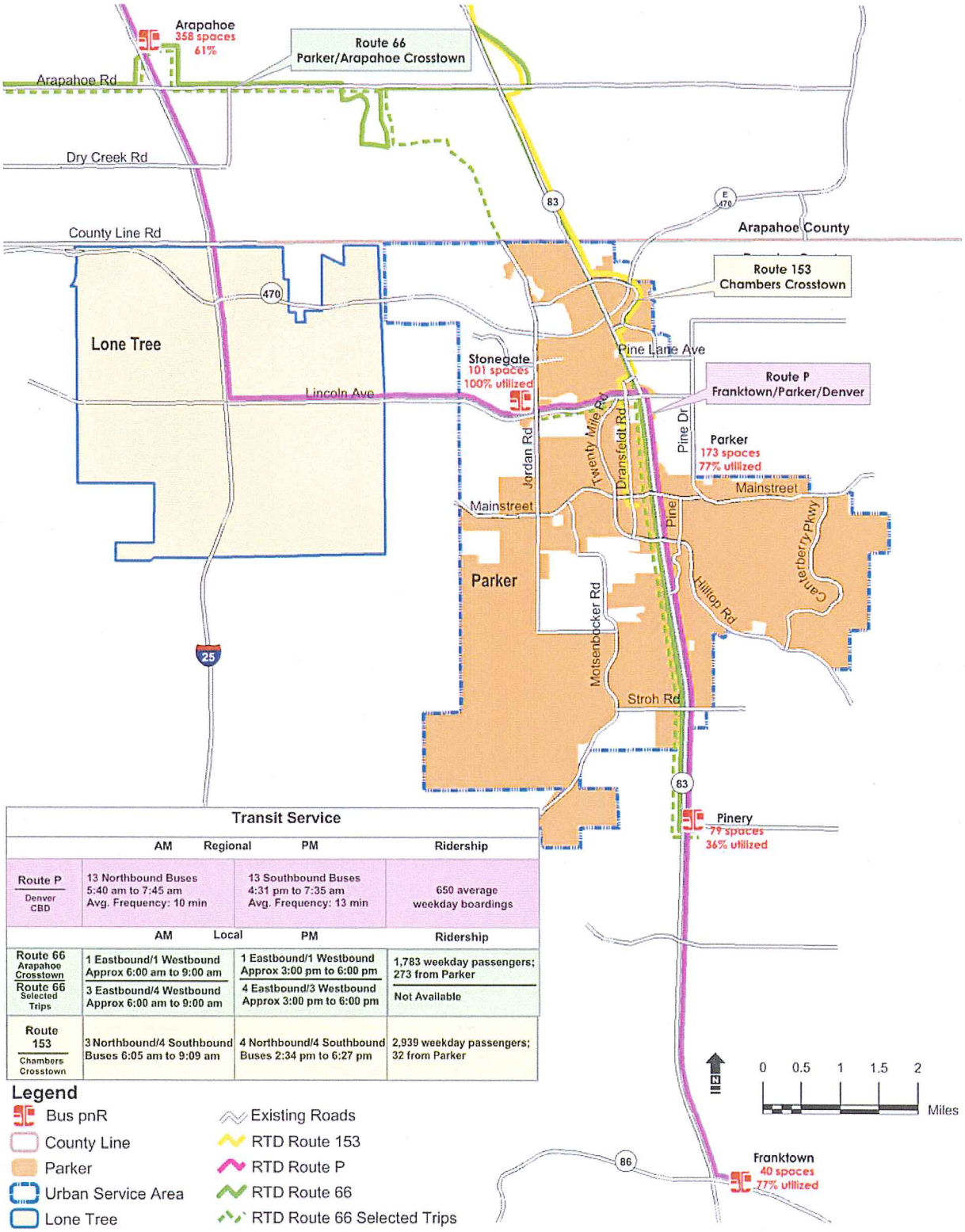
Existing Roads

Figure 13



Existing Transit Facilities and Services

Figure 14



Transit Service			
	AM Regional	PM	Ridership
Route P Denver CBD	13 Northbound Buses 5:40 am to 7:45 am Avg. Frequency: 10 min	13 Southbound Buses 4:31 pm to 7:35 am Avg. Frequency: 13 min	650 average weekday boardings
	AM Local	PM	Ridership
Route 66 Arapahoe Crosstown	1 Eastbound/1 Westbound Approx 6:00 am to 9:00 am	1 Eastbound/1 Westbound Approx 3:00 pm to 6:00 pm	1,783 weekday passengers; 273 from Parker
Route 66 Selected Trips	3 Eastbound/4 Westbound Approx 6:00 am to 9:00 am	4 Eastbound/3 Westbound Approx 3:00 pm to 6:00 pm	Not Available
Route 153 Chambers Crosstown	3 Northbound/4 Southbound Buses 6:05 am to 9:09 am	4 Northbound/4 Southbound Buses 2:34 pm to 6:27 pm	2,939 weekday passengers; 32 from Parker

Legend

- Bus pnR
- County Line
- Parker
- Urban Service Area
- Lone Tree
- Existing Roads
- RTD Route 153
- RTD Route P
- RTD Route 66
- RTD Route 66 Selected Trips

Source: RTD system plan and RTD pnR 6-month average utilization data, June 2004

2.3.2. *Future Conditions*

Roads

As shown in **Figure 15, Future Roads**, Parker's future roadway network will be much more comprehensive, with an extended Chambers Road providing a reliever to Parker Road for north-south travel, and Mainstreet providing additional east-west capacity after extensions are completed in 2013. In addition, Stroh Road will extend from I-25 to Parker Road south of Parker, enabling residents of Franktown and other southern communities to access I-25 closer to their communities rather than having to drive north to Lincoln Avenue. The Town of Parker also has a downtown area circulation plan to facilitate traffic flows onto the most appropriate facilities. Most important to this study, Mainstreet is in its own category (not considered a regional arterial or connection to I-25) within the Town of Parker's jurisdiction.

Transit

In 2006, light rail service will extend to Lincoln Station at Lincoln Avenue and I-25. Bus service will change accordingly, to connect to the light rail system. **Figure 16, Future Transit Facilities and Services,** depicts the future transit facilities and services.

Route P will become Route 410, changing from a Regional to a Local feeder service, and operating from Franktown through Parker to Lincoln Station. It will operate all day, every fifteen minutes during peak periods and every 30 minutes during non-peak periods.

Route 66 will be re-routed to be a solely east-west service along Arapahoe. It will operate all day with service every 30 minutes.

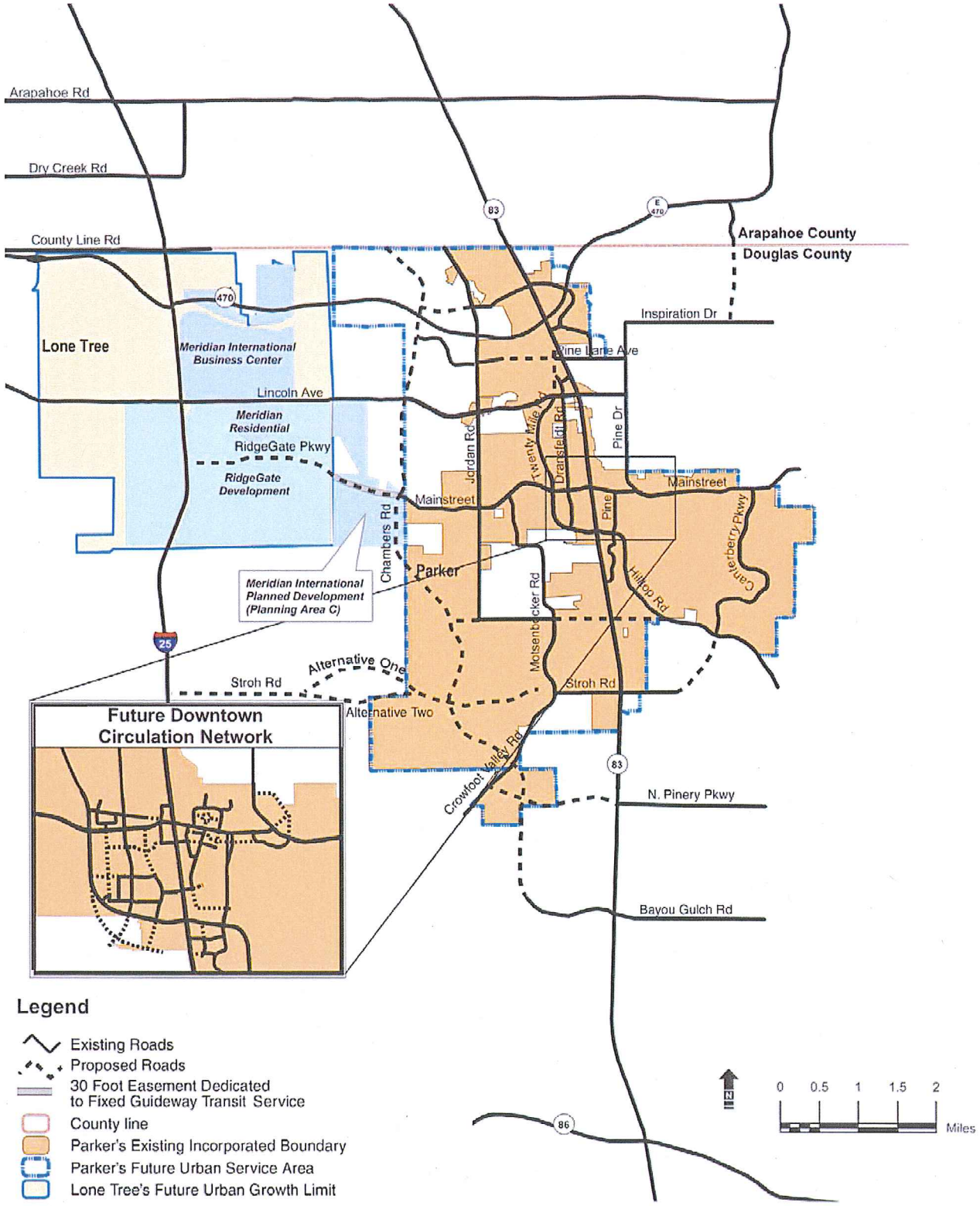
Route 153 will continue to operate along Parker Road, connecting Parker to Aurora (and the Route 66) during peak periods.

In addition, a call-n-Ride service will be implemented to serve most of the Parker area east of Twenty Mile Road. This is a door-to-door service that operates on demand when passengers call to request service.

In 2017, the Southeast Corridor light rail line will be extended to Lone Tree, creating the potential for a direct connection with Mainstreet at RidgeGate station.

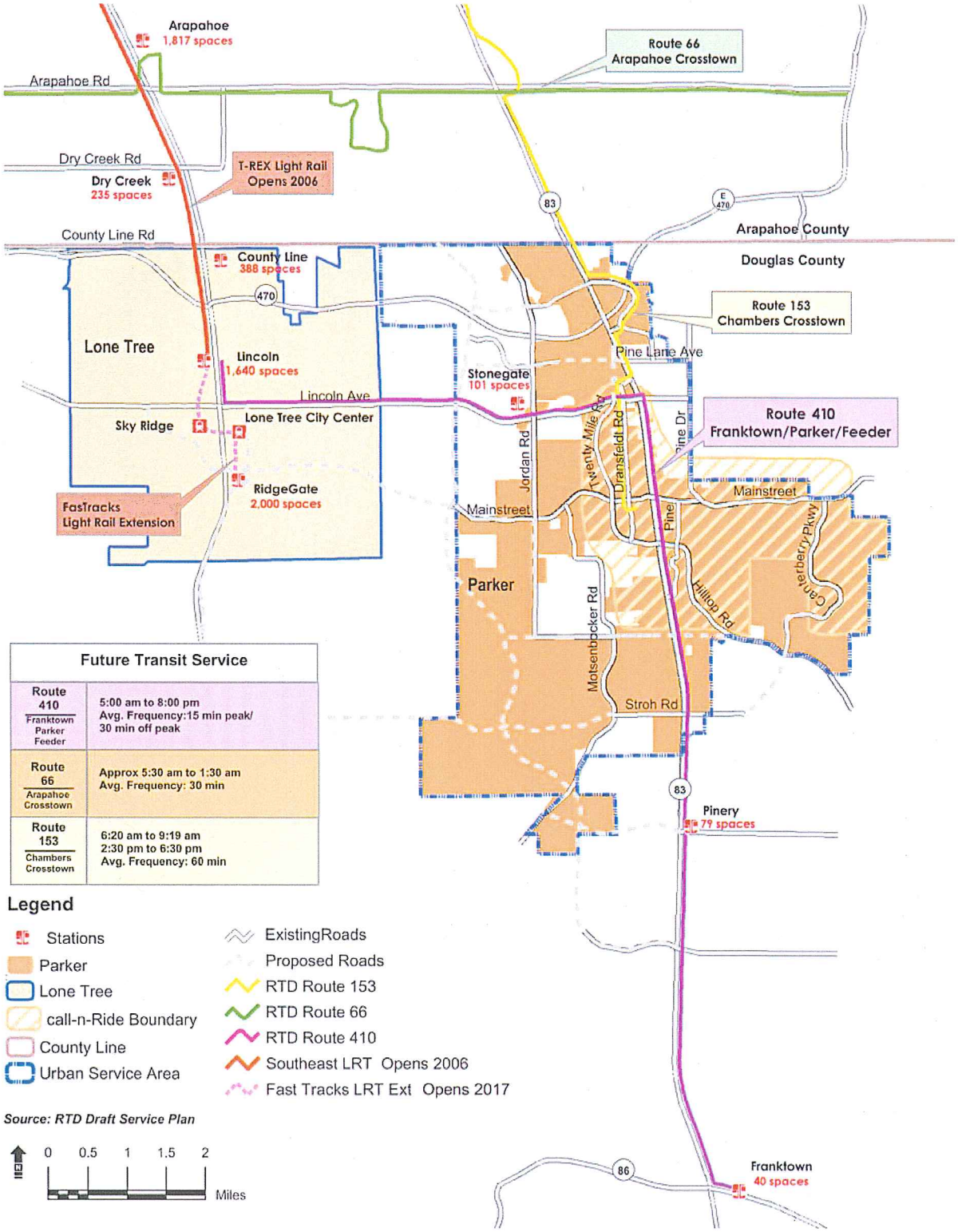
Future Roads

Figure 15



Future Transit Facilities and Services

Figure 16



3. PUBLIC AND AGENCY INVOLVEMENT

During the course of the project, public comments, ideas and review were solicited through a variety of media, including stakeholder meetings, neighborhood meetings, telephone surveys, mail-in surveys and by website.

3.1 Parker Master Plan Update

As part of the Parker Master Plan Update, Parker residents' opinions were asked by telephone, website and in various public and neighborhood meetings. Questions and responses concerning transportation issues included:

- How should future transportation investments be prioritized?
  - 84% said encouraging more public transportation and 65% said extending LRT to Parker is important
- What is your level of interest in using LRT?
  - 40% said they'd use it at least once a week
- Describe the ideal Parker in the next 20 Years?
  - Public transportation with central hub
  - FasTracks to Parker
  - Diversity of transportation options
  - More transit opportunities, bus and light rail
- What are your personal transportation preferences?
  - Ease of mobility
  - Mass transit/light rail to Parker
  - Better bus servcie
  - Transit hub
  - Well connected with the regional transportation network
  - Public transportation system
  - Centralized transit center
  - Additional park-n-Rides

The surveys and meetings that generated the responses were conducted in the summer and fall of 2004 during Phase I of the Master Plan Update.

In future phases of the Master Plan Update, the public will be consulted again, to review the results of the first phase of public involvement and to publicize and review the results of the Town of Parker *Fixed Guideway Transit Study*.

In Phase 2, topic workshops will be convened to review certain aspects of the Master Plan in depth. In transportation focus groups the study results and potential for the future will be compared with other transportation options.

In Phase III, the public will be asked to develop strategies that are more specific and achievable relative to all the options that had been identified. Then a community response to the strategies will be requested.

Finally, in Phase IV, the draft Master Plan will be made available for community review.

3.2 Stakeholder Meetings

Meeting 1

In November 2004, a stakeholders meeting was convened for the Town of Parker *Fixed Guideway Transit Study*. It included participants from local and county government, RTD, the development community, and property owners. **Appendix A, List of Stakeholders**, contains a list of the stakeholder participants. In this first meeting, the stakeholders were asked to:

- Review prior study conclusions and identify key questions and issues to be addressed by the study.
- Review and update development plans,
- Review and comment on potential transit service options, and
- Review and revise potential study goals and evaluation criteria.

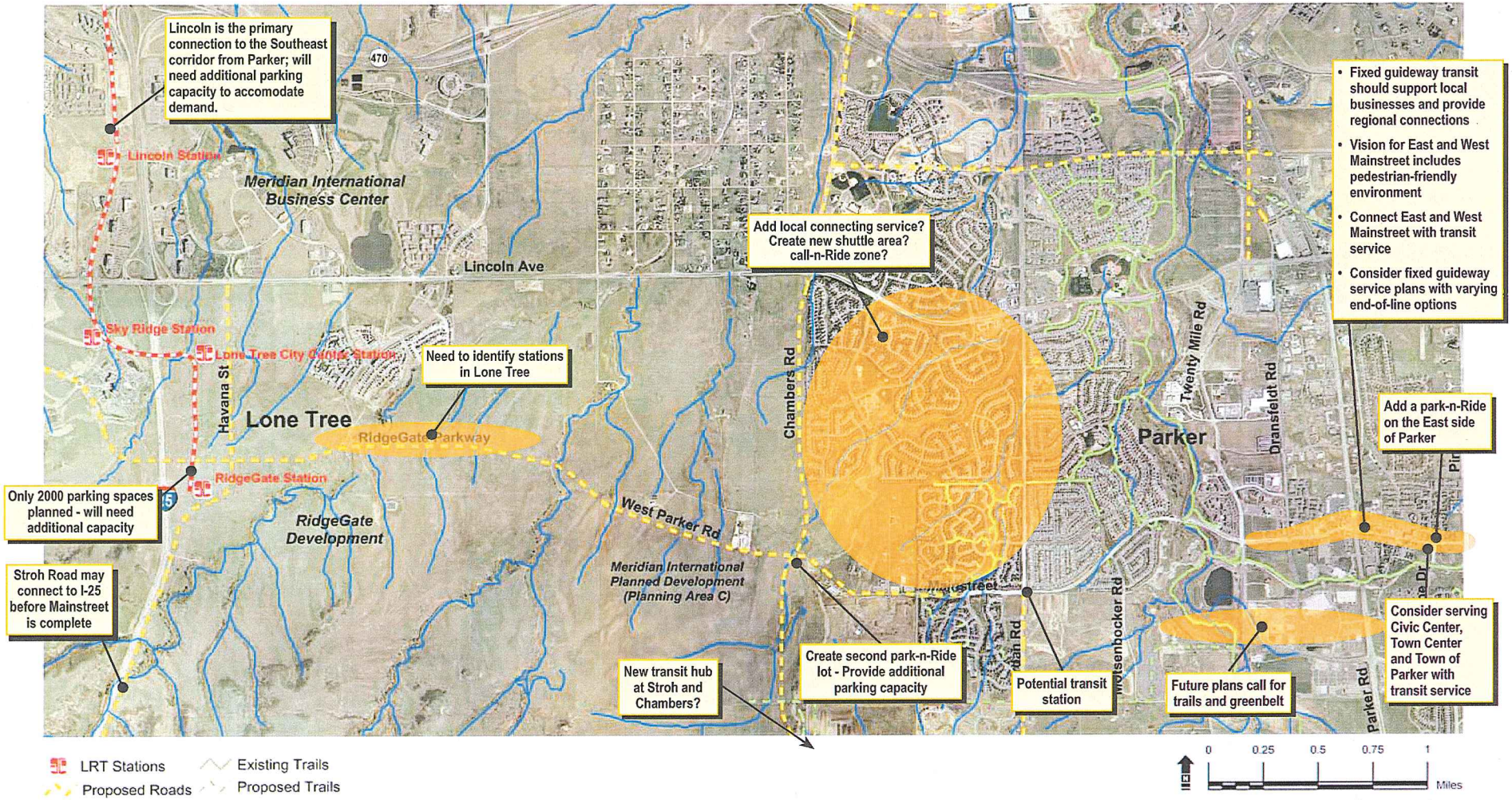
The following outcomes resulted from the November Stakeholders' Meeting. They are also summarized in **Figure 17, Stakeholder Comments**.

Modes

Participants indicated an interest in testing a light rail alternative and a bus rapid transit alternative. They acknowledged that bus rapid transit represents lower costs, but they were also interested in the difference in ridership if passengers were not forced to transfer modes at RidgeGate Station.

Stakeholder Comments*

Figure 17



Sources: Town of Parker and the Lone Tree Rail Extension LMIS

* *Received at Stakeholder Meeting on November 10, 2004.*

Stations

Participants indicated that stations should be located in the following areas:

- Parker Town Center (East of Parker Road)
- Proposed Parker Transit Hub (a new facility at Mainstreet and Dransfeldt Road)
- Mainstreet and Jordan
- Mainstreet and Chambers
- Along RidgeGate Parkway in locations to be determined

Park-n-Rides

Participants also indicated interest in additional park-n-Ride facilities along the corridor. In anticipation of the growth that is planned south of the corridor along Chambers and along Stroh Road, they recommended that the feasibility for park-n-Rides be assessed at:

- Mainstreet and Dransfeldt (Proposed Parker Transit Hub to replace Parker park-n-Ride)
- Near Town Hall (east of Parker Road)
- Mainstreet and Chambers
- Chambers and Stroh Road
- Along RidgeGate Parkway

End of Line Options

Recognizing Parker Road as a barrier to pedestrian access along Mainstreet, stakeholders recommended that the study team test end points both east and west of Parker Road. In addition, the stakeholders were interested in how ridership would increase if direct service (with no transfers) were offered from Franktown to RidgeGate Station.

Meeting 2

In June of 2005, a second stakeholders meeting was convened to review the technical results of the alternatives analysis. In this meeting the stakeholders were asked to:

- Review their prior comments;
- Review the alternatives selected for analysis (one LRT alternative and one BRT alternative);

- Review the technical results of the analysis (ridership, travel time, costs, etc.);
- Comment on the recommended design and configuration of the alternatives along Mainstreet; and
- Recommend a transit alternative.

During the meeting the stakeholders discussed the advantage of an alternative that could be implemented more quickly, as opposed to an alternative that could take longer to fund. RTD staff confirmed that by approximately 2019 to 2020 the agency would have funding available for "new" (non-FasTracks programmed) projects, and that the incremental capital cost of funding a BRT service would be far less than funding an LRT extension.

Stakeholders also discussed the advantage of identifying their preferred alternative early, as other municipalities would surely also be interested in future transit improvements. RTD staff confirmed that the *Town of Parker's Fixed Guideway Feasibility Study* is likely the first of many requests for transit improvements over and above FasTracks, and, after the study's recommendation is approved by the RTD Board, that Parker would be the first in line to receive funding for improvements.

The stakeholders collectively endorsed the BRT alternative for the following reasons:
- It is less costly than LRT, and can be built incrementally and more quickly.
- It is flexible enough to serve multiple endpoints.
- It could eventually be converted to an LRT service if sufficient ROW width is purchased at the outset.
- It connects East and West Mainstreet, making it more compliant with the Master Plan than the LRT alternative.

The stakeholders also expressed preferences regarding how and where BRT should operate along Mainstreet:

Support for curbside:
- BRT should run along the curb in split lanes – it makes service more accessible to pedestrians, making them use Mainstreet like they would a "rural LoDo".
- BRT would fit the street character better along the curb

Support for median running:
- If BRT were in the median, it would lower overall traffic speeds on Mainstreet.
- Median stations encourage, not discourage, the Town's vision for Mainstreet.

As a result of the second stakeholders meeting, the BRT alternative was advanced as the locally preferred alternative and a recommendation was made to incorporate the results into the *West Mainstreet Design Study*.

4. ALTERNATIVES DEVELOPMENT

4.1 Service Options

Mainstreet has the potential to include a variety of fixed guideway options, including light rail and bus rapid transit. However, Parker Road creates a barrier to transit service because of its wide cross section and high travel speeds. Therefore, for east Mainstreet to connect to the light rail service extending to RidgeGate, three general fixed guideway service options were considered:

1. Extend the Southeast Corridor light rail line east from RidgeGate and stop in Parker west of Parker Road.
2. Provide (light rail or bus rapid transit) shuttle service between the light rail terminus in Lone Tree and downtown Parker.
3. Provide (bus rapid transit) commuter service that links Franktown, Parker and Lone Tree to the Southeast Corridor light rail line at RidgeGate.

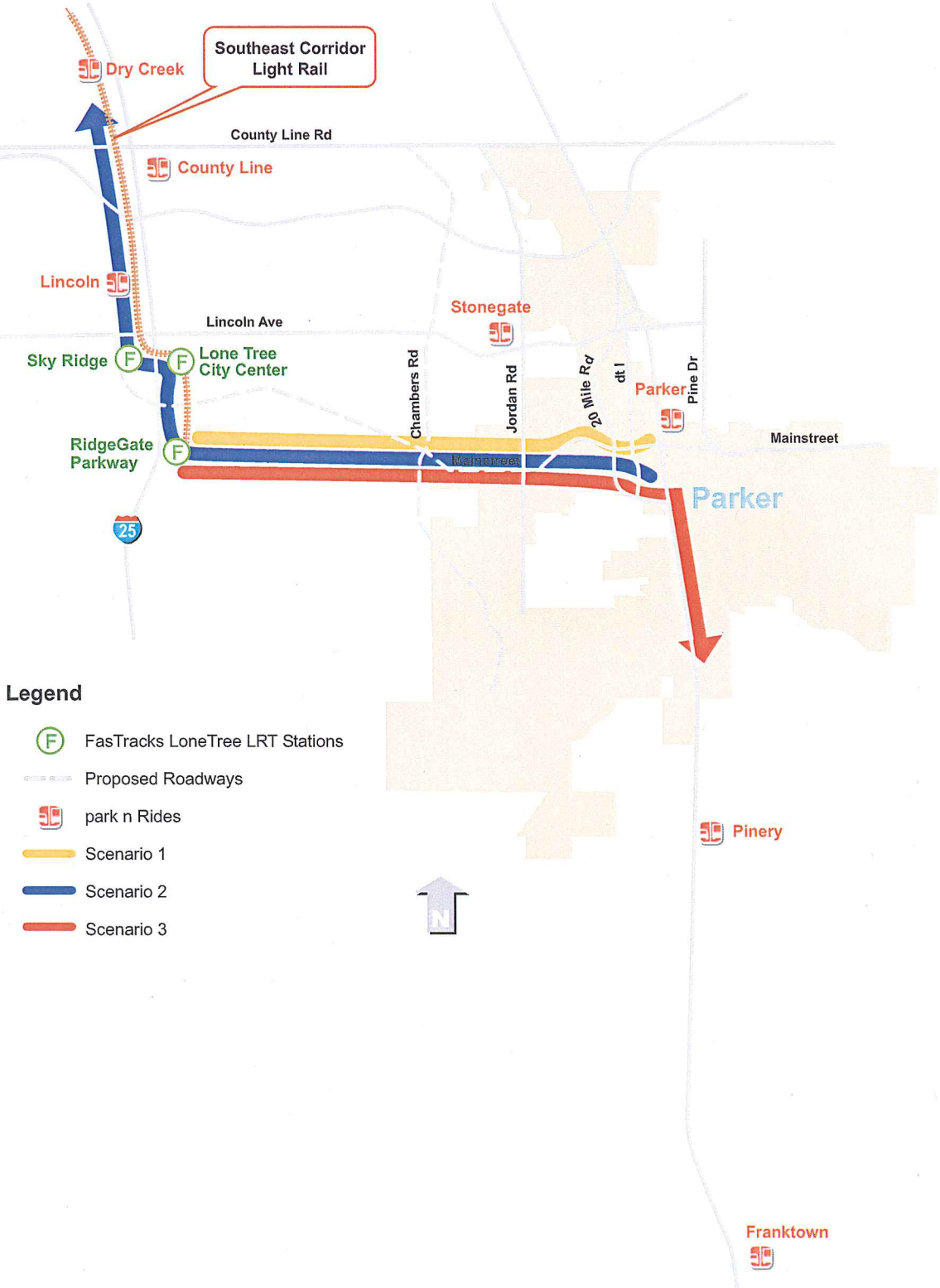
The service options are depicted graphically in **Figure 18, Service Options**.

Several items were considered in the development of service options, including:

- Existing transit service,
- Access to potential park-n-Ride locations,
- Connecting to T-REX light rail transit service as well as to the future Lone Tree extension,
- Longer-term FasTracks program, and
- Development trends.

Other considerations also influenced the development and analysis of service options, as documented in the following sections.

Figure 18


Southeast Corridor Light Rail
Dry Creek
County Line Rd
County Line
Lincoln
Lincoln Ave
Sky Ridge
Lone Tree City Center
RidgeGate Parkway
25
Stonegate
Chambers Rd
Jordan Rd
20 Mile Rd
dt l
Parker
Pine Dr
Mainstreet
Parker
Pinery
Franktown
Legend
FasTracks LoneTree LRT Stations
Proposed Roadways
park n Rides
Scenario 1
Scenario 2
Scenario 3
N

4.2 Alignment

To develop the alternatives the project team utilized stakeholder comments as well as recommendations from prior studies and data from the regional travel model.

Prior studies indicated that the most feasible alignment for fixed guideway service is on Mainstreet, for the following reasons:

- Shortest route;
- Least costly;
- Opportunity to reserve ROW (minimal existing development along corridor);
- No necessary grade-separations at crossings;
- Pedestrian-accessible station areas;
- Potential park-n-Ride locations immediately adjacent to the alignment; and
- Connects the town centers of Parker and Lone Tree.

However, stakeholders expressed interests in developing alternatives diverse enough to test different:

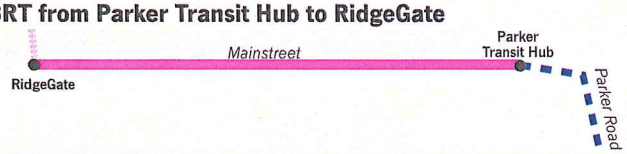
- End points
- Service types, and
- Service plans.

As summarized in **Figure 19, Alternatives Development**, and depicted in **Table 1, Narrowing the List of Potential Alternatives for Testing**, the list of potential alternatives to test narrowed for both technical and logistical reasons.

BRT Proposed Alternatives

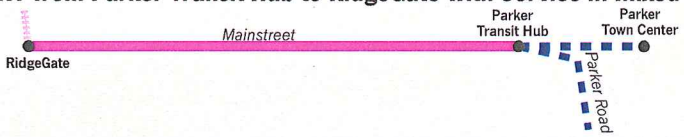
Comments

BRT from Parker Transit Hub to RidgeGate



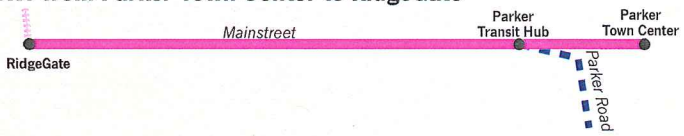
- No connection across Parker Road to tie in east and west Mainstreet
- Requires transfer at Parker Transit Hub from Franktown buses.

BRT from Parker Transit Hub to RidgeGate with Service in Mixed Traffic to Parker Town Center



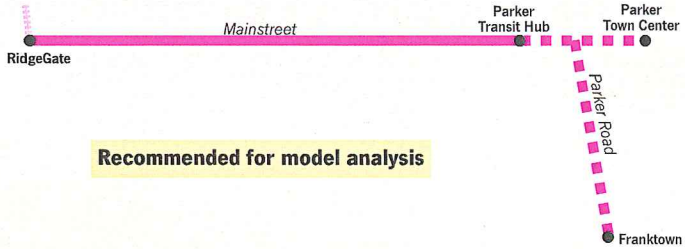
- Inefficient operations - would require passenger transfer from feeder bus east of Parker Road and from Franktown

BRT from Parker Town Center to RidgeGate



- Requires transfer at Parker Transit Hub from Franktown buses
- Fixed guideway BRT on East Mainstreet provides little travel time advantage

BRT from Parker Transit Hub to RidgeGate with Service in Mixed Traffic to Franktown and Parker Town Center



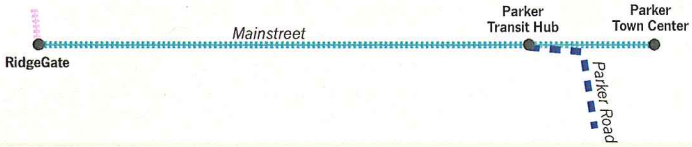
Recommended for model analysis

- Provides direct connections from east and south; minimizing passenger transfers

LRT Proposed Alternatives

Comments

LRT "Shuttle" from Parker Town Center to RidgeGate

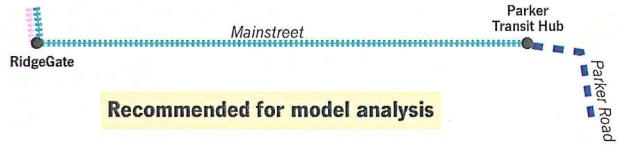


- Crossing Parker Road is expensive
- Limited ROW on east Mainstreet
- Requires transfer to southeast LRT

LRT "Shuttle" from Parker Transit Hub to RidgeGate

- Requires transfer to southeast LRT

LRT from Parker Transit Hub to Denver



Recommended for model analysis

- Provides "one seat ride" on LRT from Parker to Denver area.

Legend

- BRT on Fixed Guideway
- BRT in mixed traffic
- Bus in mixed traffic
- Southeast LRT
- LRT on Mainstreet

Table 1:
Narrowing the List of Potential Alternatives for Testing

Alternative	Action	Explanation
LRT - RidgeGate to Parker Transit Hub	Screen Out	LRT operated as a shuttle between Parker and Lone Tree forces transfers, losing the cost effectiveness of the investment
LRT - RidgeGate to Parker Town Center	Screen Out	
LRT - Downtown to Parker Transit Hub	**Advance**	Offers a "one-seat ride" between Parker and downtown Denver
LRT - Downtown to Parker Town Center	Screen Out	There is no available ROW for the fixed guideway east of Parker Road
BRT - RidgeGate to Parker Transit Hub	Screen Out	Each only serves limited number of potential transit markets, losing the flexibility benefits of bus service
BRT - RidgeGate to Parker Town Center	Screen Out	
BRT - RidgeGate to Franktown	Screen Out	
BRT - RidgeGate to Parker Town Center and Franktown	**Advance**	Serves all three potential end-of-line locations, crosses Parker Road and provides information on the number of potential riders who are deterred by a transfer to rail at RidgeGate

At a working session with RTD and Town of Parker staff, it was agreed to test one LRT and BRT alternative using the regional travel model to forecast potential ridership. They were particularly interested in the following key questions:

- What is the ridership on an LRT service offering Parker residents a "one seat ride" (no transfers) from Parker to Downtown Denver

  vs

  ridership on a BRT system that would require a transfer to LRT at RidgeGate Station?

- What is the ridership on a BRT system that serves Franktown

  vs

  ridership on a BRT system that serves Parker only?

- What is the potential park-n-Ride use and ridership if services and facilities were extended to East Mainstreet (Parker Town Center)

  vs

  park-n-Ride use and ridership if service terminated at Mainstreet and Dransfeldt (west of Parker Road)?

As depicted in **Figure 19**, **Alternatives Development,** the final fixed guideway alignment alternatives selected included:

LRT: Continuing service from the Southeast Corridor beyond the planned terminus at RidgeGate to the Parker Transit Hub along Mainstreet.

BRT: Fixed guideway bus service from the RidgeGate Station to Parker Town Center, as well as to Franktown, via Parker Transit Hub, using Mainstreet and Parker Road.

4.2.1. Alignment Configuration

To accommodate the fixed guideway more easily into the Mainstreet right of way, the guideway can be located either in the median or along a curb, in a variety of configurations. Median-running and curbside-running configurations have different advantages and disadvantages to passengers, traffic and surrounding land uses. To determine the placement of the fixed guideway, the following elements were considered:

- Right of way width
- Adjacent land uses
- Town of Parker Vision, and
- Development trends

Ultimately, a mix of configurations were recommended to best fit the right-of-way as well as development and traffic constraints. **Figure 20, Evaluation of LRT and BRT Alignment Configurations,** depicts the recommended placement of the fixed guideway on Mainstreet by section.

4.3 Stations

Based on stakeholder comments as well as ridership information from the regional travel model, varying station locations were considered along each alignment. Stakeholder comments concerning stations and park-n-Rides are summarized below:

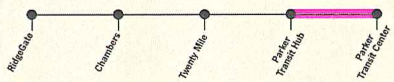
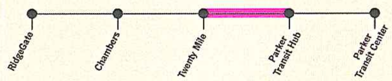
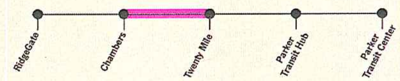
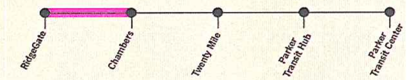
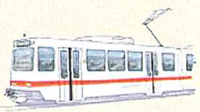
- Parker Town Center:

The Town of Parker is planning a library and Performing Arts Center near the existing Town Hall—it would be nice to serve that development. People from the eastern Parker would also be more willing to drive to a station east of Parker Road than a station west of Parker Road, so the Town Center station should also have a park-n-Ride.

Evaluation of LRT and BRT Alignment Configurations

Figure 20

Proposed Mainstreet Configurations

	Segment 1	Segment 2	Segment 3	Segment 4
	Parker Road to Town Center "East Mainstreet" 	Parker Road to Twenty Mile "West Mainstreet" 	Twenty Mile to Chambers 	Chambers to RidgeGate 
Character	**Historic, urban walkable community/business/activity center**	**New development, mixed use, retail**	**Parks, single-family residential**	**Commercial, office park, residential**
Existing Right-of-Way Width (approx.)	**60 ft.**	**120 ft.**	**100-140 ft.**	**To be determined**
Automobile and Parking 	**Same as existing:** - 1 travel lane in each direction - Landscaped median - Parallel parking on both sides of the street	**Improvements:** - 2 travel lanes in each direction - On-street parallel parking on north side of the street, angled parking on south side as interim from now until Fixed Guideway system - Median/turn lane - 18-foot pedestrian space (landscaping and sidewalks) on each side of the street	**Improvements:** - 2 travel lanes in each direction - No parking lanes	**To be determined**
LRT 	**N/A (not recommended for model analysis)**	**Dual curbside on south side of the street:** - Common catenary poles and wires, stations - Separates all automobile traffic from transit vehicles, reducing potential conflicts - Retains parking on north side of street - Additional ROW required (need 134')	**Dual curbside on south side of the street:** - Common catenary poles and wires, stations - Separates all automobile traffic from transit vehicles, reducing potential conflicts	**Dual curbside on south side of the street:** - Utilizes 30' buffer provided by Meridian on the south side of the street - Common catenary poles and wires, stations - Separates all automobile traffic from transit vehicles, reducing potential conflicts
BRT 	**On-street in shared lanes:** - Supports walkable environment - High visibility for transit - Maintains travel lanes - Potential conflicts with left turns	**Median:** - Supports walkable environment - High visibility for transit - Common stations - Maintains travel lanes - Potential conflicts with left turns - Requires additional ROW in sections to include parking on both sides of street	**Median:** - Supports walkable environment - High visibility for transit - Common stations - Maintains travel lanes - Potential conflicts with left turns - Requires additional ROW in sections to include parking on both sides of street	**Split, curbside:** - Utilizes 30 foot buffer provided by Meridian in 15' lanes on both sides of the street - Allows most flexibility for street treatments, turning movements, access to both sides of the street - Provides easier passenger access in potentially auto-oriented environment

- Parker Transit Hub
  - The existing Parker park-n-Ride should be relocated to be more accessible to Parker residents as well as to destinations and services along Mainstreet. Structured parking should also be considered.
- Jordan Road
  - There is a concentration of residential development around Jordan Road, making it a good location for a station, but not necessarily a good location for a park-n-Ride.
- Chambers Road
  - Chambers Road is scheduled to be built south to Stroh Road, with substantial development planned at the intersection of Parker and Mainstreet. It should have a station, as well as a park-n-Ride.
- Stroh Road
  - With the amount of traffic that will likely access I-25 from Stroh Road, perhaps a park-n-Ride lot and bus feeder service should be considered at the intersection of Stroh Road and Chambers.
- RidgeGate Development Area
  - At least two stations should be assumed in the RidgeGate development area, otherwise the Lone Tree City Center Station will be overwhelmed by riders from the surrounding developing areas.

All of the stations, with the exception of Stroh Road, were included on both the LRT and BRT alternatives for testing. (Stroh Road was determined to be too far from the Mainstreet alignment to serve efficiently with either the fixed guideway or with a feeder bus.) The station locations in the study area are summarized below:

LRT:

- Parker Transit Hub (Mainstreet and Dransfeldt)
- Jordan Road
- Chambers Road
- Station 4 (in the RidgeGate development—exact location to be determined)
- Station 5 (in the RidgeGate development—exact location to be determined)
- RidgeGate

Note: The LRT service would continue along the Southeast Corridor, serving each of its planned stations as well.

BRT:

Branch 1:

- Franktown
- Pinery
- Parker Transit Hub
- Chambers Road
- Station 4 (in the RidgeGate development—exact location to be determined)
- Station 5 (in the RidgeGate development—exact location to be determined)
- RidgeGate

Branch 2:

- Parker Town Center
- Parker Transit Hub
- Chambers Road
- Station 4 (in the RidgeGate development—exact location to be determined)
- Station 5 (in the RidgeGate development—exact location to be determined)
- RidgeGate

Station locations are depicted graphically in Sections 5.3: park-n-Rides, Section 5.4: LRT Alternative, and Section 5.5. BRT Alternative.

4.3.1. Station Layout

In terms of design, stations can be oriented toward or away from the street where the guideway runs. The station's orientation creates different outcomes and benefits different passengers, as depicted in **Table 2, Station Location Comparison**. Station layout concepts are also depicted on **Figure 21, Station/Stop Concepts**.

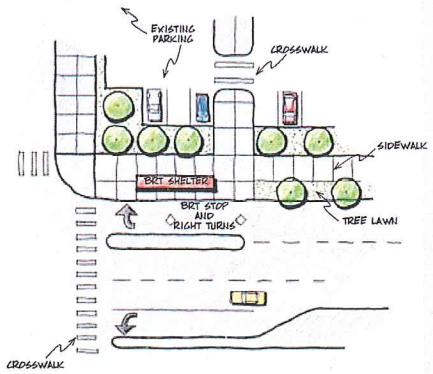
Table 2:
Station Location Comparison

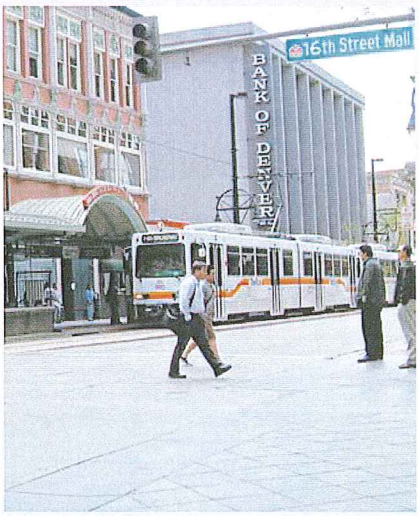
	Advantages	Disadvantages
On-Street Station	▪ Visibility and prominence in the corridor ▪ Promotes walkability ▪ Access to street-side shops and development	▪ Longer walk distance from park-n-Ride ▪ Longer walk distance for connecting bus passengers
Off-Street Station	▪ Centralized services (easy access for park-n-ride patrons and connecting bus passengers)	▪ Less prominence in the corridor ▪ Longer walk distance to access Mainstreet shops and development ▪ No pedestrian "refuge" at a median station area—less walkable

Bus Rapid Transit

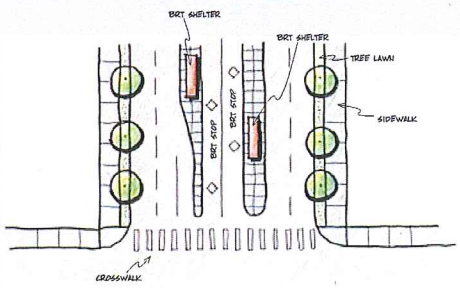
Light Rail

CURB





MEDIAN



MID-BLOCK

4.4 Park-n-Rides

4.4.1. Site Analysis

The Town of Parker conducted a potential park-n-Ride site analysis, and found available sites near the following Mainstreet intersections:

- Mainstreet and Pine (Parker Town Center)
- Mainstreet and Dransfeldt (Parker Transit Hub)
- Mainstreet and Jordan
- Mainstreet and Chambers

The results of the park-n-Ride site analysis are depicted on **Figure 22, park-n-Ride Site Analysis**.

4.4.2. Parking Estimates

The regional travel model provides an initial estimate of the passenger access mode split (either walk access or drive access) to each station, which helps estimate the need for parking. These model estimates are not constrained by the capacity of the streets serving the park-n-Rides, or by the existing infrastructure at the actual sites. A parking management plan using the model estimates and other planning and engineering information, would be required during the implementation phases of the project, to comprehensively determine the amount of parking spaces at each station. However, the initial estimates from the model, along with considerations of site constraints, provide the general magnitude of needed parking spaces and are presented below:

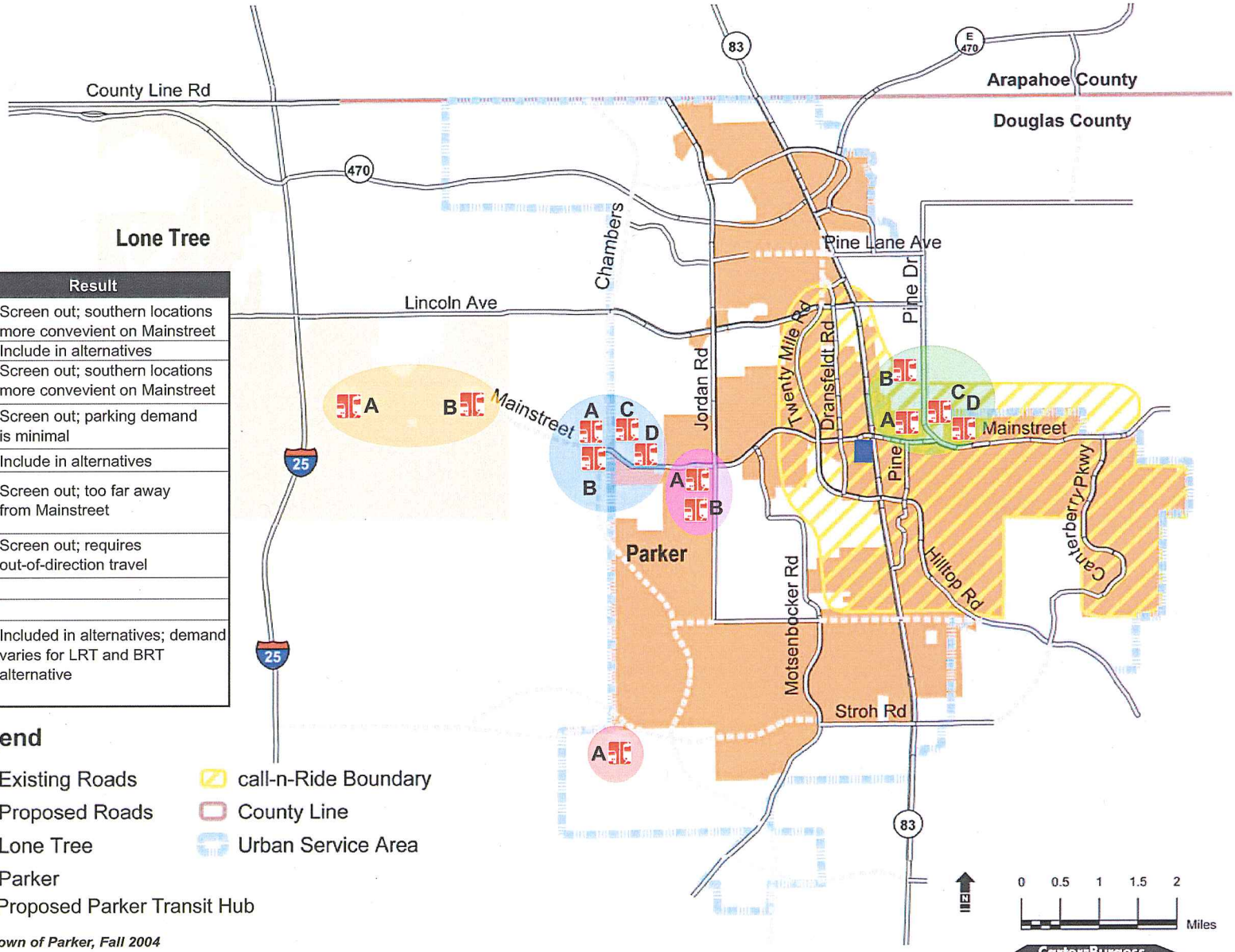
LRT:

Stations	Parking Spaces (2030)
Franktown	400
Pinery	300
Parker Transit Hub	700
Jordan Road	100
Chambers Road	800
Station 4	600
Station 5	0
RidgeGate	2,000 (current FasTracks estimate)

park-n-Ride Site Analysis

Figure 22

park-n-Ride	Acres	Spaces	Result
Chambers A	29	1450	Screen out; southern locations more convevient on Mainstreet
Chambers B	28.4	1420	Include in alternatives
Chambers C	100	TBD	Screen out; southern locations more convevient on Mainstreet
Chambers D	20	100	
Jordan A	5	250	Screen out; parking demand is minimal
Jordan B	5.2	260	
Town Hall A	8.4	420	Include in alternatives
Town Hall B	18	900	Screen out; too far away from Mainstreet
Town Hall C	10	500	
Town Hall D	35	1780	
Stroh A	134	6720	Screen out; requires out-of-direction travel
RidgeGate A	TBD	TBD	
RidgeGate B	TBD	TBD	
Parker Transit Hub (replaces current Parker park-n-Ride	TBD	300 to 700	Included in alternatives; demand varies for LRT and BRT alternative



Source: Town of Parker, Fall 2004

BRT:

Stations	Parking Spaces (2030)
Franktown	300
Pinery	400
Parker Town Center	50
Parker Transit Hub	450
Chambers	200
RidgeGate	2,000 (current FasTracks estimates)

4.5 LRT Alternative

4.5.1. Alignment and Service Plan

As shown in **Figure 23, LRT Alternative**, an LRT Alternative was developed that would begin in Parker at the proposed transit hub at Dransfeldt and Mainstreet and run to Denver Union Station (DUS) every 15 minutes and to Downtown Denver (18th and Stout) every 10 minutes during peak periods. This equates to ten (10) trains per hour during the peak periods. During the off-peak, LRT trains would run to DUS every 15 minutes, to 18th and California every 30 minutes, and to 40th/40th every 30 minutes, for a combined headway of one train every 7.5 minutes.

4.5.2. Alignment Configuration

The eastbound and westbound LRT guideways would be located side-by-side on the south side of Mainstreet. This would allow the use of one catenary system, as well as the shared use of common station platforms for eastbound and westbound passengers. In addition, it reduces potential traffic conflicts by maintaining left turn lanes and consolidating potential right turn conflicts to only one side of the street.

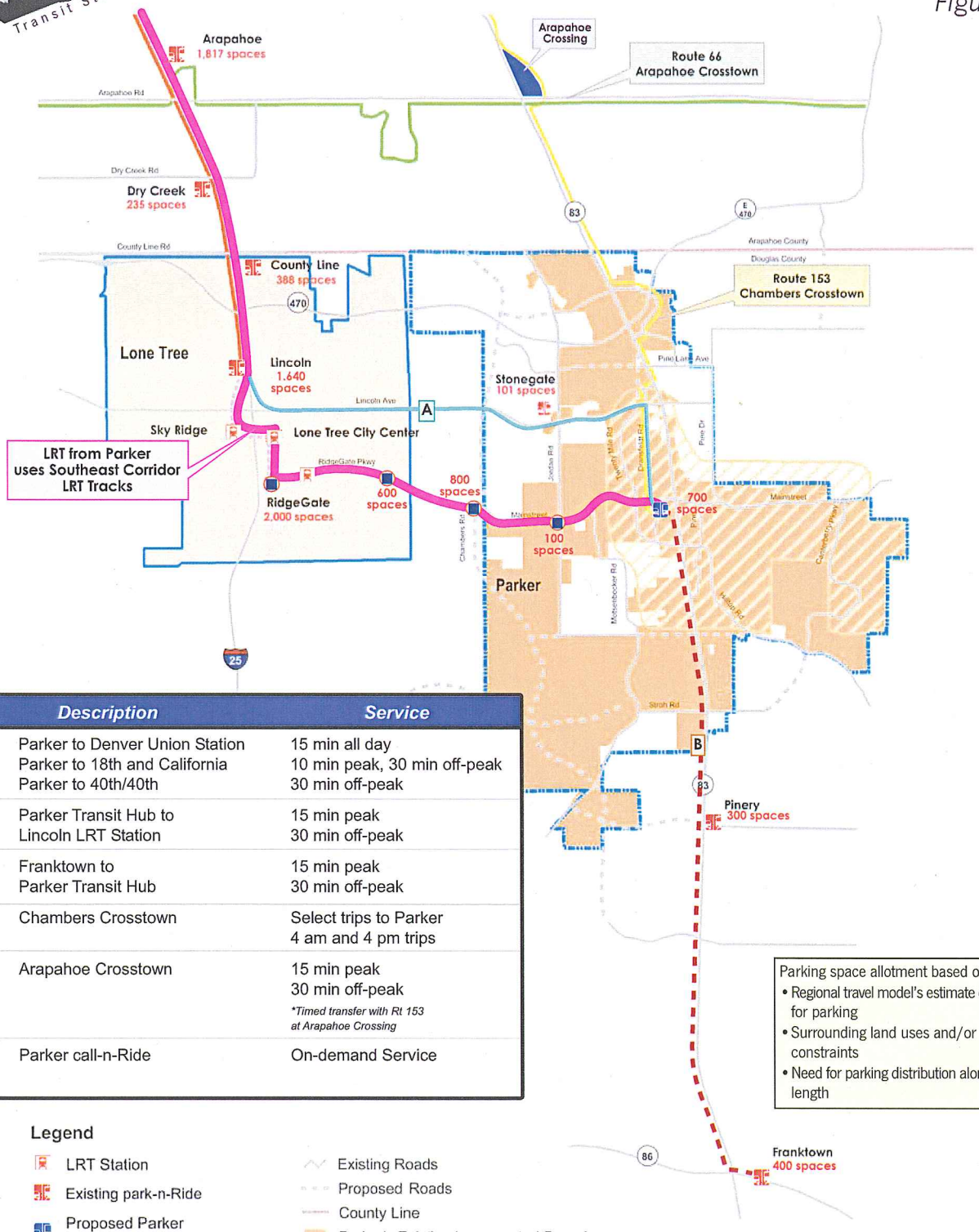
4.5.3. Stations

Stations would be located at:

- Parker Transit Hub (Mainstreet and Dransfeldt) – with parking
- Mainstreet and Jordan
- Mainstreet and Chambers -- with parking
- RidgeGate (two locations, one with parking)

LRT Alternative

Figure 23



Service	Description	Service
LRT	Parker to Denver Union Station Parker to 18th and California Parker to 40th/40th	15 min all day 10 min peak, 30 min off-peak 30 min off-peak
Bus A	Parker Transit Hub to Lincoln LRT Station	15 min peak 30 min off-peak
Bus B	Franktown to Parker Transit Hub	15 min peak 30 min off-peak
153	Chambers Crosstown	Select trips to Parker 4 am and 4 pm trips
66	Arapahoe Crosstown	15 min peak 30 min off-peak **Timed transfer with Rt 153 at Arapahoe Crossing*
902	Parker call-n-Ride	On-demand Service

Parking space allotment based on:
- Regional travel model's estimate of demand for parking
- Surrounding land uses and/or site constraints
- Need for parking distribution along corridor length

Legend

- LRT Station
- Existing park-n-Ride
- Proposed Parker Transit Hub (with parking)
- Proposed park-n-Ride
- Southeast LRT Opens 2006
- FasTracks LRT Ext Opens 2017
- Existing Roads
- Proposed Roads
- County Line
- Parker's Existing Incorporated Boundary
- Parker's Future Urban Service Area
- Lone Tree's Future Urban Growth Limit

N

0 0.5 1 1.5 2 Miles

4.5.4. Bus Network

The LRT Alternative included a feeder bus network. It assumed the implementation of a call-n-Ride service east of Parker Road, as well as a new feeder route from the proposed Parker Transit Hub to the Lincoln LRT Station. It also assumed peak-only bus service from Franktown to the proposed Parker Transit Hub. Routes 153 and 66 would continue to operate as shown in RTD's planned 2006 Southeast Corridor feeder bus network. (The fixed guideway service and the Lincoln Station feeder bus (Route A) would replace the Route 410.)

4.5.5. park-n-Rides

Using data from the regional travel model, two park-n-Ride locations were considered specifically for the light rail alternative:

- Dransfeldt and Mainstreet
- Mainstreet and Chambers

At the Parker Transit Hub (Dransfeldt and Mainstreet), two station layouts are under consideration. The station could be oriented toward Mainstreet to serve pedestrian traffic, or away from Mainstreet, to serve connecting passengers from buses and the park-n-Ride. If the station is located on Mainstreet, the Transit Hub site could be used exclusively for bus access and parking, and the station (and service) would be more visible. If the station is located within the Transit Hub (off-street), it would ease the transfer for connecting bus passengers as well as park-n-Ride users, but it would require special access to the site from Mainstreet, and decrease the service's prominence on Mainstreet.

At Chambers and Mainstreet the station would be sites for a park-n-Ride, and both would require passengers to walk to the station.

4.5.6. Summary

This alternative effectively tested the potential ridership:

- on an LRT system requiring no transfers between modes,
- on a service that terminates west of Parker Road, and
- potential utilization and access mode split of the proposed Parker Transit Hub.

4.6 BRT Alternative

4.6.1. Alignment and Service Plan

As shown in **Figure 25, BRT Alternative**, a BRT Alternative was developed that would run from RidgeGate Station to a new park-n-Ride near Parker Town Center every 15 minutes all day. In addition, a bus would run from RidgeGate to Franktown, via Parker Transit Hub and Parker Road, every 7.5 minutes during peak periods, and every 30 minutes during off-peak periods. This equates to twelve (12) buses per hour serving the Parker area during peak periods and six (6) buses per hour during non-peak periods.

4.6.2. Alignment configuration

The BRT guideway locations vary by corridor segment.

From RidgeGate to Chambers, BRT would operate in exclusive curbside lanes on each side of Mainstreet. This assumption provides the easiest access to the service for pedestrians and retains the most options for the eventual roadway design by avoiding the median.

East of Chambers, BRT could operate in exclusive lanes either in the median or curbside. The location and design of the BRT lanes and stations in this segment of the corridor will be determined by the *West Mainstreet Design Study.*

East of Parker Road, the service would transition into general purpose lanes, and operate in mixed traffic to either Parker Town Center or to Franktown. Neither the character of East Mainstreet, nor of Parker Road, is conducive to converting lanes into fixed guideway.

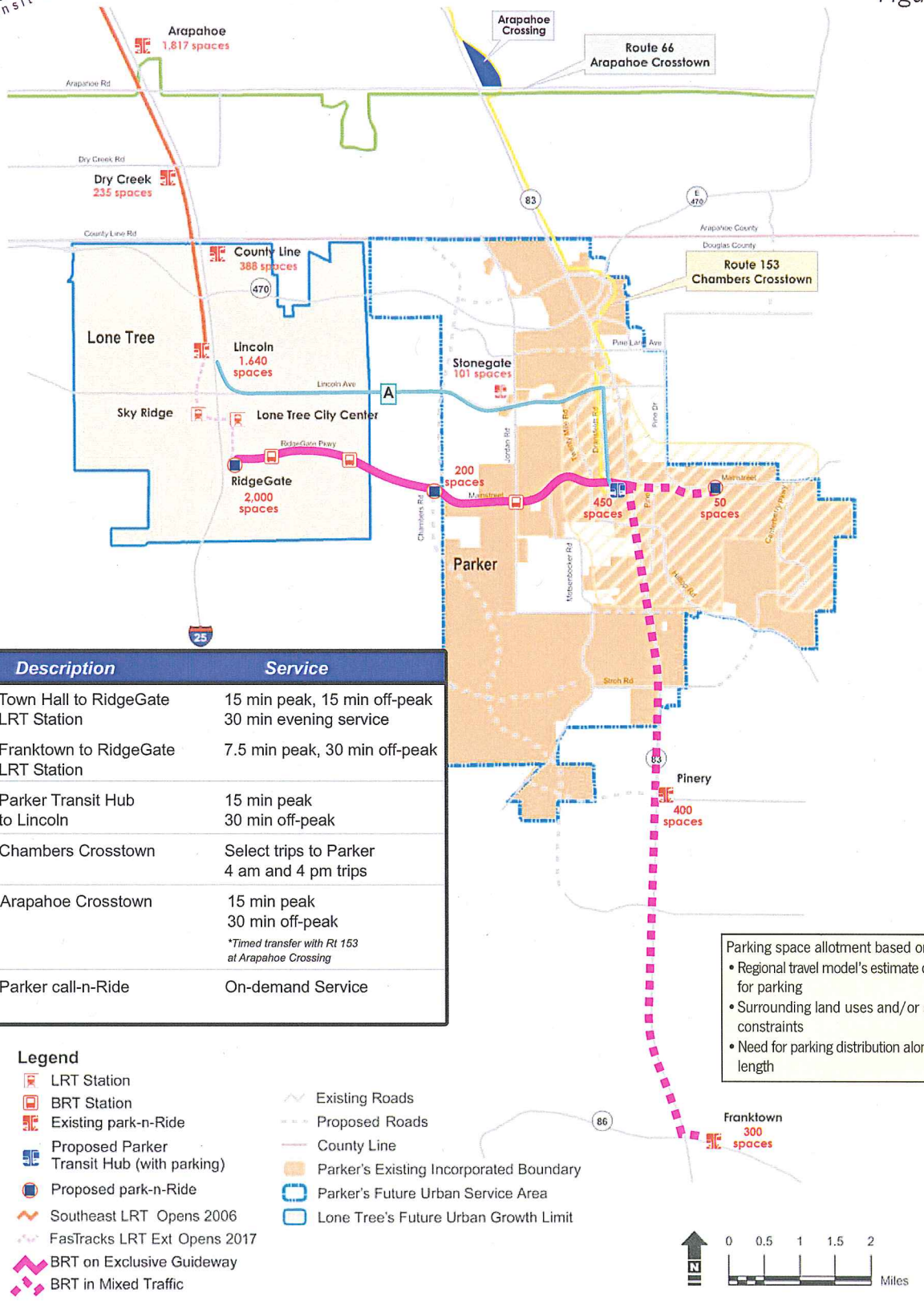
4.6.3. Stations and Park-n-Rides

Stations would be located at:

- Franktown park-n-Ride
- Pinery park-n-Ride
- Parker Town Center
- Parker Transit Hub (Mainstreet and Dransfeldt) – with parking
- Mainstreet and Jordan
- Mainstreet and Chambers -- with parking
- RidgeGate (2 stations)

BRT Alternative

Figure 24



Service	Description	Service
BRT	Town Hall to RidgeGate LRT Station	15 min peak, 15 min off-peak 30 min evening service
	Franktown to RidgeGate LRT Station	7.5 min peak, 30 min off-peak
Bus A	Parker Transit Hub to Lincoln	15 min peak 30 min off-peak
153	Chambers Crosstown	Select trips to Parker 4 am and 4 pm trips
66	Arapahoe Crosstown	15 min peak 30 min off-peak **Timed transfer with Rt 153 at Arapahoe Crossing*
902	Parker call-n-Ride	On-demand Service

Parking space allotment based on:
- Regional travel model's estimate of demand for parking
- Surrounding land uses and/or site constraints
- Need for parking distribution along corridor length

Legend

- LRT Station
- BRT Station
- Existing park-n-Ride
- Proposed Parker Transit Hub (with parking)
- Proposed park-n-Ride
- Southeast LRT Opens 2006
- FasTracks LRT Ext Opens 2017
- BRT on Exclusive Guideway
- BRT in Mixed Traffic
- Existing Roads
- Proposed Roads
- County Line
- Parker's Existing Incorporated Boundary
- Parker's Future Urban Service Area
- Lone Tree's Future Urban Growth Limit

At the Parker Transit Hub, the BRT station could be either in the median or included in the park-n-Ride area. The benefits to a median station are the same as for LRT: more prominence in the streetscape and encourages corridor walkability. It would also be more direct for the buses connecting to or from Parker Town Center. The benefits to an off-street station are also similar to LRT: consolidated services create easier transfers, and the location would be more direct for buses connecting to or from Franktown. (Fewer buses serve Franktown, but those passengers also travel much longer distances.)

The same park-n-Rides are under evaluation at Mainstreet and Chambers as in the LRT alternative. The BRT station at this location is assumed to be in the median.

4.6.4. Bus Network

The BRT alternative also included a feeder bus network. A new route would connect Lincoln Station to the proposed Parker Transit Hub, and the group of services planned for implementation in 2006 (call-n-Ride, Route 153 and Route 66) would also operate as described in the LRT Alternative section. However, the peak-only service associated with the BRT system would replace the separate feeder route connecting Franktown to the proposed Parker Transit Hub.

4.6.5. Summary

The BRT Alternative effectively tested the potential ridership:

- on a BRT service with similar segments and stations to LRT,
- the potential ridership increase when fixed guideway service is extended to East Mainstreet, and
- the potential ridership increase when fixed guideway service is extended to Franktown.

5. ALTERNATIVES ANALYSIS

5.1 Evaluation Criteria

The following evaluation criteria were developed with input from the stakeholders. The criteria are applied to the alternatives for comparative analysis. The evaluation criteria are listed below, along with the source of data:

- Daily Ridership: Number of passengers getting on the transit service anywhere along the line.
  - Source: DRCOG Regional Travel Model, assuming year 2030 conditions.
- Total Capital Costs: The cost of construction and vehicle acquisition.
  - Source: Average system costs from RTD (light rail) as well as from other transit agencies operating bus rapid transit systems.
- Daily Operating and Maintenance (O&M) Costs: Cost of providing service (operators, vehicle repair, fuel, etc.).
  - Source: Average RTD light rail system costs, as well as costs based on information from other transit agencies operating bus rapid transit systems.
- Travel Times: The time required for the transit vehicle to travel between the specified points (does not include the time required for passengers to access the transit service).
  - Source: DRCOG Regional Travel Model, assuming year 2030 conditions.

Appendix B, Cost Assumptions, contains the detailed assumptions for capital as well as operating and maintenance costs.

Appendix C, Travel Model Results Summary, contains a summary of the travel model ridership results.

5.2 Findings - LRT

The results for the LRT Alternative are depicted in **Figure 25, LRT Alternative Summary,** and summarized in **Table 3, LRT Alternative Summary**.

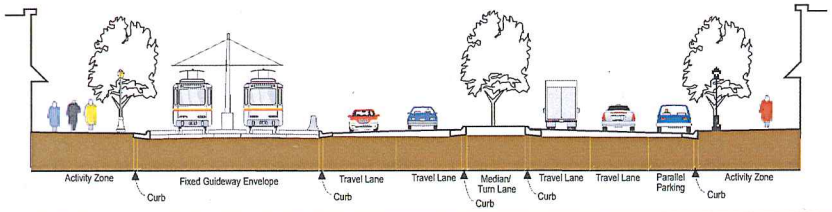
Table 3:
LRT Alternative Summary

Evaluation Criteria	Results
2030 Daily Ridership	6,200 passengers
Capital Costs	$300.5 million ($46 million/mile)
O&M Costs (annual)	$3.5 million
Travel Time (Parker Transit Hub to Denver)	56 minutes

Description

LRT on Mainstreet from new Parker Transit Hub/park-n-Ride to downtown Denver via Southeast Corridor LRT line

Double-track Curbside Operation on South side of Street



Stations (5)

- Parker Transit Hub (approximately Dransfeldt) (with parking)
- Jordan Road
- Chambers Road (with parking)
- 2 generalized locations in RidgeGate Development

Headways

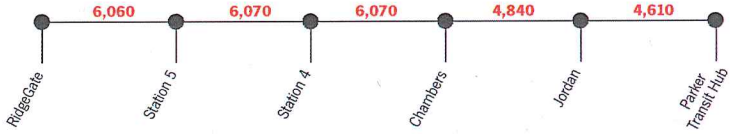
- **Combined headway: Parker to downtown Denver: 6 min pk/7.5 min off-pk**
  - ✓ Parker to 18th/California: 10 min pk/30 min off-pk
  - ✓ Parker to Denver Union Station: 15 min all day
  - ✓ Parker to 40th/40th: 30 min off-pk

Summary

Ridership

- **6,200 daily riders in 2030**
  - ✓ 80% of riders drive to the stations
  - ✓ Parker Transit Hub has highest number of riders walking or transferring from a bus (890)
  - ✓ Stations with highest number of boardings: Parker Transit Hub, Chambers Road

Number of Passengers On-Board Between Stations, 2030



Travel Times

- Parker Transit Hub to RidgeGate: **13 minutes**
- RidgeGate to downtown Denver: **43 minutes**

Costs (year 2004 $)

- Capital Costs (with vehicles): **$300.5M**
  - ✓ Guideway: **$242.2M**
  - ✓ Vehicles: **$34.3M**
  - ✓ Stations/parking: **$24M**
  - ✓ Cost/mile: **$46.5M**
- Annual Operating and Maintenance Costs: **$3.5M**
- Annualized Capital and O&M Costs/Rider: **$16.52**

Parking Requirements*

- Parker Transit Hub **700 spaces** (assumes parking structure)
- Jordan **100 spaces**
- Chambers Road **800 spaces**
- Station 4 **600 spaces**

Parking for feeder bus service*

- Franktown park-n-Ride **400 spaces**
- Pinery park-n-Ride **300 spaces**

*Parking space allotment based on:
- Regional travel model's estimate of demand for parking
- Surrounding land uses and/or site constraints
- Need for parking distribution along corridor length

DESCRIPTION SUMMARY

5.3 Findings – BRT

The results for the BRT Alternative are depicted in **Figure 26, BRT Alternative Summary,** and summarized in **Table 4, BRT Alternative Summary**.

Table 4: BRT Alternative Summary

Evaluation Criteria	Results
2030 Daily Ridership	4,600
Capital Costs	$111 million ($15.8 million/mile)
O&M Costs (annual)	$400,000
Travel Time ▪ Franktown to Denver ▪ Parker Town Center to Denver ▪ Parker Transit Hub to Denver	 76 minutes 65 minutes 57 minutes

BRT Alternative Summary

Figure 26

Description

BRT consists of two lines:

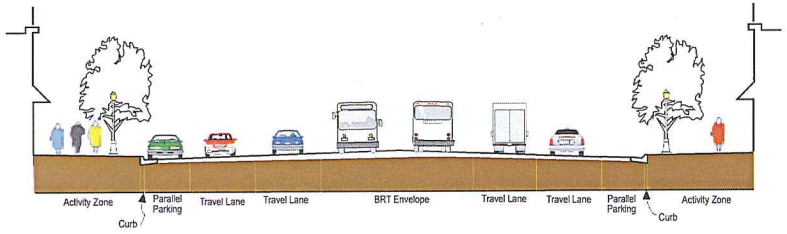
BRT from Franktown park-n-Ride to RidgeGate LRT station

- Operates in mixed traffic on Parker Road to Parker Transit Hub
- Operates in exclusive guideway from Parker Transit Hub along Mainstreet to RidgeGate LRT station

BRT from Town Hall to RidgeGate LRT station

- Operates in mixed traffic on Mainstreet to Parker Transit Hub
- Operates in exclusive guideway from Parker Transit Hub along Mainstreet to RidgeGate LRT station

BRT on Mainstreet in Median*



*From Parker Transit Hub to Chambers; operates curbside from Chambers Road to RidgeGate LRT Station

Stations (5)

- Parker Transit Hub (approximately Dransfeldt, with parking)
- Jordan Road
- Chambers Road (with parking)
- 2 generalized locations in RidgeGate Development

Headways

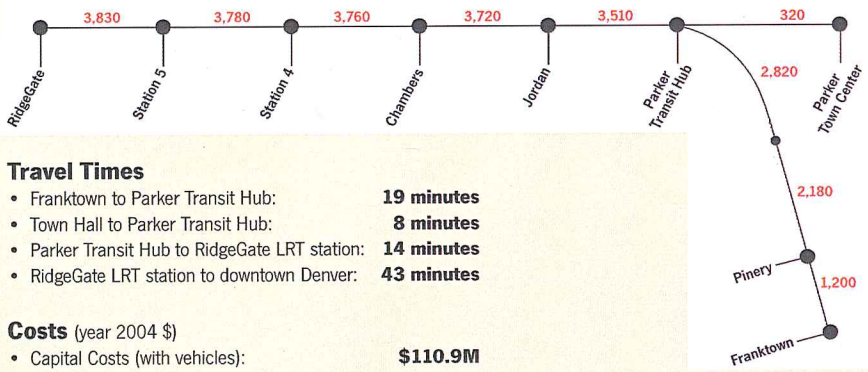
- **Combined headway: Parker Transit Hub to RidgeGate LRT station: 5 min pk/10 min off-pk**
  - ✓ Franktown to RidgeGate LRT station: 7.5 min pk/30 min off-pk
  - ✓ Town Hall to RidgeGate LRT station: 15 min all day

Summary

Ridership

- **4,600 daily riders in 2030**
  - ✓ 65% of riders drive to the stations
  - ✓ Parker Transit Hub has highest number of riders walking or transferring from a bus (490)
  - ✓ Stations with highest number of boardings: Parker Transit Hub, Chambers Road

Number of Passengers On-Board Between Stations, 2030



Travel Times

• Franktown to Parker Transit Hub:	**19 minutes**
• Town Hall to Parker Transit Hub:	**8 minutes**
• Parker Transit Hub to RidgeGate LRT station:	**14 minutes**
• RidgeGate LRT station to downtown Denver:	**43 minutes**

Costs (year 2004 $)

• Capital Costs (with vehicles):	**$110.9M**
✓ Busway:	**$93.3M**
✓ Vehicles:	**$7M**
✓ Stations/parking:	**$10.6M**
✓ Cost per mile:	**$15.8M**
• Annual Operating and Maintenance Costs:	**$400K**
• Annualized Capital and O&M Costs/Rider:	**$1.46**

Parking Requirements*

• Franktown park-n-Ride	**300 spaces**
• Pinery park-n-Ride	**400 spaces**
• Parker Town Center	**50 spaces**
• Parker Transit Hub	**450 spaces**
• Chambers Road park-n-Ride	**200 spaces**

*Parking space allotment based on:
- Regional travel model's estimate of demand for parking
- Surrounding land uses and/or site constraints
- Need for parking distribution along corridor length

DESCRIPTIONS SUMMARY

6. FINDINGS AND RECOMMENDATIONS

6.1 Preferred Alternative

As a result of the technical alternatives analysis, as well as the second stakeholder meeting, the BRT Alternative is recommended. **Table 5, LRT and BRT Comparative Summary,** depicts the relative performance of the LRT and BRT Alternatives.

Table 5:
LRT and BRT Comparative Summary

	LRT Alternative	BRT Alternative
Ridership Totals (daily passengers in 2030)	6,200	4,600
Travel Time Parker Transit Hub to Denver	56 minutes	57 minutes + 8 minutes to Parker Town Center + 19 minutes to Franktown
Capital Costs	$300.5 million	$110.9 million
Annual Operating and Maintenance Cost	$3.5 million	$400,000
Annualized Capital and 0&M Costs Per Rider	$16.52	$1.46

Although LRT would attract more ridership, the costs are substantially higher. In addition, when costs and ridership are compared:

- BRT attracts 25% less ridership, but costs 85% less than LRT to operate, and 60% less than LRT to build.
- BRT's annualized capital and operating cost per rider is $1.46, whereas LRT would be $16.52 per rider.

The BRT Alternative was preferred by the stakeholders in a meeting on June 15, 2005. They preferred BRT to LRT for the following reasons:

- BRT could be built less expensively, more quickly, and in phases.
- BRT connects East and West Mainstreet, making it consistent with the Comprehensive Plan.
- BRT could eventually be converted to LRT, if planned appropriately.

A more detailed discussion of the second stakeholders meeting where the BRT alternative was endorsed is contained in Chapter 3.

Because of its advantage in terms of cost and relative ease of implementation, as well as its endorsement by the stakeholders, BRT service is recommended on Mainstreet and summarized below:

- BRT Service
  - From Parker Town Center to RidgeGate every 15 minutes all day
  - From Franktown to RidgeGate, with service every 7.5 minutes during peak periods and every 30 minutes during non-peak periods

- Stations at:
  - Lone Tree (2 stations) - no parking
  - Chambers - with 200 parking spaces
  - Parker TH - with 450 parking spaces
  - Parker TC - with 50 spaces
  - Pinery - with 400 spaces
  - Franktown - with 300 spaces

- Operating in:
  - Shared Lanes - Parker Transit Hub to Parker Town Center and Parker Transit Hub to Franktown
  - Exclusive Median or Curbside Lanes - Parker Transit Hub to Chambers
  - Curbside Exclusive Lanes - Chambers to Ridge Gate

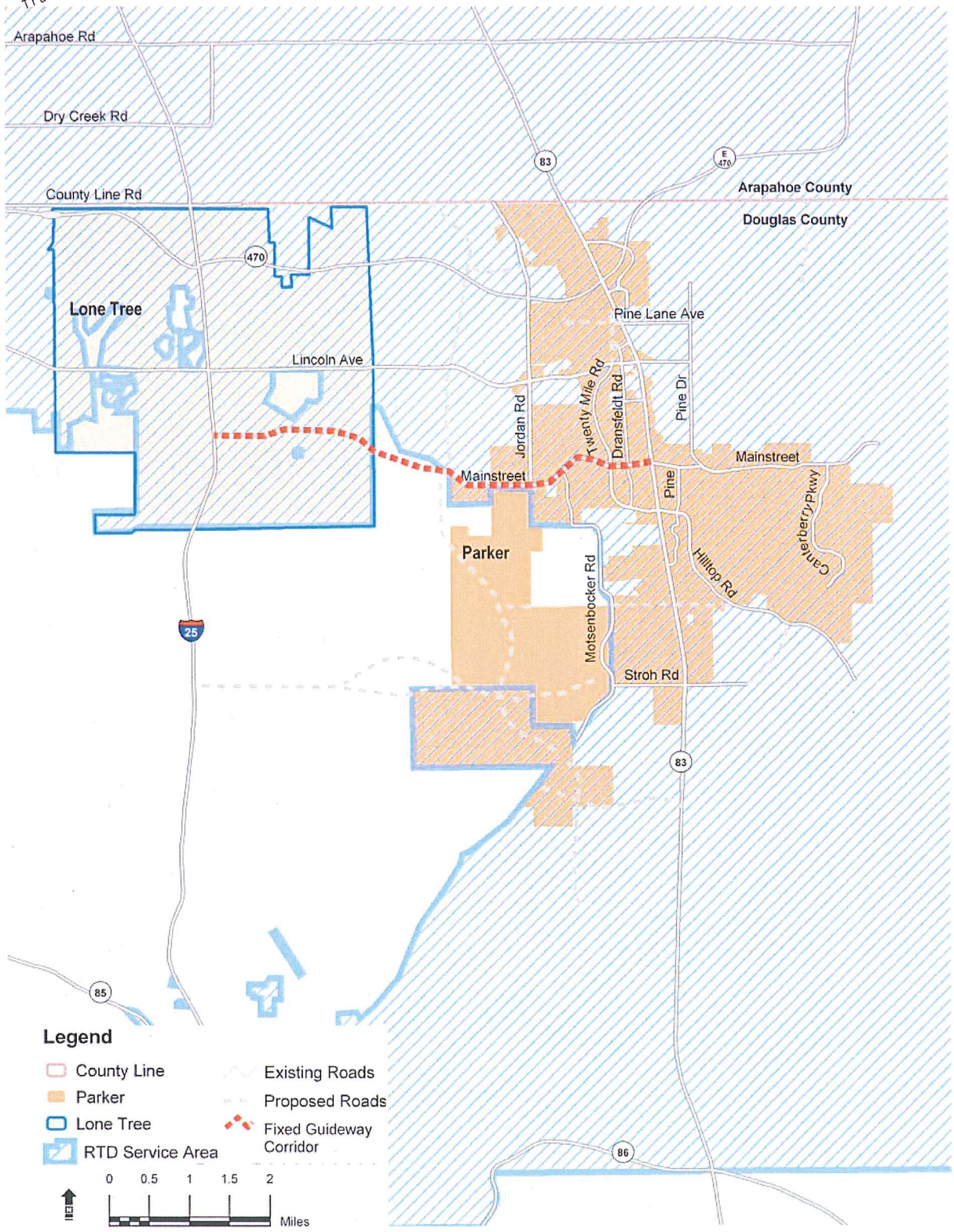
6.2 Next Steps

6.2.1. Service Area

Municipalities must elect to participate in the Regional Transportation District by choosing to support a tax to fund the transit services. As shown on **Figure 27**, **RTD Service District**, most of the Parker area is currently included in RTD, but increased service and capital investment along a fixed guideway on Mainstreet would require full participation along the alignment. Service could pass through areas that do not participate without stopping, but it would increase the financial burden on Parker. The area of influence considered for the development of fixed guideway options included RidgeGate and unincorporated areas south of Pinery.

RTD Service District

Figure 27



6.2.2. Jurisdiction

After electing to become part of RTD, Lone Tree and Parker would need to create Memorandums of Understanding (MOUs) or other documentation of agreements regarding cost sharing, design standards, service options, and other physical and policy components of implementing a fixed guideway service. Through the *Fixed Guideway Transit Study* and other previous efforts, the Town of Parker has coordinated initial analysis and policy discussions.

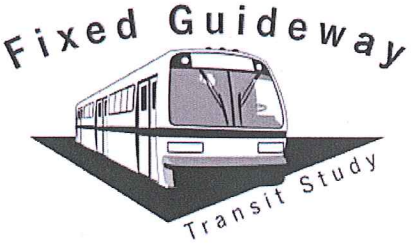
APPENDIX A

LIST OF STAKEHOLDER PARTICIPANTS

APPENDIX A

List of Stakeholder Participants

Name	Agency
Aden, David	Town of Parker
Becker, Jeff	RTD
Brinker, Dale	Parker Planning Commission
Brown, Rick	Carter & Burgess
Carr, Jason	City of Lone Tree
Carter, Jessie	RTD
Casiano, David	Town of Parker
John Cotton	City of Lone Tree
Drybread, Jennifer	City of Lone Tree
Edwards, Jennifer	DRCOG
Faestel, Dave	Faestel Prop.
Farmer, Dale	Citizen of Parker
Halpin, Gary	RTD
Heisler, Jennifer	Carter & Burgess
Hudson, Chris	Town of Parker
Hunt, Tom	CDOT
Lere, Bruce	CDOT
Lind, Bob	Parker Planning Commission
Mauser, Tom	CDOT
Matthews, Bryce	Town of Parker
Maxwell, Mike	Douglas County
Morris, Bob	Parker Planning Commission
Morrison, Julie	Carter & Burgess
Mueller, Brad	Douglas County
Myung, Smith	Manuel Padron & Associates
Niewoehner, Dennis	DEN Enterprises
Pacek, Susan	Town of Parker
Primus, Chris	Carter & Burgess
Salazar, Elyse	Douglas County
Sherman, Tracy	Parker Economic Development Council
Shonsey, John	RTD
Skinner, Ann	CDOT
Snow, Benjamin	SEBP
Stoll, Garner	Town of Parker
Sutherland, Mike	Town of Parker
Van Meter, Bill	RTD



APPENDIX B

COST ASSUMPTIONS

Parker Fixed Guideway Study

Capital Cost Summary

22-Aug-05

Bus Rapid Transit	Running Way	Segment Limits	Distance (mi)	Cost*
Segment 1	Curbside Shared GP Lane	Town Center to Parker Rd	0.2	$6,489,639
Segment 2	Median	Parker Rd to Jordan Rd, Median	1.66	$33,772,378
Segment 3	Median	Jordan Rd to Chambers Rd, Median	1.01	$20,258,918
Segment 4	Curbside Exclusive Lane	Chambers Rd to RidgeGate, Curbside Exclusive	3.58	$32,082,956
Passenger Information Corridor Infrastructure	Corridor Infrastructure, including per vehicle cost (3k), station cost (7k per), hardware and software Station cost included in segment cost.	Entire Corridor	6.45	$777,000
Maintenance Facility			N/A	$0
Vehicles (upgrade to BRT vehicles, increment over FasTracks cost)		14 Vehicles @ $500k each	N/A	$7,000,000
ROW for PNR facilities				$10,551,420
		BRT Cost (2004)	6.45	**$110,932,311**
		BRT Total Cost per Mile(2004)	7	**$15,847,473**
Light Rail (average of high and low estimate)				
Light Rail Corridor Construction Cost	4 stations, double track		6.45	$242,199,283
ROW for PNR facilities				$23,957,670
Maintenance Facility			N/A	
Vehicles	$2.7 M per vehicle (14 vehicles), Credit for reduction in 14 buses			$34,300,000
		LRT Cost (2004)		**$300,456,953**
		LRT Cost/Mile (2004)		**$46,582,473**

*Segment cost includes cost of parking. Please refer to segment by segment cost spreadsheets.

Parker Fixed Guideway Study
LRT Corridor Cost
Length: (miles) 6.4
Stations 4 Parker Transit hub, Jordan Rd, Chambers, Station 4, Station 5, Ridgegate (no cost)

	Description	Units	Unit Costs Low	Unit Costs High	Quantities	Range of Costs Low	Range of Costs High		
1.0	**Section Costs (Includes track, barrier separation, and earthwork)**								
	1.1 SINGLE TRACK BALLASTED LRT ADJACENT TO STREET	LF	$459.88	$678.68	0	$0	$0		
	1.2 DOUBLE TRACK BALLASTED LRT ADJACENT TO STREET	LF	$602.33	$911.48	20,064	$12,085,149	$18,287,935		
	1.3 DOUBLE TRACK BALLASTED LRT	LF	$354.43	$648.84	0	$0	$0		
	1.4 SINGLE TRACK PAVED LRT	LF	$493.52	$746.48	0	$0	$0		
	1.5 DOUBLE TRACK PAVED LRT	LF	$628.77	$1,153.37	13,728	$8,631,748	$15,833,526		
	1.6 DOUBLE TRACK COMMUTER RAIL	LF	$423.75	$767.49	0	$0	$0		
	1.7 BRT ADJACENT TO STREET	LF	$446.93	$619.68	0	$0	$0		
	1.8 BRT SEPARATE CORRIDOR	LF	$464.98	$632.99	0	$0	$0	**$34,121,461**	27% Track
2.0	**Street Reconstruction**								
	ADJACENT STREET RECONSTRUCTION - 2 LANES AND								
	2.1 PARKING	LF	$130.00	$130.00	27456	$3,569,280	$3,569,280		
	2.2 ADJACENT STREET RECONSTRUCTION - 3 LANES	LF	$143.00	$143.00	0	$0	$0		
	ADJACENT STREET RECONSTRUCTION - 20 FEET								
	2.3 ADJACENT TO TRACK	LF	$86.66	$86.66	0	$0	$0		
	2.4 WIDEN ROADWAY TO 96'	LF	$608.62	$747.77	0	$0	$0	**$3,569,280**	3% Pavement
3.0	**At-Grade Crossings**								
	3.1 SIGNALIZED INTERSECTION	EA	$297,415.00	$297,415.00	6	$1,784,490	$1,784,490		
	3.2 NON-SIGNALIZED INTERSECTION	EA	$117,415.00	$117,415.00	6	$704,490	$704,490		
	3.3 GRADE CROSSING PANELS	EA	$21,780.00	$23,760.00	0	$0	$0		
	3.4 GRADE CROSSING WITH GATES (2 LANE ROADWAY)	EA	$240,000.00	$240,000.00	2	$480,000	$480,000		
	3.5 GRADE CROSSING WITH GATES (GREATER THAN 2 LANE	EA	$325,000.00	$325,000.00	2	$650,000	$650,000		
	3.6 STREET WIDENING FOR GRADE CROSSING MEDIATION	EA	$1,327,500.00	$1,327,500.00	4	$5,310,000	$5,310,000	**$8,928,980**	**0.07167346** Strucure
4.0	**Stations**								
	4.1 STATION INFRASTRUCTURE	EA	$570,774.00	$3,042,048.00	4	$2,283,096	$12,168,192		
	4.2 STATION INFRASTRUCTURE - MAJOR BRT STATION	EA	$7,200,000.00	$7,200,000.00	0	$0	$0		
	4.3 F.I.&T. TICKET VENDING MACHINES (2 PER STATION)	EA	$60,000.00	$60,000.00	4	$240,000	$240,000		
	4.4 F.I.&T. STATION CONTROLLERS (1 PER STATION)	EA	$8,800.00	$8,800.00	4	$35,200	$35,200		
	4.5 F.I.&T. LUMP SUM	LS	$1,240,000.00	$1,240,000.00	0	$0	$0		
	4.6 COMMUNICATIONS STATION NODE	EA	$425,000.00	$425,000.00	4	$1,700,000	$1,700,000		
	4.7 STATION PARKING (SURFACE)	EA	$5,500.00	$5,500.00	2081	$11,445,500	$11,445,500		
	4.8 STATION PARKING (STRUCTURE)	EA	$13,500.00	$13,500.00	700	$9,450,000	$9,450,000	$35,038,892	**28%** Structure
5.0	**Bridges / Structures**								
	5.1 BRIDGE LRT	LF	$2,000.00	$4,000.00	3,185	$6,370,000	$12,740,000		
	5.2 BRIDGE PEDESTRIAN	SF	$80.00	$100.00	0	$0	$0		
	5.3 BRIDGE CMT (COOPER E-80 LOADING)	LF	$2,500.00	$6,000.00	0	$0	$0		
	5.4 ROADWAY BRIDGE	SF	$80.00	$80.00	0	$0	$0		
	5.5 BRIDGE BRT	SF	$80.00	$80.00	0	$0	$0	**$12,740,000**	**10%** Structure
6.0	**Retaining Walls**								
	6.1 MSE RETAINING WALL	SF	$40.00	$65.00	40000	$1,600,000	$2,600,000		
	6.4 RETAINING WALL STRUCTURAL BACKFILL	CY	$15.60	$24.00	100000	$1,560,000	$2,400,000		
	6.5 RETAINING WALL EARTHWORK	CY	$13.20	$30.00	10000	$132,000	$300,000	**$5,300,000**	**4.25%** Structure
7.0	**System Wide Elements**								
	7.1 BASE SIGNAL SYSTEM (LRT)	LF	$246.21	$246.21	33792	$8,320,000	$8,320,000		
	7.2 BASE SIGNAL SYSTEM (CRT)	LF	$132.58	$132.58	0	$0	$0		
	7.3 COMMUNICATIONS HUB CONTROL	LF	$42.61	$42.61	0	$0	$0		
	7.4 BASE COMMUNICATION SYSTEM	LF	$123.11	$123.11	33792	$4,160,000	$4,160,000		
	7.5 DUCTBANK (ELECTRICAL)	LF	$189.39	$189.39	0	$0	$0		
	7.6 BASE OCS SYSTEM (NON-STREET RUNNING LRT)	LF	$217.80	$217.80	0	$0	$0		
	7.7 BASE OCS SYSTEM (STREET RUNNING LRT)	LF	$246.21	$246.21	0	$0	$0		
	7.8 TRACTION POWER SUBSTATION (LRT)	LF	$284.09	$284.09	33792	$9,600,000	$9,600,000		
	7.9 CORROSION CONTROL (LRT)	LF	$11.36	$11.36	0	$0	$0		
	7.10 RELOCATE EXISTING FREIGHT TRACKS	TF	$220.00	$240.00	0	$0	$0	**$22,080,000**	**17.72%** Structure
	7.11 MAINTENANCE FACILITY	EA							
8.0	**Special Trackwork**								
	8.1 NO. 20 CROSSOVER	EA	$350,000.00	$350,000.00	8	$2,800,000	$2,800,000		
	8.2 NO. 10 CROSSOVER	EA	$141,982.80	$169,474.26	0	$0	$0		
	8.3 NO. 20 TURNOUT	EA	$170,000.00	$170,000.00	0	$0	$0		
	8.4 INTERLOCKING SIGNAL	EA	$750,000.00	$750,000.00	0	$0	$0		
	8.5 INDUSTRY SIDING SIGNAL	EA	$400,000.00	$400,000.00	0	$0	$0		
	8.6 ERGONOMIC SWITCH STAND	EA	$2,097.37	$2,414.40	0	$0	$0		
	8.7 NO. 10 TURNOUT	EA	$71,424.00	$84,636.00	0	$0	$0	**$2,800,000**	**2%** Trackwork
	A. Subtotal Quantified Constructon Costs					**$92,910,953**	**$124,578,613**		
9.0	**Environmental (5%)**	%A			0.05	$4,646,000	$6,229,000		
10.0	**Permanent Traffic Control (1%)**	%A			0.01	$929,000	$1,246,000		
11.0	**Miscellaneous (14%)**	%A			0.14	$13,008,000	$17,441,000		
	Removals (3%)								
	Drainage (5%)								
	Utility Relocation (4%)								
	Noise Mitigation (1%)								
	Urban Design/Landscaping (1%)								
	B. Subtotal Construction Costs					**$111,493,953**	**$149,494,613**		
	Mobilization	%B	6.0%		0.06	$6,690,000	$8,970,000		
	Survey	%B	3.0%		0.03	$3,345,000	$4,485,000		
	Construction Traffic Control	%B	5.0%		0.05	$5,575,000	$7,475,000		
	Insurance and Legal	%B	2.0%		0.02	$2,230,000	$2,990,000		
	C. Subtotal Construction Costs					**$129,333,953**	**$173,414,613**		
	Final Engineering	%C	12.0%		0.12	$15,520,000	$20,810,000		
	Construction Engineering	%C	18.0%		0.18	$23,280,000	$31,215,000		
	Force Account	%C	5.0%		0.05	$6,467,000	$8,671,000		
	ROW	LS							
	Contingency	%C	25.0%		0.25	$32,333,000	$43,354,000		
	Total 2004 Procurement Costs					**$206,933,953**	**$277,464,613**		
	Total Program Cost (2002)						**$224,034,337**		
	Escalation for Inflation								
		2004				206,933,953	277,464,613		
		2005		3.5%		214,176,642	287,175,874		
		2006		3.5%		221,672,824	297,227,030		
		2007		3.5%		229,431,373	307,629,976		
		2008		3.5%		237,461,471	318,397,025		
		2009		3.5%		245,772,623	329,540,921		
		2010		3.5%		254,374,664	341,074,853		

Parking Spaces Sidebar

	Spaces req'd	Spaces existing	Spaces net	Type
Parker	700		700	strucure
Jordan	100		100	surface
Chambers	800		800	surface
Station 4	600		600	surface
Station 5	0		0	n/a
Pinery	300	79	221	surface
Franktown	400	40	360	surface
Surface subtotal			2081	
Structure subtotal			700	
Total			2781	

Parker Fixed Guideway Study
BRT Segment 1, Curbside Shared
Town Center to Parker Rd
Length: (miles) 0.2
Stops 3 Parker Town Center, existing stops at Franktown pnR and Pinery pnR

	BRT		Item	Unit	Quantity	Unit Cost	Cost
A. Roadway							
	1. Exclusive Curbside Lane (2)			mile	0	$3,046,190	$0
	2. Exclusive Lane Median			mile	0	$6,703,910	$0
	3. Right Turn Lane			mile	0	$300,000	$0
	4. Shared GP Lane			mile	0.2	$200,000	$40,000
	Subtototal A						**$40,000**
B. Intersections							
	5. Signal Priority/Queue Jumping			each	1	$50,000	$50,000
	6. Intersection Improvements			each	1	$50,000	
	Subtototal B						**$50,000**
C. Stations							
	7. Median bus stop construction (2 bus queue)			each	0	$100,000	$0
	8. Curbside bus stop construction (2 bus queue)			each	2	$50,000	$100,000
	9. Transit Center			each	0	$475,000	$0
	10. Superstop Amenities*			each	0	$100,000	$0
	11. Station Amenities**			each	0	$160,000	$0
	12. Station Urban Design elements			each	0	$20,000	$0
	13. Surface Parking			each	631	$5,500	$3,470,500
	14. Crosswalks			Each	1	$20,000	$20,000
	Subtototal C						**$3,590,500**
D. Other							
	15. Structures			LF	0	$5,000	$0
	16. Roadway Overpass			LF	0	$2,000	$0
	17. Rail Overpass (Large)			LF	0	$8,000,000	$0
	18. Streetscape Improvements**			MI	0	$500,000	$0
	Subtototal D						**$0**
	Construction (A-D)						**$3,680,500**
J:_Transportation\071807 - Parker Limited MIS\manage\report\Final Report\New PDFs\[CapitalCosts_8_19_05.xls]10 Cap Cost Summary							
	19. Grading (4% of A-D)***						$147,220
	20. Drainage (5% of A-D)						$184,025
	21. Utility Relocation (4% of A-D)						$147,220
	22. Noise/Environmental Mitigation (2% of A-D)						$73,610
	23. Signing & striping (1% of A-D)						$36,805
	24. Construction/Traffic Control (1% of A-D)						$36,805
	25. Urban Design/Landscaping (2% of A-D)						$73,610
	Subtototal E						**$699,295**
	Pre-Contingency Subtotal (A-E)						**$4,379,795**
F. Contingencies							
	26. Insurance & Legal (2% of A-E)						$87,596
	27. Design Engineering (10% of A-E)						$437,980
	28. Construction Management (10% of A-E)						$437,980
	29. Start-up (1.3% of A-E)						$56,937
	Subtotal F						**$1,020,492**
G. ROW							
	30. ROW (20% of A-E)					$875,959	**$875,959**
	Subtotal G						$875,959
	Total Cost (2002, without vehicles)						$6,276,246
	Total Cost (2004 without vehicles)						**$6,489,639**
	Total Cost/Mile (2002 without vehicles)						$31,381,231
	Total Cost/Mile (2004 without vehicles)						**$32,448,193**

parking space sidebar			
	req'd	existing	net
Franktown	300	40	260
Pinery	400	79	321
Towne Center	50		50
total			631

*Superstop Station Minimum Amenities include: simple bus platform and small shelter, corridor transit signage, security lighting, landsape improvements, NexTBus passenger information and fare collection machine

** Superstop Preferred Amenities include(in addition to Priority Amenities) Enhanced passenger amenities with site furnishings, bike parking, opportunities for public art.

*** Grading adjusted to 4% from typical 3% due to corridor conditions

****Traffic Control adjusted to 1% from typical 3% due to inclusion of Traffic improvements in Item B.

22-Aug-05 J:_Transportation\071807 - Parker Limited MIS\manage\report\Final Report\New PDFs\[CapitalCosts_8_19_05.xls]10 Cap Cost Summary

Parker Fixed Guideway Study
BRT Segment 2
Parker Rd to Jordan Rd, Median
Length: (miles) 1.66
Stops 2 Parker Transit Hub, Jordan Rd

	BRT		Item	Unit	Quantity	Unit Cost	Cost
A. Roadway							
	1. Exclusive Curbside Lane (2)			mile	0	$3,046,190	$0
	2. Exclusive Lane Median			mile	1.66	$6,703,910	$11,128,491
	3. Right Turn Lane			mile	0	$300,000	$0
	4. Shared GP Lane			mile	0	$200,000	$0
	5. Roadway Reconstruction			mile	3.32	$2,359,790	
	Subtototal A						**$11,128,491**
B. Intersections							
	5. Signal Priority/Queue Jumping			each	2	$50,000	$100,000
	6. Intersection Improvements			each	2	$50,000	$100,000
	Subtototal B						**$200,000**
C. Stations							
	7. Median bus stop construction (2 bus queue)			each	4	$100,000	$400,000
	8. Curbside bus stop construction (2 bus queue)			each	0	$50,000	$0
	9. Transit Center			each	0	$475,000	$0
	10. Superstop Amenities*			each	4	$100,000	$400,000
	11. Station Amenities**			each	0	$160,000	$0
	12. Station Urban Design elements			each	4	$20,000	$80,000
	13. Structured parking			each	450	$13,500	$6,075,000 Parker Transit Hub 450
	14. Crosswalks			Each	2	$20,000	$40,000
	Subtototal C						**$6,995,000**
D. Other							
	15. Structures			LF	0	$5,000	$0
	16. Roadway Overpass			LF	0	$2,000	$0
	17. Rail Overpass (Large)			LF	0	$8,000,000	$0
	18. Streetscape Improvements**			MI	1.66	$500,000	$830,000
	Subtototal D						**$830,000**
J:_Transportation\071807	**Construction (A-D)**						**$19,153,491**
E. Percentage Items	19. Grading (4% of A-D)***						$766,140
	20. Drainage (5% of A-D)						$957,675
	21. Utility Relocation (4% of A-D)						$766,140
	22. Noise/Environmental Mitigation (2% of A-D)						$383,070
	23. Signing & striping (1% of A-D)						$191,535
	24. Construction/Traffic Control (1% of A-D)						$191,535
	25. Urban Design/Landscaping (2% of A-D)						$383,070
	Subtototal E						**$3,639,163**
	Pre-Contingency Subtotal (A-E)						**$22,792,655**
F. Contingencies							
	26. Insurance & Legal (2% of A-E)						$455,853
	27. Design Engineering (10% of A-E)						$2,279,265
	28. Construction Management (10% of A-E)						$2,279,265
	29. Start-up (1.3% of A-E)						$296,305
	Subtotal F						**$5,310,689**
G. ROW							
	30. ROW (20% of A-E)						**$4,558,531**
	Subtotal G						**$4,558,531**
	Total Cost (2002, without vehicles)						$32,661,874
	Total Cost (2004 without vehicles)						**$33,772,378**
	Total Cost/Mile (2002 without vehicles)						$19,675,828
	Total Cost/Mile (2004 without vehicles)						**$20,344,806**

*Superstop Station Minimum Amenities include: simple bus platform and small shelter, corridor transit signage, security lighting, landsape improvements, NexTBus passenger information and fare collection machine

** Superstop Preferred Amenities include(in addition to Priority Amenities) Enhanced passenger amenities with site furnishings, bike parking, opportunities for public art.

*** Grading adjusted to 4% from typical 3% due to corridor conditions

****Traffic Control adjusted to 1% from typical 3% due to inclusion of Traffic improvements in Item B.

Parker Fixed Guideway Study
BRT Segment 3
Jordan Rd to Chambers Rd, Median
Length: (miles) 1.01
Stops 1 Chambers Rd

	BRT		Item	Unit	Quantity	Unit Cost	Cost
A. Roadway							
	1. Exclusive Curbside Lane (2)			mile	0	$3,046,190	$0
	2. Exclusive Lane Median			mile	1.01	$6,703,910	$6,770,950
	3. Right Turn Lane			mile	0	$300,000	$0
	4. Shared GP Lane			mile	0	$200,000	$0
	5. Roadway Reconstruction			mile	1.01	$2,359,790	$2,383,388
	Subtotal A						**$9,154,338**
B. Intersections							
	5. Signal Priority/Queue Jumping			each	2	$50,000	$100,000
	6. Intersection Improvements			each	2	$50,000	$100,000
	Subtotal B						**$200,000**
C. Stations							
	7. Median bus stop construction (2 bus queue)			each	2	$100,000	$200,000
	8. Curbside bus stop construction (2 bus queue)			each	0	$50,000	$0
	9. Transit Center			each	1	$475,000	$475,000
	10. Superstop Amenities*			each	0	$100,000	$0
	11. Station Amenities**			each	2	$160,000	$320,000
	12. Station Urban Design elements			each	1.01	$20,000	$20,200
	13. Surface Parking			each	200	$5,500	$1,100,000 Chambers 200
	14. Crosswalks			Each	1	$20,000	$20,000
	Subtotal C						**$2,135,200**
D. Other							
	15. Structures			LF	0	$5,000	$0
	16. Roadway Overpass			LF	0	$2,000	$0
	17. Rail Overpass (Large)			LF	0	$8,000,000	$0
	18. Streetscape Improvements**			MI	0	$500,000	$0
	Subtotal D						**$0**
J:_Transportation\071807	**Construction (A-D)**						**$11,489,538**
E. Percentage Items	19. Grading (4% of A-D)***						$459,582
	20. Drainage (5% of A-D)						$574,477
	21. Utility Relocation (4% of A-D)						$459,582
	22. Noise/Environmental Mitigation (2% of A-D)						$229,791
	23. Signing & striping (1% of A-D)						$114,895
	24. Construction/Traffic Control (1% of A-D)						$114,895
	25. Urban Design/Landscaping (2% of A-D)						$229,791
	Subtotal E						**$2,183,012**
	Pre-Contingency Subtotal (A-E)						**$13,672,550**
F. Contingencies							
	26. Insurance & Legal (2% of A-E)						$273,451
	27. Design Engineering (10% of A-E)						$1,367,255
	28. Construction Management (10% of A-E)						$1,367,255
	29. Start-up (1.3% of A-E)						$177,743
	Subtotal F						**$3,185,704**
G. ROW							
	30. ROW (20% of A-E)						**$2,734,510**
	Subtotal G						**$2,734,510**
	Total Cost (2002, without vehicles)						$19,592,764
	Total Cost (2004 without vehicles)						**$20,258,918**
	Total Cost/Mile (2002 without vehicles)						$19,398,776
	Total Cost/Mile (2004 without vehicles)						**$20,058,335**

*Superstop Station Minimum Amenities include: simple bus platform and small shelter, corridor transit signage, security lighting, landsape improvements, NexTBus passenger information and fare collection machine

** Superstop Preferred Amenities include(in addition to Priority Amenities) Enhanced passenger amenities with site furnishings, bike parking, opportunities for public art.

*** Grading adjusted to 4% from typical 3% due to corridor conditions

****Traffic Control adjusted to 1% from typical 3% due to inclusion of Traffic improvements in Item B.

8/12/2005

Parker Fixed Guideway Study
BRT Segment 4
Chambers Rd to RidgeGate, Curbside Exclusive
Length: (miles) 3.58
Stops 3 Station 4, Station 5, Ridgegate (no cost)

	BRT		Item	Unit	Quantity	Unit Cost	Cost	
A. Roadway								
	1. Exclusive Curbside Lane (2)			mile	3.58	$3,046,190	$10,905,362	
	2. Exclusive Lane Median			mile	0	$6,703,910	$0	
	3. Right Turn Lane			mile	0	$300,000	$0	
	4. Shared GP Lane			mile	0	$200,000	$0	
	Subtototal A						**$10,905,362**	
B. Intersections								
	5. Signal Priority/Queue Jumping			each	2	$50,000	$100,000	
	6. Intersection Improvements			each	2	$50,000	$100,000	
	Subtototal B						**$200,000**	
C. Stations								
	7. Median bus stop construction (2 bus queue)			each	0	$100,000	$0	
	8. Curbside bus stop construction (2 bus queue)			each	4	$50,000	$200,000	
	9. Transit Center			each	0	$475,000		
	10. Superstop Amenities*			each	4	$100,000	$400,000	
	11. Station Amenities**			each	0	$160,000	$0	
	12. Station Urban Design elements			each	4	$20,000	$80,000	
	13. Structured Parking			each		$13,500	$0	Ridgegate none added
	14. Crosswalks			Each	2	$20,000	$40,000	
	Subtototal C						**$720,000**	
D. Other								
	15. Structures			LF	0	$5,000	$0	
	16. Roadway Overpass			LF	3185	$2,000	$6,370,000	
	17. Rail Overpass (Large)			LF	0	$8,000,000	$0	
	18. Streetscape Improvements**			MI	0	$500,000	$0	
	Subtototal D						**$6,370,000**	
	Construction (A-D)						**$18,195,362**	
J:_Transportation\071807	19. Grading (4% of A-D)***						$727,814	
	20. Drainage (5% of A-D)						$909,768	
	21. Utility Relocation (4% of A-D)						$727,814	
	22. Noise/Environmental Mitigation (2% of A-D)						$363,907	
	23. Signing & striping (1% of A-D)						$181,954	
	24. Construction/Traffic Control (1% of A-D)						$181,954	
	25. Urban Design/Landscaping (2% of A-D)						$363,907	
	Subtototal E						**$3,457,119**	
	Pre-Contingency Subtotal (A-E)						**$21,652,480**	
F. Contingencies								
	26. Insurance & Legal (2% of A-E)						$433,050	
	27. Design Engineering (10% of A-E)						$2,165,248	
	28. Construction Management (10% of A-E)						$2,165,248	
	29. Start-up (1.3% of A-E)						$281,482	
	Subtotal F						**$5,045,028**	
G. ROW								
	30. ROW (20% of A-E)						**$4,330,496**	
	Subtotal G						**$4,330,496**	
	Total Cost (2002, without vehicles)						$31,028,004	
	Total Cost (2004 without vehicles)						**$32,082,956**	
	Total Cost/Mile (2002 without vehicles)						$8,667,040	
	Total Cost/Mile (2004 without vehicles)						**$8,961,720**	

*Superstop Station Minimum Amenities include: simple bus platform and small shelter, corridor transit signage, security lighting, landsape improvements, NexTBus passenger information and fare collection machine

** Superstop Preferred Amenities include(in addition to Priority Amenities) Enhanced passenger amenities with site furnishings, bike parking, opportunities for public art.

*** Grading adjusted to 4% from typical 3% due to corridor conditions

****Traffic Control adjusted to 1% from typical 3% due to inclusion of Traffic improvements in Item B.

Parker Fixed Guideway Study

park-n-Ride Costs

BRT	Spaces			Type	Acreage	Cost
	req'd	existing	net			
Franktown	300	40	260	surface	3.5	$2,488,200
Pinery	400	79	321	surface	4.3	$3,071,970
Parker Town Center	50		50	surface	0.7	$478,500
Parker Hub	450		450	structure	3.6	$2,598,750
Chambers	200		200	surface	2.7	$1,914,000
					14.7	**$10,551,420**
			831	Surface subtotal		
			450	Structure subtotal		
			1281	Total		

LRT	Spaces			Type	Acreage	Cost
	req'd	existing	net			
Parker	700		700	strucure	5.6	$4,042,500
Jordan	100		100	surface	1.3	$957,000
Chambers	800		800	surface	10.7	$7,656,000
Station 4	600		600	surface	8.0	$5,742,000
Station 5	0		0	n/a	0.0	$0
Pinery	300	79	221	surface	2.9	$2,114,970
Franktown	400	40	360	surface	4.8	$3,445,200
					33.3	**$23,957,670**
			2081	Surface subtotal		
			700	Structure subtotal		
			2781	Total		

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Parker Fixed Guideway Study

Annualized Capital Costs

			Cost	Factor	Life	Annualized Cost	Operatng Cost	Total Annual Cost	Riders	Cost/Rider
BRT										
	ROW		$10,551,420	0.07	100	$738,599				
	Grading, etc.		$0	0.07	100	$0				
	Structures		$0	0.081	30	$0				
	Pavement		$0	0.094	20	$0				
	Vehicles		$7,000,000	0.126		$882,000				
		Total	$10,551,420			**$1,620,599**	400,000	2,020,599	1380000	$1.46
LRT										
	ROW		$23,957,670	0.07	100	$1,677,037				
	Grading, etc.		$4,843,986	0.07	100	$339,079				
	Structures		$230,089,319	0.081	30	$18,637,235				
	Pavement		$7,265,978	0.094	20	$683,002				
	Rail Vehicles		$34,300,000	0.086	12	$2,949,800				
		Total	$300,456,953			**$24,286,153**	3500000	$30,735,953	1860000	$16.52

contingencies are included in each line item, except ROW

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Parker Fixed Guideway Study

8/12/2005

Operating & Maintenance Costs and Statistics

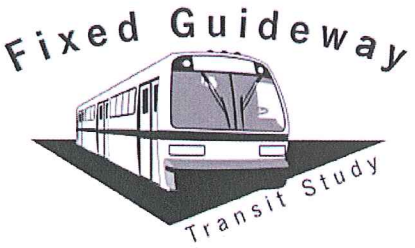
(Incremental Change From No-Action Alternative)

Characteristic		BRT	LRT
Statistics			
Change in:	Peak Buses	0	-12
	Fleet Buses	0	-14
	Ann. Rev. Bus-Hrs.	6,300	-21,600
	Ann. Rev. Bus-Mi's.	51,900	-381,700
	BRT Stations	5	0
	Peak Trainsets	0	5
	Peak Rail Cars	0	11
	Fleet Rail Cars	0	14
	Ann. Rev. Train-Hrs.	0	29,050
	Ann. Rev. Car-Mi's.	0	1,166,000
	LRT Stations	0	5
O&M Costs			
Change in:	Bus O&M	$322,300	-$1,663,900
	BRT Station O&M	$87,000	$0
	LRT O&M	$0	$5,205,700
	Total O&M Change	$409,300	$3,541,800

(1) All costs in 2004 dollars
(2) No-Action alternative includes full build-out of FasTracks
(3) Fleet Requirements include a 20% spare ratio

	Western Region CPI Average
2003	188.6
2004	193.0

17-May-05



APPENDIX C

TRAVEL MODEL RESULTS SUMMARY

Parker Fixed Guideway Transit Study

8/12/2005

Model Summary

Background network:

2030 FasTracks Transit System (2030 DRCOG RTP)

Alternative Description and Ridership Summary

				Headway (pk/off pk)
No-Action Alternative	Southeast Corridor LRT	Routes	RidgeGate to 18th & California	10 / 30
			RidgeGate to DUS	15 / 15
			RidgeGate to 40th/40th	0 / 30
			Blended headway	6 / 7.5
		Ridership	Boardings & Alightings (total of RidgeGate, SkyRidge, Lone Tree, & Lincoln stations)	10,100
	Feeder routes	410	Headway	7.5 / 30
			Ridership	6,300
		466	Headway	30 / 60
			Ridership	200
BRT Alternative	BRT	Franktown to RidgeGate	Headway	7.5 / 30
		Parker Town Center to RidgeGate	Headway	15 / 15
		Combined	Ridership	4,600
	Feeder routes	A' Route Parker Hub to Lincoln	Headway	15 / 30
			Ridership	2,500
LRT Alternative	LRT	Routes	Parker Hub to 18th & California	10 / 30
			Parker Hub to DUS	15 / 15
			Parker Hub to 40th/40th	0 / 30
			Blended headway	6 / 7.5
		Ridership	Parker to RidgeGate	6,200
	Feeder routes	A' Route Parker Hub to Lincoln	Headway	15 / 30
			Ridership	2,250
		B Route Franktown to Parker Hub	Headway	15 / 30
			Ridership	2,500

DRCOG Travel Model 2030 Fiscally Constrained 2030 FasTracks RTP Cycle 12 c12_30FT, Compass Version 86

Parker Fixed Guideway Transit Study

8/22/2005

Station Activity Summary

Alternative	Corridor	Station	Boardings & Alightings				Parking Requirements	
			Walk Access	Drive Access	Total	% Drive	Model*	Re-distributed & Rounded
BRT	Franktown to Parker Transit Hub	Franktown	40	1,170	1,210	97%	532	300
		Pinery	70	860	930	92%	391	400
		Other	770	80	850	9%		
	Parker Town Center to Parker Transit Hub	Parker Town Center	290	30	320	9%	14	50
		Other	240	80	320	25%	36	
	Mainstreet Corridor	Parker Hub	490	870	1,360	64%	395	450
		Jordan Rd	310	10	320	3%	5	
		Chambers	60	20	80	25%	9	200
		Station 4	0	0	0		0	
		Station 5	0	20	20	100%	9	
		RidgeGate	1,160	2,590	3,750	69%	1,177	1,200
Total BRT			**3,430**	**5,730**	**9,160**	**63%**	**2,605**	**2,600**
LRT	Mainstreet Corridor	Parker Hub	890	3,720	4,610	81%	1,691	700
		Jordan Rd	350	10	360	3%	5	100
		Chambers	90	1,190	1,280	93%	541	800
		Station 4	0	0	0	0%	0	600
		Station 5	0	30	30	100%	14	-
Total LRT			**1,330**	**4,950**	**6,280**	**79%**	**2,250**	**2,200**
LRT	Franktown to Parker Transit Hub (Route B)	Franktown	30	950	980	97%	432	400
		Pinery	60	740	800	93%	336	300
		Other	730	89	819	11%		
		Hub	700	1,710	2,410	71%	777	
Total Route B Boardings & Alightings			1,520	3,489	5,009	70%		
Total LRT & Route B Boardings & Alightings			**2,850**	**8,439**	**11,289**	**75%**		

*parking assumes 1.1 auto occupancy