BRIGHAM CITY
TRANSIT CORRIDOR STUDY

Prepared for the Utah Transit Authority
and Brigham City Corporation

Final Report November 2007. Project Number 060158

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Executive Summary

The Executive Summary offers a synopsis of the information contained within the full report, including process, analysis, and recommendations.

Introduction

In order to meet the transportation needs of a growing population and to satisfy public interest in alternative transit modes, especially commuter rail transit (CRT), the Utah Transit Authority (UTA) and Brigham City initiated this transit corridor study. The goals of this project are to:

- Identify the purpose of and need for a major transit investment
- Investigate mode and corridor alternatives
- Evaluate ridership demand
- Estimate capital and operating costs ranges
- Define a locally preferred alternative

Process

With the aim of accomplishing the study goals described above, groups were formed in order to address issues most effectively and with the greatest expertise. The groups consisted of a management group, a policy group, a stakeholder group and a study team. The groups met numerous times to ensure that the proper steps taken and considerations were being made. Each project task was delegated to the proper group according to their expertise. Table ES-1 below lists the members of each group.

Table ES-1: Committee Membership

Management Group	
Mark Teuscher	Brigham City, City Planner
Paul Larsen	Brigham City, Economic Development
Tom Hannum	Chair, Rail Task Force
Art Bowen	UTA Regional General Manager
Randy Park	UTA Manager Special Projects/Grants Management Oversight
Policy Group	
Primary	**Alternate**
Mike Allegra, UTA	Steve Meyer
Mick Crandall, UTA	Bruce Cardon
Mayor Lou Ann Christensen, Brigham City	Jon Adams
Reese Jensen, Brigham City Council	Holly Bell
Bruce Leonard, Brigham City Administrator	Jim Buchanan
Stakeholder Group	
Jon Adams, Brigham City Council	Cory Pope, UDOT District #1
Monica Holdway, Chamber of Commerce	Martell Menlove, School District
Mayor Ryan Tingey, Willard City	Carol Griffin, Disabled Community Rep
Mayor Jerry Nelson, Perry City	Andy Schinkle, Utah State University
Kevin Hansen, Weber State University	Ann Henderson, Interagency Council
Kevin Lane, Brigham City Planning Comm.	Nancy Green, Senior Citizens
Kurt Hasley, AutoLiv	Sandy Emile, Cache Valley Initiative
Melodie De Guibert, ATK Launch Systems	Todd Beutler, Cache Valley Transit District
Study Team	
Matt Riffkin, InterPlan	Ryan Beck, InterPlan
Rob Eldredge, InterPlan	Andrea Olson, InterPlan
Susan Rosales, CTG	Smith Myung, CTG
Mark Vlasic, Landmark Design	Charlie DeWeese, HDR
John Buttenob, HDR	

An open house was held on March 5, 2007 at the Brigham City Senior Center. The open house was held to educate the public on the possible mode characteristics, transit corridors, and station locations. The public was asked for input through an internet website and comment forms.

Study Area Characteristics

The study area for this project generally encompasses the fifteen mile long by one mile wide corridor between Pleasant View in Weber County and Brigham City in Box Elder County. More specifically, it extends from the planned Pleasant View commuter rail station to the existing Forest Street station in Brigham City and from Interstate-15 on the west side to US-89 on the east side.

Perry, Willard and Brigham City are the largest cities in Box Elder County. According to 2004 census population estimates, these three cities make up over half of the total population of the county. By 2030, the population of Box Elder County is expected to increase by approximately 30,000 people with the majority of the growth occurring within the study area. This information is summarized in Table ES-2 below.

Table ES-2: Existing and Future Population

	2000	2004	2012	2020	2030
Brigham City	14,166	14,852	16,291	17,620	20,352
Brigham City/Mantua	3,203	3,703	4,797	5,927	7,986
Perry	2,330	2,830	3,958	5,213	7,505
Willard	2,398	2,687	3,307	3,916	5,153
Study Area	22,097	24,072	28,353	32,676	40,996
Remainder of Box Elder County	20,648	21,894	24,556	27,146	32,834

Source: Brigham City, US Census

Total 2005 employment in Box Elder County was 18,892 according to the Utah Department of Workforce Services. Employment in the county is concentrated within a few major firms, with six companies accounting for approximately 50 percent of total county employment. The major employers in 2005 were:

- AutoLiv
- Wal-Mart Distribution Center
- ATK Space Systems
- LZB Manufacturing
- Nucor Corporation

Existing UTA transit in Box Elder County serves the cities of Brigham City, Willard and Perry. Existing UTA transit service includes:

- Route 630 provides service between Brigham City and the Ogden Intermodal Center from 5:30 a.m. to 9:30 p.m., Monday through Saturday.

- Route 685 offers express service between Brigham City and Ogden, with two southbound runs in the morning and one northbound run in the afternoon, Monday through Friday.

- Route 638 provides route deviation services in Brigham City only.

Purpose and Need

As the population of Box Elder County grows, additional transportation linkages will be needed to relieve the congestion that is expected. This transit investment would address three needs:

- The reduction of auto dependency in and around Brigham City/Box Elder County. Growth in vehicle miles traveled (VMT) in Box Elder County has outpaced both population growth and the national average VMT growth. Growth in VMT leads to other problems such as more time spent on the road and deteriorating air quality.

- To provide high-quality transportation options that will meet the needs of Brigham City/Box Elder commuters. Households within the study area have relatively high incomes and make relatively longer commutes compared to households in other counties along the Wasatch Front. Better transit facilities are needed to provide a better service to encourage use of the transit system.

- To promote economic development by providing transportation linkages that will further connect Brigham City/Box Elder County to the greater Wasatch Front. An improved transportation system will make a more attractive setting for commercial and business activity by providing reliable transportation linkages to the Salt Lake International Airport and other regional amenities which, in turn, will lead to economic growth in Box Elder County.

Corridor Analysis

There are only three transportation corridors that connect Box Elder and Weber Counties: US-89, Interstate-15, and the Union Pacific Railroad right-of-way.

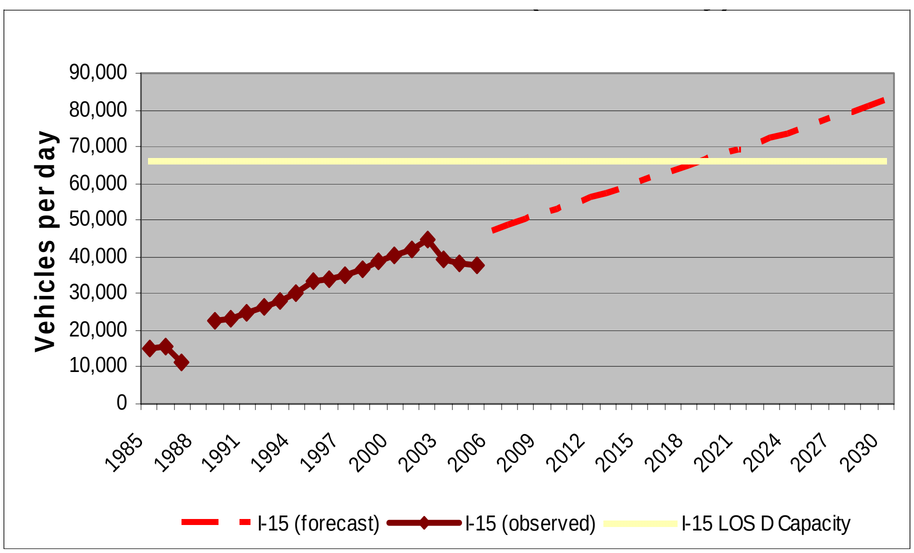
US-89 is a five-lane highway through the study area. UDOT classifies the facility as a Rural Minor Arterial. The road functions as a high-speed highway with a posted speed limit between 50 and 55 mph. UTA operates two bus routes between Box Elder and Weber Counties on US-89: Route 630 and Route 685. The majority of the US-89 corridor does not have sidewalks. US-89 is the primary route for bike trips between Box Elder and Weber County, although there are no bike lanes.

Traffic growth on US-89 over the last 21 years has been steady with an average annual growth rate of about two percent; however, US-89 had a nine percent per year growth rate between the years 2001-2003. Traffic volume has increased from 10,000 vehicles a day in 1985 to about 15,000 vehicles a day in 2005.

Within the study area, I-15 consists of two northbound lanes and two southbound lanes with interchanges at 2700 North (Weber County), 2000 West (Weber County), Willard Bay Road, 1100 South, and Forest Street. Currently, there is no transit service utilizing the I-15 corridor within the study area boundaries.

Traffic volume on I-15 through Perry increased from 15,000 vehicles a day in 1985 to close to 38,000 vehicles a day in 2005. While traffic volumes more than doubled in 21 years, the average annual growth rate of traffic was only 4.6 percent. As shown below in Figure ES-1, I-15 is expected to exceed capacity by approximately 2020.

Figure ES-1: Existing and Future Traffic Volumes on I-15



The Union Pacific Railroad line connecting Box Elder and Weber Counties is one segment of UP's Ogden Subdivision connecting Ogden and McCammon, Idaho. When UP modeled the Ogden Subdivision in Box Elder and Weber Counties in anticipation of Utah Transit Authority potential commuter rail service (FrontRunner), they considered the impacts that the additional trains would have by defining a study area that included

Cache Junction, Aspen, Lucin, and North Salt Lake City. The modeling results showed that, because of the heavy traffic on UP's lines through Ogden, significant track infrastructure and signal systems would be required. Most of this effort focused on the area on the north side of Ogden at a location UP calls Cecil Junction, which is immediately south of the Ogden Supply Depot.

Given the constraints posed by the freight operations, two possibilities to extend the UTA FrontRunner service from Pleasant View (approximately 2700 North in Ogden) to Brigham City were considered. Both possibilities included improvement of grade crossing warning devices to incorporate gates at all crossings. One possibility was to construct an additional siding at Willard and install a centralized traffic control signal system between Pleasant View and Brigham City. The other possibility considered was to construct an additional main track between Pleasant View and Brigham City, completely separating the passenger operation from the freight operation and offering the possibility of additional service as warranted with no additional infrastructure requirements from the UP Railroad.

Modal Analysis

Many modes of transit were originally proposed for analysis in the study corridor. After preliminary analysis, it became apparent that some of the alternatives would not be feasible within the study area and were therefore not advanced for further examination.

Many of the originally proposed alternatives warranted further investigation. For each proposed transit alternative, a comprehensive study of ridership and cost was completed. The following mode alternatives were considered and examined for their practicality for use in the corridor. Tables ES-3 and 4 offer a direct comparison of costs (capital and operating) and 2030 ridership.

Table ES-3: Capital and Operating Costs Comparison by Mode
(figures shown in million dollars at 2006 value)

Alternative	Operating Cost	Capital Cost	Other Capital Cost	Total Cost
Existing Transit Service	$1.1	$0	$0	$1.1
Best Bus (US-89)	$1.3*	$1.3	$0	$2.6
Best Bus (I-15)	$1.3*	$0.8	$0	$2.1
BRT (US-89)	$2.2*	$14.7	$10	$26.9
BRT (I-15)	$2.2*	$13.6	$76	$91.8
Commuter Rail (Shared Track DMU)	$0.8	$36.1	$0	$36.9
Commuter Rail (Shared Track DMU with Willard Station)	$0.8	$41	$0	$41.8
Commuter Rail (Exclusive Track)	$3.5	$80.8	$13.2	$97.5

Operating Costs include $1,200,000 for local bus

Table ES-4: Ridership Comparison by Mode, 2030

Mode Alternative	Peak	Off-peak	Total
2006 Comparison	260	160	420
Existing Transit Service	340	210	550
Best Bus (US-89)	420	210	630
Best Bus (I-15)	440	210	650
BRT (US-89)	490	290	780
BRT (I-15)	490	300	790
Commuter Rail (Shared Track DMU)	490	-	490
Commuter Rail (Shared Track DMU with Willard Station)	520	-	520
Commuter Rail (Exclusive Track)	590	340	930

Station Planning

Two broad locations for a transit station were considered. The existing historic depot at Forest Street had several advantages but was located along a curve of the railroad that would not allow for a station siding track. The depot was also perceived to be more distant for commuters between Cache County and Weber County. A general location along 1100 South was considered to address these concerns. Table ES-5 summarizes the pros and cons of each general site.

Table ES-5: Station Location Comparison

Forest Street Site		1100 South Site	
Pro/Con	Site Feature/ Condition	Pro/Con	Site Feature/ Condition
-	Two miles north of 1100 South site	+	Two miles south of Forest Street
+	Historic rail station is a major draw	-	Isolated location
+	On fringe of built-up urban area	-	In rural location within city boundaries
+	Supports city-building vision of Brigham City	-	Does not build upon city-building vision of Brigham City
+	Energizes / relates to city center	-	Bypasses City Center
+	Good road / rail connections and access	+	Good road / rail connections and access
-	Challenging rail geometry	+	Less challenging road geometry
+	Land generally available – agricultural / underutilized industrial	+	Land generally available – agriculture
+	No obvious environmental concerns	-	Possible environmental concerns (ground water, surface water, wetlands, etc.)

Based on the site analysis summarized in the table above, it was decided that the Forest Street site was the preferred of the two sites and was selected as the preferred station location. By working within the geometric constraints of the railroad, the main train station could be located along 200 South, providing better access to Cache County commuters while still providing a strong connection and relationship with the nearby historic station at Forest Street, which is envisioned as a future gateway to the station and an integral component of mixed-use district along Forest Street and 800 West.

In order to ensure that the station and surroundings are developed as envisioned, it is essential that the required land is removed from other potential development. The entire station area stretches between the existing rail corridor and 800 West, from approximately 250 South to the historic Forest Street Station. Brigham City can pursue a variety of options to achieve this essential goal, including the negotiation of purchase options and outright purchase.

Recommendations

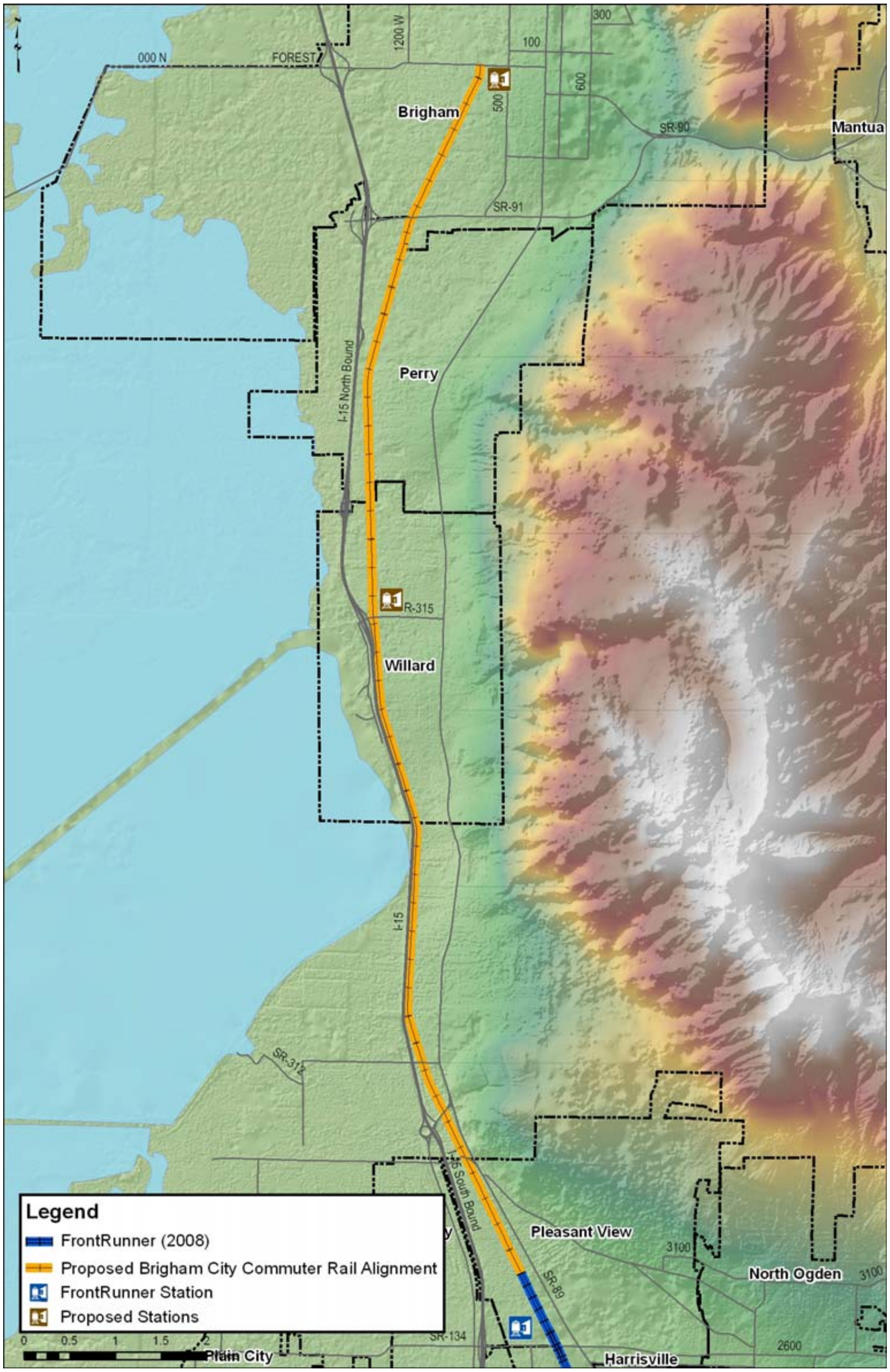
Commuter rail maintains an advantage over other modes in terms of its potential in Box Elder County and the ability to maintain reasonable speeds. The modes that utilize the highway network, including Bus Rapid Transit, would likely deteriorate over time as growth continues in Box Elder County and highways become congested. Because Box Elder County uniquely connects to the greater Wasatch Front by only two highway corridors within a constrained geography between the Great Salt Lake and the Wasatch Mountains, the opportunity for a new corridor dedicated to transit service is a compelling long term strategy.

The study team consensus is that Brigham City should work toward a fixed guideway transit option between Ogden and Brigham City. In the short term, commuter rail could utilize the existing Union Pacific Railroad right-of-way and provide service within the capacity constraints of the UP railroad. Ultimately, a dedicated track commuter rail service throughout the day should be the goal of Brigham City in order to control the commuter rail schedule and service reliability.

Based on the analysis, the operation of commuter rail service could include one set of Diesel Multiple Unit (DMU) equipment. This would provide two peak period service runs from Brigham City to Ogden in the morning and Ogden to Brigham City in the afternoon. Existing off-peak bus service would continue to be utilized for the remainder of the day. Brigham City, Willard, and Perry (generally included in the UTA service district) are actively pursuing an additional quarter cent sales tax in November 2007 to help support the operation and capital cost of this service. With taxpayer willingness, a commuter rail service could be operating as early as the year 2015. Capital funding appears to be the most significant constraint towards short term commuter rail service because a combination of additional local revenue and reduced cost options would be necessary to accelerate construction and implementation. It does not appear that commuter rail in Brigham City would compete well for Federal Transit Administration

New (or Small) Starts funding which would offer opportunities to reduce costs as well as constraints for outside capital funding.

Figure ES-2: Brigham City Commuter Rail Corridor



Chapter One: Process

Chapter One describes the process that the Brigham City Transit Corridor Study underwent in order to address the four primary goals of the project as well as to provide direction for the agencies and organizations that were involved.

In order to meet the transportation needs of a growing population and to satisfy public interest in alternative transit modes, the Utah Transit Authority (UTA) and Brigham City initiated this transit corridor study. The goals of the Brigham City Transit Corridor study can be summarized in five key objectives.

1. Identify the purpose and need of a major transit investment
2. Investigate mode and corridor alternatives
3. Evaluate ridership demand
4. Estimate capital and operating costs ranges
5. Define a locally preferred alternative

Committees

In order to provide the proper level of detail and analysis for various groups and individuals with interest in this process, three committees were formed: a management group, a policy group, and a stakeholder group. Input from these groups was used to make decisions related to corridor analysis, mode analysis and the preferred alternative.

Management Group

A management team made up of members of the planning and economic staff of UTA and Brigham City was set up to meet nine times throughout the course of the study. The primary objective of the management group was to oversee the administration of the project with a high level of involvement. Secondary responsibilities included creating a clearly defined work schedule, project tasks, budget, and making sure the objectives of the study were being carried out.

Study Team

The study team consisted of the consultants selected to perform the work and were guided by the direction of the prime consultant (InterPlan) in cooperation with staff from the lead agencies (UTA and Brigham City). Consultants were contracted to perform the study technical work and consisted of representatives from InterPlan, Connetics Transportation Group, HDR, and Landmark Design. The study team was responsible for carrying out the day-to-day work involved with the project in addition to developing all written reports. The study team was essentially the production arm of the management group.

Policy Group

A policy group was set up to represent both Brigham City and the Utah Transit Authority. This group helped guide the study team and management group when questions about policy or procedure arose. The policy group met three times throughout the study period.

Stakeholder Group

A stakeholder group was formed to act as focus group which would represent the community. The group was set up to be large enough to stand for the community but small enough to be able to communicate their ideas to the other groups involved in the study. The stakeholder group met twice throughout the course of the study.

Committee Membership

Table 1-1 lists members of each of the above groups.

Table 1-1: Committee Membership

Management Group		
Mark Teuscher	Brigham City, City Planner	
Paul Larsen	Brigham City, Economic Development	
Tom Hannum	Chair Rail Task Force	
Art Bowen	UTA Regional General Manager	
Randy Park	UTA Manager Special Projects/Grants Management Oversight	
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Mayor Ryan Tingey, Willard City	Carol Griffin, Disabled Community Rep	
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Kevin Hansen, Weber State University	Ann Henderson, Interagency Council	
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Susan Rosales, CTG	Smith Myung, CTG	
Mark Vlasic, Landmark Design	Charlie DeWeese, HDR	
John Buttenob, HDR		

Public Involvement

Public involvement was an important element of the Brigham City Transit Corridor Study. The intent behind the various groups described above was to expand public involvement opportunities to several levels. In addition, a public open house was held so that any resident or interested individual could have their questions answered and see results of analysis. This open house was intended to provide a broad understanding of the study process and results. It was not intended to meet formal public hearing requirements that are called for in other environmental processes.

Policy Group Meeting

Throughout the course of the study the policy committee met three times as a group on October 27, 2006; December 8, 2006; and March 5, 2007. Additional one-on-one meetings with decision makers at UTA and Brigham City were held subsequent to March 5, 2007. The purpose of these meetings was to outline the wants and needs of Brigham City and the Utah Transit Authority and to communicate those desires to the study group and management for possible implementation.

Stakeholder Group Meetings

Throughout the course of the study, the stakeholder group met twice on December 8, 2006 and March 5, 2007. The purpose of the meetings was to add representative public input into the study. Representatives were chosen based their ability to add to the spectrum of communities and populations represented. Many different groups were represented including: ATK Launch Systems, school districts, Cache Valley Transit District, senior citizens, Utah State University, Weber State University, AutoLiv and other groups.

Open House

An open house was held at the Brigham City Senior Center on March 5, 2007. The purpose of the open house was to educate the public on the need for a major transit investment in the corridor. The public was invited via a flyer in the utility bills and by newspaper and radio advertisements. An essential component of the public open house was to gather public input. Comment forms were distributed at the open house and via a Brigham City Transit Corridor website (see Appendix F). Comments were summarized and considered by the management and policy groups when decisions were made regarding the preferred alternative and implementation steps.

Agency Involvement

Many different agencies were involved in the Brigham City Transit Corridor Study. These different groups worked in collaboration to ensure that the project would serve the needs of the region and their respective communities:

- Brigham City. Not only will Brigham City be one of the primary benefactors of the new transit system, the city's land uses and economic condition will be affected.

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- Willard. Mayor Ryan Tingey worked in collaboration with the other groups to make sure that the project would meet the needs of Willard City citizens.

- Perry. Mayor Jerry Nelson of Perry City acted as a representative for Perry City. The Mayor worked to voice the needs and wants of Perry City.

- Utah Transit Authority (UTA). The Utah Transit Authority is responsible for planning, building, and running metropolitan Utah's transit system. UTA came to the study with the goal of improving the transportation system for Box Elder County and surrounding areas

- Utah Department of Transportation (UDOT). The Utah Department of Transportation is involved with the construction, maintenance, and operation of nearly all of the highway transportation projects in the state.

- Cache County. Cache County was represented by several individuals and interests. These individuals represented the interests of the citizens of the Cache Valley as bringing improved transit to Box Elder County/ Brigham City will also bring improved transit to the Cache Valley.

- Union Pacific Railroad (UP). Some of the transit mode alternatives utilized the existing Union Pacific track or right-of-way. The Union Pacific Railroad was involved in this process to verify that these alternatives were feasible. The study team coordinated with UTA to provide a single point of contact with the Union Pacific Railroad.

- Federal Transit Administration (FTA), Region VIII. The goals of Region VIII of the Federal Transit Administration are to help fund, plan, execute, and complete local transit construction projects. UTA coordinated directly with FTA.

Other Relevant Plan Documents

The Box Elder Transit study and the UTA Commuter Rail Environmental Impact Statement both were precursor documents to the Brigham City Transit Corridor Study. The completion of these documents was important to provide the ground work for the Brigham City Transit Corridor Study:

- Box Elder Transit Study, June 2005. InterPlan Co. was hired by Brigham City Corporation to provide the first phase of a Transit Feasibility Study for Brigham City and Box Elder County. The first phase was designed to provide for policy planning in order to assess the types of transit services desired by the community and the range of costs associated with various levels of transit service

- UTA Commuter Rail EIS. This EIS was focused on the proposal of a 44 mile commuter rail line between Salt Lake City and Pleasant View. The proposed project utilized the existing Union Pacific line. The Utah Transit Authority prepared the EIS with the assistance of the Federal Transit Administration.

Chapter Two: Study Area Characteristics

The study area for this project is described in detail here with respect to population, employment, existing transportation facilities, land use, and travel demand. These are key elements in determining the viability of various transit alternatives.

Study Area

The study area for this project generally encompasses the fifteen mile long by one mile wide corridor between Pleasant View in Weber County and Brigham City in Box Elder County. More specifically, it extends from the planned Pleasant View commuter rail station to the existing Forest Street station in Brigham City and from Interstate-15 on the west side to US-89 on the east side. The land use within the study area can be accurately described as low density residential and agricultural. Demographic and other information are given for areas larger than the study area because a regional transit facility would draw from a much larger vicinity than the specific study area. Analysis extended to areas as far south as Provo and as far north as southern Idaho in order to capture the full travel shed of possible transit riders.

Land Use

Demographic data and projections were developed for each of the 26 analysis zones used in the study. Existing data were based upon Census 2000 Block Group data. Projections were developed by Brigham City using county level projections from the Utah Governor's Office of Planning and Budget as control totals. This section summarizes existing and future demographics used in the study.

General Plan

In order to analyze and forecast traffic volumes, it is essential to understand the land use patterns within the study area. Chapter 2 of the Brigham City General Plan outlines land use classifications and annexation plans. Much of the city is zoned residential, but there are also many areas that are zoned commercial and industrial.

Demographics

In order to organize data at a more detailed level, the Project Study Management Group developed 26 zones that included the Wasatch Front region. These zones were used for both demographic and ridership analysis, which will be discussed later in this report. Demographic data and projections were developed for each of the 26 analysis zones used in the study. Existing data were based upon Census 2000 data. Future projections were developed by Brigham City using county-level information from the Utah Governor's Office of Planning and Budget. This section summarizes the existing and future demographics used in the study.

Population

Brigham City is the largest city within Box Elder County with a 2005 Census population estimate of 18,355. Along with Perry and Willard, the Brigham City study corridor is the major population center within Box Elder County. According to the 2005 population estimates, these three cities comprise approximately half of the entire population of Box Elder County. Table 2-1 provides existing population data for Box Elder County and study corridor cities.

Table 2-1: Study Area Population, 2000-2005

City	2000	2005	% Increase 2000 - 2005	AARC* 2001-2005
Brigham City	17,476	18,355	5.0%	1.0%
Perry	2,420	3,081	27.3%	4.9%
Willard	1,626	1,663	2.3%	0.5%
Box Elder County	42,888	46,333	8.0%	1.6%

*Average Annual Rate of Change
Source: US Census Bureau

The Box Elder County population is forecast to increase by over 28,000 people by 2030 with a significant portion of the population growth occurring within the study area. By 2030, over 40,000 people are forecasted to live within the study area cities of Brigham City, Perry, and Willard. Table 2-2 and Figure 2-1 below show population data and projections for the study corridor and Box Elder County by aggregated sub-county districts.

Table 2-2: Study Area Population Projections, 2000-2030

	2000	2004	2012	2020	2030
Brigham City	14,166	14,852	16,291	17,620	20,352
Brigham City/Mantua	3,203	3,703	4,797	5,927	7,986
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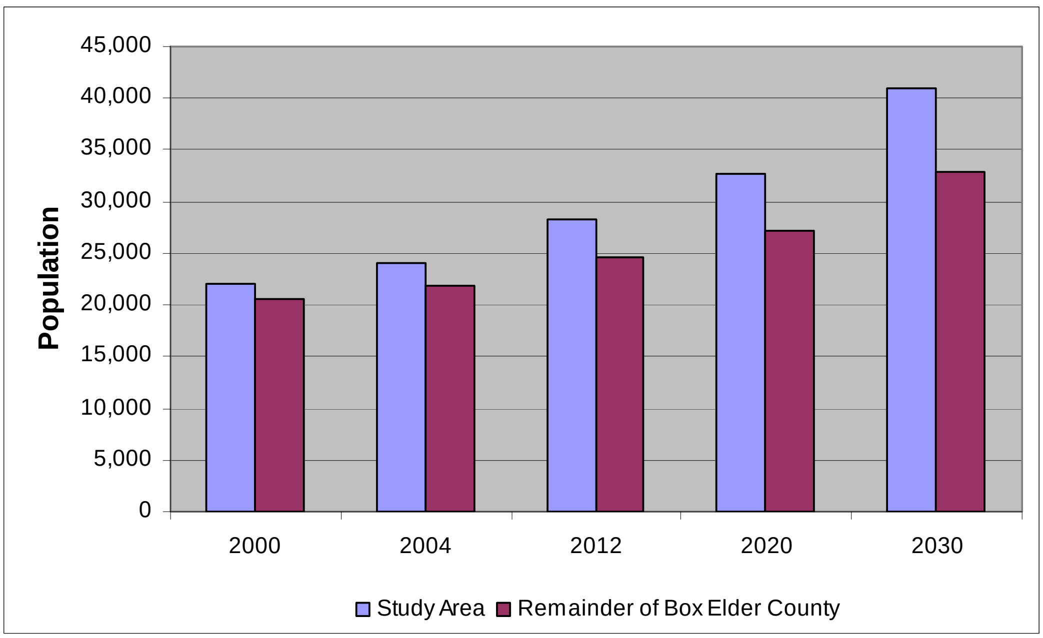
Source: Brigham City, US Census

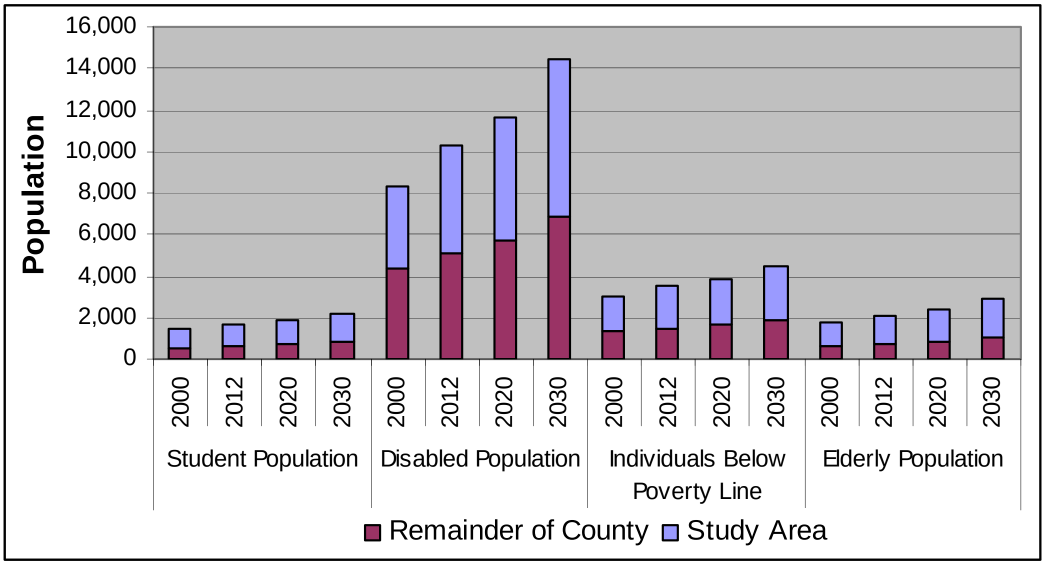
Figure 2-1: Study Area Population Projections, 2000-2030



Source: Brigham City, US Census

According to the para-transit study performed by InterPlan in 2005, demographic projections were developed for target transit user groups that live within the study area for both a base year of 2000 and a future year of 2030. Of these transit user groups, People with Disabilities is the single largest transit user group within Box Elder County. People with Disabilities comprised approximately 24 percent of the total population according to the 2000 Census which was similar to other Wasatch Front counties. Although People with Disabilities is the largest transit user group, the other three user groups are a significant component of the total population. Figure 2-2 below illustrates the existing and forecast population for the transit user groups within the study area and in Box Elder County.

Figure 2-2: Transit User Group Population Projections, 2000-2030



Source: Brigham City, US Census

Although para-transit users may not explain the demands for a major transit investment between Brigham City and Ogden, they are important in understanding the nature of existing transit riders in the study area, particularly with respect to route deviation service recently provided.

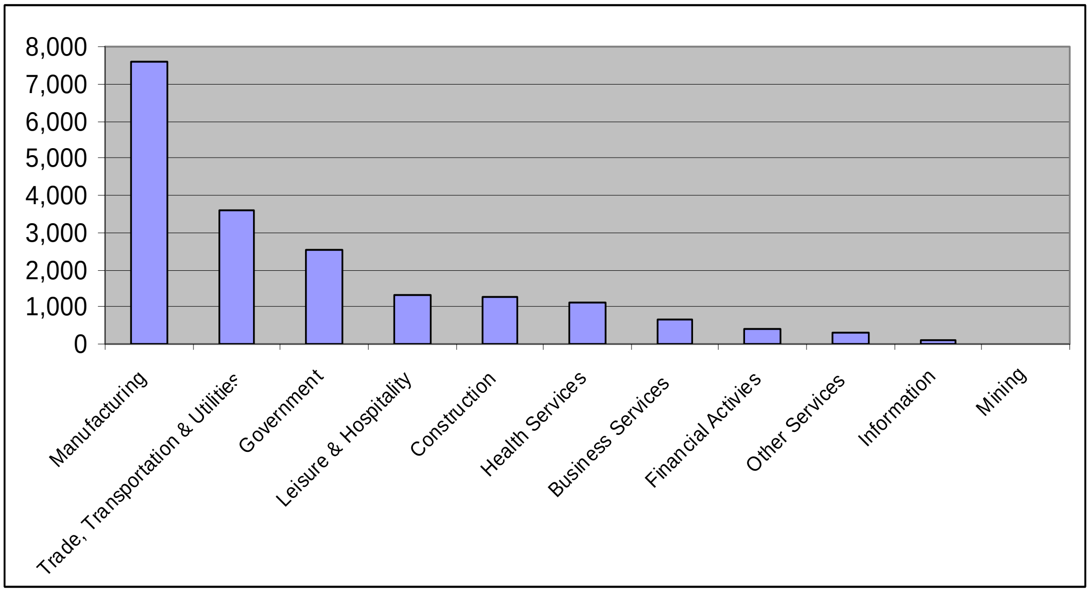
Employment

According to the Utah Department of Workforce Services, total employment in Box Elder County was 18,892 in 2005. Accounting for 40 percent of all employment, manufacturing was the most dominant sector of the economy. Other notable economic sectors were:

- Trade, transportation, and utilities (20 percent)
- Government (13 percent)
- Leisure and hospitality (7 percent)
- Construction (7 percent)

Figure 2-3 illustrates 2005 employment by sector in Box Elder County.

Figure 2-3: Box Elder County Employment by Sector, 2005



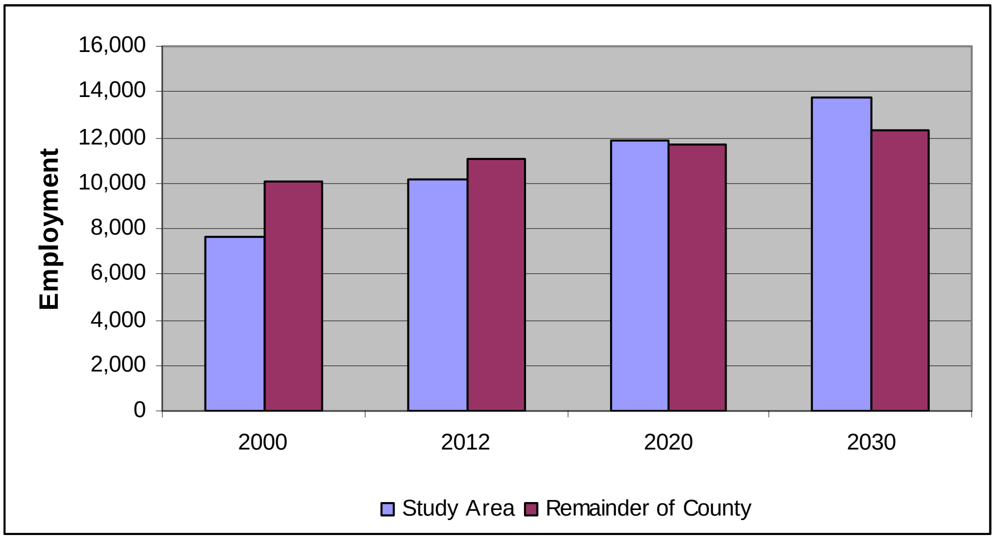
Source: Utah Department of Workforce Services, Economic Data & Analysis Unit, Annual Report of Labor Market Information, 2005.

Employment in Box Elder is concentrated within a few major firms with five companies accounting for approximately 50 percent of total county employment. The major employers in 2005 were:

- AutoLiv
- Wal-Mart Distribution Center
- ATK Space Systems
- LZB Manufacturing
- Nucor Corporation

Future employment is expected to exceed 26,000 by 2030. Many of these new jobs will be concentrated in the study corridor. In 2000, the majority of employment was outside of the study area. However, according to Brigham City estimates, by 2020 there will be more jobs within the three-city study area than in the remainder of the county. Figure 2-4 shows projected employment within the county for both the study area and the rest of Box Elder County.

Figure 2-4: Box Elder County Employment Projections



Source: Brigham City, Utah Department of Workforce Services

Transportation Facilities

There are three transportation corridors within the study area. US-89 and I-15/I-84 are the primary highways that serve the study area. I-15 is immediately east of the power corridor and US-89 is approximately one mile east of I-15, generally at the base of the foothills of the Wasatch Mountains. The other transportation facility is Union Pacific's mainline railroad track that runs through the center of the study area. The Union Pacific Railroad is between I-15 and US-89, generally adjacent to I-15. Transit service utilizes the US-89 corridor for both local and express service. Growing residential development straddles US-89 such that it is highly unlikely that a new linear transportation corridor could be developed.

Figure 2-5: Study Corridor

Highway

In the study area, US-89 is the easternmost transportation corridor providing local access to the study area and connecting the communities to Ogden and Cache County. US-89 exists as a five lane highway (two northbound lanes, two southbound lanes and a center turn lane) and UDOT currently does not have plans to widen the facility.

I-15/I-84 is a limited access freeway that runs through the west side of Brigham City, Perry, and Willard. I-15/I-84 provides high-speed access to the Wasatch Front and southern Idaho via interchanges at Forest Street, 1100 South, 750 North, and SR-126. Currently, I-15/I-84 has two northbound and two southbound travel lanes through the study area. According to the UDOT Long Range Transportation Plan, UDOT plans to widen I-15/I-84 through the study area to 1100 South before 2025. However, no funding has been programmed for this project

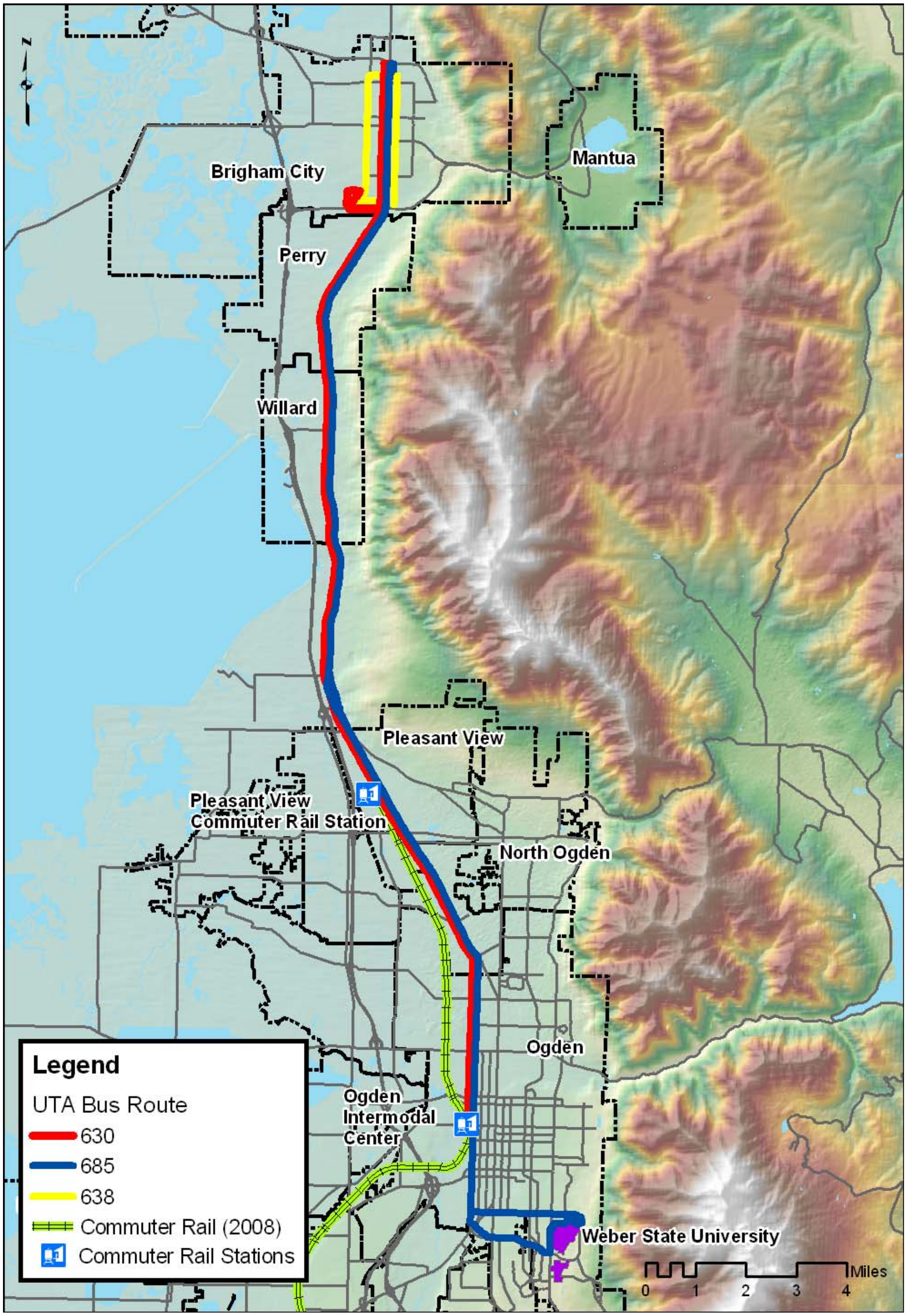
Transit

In Box Elder County, UTA currently serves only the cities of Brigham City, Perry, and Willard within the UTA Transit district.

- Route 630 provides service between Brigham City and the Ogden Intermodal Center from 5:30 a.m. to 9:30 p.m., Monday through Saturday.
- Route 685 offers express commute service between Brigham City and Ogden, with two southbound runs in the morning and one northbound run in the afternoon, Monday through Friday.
- Route 638 provides route deviation services in Brigham City and was recently implemented in August 2006.

The UTA service area is shown in Figure 2-6.

Figure 2-6: UTA Transit Service Area in Box Elder and North Weber Counties



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Rail

The Union Pacific provides freight rail access to Box Elder County. The corridor is centrally located in the study area. The ROW parallels I-15 through Willard, Perry and Brigham City. Passenger rail access was historically provided at the Forest Street train station in Brigham City, but no passenger rail service presently exists in the corridor. Currently Union Pacific is utilizing this mainline as a freight line. UTA has a preliminary negotiation of track usage rights on this line; these rights are secondary usage rights with Union Pacific having the priority usage of the track. This agreement is subject to a capacity analysis to be preformed and paid for by Brigham City and UTA.

Chapter Three: Travel Pattern Analysis

A detailed analysis of the nature of trips that people take, both in terms of destination of the trip and reason for the trip, gives great insight as to the likelihood of transit use for those trips. This chapter describes these trips in specific detail so that further analysis such as mode choice can be performed.

Work Trip Travel Demand

Travel demand for the study area was based on census county-to-county worker flows. Census worker flow data offer reliable commuting patterns at the county level by providing all work destinations for people who live in each county. Table 3-1 summarizes county-to-county work flows for the counties in the study area.

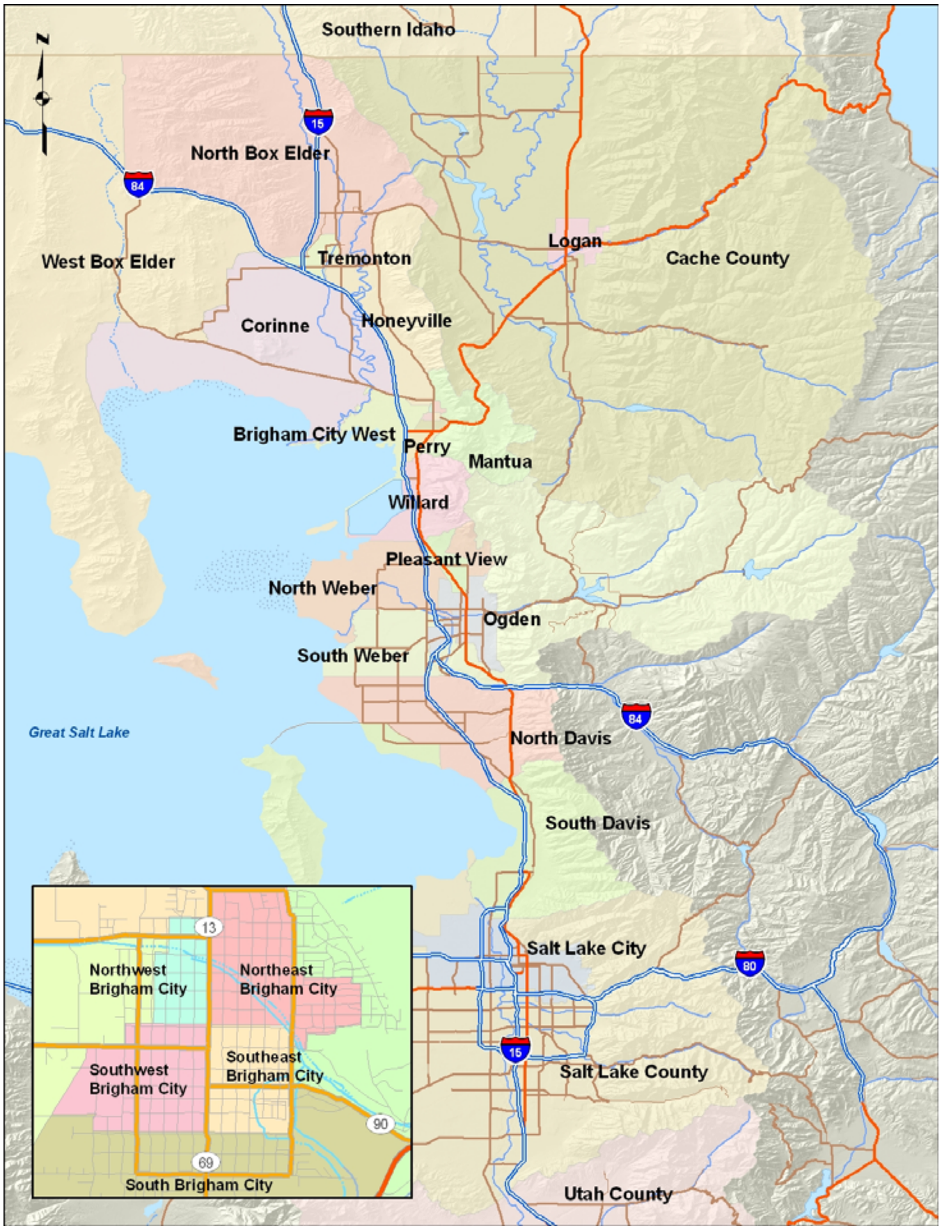
Table 3-1: County to County Work Trips, 2000

		County of Workplace							
		Box Elder	Cache	Davis	Salt Lake	Utah	Weber	Southern Idaho	Other
County of Residence	Box Elder	13,570	631	660	401	26	2,529	16	197
	Cache	2,383	39,235	334	463	94	606	218	398
	Davis	313	199	61,208	33,851	803	14,876	0	1,467
	Salt Lake	80	224	8,370	411,283	8,075	2,084	0	8,511
	Utah	14	12	842	18,159	140,834	317	0	3,399
	Weber	1,671	379	16,659	6,425	458	64,671	0	1,081
	Southern Idaho	519	1,773	57	115	17	53	3,993	50
	Other	179	326	1,718	19,083	3,205	1,376	181	

Source: US Census Bureau

The county-to-county work flow data was used as the basis for allocating work trips to the defined sub-county geographies. Sub-county level geography was used in order to better identify travel patterns and market groups within the study area. The defined geography included broad travel markets such as Salt Lake and Utah Counties as well as smaller geographic areas near the corridor itself. Figure 3-1 shows the defined geography for the 26 sub-areas.

Figure 3-1: Sub-County Geography



County level work trips were distributed to the 26 defined sub-areas based upon the relative employment and population of each sub-area. Table 3-2 below shows work trips in 2000 distributed on a sub-county basis.

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Table 3-2: Distributed Work Trips, 2000

To

From	Northwest Brigham City	Northeast Brigham City	Southeast Brigham City	Southwest Brigham City	South Brigham City	West Brigham City	Perry	Willard	Mantua	Corinne	Honeyville	Tremonton	North Box Elder County	West Box Elder County	Pleasant View	Ogden	North Weber County	South Weber County	Logan	Cache County	North Davis County	South Davis County	Salt Lake City	Salt Lake County	Utah County	Southern Idaho	Total Productions
Northwest Brigham City	11	22	5	14	28	56	21	9	15	42	16	71	22	90	1	35	15	28	13	7	12	8	5	7	1	0	554
Northeast Brigham City	27	52	13	34	66	132	51	22	35	99	37	170	52	213	3	82	35	66	30	16	30	19	13	17	2	1	1,317
Southeast Brigham City	12	24	6	15	30	59	23	10	16	44	17	76	24	96	1	37	16	30	14	7	13	9	6	8	1	1	592
Southwest Brigham City	17	34	8	22	43	86	33	14	23	64	24	110	34	139	2	54	23	43	20	10	19	12	8	11	1	1	857
South Brigham City	43	85	21	55	107	215	83	35	57	160	60	275	85	346	5	134	58	107	49	26	48	31	21	27	3	2	2,137
West Brigham City	9	18	4	12	23	45	18	7	12	34	13	58	18	73	1	28	12	23	10	6	10	7	4	6	1	0	453
Perry	20	39	10	25	48	98	38	16	26	73	27	125	39	157	2	61	26	49	23	12	22	14	9	12	1	1	972
Willard	20	40	10	26	50	100	39	17	27	75	28	129	40	162	2	63	27	50	23	12	23	15	10	13	1	1	1,000
Mantua	27	53	13	34	67	134	52	22	36	100	37	172	53	216	3	84	36	67	31	16	30	19	13	17	2	1	1,336
Corinne	38	75	18	48	94	189	73	31	51	142	53	243	75	305	4	118	51	95	44	23	42	27	18	24	3	2	1,886
Honeyville	33	64	16	41	81	163	63	27	43	121	45	209	64	262	4	101	44	81	37	20	36	23	16	21	2	1	1,618
Tremonton	61	120	30	77	151	304	117	50	81	227	85	390	120	489	7	189	82	152	70	37	68	44	29	39	4	3	3,027
North Box Elder County	29	57	14	37	72	144	56	24	39	108	40	185	57	233	3	90	39	72	33	18	32	21	14	18	2	1	1,439
West Box Elder County	13	26	6	16	32	65	25	11	17	48	18	83	26	104	1	40	17	32	15	8	14	9	6	8	1	1	644
Pleasant View	2	3	1	2	4	9	3	1	2	7	2	11	3	14	40	1,135	489	909	10	5	403	260	110	146	18	0	3,589
Ogden	13	26	6	17	33	66	25	11	18	49	18	84	26	106	297	8,489	3,655	6,797	74	39	3,013	1,943	822	1,089	136	0	26,851
North Weber County	10	20	5	13	25	51	20	8	14	38	14	65	20	82	231	6,581	2,833	5,269	57	30	2,336	1,506	637	844	106	0	20,816
South Weber County	19	38	9	24	47	95	37	16	25	71	27	122	38	153	432	12,332	5,309	9,874	107	57	4,377	2,822	1,194	1,582	198	0	39,007
Logan	30	59	14	38	74	148	57	24	40	111	41	190	59	239	4	126	54	101	12,094	6,393	96	62	94	124	44	103	20,418
Cache County	33	66	16	42	83	166	64	27	44	124	46	213	66	268	5	141	61	113	13,573	7,175	107	69	105	140	50	115	22,915
North Davis County	5	10	3	7	13	26	10	4	7	19	7	33	10	41	143	4,088	1,760	3,273	81	43	23,174	14,941	9,065	12,014	500	0	69,277
South Davis County	3	6	2	4	8	16	6	3	4	12	4	20	6	25	87	2,477	1,066	1,983	49	26	14,040	9,053	5,492	7,279	303	0	41,973
Salt Lake City	0	1	0	1	1	2	1	0	1	1	1	3	1	3	6	172	74	138	27	15	954	615	33,159	43,945	1,514	0	80,635
Salt Lake County	2	3	1	2	4	9	3	1	2	6	2	11	3	14	26	747	322	598	119	63	4,135	2,666	143,715	190,463	6,561	0	349,481
Utah County	0	1	0	0	1	2	1	0	0	1	1	2	1	3	5	140	60	112	8	4	512	330	7,809	10,350	140,834	0	160,178
Southern Idaho	13	26	6	17	33	66	25	11	18	49	18	85	26	106	1	18	8	14	1,132	599	29	19	15	21	15	3,993	6,364
Total Attractions	491	967	238	623	1,214	2,446	943	402	653	1,827	683	3,138	969	3,938	1,316	37,562	16,171	30,074	27,744	14,667	53,577	34,544	202,392	268,226	150,305	4,227	

Future work trips were estimated for each sub-area using the Fratar growth method. The Fratar method applies growth factors to both the productions (residential population) and attractions (jobs) and the resulting origin/destination matrix is sequentially iterated until the total productions and attractions are equal or separated by a small tolerance interval. Growth factors are based upon forecast population growth for productions and employment growth for attractions. Table 3-3 provides the 2030 work trip origin and destination matrix for condensed sub-areas within the study corridor.

Table 3-3: Origins and Destinations of Work Trips, 2030

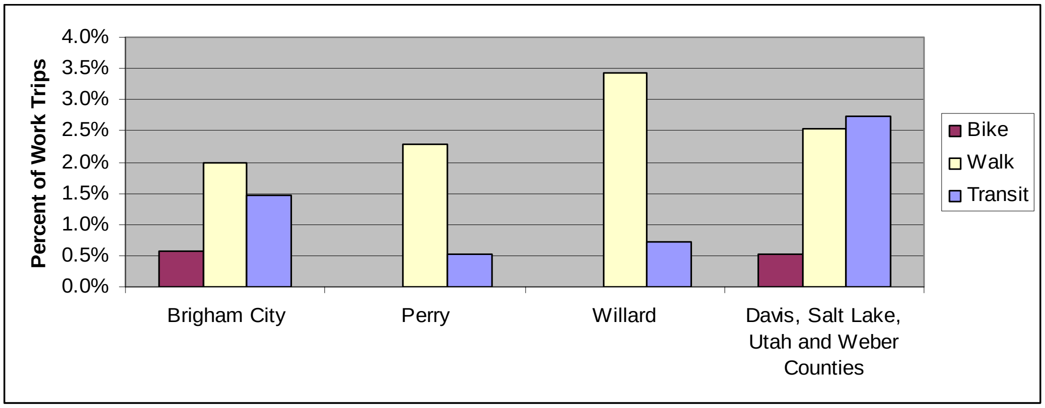
		To								
		Brigham City	Perry	Willard	Box Elder County	Pleasant View	Ogden	Weber County	Cache County	Davis, Salt Lake, Utah Counties
From	Brigham City	3,155	763	220	3,719	46	729	1,252	429	942
	Perry	836	202	58	985	12	193	332	114	250
	Willard	574	139	40	676	8	133	228	78	171
	Box Elder County	3,656	884	255	4,309	53	845	1,450	497	1,092
	Pleasant View	39	9	3	46	117	1,871	3,212	26	2,059
	Ogden	163	39	11	192	491	7,824	13,428	108	8,608
	Weber County	506	122	35	596	1,523	24,294	41,695	336	26,728
	Cache County	1,561	377	109	1,840	31	492	845	75,204	2,232
	Davis, Salt Lake, Utah Counties	169	41	12	199	558	8,896	15,268	527	1,107,772

Work Trip Mode Share

In 2000, approximately 95 percent of all work trips in the study area and in the Wasatch Front region were by automobile. Although most work trips were drive-alone trips followed by carpool trips; walking, biking, and transit were also reported as a primary means of travel to and from work.

Figure 3-2 shows the work trip mode share for Brigham City, Perry, and Willard. Bicycling had the lowest share of all modes with less than one percent of all workers commuting by bicycle. Within the study area, walking was the most common non-auto mode with between two percent and three percent of people walking to work. Transit had the highest mode share in the other Wasatch Front counties where more transit options exist. Despite relatively limited transit service within the study area, Brigham City had approximately 1.5 percent of people commuting by transit. Perry and Willard had a transit share of roughly one-half percent.

Figure 3-2: Work Trip Mode Share, 2000



Source: US Census 2000, SF 3, Block Group Data

Transit work trip origins and destinations were calculated using Census journey-to-work mode share data and the estimated work trip origins and destinations. The resulting transit work trip origin and destination matrix serves as the basis of all transit trip forecasts. Table 3-4 below shows the 2030 transit work trip origin and destination matrix. Compared to other cities and counties, the study area is forecast to have relatively fewer total work trips and transit work trips.

Table 3-4: Origins and Destinations of Transit Work Trips, 2030

		To								
		Brigham City	Perry	Willard	Box Elder County	Pleasant View	Ogden	Weber County	Cache County	Davis, Salt Lake, Utah Counties
From	Brigham City	44	11	3	52	1	10	17	6	13
	Perry	4	1	0	5	0	1	2	1	1
	Willard	4	1	0	5	0	1	2	1	1
	Box Elder County	12	3	1	14	0	3	5	2	4
	Pleasant View	0	0	0	0	1	14	25	0	16
	Ogden	4	1	0	5	12	183	315	3	202
	Weber County	6	2	0	8	19	309	530	4	340
	Cache County	19	5	1	22	0	6	10	911	27
	Davis, Salt Lake, Utah Counties	4	1	0	5	13	210	360	15	29,753

Base Year Transit Ridership

Work trips were used as the basis for estimating all transit ridership due to the abundance of high-quality commuting/mode share data available from the US Census. Additionally, work trips are generally the largest share of all transit trips, typically, approximately 50 percent of transit trips.

The 2006 UTA on-board transit survey estimated that home-based work (HBW) trips accounted for approximately 45 percent of all transit trips. However, there were no on-board survey response data for the study area. HBW trip share in the US-89 corridor is probably significantly higher due to the regional nature of existing transit. Route 630 provides regional service to Ogden City and Weber County and does provide limited local service along Main Street in Brigham City.

Transit trips were estimated using the census work-trip transit mode share for each district. A factor of 1.8 was used to compute the other trip end (from work to home) in order to convert one-way transit trips to two-way trips occurring throughout the day. This factor is less than two because not all trips from work go directly home and would be classified as other trip purposes accordingly.

Table 3-5 provides the UTA daily boardings data for the year 2000 and estimated trips by type. The relative share for home-based college (HBC), home-based other (HBO), and non-home based (NHB) is dependent on their relative share in the UTA 2006 on-board survey. Based upon an average month in 2000, the 195 HBW transit trips would account for approximately 74 percent of all transit trips. For the base year, HBW transit trip share was estimated to be between 63 and 89 percent of all transit trips.

Table 3-5: Estimated Daily Transit Trips by Type, 2000

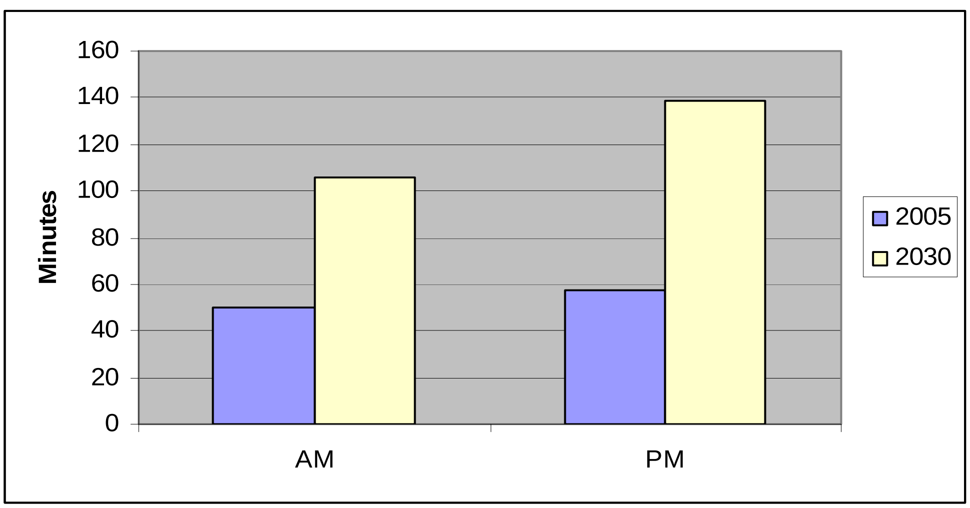
Work Trip Share						
Route 630 Weekday Boardings Year 2000 (Monthly Average)	**Low**		**Average**		**High**	
	219		**263**		**313**	
	Trips	**Share**	**Trips**	**Share**	**Trips**	**Share**
Home-based work	195	89.0%	195	74.1%	195	62.3%
Home-based college	10	4.8%	30	11.3%	51	16.5%
Home-based other	7	3.2%	20	7.5%	34	11.0%
Non-Home-based	7	3.0%	19	7.1%	32	10.3%
Total	**219**	**100%**	**263**	**100%**	**313**	**100%**

Travel Time

As traffic increases on I-15 and other north-south roads, Brigham City becomes further removed from the rest of the Wasatch Front in terms of travel time. Increased traffic congestion forces people to spend more time traveling to business and cultural destinations south of the study area. Longer time and less reliable travel between Brigham City and cultural amenities of the greater Wasatch Front such as Salt Lake International Airport and the Central Business District are viewed as negative aspects of growth and a detriment to the quality of life in the study area.

Figure 3-3 shows the 2005 and 2030 travel times from the Weber/Box Elder County line to the Salt Lake Airport. With no transportation system improvements, travel times to and from Box Elder County increase significantly. The morning peak period travel time to the Salt Lake Airport more than doubles with a 50 minute trip in 2005 taking one hour and 45 minutes in 2030. Afternoon peak period travel times increase even more with a travel time from the airport to Box Elder County increasing from 57 minutes in 2005 to two hours and 18 minutes in 2030. Improvements to Legacy Parkway and I-15 included in the Wasatch Front Regional Council's Regional Transportation Plan may mitigate congestion as compared to a no-build scenario, but it is clear that options such as the FrontRunner Commuter Rail service between Ogden and Salt Lake are vital to a successful transportation system as more users are projected on the expanded highway system.

Figure 3-3: Weber/ Box Elder County Line to Salt Lake Airport, Peak Hour Travel Times, 2005 and 2030



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Chapter Four: Purpose & Need

This chapter describes the purpose of and need for a more robust transit connection between Brigham City and the remaining Wasatch Front region. It focuses on three specific needs and offers data which supports them.

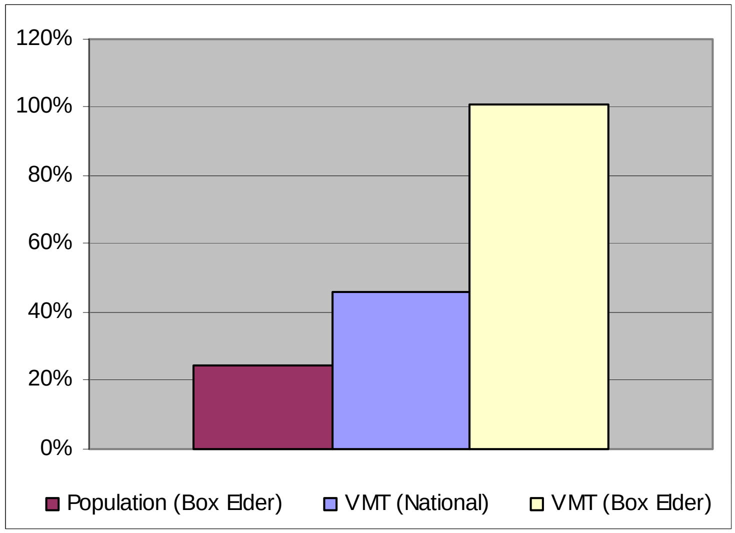
The Brigham City Transit Corridor Study is an effort on the part of the Utah Transit Authority (UTA) and Brigham City to analyze the need for a major transit investment in the I-15/US-89 corridor between downtown Ogden and Brigham City. This investment would address three needs:

- To provide transportation options that will assist in reducing auto dependency and to offer transportation options in and around Brigham City/Box Elder County.
- To provide high-quality transportation options that meet the needs of Brigham City and Box Elder County commuters and transit riders.
- To promote economic development by providing additional transportation linkages and by reducing or maintaining travel time, that will further connect Brigham City and Box Elder County to the greater Wasatch Front.

Reduce Auto Dependency

A major transit investment in the corridor between Ogden and Brigham City would aim to make transportation alternatives available for residents and workers that utilize the corridor. Growth in vehicle miles traveled (VMT) in Box Elder County has outpaced both population growth and national VMT growth. Figure 4-1 illustrates these disparate increases between 1988 and 2004.

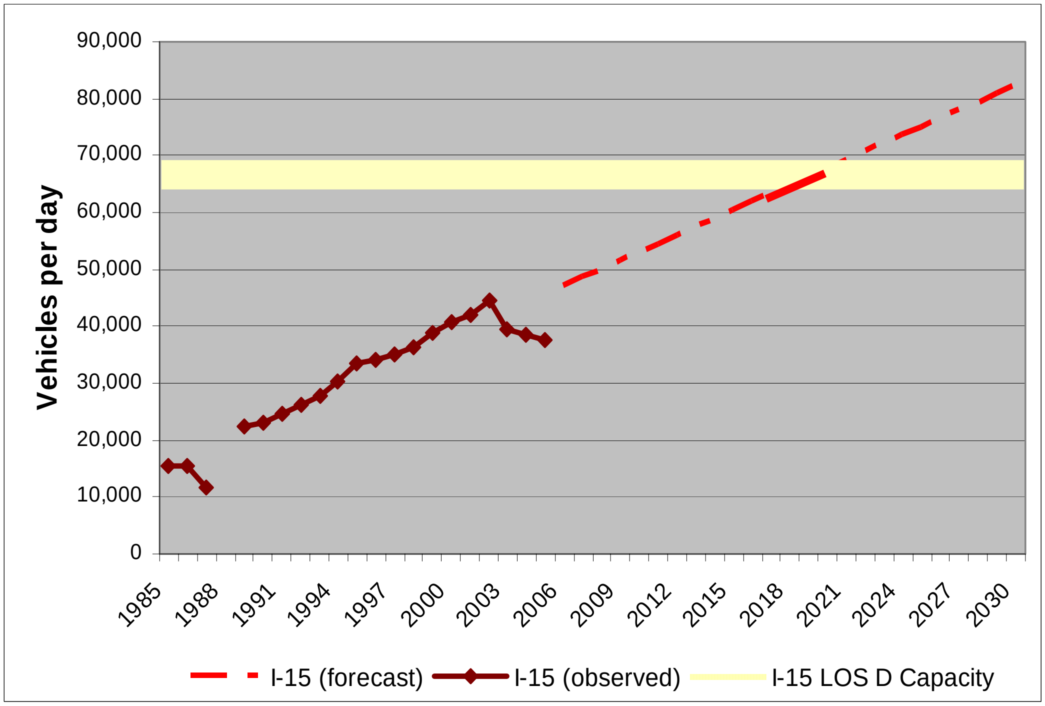
Figure 4-1: Percent Increase in VMT and Population, 1988 to 2004



Increasing VMT has repercussions throughout society at both global and local levels. Larger numbers of cars spending greater time on the roads leads to increased emissions that negatively affect air quality. Additionally, greater use of the road system forces more frequent and extensive infrastructure repair than might otherwise be warranted, further straining already limited governmental resources. Increased time spent in vehicles, especially commuting to and from work, decreases the productivity of workers and ultimately damages economic conditions. Finally, this process creates an unsustainable cycle as people move away from areas with traffic congestion to more "pristine" areas such as Box Elder County until the next wave of growth creates more traffic and continued land use sprawl.

Interstate 15 is the primary north-south route between Brigham City and northern parts of the Wasatch Front region. With continued growth in Box Elder County, I-15 is expected to exceed its capacity sometime after 2020 (assuming a level of service D or approaching unstable flow). Traffic volumes on US-89 will continue to increase as well, especially as I-15 becomes more congested. Historic, existing, and future traffic volumes on I-15 are shown in Figure 4-2.

Figure 4-2: Historic and Projected Traffic Volume on I-15

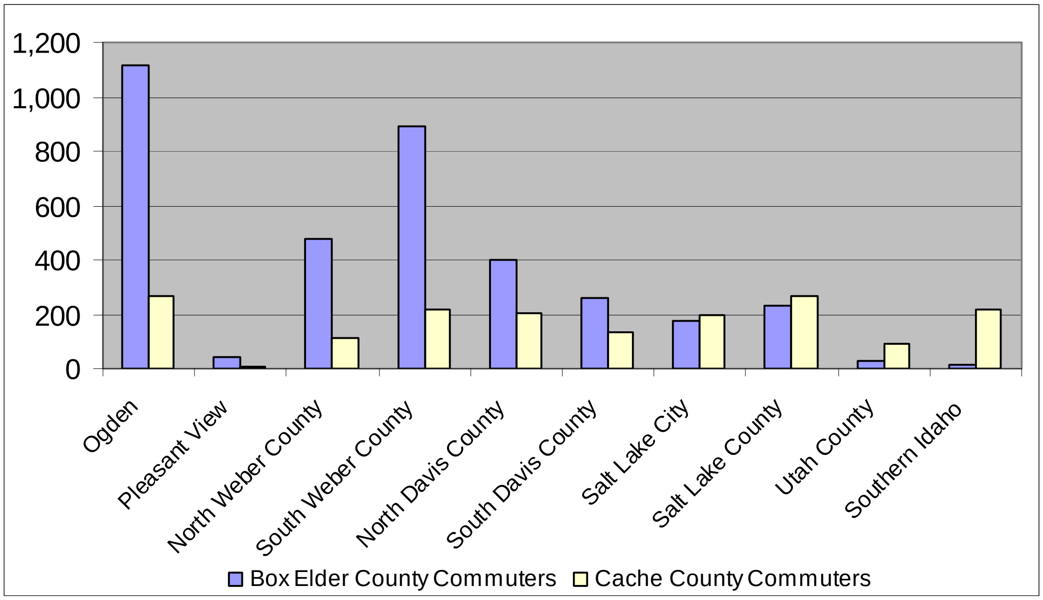


Without significant and costly investment in the highway network, considerable traffic congestion should be expected, making travel between Box Elder County and the rest of the Wasatch Front increasingly difficult and time consuming. Providing alternatives to travelers in this corridor is important in maintaining quality of life and the ability to move around the region in an economical and timely way. I-15 and US-89 are presently the only transportation connections between Brigham City and the greater Wasatch Front.

Currently, transit service in the corridor primarily connects Brigham City and downtown Ogden. Existing transit service consists of hourly local service to and from Ogden (Route 630), three express buses per day to Ogden (Route 685), and 45-minute "flex" service within Brigham City (Route 638).

Census journey-to-work data factored for the sub-county study geography indicates that Box Elder commuters have diverse destinations. Transportation options that serve these diverse needs can assist in reducing auto dependency in Box Elder County. Figure 4-3 shows the employment destinations for Box Elder and Cache County commuters.

Figure 4-3: Work Trip Destinations



Due to the environmental constraints of the Great Salt Lake, surrounding wetlands, and topographic constraints of the Wasatch Mountains, it is unlikely that additional north-south corridors can be created for surface transportation.

Provide High-Quality Transportation Options

The second objective of a major transit investment in the corridor is to provide high-quality transportation options that meet the needs of Brigham City and Box Elder County commuters and transit users. Households within the study area have relatively high incomes compared to other Wasatch Front communities. Table 4-1 shows median household income for several sub-areas in Box Elder County as well as other Wasatch Front counties.

Table 4-1: Wasatch Front Median Household Income, 2000

Area	Median Household Income
Brigham City	$42,335
Mantua	$60,234
Perry	$52,500
Pleasant View	$48,956
Willard	$52,150
Davis County	$53,726
Salt Lake County	$48,373
Utah County	$45,833
Weber County	$44,014

Source: U.S. Census Bureau, Census 2000

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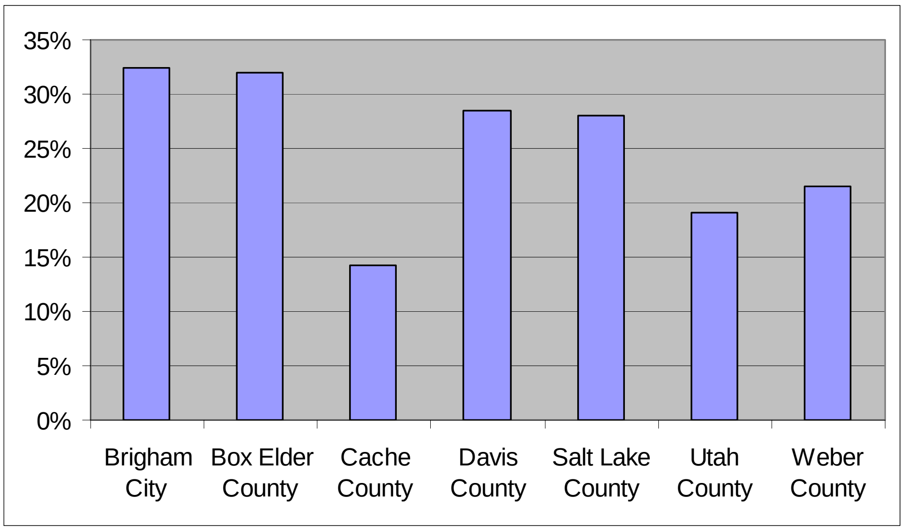
Transit facilities need to serve these users by providing better service with a quality product. Typical users are likely to be professional commuters where the ability to work or perform other tasks while traveling will be important.

Box Elder County commuters spend more time commuting than employees from other Wasatch Front counties. According to the 2000 Census, 32 percent of Brigham City and Box Elder County commuters spent 30 minutes or more traveling to work, greater than any other Wasatch Front county. Figure 4-4 shows the percent of commuters that travel 30 minutes or more to work in the Wasatch Front.

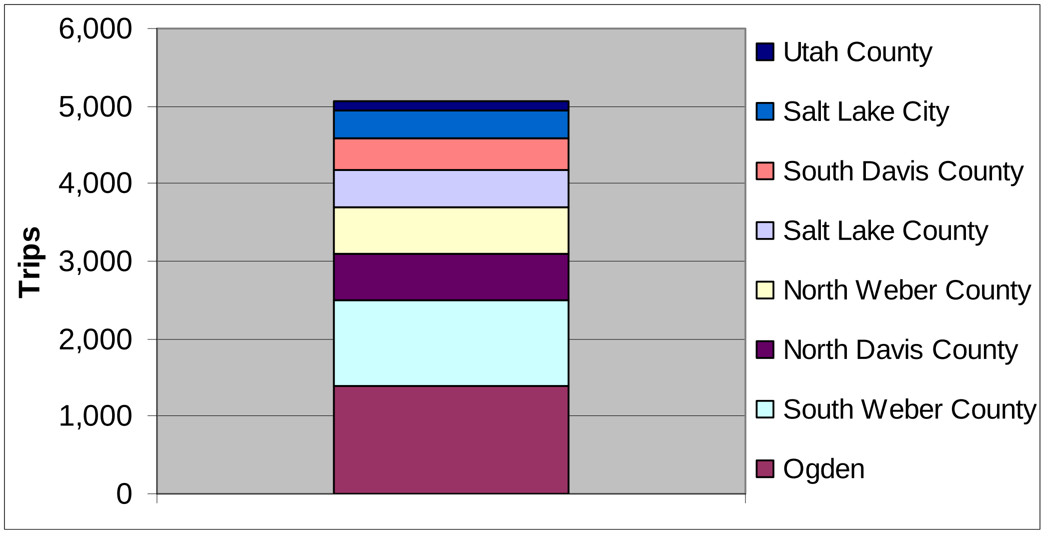
Figure 4-4: Percent of Commuters Traveling 30+ Minutes to Work



This discrepancy in travel time to work is not surprising, given the distance of Brigham City and the rest of Box Elder County from major employment centers in Weber, Davis, Salt Lake, and Utah Counties as well as the remote locations of a few major Box Elder County employers. In order to move people from the convenience of their personal vehicles, alternate modes of transportation need to speed convenience and efficiency as fundamental operating characteristics. Transit service that eliminates or reduces transfers would better serve commuters traveling to destinations south of Ogden.

Existing transit provides convenient service to Ogden and north Weber County. However, these destinations make up only a fraction of work trips from Brigham City. Figure 4-5 shows the share of work trips from Brigham City to Ogden and other Wasatch Front destinations

Figure 4-5: Destination Share of Work Trips from Brigham City



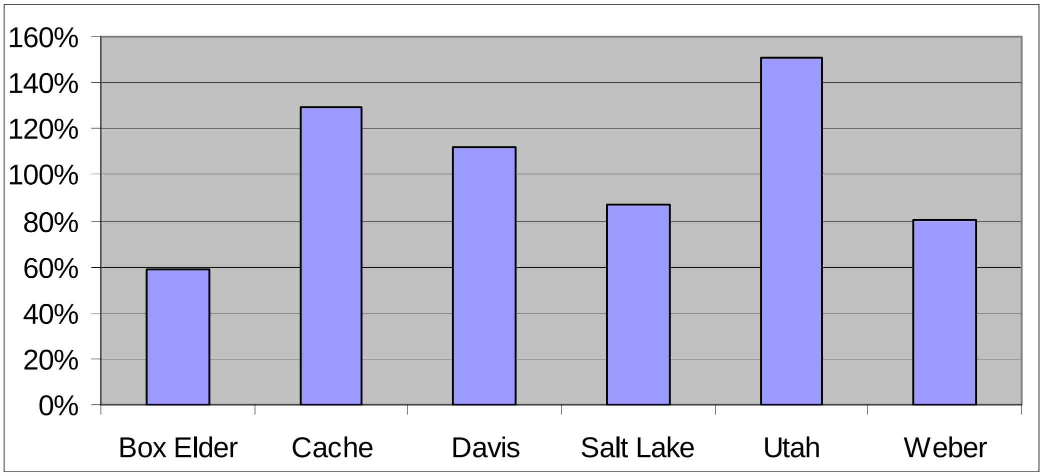
Due to the generally rural nature of Box Elder County, elderly and disabled residents are often forced to rely on friends, family, and limited social service support to travel by car. Recent para-transit service expansion using flexible route deviation in Brigham City has been very successful in serving additional transit riders. More convenient transit service to the greater Wasatch Front will also better serve the existing "transit captive" market of people who are unable to drive themselves.

Promote Economic Development

Finally, transit service between Ogden and Brigham City should seek to promote economic development in Brigham City and Box Elder County by providing additional transportation linkages that will further connect the area to the greater Wasatch Front.

Employment growth in Box Elder County between 1980 and 2004 was lower than in any other Wasatch Front county. Figure 4-6 shows employment growth for five counties between 1980 and 2004.

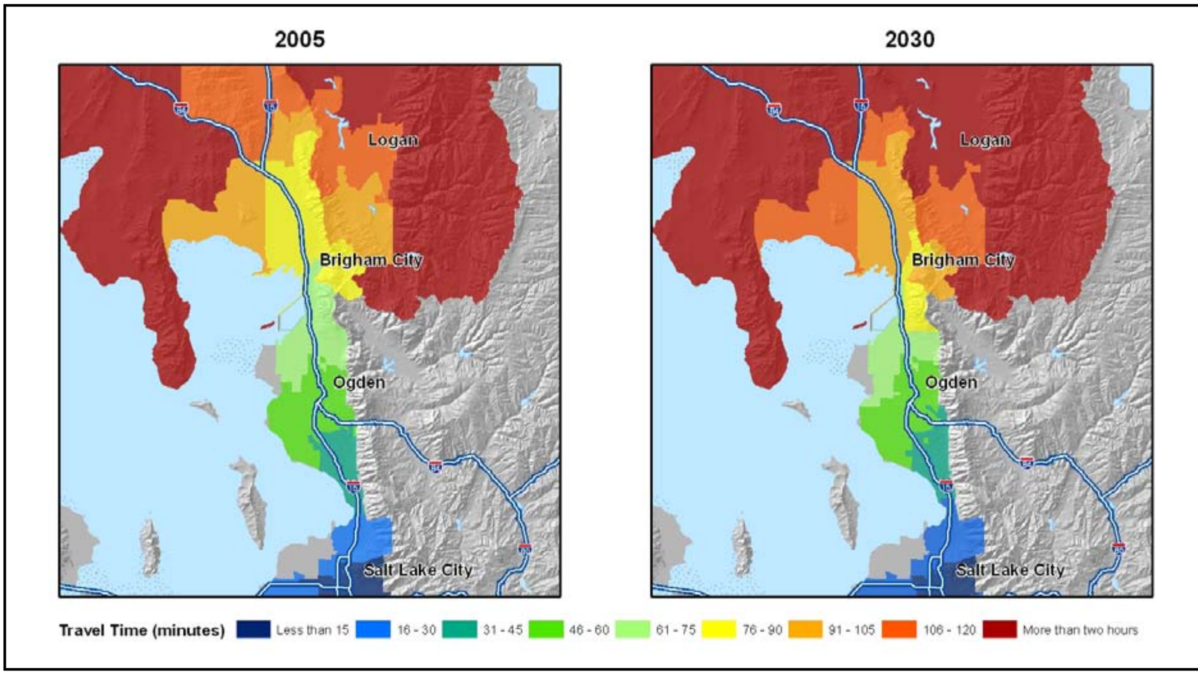
Figure 4-6: Wasatch Front Employment Growth, 1980-2004



Providing a broader spectrum of transportation alternatives in the I-15/US-89 corridor opens up economic opportunities for Brigham City and Box Elder County. The area becomes a more attractive setting for businesses and commercial activity by providing a larger and more accessible employment base as well as opening up the area to other commercial activity networks.

Residents of Box Elder County align themselves culturally to the diversity of activities of the greater Wasatch Front. Fast and convenient access to the Salt Lake International Airport and downtown Salt Lake City are key selling points for Box Elder County. As shown in Figure 4-7, traffic congestion increasing in the greater Wasatch Front is causing Salt Lake City to become more distant in terms of travel time from Brigham City and could reduce the competitive advantage of Brigham City to attract new population and employment growth.

Figure 4-7: Travel Time Increases, 2005 to 2030



In summary, as has been demonstrated by the preceding discussion, the call for a major transit investment in the I-15/US-89 corridor is compelled by three distinct needs: reducing auto dependency, providing high-quality transportation options, and promoting economic development opportunities. All of these needs provide the foundation on which to build the range of alternatives that will best address them. Subsequent analysis will continue to define, refine and support these needs and identify solutions which address the purpose.

Chapter Five: Corridor Analysis

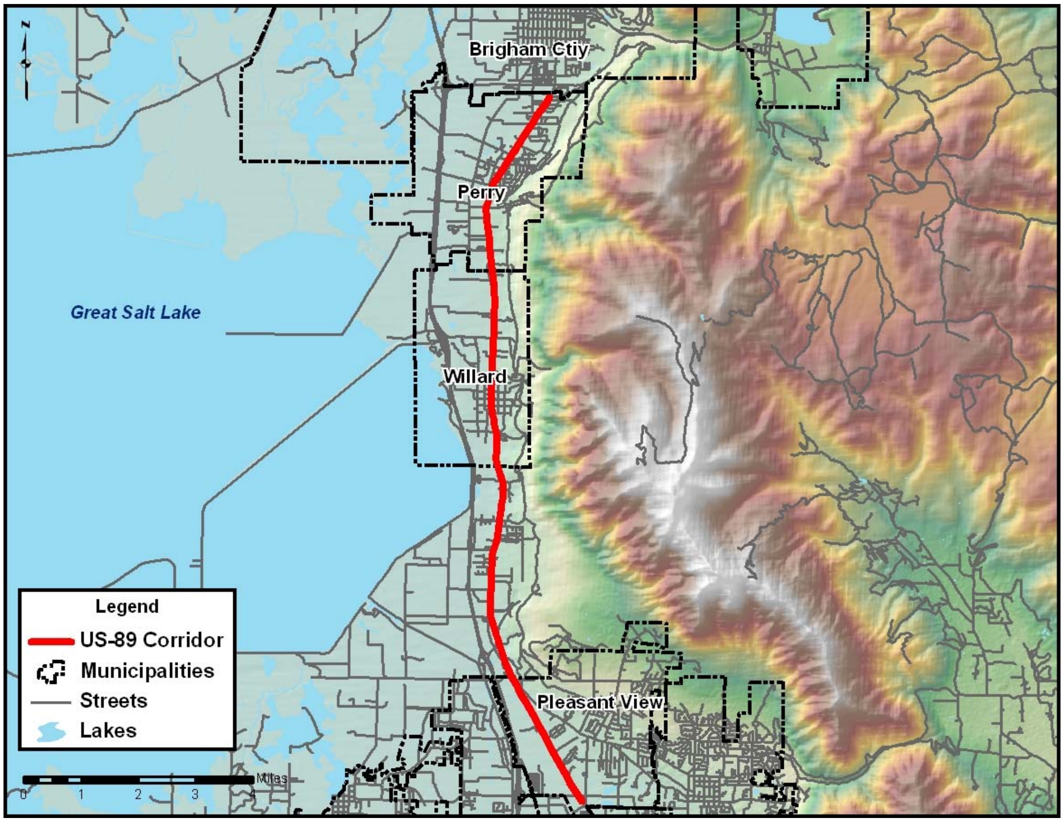
Chapter Five offers a detailed description of each of the three existing transportation corridors: the US-89 corridor, the I-15 corridor, and the Union Pacific Rail corridor.

Three transportation corridors connect Box Elder and Weber Counties: US-89, I-15, and the Union Pacific Railroad. From Brigham City to Pleasant View, these facilities are generally located within a half-mile wide corridor. At the narrowest point in South Willard, there is only one-half mile between Willard Bay and the Wasatch Mountains. As a result, these three corridors will be required to handle increased traffic as the region develops due to the limited options for new transportation facilities.

US-89, Brigham City to Pleasant View

US-89 is the easternmost highway between Brigham City and Pleasant View. The 13.4 mile segment of US-89 extends from 2700 North in Pleasant View (mile marker 360.7) to US-91 (mile marker 374.0) in Brigham City. This segment of US-89 is a five-lane highway that is designated by UDOT's Functional Classification System as a Rural Minor Arterial. The road functions as a high-speed highway with posted speed limits of 55 mph in rural areas and 50 mph in more urbanized areas. Figure 5-1 shows the US-89 analysis segment between Pleasant View and Brigham City.

Figure 5-1: US-89 Corridor



Transit

UTA currently operates two bus routes on US-89 that provide a connection between Box Elder and Weber County communities.

Route 630 provides local bus service between Brigham City and the Ogden Transit Center with one-hour headways. Route 630 is operated Monday through Friday (5:09 a.m. to 8:28 p.m.) and Saturdays (8:05 a.m. to 9:11 p.m.) with no service Sundays or holidays.

Route 685 is a limited stop, peak-hour route between Brigham City and Weber State University. Existing service is limited to two morning trips from Brigham City (6:50 a.m. and 7:00 a.m.) and one evening trip from Weber State University (5:09 p.m.).

Pedestrian/Bike Facilities

The majority of the US-89 corridor does not have sidewalks. However, some of the more urbanized areas or newer developments do provide a sidewalk and crosswalks on US-89. Due to the sporadic availability of sidewalks, pedestrian connectivity on the corridor is poor and does not serve walking trips well.

US-89 is the primary route between Box Elder County and Weber County for bike trips. Highway shoulders on many segments of the US-89 provide a safe riding area for cyclists and currently substitute for bike lanes between Brigham City and Pleasant View.

Existing & Future Traffic

Traffic growth on the US-89 has been steady over the last two years with an average annual growth rate of just under two percent. Between the years 2001 and 2003, traffic volumes grew faster than the 21-year average at approximately nine percent per year. Traffic volume has increased from approximately 10,000 vehicles a day in 1985 to just fewer than 15,000 in 2005.

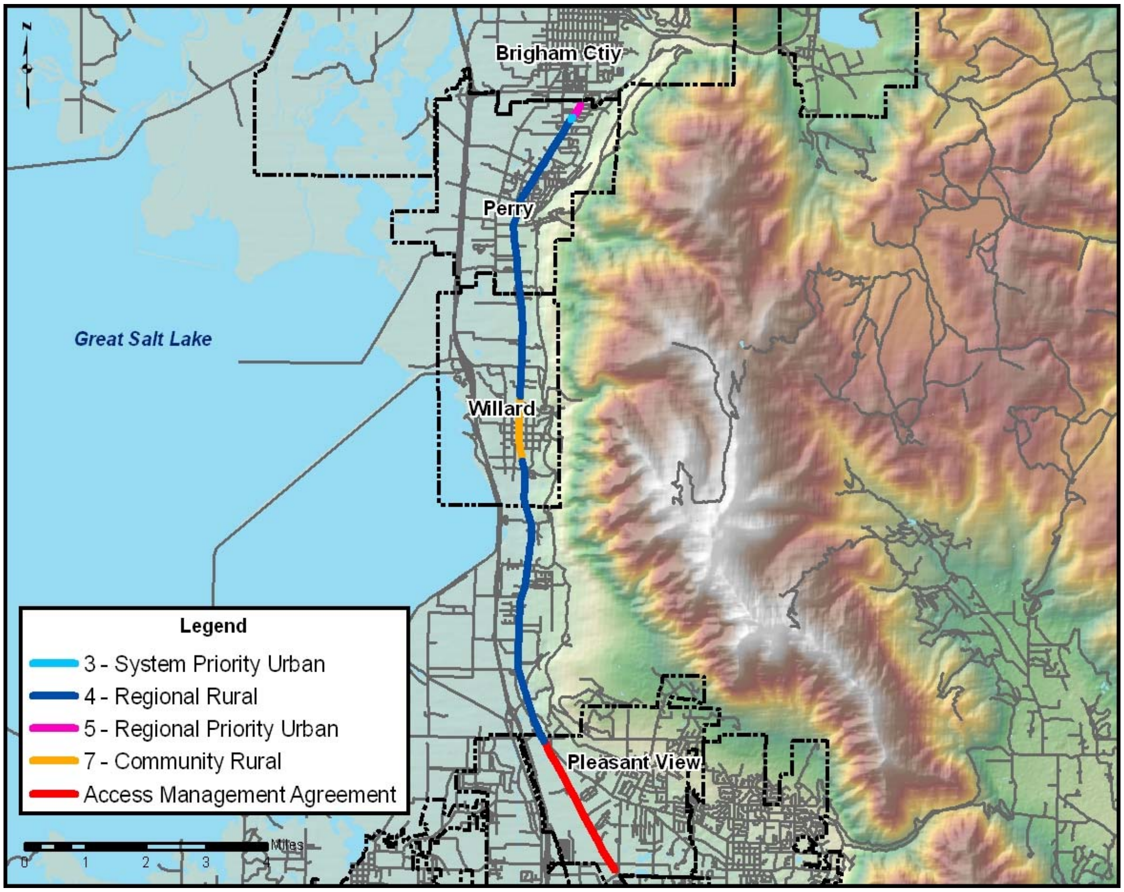
The highest traffic volumes on US-89 are just south of US-91 in Brigham City, and the volumes gradually decrease heading south. The lowest traffic volumes are located in Pleasant View between 2700 North and the I-15 interchange at the Box Elder/Weber County line. These volumes are approximately 30 percent lower than those at the northern end of the US-89.

Future Travel Time/Access Management

Future travel times on US-89 were estimated from Brigham City to the Ogden Intermodal Center by accounting for future delay from new traffic signals. Assumed signal spacing was based upon existing access management agreements along the US-89 corridor.

State highway access standards are governed by Administrative Rule R930-6 which was adopted by UDOT to accommodate utilities, control, and protect state highway rights-of-way. These standards have nine distinct categories that provide differing standards for access control. The majority of US-89 in Box Elder County is designated as Regional Rural. However, there are segments of Regional Priority Urban and Community Rural. Access Management through Pleasant View is regulated by a separate access management agreement between UDOT and Pleasant View. Figure 5-2 provides the access management categories on US-89.

Figure 5-2: Access Management Categories, US-89



Source: UDOT

The access management categories on US-89 require ½-mile signal spacing except for Category 7 Community Rural that allows for ¼ -mile signal spacing. Currently there are a total of two signals on the US-89 analysis segment. The existing standards allow for the installation of up to 24 signals from 2700 North to US-91.

Table 5-1 illustrates the impact of new signals on future travel time. Assuming that new signals will be installed at existing cross-streets that meet signal spacing standards, it is estimated that there will be 19 signals along the corridor as development increases and traffic signals are warranted. With an average delay of 20 seconds from each signal (assuming good progression and levels of service at each intersection), future travel time on US-89 will increase by over 40 percent – at least seven minutes. Table 5-1 provides the estimated future travel time on US-89 from 2700 North Pleasant View to US-91 Brigham City.

Table 5-1: Traffic Signals and Travel Time, US-89

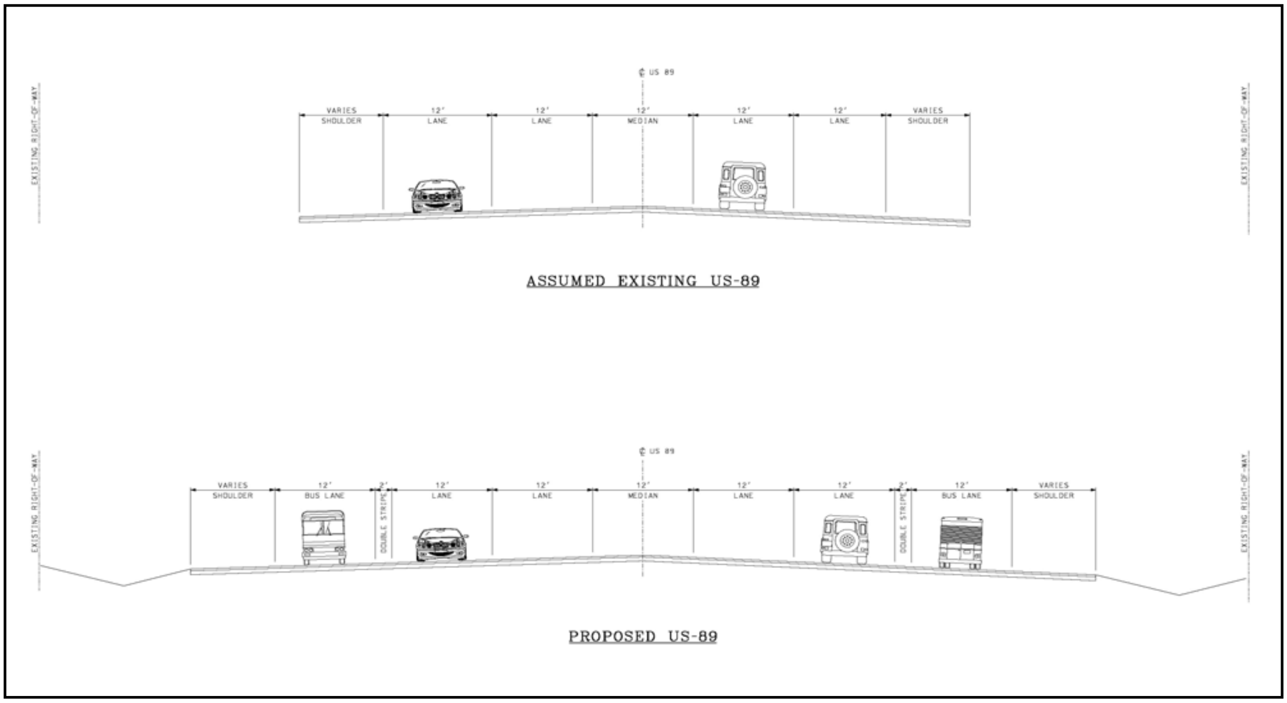
Signals		Travel Time (minutes)	
Existing	Future	Existing	Future
2	19	16	23

InterPlan Co.
Transportation Planning

Dedicated Transit Lane

One option to prevent increased traffic and delay from impacting transit service is to provide a dedicated lane on US-89. This lane would allow for buses (or bus rapid transit) to pass vehicles queued in the other travel lanes, improving future transit travel times. This cross section could be installed throughout the corridor or at key signalized locations to allow for queue-jumper lanes of transit vehicles. Figure 5-3 shows the existing cross-section and an example cross-section with a dedicated transit lane.

Figure 5-3: Road Cross-Section and Dedicated Transit Lanes, US-89



Source: HDR

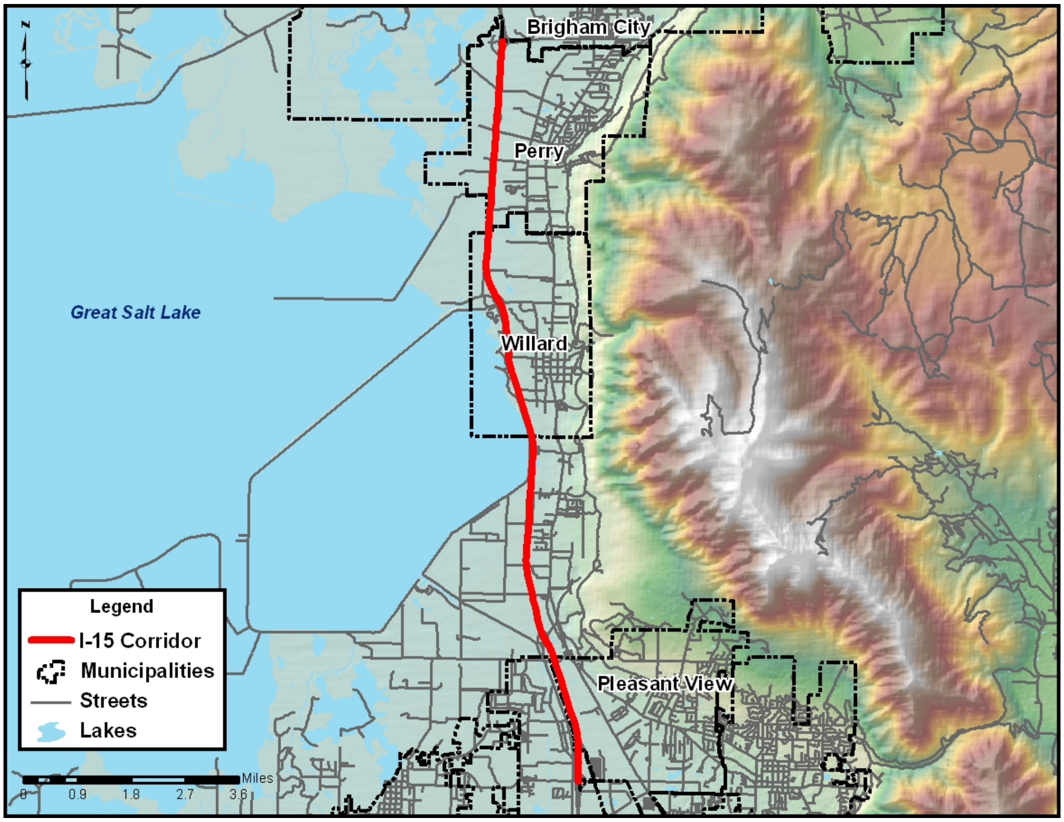
Cost

To provide a dedicated transit lane on the full length of US-89, the reconstruction costs from Brigham City to Pleasant View are estimated to be approximately $15,500,000, not including ROW or vehicle costs.

I-15, Brigham City to Pleasant View

The I-15 segment between Box Elder and Weber County is situated adjacent to Willard Bay and the Great Salt Lake. The 12.6 mile corridor extends from 2700 North in Pleasant View (mile marker 350) to 1100 South in Brigham City (mile marker 362.6). Through this segment, I-15 consists of two northbound and two southbound lanes with interchanges at 2700 North (SR-134), 2000 West (SR-126), Willard Bay Road (SR-315) 1100 South (US-91) and Forest Street to the north. Figure 5-4 shows the I-15 segment between Pleasant View and Brigham City.

Figure 5-4: I-15 Corridor



Transit

Existing transit service does not utilize the I-15 corridor.

Existing & Future Traffic

Traffic volume on I-15 through Perry increased from 15,000 vehicles a day in 1985 to close to 38,000 vehicles a day in 2005. Although traffic volumes more than doubled in 21 years, the average annual growth in traffic was only 4.6 percent with traffic volumes actually decreasing between 2002 and 2005.

In 2005, truck traffic accounted for between 16 and 20 percent of all daily traffic in the I-15 corridor with approximately 6,000 trucks per day through Perry. In addition to significant truck traffic, a weigh station is located in south Perry (mile marker 359.5) that requires most truck traffic to exit/enter the highway.

The highest traffic volumes in the I-15 corridor are recorded at 2700 North in Pleasant View (mile marker 360) and gradually decrease heading north. In 2004, traffic volumes at 2700 North were roughly 37 percent higher than those at the Forest Street interchange. As previously shown, traffic volumes are projected to exceed capacity on a daily basis by the year 2020. Even today, there are periods, specifically during heavy truck traffic, where traffic delays are beginning to develop due to slow moving vehicles in the outside travel lanes. Pavement condition shows significant wear and rutting of the outside travel lanes due to the high levels of truck traffic as well as high levels of acceleration and deceleration in these lanes.

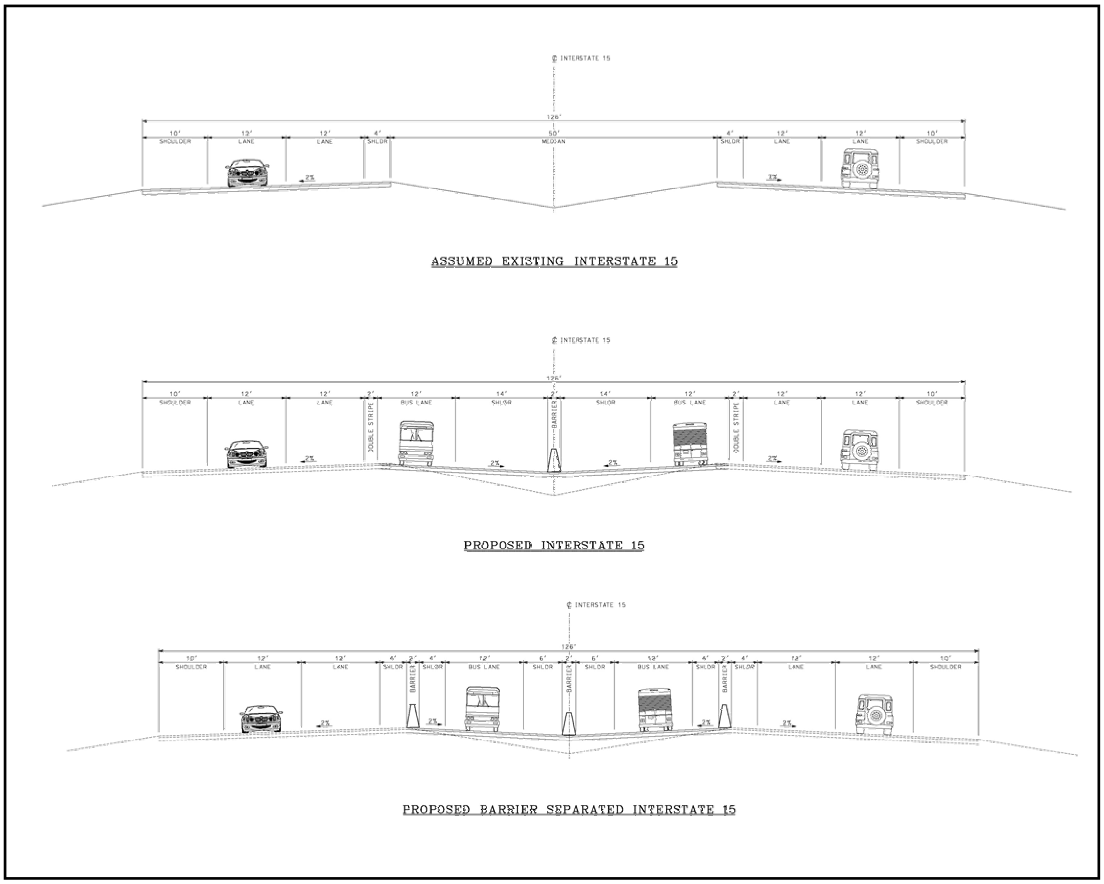
Planned Improvements

Due to increasing traffic volumes and significant truck traffic in the I-15 corridor, UDOT's Long Range Plan calls for I-15 to be widened from 2700 North to US-91 in Phase I (2007 to 2015) and Phase II (2015-2025).

Dedicated Transit Lane

Two dedicated transit lanes alternatives were considered for the I-15 corridor; a striped HOV/BRT lane, and a barrier separated alternative. Figure 5-6 illustrates the two dedicated lane alternative cross-sections for I-15 corridor. Widening of I-15 may occur without a dedicated transit lane, which will also improve travel times on I-15.

Figure 5-5: Road Cross-Section and Dedicated Transit Lanes, I-15



Source: HDR

Cost

The estimated cost for the construction/reconstruction of I-15 from 2700 North to US-91 to accommodate a striped HOV/BRT lane is $80,920,000, and, to build a barrier separated BRT lane, the cost is estimated at $95,070,000 (costs are for lane widening only).

Union Pacific Railroad

The Union Pacific Railroad line connecting Box Elder and Weber Counties is one segment of UP's Ogden Subdivision, connecting Ogden and McCammon, ID over a distance of approximately 110 miles. The line is generally 133-pound Continuous Welded Rail (CWR)[1] single track, with an overall freight train speed of 60 miles per hour. The line has passing sidings over one mile long at five to ten mile intervals throughout. Train control methodology is ABS[2] governing track conditions and manual dispatching using TWC[3].

Line Capacity

The definition of rail line capacity is difficult to express in standard terms. The variations in time of day, types of trains, local service to customers, and many other issues preclude definition of capacity in terms comparable to highways. Railroads have adopted a computer modeling process, and UP uses Rail Traffic Controller (RTC), one of the industry standards.

When UP modeled the Ogden Subdivision in Box Elder and Weber Counties in anticipation of Utah Transit Authority potential commuter rail service (FrontRunner), they considered the impacts that the additional trains would have by defining a study area that included Cache Junction, Aspen, Lucin, and north Salt Lake City. The modeling results showed that, because of the heavy traffic on UP's lines through Ogden, significant track infrastructure and signal systems would be required. Most of this effort focused on the area on the north side of Ogden at a location UP calls Cecil Junction, which is immediately south of the Ogden Supply Depot. Since there was no immediate request for service north of Pleasant View, track capacity issues north of Pleasant View did not surface as constraints or priorities.

Passenger Trains

The Ogden Subdivision was a passenger train route for Amtrak until the early 1990's and for Union Pacific for many years after the line's construction in the late 1800's. The geometry and profile of the line permit passenger train speeds (50 to 70 miles per hour) over most segments of the line.

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[1] Railroad rail is described in pounds per lineal yard of rail. Typical rail weights in use today on main lines range from 90 pounds per lineal yard to 150 pounds per lineal yard. This line's 133-pound rail is considered good for the traffic it carries, and it is capable of carrying more.

[2] ABS is the acronym for automatic block signals – a train control system of wayside signals actuated by track conditions. ABS detects track conditions and causes signals to be displayed. These signals include train occupancy, switch position, and, in some cases, broken rails. The system is in wide use for many main lines.

[3] TWC is the acronym for Track Warrant Control, a manual, procedure-based method of train control. Most train movements with TWC are governed by voice radio instructions issued by a train dispatcher and written on a form by the train crew members. The system is in wide use for many main lines.

Freight Constraints

Passenger trains operating on the line compete with freight trains and, more importantly, freight railroad company interests. Between Ogden and Cecil Junction, the UP transcontinental trains make up most of the 70 trains per day that operate on some or all of the Ogden Subdivision. Through-trains on the Ogden Subdivision between Ogden and McCammon, three plus or minus per day, also compete with local trains serving the Weber Industrial Park (WIP), the Little Mountain Branch (diverges at Willard) and the Cache Valley Local originating at Brigham City.

Costs

Given the constraints posed by the freight operations, two possibilities to extend the UTA FrontRunner service from Pleasant View (approximately 2700 North in Ogden) to Brigham City were considered. Both possibilities included improvement of grade crossing warning devices to incorporate gates at all crossings. One possibility was to construct an additional siding at Willard and install a CTC[4] signal system on UP between Pleasant View and Brigham City. The other possibility considered was to construct an additional main track between Pleasant View and Brigham City, completely separating the passenger operation from the freight operation and offering the possibility of additional service as warranted with little or no additional infrastructure requirements. Right-of-way (ROW) costs for the exclusive track operation would likely require ROW to be purchased from individual property owners; the current location of the existing UP track would not allow for an additional track to be constructed that would meet industry standards within the existing UP ROW. These infrastructure improvements, excluding ROW costs, were estimated to cost between $35 million or $65 million, depending on several policy choices.

[4] CTC is the acronym for Centralized Traffic Control. In a CTC system the signaling of ABS is enhanced by train dispatcher control of critical switches and signals, usually switches and signals at the ends of sidings, entrances, and exits to yards and junctions with diverging lines. The control of these critical locations eliminates the need for manual instructions via voice radio. Most heavy freight lines and passenger lines have CTC.

Chapter Six: Modal Analysis

Chapter Six provides a detailed comparison of the modes of transportation that were considered as possible transit alternatives as well as variations of some modes to create sub-alternatives. In addition, it describes why some alternatives were carried forward for more detailed analysis while others were not.

The Brigham City Transit Corridor Study evaluated transit options between Brigham City and Ogden. Several transit alternatives were developed in sufficient detail to determine their feasibility. Two of these alternatives focus on enhancing bus transit to serve the corridor from Brigham City to Ogden. Two alternatives involved Bus Rapid Transit (BRT), a rubber tired alternative which operates like a bus but can perform similar to rail. Three alternatives focus on bringing rail transit to Brigham City. Transit operations plans, ridership forecasts, and capital and operating costs were prepared for these alternatives. This chapter summarizes the approach used to generate the ridership forecasts and cost estimates, defines the alternatives, and provides ridership forecasts and cost estimates for each alternative.

Screened Alternatives

After preliminary analysis, it became apparent that some of the initially proposed alternatives raised by the public would not be feasible in the corridor and were therefore eliminated from further consideration. While these forms of transit are feasible in some settings, they could not provide the correct type of service for this area. Other forms were ruled out because of the high cost associated with their construction and operation.

Light Rail Transit

Light rail was eliminated from further consideration because it is primarily used for serving geographic areas with higher densities and serves stations that are closer together than those proposed between Ogden and Brigham City. Light rail transit generally works well when the commute is suburban to urban. Light rail train speeds, while reliable, are generally slower than freeway speeds and would not compete well over longer distances. One of the main advantages of light rail is that the slower speeds combined with an electric vehicle type can allow for quick acceleration and deceleration at stations separated by approximately one mile.

Monorail

Monorail was eliminated from further analysis because there are very few working examples that have been successful worldwide and especially in the United States. The high construction and operating costs associated with building structures to allow the monorail to operate above grade makes monorail feasible only in specific situations where the track land is constrained and the track needs to be above grade. Elevating the track also raises construction prices considerably.

Trolleys/Streetcars

Trolleys and streetcars were eliminated from more detailed analysis because they are a mode of transit that works best in a short circulation system and serves commuters when short distance trips are required. Trolleys and streetcars generally tend to run at lower speeds than is needed for an Ogden to Brigham City commute.

It should be noted that there exists a range of technological choices for each and every mode, and this report focuses on only the broad technologies that are most likely to appeal to the Brigham City area. The difference between a trolley and a streetcar may be important at a refined application. However, for the purpose of this analysis, that refinement is largely based on a technological choice. For example, buses commonly run on diesel engines, but natural gas buses are becoming increasingly popular, and electric buses (either self propelled or via external power) are gaining favor in specific situations. The purpose of this section is to evaluate a wide range of modes and select the most appropriate mode for application in the Brigham City area. Subsequent analysis may refine the selected mode based on various technological choices that are available upon implementation.

Existing Local and Express Bus Service

Local existing bus service was used as the baseline condition for the study. It was assumed if no additional transit investment were made, existing service would continue to operate in the corridor. The baseline served as a comparison for the proposed alternatives.

While the baseline service does provide a point of comparison, this scenario does not meet the purpose and need of the project. The baseline bus service is constrained by the increases in travel time projected over the US-89 corridor. Currently, the existing bus service utilizes a rubber tire conventional bus.

Currently, Route 630 runs from Brigham City to Ogden via US-89. This route provides hourly local service. Route 685 operates from Brigham City to Ogden via US-89 (including Flying J and Weber State). Route 685 provides morning and afternoon express service. These two routes provide over 40 local stops and six express stops.

In 2006, ridership on the current bus service was 419 average riders daily. If this service remained constant, the 2030 ridership would be approximately 550 average riders daily.

The annual operating cost to operate Route 630 and Route 685 via US-89 is estimated to be $1,100,000. This estimate is based largely on existing hourly operating cost with projections of comparable service taking over 40 percent longer due to congestion and traffic signals on the US-89 corridor.

Analyzed Alternatives

Several of the proposed alternatives warranted further investigation. The following mode alternatives were examined in detail for their viability for use in the corridor. For each proposed transit alternative, a comprehensive study of ridership and cost was completed. The three main alternatives consisted of:

1. Improved bus service
2. Bus rapid transit
3. Commuter rail transit

Within each of these alternatives, several possible options were studied.

Option 1: Improved Bus Service

This alternative was defined as a low capital cost option or the best service that could be done without a "major" capital expenditure. This option would provide slightly more service than current levels. The improved bus service alternative serves as a baseline for comparison of Federal Transit Administration transit service akin to a "best bus alternative" system. The existing local route via US-89 would continue to operate at 60-minute all day frequencies (with 30 minute options available as needed) between Brigham City and the Ogden Intermodal Center, also providing service to Perry and Willard.

For the express/limited route, three peak direction, peak period trips and one reverse peak direction trip are proposed. This route would operate between Brigham City and Weber State University (WSU). Two possible alignments are proposed for this route:

- The I-15 option would start in Brigham City and travel south on Main Street, west on 100 South, south on I-15, east on 2700 North, south on US-89, and, finally, east on 36th Street to WSU. Stops are proposed at 600 N/Main, Forest/Main, I-15/Forest, I-15/W 1100 S, I-15/W 750 N, I-15/SR-126, I-15/W 2700 N, Pleasant View Station, Ogden Intermodal Center, and WSU. Stops along I-15 would occur off-line, most likely near the on/off ramps.

- The US-89 option would start in Brigham City and follow the current routing of the Flying J route to WSU. Stops are proposed at 600 N/Main, Forest/Main, 600 S/Main, US-89/W 1100 S, US-89/2400 S, US-89/W 3600 S, US-89/W 100 S, US-89/W 8700, Pleasant View Station, Ogden Intermodal Center, and WSU.

Schematics by corridor alignment have been provided in Figures 6-1 and 6-2.

Figure 6-1: Bus Options via I-15

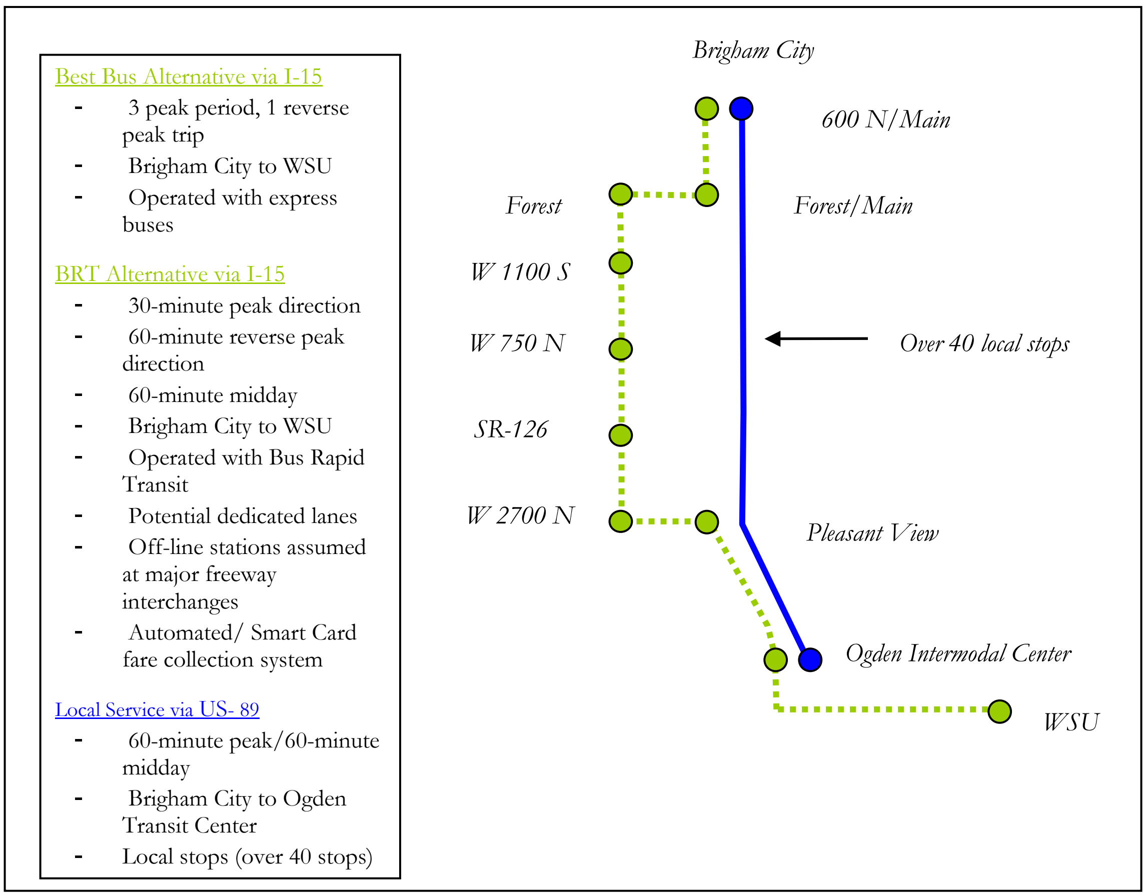
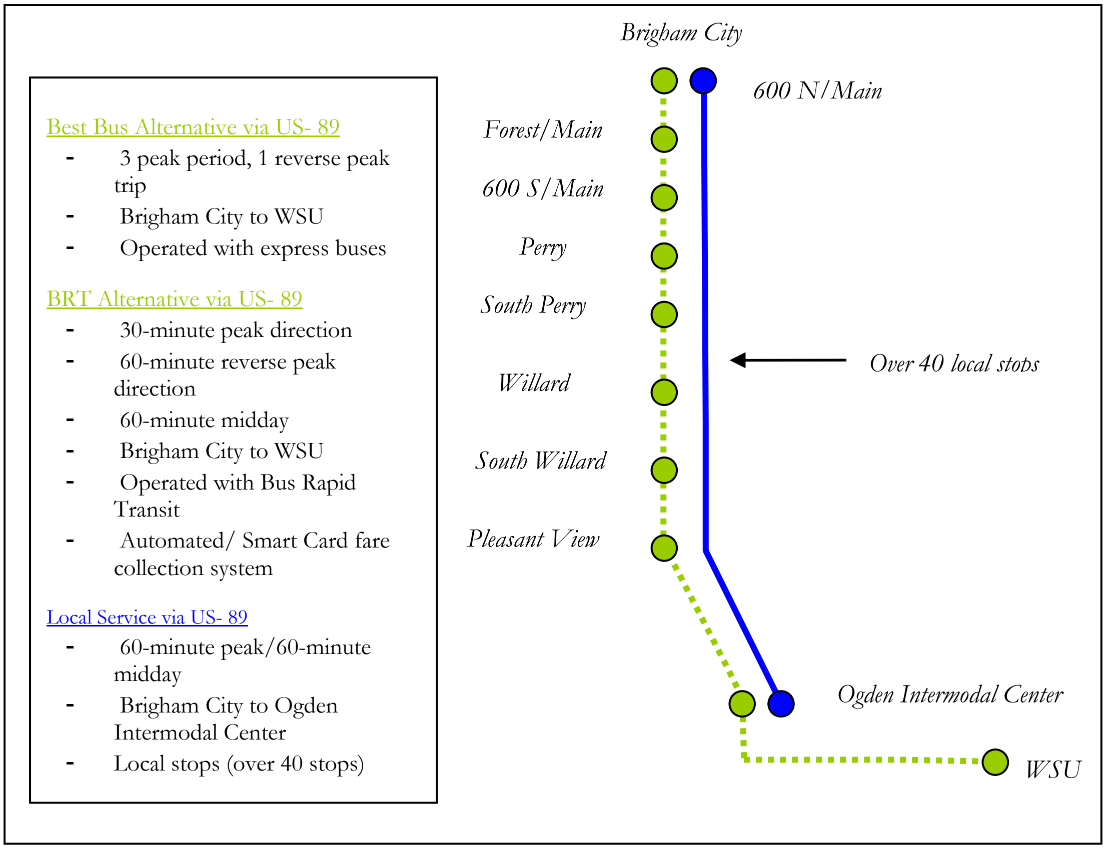


Figure 6-2: Bus Options via US-89



Ridership

The 2030 ridership projection for the Improved Bus Service alternative is approximately 630 riders for US-89 and 650 riders for I-15 during an average weekday. This represents about a 55 percent increase over the current combined ridership on the Routes 630 and 685.

Operating Characteristics

The one-way travel time for the local service on US-89 is 58 minutes from Brigham City to the Ogden Intermodal Center. The one-way travel time for express service is 59 minutes from Brigham City to Weber State University. Based on these run times, six buses would be required in the peak periods. Assuming a 20 percent spare ratio, two additional vehicles would be needed for a total fleet of eight buses. Annual vehicle miles are estimated to be 418,300 while annual vehicle hours are 22,300.

For the I-15 option, the one-way travel time for the express bus is 49 minutes. The local bus would continue to operate on US-89 with the same travel time of 58 minutes. This option would require five buses in the peak periods and a total of seven vehicles assuming a 20 percent spare ratio. Annual vehicle miles are estimated to be 418,200 while annual vehicle hours are 21,800.

Detailed operations statistics worksheets have been provided in Appendix C, Transit Analysis.

Capital Costs

The Improved Bus Service alternative would require an additional two to three buses over the No-Build Baseline alternative, depending on whether the express route operates on US-89 or I-15. Assuming a unit cost of $350,000 per bus, the I-15 option estimated cost is $800,000, while the US-89 option is estimated at $1,300,000.

Operation and Maintenance Costs

The annual operating and maintenance costs for the Improved Bus Service alternative, option US-89 or I-15) are estimated to be approximately $1,300,000 (based on $1,200,000 costs for local bus plus either $105,000 for US-89 or $70,000 for the I-15 option). These costs are estimated based on current UTA costs per service hour applied to the estimate of future service hours anticipated with the improved bus system.

Option 2: Bus Rapid Transit (BRT)

The BRT alternative provides substantially more service than the Improved Bus Service option. In order to compare costs and ridership directly to the improved bus service, the local bus route via US-89 was assumed to continue to operate at 60-minute all day frequencies between Brigham City and the Ogden Intermodal Center, also providing service to Perry and Willard. However, due to the added service of the assumed BRT, it would be possible to reduce local bus service in the study area and rely more heavily on the off-peak BRT to service the demand.

For the BRT service, a 30-minute peak direction, peak period, 60-minute reverse peak, and 60-minute midday service is proposed. Similar to the express service of the Improved Bus, the route would operate between Brigham City and WSU. Two possible BRT alignments options are also proposed for this route (shown in figures 6-1 and 6-2):

- The I-15 option would start in Brigham City and travel south on Main Street, west on 100 South, south on I-15, east on 2700 North, south on US-89, and east on 36th Street to WSU. Stops are proposed at 600 N/Main, Forest/Main, I-15/Forest, I-15/W 1100 S, I-15/W 750 N, I-15/SR-126, I-15/W 2700 N, Pleasant View Station, Ogden Intermodal Center, and WSU. The BRT would most likely allow passenger boarding and alighting at stops near the on/off-ramps.

- The US-89 option would start in Brigham City and follow the current routing of the Flying J route to WSU. Stops are proposed at 600 N/Main, Forest/Main, 600 S/Main, US 89/W 1100 S, US-89/2400 S, US-89/W 3600 S, US-89/W 100 S, US-89/W 8700, Pleasant View Station, Ogden Intermodal Center, and WSU.

All BRT stations would have ticket vending machines and off-vehicle fare collection systems to facilitate quick passenger boarding and alighting at each stop. Vehicle costs have assumed dual doors for fast loading and unloading as well as attractive vehicles for a "branding" incentive of an express, higher speed vehicle. Queue jumpers and transit signal priority (TSP) elements have been included in the capital costs for both alignments. These improvements will ensure that BRT vehicles will be able to provide quick, reliable transit service as traffic experiences increased delay in general purpose lanes.

Ridership

The 2030 ridership forecast for the BRT alternative is approximately 780 riders if utilizing the US-89 option and 790 riders if utilizing the I-15 option during an average weekday. This represents about an 86 percent increase over the current combined ridership on Routes 630 and 685. This estimate also includes a 10 percent increase in ridership specifically attributable to the BRT mode due to the attractiveness of a branded vehicle. Anecdotal evidence has suggested that the implementation of BRT in several applications across the country has increased ridership anywhere from 10 to 20 percent in Boston, Los Angeles, and Vancouver.

Operating Characteristics

The one-way travel time for the local bus and BRT bus service on US-89 is 58 minutes and 47 minutes respectively. Based on these run times, seven buses would be required in the peak periods. Assuming a 20 percent spare ratio, three additional vehicles would be needed for a total fleet of 10 buses. Annual vehicle miles are estimated to be 461,700 while annual vehicle hours are 29,700.

For the I-15 option, the one-way travel time for the express bus is 46 minutes. The local bus would continue to operate on US-89 with the same travel time of 58 minutes. This option would require seven buses in the peak periods and a total of 10 vehicles, assuming a 20 percent spare ratio. Annual vehicle miles are estimated to be 473,600 while annual vehicle hours are 29,700.

Capital Costs

The BRT alternative would require an additional six buses over the No-Build alternative. Assuming a unit cost of $500,000 per BRT vehicle, the capital costs would be approximately $3,000,000 in 2006 dollars. The assumed unit cost per bus is in the lower range of costs of BRT vehicles. Higher-end BRT vehicles can cost upwards of a $1,000,000 each. The French manufacturer Civis sells its self-guided BRT vehicle for approximately that amount.

Depending on the alignment, the total capital cost would be roughly between $13,600,000 and $14,700,000. This total includes vehicle costs, land acquisition related to park-and-rides, station costs, queue jumpers, off-vehicle fare collection, system costs, and soft costs.

Operation and Maintenance Costs

The annual operating and maintenance costs for the BRT alternative, option US-89 or I-15 are estimated to be approximately $2,200,000 (based on $1,200,000 costs for local bus plus either $1,010,000 for US-89 or $990,000 for the I-15 option). O&M costs for BRT were assumed consistent with the hourly cost of operating a UTA bus.

Option 3: Commuter Rail Transit

Commuter rail is an alternative which utilizes a diesel powered engine and a fixed guideway system. The three commuter rail options which are described below operate at about 60 mph on average. Due to the desire of Brigham City to explore specific commuter rail options that may be applicable in the study area, commuter rail alternatives more heavily addressed the details of technology that would affect the application of service. Specifically, commuter rail options ranged from more traditional locomotive commuter rail (similar to the proposed service between Salt Lake and Pleasant View) and Diesel Multiple Unit (DMU) commuter rail, which is a Federal Railroad Administration (FRA) compliant vehicle that does not require a separate locomotive.

Seating capacity per single level Diesel Multiple Unit (DMU) vehicle is about 100 passengers while a double-level DMU has a seating capacity of about 210 per coach. Seating capacity for a commuter rail coach is about 100 persons for the single level, while the double-level coach has a seating capacity of approximately 150 passengers. Three options utilizing rail were studied:

- Shared track DMU without a station at Willard
- Shared track DMU with a station at Willard
- Commuter rail with exclusive track.

Ridership

The 2030 ridership forecast for the Commuter Rail alternative varies from approximately 490 to 930 during an average weekday. The shared track alternative with the lower forecast assumes shuttle service operating from Brigham City to Pleasant View during the peak periods only. There is a minor variation of this alternative that assumes an additional station in Willard. Ridership numbers are shown below:

- ***Shared Track DMU without Willard Station:*** The 2030 ridership projection for this alternative is approximately 490 riders for an average weekday. While this service is lower than the projected bus service, this estimate represents peak period service only and may be combined with an off-peak bus system for a ridership increase.

- ***Shared Track DMU with Willard Station:*** The 2030 ridership projection for this alternative is approximately 520 riders for an average weekday. Similarly, this service is lower than the projected bus service, but this estimate represents peak period service only and may be combined with an off-peak bus system for a ridership increase.

- ***Commuter Rail with exclusive track:*** The 2030 ridership projection for this alternative is approximately 930 riders for an average weekday. Due to the daily operating characteristics of the exclusive track commuter rail, this service would most likely replace existing bus service, but there may be situations where local bus service provides advantages to the communities and would need to be evaluated prior to advancing this option.

The patronage forecast also includes a 15 percent increase in ridership specifically attributable to the commuter rail mode due to its branding, image, and expected appeal. Modal bias constants have been used in travel demand models to capture important but undefined ridership attributes in areas that are yet untested in the market. The 15 percent increase, similar to the ten percent increase of BRT ridership, is consistent with borrowed travel model bias constants and is expected to yield accurate but possibly conservative (low) estimates compared to the development of a detailed travel demand model.

Operating Characteristics

New stations were proposed at Brigham City and Willard. Service assumptions include:

- ***Shared Track DMU without Willard Station:*** This option utilizes a shared track agreement with the Union Pacific Railroad. The service would provide two morning and two afternoon peak period trains from Brigham City to Pleasant View. Because of the track agreement with Union Pacific, no mid-day off-peak service would be available.

- ***Shared Track DMU with Willard Station:*** This option provides nearly the same service as above with an additional station in Willard. This service would provide two morning and two afternoon peak period trains from Brigham City to Pleasant View. This option utilizes a shared track agreement with the Union Pacific Railroad, and, therefore, off peak mid-day service would not available.

- ***Commuter Rail with exclusive track:*** This option utilizes an exclusive track. In the morning peak period it would call for three southbound and three northbound trains from Brigham City to Pleasant View, one southbound and one northbound train from Brigham City to Ogden, and one southbound train from Brigham City to Salt Lake City. In the afternoon peak period, there would be three southbound and three northbound trains from Pleasant View to Brigham City, one southbound and one northbound train between Ogden and Brigham City, and one northbound train from Salt Lake City to Brigham City. In the midday, there would be a 60-minute service from Brigham City to Pleasant View.

Capital Costs

Costs for the DMU alternatives assumed the leasing of equipment from Colorado Rail Car, while the commuter rail exclusive track alternative assumes that the locomotive and passenger cars will be purchased. Due to the concern of operating commuter rail and

DMU service in the same corridor, a lease maintenance agreement was estimated to be a desirable capital cost strategy for implementing DMU service.

- ***Shared Track DMU without Willard Station:*** The capital cost estimate for shared track DMU is $36,100,000 in 2006 dollars.

- ***Shared Track DMU with Willard Station:*** The addition of a 4.9 million dollar station at Willard raises the cost of the DMU option to $41,000,000 in 2006 dollars.

- ***Commuter Rail with exclusive track:*** The exclusive track commuter rail option was the most expensive option. The $81,000,000 capital cost estimate includes track, crossings and all other utilities necessary to run commuter rail on an exclusive track. This capital cost estimate is in 2006 dollars.

Operation and Maintenance Costs

- ***Shared Track DMU with or without a Willard Station:*** The operating cost to run DMU is $800,000 in 2006 dollars. This operating cost estimate is the same with or without a station at Willard and does not increase over time in real dollars (since travel time does not change). This cost includes a $6 per train mile payment to Union Pacific RR for permission to use their track.

- ***Commuter Rail with exclusive track:*** In 2006 dollars, the operating and maintenance cost for exclusive track commuter rail is $3,500,000 which also stays constant in real dollars based on more service being offered.

Analysis Summary

Tables 6-1 and 6-2 below give a direct comparison of the proposed alternatives. The first table details capital and operating costs for each alternative based on UTA and planning-level estimates (see Appendix E). The second compares ridership forecasts based on 2000 Census county-to-county workflows disaggregated to smaller areas with changes anticipated for travel time, level of service, and amenities (see Appendix B). A broad list of components that make up the capital and operating costs has been included in Appendix E.

Table 6-1: Capital and Operating Cost Comparison

(figures shown in million dollars at 2006 value)

Alternative	Operating Cost	Capital Cost	Other Capital Cost	Total Cost
Existing Transit Service	$1.1	$0	$0	$1.1
Best Bus (US-89)	$1.3*	$1.3	$0	$2.6
Best Bus (I-15)	$1.3*	$0.8	$0	$2.1
BRT (US-89)	$2.2*	$14.7	$10	$26.9
BRT (I-15)	$2.2*	$13.6	$76	$91.8
Commuter Rail (Shared Track DMU)	$0.8	$36.1	$0	$36.9
Commuter Rail (Shared Track DMU with Willard Station)	$0.8	$41	$0	$41.8
Commuter Rail (Exclusive Track)	$3.5	$80.8	$13.2	$97.5

Operating Costs include $1,200,000 for local bus

Table 6-2: Ridership Comparison

	Year 2030 Ridership		
	Peak	Off-peak	Total
2006 Comparison	260	160	420
Existing Transit Service	340	210	550
Best Bus (US-89)	420	210	630
Best Bus (I 15)	440	210	650
BRT (US-89)	490	290	780
BRT (I 15)	490	300	790
Commuter Rail (Shared Track DMU)	490	-	490
Commuter Rail (Shared Track DMU with Willard Station)	520	-	520
Commuter Rail (Exclusive Track)	590	340	930

Figure 6-3 represents the study operating costs. The costs reflect planning level estimates of maintaining and operating each mode of transit for one year.

Figure 6-3: Operating Costs Comparison

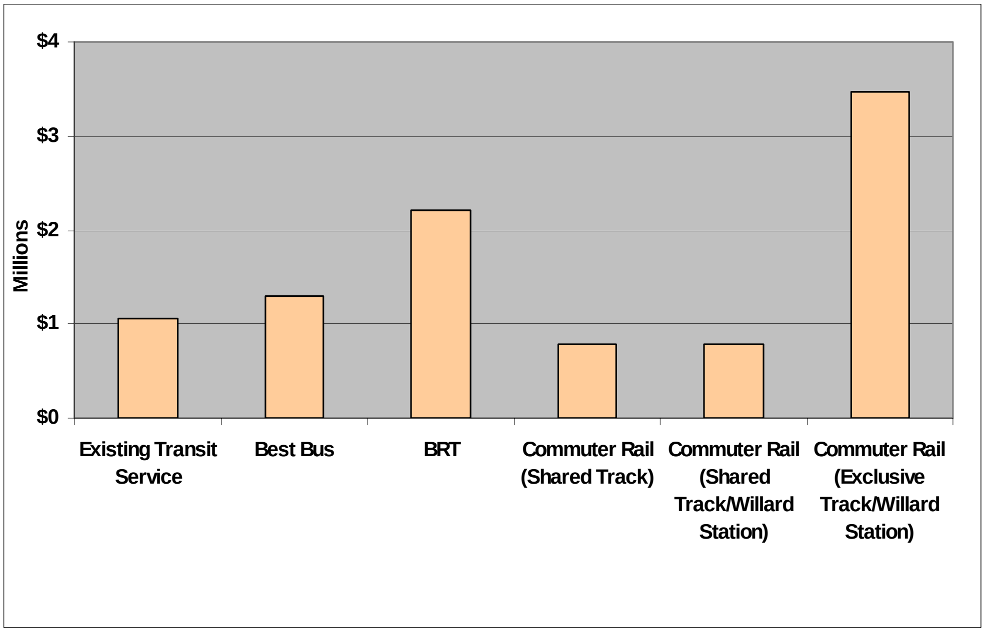


Figure 6-4 shows a ridership comparison. The ridership was calculated based on an average 2030 weekday. The purple represents peak hour ridership, while the red represents off-peak hour ridership.

Figure 6-4: Ridership Comparison

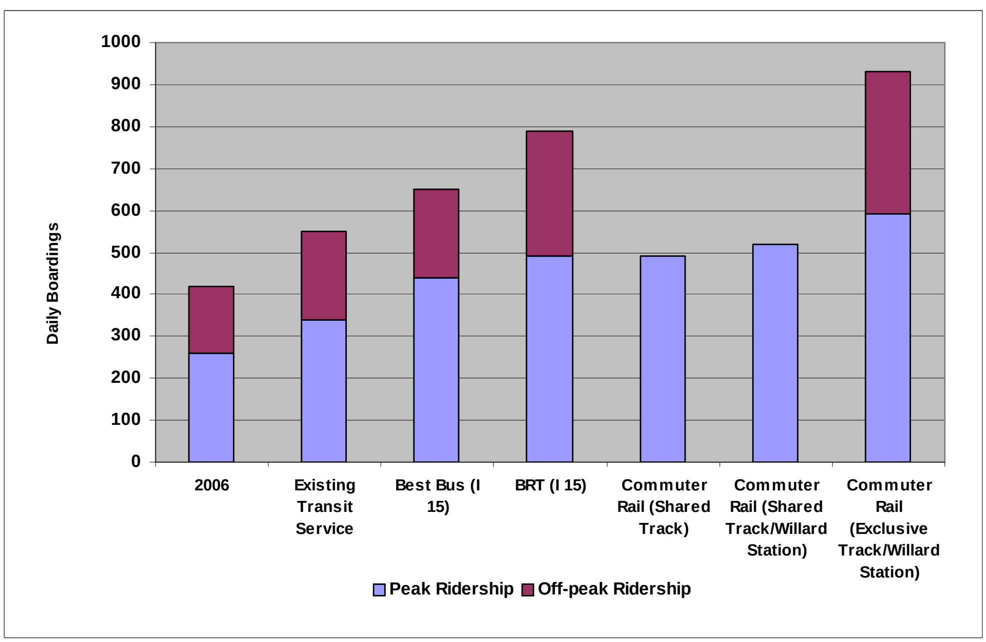
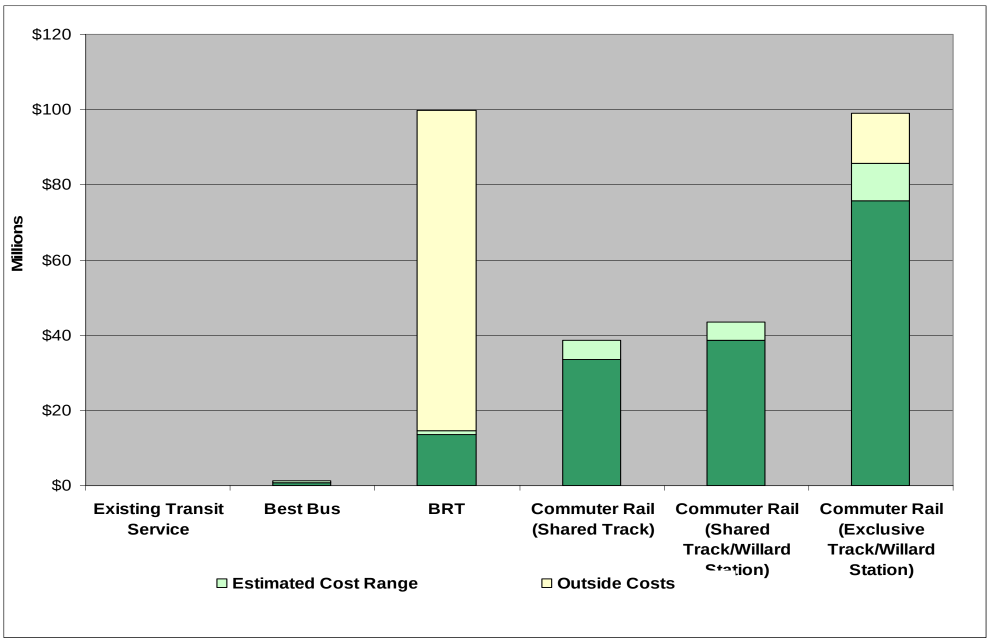


Figure 6-5 indicates planning level capital costs. The dark green sections represent the estimated cost of each proposed project. The light green sections represent the anticipated cost range that each project should be completed within. The yellow sections show costs that need to be planned for but were not part of this study. For the BRT option, the yellow section represents the cost of widening I-15, likely paid for by UDOT. For the Commuter Rail option, the yellow section represents the cost of an additional track from Pleasant View to Ogden, likely paid for by UTA if an exclusive track option were implemented.

Figure 6-5: Capital Cost Comparison



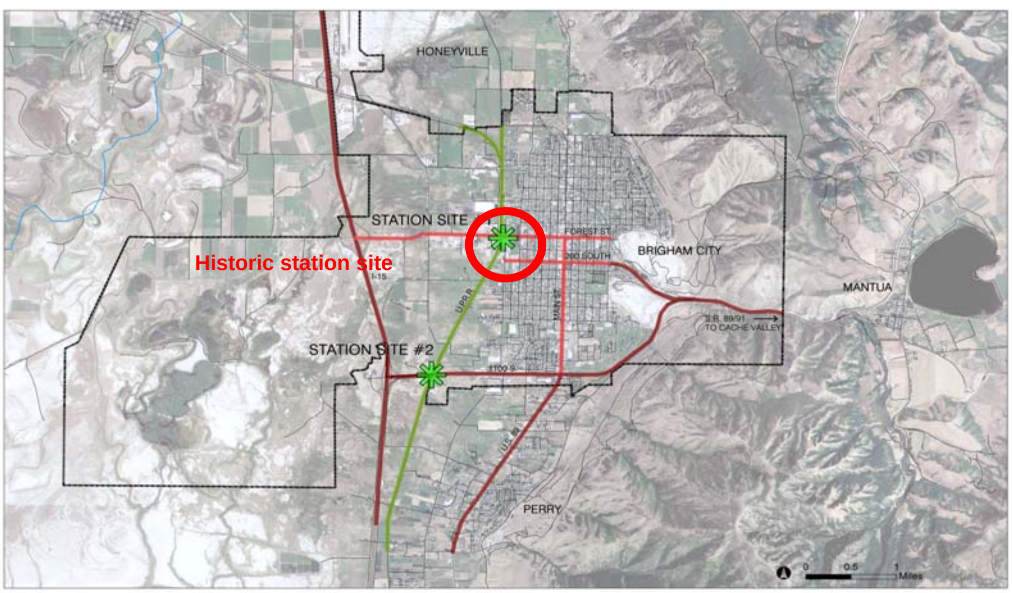
Chapter Seven: Station Area Planning

This chapter investigates potential locations and design options for a potential bus/rail station and corresponding park-and-ride lots to serve Brigham City. Investigations addressed both bus and rail operations for short and long-term travel demand.

Existing Conditions and Analysis

As illustrated in Figure 7-1, there are two sites that could possibly fulfill the rail station needs of Brigham City and its environs: Forest Street Depot (Site #1) and US-91/1100 West (Site #2). Both are located adjacent to the existing rail line with crossings at primary roads that connect I-15 with US-89 and Cache County.

Figure 7-1: Possible Station Sites



Each site has qualities that potentially support the development of a station site. However, the Forest Street site (circled in red in Figure 7-1) received special attention from the outset due in large part to its location within a future development area on the established edge of the built city and due to it being Brigham City's preference.

Interview 1

Landmark Design met with Randy Park, Art Bowen and Steve Meyer of UTA early in the process. Discussions focused on the vision of Brigham City to establish a station at the historic Forest Street rail depot, the context of the site, and corresponding challenges related to geometrics and land availability. The following is a summary of these issues and their implications to the project.

Geometrics

The historic station is located on a curved track segment that exceeds UTA's operating and design standards. The station and platform must be located on a tangent or nearly-tangent rail segment, which allows for unimpeded sight lines and safety checks from the train. A straight configuration also reduces safety issues related to gaps and "pinching" as the track straightens, ADA requirements, and homeland security issues. A suitably straight segment begins approximately 1000 feet south of Forest Street.

The station/platform will need to be approximately 1,000 feet in length to be consistent with other FrontRunner stations. In order to accommodate a 3-car train south of Forest Street, the platform will need to be located at least 1000 feet south of Forest Street which dilutes the "historic station" concept desired by Brigham City.

Land Availability

UTA owns trackage rights but not the track itself. Trains will not be allowed to park on track and must use a siding track for parking at stations. These conditions require that a siding track be located at least 25 feet from the existing train line. The platform itself would be located adjacent to the siding track. This would ideally be a center platform with tracks located on either side.

The need for a siding track is further complicated by the historic station buildings which are located immediately adjacent to the existing track. This will require the new platform and station to be located up or down-track from the buildings in order to provide adequate ingress/egress track connections.

Implications

To maintain a 1000 foot straight segment of platform, the station will need to be located north or south of Forest Street. Other considerations included:

- The need/desire for a tail track, preferably north of the station;
- Parking accommodations for at least 750 vehicles, although this number may be as high as 1000 depending on Cache County usage. 40 to 60 percent of parking will be required initially with the rest to be phased in. Parking may be shared with other uses, although it depends on the type of use. Office uses

are not good shared parking partners. Nighttime and some commercial are better.

Interview 2

Landmark Design met with Brigham City Planner Mark Teuscher to get his perspective on the project. Mark believes that the historic train site is the obvious location for a station. The surrounding area has much potential for development because it is surrounded by vacant land and under-utilized areas.

Mark would like to see the station idea undertaken as a series of interim steps with bus service and a park-and-ride lot developed at the historic site in the short-term, with riders bussed to Pleasant View station. Eventually, the station would blossom into a full-fledged bus/train transit center. Mark reviewed the general ideas proposed in the Forest Street Design Plan.

Forest Street Site Visit

In order to become familiar with the site and surrounding conditions, Landmark Design visited the historic train depot. As illustrated in the accompanying photos, the site consists of three primary structures along Forest Street, with a scattering of agricultural/industrial uses and Box Elder High School located to the south. Pioneer Park is located directly to the north, and agricultural uses are located on the west side of the tracks. The Brigham City Museum occupies the historic train depot building and is operated sporadically according to season and day of week. To some degree, the site marks the west limits of the developed city.

The curving geometrics of the rail line were observed and the impacts to the design discussed. Likewise, the impact of the required siding track was investigated.

Preliminary Analysis

Table 7-1 below shows two sites that could possibly fulfill the rail station needs of Brigham City and its environs. Both are located adjacent to the rail line, with crossings at primary roads that connect I-15 with US-89 and Cache County.

Figure 7-2: Historic Forest Street depot building, east facade

Figure 7-3: View toward station from south (left), historic train depot and existing siding track (right)

As illustrated in Table 7-1 below, the positive and negative qualities of the Forest Street and 1100 South sites were broadly evaluated using a binary point system for nine categories:

- Distance north from Pleasant View site
- "Placemaking" potential of the site
- Location in city
- Role in city vision
- Relationship to city center
- Rail connection and access
- Rail geometry
- Land availability
- Probable environmental conditions

Table 7-1: Forest Street and 1100 South Station Site Comparison

Forest Street Site		1100 South Site	
Pro/Con	**Site Feature/ Condition**	**Pro/Con**	**Site Feature/ Condition**
-	Two miles north of 1100 South site, less accessible to Cache County citizens	+	Two miles south of Forest Street, more accessible to Cache County citizens
+	Historic rail station is a major draw	-	Isolated location
+	On fringe of built-up urban area	-	In rural location within city boundaries
+	Supports city-building vision of Brigham City	-	Does not build upon city-building vision of Brigham City
+	Energizes / relates to city center	-	Bypasses City Center
+	Good road / rail connections and access	+	Good road / rail connections and access
-	Challenging rail geometry	+	Less challenging road geometry
+	Land generally available – agricultural / underutilized industrial	+	Land generally available - agriculture
+	No obvious environmental concerns	-	Possible environmental concerns (ground water, surface water, wetlands, etc.)
+5	**Cumulative Score**	**-1**	**Cumulative Score**

This analysis supports additional scrutiny of the Forest Street site.

Forest Street Preliminary Design Concepts

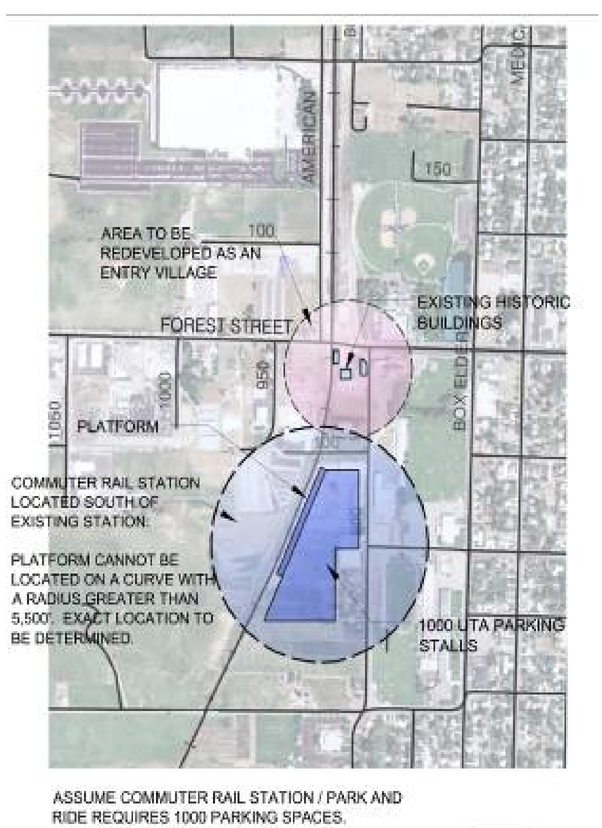
Preliminary Design Concepts A-C emerged for the Forest Street site, each of which addresses the functional needs of the station in a different way. Concepts A and B assume that the station will accommodate both rail and bus traffic. Concept C assumes that the station will serve bus traffic only. Each alternative accommodates 1000 parking spaces as requested by UTA.

Preliminary Concept A: Train/Bus Station on South Side of Forest Street

Due to the curved track geometry adjacent to the historic rail station, the new station and platform is located approximately 1000 feet south of Forest Street. The historic station will serve as an "entry" and draw to the station beyond but will have little direct connection with the station activities because of the distance between the facilities.

The surrounding area could be developed into a mixed-use village, with transit and rail as a unifying theme. The station will be located in relative close proximity to the high school and Pioneer Park, providing both opportunity and constraints. Location of the tail track, refined parking, and access concepts are pending.

Figure 7-4: Preliminary Concept A

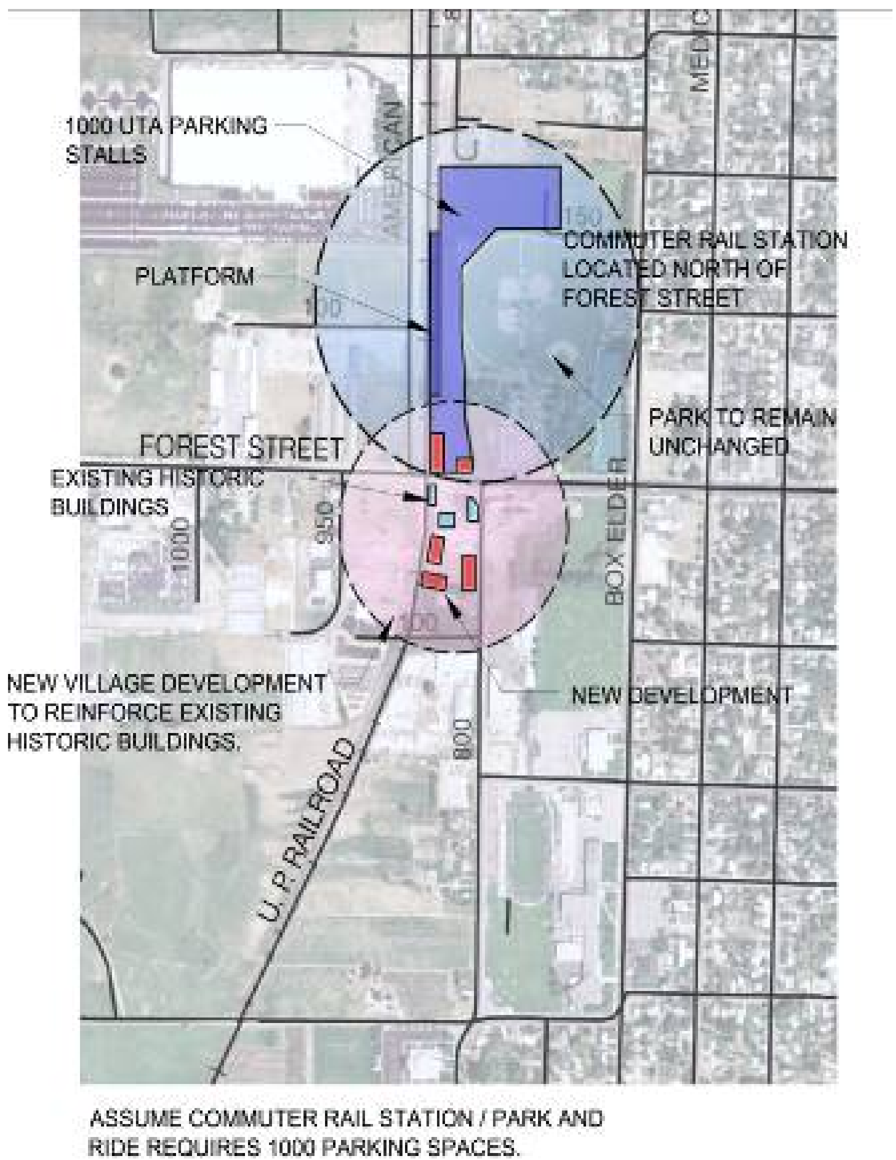


Preliminary Concept B: Train/Bus Station on North Side of Forest Street

Due to the curved track geometry adjacent to the historic rail station, the new station and platform are located approximately 1000 feet north of Forest Street, west of Pioneer Park. The historic station will serve as an iconic node/community entry point in to the community, calling attention to the transit history and uses of the area. The existing historic structures will have limited direct connection with the new station activities, due to the distance between the facilities and locations on opposite sides of Forest Street.

The south side of the street could still be developed as a mixed-use village, with transit and rail as a unifying theme. The station will be located in close proximity to Pioneer Park, providing both opportunity and constraints. Location of the tail track, refined parking and access concepts are pending.

Figure 7-5: Preliminary Concept B

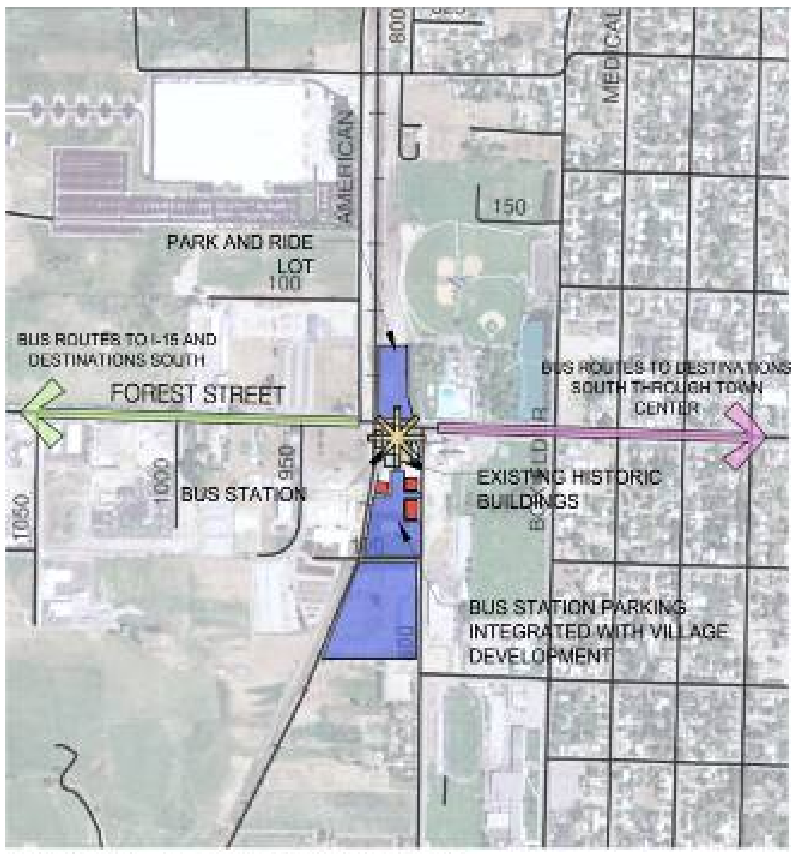


Preliminary Concept C: Bus Station on North Side of Forest Street

This concept assumes rail traffic will not be feasible, thus eliminating the need to address rail geometry. The result is a bus station that is merged with the existing historic pattern of the site as a mixed-use village. The rail and transit motif will still define the site. The station location provides options for linking with the Pleasant View Rail Station, utilizing either 1-15 to the west or US-89 through Brigham City to the east.

Phased parking is extended to the north side of Forest Street, providing a potential shared parking relationship with Pioneer Park. There is no need for tail track, track sidings and other rail facilities. Refined parking and access concepts are pending.

Figure 7-6: Preliminary Concept C



ASSUME COMMUTER RAIL STATION / PARK AND RIDE REQUIRES 1000 PARKING SPACES.

Forest Street Detailed Design Concepts

Based on preliminary review of the Preliminary Design Options, two refined design concepts were created for the transit station, both of which focus development along 800 West between the historic station and 200 South. This particular area was preferred due to its strong connection to Sardine Canyon and commuters from Cache Valley. Both options have the capacity to accommodate a rail platform and the potential for a link with the historic train station. Option A is designed for a bus station only, while Option B is designed for both buses and commuter rail.

Detailed Design Concept A: Bus Station on Forest Street

This concept assumes rail traffic will not be accommodated, thus eliminating the need to address rail geometry and supporting the use of the historic station area as the general site of bus station operations.

Figure 7-7: Detailed Design Concept A: Bus Station Centered on Forest Street

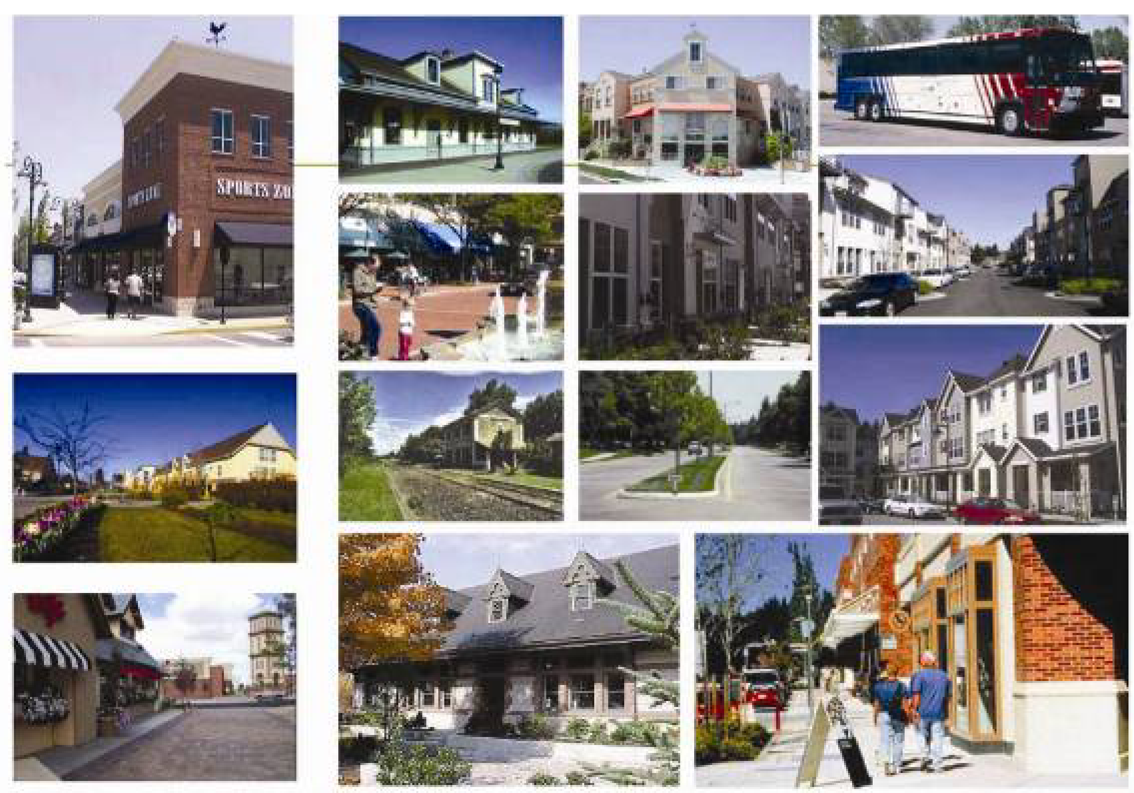
The bus station location provides options for linking with the Pleasant View Rail Station, utilizing either I-15 to the west or US-89 through Brigham City to the east. The station takes advantage of historic rail uses on the south side of Forest Street, helping to create a unique place and destination.

Parking is provided to the south and east of the station, with additional parking to be eventually located on the north side of Forest Street behind mixed-use buildings sited along the street. The north parking area provides a possibility for a shared parking relationship with Pioneer Park, which is immediately to the east. Shared parking is supported where feasible.

The transit station and surrounding area will be developed as a mixed-use development with architecture and uses to integrate with the adjacent historic buildings and parks. The area will also amalgamate with Brigham City's expanding commercial base.

The following images portray the possible uses and aesthetics to be incorporated in the station design.

Figure 7-8: Concept Images Concept A



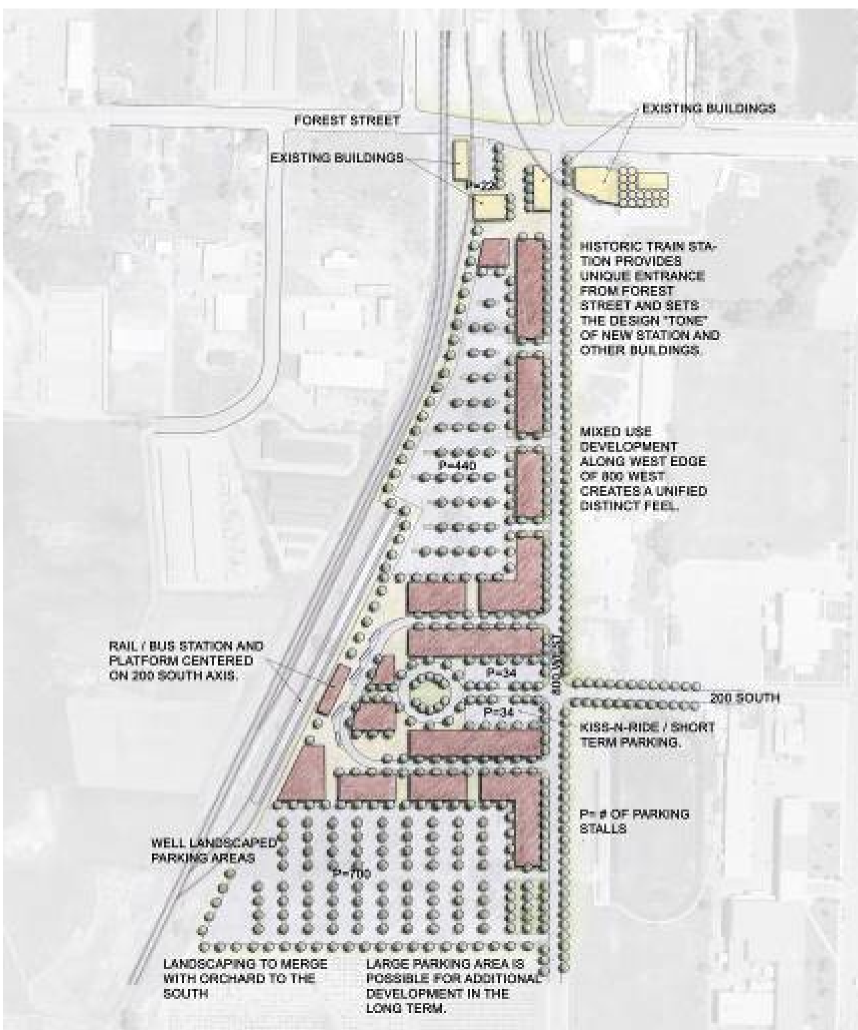
Detailed Design Concept B: Rail/Bus Station Centered on 200 South

This design assumes a rail/bus station will be required. Due to the curved track geometry adjacent to the historic rail station, a new station and platform is located approximately 1000 feet south of Forest Street. The historic station will serve as an "entry" and draw to the station from Forest Street, and will be indirectly connected to the station. Road access options to the site are available from I-15 to the west along Forest Street, or via US-89 through Brigham City.

200 South will serve as a primary access to the station, which includes a one-way bus access on either side of 200 South and a small parking lot/entrance plaza for drivers. The station/plaza will provide a strong visual terminus. Parking is spread throughout the area and should be shared as possible.

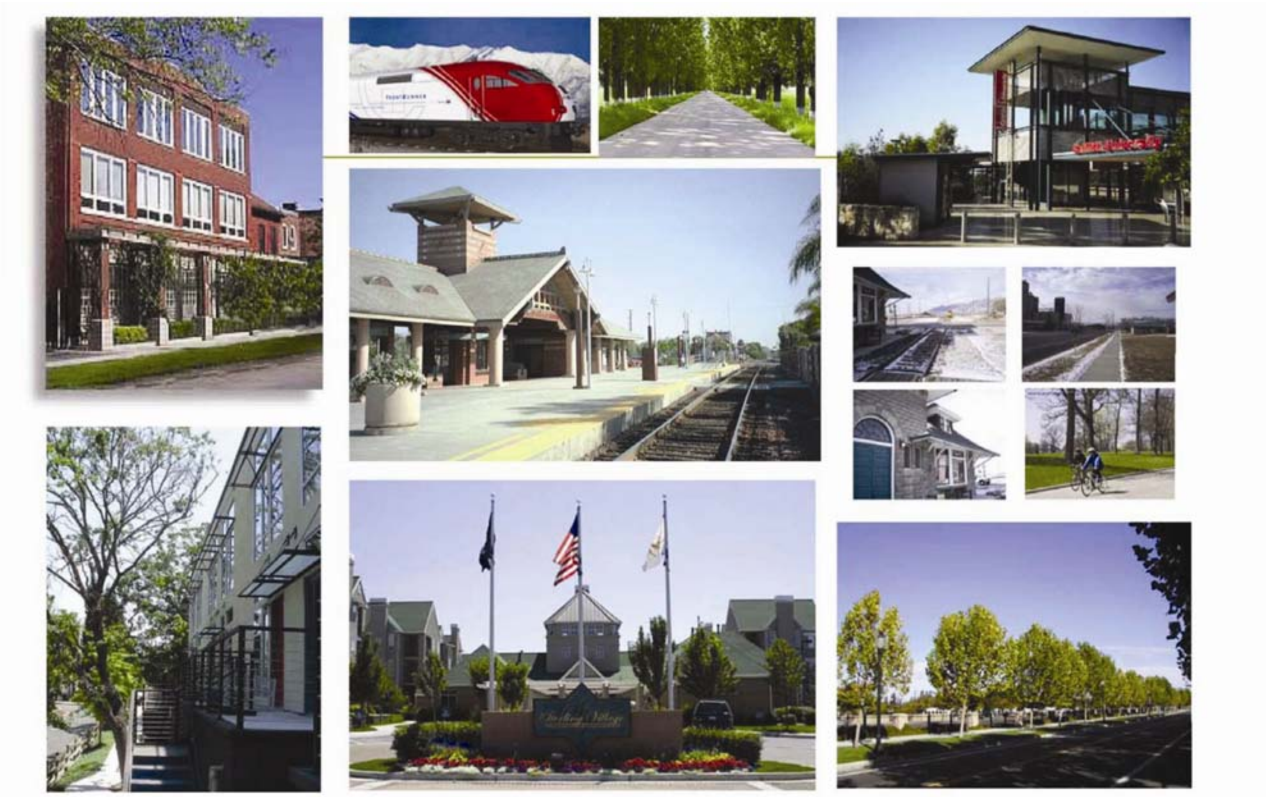
Figure 7-9: Detailed Design Concept B:

Rail/Bus Station Centered on 200 South



The area could be developed as a mixed-use village, with transit and rail as a unifying theme. The station is in close proximity to the high school and Pioneer Park. A large parking area to the south may eventually be developed into a second phase of mixed uses if desired by the community.

Figure 7-10: Concept Images Concept B



Final Station Design

The Brigham City Final Station Design builds upon previously-established concepts, tempered by recent shifts and developments related to the probable timing of development and overall project direction. In particular, the Final Station Design presents phased development opportunities in line with projected funding and development scenarios.

Station Concept Summary

The proposed Brigham City Transit Station is centered on 200 South on the west side of 800 West. The site provides good access for both local commuters and those living outside of Brigham City, particularly residents of the Cache Valley. The site also maintains a strong connection and relationship with the nearby historic station at Forest Street, which is envisioned as a future gateway to the station, and an integral component of mixed-use district envisioned along Forest Street and 800 West.

In order to ensure that the station and surroundings are developed as envisioned, it is essential that the required land be removed from other potential development. As illustrated in the accompanying diagrams, the land to be secured includes the station site itself, as well as a more extensive swath of land that stretches to the north. In essence, the entire area stretches between the existing rail corridor and 800 West, from approximately 250 South to the historic Forest Street Station. Brigham City can pursue a variety of options to achieve this essential goal, including the negotiation of purchase options and outright purchase.

The station concept assumes that transit enhancements will be established in a phased manner. In the earliest stages, the role of the station will be relatively limited, serving primarily as a park-and-ride facility for regional bus service between Brigham City and FrontRunner rail service in Pleasant View. The role of the station will expand over time as transit opportunities increase and rail service is established. Investment in the station will be phased accordingly, focusing on basic parking and station services in the earliest stages to be expanded as transit opportunities and the number of riders increases.

The station will include simple treatments and facilities in the earliest stages, with more extensive treatments added as the type of transit and corresponding riders increase. Eventually, the station will accommodate both rail and bus transit, and will serve as a central component of a thriving mixed-use district of Brigham City.

Station Development Phases

The proposed phasing of station development is described below. Each phase includes a plan illustrating the development envisioned, and an estimate of probable cost. The costs are based on recent estimates for developing FrontRunner stations currently under construction. Costs for property acquisition and non-essential structures (station buildings, mixed-use structures, etc.) are not included in the estimates.

Phase One

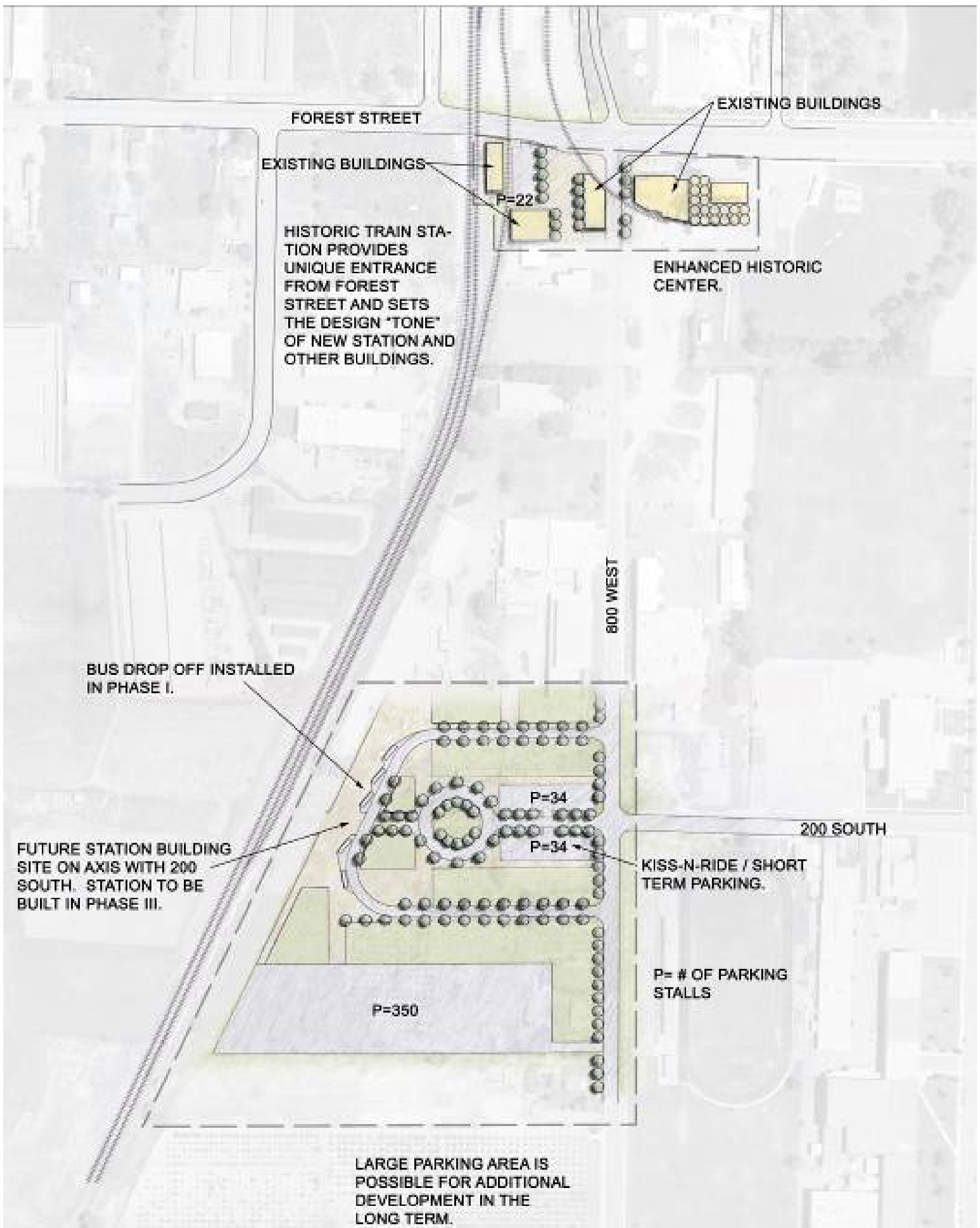
A park-and-and ride lot is developed to accommodate bus transit between Brigham City and the Pleasant View FrontRunner station. The station is developed with minimal facilities to meet basic needs at this stage. Proposed facilities include an access road centered on 200 South with limited park-and-ride/kiss-n-ride/drop-off/station facilities immediately adjacent. A separate roadway rings the parking area, providing one-way access and parking for buses.

The station is developed in a minimal fashion at this stage, encompassing a basic plaza, necessary sidewalks, and landscaping. A 350-space asphalt parking lot is located to the south, providing additional parking to accommodate growing ridership.

Table 7-2: Phase One Facilities

Station Development	Unit	Amount	Cost Per Unit	Subtotal
Access/Bus Parking/Kiss-and-Ride	Square Feet	50,000	$6.00	$300,000
Parking Lot – 350 Spaces	Square Feet	260,000	$4.00	$1,040,000
Total		**310,000**		**$1,340,000**

Figure 7-11: Phase One



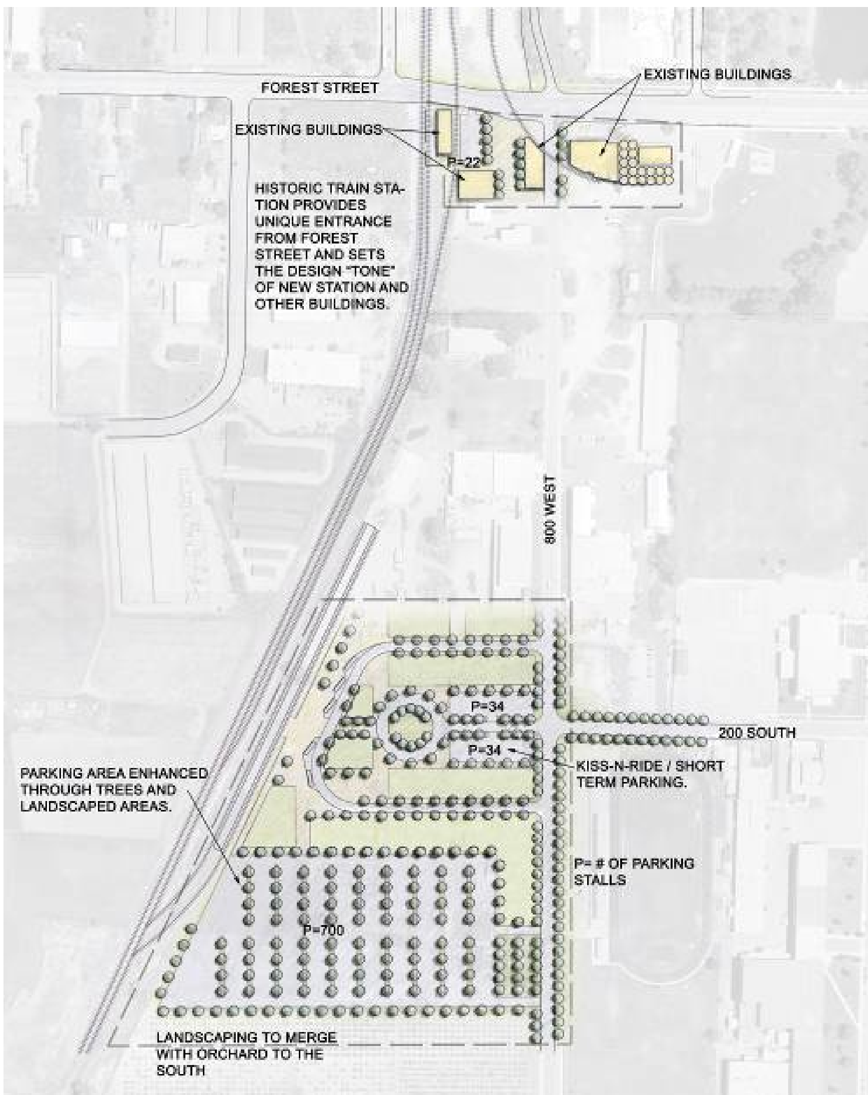
Phase Two

As bus ridership grows, the station is enhanced to meet changing needs. The south parking lot is expanded to 700 spaces with final landscaping improvements provided throughout the parking zone. The parking developed along the central roadway in Phase One is no longer used for parking; it is now limited to kiss-n–ride/drop-off uses only.

Table 7-3: Phase Two Facilities

Station Development	Unit	Amount	Cost Per Unit	Subtotal
Enhance Access/Bus Parking/Kiss-and-Ride	Square Feet	25,000	$6.00	$150,000
Complete Parking Lot – 700 Spaces total	Square Feet	260,000	$400	$1,040,000
Total		**285,000**		**$1,190,000**

Figure 7-12: Phase Two



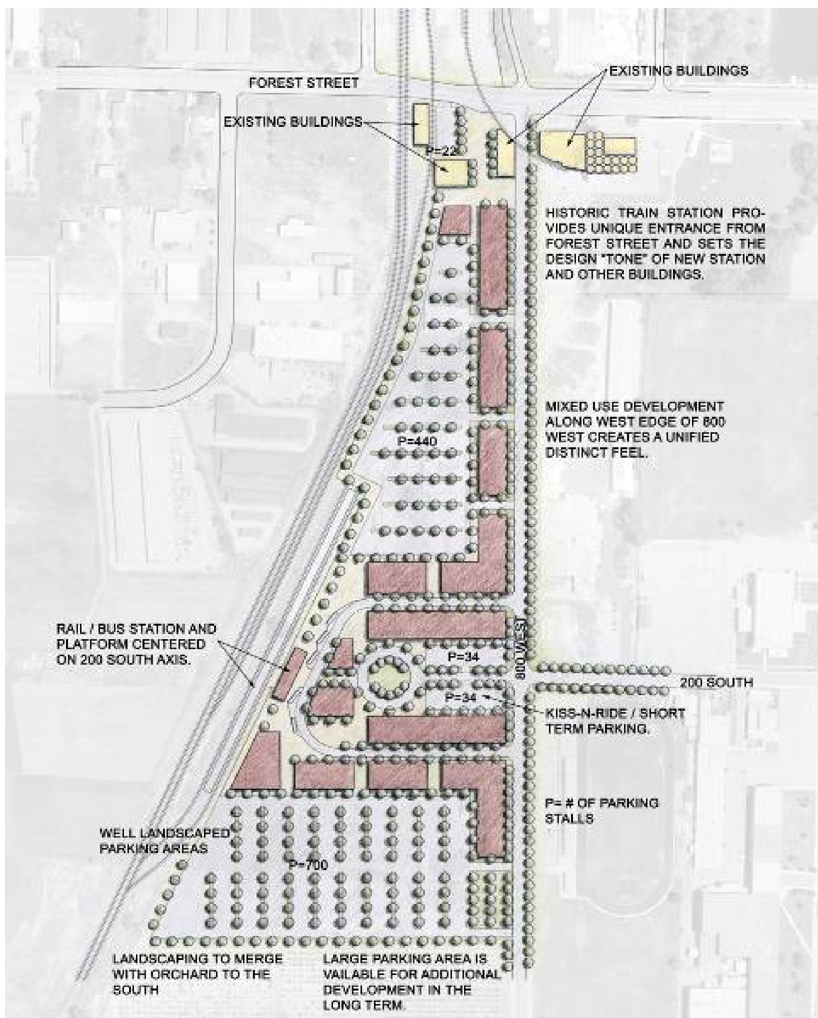
Phase Three

The Brigham City Station is developed to include rail service. Platforms and siding lines are constructed at this stage, plazas and waiting areas are modified accordingly. Additional parking is constructed to the north as part of a mixed used district. Upon completion, a range of station and mixed-use structures are envisioned. However, the costs for developing mixed-use sites and parking are not included in this project.

Table 7-4: Phase Three Facilities

Station Development	Unit	Amount	Cost Per Unit	Subtotal
Access/Park-and-Ride	Square Feet	125,000	$2.00	$250,000
Rail Improvements: Siding/Platform Area	Lump	1	$1.5 M	$1,500,000
Total				**$1,750,000**

Figure 7-13: Phase Three



Summary

As illustrated in the following table, the approximate cost for completing the Brigham City Station as envisioned is $4.3 million. This figure does not include land acquisition costs, construction of non-essential buildings and structures (including a permanent station building), or the development of mixed-use buildings and corresponding parking facilities north of the station.

Table 7-5: Total Cost of Station Facilities

Station Development	Cost
Phase One	$1,340,000
Phase Two	$1,190,000
Phase Three	$1,750,000
Total	**$4,280,000**

Note that the station buildings are not included in the envisioned costs.

Chapter Eight: Recommendations

This chapter summarizes the evaluation process and describes the preferred alternative that was developed from both a short-term and long-term perspective. In addition, the chapter discusses implementation steps and funding strategies for the preferred alternative.

Preferred Alternative

Chapter Six details the transit alternatives considered for the Brigham City corridor. In addition to technical analysis presented in Chapter Six, input from participating agencies and the general public helped guide and ultimately select the preferred alternative. This chapter reviews the evaluation process and evaluation results.

The primary criteria in selecting the preferred alternative was the ability of each transit alternative to address the needs of Box Elder County. As outlined in Chapter Four, the preferred alternative was primarily selected based on three specific needs.

1. Reduce auto dependency,
2. Provide high quality transit options, and
3. Promote economic development.

Reduce Auto Dependency

All evaluated transit alternatives provide additional transportation options within the study corridor. However, the commuter rail options had the highest forecast ridership. Additionally, the commuter rail alternatives have the greatest potential to increase passenger capacity in both the short and long term. Of the evaluated alternatives, the commuter rail alternatives best address the need of reducing auto dependency due to higher forecast ridership and passenger capacity. Finally, commuter rail offers an independent alignment option which allows transit service to be provided without the constraint of growing automobile traffic.

High Quality Service

High quality transit service in terms of travel time, and passenger comfort is the second specific need identified in Chapter Four. Commuter rail maintains a critical advantage over the other mode options in terms of its ability to maintain reasonable speeds between the core areas of the Wasatch Front and Brigham City. The other "over the road" options, including Bus Rapid Transit, are likely to deteriorate over time as growth continues in Box Elder County and the highways become more congested. The commuter rail option would offer the highest average speeds and the shortest travel times for the majority of trips within the corridor particularly for longer distance trips. Although difficult to quantify, commuter rail would also provide the highest level of passenger comfort and reliability of the evaluated alternatives.

Economic Development

Economic development of Brigham City and Box Elder County was the third specified need of the transit investment. Commuter rail has several economic development advantages over improved bus service or BRT. Generally, fixed capital transit investments in the form of stations and/or guideways can be used to promote private development in the area, whereas increased or improved bus service that can easily be rerouted are less attractive to private investments. Economic impacts of fixed transit investments usually include potential residential, office and retail development within one-quarter to one-half mile of the proposed stations which is consistent with the station design concepts presented in Chapter Seven. Of the evaluated alternatives, commuter rail has the greatest economic development potential due to the required fixed capital transit investment as well as the previously discussed travel time reliability.

Cost

FTA project comparisons emphasize cost-effectiveness. Of the evaluated alternatives, the best bus alternative is the most cost-effective as shown in Table 8-1. However, the best bus alternative does not satisfy the identified needs of High Quality Service, and Economic Development. BRT is also more cost effective than the evaluated commuter rail option, but would be competitive with commuter rail if commuter rail service could be provided during off-peak periods since the annualized cost of BRT is actually higher than commuter rail.

Table 8-1: Cost per New Rider

	Best Bus	BRT (mixed traffic)	BRT (separate guideway)	Commuter Rail
New Riders	100	240	240	150
Annualized Cost	$339,160	$2,477,020	$3,706,944	$3,480,534
Cost per New Rider	$13	$40	$59	$89

Public Input

Public input was also gathered during the March 2007 open house. Twenty-two comment forms were returned from the open house. Of these, 20 people preferred commuter rail, two preferred improved local bus, and no one indicated a preference for BRT. Based upon these responses the public has a significant preference for commuter rail compared to the other evaluated alternatives. Although it should be acknowledged that the public is not always aware of BRT technology, specifically where none exists in the Salt Lake-Ogden Metropolitan Area, the public understands the constraints in Box Elder County related to the limited options for a new transportation linkage to the greater Wasatch Front.

With the fixed guideway transit option, Brigham City and Box Elder County would maintain the competitive advantage of having a small town character with reliable access to the urban amenities of the greater Wasatch Front.

Conclusion

Of the evaluated alternatives, only commuter rail met all three specific needs identified in Chapter Four. For BRT to meet all three needs, it would require a separate guideway. Commuter rail compared to BRT with a separate guideway has a lower annualized cost, and with off-peak service would be competitive with the BRT alternative. Additionally, public comment strongly favored commuter rail over improved bus service, and BRT. Commuter rail represents a transportation mode which offers reliable peak period travel times on a schedule that fits the needs of Box Elder County commuters.

Implementation

Cost considerations will help to determine the appropriate "phase-in" of the commuter rail option. The appropriate short-term and long-term complement of rail and bus service will be necessary to serve the transportation needs of Brigham City and Box Elder County.

Short Term

Within the next ten years, it would be desirable to:

- **Extend peak period commuter rail service from Ogden to Brigham City**, utilizing the UTA shared track service agreement with the Union Pacific Railroad (UP), which allows for two morning peak and two afternoon peak trips.

- **During off-peak periods, existing bus service would continue**. The commuter rail service would replace the peak UTA Route 685 bus service and/or allow a re-routing of the UTA bus Route 630 during the peak periods.

This solution would offer advantages to Box Elder County commuters while offering small cost advantages to UTA. The cost of existing services could be reduced and the operating cost of new service could be covered by the additional tax base.

The commuter rail service could provide two peak period service runs from Brigham City to Ogden in the morning and two peak period service runs from Ogden to Brigham City in the afternoon. The equipment would operate from Brigham City to Ogden for the first morning trip, return to Brigham City, and make a second trip to complete the morning peak period service. Each trip would also stop in Pleasant View. The equipment would remain at Ogden during the day. The final trip of the day would be from Ogden to Brigham City where the equipment would stay overnight. The most probable arrangement would be for the equipment to reside at Brigham City on a track near the station, accessible to trucks for fueling and maintenance. A potential schedule is shown in Table 8-2 below.

Table 8-2: Example Commuter Rail Schedule

A.M. Peak	A.M. Peak	P.M. Peak		A.M. Peak	P.M. Peak	P.M. Peak
Southbound Trains – Read Down				Northbound Trains – Read Up		
6:30 A.M.	8:00 A.M.	4:42 P.M.	Brigham City	7:44 A.M.	4:32 P.M.	6:02 P.M.
6:50 A.M.	8:20 A.M.	5:02 P.M.	Pleasant View	7:24 A.M.	4:12 P.M.	5:42 P.M.
7:02 A.M.	8:32 A.M.	5:14 P.M.	Ogden	7:12 A.M.	4:00 P.M.	5:30 P.M.

This recommendation to operate commuter rail service would include one set of DMU equipment leased from and maintained by Colorado Rail Car (Colorado Rail Car is the only manufacturer of Federal Railroad Administration-compliant DMUs in the country). Leasing the DMUs reduces capital costs and also provides for the maintenance of the units. The proposed lease would be for five years, and the assumption is that there could be another market for the DMU equipment if other equipment were to subsequently be used in the Brigham City–Ogden service.

Annual lease cost for the approximately $4.5 million per DMU is approximately $1,000,000 per year over six years ($85,000 per month over 72 months). Annual maintenance cost for the DMU is approximately $100,000 based on an estimated 50,000 vehicle miles per year or less (approximately $2 per mile) assuming that non-scheduled maintenance is the result of accidents. It is likely that the DMU lease agreement would be structured as a capital lease in order to take advantage of lower interest rates and tax exempt status of interest payments, but a variety of lease structures exist.

Operating costs for peak period service including vehicle lease and maintenance from Brigham City to Ogden would be relatively affordable with an additional quarter-cent sales tax in Brigham City, Willard, and Perry. Reducing costs of the existing bus service coupled with the option of replacing full commuter rail vehicles from Ogden to Pleasant View with DMU vehicles will allow existing sales tax revenue to be stretched farther, beginning to offset the capital cost. The capital cost of commuter rail represents the greatest short-term challenge because of the significant up front investment. In this scenario, riders from the Pleasant View station would trade same seat commuter rail service south of Ogden for service offerings in Brigham City.

The actual time frame of this short-term recommendation varies according to the taxpayer willingness of Brigham City and surrounding cities to implement a financing plan for the capital cost (discussed in the implementation steps of this chapter). Voter approval is needed for a sales tax initiative. A transit service district sales tax referendum is proposed for voter approval in November 2007. If this "second quarter-cent" sales tax is approved, commuter rail could run from Brigham City between 2020 and 2025 without any additional taxes. Commuter rail operation could be accelerated if a county-wide "third quarter-cent" (although this third quarter-cent would be the first quarter-cent in the remaining county outside of the UTA service district) sales tax (available for highways and transit) is passed in 2009 with an assumed 50 percent dedicated to transit. Earlier voter approval than 2009 (for the county-wide sales tax) and/or a higher transit split than the estimated 50 percent could have commuter rail operating sooner than 2015.

Preliminary financial plans have been developed for the short term implementation of shared track commuter rail (see Appendix G). Various assumptions have been made including the assumption that the capital cost remains at approximately $36 million. Other assumptions include growth in sales tax revenue at 5.5 percent annually, operating cost inflation at 4 percent annually, capital cost inflation at 3 percent annually, and a 20 year bond rate of 5.25 percent. Based on these assumptions, commuter rail revenue would exceed costs if implemented between 2020 and 2025 based on a favorable second quarter-cent sales tax increase in the Box Elder County transit district (Brigham City, Perry, and Willard) in 2007. As discussed, commuter rail revenue would exceed costs by 2015 if a county-wide sales tax is passed in 2009 with an approximate split of 50 percent dedicated to transit and the remaining 50 percent dedicated to highway improvements, in addition to the proposed 2007 transit sales tax initiative. A more detailed and updated financing plan based on actual UTA bond ratings and other variables would provide a prudent next step for advancing commuter rail.

Long Term

The recommended long term commuter rail implementation goals are:

- **Construction of a separate track parallel to the existing UP track.** A separate and private right of way would allow the most reliability and the greatest flexibility in terms of service to Brigham City and Box Elder County.

- **Construction of a station to serve Willard and Perry**. This station could be added either before or during commuter rail operation. Initial suggestions have been for the station to be located at the 750 North interchange.

The shared track service agreement with UP is restricted to two trains in each peak period with no off-peak service. Although this agreement may change over time, it appears that operating mid-day and evening off-peak service will be a problem due to UP schedule conflicts. Construction of a separate track parallel to the UP track comprised of both UP right-of-way as well as private right-of-way would allow the greatest flexibility and the most reliable transit service throughout the day. Ultimately, a dedicated track commuter rail service throughout the day should be a goal of Brigham City. Although the separate track service would cost more, it may offer long term economies by not having to upgrade the UP track prior to building a new track and provides desirable control of UTA over the commuter rail schedule, operations, and long term cost. Various improvements to the UP track required under a shared track agreement would be obsolete or of little value once an exclusive track is built.

Ultimately the goal of commuter rail service should be service uninhibited by UP operating and right-of-way constraints. Same seat service from Brigham City to Salt Lake would be an improvement over the forced transfer to DMU service between Ogden and Brigham City. Same seat service could evolve by adding one additional peak hour service between Ogden and Brigham City via a locomotive commuter rail vehicle which would continue from Ogden to Salt Lake. Same seat service could evolve independently of exclusive track operation and would depend on ridership levels from Brigham City.

A station serving the cities of Perry and Willard is another desirable long term goal of the project. An estimated $4.9 million dollar station could be added either prior to or during commuter rail operation. No formal station plans have been developed, but initial thoughts suggest that a station in Perry east of the Flying J service station and served by the 750 North interchange would provide good freeway access and would offer convenient commuter rail service to the cities of Willard and Perry. Again, an additional station serving Perry and Willard is independent of exclusive track operation of commuter rail and is a function of cost and ridership at Perry and Willard.

Next Steps

The recommended next steps to implement commuter rail are:

- **Perform a capacity analysis with Union Pacific.** The capital costs presented in this report may be reduced as a result of a capacity analysis performed to UP specifications.

- **Put on ballot for November 2007 election**. Voter approval of the second quarter-cent sales tax is necessary for the financial success of bringing commuter rail to Box Elder County. It is desirable for voters to understand that this second quarter-cent sales tax dedicated to transit could allow commuter rail to be implemented after the year 2020, or an additional third quarter-cent sales tax could be approved in 2009 to bring commuter rail service by 2015, while still allowing the remaining county's first quarter-cent sales tax to be dedicated to highway improvements.

- **Develop a financial plan.** The key to implementing a successful transit system is establishing a solid and realistic financial plan. In broad terms, fixed guide way transit such as commuter rail trades ongoing operating costs for one-time capital costs. This is specifically true for the proposed Brigham City commuter rail service. Draft financial plans have been initiated in this report.

- **Station area planning.** Preliminary steps for the construction of a station need to be taken including setting aside the land for the station. Preliminary station planning has been developed in this report, but Brigham City should define needed rights-of-way so that it may be coordinated with private development in the area.

Capacity Analysis may provide mechanisms to reduce capital costs

Capital cost financing remains a large challenge for implementing commuter rail service to Brigham City. To meet this challenge, it would be prudent for Brigham City and UTA to explore reduced cost options for commuter rail. Although the proposed option maintains shared track service with UP, it includes an anticipated level of siding track, signals, grade crossings and other improvements typically implemented by UTA in similar circumstances. These improvements may be beyond the minimum requested by UP to meet the capacity demands of existing UP freight operations. Therefore, the capital cost presented in this report may be reduced as a result of a capacity analysis performed to UP specifications. Since UP has already built a capacity model for the section of track between Ogden and Pleasant View, it is estimated that a capacity analysis can be completed for an

A capacity analysis can be completed for an estimated cost of $50,000 and performed within a three month period.

additional cost of $50,000 and performed within a three month period.

Additional sales tax revenues accelerate availability of commuter rail

Currently, the UTA transit district serving Brigham City, Willard and Perry collects approximately $760,000 from a quarter-cent sales tax. Present Utah legislation allows for a first, second and third quarter-cent sales tax to be implemented based on voter approval. The first and second quarter-cent is available for transit service; the third quarter-cent sales tax is available for both highways and transit. Voter approval of a second quarter-cent sales tax is necessary for the financial success of bringing commuter rail to Box Elder County. Voter approval of the third quarter-cent, the first quarter-cent county-wide, could accelerate commuter rail and provide excess funding for other highway improvements. One proposed sales tax increase would be for the second quarter-cent and would not apply to areas outside of Brigham City, Perry and Willard. Another proposed quarter-cent sales tax increase would apply to the entire county, thus representing the third tax permissible in Brigham City, Perry and Willard.

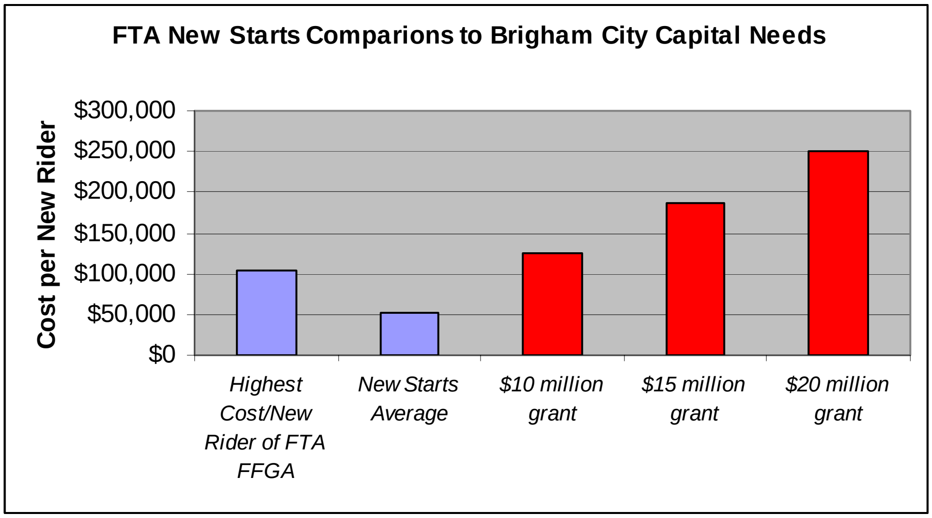
Financial assumptions presented in the appendix of this report display that commuter rail would operate at a loss if it began by 2020 but would operate with more revenue than expenditures if it began in 2025. Approval of a county-wide quarter-cent sales tax in 2009 would provide revenues towards highways and transit. An estimated fifty percent of these revenues could be dedicated to transit in order to accelerate operation of commuter rail to the year 2015. Revenues generated from an additional quarter-cent sales tax in Brigham City, Perry and Willard and an additional quarter-cent sales tax county-wide would provide commuter rail in 2015. At the time of this writing, Weber and Davis Counties are seeking voter approval of this third quarter-cent in 2007 and the metropolitan area of Cache County and the UTA service district in Box Elder County are seeking voter approval of the second quarter-cent in 2007.

A financing plan lays the framework for successful implementation

The Federal Transit Administration (FTA) has administered a competitive capital project funding program called New Starts for many years. Full Funding Grant Agreements, the final step in the FTA New Starts process, have been reviewed since 1995. Generally, the competition for these capital grants has intensified over this period requiring an increasingly rigorous forecasting and cost estimating process resulting in greater competition for remaining funds.

As the competition for funding has increased, FTA has recently initiated a "Small Starts" program to help fund smaller capital projects such as Bus Rapid Transit (BRT) or Commuter Rail. The results of the Small Starts program are still untested, but it is limited to capital projects that cost less than $100 million. However, given the track record for New Starts funds, it is unlikely that commuter rail in Brigham City would meet the minimum metrics to be eligible for New Starts/Small Starts, and it is highly unlikely that FTA capital grants would be a significant source of funding for commuter rail in Brigham City. Figure 8-1 shows that even a modest request for 30 percent ($12 million) capital assistance would result in a request for approximately 2.5 times the FTA average cost per new rider and well over the highest cost per new rider of other transit systems funded across the nation. It is recommended that the federal requirements of building a travel model, meeting various environmental and financial commitments, and related requirements associated with federal funding would not be worth the small probability of acquiring limited federal funds.

Figure 8-1: Brigham City Capital Cost Comparisons to FTA Federal Grant Recipients



Adjacent counties could provide revenues towards commuter rail. Both Weber and Cache Counties would see service improvements with an extension of commuter rail from Pleasant View to Brigham City. Although Cache County would probably benefit most, there is a relatively small tax base in Cache County to offer funding. However, there is a large tax base in Weber County, and it is possible that Brigham City commuter rail could be tied to a near-term sales tax referendum in Weber County (representing the third quarter-cent sales tax, split between highways and transit).

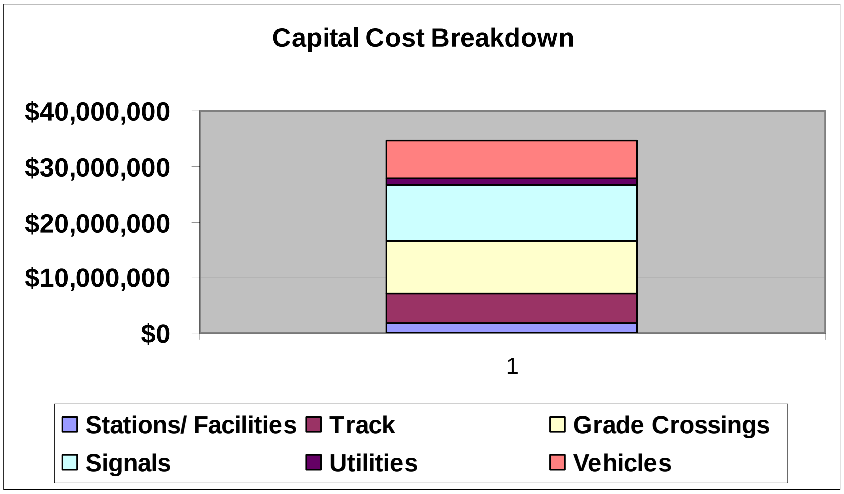
Box Elder County employment base is dominated by several large employers. Large employers such as ATK, AutoLiv, NuCor Steel, etc. are running vanpools and various privately sponsored "transit" arrangements. These employers may see cost savings and value in a larger employment market through commuter rail service to Brigham City.

A financing plan should include expense reduction techniques as well as revenue generating tools. Capital cost reduction of the initial investment would speed implementation. To reduce the cost of the initial investment, it is recommended that steps are taken to aid the timeliness of bringing shared track DMU to Brigham City. These include:

- Outdoor waiting platforms
- Gravel parking lots
- Limited passenger amenities

- Leased DMU vehicles
- A Union Pacific capacity analysis to determine the mandatory versus optional UP track requirements

Figure 8-2: Capital Cost Breakdown



Brigham City Station

The commuter rail station planning must proceed. While preliminary steps have been taken towards the planning and design of a station in Brigham City, it is recommended that a more in depth plan is developed. The location and proper amount of land needs to be set aside from private development and coordinated with private development plans. The design of the station and associated areas with proper rail yard metrics are all issues that need to be addressed in greater detail.

Appendix A: Sub-County Geography

The origin-destination matrix is based upon sub-county geographic areas, and includes smaller geography near the study area with broad geography farther from the study area in travel markets such as Davis, Salt Lake, and Utah Counties. This information is intended to document the defined geography and serve as an explanation of how future work trips were estimated.

Base Geography

County/sub-county level geography was defined in order to identify travel patterns and market groups within the study area. This defined geography included broad travel markets such as Davis, Salt Lake and Utah Counties, as well as smaller geographic areas near the transit corridor itself.

The majority of the defined geographic areas were aggregated from Census Block Groups (BGs). Block groups were used to create the defined geographies in:

- Box Elder County
- Cache County
- Davis County
- Salt Lake County
- Weber County

For areas farther removed from the study area, county level geography was used to create the defined geography. County level geography was used for:

- Utah County
- Franklin County, Idaho
- Oneida County, Idaho

Figure A-1 shows the defined geography for the corridor study.

Figure A-1: Defined Geography

InterPlan Co.
Transportation Planning

All counties along the future commuter rail corridor were included in the defined geography. To determine which counties outside FronterRunner's planned service area should be included in the defined study geography, Census county-to-county worker flows were evaluated.

The Census long-form includes questions on employment location and is summarized in the county-to-county worker flows. These data provide a good estimate of county to county commuting.

Cache County was incorporated in the defined geography since the Census data showed that a significant number of people (3,907) from Cache County commuted to counties along the commuter rail corridor. Morgan County, Summit County, and Tooele County were not included in the defined geography since only 31 people commuted from these counties to Box Elder County in the year 2000.

Seven Idaho counties were evaluated using the Census County to County Worker Flows data. These counties are located near the Utah boarder or along the I-15 or I-84 corridors. The seven counties evaluated for inclusion into the Southern Idaho geography are:

- Bannock
- Bingham
- Bonneville
- Cassia
- Franklin
- Twin Falls
- Oneida

Franklin County and Oneida County accounted for the highest number of trips to counties within the study area (approximately 90 percent of all trips). Since these two counties accounted for the highest number of trips, they were included in the Southern Idaho geography. The other five counties did not provide a significant number of trips and therefore were not incorporated into the defined geography. Table A-1 summarizes the number of trips by county and the percent of total trips to counties in the study area.

Table A-1: Trips to the Wasatch Front from Southern Idaho Counties

County	Trips	Percent of All Trips
Bannock	163	6%
Bingham	10	1%
Bonneville	58	2%
Cassia	27	1%
Franklin	1,837	69%
Oneida	534	20%
Twin Falls	19	1%

Appendix B: Sub-County Work Trip Origin and Destination Matrices

Census worker flows provide reliable commuting data at the county level. These data served as a basis for allocating work trips to the defined geography at a sub-county level. County level work flows for the counties within the defined geography are summarized in Table B-1.

Table B-1: County to County Worker Flows (2000)

		Workplace							
		Box Elder	Cache	Davis	Salt Lake	Utah	Weber	Southern Idaho	Other
Residence	Box Elder	13,570	631	660	401	26	2,529	16	197
	Cache	2,383	39,235	334	463	94	606	218	398
	Davis	313	199	61,208	33,851	803	14,876	0	1,467
	Salt Lake	80	224	8,370	411,283	8,075	2,084	0	8,511
	Utah	14	12	842	18,159	140,834	317	0	3,399
	Weber	1,671	379	16,659	6,425	458	64,671	0	1,081
	Southern Idaho	519	1,773	57	115	17	53	3,993	50
	Other	179	326	1,718	19,083	3,205	1,376	181	

Source: US Census Bureau

County level work trips were distributed to the 26 defined area based upon the relative proportion of employment and population for each sub-area. For example, in 2000 there were 660 work trips from Box Elder County to Davis County. Northeast Brigham City accounted for approximately seven percent of the total population in 2000, and therefore, seven percent of the trips from Box Elder County to Davis County were from Northeast Brigham City (48.7 trips). These trips were then distributed to the sub-areas in Davis County according to the relative employment of each sub-area. North Davis County accounted for 61 percent of the total employment, thus 61 percent of the total trips from Northeast Brigham City were allocated to North Davis County (29.6 trips). This process was repeated for each origin and destination pair to complete the base year origin-destination (O-D) matrix. Table B-2 shows the base year O-D matrix.

Table B-2: Base Year Work Trip Origin – Destination Matrix

To

From	Northwest Brigham City	Northeast Brigham City	Southeast Brigham City	Southwest Brigham City	South Brigham City	West Brigham City	Perry	Willard	Mantua	Corinne	Honeyville	Tremonton	North Box Elder County	West Box Elder County	Pleasant View	Ogden	North Weber County	South Weber County	Logan	Cache County	North Davis County	South Davis County	Salt Lake City	Salt Lake County	Utah County	Southern Idaho	Total Productions
Northwest Brigham City	11	22	5	14	28	56	21	9	15	42	16	71	22	90	1	35	15	28	13	7	12	8	5	7	1	0	554
Northeast Brigham City	27	52	13	34	66	132	51	22	35	99	37	170	52	213	3	82	35	66	30	16	30	19	13	17	2	1	1,317
Southeast Brigham City	12	24	6	15	30	59	23	10	16	44	17	76	24	96	1	37	16	30	14	7	13	9	6	8	1	1	592
Southwest Brigham City	17	34	8	22	43	86	33	14	23	64	24	110	34	139	2	54	23	43	20	10	19	12	8	11	1	1	857
South Brigham City	43	85	21	55	107	215	83	35	57	160	60	275	85	346	5	134	58	107	49	26	48	31	21	27	3	2	2,137
West Brigham City	9	18	4	12	23	45	18	7	12	34	13	58	18	73	1	28	12	23	10	6	10	7	4	6	1	0	453
Perry	20	39	10	25	48	98	38	16	26	73	27	125	39	157	2	61	26	49	23	12	22	14	9	12	1	1	972
Willard	20	40	10	26	50	100	39	17	27	75	28	129	40	162	2	63	27	50	23	12	23	15	10	13	1	1	1,000
Mantua	27	53	13	34	67	134	52	22	36	100	37	172	53	216	3	84	36	67	31	16	30	19	13	17	2	1	1,336
Corinne	38	75	18	48	94	189	73	31	51	142	53	243	75	305	4	118	51	95	44	23	42	27	18	24	3	2	1,886
Honeyville	33	64	16	41	81	163	63	27	43	121	45	209	64	262	4	101	44	81	37	20	36	23	16	21	2	1	1,618
Tremonton	61	120	30	77	151	304	117	50	81	227	85	390	120	489	7	189	82	152	70	37	68	44	29	39	4	3	3,027
North Box Elder County	29	57	14	37	72	144	56	24	39	108	40	185	57	233	3	90	39	72	33	18	32	21	14	18	2	1	1,439
West Box Elder County	13	26	6	16	32	65	25	11	17	48	18	83	26	104	1	40	17	32	15	8	14	9	6	8	1	1	644
Pleasant View	2	3	1	2	4	9	3	1	2	7	2	11	3	14	40	1,135	489	909	10	5	403	260	110	146	18	0	3,589
Ogden	13	26	6	17	33	66	25	11	18	49	18	84	26	106	297	8,489	3,655	6,797	74	39	3,013	1,943	822	1,089	136	0	26,851
North Weber County	10	20	5	13	25	51	20	8	14	38	14	65	20	82	231	6,581	2,833	5,269	57	30	2,336	1,506	637	844	106	0	20,816
South Weber County	19	38	9	24	47	95	37	16	25	71	27	122	38	153	432	12,332	5,309	9,874	107	57	4,377	2,822	1,194	1,582	198	0	39,007
Logan	30	59	14	38	74	148	57	24	40	111	41	190	59	239	4	126	54	101	12,094	6,393	96	62	94	124	44	103	20,418
Cache County	33	66	16	42	83	166	64	27	44	124	46	213	66	268	5	141	61	113	13,573	7,175	107	69	105	140	50	115	22,915
North Davis County	5	10	3	7	13	26	10	4	7	19	7	33	10	41	143	4,088	1,760	3,273	81	43	23,174	14,941	9,065	12,014	500	0	69,277
South Davis County	3	6	2	4	8	16	6	3	4	12	4	20	6	25	87	2,477	1,066	1,983	49	26	14,040	9,053	5,492	7,279	303	0	41,973
Salt Lake City	0	1	0	1	1	2	1	0	1	1	1	3	1	3	6	172	74	138	27	15	954	615	33,159	43,945	1,514	0	80,635
Salt Lake County	2	3	1	2	4	9	3	1	2	6	2	11	3	14	26	747	322	598	119	63	4,135	2,666	143,715	190,463	6,561	0	349,481
Utah County	0	1	0	0	1	2	1	0	0	1	1	2	1	3	5	140	60	112	8	4	512	330	7,809	10,350	140,834	0	160,178
Southern Idaho	13	26	6	17	33	66	25	11	18	49	18	85	26	106	1	18	8	14	1,132	599	29	19	15	21	15	3,993	6,364
Total Attractions	491	967	238	623	1,214	2,446	943	402	653	1,827	683	3,138	969	3,938	1,316	37,562	16,171	30,074	27,744	14,667	53,577	34,544	202,392	268,226	150,305	4,227	

Future Work Trip Projections

Future work trips were then estimated for both the short term (2012) and long term (2030) using the growth (Fratar) method. The Fratar method applies growth factors to both the productions and attractions and the resulting O-D matrix is sequentially corrected until the total productions and attractions are equal. Future productions and attractions are estimated by factoring total productions and attractions for each zone by the expected growth (population and employment respectively). Table B-3 provides the estimated 2030 work trip origin and destination matrix .

The Fratar method is used to balance a two dimensional matrices and as a result the estimated productions and attractions for each zone may not be equal to the input productions and attractions. Additionally, this method does not incorporate distances so the balanced matrix may distribute trips to zones located farther away.

Table B-3 – 2030 Work Trip Origin and Destination Matrix

To

From	Northwest Brigham City	Northeast Brigham City	Southeast Brigham City	Southwest Brigham City	South Brigham City	West Brigham City	Perry	Willard	Mantua	Corinne	Honeyville	Tremonton	North Box Elder County	West Box Elder County	Pleasant View	Ogden	North Weber County	South Weber County	Logan	Cache County	North Davis County	South Davis County	Salt Lake City	Salt Lake County	Utah County	Southern Idaho	Total Productions
Northwest Brigham City	8	16	4	10	29	76	40	12	22	35	25	62	17	57	2	38	25	40	13	10	21	9	6	11	2	1	590
Northeast Brigham City	19	37	10	24	67	177	93	27	51	81	58	144	40	132	6	89	58	95	30	23	49	22	15	25	4	1	1,377
Southeast Brigham City	9	18	5	12	32	85	44	13	24	38	28	69	19	63	3	43	28	45	14	11	23	11	7	12	2	1	657
Southwest Brigham City	13	25	7	16	45	118	62	18	34	54	39	96	27	88	4	59	39	63	20	15	33	15	10	17	3	1	919
South Brigham City	49	94	25	62	169	450	236	68	130	205	146	365	101	336	14	226	148	240	76	57	125	56	37	64	10	4	3,494
West Brigham City	15	28	8	19	51	136	71	21	39	62	44	110	31	102	4	68	45	72	23	17	38	17	11	19	3	1	1,056
Perry	42	80	21	53	145	384	202	58	111	175	125	312	86	287	12	193	127	205	65	49	106	48	32	55	9	3	2,984
Willard	29	55	15	36	99	264	139	40	76	120	86	214	59	197	8	133	87	141	44	34	73	33	22	38	6	2	2,049
Mantua	45	85	23	56	154	409	215	62	118	186	133	332	92	305	13	206	135	218	69	52	113	51	34	58	9	3	3,175
Corinne	38	73	19	48	132	351	185	53	101	160	114	285	79	262	11	176	116	187	59	45	97	44	29	50	8	3	2,726
Honeyville	59	112	30	74	203	539	283	82	155	245	175	437	121	402	17	271	178	287	91	69	149	67	45	77	12	4	4,182
Tremonton	55	105	28	70	190	506	266	77	146	230	165	410	114	377	16	254	167	270	85	64	140	63	42	72	12	4	3,926
North Box Elder County	23	44	12	29	80	211	111	32	61	96	69	172	48	158	7	106	70	113	36	27	59	26	17	30	5	2	1,642
West Box Elder County	8	16	4	10	28	75	39	11	21	34	24	60	17	56	2	37	25	40	13	9	21	9	6	11	2	1	579
Pleasant View	2	4	1	2	7	18	9	3	5	8	6	15	4	13	117	1,871	1,227	1,985	15	11	1,017	459	193	332	59	0	7,383
Ogden	8	16	4	10	28	75	39	11	22	34	24	61	17	56	491	7,824	5,131	8,297	62	47	4,251	1,917	806	1,388	246	0	30,864
North Weber County	10	18	5	12	33	89	47	13	26	40	29	72	20	66	579	9,239	6,059	9,798	73	55	5,020	2,264	952	1,639	290	0	36,448
South Weber County	16	30	8	20	54	144	76	22	42	66	47	117	32	108	944	15,055	9,873	15,965	119	89	8,179	3,689	1,551	2,670	473	0	59,388
Logan	30	57	15	38	104	276	145	42	80	126	90	224	62	206	12	189	124	201	16,474	12,430	220	99	150	258	130	174	31,956
Cache County	48	92	24	61	166	442	232	67	127	201	144	359	99	330	19	303	199	322	26,389	19,911	352	159	240	414	209	279	51,188
North Davis County	5	9	2	6	16	42	22	6	12	19	14	34	9	31	338	5,387	3,533	5,713	97	73	46,752	21,089	12,711	21,889	1,290	0	119,099
South Davis County	2	4	1	2	7	18	9	3	5	8	6	14	4	13	143	2,284	1,498	2,422	41	31	19,817	8,939	5,388	9,278	547	0	50,484
Salt Lake City	0	0	0	0	1	2	1	0	1	1	1	2	1	2	10	161	106	171	23	18	1,366	616	32,993	56,816	2,771	0	95,064
Salt Lake County	1	3	1	2	5	13	7	2	4	6	4	10	3	10	57	908	596	963	131	99	7,692	3,470	185,809	319,973	15,605	0	535,371
Utah County	0	1	0	0	1	3	1	0	1	1	1	2	1	2	10	156	102	165	8	6	872	393	9,240	15,913	306,545	0	333,422
Southern Idaho	13	25	7	16	45	119	63	18	34	54	39	97	27	89	2	26	17	27	1,494	1,128	65	29	24	41	43	6,550	10,092
Total attractions:	548	1,045	277	692	1,889	5,020	2,639	762	1,447	2,285	1,634	4,072	1,128	3,749	2,841	45,304	29,711	48,042	45,563	34,378	96,648	43,596	250,369	431,149	328,292	7,034	

Transit Origin and Destination Matrix

The transit trip origin and destination matrices were estimated using the reported transit mode share for work trips for each district from the US Census. The sub-county district mode share was aggregated from Census Block Group Journey-to-Work data. Table B-4 reports the mode share for each sub-area from the 2000 Census

Table B-4: Transit Mode Share by Sub-County District

Area ID	Area	Transit Mode Share
1	Northwest Brigham City	0.8%
2	Northeast Brigham City	1.4%
3	Southeast Brigham City	2.5%
4	Southwest Brigham City	3.2%
5	South Brigham City	1.1%
6	West Brigham City	0.4%
7	Perry	0.5%
8	Willard	0.7%
9	Mantua	1.4%
10	Corinne	0.5%
11	Honeyville	0.5%
12	Tremonton	0.1%
13	North Box Elder County	0.3%
14	West Box Elder County	0.0%
15	Pleasant View	0.8%
16	Ogden	2.3%
17	North Weber County	1.2%
18	South Weber County	1.3%
19	Logan	2.9%
20	Cache County	0.1%
21	North Davis County	2.0%
22	South Davis County	2.8%
23	Salt Lake City	6.6%
24	Salt Lake County	2.9%
25	Utah County	1.5%
26	Southern Idaho	0.2%

Tables B-5 and B-6 show 2000 and 2030 transit trip origin and destination matrices.

Table B-5: Base Year Transit Work Trip Origin – Destination Matrix

To

From	Northwest Brigham City	Northeast Brigham City	Southeast Brigham City	Southwest Brigham City	South Brigham City	West Brigham City	Perry	Willard	Mantua	Corinne	Honeyville	Tremonton	North Box Elder County	West Box Elder County	Pleasant View	Ogden	North Weber County	South Weber County	Logan	Cache County	North Davis County	South Davis County	Salt Lake City	Salt Lake County	Utah County	Southern Idaho	Total Productions
Northwest Brigham (	0.1	0.2	0.0	0.1	0.2	0.5	0.2	0.1	0.1	0.3	0.1	0.6	0.2	0.7	0.0	0.3	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	4.5
Northeast Brigham C	0.4	0.7	0.2	0.5	0.9	1.8	0.7	0.3	0.5	1.3	0.5	2.3	0.7	2.9	0.0	1.1	0.5	0.9	0.4	0.2	0.4	0.3	0.2	0.2	0.0	0.0	17.9
Southeast Brigham (	0.3	0.6	0.1	0.4	0.7	1.5	0.6	0.2	0.4	1.1	0.4	1.9	0.6	2.4	0.0	0.9	0.4	0.8	0.3	0.2	0.3	0.2	0.1	0.2	0.0	0.0	15.0
Southwest Brigham	0.5	1.1	0.3	0.7	1.4	2.7	1.1	0.4	0.7	2.0	0.8	3.5	1.1	4.4	0.1	1.7	0.7	1.4	0.6	0.3	0.6	0.4	0.3	0.3	0.0	0.0	27.2
South Brigham City	0.5	0.9	0.2	0.6	1.1	2.3	0.9	0.4	0.6	1.7	0.6	2.9	0.9	3.7	0.0	1.4	0.6	1.1	0.5	0.3	0.5	0.3	0.2	0.3	0.0	0.0	22.7
West Brigham City	0.0	0.1	0.0	0.0	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.3	0.1	0.3	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9
Perry	0.1	0.2	0.0	0.1	0.3	0.5	0.2	0.1	0.1	0.4	0.1	0.7	0.2	0.8	0.0	0.3	0.1	0.3	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	5.0
Willard	0.1	0.3	0.1	0.2	0.4	0.7	0.3	0.1	0.2	0.5	0.2	0.9	0.3	1.2	0.0	0.5	0.2	0.4	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.0	7.2
Mantua	0.4	0.8	0.2	0.5	1.0	1.9	0.7	0.3	0.5	1.4	0.5	2.5	0.8	3.1	0.0	1.2	0.5	1.0	0.4	0.2	0.4	0.3	0.2	0.2	0.0	0.0	19.2
Corinne	0.2	0.4	0.1	0.3	0.5	1.0	0.4	0.2	0.3	0.8	0.3	1.3	0.4	1.6	0.0	0.6	0.3	0.5	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.0	10.2
Honeyville	0.1	0.3	0.1	0.2	0.4	0.7	0.3	0.1	0.2	0.5	0.2	0.9	0.3	1.2	0.0	0.5	0.2	0.4	0.2	0.1	0.2	0.1	0.1	0.1	0.0	0.0	7.3
Tremonton	0.1	0.2	0.0	0.1	0.2	0.4	0.2	0.1	0.1	0.3	0.1	0.5	0.2	0.7	0.0	0.3	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	4.2
North Box Elder Cou	0.1	0.2	0.0	0.1	0.2	0.4	0.2	0.1	0.1	0.3	0.1	0.5	0.2	0.6	0.0	0.2	0.1	0.2	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	4.0
West Box Elder Cou	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pleasant View	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.3	8.7	3.8	7.0	0.1	0.0	3.1	2.0	0.8	1.1	0.1	0.0	27.6
Ogden	0.3	0.6	0.1	0.4	0.8	1.5	0.6	0.3	0.4	1.1	0.4	2.0	0.6	2.5	7.0	199.0	85.7	159.3	1.7	0.9	70.6	45.5	19.3	25.5	3.2	0.0	629.5
North Weber County	0.1	0.2	0.1	0.2	0.3	0.6	0.2	0.1	0.2	0.5	0.2	0.8	0.2	1.0	2.8	80.4	34.6	64.4	0.7	0.4	28.5	18.4	7.8	10.3	1.3	0.0	254.4
South Weber County	0.2	0.5	0.1	0.3	0.6	1.2	0.5	0.2	0.3	0.9	0.3	1.6	0.5	2.0	5.6	160.5	69.1	128.5	1.4	0.7	57.0	36.7	15.5	20.6	2.6	0.0	507.6
Logan	0.9	1.7	0.4	1.1	2.1	4.3	1.7	0.7	1.2	3.2	1.2	5.5	1.7	7.0	0.1	3.7	1.6	2.9	352.5	186.3	2.8	1.8	2.7	3.6	1.3	3.0	595.1
Cache County	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.4	0.0	0.2	0.1	0.2	20.2	10.7	0.2	0.1	0.2	0.2	0.1	0.2	34.1
North Davis County	0.1	0.2	0.0	0.1	0.3	0.5	0.2	0.1	0.1	0.4	0.1	0.6	0.2	0.8	2.8	80.5	34.6	64.4	1.6	0.8	456.3	294.2	178.5	236.5	9.8	0.0	1,364.0
South Davis County	0.1	0.2	0.0	0.1	0.2	0.4	0.2	0.1	0.1	0.3	0.1	0.6	0.2	0.7	2.5	70.3	30.3	56.3	1.4	0.7	398.7	257.1	156.0	206.7	8.6	0.0	1,192.0
Salt Lake City	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.1	0.2	0.4	11.3	4.9	9.1	1.8	1.0	62.7	40.4	2,179.8	2,888.8	99.5	0.0	5,300.7
Salt Lake County	0.0	0.1	0.0	0.1	0.1	0.2	0.1	0.0	0.1	0.2	0.1	0.3	0.1	0.4	0.8	21.5	9.3	17.3	3.4	1.8	119.2	76.9	4,144.6	5,492.7	189.2	0.0	10,078.6
Utah County	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.1	0.9	1.6	0.1	0.1	7.5	4.8	114.6	151.9	2,067.2	0.0	2,351.2
Southern Idaho	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.2	0.1	0.2	0.0	0.0	0.0	0.0	2.2	1.2	0.1	0.0	0.0	0.0	0.0	7.9	12.5
Total Attractions	4.9	9.6	2.4	6.2	12.0	24.2	9.3	4.0	6.5	18.1	6.8	31.1	9.6	39.0	22.7	647.5	278.8	518.4	390.6	206.5	1,210.0	780.2	6,821.2	9,040.0	2,383.2	11.2	

Table B-6: 2030 Transit Work Trip Origin – Destination Matrix

To

From	Northwest Brigham City	Northeast Brigham City	Southeast Brigham City	Southwest Brigham City	South Brigham City	West Brigham City	Perry	Willard	Mantua	Corinne	Honeyville	Tremonton	North Box Elder County	West Box Elder County	Pleasant View	Ogden	North Weber County	South Weber County	Logan	Cache County	North Davis County	South Davis County	Salt Lake City	Salt Lake County	Utah County	Southern Idaho	Total Productions
Northwest Brigham City	11.2	22.0	5.4	14.2	27.6	55.7	21.5	9.2	14.9	41.6	15.5	71.4	22.1	89.7	1.2	34.7	14.9	27.8	12.8	6.8	12.5	8.0	5.4	7.1	0.8	0.5	554.5
Northeast Brigham City	26.5	52.3	12.9	33.7	65.7	132.2	51.0	21.7	35.3	98.8	36.9	169.6	52.4	212.9	2.9	82.4	35.5	66.0	30.5	16.1	29.6	19.1	12.7	16.9	1.9	1.2	1,316.7
Southeast Brigham City	11.9	23.5	5.8	15.2	29.5	59.4	22.9	9.8	15.9	44.4	16.6	76.3	23.6	95.7	1.3	37.0	15.9	29.7	13.7	7.2	13.3	8.6	5.7	7.6	0.9	0.5	592.0
Southwest Brigham City	17.3	34.0	8.4	21.9	42.7	86.1	33.2	14.1	23.0	64.3	24.0	110.4	34.1	138.6	1.9	53.6	23.1	42.9	19.8	10.5	19.3	12.4	8.3	11.0	1.2	0.8	856.9
South Brigham City	43.1	84.9	20.9	54.7	106.6	214.6	82.8	35.3	57.3	160.4	59.9	275.4	85.0	345.6	4.7	133.7	57.6	107.1	49.5	26.2	48.1	31.0	20.7	27.4	3.1	1.9	2,137.3
West Brigham City	9.1	18.0	4.4	11.6	22.6	45.5	17.5	7.5	12.1	34.0	12.7	58.3	18.0	73.2	1.0	28.3	12.2	22.7	10.5	5.5	10.2	6.6	4.4	5.8	0.7	0.4	452.7
Perry	19.6	38.6	9.5	24.9	48.5	97.6	37.6	16.0	26.0	72.9	27.3	125.2	38.7	157.2	2.1	60.8	26.2	48.7	22.5	11.9	21.9	14.1	9.4	12.5	1.4	0.9	972.1
Willard	20.2	39.7	9.8	25.6	49.9	100.5	38.7	16.5	26.8	75.1	28.1	128.9	39.8	161.8	2.2	62.6	27.0	50.1	23.2	12.2	22.5	14.5	9.7	12.8	1.5	0.9	1,000.4
Mantua	26.9	53.1	13.1	34.2	66.6	134.2	51.7	22.1	35.8	100.3	37.5	172.2	53.2	216.1	2.9	83.6	36.0	67.0	30.9	16.4	30.1	19.4	12.9	17.1	1.9	1.2	1,336.3
Corinne	38.0	74.9	18.4	48.3	94.1	189.4	73.0	31.1	50.5	141.5	52.9	243.0	75.1	305.0	4.1	118.0	50.8	94.5	43.7	23.1	42.4	27.4	18.2	24.2	2.7	1.7	1,886.1
Honeyville	32.6	64.3	15.8	41.4	80.7	162.5	62.7	26.7	43.4	121.4	45.4	208.5	64.4	261.7	3.5	101.3	43.6	81.1	37.5	19.8	36.4	23.5	15.6	20.7	2.4	1.5	1,618.3
Tremonton	61.0	120.2	29.6	77.5	150.9	303.9	117.2	50.0	81.1	227.1	84.9	390.0	120.4	489.4	6.6	189.4	81.5	151.6	70.1	37.0	68.1	43.9	29.3	38.8	4.4	2.7	3,026.7
North Box Elder County	29.0	57.1	14.1	36.8	71.8	144.5	55.7	23.8	38.6	108.0	40.3	185.4	57.3	232.7	3.2	90.0	38.8	72.1	33.3	17.6	32.4	20.9	13.9	18.4	2.1	1.3	1,438.9
West Box Elder County	13.0	25.6	6.3	16.5	32.1	64.7	24.9	10.6	17.3	48.3	18.1	83.0	25.6	104.2	1.4	40.3	17.4	32.3	14.9	7.9	14.5	9.3	6.2	8.3	0.9	0.6	644.1
Pleasant View	1.760	3.5	0.9	2.2	4.4	8.8	3.4	1.4	2.3	6.6	2.4	11.3	3.5	14.1	39.76	1,134.76	488.54	908.54	9.9	5.2	402.8	259.7	109.9	145.6	18.2	0.0	3,589.2
Ogden	13.2	25.9	6.4	16.7	32.6	65.6	25.3	10.8	17.5	49.0	18.3	84.2	26.0	105.6	297.45	8,489.13	3,654.78	6,796.75	73.8	39.0	3,013.0	1,942.6	822.0	1,089.3	136.2	0.0	26,851.1
North Weber County	10.2	20.1	5.0	13.0	25.3	50.9	19.6	8.4	13.6	38.0	14.2	65.2	20.2	81.9	230.59	6,581.03	2,833.29	5,269.04	57.2	30.2	2,335.8	1,506.0	637.2	844.5	105.6	0.0	20,815.8
South Weber County	19.1	37.7	9.3	24.3	47.3	95.3	36.7	15.7	25.4	71.2	26.6	122.3	37.8	153.4	432.11	12,332.22	5,309.32	9,873.68	107.1	56.6	4,377.0	2,822.1	1,194.1	1,582.5	197.9	0.0	39,006.8
Logan	29.7	58.6	14.4	37.8	73.6	148.2	57.1	24.4	39.5	110.7	41.4	190.1	58.7	238.6	4.4	126.0	54.2	100.9	12,093.6	6,393.3	95.7	61.7	93.8	124.3	44.3	102.7	20,417.8
Cache County	33.4	65.8	16.2	42.4	82.6	166.3	64.1	27.3	44.4	124.3	46.4	213.4	65.9	267.8	5.0	141.4	60.9	113.2	13,572.8	7,175.3	107.4	69.2	105.3	139.5	49.7	115.3	22,915.2
North Davis County	5.2	10.2	2.5	6.6	12.8	25.7	9.9	4.2	6.9	19.2	7.2	33.0	10.2	41.4	143.2	4,087.7	1,759.8	3,272.8	81.1	42.9	23,173.8	14,941.3	9,065.4	12,014.1	500.0	0.0	69,277.0
South Davis County	3.1	6.2	1.5	4.0	7.7	15.6	6.0	2.6	4.2	11.6	4.4	20.0	6.2	25.1	86.8	2,476.6	1,066.2	1,982.9	49.1	26.0	14,040.4	9,052.5	5,492.5	7,279.0	303.0	0.0	41,973.0
Salt Lake City	0.4	0.8	0.2	0.5	1.0	2.0	0.8	0.3	0.5	1.5	0.6	2.5	0.8	3.2	6.0	172.4	74.2	138.0	27.5	14.5	954.0	615.1	33,159.1	43,945.2	1,513.8	0.0	80,635.0
Salt Lake County	1.7	3.4	0.8	2.2	4.3	8.6	3.3	1.4	2.3	6.4	2.4	11.0	3.4	13.8	26.2	747.2	321.7	598.2	119.1	62.9	4,134.9	2,666.0	143,715.4	190,463.3	6,561.2	0.0	349,481.0
Utah County	0.4	0.7	0.2	0.5	0.9	1.8	0.7	0.3	0.5	1.4	0.5	2.4	0.7	3.0	4.9	139.9	60.2	112.0	7.9	4.1	511.9	330.1	7,809.4	10,349.6	140,834.0	0.0	160,178.0
Southern Idaho	13.3	26.1	6.4	16.9	32.8	66.1	25.5	10.9	17.6	49.4	18.5	84.8	26.2	106.5	0.6	17.7	7.6	14.1	1,132.4	598.6	29.2	18.8	15.5	20.5	15.0	3,993.0	6,364.0
Total Attractions	490.8	967.0	238.1	623.4	1,214.4	2,445.6	942.9	402.0	652.6	1,827.4	682.9	3,137.9	969.0	3,937.8	1,316.1	37,561.9	16,171.3	30,073.6	27,744.0	14,667.0	53,577.2	34,543.8	202,391.8	268,226.2	150,305.0	4,227.0	

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Transportation Planning

Appendix C: Transit Operations Analyses

The Brigham City Transit Corridor Study is evaluating transit options between Brigham City and Ogden. Currently, two bus routes operate in the relatively long 28-mile corridor. The Route 630 is a local route that operates between Brigham City and the Ogden Transit Center via US 89. Service is provided at 60-minute service frequencies throughout the day. The Flying J Express (Route 685) provides one morning trip from Brigham City to the Flying J corporate headquarters in Ogden. By 2008, the FrontRunner will provide commuter rail service from Salt Lake City to Pleasant View.

Several transit alternatives were developed in sufficient detail in order to determine their feasibility. Two of these alternatives focus on enhancing bus transit to serve the Brigham City to Ogden corridor. Transit operations plans, ridership forecasts, and both capital and operating costs were prepared for these alternatives. This memorandum discusses the approach used to generate the ridership forecasts and cost estimates, summarizes the definition of each of the bus alternatives, and provides ridership forecasts and cost estimates for each of the bus alternatives.

Operating Plan Methodology

A detailed operating plan was created for each of the bus alternatives. This information was used to make reasonable estimates on fleet requirements as well as the operating and maintenance (O&M) costs associated with the alternative. The important inputs in the operating plan are the following: one-way run time, one-way distance, service frequencies, and span of service assumptions. These inputs allow the estimation of peak and total fleet sizes, as well as the calculation of the annual vehicle miles and annual vehicle hours. Development of each of the four inputs is described below:

One-way run times

While the one-way travel times were available for the existing Routes 630 and 685, some assumptions were made regarding travel on US 89 for the future. Currently, the segment of US 89 between Perry and Pleasant View is not signalized. By 2030, it was assumed that due to increased congestion on US 89 along with the addition of 17 signals, travel times between Brigham City and Ogden would increase by 20 percent. Therefore, any buses operating on US 89 would also experience greater travel times in the same range.

In estimating bus travel times on I-15, travel time worksheets were prepared using the higher speed limits on the freeway, acceleration and deceleration characteristics of the transit vehicles, and various dwell time assumptions associated with the bus technology.

One-way distance

Distances for each of the routes were estimated from Google Earth aerial maps.

Service frequencies

Headways for the peak, base, and evening/late periods are specified for each transit route defined in each of the project alternatives.

Span of service

Span of service refers to how many hours per day service is provided on weekdays, Saturdays, and Sundays/holidays. The operating worksheets allow specification of whether a route operates only on weekdays, 6 days a week, or 7 days a week.

For this analysis, 19 hours of service was assumed during the weekday. This was further divided into three separate periods—peak, base, and early/late. The peak period includes both the AM and PM periods from 6:30 – 8:30 and 16:00 – 18:30. The base period was assumed to be from 8:30 – 16:00 and 18:30 – 21:00. Finally, the early/late period was assumed to be from 6:00 – 6:30 and 21:00 – 1:00. Weekend service was also assumed for the local bus operating on US-89.

While the span of service assumptions are different than UTA's current operations, they do represent a prototypical example of service levels that are provided with more premium services like BRT. In addition, this assumption was used consistently across all bus alternatives including the No-build. Hence, increases in operating costs can be directly traced to either changes to service frequencies or whether service is provided on weekends.

Ridership Forecasting Methodology

Ridership forecasts were prepared using year 2000 census data, demand elasticities, and planning judgment. First, a base year trip table was created from year 2000 Census journey-to-work information. This trip table was organized into 26 sub-areas that were identified at the beginning of the study. For 2030, the base year trip table was fratared using the 2030 demographic forecasts as the row and column marginals. From the 2030 trip table, a transit trip table was created using the reported mode shares from each sub-area. Since the Census journey-to-work data only captures the home-to-workplace part of the trip, the trips were factored by 1.8 to account for the workplace-to-home end. Finally, to capture the non-work trips that would likely be made on any transit service, the transit work trip estimate was divided by 74 percent to arrive at a typical weekday estimate. Seventy-four (74) percent represents the percentage of home-based work (HBW) trips out of the total that are made on transit in the corridor. The source of the HBW transit trip percentage was from UTA on-board survey data as well as planner experience in the area.

The first step in developing ridership forecasts for the alternatives was determining which trip interchanges would most likely use the proposed transit investment. A work trip from Southern Idaho to Salt Lake City, for example, would be unlikely to use a bus that runs from Brigham City to Ogden. Once the most reasonable sub-area interchanges were included in the trip matrix, the total transit work trips were summed and then converted into a weekday total. Time-of-day factors were applied to the forecast in order to get peak period and off-peak ridership. Based on observed ridership data for the Routes 630 and 685, 61.7 percent of the total ridership occurred in either the AM or PM peak periods with the balance occurring in the off-peak period.

Commuter rail ridership forecasts were developed using the same methodology as the bus alternatives with a few exceptions. There were several assumptions that were unique to the commuter rail mode. First, due to the limited number of stations assumed for the commuter rail options, shorter trips were not counted in the work trip summary.

For example, a Brigham City to Brigham City work trip would not ride the commuter rail since only one station was assumed in Brigham City. Similarly, a Brigham City to Perry work trip would also not use the rail line since the next station is assumed at Willard in one of the alternatives.

Research has shown that commuter rail as a transit mode becomes very attractive when trip distances are very long. For this reason, work trips from the sub-areas north of Brigham City were included in the summary. They are Tremonton, Corrine, Honeyville, Mantua, Cache County, Logan, West Box Elder, North Box Elder, and South Elder. In addition, reverse work trips originating in the Salt Lake City metropolitan area and destined to Logan were included in the transit trip table. Cache Valley Transit has suggested that they would provide bus service from Logan to Brigham City with the extension of commuter rail to Brigham City. Finally, higher transit mode shares were used for some of the longer trip interchanges. These were the shares reported for trips taking longer than 30 minutes. Generally, these values were in the range of 1 percent to 9 percent.

Demand elasticities are often used to show how ridership changes with regard to changes in key variables such as service frequencies or travel time. For this analysis, commonly accepted demand elasticities were applied to the alternatives and the incremental increase in demand was added to the base ridership forecast.

Cost Methodology

Annual O&M costs were estimated by simply taking the change in annual revenue bus hours and applying an hourly service cost to the difference. Operating plans created for an existing condition as well as the Best Bus and BRT alternatives provided the data needed to determine the change in annual revenue hours that would result from the bus alternatives.

An hourly service cost was estimated for several service types. For local service, UTA data for the Route 630 was used. UTA reported in September 2006 that the total annual weekday operating hours on the Route 630 was 7,569 while the total annual service costs for weekday service was $443,231. The average service cost per vehicle revenue hour was calculated as $55.85. For express service, UTA data for the Route 685 was used. UTA reported in September 2006 that the total annual weekday operating hours on the Route 685 was 813 while the total annual service costs for weekday service was $56,939. The average service cost per vehicle revenue hour was calculated as $70.00. Finally, for

BRT service, the average service cost for express service was inflated by 20 percent. The average service cost per BRT vehicle revenue hour was calculated as $84.00. In addition, $25,000 per station was added to the total O&M cost. This cost assumes the contracting of service to provide daily maintenance at the stations such as trash pickup.

Capital costs were estimated using typical unit costs from similar type projects across the country. Fleet vehicle requirements were based on assumptions in the operating plan including span of service, service frequencies, and cycle time. Once peak vehicle requirements were calculated, a 20 percent spare ratio was assumed for the total fleet.

The *Transit Facility Capital Cost Methodology & Unit Cost Guidelines, October 2001* (Manuel Padron & Associates) was used to estimate capital costs for the BRT alternative.

Bus Travel Time Worksheets

BRIGHAM CITY TRANSIT CORRIDOR STUDY
BRT TRAVEL TIME ESTIMATES: ALL STOP
Best Bus Alternative via SH 89

Brigham City to WSU

Station	Max Spd . (mph)	Distance (miles) Miles	Total	Run Time (hr:min:sec)	Delay Time (hr:min:sec)	Dwell Time (hr:min:sec)	Total Time (hr:min:sec)
Brigham City (600 N / Main)			**0.00**			**0:00:00**	**0:00:00**
	30	0.86		0:01:59	0:00:00		
Brigham City (Forest / Main)			**0.86**			**0:00:40**	**0:02:39**
	35	0.83		0:01:46	0:00:20		
Brigham City (600 S / Main)			**1.69**			**0:00:40**	**0:05:25**
	45	0.82		0:01:33	0:00:20		
Brigham City (W 1100 S)			**2.51**			**0:00:40**	**0:07:58**
	55	1.63		0:02:25	0:01:00		
Perry (US Hwy 89 / 2400 S)			**4.14**			**0:00:40**	**0:12:03**
	55	1.61		0:02:24	0:01:00		
S. Perry (US Hwy 89 / W 3600 S)			**5.75**			**0:00:40**	**0:16:07**
	55	2.47		0:03:20	0:01:00		
Willard (just north of W 100 S)			**8.22**			**0:00:40**	**0:21:07**
	55	3.98		0:04:59	0:01:00		
S. Willard (at W 8700)			**12.20**			**0:00:40**	**0:27:46**
	55	3.74		0:04:43	0:01:00		
Pleasant View			**15.94**			**0:00:40**	**0:34:09**
	45	6.41		0:09:00	0:01:00		
Ogden Transit Center			**22.35**			**0:00:40**	**0:44:49**
	35	4.42		0:07:56	0:01:00		
WSU			**26.77**			**0:00:40**	**0:54:25**
TOTALS			**26.77**	**0:40:05**	**0:07:40**	**0:06:40**	**0:54:25**
						Avg Speed =	**29.52**

BRIGHAM CITY TRANSIT CORRIDOR STUDY
BRT TRAVEL TIME ESTIMATES:
Best Bus Alternative via I-15

Brigham City to WSU

Station	Max Spd . (mph)	Distance (miles) Miles	Total	Run Time (hr:min:sec)	Delay Time (hr:min:sec)	Dwell Time (hr:min:sec)	Total Time (hr:min:sec)
Brigham City (600 N / Main)			**0.00**			**0:00:00**	**0:00:00**
	30	0.86		0:01:59	0:00:00		
Brigham City (Forest / Main)			**0.86**			**0:00:45**	**0:02:44**
	50	2.46		0:03:32	0:00:00		
Brigham City (I-15 / Forest)			**3.32**			**0:00:45**	**0:07:01**
	35	0.36		0:00:51	0:00:00		
On ramp			**3.68**			0:00:00	0:07:52
	70	1.04		0:01:11	0:00:00		
Off ramp			**4.72**			0:00:00	0:09:03
	35	0.40		0:00:48	0:00:00		
I-15 @ W 1100 S			**5.12**			**0:00:45**	**0:10:36**
	35	0.27		0:00:42	0:00:00		
On ramp			**5.39**			0:00:00	0:11:18
	70	3.89		0:03:38	0:00:00		
Off ramp			**9.28**			0:00:00	0:14:56
	35	0.29		0:00:37	0:00:00		
I-15 @ W 750 N			**9.57**			**0:00:45**	**0:16:18**
	35	0.24		0:00:39	0:00:00		
On ramp			**9.81**			0:00:00	0:16:57
	70	5.24		0:04:47	0:00:00		
Off ramp			**15.05**			0:00:00	0:21:44
	35	0.36		0:00:44	0:00:00		
I-15 @ 126			**15.41**			**0:00:45**	**0:23:13**
	35	0.28		0:00:43	0:00:00		
On ramp			**15.69**			0:00:00	0:23:56
	70	2.20		0:02:11	0:00:00		
Off ramp			**17.89**			0:00:00	0:26:07
	35	0.30		0:00:38	0:00:00		
I-15 @ W 2700 N			**18.19**			**0:00:45**	**0:27:30**
	45	0.87		0:01:37	0:00:00		
Pleasant View			**19.06**			**0:00:45**	**0:29:52**
	45	6.41		0:09:00	0:00:40		
Ogden Transit Center			**25.47**			**0:00:45**	**0:40:17**
	35	4.42		0:07:56	0:00:40		
WSU			**29.89**			**0:00:45**	**0:49:38**
TOTALS			**29.89**	**0:41:33**	**0:01:20**	**0:06:45**	**0:49:38**
						Avg Speed =	**36.13**

BRIGHAM CITY TRANSIT CORRIDOR STUDY
BRT TRAVEL TIME ESTIMATES: ALL STOP
BRT Build Alternative - BRT via SH 89

Brigham City to WSU

Station	Max Spd . (mph)	Distance (miles) Miles	Total	Run Time (hr:min:sec)	Delay Time (hr:min:sec)	Dwell Time (hr:min:sec)	Total Time (hr:min:sec)
Brigham City (600 N / Main)			**0.00**			**0:00:00**	**0:00:00**
	30	0.86		0:01:59	0:00:00		
Brigham City (Forest / Main)			**0.86**			**0:00:20**	**0:02:19**
	35	0.83		0:01:46	0:00:40		
Brigham City (600 S / Main)			**1.69**			**0:00:20**	**0:05:05**
	45	0.82		0:01:33	0:00:40		
Brigham City (W 1100 S)			**2.51**			**0:00:20**	**0:07:38**
	55	1.63		0:02:25	0:00:40		
Perry (US Hwy 89 / 2400 S)			**4.14**			**0:00:20**	**0:11:03**
	55	1.61		0:02:24	0:00:20		
S. Perry (US Hwy 89 / W 3600 S)			**5.75**			**0:00:20**	**0:14:07**
	55	2.47		0:03:20	0:00:20		
Willard (just north of W 100 S)			**8.22**			**0:00:20**	**0:18:07**
	55	3.98		0:04:59	0:00:20		
S. Willard (at W 8700)			**12.20**			**0:00:20**	**0:23:46**
	55	3.74		0:04:43	0:00:20		
Pleasant View			**15.94**			**0:00:20**	**0:29:09**
	45	6.41		0:09:00	0:01:00		
Ogden Transit Center			**22.35**			**0:00:20**	**0:39:29**
	35	4.42		0:07:56	0:01:00		
WSU			**26.77**			**0:00:20**	**0:48:45**
TOTALS			**26.77**	**0:40:05**	**0:05:20**	**0:03:20**	**0:48:45**
						Avg Speed =	**32.95**

InterPlan Co.
Transportation Planning

BRIGHAM CITY TRANSIT CORRIDOR STUDY
BRT TRAVEL TIME ESTIMATES:
BRT Build Alternative - BRT via I-15

Brigham City to WSU

Station	Max Spd . (mph)	Distance (miles) Miles	Total	Run Time (hr:min:sec)	Delay Time (hr:min:sec)	Dwell Time (hr:min:sec)	Total Time (hr:min:sec)
Brigham City (600 N / Main)			**0.00**			**0:00:00**	**0:00:00**
	30	0.86		0:01:59	0:00:00		
Brigham City (Forest / Main)			**0.86**			**0:00:20**	**0:02:19**
	50	2.46		0:03:32	0:00:00		
Brigham City (I-15 / Forest)			**3.32**			**0:00:20**	**0:06:11**
	35	0.36		0:00:51	0:00:00		
On ramp			**3.68**			0:00:00	0:07:02
	70	1.04		0:01:11	0:00:00		
Off ramp			**4.72**			0:00:00	0:08:13
	35	0.40		0:00:48	0:00:00		
I-15 @ W 1100 S			**5.12**			**0:00:20**	**0:09:21**
	35	0.27		0:00:42	0:00:00		
On ramp			**5.39**			0:00:00	0:10:03
	70	3.89		0:03:38	0:00:00		
Off ramp			**9.28**			0:00:00	0:13:41
	35	0.29		0:00:37	0:00:00		
I-15 @ W 750 N			**9.57**			**0:00:20**	**0:14:38**
	35	0.24		0:00:39	0:00:00		
On ramp			**9.81**			0:00:00	0:15:17
	70	5.24		0:04:47	0:00:00		
Off ramp			**15.05**			0:00:00	0:20:04
	35	0.36		0:00:44	0:00:00		
I-15 @ 126			**15.41**			**0:00:20**	**0:21:08**
	35	0.28		0:00:43	0:00:00		
On ramp			**15.69**			0:00:00	0:21:51
	70	2.20		0:02:11	0:00:00		
Off ramp			**17.89**			0:00:00	0:24:02
	35	0.30		0:00:38	0:00:00		
I-15 @ W 2700 N			**18.19**			**0:00:20**	**0:25:00**
	45	0.87		0:01:37	0:00:00		
Pleasant View			**19.06**			**0:00:20**	**0:26:57**
	45	6.41		0:09:00	0:00:40		
Ogden Transit Center			**25.47**			**0:00:20**	**0:36:57**
	35	4.42		0:07:56	0:00:40		
WSU			**29.89**			**0:00:20**	**0:45:53**
TOTALS			**29.89**	**0:41:33**	**0:01:20**	**0:03:00**	**0:45:53**
						Avg Speed =	**39.09**

Operating Statistics Worksheets

Brigham City Corridor Study
Modal Operating Plan Assumptions

OPERATING ASSUMPTIONS:	Hours	Time Periods
WKDYPKHR	4.5	06:30 - 08:30, 15:30-18:00
WKDYBASEHR	10	08:30 - 15:30, 18:00 - 21:00
WKDYELHR	4.5	06:00-06:30, 21:00 - 01:00
Weekday Total Hours	19	
SATBASEHR	12	09:00-21:00
SATELHR	7	06:00-09:00, 21:00-01:00
Saturdat Total Hours	19	
SUNBASEHR	12	09:00-21:00
SUNELHR	7	06:00-09:00, 21:00-01:00
Sunday Total Hours	19	
ANNUAL WEEKDAYS	255	
ANNUAL SATURDAYS	52	
ANNUAL SUNDAYS, HOL.	58	
Annual Days of Service	365	
ANNUALPEAK	1,148	
ANNUALBASE	3,870	
ANNUALEL	1,918	
Annual Service Hours	6,935	

BRIGHAM CITY - UTA (Brigham City to Ogden)
BEST BUS OPERATING PLAN

BEST BUS ALTERNATIVE VIA US 89

			Run Time	Distance		Headway			Vehicles		Annual		Vehicles			One-way daily trips			
From	**To**	**RT.**	**(minutes)**	**(miles)**	**Day**	Peak	Base	E/L	Peak	Total	Veh-Miles	Veh-Hrs	Peak	Base	E/L	Peak	Base	E/L	Total
Brigham City	Ogden (Local)	1	57.60	25.9	M-F	60	60	60	3	4	251,000	14,500	3	3	3	9	20	9	38
					Sat	n/a	60	60			51,200	3,000	0	3	3	0	24	14	38
	avg spd		*26.98*		Sun	n/a	60	60			57,100	3,300	0	3	3	0	24	14	38
Brigham City	Ogden (Express)	2	58.80	28.93	M-F	30	0	0	3	4	59,000	1,500	3	0	0	8	0	0	8
(One Way)					Sat	n/a	n/a	n/a					0	n/a	n/a	0	0	0	0
	avg spd		*29.52*		Sun	n/a	n/a	n/a					0	n/a	n/a	0	0	0	0
ESTIMATED ANNUAL TOTALS:									**6**	**8**	**418,300**	**22,300**	**6**	**3**	**3**				

NOTES:
(1) Operating hours assume 19 hours of service Monday thru Sunday.
(2) Distances, run time estimates obtained from CTG travel time worksheets.
(3) Calculated total fleet = peak vehicle requirement * 1.2 (20% spare ratio).
(4) Local service assumes a 20% slower travel time compared to current run times.

BRIGHAM CITY - UTA (Brigham City to Ogden)
BEST BUS OPERATING PLAN

BEST BUS ALTERNATIVE VIA I-15

			Run Time	Distance		Headway			Vehicles		Annual		Vehicles			One-way daily trips			
From	**To**	**RT.**	**(minutes)**	**(miles)**	**Day**	Peak	Base	E/L	Peak	Total	Veh-Miles	Veh-Hrs	Peak	Base	E/L	Peak	Base	E/L	Total
Brigham City	Ogden (Local)	1	57.60	25.9	M-F	60	60	60	3	4	251,000	14,500	3	3	3	9	20	9	38
					Sat	n/a	60	60			51,200	3,000	0	3	3	0	24	14	38
	avg spd		*26.98*		Sun	n/a	60	60			57,100	3,300	0	3	3	0	24	14	38
Brigham City	Ogden (Express)	2	49.38	28.89	M-F	30	0	0	2	3	58,900	1,000	2	0	0	8	0	0	8
(One Way)					Sat	n/a	n/a	n/a					0	n/a	n/a	0	0	0	0
	avg spd		*35.10*		Sun	n/a	n/a	n/a					0	n/a	n/a	0	0	0	0
ESTIMATED ANNUAL TOTALS:									**5**	**7**	**418,200**	**21,800**	**5**	**3**	**3**				

NOTES:
(1) Operating hours assume 19 hours of service Monday thru Sunday.
(2) Distances, run time estimates obtained from CTG travel time worksheets.
(3) Calculated total fleet = peak vehicle requirement * 1.2 (20% spare ratio).
(4) Local service assumes a 20% slower travel time compared to current run times.

BRIGHAM CITY - UTA (Brigham City to Ogden)
BUS RAPID TRANSIT OPERATING PLAN

BRT ALTERNATIVE VIA US 89

		BRT	Run Time	Distance		Headway			Vehicles		Annual		Vehicles			One-way daily trips			
From	To	RT.	(minutes)	(miles)	Day	Peak	Base	E/L	Peak	Total	Veh-Miles	Veh-Hrs	Peak	Base	E/L	Peak	Base	E/L	Total
Brigham City	Ogden (Local)	1	57.60	25.9	M-F	60	60	60	3	4	251,000	14,500	3	3	3	9	20	9	38
					Sat	n/a	60	60			51,200	3,000	0	3	3	0	24	14	38
	avg spd		*26.98*		Sun	n/a	60	60			57,100	3,300	0	3	3	0	24	14	38
Brigham City	Ogden (BRT)	2	47.25	26.77	M-F	60	60	0	2	3	61,400	7,400	2	2	0	9	20	0	29
(Two Way)					Sat	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
	avg spd		*33.99*		Sun	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
Brigham City	Ogden (BRT)	2	47.25	26.77	M-F	60	0	0	2	3	41,000	1,500	2	0	0	6	0	0	6
(One Way)					Sat	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
					Sun	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
ESTIMATED ANNUAL TOTALS:									**7**	**10**	**461,700**	**29,700**	**7**	**5**	**3**				

NOTES:
(1) Operating hours assume 19 hours of service Monday thru Sunday.
(2) Distances, run time estimates obtained from CTG travel time worksheets.
(3) Calculated total fleet = peak vehicle requirement * 1.2 (20% spare ratio).
(4) Run time for the local service assumes future year traffic will degrade the existing travel time by 20 percent.

BRIGHAM CITY - UTA (Brigham City to Ogden)
BUS RAPID TRANSIT OPERATING PLAN

BRT ALTERNATIVE VIA I-15

From	To	BRT RT.	Run Time (minutes)	Distance (miles)	Day	Headway Peak	Headway Base	Headway E/L	Vehicles Peak	Vehicles Total	Annual Veh-Miles	Annual Veh-Hrs	Vehicles Peak	Vehicles Base	Vehicles E/L	One-way daily trips Peak	One-way daily trips Base	One-way daily trips E/L	One-way daily trips Total
Brigham City	Ogden (Local)	1	57.60	25.9	M-F	60	60	60	3	4	251,000	14,500	3	3	3	9	20	9	38
					Sat	n/a	60	60			51,200	3,000	0	3	3	0	24	14	38
	avg spd		*26.98*		Sun	n/a	60	60			57,100	3,300	0	3	3	0	24	14	38
Brigham City	Ogden (BRT)	2	45.53	29.89	M-F	60	60	0	2	3	68,600	7,400	2	2	0	9	20	0	29
(Two Way)					Sat	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
	avg spd		*39.39*		Sun	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
Brigham City	Ogden (BRT)	2	45.53	29.89	M-F	60	0	0	2	3	45,700	1,500	2	0	0	6	0	0	6
(One Way)					Sat	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
					Sun	n/a	n/a	n/a					n/a	n/a	n/a	0	0	0	0
ESTIMATED ANNUAL TOTALS:									**7**	**10**	**473,600**	**29,700**	**7**	**5**	**3**				

NOTES:
(1) Operating hours assume 19 hours of service Monday thru Sunday.
(2) Distances, run time estimates obtained from CTG travel time worksheets.
(3) Calculated total fleet = peak vehicle requirement * 1.2 (20% spare ratio).

Detailed BRT Capital Costs

BUS RAPID TRANSIT UNIT CAPITAL COSTS
Brigham City (US 89 Alignment)
Revised 2/27/2007

Item	Units	Unit Cost	Units	Total Cost
1. Station / Stops	Each	$83,500	11	$918,500
Park and Ride at Main @ 600 S (Brigham City)	Square foot	$3.50	21,780	$76,230
Park and Ride at US 89 @ 2400 S (Perry)	Square foot	$3.50	21,780	$76,230
Park and Ride at US 89 @ just north of W 100 S (Willard)	Square foot	$3.50	21,780	$76,230
Contingency (20%-25%age)				$286,800
Total Stations				**$1,433,990**
2. Queue Jumpers	Intersection	$835,300	3	$2,505,900
Contingency (20%-25%age)				$626,500
Total Queue Jumpers				**$3,132,400**
3. Systems				
Signal priority/ITS	Intersection	$41,200	25	$1,030,000
Communications	Station	$139,200	11	$1,531,200
Contingency (20%-25%age)				$640,300
Total Systems				**$3,201,500**
4. Vehicles				
BRT	Each	$500,000	6	$3,000,000
Contingency (5-10%age)				$300,000
Total Vehicles				**$3,300,000**
5. Off-Vehicle Fare Collection				
Ticket vending machines (TVM)	Each	$40,000	11	$440,000
TVM software and suppoort	Each	$15,000	11	$165,000
Contingency (20%-25%age)				$151,300
Total Off-Vehicle Fare Collection				**$756,300**
6. Soft Costs				
Project Reserve	% 1-3, 5	3.0%	n/a	$255,700
Pre-Construction Soft Costs				
EIS/PE/Final Design	% 1-3, 5	7.0%	n/a	$596,700
Third Party Reviews	% 1-3, 5	1.0%	n/a	$85,200
Agency Mgmt. of Above	% 1-5	3.0%	n/a	$354,700
During Construction				
Construction Management/Engineering	% 1-3, 5	5.0%	n/a	$426,200
Insurance/Legal	% 1-3, 5	2.0%	n/a	$170,500
Third Party Reviews	% 1-3, 5	3.0%	n/a	$255,700
Agency Mgmt. of Above	% 1-5	6.0%	n/a	$709,500
Total Soft Costs				**$2,854,200**
TOTAL PROJECT COST				**$14,678,390**

(1) All costs in 2006 dollars

(2) Original unit costs were in 2002 dollars. Inflation factor of 1.114 was used.
West Urban CPI (2002) = 184.7
West Urban CPI (2006) = 205.7 1.114

(3) Unit costs and soft costs from the *Transit Facility Capital Cost Methodology & Unit Cost Guidelines, October 2001, Manuel Padron & Associates*

BUS RAPID TRANSIT UNIT CAPITAL COSTS
Brigham City (I-15 Alignment)
Revised 2/27/2007

Item	Unit	Unit Cost	Units	Total Cost
1. Station / Stops	Each	$83,500	10	$835,000
Park and Ride at I-15 @ Forest	Square foot	$3.50	21,780	$76,230
Park and Ride at I-15 @ W 1100 S	Square foot	$3.50	21,780	$76,230
Park and Ride at I-15 @ W 750 N	Square foot	$3.50	21,780	$76,230
Park and Ride at I-15 @ 126	Square foot	$3.50	21,780	$76,230
Contingency (20%-25%age)				$285,000
Total Stations				**$1,424,900**
2. Queue Jumpers	Intersection	$835,300	3	$2,505,900
Contingency (20%-25%age)				$626,500
Total Queue Jumpers				**$3,132,400**
3. Systems				
Signal priority/ITS	Intersection	$41,200	14	$576,800
Communications	Station	$139,200	10	$1,392,000
Contingency (20%-25%age)				$492,200
Total Systems				**$2,461,000**
4. Vehicles				
BRT	Each	$500,000	6	$3,000,000
Contingency (5-10%age)				$300,000
Total Vehicles				**$3,300,000**
5. Off-Vehicle Fare Collection				
Ticket vending machines (TVM)	Each	$40,000	10	$400,000
TVM software and suppoort	Each	$15,000	10	$150,000
Contingency (20%-25%age)				$137,500
Total Off-Vehicle Fare Collection				**$687,500**
6. Soft Costs				
Project Reserve	% 1-3, 5	3.0%	n/a	$231,200
Pre-Construction Soft Costs				
EIS/PE/Final Design	% 1-3, 5	7.0%	n/a	$539,400
Third Party Reviews	% 1-3, 5	1.0%	n/a	$77,100
Agency Mgmt. of Above	% 1-5	3.0%	n/a	$330,200
During Construction				
Construction Management/Engineering	% 1-3, 5	5.0%	n/a	$385,300
Insurance/Legal	% 1-3, 5	2.0%	n/a	$154,100
Third Party Reviews	% 1-3, 5	3.0%	n/a	$231,200
Agency Mgmt. of Above	% 1-5	6.0%	n/a	$660,300
Total Soft Costs				**$2,608,800**
TOTAL PROJECT COST				**$13,614,600**

(1) All costs in 2006 dollars

(2) Original unit costs were in 2002 dollars. Inflated to 2006 dollars using 1.11
West Urban CPI (2002) = 184.7
West Urban CPI (2006) = 205.7 1.114

(3) Unit costs and soft costs from the *Transit Facility Capital Cost Methodology & Unit Cost Guidelines, October 2001, Manuel Padron & Associates*

Appendix D: Transit Ridership Worksheets

Bus Ridership

	ALTERNATIVE			**Existing network (future condition)**		**Best Bus (US 89)**		**Best Bus (I-15)**		**BRT (US 89)**		**BRT (I-15)**
1	Ridership by TOD (observed)											
	Peak (61.7%)	**0.617**		337		337		337		337		337
	Off-peak (38.3%)	**0.383**		209		209		209		209		209
		% change	**Value**									
2	**Travel Time Elasticity**	***per 1% change in travel time***					**TT**		**TT**		**TT**	
	Old travel time	**100**					58.8		58.8		58.8	
	New travel time	**90**					49.35		48.45		45.53	
	% change	**-0.1**					-0.16		-0.18		-0.23	
							0.06	19	0.06	21	0.08	27
	High value (-0.35)	**-0.35**								13		17
	Source: "*Patronage Impacts of Changes in Transit Fares and Services*" by Ecosometrics, Inc. 1980.							19		34		43
3	**Service Elasticity**	***per 1% change in service frequency***			**SE**		**SE**		**SE**			
	Base peak headway	1 trip			120		120		120			
	New peak headway	1 trip			40		40		30			
	Base midday headway	60			60		60		60			
	New midday headway	60			60		60		30			
	% change peak	0.00			-0.67		-0.67		-0.75			
	% change midday	0			0		0		-0.5			
	Peak hours elasticity	-0.37	0	0	0.25	83	0.25	83	0.28	94	0.28	94
	Off-peak elasticity	-0.46		0		0		0	0.23	48	0.23	48
						83		83		142		142
	Source: Mayworm, Lago, McEnroe (1980)											
4	**Other Variables (amenities, image, and branding)**											
	Low value (10 %)	0.10		0		0		0		55		55
	Source: Information from various BRT lines (Silver Line, Boston; MetroRapid, LA; B-Line, Vancouver)											
5	**Grand Total**			550		630		650		780		790

InterPlan Co.
Transportation Planning

Rail Ridership

1	Ridership by TOD					
	Peak (61.7%)	0.617	406			374
	Off-peak (38.3%)	0.383	252			232
		% change	Value			
2	**Travel Time Elasticity**	***per 1% change in travel time***				
	Old travel time	100			21	
	New travel time	90			19.25	
	% change	-0.1			-0.08	
	Value (-0.35)	-0.35			0.03	11 7
	Source: "Patronage Impacts of Changes in Transit Fares and Services" by Ecosometrics, Inc. 1980.					
3	**Service Elasticity**	***per 1% change in service frequency***				
	Base peak headway	120				
	New peak headway	60				
	Base midday headway	60				
	New midday headway	60				
	% change peak	-0.50				
	% change midday	0				
	Peak hours	-0.37	0			0
	Off-peak	-0.46				
	Source: Mayworm, Lago, McEnroe (1980)					
4	**Other Variables (amenities, image, and branding**					
	Low value (15 %)	0.15	61 38			56 35
	Peak Total		467			441
	Off-peak Total					
	Grand Total		467			441

Appendix E: Cost Worksheets

BRT (US-89)

BUS RAPID TRANSIT UNIT CAPITAL COSTS
Brigham City (US 89 Alignment)
Revised 2/27/2007

Item	Units	Unit Cost	Units	Total Cost	
1. Station / Stops	Each	$83,500	11	$918,500	
Park and Ride at Main @ 600 S (Brigham City)	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 ca
Park and Ride at US 89 @ 2400 S (Perry)	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 ca
Park and Ride at US 89 @ just north of W 100 S (Willa	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 ca
Contingency (20%-25%age)				$286,800	
Total Stations				**$1,433,990**	
2. Queue Jumpers	Intersection	$835,300	3	$2,505,900	
Contingency (20%-25%age)				$626,500	
Total Queue Jumpers				**$3,132,400**	
3. Systems					
Signal priority/ITS	Intersection	$41,200	25	$1,030,000	
Communications	Station	$139,200	11	$1,531,200	
Contingency (20%-25%age)				$640,300	
Total Systems				**$3,201,500**	
4. Vehicles					
BRT	Each	$500,000	6	$3,000,000	
Contingency (5-10%age)				$300,000	
Total Vehicles				**$3,300,000**	
5. Off-Vehicle Fare Collection					
Ticket vending machines (TVM)	Each	$40,000	11	$440,000	
TVM software and suppoort	Each	$15,000	11	$165,000	
Contingency (20%-25%age)				$151,300	
Total Off-Vehicle Fare Collection				**$756,300**	
6. Soft Costs					
Project Reserve	% 1-3, 5	3.0%	n/a	$255,700	
Pre-Construction Soft Costs					
EIS/PE/Final Design	% 1-3, 5	7.0%	n/a	$596,700	
Third Party Reviews	% 1-3, 5	1.0%	n/a	$85,200	
Agency Mgmt. of Above	% 1-5	3.0%	n/a	$354,700	
During Construction					
Construction Management/Engineering	% 1-3, 5	5.0%	n/a	$426,200	
Insurance/Legal	% 1-3, 5	2.0%	n/a	$170,500	
Third Party Reviews	% 1-3, 5	3.0%	n/a	$255,700	
Agency Mgmt. of Above	% 1-5	6.0%	n/a	$709,500	
Total Soft Costs				**$2,854,200**	
TOTAL PROJECT COST				**$14,678,390**	

(1) All costs in 2006 dollars

(2) Original unit costs were in 2002 dollars. Inflation factor of 1.114 was used.
West Urban CPI (2002) = 184.7
West Urban CPI (2006) = 205.7   1.114

(3) Unit costs and soft costs from the *Transit Facility Capital Cost Methodology & Unit Cost Guidelines, October 2001, Manuel Padron & Associates*

BRT (US-89) Dedicated Lane

DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
Granular Borrow	Ton	$12.00	139075	$1,670,000
Untreated Base Course 3/4 inch or 1 inch Max	Ton	$13.60	69537	$950,000
HMA - 3/4 inch	Ton	$80.00	69537	$5,570,000
Open Graded Surface Course	Ton	$38.00	10543	$410,000
Roadway Excavation (Plan Quantity)	cu yd	$9.29	148265	$1,380,000
SUBTOTAL				$9,980,000
CONSTRUCTION CONTINGENCIES (30%)				$3,000,000
ROW	sq ft		6750	$250,000
CONSTRUCTION MANAGEMENT (8%)				$800,000
ENGINEERING (12%)				$1,200,000
ADMINISTRATION (2%)				$200,000
TOTAL				$15,430,000

BRT (I-15)

Item	Unit	Unit Cost	Units	Total Cost	
1. Station / Stops	Each	$83,500	10	$835,000	
Park and Ride at I-15 @ Forest	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 cars
Park and Ride at I-15 @ W 1100 S	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 cars
Park and Ride at I-15 @ W 750 N	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 cars
Park and Ride at I-15 @ 126	Square foot	$3.50	21,780	$76,230	Assumes 0.5 acre - 50 cars
Contingency (20%-25%age)				$285,000	
Total Stations				**$1,424,900**	
2. Queue Jumpers	Intersection	$835,300	3	$2,505,900	
Contingency (20%-25%age)				$626,500	
Total Queue Jumpers				**$3,132,400**	
3. Systems					
Signal priority/ITS	Intersection	$41,200	14	$576,800	
Communications	Station	$139,200	10	$1,392,000	
Contingency (20%-25%age)				$492,200	
Total Systems				**$2,461,000**	
4. Vehicles					
BRT	Each	$500,000	6	$3,000,000	
Contingency (5-10%age)				$300,000	
Total Vehicles				**$3,300,000**	
5. Off-Vehicle Fare Collection					
Ticket vending machines (TVM)	Each	$40,000	10	$400,000	
TVM software and suppoort	Each	$15,000	10	$150,000	
Contingency (20%-25%age)				$137,500	
Total Off-Vehicle Fare Collection				**$687,500**	
6. Soft Costs					
Project Reserve	% 1-3, 5	3.0%	n/a	$231,200	
Pre-Construction Soft Costs					
EIS/PE/Final Design	% 1-3, 5	7.0%	n/a	$539,400	
Third Party Reviews	% 1-3, 5	1.0%	n/a	$77,100	
Agency Mgmt. of Above	% 1-5	3.0%	n/a	$330,200	
During Construction					
Construction Management/Engineering	% 1-3, 5	5.0%	n/a	$385,300	
Insurance/Legal	% 1-3, 5	2.0%	n/a	$154,100	
Third Party Reviews	% 1-3, 5	3.0%	n/a	$231,200	
Agency Mgmt. of Above	% 1-5	6.0%	n/a	$660,300	
Total Soft Costs				**$2,608,800**	
TOTAL PROJECT COST				**$13,614,600**	

(1) All costs in 2006 dollars

(2) Original unit costs were in 2002 dollars. Inflated to 2006 dollars using 1.11
West Urban CPI (2002) = 184.7
West Urban CPI (2006) = 205.7 1.114

(3) Unit costs and soft costs from the *Transit Facility Capital Cost Methodology & Unit Cost Guidelines, October 2001, Manuel Padron & Associates*

BRT (I-15) Dedicated Lane

DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
Borrow	Ton	$17.03	92379	$1,580,000
Granular Borrow	Ton	$12.00	258603	$3,110,000
Untreated Base Course 3/4 inch or 1 inch Max	Ton	$13.60	129301	$1,760,000
24 inch Reinforced Concrete Pipe Culvert, Class C	Feet	$40.00	74955	$3,000,000
Dual Inlet Catch Basin	Each	$7,000.00	222	$1,560,000
Portland Cement Concrete Pavement 11 inch Thick	sq yd	$58.55	399078	$23,370,000
Lean Concrete Base Course, 4 inch thick.	sq yd	$24.52	399078	$9,790,000
Cast-in-Place Constant Slope Barrier	Feet	$70.00	66513	$4,660,000
Roadway Excavation (Plan Quantity)	cu yd	$9.29	138840	$1,290,000
SUBTOTAL				$50,120,000
CONSTRUCTION CONTINGENCIES (30%)				$15,040,000.00
ROW (0%)				$0.00
CONSTRUCTION MANAGEMENT (8%)				$4,010,000.00
ENGINEERING (12%)				$6,020,000.00
ADMINISTRATION (2%)				$1,010,000.00
Steel Bridge Widening	sq ft	$225.00	7500	$1,690,000.00
Concrete Bridge Widening	sq ft	$200.00	15150	$3,030,000.00
TOTAL				$80,920,000.00

BRT (I-15) Dedicated Lane Barrier Separated

DESCRIPTION	UNIT	UNIT COST	QUANTITY	AMOUNT
Borrow	Ton	$17.03	92379	$1,580,000
Granular Borrow	Ton	$12.00	258603	$3,110,000
Untreated Base Course 3/4 inch or 1 inch Max	Ton	$13.60	129301	$1,760,000
24 inch Reinforced Concrete Pipe Culvert, Class C	Feet	$40.00	74955	$3,000,000
Dual Inlet Catch Basin	Each	$7,000.00	222	$1,560,000
Portland Cement Concrete Pavement 11 inch Thick	sq yd	$58.55	399078	$23,370,000
Lean Concrete Base Course, 4 inch thick.	sq yd	$24.52	399078	$9,790,000
Cast-in-Place Constant Slope Barrier	Feet	$70.00	199539	$13,970,000
Roadway Excavation (Plan Quantity)	cu yd	$9.29	138840	$1,290,000
SUBTOTAL				$59,430,000
CONSTRUCTION CONTINGENCIES (30%)				$17,830,000.00
ROW (0%)				$0.00
CONSTRUCTION MANAGEMENT (8%)				$4,760,000.00
ENGINEERING (12%)				$7,140,000.00
ADMINISTRATION (2%)				$1,190,000.00
Steel Bridge Widening	sq ft	$225.00	7500	$1,690,000.00
Concrete Bridge Widening	sq ft	$200.00	15150	$3,030,000.00
TOTAL				$95,070,000.00

Commuter Rail (Shared Track) without Willard Station

	Unit Cost	Unit	Shared Track Units	Shared Track Cost	
Station Brigham City	$ 67.00	square feet	2,000	$ 134,000	
Station Willard	$ 67.00	square feet		$ -	
Park & Ride Lot Brigham City	$ 3.50	square feet	87,120	$ 304,920	Assumes 2 acres - 200 cars
Park & Ride Lot Willard	$ 3.50	square feet		$ -	Assumes 1 acre - 100 cars
TVM	$ 55,000	each	1	$ 55,000	
Maintenance Facility	$ 5,000,000	each	0.1	$ 500,000	
Facility Contingency	25%	Facility Cost	$ 993,920	$ 248,480	
Facilities				**$ 1,242,400**	
Embankment	$ 8.00	cubic yard		$ -	
Track	$ 249.00	Linear Foot		$ -	
Culvert Extensions	$ 10,000	Each	1	$ 10,000	
Track + Embankment	$ 289.00	Linear Foot	10,560	$ 3,051,840	
Track + Embankment Contingency	25%	Track + Embankment Estimate	$ 3,061,840	$ 765,460	
Track				**$ 3,827,300**	
Purchase Signal and Gate Equipme	$ 77.51	track feet		$ -	
Install Signal and Gate Equipment	$ 21.11	track feet		$ -	
Purchase and Install Sig/Com Duct	$ 11.48	track feet		$ -	
Grade Crossings - New Devices	*$ 250,000*	*each*	21	$ 5,250,000	Assume all crossings are gated in either case
Grade Crossings - Relocated Devic	*$ 170,000*	*each*	-	$ -	
Quad Gates	$ 500,000	each		$ -	
Grade Crossing Contingency	25%	Grade Crossing Estimate	$ 5,250,000	$ 1,312,500	
Grade Crossings				**$ 6,562,500**	
Distant Signal	*$ 68,000*	*each*		$ -	
CP Universal Number 20 Crossove	*$ 666,000*	*each*		$ -	
CP Number 20 POTO Pleasant Vie	*$ 390,999*	*each*	1	$ 390,999	
CP Number 20 POTO Pleasant Vie	*$ 391,000*	*each*		$ -	Short section of single track under SH 126 eliminating $2,475,200 bridge
CP Number 20 POTO Brigham City	*$ 391,000*	*each*	1	$ 391,000	
CP Number 20 POTO Willard	*$ 391,001*	*each*	-	$ -	Siding at Willard
CP Number 15 POTO	*$ 341,000*	*each*	5	$ 1,705,000	
Two Track Back to Back Signals	*$ 119,000*	*each*		$ -	Assume intermediate signals every two miles
Electric Locks	$ 96,000	each	6	$ 576,000	
Signal Contingency	25%	Signal Costs	$ 16,187,999	$ 4,047,000	
Relocate UP Signals	$ 22,504,100	Each???		$ -	
Relocate UP Signals Contingency	40%	Relocate UP Signals		$ -	
Signals				**$ 7,109,999**	
Utilities	10%	Construction Cost	5,069,700	$ 506,970	
Utility Contingency	35%	Utilities Estimate	506,970	$ 177,440	
Utilities				**$ 684,410**	
General Conditions	$ 2,788,162	each	0.2	$ 557,632	
General Conditions Contingency	25%	General Conditions Contingency	557,632	$ 139,408	
Real Estate	$ 3.00	square feet	174,240	$ 522,720	
Real Estate Contingency	50%	Real Estate Estimate	522,720	$ 261,360	
Project Management	5%	Construction and ROW Cost	$ 19,426,608	$ 971,330	
Engineering	8%	Construction and ROW Cost	$ 19,426,608	$ 1,554,129	
UTA Labor	5%	Construction and ROW Cost	$ 19,426,608	$ 971,330	
Insurance	1%	Construction and ROW Cost	$ 19,426,608	$ 194,266	
Finance Charges	5%	Construction and ROW Cost	$ 19,426,608	$ 971,330	
PM/Engineering/UTA/Ins Continger	25%	PM/Engineering/UTA/Ins	$ 3,691,056	$ 922,764	
Mitigation Contingency	2%	Capital Costs	$ 19,426,608	$ 388,532	
Project Reserve	8%	Capital Costs	$ 19,426,608	$ 1,554,129	
Other Costs				**$ 8,311,891**	
Grand Total				**$ 27,738,499**	

Commuter Rail (Shared Track) with Willard Station

	Unit Cost	Unit	Shared Track Units	Shared Track Cost	
Station Brigham City	$ 67.00	square feet	2,000	$ 134,000	
Station Willard	$ 67.00	square feet	1,000	$ 67,000	
Park & Ride Lot Brigham City	$ 3.50	square feet	87,120	$ 304,920	Assumes 2 acres - 200 cars
Park & Ride Lot Willard	$ 3.50	square feet	43,560	$ 152,460	Assumes 1 acre - 100 cars
TVM	$ 55,000	each	2	$ 110,000	
Maintenance Facility	$ 5,000,000	each	0.1	$ 500,000	
Facility Contingency	25%	Facility Cost	$ 1,268,380	$ 317,095	
Facilities				**$ 1,585,475**	
Embankment	$ 8.00	cubic yard		$ -	
Track	$ 249.00	Linear Foot		$ -	
Culvert Extensions	$ 10,000	Each	1	$ 10,000	
Track + Embankment	$ 289.00	Linear Foot	15,840	$ 4,577,760	Includes 1 mile siding at Willard
Track + Embankment Contingency	25%	Track + Embankment Estim	$ 4,587,760	$ 1,146,940	
Track				**$ 5,734,700**	
Purchase Signal and Gate Equipme	$ 77.51	track feet		$ -	
Install Signal and Gate Equipment	$ 21.11	track feet		$ -	
Purchase and Install Sig/Com Duct	$ 11.48	track feet		$ -	
Grade Crossings - New Devices	*$ 250,000*	*each*	21	$ 5,250,000	Assume all crossings are gated in either case
Grade Crossings - Relocated Devic	*$ 170,000*	*each*	-	$ -	
Quad Gates	$ 500,000	each		$ -	
Grade Crossing Contingency	25%	Grade Crossing Estimate	$ 5,250,000	$ 1,312,500	
Grade Crossings				**$ 6,562,500**	
Distant Signal	*$ 68,000*	*each*		$ -	
CP Universal Number 20 Crossove	*$ 666,000*	*each*		$ -	
CP Number 20 POTO Pleasant Vie	*$ 390,999*	*each*	1	$ 390,999	
CP Number 20 POTO Pleasant Vie	*$ 391,000*	*each*		$ -	Short section of single track under SH 126 eliminating $2,475,200 bridge
CP Number 20 POTO Brigham City	*$ 391,000*	*each*	1	$ 391,000	
CP Number 20 POTO Willard	*$ 391,001*	*each*	2	$ 782,002	Siding at Willard
CP Number 15 POTO	*$ 341,000*	*each*	5	$ 1,705,000	
Two Track Back to Back Signals	*$ 119,000*	*each*		$ -	Assume intermediate signals every two miles
Electric Locks	$ 96,000	each	6	$ 576,000	
Signal Contingency	25%	Signal Costs	$ 16,970,001	$ 4,242,500	
Relocate UP Signals	$ 22,504,100	Each???		$ -	
Relocate UP Signals Contingency	40%	Relocate UP Signals		$ -	
Signals				**$ 8,087,501**	
Utilities	10%	Construction Cost	7,320,175	$ 732,018	
Utility Contingency	35%	Utilities Estimate	732,018	$ 256,206	
Utilities				**$ 988,224**	
General Conditions	$ 2,788,162	each	0.2	$ 557,632	
General Conditions Contingency	25%	General Conditions Conting	557,632	$ 139,408	
Real Estate	$ 3.00	square feet	174,240	$ 522,720	
Real Estate Contingency	50%	Real Estate Estimate	522,720	$ 261,360	
Project Management	5%	Construction and ROW Cos	$ 22,958,400	$ 1,147,920	
Engineering	8%	Construction and ROW Cos	$ 22,958,400	$ 1,836,672	
UTA Labor	5%	Construction and ROW Cos	$ 22,958,400	$ 1,147,920	
Insurance	1%	Construction and ROW Cos	$ 22,958,400	$ 229,584	
Finance Charges	5%	Construction and ROW Cos	$ 22,958,400	$ 1,147,920	
PM/Engineering/UTA/Ins Continger	25%	PM/Engineering/UTA/Ins	$ 4,362,096	$ 1,090,524	
Mitigation Contingency	2%	Capital Costs	$ 22,958,400	$ 459,168	
Project Reserve	8%	Capital Costs	$ 22,958,400	$ 1,836,672	
Other Costs				**$ 9,680,460**	
Grand Total				**$ 32,638,860**	

Commuter Rail (Exclusive Track) with Willard Station

	Unit Cost	Unit	Separate Track Units	Separate Track Cost	
Station Brigham City	$ 67.00	square feet	2,000	$ 134,000	
Station Willard	$ 67.00	square feet	1,000	$ 67,000	
Park & Ride Lot Brigham City	$ 3.50	square feet	87,120	$ 304,920	Assumes 2 acres - 200 cars
Park & Ride Lot Willard	$ 3.50	square feet	43,560	$ 152,460	Assumes 1 acre - 100 cars
TVM	$ 55,000	each	2	$ 110,000	
Maintenance Facility	$ 5,000,000	each	0.1	$ 500,000	
Facility Contingency	25%	Facility Cost	$ 1,268,380	$ 317,095	
Facilities				**$ 1,585,475**	
Embankment	$ 8.00	cubic yard		$ -	
Track	$ 249.00	Linear Foot		$ -	
Culvert Extensions	$ 10,000	Each	4	$ 40,000	
Track + Embankment	$ 289.00	Linear Foot	81,700	$ 23,611,300	Includes 1 mile siding at Willard
Track + Embankment	$ 289.00	Linear Foot	29,040	$ 8,392,560	Separate track Pleasant View to Ogden Intermodal Center
Track + Embankment Contingency	25%	Track + Embankment Estim	$ 23,651,300	$ 5,912,825	
Track				**$ 37,956,685**	
Purchase Signal and Gate Equipme	$ 77.51	track feet		$ -	
Install Signal and Gate Equipment	$ 21.11	track feet		$ -	
Purchase and Install Sig/Com Duct	$ 11.48	track feet		$ -	
Grade Crossings - New Devices	*$ 250,000*	*each*	21	$ 5,250,000	Assume all crossings are gated in either case
Grade Crossings - Relocated Devic	*$ 170,000*	*each*	3	$ 510,000	
Quad Gates	$ 500,000	each		$ -	
Grade Crossing Contingency	25%	Grade Crossing Estimate	$ 5,760,000	$ 1,440,000	
Grade Crossings				**$ 7,200,000**	
Distant Signal	*$ 68,000*	*each*		$ -	
CP Universal Number 20 Crossove	*$ 666,000*	*each*		$ -	
CP Number 20 POTO Pleasant Vie	*$ 390,999*	*each*		$ -	
CP Number 20 POTO Pleasant Vie	*$ 391,000*	*each*	2	$ 782,000	Short section of single track under SH 126 eliminating $2,475,200 bridge
CP Number 20 POTO Brigham City	*$ 391,000*	*each*		$ -	
CP Number 20 POTO Willard	*$ 391,001*	*each*	2	$ 782,002	Siding at Willard
CP Number 15 POTO	*$ 341,000*	*each*		$ -	
Two Track Back to Back Signals	*$ 119,000*	*each*	7	$ 833,000	Assume intermediate signals every two miles
Electric Locks	$ 96,000	each		$ -	
Signal Contingency	25%	Signal Costs	$ 16,797,002	$ 4,199,251	
Relocate UP Signals	$ 22,504,100	Each???		$ -	
Relocate UP Signals Contingency	40%	Relocate UP Signals		$ -	
Signals				**$ 6,596,253**	
Utilities	10%	Construction Cost	39,542,160	$ 3,954,216	
Utility Contingency	35%	Utilities Estimate	3,954,216	$ 1,383,976	
Utilities				**$ 5,338,192**	
General Conditions	$ 2,788,162	each	1	$ 2,788,162	
General Conditions Contingency	25%	General Conditions Conting	2,788,162	$ 697,040	
Real Estate	$ 3.00	square feet	398,230	$ 1,194,690	
Real Estate Contingency	50%	Real Estate Estimate	1,194,690	$ 597,345	
Project Management	5%	Construction and ROW Cos	$ 51,476,604	$ 2,573,830	
Engineering	8%	Construction and ROW Cos	$ 51,476,604	$ 4,118,128	
UTA Labor	5%	Construction and ROW Cos	$ 51,476,604	$ 2,573,830	
Insurance	1%	Construction and ROW Cos	$ 51,476,604	$ 514,766	
Finance Charges	5%	Construction and ROW Cos	$ 51,476,604	$ 2,573,830	
PM/Engineering/UTA/Ins Continger	25%	PM/Engineering/UTA/Ins	$ 9,780,555	$ 2,445,139	
Mitigation Contingency	2%	Capital Costs	$ 51,476,604	$ 1,029,532	
Project Reserve	8%	Capital Costs	$ 51,476,604	$ 4,118,128	
Other Costs				**$ 21,739,219**	
Grand Total				**$ 80,415,823**	

Commuter Rail Equipment Cost

Equipment Options

One set of equipment can support hourly service for a Brigham City - Pleasant View Shuttle
Two sets of equipment and a siding at Willard for them to meet are required for half hour service

		BiLevel		**Single Level**	
	Locomotives	**Cab Cars**	**Coaches**	**Comet I**	**Total**
UTA's Prototype Train is 3 cars and 1 locomotive	$ 1,500,000	$ 2,400,000	$ 2,200,000	$ 700,000	$ 6,800,000
Diesel Multiple Unit (DMU)		$ 4,200,000		$ 3,700,000	

		Bombardier		**NJT**	**Metra**	**Total Cars**	**Colorado Rail Car**	
	Locomotives	**Cab Cars**	**Coaches**	**Comet I**	**Gallery**		**BiLevel**	**Single**
Fleet	11	12	10	29	30	81		
Opening Day	11	12	10	15		37		
Unit Costs	$ 1,500,000	$ 2,400,000	$ 2,200,000	$ 700,000		$ 6,800,000	$ 4,200,000	$ 3,700,000

Bus O&M Costs

Brigham City Corridor Study - Alternatives
DRAFT BUS O&M COSTS (Feb. 27, 2007)

Mode	Statistic	Future No-Action	Best Bus US 89	Best Bus I-15	BRT US 89	BRT I-15
BRT	Peak Buses	0	0	0	4	4
	Fleet Buses	0	0	0	6	6
	Ann. Rev. Bus-Hrs.	0	0	0	8,800	8,800
	Ann. Rev. Bus-Mi's.	0	0	0	98,900	110,500
	Annual O&M Cost	*n/a*	*n/a*	*n/a*	*$1,014,200*	*$989,200*
Local Bus	Peak Buses	3	3	3	3	3
	Fleet Buses	4	4	4	4	4
	Ann. Rev. Bus-Hrs.	17,800	20,800	20,800	20,800	20,800
	Ann. Rev. Bus-Mi's.	302,200	359,300	359,300	359,300	359,300
	Annual O&M Cost	*$1,042,190*	*$1,217,840*	*$1,217,840*	*$1,217,840*	*$1,217,840*
Express bus	Peak Buses	1	3	2	0	0
	Fleet Buses	1	4	3	0	0
	Ann. Rev. Bus-Hrs.	300	1,500	1,000	0	0
	Ann. Rev. Bus-Mi's.	14,800	59,000	58,900	0	0
	Annual O&M Cost	*$21,000*	*$105,000*	*$70,000*	*n/a*	*n/a*
TOTAL O&M COST		**$1,063,190**	**$1,322,840**	**$1,287,840**	**$2,232,040**	**$2,207,040**
Change from No-Action (O&M cost)			*$259,650*	*$224,650*	*$1,168,850*	*$1,143,850*
Change from No-Action (fleet)		*BRT*	*0*	*0*	*6*	*6*
		Local Bus	*0*	*0*	*0*	*0*
		Exp. Bus	*3*	*2*	*0*	*0*
		TOTAL	*3*	*2*	*6*	*6*

Note:
(1) For the Best Bus and BRT, an expanded span of service (Sunday service) was assumed for the local bus service category.

(2) An additional $25,000 per station was assumed for BRT. These costs are associated with the contracting of service to provide daily maintenance (e.g. trash removal, cleaning,etc.) at BRT stations.

(3) O&M costs for **local bus** service were estimated from UTA data. UTA reported in September 2006 that the total annual weekday operating hours on Route 630 was 7,569. Total annual service costs for weekday service was $443,231.

(4) O&M costs for **express bus** service were estimated from UTA data. UTA reported in September 2006 that the total annual weekday operating hours on Route 685 was 813. Total annual service costs for weekday service was $56,939.

Rail O& M Costs

Brigham City Corridor Study - Alternatives
DRAFT RAIL O&M COSTS (Feb. 26, 2007)

	Shared Track		Exclusive Track	
Trips Per Day	**Brigham City to Pleasant View**	**Brigham City to Ogden**	**Brigham City to Pleasant View**	**Brigham City to Ogden**
4	$528,192	$756,110	$437,088	$625,694
6	$792,288	$1,134,165	$655,632	$938,541
14	$1,848,671	$2,646,385	$1,529,807	$2,189,929
30	$3,961,438	$5,670,825	$3,278,158	$4,692,705
40	$5,281,917	$7,561,100	$4,370,877	$6,256,940
50	$6,602,396	$9,451,376	$5,463,596	$7,821,176

	Shared Track(1)	Exclusive Track(2)
TOTAL O&M COST	$792,288	$3,466,764

Estimated OE per VM	$	14.39
Estimated Vehicles per Train		2
Vehicle OE Cost	$	28.79
UP Train Mile Payment	$	6.00
Total Per Train Mile	$	34.79

			Daily Train Miles					
Trips per day			**4**	**6**	**14**	**30**	**40**	**50**
Ogden	Brigham City	20.9	84	125	293	627	836	1045
Pleasant View	Brigham City	14.6	58	88	204	438	584	730

Notes:	AM Service	PM Service	Midday Service
(1)	3 SB Brigham City to Pleasant View (hourly service)	3 NB Pleasant View to Brigham City (hourly service)	No Midday Service
(2)	3 SB 3 NB Brigham City to Pleasant View, 1 SB 1 NB Brigham City to Ogden	3 NB 3 SB Pleasant View to Brigham City, 1 SB 1 NB Ogden to Brigham City	60 Minute Midday Service Brigham City to Pleasant View

Appendix F: Public Comment

Brigham City Comment Form Summary

- Consider a reduced fare rate for families.
- Can't satisfy everyone's wants, so as the experts, you need to make the decisions, even if some complain.
- We really need commuter rail. Many medical patients do not have access to medical facilities in SLC.
- Night rides need to be returned to route 630. Night options have been reduced to return to Brigham City. Reversing Engine fronts on Frontrunner is dangerous, use existing side rail. Where are the Logan and Tremonton corridor studies? Use a tunnel from Honeyville to Wellsville to get Frontrunner to Logan.
- Add car pool lane from SLC to Brigham City. Also build a third highway along the mountain from Brigham City to SLC.
- Buses are more economical. More Bang for buck. Stations need to be at the center of the city. Buses need to be run on Sundays. Liked the station design, but use it for buses. The buses should be run on US-89 for max use.
- Is any tax good? Thank you for looking to solve future problems.
- Use surplus.
- Tie the Brigham City commuter rail into the existing commuter rail being built in Ogden. I don't think this is an "if" situation it is a "when" situation.
- Have everyone in Box Elder pay sales tax- i.e. - All pay ½ cent sales tax.
- The turnout at the open house did not seem great. I counted 26. How can you move forward on a project this large without the support of the citizens of Box Elder County?
- Will this service get me to SLC as fast a car? Access to Weber State looked minimal, the expansion and rebuild of the campus need to be addressed as part of the Commuter rail project. A southern expansion to Utah County needs to be pushed. Access to ATK with 3000 employees needs to be addressed.
- Plan to do rail in the future and enhance the bus service now.
- Roadway traffic will be very congested in the next decade or so. Our perception is that the general public of Brigham City and Box Elder County are not aware of the project or the economics effects that the project will have.

  It appears that now would be the time to educate the public about this issue, so if there is an initiative on the ballot this November, people will better understand the reason for the tax increase. The rail technology that appeared to be best suited was Diesel Multiple Units. Since Diesel Multiple Units offer a lower cost, it seems they would be a good choice to link Brigham City with service in Ogden or Pleasant View. Again it seems we are at a point where providing info to the public, would be a good idea, so that they can make an informed decision at the polls this November if there is a ballot initiative.

Comment Form Summary

Question	Responses									
	Newspaper		Flyer		Internet		Other			
How did you learn of this open house?	**9**	35%	**10**	38%	**1**	4%	**6**	23%		
	Yes		No							
Was the information presented in an easy to understand manner?	**20**	91%	**2**	9%						
	Yes		No							
Do you feel the region's transportation needs are being met?	**2**	10%	**19**	90%						
	Commuter Rail New Track		Improved Local & Express Bus		Bus Rapid Transit		Commuter Rail Shared Track			
Which project alternative do you feel will best support future transportation issues?	**11**	46%	**4**	17%	**0**	0%	**9**	38%		
	Gasoline Tax		Vehicle Registration Tax		Sales Tax		Property Tax		None	
Any transportation initiative will require a tax increase. Which type of funding do you support?	**9**	24%	**7**	19%	**15**	41%	**5**	14%	**1**	3%

Total comment forms returned: 22

Appendix G: Draft Financial Plans

Best Bus

Sales Tax Growth Rate 5.50% | Operating Cost Growth Rate 4.00% | Construction Inflation 3.00% | Interest Rate 5.25% | Bond Term 20

FY Year	Sales Tax Revenue	Fare box	Total Revenue	Operating Cost Route 630	Route 685	Route 638	Para Transit	Best Bus Local	Best Bus Express	Total	Net Revenue	Construction Cost	Debt Service	Bond Proceeds
2006				$516,099	$56,939	$90,631	$32,000			$695,669				
2007				$536,743	$59,217	$94,256	$33,280			$723,496				
2008	$761,760	$225,731	$987,491	$558,213	$61,585	$98,026	$34,611			$752,436	$235,055			
2009[1]	$1,607,314	$475,976	$2,083,290			$101,948	$35,996	$1,369,904	$78,740	$1,586,588	$496,702			
2010	$1,695,716	$495,015	$2,190,731			$106,025	$37,435	$1,424,701	$81,890	$1,650,052	$540,680			
2011	$1,788,980	$514,816	$2,303,796			$110,266	$38,933	$1,481,689	$85,166	$1,716,054	$587,743			
2012	$1,887,374	$535,409	$2,422,783			$114,677	$40,490	$1,540,956	$88,572	$1,784,696	$638,087			
2013	$1,991,180	$556,825	$2,548,005			$119,264	$42,110	$1,602,594	$92,115	$1,856,084	$691,921			
2014[2]	$2,100,695	$579,098	$2,679,793			$124,035	$43,794	$1,666,698	$95,800	$1,930,327	$749,466		$0	
2015	$2,216,233	$602,262	$2,818,495			$128,996	$45,546	$1,733,366	$99,632	$2,007,540	$810,955		$0	
2016	$2,338,126	$626,352	$2,964,478			$134,156	$47,368	$1,802,701	$103,617	$2,087,842	$876,636		$0	
2017	$2,466,723	$651,407	$3,118,129			$139,522	$49,263	$1,874,809	$107,762	$2,171,355	$946,774		$0	
2018	$2,602,392	$677,463	$3,279,855			$145,103	$51,233	$1,949,801	$112,072	$2,258,210	$1,021,646		$0	
2019	$2,745,524	$704,561	$3,450,085			$150,907	$53,282	$2,027,793	$116,555	$2,348,538	$1,101,547		$0	
2020	$2,896,528	$732,744	$3,629,271			$156,944	$55,414	$2,108,905	$121,217	$2,442,479	$1,186,792		$0	
2021	$3,055,837	$724,234	$3,780,070			$163,221	$57,630	$2,193,261	$126,066	$2,414,113	$1,365,958		$0	
2022	$3,223,908	$753,203	$3,977,111			$169,750	$59,935	$2,280,991	$131,109	$2,510,677	$1,466,434		$0	
2023	$3,401,223	$783,331	$4,184,554			$176,540	$62,333	$2,372,231	$136,353	$2,611,104	$1,573,450		$0	
2024	$3,588,290	$814,664	$4,402,954			$183,602	$64,826	$2,467,120	$141,807	$2,715,548	$1,687,406		$0	
2025	$3,785,646	$847,251	$4,632,897			$190,946	$67,419	$2,565,805	$147,479	$2,824,170	$1,808,727		$0	
2026	$3,993,856	$881,141	$4,874,997			$198,584	$70,116	$2,668,437	$153,379	$2,937,137	$1,937,860		$0	
2027	$4,213,518	$916,387	$5,129,905			$206,527	$72,921	$2,775,175	$159,514	$3,054,623	$2,075,283		$0	
2028	$4,445,262	$953,042	$5,398,304			$214,788	$75,837	$2,886,182	$165,894	$3,176,807	$2,221,497		$0	
2029	$4,689,751	$991,164	$5,680,915			$223,380	$78,871	$3,001,629	$172,530	$3,303,880	$2,377,036		$0	
2030	$4,947,688	$1,030,810	$5,978,498			$232,315	$82,026	$3,121,694	$179,431	$3,436,035	$2,542,463		$0	
2031	$5,219,810	$1,072,043	$6,291,853			$241,607	$85,307	$3,246,562	$186,609	$3,573,476	$2,718,377		$0	
2032	$5,506,900	$1,114,925	$6,621,825			$251,272	$88,719	$3,376,425	$194,073	$3,716,415	$2,905,409		$0	
2033	$5,809,780	$1,159,522	$6,969,301			$261,323	$92,268	$3,511,482	$201,836	$3,865,072	$3,104,229		$0	
2034	$6,129,317	$1,205,902	$7,335,220			$271,775	$95,959	$3,651,941	$209,909	$4,019,675	$3,315,545		$0	
2035	$6,466,430	$1,254,139	$7,720,568			$282,646	$99,797	$3,798,018	$218,306	$4,180,462	$3,540,107		$0	
2036	$6,822,084	$1,304,304	$8,126,388			$293,952	$103,789	$3,949,939	$227,038	$4,347,680	$3,778,707			
2037														
2038														

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)
2 Opening day Best Bus costs (july 2009) estimated at $1,586,588 ($1,271,840 Local & $70,000 Express) inflated at 4% $1,464,257.65
3 Construction Cost Total $0

InterPlan Co. Transportation Planning

Bus Rapid Transit

Sales Tax Growth Rate 5.50% | Operating Cost Growth Rate 4.00% | Construction Inflation 3.00% | Interest Rate 5.25% | Bond Term 20

FY Year	Sales Tax Revenue	Fare box	Total Revenue	Operating Cost: Route 630	Route 685	Route 638	Para Transit	BRT	Total	Net Revenue	Construction Cost	Debt Service	Bond Proceeds	Net
2006				$516,099	$56,939	$90,631	$32,000		$695,669					
2007				$536,743	$59,217	$94,256	$33,280		$723,496					
2008	$761,760	$225,731	$987,491	$558,213	$61,585	$98,026	$34,611		$752,436	$235,055				$235,055
2009(1)	$1,607,314	$234,760	$1,842,074	$580,541	$64,049	$101,948	$35,996		$782,533	$1,059,540				$1,059,540
2010	$1,695,716	$244,150	$1,939,866	$603,763	$66,611	$106,025	$37,435		$813,834	$1,126,032				$1,126,032
2011	$1,788,980	$253,916	$2,042,897	$627,913	$69,275	$110,266	$38,933		$846,388	$1,196,509				$1,196,509
2012	$1,887,374	$264,073	$2,151,447	$653,030	$72,046	$114,677	$40,490		$880,243	$1,271,204	$1,194,052			$77,152
2013	$1,991,180	$274,636	$2,265,816	$679,151	$74,928	$119,264	$42,110		$915,453	$1,350,363	$1,978,621			($628,258)
2014(2)	$2,100,695	$285,621	$2,386,316	$706,317	$77,925	$124,035	$43,794		$952,071	$1,434,245	$13,941,818	$577,500	$11,000,000	($2,085,073)
2015	$2,216,233	$719,428	$2,935,661	$734,570	$81,042	$128,996	$45,546	$1,407,940	$2,398,094	$537,567		$577,500		($39,933)
2016	$2,338,126	$748,205	$3,086,331	$763,953	$84,284	$134,156	$47,368	$1,464,258	$2,494,018	$592,313		$577,500		$14,813
2017	$2,466,723	$778,134	$3,244,856	$794,511	$87,655	$139,522	$49,263	$1,522,828	$2,593,778	$651,078		$577,500		$73,578
2018	$2,602,392	$809,259	$3,411,651	$826,291	$91,161	$145,103	$51,233	$1,583,741	$2,697,530	$714,122		$577,500		$136,622
2019	$2,745,524	$841,629	$3,587,153	$859,343	$94,808	$150,907	$53,282	$1,647,091	$2,805,431	$781,722		$577,500		$204,222
2020	$2,896,528	$875,294	$3,771,822	$893,716	$98,600	$156,944	$55,414	$1,712,974	$2,917,648	$854,174		$577,500		$276,674
2021	$3,055,837	$910,306	$3,966,143	$929,465	$102,544	$163,221	$57,630	$1,781,493	$3,034,354	$931,789		$577,500		$354,289
2022	$3,223,908	$946,718	$4,170,626	$966,644	$106,646	$169,750	$59,935	$1,852,753	$3,155,728	$1,014,898		$577,500		$437,398
2023	$3,401,223	$984,587	$4,385,810	$1,005,309	$110,912	$176,540	$62,333	$1,926,863	$3,281,957	$1,103,853		$577,500		$526,353
2024	$3,588,290	$1,023,971	$4,612,260	$1,045,522	$115,348	$183,602	$64,826	$2,003,938	$3,413,235	$1,199,025		$577,500		$621,525
2025	$3,785,646	$1,064,929	$4,850,575	$1,087,343	$119,962	$190,946	$67,419	$2,084,095	$3,549,765	$1,300,810		$577,500		$723,310
2026	$3,993,856	$1,107,527	$5,101,383	$1,130,836	$124,760	$198,584	$70,116	$2,167,459	$3,691,755	$1,409,627		$577,500		$832,127
2027	$4,213,518	$1,151,828	$5,365,346	$1,176,070	$129,751	$206,527	$72,921	$2,254,157	$3,839,426	$1,525,920		$577,500		$948,420
2028	$4,445,262	$1,197,901	$5,643,163	$1,223,113	$134,941	$214,788	$75,837	$2,344,324	$3,993,003	$1,650,160		$577,500		$1,072,660
2029	$4,689,751	$1,245,817	$5,935,568	$1,272,037	$140,338	$223,380	$78,871	$2,438,097	$4,152,723	$1,782,845		$577,500		$1,205,345
2030	$4,947,688	$1,295,650	$6,243,337	$1,322,919	$145,952	$232,315	$82,026	$2,535,620	$4,318,832	$1,924,505		$577,500		$1,347,005
2031	$5,219,810	$1,347,475	$6,567,286	$1,375,835	$151,790	$241,607	$85,307	$2,637,045	$4,491,585	$2,075,701		$577,500		$1,498,201
2032	$5,506,900	$1,401,375	$6,908,275	$1,430,869	$157,862	$251,272	$88,719	$2,742,527	$4,671,248	$2,237,026		$577,500		$1,659,526
2033	$5,809,780	$1,457,429	$7,267,209	$1,488,104	$164,176	$261,323	$92,268	$2,852,228	$4,858,098	$2,409,111		$577,500		$1,831,611
2034	$6,129,317	$1,515,727	$7,645,044	$1,547,628	$170,743	$271,775	$95,959	$2,966,317	$5,052,422	$2,592,622		$577,500	($11,000,000)	($8,984,878)
2035	$6,466,430	$1,576,356	$8,042,786	$1,609,533	$177,573	$282,646	$99,797	$3,084,970	$5,254,519	$2,788,266		$0	$0	$2,788,266
2036	$6,822,084	$1,639,410	$8,461,493	$1,673,914	$184,676	$293,952	$103,789	$3,208,369	$5,464,700	$2,996,794				$2,996,794
2037														

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)
2 Opening day BRT costs (july 2014) estimated at $1,407,940 ($989,200) inflated at 4% $1,464,257.65
3 Construction Cost Total $13,614,00 (I-15 option) over three years with DEIS $1,000,000, PE/Final Design $1,608,800, Construction $11,005,800 and inflated at 3% per year

InterPlan Co.
Transportation Planning

2015 Commuter Rail Transit

Sales Tax Growth Rate 5.50%
Operating Cost Growth Rate 4.00%
Construction Inflation 3.00%
Interest Rate 5.25%
Bond Term 20

FY Year	Sales Tax Revenue	Fare box	Total Revenue	Operating Cost Route 630	Operating Cost Route 685	Operating Cost Route 638	Operating Cost Para Transit	Operating Cost CRT	Operating Cost Total	Net Revenue	Construction Cost	Debt Service	Bond Proceeds	Net
2006				$516,099	$56,939	$90,631	$32,000		$695,669					
2007				$536,743	$59,217	$94,256	$33,280		$723,496					
2008	$761,760	$225,731	$987,491	$558,213	$61,585	$98,026	$34,611		$752,436	$235,055				$235,055
2009(1)	$1,607,314	$234,760	$1,842,074	$580,541	$64,049	$101,948	$35,996		$782,533	$1,059,540				$1,059,540
2010	$1,695,716	$244,150	$1,939,866	$603,763	$66,611	$106,025	$37,435		$813,834	$1,126,032				$1,126,032
2011	$1,788,980	$253,916	$2,042,897	$627,913	$69,275	$110,266	$38,933		$846,388	$1,196,509				$1,196,509
2012	$1,887,374	$264,073	$2,151,447	$653,030	$72,046	$114,677	$40,490		$880,243	$1,271,204	$1,194,052			$77,152
2013	$1,991,180	$274,636	$2,265,816	$679,151	$74,928	$119,264	$42,110		$915,453	$1,350,363	$2,016,993	$0		($666,630)
2014	$2,100,695	$285,621	$2,386,316	$706,317	$77,925	$124,035	$43,794		$952,071	$1,434,245	$22,801,861	$1,050,000	$20,000,000	($2,417,617)
2015(2)	$2,216,233	$297,046	$2,513,279	$734,570	$81,042	$128,996	$45,546		$990,154	$1,523,125	$20,223,984	$2,100,000	$20,000,000	($800,859)
2016	$2,338,126	$660,762	$2,998,888	$763,953	$84,284	$134,156	$47,368	$1,172,780	$2,202,540	$796,348		$2,100,000		($1,303,652)
2017	$2,466,723	$687,192	$3,153,915	$794,511	$87,655	$139,522	$49,263	$1,219,691	$2,290,641	$863,274		$2,100,000		($1,236,726)
2018	$2,602,392	$714,680	$3,317,072	$826,291	$91,161	$145,103	$51,233	$1,268,479	$2,382,267	$934,805		$2,100,000		($1,165,195)
2019	$2,745,524	$743,267	$3,488,791	$859,343	$94,808	$150,907	$53,282	$1,319,218	$2,477,558	$1,011,233		$2,100,000		($1,088,767)
2020	$2,896,528	$772,998	$3,669,526	$893,716	$98,600	$156,944	$55,414	$1,371,986	$2,576,660	$1,092,866		$2,100,000		($1,007,134)
2021	$3,055,837	$803,918	$3,859,755	$929,465	$102,544	$163,221	$57,630	$1,426,866	$2,679,726	$1,180,028		$2,100,000		($919,972)
2022	$3,223,908	$836,075	$4,059,982	$966,644	$106,646	$169,750	$59,935	$1,483,941	$2,786,916	$1,273,067		$2,100,000		($826,933)
2023	$3,401,223	$869,518	$4,270,740	$1,005,309	$110,912	$176,540	$62,333	$1,543,298	$2,898,392	$1,372,348		$2,100,000		($727,652)
2024	$3,588,290	$904,298	$4,492,588	$1,045,522	$115,348	$183,602	$64,826	$1,605,030	$3,014,328	$1,478,260		$2,100,000		($621,740)
2025	$3,785,646	$940,470	$4,726,116	$1,087,343	$119,962	$190,946	$67,419	$1,669,231	$3,134,901	$1,591,215		$2,100,000		($508,785)
2026	$3,993,856	$978,089	$4,971,945	$1,130,836	$124,760	$198,584	$70,116	$1,736,001	$3,260,297	$1,711,648		$2,100,000		($388,352)
2027	$4,213,518	$1,017,213	$5,230,731	$1,176,070	$129,751	$206,527	$72,921	$1,805,441	$3,390,709	$1,840,022		$2,100,000		($259,978)
2028	$4,445,262	$1,057,901	$5,503,163	$1,223,113	$134,941	$214,788	$75,837	$1,877,658	$3,526,337	$1,976,826		$2,100,000		($123,174)
2029	$4,689,751	$1,100,217	$5,789,969	$1,272,037	$140,338	$223,380	$78,871	$1,952,765	$3,667,391	$2,122,578		$2,100,000		$22,578
2030	$4,947,688	$1,144,226	$6,091,914	$1,322,919	$145,952	$232,315	$82,026	$2,030,875	$3,814,086	$2,277,827		$2,100,000		$177,827
2031	$5,219,810	$1,189,995	$6,409,805	$1,375,835	$151,790	$241,607	$85,307	$2,112,110	$3,966,650	$2,443,156		$2,100,000		$343,156
2032	$5,506,900	$1,237,595	$6,744,495	$1,430,869	$157,862	$251,272	$88,719	$2,196,595	$4,125,316	$2,619,179		$2,100,000		$519,179
2033	$5,809,780	$1,287,099	$7,096,878	$1,488,104	$164,176	$261,323	$92,268	$2,284,458	$4,290,328	$2,806,550		$2,100,000		$706,550
2034	$6,129,317	$1,338,582	$7,467,900	$1,547,628	$170,743	$271,775	$95,959	$2,375,837	$4,461,942	$3,005,958		$2,100,000	($20,000,000)	($19,094,042)
2035	$6,466,430	$1,392,126	$7,858,556	$1,609,533	$177,573	$282,646	$99,797	$2,470,870	$4,640,419	$3,218,136		$1,050,000	($20,000,000)	($17,831,864)
2036	$6,822,084	$1,447,811	$8,269,894	$1,673,914	$184,676	$293,952	$103,789	$2,569,705	$4,826,036	$3,443,858				$3,443,858
2037														

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)
2 Opening day rail operating costs (2016) estimated at $1,172,780 ($792,288) inflated at 4% $0
3 Construction Cost Total $36,140,000 over four years with DEIS $1,000,000, FEIS $1,640,000, First Year Construction $18,000,000 Second Year Construction $15,500,000

2020 Commuter Rail Transit

Sales Tax Growth Rate 5.50%

Operating Cost Growth Rate 4.00%

Construction Inflation 3.00%

Interest Rate 5.25%
Bond Term 20

FY Year	Sales Tax Revenue	Fare box	Total Revenue	Operating Cost Route 630	Route 685	Route 638	Para Transit	CRT	Total	Net Revenue	Construction Cost	Debt Service	Bond Proceeds	Net
2006				$516,099	$56,939	$90,631	$32,000		$695,669					
2007				$536,743	$59,217	$94,256	$33,280		$723,496					
2008	$761,760	$225,731	$987,491	$558,213	$61,585	$98,026	$34,611		$752,436	$235,055				$235,055
2009[1]	$1,607,314	$234,760	$1,842,074	$580,541	$64,049	$101,948	$35,996		$782,533	$1,059,540				$1,059,540
2010	$1,695,716	$244,150	$1,939,866	$603,763	$66,611	$106,025	$37,435		$813,834	$1,126,032				$1,126,032
2011	$1,788,980	$253,916	$2,042,897	$627,913	$69,275	$110,266	$38,933		$846,388	$1,196,509				$1,196,509
2012	$1,887,374	$264,073	$2,151,447	$653,030	$72,046	$114,677	$40,490		$880,243	$1,271,204				$1,271,204
2013	$1,991,180	$274,636	$2,265,816	$679,151	$74,928	$119,264	$42,110		$915,453	$1,350,363				$1,350,363
2014	$2,100,695	$285,621	$2,386,316	$706,317	$77,925	$124,035	$43,794		$952,071	$1,434,245				$1,434,245
2015	$2,216,233	$297,046	$2,513,279	$734,570	$81,042	$128,996	$45,546		$990,154	$1,523,125				$1,523,125
2016	$2,338,126	$308,928	$2,647,054	$763,953	$84,284	$134,156	$47,368		$1,029,760	$1,617,294				$1,617,294
2017	$2,466,723	$321,285	$2,788,008	$794,511	$87,655	$139,522	$49,263		$1,070,950	$1,717,057	$1,384,234			$332,823
2018	$2,602,392	$334,137	$2,936,529	$826,291	$91,161	$145,103	$51,233		$1,113,788	$1,822,740	$2,338,248			($515,508)
2019	$2,745,524	$347,502	$3,093,026	$859,343	$94,808	$150,907	$53,282		$1,158,340	$1,934,686	$26,433,607	$682,500	$13,000,000	($12,181,421)
2020[2]	$2,896,528	$361,402	$3,257,930	$893,716	$98,600	$156,944	$55,414		$1,204,674	$2,053,256	$23,445,141	$1,890,000	$23,000,000	($281,885)
2021	$3,055,837	$803,918	$3,859,755	$929,465	$102,544	$163,221	$57,630	$1,426,866	$2,679,726	$1,180,028		$1,890,000		($709,972)
2022	$3,223,908	$836,075	$4,059,982	$966,644	$106,646	$169,750	$59,935	$1,483,941	$2,786,916	$1,273,067		$1,890,000		($616,933)
2023	$3,401,223	$869,518	$4,270,740	$1,005,309	$110,912	$176,540	$62,333	$1,543,298	$2,898,392	$1,372,348		$1,890,000		($517,652)
2024	$3,588,290	$904,298	$4,492,588	$1,045,522	$115,348	$183,602	$64,826	$1,605,030	$3,014,328	$1,478,260		$1,890,000		($411,740)
2025	$3,785,646	$940,470	$4,726,116	$1,087,343	$119,962	$190,946	$67,419	$1,669,231	$3,134,901	$1,591,215		$1,890,000		($298,785)
2026	$3,993,856	$978,089	$4,971,945	$1,130,836	$124,760	$198,584	$70,116	$1,736,001	$3,260,297	$1,711,648		$1,890,000		($178,352)
2027	$4,213,518	$1,017,213	$5,230,731	$1,176,070	$129,751	$206,527	$72,921	$1,805,441	$3,390,709	$1,840,022		$1,890,000		($49,978)
2028	$4,445,262	$1,057,901	$5,503,163	$1,223,113	$134,941	$214,788	$75,837	$1,877,658	$3,526,337	$1,976,826		$1,890,000		$86,826
2029	$4,689,751	$1,100,217	$5,789,969	$1,272,037	$140,338	$223,380	$78,871	$1,952,765	$3,667,391	$2,122,578		$1,890,000		$232,578
2030	$4,947,688	$1,144,226	$6,091,914	$1,322,919	$145,952	$232,315	$82,026	$2,030,875	$3,814,086	$2,277,827		$1,890,000		$387,827
2031	$5,219,810	$1,189,995	$6,409,805	$1,375,835	$151,790	$241,607	$85,307	$2,112,110	$3,966,650	$2,443,156		$1,890,000		$553,156
2032	$5,506,900	$1,237,595	$6,744,495	$1,430,869	$157,862	$251,272	$88,719	$2,196,595	$4,125,316	$2,619,179		$1,890,000		$729,179
2033	$5,809,780	$1,287,099	$7,096,878	$1,488,104	$164,176	$261,323	$92,268	$2,284,458	$4,290,328	$2,806,550		$1,890,000		$916,550
2034	$6,129,317	$1,338,582	$7,467,900	$1,547,628	$170,743	$271,775	$95,959	$2,375,837	$4,461,942	$3,005,958		$1,890,000		$1,115,958
2035	$6,466,430	$1,392,126	$7,858,556	$1,609,533	$177,573	$282,646	$99,797	$2,470,870	$4,640,419	$3,218,136		$1,890,000		$1,328,136
2036	$6,822,084	$1,447,811	$8,269,894	$1,673,914	$184,676	$293,952	$103,789	$2,569,705	$4,826,036	$3,443,858		$1,890,000		$1,553,858
2037	$7,197,298	$1,505,723	$8,703,021	$1,740,871	$192,063	$305,710	$107,940	$2,672,493	$5,019,077	$3,683,944		$1,890,000		$1,793,944
2038	$7,593,149	$1,565,952	$9,159,102	$1,810,506	$199,745	$317,939	$112,258	$2,779,393	$5,219,841	$3,939,261		$1,890,000		$2,049,261
2039	$8,010,773	$1,628,590	$9,639,363	$1,882,926	$207,735	$330,656	$116,748	$2,890,569	$5,428,634	$4,210,729		$1,890,000	($13,000,000)	($10,679,271)
2040	$8,451,365	$1,693,734	$10,145,099	$1,958,243	$216,045	$343,883	$121,418	$3,006,191	$5,645,780	$4,499,320		$1,207,500	($23,000,000)	($19,708,180)
2041	$8,916,190	$1,761,483	$10,677,674	$2,036,573	$224,686	$357,638	$126,275	$3,126,439	$5,871,611	$4,806,063		$0		$4,806,063
2042														

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)
2 Opening day rail operating costs (2021) estimated at $1,426,866 ($792,288) inflated at 4% $1,426,866
3 Construction Cost Total $36,140,000 over four years with DEIS $1,000,000, FEIS $1,640,000, First Year Construction $18,000,000 Second Year

2025 Commuter Rail Transit

Sales Tax Growth Rate 5.50% | Operating Cost Growth Rate 4.00% | Construction Inflation 3.00% | Interest Rate 5.25% | Bond Term 20

FY Year	Sales Tax Revenue	Fare box	Total Revenue	Operating Cost						Net Revenue	Construction Cost	Debt Service	Bond Proceeds
				Route 630	Route 685	Route 638	Para Transit	CRT	Total				
2006				$516,099	$56,939	$90,631	$32,000		$695,669				
2007				$536,743	$59,217	$94,256	$33,280		$723,496				
2008	$761,760	$225,731	$987,491	$558,213	$61,585	$98,026	$34,611		$752,436	$235,055			
2009[1]	$1,607,314	$234,760	$1,842,074	$580,541	$64,049	$101,948	$35,996		$782,533	$1,059,540			
2010	$1,695,716	$244,150	$1,939,866	$603,763	$66,611	$106,025	$37,435		$813,834	$1,126,032			
2011	$1,788,980	$253,916	$2,042,897	$627,913	$69,275	$110,266	$38,933		$846,388	$1,196,509			
2012	$1,887,374	$264,073	$2,151,447	$653,030	$72,046	$114,677	$40,490		$880,243	$1,271,204			
2013	$1,991,180	$274,636	$2,265,816	$679,151	$74,928	$119,264	$42,110		$915,453	$1,350,363			
2014	$2,100,695	$285,621	$2,386,316	$706,317	$77,925	$124,035	$43,794		$952,071	$1,434,245			
2015	$2,216,233	$297,046	$2,513,279	$734,570	$81,042	$128,996	$45,546		$990,154	$1,523,125			
2016	$2,338,126	$308,928	$2,647,054	$763,953	$84,284	$134,156	$47,368		$1,029,760	$1,617,294			
2017	$2,466,723	$321,285	$2,788,008	$794,511	$87,655	$139,522	$49,263		$1,070,950	$1,717,057			
2018	$2,602,392	$334,137	$2,936,529	$826,291	$91,161	$145,103	$51,233		$1,113,788	$1,822,740			
2019	$2,745,524	$347,502	$3,093,026	$859,343	$94,808	$150,907	$53,282		$1,158,340	$1,934,686			
2020	$2,896,528	$361,402	$3,257,930	$893,716	$98,600	$156,944	$55,414		$1,204,674	$2,053,256			
2021	$3,055,837	$375,858	$3,431,695	$929,465	$102,544	$163,221	$57,630		$1,252,861	$2,178,834			
2022	$3,223,908	$390,892	$3,614,800	$966,644	$106,646	$169,750	$59,935		$1,302,975	$2,311,825	$1,604,706		
2023	$3,401,223	$406,528	$3,807,751	$1,005,309	$110,912	$176,540	$62,333		$1,355,094	$2,452,657	$2,710,670		
2024	$3,588,290	$422,789	$4,011,079	$1,045,522	$115,348	$183,602	$64,826		$1,409,298	$2,601,781	$30,643,795		
2025[2]	$3,785,646	$439,701	$4,225,347	$1,087,343	$119,962	$190,946	$67,419		$1,465,670	$2,759,677	$27,179,344	$1,312,500	$25,000,000
2026	$3,993,856	$978,089	$4,971,945	$1,130,836	$124,760	$198,584	$70,116	$1,736,001	$3,260,297	$1,711,648		$1,312,500	
2027	$4,213,518	$1,017,213	$5,230,731	$1,176,070	$129,751	$206,527	$72,921	$1,805,441	$3,390,709	$1,840,022		$1,312,500	
2028	$4,445,262	$1,057,901	$5,503,163	$1,223,113	$134,941	$214,788	$75,837	$1,877,658	$3,526,337	$1,976,826		$1,312,500	
2029	$4,689,751	$1,100,217	$5,789,969	$1,272,037	$140,338	$223,380	$78,871	$1,952,765	$3,667,391	$2,122,578		$1,312,500	
2030	$4,947,688	$1,144,226	$6,091,914	$1,322,919	$145,952	$232,315	$82,026	$2,030,875	$3,814,086	$2,277,827		$1,312,500	
2031	$5,219,810	$1,189,995	$6,409,805	$1,375,835	$151,790	$241,607	$85,307	$2,112,110	$3,966,650	$2,443,156		$1,312,500	
2032	$5,506,900	$1,237,595	$6,744,495	$1,430,869	$157,862	$251,272	$88,719	$2,196,595	$4,125,316	$2,619,179		$1,312,500	
2033	$5,809,780	$1,287,099	$7,096,878	$1,488,104	$164,176	$261,323	$92,268	$2,284,458	$4,290,328	$2,806,550		$1,312,500	
2034	$6,129,317	$1,338,582	$7,467,900	$1,547,628	$170,743	$271,775	$95,959	$2,375,837	$4,461,942	$3,005,958		$1,312,500	
2035	$6,466,430	$1,392,126	$7,858,556	$1,609,533	$177,573	$282,646	$99,797	$2,470,870	$4,640,419	$3,218,136		$1,312,500	
2036	$6,822,084	$1,447,811	$8,269,894	$1,673,914	$184,676	$293,952	$103,789	$2,569,705	$4,826,036	$3,443,858		$1,312,500	
2037	$7,197,298	$1,505,723	$8,703,021	$1,740,871	$192,063	$305,710	$107,940	$2,672,493	$5,019,077	$3,683,944		$1,312,500	
2038	$7,593,149	$1,565,952	$9,159,102	$1,810,506	$199,745	$317,939	$112,258	$2,779,393	$5,219,841	$3,939,261		$1,312,500	
2039	$8,010,773	$1,628,590	$9,639,363	$1,882,926	$207,735	$330,656	$116,748	$2,890,569	$5,428,634	$4,210,729		$1,312,500	
2040	$8,451,365	$1,693,734	$10,145,099	$1,958,243	$216,045	$343,883	$121,418	$3,006,191	$5,645,780	$4,499,320		$1,312,500	
2041	$8,916,190	$1,761,483	$10,677,674	$2,036,573	$224,686	$357,638	$126,275	$3,126,439	$5,871,611	$4,806,063		$1,312,500	
2042	$9,406,581	$1,831,943	$11,238,523	$2,118,035	$233,674	$371,944	$131,326	$3,251,497	$6,106,475	$5,132,048		$1,312,500	
2043	$9,923,943	$1,905,220	$11,829,163	$2,202,757	$243,021	$386,821	$136,579	$3,381,556	$6,350,734	$5,478,429		$1,312,500	
2044	$10,469,760	$1,981,429	$12,451,189	$2,290,867	$252,742	$402,294	$142,042	$3,516,819	$6,604,764	$5,846,425		$1,312,500	
2045	$11,045,596	$2,060,686	$13,106,283	$2,382,502	$262,851	$418,386	$147,724	$3,657,491	$6,868,954	$6,237,328		$1,312,500	($25,000,000)
2046	$11,653,104	$2,143,114	$13,796,218	$2,477,802	$273,365	$435,121	$153,633	$3,803,791	$7,143,712	$6,652,506			
2047													

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)
2 Opening day rail operating costs (2026) estimated at $1,736,001 ($792,288) inflated at 4%
3 Construction Cost Total $36,140,000 over four years with DEIS $1,000,000, FEIS $1,640,000, First Year Construction $18,000,000 Second Year Construction $15,500,000

2030 Commuter Rail Transit

Sales Tax Growth Rate 5.50% — Operating Cost Growth Rate 4.00% — Construction Inflation 3.00% — Interest Rate 5.25%, Bond Term 20

FY Year	Sales Tax Revenue	Fare box	Total Revenue	Operating Cost Route 630	Route 685	Route 638		CRT	Total	Net Revenue	Construction Cost	Debt Service	Bond Proceeds
2006				$516,099	$56,939	$90,631	$32,000		$663,669				
2007				$536,743	$59,217	$94,256	$33,280		$690,216				
2008	$761,760	$215,347	$987,491	$558,213	$61,585	$98,026	$34,611		$717,824	$269,666			
2009[1]	$1,607,314	$223,961	$1,831,275	$580,541	$64,049	$101,948	$35,996		$746,537	$1,084,737			
2010	$1,695,716	$232,920	$1,928,636	$603,763	$66,611	$106,025	$37,435		$776,399	$1,152,237			
2011	$1,788,980	$242,236	$2,031,217	$627,913	$69,275	$110,266	$38,933		$807,455	$1,223,762			
2012	$1,887,374	$251,926	$2,139,300	$653,030	$72,046	$114,677	$40,490		$839,753	$1,299,547			
2013	$1,991,180	$262,003	$2,253,183	$679,151	$74,928	$119,264	$42,110		$873,343	$1,379,840			
2014	$2,100,695	$272,483	$2,373,178	$706,317	$77,925	$124,035	$43,794		$908,277	$1,464,901			
2015	$2,216,233	$283,382	$2,499,615	$734,570	$81,042	$128,996	$45,546		$944,608	$1,555,007			
2016	$2,338,126	$294,718	$2,632,843	$763,953	$84,284	$134,156	$47,368		$982,392	$1,650,451			
2017	$2,466,723	$306,506	$2,773,229	$794,511	$87,655	$139,522	$49,263		$1,021,688	$1,751,541			
2018	$2,602,392	$318,767	$2,921,159	$826,291	$91,161	$145,103	$51,233		$1,062,555	$1,858,603			
2019	$2,745,524	$331,517	$3,077,041	$859,343	$94,808	$150,907	$53,282		$1,105,058	$1,971,983			
2020	$2,896,528	$344,778	$3,241,306	$893,716	$98,600	$156,944	$55,414		$1,149,260	$2,092,046			
2021	$3,055,837	$358,569	$3,414,406	$929,465	$102,544	$163,221	$57,630		$1,195,230	$2,219,175			
2022	$3,223,908	$372,912	$3,596,820	$966,644	$106,646	$169,750	$59,935		$1,243,040	$2,353,780			
2023	$3,401,223	$387,828	$3,789,051	$1,005,309	$110,912	$176,540	$62,333		$1,292,761	$2,496,290			
2024	$3,588,290	$403,341	$3,991,631	$1,045,522	$115,348	$183,602	$64,826		$1,344,472	$2,647,160			
2025[2]	$3,785,646	$419,475	$4,205,121	$1,087,343	$119,962	$190,946	$67,419		$1,398,250	$2,806,870			
2026	$3,993,856	$436,254	$4,430,110	$1,130,836	$124,760	$198,584	$70,116		$1,454,181	$2,975,930			
2027	$4,213,518	$453,704	$4,667,223	$1,176,070	$129,751	$206,527	$72,921		$1,512,348	$3,154,875	$1,860,295		
2028	$4,445,262	$471,852	$4,917,114	$1,223,113	$134,941	$214,788	$75,837		$1,572,842	$3,344,273	$3,142,410		
2029	$4,689,751	$490,727	$5,180,478	$1,272,037	$140,338	$223,380	$78,871		$1,635,755	$3,544,723	$35,524,557		
2030	$4,947,688	$510,356	$5,458,043	$1,322,919	$145,952	$232,315	$82,026		$1,701,186	$3,756,858	$27,179,344		
2031	$5,219,810	$1,189,995	$6,409,805	$1,375,835	$151,790	$241,607	$85,307	$2,112,110	$3,966,650	$2,443,156			
2032	$5,506,900	$1,237,595	$6,744,495	$1,430,869	$157,862	$251,272	$88,719	$2,196,595	$4,125,316	$2,619,179			
2033	$5,809,780	$1,287,099	$7,096,878	$1,488,104	$164,176	$261,323	$92,268	$2,284,458	$4,290,328	$2,806,550			
2034	$6,129,317	$1,338,582	$7,467,900	$1,547,628	$170,743	$271,775	$95,959	$2,375,837	$4,461,942	$3,005,958			
2035	$6,466,430	$1,392,126	$7,858,556	$1,609,533	$177,573	$282,646	$99,797	$2,470,870	$4,640,419	$3,218,136			
2036	$6,822,084	$1,447,811	$8,269,894	$1,673,914	$184,676	$293,952	$103,789	$2,569,705	$4,826,036	$3,443,858			
2037	$7,197,298	$1,505,723	$8,703,021	$1,740,871	$192,063	$305,710	$107,940	$2,672,493	$5,019,077	$3,683,944			
2038	$7,593,149	$1,565,952	$9,159,102	$1,810,506	$199,745	$317,939	$112,258	$2,779,393	$5,219,841	$3,939,261			
2039	$8,010,773	$1,628,590	$9,639,363	$1,882,926	$207,735	$330,656	$116,748	$2,890,569	$5,428,634	$4,210,729			
2040	$8,451,365	$1,693,734	$10,145,099	$1,958,243	$216,045	$343,883	$121,418	$3,006,191	$5,645,780	$4,499,320			
2041	$8,916,190	$1,761,483	$10,677,674	$2,036,573	$224,686	$357,638	$126,275	$3,126,439	$5,871,611	$4,806,063			
2042	$9,406,581	$1,831,943	$11,238,523	$2,118,035	$233,674	$371,944	$131,326	$3,251,497	$6,106,475	$5,132,048			
2043	$9,923,943	$1,905,220	$11,829,163	$2,202,757	$243,021	$386,821	$136,579	$3,381,556	$6,350,734	$5,478,429			
2044	$10,469,760	$1,981,429	$12,451,189	$2,290,867	$252,742	$402,294	$142,042	$3,516,819	$6,604,764	$5,846,425			
2045	$11,045,596	$2,060,686	$13,106,283	$2,382,502	$262,851	$418,386	$147,724	$3,657,491	$6,868,954	$6,237,328			
2046	$11,653,104	$2,143,114	$13,796,218	$2,477,802	$273,365	$435,121	$153,633	$3,803,791	$7,143,712	$6,652,506			
2047	$12,294,025	$1,651,318	$13,945,343	$2,576,914	$284,300	$452,526	$159,778	$2,030,875	$5,504,393	$8,440,950			
2048	$12,970,196	$1,693,000	$14,663,196	$2,679,991	$295,672	$470,627	$166,169	$2,030,875	$5,643,334	$9,019,863			
2049	$13,683,557	$1,736,350	$15,419,907	$2,787,190	$307,499	$489,452	$172,816	$2,030,875	$5,787,832	$9,632,075			
2050	$14,436,153	$1,781,433	$16,217,586	$2,898,678	$319,799	$509,030	$179,728	$2,030,875	$5,938,110	$10,279,475			
2051	$15,230,141	$1,828,320	$17,058,461	$3,014,625	$332,591	$529,392	$186,918	$2,030,876	$6,094,401	$10,964,060			

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)
2 Opening day rail operating costs (2031) estimated at $2,112,110 ($792,288) inflated at 4%
3 Construction Cost Total $36,140,000 over four years with DEIS $1,000,000, FEIS $1,640,000, First Year Construction $18,000,000 Second Year Construction $15,500,000

2015 Commuter Rail Transit with 3rd Quarter Cent

Sales Tax Growth Rate 5.50%

Operating Cost Growth Rate 4.00%

Construction Inflation 3.00%

FY Year	Sales Tax Revenue	Countywide 3rd Quarter Cent		Fare box	Total Revenue	Operating Cost						Net Revenue	Construction Cost	Debt Service
		Sales Tax Revenue	Transit District			Route 630	Route 685	Route 638	Para Transit	CRT	Total			
2006		$1,210,778				$516,099	$56,939	$90,631	$32,000	$792,288	$695,669			
2007		$1,277,371				$536,743	$59,217	$94,256	$33,280	$823,980	$723,496			
2008	$761,760	$1,347,627		$225,731	$987,491	$558,213	$61,585	$98,026	$34,611	[illegible]	$752,436	$235,055		
2009[1]	$1,607,314	$1,421,746		$234,760	$1,042,074	$580,541	$64,049	$101,948	$35,996		$782,533	$1,059,540		
2010	$1,695,716	$1,499,942		$244,150	$1,939,866	$603,763	$66,611	$106,025	$37,435		$813,834	$1,126,032		
2011	$1,788,980	$1,582,439	$791,220	$253,916	$2,834,116	$627,913	$69,275	$110,266	$38,933		$846,388	$1,987,728		
2012	$1,887,374	$1,669,473	$834,737	$264,073	$2,986,184	$653,030	$72,046	$114,677	$40,490		$880,243	$2,105,940	$1,194,052	
2013	$1,991,180	$1,761,294	$880,647	$274,636	$3,146,463	$679,151	$74,928	$119,264	$42,110		$915,453	$2,231,010	$2,016,993	$0
2014	$2,100,695	$1,858,165	$929,083	$285,621	$3,315,399	$706,317	$77,925	$124,035	$43,794		$952,071	$2,363,328	$22,801,861	$866,250
2015[2]	$2,216,233	$1,960,364	$980,182	$297,046	$3,493,461	$734,570	$81,042	$128,996	$45,546		$990,154	$2,503,307	$20,223,984	$1,863,750
2016	$2,338,126	$2,068,184	$1,034,092	$635,477	$4,007,695	$763,953		$134,156	$47,368	$1,172,780	$2,118,256	$1,889,439		$1,863,750
2017	$2,466,723	$2,181,935	$1,090,967	$660,896	$4,218,586	$794,511		$139,522	$49,263	$1,219,691	$2,202,986	$2,015,599		$1,863,750
2018	$2,602,392	$2,301,941	$1,150,971	$687,332	$4,440,695	$826,291		$145,103	$51,233	$1,268,479	$2,291,106	$2,149,589		$1,863,750
2019	$2,745,524	$2,428,548	$1,214,274	$714,825	$4,674,623	$859,343		$150,907	$53,282	$1,319,218	$2,382,750	$2,291,873		$1,863,750
2020	$2,896,528	$2,562,118	$1,281,059	$743,418	$4,921,005	$893,716		$156,944	$55,414	$1,371,986	$2,478,060	$2,442,944		$1,863,750
2021	$3,055,837	$2,703,034	$1,351,517	$773,155	$5,180,509	$929,465		$163,221	$57,630	$1,426,866	$2,577,183	$2,603,326		$1,863,750
2022	$3,223,908	$2,851,701	$1,425,851	$804,081	$5,453,839	$966,644		$169,750	$59,935	$1,483,941	$2,680,270	$2,773,569		$1,863,750
2023	$3,401,223	$3,008,545	$1,504,272	$836,244	$5,741,739	$1,005,309		$176,540	$62,333	$1,543,298	$2,787,481	$2,954,259		$1,863,750
2024	$3,588,290	$3,174,015	$1,587,007	$869,694	$6,044,991	$1,045,522		$183,602	$64,826	$1,605,030	$2,898,980	$3,146,011		$1,863,750
2025	$3,785,646	$3,348,586	$1,674,293	$904,482	$6,364,420	$1,087,343		$190,946	$67,419	$1,669,231	$3,014,939	$3,349,481		$1,863,750
2026	$3,993,856	$3,532,758	$1,766,379	$940,661	$6,700,896	$1,130,836		$198,584	$70,116	$1,736,001	$3,135,537	$3,565,360		$1,863,750
2027	$4,213,518	$3,727,060	$1,863,530	$978,287	$7,055,336	$1,176,070		$206,527	$72,921	$1,805,441	$3,260,958	$3,794,377		$1,863,750
2028	$4,445,262	$3,932,048	$1,966,024	$1,017,419	$7,428,705	$1,223,113		$214,788	$75,837	$1,877,658	$3,391,396	$4,037,308		$1,863,750
2029	$4,689,751	$4,148,310	$2,074,155	$1,058,116	$7,822,022	$1,272,037		$223,380	$78,871	$1,952,765	$3,527,052	$4,294,970		$1,863,750
2030	$4,947,688	$4,376,468	$2,188,234	$1,100,440	$8,236,362	$1,322,919		$232,315	$82,026	$2,030,875	$3,668,134	$4,568,227		$1,863,750
2031	$5,219,810	$4,617,173	$2,308,587	$1,144,458	$8,672,855	$1,375,835		$241,607	$85,307	$2,112,110	$3,814,860	$4,857,995		$1,863,750
2032	$5,506,900	$4,871,118	$2,435,559	$1,190,236	$9,132,695	$1,430,869		$251,272	$88,719	$2,196,595	$3,967,454	$5,165,241		$1,863,750
2033	$5,809,780	$5,139,029	$2,569,515	$1,237,846	$9,617,140	$1,488,104		$261,323	$92,268	$2,284,458	$4,126,152	$5,490,988		$1,863,750
2034	$6,129,317	$5,421,676	$2,710,838	$1,287,360	$10,127,515	$1,547,628		$271,775	$95,959	$2,375,837	$4,291,198	$5,836,316		$1,863,750
2035	$6,466,430	$5,719,868	$2,859,934	$1,338,854	$10,665,218	$1,609,533		$282,646	$99,797	$2,470,870	$4,462,846	$6,202,371		$997,500
2036	$6,822,084	$6,034,461	$3,017,230	$1,392,408	$11,231,722	$1,673,914		$293,952	$103,789	$2,569,705	$4,641,360	$6,590,362		
2037														

1 Assumes second 1/4 sales tax passes in Nov 2007 and collections start FY 2009 (July 2008)

2 Opening day rail operating costs (2016) estimated at $1,172,780 ($792,288) inflated at 4% $0

3 Construction Cost Total $36,140,000 over four years with DEIS $1,000,000, FEIS $1,640,000, First Year Construction $18,000,000 Second Year Construction $15,500,000

InterPlan Co. Transportation Planning