Foothill Drive Corridor Study

Final Report

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EXECUTIVE SUMMARY

BACKGROUND

Foothill Drive is a vital corridor along the east bench of the Wasatch Mountains in Salt Lake City. The thoroughfare extends from the I-80 and I-215 freeways on its south end to the University of Utah along 500 South on the north end. It connects people to the University of Utah, Research Park, shopping areas and surrounding neighborhoods.

The Foothill Drive Corridor Study is a joint effort of the Wasatch Front Regional Council (WFRC), the Utah Department of Transportation (UDOT), the Utah Transit Authority (UTA), Salt Lake City and the University of Utah, and was managed by a Steering Committee of those agencies. The study was conducted by DMJM Harris, in association with Wilkinson Ferrari & Co. for public involvement activities and Two Hundred for web site management. The results and recommendations from this study, including public feedback, have been prepared and submitted to these agencies for their use in future transportation and community planning.

The project activities included the analysis of current and future transportation needs, the evaluation of potential impacts to transportation demand caused by future changes in land use along Foothill Drive and the identification of opportunities for future visions of the corridor.

Public involvement was vital to the study and helped the Steering Committee and consulting team to identify issues and evaluate alternatives. Two workshops and an open house were held in 2007 to evaluate issues and alternative concepts. A final workshop and open house in spring 2008 helped to review the final alternatives and proposed recommendations.

IDENTIFICATION AND EVALUATION OF ALTERNATIVES

During the initial phases of the study, several common themes were heard and became the foundation for further development of improvement alternatives. These included:

- While vehicle traffic will continue to grow in the Foothill Drive corridor, the growth should be minimized by greater use of transit and other higher occupancy modes.
- A multi-modal approach is desired with a balanced strategy of traffic management, transit improvements and neighborhood amenities.
- Foothill Drive has an important regional transportation role, serving both vehicle traffic and regional transit services.
- Improved transit service is an important future strategy, but should extend beyond the corridor, connecting the University and Research Park destinations with multiple origins.
- There is a strong desire for the corridor to look better, including improved and more uniform sidewalks and attractive landscaping.

Four specific alternatives were identified for evaluation, each providing variations in the bus, HOV and general auto lane configurations and each providing a slightly different level of transit service and community amenities. These alternatives were:

1. **Bus Rapid Transit in Dedicated Median**
2. **Managed Lanes with Shoulder Bus/HOV Lane**
3. **Peak Hour Bus/HOV Lane**
4. **Six Lanes Throughout with Enhanced Bus Service**

These alternatives were evaluated in greater detail and reviewed with the community. Final study recommendations were then prepared in response to this review.

CONCLUSIONS AND RECOMMENDATIONS

Transit Needs and Issues

There is relatively low transit demand for trips having both an origin and destination in the Foothill Drive corridor –due to the current land use pattern, the limited level of local transit service and the relatively poor condition of transit facilities (stops, waiting areas).

The corridor primarily serves regional trips to and from the University and Research Park – these transit services are reasonably effective, but there is not currently a high level of transit service. The University has a strong and effective program to encourage transit usage.

Transit travel times on Foothill Drive in the peak are relatively slow due to peak period auto congestion – there are no current provisions for transit priority. The regional nature of the corridor makes it a long range candidate for higher capacity transit (BRT or LRT) as an element of the regional plan.

Recommended Transit Strategies

- Near to mid-term transit improvements should give priority to improved commuter express service (Fast Bus) – adding new lines (including potential service from Park City) and increasing the number of peak trips and adding mid-day service to the current Fast Bus routes (354 and 313).
- A second, lower priority would be more frequent local service (15 minute frequency) as demand warrants.
- Shorter, peak period travel times on Foothill Drive are desirable and would increase transit usage. A peak bus or bus/HOV lane, combined with Transit Signal Priority, would best achieve higher speeds and reduced travel times.
- Bus stops along Foothill Drive should be improved in conjunction with sidewalk and streetscape upgrades. Priorities should be better, ADA compliant boarding areas, improved lighting and new benches. Shelters should be considered at some stops if warranted by future growth in ridership.

- Bus Rapid Transit in the Foothill Drive corridor is a potential longer range strategy if developed as part of a regional service extending south of I-80 and/or north to downtown Salt Lake.

Roadway Needs and Issues

Traffic demand and delays are greatest (now and in 2030) at Foothill Drive and Sunnyside Avenue. Intersection improvements and added capacity at that location would have the greatest benefit in improving traffic conditions.

Foothill was identified as a candidate for Managed Lanes (UDOT Managed Lane Study) based in part on the high peak directional traffic split (80/20 in the AM and 70/30 in the PM). Development of managed (reversible) lanes in the corridor has the potential to improve peak direction capacity without requiring additional right-of-way. Left turn movements are not high along the corridor, but are important for access to businesses and adjacent neighborhoods and should be retained for the most part.

The Bus/HOV Lane option, in combination with Sunnyside Avenue improvements, appears to have the greatest benefit in terms of reducing delays and encouraging alternative modes.

Recommended Roadway and Traffic Strategies

- Priority should be given to near term improvements at Sunnyside Avenue in order to mitigate current and future peak traffic impacts. The most effective traffic improvements appear to be the addition of a third left turn lane on Sunnyside and providing northbound and eastbound right turn overlap phases. A “Michigan Left” or a Continuous Flow Intersection (CFI) design for handling left turns should also be investigated further (see Appendix C for more information).
- For the longer term, a peak period, peak direction Bus/HOV Lane is recommended, to be developed in conjunction with expanded transit service and TDM efforts at the University and Research Park.
- The limits of the Bus/HOV Lane should extend from I-80 to north of Sunnyside Avenue as needed for operational effectiveness (PM southbound lane may need to extend further north (e.g. Wasatch Drive) due to the length of the traffic queue). Establishment of the Bus/HOV Lane would vary in the two Foothill segments:
    - North of 2300 East – the existing peak direction curb lane would be converted to Bus/HOV use only in the peak period.
    - South of 2300 East – a new, peak period Bus/HOV Lane would be constructed, reverting to a general purpose lane in the off-peak.
- Additional peak direction capacity (particularly at Sunnyside) is needed to support the establishment of the Bus/HOV Lane. The development of Managed Lanes should be further explored as a potential complement to the Bus/HOV Lane and a strategy to avoid or minimize right-of-way impacts.

- The University, Research Park, the Medical Center and other large employers in the area should be encouraged to continue and expand Transportation Demand Management (TDM) strategies to reduce peak hour traffic congestion in the corridor.

Community Amenities and Pedestrian Provisions

The community has expressed interest in better streetscape and landscaping provisions to improve the quality and attractiveness of the corridor. The current narrow sidewalks and the two-way left turn lane constrain opportunities for improvement. Pedestrian movement along the corridor is relatively low, due in part to the poor condition of the sidewalks (narrow, uneven, no traffic buffer). Other issues include the need for improved pedestrian crossings of Foothill Drive at intersections and wider areas for snow removal.

There is potential to establish a better streetscape environment with wider sidewalks and a park strip buffer area. Space for a wider sidewalk exists within the corridor cross-section, but may require trade-offs with turn lanes and added lanes (or require additional right-of-way, at intersections for example).

Recommended Strategies

- Improved and widened sidewalks offer the best strategy to improve the pedestrian environment and add landscaping. Sidewalk improvements would provide a more level and safe walkway and a landscaped buffer from traffic.
- Sidewalk improvements can be pursued in conjunction with the addition of the Bus/HOV Lane. In some areas, narrower lanes or elimination of the median turn lane could provide space for the wider sidewalks. In other areas, minor right-of-way acquisition may be required.
- In some locations south of 2300 East, there are opportunities to add a landscaped median replacing the turn lane in areas with limited need for left turns.
- Improved pedestrian crossings of Foothill Drive can be addressed by adding countdown timers at key locations and reviewing pedestrian signal timing.
- A preliminary design study is needed to determine the specific roadway design, lane configuration and right-of-way needs. This study would look at parking, turning, driveway access, pedestrian volumes and other traffic issues on a block-by-block basis.

Bicycle Provisions

There are no current designated or planned bicycle lanes on Foothill Drive and cyclists are discouraged from using Foothill due to high traffic volumes and speeds (primarily a peak period issue). Alternative bicycle routes in the corridor are encouraged. They include 2100 East and 2300 East (both marked bike lanes). There is also a designated bicycle route along Wasatch Drive. This route is part of the Bonneville Shoreline Trail and is classified as a *signed shared roadway*. This trail remains nearly parallel to Foothill Drive until 1300 South where it heads east

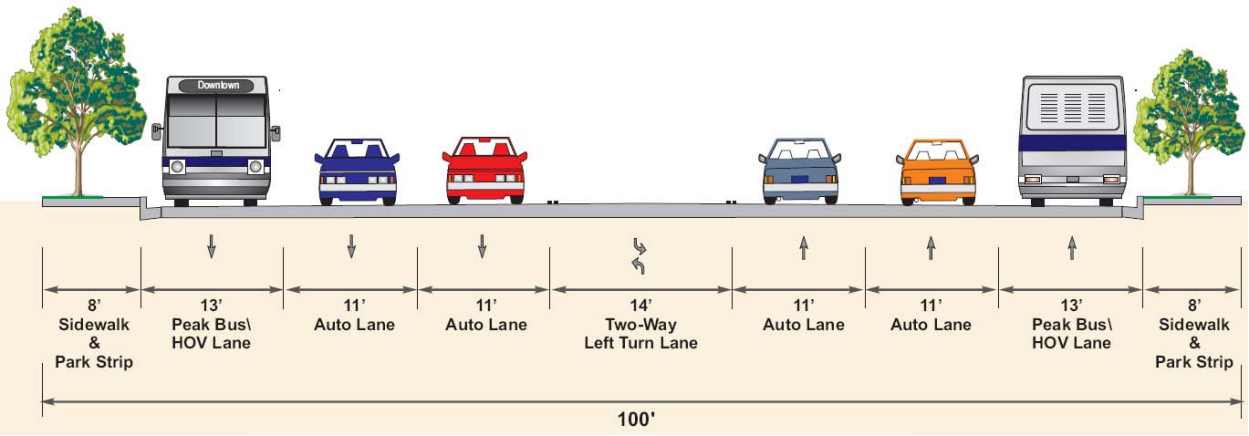
and thus is currently not a good alternative for travel to the University area. This route includes a shared use path on the south end of the corridor (running on the east side of Foothill from Thunderbird Drive) connecting to the Bonneville Shoreline Trail. A recently completed bicycle/pedestrian bridge over I-215 just south of I-80 has extended this trail.

Recommended Strategies

- Continued emphasis on parallel bicycle routes with improvements is recommended.
- Suggested improvement strategies include:
    - Extend shared use path north to intersect with Wasatch Drive at Broadmore St.
    - Construct a new bicycle path through the Bonneville Golf Course to connect Wasatch Drive with the existing bicycle lanes on Sunnyside and Arapeen (providing a more direct route to Research Park and the University).

POTENTIAL ROADWAY CROSS-SECTION

The following cross-section illustrates a potential modification of Foothill to provide the bus/HOV lane along with some additional sidewalk and landscape upgrades, while retaining the lane for turn movements in most locations.



RECOMMENDED ACTION PLAN

Implementation of the recommended improvements on Foothill Drive should occur in a phased manner. Initially, more modest actions would establish the foundation for the subsequent, longer term upgrades. For example, programs that expand transit and rideshare use are needed to allow the later success of the proposed Bus/HOV Lane. Following are the key proposed near and longer term actions with the primary responsible agencies.

Near Term

- Increase commuter express transit service and expand TDM efforts (UTA and University of Utah).
- Investigate traffic improvements at Sunnyside and implement preferred improvements (UDOT).
- Improve pedestrian safety at intersections (City).
- Develop design for addition of Bus/HOV Lanes, including a plan for adequate roadway capacity and addressing sidewalk and landscape improvements (UDOT and City).
- Design plans for bicycle path through golf course (City).

Longer Term

- Implement Bus/HOV Lanes and related roadway improvements (UDOT).
- Improve sidewalks and add landscaping in conjunction with Bus/HOV Lane (UDOT and City).
- Construct new bike path through golf course (City).

1.0 BACKGROUND / PROJECT DESCRIPTION

The Foothill Drive Corridor Study is a joint effort of the Wasatch Front Regional Council (WFRC), the Utah Department of Transportation (UDOT), the Utah Transit Authority (UTA), Salt Lake City and the University of Utah, and was managed by a Steering Committee of those agencies. The study was conducted by DMJM Harris, in association with Wilkinson Ferrari & Co. for public involvement activities and Two Hundred for web site management. The results and recommendations from this study, including public feedback, have been prepared and submitted to these agencies for their use in future transportation and community planning.

The purpose of the Foothill Drive Corridor Study was to evaluate transportation needs in the Foothill Drive Corridor, extending from I-80 and I-215 to the south edge of the University of Utah campus. Potential land use changes were considered and transportation alternatives developed to potentially better serve existing and future needs.

The study consisted of five work tasks:

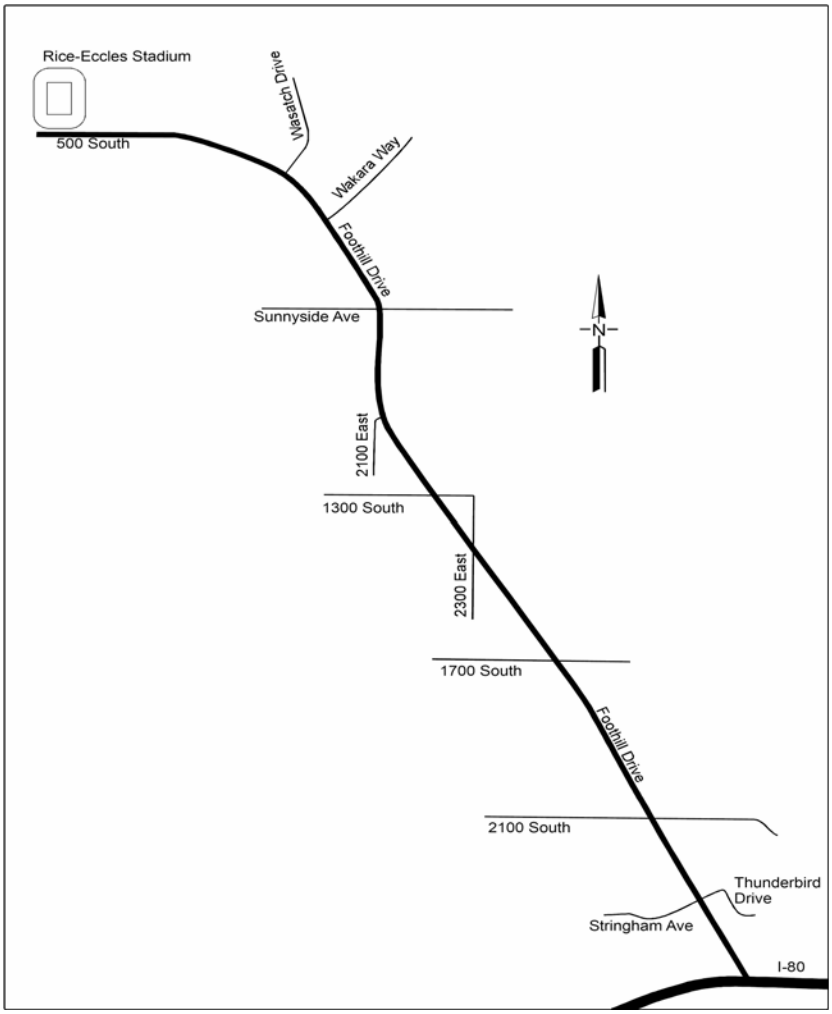
Task 1 – Public Participation Process
Task 2 – Land Use
Task 3 – Analysis and Recommendations for Roadway Improvements
Task 4 – Analysis and Recommendations for Transit Improvements
Task 5 – Action/Implementation Plan

This Final Report provides a summary of Tasks 1 and 2 (with additional information provided as appendices) and the conclusions and recommendations resulting from Tasks 3, 4 and 5.

Current Roadway Cross-Section and Right-Of-Way

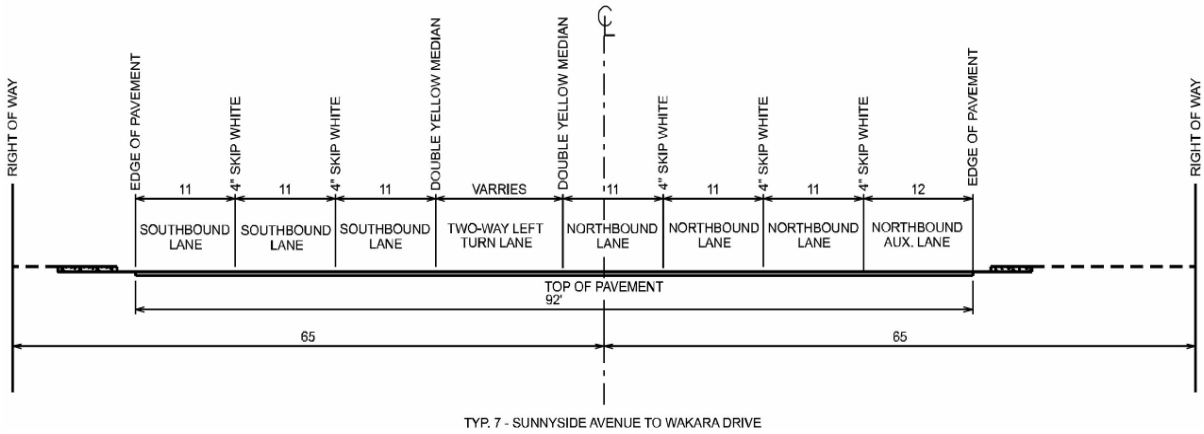
The Foothill Drive Corridor extends from I-80 on the south to Rice-Eccles Stadium on the north, which is approximately four miles. Figure 1 illustrates the general location of the nine signalized intersections (Wasatch Drive, Wakara Way, Sunnyside Avenue, 2100 East, 1300 South, 2300 East, 1700 South, 2100 South, and Stringham Avenue/Thunderbird Drive) along Foothill Drive.

Figure 1 Foothill Drive Corridor



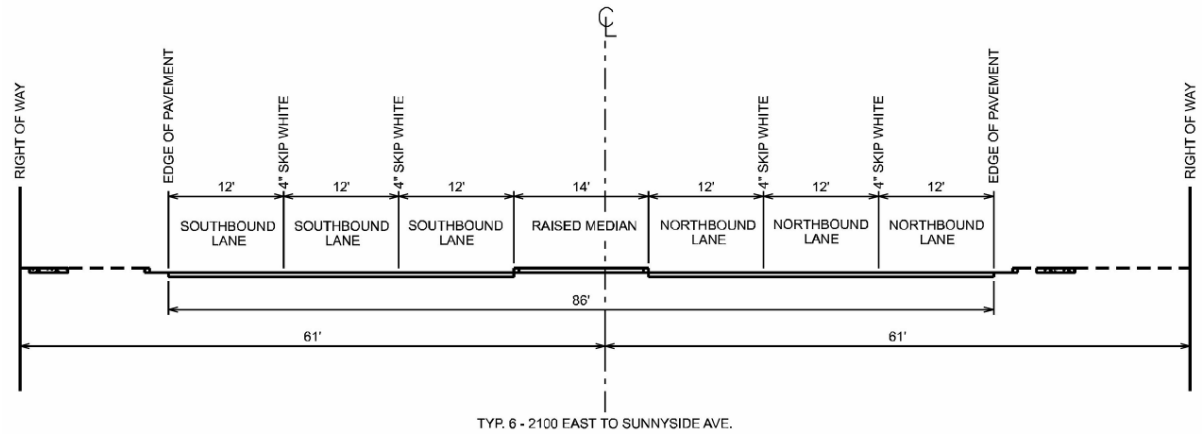
The cross section along Foothill Drive varies from a 100-foot right-of-way with two traffic lanes in each direction at the south end to a 130-foot right-of-way with four traffic lanes northbound and three traffic lanes southbound north of Sunnyside Avenue. The Baseline Conditions Report provides detailed information on the specific cross-sections throughout the corridor. For purposes of developing alternatives, three basic configurations should be referenced, due to the variation in available right-of-way and other factors. These three cross-sections are illustrated on the following page.

North of Sunnyside – This segment has a 130 foot right-of-way with multiple lanes handling the highest traffic flow; some widening potential exists within the available right-of-way.



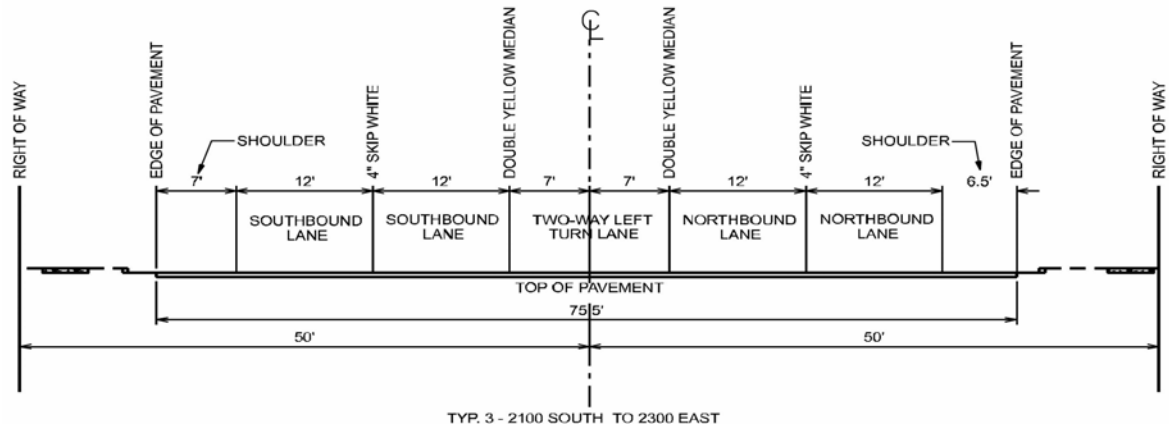
TYP. 7 - SUNNYSIDE AVENUE TO WAKARA DRIVE

2100 East to Sunnyside – This segment has a 122 foot right-of-way with six lanes of traffic and a raised, landscaped median.



TYP. 6 - 2100 EAST TO SUNNYSIDE AVE.

South of 2100 East – While there are variations in the cross-section, this segment has a 100 foot right-of-way throughout. From 2100 East to 2300 East, there are six (generally 11-foot) lanes. South of 2300 East, there are four (12-foot) lanes.



TYP. 3 - 2100 SOUTH TO 2300 EAST

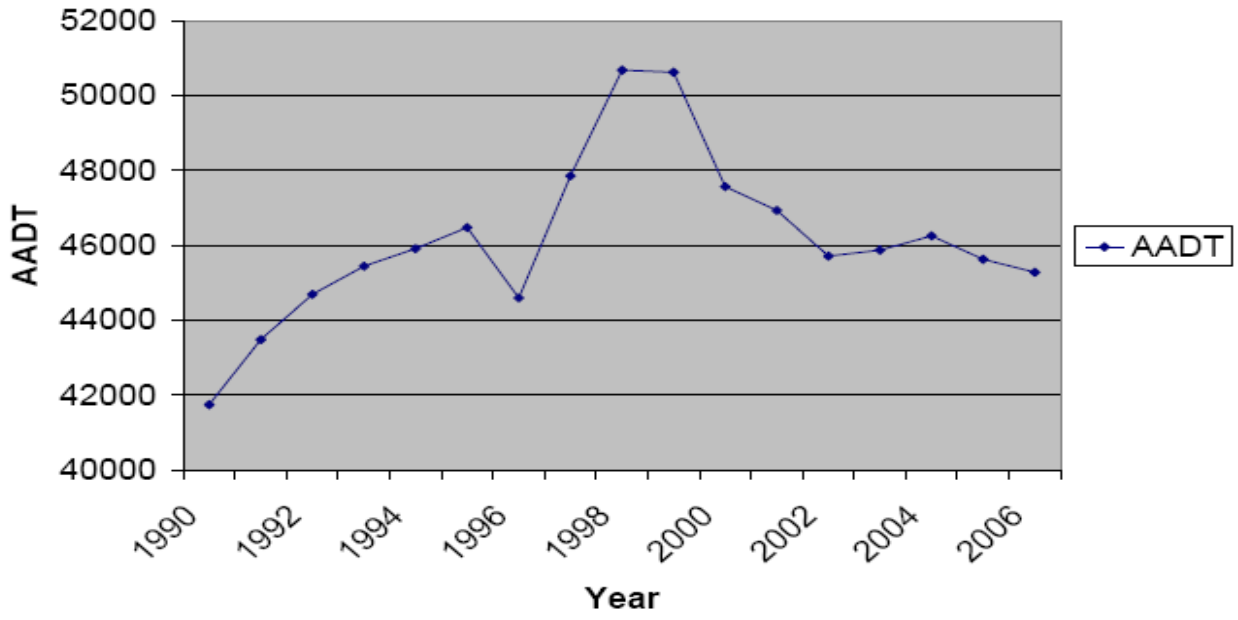
Existing Traffic Conditions

Foothill Drive is a major commuter road leading from I-80 and I-215 on the south to Research Park, the University of Utah, and the Medical Center near the northern end of the Foothill Drive Corridor. Foothill Drive also provides a fairly direct route between Park City and Summit County to the east side of Downtown Salt Lake City. Multiple roads feed onto Foothill Drive throughout the corridor.

Figure 2 provides the average annual daily traffic (AADT) from 1990 to 2006 on Foothill Drive south of Sunnyside Avenue. The AADT along the Foothill Drive Corridor remained fairly constant from 2002-2006 and overall the growth rate has been very low along the corridor. The higher traffic volumes in the late 1990's occurred when I-15 in the Salt Lake Valley was being reconstructed, and before the east/west light rail line between downtown Salt Lake and the University of Utah was opened.

Traffic counts were collected from UDOT for all nine study intersections during both the A.M. and P.M. peak hour, except for the 2300 East/Foothill Drive intersection which only has an A.M. peak hour count. The dates of the counts vary but the majority of the counts are from the spring of 2007. Data on average running times was also tabulated. This and other background information was summarized in the Baseline Conditions Report.

Figure 2 Average Annual Daily Traffic



Source: UDOT Permanent Automatic Traffic Recorder Station at 900 South

2.0 PUBLIC PARTICIPATION PROCESS

Public involvement strategies were essential to the Foothill Drive Corridor Study to make sure that public issues were considered during the planning process. The study team worked with project sponsors, city officials, community councils, businesses, bicycle organizations and residents to identify and address public issues regarding the future of Foothill Drive.

The public involvement process for the Foothill Drive Corridor Study included three primary objectives:

- Elevate awareness about the project.
- Identify stakeholder issues and concerns early in the study-process.
- Develop and implement a communications strategy to inform and involve the public in the planning process.

A variety of means were used to understand current public sentiments and to educate the public about the study's purpose and process.

Three community workshops were held with representatives from community councils, local businesses, bicycle organizations and the general public. Workshop attendees provided the study team with specific feedback regarding land use, traffic, bicyclists, pedestrians, safety and growth issues. During the July 2007 workshop, the attendees were asked to identify the key issues, challenges and concerns for the corridor that they wanted to see addressed in the study. From those key issues, the study team created potential options or "visions" for the corridor and presented the information at the September 2007 workshop.

In November 2007, a public open house was held to provide the public with an opportunity to review the identified study issues and potential visions for the corridor. Public comments were summarized and reviewed with the study team. Study alternatives were then developed to address the issues discussed in the workshops and public open house.

A final workshop was held in February 2008 to discuss the study alternatives; participants were divided into small groups to talk about the advantages and disadvantages of each alternative. The alternatives were also presented to the public at the May 2008 Final Public Open House along with a set of draft recommendations. A summary of public comments was sent to the study team for review.

The reports describing the individual workshops and open houses and summarizing the comments received are provided in Appendix A.

Project materials, such as fact sheets, comment forms, the project website (found at www.wfrc.org) and content for community newsletters, were distributed throughout the study. The study team participated in two Salt Lake City Town Hall meetings to provide an update on the study, and study representatives met individually with concerned residents and community councils. Three feature stories about the Foothill Drive Study ran in the Sugar House Valley Journal. Smaller stories were covered by The Deseret Morning News and KSL TV.

3.0 ILLUSTRATIVE LAND USE CONCEPT

Base land use information utilized in this study was developed by Urban Planning students at the University of Utah for class work in the Spring of 2007 (URBL 4280) in partnership with Salt Lake City, the Wasatch Front Regional Council (WFRC) and the Utah Transit Authority (UTA).

The product of the student class work, *Foothill Drive Land Use Study* prepared by Derrick Cox, Andrew King, Michael Manoukian, and Camille Petersen, includes an inventory of existing conditions, analyses of the inventory information, and a preferred plan. Existing conditions inventoried included transportation, social and economic characteristics, the natural environment, and the built environment - land use. A full copy of the student report is posted on the Foothill Drive Corridor Study link on WFRC's website (www.wfrc.org).

During Task 2 – Land Use, an analysis of existing and projected land use, zoning, and proposed (re)developments within the Foothill Corridor identified several verifiable projects and future land use projections that were further analyzed to determine their potential impact on future accessibility and mobility in the corridor. Descriptions and locations of these projects and projections are *Appendix B Final Illustrated Land Use Concept Plan*.

The Plan is based upon three initial land use development scenarios that were developed reflecting future uncertainties in the real estate market and the timing of anticipated start-ups of identified land use (re)development opportunities in the corridor. These initial development scenarios reflected estimates of minimum, moderate, and maximum development potential in the corridor. Each was analyzed to determine individual project and collective scenario impacts to future transportation demand.

The results of the analysis indicate that the verifiable projects and land use projections indicated in the Plan will not greatly increase existing or future transportation demand in the corridor. Rather, the greatest impact on future travel demand in the corridor will result from additional growth in and around the University and Research Park and overall increased regional growth, particularly in the south and southeast areas of Salt Lake County. This growth will generate a moderate increase in trips that will utilize Foothill Drive as a major access corridor to the University, Research Park and downtown destinations.

4.0 IDENTIFICATION OF ISSUES AND PRELIMINARY SCREENING

The study evaluated existing conditions (including the current state of roadway, transit and other modes), identified land use opportunities, developed future concepts and strategies and conducted public outreach. Based on the two workshops with key stakeholders and a public open house held in 2007, several conclusions were reached, including:

- While vehicle traffic will continue to grow in the Foothill Drive corridor, the growth should be minimized by greater use of transit and other higher occupancy modes.
- A multi-modal approach is desired with a balanced strategy of traffic management, transit improvements and neighborhood amenities.
- Foothill Drive has an important regional transportation role, serving both vehicle traffic and regional transit services.
- Improved transit service is an important future strategy, but should extend beyond the corridor, connecting the University and Research Park destinations with multiple origins; bus services would best meet the needs in the corridor, at least for the near term.
- There is a strong desire for the corridor to look better, including improved and more uniform sidewalks and attractive landscaping; pedestrian use and safety would be enhanced with improved sidewalks, crosswalks, medians and lighting.
- There is support for limited widening (within the existing right-of-way to the extent possible), primarily for transit, sidewalks and the improved look of the corridor – traffic should be managed using the existing vehicle lanes plus limited intersection improvements.

Given these results, the broader concepts were narrowed in order to develop specific alternatives. These alternatives are based on the following general conclusions:

- Rail transit does not seem to fit the corridor needs, at least for now:
    - TRAX (light rail) is well-supported and could be a longer-term strategy, but should be developed as a regional service extending further south.
    - A streetcar line in the corridor would require additional transfers, is not regional and would probably not attract sufficient usage.
- The addition of a continuous new traffic lane would conflict with other corridor priorities and does not appear justified if other traffic management strategies can address the peak period needs. However, adding lanes in the southern section to provide six lanes the length of Foothill Drive should be investigated to determine how that might improve traffic flow.
- A fully-featured Bus Rapid Transit (BRT) service (requiring a permanent dedicated lane and frequent, all-day service) does not seem to fit with the current peak period, commute-oriented need, or with the land use characteristics, in the corridor. However, further investigation of BRT is warranted in order to understand the potential impact of BRT as a long term strategy. The BRT guideway could primarily serve peak commuter routes initially, evolving to full BRT in the future.

- The following alternatives should be considered for further, more detailed investigation:
    - Reversible lanes for traffic or for transit operations
    - Intersection improvements, including provisions for transit priority
    - Peak hour bus lanes combined with increased commuter bus service; in the off-peak, the lane could be used for turn movements or shoulder / parking
    - Enhanced bus service in the corridor, with more frequent service, special bus stop designs, signal priority and queue-jump lanes, but no continuous bus lane
    - Upgraded sidewalks and expanded and improved landscaping
    - Alternative strategies for bicycle travel in the corridor

Four specific alternatives were developed using various combinations of the above strategies. The remainder of this report provides a detailed description and evaluation of these potential alternatives.

Opportunities and Constraints

The identification and evaluation of alternatives should consider, in addition to the broader community concerns and conclusions discussed above, the specific opportunities and constraints provided within the corridor itself. These include:

Opportunities

- Adequate right-of-way (100 to 130 feet) to accommodate alternative lane configurations
- Property set-backs in many segments allow the potential for minor right-of-way expansion, if needed, to provide desired improvements
- Strong peak directional traffic split provides reversible lane opportunity
- Relatively good existing traffic level-of-service (LOS A to C) south of Sunnyside
- Turning movements are relatively low in most segments; some could be eliminated
- Limited use of median turn lane, especially south of 2300 East
- Limited on-street parking demand in corridor

Constraints

- Need to maintain, or provide alternatives for, existing left movements and property access – particularly in the Foothill Village area
- Direct residential frontage in many segments
- Desire for better sidewalks and landscaping may require added right-of-way
- Raised, landscaped median in segment north of 2100 East limits some options if maintained

5.0 DESCRIPTION OF ALTERNATIVES

Four alternatives were identified for evaluation, each providing variations in the bus, HOV and general auto lane configurations and each providing a slightly different level of transit service and community amenities. All of the alternatives are assumed to include transit improvements such as transit signal priority and upgraded transit stops (e.g. better shelters and lighting). The four alternatives are:

1. Bus Rapid Transit in Dedicated Median

2. Managed Lanes with Shoulder Bus / HOV Lane

3. Peak Hour Bus / HOV Lane

4. Six Lanes Throughout with Enhanced Bus Service

The following summary table shows the proposed lane configurations and the handling of the median for the four alternatives compared to existing conditions.

Table 1 Summary of Alternatives

ALTERNATIVE	NORTH OF 2300 EAST				SOUTH OF 2300 EAST			
	NUMBER OF LANES			MEDIAN	NUMBER OF LANES			MEDIAN
	AUTO	BRT	BUS / HOV		AUTO	BRT	BUS / HOV	
EXISTING	6	–	–	YES	4	–	–	TWO WAY TURN LANE
1. BUS RAPID TRANSIT	6	1(R)	–	NO	4	2	–	NO
2. MANAGED LANES	4+ 1(R)	–	2	TURN LANE OFF-PEAK	4+ 1(R)	–	2	TURN LANE OFF-PEAK
3. PEAK BUS / HOV LANE	4	–	2	YES	4	–	2	NO
4. SIX LANES & ENHANCED BUS	6	–	**	YES	6	–	–	YES

(R) = REVERSIBLE LANE ** = QUEUE JUMP TREATMENT AT SUNNYSIDE

Detailed Description of the Alternatives

Alternative 1 - Bus Rapid Transit in Dedicated Median

This alternative provides a Bus Rapid Transit guideway in the corridor, similar to those being developed in other communities (e.g. Cleveland's Euclid Corridor project), as well as the UTA BRT project on 3500 South. The BRT guideway would have two different configurations, depending on the number of auto lanes. The basic cross-section for this alternative for the four-lane segment, south of 2300 East, includes a two-lane Bus guideway (Figure 3). Widened sidewalks and added landscaping can also be provided in this segment. In the six-lane segment, north of 2300 East, the BRT lane would become a single, reversible bus lane, serving northbound trips in the morning and southbound trips in the afternoon (Figure 4).

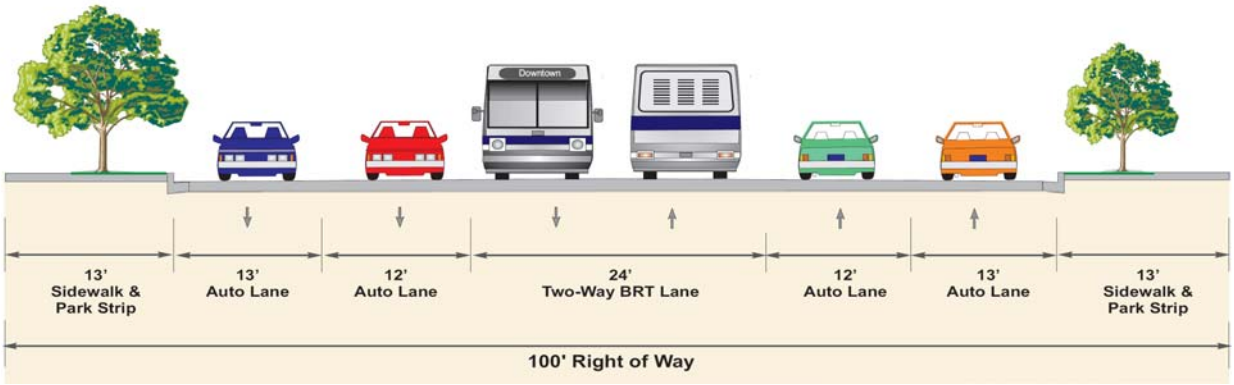


Figure 3 BRT Operation South of 2300 East

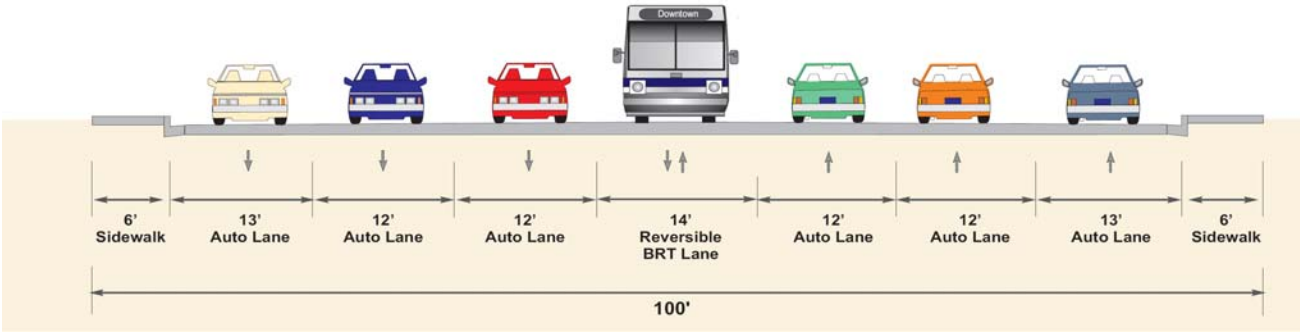


Figure 4 BRT Operation North of 2300 East

Transit Service Plan – For this alternative, BRT service will include high frequency (~ 7 ½ minute) service on Foothill Drive to the University area supplemented with 5 or more commuter express lines operating in the peak. BRT service would have 2-3 stops on Foothill, while express lines would be non-stop. BRT travel times would be comparable to off-peak times, benefiting from the dedicated bus lane.

Alternative 2 - Managed Lanes with Shoulder Bus / HOV Lane

This alternative would utilize the existing two-way left turn lane as a reversible auto lane in peak hours, serving peak direction trips. Buses and carpools would operate in a peak period outside lane (that would revert to a shoulder or a general purpose auto lane in the off-peak, depending on the segment). An initial alternative (Figure 5) was developed using just the median turn lane as a reversible lane, requiring restrictions to left turns during peak periods.

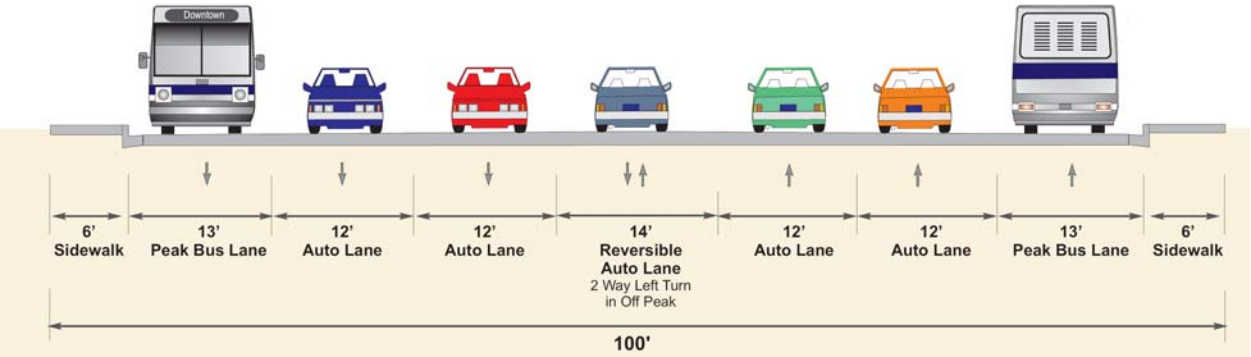


Figure 5 Initial Managed Lane Concept

Initial review of this option resulted in considerable agency and public concern regarding the left turn restrictions. In order to preserve left turn movements, a second option (Figure 6) was developed that would modify movements in the two inside lanes, shifting the location of the turn lanes in the peak, as shown in the cross-section below.

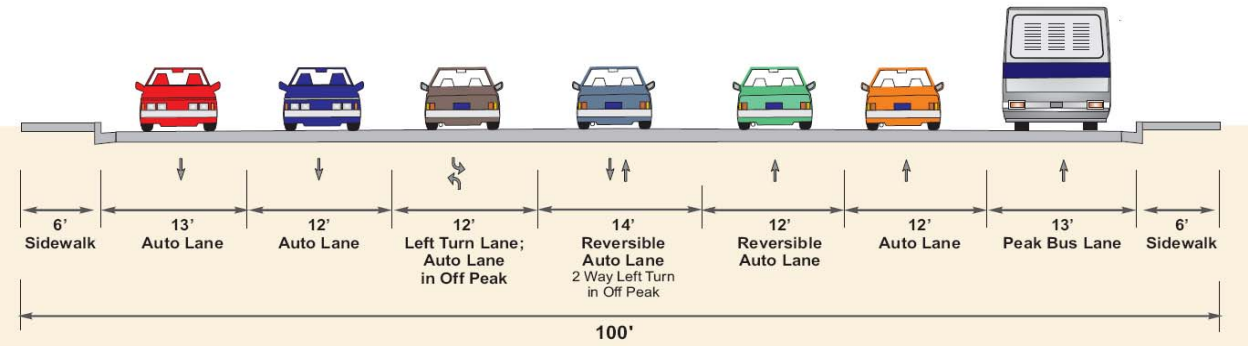
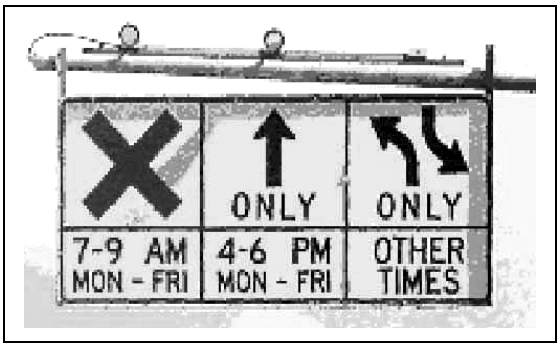


Figure 6 Modified Managed Lane Concept

Foothill Drive was identified as a candidate for reversible lanes (UDOT Managed Lane Study) based in part on the high peak directional traffic split (80/20 in the AM and 70/30 in the PM). In that study, UDOT established criteria for reversible lanes, as follows:

- Volume to capacity ratio greater than 0.9 – Foothill and Sunnyside are expected to be at 1.1 in the AM and 1.5 in the PM
- Directional traffic split of 60/40 – Foothill current split is 80/20 in the AM and 70/30 in the PM
- Three lanes in both directions – Exists on Foothill north of 2300 East

Operational control and management are critical elements for reversible lanes. Overhead traffic signs every ¼ mile would control use of the lane, but special striping and other lane control would probably also be needed. Safe management of the modified option is more complex (involving two travel lanes and the median turn lane) and does not appear to have been attempted elsewhere on a major arterial such as Foothill Drive.



Transit Service Plan – A reduced level of BRT service, compared to Alternative 1, would provide 10 minute service along Foothill. Commuter express lines (4-5) would operate in the peak. Travel time savings would be significant, but somewhat reduced by the presence of carpools and right turning vehicles in the outside bus/HOV lane.

Alternative 3 - Peak Hour Bus / HOV Lane

This alternative would provide a continuous Bus/HOV Lane in peak hours. To maintain adequate capacity through Sunnyside, three general auto lanes would be provided (in addition to the HOV lane) at the intersection, merging down to two south of Sunnyside. In the four-lane segment, south of 2300 East, the current two-way turn lane median would be eliminated in order to allow for wider sidewalks and landscaping (turn lanes and parking would be retained in essential locations (Figure 7).

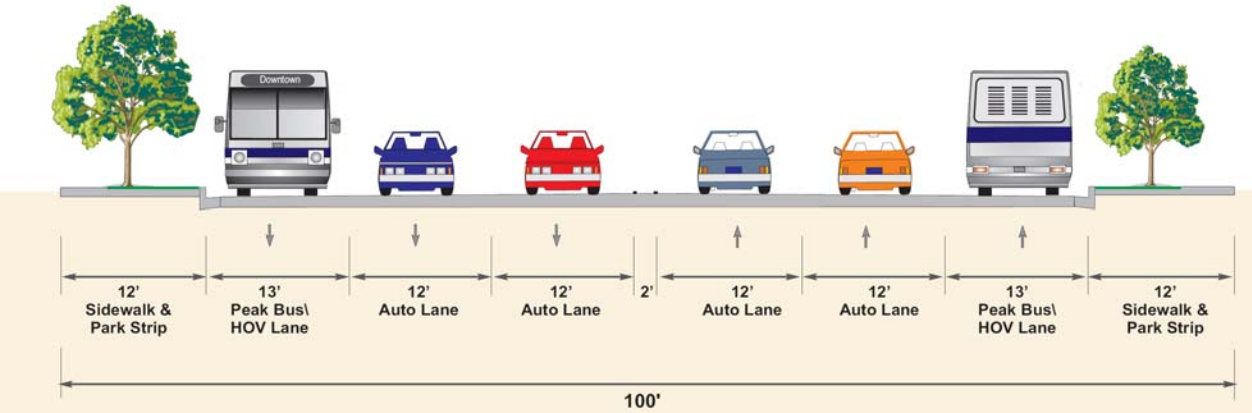


Figure 7 Peak Hour Bus / HOV Lane

Transit Service Plan – Local service would be similar to planned baseline service (15 minute frequency), but enhanced by the use of the continuous Bus/HOV Lane. A higher level, compared to the baseline, of commuter express service (3-4 lines) would operate in the peak. Travel time savings would be similar to Alternative 2.

Alternative 4 - Six Lanes Throughout with Enhanced Bus Service

This alternative would couple enhanced bus service with traffic improvements, including adding auto lanes south of 2300 East for six continuous auto lanes in the corridor. This alternative would also include a bus queue-jump lane at Sunnyside Avenue. For this option, the two-way turn lane in the southern segment would be replaced with a landscaped median and limited turn pockets, resulting in a landscaped median throughout most of the corridor.

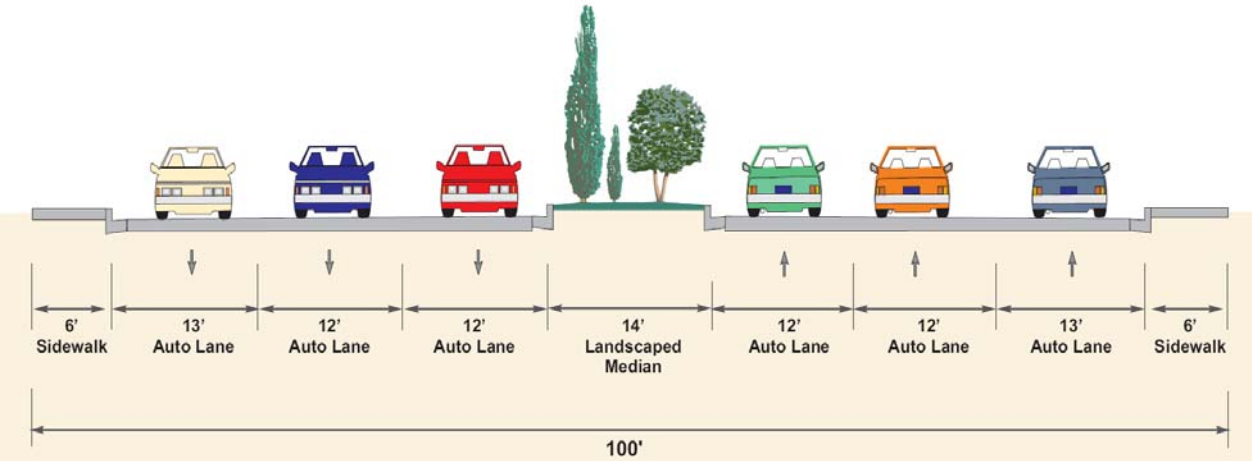


Figure 8 Six Lane Alternative

Transit Service Plan – Local service (15 minute frequency) and commuter express service (2-3 lines) would be similar to baseline service, but travel times would benefit from the planned queue-jump lane at Sunnyside (where the greatest delays occur).

6.0 EVALUATION OF ALTERNATIVES

A summary evaluation of these four alternatives was prepared and presented at the third community workshop, held in February 2008. This evaluation addressed:

- Traffic conditions in 2030 – measured in terms of LOS and intersection delay
- Total persons served by lane for each alternative
- Transit benefits – reduced travel time, improved service, new riders
- Capital costs (order of magnitude costs)
- Other improvements (qualitative measures)
    - Pedestrian conditions
    - Bicycle provisions
    - Community amenities

Traffic Analysis – A comparative analysis of four key intersections along Foothill looked at traffic level-of-service and delay at the each intersection. The results show that the Sunnyside intersection is the most critical and that Alternatives 2 and 3 provide the best improvement at that location. By comparison, the current delay at Sunnyside in the PM is about 110 seconds.

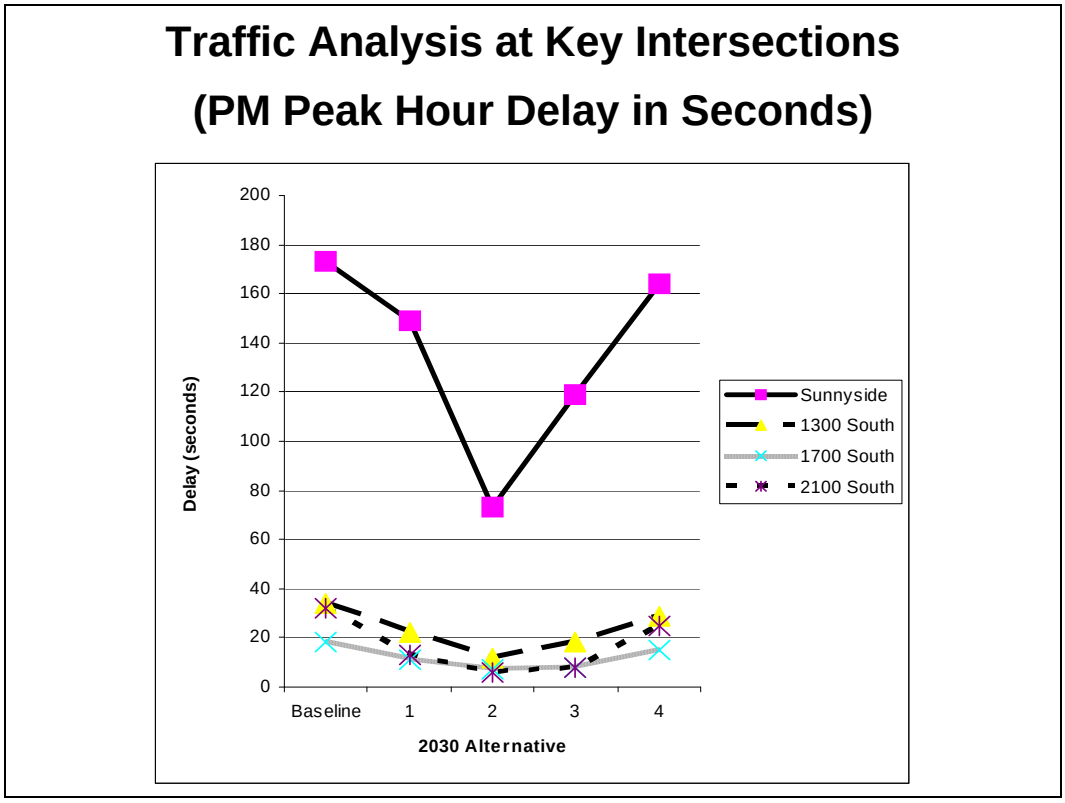
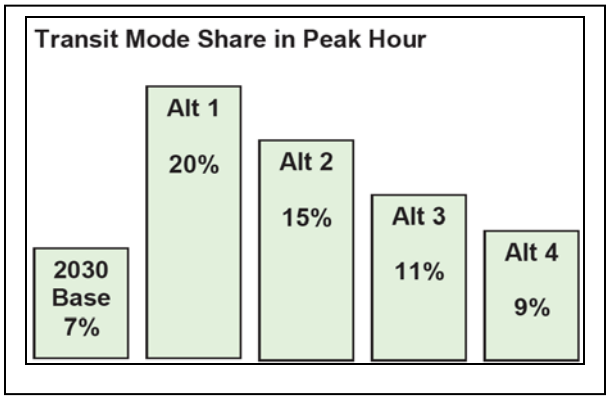
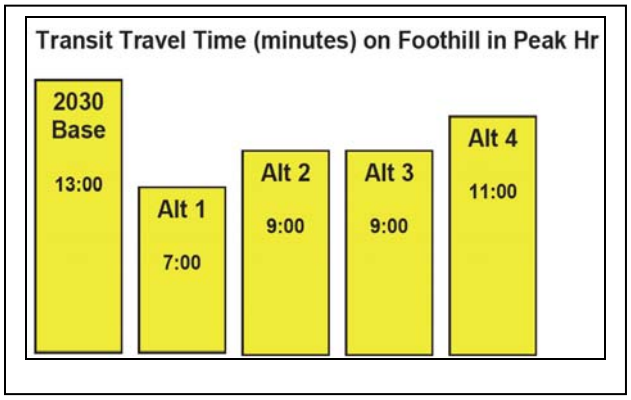


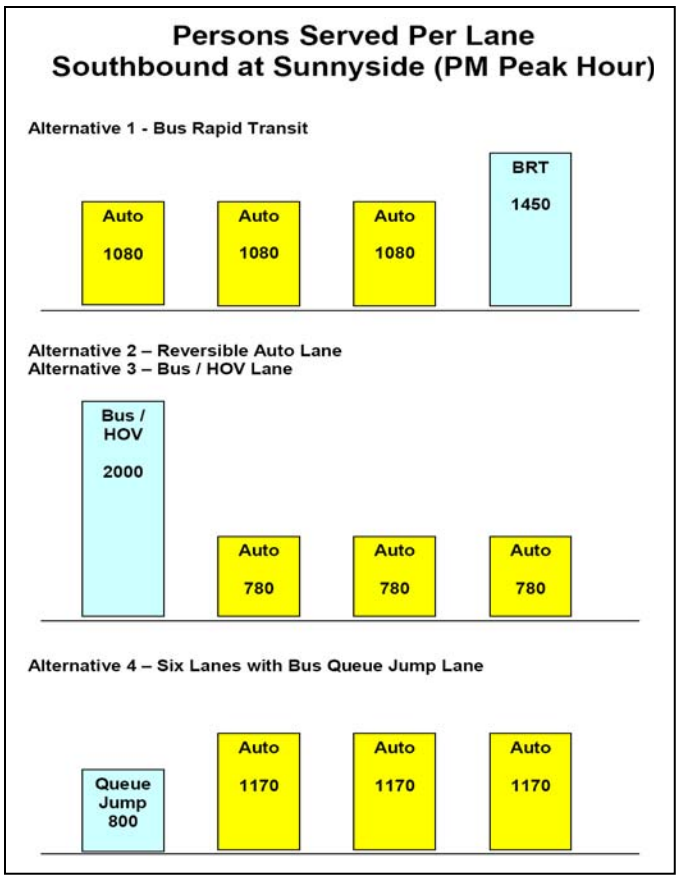
Figure 9 Intersection Delay

Transit Analysis – Transit performance for the alternatives (Figure 10) was measured in terms of transit mode share (by factoring base transit estimates from the RTP) and in travel time through the corridor (by calculating the benefit of priority treatments). As expected the BRT option performs the best and the others, with relatively less transit service and priority treatment, are less effective – though still improved over the baseline.

Figure 10 Transit Evaluation (2030 Conditions)







Persons Served – A goal of the project is to improve the person-carrying capacity of the corridor, mitigating the impact of the expected growth in person trips. The alternatives were compared in terms of person capacity per lane (Figure 11), considering the projected impact of new transit services and the benefit of providing a dedicated high-occupancy-vehicle (HOV) lane. The results (measured at Sunnyside) show that Alternatives 2 and 3 (with the Bus/HOV Lane) provide the highest single lane capacity while also reducing demand on the general purpose lanes.

Figure 11 Persons Served

Cost – The four alternatives require modest capital improvements, ranging from about $1-10 million per mile, assuming little or no right-of-way acquisition. Table 2 summarizes the estimated capital cost for each alternative. The BRT alternative would be the most costly based on similar projects. The costs for the Managed Lanes alternative could vary significantly, since there are few similar projects.

Alternative	Estimated Costs
1	$25 – 30 million
2	$15 + million
3	$7 – 10 million
4	$5 – 7 million

Table 2 Estimated Costs

Community Amenities – The community has also been interested in improved landscaping, better sidewalks and the general streetscape environment. Table 3 shows how the alternatives would address these issues.

Community Amenities

Alt.	Median	Sidewalks
Baseline	Landscaped (North) & Turn Lane	Narrow
1	BRT Lane	Widen w/ Landscape
2	Reversible Lane	No Change
3	Reduced in South	Widen w/ Landscape
4	Landscaped Throughout	No Change

Table 3 Community Amenities

7.0 DEVELOPMENT OF RECOMMENDED STRATEGIES

Based on the technical analysis of the alternatives combined with the community workshop, specific recommendations were developed as discussed below.

Transit Options

Conclusions and Observations

- There is relatively low transit demand for trips having both an origin and destination in the corridor – primarily due to the nature of land use
- The corridor primarily serves regional trips to and from the University and Research Park – these transit services are reasonably effective, but there is not currently a high level of transit service
- Transit travel times on Foothill Drive in the peak are relatively slow due to auto congestion – there are no current provisions for transit priority
- Current transit facilities (stops, waiting areas) are poor
- The regional nature of the corridor makes it a potential long range candidate for higher capacity transit (BRT or LRT) as an element of the regional plan

Alternatives

- **Bus Rapid Transit** – BRT service will include high frequency (~ 7 ½ to 10 minutes) service on Foothill Drive to the University area supplemented with 5 or more commuter express lines operating in the peak. BRT service would have 2-3 stops on Foothill, while express lines would be non-stop. BRT travel times would be comparable to off-peak times, benefiting from the dedicated bus lane.
- **Increased peak period commuter express** - A higher level, compared to the baseline, of commuter express service (3-5 lines) would operate in the peak. Travel time savings would be better than baseline conditions, but not as great as the BRT option. An alternative lower level of express service (2-3 lines) would be similar to baseline service, but travel times would benefit from the HOV Lane or the queue-jump lane at Sunnyside Avenue (where the greatest delays occur).
- **Expanded local service** - Local service would be more frequent compared to current service (15 minute frequency).

Assessment

- Estimated ridership was projected using the WFRC model results as a base, adjusting for changes in service level and travel time. Peak transit travel time was estimated from 2030 traffic projections. Characteristics of the options are summarized in Table 3.
- The WFRC model estimates for BRT were relatively strong, but were based on a longer BRT route serving downtown Salt Lake City. The Foothill Drive portion is estimated to carry about 1000 daily riders per mile.

- Express buses were projected to carry up to approximately 20% of commute trips in the specific zones served (based on current University transit usage).

Table 4 Transit Service

Transit Service	Frequency (Average in Minutes)	Buses per Hour	Peak Travel Time (Min.)	Peak Riders
Current Service				
Local Bus	30	2	11.0	120
Express Routes	10	6	9.0	138
2030 Baseline				
Local Bus	15	4	13.0	278
Express Routes	10	6	11.0	240
Transit Alternatives				
Bus Rapid Transit	7.5 - 10	6-8	7.0	470-678
Express Routes w/ BRT	5	12	6.0	600-800
Express Routes w/ HOV Lane	6-8	8-9	8.0	480-600
Enhanced Local Bus	15	4	9.0 – 11.0	300-340

Recommended Transit Strategies

- Near to mid-term transit improvements should give priority to improved commuter express service (Fast Bus) – adding new lines (including potential service from Park City) and increasing the number of peak trips and adding mid-day service to the current Fast Bus routes (354 and 313).
- A second, lower priority would be more frequent local service (15 minute frequency).
- Shorter, peak period travel times on Foothill Drive are desirable and would increase transit usage. A peak Bus or Bus/HOV Lane, combined with Transit Signal Priority, would best achieve higher speeds and reduced travel times.
- Bus stops along Foothill should be improved in conjunction with sidewalk and streetscape upgrades. Priorities should be better, ADA compliant boarding areas, improved lighting and new benches. Shelters should be considered at some stops if warranted by future growth in ridership.
- Bus Rapid Transit in the Foothill Drive corridor is a potential longer range strategy if developed as part of a regional service extending south of I-80 and/or north to downtown Salt Lake.

Roadway and Traffic Options

Conclusions and Observations

- Traffic demand and delays are greatest (now and in 2030) at Foothill Drive and Sunnyside Avenue. Added capacity at that location would have the greatest benefit in improving traffic conditions.
- Left turn movements are not high along the corridor, but are important for access to businesses and adjacent neighborhoods.
- Foothill Drive was identified as a candidate for reversible lanes (UDOT Managed Lane Study) based in part on the high peak directional traffic split (80/20 in the AM and 70/30 in the PM).
- Elimination of the landscaped median, north of 2300 East, is a community concern.

Alternatives

- **Managed Lane with Shoulder Bus / HOV Lane** - This alternative would utilize the existing two-way left turn lane as a reversible auto lane in peak hours, serving peak direction trips. Buses and carpools would operate in a peak period outside lane (that would revert to a shoulder or a general purpose auto lane in the off-peak, depending on the segment). In order to preserve left turn movements, a revised option was developed that would modify movements in the two inside lanes, shifting the location of the turn lanes in the peak, as shown in the cross-section (Figure 6).
- **Peak Hour Bus / HOV Lane** - This alternative would provide a continuous Bus/HOV Lane in peak hours. To maintain adequate capacity through Sunnyside Avenue, three general auto lanes would be provided (in addition to the HOV lane) at the intersection, merging down to two south of Sunnyside. In the four-lane segment, south of 2300 East, the Bus/HOV Lane could revert, in off-peak hours, to a new general purpose lane or to a shoulder and parking area.
- **Six Lanes Throughout** - This alternative would add auto lanes south of 2300 East for six continuous auto lanes in the corridor. This alternative would also include a bus queue-jump lane at Sunnyside.

Assessment

- The Bus/HOV Lane and added lanes at Sunnyside Avenue appears to have the greatest benefit in terms of reducing PM delays.
- Improvements at Sunnyside (e.g. HOV Lanes) would need to extend north to at least Wasatch in order to cover the PM queue back-up.
- Added general purpose lanes (for six throughout) do not significantly improve traffic conditions in the south segment of the corridor – there are constraints from driveway access points that affect these additional lanes and may require the widening of sidewalks and narrowing of the median.

- Reversible lanes may be best suited to the segment at and north of Sunnyside Avenue – a benefit of reversible lanes is a reduced right-of-way need at Sunnyside, compared with the HOV / added lanes option. Reversible lanes should also be considered south of Sunnyside for operational effectiveness as determined by a traffic analysis, although this would impact the existing landscaped median important to the neighborhood.
- Converting the Bus/HOV Lane to a shoulder and parking in the off-peak will require enforcement and parking restrictions

Recommended Roadway and Traffic Strategies

- Priority should be given to near term improvements at Sunnyside Avenue in order to mitigate current and future peak traffic impacts. The most effective traffic improvements appear to be the addition of a third left turn lane on Sunnyside and providing northbound and eastbound right turn overlap phases. A "Michigan Left" or a Continuous Flow Intersection (CFI) design for handling left turns should also be investigated further (see Appendix C for more information).
- For the longer term, a peak period, peak direction Bus/HOV Lane is recommended, to be developed in conjunction with expanded transit service and TDM efforts at the University and Research Park.
- The limits of the Bus/HOV Lane should extend from I-80 to north of Sunnyside as needed for operational effectiveness (PM southbound lane may need to extend further north (e.g. Wasatch Drive) due to the length of the traffic queue). Establishment of the bus/HOV lane would vary in the two Foothill segments:
    - North of 2300 East – the existing peak direction curb lane would be converted to Bus/HOV use only in the peak period.
    - South of 2300 East – a new, peak period Bus/HOV Lane would be constructed, reverting to a general purpose lane in the off-peak.
- Additional peak direction capacity (particularly at Sunnyside) is needed to support the establishment of the Bus/HOV Lane. The development of Managed Lanes should be further explored as a potential complement to the Bus/HOV Lane and a strategy to avoid or minimize right-of-way impacts.
- The University, Research Park, the Medical Center and other large employers in the area should be encouraged to continue and expand Transportation Demand Management (TDM) strategies to reduce peak hour traffic congestion in the corridor.

Other Community Issues

Community Amenities and Pedestrian Provisions

The community has expressed interest in better streetscape and landscaping provisions to improve the quality and attractiveness of the corridor. The current narrow sidewalks and the two-way left turn lane constrain opportunities for improvement. Additionally, some options under consideration would eliminate the current landscaped median in a portion of the corridor.

Foothill Sidewalk Condition

Pedestrian movement along the corridor is relatively low, due in part to the poor condition of the sidewalks (narrow, uneven, no traffic buffer). There is community interest in a better streetscape environment, with wider sidewalks and a park strip buffer area. Other issues include improved pedestrian crossing of Foothill at intersections and wider areas for snow removal. Space for a wider sidewalk exists within the corridor cross-section, but may require trade-offs with turn lanes and added lanes (or require additional right-of-way, at intersections for example).

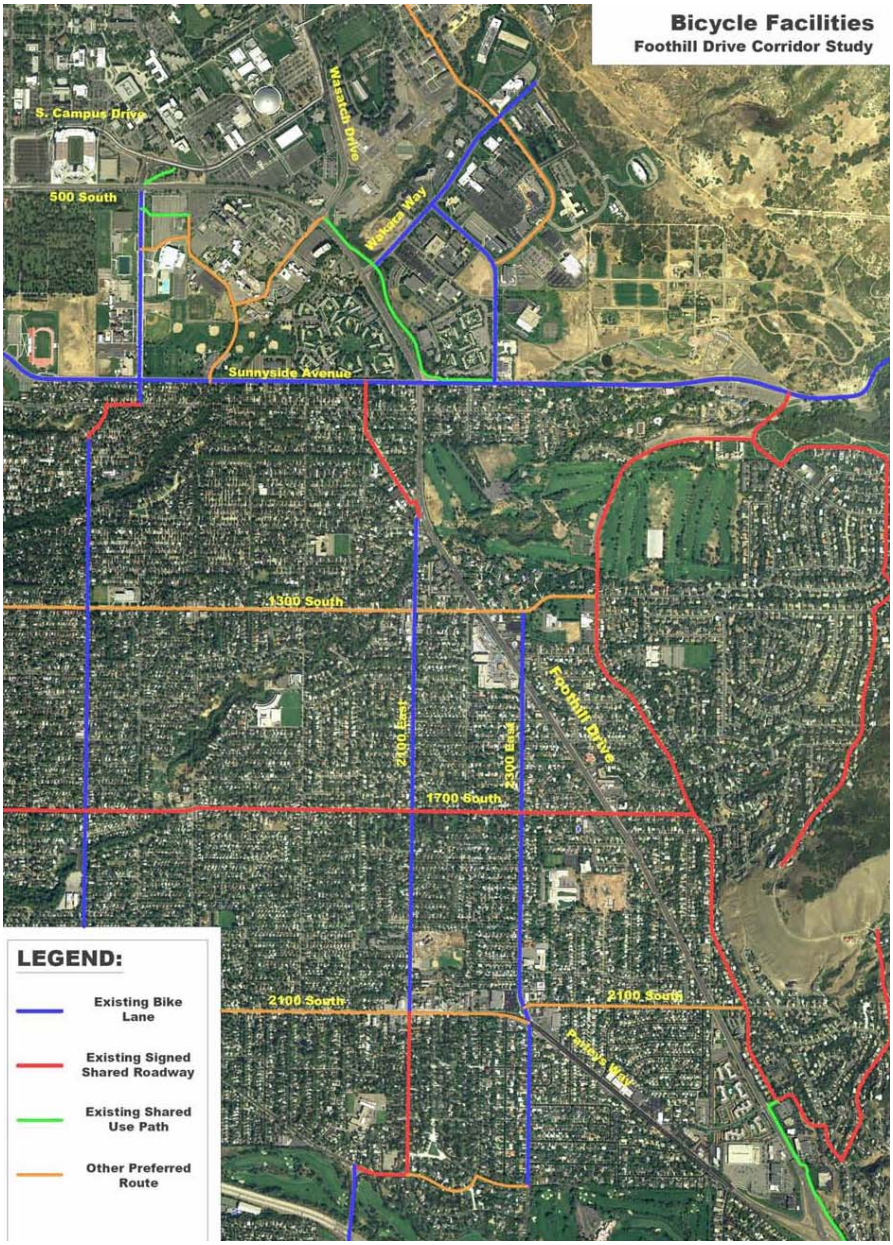
Recommended Strategies

- Improved and widened sidewalks offer the best strategy to improve the pedestrian environment and add landscaping. Sidewalk improvements would provide a more level and safe walkway and a landscaped buffer from traffic.
- Sidewalk improvements can be pursued in conjunction with the addition of the Bus/HOV Lane. In some areas, narrower lanes or elimination of the median turn lane could provide space for the wider sidewalks. In other areas, minor right-of-way acquisition may be required.
- In some locations south of 2300 East, there are opportunities to add a landscaped median replacing the turn lane in areas with limited need for left turns.
- Improved pedestrian crossings of Foothill Drive can be addressed by adding countdown timers at key locations and reviewing pedestrian signal timing.
- A preliminary design study is needed to determine the specific roadway design, lane configuration and right-of-way needs. This study would look at parking, turning, driveway access, pedestrian volumes and other traffic issues on a block-by-block basis.

Bicycle Provisions

There are no current designated or planned bicycle lanes on Foothill Drive and cyclists are discouraged from using Foothill Drive due to high traffic volumes and speeds (primarily a peak period issue). Alternative bicycle routes in the corridor are encouraged (see map below). They include 2100 East and 2300 East (both marked bike lanes). There is also a designated bicycle route along Wasatch Drive. This route is part of the Bonneville Shoreline Trail and is classified

as a *signed shared roadway*. This trail remains nearly parallel to Foothill Drive until 1300 South where it heads east and thus is currently not a good alternative for travel to the University area. This route includes a shared use path on the south end of the corridor, on the east side of Foothill Drive from Thunderbird Drive connecting to the Bonneville Shoreline Trail. A recently completed bicycle/pedestrian bridge over I-215 just south of I-80 provides a connection over the freeway.



Recommended Strategies

- Continued emphasis on parallel routes with improvements is recommended.
- Suggested improvement strategies include:
    - Extend shared use path north to intersect with Wasatch Drive at Broadmore St.
    - Construct a new bicycle path through the Bonneville Golf Course to connect Wasatch Drive with the existing bicycle lanes on Sunnyside and Arapeen (providing a more direct route to Research Park and the University)

RECOMMENDED ACTION PLAN

Implementation of the recommended improvements on Foothill Drive should occur in a phased manner. Initially, more modest actions would establish the foundation for the subsequent, longer term upgrades. For example, programs that expand transit and rideshare use are needed to allow the later success of the proposed Bus/HOV Lane. Following are the key proposed near and longer term actions with the primary responsible agencies.

Near Term

- Increase commuter express transit service and expand TDM efforts (UTA and University of Utah).
- Investigate traffic improvements at Sunnyside and implement preferred improvements (UDOT).
- Improve pedestrian safety at intersections (City).
- Develop design for addition of Bus/HOV Lanes, including a plan for adequate roadway capacity and addressing sidewalk and landscape improvements (UDOT and City).
- Design plans for bicycle path through golf course (City).

Longer Term

- Implement Bus/HOV Lanes and related roadway improvements (UDOT).
- Improve sidewalks and add landscaping in conjunction with Bus/HOV Lane (UDOT and City).
- Construct new bike path through golf course (City).