Executive Summary

1. Purpose and Introduction

The purpose of this Campus Parking and Transportation Master Plan and Research Park Mobility Plan is to look comprehensively at the parking and transportation issues in and around the campus area, including the jurisdictions and agencies serving the campus area. The plan will recommend integral solutions for all transportation modes and will serve as a complimentary plan to the Campus Master Plan. The document is separated into the following sections:

- Introduction
- Goals and Objectives
- Public Outreach
- Traffic
- Parking
- Transit
- Bicycle and Pedestrian

Each section seeks to describe the existing transportation conditions and identifies any observed deficiencies in the network. Future conditions are modeled and acknowledged with potential problems as the focus for mitigation recommendations. These mitigations take the form of policy recommendations or transformative projects. Where applicable, each recommendation comes with a priority ranking of high, medium, or low based on criteria specific to each transportation mode and a cost estimate. This executive summary includes a brief synopsis of the master plan, as well as a list of proposed policy and transformative project recommendations.

One of the primary purposes of the plan is to support the University goal of reducing single occupancy vehicle (SOV) trips so that they account for only 50% of all trips to and from campus. A reduction in SOV trips will significantly benefit the campus as a whole by reducing the number of vehicles coming to campus thus reducing the potential need for substantial roadway and parking improvements. However, this plan cannot focus solely on the goal to reduce SOV without accommodating the remaining 50% of trips coming to campus. This can be done without compromising the objective to reduce SOV trips. The focus of the study to accommodate vehicle trips was to make the roadway network and parking facilities more efficient. Some strategies that will aid in this endeavor include traffic calming on minor streets to encourage use of major roadways; the use of technology to assist drivers in finding available parking; traffic signal enhancements; and removing pedestrian, bicycle and automobile conflicts by creating separate facilities for each user type.

2. Goals and Objectives

The goals and objectives listed in the master plan were vetted and approved early in the planning process by a steering committee consisting of several department heads and their representatives from across the many departments at the University of Utah (“University”). The overriding goal of the master plan is
to provide a comprehensive plan to address future transportation and parking needs from a multi-modal perspective. Each goal and objective should complement the others in assuring the University and surrounding areas are equipped to handle the future growth, as well as being proactive in reducing single occupancy vehicle trips and providing a safe, secure, and pleasant campus. The broad goals and objectives for the master plan are as follows:

1. Best Practices for all Modes of Transportation
2. Strategy for Addressing Parking
3. Regional Mobility & Multi-Modal Needs
4. Neighborhoods & Communities
5. Aesthetics & Complete Streets
6. Engage Stakeholders
7. Implementation

3. Public Outreach

One area of focus for the master plan was to ensure that the voice of the many different campus and community users was heard. An extensive public involvement process was initiated and over 900 individual public comments were received and documented via an interactive online comment map. These comments helped form the basis for the focus of areas of the master plan and are included as part of the public record. A comment resolution matrix is included as part of the plan to show where and how the comments have been incorporated into the overall plan.

In addition to the public comment web map, meetings were held with various stakeholders to gauge support, brainstorm ideas, and coordinate other planning efforts into the master plan. The stakeholder meetings were conducted as follows:

- March 10, 2014 Project Kickoff/Public Involvement Strategy Meeting
- April 28, 2014 Public Outreach Strategy Meeting
- June 23, 2014 UTA Coordination Meeting
- September 9, 2014 Salt Lake City Coordination Meeting
- September 19, 2014 Master Plan Findings Presentation
- October 9, 2014 Presentation to Community Forum
- October 14, 2014 Presentation to Transportation and Traffic Committee
- November 12, 2014 Steering Committee Presentation of Public Outreach
- January 8, 2015 Presentation to Community Forum

4. Traffic

The explicit goal for the University is to reduce single occupancy vehicle trips to 50% of the overall campus trips. This will allow the campus to grow without creating a burden on the roadway network. It also allows the campus to become more walkable and safer for pedestrians and bicyclists. In order to achieve this goal, a much broader view of the transportation network must be taken than simply to identify traffic
deficiencies and needs. The traffic section of this report identifies roadway network improvements that in some cases reduce capacity through traffic calming or road diets, and in others increases capacity, particularly on the off-campus roads. Intersection and roadway improvements will serve to enhance both the driver and pedestrian experience.

Many campus visitors are what may be termed “captive drivers”, i.e., those that, through scheduling or geographic circumstances are left with little choice but to drive to campus. These users must be accommodated while at the same time discouraging those who opt to drive to campus by providing alternative solutions. Several projects have been identified that will ease congestion in the future while discouraging single occupant vehicle trips.

5. Parking

The management and operation of parking systems is a primary focal point for the success of a campus like the University of Utah. With only approximately 10% of students living on campus, the primary mode of transportation into and on campus is the personal automobile. That has resulted in a highly utilized parking environment where many of the existing parking facilities on campus are at or near capacity during peak conditions. With that in mind, the purpose of this section of the report is to define first how the University handles immediate and forthcoming changes without experiencing parking issues that impact the ability to manage and operate the campus. Beyond that, the section provides guidance on how to transform parking management on campus into an asset to discourage SOV trips and improve the overall campus experience.

The parking sections of the report also outlines the way the Park+ model was used to identify parking strategies and projects to help to maintain a robust parking system in the future. Park+ is an interactive parking scenario planning model, integrated with ArcGIS, that has the ability to evaluate existing parking supply and demands, identify and test new development and parking facilities, and apply parking management strategies. The Park+ model enables university administrators to analyze the impacts of parking demand for an endless array of scenarios. Planners, engineers, managers, campus planners and administrators, parking operators, and developers can all benefit from introducing the Park+ model into their parking systems, as it offers the tools to identify and manage parking demand within any community and agency. The recommendations in the parking section include some new parking facilities, but focus mainly on policy changes, such as rate adjustments that will ensure the parking program on campus enhances the overall system and encourages transit and other alternatives to the single occupant vehicle.

6. Transit

Transit represents the most effective way to accomplish the goal of reducing single occupant vehicle trips in and around campus. The transit section of this reports identifies current UTA and campus plans and shows ways in which the transit system may be enhanced to encourage greater ridership and an overall better user experience. Several new transit alternatives are explored, such as BRT and PRT/GRT.
Strategies such as improved transit planning and travel demand management are also shown and recommended as part of the comprehensive transportation system.

Transit recommendations include maintaining close relationships with the Utah Transit Authority and providing data to them on a regular basis through an annual user survey. Also, new TRAX and shuttle lines would improve on campus connectivity and reduce transit travel times. Enhancing the user experience with a new transit hub, including kiosks and amenities that are enticing to the user, is also encouraged. Fare structures, additional rapid transit solutions, and aesthetic enhancements are also included in the recommendations.

7. Pedestrian and Bicycle

The purpose of this section is to provide the facility designer with an understanding of how pedestrians operate while using pedestrian facilities, such as sidewalks, crosswalks, or shared use paths. Pedestrians and users of mobility devices are, by nature, much more affected by poor facility design, construction, and maintenance practices than motor vehicle drivers. They lack the protection from the elements and roadway hazards provided by an automobile’s structure and safety features. By understanding the unique characteristics and needs of these users, a facility designer can provide quality facilities and minimize user risk. The bicycle-related sections of this chapter reference the University of Utah’s Bicycle Master Plan (2012), the guiding document for all bicycle planning and implementation at the University.

Many of the recommendations include new pedestrian and bicycle facilities, such as overpasses across busy streets in Research Park and the addition of bike lanes on campus. Filling the existing sidewalk gaps on campus to create a truly pedestrian connected campus is also strongly recommended. Some of the recommendations are included in roadway design projects, such as Wasatch Drive or at intersections.

8. Policy Recommendations

The following table identifies policy recommendations that, if implemented, will aid in reducing SOV trips and/or improve the transportation network generally. These recommendations are explained in greater detail in the relevant sections of the report.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Calming</td>
<td>Develop a traffic calming program</td>
<td>HIGH</td>
</tr>
<tr>
<td>TDM</td>
<td>Develop a Transportation Demand Management (TDM) program</td>
<td>HIGH</td>
</tr>
<tr>
<td>Shared Parking</td>
<td>Establish shared parking agreements with Research Park</td>
<td>HIGH</td>
</tr>
<tr>
<td>Permits</td>
<td>Review permit structure</td>
<td>HIGH</td>
</tr>
<tr>
<td>Park+</td>
<td>Maintain the Park+ model with accurate data</td>
<td>HIGH</td>
</tr>
<tr>
<td>Fine Tune Campus Shuttle</td>
<td>Improve mobility between buildings/land uses on campus</td>
<td>HIGH</td>
</tr>
<tr>
<td>Promotion of Transit</td>
<td>Continue promotion of transit throughout campus</td>
<td>HIGH</td>
</tr>
<tr>
<td>City Permits</td>
<td>Coordinate with City for neighborhood permitting</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Virtual Permits</td>
<td>Monitor and adjust virtual permitting as necessary</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Variable Pricing</td>
<td>Develop demand based pricing structure</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Priority</td>
</tr>
<tr>
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</tr>
<tr>
<td>Wayfinding</td>
<td>Establish parking wayfinding including smartphone apps</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Gather Transit Data</td>
<td>Gather annual data for transportation, transit ridership, and customer input</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>TRAX Black Line Support</td>
<td>Support TRAX Black Line Implementation</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Additional Staff</td>
<td>Staff a bicycle and pedestrian safety coordinator</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Website</td>
<td>Enhance and maintain university bicycle website</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Data Collection</td>
<td>Collect bicycle and pedestrian data annually</td>
<td>MEDIUM</td>
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<tr>
<td>Off-Campus Parking</td>
<td>Identify Off-Campus parking opportunities with shuttling</td>
<td>LOW</td>
</tr>
<tr>
<td>Linkages between parking &amp; Transit</td>
<td>Improve walking routes, wayfinding between parking and transit</td>
<td>LOW</td>
</tr>
<tr>
<td>New students</td>
<td></td>
<td>LOW</td>
</tr>
<tr>
<td>Media</td>
<td></td>
<td>LOW</td>
</tr>
<tr>
<td>Certification</td>
<td>Seek higher level of Bicycle Friendly Community certification</td>
<td>LOW</td>
</tr>
<tr>
<td>Fleet</td>
<td>Provide a bicycle fleet for faculty, staff and students</td>
<td>LOW</td>
</tr>
<tr>
<td>Events</td>
<td>Provide valet event bicycle parking</td>
<td>LOW</td>
</tr>
<tr>
<td>Incentives</td>
<td>Develop an incentive program for bicycle use</td>
<td>LOW</td>
</tr>
</tbody>
</table>
9. Transformative Projects

The following transformative projects are capital projects, which, if constructed, will enhance the transportation system on and around campus and will help in achieving the wider goals and objectives of this plan. Further detail on each project is found in the relevant sections of the report.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Street</td>
<td>Enhanced pedestrian facilities, traffic calming</td>
<td>$100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman Way</td>
<td>Enhanced pedestrian facilities, traffic calming</td>
<td>$100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Foothill Drive</td>
<td>Signal Timing</td>
<td>$100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Medical Drive North</td>
<td>Roundabout, roadway reconfiguration</td>
<td>$2,000,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Committed Parking Projects</td>
<td>Build the committed parking projects as planned</td>
<td>$4,000-$8,000 (Lots)</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$15k-$25k (Garage)</td>
<td></td>
</tr>
<tr>
<td>Sidewalk Connectivity</td>
<td>Install sidewalk at all missing locations</td>
<td>VARIABLE</td>
<td>HIGH</td>
</tr>
<tr>
<td>Intermodal Transportation Hub</td>
<td>Transit Station for all modes of transportation</td>
<td>$500,000-$750,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Expand On-Campus Bus Service</td>
<td>Add North-South and East-West Bus Service</td>
<td>VARIABLE</td>
<td>HIGH</td>
</tr>
<tr>
<td>New Shuttle Stop</td>
<td>383 Colorow building on the black line</td>
<td>$15,000-$25,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>PRT/GRT Automated Fixed Guideway Study</td>
<td>Feasibility Study</td>
<td>$50,000-$75,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Enhance Bicycle and Pedestrian Access</td>
<td>Improve access to transit</td>
<td>$250,000/yr</td>
<td>HIGH</td>
</tr>
<tr>
<td>400 South Bike Turn Queue Box</td>
<td>Bike Box/Bicycle Detection</td>
<td>$12,500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Left Turn Markings to Law Bldg.</td>
<td>Intersection Markings</td>
<td>$500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Marriott Library Bicycle Ramp/Runnels</td>
<td>Ramp/Runnels</td>
<td>$18,500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman Way</td>
<td>Bike Box</td>
<td>$3,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>South Campus Road Diet</td>
<td>Protected bike lanes</td>
<td>$200,000-$500,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>North Campus Drive Improvements</td>
<td>Shared Use Path</td>
<td>$175,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Central Campus Drive Improvements</td>
<td>Shared Use Path</td>
<td>$115,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Wasatch Drive Bicycle Lanes</td>
<td>Bicycle Lanes</td>
<td>$15,300</td>
<td>HIGH</td>
</tr>
<tr>
<td>Legacy Bridge Ramp</td>
<td>Spiral Ramp on West Side</td>
<td>$250,000-$400,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Sunnyside Bike Path</td>
<td>Bike Path</td>
<td>$1,100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Arapeen Dr. to Mario Capecchi Path</td>
<td>Shared Use Path</td>
<td>$140,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Medcan TRAX Station</td>
<td>Bike Path/Ramp</td>
<td>$115,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Research Park to Health Sciences</td>
<td>Shared Use Path</td>
<td>$175,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>University Student Apt. to S. Campus</td>
<td>Shared Use Path</td>
<td>$350,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Mario Capecchi Bike Lane</td>
<td>Bike Lane</td>
<td>$45,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman Way</td>
<td>Shared Lane</td>
<td>$2,200</td>
<td>HIGH</td>
</tr>
<tr>
<td>South Campus Drive</td>
<td>Shared Lane</td>
<td>$14,500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Stadium Connector</td>
<td>Bicycle Path</td>
<td>$20,300</td>
<td>HIGH</td>
</tr>
<tr>
<td>North Campus Path #1</td>
<td>SUP</td>
<td>$145,500</td>
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<tr>
<td>North-South Path</td>
<td>Bicycle Path</td>
<td>$94,800</td>
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<tr>
<td>Northeast Parking Lot</td>
<td>Shared Lane</td>
<td>$19,250</td>
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</tr>
<tr>
<td>1500 E Connector</td>
<td>SUP</td>
<td>$3,900</td>
<td>HIGH</td>
</tr>
<tr>
<td>Project Name</td>
<td>Description</td>
<td>Cost</td>
<td>Priority</td>
</tr>
<tr>
<td>------------------------------------</td>
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</tr>
<tr>
<td>Foothill Dr Path #2</td>
<td>SUP</td>
<td>$7,300</td>
<td>HIGH</td>
</tr>
<tr>
<td>HPER Mall Path</td>
<td>Bicycle Path</td>
<td>$208,000</td>
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</tr>
<tr>
<td>VA Western Route</td>
<td>Shared Lane</td>
<td>$10,300</td>
<td>HIGH</td>
</tr>
<tr>
<td>Chipeta Way/Connor Rd</td>
<td>Shared Lane</td>
<td>$7,750</td>
<td>HIGH</td>
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<tr>
<td>Federal Way</td>
<td>Shared Lane</td>
<td>$4,900</td>
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<tr>
<td>Fieldhouse/Library Connector</td>
<td>Shared Lane</td>
<td>$2,600</td>
<td>HIGH</td>
</tr>
<tr>
<td>HPER Mall Bisect</td>
<td>Bicycle Path</td>
<td>$193,200</td>
<td>HIGH</td>
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<tr>
<td>Legacy Bridge Path</td>
<td>Bicycle Path</td>
<td>$23,800</td>
<td>HIGH</td>
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<tr>
<td>Presidents Circle</td>
<td>Shared Lane</td>
<td>$8,500</td>
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<tr>
<td>Red Butte Canyon Rd</td>
<td>Shared Lane</td>
<td>$6,000</td>
<td>HIGH</td>
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<tr>
<td>Research Park Connector</td>
<td>SUP</td>
<td>$62,900</td>
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<tr>
<td>South Temple</td>
<td>Shared Lane</td>
<td>$4,700</td>
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<tr>
<td>Student Life Connector</td>
<td>Bicycle Path</td>
<td>$85,000</td>
<td>HIGH</td>
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<tr>
<td>VA Eastern Route</td>
<td>Shared Lane</td>
<td>$6,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>2030 E</td>
<td>Shared Lane</td>
<td>$10,700</td>
<td>HIGH</td>
</tr>
<tr>
<td>Business Loop</td>
<td>Shared Lane</td>
<td>$11,000</td>
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<tr>
<td>Institute Loop</td>
<td>Shared Lane</td>
<td>$10,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>VA Central Route</td>
<td>Shared Lane</td>
<td>$14,500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Wolcott Extension</td>
<td>Shared Lane</td>
<td>$5,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>1500 E/Olpin Union Connector</td>
<td>Bicycle Path</td>
<td>$18,000</td>
<td>HIGH</td>
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<tr>
<td>1500 East</td>
<td>Shared Lane</td>
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<td>HIGH</td>
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<td>Hempstead Rd</td>
<td>Bicycle Lane</td>
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<td>HIGH</td>
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<tr>
<td>South Medical Dr</td>
<td>Bicycle Lane/Shared Lane</td>
<td>$15,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Wakara</td>
<td>Shared Lane</td>
<td>$6,800</td>
<td>HIGH</td>
</tr>
<tr>
<td>2000 E #2</td>
<td>Shared Lane</td>
<td>$2,600</td>
<td>HIGH</td>
</tr>
<tr>
<td>Ctrl Campus Dr #2</td>
<td>Shared Lane</td>
<td>$10,300</td>
<td>HIGH</td>
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<tr>
<td>Medical School Access</td>
<td>Bicycle Lane/Shared Lane</td>
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<td>HIGH</td>
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<td>Pollock</td>
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</tr>
<tr>
<td>2000 E #1</td>
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<td>$2,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Army Rd</td>
<td>Shared Lane</td>
<td>$7,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Central Campus Dr #1</td>
<td>Bicycle Lane</td>
<td>$9,000</td>
<td>HIGH</td>
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<tr>
<td>Connor-Fort Douglas Connector</td>
<td>Bicycle Path</td>
<td>$20,600</td>
<td>HIGH</td>
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<tr>
<td>Foothill Dr Path #1</td>
<td>SUP</td>
<td>$44,900</td>
<td>HIGH</td>
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<tr>
<td>Fort Douglas Blvd</td>
<td>Bicycle Lane</td>
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<td>Fort Douglas Blvd</td>
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<td>Heritage Center Path</td>
<td>Bicycle Path</td>
<td>$12,000</td>
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<tr>
<td>Heritage/Officers Circle Connector</td>
<td>Bicycle Path</td>
<td>$18,000</td>
<td>HIGH</td>
</tr>
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<td>Stover St #1</td>
<td>Shared Lane</td>
<td>$1,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Stover St #2</td>
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<tr>
<td>Exploration Way</td>
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</tr>
<tr>
<td>Project Name</td>
<td>Description</td>
<td>Cost</td>
<td>Priority</td>
</tr>
<tr>
<td>--------------------------------------</td>
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</tr>
<tr>
<td>Officers Circle</td>
<td>Shared Lane</td>
<td>$6,400</td>
<td>HIGH</td>
</tr>
<tr>
<td>Research Rd</td>
<td>Shared Lane</td>
<td>$3,800</td>
<td>HIGH</td>
</tr>
<tr>
<td>Chipeta Way Bridge</td>
<td>Widen to 4 Lanes</td>
<td>$2,000,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Connor Road</td>
<td>Widen to 4 Lanes</td>
<td>$1,000,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Lower Campus East-West Path</td>
<td>Bicycle Path</td>
<td>$127,600</td>
<td>MEDIUM</td>
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<tr>
<td>Guardsman Way</td>
<td>Bicycle Lane</td>
<td>$3,200-$27,200</td>
<td>MEDIUM</td>
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<td>South Campus Dr</td>
<td>Bicycle Lane</td>
<td>$21,000-$179,400</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Arapeen</td>
<td>Bicycle Lane</td>
<td>$177,200</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Mario Capecchi Path</td>
<td>SUP</td>
<td>$136,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Red Butte Creek Trail – Seg. 3</td>
<td>SUP</td>
<td>$80,200</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Stadium/ President’s Circle Connector</td>
<td>Bicycle Path</td>
<td>$91,200</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Chipeta</td>
<td>Bicycle Lane</td>
<td>$165,400</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Red Butte Creek Trail – Seg. 1</td>
<td>SUP</td>
<td>$102,600</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Wakara</td>
<td>Bicycle Lane</td>
<td>$179,600</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Foothill Dr Path #3</td>
<td>SUP</td>
<td>$1,200</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Foothill Dr Path #4</td>
<td>SUP</td>
<td>$12,000-$105,200</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Interdisciplinary Mall</td>
<td>Bicycle Path</td>
<td>$136,200</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Red Butte Creek Trail – Segment 4</td>
<td>SUP</td>
<td>$109,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Student Housing Path</td>
<td>Bicycle Path</td>
<td>$124,100</td>
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</tr>
<tr>
<td>Middle Campus East-West Connector</td>
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<td>$20,600</td>
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</tr>
<tr>
<td>2000 East Extension</td>
<td>Bicycle Path</td>
<td>$31,900</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Red Butte Creek Trail – Segment 2</td>
<td>SUP</td>
<td>$27,300</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Foothill Drive</td>
<td>Flex Lanes</td>
<td>$1,000,000</td>
<td>LOW</td>
</tr>
<tr>
<td>New Parking Facilities</td>
<td>Build 2 new parking facilities at locations A&amp;B</td>
<td>$15k-$25k (Space)</td>
<td>LOW</td>
</tr>
<tr>
<td>Fieldhouse Path</td>
<td>Bicycle Path</td>
<td>$49,000</td>
<td>LOW</td>
</tr>
<tr>
<td>Mario Capecchi Dr</td>
<td>Bicycle Lane</td>
<td>$31,000-$187,300</td>
<td>LOW</td>
</tr>
<tr>
<td>100 South</td>
<td>Bicycle Lane</td>
<td>$10,000</td>
<td>LOW</td>
</tr>
<tr>
<td>North Campus Dr</td>
<td>Bicycle Lane</td>
<td>$264,000</td>
<td>LOW</td>
</tr>
<tr>
<td>North Campus Path #2</td>
<td>SUP</td>
<td>$250,000</td>
<td>LOW</td>
</tr>
<tr>
<td>Shuttle Route Bicycle Lanes</td>
<td>Bicycle Lane</td>
<td>Unk.</td>
<td>LOW</td>
</tr>
<tr>
<td>Foothill Dr Path #5</td>
<td>SUP</td>
<td>$7,700</td>
<td>LOW</td>
</tr>
</tbody>
</table>
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Chapter 1 Introduction

The University of Utah is located at the foot of the Wasatch Mountains in the state’s capitol of Salt Lake City. The campus benefits from and contributes to the rich cultural history and sophisticated metropolis allure of Salt Lake City. Only minutes from the mountain bike trails and downtown amenities, the University of Utah has a need to update their Parking and Transportation Master Plan.

Public involvement efforts for the 2008 Campus Master Plan revealed strong community desires for a multi-modal transportation plan to be implemented. The University of Utah has many transportation demand management measures currently in place, including excellent service provided by the Utah Transit Authority (UTA) TRAX light rail and bus services and University-owned campus shuttle buses. The University is committed to encouraging walking, bicycling, and the use of the transit system as a major factor in its transportation toolbox. An increasing portion of University students, faculty and staff utilize these forms to commute to campus. The university seeks to continue this trend and move towards a goal of single occupancy vehicle (SOV) trips making up only 50% of all campus trips.

The University campus perimeter is surrounded by regional streets carrying a large amount of vehicles. These streets act as barriers for pedestrians and bicyclists attempting to access the campus. The most significant barriers are Mario Capecchi Drive, North Campus Drive, South Campus Drive, and 500 South/Foothill Drive. Students coming to campus from off-site residential neighborhoods or satellite parking areas must cross these streets. Given the campus setting and the limited through-routes in the area, campus streets tend to be used by all vehicle types with limited vehicular restrictions.

Walkways in the campus core are heavily utilized by bicyclists, pedestrians, skateboarders and other non-motorized users. This leads to conflicts between users, particularly bicyclists coming downhill at fast speeds and the pedestrians in their path. The University of Utah currently allows bicyclists on all pedestrian pathways.

As the University of Utah evolves, cars will continue to have a presence on campus, but by making walking, cycling and transit use easier with a variety of strategies, the number of vehicles traveling to and across campus can be reduced. By building an extensive path network across campus, managing surface parking and truck movements, a more car-free environment can be created, helping reduce the carbon footprint and increasing the health, safety and welfare of the campus students, facility and visitors.

Historical Student Growth

According to the University, annual growth of the student body is about 1%. This has been the student growth rate for the past decade. Utah’s colleges and universities have been bracing for significant temporary enrollment declines ever since the LDS Church announced last October that it was lowering the age at which a young man or woman could serve a mission. The official Fall 2013 enrollment numbers released show that the impact at the University of Utah is less than what had been projected based on the missionary age change and the continuing improvements in the state’s economy. Traditionally, when
the economy is growing and jobs are more plentiful, some students leave college to return to the workforce.

The University of Utah has a total undergraduate enrollment of 24,492 students. The total for graduate enrollment is 7,585, providing the University of Utah with a student body of 32,077. The gender distribution is around 55 percent male and 45 percent female.

**Campus Housing**

At the University of Utah, of the 32,077 students only 4,170 live on campus, 13% of the student body. The University of Utah provides housing in a 32-building housing complex on campus. The complex consists of seven housing areas: Chapel Glen, Gateway Heights, Sage Point, Officer’s Circle, Benchmark Plaza, Shoreline Ridge, and the Donna Garff Marriott Honors Residential Scholars Community. In addition, more than 1,200 students, including those with families, reside in the University Student Apartments. The University of Utah has a goal of 35% of the students living on campus. This can be accomplished by adding more campus housing on or near the campus. These newer buildings will encourage students to live on campus and use the different amenities that the campus has available.

**Historical Research Park Growth**

Established in 1968, the University of Utah Research Park lies adjacent to campus on 320 acres of ancient Lake Bonneville shoreline. The park houses 53 companies, 82 academic departments and approximately 9,700 employees. A master plan has been developed with emphasis on preservation and enhancement of land contiguous to the University.

Research Park companies have added more than 6,000 jobs to the State’s economy and the annual in-state productivity of Park residents exceeds $550 million. The Park provides a special environment for entrepreneurial growth. It is a reservoir of practical research and business opportunities for University Faculty and both graduate and undergraduate students, giving new challenges and opportunities. These opportunities are created in a community that values technological innovation and commercial enterprise.

**Historical Medical Center Growth**

The University of Utah Medical Center opened its doors on July 10, 1965 with a 220-bed, $15.6 Million building. Shortly thereafter, the first newborn intensive care unit in the intermountain west was opened at the medical center, thus beginning the proud history of innovation and regional, national, and international firsts. In September of 1981, the new University of Utah hospital opened where the world’s first artificial heart implant was performed on Barney Clark. In 1993, the University added the John A. Moran Eye Center to its campus, followed shortly by the internationally renowned and respected Huntsman Cancer Institute in 1999. Since the turn of the century, the medical center campus has expanded to include the Eccles Critical Care Pavilion (2003), Huntsman Cancer Hospital (2004), Eccles...
Health Sciences Education Building (2005), the new John A. Moran Eye Center (2006), Clinical Neurosciences Center (2008), Health and Wellness Center (2009) and the Patient Care Pavilion (2009). The University of Utah Medical Center is the jewel in the crown of University of Utah Health Care and has served millions of patients in its long and illustrious history.

**Future Growth**

Future transportation patterns and the resulting operating conditions of the campus are directly related to land use planning and socioeconomic conditions. As traffic is not restricted to the University of Utah, its Research Park and Medical Center area, and that many of the roadways within the general facility are in fact regional roads linking communities to the west and south of the campuses, the socioeconomic and land use data in Salt Lake City must also be considered when projecting future conditions on the campuses. Thus, socioeconomic and land use data for the entire area was considered when developing the future scenarios.

**Socioeconomic Conditions**

The projected socioeconomic data for Salt Lake City used in this study comes mostly from the WFRC travel demand model, which is based upon the best available statewide data provided by the Governor’s Office of Planning and Budget (GOPB). This data was supplemented and verified using the data provided by the University and Salt Lake City planning department in the form of the adopted Land Use Plan and Zone Map and the Campus Master Plans of the University, Research Park, and Medical Center. This information is considered the best available for predicting future travel demand; however, campus planning is a dynamic process and the assumptions made in this report should be used as a guide and should not supersede other planning efforts.

Based on the current land use, zoning, demographics, and growth patterns, Salt Lake City is expected to grow to approximately 245,800 residents by the year 2040 (Table 1-1). This forecasted growth will place increased pressure on the City’s infrastructure, including the University.
Table 1-1 Salt Lake City Population

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Population Change</th>
<th>Population Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>163,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1990</td>
<td>160,000</td>
<td>-3,000</td>
<td>-2%</td>
</tr>
<tr>
<td>2000</td>
<td>181,800</td>
<td>21,800</td>
<td>14%</td>
</tr>
<tr>
<td>2010</td>
<td>186,400</td>
<td>4,600</td>
<td>3%</td>
</tr>
<tr>
<td>2040</td>
<td>245,800</td>
<td>59,400</td>
<td>32%</td>
</tr>
</tbody>
</table>

Enrollment at the University of Utah has experienced a similar trend, increasing from 22,970 in 1980 to 31,515 in 2014 (37% increase or 1% per year). Following this trend, it is expected that by 2040, total enrollment in the University of Utah will be close to 40,000 (see Table 1-2).

Table 1-2 University of Utah Enrollment

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Population Change</th>
<th>Population Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>22,970</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1990</td>
<td>24,311</td>
<td>1,341</td>
<td>6%</td>
</tr>
<tr>
<td>2000</td>
<td>25,630</td>
<td>1,319</td>
<td>5%</td>
</tr>
<tr>
<td>2014</td>
<td>31,515</td>
<td>5,885</td>
<td>23%</td>
</tr>
<tr>
<td>2040</td>
<td>39,709</td>
<td>8,794</td>
<td>26%</td>
</tr>
</tbody>
</table>

As the designated Metropolitan Planning Organization (MPO) for the Salt Lake Valley area, the Wasatch Front Regional Council (WFRC), organized in 1973 under the Interlocal Cooperation Act of Utah State Law, is largely responsible for regional transportation planning in the region of Salt Lake, Davis, Weber, Morgan, Box Elder and Tooele Counties. In this capacity, WFRC produces a 30 Year Long Range Transportation Plan (LRTP) and a 5 Year Transportation Improvement Program (TIP). Both of these products are constrained by reasonably available revenue. As a result, the LRTP does not always include the regional facility improvements, which are planned by the University. This Master Plan makes great efforts to supplement the regional plans produced by WFRC and to provide direction for future regional planning efforts that will include the University of Utah.

Future Land Use

Salt Lake City has prepared Master Plans for separately defined areas of the City. The University of Utah borders the East Bench area on the south and the Central Community area on the west. The East Bench Master Plan indicates that the area of the City south of campus will remain low density residential for the foreseeable future. West of Campus, the Central Community Master Plan shows a mix of residential densities, as well as some mixed-use allowing for neighborhood commercial land uses. These areas were identified and reviewed individually in addition to the WFRC land use assumptions. The individual area
master plans are available on the Salt Lake City website at http://www.slcgov.com/planning/planning-master-plans.

In addition to the city-wide master plans, the University also has an adopted campus master plan completed in 2008. The Campus Master Plan identified several goals and objectives designed to guide efficient campus development over the next 15 to 20 years. The plan proposed 14 transformative capital projects that would contribute in a prominent manner to the transformation of the physical characteristics and transportation trends of the campus. The 14 projects recommended in the plan are listed in Table 1-3 and shown in Figure 1-1.

### Table 1-3 Campus Master Plan Transformative Projects

<table>
<thead>
<tr>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. School of Medicine Replacement</td>
</tr>
<tr>
<td>2. Ambulatory Care Complex</td>
</tr>
<tr>
<td>3. Interdisciplinary Quad</td>
</tr>
<tr>
<td>4. Engineering Mall</td>
</tr>
<tr>
<td>5. Central Playing Fields</td>
</tr>
<tr>
<td>6. HPER Mall</td>
</tr>
<tr>
<td>7. Student Life Center</td>
</tr>
<tr>
<td>8. South Campus Walk</td>
</tr>
<tr>
<td>9. South Campus Housing</td>
</tr>
<tr>
<td>10. Stadium TRAX Link</td>
</tr>
<tr>
<td>11. Universe Project</td>
</tr>
<tr>
<td>12. Science Yard</td>
</tr>
<tr>
<td>13. Marriott Library Plaza</td>
</tr>
<tr>
<td>14. Business Incubator</td>
</tr>
</tbody>
</table>

Each of these projects can be viewed in more detail by accessing the University Campus Master Plan located at http://facilities.utah.edu/campus-planning/master-plan/2008-master-plan.php.
Similarly, the Health Sciences Center Master Plan, completed in December of 2014 has identified transformative projects as follows in Table 1-4 and Figure 1-2.
### Table 1-4 Health Sciences Center Master Plan Transformative Projects

<table>
<thead>
<tr>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>The MED</td>
</tr>
<tr>
<td>Knowledge Center</td>
</tr>
<tr>
<td>Circular Road</td>
</tr>
<tr>
<td>Bridge/Tunnel</td>
</tr>
<tr>
<td>Research Corridor</td>
</tr>
</tbody>
</table>

These projects can also be viewed in more detail online at [http://tinyurl.com/k7rwsI7](http://tinyurl.com/k7rwsI7).

### Figure 1-2 Health Sciences Center Master Plan Transformative Projects

**Transformative Projects**

Five master-planned projects and elements contribute in a significant way to the transformation of the Health Sciences Center campus.

These transformative projects were developed with the objective of achieving the campus vision as defined by key project stakeholders.
Chapter 2 Goals and Objectives

The goals and objectives discussed in this chapter guided the development of the Parking and Transportation Master Plan and will continue to guide the parking and transportation facilities implementation for years to come. Goals and objectives direct resource allocation, program operation and University prioritization. This section lays out a framework for how to create programs and facilities that increase the multi-modal transportation options within and surrounding the University of Utah.

Goals and objectives should build upon and be congruent with the transportation sections of the 2007 Campus Master Plan and the 2010 Energy and Environmental Stewardship-Climate Action Plan to support the University’s vision and should describe the most important aspects of the University’s programs, priorities and attitudes. The master plan should create a report for the University that can be utilized to guide decisions that will direct efficient and future site infrastructure, traffic, parking, mass transit and policy development for the creation of an environmentally responsible transportation strategy. Based on input from the project Committees, the goals and objectives for the Parking and Transportation Master Plan are broken down into the following categories:

1. Best Practices for all Modes of Transportation
2. Strategy for Addressing Parking
3. Regional Mobility & Multi-Modal needs
4. Neighborhoods & Communities
5. Aesthetics & Complete Streets
6. Engage Stakeholders
7. Implementation

Each section of the master plan document addresses the goals and objectives listed in the following paragraphs and references to the specific goal and objective addressed is found in the chapter, section or paragraph heading in the format (1.B.iii) to indicate Goal 1, Objective B, subheading iii.

1. Develop a campus transportation plan that focuses on reducing single occupancy vehicles (SOV), smart-growth and land use, and best management practices for all modes of transportation

   A. With an appropriate landscape consultant, landscaping options shown in the master plan shall follow urban sustainable planning practices. (Pages 4-1 – 4-5, 4-18 – 4-22, 6-1 – 6-12)

   B. Use Smart-Growth practices by providing pedestrian connectivity between existing infrastructure gaps, transit stops and hubs, and promotion. (Pages 1-1 - 1-4, 4-18, 4-23, 6-13 - 6-17)

   C. Add sub-goals similar to “B” above, but for active transportation, and for shuttles (gaps in those systems as well). (Pages 4-23, 6-23, 6-48)

   D. Consider development and opportunities of all other components of the transportation system to support movement to/from and around campus. (Pages 4-25 – 4-27, 6-24 – 6-47)
E. Integrate planning efforts into a coherent vision that is forward compatible with long term campus plans (Page 8-1)

2. Create a parking strategy based on data and assumptions that will address the needs resulting from the success/failure of the composite transportation system

A. Cost Structure Analysis: Analyze our current cost structure and compare to other universities, make recommendations for each: (Pages 5-1 – 5-7)

i. Visitor parking
ii. Parking permits
iii. Parking tickets
iv. Transit fee for faculty, staff and students
v. Recommended ratio of revenue collection from each of the preceding categories

B. Parking Ratio Analysis: Identify and develop a working parking ratio: (Pages 5-5 – 5-7)

i. Analyze current and future needs of the campus community for parking in relation to current/expected growth and current/expected building projects
ii. Provide options for addressing the needs
iii. Assist in creation of “parking need formula” for new buildings on the University of Utah Campus
iv. The city uses a standard based on the use and square footage of buildings, we would like something similar
v. What do other universities of comparable size and commuter/housing ratio use for formula?
vi. Quantify cost of additional parking garages as “cost per stall” for upper and lower campus. (use $21,000 per stall) – more or less depending on campus location.
vii. Combine cost per stall and parking ratio formula to create worksheet formula for use in developing a cost of parking for new facilities built on campus during the planning phase.
viii. Identify best practices from other universities of similar demographics.

C. Parking Review by Quadrants: (Pages 5-10, 5-12)

i. Analyze parking ratio in quadrants and subsections to determine deficiencies
ii. Create parking formula for new facilities, showing parking impact and needs
iii. Analyze cost of vertical parking facilities and give a working cost per stall

D. Parking Garages: (Page 5-21)

i. Analyze and update the latest Parking Garage Location Study
ii. Identify and vet locations that can be reserved for future parking garages
iii. Identify and Prioritize locations by campus quadrants.
E. Visitor Parking Lots: (Pages 5-1, 5-6)
   i. Determine the adequacy of visitor parking lots
   ii. Do the visitor lot locations being utilized and need to be increased or decreased?
   iii. Recommend new locations based on future campus growth
   iv. Use “best practices” when considering future visitor parking recommendations

F. Parking Mitigation Policies: (Page 5-4)
   i. Identify parking priorities and strategies that can assist in parking mitigation. Examples for consideration: Restricting parking permits for freshman; introducing parking by seniority/tenure
   ii. Recommend policies for consideration that support parking reduction.
   iii. Identify best practices from other universities of similar demographics

G. Traffic Calming vs Traffic Routing around Campus: (Pages 4-25-4-31)
   i. Identify which management method is most efficient per location

3. Approach the planning effort by reviewing and understanding regional mobility and multi-modal (pedestrian, bicycle, motorist, transit, parking, etc.) needs with the goal of reducing vehicular traffic, enhancing safety, ensuring clear and consistent wayfinding, and creating a better overall campus mobility plan

A. It is the goal to increase the University transit ridership from 35% to 50%. To achieve this goal, incentives and motivation through best management practices shall be included in the master plan. (Page 4-23)

B. It is a goal to reduce all vehicular traffic to the University by 20% (transit, bike, ped, other) (Page 4-25)

C. Consider a fee-based system for all university owned/controlled lots (Research Park, downtown “campus” at 100S-500E, etc.) that is transparent to all commuters. (Pages 5-20, 5-21)

D. Signage and Way-Finding: (Page 5-30)
   I. Analyze and grade the University’s signage for those visiting the campus.
   II. Use signage to shorten the length of time people are driving around looking for their destination
   III. Visitors currently are not always aware they are near or within the University
   IV. Develop recommendations for visitor kiosks
   V. Identify best practices from other universities of similar demographics.
   VI. Ensure that signage must be architecturally and/or aesthetically recognizable and consistent with the campus standards
   VII. Require that signage design must be clear enough to read while passing at 25 mph
   VIII. Must give clear identification on location/direction of destinations
IX. Provide standard signage options
X. Evaluate the ability to implement HCS’s signage plan campus wide

4. Develop a plan that addresses Mass Transit issues by engaging surrounding neighborhoods, communities and agencies (UDOT, UTA, SLC, etc.). Over time, our goal of reducing passenger car trips to the campus will also help with neighborhood traffic issues.

A. Use the established neighborhood committees, organizations, stakeholders in decision-making processes that may affect or perceive to affect the surrounding communities (Pages 3-1 – 3-2, 6-6 – 6-7)

B. Establish or maintain a mechanism such as occasional meetings where the University campus hosts or attends community or neighborhood events to seek input to improving relations. (Pages 3-1 – 3-2)

C. Engage in active communication with SLC, Utah Department of Transportation (UDOT) and UTA regarding cohesive transportation strategies. (Page 3-1)

D. UTA Prioritization: Identify and prioritize the most beneficial mode of transit to/from the University and why (Pages 6-13 – 6-22)

   i. UTA bus service
   ii. TRAX service
   iii. Street cars

E. Mass Transit Alternatives: Explore and recommend other mass transit alternative options (Pages 6-28 – 6-29)

   i. Criteria: benefit to commuters out of their cars and riding mass transit
   ii. Speed, timing, safety
   iii. Survey our employees, students and faculty.
   iv. Analyze the data and make recommendations

F. TRAX Realignment: (Page 6-48)

   i. Identify health, safety, and efficiency changes to current mass transit
   ii. 5th South TRAX extension and new stadium station that aligns with walking paths into campus.
   iii. New VA TRAX stop and new connection to current TRAX line
   iv. Modification of South Campus Drive round-about to allow better traffic flow
   v. New Huntsman Center/Institute station TRAX realignment, consideration for moving track to North onto sidewalk
   vi. Dropping track into Health Science area to coincide with tunnel and parking garage access
   vii. Realignment/modification of Wasatch Drive and Mario Capecchi Intersection
   viii. Realignment of TRAX along South Campus Drive
ix. Feasibility of this option
x. New primary rail route to the South of the Stadium
   a. Feasibility of this option.

G. University Shuttle System: Analyze the University shuttle service’s routes and stops for efficiency (Page 6-17)
   i. Include population densities
   ii. Ridership efficiency
   iii. Additional service through the surrounding neighborhoods
   iv. New routes, route change recommendations. Include cross-campus routes that support future parking lot considerations, transit drop off points, pedestrian and bike routes, etc.
   v. Identify best practices from other universities of similar demographics.

H. Intermodal Transit Hub: (Pages 6-17 – 6-22)
   i. Locate options for intermodal transit hub(s) at the University
   ii. Locations that UTA and University shuttles can begin and end routes
   iii. Integrate with Foothill transportation needs
   iv. Identify best practices from other universities of similar demographics.

5. Maintain the integrity of the campus through aesthetics and through embracing a holistic “complete streets” concept

A. All modes of travel (bike, ped, motorist, transit) need to all have inviting features and infrastructure that encourages the use of all modes. (Page 8-1)

B. The “complete streets” or “active transportation” concept needs to be established, embraced, and supported by the various departments and decisions makers on Campus. (Page 6-56)

C. Use the campus mobility and wayfinding plans mentioned above to be integrated into the “active transportation” concept. (Page 6-56)

D. Service and delivery vehicles need to be considered for safety of the pedestrian (Page 7-6)

E. Connecting the Inter-Campus: Look through the eyes of those who maneuver the campus using alternative means of transportation, including golf carts, ATVs, walking, biking and other alternative inter-campus commuting methods (Pages 3-21, 7-11)
   i. Identify health, safety, and efficiency changes to crossing large roads and intersections (100 South, Guardsman Way, Mario Capecchi, Foothill, Wasatch, North Campus Dr, South Campus Dr.)
   ii. Make recommendations to connect the campuses in order of priority. Tunnels, crosswalks, bridges, etc. that support the unification of individual “campuses.”
   iii. Connections between Research Park and Health Sciences
iv. North side of Campus - 100 South to the Hospital recommendations: Kennecott Building is isolated from campus, possible re-route 100 S. behind Kennecott feasibility. Safety and better traffic flow?

6. Engage stakeholders of the master plan such as campus departments, university and research park employees, hospital staff, neighborhoods, community leaders, specialty groups, and the public for input and feedback at appropriate times

A. The stakeholders of the master plan listed above have been and will continue to be included in the master plan process. (Page 3-1)

B. Feedback will be documented, organized, and included as part of the justification and support of the master plan (Pages 3-2, 3-3)

C. The integration of planning efforts will be established through seeking a consensus from the different geographic areas of campus (Medical Center, University Campus, and the Research Park) (Pages 3-3 - 3-21)

7. Create a usable master plan with financially viable options and a strategy for phasing and implementing plan elements

A. All major projects will have costs associated to them, with priority ranking through the Working and Steering Committees. (Pages 4-28 – 4-31, 5-34 – 5-38, 6-56 – 6-57, 7-22 – 7-24, 7-34 – 7-49)

B. Constrained items will be given viable options that may be an alternative to the preferred option, but more feasible. (Pages 5-32, 7-13 – 7-14, 7-20)

C. Phasing of many plan elements will allow the preferred options to be constructed over time without reducing the quality of the improvement. (Pages 6-46, 7-21 – 7-23)

D. Decisions will be based on market-based approaches that include balancing parking fees that encourage transit ridership, but also maximizing parking revenue. (Pages 5-21 – 5-26)
Chapter 3 Public Outreach

This section describes coordination activities, summarizes key issues and pertinent information received from the public and agencies, and lists those agencies and persons that were consulted.

Public and Agency Coordination meetings (6)

The following is a list of meetings held between March 2014 and March 2015 as part of the coordination process for this Master Plan. In addition to these meetings, where public outreach was a key agenda item, regular project team meetings were held with representatives from the University of Utah, Utah Transit Authority (UTA), the Utah Department of Transportation (UDOT), Salt Lake City, and Horrocks Engineers.

- March 10, 2014 Project Kickoff/PI Strategy Meeting
- April 28, 2014 Public Outreach Strategy Meeting
- June 23, 2014 UTA Coordination Meeting
- September 9, 2014 Salt Lake City Coordination Meeting
- September 19, 2014 Master Plan findings Presentation
- October 9, 2014 Presentation to Community Forum
- October 14, 2014 Presentation to Transportation and Traffic Committee
- November 12, 2014 Steering Committee Presentation of Public Outreach
- January 8, 2015 Presentation to Community Forum

March 10, 2014 - Project Kickoff Meeting (6.A,C)

This was the first project team meeting, which has held to set up the study's goals and objectives and begin project scoping activities and public outreach coordination. The goals and objectives can be found in Chapter 2 of this report.

April 28, 2014 – Public Outreach Strategy Meeting (6.A)

The purpose of this meeting was to define the roles and responsibilities of the team members, discuss the study’s goals and objectives and determine how to meet them, and identify key stakeholders, including how to keep them informed and the best times to include them to get the best input.

June 23, 2014 – UTA Coordination Meeting (6.A)

This meeting was intended to coordinate past, present, and future plans with UTA. Since the University is the number one user for UTA (35% mode split), a partnership for long range planning would give the University and UTA the best plan possible for transit. UTA and the University have a shared goal of 50% mode split on campus and will work together to find ways to achieve this goal.
**September 9, 2014 – Salt Lake City Coordination Meeting (6.A)**

The purpose of this meeting was to coordinate planning efforts on campus and surrounding areas with Salt Lake City. Items discussed were bicycle lanes, pedestrian sidewalks and tunnels, future signals, and ongoing planning studies.

**October 9 - Presentation to Community Forum (6.A)**

The Community Forum is made up of representatives from Salt Lake City’s Community Council groups. These Community Councils represent different areas of Salt Lake City and are encouraged to make recommendations to the City on matters affecting the city or their particular neighborhood. The study team was invited to the Community Forum to share the findings of the Master Plan research and to solicit their input on the plan. The study team showed attendees how to enter comments on the study website and encouraged them to share the website with their respective neighborhood groups.

**October 14, 2014 – Presentation to Traffic and Transportation Committee (6.A,C)**

The Traffic and Transportation Committee provides a forum, hosted by the University of Utah, for a variety of groups located in the northeast sector of Salt Lake City to discuss and share ideas regarding traffic, transportation, and growth. The study team was invited to the Traffic and Transportation Expo to share the findings of the Master Plan research and to solicit their input on the plan.

**November 12, 2014 – Steering Committee Presentation of Public Outreach (6.C)**

The purpose of this meeting was to share the findings of the Master Plan research to the Steering Committee and to solicit their input on the plan. The study team showed them how to enter comments on the study website and encouraged them to share the website with their respective groups within the campus.


The purpose of this meeting was to update the Community Councils with input received so far on the Master Plan. An overview of the types of outreach done and comments received was presented.

**Public Outreach Activities (6.A)**

Several methods were used to advertise the study’s website and interactive map. The website/map opened for comment on October 10, 2014 and was open for comments through December 15, 2014.

A flier was distributed via the following methods:

- University’s Main Facebook page
Summary of Comments (6.B)

The website/map received 977 comments, which have been categorized and summarized below.

Transit (6.B)

Campus

Guardsman Way and Sunnyside Ave

- Schedule Sunnyside construction during summer break.
- Hazard intersection due to excess speeding.

Mario Capecchi Drive and Foothill Drive

- Recommend bike tunnel.
- Improve right turn traffic flow at Peak hours onto Mario Capecchi.
- Two right turn lanes.

Foothill Drive and Guardsman Way

- Add yellow traffic turn arrow.
- Improve traffic signal timing.
- Improve signage.

Guardsman Way and South Campus Drive

- Coordinate TRAX train better.
- Increase shoulder so cars are able to pass if needed.
- Roundabout is a nightmare.
- Improve traffic when TRAX is running.
- Improve pedestrian crossing.

1500 East and South Campus

- Improve signage and visibility.
- Create a 3 way stop (stop the Northbound Traffic).
- TRAX should have priority.
- Turn left into student Library Parking.
• Maintenance of vegetation for visibilities.

**South Campus Drive and University Street**

• Recommend 2 way stop side.
• Do not add parking.
• Long wait time to turn onto South Campus.
• Improve access.

**South Campus Drive and 1800 East**

• Add turn Lane.

**Mario Capecchi Drive and South Campus Drive**

• Move bus stop so it doesn’t conflict with traffic.
• “Impossible” intersection to use to get in and out of campus.
• Improve signal timing.
• Improve street signage.
• Improve visibility on access just north of the intersection.

**President Circle**

• Improve intersection flow.
• Turn off bus when idling for a break.
• Delivery vehicles block visibility.
• Recommend roundabout.
• Turn University into a one way street.
• Reduce speed limit.
• Improve signage with what is pedestrian zone.

**University Street and 100 South**

• Reduce turning radius.
• Reduce speed limit.

**North Campus Drive where it turns into 100 south**

• Reduce turning radius.
• Include a bus only lane.
• Pedestrian bridge/tunnel.
• Connect alleyway.
• Reduce speed limit.
• Enforce HAWK signal.
North Campus and Central Campus Drive

- Needs bike lane.
- North Campus is dangerous.
- Parking entrance should be an entrance only.
- Build a parking garage.

1300 East and Sunnyside Ave

- Improve signal timing.
- Have dedicated turn arrows.

Research Park
Wakara Way and Chipeta Drive

- Improve signage.
- Driveway blocked because of traffic exiting Connor Road.
- Lack of visibility.
- Recommend roundabout.
- Recommend traffic light.
- Recommend right turn lane westbound.
- Improve striping.
- Need a protected left turn lane on Chipeta Drive.
- Recommend bike lane.

Connor Road and Red Butte

- Remove stop sign.
- Widen Connor Road to go through Ft. Douglas.

Arapeen and Chipeta

- Traffic light.
- Right and left lane in both directions.
- 3 way stop in peak hour.
- Alternate route to get to Sunnyside Ave.

Sunnyside Ave and Arapeen Drive

- Improve striping.
- Move the left turn lane farther down Sunnyside and have them do a U-turn.
- Improve alternate routes to get to Foothill or Sunnyside Ave.
- Add another right turn lane onto Sunnyside Ave.
- Remove Research Park sign, blocks visibility.
• Improve signage.
• Improve access to University Apartments.
• The median into the post office causes drivers to drive on the wrong side of the road.
• “Entering Research Park in the a.m. isn’t a problem, but trying to get out in the p.m. is. Both the Arapeen and Wakara exits often get painfully backed up. I’ve spent more than 40 minutes on occasion just trying to get out of Research Park.”

Foothill Drive and Sunnyside Ave

• Improve/update striping.
• Three left hand turn lanes turning from Sunnyside Ave onto Foothill.
• Improve signal timing.
• Speed Limit on Sunnyside Ave should be 35.
• Allow Bus Shuttles to go into Village apartments.

Wakara Way and Arapeen Drive

• Needs left turn lanes.
• North access needs improvements.
• Recommend traffic light.
• Utility boxes limits visibilities.
• Improve signage.
• Recommend roundabout.

Komas Drive and Wakara Way

• Recommend traffic light.
• Turning left off Komas is dangerous.
• Improve bus schedule for a dedicated Research Park Shuttle.
• Limited visibility.
• Recommend 25 mph traffic speed reduction.
• Limited visibility of crosswalk on Wakara Way.

Wakara Way and Foothill Drive

• Improve signage about going straight from Wakara Way.
• Improve speed signage and visibility.

Medical
Wasatch Drive and North Campus Drive

• Visibility is blocked by buses and shuttles from new garage.
• U-turn legal.
Wasatch Drive and Mario Capecchi Drive

- Ballif Road should not be a one way.
- Access visibility are blocked by on street parking.
- Long wait time to turn left onto Wasatch.

Mario Capecchi Drive and South Medical Drive

- Turning left from South Medical Drive is “next to impossible”.
- Improve visibility of signage.
- Add a connection to Research Park.

Red Butte and East Medical Drive

- Poor visibility.
- Widen intersection.

East Medical Drive

- Confusing intersection.
- Too narrow.
- Horrible parking.

Medical Drive North

- Recommend traffic light.
- Recommend roundabout.
- Improve signage.
- Confusing intersection.

North Campus Drive and Mario Capecchi Drive

- Right turn only on North Campus.

North Campus Drive and Federal Heights Drive

- Be able to turn Left off of Federal Heights.
- Put protected bike lanes.

*Comments that are not in the University boundaries*

Fort Douglas Blvd

- Realign TRAX to go through Fort Douglas.
- Improve street signage.
Virginia

- No on street parking.
- Extend Island.
- Improve signage.

Parking (6.B)

Campus
Mario Capecchi Drive and South Campus Drive

- Need electrical quick charge station.

South Campus Drive and Campus Center Drive

- Remove parking lot on northwest corner because its “ugly”.

Ballif Road

- Need more parking.
- Need U level parking.
- Build it into a parking garage.
- More parking alternatives/shuttle services.
- Improve bus schedule to this area.

Guardsman way and South Campus Drive

- Turn the parking lot on the northwest corner into a parking garage.
- Turn the parking lot on the southwest corner into a parking garage.

Guardsman Way and 500 South

- Eliminate the E parking pass.

Rice-Eccles Stadium

- Add another drive way south end of this.
- Close north end driveway.

University Street and South Campus

- Create parking garage on northeast corner.
- Parking garage just north of the stadium.
President Circle

- Driveway just south for Pioneer Theater.
- Monitor meters more from park and wait people.
- Eliminate parking.
- Make only for bus/bike and pedestrians.

1455 East and 100 South

- “No parking garage here”.
- “Thank you for putting a parking garage here”.
- Eliminate parking in front of the fraternities and sororities.

North Campus Drive and Central Campus Drive

- Parking garage on southwest corner.
- Don’t build a parking garage.
- “While incentivizing use of TRAX is better in the long run, TRAX has a long ways to go before it is convenient. A parking garage would be of great help finding parking at noon when I can’t use mass transit.”

Research Park
Arapeen and Wakara Way

- Only A parking.
- More student parking.
- Expand parking lot.
- More employees parking.
- More road side parking.
- More parking at the HSEB.
- Open lots directly north and have pedestrian access for more parking in Research Park.

Wakara Way and Chipeta

- Students need their own place to park.

Chipeta Way and Tabby Lane

- “While there are cars parked in this picture, there are no parking signs here now. Once again, the street is extremely wide with plenty of parking space, so why the need to prevent anyone from parking anywhere?”
Colorow Road and Colorow Drive

- Three hour parking in certain hours on Colorow Road.

Medical

Wasatch Drive

- Driveway visibility is blocked by south side on street parking.

Mario Capecchi and North campus Drive

- Better a parking.
- Better TRAX/shuttle parking.

North Medical Drive

- Pricing for parking should be different for covered and un covered spots.

South Medical Drive

- Improve signage.

East Medical Drive

- Need parking garage.
- Parking terrace for “A” permits.
- Better snow and ice removal.

Comments that are not in the University Boundaries

Potter Street

- Parking lot not adequate for military museum.

Virginia Street

- Prohibit parking on west side.

Sigsbee Ave

- No traffic by roundabout.
University comments with no specific area

- “Please stop using our tuition to subsidize private automobile use that both hurts other, often marginalized, students who depend on public transit to get to school and our health as a student body, community, and city through the pollution of our air”
- Keep parking in the neighborhoods around the stadium for neighborhoods only.

Traffic (6.8)

Campus

Guardsman Way and Sunnyside Ave

- Schedule Sunnyside construction during summer break.
- Hazard intersection due to excess speeding.

Mario Capecchi Drive and Foothill Drive

- Recommend bike tunnel.
- Improve right turn traffic flow at Peak hours onto Mario Capecchi.
- Two right turn lanes.

Foothill Drive and Guardsman Way

- Add yellow traffic turn arrow.
- Improve traffic signal timing.
- Improve signage.

Guardsman Way and South Campus Drive

- Coordinate TRAX train better.
- Increase Shoulder so cars are able to pass if needed.
- Roundabout is a nightmare.
- Improve traffic when TRAX is running.
- Improve Pedestrian crossing.

1500 East and South Campus

- Improve signage and visibility.
- Create a 3 way stop (stop the northbound traffic).
- TRAX should have priority.
- Turn left into student Library Parking.
- Maintenance of vegetation for visibilities.
South Campus Drive and University Street

- Recommend 2 way stop side.
- Do not add parking.
- Long wait time to turn onto South Campus.
- Improve access.

South Campus Drive and 1800 East

- Add turn lane.

Mario Capecchi Drive and South Campus Drive

- Move bus stop so it doesn’t conflict with traffic.
- “Impossible” intersection to use to get in and out of campus.
- Improve signal timing.
- Improve street signage.
- Improve visibility on access just north of the intersection.

President Circle

- Improve intersection flow.
- Turn off bus when idling for a break.
- Delivery vehicles block visibility.
- Recommend roundabout.
- Turn University into a one way street.
- Reduce speed limit.
- Improve signage with what is pedestrian zone.

University Street and 100 South

- Reduce turning radius.
- Reduce speed limit.

North Campus Drive where it turns into 100 south

- Reduce turning radius.
- Include a bus only lane.
- Pedestrian bridge/tunnel.
- Connect alleyway.
- Reduce speed limit.
- Enforce HAWK signal.
North Campus and Central Campus Drive

- Needs bike lane.
- North Campus is dangerous.
- Parking entrance should be an entrance only.
- Build a parking garage.

1300 East and Sunnyside Ave

- Improve signal timing.
- Have dedicated turn arrows.

Research Park
Wakara Way and Chipeta Drive

- Improve signage.
- Driveway blocked because of traffic exiting Connor Road.
- Lack of visibility.
- Recommend roundabout.
- Recommend traffic light.
- Recommend right turn lane westbound.
- Improve striping.
- Need a protected left turn lane on Chipeta Drive.
- Recommend bike lane.

Connor Road and Red Butte

- Remove stop sign.
- Widen Connor Road to go through Ft Douglas.

Arapeen and Chipeta

- Traffic light.
- Right and left lane in both directions.
- 3 way stop in peak hour.
- Alternate route to get to Sunnyside Ave.

Sunnyside Ave and Arapeen Drive

- Improve striping.
- Move the left turn lane farther down Sunnyside and have them do a U-turn.
- Improve alternate routes to get to Foothill or Sunnyside Ave.
- Add another right turn lane onto Sunnyside Ave.
- Remove Research Park sign blocks visibility.
• Improve signage.
• Improve access to University Apartments.
• The median into the post office creates drivers to drive on the wrong side of the road.
• “Entering Research Park in the a.m. isn’t a problem, but trying to get out in the p.m. is. Both the Arapeen and Wakara exits often get painfully backed up. I’ve spent more than 40 minutes on occasion just trying to get out of Research Park.”

**Foothill Drive and Sunnyside Ave**

• Improve/update striping.
• Three left hand turn lanes turning from Sunnyside Ave onto Foothill.
• Improve signal timing.
• Speed Limit on Sunnyside Ave should be 35 mph.
• Allow bus shuttles to go into Village Apartments.

**Wakara Way and Arapeen Drive**

• Needs left turn lanes.
• North access needs improvements.
• Recommend traffic light.
• Utility boxes limit visibilities.
• Improve signage.
• Recommend roundabout.

**Komas drive and Wakara Way**

• Recommend traffic light.
• Turning left off Komas is dangerous.
• Improve bus schedule for a dedicated Research Park Shuttle.
• Limited visibility.
• Recommend 25 mph traffic speed reduction.
• Limited visibility of crosswalk on Wakara Way.

**Wakara Way and Foothill Drive**

• Improve signage about going straight from Wakara Way.
• Improve speed signage and visibility.

**Medical**

**Wasatch Drive and North Campus Drive**

• Visibility is blocked by buses and shuttles from new garage.
• U-turn legal.
Wasatch Drive and Mario Capecchi Drive

- Ballif Road should not be a one way.
- Access visibility are blocked by on street parking.
- Long wait time to turn left onto Wasatch.

Mario Capecchi Drive and South Medical Drive

- Turning left from South Medical Drive is “next to impossible”.
- Improve visibility of signage.
- Add a connection to Research Park.

Red Butte and East Medical Drive

- Poor visibility.
- Widen intersection.

East Medical Drive

- Confusing intersection.
- Too narrow.
- Horrible parking.

Medical Drive North

- Recommend traffic light.
- Recommend roundabout.
- Improve signage.
- Confusing intersection.

North Campus Drive and Mario Capecchi Drive

- Right turn only on North Campus.

North Campus Drive and Federal Heights Drive

- Be able to turn Left off of Federal Heights.
- Put protected bike lanes.

Comments that are not in the University boundaries
Fort Douglas Blvd

- Realign TRAX to go through Fort Douglas.
- Improve street signage.
Virginia

- No on street parking.
- Extend Island.
- Improve signage.

**Pedestrian (6.8)**

*Campus*

**Foothill Drive and Mario Capecchi Drive**

- Crosswalk on all four corners to connect Research Park and Campus better.

**Guardsman Way and 500 South**

- Traffic calming on right turn.
- Improve street lighting.
- More crosswalks on 500 South.
- Improve signal pedestrian crossing times (long wait and short crossing timing).
- Pedestrian bridge recommend.
- Many jaywalk on Guardsman Way.

**Mario Capecchi Drive and South Campus Drive**

- Better pedestrian signal timing (too short).
- TRAX train and pedestrian signal conflict.
- Bridge across South Campus to the Huntsman Center.

**251 South and 1400 East**

- Request curb cut.

**386 East and Campus Center Drive**

- Improve map for students.
- Improve crosswalk from TRAX Station.

**University Street and 100 South**

- “Traffic backs up in all directions at this signal. A pedestrian bridge would eliminate time waiting for pedestrians to cross the street and allow more time for vehicle traffic. It would also be safer for the pedestrians.”
- Better pedestrian signage.
- Better pedestrian timing.
- Traffic calming.
University Street and 400 South

- Traffic calming.
- Decrease pedestrian crossing distance.

North Campus Drive and Mario Capecchi Drive

- Crosswalk by TRAX Station.
- Incomplete sidewalks.
  - Connection between Medical Center Station and Heritage Center.

100 South and 1500 East

- Better street lighting.
- Crosswalk doesn’t lead anywhere.

1635 East and Campus Center Drive

- Improve pedestrian visibility with lights/HAWK.
- Reduce speed limit.
- Improve bus routes.
- Improve traffic calming.
- Needs crosswalk.

10 South and 1900 East

- Better pedestrian visibility.

100 South and North Campus Drive

- Dangerous intersection.
- Crossing bridge.

1300 East and Sunnyside Avenue

- Better school zone lights.
- Better visibility for pedestrian/ lights/ HAWK.
- Traffic calming.

1300 East and 300 South

- Better visibility for pedestrian/ lights/ HAWK.
President Circle

- Stop sign is blocked by bus stop.
- Traffic light.
- Pedestrian activated signals.

100 South and University Street

- Dangerous intersection.

Guardsman Way and South Campus Drive

- Pedestrian crossing cause traffic build up.
- Improve street lighting.
- Improve signal timing at the cross walk east of this intersection.

1500 East and South Campus Drive

- Dangerous crossing.
- Hand rails leading into the tunnel extremely slippery when wet.
- Slope to tunnels are extreme.
- Better access to TRAX Station.
- Improve bus routes.

1455 East and 100 South

- Recommend pedestrian bridge.
- Pedestrian crossing cause traffic build up.
- Signal pedestrian crossing.
- Improve sidewalks.
- Better crossing visibility.
- Reduce speed limit.
- Recommend pedestrian bridge or tunnel to Research Park

Arapeen Drive and Wakara Way

- Dangerous intersection because pedestrians and bikers are not noticed.
- Not designed for pedestrians.
- Needs better signage and markings.
- Needs traffic light.
- Complete existing sidewalk.
- Reduce traffic speed/ traffic calming.
- Many “close call” motorist to pedestrian accidents.
- Better street lighting.
• Lack of visibility.
• Covered bus stops.

Wakara Way and Chipeta Way

• Dangerous intersection.
• Traffic calming curb radius.
• Traffic light.
• Complete sidewalks on all four corner.
• Maintain existing sidewalk.
• Bus stop is covered with snow in the winter.
• Make Americans with Disabilities Act (ADA) cuts at each corner.

Wakara Way and Colorow Road

• Needs sidewalk.

Wakara Way and Komas Drive

• Crossing HAWK/lights/ better visibility for pedestrians.
• Sidewalk on both sides.
• Dangerous intersection for pedestrians.
• Sidewalk not maintained and over grown with vegetation.
• Improve street lighting.

Foothill Drive and Wakara Way

• Crosswalk at all four corners.
• Signal timing for better pedestrian timing.
• Traffic calming or enforce speed limit.
• Original crosswalk is lack of vision and dangerous.
• Recommend footbridge.
• Many “close call” motorist to pedestrian accidents.
• Flags do not help crossing.

Foothill Drive and Sunnyside Ave

• Improve Green Shuttle route.
• Better access to West Village.
• Improve bus schedule.
• Raised sidewalks on Sunnyside Ave for traffic calming.
Red Butte Road

- Needs a crosswalk.
- Needs sidewalk.

Pollock Road and Connor Road

- No sidewalk on either side.
- Better connection from Research Park.
- Improve stop sign visibility.

Le Grand Street and Sunnyside Ave

- Pedestrian signage needs maintenance.

Medical

Wasatch Drive and North Campus Drive

- Better connection from Wasatch Drive to lower campus.

Mario Capecchi Drive and Wasatch Drive

- Better access to lower campus/TRAX/Bus stop.
- No sidewalks.
- Northbound traffic be constrained to one lane until after the crosswalk.

Federal Heights and North Campus Drive

- Needs crosswalks.

North Campus Drive and Central Campus Drive

- Needs sidewalks on North Campus Drive.
- HAWK is confusing to some motorist.

Legacy Bridge

- Not safe with cyclist and skateboarders on it.

Circle of Hope

- Complete sidewalks and crosswalks.
East Medical Drive

- Conflicting signage with stop and slow in the same place.
- Erosion issue on gravel ramp.

**Comments that are not in the University boundaries**
140 South and Fort Douglas

- Stop sign visibility is blocked.

Lewis Street

- Improve bus shuttle signage.

**Comments with no specific area**

- Maintain sidewalks better in the winter.
- Historic pedestrian path reopened.
- Associated Students of the University of Utah (ASUU) golf carts driven reckless on sidewalks.
- Construction area causes delays for pedestrians also.
- Natural History Museum of Utah (NHMU) trail/path needs lights and pavements.
- Connect staircase to pedestrian parking lot paths.
- More ADA accessibility
Chapter 4 Traffic

This chapter encompasses everything to do with vehicular traffic on campus, including the Medical Center and Research Park. Vehicular traffic is most often defined as motor vehicles, specifically passenger cars and trucks. The interaction between these modes of transportation and the other modes discussed in this plan are important for a sustainable and efficient transportation network. This chapter will discuss the existing roadway conditions, including any deficiencies. Also included is the projected future travel demand, which in turn gives way to recommended capital improvements to meet that demand. Sections in this chapter will also discuss ways to reduce the number of single occupancy vehicle trips to and from the campus and how vehicles and pedestrians interact.

Existing Traffic Conditions (3)

In order to accurately predict future growth in transportation, a solid baseline must be established. Traffic data was collected throughout the study area. These data included the existing network of major streets, intersection type and location, 24-hour vehicular volumes and peak hour intersection turning movement counts. This information provides a snapshot in time, representing a normal day on and around campus. Existing trends and deficiencies were then identified. This data collection effort forms the basis of future analysis.

Street Network (3.B)

The study of roadways surrounding and within the University of Utah and Research Park campuses providing access to the campuses will be discussed in the following paragraphs and these roadways are illustrated in Figure 4-1.

Mario Capecchi Drive

Mario Capecchi Drive is a major thoroughfare for the University of Utah and Medical Center. Mario Capecchi Drive is on the eastside of campus and runs south through campus. The speed limit is 35 mph making this an arterial road for this region and it has a road capacity of two lanes each way, averaging 23,000 vehicles per day. Mario Capecchi Drive has 4 traffic control signals and has designated left hand turn lanes. This road has a divided median along most of its 1.2 miles. Mario Capecchi Drive is currently operating at an acceptable level of service.

Wasatch Drive

Wasatch Drive is a collector roadway on the eastside of campus. It connects North Campus Drive with Mario Capecchi Drive. The speed limit is 25 mph with one lane each direction. Wasatch Drive is mainly used to access parking and to connect roadways. This roadway has an average of 8,300 vehicles per day. Wasatch Drive is currently operating at an acceptable level of service.
Foothill Drive

Foothill Drive is an arterial roadway on the west side of Research Park and the southernmost portion of the University campus. The speed limit is 40 mph. Foothill Drive currently has a road capacity of three lanes in each direction with northbound protected right turn lanes at Sunnyside Avenue, Wakara Way and Mario Capecchi Drive. At the intersections of Wakara Way and Mario Capecchi Drive, there are two protected left turn lanes to help distribute the amount of vehicles turning onto Foothill Drive. This roadway has an average of 35,000 vehicles per day. Foothill Drive is currently operating at an acceptable level of service.

Medical Drive

Medical Drive is a collector roadway that surrounds the Medical Center. Medical Drive west of the hospital has two lanes eastbound and one lane with a protected left turn lane for the westbound traffic. East of the hospital, Medical Drive has one lane each way and a speed limit of 25 mph. Medical Drive is mainly used to access the hospital. This roadway has an average of 13,000 vehicles. Medical Drive is currently operating at an acceptable level of service.

North Campus Drive

North Campus Drive is an arterial roadway on the north side of the University and turns into Medical Drive. The speed limit on this road is 30 mph. North Campus Drive turns into 100 South as North Campus Drive makes the right angle turn. This roadway has an average of 13,500 vehicles per day. North Campus Drive is currently operating at an acceptable level of service.

100 South

100 South is a collector roadway that runs through Salt Lake City from east to west. It distributes traffic to the end of campus. The speed limit on this road is 30 mph. 100 South turns into North Campus Drive. This roadway has an average of 20,500 vehicles per day. 100 South is currently operating at an acceptable level of service.

500 South

500 South is an arterial roadway on the south side of the University. The speed limit is 35 mph. 500 South merges with Foothill Drive and has a road capacity of three lanes in each direction. 500 South also includes Light Rail tracks up to Rice-Eccles Stadium. This roadway has an average of 29,300 vehicles per day. 500 South is currently operating at an acceptable level of service.
1300 East

1300 East is an arterial roadway on the west side of the University. The speed limit is 30 mph. 1300 East has two lanes in each direction with two left turn lanes at 500 South. This roadway has an average of 16,700 vehicles per day. 1300 East is currently operating at an acceptable level of service.

Central Campus Drive

Central Campus Drive is a collector / local roadway that serves the University and its Student Union building at the Center of Campus. The speed limit on this road is 25 mph. Central Campus Drive has one lane each way south of the Scientific Computing Imaging (SCI) Institute building and two lanes each way north of the same building. This roadway has an average of 5,400 vehicles per day. Central Campus Drive is currently operating at an acceptable level of service.

Wakara Way

Wakara Way is an arterial roadway for Research Park and other facilities that are in the area. The speed limit on this road is 30 mph. Wakara Way has three lanes in each direction from Foothill Drive to Arapeen Drive, with a left turn lane at Komas Drive. Wakara Way is currently operating at an acceptable level of service.

Chipeta Way

Chipeta Way is the east leg of the ring road around Research Park and services everything on the east bench of the park. The speed limit on the roadway is 30 mph and there are two travel lanes in each direction. A landscaped median runs along the entire roadway, except to allow left turn access to major parking lots, Colorow Road, and Tabby Lane. Chipeta Way is currently operating at an acceptable level of service.

Arapeen Drive

Arapeen Drive is the main entrance to Research Park from Sunnyside Avenue. It is a four lane roadway section with landscaped median along its entire length. Left turns are allowed at the major parking areas and Chipeta Way. The speed limit along Arapeen Drive is 30 mph and the road is currently operating at an acceptable level of service.

Guardsman Way

Guardsman Way runs between Sunnyside Park on the east and Rowland Hall-St. Marks Elementary School on the west. Also along the road is The Salt Lake City Sports Complex and Eccles Tennis Center. The roadway currently has one travel lane in each direction with sporadic landscaped medians. Left turn access is permitted at all driveways and cross streets along the roadway. The speed limit is 30 mph and
on street parking is permitted on both sides of the road. There is also a bicycle lane in both directions. Guardsman Way is currently operating at an acceptable level of service.

**Sunnyside Avenue/800 South**

Sunnyside Avenue runs south of campus and connects to 800 South. The only university related facility that borders Sunnyside Avenue is the West University Village. The south side of the road is almost entirely residential. Sunnyside is an arterial street with two travel lanes in each direction. There is a continuous two-way left-turn lane along the length of the roadway providing left turn access at every residential driveway on the south side of the road. The speed limit on Sunnyside Avenue is 35 mph and on street parking is permitted on both sides of the road. Sunnyside Avenue currently operates at an acceptable level of service.

**University Street**

University Street runs north south in front of President’s Circle. University Street marks the boundary between the west edge of campus and the residential areas. University Street has one lane in each direction with no two-way left-turn lane. Left turn pockets are provided at the intersections and on-street parking is also permitted. There is a bike lane in both the north and southbound directions along the length of the roadway. University Street operates at an unacceptable level of service.

**South Campus Drive**

South Campus Drive runs between the Huntsman Center and the Latter Day Saint (LDS) Institute of Religion. Between the roundabout at Campus Center Drive and University Street, the roadway is narrow with only one lane in each direction and no parking. East of the roundabout there are two lanes in each direction. There are striped bike sharrows on this section of roadway. Two TRAX lines run down the center of the roadway with the University South Campus Station opposite the LDS Institute of Religion. South Campus Drive services between 8,000 and 10,000 vehicles per day and is not currently over capacity.
Level of Service (3.B)

Level of Service (LOS) is a measure of how well traffic flows on any given roadway segment. Typically a letter grade is assigned based on a scale of A-F. LOS A indicates a roadway well below capacity, LOS F is the threshold where a roadway exceeds its absolute capacity. Good engineering principles recommend that LOS D be established as the allowable limit for traffic operations. This ensures that money to improve roadways is spent wisely to reduce delay and congestion to acceptable levels.

Roadway LOS is used as a planning tool to quantitatively represent the ability of a particular roadway to accommodate the travel demand. The following thresholds shown in Table 4-1 and Table 4-2 were used as guides for quantifying LOS, and subsequently, the conditions of each of the major roadways around the University of Utah, Research Park and the Medical Center. LOS D is approximately 80 percent of a roadway’s capacity and is a common goal for urban streets during peak hours. Attaining LOS C on these streets would be potentially cost prohibitive and may present societal impacts, such as the need for additional lanes and wider street cross-sections. LOS D suggests that for most times of the day, the roadways will be operating at well below capacity. The peak times of day will likely experience moderate congestion characterized by a higher vehicle density and slower than free flow speeds. LOS D provides acceptable traffic flow, but also enough congestion to discourage short haul and SOV trips.

A four-lane freeway facility can accommodate 70,000 vehicles per day at LOS D; adding two additional lanes will increase this threshold by 40,000 vehicles to 110,000 vehicles per day. Arterial streets can handle significantly less traffic at LOS D; a seven lane arterial (6 travel lanes and one center turn lane) can only accommodate approximately 50 percent of the traffic of a freeway of similar lane configuration (55,000 versus 110,000). Similarly, much capacity is lost when reducing the number of arterial lanes by one in each direction, which results in a 17,700 vehicle per day reduction in LOS D capacity. Collector streets are designed at lower speeds than arterials in order to be less intrusive and are not as strictly access-controlled. Again, this results in a loss of capacity when compared to arterial streets. A three lane collector street will be able to move 1,700 less vehicles per day than a three lane arterial street. Removing the center turn lane on a collector results in a loss of capacity of 1,300 vehicles per day. On local streets LOS C is the minimum expectation for design. This ensures that these streets are more “livable” for homes that may front these streets. Figure 4-2 shows the level of service for each of the major roadways around the campuses.

University Street is the only roadway on or around campus that is currently over capacity based on daily traffic volumes.

Table 4-1 Suburban Arterial LOS Capacity Criteria in Vehicles per Day

<table>
<thead>
<tr>
<th>Lanes</th>
<th>LOS C</th>
<th>LOS D</th>
<th>LOS E</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>12,400</td>
<td>15,100</td>
<td>17,700</td>
</tr>
<tr>
<td>5</td>
<td>28,500</td>
<td>32,800</td>
<td>40,300</td>
</tr>
<tr>
<td>7</td>
<td>43,000</td>
<td>50,500</td>
<td>63,400</td>
</tr>
<tr>
<td>Lanes</td>
<td>LOS C</td>
<td>LOS D</td>
<td>LOS E</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>2</td>
<td>9,700</td>
<td>12,100</td>
<td>14,500</td>
</tr>
<tr>
<td>3</td>
<td>10,800</td>
<td>13,400</td>
<td>16,100</td>
</tr>
</tbody>
</table>
Figure 4-2: Existing Roadway Level of Service

Level of Service
- Green: Acceptable
- Red: Unacceptable

Traffic

University of Utah Transportation Master Plan

DATE
DRAWN

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

University of Utah Facilities Management GIS

3/14/2016
3/14/2016

Horrocks Engineers
Intersections (3.B)

There are many intersection within the study area. Each intersection was reviewed and several identified as major intersections. The characteristics of a major intersection include the control type, approach volumes, location and proximity to major roads, and level of service. The major intersections are listed in Table 4-3 and illustrated in Figure 4-3.

<table>
<thead>
<tr>
<th>Table 4-3 Major Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection Location</td>
</tr>
<tr>
<td>500 South &amp; 1300 East</td>
</tr>
<tr>
<td>400 South &amp; 1300 East</td>
</tr>
<tr>
<td>100 South &amp; 1300 East</td>
</tr>
<tr>
<td>100 South &amp; University St</td>
</tr>
<tr>
<td>North Campus Drive &amp; Central Campus Drive</td>
</tr>
<tr>
<td>North Campus Drive &amp; Wasatch Drive</td>
</tr>
<tr>
<td>Medical Drive &amp; Mario Capecchi Drive</td>
</tr>
<tr>
<td>Medical Drive &amp; 2030 East</td>
</tr>
<tr>
<td>Mario Capecchi Drive &amp; Primary Childrens Medical Center</td>
</tr>
<tr>
<td>Medical Drive South &amp; 1900 East</td>
</tr>
<tr>
<td>Mario Capecchi Drive &amp; Wasatch Drive</td>
</tr>
<tr>
<td>Mario Capecchi Drive &amp; South Campus Drive</td>
</tr>
<tr>
<td>Pollock Road &amp; Connor Road</td>
</tr>
<tr>
<td>Wakara Way &amp; Chipeta Way</td>
</tr>
<tr>
<td>Chipeta Way &amp; Arapeen Drive</td>
</tr>
<tr>
<td>Wakara Way &amp; Arapeen Drive</td>
</tr>
<tr>
<td>Mario Capecchi Drive &amp; Foothill Drive</td>
</tr>
<tr>
<td>Wakara Way &amp; Foothill Drive</td>
</tr>
<tr>
<td>Sunnyside Avenue &amp; Foothill Drive</td>
</tr>
<tr>
<td>500 South &amp; Guardsman Way</td>
</tr>
<tr>
<td>South Campus Drive &amp; Guardsman Way</td>
</tr>
<tr>
<td>Arapeen Drive &amp; University Village East</td>
</tr>
</tbody>
</table>
**Intersection Level of Service**

Whereas roadway LOS considers an overall picture of a roadway to estimate operating conditions, intersection LOS looks at each individual movement at an intersection and provides a much more precise method for quantifying operations. Since intersections tend to be a source of bottlenecks in the transportation network, a detailed look into the delay at each intersection should be performed on a regular basis. The methodology for calculating delay at an intersection is outlined in the *Highway Capacity Manual* and the resulting criteria for assigning LOS to signalized and un-signalized intersections are outlined in Table 4-4. As in the case with roadways, LOS D is considered the industry standard for intersections in an urbanized area. LOS D at an intersection corresponds to an average control delay of 35-55 seconds per vehicle for a signalized intersection and 25-35 seconds per vehicle for an un-signalized intersection.

At a signalized intersection under LOS D conditions, the average vehicle will be stopped for less than 55 seconds. This is considered an acceptable amount of delay to experience during the times of the day when roadways are most congested. As a general rule, traffic signal cycle lengths (the length of time it takes for a traffic signal to cycle through each movement in turn) are kept below 90 seconds. An average delay of less than 55 seconds suggests that in most cases, no vehicles will have to wait more than one cycle before proceeding through an intersection.

Un-signalized intersections are generally stop-controlled. Major streets may be two-way stop-controlled, meaning only the minor street traffic must stop. In cases where traffic volumes are more evenly distributed or where sight distances may be limited, four-way stop-controlled intersections are common. LOS for an un-signalized intersection is assigned based on the average control at the worst approach (always a stopped approach) of the intersection. An un-signalized intersection operating at LOS D means that the average vehicle waiting at one of the stop-controlled approaches will wait no longer than 35 seconds before proceeding through the intersection. This delay may be caused by large volumes of traffic on the major street, resulting in fewer gaps in traffic for a vehicle to turn into, or from queued vehicles waiting at the stop sign. Figure 4-4 illustrates the LOS of the major intersections on and around campus.

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Delay (seconds/vehicles)</th>
<th>Signalized Intersection</th>
<th>Unsignalized Intersection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤ 10</td>
<td>≤ 10</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>&gt; 10 - 20</td>
<td>&gt; 10 - 15</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>&gt; 20 - 35</td>
<td>&gt; 15 - 25</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>&gt; 35 - 55</td>
<td>&gt; 25 - 35</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>&gt; 55 - 80</td>
<td>&gt; 35 - 50</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>&gt; 80</td>
<td>&gt; 50</td>
<td></td>
</tr>
</tbody>
</table>

Note: LOS for unsignalized intersections is measured for the worst approach only
Figure 4-4

Existing Intersection Level of Service

- Roundabout
- 2 Way Stop
- 3 Way Stop
- 4 Way Stop
- Pedestrian Flags
- Hawk
- Street Light

University of Utah Facilities Management GIS

Traffic

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

DATE: 03/14/2016
DRAWN: jts

4-4 Existing Intersetction LOS.mxd, 3/14/2016 4:01:00 PM, Justins
Level of Service E or F is currently experienced at the intersections listed in Table 4-5.

<table>
<thead>
<tr>
<th>Intersection Location</th>
<th>Control Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chipeta Way/Arapeen Drive</td>
<td>STOP</td>
</tr>
<tr>
<td>Sunnyside Avenue/Foothill Boulevard (Signal)</td>
<td>SIGNAL</td>
</tr>
<tr>
<td>Guardsman Way/Foothill Boulevard (Signal)</td>
<td>SIGNAL</td>
</tr>
<tr>
<td>1300 East/University Boulevard (Signal)</td>
<td>SIGNAL</td>
</tr>
<tr>
<td>Guardsman Way/South Campus Drive</td>
<td>ROUNDABOUT</td>
</tr>
</tbody>
</table>
Projecting Future Demand (3)

Projecting future travel demand is a function of projected land use and socioeconomic conditions. The WFRC travel demand model was used to predict future traffic patterns and travel demand. The travel demand model was modified to reflect better accuracy through the University and surrounding area by creating smaller Traffic Analysis Zones and a more accurate and extensive roadway network. Existing conditions were simulated in the travel demand model and compared to the observed traffic count data to get a reasonable base line for future travel demand. Once this effort was completed, future land uses and socioeconomic data were input into the model to predict the roadway conditions for the design year 2040. 2040 was selected as the design year in order to be consistent with the WFRC planning process. The 2040 Regional Transportation Plan (available at www.wfrc.org) was completed in May, 2015. The transportation plan is a guide to maintain and enhance the regional transportation system for the Salt Lake Valley. This plan, as well as the Campus Master Plan and Health Sciences Center Master Plan, provided the inputs for the future scenarios modeled to project transportation conditions in 2040.

Future Traffic Volumes and Conditions (3)

The resulting outputs of the travel demand model were made up of traffic volumes on all of the classified streets on campus and the surrounding area. This data was used to identify the need for future roadway improvements to accommodate projected growth through the year 2040.

Roadway Conditions (3)

Areas of future concern on the street system were identified using traffic models of existing and projected traffic volumes to evaluate existing and projected level of service conditions. Improvements will need to be made as growth occurs in order to accomplish the goals of the University to provide a functional and sustainable transportation system. As a measure of performance, Level of Service on the roadway network was predicted for the year 2040 (see Figure 4-5). Guardsman Way south of campus, University Street, Foothill Drive, and the bridge connecting Chipeta Way and Connor Road are all expected to be deficient by the year 2040. Each of these areas are explained in detail in the following paragraphs.
Figure 4-5
2040 Projected Traffic Volumes and LOS

Level of Service

- Acceptable
- Unacceptable
University Street

University Street is currently deficient as a roadway segment. There are approximately 15,600 vehicles per day on the two-lane roadway today. The daily traffic volume is not expected to increase beyond 17,000 vehicles per day by 2040, but as the road is in failure condition today, it should be addressed. The acceptable traffic volume for a two-lane street of this nature at LOS D is 11,500 vehicles per day. The number of pedestrian conflicts and the presence of bike facilities and on-street parking further reduce the roadway capacity of University Street. It is also a residential street in places and should not be considered for capacity upgrades. Removal of on-street parking and pedestrian/bike facilities would enable a capacity increase project, but would be detrimental to the function of the roadway as a pedestrian/bike friendly gateway to the University Main access at President’s Circle. As such, every effort should be made to discourage vehicular use of University Street for anything other than local traffic. This can be accomplished by further enhancing pedestrian facilities with signalized crossings and bulb outs, as well as calming the road with raised crosswalks and potentially chicanes, half closures at either end of the street, or median barriers. Each of these measures would reduce the vehicular through traffic on University Street and allow the roadway to function more as a local connection to the University. This will of course result in the traffic expected on University Street to be dispersed to other roads, such as 1300 East and South Campus Drive. These roadways are more equipped to handle increases in traffic as they are designated as collector streets. The University should work with the City to encourage solutions and improvements to 1300 East.

Guardsman Way

Guardsman Way south of campus carries 12,700 vehicles per day currently. The roadway essentially functions as a three-lane road with limited access. The LOS D capacity for Guardsman Way is approximately 13,000 vehicles per day. This suggests that only a small amount of growth in the area will cause Guardsman Way to enter a failing condition. It is expected that vehicular volume in this area will increase to approximately 18,000 vehicles per day by the year 2040. This will exceed the carrying capacity of the roadway in its current configuration by 5,000 vehicles per day. Guardsman Way is similar to University Street in that it is both a pedestrian and bicycle friendly facility. This must remain its primary function in the future and vehicular traffic should be discouraged from using the roadway. Much of the traffic on Guardsman Way comes from the large sports complex parking facility on the east side of the road and little can be done to divert this traffic. Encouraging transit use in the area would be an effective and efficient way to eliminate some projected traffic. It may be possible to provide UTA transit passes to patrons to the sports complex as part of the usage fee. This would encourage transit use and help to reduce traffic on Guardsman Way. Raising and/or signalizing the existing crosswalks would also help to discourage vehicular through traffic and reduce volumes. As with University Street, through traffic should be discouraged through traffic calming with these vehicles dispersing to more vehicle friendly roadways.

Foothill Drive

Foothill Drive’s primary function is to move traffic. The roadway is currently configured with three travel lanes in each direction and a center two-way left-turn lane. The area between Mario Capecchi Drive and
Wakara Way is particularly congested during the peak times of the day and is expected to carry over 53,000 vehicles per day in the future, which is 7,000 more than its LOS D capacity. It would be almost unprecedented to widen an area of Foothill Drive beyond the current seven lane configuration; however, due to the relative short length of this particular segment of Foothill Boulevard and the close intersection spacing between Mario Capecchi Drive and Wakara Way, significant increases in capacity may be achieved by providing overall better signal operations and signal geometry changes. Another alternative to accommodate the large volume of traffic along Foothill would be the introduction of flex lanes. Flex lanes are single lanes that can be reversed in direction based on peak demands where travel patterns are predominately one directional during the peak hours. Foothill Drive is a commuter road and traffic data suggests that during the a.m. peak hour northbound traffic into the University and downtown accounts for approximately two thirds of the traffic on Foothill Drive. Similarly, during the p.m. peak hour, two thirds of the traffic is headed out of the downtown area and away from the University in the southbound direction. This directional split makes Foothill Drive a potential candidate for flex lanes and could therefore avoid any potentially cost prohibitive and socially impactful roadway widening. The University does not control Foothill Drive, but should continue to encourage UDOT to find solutions to future problems.

**Chipeta Way Bridge and Connor Road**

The Chipeta Way Bridge provides the most direct connection between the University Medical Center and Research Park. It currently services approximately 8,000 vehicle trips per day and is expected to exceed 12,000 trips in the future as research park continues to expand and the need for a direct connection avoiding Foothill Drive and the University Main Campus becomes more important. The current two lane bridge is relatively narrow and will not accommodate the expected traffic volume. A new four-lane bridge is recommended to match the four lanes to the east on Chipeta Way. It may also be necessary to accommodate pedestrians and bicyclists, unless another alternate river crossing can be provided in close proximity to the roadway bridge. Connor Road will also need to be expanded up to the medical center parking areas to allow the safe and efficient flow of vehicles between the Medical Center and Research Park. Other alternatives include a personal rapid transit system (discussed in the transit section of this document). This may allow for reduced vehicular trips between Research Park and the Medical Center but if the Chipeta Way bridge is to accommodate an on the ground PRT system, it would still need to be widened.

**Medical Drive North**

Medical Drive North is particularly challenging as it is the main access to the Medical Center and is at the confluence of several roadways. A full traffic study was performed in this area and is included in the appendix of this report. The conclusions of the study call for realigning the entrance to the multi-level parking facility, reconfiguring the intersection of Medical Drive North and the maintenance access to a four-way stop and installing a roundabout at the main Medical Center entrance and Medical Drive North. As part of this reconstruction, lane configurations and striping will also be modified. Figure 4-6 shows a conceptual layout of the Medical Drive North reconfiguration.
Intersection Conditions (3.B)

LOS for signals is very difficult to predict so far out into the future. It is expected that at least some of the signals will fail to operate at LOS D or better as growth occurs and traffic patterns change. It is recommended that the signalized intersections in and around campus be regularly monitored and signal timings adjusted as needed to maintain acceptable operating conditions. Many of the signals around campus are controlled by either UDOT or Salt Lake City. The University must continue to coordinate with these entities to ensure signals are routinely optimized. Additionally, care should be taken to regularly monitor the non-signalized intersections in the area and, where appropriate, signal warrant studies should be performed to assess whether a traffic signal is warranted. The following paragraphs identify intersections that are likely to experience unacceptable levels of service in the future and are identified in Figure 4-7. Concept designs for some of these proposed projects can be found in the appendix of this report.

Chipeta Way/Arapeen Drive

The intersection of Chipeta Way and Arapeen Drive is currently stop controlled and is in a failing condition. Signalizing this intersection should alleviate the delay experienced by vehicles entering the intersection on Chipeta Way and allow for acceptable operations into the future. The specific configuration of the
intersection will need to be determined upon further study and the completion of a traffic signal warrant as described in the Manual on Uniform Traffic Control Devices (MUTCD).

**Sunnyside Avenue/Foothill Drive**

The Sunnyside and Foothill intersection is already signalized, but the south leg of the intersection is lacking the required capacity to make the intersection function appropriately. There are some considerable right of way challenges on the south leg, but these need to be faced head on to accommodate the growing need for northbound/southbound progression through the intersection. An additional dedicated left turn lane on the north, west and south legs of the intersection would considerably improve the functionality of the intersection. If possible, a free right turn northbound to eastbound would also be favorable, although a dedicated right turn lane should be installed at a minimum. The access of Connor Street onto Sunnyside is also problematic due to its close proximity to Foothill. Closing this access would allow for the aforementioned free right turn from northbound Foothill and would eliminate the potentially hazardous conflict of vehicles turning right at Foothill onto Sunnyside and vehicles exiting Connor Road. At a minimum, left turns from and into Connor Road from Sunnyside should be prohibited by a raised curb or other appropriate physical barrier. This intersection falls under UDOT control.

**Guardsman Way/Foothill Drive, 1300 East/University Boulevard**

Guardsman Way and Foothill Drive is a busy intersection with a very heavy eastbound left turn movement. The intersection is currently experiencing excessive delays which could be reduced by retiming the signal. 1300 East and University Boulevard is also failing, but could potentially be fixed with signal timing. A signal timing study should be performed on each of the major corridors through and around campus to ensure that signals are optimized for progression during the peak periods. Foothill and Sunnyside should be prioritized for a signal timing effort. This section of roadway is controlled by UDOT.

**Guardsman Way/South Campus Drive**

This intersection is a special case roundabout with TRAX running through the center. The roundabout could benefit from some geometrical improvements, notably a free right turn westbound to southbound. Adding a second lane for the westbound to southbound movement would also enhance operations and allow for greater capacity. This could be achieved by separating the westbound through moving vehicles from the left turning vehicles with raised curbing or other channelizing physical barrier. An additional approach lane on the east leg would also be required to accommodate this modification.

**100 South/North Campus Drive**

Although not technically an intersection, 100 South where it turns into North Campus Drive is a sharp 90 degree bend with a diagonal pedestrian crossing which was recently modified to enhance both safety and efficiency. The recent improvements include a HAWK signal for the diagonal crossing installed by UDOT, as well as a pedestrian bridge that connects to the recently renovated Rio Tinto Kennecott building.
**Mario Capecchi Drive/Foothill Drive**

The heaviest movement at this intersection is left turning vehicles from Mario Capecchi Drive onto southbound Foothill. There are currently two dedicated and protected left turn lanes for this movement. Due to the restricted through movements on this approach, an additional left turn lane will be warranted and possible to accommodate traffic increases. In the interests of pedestrian/bicycle connectivity and safety, a pedestrian underpass should be constructed under Mario Capecchi Drive to allow/encourage bicycle commuters to stay off the road through this busy intersection and provide connectivity to a future sidewalk on the north side of Foothill.

**Medical Drive South/Mario Capecchi**

Pending an MUTCD signal warrant study, the intersection at Medical Drive South and Mario Capecchi Drive will likely need to be signalized in the future. In addition to the signal, a second left turn lane should be installed on the southbound leg of Medical Drive north and a dedicated right turn lane will be required on the northbound leg of Mario Cappechi. These enhancements will help to accommodate the growing number of trips expected between Foothill and the Medical Center.

**Wakara Way/Komas Drive**

As Research Park continues to grow, the parking facility accesses from Wakara Way will become more and more congested. In particular, the access of Komas Drive, which serves the large medical office building north of Wakara and several other large parking areas to the south, will need to be signalized. Pedestrian walkways should also be constructed along Wakara and Komas where they do not currently exist to improve pedestrian connectivity through the intersection.

**Wakara Way/Arapeen Drive**

Similarly to Wakara Way and Komas Drive, this intersection will need to be signalized as traffic in Research Park increases. Wakara Way and Arapeen Drive are the main thoroughfares through the Park and these intersections are critical to efficient and safe traffic flow. As busy intersections, they are also potentially hazardous to pedestrians and must be treated appropriately. Dedicated left turn lanes should be installed on all four intersection approaches. This will require the removal of part of the landscaped median on each approach to allow room for storage lanes. It is unlikely that these left turn lanes will need to be protected and can be left as permissive, but the signal design should allow for expanded signal phases to accommodate protected left turns in the future. The parking access (north leg) will need to be expanded to accommodate at least a dedicated left and shared through/right turn lane. Sidewalk connections will need to be made on the east side of Wakara and the north side of Arapeen where they currently do not exist.
**Arapeen Drive/Sunnyside Avenue**

The majority of traffic using this intersection in the p.m. peak is leaving Research Park and turning right onto Sunnyside. The a.m. peak is the reverse. In order to accommodate the high demand for these two movements, additional turning capacity will be required. Dual lefts turns on both the southbound and eastbound legs of the intersection are recommended.

**Foothill Drive/Wakara Way**

The signalized intersection of Foothill Drive and Wakara Way is the main entrance to Research Park. The growth in the area will require additional turning capacity for Research Park employees and visitors. It is likely that an additional left turn out of Research Park will be required; this can be achieved with a shared through/left lane, but this would require split phasing of the signal and should be carefully considered. A full intersection study should be performed here as traffic increases. The at-grade trail crossing just east of the intersection on Wakara Way will become increasingly more dangerous as traffic volumes increase and should be removed and replaced by an underground crossing. This will likely require relocating part of the paved trail and landscape repair, but will provide a much safer crossing for pedestrians and cyclists, removing them from the busy intersection as much as possible.
Transportation Demand Management (1,3)

Campus communities have tended to support walking and biking above vehicle circulation and have been ahead of the curve in employing Transportation Demand Management (TDM) strategies to mitigate the numerous daily peak hours created by academic activities. TDM programs are often a cost effective way to mitigate congestion and avoid the need for large scale roadway infrastructure projects and to also achieve the goal of 50% SOV trips. The Victoria Transport Policy Institute (VTPI) developed a TDM encyclopedia, which is where much of the following information is derived.

TDM is the application of strategies and policies to reduce travel demand, specially that of single-occupancy private vehicles) or to redistribute this demand in space or in time. These strategies and policies can be a cost effective alternative to increasing capacity. A demand management approach to the campus also has the potential to deliver better environmental outcomes, improved public health, and stronger communities. The application of TDM principles is largely a policy decision. TDM practices can be extremely effective in campus settings due to the nature of the transportation network user and the close proximity of multiple destinations that may need to be accessed in a short period of time. The following paragraphs outline some strategies the University may employ to encourage alternatives to single occupancy vehicle use and thus reduce the costly demands of traffic on infrastructure and capital facilities.

Transit Improvements and Fare Discounts (3.A)

The University is extremely transit accessible thanks to the University TRAX line, UTA bus service and Campus Shuttle. Improved transit connections, frequency, and fare discounts can provide the incentive for users to achieve the goal of 50% transit ridership in the future.

Ridesharing (3.B)

Ridesharing refers to carpooling and vanpooling, in which a vehicle carries additional passengers when making a trip, with minimal additional mileage. This does not include chauffeured trips in which a driver makes a special trip to carry a passenger.

Ridesharing is one of the most common and cost effective alternative modes, particularly in areas that are not well served by public transit. Many commuters rideshare part-time, for example, twice a week. Ridematching is a common component of commute trip reduction programs intended to reduce urban traffic problems. Ridesharing is also an important mobility option for non-drivers, particularly in small towns and rural areas where notices are often posted on bulletin boards and travel needs are shared through informal networks. Transportation management associations, transit agencies and community transportation organizations often provide ridematching services.
Ridesharing tends to experience economies of scale: as more people use the service the chances of finding a suitable carpool or vanpool increase significantly. As a result, success depends on promotion programs that encourage a significant portion of potential users to register for possible participation.

**Zimride by Enterprise**

The University has entered into a three year contract with Zimride by Enterprise which will commence this year. Zimride is an innovative rideshare program which allows users to find classmates, friends and coworkers who are travelling to and from the same location. Users can utilize the program to fill their own vehicles with ridesharers, or locate available seats in other user’s vehicles. This is a safe, efficient alternative to traditional word of mouth ridesharing and will go some way to accomplish the University’s goal to reduce single occupancy vehicle trips on campus. More information is available at [www.zimride.com/utah](http://www.zimride.com/utah).

In cases where Zimride is unavailable or not desired, Enterprise also operates a CarShare program on and around campus. This allows drivers to rent vehicles by the hour and pick up and drop off at multiple parking locations in the Salt Lake City area. This service can also be combined with Zimride to accommodate multiple users.

**Marketing and Promotional Campaigns (3)**

*Marketing* involves determining consumer needs and preferences, creating appropriate products, providing useful information about products to consumers, and promoting their use. Public knowledge and attitudes have a major effect on travel behavior, so marketing is an important component of TDM implementation.

Marketing is more than simply advertising to promote a product or activity. It is an ongoing dialogue between producers and consumers. It involves Change Management that is an effort to change the way problems are defined and solutions evaluated. The most effective TDM Marketing programs involve a variety of partners within a community, including public officials, community organizations and individuals who support transportation alternatives.

TDM Marketing efforts include surveys to determines preferences and opportunities; targeted personalized marketing campaigns; education of University officials and policy makers; promotion of alternative modes as health aware, green etc.; producing a multi-modal access guide to provide information on alternative transportation options; improving wayfinding; providing promotional discounts for alternative modes; and developing contests or competition to encourage alternative modes of transportation.

**Commute Trip Reduction (3.B)**

Commute trip reduction involves giving employees at the University opportunity or incentive to either eliminate commuting entirely or avoid the peak congested times of the day, thus reducing the number of
trips to and from campus. Avoiding class times that begin or end during the peak commute times, allowing employees to telecommute, offering more online courses, and providing restaurant and shopping amenities on campus are all ways to reduce peak hour and particularly commuter trips.

**Address Security Concerns (3.B)**

Many people feel unsafe walking, cycling or using public transportation because of a legitimate or perceived security concern. Ensuring walking paths are separated from traffic but not isolated, maintaining well lit and attractive walking areas and transit stations, and implementing crime reduction techniques, such as security surveillance and police or security personnel presence are all methods to alleviate security concerns. Marketing efforts can help to address the perceived security concerns and may include encouraging street life by supporting special events in public spaces and celebrating campus safety days where public safety practices are highlighted to educate campus users.

**Transportation Access Guide (3)**

Many people may be unaware of their options when visiting the campus. A transportation access guide can concisely describe how to access the campus, Medical Center, and Research Park on foot, bicycle or via public transportation. This guide can be developed using multi-media and be delivered in the form of a flyer, web page or mobile app and can be created as interactively as desired. Allowing the travelling public and regular campus users the opportunity to know at the swipe of a touchscreen where and when the next bus, train, or rideshare opportunity will be can considerably reduce vehicular traffic in and around campus.

**Traffic Calming (2.G)**

Street patterns are typically developed at the time of construction. In Utah, the history of using a grid system for planning and development purposes started with the first settlers and has proven efficient for moving people and goods throughout a network of surface streets. On some streets, there is an excessive amount of speeding. For this reason, traffic calming measures (TCM) can be implemented to reduce speeds on roadways. Traffic calming can go a long way to reducing SOV trips.

ITE has established a definition for traffic calming that reads, “Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users.” Altering driver behavior includes lowering of speeds, reducing aggressive driving, and increasing respect for non-motorized streets users.

**Types of Traffic Calming Measures (5.B)**

There are several types of TCM that can be grouped into three categories, depending on the level of control or the effect on traffic flow and speeds. Category 1 measures are the least restrictive, while Category 3 are the most dramatic. These categories are outlined in further detail below. Several factors
can influence the choice of TCM used, including the location, street classification, street geometry, adjacent land uses, public transit needs, budget, climate, aesthetics and community preferences.

**Category One – Non-Physical Measures**

Traffic control devices consist of signs, signals, and pavement markings to regulate, warn, guide, and provide information to drivers. Examples include regulator signs (i.e., speed limit signs), warning signs (i.e., pedestrian warning signs), traffic signals, etc. Often traffic control devices are overused as TCMs. Though the function of traffic calming devices is often similar to that of TCMs, specific traffic control devices should not be overused to communicate different purposes. One of the primary purposes of traffic control devices is to inform drivers of traffic laws and specific right-of-ways in order to maintain order and safety. Overuse of such traffic control devices diminishes their intended purpose. For example, the MUTCD states “stop signs should not be used for speed control.” When used following the guidelines outlined in the MUTCD, traffic control devices can assist as part of roadway/intersection designs to calm traffic where necessary.

**Category Two – Speed Control Measures**

Street modification TCMs include actions that physically alter the vertical or horizontal alignment of the roadway. Vertical changes include speed humps, speed tables, raised intersections, etc. Horizontal changes include chicanes and lateral shifts. Other street modification TCMs include constrictions (i.e., narrowing, pinch points, islands, chokers, etc.), narrow pavement widths (i.e., medians, edge treatments, bulb-outs, etc.), entrance features, roundabouts, small corner radii, street closures, and streetscaping (i.e., surface textures and colors, landscaping, street trees, street furniture, etc.).

**Category Three – Volume Control Measures**

Route modifications consist of altering available routes of traffic flow. Examples include one-way streets, diverters, closures, and turn prohibitions. Instead of attempting to alter drivers’ behavior (Categories 1 and 2), route modification TCMs attempt to alter drivers’ routes altogether.

**Streetscaping**

Streetscaping includes the planning and placement of items, such as street furniture, lighting, art, trees, landscaping, and side treatments along streets and intersections. Although streetscaping can be implemented without traffic calming, TCMs need a certain element of streetscaping to be functional. Streetscaping softens the appearance of speed humps or tables and enhances the aesthetics of roundabouts and constrictions, etc. Landscaping and other roadside treatments make street closures more effective and safer by highlighting the presence of the measure.
Other Considerations

Spacing is an important consideration for TCMs. If TCMs are too far apart (greater than 600 to 1000 feet), speeding can occur between the measures. TCMs should be spaced 200 to 300 feet apart so vehicles will not have sufficient distance to accelerate between measures.

Other considerations when deciding which TCMs to install include snow removal maintenance and emergency vehicle access. Some TCMs may decrease the efficiency of both snow removal and/or emergency vehicle access, for example, speed humps or tables.

Installation of Traffic Calming Measures

When deciding to implement TCMs, the decision should be based on engineering merits of a TCM application, as opposed to public clamor. An engineering study that documents the need for such measures and the nature of the traffic problem via speed and volume measurements should be the determining factor.

The next step should be to propose TCMs that are capable of solving the problem and matching the terrain, climate and nature of the street in question. One or several measures could then be implemented on a temporary basis subject to performance evaluations and neighborhood review. Before implementing these improvements on a more permanent basis, the final step would be to compare the before and after studies for speed and volume changes to see if the TCMs have performed as expected.

In order to make any of the TCMs effective, traffic calming must be community based and as wide spread as possible. For example, the repercussions of traffic calming on one street can result in higher speeds on adjacent streets due to a shift in travel patterns. The need for a campus based traffic calming plan is fundamental to the quality of experience for the campus community.

We recommend the University of Utah develop a traffic calming program that implements the latest TCMs. A traffic calming program that uses a quantitative method of scoring and prioritizing traffic calming needs by gathering speed, volume, crash history, geometric, and other data to rank each citizens request for the TCMs. It is beyond the scope of this Master Plan to determine the exact location and nature of every possible TCM. The University Traffic Calming plan should provide general guidelines that can in turn be applied to specific situations based on an engineering study.

Research Park Specific Traffic

As growth continues in Research Park there will be a need to accommodate the traffic this growth causes. The nature of the trips in Research Park is different from the rest of the University as more of these trips are SOV trips than anywhere else. This is to be expected in a business park setting. There is a desire to reduce these SOV trips wherever possible but an emphasis must also be placed on accommodating the SOV trips that are unavoidable.
The intersections in Research Park currently function relatively well and most of the roadways are wide enough to support the anticipated future growth in the area. The exception is the Chipeta Way Bridge and Connor Road. This bridge is a narrow structure with only one lane in each direction and very little if any shoulder. This is the primary route for connections between Research Park and University Hospital. As both areas grow, this connection will become more important for medical staff, doctors and patients moving between the two locations. Options to reduce those SOV trips will be discussed in subsequent sections but regardless this bridge will likely need to be widened to accommodate two lanes in each direction or at a minimum to provide shoulders and pedestrian/bike facilities.

Several of the intersections in and around Research Park should be signalized as Traffic Signal Warrants outlined in the Manual on Uniform Traffic Control Devices (MUTCD) are met. Chipeta Way and Arapeen Drive should be signalized. Sunnyside Avenue and Foothill Drive needs to be improve on the south leg to add capacity. Wakara Way and Komas Drive will need to be signalized. Wakara Way and Arapeen Drive will need dedicated left turn lanes and pedestrian enhancements. Arapeen Drive and Sunnyside will require additional turning movement capacity. Foothill and Wakara will also require additional turning capacity and pedestrian enhancements in the future.

Transportation Demand Management as a means to reduce SOV trips could be well employed at Research Park but only in conjunction with enhanced transit, pedestrian and bike facilities. Some TDM methods that could work well in Research Park include staggering the working hours of some of the employees in the park. Many of the employees work a traditional 8-5 work day which puts considerable pressure on the roadway network as all of that traffic is concentrated during the peak times of the day. These peak times also coincide with the peak travel times on Sunnyside and Foothill, adding to congestion on those major roads. Incentivized transit options would also increase the likelihood that employees in Research Park will leave their vehicles at home and reduce the demand on the roadway network. Incentives can range from free transit passes to wellness programs that pay employees to walk/bike at least part way to work. Restricting parking to visitors or specific employees can also help reduce the number of SOV trips. One parking restriction that has proved successful in the past has been where parking is generally free to allow employees to take a cash incentive rather than a parking pass.

Traffic Calming may not be applicable in Research Park as most of the roads are internal and cut through traffic in unlikely. However street design with enhanced pedestrian facilities, narrower lanes, and shorter pedestrian crossings will help naturally calm and slow the traffic and make the park more pedestrian and bike friendly.

Transformative Projects (7)

The preceding sections identified in detail the projects recommended to achieve the goals of the University, Medical Center, and Research Park to maintain a sustainable, safe, and efficient transportation network. Table 4-6 and
Table 4-7 summarize the capital project recommendations, establishes a prioritized timeline for each project and a cost to implement each project. Projects are listed as HIGH, MEDIUM and LOW priorities. Table 4-8 includes policy recommendations. The Figure 4-8 shows the location of these transformative projects.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Street</td>
<td>Enhanced pedestrian facilities, traffic calming</td>
<td>$100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman Way</td>
<td>Enhanced pedestrian facilities, traffic calming</td>
<td>$100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Foothill Drive</td>
<td>Signal Timing</td>
<td>$100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Foothill Drive</td>
<td>Flex Lanes</td>
<td>$1,000,000</td>
<td>LOW</td>
</tr>
<tr>
<td>Chipeta Way Bridge</td>
<td>Widen to 4 Lanes</td>
<td>$2,000,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Connor Road</td>
<td>Widen to 4 Lanes</td>
<td>$1,000,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Medical Drive North</td>
<td>Roundabout, roadway reconfiguration</td>
<td>$2,000,000</td>
<td>HIGH</td>
</tr>
</tbody>
</table>
### Table 4-7 Intersection Transformative Project List

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chipeta Way/Arapeen</td>
<td>Signalize</td>
<td>$250,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Sunnyside Ave/Foothill</td>
<td>Additional Turning Capacity</td>
<td>$250,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman/Foothill Dr</td>
<td>Signal Timing</td>
<td>$25,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>1300 East/University Blvd</td>
<td>Signal Timing</td>
<td>$25,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman/South Campus Blvd</td>
<td>Geometric Improvements</td>
<td>$100,000</td>
<td>LOW</td>
</tr>
<tr>
<td>100 S/North Campus Dr</td>
<td>Geometric Improvements</td>
<td>$100,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Mario Capecchi Dr/Foothill</td>
<td>Additional Turning Capacity</td>
<td>$100,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Medical Dr/Mario Capecchi</td>
<td>Signalize, additional turning capacity</td>
<td>$250,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Wakara Way/Komas Drive</td>
<td>Signalize</td>
<td>$250,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Wakara Way/Arapeen Dr</td>
<td>Signalize, additional turning capacity</td>
<td>$250,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Arapeen Dr/Sunnyside Ave</td>
<td>Additional turning capacity</td>
<td>$250,000</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

### Table 4-8 Policy Recommendations

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Calming</td>
<td>Develop a traffic calming program</td>
<td>HIGH</td>
</tr>
<tr>
<td>TDM</td>
<td>Develop a TDM program</td>
<td>HIGH</td>
</tr>
</tbody>
</table>
Roadway Transformative Projects

1. Traffic Calming, Pedestrian Enhancements
2. Traffic Calming, Pedestrian Enhancements
3. Intersection Operations, Flex Lanes
4. Bridge and Roadway Widening
5. Lane Configuration, Access Reconfiguration

Intersection Transformative Projects

1. New Signal
2. Additional Turning Capacity
3. Signal Timing
4. Signal Timing
5. Geometric Improvements
6. Geometric Improvements
7. Additional Turning Capacity
8. Signalize, Additional Turning Capacity
9. New Signal
10. Signalize, Additional Turning Capacity
11. Additional Turning Capacity
Chapter 5 Parking

The management and operation of parking systems is a primary focal point for the success of a campus like the University of Utah. With approximately 10% of students living on campus, the primary mode of transportation into and on campus is the personal automobile. That has resulted in a highly utilized parking environment, where many of the existing parking facilities on campus are at or near capacity during peak conditions. With that in mind, the purpose of this section of the report is first to define how the University currently handles immediate and forthcoming changes without experiencing parking issues that impact the ability to manage and operate the campus. Beyond that, the section provides guidance on how to transform parking management on campus as an asset to encourage a reduction of SOV and improve the overall campus experience.

Existing Conditions (2)

The University of Utah parking system consists of a collection of surface parking lots, garages, and metered parking spaces provided to support the parking demands of the various users on campus. The system includes approximately 123 parking facilities with a total of 29,676 parking spaces. These facilities serve faculty/staff, students, Research Park staff and students, hospital staff, and visitor demands on campus. Of the 29,676 spaces, the University owns 18,758 spaces. The remaining 10,918 spaces are privately owned, but are still part of the overall campus parking system. These 10,918 spaces are associated with the Research Park, University Hospital, religious institutions, and Ft. Douglas, as shown in Table 5-1. Figure 5-1 identifies the locations of on-and-off-street parking locations on the University of Utah campus, as well as the University Hospital and Research Park.

<table>
<thead>
<tr>
<th>Area</th>
<th>Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>University</td>
<td>18,758 spaces</td>
</tr>
<tr>
<td>University Hospital</td>
<td>1,509 spaces</td>
</tr>
<tr>
<td>Research Park</td>
<td>7,827 spaces</td>
</tr>
<tr>
<td>Private</td>
<td>1,582 spaces</td>
</tr>
<tr>
<td><strong>Total Parking Spaces</strong></td>
<td><strong>29,676 spaces</strong></td>
</tr>
</tbody>
</table>

The campus parking facilities are managed and enforced through the use of a permit system, where parking permits are required in all campus parking facilities. Students, faculty, and staff can purchase a permit through the Commuter Services Department. The parking permit system is designed to allow permit holders to park in any parking facility that matches their corresponding permit. Within the system, parking facilities may allow more than one type of permit to park.

There are a variety of different permit options that students, faculty, and staff may purchase. Table 5-2 identifies the various types of parking permits that may be purchased and the cost of each permit. Faculty
members may also purchase a reserved permit, in addition to an “A”, “U”, or “E” permit, which provides them with an assigned parking space within a specific facility.

<table>
<thead>
<tr>
<th>Permit</th>
<th>Annual Rate</th>
<th>Typical User</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$498</td>
<td>Faculty</td>
</tr>
<tr>
<td>U</td>
<td>$220</td>
<td>Student</td>
</tr>
<tr>
<td>E</td>
<td>$130</td>
<td>Student or Faculty</td>
</tr>
<tr>
<td>D (Disabled)</td>
<td>$220</td>
<td>Student or Faculty</td>
</tr>
<tr>
<td>M (Motorcycle)</td>
<td>$60</td>
<td>Student or Faculty</td>
</tr>
<tr>
<td>R (12-hr Reserved)</td>
<td>$1,590</td>
<td>Faculty</td>
</tr>
<tr>
<td>R (Garage Reserved)</td>
<td>$1,974</td>
<td>Faculty</td>
</tr>
</tbody>
</table>

Visitors have the option of parking within one of the approximately 300 metered spaces throughout the campus or to purchase a visitor permit for $10 per day from the Commuter Services Department. A discussion of permit types in peer universities is included in later sections, including guidance on how to set rates and permit restrictions.
Occupancies (2.B)

Parking occupancy data was collected to identify current parking behaviors on campus. Parking occupancy observations were conducted over a one hour period (10:00AM) on two separate days during the months of August and October 2014 for parking facilities that are associated with A, U, and E permits. For the purposes of this analysis, the results of the October parking occupancy data collection effort were used to evaluate campus parking demands. The August parking occupancy data likely reflects higher parking demands, as students move onto campus, and more visitors are coming to campus as school begins. October parking data captures a normalized view of the parking demand on campus, after the initial demands of the semester have subsided. Figure 5-2 illustrates the occupancy of the parking facilities throughout campus observed at 10:00AM in October, indicating that a majority of the facilities are currently operating at or above 90% occupancy.

Parking Ratios (2.B)

The overall health of a campus parking system can be defined by the ratio of parking spaces to its user population. A low space per user count (<0.3 spaces per user) either indicates a system that is deficient on parking or highly successful in implementing alternative transportation measures. A higher space per user count (>0.5 spaces per user) indicates a system that is highly dependent on automobile travel. This typically occurs in a rural setting or commuter campus. A higher ratio could also occur on a campus where the majority of students live off campus and prefer to drive in.

A university parking ratio is defined as the total number of parking spaces per university population or per specific subsets of a university population (students, faculty, etc.). The following information was used to compute the parking ratio on the University of Utah campus:

- Total student enrollment – 32,000 students
- Total Academic staff – 2,700 staff members
- Total Administrative staff – 14,000 staff members
- Total on-campus parking spaces – 18,525

Based on these assumptions, the parking ratio on campus is 0.38 spaces per person. Table 5-3 provides a comparison of parking ratios for similar universities located throughout the United States. The comparison indicates that the University of Utah parking ratio is consistent with the parking ratios found at the peer universities. At those campuses that have adopted more sustainable parking and transportation policies (e.g. Arizona State University, University of Washington, University of Colorado), parking ratios in the 0.29 - 0.33 spaces/user population have proven to be viable since they have successfully adopted programs to enhance non-vehicular access to campus. The overall average for the peer group was 0.35 spaces per campus user.
Table 5-3 Peer University Parking Ratios

<table>
<thead>
<tr>
<th>Location</th>
<th>Population</th>
<th>Parking Spaces</th>
<th>Parking Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Utah</td>
<td>48,700</td>
<td>18,525</td>
<td>0.38</td>
</tr>
<tr>
<td>Penn State University</td>
<td>58,380</td>
<td>14,000</td>
<td>0.24</td>
</tr>
<tr>
<td>Arizona State University</td>
<td>45,000</td>
<td>12,150</td>
<td>0.27</td>
</tr>
<tr>
<td>Washington State University</td>
<td>27,642</td>
<td>7,800</td>
<td>0.28</td>
</tr>
<tr>
<td>University of Iowa</td>
<td>45,403</td>
<td>14,128</td>
<td>0.31</td>
</tr>
<tr>
<td>University of Washington</td>
<td>19,446</td>
<td>6,050</td>
<td>0.31</td>
</tr>
<tr>
<td>University of Colorado</td>
<td>35,971</td>
<td>11,989</td>
<td>0.33</td>
</tr>
<tr>
<td>Colorado State University</td>
<td>31,725</td>
<td>10,800</td>
<td>0.34</td>
</tr>
<tr>
<td>Boise State University</td>
<td>22,003</td>
<td>7,950</td>
<td>0.36</td>
</tr>
<tr>
<td>University of North Carolina</td>
<td>39,669</td>
<td>14,973</td>
<td>0.37</td>
</tr>
<tr>
<td>Cornell University</td>
<td>34,210</td>
<td>13,499</td>
<td>0.39</td>
</tr>
<tr>
<td>Ohio State University</td>
<td>57,466</td>
<td>25,250</td>
<td>0.44</td>
</tr>
<tr>
<td>Indiana University</td>
<td>45,691</td>
<td>20,639</td>
<td>0.45</td>
</tr>
<tr>
<td>Princeton University</td>
<td>12,734</td>
<td>6,000</td>
<td>0.47</td>
</tr>
</tbody>
</table>

The 0.38 parking ratio for the University of Utah falls in the middle of the spectrum, indicating that the campus has a healthy balance of parking for its users. This ratio may decrease as investments are made to support multi-modal transportation alternatives, which aligns with the overall campus master plan and sustainability goals. As transportation alternatives are realized, the University should define a goal of achieving a parking ratio of 0.33 spaces per person. Moving towards a lowered ratio will help the University promote the reduction of SOV, while saving valuable land area on campus for the continued enhancement of academic services. The funds that would have been invested in the parking system to maintain the current parking space ration should be reinvested into transportation demand management programs to promote alternative access to campus.

Park+ Analysis (2.C)

Park+ was developed by Kimley-Horn to manage and evaluate parking management decisions and the ever-evolving parking environment. Park+ is an interactive parking scenario planning model, integrated with ArcGIS, which has the ability to:

- Evaluate existing parking supply and demands
- Identify and test new development and parking facilities
- Set multimodal parameters
- Apply parking management strategies

As part of this study, Kimley-Horn utilized Park+ to allow the University of Utah to measure how changes in land use, parking, trip distribution, parking price, and management strategies affect the demands of parking. The following section describes the Park+ modeling application for University of Utah.
Introduction to Park+

The Park+ Model is largely modeled after traditional supply and demand evaluations, which includes a multi-step process for evaluating parking demand conditions for a development, community, or campus. The multi-step process typically includes gathering data, defining assumptions or characteristics, selecting generation rates, applying reduction factors, creating scenarios, and evaluating results.

At its foundation, the Park+ model is built on existing land use and intensity information, as well as existing parking supply and utilization data. Other community characteristic components, which are added into the University of Utah model, include the following:

- Multimodal split (bus, bike, walk)
- Area-specific walking tolerances (walk distance to class, union, stadium, etc.)
- Parking permit pricing and types (A, U, E, Visitor, etc.)
- Parking relationships based on area land uses (Student Union, Student Housing, etc.)

These characteristic components are analyzed using an algorithm to create a localized score for each specific parking facility and land use within the university. These scores are used to define the percentage of parking demand allocated to each parking facility, up to a user specified maximum occupancy percentage, which is defined as one of the user inputs to reflect the perceived effective capacity conditions within each Park+ community or campus.

The outputs of the Park+ Model include parking demand, parking supply, general surplus or deficit, met demand, latent (unmet) demand, and traditional parking demand required. The parking demand metric is a summary of the demand generated for the entire study area (or for the selection area). The parking supply metric is a summary of the parking capacity for the entire study area (or the selection area). The surplus or deficit metric is simply the difference between the demand and supply metrics for the given area. The met demand metric describes the amount of parking demand that is actually allocated using the proximity parking methodology within the study area or for a given selection area. The latent demand represents the amount of demand that is not met within each localized walking radius defined within the model. While the overall supply and demand may be met within a given scenario, there may still be localized deficiencies within specific areas of the model – latent demand captures and identifies these areas.

Calibration and Scenario Development

The Park+ Calibration process utilizes existing parking demands (collected by the University of Utah) to calibrate parking generation rates for each individual land use within the study area. The result is a more accurate depiction of parking generation characteristics for the study area, rather than depending on outdated national parking generation rates reported by the Institute of Transportation Engineers (ITE) or the Urban Land Institute (ULI). The calibration process uses the parking occupancy data, land use characteristics, multi-modal characteristics, parking relationships, and area specific walking tolerances to define the adjusted parking generation rates. University of Utah specific inputs are found in the appendix.
of this report. Once the model calibration settings are determined to accurately reflect existing conditions, the Park+ model is able to run projected conditions for the current parking environment as well as develop and run future scenarios based on a myriad of different conditions. Two scenarios were developed using the University of Utah Park+ model to reflect development projections. The scenarios are not independent of each other. The second scenario builds upon the assumptions and development intensities included in the first scenario. The two scenarios are summarized below.

- Existing Conditions – existing land uses and parking demands
- 5 Year Build-Out – projects defined by the University Facility Management group

The following sections will review the two parking scenarios developed for this study, analyzing the parking impacts of current and future development projections. The Park+ Model is intended as a liable model where additional scenarios can be analyzed as needed.

**Assumptions**

Prior to reviewing the results of the scenarios, a few assumptions were made involving their development:

- A 35% multi-modal factor was applied to the model based on the Utah Transit Authority 2012 Performance Report;
- October parking occupancy was used in the model as it captures a more realistic, normalized view of the parking demand on campus after the initial demands of the semester have subsided; and
- Each scenario builds off the assumptions of the previous scenario, including land use densities and parking supplies

**Existing Conditions**

The existing conditions scenario focuses on the current parking conditions present on the University of Utah campus, including the University Hospital and Research Park. This model includes all existing land use data, parking supply, parking pricing, and parking occupancies of each facility as of October 2014. The results of the existing conditions scenario represent how the parking system is utilized today and predict where parkers would prefer to park if given the choice – based on the relationship between walking distance, price, and attractiveness of parking. **Table 5-4** identifies the total existing square footage, dwelling units, and parking spaces on the University of Utah campus that were included in the existing conditions scenario.
### Table 5-4 Total Existing Infrastructure on the University of Utah Campus, University Hospital, and Research Park

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Intensity</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>1,083,435</td>
<td>square feet</td>
</tr>
<tr>
<td>Apartments</td>
<td>3,216</td>
<td>dwelling units</td>
</tr>
<tr>
<td>Arena</td>
<td>60,269</td>
<td>square feet</td>
</tr>
<tr>
<td>Church</td>
<td>114,500</td>
<td>square feet</td>
</tr>
<tr>
<td>Classroom</td>
<td>319,645</td>
<td>square feet</td>
</tr>
<tr>
<td>Community Center</td>
<td>75,000</td>
<td>square feet</td>
</tr>
<tr>
<td>Day Care</td>
<td>12,375</td>
<td>square feet</td>
</tr>
<tr>
<td>University Hospital</td>
<td>124,670</td>
<td>square feet</td>
</tr>
<tr>
<td>Hotel</td>
<td>180</td>
<td>rooms</td>
</tr>
<tr>
<td>Lab/Research</td>
<td>1,262,229</td>
<td>square feet</td>
</tr>
<tr>
<td>Office</td>
<td>2,736,142</td>
<td>square feet</td>
</tr>
<tr>
<td>Performing Arts Theater</td>
<td>3,000</td>
<td>seats</td>
</tr>
<tr>
<td>Stadium</td>
<td>3,280</td>
<td>seats</td>
</tr>
<tr>
<td>Storage</td>
<td>2,726,424</td>
<td>square feet</td>
</tr>
<tr>
<td>Student Residence</td>
<td>1,807</td>
<td>dwelling units</td>
</tr>
<tr>
<td>Student Services</td>
<td>880,310</td>
<td>square feet</td>
</tr>
</tbody>
</table>

The existing parking demand within the campus, University Hospital, and Research Park area is 27,175 spaces with a supply of 29,676 spaces. While there is available parking in the Research Park area, a latent demand of approximately 469 spaces is being generated that is associated with campus users, faculty/staff, students and student residences. The cause of the latent demand is likely the lack of available parking spaces within acceptable walking tolerance for users. The results of the existing conditions scenario are shown in Figure 5-3 and Table 5-5.

### Table 5-5 Existing Conditions

<table>
<thead>
<tr>
<th>Demand</th>
<th>Supply</th>
<th>Surplus/Deficit</th>
<th>Latent Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>27,175 Spaces</td>
<td>29,676 Spaces</td>
<td>+ 2,491 Spaces</td>
<td>656 Spaces</td>
</tr>
</tbody>
</table>
University of Utah Parking & Transportation Master Plan

Study Area
Land Uses
Land Uses with latent demand
Calibrated Occupancy
- 0 - 50 %
- 50 - 75 %
- 75 - 90 %
- 90+ %

Existing Conditions

Figure 5-3

3/6/2015

JAG

Service Layer Credits: 2014 NAIP Imagery
It should be noted that while the overall campus surplus is minimal, nearly all parking facilities are operating at or above 90% occupancy in the modeled scenario. In actuality, if all parking facilities are operating above 90%, it can make finding available spaces difficult within the system. As parking availability decreases and finding an available space becomes more difficult, drivers can become confused and frustrated, reducing efficiency in the parking system and negatively impacting the perception and customer satisfaction regarding campus parking. The modeled results are based on occupancy data provided by the University, adjusted for peak day conditions. The system should be monitored to ensure that the parking utilization on campus is maintained at a healthy level.

Five Year Build-Out

The Five Year Build-Out Scenario analyzes the demand associated with the addition of new development (that is currently under construction or in the design phase) and its impact on the existing parking system. **Table 5-6** and **Table 5-7** identify the new construction and committed parking projects that are planned for the campus, as well as their use and development intensities. These projects include new planned garages that are under construction or in design, expansions to an existing lot, and an existing lot that was previously under construction reopening. Additionally, there are plans to remove parking spaces to accommodate the new construction, reducing available parking supply within the system. The reduction in parking supply is occurring at Lot 24 (264 spaces) and Lot 66 (147 spaces). **Figure 5-4** identifies the location of future construction and committed parking projects that are planned throughout campus.

### Table 5-6 Future Construction Projects

<table>
<thead>
<tr>
<th>Project #</th>
<th>Name</th>
<th>Use</th>
<th>Square Footage/Dwelling Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mechanical Engineering 2015</td>
<td>Classroom</td>
<td>39,000</td>
</tr>
<tr>
<td>2</td>
<td>Huntsman Cancer Institute Expansion 2016</td>
<td>Lab/Research</td>
<td>220,000</td>
</tr>
<tr>
<td>3</td>
<td>Oral Health Sciences Building 2014</td>
<td>Lab/Research</td>
<td>50,000</td>
</tr>
<tr>
<td>4</td>
<td>Oral Health Sciences Building 2014</td>
<td>Classroom</td>
<td>25,000</td>
</tr>
<tr>
<td>5</td>
<td>Science Center 2016</td>
<td>Lab/Research</td>
<td>52,500</td>
</tr>
<tr>
<td>5</td>
<td>Lassonde Studios 2016</td>
<td>Student Housing</td>
<td>412</td>
</tr>
<tr>
<td>6</td>
<td>Lassonde Studios 2016</td>
<td>Student Services</td>
<td>20,000</td>
</tr>
<tr>
<td>6</td>
<td>Student Life Center 2014</td>
<td>Student Services</td>
<td>163,000</td>
</tr>
<tr>
<td>7</td>
<td>Basketball Facility 2015</td>
<td>Student Services</td>
<td>80,000</td>
</tr>
<tr>
<td>8</td>
<td>Law College Expansion</td>
<td>Lab/Research</td>
<td>152,247</td>
</tr>
<tr>
<td>10</td>
<td>Rehabilitation Hospital</td>
<td>Hospital</td>
<td>72,193</td>
</tr>
<tr>
<td>11</td>
<td>Medical Education and Discovery (Hospital Area)</td>
<td>Office</td>
<td>180,000</td>
</tr>
<tr>
<td>11</td>
<td>Medical Education and Discovery (Hospital Area)</td>
<td>Classroom</td>
<td>65,000</td>
</tr>
<tr>
<td>11</td>
<td>Medical Education and Discovery (Hospital Area)</td>
<td>Lab/Research</td>
<td>65,000</td>
</tr>
<tr>
<td>12</td>
<td>Ambulatory Care Complex (Hospital Area)</td>
<td>Office</td>
<td>43,880</td>
</tr>
<tr>
<td>12</td>
<td>Ambulatory Care Complex (Hospital Area)</td>
<td>Hospital</td>
<td>86,953</td>
</tr>
<tr>
<td>12</td>
<td>Ambulatory Care Complex (Hospital Area)</td>
<td>Student Services</td>
<td>43,814</td>
</tr>
</tbody>
</table>
The Park+ model was used to evaluate the demands associated with these new developments, including both the new building infrastructure identified in Table 5-6 and net new parking identified in Table 5-7. With the addition of these projects, the demand increased by 3,334 spaces, which is shown in Table 5-8.

With the addition of committed parking projects, the University will have an approximate 1,941 space surplus, including the new committed parking projects. While this is a small surplus of parking on campus, there are specific localized deficiencies within the campus user types that need to be addressed to keep...
the system operating efficiently. Table 5-9 provides a comparison of supply versus demand for the primary users on campus.

<table>
<thead>
<tr>
<th>User</th>
<th>Supply</th>
<th>Demand</th>
<th>Surplus/Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>4,110 Spaces</td>
<td>3,551 Spaces</td>
<td>+559 Spaces</td>
</tr>
<tr>
<td>Students</td>
<td>13,847 Spaces</td>
<td>14,027 Spaces</td>
<td>-180 Spaces</td>
</tr>
<tr>
<td>Student Residents</td>
<td>2,701 Spaces</td>
<td>2,841 Spaces</td>
<td>-140 Spaces</td>
</tr>
</tbody>
</table>

Note: Visitor parking demands were included with the Student user group

In particular, certain on campus residential sites face latent demand issues, meaning their primary users can’t find parking within a reasonable walking distance of the sites. The total student residential deficiency is approximately 140 spaces. The main sites impacted by this deficiency include Benchmark Plaza, Chapel Glen, Donna Garff Marriott Residential Scholars, Shoreline Ridge, and University Student Apartment Towers.

In order to mitigate this student resident deficiency, the University should identify excess availability at on-campus parking facilities (including the new Business Parking Garage), underutilized facilities on Research Park, or off-campus parking facilities to support the excess demand. These options could require additional shuttling services to and from these facilities depending on the distance.

When looking at parking supply for the entire campus, as well as the adjacent uses, the model projects the campus to have less than a 10% surplus. Additionally, the Hospital has a deficiency of a couple hundred parking spaces. A parking system with less than 10% surplus is considered at or above capacity, and the lack of sufficient parking can impact the overall operations and efficiency of the parking system, as well as negatively impacting the perception of parking and customer satisfaction. However, this perception can also lead to an increase in utilization of alternative modes where available.

The results of this scenario are shown in Figure 5-5 and Table 5-10.

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Supply</th>
<th>Demand</th>
<th>Surplus/Deficiency</th>
<th>Percent Surplus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus</td>
<td>21,599 spaces</td>
<td>21,120 spaces</td>
<td>+479 spaces</td>
<td>2%</td>
</tr>
<tr>
<td>University Hospital</td>
<td>2,470 spaces</td>
<td>1,965 spaces</td>
<td>-505 spaces</td>
<td>-</td>
</tr>
<tr>
<td>Research Park</td>
<td>7,827 spaces</td>
<td>5,957 spaces</td>
<td>+1,870</td>
<td>24%</td>
</tr>
</tbody>
</table>
Parking Supply Recommendations (2.A)

Based on the Park+ scenario evaluations defined in the previous sections, the University is projected to operate at 8% surplus with the addition of the committed campus projects. This small surplus is not enough to operate the parking system efficiently and will likely create problems as additional campus changes are evaluated. In addition to the small surplus issues on the campus, the adjacent hospital is projected to operate at a deficiency, which will only further exaggerate the parking problem on campus.

Based on these findings, there are three potential strategies that could be realized to solve the projected parking issues on campus. These include:

- Build additional parking supply to meet growing demands
- Realize shared parking opportunities with Research Park
- Identify off-campus parking opportunities, along with changes to the current permit structure to promote alternative access
- Coordinate with the Strategic Scheduling Team to more evenly space courses throughout the week to reduce parking demand at peak times

These three strategies are discussed in the following sections. None of these strategies are likely to provide the desired result on their own, so the final evaluated strategy is a combination of all three of these strategies that will likely achieve the goal of satisfying parking demand while promoting a less vehicular oriented campus. The final section will define recommendations that combine all three approaches.

**Build Additional Parking**

The most common approach to solving parking demand issues is to build additional parking. While not the most effective at minimizing land impacts or financial constraints, building parking allows the University to continue operating at current conditions. However, this may not be an ideal solution, because the business-as-usual case may not be sustainable in the long run, as land becomes scarce or population demands necessitate more and more parking.

To satisfy the current demand issue and achieve a 10% surplus on campus, the University would need to provide approximately 2,171 additional spaces on-campus. The Park+ model was used to analyze potential garage locations based on where demands were highest on the campus, the size of available space to fit a structure, and the location of committed projects. Figure 5-6 and Table 5-11 provide two potential locations that could accommodate new parking facilities. Even with these two locations, the University cannot realize the parking supply needed to offset the surplus issues on campus.
### Table 5-11 Potential Parking Facility Size

<table>
<thead>
<tr>
<th>Location</th>
<th>Size of Area</th>
<th>Total Number of Spaces&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Floors</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>49,640 square feet</td>
<td>425 spaces</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>162,743 square feet</td>
<td>1,394 spaces</td>
<td>4</td>
</tr>
</tbody>
</table>

<sup>1</sup>Space projections based on appropriate setbacks and 350 square feet per parking space

While this is certainly an alternative to consider, *this study does not recommend that constructing new parking facilities be the primary means of supporting new on campus demands.*
Shared Parking with Research Park

The adjacent Research Park area has an overall 24% surplus of parking spaces based on modeling projections. Within the area, there are multiple parking facilities that are operating at less than 50% occupancy during the peak hour. The excess capacity within the area provides the University an opportunity to establish potential shared parking arrangements, helping to offset specific parking problems and minimize the amount of new parking that needs to be built. Table 5-12 provides a list of underutilized parking facilities within the Research Park area that are within ideal walking distances of campus demand generators:

<table>
<thead>
<tr>
<th>Parking Facility</th>
<th>Total Capacity</th>
<th>Available Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>360 Wakara – Lot 106</td>
<td>45 spaces</td>
<td>15 spaces</td>
</tr>
<tr>
<td>Human Resources – Lot 103</td>
<td>80 spaces</td>
<td>44 spaces</td>
</tr>
<tr>
<td>Williams Garage – Lot 108</td>
<td>11 spaces</td>
<td>3 spaces</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>136 spaces</strong></td>
<td><strong>62 spaces</strong></td>
</tr>
</tbody>
</table>

Beyond ideal walking conditions, the University could provide shuttling services for additional available parking supply. Outside of the ideal walking conditions, there are another 2,251 spaces that could be used for overflow parking demands, assuming ideal shuttling conditions.

Permitting Changes and Off-Campus Parking Opportunities

Another potential solution to solve the on-campus surplus issue is to identify changes to the permitting system that prioritize access to campus parking, as well as locating an off-campus parking supply that can distribute current demands outside of the current campus boundary. These solutions, when combined, would aim to redistribute campus parking demand and promote a more balanced parking system.

From the permitting perspective, the University has already made the first step towards prioritizing users, with the implementation of a permit system on campus. The next step would be to identify specific user groups to prioritize (or deprioritize) based on campus access needs. A very well documented solution to this problem across the country has been the restriction of freshman owned vehicles on campus. This type of solution aims to identify specific user groups and train them to access campus by different modes. While this specific example has been applied throughout the country, it may not be the best solution for Utah, given the small amount of students who actually live on campus.

A more prescient example might be the permitting approach of the University of North Carolina (Chapel Hill). The parking and transportation management team has used the distribution of permits as a means of supporting campus access and maintaining an efficient transportation and parking network on campus. Within the permit system, permits are tiered and distributed by class level. There are only a certain number of permits that are provided for each class level. Incoming freshman are not allowed to purchase an on-campus permit, but rather must utilize fringe park-and-ride lots with shuttle access. Additionally,
for students who live off-campus but within one mile of the center of campus, no access to permits is provided. Those students are assumed to walk, bike, or use transit to access campus.

Moving to this type of permit distribution system will have the added benefit of actively promoting the other campus access modes, including walking, biking, and light rail transit. The permit changes would need to be coupled with the introduction of off-campus parking, but that does not necessarily have to equate to the 2,171 space deficiency defined by the Park+ projections. Instead, the University can probably establish 600 to 1,200 spaces of off-campus park-and-ride, located near UTA light rail stations, to satisfy overflow commuter demands. The remaining spaces of demand will likely be offset by local off-campus residents (who live within a mile of campus) increasing their walking, biking, or transit access to campus.

**Combination of Parking Strategies**

The most likely solution on campus will be to realize a combination of all of the previous three strategies, which should help the University solve existing, imminent, and future parking problems. Additionally, as defined in the parking ratio section of this chapter, the University of Utah’s current parking per population ratio is 0.38 spaces per person. By implementing some of the permitting, off-campus, and TDM related improvements of this study, the University could reduce SOV and lower the overall ratio and achieve a more balanced access strategy for campus. *This study recommends that the University should adopt a goal of achieving a 0.33 spaces per person ratio moving forward.*

This recommendation does not necessarily mean the University should try to reach that ratio immediately – that would mean reducing parking spaces on campus today or even into the immediate future, which is not advisable. However, as the University looks to increase its population over time, it should look to increase parking supply at a lower rate than which it currently uses. For example, if the University were looking to increase the on-campus population by 6,000 full-time equivalents (FTEs), a reduced ratio approach would necessitate the addition of approximately 1,980 spaces, rather than 2,300 spaces. Over time, this approach, coupled with investments in transit and TDM improvements, will result in lessened parking infrastructure on campus and increased development opportunities.

Specifically related to combined improvements within the University parking system, the University should:

- Identify opportunities to share parking with the adjacent Research Park campus, including a combination of pedestrian access lots or shuttle service lots
- Make changes to permitting to prioritize campus access, including the following:
  - Restrict permit purchases for those off-campus residents who live within one mile of the core of campus.
  - Limit permit access for those students who live within a half mile of UTA light rail stations. This restriction should require the purchaser to provide a need for on-campus vehicle access and limit the number of permits sold to this group. The result should be an active promotion of light rail use amongst off-campus residents.
Define off-campus park-and-ride permits that limit vehicular access to the core of campus

- Identify off-campus park-and-ride facilities (in conjunction with the third permit recommendation above) that are either served by shuttle access or within a quarter mile walk boundary of light rail stations.

Parking Permit Structure Recommendations (2.A.ii)

Distribution of parking permits in a university setting can be complicated, but it is necessary to manage and balance the parking needs of the multiple users of the parking system, including students, faculty, staff, on-campus residents and visitors. The following section will briefly review various parking permit structures and strategies commonly utilized in campuses across the country. The University of Utah recently switched to a tiered permit system. This section will explore the benefits and drawbacks of that system, as well as the other predominant permit system used in large university settings.

**Hunting Parking Permit Structure**

The “hunting license” approach is a widely used parking permit system that is based on defined permit categories and defined affiliations for parking facilities, such as faculty, staff, commuter student, student resident, etc. In this system, motorists are issued a parking permit that is based on their affiliated designation with the university and must park in facilities that match that permit type (e.g. commuter student parking). The “hunting” name refers to users hunting for a first come first space in their particular designated lots and facilities.

This approach is commonly how parking organizations initially manage the parking system, when parking demand is relatively low and the parking system is relatively less complicated and sophisticated. In this approach, there are typically no limits set to the number of parking permits that can be sold. As parking demand increases and permit purchases increase, the availability of a parking space in the designated lots is not guaranteed. **Table 5-13** summarizes the advantages and disadvantages to a hunting-style permit system.
Table 5-13 Hunting Permit Advantages and Disadvantages

<table>
<thead>
<tr>
<th>Hunting Permit Advantages</th>
<th>Hunting Permit Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relatively simple to understand once a parker learns where their lots are located</td>
<td>Relatively inefficient because parkers can and typically do use more than one space per day.</td>
</tr>
<tr>
<td>Often allows for multiple parking options. A person can park in one lot in the morning and then move in the afternoon using the same permit.</td>
<td>As demand for parking increases the competition for a parking space increases.</td>
</tr>
<tr>
<td>Relatively easy to use with a color-coded system. Permit colors match lot colors.</td>
<td>As demand increases, motorists cruise to find an available parking space, increasing emission of greenhouse gases and other pollutants.</td>
</tr>
<tr>
<td>When demand is relatively low, this approach is easy to administer and does not require facility-specific demand and occupancy information.</td>
<td>As parking availability decreases, motorists can become frustrated as they attempt to find an open space, negatively impacting customer satisfaction.</td>
</tr>
</tbody>
</table>

**Tiered-Permit Parking Structure**

Contemporary, high-demand parking programs at universities require a more sophisticated system of allocating scarce parking resources. This system is grounded in supply/demand economics that utilizes pricing strategies that help consumers with convenience and cost tradeoffs. In a tiered parking scheme, parking lots and garages are typically treated as individual facilities, each with different parking priority users, demands, and characteristics. In a tiered parking structure, a cap is placed on the number of parking permits for each parking facility within a set oversell limit based on occupancy data collected for that facility. A tiered permit system can be designed to restrict admission into a facility to one, multiple, or all priority users (faculty, staff, commuter student, resident, visitor, etc.) depending on the unique needs of each facility. **Table 5-14** summarizes the advantages and disadvantages to a tiered permit system.
### Table 5-14 Tiered Permit Advantages and Disadvantages

<table>
<thead>
<tr>
<th>Tiered Permit System Advantages</th>
<th>Tiered Permit System Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can allow motorists with a specific permit type to park in another permit lot during periods of low demand.</td>
<td>Requires increased resources to conduct occupancy studies to define the parking demands and characteristics of each lot</td>
</tr>
<tr>
<td>Motorists can find parking more easily than compared to a “hunting” style program because they are assigned to specific facilities.</td>
<td>Increased complexity to define how parking permits should be allocated for each facility.</td>
</tr>
<tr>
<td>Reduced vehicular cruising.</td>
<td></td>
</tr>
<tr>
<td>Reduces the potential for “maxing out” parking supplies as a result of the parking oversell limit.</td>
<td></td>
</tr>
</tbody>
</table>

**The Hybrid Model**

In most cases when universities consider moving from hunting to tiered parking systems, demand is not high enough across the entire parking system to warrant a wholesale change. Instead, it is possible to marry the two systems and realize the advantages of both systems simultaneously. Under this arrangement, medium- and high-demand lots are moved to the tiered, reserved system while low-demand lots are offered under the hunting license system. Only when demand grows beyond a predetermined threshold are lots moved from hunting to tier reserved parking.

**Who Gets to Park Where?**

While different permit structures can be implemented to manage a university’s system, there are some general rules of thumb regarding where different users should be organized in a system.

- Faculty and Staff – core parking areas located near classrooms and offices
- Commuter students – in fringe parking facilities
- Student residents – near student resident buildings or in fringe parking facilities
- Graduate students – either in core parking areas or in fringe parking areas, depending on demand

In addition to the aforementioned rules of thumb, there are three strategies that help determine how permits are distributed among the different users of the parking system.

**EGALITARIAN MODEL**

In the egalitarian model, a portion of each lot is set aside for each user group. While the percent of each lot set aside for each group may differ, everyone has a reasonable chance to gain access to the facility.
FIRST COME, FIRST SERVED MODEL

In this model, there is no limit to who can purchase a permit. Permits will be sold until the established oversell rate is reached, regardless of user type.

SENIORITY MODEL

In the seniority model, permit sales are available for purchase on a seniority scale. Typically, faculty and graduate students can purchase permits first, then upper classmen, then full-time underclassmen, and finally part-time underclassmen. In some instances, on-campus residents, who are last on the priority scale, are not eligible to purchase a permit in efforts to increase parking supply for commuting faculty and staff.

How Are Permit Prices Based?

Normally, price is based on proximity to the campus core or convenience to the primary demand generator. This provides for a mechanism to push demand away from the campus core and to more evenly distribute parking utilization.

A relatively simple way to determine which parking facilities should be priced highest is to use peak occupancy with the highest-peak-occupancy facilities having the highest value, therefore, the highest permit price. Table 5-15 shows permit price considerations based on parking lot utilization.

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>85% - 100%</td>
<td>High</td>
</tr>
<tr>
<td>50% - 84%</td>
<td>Medium</td>
</tr>
<tr>
<td>Below 50%</td>
<td>Low</td>
</tr>
</tbody>
</table>

On an annual basis peak, occupancy data are updated and lots are moved from one demand group to another if necessary. This establishes a dynamic and responsive way to allocate parking permits based on the changing nature of the campus.

At some institutions, permit prices are based on salaries so that those who make more pay more. This system is not recommended because it is not typically how goods and services are priced. This may also force those who have higher means to subsidize parking for those of lesser means and may inadvertently deter more price-sensitive customers from using less expensive alternatives to driving alone.

Another feature of this model that is considered a best practice is that all parking is assigned a value and therefore carries a fee for use. Higher demand areas require more management and also require more frequent maintenance, which justifies the higher price. If the University were to adopt this model, it is
recommended that no-charge parking would discontinue (for example: university student housing). This is called unbundling parking and housing.

Unpriced parking is often “bundled” with building costs, which means that a certain number of spaces are automatically included with building purchases or leases. Unbundling parking means that parking is sold or rented separately. For example, rather than renting an apartment for $1,000 per month with two parking spaces at no extra cost, each apartment can be rented for $850 per month, plus $75 per month for each parking space. Occupants only pay for the parking spaces they actually need. This is more efficient and fair, since occupants save money when they reduce parking demand, are not forced to pay for parking they do not need, and can adjust their parking supply as their needs change.

The base tiered parking system can offer features that expand customer convenience and facility efficiency based on the university’s needs. These include:

- The ability for parkers to purchase additional convenience.
- To maximize facility utilization and offer additional convenience, parkers can be allowed to “park down” meaning that higher-priced permits allow for parking in lower demand parking areas.
- Parking related to official business can be accommodated with a companion permit. Under this arrangement, a parker must have a business-related need based on criteria the university determines. The parker must typically also possess a permit purchased by their own funds. The two permits are then used in combination for certain parking access. This may be time and location limited.
- Parkers with accessibility needs can be accommodated easily and in a manner that offers them convenience and price choice. For example, they may wish to purchase a low-cost permit and this allows them to park in a low-cost lot or lots in any space that includes accessible parking spaces, which provide access aisles so that individuals in wheelchairs may enter/exit the vehicle. They may also park in any accessible space in any priced lot without an additional charge on a space available basis.
- Service vehicles can be accommodated in a tiered reserved system in dedicated spaces, allowed to park in any lot, or they may be restricted to certain lots. Normally, service vehicles are prohibited from parking at meters.
- Contractor permits work in a similar manner as service vehicles with the exception that there would not normally be dedicated spaces provided for this group of parkers, and that special accommodations even in the highest demand areas may be required to support certain projects. Normally, contractors would be restricted to certain lots. In all cases the contractor should have a permit.
- Vendors also require permits, but since they normally do not occupy a space as long as a contractor, they may be allowed access to parking meters. They may also use service spaces designated for university vehicles given their short stay durations.
- While salary-based pricing is not recommended, some exceptions may be warranted. At some universities, the lowest paid employees are offered discounted parking permits but in peripheral parking facilities including underutilized upper levels of parking garages. This offers price-sensitive access but without jeopardizing the entire system.
Parking Permit Structure Recommendations

Based on the Park+ model analysis, it is recommended that the University review their permit structure and prioritize users’ parking needs to access campus and create a uniform way of managing the entire campus. The following are recommendations on what the University should include when reviewing their tiered structure.

- Create a permit level for the Research Park in the tiered permit structure. This will allow those parking in those facilities to be managed by the same structure as the rest of the campus while continuing to restrict the parking to those users.
- Identify the users that can be moved to off-campus facilities. These would typically be student users that are parking for longer periods of time and would take advantage of cheaper parking.
- Limit permit access for those users who have direct access to walking, cycling, or transit connections to campus, generally those within a quarter mile distance of the campus. This distance is considered to be a comfortable walking and biking distance for most people. The intent of this recommendation is to encourage these users to take advantage of the alternative forms of transportation that are available to them, thus reducing their reliance on a personal vehicle to commute to the campus.
- Set caps for class levels and faculty to control the vehicular access to campus. The intent is to create more parking availability for those with greater seniority on the campus. This recommendation will also encourage people to use alternative modes of transportation.
- Work actively with UTA Light Rail to promote ridership, including subsidizing eco-passes. Access to subsidized transit will encourage people to utilize the transit system in place, which will become critical for those that are restricted from purchasing a permit.

Class Loading Recommendations (2.F)

While changes could be made to the parking system to improve supply and availability of parking, the University could make larger system changes to the class schedules that would ultimately impact the parking system. Parking demands are driven by class times on the campus. There is greater demand at times when most classes are being held.

The University should obtain actual class enrollment data for each individual class on campus. This will provide hour-by-hour, building-by-building distributions of class loading. The class loading data could be used to inform the Park+ model to distribute building demands and therefore project parking demands based on the class loading demands.

It is recommended that the University perform a class loading analysis for each of their classes to be able to coordinate class scheduling and parking demands. The University’s Commuter Services department should communicate and coordinate on this effort with the Strategic Scheduling Team to obtain this information.
Neighborhood Impact Recommendations (2.C)

A common issue at most universities is the impact of parking on the surrounding neighborhoods. Neighborhood streets are generally unregulated, meaning they are free to park on, easy to access, without time limit constraints, and close to the campus. However, this creates conflicts with the residents since availability becomes diminished for residential users.

To help manage the overflow impacts of the University parking system on the surrounding neighborhoods, the University should work with the City to manage the City Permit Program (CPP) in the areas surrounding the University. The CPP allows those parking in a designated area to park if they have a valid permit displayed. All others are restricted from parking in that area for certain times of day. A potential solution for areas around the University could be to allow non-residential, university parking in these neighborhoods during the day when the University is operating at its peak and then restrict non-residential parking during the mornings and evenings when the residential parking demands are peaking.

Technology Enhancement Recommendations (2.D)

Parking technology plays an important role in supporting efficient and effective use of the parking system. Installing and leveraging new parking technologies will increase efficiency in the University’s parking system and improve the user experience. The following sections will summarize several emerging parking technology enhancements that the University could consider to improve parking operations and user experience.

Smart Meters

Smart meters provide users with expanding payment options by accepting both coin and debit/credit card payment. Smart-meters come in multiple varieties, including single-space meters and multi-space parking kiosks. Many new smart meters are tied to in depth back-end management applications that provide access to revenue, transaction, usage, and duration data, which can be used in ongoing parking planning and management. The data provided by newer smart meter technology can allow the parking management to evaluate parking behaviors on a wide scale, and then be able to develop and apply appropriate parking management decisions, including changes to prices and permitting, time limits, and enforcement needs.

Pay-by-Phone

The Pay-by-Phone system currently in use at the University is a growing alternative payment option to coin or credit-card meter payment. Pay-by-phone applications can rely on voice calls, texts, or smartphone application platforms to allow users to pay for parking and extend time periods and can warn users via text when their transaction is about to expire. The increased payment flexibility provided by pay-by-phone improves the users experience by minimizing payment transaction time, reducing the potential for citation for parking past the meter time, and providing more payment options for the user. To use the pay-by-
phone application, the motorist inputs the meter ID number identified on the meter face where they are parked and calls a generic number or uses their smartphone application to view allotted time, extend their time over the phone, or pay for parking.

Many cities throughout Europe and the Middle East have moved to a pure pay-by-phone parking environment in the past five years, reducing their capital expenditure and increasing access for customers. Within the past year, several communities in the U.S. have begun to experiment with this type of system, implementing pilot areas to measure acceptance and potential for revenue offsets.

The initial reluctance to institute a pay-by-phone-only system was the perception that the system would not be equitable. More directly, how would those citizens without cell phones pay for their parking? As cell phones become a more integrated part of society, that fear is dwindling. According to research by the Pew Research Center, 88% of Americans own a cell phone. Even more important, 46% of Americans own a smartphone and use their cellular devices for more than phone calls, a trend that is escalating quickly (with another estimated 10% bump by the end of next year).

With these statistics and the continued evolution of the cell phone, is it any surprise that pay-by-phone payment methodologies are popping up in communities everywhere? Pay-by-phone is not a new concept, but its acceptance is at an all-time high. And for the first time since its introduction in the U.S., we are starting to see communities consider all pay-by-cell systems. Think about some of the benefits:

- The user pays an overwhelming majority of capital and maintenance costs – the only equipment needed is the user’s cell phone
- The user only pays for the time that they park – the transaction is engaged at the beginning and can be disengaged when completed
- The user can receive notifications before they go over time, allowing for remote addition of time or advanced notification prior to violation
- Integration of smartphone applications allows for wayfinding, payment, management, enforcement, and communications all through the user’s smartphone
- Most systems have robust back-end management systems that can provide advanced management of the parking system
- Transaction and gateway costs (sometimes as high as $0.16 per transaction with traditional meters) are negated or passed on

**Demand Based Parking Pricing**

Demand based parking pricing, also known as variable or performance-based pricing, is a pricing strategy that implements parking rates based on observed parking demands to reach ideal parking occupancies within a parking system’s various facilities. Using this pricing strategy, parking rates are increased in areas with high demand and decreased in areas with low demand. This varied pricing structure is used to shift motorists from high demand areas to areas with less demand to create a more balanced parking system. The higher rates are applied to those areas with higher parking demands. As a result, users typically make the decision to either park in areas with lower rates or opt to use an alternative form of transportation. As the commuting and parking patterns change, and people either park elsewhere or do not drive a car
to campus, the result is more parking availability on the campus. Newer smart meter technology can be used to analyze parking demand within each facility and rates changes can be made to smart meters from a remote location, improving effective application of variable parking rates.

The benefits of a variable parking pricing strategy include:

- Improved parking space availability
- Balanced parking demands
- Increases space turnover
- Encourages alternative modes of transportation
- Reduced congestion in the parking and transportation system
- Decreases single occupancy trips

Virtual Permitting

The University of Utah recently implemented a virtual permitting system on campus, which is quickly emerging as an operational and cost savings trend on major campuses across the United States. Implementing a virtual permitting system throughout campus, managed by License Plate Recognition (LPR) technology can be a tremendous technology enhancement that saves considerable operational costs and streamlines management processes. The program replaces existing hang tag or sticker permits with virtual permits tangibly tied to the users' license plates. The system is easier for users to manage, handling parking transactions and citations through a web portal. The LPR system allows enforcement staff to quickly analyze parking violations related to misparked or illegally parked vehicles.

While the system does include a considerable capital investment, the ongoing savings from the program will cover the costs of installation over a short period of time. Texas Tech University, who installed a virtual permitting system, had up-front capital costs of $250,000 for the LPR equipment and back-end software. However, the annual costs savings include the following:

- $60,000 in permit orders
- $7,000 in permit maintenance
- $24,000 in office personnel
- $96,000 in enforcement personnel

The investment of $250,000 would be covered in less than two years with the $187,000 annual costs savings. On top of those savings, the program brought in more than $400,000 in additional citation revenue in the first year.

Pre-Paid Parking Payment

An emerging payment option for meters and garages are pre-paid parking cards. Pre-paid cards can be purchased with a monetary value and utilized at authorized parking meters, garages, and surface lots as
a method of payment. These pre-paid parking cards can be reloaded with additional funds for on-going use. There are multiple benefits to the pre-paid parking card including:

- Customers do not have to carry around coins
- Increase flexible payment opportunities
- Allows consumer to be refunded for extra-time not spent parked at a meter
- Reduces time, costs, and staff resources required to empty coins from meters
- Increases upfront revenue through the one-time fee for purchasing the pre-paid card

In a university setting, these pre-paid cards can be tied to student identification cards, helping to store the monetary value of the parking transaction in the student’s university account. This could include an initial payment with semester tuition payments.

**Wayfinding and Navigation Improvements**

Improvements in wayfinding and navigation could include signage, mapping, or real time availability applications. These improvements could have the following benefits:

- Promotes efficient movement of people and vehicles
- Provides better information to patrons related to parking location and availability
- Enhances facility utilization
- Reduces cruising and congestion
- Allows for greater flexibility in traffic management
- Allows users to pre-plan trips, reducing cruising and congestion
- Provides enhanced customer service

Wayfinding signage communicates parking locations, availability, rates, and other key destinations. Signage types may be temporary, permanent, static, or dynamic. The use of dynamic signage provides more flexibility with critical user information. Parking guidance systems typically consist of dynamic wayfinding signage that navigates motorists to available spaces. The systems require a significant investment in data collection technology, including loop detection systems or camera detection systems.

Online maps communicate parking locations, rates, availability and other pertinent information to help motorists plan their trip. Maps can also provide driving directions specific to parking, allowing for better management of traffic flow and arrival patterns.

Real-time availability tools, including smartphone apps and parking guidance systems, communicate to motorists where parking spaces are available. These vary from personal navigation to mounted signs and can prove effective in reducing the search for available parking spaces. Parking facilities can be equipped with individual space sensor technology to help motorists find available parking within a facility. Systems are typically characterized by red and green lights that indicate a full or open space respectively. These systems require a significant investment in data collection technology, including loop detection systems or camera detection systems.
Technology Enhancement Recommendations

The following are recommendations regarding the technology used on campus that will help to monitor and manage the parking system efficiently.

- Monitor the effectiveness of the virtual permitting system as implemented.
  - Document realized cost and operational savings.
  - Consider expanding the use of the existing License Plate Recognition practices to use the technology for access for parking facilities.
- Consider the implementation of demand based pricing for both permits and transient parking. For permits, as sales increase for a particular level, the price of the permit rises in response. This will maintain market rates for parking, while continuing to incentivize campus users to find alternative modes of access to campus.
- Implement parking guidance and wayfinding systems (including smartphone apps and space detection systems) to reduce circulation patterns on campus and near the University Hospital.

Mobile Apps and Parking Management

Mobile apps are being implemented on campuses across the country to assist campus visitors in finding the best places to park. These apps allow the user to see real-time parking data, including lot permit type, pricing (where applicable), available stalls, etc. The effectiveness of these apps relies on the availability of parking information, such as occupancy rates, permit types, etc. These apps can also be integrated into mapping software to give users directions to available parking.

The most efficient system for counting space availability involves counting vehicles as they enter and exit the parking lots. These systems can be integrated with monitoring software to analyze lot utilization from a global perspective and also connect to mobile apps to direct drivers to lots with open spaces. The downside to the entry/exit based programs is apparent when lots have multiple permit types. It is impossible to tell which spaces are being filled in each individual parking lot. It is recommended that this high level per lot approach be taken by the University as soon as possible. In order to make this process successful, as many lots as possible should be converted to this management system via the installation of detection loops and through purchasing software, such as the T2 UNIFI Parking Management Platform. It will also be necessary, and it is strongly recommended, to consolidate parking spaces to single permit lots instead of the current system where each lot is served by multiple permit types. The costs of this system will be offset by the reduction in re-circulation traffic on campus as people are directed to the best available parking space efficiently. It is advised to concentrate efforts initially on the lots interior to campus. This will allow for greater reduction in recirculation traffic on the roadways where it is most important.

Another alternative is to provide actual space by space data to the users via similar mobile apps. This can be very costly, particularly as a retrofit to an existing parking lot or structure. This system relies on a sensor puck in each stall which detects the presence of a vehicle. Although this would allow for better and more reliable information for the user, the cost/benefit is likely not as high as for the entry/exit
scenario described above. This is especially true if parking lots are to be consolidated into single permit type lots.

**Sustainable Practices (2.F)**

Parking can have a substantial impact on the environment, as parking facilities require a large investment of material, energy, and land resources; contribute to the urban heat island effect; increase stormwater runoff; and inadvertently influence vehicular transportation. In efforts to mitigate the environmental impacts of parking, many universities are incorporating sustainable practices in the construction and management of parking facilities and programs. The following section will summarize sustainable parking practices that could be implemented within existing and future University parking facilities to help reach University sustainability objectives; specifically, reviewing opportunities to increase green-space within University facilities, reduce the urban heat island effect, and implement sustainable transportation practices using technology and management.

**Reducing the Urban Heat Island Impact**

The urban heat island impact is defined as the event where air and surface temperatures are higher in urban areas than surrounding, less developed areas. This urban heat island effect is a result of the built environment of an urban area, which is largely comprised of materials like asphalt and concrete that absorb (rather than reflect) solar energy, increasing surface and surrounding air temperatures. Surface parking lots and parking structures further contribute to the urban heat island effect as a result of the materials out of which they are made. Facility design strategies are available to reduce the impact of parking facilities on the urban heat island effect, which primarily involve using “cool” materials that absorb less heat and installing shading at the facility to reduce absorption from the sun’s heat. The follow summarizes parking facility design strategies that minimize the urban heat island effect:

- **Cool Roofs and Cool Pavement** – Building and pavement materials that have a high albedo, or a high solar reflectance, to reflect solar energy away from the garage or lot.
- **Green Roofs** – Vegetation is planted atop a parking garage, either in one layer or as a rooftop garden, to shade the facility and reduce the surrounding temperatures through evapotranspiration.
- **Vegetation** – Similar to green roofs, additional vegetation planted within or surrounding a parking facility shades the facility from the solar energy, reducing absorption and subsequent increases in temperature. Plants also reduce surrounding temperatures through evapotranspiration.

The benefits of incorporating the aforementioned strategies into a parking facility go beyond reducing the urban heat island effect, where mitigating the absorption of sunlight and reducing surrounding temperatures through cool materials and vegetation includes:

- Reduced facility cooling and energy costs
- Enhanced beautification of a facility with additional foliage

5-32
• Improved human health and comfort as a result of reduced temperatures
• Reduced air pollution and greenhouse gas emissions

The following sections will expand upon providing additional green space and foliage as a sustainable design practice.

**Green Space**

Vegetation, or green space, within or surrounding a parking facility can support a variety of different sustainability initiatives. Primarily, there are three “green space” design strategies that are implemented in parking facilities: green roofs, vegetated parking islands, and aesthetic vegetation. Each of these strategies support the University’s sustainability initiatives at varying scales. The following sections provide a brief overview of the “green space” strategies that could be incorporated into the University’s parking system.

**Green Roofs**

In a green roof, vegetation is planted, either in a blanket layer, a garden, or even a community park with trees atop a parking garage. The additional foliage coverage as part of a green roof can provide the following benefits:

• Added coverage minimizes absorption of sunlight by a parking facility, reducing surface and surrounding temperatures
• Lower temperatures reduce associated garage energy and cooling costs
• Reduced greenhouse gas emissions
• Added green space
• Supports urban ecosystems
• Evapotranspiration by plants reduces surrounding air temperatures
• Rooftop gardens can be used to produce food for sale, including fruits and vegetables

**Aesthetic Vegetation and Vegetated Parking Islands Medians**

Aesthetic vegetation and planted parking islands and medians use small shrubs, flower beds, or trees located throughout surface parking structures and surrounding parking garages. While their inclusion in facility design does provide an enhanced aesthetic appeal, they also offer additional benefits. The vegetated cover, while less dense than compared to a green roof, provides the following benefits:

• Shades the surface lot and the exterior walls of a garage, reducing the urban heat island effect, and can lower, to a lesser degree than green roofs, facility cooling costs
• Evapotranspiration by plants reduces surrounding air temperatures
• Planted medians, islands, and other planters can be designed to incorporate storm water management
• Planted medians and islands improve traffic flow within a facility
• Additional plant coverage sequesters pollutants and greenhouse emissions from the air

**Other Sustainable Parking Design Alternatives**

Beyond the standard green roof and vegetation approaches, there are several other opportunities to improve the urban heat island effect within parking areas, including:

• Applying high-reflectivity coating to parking lot asphalt, including asphalt chip seals and emulsion sealcoats, which reduce the albedo factor of asphalt
• Roof sprinkling, which includes the use of roof top sprinklers to cool the air around the top of the structure through evaporation
• Use of pervious pavement surfaces for lower volume parking areas to allow infiltration of stormwater
• Use of bio-retention basins and/or rain gardens to treat and infiltrate stormwater

**Parking Demand Management as a Sustainable Practice**

In addition to design practices, the University can also mitigate future environmental impacts by focusing on reducing vehicle miles traveled and continuing to shift the predominant form of travel from the personal automobile to more sustainable modes of travel. A number of management options and technology strategies can be implemented to reduce single occupancy vehicular demand on campus.

Technology enhancements are a primary area where progress toward campus sustainability goals can be enhanced. Several new technology applications, including LED lighting to reduce energy consumption and solar panels on the garage rooftops, can reducing energy needs and environmental impacts. Technology can also be used to reduce the circulation patterns on campus, including single-space monitoring systems in new garages, development of parking guidance and campus wayfinding systems, and mobile apps that provide real-time parking availability information to improve navigation and reduce circulation related to searching for parking.

The introduction of vehicular demand management strategies can also have the impact of removing vehicles from campus by promoting walking, cycling, and transit trips over the vehicular commute. Implementing programs like rideshare, bike share, or car share can help campus users relinquish control of their personal automobile. Enhancements to transit service, including deeply discounted or subsidized transit passes, can sway the commuter to change modes. Parking pricing can be used as a disincentive to the SOV commute trip. The University should actively integrate Transportation Demand Management into its parking and transportation planning activities going forward.

**Recommended Projects**

The following are a list of potential parking-related projects the University of Utah should implement as growth occurs on campus:
- Build the committed parking projects (as defined in Table 5-7).
- Establish shared parking agreements with Research Park, taking advantage of underutilized parking facilities. This recommendation may require additional shuttling service, depending upon the location of the shared lots.
- Identify off-campus parking facilities along with shuttling services to redistribute demand and balance the parking system.
- Review permit structure and prioritize users’ parking needs to access campus.
  - Create a permit level for the Research Park in the tiered permit structure
  - Identify the users that can be moved to off-campus facilities
  - Limit permit access for those users who have direct access to walking, cycling, or transit connections to campus. This typically includes people living within a quarter-mile of the campus and along transit lines. The intent is to encourage these users to take advantage of the alternative forms of transportation that is readily available to them and discourage the use of the personal vehicle by restricting parking permits for them.
  - Set caps for class levels and faculty to control the vehicular access to campus
  - Work actively with UTA Light Rail to promote ridership, including subsidizing eco-passes
- Obtain class loading data that can be used to inform the Park+ model and help coordinate class schedules so that they balance out parking demands.
- Coordinate with the City to establish a City Permit Program in neighborhoods around the University to help manage overflow.
- Monitor the effectiveness of the virtual permitting system as implemented. Document realized cost and operational savings. Consider expanding the use of the existing License Plate Recognition practices to use the technology for access for parking facilities.
- Consider installation of smart meters and/or pay by phone systems to improve payment options for transient parkers (visitors or students who do not purchase a permit and choose to pay as you go).
- Consider the implementation of demand based pricing, for both permits and transient parking. For permits, consider that as sales increase for a particular level, the price of the permit rises in response. This will maintain market rates for parking, while continuing to incentivize campus users to find alternative modes of access to campus.
- Consolidate parking lots into single permit lots.
- Implement parking guidance and wayfinding systems (including smartphone apps and space detection systems) to reduce recirculation traffic and congestion.

**Research Park Specific Parking**

Establishing shared parking agreements between Research Park and the main University Campus and University Hospital will go a long way to maximizing the efficient use of space in all three locations. Projections for parking occupancy in the next five years predict that many of the Research Park lots will be below 75% occupancy. This is an ideal situation to implement shared parking. In order for shared parking to be successful, the lots should be converted to park and ride with shuttle service to the main campus and hospital. The Komas Drive lot is ideally situated for park and ride as it is close to the outskirts of the park and is easily accessible from Wakara Way and Komas Drive.
Many of the lots in Research Park are surface lots which take up a great deal of space and are not sustainable. As development occurs, these lots will be taken up with building space and parking structures will accommodate the future needs. Given the amounts of parking currently on the site and the observed occupancy rates it is unlikely that additional parking spaces will be required other than to replace those lost due to building construction. We recommend capping the number of spaces in Research Park at their existing levels and providing better alternatives for transport such as park and ride and the principles of Travel Demand Management.

The new wave of parking structures that will be built in conjunction with additional buildings in the park should include sustainable parking technologies such as LED lighting and enhanced wayfinding. Any new parking lots/structures should also include enter/exit parking counters to enable integration with mobile apps for finding available parking, especially where the parking will be shared with the main campus and hospital.

**Transformative Projects (7)**

The preceding sections identified in detail the projects recommended to achieve the goals of the University, Medical Center, and Research Park to maintain a sustainable, safe, and efficient parking network.
Table 5-16 summarizes the capital project recommendations, establishes a prioritized timeline for each project and a cost to implement each project. Projects are listed as HIGH, MEDIUM and LOW priorities. Table 5-17 includes parking policy recommendations.
### Table 5-16 Parking Transformative Project List

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost/Space</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committed Parking Projects</td>
<td>Build the committed parking projects as planned</td>
<td>$4,000-$8,000 (Lots)</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$15k-$25k (Garage)</td>
<td></td>
</tr>
<tr>
<td>New Parking Facilities</td>
<td>Build 2 new parking facilities at locations A&amp;B</td>
<td>$15k-$25k (Space)</td>
<td>LOW</td>
</tr>
</tbody>
</table>

### Table 5-17 Parking Policy Recommendations

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Parking</td>
<td>Establish shared parking agreements with Research Park</td>
<td>HIGH</td>
</tr>
<tr>
<td>Permits</td>
<td>Review permit structure</td>
<td>HIGH</td>
</tr>
<tr>
<td>Park+</td>
<td>Maintain the Park+ model with accurate data</td>
<td>HIGH</td>
</tr>
<tr>
<td>Single Permit Lots</td>
<td>Consolidate lots into single permit types</td>
<td>HIGH</td>
</tr>
<tr>
<td>City Permits</td>
<td>Coordinate with City for neighborhood permitting</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Virtual Permits</td>
<td>Monitor and adjust virtual permitting as necessary</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Variable Pricing</td>
<td>Develop demand based pricing structure</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Wayfinding</td>
<td>Establish parking wayfinding including smartphone apps</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Off-Campus Parking</td>
<td>Identify Off-Campus parking opportunities with shuttling</td>
<td>LOW</td>
</tr>
</tbody>
</table>
Chapter 6 Transit Services

Study Area Context (4.A)

Existing Context and Land Uses in the Study Area (4.A)

The project study area for the purposes of providing transit analysis and recommendations includes the University of Utah campus, University Hospital, Research Park, and other land uses in the vicinity that access the transit systems. University Hospital, Veterans Administration Hospital, and Fort Douglas (a historic Army Fort and active Armed Forces Reserve Center), are some of the other areas in the vicinity of campus that have access to and from transit systems. Numerous historic districts are located in the proximity of the study area, including Fort Douglas Historic District and the University Circle Historic District. The historic Mount Olivet Cemetery borders the southwest corner of the study area and multiple recreation destinations and parks are located along the periphery, including Hogle Zoo, Sunnyside Park, and the Matheson State Park and Nature Preserve.

The core area of the University of Utah campus, located in the western portion of the study area, includes education buildings surrounded by parking, administration, and athletics and event facilities. Two main groups of student housing (south along Sunnyside and east, south of the University Hospital) provide a majority of the 1,094 dwelling units for on-campus residents. The University of Utah, combined with the University Hospital, is the second largest employer in the State of Utah. Based on current available information, approximately 68,000 people access the study area per day, using motor vehicles, transit, bicycles, or by walking. There are approximately 45,056 faculty, staff, and students at the campus on a regular day of classes (2014).

The Veterans Administration Hospital has 2,276 employees, 1,027 volunteers and, in 2013 serviced 635,661 outpatient visits. The University Hospital has 5,622 employees and admitted 22,831 patients and serviced 1,335,670 outpatient visits during 2013. Research Park, a cooperative effort to promote industrial technology, houses 53 private businesses that employ 6,340 people and 112 University-based organizations that employ 4,251 people.

Refer to Figure 6-1 and Figure 6-2 for a depiction of the study area and existing buildings and land uses in the study area.

Land Use Changes and Improvements in the Study Area (4.A)

Several new developments have recently been completed or are under construction at the University of Utah and University Hospital. These expansions include buildings and renovations that provide additional classroom space, research space, faculty and staff space, and exhibition and hospital space. Additional projects referenced in the 2010 Addendum to the Campus Master Plan include Rice Eccles Stadium Expansion, Dee Glen Smith Expansion, and the University Information Technology Office Building. The South Campus Village housing project is adding 1,600 beds and 700 parking stalls in five- and six-story buildings adjacent to the Fort Douglas TRAX Station, located below the Eccles Legacy Bridge. Various other
capital development projects are in the planning, design, and construction stages on campus and at the hospital. With more space for students, faculty, staff, and visitors, the demand for transit will continue to grow. Figure 6-3 is the University of Utah Campus Master Plan Vision map.
Surrounding Neighborhoods and Districts/Commuter Origins (4.A)

The study area is surrounded by various neighborhoods and districts, including single family areas, as well as multi-family, mixed use, commercial, and office uses. UTA recently mapped campus-bound commuter origins. These commuters currently travel by driving, taking transit, bicycling, or walking to the campus. An analysis of the commuter origins data shows:

- 6,381 commuter origins within one mile of campus
- 5,845 commuter origins within ¼ mile (5 minute walk) of existing bus stops within one mile of campus
- 11,793 commuter origins within two miles of campus
- 10,737 commuter origins within ¼ mile (5 minute walk) of existing bus stops within two miles of campus

The maps shown on Figure 6-11 depict the commuter origin points listed above. The potential to capture more transit ridership from these surrounding neighborhoods and areas is currently being analyzed by UTA. The agency is considering potential increases in service frequencies and extending service for longer hours on some routes in the vicinity of the study area. More information will be available in the coming weeks on this analysis.

The UTA is currently in the process of completing an update to its five year service plan. This plan will address service improvements to/from and in proximity to the University campus and vicinity. Service needs for residents in surrounding outlying areas also are being evaluated (including those of students, faculty, and staff living in the East Bench area, as well as other residential areas of the city and county). In addition, Salt Lake City is currently in the process of developing a transit master plan which will identify specific service improvements to many corridors serving the University of Utah campus. The following map shows corridors in proximity to campus that are part of the analysis.
Map illustrating corridors being analyzed as part of the Salt Lake City Transit Master Plan, currently in development
Using Google Maps, Otak, a design firm consisting of engineers, architects, urban designers, and planners, conducted an analysis of travel times based on theorized trips from various points on and off campus to key destination points. The analysis used the transit and walking routing features of Google Maps and through a series of exercises, timetables were created to illustrate and compare the time periods associated with walking or riding transit to key destinations. These timetables are provided as Table 6-1 through Table 6-4. Table 6-1 shows travel times to President’s Circle from various origins on a typical fall or spring weekday. Table 6-2 shows travel times to the A. Ray Olpin Student Union on a typical fall or spring weekday. Table 6-3 shows travel times to HPER Recreation on a typical fall or spring weekday. Off campus trip options via the TRAX system also were analyzed, and these are depicted in Table 6-4.

The travel time analysis shows comparative timeframes of riding various segments of transit versus walking and bicycling. As shown in the analysis, some transit segments provide a clear travel time advantage to walking and bicycling, while for others it would be faster to walk or bicycle between destinations rather than using transit. This analysis provides a helpful reference in considering how to fine tune transit services between key destinations on campus and in the vicinity to improve efficiency and convenience.
### Table 6-1 Travel Time Analysis—President’s Circle

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Trip Time (mins)</th>
<th>Routes</th>
<th>Mode of Transport</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Walk</strong></td>
<td><strong>Trip Time (mins)</strong></td>
<td><strong>Routes</strong></td>
<td><strong>Mode of Transport</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td><strong>Trip Time (mins)</strong></td>
<td><strong>Medical Plaza Towers</strong></td>
<td><strong>Chapel Glen</strong></td>
<td><strong>Gateway Heights</strong></td>
<td><strong>Shoreline Ridge</strong></td>
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<tr>
<td><strong>Daytime Trip Time (mins)</strong></td>
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<td>15-17</td>
<td>11-21</td>
<td>11-21</td>
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<tr>
<td><strong>Mode of Transport</strong></td>
<td><strong>Nighttime Frequency</strong></td>
<td><strong>Nighttime Trip Time (mins)</strong></td>
<td><strong>Walk/Shuttle/Walk</strong></td>
<td><strong>Walk/Shuttle/Walk/Train</strong></td>
</tr>
<tr>
<td><strong>Trip Time (mins)</strong></td>
<td><strong>UTA Bus</strong></td>
<td><strong>Routes</strong></td>
<td><strong>Mode of Transport</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td><strong>Trip Time (mins)</strong></td>
<td><strong>Medical Plaza Towers</strong></td>
<td><strong>Chapel Glen</strong></td>
<td><strong>Gateway Heights</strong></td>
<td><strong>Shoreline Ridge</strong></td>
</tr>
<tr>
<td><strong>Routes</strong></td>
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<td><strong>Multiple</strong></td>
<td><strong>Multiple</strong></td>
<td><strong>Multiple</strong></td>
</tr>
<tr>
<td><strong>Mode of Transport</strong></td>
<td><strong>Frequency</strong></td>
<td><strong>15-30 mins</strong></td>
<td><strong>15-30 mins</strong></td>
<td><strong>15-30 mins</strong></td>
</tr>
<tr>
<td><strong>Trip Time (mins)</strong></td>
<td><strong>TRAX</strong></td>
<td><strong>Routes</strong></td>
<td><strong>Mode of Transport</strong></td>
<td><strong>Frequency</strong></td>
</tr>
<tr>
<td><strong>Trip Time (mins)</strong></td>
<td><strong>Medical Plaza Towers</strong></td>
<td><strong>Chapel Glen</strong></td>
<td><strong>Gateway Heights</strong></td>
<td><strong>Shoreline Ridge</strong></td>
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<tr>
<td><strong>Daytime Trip Time (mins)</strong></td>
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<td>22</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td><strong>Routes</strong></td>
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<td><strong>Multiple</strong></td>
<td><strong>Multiple</strong></td>
<td><strong>Multiple</strong></td>
</tr>
<tr>
<td><strong>Mode of Transport</strong></td>
<td><strong>Frequency</strong></td>
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See Note 2: [Details provided elsewhere in the document.](#)
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<tr>
<th>Walk Trip Time (mins)</th>
<th>Bike Trip Time (mins)</th>
<th>Campus Shuttle Trip Time (mins)</th>
<th>UTA Bus Trip Time (mins)</th>
<th>TRAX Trip Time (mins)</th>
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<tbody>
<tr>
<td>Medical Plaza Towers</td>
<td>Chapel Glen</td>
<td>Gateway Heights</td>
<td>Officer’s Circle</td>
<td>Benchmark Plaza</td>
</tr>
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<td>Travel Origin: On-Campus Housing</td>
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<td>Gateway Heights</td>
<td>Officer’s Circle</td>
</tr>
<tr>
<td>10-13</td>
<td>6-10</td>
<td>7-9</td>
<td>9-11</td>
<td>9-10</td>
</tr>
<tr>
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<td>Multiple</td>
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<td>Multiple</td>
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<td>18</td>
<td>18</td>
<td>19</td>
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<td>Walk/Train</td>
<td>Walk/Train</td>
<td>Walk/Train</td>
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<tr>
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<td>15 min</td>
<td>15 min</td>
<td>15 min</td>
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</tr>
</tbody>
</table>

1. Mode of Transport is not convenient – requires rider to walk farther to transit stop and/or from transit stop than to destination
2. Mode of Transport is not convenient – requires rider to take convoluted route that includes considerable back-tracking, transfers and other complications
3. Mode of transport is not convenient – requires rider to circulate around campus to get to destination
<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Medical Plaza Towers</th>
<th>Chapel Glen</th>
<th>Gateway Heights</th>
<th>Officer’s Circle</th>
<th>Benchmark Plaza</th>
<th>Shoreline Ridge</th>
<th>Sage Point</th>
<th>Marriott Residential</th>
<th>West Village</th>
<th>East Village</th>
<th>Downtown Commons</th>
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<tbody>
<tr>
<td>Bike Trip Time (mins)</td>
<td>7-9</td>
<td>6-8</td>
<td>5-7</td>
<td>9-11</td>
<td>9-10</td>
<td>11</td>
<td>10-11</td>
<td>5-6</td>
<td>10-12</td>
<td>10-13</td>
<td>10-11</td>
</tr>
<tr>
<td>Mode of Transport</td>
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<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
<td>Multiple Walk/Bus</td>
</tr>
<tr>
<td>TRAX Trip Time (mins)</td>
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<td>19 See Note 1</td>
<td>703 See Note 1</td>
<td>17 703</td>
<td>18 703</td>
<td>19 703</td>
<td>19 703</td>
<td>10 703</td>
<td>NA NA</td>
<td>NA</td>
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</tr>
<tr>
<td>Mode of Transport</td>
<td>703 Walk/Train</td>
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<td>See Note 1 Walk/Train</td>
<td>15 min Walk/Train</td>
<td>15 min Walk/Train</td>
<td>15 min Walk/Train</td>
<td>15 min Walk/Train</td>
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<td>15 min Walk/Train</td>
<td>15 min Walk/Train</td>
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</tr>
<tr>
<td>Route Frequency</td>
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<td>15 min</td>
</tr>
</tbody>
</table>

1. Mode of Transport is not convenient – requires rider to walk farther to transit stop and/or from transit stop than to destination
2. Mode of Transport is not convenient – requires rider to take convoluted route that includes considerable back-tracking, transfers and other complications
3. Mode of transport is not convenient – requires rider to circulate around campus to get to destination
<table>
<thead>
<tr>
<th>Travel Destination</th>
<th>President’s Circle</th>
<th>Student Union</th>
<th>HPER Rec Centers</th>
<th>University Medical Center</th>
<th>Research Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>University South Campus Station</td>
<td>Walk, Bike, Shuttle, Bus</td>
<td>Time</td>
<td>Frequency</td>
<td>Walk, Bike, Shuttle, Bus</td>
<td>Time</td>
</tr>
<tr>
<td>Stadium Station</td>
<td>Walk, Bike, Shuttle, Bus</td>
<td>Time</td>
<td>Frequency</td>
<td>Walk, Bike, Shuttle, Bus</td>
<td>Time</td>
</tr>
<tr>
<td>University Medical Center</td>
<td>Walk, Bike, Shuttle, Bus</td>
<td>Time</td>
<td>Frequency</td>
<td>Walk, Bike, Shuttle, Bus</td>
<td>Time</td>
</tr>
</tbody>
</table>

1. Mode of Transport is not convenient – requires rider to walk farther to transit stop and/or from transit stop than to destination
2. Mode of Transport is not convenient – requires rider to take convoluted route that includes considerable backtracking, transfers and other complications
3. Mode of transport is not convenient – requires rider to circulate around campus to get to destination
Transit Services and Access to Transit (4.C)

Transit service to, from, and within the study area is provided by UTA and the University. There are three transit systems that serve the project study area:

- UTA bus service
- UTA TRAX light rail
- University Campus Shuttle

UTA Bus Service (4.D)

The UTA provides extensive bus services throughout the Salt Lake area, surrounding suburbs, and some rural areas. Within the local context of the study area, there are 17 UTA routes and 94 stops. There are 12 local routes, two fast bus routes, and three express bus routes. Most of the connecting routes originate in the Salt Lake metro area. Several lines originate outside the local metro context. The PC-SLC Connect starts 25 miles east of the campus. The U of U/WSU express (455) and the SLC - Ogden Hwy 89 express (473) originate in Ogden, approximately 35 miles north of the campus.

Figure 6-4 shows locations of bus routes operated by UTA, and Figure 6-5 shows 1/8 mile walking radii around the bus stops. Bus stop amenities range from having only a basic bus sign to a bus shelter designed for winter conditions (partial or full enclosure.) Refer to Figure 6-6 for the types of features existing at each bus stop.
Figure 6-4

UTA Bus Routes and Stops
Figure 6-6
UTA Bus Stop Conditions

Legend
- Project Area
- Major Road
- UTA Light Rail Route
- UTA Bus Route

Bus Stop Amenities
- Bus Stop Sign Only
- Bus Stop Sign, and Lighting
- Bus Stop Sign, Lighting, and Trash Recepticle
- Bus Stop Sign, Lighting, Trash Recepticle, and Shelter
- Bus Stop Sign, Lighting, Trash Recepticle, Bench, and Shelter
UTA TRAX Light Rail Service (4.D)

The TRAX light rail connects areas in the Salt Lake area to the downtown core and provides service to the project area via four stations: Stadium, University South Campus, Fort Douglas, and University Medical Center. Refer to Figure 6-7 for the locations of the UTA TRAX light rail line and stations. Figure 6-8 shows the ¼ mile walking radii around light rail stations. Light rail stations have full open air shelters with wind breaks and other amenities.

University Campus Shuttle (4.G)

The University shuttle mostly provides service to the areas in and around the University. The University of Utah Shuttle system is a local circulator designed to serve the campus and surrounding areas. There are six main routes; Blue, Red, Green, Purple, Black and Orange. The main shuttle routes run between 6:00 a.m. and 6:00 p.m. Night time shuttles can run up to 11:00 p.m. Depending on the route, the wait time can range between 13 and 20 minutes. Other routes provide ancillary service and service during special events. Refer to Figure 6-9 shows the University Campus shuttle routes and stops. Figure 6-10 shows the 1/8 mile walking radii around each shuttle stop.

Planned Transit Services (4.D)

The 2015-2040 Regional Transportation Plan depicts a new Bus Rapid Transit (BRT) connecting through the northern part of the University campus (see Figure 6-7). Additionally, the planning documents show a streetcar running east/west along South Temple connecting to a larger street car system west of the Downtown area. The UTA is preliminarily evaluating the potential of a black line extension of TRAX to the campus, which could provide 7.5 minute service from the airport and/or commuter rail system to the University. Ideally, this service would arrive at campus at a new intermodal hub.
Commuter Origin Map - Points within Proximity to the Study Area

- Points within 1 Mile of the Study Area
- Points within 1 Mile of the Study Area and within 1/4 Mile Radius from Bus Stops
- Points within 2 Miles of the Study Area
- Points within 2 Miles of the Study Area and within 1/4 Mile Radius from Bus Stops

Service Layer Credits: 2014 NAIP Imagery
Transit Ridership, Goals, and Forecasts (4.A)

Existing Ridership Levels (4.D,G)

UTA TRAX and Bus Services (4.D)

The TRAX light rail and bus services operated by UTA carry thousands of riders to and from the study area daily. Of the three TRAX lines serving campus, University of Utah Commuter Services estimates that there are 9,741 University riders daily (2014). The average daily ridership reported by UTA for the fall semester of 2011 was 6,578. As such, there has been a 48 percent increase in ridership within a three-year period. UTA estimates that bus lines carry approximately 17,000 people to and from the study area daily. Commuter Services provides a transit pass for every member of the campus population (students, faculty, and staff totaling 45,056 in fall 2014). The cost for providing these passes will exceed $4.1 million in 2015.

![Daily TRAX Ridership chart](chart.png)

Source: University Commuter Services, 2014

Sporting Events—Commuter Services pays an additional $300,000 per year so tickets to athletic events can be used as a transit pass on game day. The ticket to the game is the ticket for the train. This results in an additional 10,000 to 14,000 riders using the UTA TRAX system during each football game. Fans also ride for free with their tickets to basketball, gymnastics, soccer, and other campus events.

University Campus Shuttle (4.G)

Based on data provided by Commuter Services, the campus shuttle system operated by the University of Utah has 36,000 to 40,000 boardings within a 24-hour period (day and evening service) during the fall, winter, and spring terms of the academic year. This includes all lines of the system, and multiple boardings may be made by one person within the 24-hour period.
Current Ridership Levels and Transit Mode Share (4)

UTA estimates that the current transit mode share for the project area is approximately 35 to 39%, varying throughout the year. The UTA’s goal for transit mode share in the project area is 50%. University Commuter Services estimates that transit mode share may be higher on campus, particularly for the University shuttle, which already appears to carry 50% of the trips on campus.

A recent commuter survey conducted in fall of 2014 found that 37.5% of University of Utah commuters and travelers use UTA services including TRAX, FrontRunner, and bus to get to and from the study area. Once on campus, 23% of the respondents stated that they use the campus shuttle, with the Red line being the most popular shuttle route, followed by the Blue line and then Black line.

Of the 37.5% riding UTA systems, 2.5% were faculty, 13.3% were staff, 15.6% were undergraduate students, and 6.1% were graduate students. The top two reasons commuters stated for not using transit services were convenience and time.

Potential Personal Rapid Transit/Group Rapid Transit Service (4.E)

Introduction

This subsection of the Transit section explores the potential concept of implementing a personal rapid transit (PRT) or group rapid transit (GRT) in the study area. Similar types of fixed guideway rapid transit systems that have been implemented around the world are summarized, along with their general characteristics, costs (as known), and other important considerations related to implementation and operations. Suggested next steps for further analyzing the potential for PRT or GRT implementation also are provided.

The University has expressed interest in the potential to implement an elevated PRT, GRT, or other type of efficient automated fixed guideway system to serve key land uses in the study area. As a first phase of implementation, the system would provide fast, frequent transport between Research Park and the University Hospital/School of Medicine, places that require back and forth travel for employees, students, faculty, patients, and guests multiple times per day. Ultimately, other places on campus and in the nearby vicinity could benefit from the service of a fixed guideway system, such as the Rice-Eccles Stadium, Huntsman Center, V.A Hospital, and other popular destinations, and the system could be expanded as part of future phases of implementation.

Figure 6-12 illustrates potential conceptual routing of an elevated fixed guideway system providing access to these areas. Ideally, this system would include stops/stations in proximity to other modal hubs (such as light rail stations) and at key destinations in the network (e.g. University Hospital and Research Park). These hubs for the automated system also could provide some park and ride capacity (see Figure 6-12 for conceptual hub/park and ride locations). Figure 6-13 illustrates the conceptual fixed guideway system in proximity to other transit services and facilities in the study area. A seamless, interconnected network of transit services is envisioned. The automated fixed guideway system would serve a unique need for frequent back and forth travel between Research Park, Hospital locations, and other area destinations. Once the automated service is fully implemented, some existing bus routes could potentially be replaced.
by the service or some route adjustments may be needed to provide better connections. The University and UTA would need to evaluate ongoing transit services on campus to determine needed adjustments in the future. This could be further explored in a detailed feasibility study for PRT/GRT on campus.

**First Last Mile Planning**

Trips are defined as the entire journey from departure point to arrival point. Every transit trip, by definition, is multi-modal as transit rarely begins at the real trip origin and terminates at the real destination. Therefore, some other mode must be included in the trip. When planning transit facilities, it is essential to account for these modes at the ends of each trip. Therein lies the concept of first last mile planning, accommodating transit users for the first mile of their trip and the last mile of their trip.

The guiding principles behind a good first last mile plan include safety, efficiency, intuitiveness, accessibility and aesthetics. If all of these things are considered, the transportation user is much more likely to consider transit a viable alternative which will aid the goal of reducing SOV.

Safety is the primary concern. This can be accomplished through protected facilities like transit stops, improved street crossings, lighting and traffic calming. Each of these elements should be implemented in the vicinity of transit locations, especially the newly proposed transit hub.

The first last mile route must be efficient. Priority signalization, smooth walking/biking surfaces, wide facilities, and direct routes ensure there is no unnecessary wasted time in the first last mile.

First last mile facilities must be intuitive. Improved wayfinding and the use of technology link the transit experience with other modes used in the first last mile. This allows for seamless transfer between modes.

Accessibility is a major concern as many captive transit users require accessible facilities. This includes facilities for wheelchair users, the visually impaired, and the hearing impaired. There are a myriad of options for accessible solutions to enhance the first last mile and each facility should be reviewed to ensure that ADA requirements are met and exceeded in each case.

Nothing encourages transit use or discourages transit use more than aesthetics. This ranges from cleanliness to artwork. The first last mile concept includes functional street art, such as wayfinding, landscaping, benches and street furniture, and decorative lighting.

The first last mile design concepts should be considered for all new transit facilities and should be retrofit for all existing facilities as finances and opportunities arise.
Future Fixed Guideway System Concept Plan

Potential Major Hub for Future Fixed Guideway System/Park and Ride Locations

Potential Major Hubs for Multi-Modal/Transit Systems at UTA Light Rail Stations

Potential Fixed Guideway Systems Route

Figure 6-13

University of Utah Parking & Transportation Master Plan
Personal rapid transit (PRT) is a type of automated fixed guideway transit. Fixed guideway transit systems encompass a broad range of systems, not only PRT but also larger vehicles such as metro and subway systems, light rail trains, and trams. The distinction of PRT (also called podcar) systems is that the vehicles are small, sized for individual or small group travel, and typically carry no more than three to six passengers per vehicle.

Automated transit networks (ATN) is an umbrella term that includes PRT, as well as group rapid transit systems. Group rapid transit (GRT) systems are similar to PRT, but with higher-occupancy vehicles and with passengers group with potentially different origin-destination pairs. As such, some have likened GRT to a form of horizontal elevator. As such, GRT systems may have fewer direct-to-destination trips than single-destination PRT, but fewer average stops than conventional transit. GRT may be thought of as an automated share taxi system, whereas PRT is more along the lines of an automated private cab system.

PRT and GRT guideways are arranged in a network topology with all stations located on sidings, and with frequent merge/diverge points, allowing for nonstop, point-to-point travel that bypasses intermediate stations. The point-to-point service has been compared to a private on-demand taxi or a horizontal lift (elevator) with call buttons taking you to your location.

Most mass transit systems move people in groups over scheduled routes, which can result in inherent inefficiencies as passengers wait for others to board and deboard at other stops along the route. Also, with some larger vehicles that weigh more, accelerating and decelerating can result in heavy fuel use, noise, and pollution. PRT systems can be more efficient and effective by moving individuals and small groups nonstop in automated vehicles on fixed tracks. The ideal system would allow passengers the ability to board a pod immediately upon arriving at a station, and then take relatively direct routes to their destination without stops in between (with a sufficiently extensive network of tracks).

PRT systems can offer many traits similar to automobiles such as privacy and the ability to choose one's own schedule. PRT systems also can transport freight and deliveries between destinations.

**Personal Rapid Transit (PRT) Provides:**
- Direct origin-to-destination service with no need to transfer or stop at intermediate stations.
- Exclusive use of small vehicles for individual or small groups traveling together by choice.
- Service available on demand by the user rather than on fixed schedules.
- Fully automated vehicles (no human drivers), which can be available for use 24 hours per day, 7 days a week.
- Vehicles captive to a guideway that is reserved for their exclusive use.
- Small (narrow and light) guideways, usually elevated, but also at or near ground level or underground.
- Vehicles are able to use all guideways and stations on a fully connected PRT network.

Source: Advanced Transit Association (ATRA)
PRT systems typically provide more efficient and faster transportation during peak traffic periods since automated vehicles on a separated trackway move independently of traffic flows. The lower weight of smaller PRT vehicles can be supported by lighter-weight infrastructure compared to other mass transit systems. This can translate into lower costs, smaller corridors, and less visually intrusive trackway systems.

**Example Systems (4.E)**

A few automated transit networks recognized as true PRT and GRT technologies in operation around the world are summarized. Other automated and non-automated people mover, tram, and monorail systems also are highlighted.

**Morgantown, West Virginia PRT** *(Link)*—Home to the world’s oldest and most extensive PRT system in operation since 1975, the Federal Transit Administration (FTA) recently funded rehabilitation of the system. This system is known as “the PRT” and moves people in the vicinity of the West Virginia University campus and popular destinations throughout Morgantown. However, the Morgantown PRT does not meet the modern definition of a PRT system because each car holds about 20 passengers and speeds are relatively slow (top speed is 30 mph). The system runs on a ground-mounted rail. The guideway network extends 8.2 miles, and provides point to point transport, except during off-peak periods of use when multiple stops are made. The system was originally manufactured by the Boeing Company. Although newer PRT technology is being explored and implemented today, many still consider the Morgantown PRT to be a model of the reliability, safety and improved service that PRT networks can offer.

**Masdar, UAE CyberCab PRT System by 2getthere**—In operation since 2010, the 13-vehicle PRT system is considered to be a pilot system. Expansion of the system was cancelled just after the original system opened, but the original system is still continuously operated. Masdar is a planned modern city outside of Abu Dhabi in the United Arab Emirates, promoted as potentially the first zero-carbon, zero-waste, car-free city in the world. The Masdar system is .9 miles in length and the vehicles have differing functions (10 passenger and 3 freight).
2getthere develops electronically guided automated people mover systems, and has other systems in operation besides the Masdar program. In 1997, the company developed its first GRT system in the Netherlands, and in 2002 2getthere installed and operated a basic PRT system (two online stations and a line connection) at the Floriade Exhibition. 2getthere now develops second generation PRT and GRP systems, including the ParkShuttle GRT system, which is operating at the Schiphol Airport and the Rivium Business Park in the Netherlands and the CyberCab PRT project. 2getthere systems can be installed at any level—underground, at grade, or elevated. However, most systems are elevated to avoid conflicts with other transportation modes at grade (street level), maximizing efficiency by minimizing travel time point to point. The all electric rubber tire vehicles operate free of rail guidance within a guideway, minimizing greenhouse gas emissions and noise.

2getthere is an independent company that focuses on project management, engineering, controls development, marketing, and sales. They own an exclusive license for application of the FROG guidance technology in automated people mover applications. The company often partners with local interests to realize turn-key projects, including financial partners via franchise agreements. They will partner with local engineering and construction companies to guide the design and infrastructure development. For more information, see “Other Resources” at the end of this section.
2getthere Park Shuttle elevated GRT system on the Rivium Bridge in the Netherlands

2getthere GRT at grade system at Schiphol Airport, the Netherlands

**Heathrow Airport, London UK ULTra System**—Opened in 2011, this 21-vehicle PRT provides access to airport customers and employees via ULTra vehicles. The 2.4 mile-long system connects to Terminal 5’s long-term car park. The podcars are small, driverless electric vehicles that run on elevated guideways.
The lightweight and flexible nature of the system enables it to be retrofitted into a broad range of environments and provide transportation that is environmentally friendly and operationally efficient. ULTra podcars are rubber-tired and battery-powered, easily capable of carrying four passengers and their luggage. Compliant with disability legislation, the podcars are designed to accommodate wheelchairs, prams (strollers), and bicycles. The ULTra system offers security and convenience by providing a non-stop journey that gives passengers exclusive use of their vehicle. Each podcar is monitored by closed caption television and a dedicated team of controllers are on hand to help at the push of a button. With a turning radius of only 16 feet and an empty weight of 1,870 pounds, the pods can navigate complex routes with lightweight infrastructure, and are virtually silent when running, producing little or no external vibration and zero emissions.
Suncheon, South Korea Vectus System—Officially opened in 2014 after a year of testing, 40 Vectus vehicles serve two in-line stations over a distance of 2.9 miles. Some call this system the Skycube, connecting the site of the 2013 Suncheon Garden Expo to the station next to the Suncheon Literature Museum. Vectus provides both PRT and GRT systems and vehicles. GRT can be provided through the combination of multiple PRT vehicles, with the larger vehicles designed to accommodate standees and operate on the same guideway as the PRT vehicles. The door spacing of the larger vehicles matches the door spacing of PRT vehicles stopped in a station, allowing the GRT vehicles to share the same station infrastructure. The concept is intended to allow GRT to serve high-demand station pairs during peak periods, while PRT serves all stations at all times in a network that might include high-demand station pairs as well as other stations. Vectus is a spin-off company of South Korean steel giant POSCO.

Vectus vehicles operating in snowy conditions on lightweight trackway

PRT Test Track and Studies in Sweden—PRT has been of strong interest in Sweden since the mid-1960s, and while interest has waned over the decades since, efforts of promoting PRT in Sweden have become more serious and frequent in recent years. Researchers and consultants have completed various pre-feasibility and feasibility studies. A PRT test track is in operation in Uppsala, Sweden (also a Vectus system).

Interest throughout Europe in PRT continues to rise. From 2002–2005, the European Union sponsored a study of the feasibility of PRT in four European cities. The study involved 12 research organizations and concluded that PRT:

- Would provide future cities “a highly accessible, user-responsive, environmentally friendly transport system which offers a sustainable and economic solution.”
- Could “cover its operating costs, and provide a return which could pay for most, if not all, of its capital costs.”
- Would provide “a level of service which is superior to that available from conventional public transport.”
- Would be “well received by the public, both public transport and car users.”
The report also concluded that, despite these advantages, public authorities will not commit to building PRT because of the risks associated with being the first public implementation. These same challenges exist with implementation in the United States.

**Fixed Guideway People Mover, Monorail, and Tram Systems in the United States**—While implementation of PRT systems in the United States has been limited, there are many examples of automated people mover, aerial trams, and monorail systems in operation. Most of these systems are relatively small scale operations within limited geography, such as airports, campuses, amusement parks, or entertainment districts. Several of these systems are summarized below.

**Aerial Tram in Portland, Oregon, Oregon Health and Science University (OHSU) Campus**

- Opened in 2006, this gondola style aerial tram extends 3,300 linear feet from South Waterfront to Marquam Hill serving access between the Oregon Health Sciences University (OHSU) campus and nearby high-tech office uses (OHSU is Portland’s largest employer with 20,000 people a day accessing the main campus)
- Speed: 22 miles per hour
- Tram cabins rise 500 feet during the four-minute trip
- Each of the two cabins have a capacity of 79 people, including the operator
- The Tram operates load-n-go; if passengers miss a cabin, they only have to wait a few minutes until the next one comes around
- The City of Portland owns the tram and OHSU provided $40 million of the $57 million construction cost (2006) of the tram; the City’s share ($8.5 million) of the construction costs will be collected over time from rising property values in the district (tax increment financing)
- OHSU oversees operation of the tram, while the City is responsible for maintenance of the stations and tower
- The tram is coordinated/integrated with Portland’s other public transportation systems, including TriMet buses and the Portland Streetcar system
- The Tram was designed by Angelil/Graham/Pfenniger/Scholl, based in Zurich, Switzerland, and Los Angeles; the custom-designed cabins were made by Gangloff Cabins of Bern, Switzerland
- There will be times when high winds or ice may affect Tram operations; however, this type of Tram has proved itself very capable and trustworthy in the extreme winter conditions of the Swiss Alps

- [https://en.wikipedia.org/wiki/Portland_Aerial_Tram](https://en.wikipedia.org/wiki/Portland_Aerial_Tram)
Portland Aerial Tram poster and photo of system in operation

**AirTrain Monorail JFK Airport, New York**

- Opened in 2003 and provides service from JFK Airport to Queens, 8.1 miles in length
- Elevated trackway with 10 stations
- Owned by Port Authority of New York and New Jersey
- Operated by Bombardier Transportation
- [http://www.worldlibrary.org/articles/AirTrain_JFK](http://www.worldlibrary.org/articles/AirTrain_JFK)

**AirTrain Monorail Newark, New Jersey**

- Opened in 1996 and provides service at Newark Liberty International Airport, New Jersey
- Elevated monorail track extends three miles and serves eight stations
- Owned by Port Authority of New York and New Jersey
- Operated by Bombardier Transportation
- [http://www.worldlibrary.org/articles/AirTrain_Newark](http://www.worldlibrary.org/articles/AirTrain_Newark)

**Huntsville Hospital Tram System**

- Opened in 2002, an automated people mover operating on a 1,890 foot elevated concrete guideway with trams
- Two car system serving four stations
- Elevated 30 feet above ground
- Construction cost $10.9 million (2002)
- $280,000 annually to operate
- 2,200 passengers per day; each car carries 38 standing passengers/three seated
- Each car designed to accommodate the largest bed in use by the hospital for the transport of patients
- [http://www.worldlibrary.org/articles/Huntsville_Hospital_Train_System](http://www.worldlibrary.org/articles/Huntsville_Hospital_Train_System)

**Indiana University Health People Mover**

- Opened in 2003, people mover system in Indianapolis, Indiana with one line serving three stations for a length of 1.3 miles
- Duorail concrete guideway (two separate side-by-side guideways operating in both directions)
- Concrete rails have gap between them designed to combat winter snow (as such not a monorail)
- Two trains each with three carriages for total capacity of 81 passengers (seated and standing)
- Speed: 17 mph (average) to 30 mph (top)
- Operated by Indiana University Health
- Constructed by Schwager Davis Inc. (SDI) from San Jose, CA using Unitrak standard
- [http://www.worldlibrary.org/articles/Indiana_University_Health_People_Mover](http://www.worldlibrary.org/articles/Indiana_University_Health_People_Mover)

**Jacksonville Skyway Monorail**

- Opened in 1989, serves Convention Center to Kings Avenue ad Rosa Parks Transit Station with total line length of 2.5 miles
- Two tracks (monorail gauge with third rail electrification) serving eight stations
- Approx. 500,000 riders annually
- 35 mph speed
- Construction cost of $34.6 million (1989)
- Operated by Jacksonville Transit Authority
- [http://www.worldlibrary.org/articles/Jacksonville_Skyway](http://www.worldlibrary.org/articles/Jacksonville_Skyway)

**Las Colinas APT System**

- Opened in 1989, people mover serving Los Colinas/Irving suburb of Dallas
- Two lines serving four stations over 1.4 mile length
- Manual system with drivers
- Four vehicles that each carry 45 passengers (33 standing and 12 seated)
- Operated by Dallas County Utility and Reclamation District
- Construction cost of $45 million (1989, included first five years of operation)
- [http://www.worldlibrary.org/articles/Las_Colinas_APT_System](http://www.worldlibrary.org/articles/Las_Colinas_APT_System)

**Las Vegas Monorail**

- Opened in 2004, provides service between MGM Grand and Sahara for 3.9 miles
- Monorail with two tracks with third rail electrification
• Nine Bombardier trains
• Seven stations (five more to be added including two underground at the airport)
• 50 mph speed
• Elevated up to 60 feet above ground
• Owned and operated by Las Vegas Monorail Company

http://www.worldlibrary.org/articles/Las_Vegas_Monorail

Mandalay Bay Tram, Las Vegas

• Opened in 1999, a 2,749-foot-long people mover between the Tropicana and Mandalay Bay Resort
• Dual track, cable driven system (two independent shuttle systems running side-by-side)
• Guideway above street level at height between 16 and 26 feet
• Four stations
• Train with five cars (car capacity 32; total train capacity 160)
• Ridership: Line 1 = 1,300 passengers per hour per direction; Line 2 = 1,900 passengers per hour per direction;
• Free for public use
• Constructed for 16 million in 1998-1999 (constructed in nine months)

http://www.worldlibrary.org/articles/Mandalay_Bay_Tram

Miami International Airport (MIA) Mover

• Opened in 2011 and designed to quickly transport between MIA main terminal and Miami Central Station and Rental Car Center for length of 1.27 miles
• One route with two guideways (one in each direction) serving two stations
• Operated by Crystal Mover Services, Inc.
• Mitsubishi Crystal Mover vehicles
• 48,000 daily riders by 2020
• $259 million construction (2011)
• Concrete elevated guideways average of 40 feet above grade supported by concrete piers every 120 feet

http://www.worldlibrary.org/articles/MIA_Mover

Minneapolis-St. Paul Airport Trams

• Hub tram with two stations covering 1,100 feet and C Concourse people mover with four stations covering 2,700 feet
• Hub opened in 2001 and C Concourse in 2004
• Hub tram construction cost $25 million (2001)
• C Concourse construction cost $36 million (2004)

http://www.worldlibrary.org/articles/Minneapolis%E2%80%93St._Paul_Airport_Trams
Numerous other PRT systems have been proposed but not implemented in the past several decades, including many substantially larger than those now operating. While the systems in operation demonstrate the feasibility of PRT and GRT, many experts believe that the full potential of PRT and GRT have yet to be realized. Although there are only a few true PRT and GRT systems in operation worldwide, vendors and manufacturers are researching, testing, and making technological advances all the time. Raising capital funding seems to be a major impediment, along with the time involved with safety assessment and testing required to implement public transit systems.

SkyTran is a company researching and developing PRT options that involve all-electric, linear motor systems that use magnetic levitation. With these systems, there is no wheel contact and as such, no wheel noise as the vehicles travel on the guideways. SkyTran is exploring the potential to provide point-to-point, nonstop, on-demand service, just like a car “except better” according to Chris Perkins, Vice President of Government Affairs for the company in a recent article.

“A single guideway is equivalent to three lanes of traffic,” Perkins said, yielding potentially 11,000 passengers per hour. “The cost to the consumer is about half that of owning a car,” he said, “and would cost a city about $9 million per mile to build, which is much cheaper than the cost of most traditional transportation infrastructure.” The low cost and small footprint of PRTs are two reasons the technology is starting to replace automated people movers in airports, as it did in London’s Heathrow, and why a city like Tel Aviv will try it. “SkyTran’s design is modular, so it could be mass produced easily, he added. “It can be built in factories, then shipped to the job site and assembled like Tinkertoys,” Perkins said. The Colorado Department of Transportation is evaluating whether SkyTran should build a guideway between Denver International Airport and nearby ski resorts. That system, if built, could possibly someday extend into a larger system used for more general transport.

In spite of solid advancements in PRT, its feasibility is often scrutinized by a wide range of vested interests in the automotive and public transport industries, and the federal government maintains strict standards over implementation of new transit technologies carrying public passengers in the US. William Millar, former president of the American Public Transportation Association commented that PRT networks have very specialized functions. “For the technology to progress beyond airports and pilot cities,” he said, “something must change. Factors like rising fuel prices, growing populations and increased public concern about global warming all are forcing transportation methods toward greater efficiency.”

A study conducted by Kimley Horn for the City of San Jose, California (completed in 2012) examined the possible use of a PRT network for transporting people both within San Jose International Airport and connecting them with nearby train and light rail systems. The reports found that PRT has potential, beating out shuttle buses and automated people movers in terms of cost and service provided to the user, but the studies also recommended that San Jose move forward carefully and cautiously toward the first steps of implementation. The study found that none of the current operating PRT systems were comparable to San Jose’s aspirations to build a 6.4 mile system with ten stations. The Heathrow system was the closest. The study also pointed to the lack of an established regulatory process to support construction of PRT or
automated transportation networks in the United States. This complicates efforts to accurately estimate the cost of building and operating a system.

Although industry experts recognize the challenges with getting PRT systems up and running, the FTA has studied various PRT technologies in recent years, and there continues to be a growing interest in these technologies. FTA funded a $250 million research program on magnetic levitation and key challenges of this propulsion technology in urban areas, such as obtaining right-of-way, meeting safety standards, and traveling at speeds lower than normal for magnetic levitation systems. The FTA administers a lengthy testing and approval process for new transit technologies.

Typical System Elements and Components (4.E)

Vehicles and Passenger Capacity—Individual PRT vehicles have been designed to carry two to six passengers typically. Larger size GRT vehicles may carry more passengers, but the advantage of smaller vehicles is less weight, so lighter-weight infrastructure support systems are needed. Point to point routing is more expensive with larger vehicles. However, smaller vehicles have more surface area per passenger and higher total air resistance in the system, which in turn requires more energy to move the vehicles. The average car in the US carries 1.16 passengers, and as such, some suggest that a two passenger PRT vehicle is an optimal size. Designs vary across the systems in operations. Some have space to carry freight, bicycles, and luggage. In the US, all public transport systems must be designed to accommodate people with disabilities, including passengers with wheelchairs.

GRT systems may have advantages over lower capacity PRT in some applications, such as where higher passenger density occurs. GRT would be well suited to locations where there are peak surges in demand on a system, such as with sporting events. Employment centers with remote parking where set shifts result in high numbers of people leaving from the worksite at the same time is another example where GRT may be best. GRT may be suitable where there is an extended demand for service or very high demand between a specific origin and destination in a setting. GRT and PRT systems can be developed to provide a range of vehicle sizes to accommodate different passenger load requirements, for example, at different times of day or on routes with less or more average traffic.
**Propulsion**—Most all vehicles and systems in operation today are powered by electricity. In order to reduce vehicle weight, power may be transmitted via lineside conductors rather than on-board batteries (but most systems carry small on-board batteries to reach the next stop in case of power failure). The ULTra system uses on-board batteries that are recharged at stops, increasing safety and reducing cost, complexity, and maintenance of the guideway. As a result, the ULTra guideway is narrower and less expensive to construct than some of the other guideways. (It resembles a sidewalk with curbs.) Electricity powered systems are quiet and typically more ecologically-friendly. Due to the efficiency of PRT, solar powered vehicles could potentially be viable. Elevated guideways provide a ready platform for solar voltaic collectors.

**Switching**—Vehicle mounted switches or systems with conventional steering are often preferred by designers of PRT and GRT systems instead of track switching. Avoiding track switching reduces the complexity of the trackway/guideway and makes junctions less visually obtrusive. On the other hand, trackway switching may be preferred to keep vehicles more simple and less costly to replace.

**Guideways**—Experts debate the best type of guideway, ranging from beams similar to monorail systems, trusses supporting internal trackways, cables embedded in a roadway, and elevated paths with curbs to contain vehicles in the travel space. Most designs put vehicles on top of the track reducing visual intrusion and costs. Most designs also use the guideway to distribute power and communications. Designs that can maintain operation during snow and ice are critical. The Vectus system test operations are showing good results in snowy conditions. Elevated guideways can take many forms architecturally. An overarching concern relates to effectively and cohesively blending the system into the setting and context and avoiding visual obtrusions.

**Stations**—Most stations are designed to be simple and minimalistic without restrooms or extensive facilities to keep costs lower. Stations are often located on side tracks so that other traffic can bypass vehicles dropping off or picking up passengers. Stations can be designed to serve multiple vehicles at once, and it may be that one third of the vehicles in a system are stored at stations waiting for passengers at any given time. When service demand is low or off peak, surplus vehicles can be configured to stop at empty stations at strategically placed points around the network, enabling an empty vehicle to be quickly dispatched to wherever it is required with minimal waiting time.

Decisions about routing and station locations are vital in the attraction of the system to passengers, avoiding environmental impacts, and creating a seamless connection with other transit and transportation networks. Spacing and quantity of stations is another important concern in order to maximize ridership and serve a sufficient number of destinations. This will be influenced by spatial planning throughout the project area and availability of space for the system and stations.

**Headways and System Capacity**—Spacing of vehicles on the guideway influences the maximum passenger capacity of the system. Short spacing with smaller headway distances is preferred. Two-second headways are often assumed for planning purposes. With four person vehicles at two second headways, a single PRT line can achieve a maximum capacity of 7,200 passengers per hour. However, most planning estimates
assume that not all vehicles will fill to capacity. Assuming an average vehicle occupancy of 1.5 passengers per vehicle, the maximum capacity would be 2,700 passengers per hour.

**Speed of Travel**—Different systems operate at different speeds. Nonstop journeys operate about three times faster than those with intermediate stops. Most systems operate at speeds of 25 to 45 miles per hour.

**Maintenance and Control Facilities and Staffing**—There will be a need for a maintenance garage and control station for most systems. Ideally, this should be placed in a central location to the system, allowing short response times.

For operations, system operators often recommend a dedicated on-site team that may consist of shifts of the following positions: an overall system operator (during all operational hours), a service engineer (during all operational hours), and maintenance personnel (during business hours). Various system vendors and developers can assume operations based on an operations contract and then set up a dedicated team with in-depth knowledge of all aspects of the system.

*Potential Implementation in the University Study Area (4.E)*

Implementation of a PRT, GRT, or other type of automated or piloted fixed guideway system in the vicinity of the University merits further exploration. The campus, University Hospital, and the relationship with land uses in Research Park create an ideal framework and need for a fast, convenient, clean mode of transportation to serve the needs of staff, students, patients, and others. PRT and GRT systems seem to apply well in settings where destinations are well-defined—such as campuses, business parks, entertainment districts, and planned communities. Regional medical centers, office parks, college campuses, and other institutions are cited by experts as the appropriate place types suitable for PRT and GRT.

The potential to provide PRT service between Research Park and the University Hospital and Medical School fits this application.

Considering that most PRT systems are built on elevated guideways, the topography and architecture of the University campus could support an elevated guideway or trackway with above-ground stations added onto existing buildings or constructed with new buildings. Portions of existing parking areas in proximity to stations or hubs could be converted to park and ride use. This would allow the system riders to park their car at one place at the beginning of their work shift or visit and use the system to travel back and forth to their destination. The experience of riding at an elevated level with scenic mountains in the backdrop would be extraordinary and unique.

PRT systems that supplement a full transit network are typically the most plausible. Experts caution against viewing PRT as a system that will replace cars and all other forms of transit. Rather, PRT can fill a gap in special areas by carrying people to and from popular destinations and can connect these destinations to larger transit and transportation networks via other facilities. Again, the University context
fits this dynamic, with bus, shuttle, and light rail systems that can interconnect and support the PRT or GRT system.

Potential routing of an automated fixed guideway PRT or GRT system on campus and in the vicinity is shown in Figure 6-12 and Figure 6-13. The total distance of the system concept plan shown, including all lines, would be 5.35 miles. This distance is less than the Morgantown, WV system, but about twice the distance of the Heathrow and Suncheon systems. However, it is anticipated that the system would be implemented in phases over time. The first phase, from Research Park to University Hospital, would extend approximately 2 miles, which is shorter than the Heathrow and Suncheon systems.

Station locations would need to be determined through further planning and design, but it is recommended that they be located in conjunction with existing parking areas that could be adapted for park and ride use, as well as in proximity to other modal hubs (such as light rail stations) to facilitate transfers and encourage a greater level of ridership.

Capital costs of implementing PRT and GRT systems vary widely depending on a number of factors, including the size and type of vehicle, propulsion, guideway, and numbers of stations and facilities needed to support the system. That said, proponents of PRT and GRT promote the advantages of lower capital costs and lower operating costs of these systems compared to other modes of transit. Typical estimates of comparative existing and planned systems range from $7 million to $30 million or more per mile. Another source states that cars typically cost $75,000 each and infrastructure costs are typically $6 million per mile for PRT. A basic rule of thumb of $7 million to $15 million per mile for PRT is used in multiple studies. Applying that rule of thumb, the 2-mile first phase of the University system could cost in the range of $14 million to $30 million to implement. This cost is considerably less per mile for implementation than streetcar and light rail systems (typically $50 to $100 million per mile or more). However, it will be important to gain a more definitive sense of capital costs with a more detailed feasibility study of PRT/GRT potential if the University determines to explore the concept further.

Operating costs are also highly variable. For fully automated systems estimates, costs of $.50 per trip or $.40 per passenger mile for operations have been cited. Another source cited a cost of $2,000 per route mile for a daily operating cost. Potential operating costs are influenced by market, labor force, system components and design, and various other factors. Operating and life cycle costs for the system also would need to be assessed and calculated more definitively as part of the next step of a detailed feasibility study.

PRT Consulting, Inc. based in Franktown, Colorado (http://www.prtconsulting.com/content.html) provides a variety of information and resources at their website, including a matrix comparing attributes of PRT to transit and car modes:
## Benefit Comparison

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Transit</th>
<th>Car</th>
<th>PRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>New technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trip Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost per passenger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-demand 24/7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seated travel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-stop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle waits for passenger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADA compliant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safe and secure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User friendly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snow &amp; ice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal walking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmentally friendly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy efficient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visually appealing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operates inside buildings</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- Bad  
- OK  
- Good
Potential benefits of implementing a PRT or GRT system at the University include the following.

- The convenience of fast, highly efficient and direct service between Research Park and the University Hospital, as well as other point to point origins and destinations.
- Personalized on demand service and short waiting times.
- The University could be a model for other institutions in implementing a clean, green, efficient form of transport in a campus, medical, and high tech environment.
- Lower costs of infrastructure development over time (less roads and parking facilities would be needed as the University and businesses in Research Park expand and that land could then become available for other uses).
- Economic and market competition benefits resulting from the desirability to locate near the new, clean, green system.
- Significantly less energy use (studies estimate that PRT systems consume 50 to 300 percent less energy than conventional public transportation), and the opportunity to integrate innovative technology, such as solar powered vehicles.
- Lower vehicle miles travelled, greenhouse gas emissions, air pollution, and traffic congestion—all factors that contribute to a variety of environmental and lifestyle benefits.
- The potential to partner with the Hospital and private sector entities of Research Park, as well as other property owners in funding and implementing the system.
- The unique, scenic experience of traveling in a modern PRT system in this setting.
- Significant reduction to daytime SOV trips between district destinations.

Additional information and benefits are cited in the resources listed at the end of this section and in documents provided in the Appendix.

*Vectus trackway and vehicle*
Larger Vectus vehicle

Vectus test track station
**Suggested Next Steps (4.E)**

Now that the vision for a potential automated fixed guideway PRT or GRT system has been shaped through this initial exploration, more thorough analysis should be completed to define the physical parameters of the system more specifically and estimate costs of implementation and operation more definitively. The following next steps are suggested.

**Complete a more detailed feasibility study that will:**

- Further define, quantify, and illustrate the parameters of the envisioned PRT or GRT system
- Analyze system demand and capacity scenarios based on employee, student, and patient demographics and forecasted levels of use
- Evaluate routing, station locations, facility locations, phasing, and other parameters of the system in more detail
- Advance the design of the system and supporting infrastructure and facilities to at least a 15 percent level (ideally a 30 percent level) to more definitively estimate capital costs
- Develop the business case for the system supported by cost/benefit analysis
- Assess and estimate operating costs more definitively and prepare a financial plan to sustain the system operations over time
- Identify potential funding sources and partnership opportunities
- Identify regulatory and permitting requirements
- Estimate timeframes to implementation (safety assessment and planning, design, permitting, construction, and testing)
- Meet with regional transit operators and FTA representatives to discuss the concept plan and obtain their input and guidance related to implementation. Due to the regulatory aspects of opening a system for public transport in the United States, close coordination with FTA on an ongoing basis will be required.
- Generate community and political support for the vision by promoting the anticipated long term benefits to the institution partners and the region; develop promotional materials to share the vision and generate interest and support
- Once an initial level of capital funding is generated for the project, the University could put out a Request for Qualifications to system providers and operators to work through the process of implementation. There are various companies working around the world that also might engage local partners on system design, construction/installation, and if desired, operations. An independent assessment of safety along with pilot testing of the system would be required. Experts in PRT could help guide the University through this process.

**Other Resources (4.E)**

**PRT Vendors**

PRT Consulting, Inc. has gathered a list of vendors that claim to either have a system operating in the public domain or a full-scale prototype vehicle and track and meet at least three of the following criteria:

- Their vehicle operation is fully automated
- They have small vehicles carrying six or less passengers
Their system can bypass intermediate stations
Their system has the ability to operate on-demand (unscheduled)

These vendors (in alphabetical order) are:

- 2getthere Automated People Mover Systems (Masdar City system, UAE) [http://www.2getthere.eu/](http://www.2getthere.eu/)
- ULTra PRT (Heathrow Airport system, UK) [http://www.ultraglobalprt.com/how-it-works/](http://www.ultraglobalprt.com/how-it-works/)
- Vectus PRT (Trial operations at Suncheon Bay, South Korea) [http://www.vectusprt.com/EN/](http://www.vectusprt.com/EN/)

Organizations and Services

- The Advanced Transit Association (ATRA)—An international association and nonprofit corporation of active and retired transportation professionals, engineers, architects, urban planners, students, educators, and enthusiasts encouraging development and deployment of advanced transportation systems Advanced Transit Association
- PRT Consulting, Inc.—Describe themselves as the only firm of professional engineers and planners who specialize in providing vendor independent consulting related to PRT. [http://www.prtconsulting.com/content.html](http://www.prtconsulting.com/content.html)
- Automated People Movers (APM) and Automated Transit Systems Conference—Toronto, Canada, April 17-20, 2016 [http://www.apmconference.org/program/](http://www.apmconference.org/program/)
- Cities 21
- Citizens for Personal Rapid Transit
- Get On Board!
- Get There Fast
- Innovative Transportation Technologies (UW)
- PodCar.org

PRT Video Links

- Heathrow ULTra Pod on Fully Charged: [https://www.youtube.com/watch?v=4Ujd4wutddE](https://www.youtube.com/watch?v=4Ujd4wutddE)
- Heathrow ULTra System: [https://www.youtube.com/watch?v=F5Knmgr2Ge8](https://www.youtube.com/watch?v=F5Knmgr2Ge8) [https://www.youtube.com/watch?v=-CFX5VEpMKg](https://www.youtube.com/watch?v=-CFX5VEpMKg)
- Masdar City: [https://www.youtube.com/watch?v=K5lh4JYWzPY](https://www.youtube.com/watch?v=K5lh4JYWzPY)
- PRT Test Track in Uppsala, Sweden: [https://www.youtube.com/watch?v=0CftoTzUYXc](https://www.youtube.com/watch?v=0CftoTzUYXc)
- Skytran by NASA: [https://www.youtube.com/watch?v=Z3e4960oYpg](https://www.youtube.com/watch?v=Z3e4960oYpg) [https://www.youtube.com/watch?v=Fla4i2U0NKk](https://www.youtube.com/watch?v=Fla4i2U0NKk)
- Three Examples, Vectus, ULTra, [https://www.youtube.com/watch?v=4uUsI052pRI](https://www.youtube.com/watch?v=4uUsI052pRI)
- SMT Greenest Rail System: [https://www.youtube.com/watch?v=JydTAoQugCl](https://www.youtube.com/watch?v=JydTAoQugCl)
- Vectus PRT: [https://www.youtube.com/watch?v=S1rf_LOb3b0](https://www.youtube.com/watch?v=S1rf_LOb3b0) [https://www.youtube.com/watch?v=V5W3OSZu9oA](https://www.youtube.com/watch?v=V5W3OSZu9oA)
Recommendations (4)

Strategies and Goals (4)

The University has adopted the following mitigation strategies for addressing campus transportation demands:

- Encourage public transportation
- Expand campus shuttles
- Increase parking supply
- Implement other transportation demand management actions
- Improve planning

UTA has set a goal of increasing transit ridership by students, faculty, and employees to/from the University of Utah campus to 50 percent within ten to fifteen years by all forms of transit (bus and light rail via TRAX). In order to achieve this ridership goal, UTA is currently evaluating options for increasing the frequency and span of service along key routes, along with other potential service and facility improvements. UTA’s assessment of service and facility improvement needs to reach the 50 percent ridership goal should become available within the next two months and can be reflected in the final transportation master plan document.

UTA is currently in the process of preparing its five year service plan (updated) and is evaluating potential improvements in service to/from campus area destinations. Needed projects and services that UTA is currently evaluating as potential options for increasing ridership to/from campus and its vicinity include:

- Implementing the TRAX Black Line (see below for more information)
- 400 South light rail connection to the Hub, which would enable faster service
- South Davis service
- Bus route/stop improvements in targeted areas of Salt Lake County, including along key avenues
- Span and frequency improvements to Route 2 bus service
- Span and frequency improvements to Route 9 bus service
- BRT strategies, as well as span and frequency improvements to Route 220
- Span and frequency improvements to Route 223
- Span and frequency improvements to Route 228
- Express services
- Sibul Route (Route 13) improvements
- Implementation of a new bus route (to be determined)

The University should continue to coordinate with UTA as the five year service plan develops to be informed of the specific service improvements planned for implementation. In the meantime, our team identified the following potential actions and projects to be included in the transportation master plan.
More coordination between the University of Utah, UTA, and other partners will be needed to implement these actions and projects over the life of the master plan.

**High Priority Actions (4.C):**

**INTERMODAL TRANSPORTATION HUB (4.H)**

Determine the preferred location(s) on campus or at the edge of campus for an intermodal transportation hub. Ideally, this hub should occur in proximity to a nexus of University Shuttle, UTA bus lines, and TRAX system access points, as well as parking/park and ride, if possible. Layover space for eight to ten UTA buses should be considered (40 foot buses), along with provisions for an operator restroom.

- This facility would not only improve transit operations, it would help facilitate more seamless transfers between TRAX, UTA bus service, and the University Shuttle system. So in addition to having an internal operations purpose, the intermodal hub also should function as a public facility with public restrooms, electronic displays and information about routes and time schedules, a public plaza/waiting area and furnishings, and other elements. This could also be a location for a bicycle station/bike parking, electronic charging stations, and other transportation functions.
- When queried about potential locations for this facility with UTA and University of Utah staff, the following areas were mentioned (as shown in Figure 6-14).
  - In the vicinity of the stadium
  - Along South Campus Drive in the vicinity of the Huntsman Center
- While either of these locations would be effective, the stadium location might be more advantageous in terms of attracting more riders to the edge of campus, with better identity and access to the outside. Given the event-focus of parking at the stadium, there could be more park and ride capacity or flexibility in parking use at the stadium as well to serve daily commuter needs.

The cost of an intermodal hub of this type needs to be analyzed in more detail and would vary depending upon the level of facilities offered. For example, if the hub includes a building that houses restrooms, bike station, transit information/ticketing, indoor waiting areas, and other functions, the costs could run in the millions of dollars, with the long term benefit of more sustainable and seamless transportation systems and connections between services.

**Intermodal Hub Selection Criteria (4.H)**

Further study will be required to make a final decision on the preferred location of the Intermodal Hub. This master plan does not attempt to finalize its location, but a cursory investigation of several selection criteria and which location would potentially better satisfy the needs of each criterion is discussed in this section. Based on this planning level analysis, the Stadium locations appears to meet more of the criteria for an intermodal hub than the South Campus Drive location.
The following selection criteria should be considered when deciding on a preferred location for the Intermodal Hub. The location which best fits the needs of the specific criterion is identified in each case below:

**Transit Connectivity (Both Locations)**

This refers to the ability of the facility to allow riders to easily transfer between transit modes, including UTA TRAX and buses and the campus shuttle. The Hub location should allow seamless transfer between modes. Both proposed locations provide excellent transit connectivity, with the Stadium location providing better connections to the main part of campus and the South Campus Drive location providing slightly better access to the University Hospital.

**Pedestrian Access (Stadium)**

The Intermodal Hub should be located within walking distance of the major generators on campus. Locations within ¼ and ½ mile of the Intermodal Hub will be easily accessed by users of the hub. The Stadium location provides better pedestrian access to the main parts of campus, including administrative offices, classrooms and the student union. The ability of the intermodal hub to serve game day and event pedestrian access to the stadium should not be underestimated. In contrast, the South Campus Drive location provides relatively poor pedestrian connectivity to the main part of campus and Rice-Eccles Stadium. Also, given the steep topography in the vicinity of the hospital, a hub in this location would not serve pedestrian traffic to the only major generator in the area.

**Bike Access (South Campus Drive)**

The location of the intermodal hub should accommodate bikes with connecting facilities and long and short term bike storage. Either of the locations can be made to accommodate bikes storage and bike facilities connecting to either location can be accomplished relatively easily. With over 400 feet of elevation climb from the Stadium to the Hospital, it’s likely that a more central location for the intermodal hub would be preferable, thus the South Campus Drive location is slightly more favorable to bike access.

**Park and Ride Potential (Stadium)**

If the intermodal hub is to be truly multi-modal, there must be good connectivity for automobiles, which includes a park and ride component. The Stadium location is head and shoulders above the South Campus Drive in terms of park and ride potential. The large stadium lot is heavily used for commuters and could be repurposed, at least in part, to serve park and ride for an intermodal hub. In contrast, the South Campus Drive location does not currently have any significant parking and constructing park and ride facilities would be extremely costly.
Conformity with Existing Surroundings (Stadium)

The proposed location must conform to the land uses in the immediate vicinity in order to be a compatible and appropriate location. Land uses should include heavily pedestrianized areas and density. The major pedestrian locations on campus are located in the vicinity of the Stadium and this area is also the most densely populated with buildings and campus uses. Construction of an intermodal hub with associated facilities, including parking, would be somewhat detrimental to the greenspace and feel of the surroundings in the South Campus Drive location.

Physical Size of Footprint (Stadium)

Without a clear idea of the size and nature of the intermodal hub, it is difficult to predict the footprint required. It is possible however, to determine which location may be able to accommodate the footprint of an intermodal hub better. The Stadium location is currently a parking lot and would accommodate the intermodal hub at the expense of some parking. It is likely that the need for these parking stalls will be offset by the hub itself. The South Campus Drive location is directly adjacent to the George S. Eccles Legacy Bridge and Marriott Housing. An intermodal hub and related facilities in this location would need to avoid conflict with these features, which could be problematic. Therefore, the Stadium location is likely to better accommodate the intermodal hub footprint.

Cost (Stadium)

As previously stated, it is difficult to quantify some considerations without a preliminary design but the cost of the hub should be a major factor when determining its location. With the proximity of the hub to buildings and the topography of the South Campus Drive location, it is likely that the costs to build the hub would exceed those expected at the stadium.

Shared Use Potential (Both Locations)

The ability for the hub to be used by more than just campus traffic should be considered a positive when determining a location. This increases the chances of high ridership, stakeholder buy in, and funding opportunities. Each location has the potential for shared use. The Stadium is obviously a great option for game day and event users, as well as providing the potential for use by the VA facilities and Salt Lake City Sports Complex. The South Campus Drive location would provide shared use with the University Hospital.

Impacts on Traffic Network (Stadium)

The preferred site should minimize conflict with the traffic network and consolidate any additional traffic onto the arterial roads. The Stadium location is ideal for traffic minimization as it would be on the extreme edge of campus. This allows traffic to the hub to use the arterial network, particularly 500 South and Foothill Drive, to access the hub rather than the interior campus streets. City buses, additional TRAX lines and any other transit options can then be restricted to the exterior of the campus.
**EXPAND ON-CAMPUS BUS SERVICE (4.G)**

UTA and the University of Utah should coordinate on the potential to add a north-south route/extend service back into the “business loop” area of campus. The provision of transit service along this route could save customers an average of five minutes in each direction. Analysis of the current system of transit service on campus indicates that both east-west and north-south service enhancements could greatly increase ridership (avoiding historic core areas and addressing changes in elevation).

**FINE TUNE CAMPUS SHUTTLE SERVICES (4.G)**

Monitor the System

Improving mobility between buildings and land uses on campus and in the vicinity will be an ongoing need. Transit service needs are dynamic, changing based on construction of new facilities and shifts in demographics, land uses, parking, and other factors. As such data collection, analysis, and adjustments need to be implemented on an ongoing basis. The University will evaluate service routes and segments in relation to ridership data, travel time efficiencies, and changes in land uses on campus to determine areas that shuttle services can be fine-tuned on an ongoing basis. A key ongoing objective will be to reduce travel times and operating costs as part of integration with through campus routes. Strategies the University will be evaluating include dropping fixed route services in the late afternoon and going to a demand model with smaller vans. As changes are implemented, it will be important to analyze potential resulting impacts to traffic and parking. Performance measures by which individual routes should be evaluated are Passenger per Revenue Hour (PPRH) and Passenger per Mile (PPM). In each case, minimum standards should be applied to determine whether a route is viable or whether it should be discontinued or even expanded. As a general rule, routes which operate at 20-30 PPRH and 2.5-3.5 PPM are operating efficiently. If these thresholds are not met, the route should be evaluated and modified. If these thresholds are exceeded, the route should be evaluated to ensure demand is being met.

Reduce the Number of Stops

There are a lot of bus stops, including shuttle stops, on the University of Utah Campus. A large number of stops benefits the shuttle user as they have less distance to walk to reach a bus stop. However, having fewer stops also benefits the shuttle rider as bus service will general be faster and more reliable.

Many of the shuttle stops on campus are spaced closely together, with some as close as one tenth of a mile apart. Industry best practices indicate that bus stops should be spaced one fourth or one fifth of a mile apart. This is consistent with a rule of thumb that suggests that a quarter mile walking distance to a transit stop is reasonable. In a campus environment, it is not uncommon to place shuttle stops at convenient locations near the entrance of high use buildings. In situations where buildings are clustered it is recommended that the shuttle stops be consolidated into fewer central locations where possible. This will increase the efficiency of the shuttle system by providing faster and more reliable service. Each stop should be looked at individually to see if its removal would benefit the system overall and where consolidation efforts can be advantageous.
The biggest challenge to the removal or consolidation of shuttle stops will come from those users who frequent the stops which are removed. This resistance is likely to subside over time as the benefits of a more efficient system are felt. Care must however be taken to ensure that the removal of a bus stop does not impede persons with disabilities. Where stops are removed or consolidated, the University must provide accommodations for the disabled community to access alternative stops or facilities.

**Operate Service on a Headway Based Schedule**

The University should operate the shuttle system on a headway basis. This is in contrast to a fixed time system where users expect a shuttle to arrive at a certain time every day. Fixed time systems work well for public bus routes but often do not provide the flexibility necessary for a campus shuttle. A headway based system functions as shuttles leave the starting point of a route at a given interval. This results in more reliable service as users become accustomed to knowing they will be waiting a finite time period at a stop rather than timing their journey to arrive at a certain time. The benefits of a headway based system include the ability to adjust the headways for different times of day or different circumstances. If there is congestion around the campus and shuttles are bunching together on routes, the operator can hold shuttles and increase headways. If there is higher demand at a particular time of day and buses are becoming crowded, headways can be shortened. Headway based systems also integrate well with technology which uses GPS to tell riders where a bus is on its route in real time.

**Operate Service with Larger Buses**

Overcrowding of buses is a major problem on the most popular routes during the busiest times of the day. When buses are overcrowded, it discourages use by the student population and particularly people with disabilities. One option to increase capacity would be to operate larger campus shuttles for the most popular routes at certain times of the day. This would include additional cost, but would also make the system more reliable and the rider experience more pleasant. There are, however, safety concerns which will need to be explored as larger vehicles can present a hazard to the pedestrian and bicycle users on campus. It is recommended that a limited number of larger buses be employed for major routes on campus.

*GATHER DATA ON AN ANNUAL BASIS (4)*

The University should continue to gather data related to transportation, transit ridership, and customer input on an annual basis to determine how people are traveling to and from campus and the vicinity, barriers they encounter to mobility, and opportunities to improve convenience and access. The Commuter Survey should be an annual data collection activity.

*NEW SHUTTLE STOP (4.G)*

Develop a new shuttle stop in front of the 383 Colorow building on the Black Line to enhance service for Research Park. Continue to evaluate other transit services needs related to enhancing service to and from
Research Park in the interim (in addition to exploring the potential for a future automated fixed guideway connection between Research Park and hospital locations and other campus destinations).

**STRENGTHEN LINKAGES BETWEEN PARKING AND TRANSIT (4)**

As part of implementing this master plan, there will be an ongoing need to strengthen the proximity of transit stops to parking areas so that more park and ride activity is encouraged on campus. Analyzing ways to improve potential walking routes and wayfinding between parking areas and transit stops and then implementing improvements and promoting more of a park and ride culture through outreach, education, and messaging is recommended. Refer to the other sections of this plan pertaining to parking, walking, and bicycling for improvement recommendations that can help to enhance routes to and from parking areas to transit stops and services.

**MOVE FORWARD WITH NEXT STEPS IN ANALYZING HOSPITAL TO RESEARCH PARK FIXED GUIDEWAY (SEE Potential Personal Rapid Transit/Group Rapid Transit Service SECTION (4.E)**

The University should conduct a formal feasibility study of the potential for implementing fixed guideway, personal rapid transit (PRT) or group rapid transit (GRT) service between the Hospital and Research Park. A preliminary evaluation of considerations related to this service is provided following this section. A more detailed feasibility study would be the next logical step in considering the feasibility of implementing a PRT or GRT system, envisioned as an elevated (grade separated) system of vehicles on a trackway or guideway that provides frequent, direct service back and forth between Hospital locations and Research Park.

**SUPPORT IMPLEMENTATION OF TRAX BLACK LINE EXTENSION TO CAMPUS (4.F)**

UTA is preliminarily evaluating the potential of a Black Line extension of TRAX to the campus, which could provide 7.5 minute service from the airport and/or commuter rail system to the University. Ideally, this service would arrive at campus at a new intermodal hub (mentioned above). The benefits of implementing this service include regional reductions in vehicle miles traveled (visitors from the airport and commuters from the region bound to campus would have another fast, convenient option for transport). Airport travelers could reach campus and hospital locations, Research Park, and other destinations by TRAX and transfer to local bus routes and campus shuttle routes rather than driving via car rental or cab. Lower vehicle miles traveled in the region will result in reductions in greenhouse gas emissions, pollution, and energy use.

**ENHANCE BICYCLE AND PEDESTRIAN ACCESS TO TRANSIT ON CAMPUS AND WITHIN TWO MILES (4)**

To encourage more walking and bicycling to transit on campus and in the vicinity of campus (within two miles), service providers should provide more amenities and consider how to increase bicycle carrying capacity on transit vehicles. There are limited bicycle racks at LRT stops for example. Shelters, benches, and other amenities could be added at many stops. Some bicycle and walking routes in the vicinity of transit stops need bike lanes or sharrows, sidewalks, and intersection crossing treatments. A more
detailed assessment of specific improvement needs should be conducted, but it is anticipated that more people would walk and bicycle to transit (and then take transit to/from and on campus) if more pedestrian and bicycle facilities are provided. An annual investment of approximately $250,000 in these types of improvements over the next few years could incrementally enhance conditions and encourage more transit ridership.

**CONTINUE TO PROMOTE AND INCREASE PROMOTION OF TRANSIT (4)**

As a mode of access to/from and on campus, the University, UTA, and other partners should continue to invest in marketing, outreach, and promotions to encourage higher levels of ridership. Environmental sustainability themes, economic benefits (lower household transportation costs), and health benefits of active transportation (walking/bicycling to/from transit) could be promoted.

**Medium Priority Actions (4.C)**

- UTA will continue to implement service and facility improvements to reach the 50 percent ridership goal.
- The analyses listed above could proceed into funding procurement, design, and implementation phases.
- Ongoing funding and implementation of bicycle and pedestrian access to transit enhancements.
- Ongoing marketing and promotions of transit and walking/bicycling to transit and campus.

**Research Park Specific Transit**

Establishing a Park and Ride system within Research Park to enable shared parking between the park and main campus/hospital will allow for greater transit use as a whole and help redirect vehicles from the congested parking lots on the main campus to the less densely occupied lots in Research Park. The PRT/GRT system between Research Park and hospital should be explored further and if feasible, should be implemented as funding becomes available. This will significantly reduce the impact of intercampus traffic between the park and hospital.

The campus shuttle could be enhanced with a new shuttle stop in front of the Colorow Building on the Black Line. Shuttle frequency and running times should also be monitored and adjusted as demands change.

**Transformative Projects (7.A)**

The preceding sections identified in detail the projects recommended to achieve the goals of the University, Medical Center, and Research Park to maintain a sustainable, safe, and efficient transit network. **Table 6-5** summarizes the capital project recommendations, establishes a prioritized timeline for each project and a cost to implement each project. Projects are listed as HIGH, MEDIUM and LOW priorities. **Table 6-6** includes pedestrian and bicycle policy recommendations.
### Table 6-5 Transit Transformative Project List

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermodal Transportation Hub</td>
<td>Transit Station for all modes of transportation</td>
<td>$500,000-$750,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Expand On-Campus Bus Service</td>
<td>Add North-South and East-West Bus Service</td>
<td>VARIES</td>
<td>HIGH</td>
</tr>
<tr>
<td>New Shuttle Stop</td>
<td>383 Colorow building on the black line</td>
<td>$15,000-$25,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Enhance Bicycle and Pedestrian Access</td>
<td>Improve access to transit</td>
<td>$250,000/yr</td>
<td>HIGH</td>
</tr>
<tr>
<td>PRT/GRT Automated Fixed Guideway Study</td>
<td>Feasibility Study</td>
<td>$50,000-$75,000</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

### Table 6-6 Transit Policy Recommendations

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine Tune Campus Shuttle</td>
<td>Improve mobility between buildings/land uses on campus</td>
<td>HIGH</td>
</tr>
<tr>
<td>Promotion of Transit</td>
<td>Continue promotion of transit throughout campus</td>
<td>HIGH</td>
</tr>
<tr>
<td>Gather Transit Data</td>
<td>Gather annual data for transportation, transit ridership, and customer input</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>TRAX Black Line</td>
<td>Support TRAX Black Line Implementation</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Fleet</td>
<td>Provide a bicycle fleet for faculty, staff and students</td>
<td>LOW</td>
</tr>
<tr>
<td>Events</td>
<td>Provide valet event bicycle parking</td>
<td>LOW</td>
</tr>
<tr>
<td>Incentives</td>
<td>Develop an incentive program for bicycle use</td>
<td>LOW</td>
</tr>
</tbody>
</table>
Chapter 7 Pedestrians and Bicycles

Introduction

The Role of the Pedestrian (1)

The purpose of this section is to provide the facility designer with an understanding of how pedestrians operate while using pedestrian facilities, such as sidewalks, crosswalks, or shared use paths. Pedestrians and users of mobility devices are, by nature, much more affected by poor facility design, construction, and maintenance practices than motor vehicle drivers. They lack the protection from the elements and roadway hazards provided by an automobile’s structure and safety features. By understanding the unique characteristics and needs of these users, a facility designer can provide quality facilities and minimize user risk. Enhancing pedestrian facilities can contribute significantly to increased transit and bicycle use, resulting in significant reductions in SOV trips.

Pedestrians have a variety of characteristics and the transportation network should accommodate a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians’ physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing.

The MUTCD recommends a normal walking speed of three and a half feet per second when calculating the pedestrian clearance interval at traffic signals. The walking speed can drop to three feet per second for areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent. Different areas of campus have very different user groups and these factors must be considered during design and construction. A facility designed around the Student Union will be significantly different than a facility designed around the Medical Center.

The Role of the Bicyclist (1)

The bicycle-related sections of this chapter reference the University of Utah’s Bicycle Master Plan (2012), the guiding document for all bicycle planning and implementation at the University.

Similar to motor vehicles, bicyclists and their bicycles come in a variety of sizes and configurations. This variation ranges from the type of bicycle a bicyclist chooses to ride (i.e. a conventional bicycle, a recumbent bicycle, or a tricycle) to the behavioral characteristics and comfort level of the bicyclist. Bicyclists by nature are much more sensitive to poor facility design, construction and maintenance than motor vehicle drivers. Bicyclists are more exposed to the elements and prone to physical injury due to the lack of protection of the bicycle compared to the automobile.
Bicyclist skill level also leads to a dramatic variance in expected speeds and behavior. Several systems of bicyclist classification are currently in use within the bicycle planning and engineering professions. These classifications can be helpful in understanding the characteristics and infrastructure preferences of different bicyclists. However, it should be noted that these classifications may change in type or proportion over time as infrastructure and culture evolve. Sometimes an instructional course can instantly change a less confident bicyclist to one that can comfortably and safely share the roadway with vehicular traffic. Bicycle infrastructure should be planned and designed to accommodate as many user types as possible with separate or parallel facilities considered to provide a comfortable experience for the greatest number of bicyclists. In addition, program recommendations described later in this chapter should be considered an important tool, in conjunction with infrastructure improvements, to enhance bicycling conditions on the University of Utah campus and encourage bicycle use as an alternative to the automobile.

The 1999 AASHTO Guide for the Development of Bicycle Facilities identifies bicyclists as being “Advanced or Experienced”, “Basic or Less Confident” or “Children”. These AASHTO classifications have been the standard for at least 15 years and have been found to be helpful when assessing people who currently bicycle. However, these classifications do not accurately describe all types of bicyclists, nor do they account for the population as a whole, especially potential bicyclists who are interested in riding but may not feel existing facilities are safe enough. Beginning in the Pacific Northwest in 2004, and then supported by data collected nationally after 2006, alternative categories have been developed to address the attitudes of Americans towards bicycling. Figure 7-1 illustrates the different viewpoints and their respective proportions.

**Figure 7-1 Bicyclist Types by Overall Population**

<table>
<thead>
<tr>
<th>Enthused &amp; Confident</th>
<th>Interested, but Concerned</th>
<th>Not Interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong &amp; Fearless</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Less than two percent of Americans comprise a group of bicyclists who are “Strong & Fearless”. These bicyclists typically ride anywhere on any roadway regardless of roadway conditions or weather. They can ride faster than other user groups, prefer direct routes and will typically choose roadway connections – even if shared with vehicles – over separate bicycle facilities such as bicycle paths.

“Enthused & Confident” bicyclists encompass 10-13% of people. They are mostly comfortable riding on all types of bicycle facilities, usually prefer low traffic streets or shared-use pathways when available, and may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists, including commuters, recreationalists, racers and utilitarian bicyclists.
The third group can be categorized as “Interested, but Concerned”. They do not ride a bicycle regularly. 50-60% percent of the population falls into this category, which represents bicyclists who typically only ride on low traffic streets or bicycle paths under favorable conditions and weather. This group perceives traffic and safety as significant barriers that prevent them from bicycling more often. They may become more regular riders with encouragement, education and experience.

The remainder of the American population – 20-30% – are not bicyclists and perceive severe safety issues with riding in traffic. This group is classified as “Not Interested”. Some people in this group may eventually give bicycling a second look and may progress to the user types above. However, a significant portion of them will never ride a bicycle under any circumstances.

University campuses offer a special environment that can vary significantly in modal trends from the rest of the nation and even the general population within the same city. Students, faculty and staff on university campuses typically walk and bicycle in much higher numbers than their counterparts elsewhere. Individuals commuting to campuses choose alternative means of transportation for varying reasons – to save money, to avoid the hassle of parking, for convenience, and because it’s more environmentally-friendly than driving alone. These factors support the University of Utah’s desire to decrease single occupant vehicle trips and will ultimately assist the university in achieving this objective.

**Existing Pedestrian Conditions (1)**

Pedestrian counts were completed at various locations around the University and Research Park Campuses. **Figure 7-2** indicates the locations of the pedestrian counts. Most of the data were collected during the PM peak hour in conjunction with vehicle turning movement counts. This information was used to calibrate pedestrian models and identify areas on campus where pedestrian facilities are deficient when compared to the number of pedestrian users identified. Higher priority will be given to projects where pedestrian use is highest and level of service lowest.

**Pedestrian Conditions (5.E)**

One of the planning principles of the Campus Master Plan is to “establish a compact academic campus”. This goal involves achieving a vibrant, pedestrian friendly campus environment where centers of student activity are situated within convenient walking distance. In order to accomplish this goal, a connected and attractive network of walking paths and sidewalks is essential. **Figure 7-3** shows the location of existing sidewalks and walking paths.
Pedestrian Safety (1)

On average, a pedestrian is injured in a traffic collision every eight minutes nationwide. Most pedestrian injuries occur as the result of the inattentiveness of motorists and the failure of pedestrians to use crosswalks, combined. Additionally, the failure of both pedestrians and motorists to obey traffic signals can cause a fatality. By taking basic precautions and being aware of one’s surroundings, the likelihood of an unnecessary collision can be dramatically reduced.

Interactions between pedestrians and vehicles on campus present the greatest threat to pedestrian safety. In order to increase pedestrian safety, all areas where large pedestrian volumes interact with vehicles should be highly visible. Crosswalks should be clearly defined, either by introducing a new material for the crosswalks or by ensuring crosswalks are painted distinctly. Pedestrian signage should also be installed to warn motorists of high pedestrian crossing areas.

At the busiest pedestrian crossing points on campus the University of Utah should investigate the installation of raised crosswalks. Raised crosswalks will help alert motorists that they are entering a high pedestrian area and will serve as a traffic calming measure to help reduce vehicle speeds.

Walking conditions on the University of Utah campus are good in some areas, but lacking in others (i.e. Research Park where sidewalks are not standard). Extensive internal paths, walkways, sidewalks, and accessible entrances at most buildings encourage students to walk from off campus and between classes. As will be discussed in a later section, improving bicycling facilities and accommodations will simultaneously improve conditions for pedestrians, reducing conflicts and congestion, providing dedicated space for each user type, and typically more separation from motor vehicle traffic. Additional pedestrian-specific improvements will improve walking conditions even more.
Lighting (5A)

Well-lit streets and paths are critical to encouraging walking past daylight hours. Currently, most of the lighting along the University’s active streets is highway-type lighting, which generally provides a low level of illumination for walkers. To ensure pedestrians feel safe traversing the campus, a higher level of lighting is recommended along major routes. A program of lighting improvements should be developed and implemented for all existing sidewalks and preferred mid-block routes linking residential areas and visitor parking to common destinations (libraries, athletic/performance venues, other social and cultural hubs.)

As the University of Utah pedestrian network expands, new pathways should include pedestrian-level lighting. New high efficiency, LED-type fixtures being developed and soon-to-be available will ensure enhanced pedestrian lighting has a minimal impact on overall energy consumption, providing the sustainability of the campus.

Pedestrian scale lighting improves visibility for both pedestrians and motorists - particularly at intersections and in areas where personal safety is a concern. Pedestrian scale lighting is characterized by short light poles (12-14 feet high), close spacing, low levels of illumination (except at crossings), and the use of LED lamps to produce good color rendition, long service life and high energy efficiency. Lighting should be oriented downward to illuminate the pedestrian environment.

Pedestrian scale lighting should be located in the furnishing/utility zone so as not to impede pedestrian traffic in the through area. Lamp fixtures should be at height of about 12-14 feet, and poles should be spaced approximately 25-50 feet apart depending on the intensity of lights. Lamp fixtures should be shaded so as to project light downward and provide sufficient illumination of the sidewalk while limiting excess light pollution. Illumination should be warm and moderate, rather than dim or glaring, and provide a balanced coverage of the corridor and surrounding area for comfort and security.

Both street and pedestrian lighting levels should be considered for the same street corridor, especially in areas with tree canopy. “Dark Sky” lighting should be pursued to reduce light pollution. Pedestrian scale
lighting should be used in areas of high pedestrian activity and along pedestrian corridors connecting
destinations, including transit hubs and access points, and multi-family neighborhoods.

Additionally, street trees should be regularly maintained so as not to obstruct light fixtures and light
projection. Low-cost light emitting diodes (LED) offer a wide range of light levels and can reduce long term
utility costs.

As development occurs throughout campus, the University of Utah should establish guidelines for
construction projects to minimize their impacts on pedestrians, bicycles, parking and vehicular
circulation. They should include maximum parking space requirements for construction vehicles and limit
encroachment onto sidewalks and roadways. To address parking demand greater than provided on-site,
the University could require contractors to shuttle workers to remote parking areas throughout the area.

**Existing Sidewalks (5)**

All interior campus pathways currently serve pedestrians and bicyclists. Shared-use paths differ from
these campus pathways because they usually are at least 10 feet wide (may be up to 14 feet wide where
high concentrations of people are expected) and are specifically designated as shared pedestrian and
bicycle space.

Maintenance vehicles should be discouraged from using these paths unless they are maintaining the path
itself. The recommended shared-use paths are primarily located along commuter routes at the periphery
of campus.
Existing Bicycle Conditions (5)

Walkways in the campus core are heavily utilized by bicyclists, pedestrians, skateboarders and other non-motorized users (as well as occasional motorized maintenance vehicles). This leads to conflicts between users, particularly bicyclists coming downhill at fast speeds and the pedestrians in their path. This is visible in locations throughout campus, including existing ADA ramps, high-speed downhill corridors like the HPER Mall and lower campus near President’s Circle. Despite perceived concerns and stories of near crashes, very few pedestrian-bicycle crashes have been reported to University Police in recent years. Bicyclists also sometimes encounter conflicts with maintenance vehicles and golf carts.

The University of Utah currently allows bicyclists on all pedestrian pathways and has a 10 mph speed limit. While the University Police Department can issue speeding tickets to bicyclists, this rarely occurs. Many bicyclists prefer not to use the pedestrian pathways and have expressed a desire for improved bicycle facilities such as dedicated conventional or low stress bicycle lanes on University, City, and UDOT roadways.

The campus rises nearly 500 feet from University Street to the Medical Campus. Experience shows that many bicyclists use circuitous routes to gain elevation in order to keep the grade to a minimum. These routes are often complex and result in shortcuts that require illegal riding behavior. The campus bicycle tour followed several such routes. Future bicycle routes on campus should minimize grade, manage bicyclist speed and provide direct connections between campus destinations.

Several types of bicycle facilities are available on or near campus. Both those that exist and those that are proposed are described in the following sections of this chapter.

Signed and/or Marked Shared Roadways (5)

Shared lanes are an on-street bikeway alternative most often used to accommodate bicyclists within constricted rights-of-way that have relatively low speed limits (35 mph or less, with 25 mph or less being the most desirable) and/or daily traffic volume. Depending on the traffic volume for the individual roadway and skill level of the bicyclist, signed shared roadways vary in their efficacy as designated bikeways. Within the past few years, additional designs, such as the Shared Lane Marking (i.e. “Sharrow”), have been added to the MUTCD to aid bicyclists and motorists on shared roadways. These markings are being used in Salt Lake City as a measure to give bicyclists guidance on proper lateral positioning within the traffic lane and reinforce to motorists a bicyclist’s right to use the full lane; they do not restrict other vehicles from using the lane.

Shared lanes usually do not require roadway reconstruction or modifications to existing striping. For this reason, they are some of the easiest and least expensive bikeways to implement. However, they do not provide the same level of accommodation as dedicated bicycle lanes, bike paths, or shared-use paths on streets with traffic traveling above 25 mph. The facilities are typically used by the groups defined as “Strong and Fearless” or “Enthused and Confident” in Figure 7-1.
Bicycle Lanes (5)

Bike lanes are on-street facilities that provide a separate operating space for bicyclists. Depending on the street configuration, bike lanes range between 4-7 feet in width. They are popular facilities for many bicyclists, though they require regular maintenance to remove road debris and snow during the winter months. Streets both within and adjacent to the University of Utah campus can be retrofitted to accommodate bicyclists in dedicated on-street bicycle lanes. Salt Lake City maintains several bike lanes adjacent to the campus core and within Research Park. Some users in the “Interested but Concerned” category from Figure 7-1 are likely to use bike lanes.
**Bicycle Lanes / Shared Lanes (Climbing Bike Lanes) (5)**

On certain roadways, it makes sense to have bike lanes on one side of the street and shared lanes on the other. This usually occurs on streets wide enough for bicycle lanes in only one direction and grades steep enough to result in downhill bicycle speeds approaching the posted speed limit. Bike lanes are placed in the uphill direction to give faster vehicles the ability to safely pass slower cyclists. Shared lane markings are placed in the downhill direction to direct bicyclists to position themselves in line with other traffic. As with regular shared lane treatments, these facilities should only be used when the speed limit is 35 mph or less – ideally no more than 25-30 mph.

**Bicycle Paths (Dedicated) (5)**

Bike paths operate and are designed similar to shared-use paths, but have a higher level of treatment indicating preferential intended use for bicyclists. The University of Utah has several bike paths on its campus that were developed in 2008 as a pilot program. In planning for bicycle transportation and movement through a campus, bike paths are favorable compared to shared-use paths because they can reduce conflict between bicyclists and pedestrians. In university environments, this conflict is present especially during passing periods, special events, and other times when campus activity is high. Bike paths are typically enjoyed by all bicycle user groups.

Bicycle paths differ from shared-use paths and undesignated campus pathways because they provide exclusive space for bicycles. Shared-use paths are meant to accommodate both bicycles and pedestrians, and are typically at least 10 feet wide. Since golf carts currently use many campus pathways, new bicycle paths should be 12 feet wide where golf cart use is expected. Undesignated campus pathways may also be used by both bicycles and pedestrians, but are not necessarily as wide. They are primarily meant for pedestrians, with bicycles welcome at reasonable speeds that do not threaten pedestrian traffic.

Although bicycle paths are meant for the exclusive use of bicycles, it should be acknowledged that some pedestrians will also inevitably use the space. As more bicyclists use the paths, however, the paths will become increasingly self-enforcing as they become less comfortable places for pedestrians. It should be noted that the recommended bicycle paths will cross pedestrian plazas where high-speed bicycle traffic is undesirable. In these locations, the character of the path may change to signal to bicyclists that they are entering shared space where they need to exhibit caution and respect pedestrians. Decisions at this level of detail will be made on a case-by-case basis as individual projects move through the design process.
Bicyclists expect a certain level of quality on shared-use paths relative to undesignated sidewalks and campus pathways. This quality difference typically manifests itself through bicycle route signage and treatments at roadway crossings. Conflicts can occur on shared-use paths because user types are not separated. Shared-use paths are popular with many bicyclists because they provide relief from vehicular traffic. A common point of conflict for path users occurs at intersections with roadways. Bridges and undercrossings at intersections can help mitigate conflicts and improve overall path usability.
Future Conditions

New Sidewalks (1.E)

As new build out of the University of Utah campus, Medical Center and Research Park occurs, sidewalk infill and improvements should be made for pedestrians. If there is no sidewalk the University should install sidewalk to improve accessibility. Nationally recognized guidelines for street and highway design recommend that sidewalks be constructed in areas with pedestrian activity, especially in residential and school areas. Federal policy dictates that, “walking facilities will be incorporated into all transportation projects unless exceptional circumstances exist” (FHWA, 2000). The Federal Highway Administration urges State and local jurisdictions to revise programs to better construct and maintain an accessible pedestrian network. For road segments that lack sidewalks on both sides of the street, roadway reconstruction, a curb and gutter installation, or curb and gutter replacement projects shall include the installation of a sidewalk on at least one side of the street. For roadways that are missing sidewalks, but where no major construction project is currently planned, new sidewalk installation shall be prioritized for routes that provide access to parks and recreational facilities, school areas, transit stops, locations where the absence of a sidewalk creates substantial pedestrian safety risks, and roadway segments for which residents petitioned to have sidewalks.

Sidewalks are crucial in providing access to key destinations, especially for persons with disabilities. We performed a sidewalk inventory of the University of Utah, Medical Center and Research Park and found the majority of the sidewalks are complete. There are some sections in Research Park that could benefit from additional sidewalks. Figure 7-4 and Figure 7-5 show the location of the proposed pedestrian projects on campus and proposed pedestrian projects within Research Park respectively. The following sections discuss improvements included in Figure 7-4 and Figure 7-5.

Campus Wide Connectivity

The most important part of the plan to ensure a connected and pedestrian friendly campus is to infill the gaps where sidewalk does not currently exist. This requires approximately 35,000 linear feet of sidewalk or walking path. The main areas to consider are along North Campus Drive, Foothill Drive, Mario Capecchi Drive and throughout Research Park.

Wasatch Drive

Wasatch Drive is an area where pedestrian improvements are needed beyond just adding sidewalk. These include giving the roadway a “road diet”. This concept involves narrowing the lanes, creating safe vehicle drop-off zones, creating raised medians, developing safe raised pedestrian crossings and enhancing the aesthetics of the entire area. This will discourage vehicular traffic, particularly pass through traffic and encourage pedestrian use.
Underpasses

Two locations have been identified as potential areas for pedestrian/bicycle underpasses. Each location is at an intersection with Foothill Drive. The purpose of the underpass is two-fold. First, to provide a safe place for pedestrians to cross very busy intersections and second, to remove the pedestrian phases from the signal to allow for more efficient signal timings, thereby relieving congestion. The locations of the two underpasses are at Mario Capecchi Drive and Wakara Way where they both intersect with Foothill Drive.
In Salt Lake City’s Pedestrian and Bicycle Master Plan, a pedestrian design typology was developed to increase pedestrian and bicycle connectivity simultaneously if sidewalks are not installed.

Description
Historically, these job centers have been located on the fringes of a city or town and combine suburban development elements with the daytime employment peak hours and demands. They are primarily designed for motorists in single occupancy vehicles arriving in the morning and departing in the evening and frequently lack sidewalks. A retrofit of this type of land use would accommodate and encourage more walking exercise and more options for transportation to and from the site, as well as mid-day users.
Guidance

- Sidewalks may replace some green space in order to accommodate walking, access to and from transit, and exercising.
- Due to the frequent presence of large surface parking lots, on-street parking is, for the most part, unnecessary. Providing it may not be an efficient use of roadway space.
- Encouraging transit-oriented development and corporate transit pass programs decreases parking demand and peak-hour congestion.

Bicyclist & pedestrian lane interface:

A physical barrier (curb, planters, etc.) can be added if additional separation and protection is desired.

Transit stop accommodation:

Discussion

Businesses within suburban business parks are often self-contained, which reduces the need for employees to go out for lunch or other needs. However, some people like to use their lunch hour for exercise or to walk to a lunch destination and providing places for them to walk and bike helps to satisfy this demand. Specific attention should be given to making transit stops more accessible and attractive to employees.

When the opportunity to retrofit suburban business parks arises, consideration should be given to consolidating parking between the various businesses. Unused green space should also be consolidated into more productive, usable vegetated spaces. Building accesses should be added or reoriented to face the street rather than only face parking lots located at the rear of the buildings. Sidewalks would preferably be added along all streets as part of retrofits but this graphic emphasizes improvements that could be made in lieu of continuous sidewalks.
ADA Compliance (1.E)

The Americans with Disabilities Act (ADA) of 1990 prohibits discrimination and ensures equal opportunity and access for persons with disabilities.

ADA standards govern the construction and alteration of places of public accommodation, commercial facilities, and state and local government facilities. The Department of Justice (DOJ) maintains ADA standards that apply to all ADA facilities except transit facilities, which are subject to similar standards issued by the Department of Transportation (DOT). The DOJ published revised regulations for Titles II and III of the American with Disabilities Act of 1990 in the Federal Register on September 15, 2010, which are available online at [http://www.ada.gov/2010ADASTANDARDS_INDEX.htm](http://www.ada.gov/2010ADASTANDARDS_INDEX.htm). Chapter 4: Accessible Routes of the 2010 ADA Standards for Titles II and III Facilities governs the design of Accessible Routes.

The ADA standards should be regularly reviewed to ensure that campus standards and specifications are in compliance with Federal ADA regulations. All areas of newly designed and constructed buildings and facilities, as well as altered portions of existing buildings and facilities, shall comply with the ADA requirements as published. Although only new and altered facilities must be in compliance with ADA standards, in order to improve the quality of life of the campus experience for users with disabilities, a thorough review of all campus rights-of-way and facilities should be conducted over the next few years, as far as is economically viable.

To adequately plan for pedestrians with disabilities, each disability and its corresponding limitations should be considered. It is important to also be aware of how planning for people with one disability may affect users with other limitations.

Certain disabled populations (those who are partially or full blind or deaf, those with limited perceptions of touch or balance, and those with color blindness) face difficulties with lack of depth perception, information about their surroundings, and non-visual information; the inability to react quickly; complex intersections; and detection of street crossing timing. Curb ramp orientation is particularly important to those with visual impairments as diagonal curb ramps leading out into the intersection can be confusing when compared to perpendicular curb ramps which lead to the opposing sidewalk.

Hearing-impaired pedestrians rely on visual information. Their primary mobility difficulties include the inability to hear approaching vehicles and detect the time of their arrival. This is especially an issue in locations with limited sight distances, such as curved street segments or overgrown vegetation impeding sight lines.

The University will budget funds for survey, inventory and reconstruction of existing facilities to identify areas of non-compliance. The University of Utah intends to inventory the campus facilities that are eligible for ADA compliance over the next few years. These facilities will be stored within a Geographic Information Systems (GIS) database and areas of ADA deficiency will be cataloged. Once a database has been established, a plan will be set in motion to budget for improving those facilities that can be readily approved in compliance with the 2010 ADA standards.
Curb Ramps (1)

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair, forcing them back to a driveway and out into the street for access.

Although diagonal curb ramps might save money, they create potential safety and mobility problems for pedestrians, including reduced maneuverability and increased interaction with turning vehicles, particularly in areas with high traffic volumes. Diagonal curb ramp configurations are the least preferred of all options.

The landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself.

- The ramp shall slope no more than 1:12 with a maximum cross slope of 2.0%.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5′-0″ long and at least as wide as the ramp, although a width of 5′-0″ is preferred.

The edge of an ADA compliant curb ramp may be marked with a tactile warning device (also known as truncated domes) to alert people with visual impairments to changes in the pedestrian environment. Contrast between the raised tactile device and the surrounding infrastructure is important so that the change is readily evident. These devices are most effective when adjacent to smooth pavement so the difference is easily detected. The devices should provide color contrast so partially sighted people can see them.
The University of Utah’s Accessible Paths of Travel ADA Study states:

The University of Utah campus contains a wide variety of pedestrian oriented paths of travel within the existing built environment. The age and conditions of these paths varies throughout the campus and many...do not meet ADA standards. These paths connect to the surrounding Salt Lake City neighborhoods as well as connecting the various facilities and districts with the campus.

The University should follow the recommended actions in that plan. Ultimately, planning, design, and implementation of all on-campus or campus-related projects should adhere to national ADA standards and the findings in the University of Utah’s Accessible Paths of Travel ADA Study (2012) or any revised or newer version of that plan.

General and Policy Recommendations

Recommended Bicycling Improvement Areas (1)

Many of the comments received throughout the public input process were related to bicycling conditions on and near campus and Research Park. In addition to the recommendations made in the Recommended Capital Projects and Phasing section of this chapter, the following general areas should be addressed and improved for bicyclists in the future:
Campus

Comments on or very near campus emphasized improved connections between streets in Salt Lake and the campus; improved bicycle parking at major destinations like Rice-Eccles Stadium; more campus bicycle repair shops; improved ride-ability and comfort of some of the internal paths (that were originally designed for pedestrians only); delineated bicycle space (from other users’ spaces); improved maintenance of existing and future bike lanes and paths; and improved safety, comfort, and protection in addition to clear directions at intersections.

Research Park

The public input regarding bicycling in Research Park focused on slowing traffic speeds; adding bike lanes and paths; providing more mid-block crossings and building access (especially important where blocks are so large); improving signal timing for bicyclists (especially during peak hours); adding bicycle parking at all buildings; and adding logical bicycle connections within Research Park and to other destinations like Campus and the Medical Center, as well as neighborhoods to the south and recreational opportunities to the east.

Medical Campus

Public input indicated a desire for improved bicycle access and ease of use on and near transit stations, connecting the main campus to the Medical Campus, and reducing speeds and improving the low feeling of security for all non-motorized users along Mario Capecchi Drive.

Bike Parking

Bicycle parking on the University of Utah campus is provided through bicycle racks, lockers, and secure indoor storage spaces. Bicycle racks are spread throughout the campus. Some reach capacity while others stand empty. Opportunities exist at several sites to upgrade regular bicycle racks to high capacity racks or to racks that increase security by providing more points at which to lock a bicycle. Underutilized bicycle parking could be relocated to sites where additional parking is needed. Courtyards can be appropriate locations for installing additional bicycle racks that access high traffic buildings. Transit stations represent another bicycle parking opportunity. Increased bicycle parking at TRAX stations and bus stops would be a valuable asset to commuters by allowing them to leave their bicycle at the station, thus also freeing up space on the trains and buses.

Short-Term Bike Parking

Approximately 350 short-term bicycle parking locations currently exist on the main campus and medical campus. Short-term bicycle parking is meant to accommodate users who are expected to depart the rack within several hours of arriving. Based on the short-term bicycle parking inventory, the University of Utah has approximately 4,800 bicycle parking spaces.
The predominant bicycle rack type on campus is known as the “ribbon” or “wave” rack. This rack type was standardized in the late 1980s by the Director of Campus Design and Construction based on aesthetic, function, and cost factors. At the time, the Campus Bicycle Committee endorsed this decision “with the knowledge that there are better options from a function standpoint”. While the wave rack is easy to use and recognizable, it is less space-efficient and secure. The University has recently established Park-a-Bike racks as their preferred version. These racks provide many functional and spatial advantages over wave racks. As funding becomes available, the University should continue to replace older waves racks with the newer Park-A-Bike models.

An often-overlooked component of short-term bike parking is proper installation. Proper installation of bike racks allows bicyclists to lock their bikes to the rack without infringing on adjacent pedestrian walkways or other surrounding uses. Figure 7-6 illustrates proper layout of Park-a-Bike racks in both perpendicular and angle layouts. Twenty-four inch spacing between bicycles is the preferred layout, according to the Association of Pedestrian and Bicycle Professionals (APBP).
Figure 7-6 Short-Term Bike Parking Installation Guidance

Covered Bike Parking

The University can also improve short-term parking by providing shelter over groups of bike racks. Covered parking encourages bike use by protecting bicycles from the sun, rain and snow, making bicycling a more attractive option during inclement weather. The University may consider incorporating covered bike parking into new building construction through the provision of overhangs.

Siting Guidelines

Proper bicycle rack installation also involves situating them appropriately with respect to buildings. Racks should be installed within 50 feet (or as close as possible) of main entrances to buildings in well-lit, visible parts of campus with high pedestrian volumes to deter theft and enhance the racks’ overall convenience.

Bike Parking Requirements

Some universities have adopted guidelines to ensure proper bike rack supply throughout their campus growth and expansion. These guidelines can take many forms, but most of them associate a fixed number of racks or bike parking spaces with a given size or use of the building. This allows the university to estimate usage and place racks where the greatest demand is likely to occur. In practice, additional bicycle parking may be needed or relocated to meet actual demand. Sample bike parking requirements are illustrated in Table 7-1.
Table 7-1 Sample Bike Parking Requirements

<table>
<thead>
<tr>
<th>Long-Term Bike Parking</th>
<th>Short-Term Bike Parking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 space for each 10 employees</td>
<td>1 space for each 10 students of planned capacity (minimum 2 spaces)</td>
</tr>
<tr>
<td>1 space for each 10 students of planned peak capacity</td>
<td></td>
</tr>
<tr>
<td>1 space for each 20,000 square feet of floor area</td>
<td></td>
</tr>
</tbody>
</table>

Long-Term Bike Parking

Long-term bike parking is a valuable amenity a university can provide its students, faculty and staff. Some individuals would like to ride their bicycle to campus, but have reservations about leaving it locked to a short-term bicycle rack. Long-term bike facilities generally provide a more secure parking environment, and offer patrons greater control over the type of environment in which they store their bike. At present, there are several options for long-term bike parking on Campus. Bike lockers are one example of long-term bicycle parking. These lockers are available for use in several locations on the University of Utah campus, several of which are managed by UTA at light rail stations. Various departments manage other on-campus locker locations independently. All require a subscription for access. Locations include the Union Building, the School of Medicine, the Heritage Center parking garage (for residents only) and the Health Sciences Education Building (HSEB) parking garage. Both the Emma Eccles Jones Medical Research Building and HSEB have dedicated interior secure bicycle storage for occupant use on each floor. These rooms are accessible with keys given to employees and students who work inside. The parking garage beneath HSEB also has two locked cages for commuters to secure their bicycles. The cages have wall-mounted brackets for hanging bicycles, and cables for securing bicycles. Space is available for $30 per year (Jul 1 - Jun 30).

Currently, finding information about existing secure bicycle parking is challenging for potential users. Facilities are often managed by a building employee. Students have few existing options to securely store their bicycles. Running all secure bicycle parking operations through a single administrative organization, such as Commuter Services, would improve usage and convenience. Doing so would centralize all maintenance and utilization information, thereby allowing secure bike parking to function more efficiently, similar to other campus-wide programs.

Additional secure bike parking should be considered at the following locations:

- Student Union
- Honors Housing
- Married Student Housing
- Marriott Library
- University Hospital
- Outdoor Program
Long-term secure bike parking is more costly than short-term parking, but unlike bike racks, it can generate revenue through registration and user fees. Using University funds for bicycle infrastructure and support facilities may require consensus building among the various University departments. However, as shown in Table 7-2, bicycle and pedestrian investments are fiscally attractive when compared to funds spent on other commute modes.

### Table 7-2 Annual Cost per Commuter

<table>
<thead>
<tr>
<th>Commuter Type</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Parking (physical costs only)</td>
<td>$300</td>
</tr>
<tr>
<td>Surface Parking (including land costs)</td>
<td>$3,000</td>
</tr>
<tr>
<td>Structured Parking</td>
<td>$2,000</td>
</tr>
<tr>
<td>Transit</td>
<td>$200</td>
</tr>
<tr>
<td>Bike/Ped Improvements</td>
<td>$50</td>
</tr>
</tbody>
</table>

Source: California Polytechnic State University, San Luis Obispo – Parking estimates include maintenance staffing and utilities.

Given the low cost of supporting bicycle commuters coming to campus relative to other modes, bicycle improvements are an attractive option for the University of Utah to accommodate the growth of the student, faculty and staff populations while not straining physical or fiscal limitations.

Another type of long-term bike parking is the “Bikestation” model that combines a secure bike parking room with optional access to bike repair facilities, parts, supplies and shower/changing facilities (See Figure 7-7). A bicycle station provides a number of valuable amenities, typically in focal points of bicycle activity or near transit nodes. Bicycle stations serve existing populations of cyclists, and also encourage new bicyclists by providing services that overcome barriers cited by many as a reason that they do not bicycle more. Bicycle stations can provide any or all of the following services:

- Bicycle repair (self-serve or staffed)
- Bicycle rental
- Retail sales of bicycle-related equipment and accessories
- 24-hour secure and covered bicycle parking
- Restrooms, showers and/or changing facilities
- Coffee shop
- Convenient access to public transportation
Proposed Bike Stations and Secure Bicycle Parking Locations

The University of Utah Campus Master Plan and Bicycle Master Plan recommend bicycle stations be included with the proposed Engineering Mall, Health Sciences Campus and Research Park. This plan endorses this recommendation. Additionally, secure bike parking should also be considered at the following locations:

- Student Union
- Honors Housing
- Married Student Housing
- Marriott Library
- University Hospital
- Outdoor Program
- Benchmark Plaza
- Health Sciences Building
- Business Building
- Research Park

Bicycle Share

Bicycle share systems allow anyone to check out a bicycle from a mobile or permanent station and return it at the end of their trip to another determined location. Bike share trips are meant to be short (i.e., 30 minutes or under). Users can use bicycles for transportation and recreation without needing to rent all day from a bike shop or make the investment of bicycle ownership. If a bicycle share system is implemented at the University of Utah, it should be in conjunction with the existing GREENbike program in Salt Lake City. This will allow students, faculty, and staff to use bicycles between destinations on campus and use it downtown, encouraging more connections by bicycle between the campus and the commercial center of the city.
Bicycle share systems on higher education campuses are most successful at attracting student use when the bike share membership fee is incorporated into their annual tuition or parking, housing, and transit fee structure. A University and Travel Demand Management program, similar to the partnership between B-Cycle Madison (Wisconsin) and the University of Wisconsin-Madison, offers a greatly discounted rate for bulk purchase by organization. The example program in Madison generated approximately 900 members in 2012.

Consideration of topographic differences between campus and trip generation and destination analysis are necessary in order to determine how to introduce bike sharing at the University of Utah and how it will affect the overall system. UTA is currently developing a GREENbike Regionalization Study to address how municipalities and jurisdictions outside of downtown Salt Lake City can implement bike share so that the system works at a regional scale. The study’s findings may prove relevant to the University of Utah in developing a structure that will allow bike share to work both on and off the University of Utah campus.

**Bicycle Program Recommendations**

Infrastructure improvements are not the only way to improve bicycling activity on the University of Utah campus. The 2011 Bicycle Master Plan recommended a suite of programs to improve bicycling conditions on the campus. Many of these recommendations have been followed and are currently being implemented at various levels. One overarching recommendation to improve the success of the following programs would be to provide a stable, annual funding source for implementation of bicycle and pedestrian education and encouragement programs. In addition, the University should develop or continue implementation of the following programs, as described in the Bicycle Master Plan:

- Staff a bicycle and pedestrian coordinator
- Continue to enhance and improve the University’s Bicycling Website: [http://commuterservices.utah.edu/alternative-transit/bike.php](http://commuterservices.utah.edu/alternative-transit/bike.php)
- Expand bike orientation efforts for incoming students
- Provide a specific program and curriculum to provide better educational opportunities in addition to the tabling already provided at various orientation events by commuter services
- Bicycle Safety Media Campaign
- Adding more topics and more extensive outreach to existing bicycle safety campaigns
- Continue to seek higher levels of certification as a Bicycle Friendly Community (currently Silver)
- Develop an annual report that includes bicycle counts at locations in addition to what Salt Lake City provides
- Secure funding to implement a campus bicycle fleet for staff or student use (An existing fleet of bicycles has been donated to commuter services, however, no funding mechanism is in place to ensure ongoing maintenance and operation of a campus bicycle fleet.)
- Provide valet event bicycle parking
- Develop an encouragement / incentive campaign to encourage as a viable form of transportation for University of Utah staff or students
Research Park Specific Bike and Pedestrian

Sidewalk enhancements, particularly infill should be a priority in Research Park, specifically in areas around the shuttle stops and at street crossings. Once these areas are addressed, the remaining areas of the park should be retrofit with sidewalk as opportunities for enhancements arise. Priority should be given to the southwest end of the park where densities are highest and move northeast from there.

In addition to sidewalk connectivity, pedestrian underpasses are recommended crossing Wakara and Arapeen to allow safe crossing for pedestrians and bicyclists and also removal of the pedestrian phases at each of those signals which will improve traffic flow through the intersections. Providing building facilities such as secure bike parking, showers, and lockers in new and existing buildings will also improve the overall bike friendliness of Research Park. Incentives such as wellness program incentives will also promote healthy practices like biking and parking and increase the chances of reducing SOV in the park.

Bicycle Facility Recommendation Overview (1)

The bikeways and spot improvements recommended in the 2012 University of Utah Bicycle Master Plan consist of strategic routes and locations that interact with the existing system to provide a high quality user experience and enable access to key destinations on and around campus. The bikeways are comprised primarily of the following classifications: shared-use paths, bike paths, bike lanes, and shared lanes. Spot improvements enhance these linear bikeways. A key objective in the planning process was providing bicyclists with key direct cross-campus bike paths, while reserving most of the existing system of campus pathways for local connections to buildings just as they are today.

Priority Projects (1)

Campus Facilities and the Bicycle Coordinator developed a list of high priority projects to improve bicycling conditions on campus. The following projects were identified. Some projects were previously detailed and identified in the Campus Bicycle Master Plan while others are newly identified projects. A list of the proposed priority projects, as well as a map, can be found in Table 7-3 and Figure 7-8, respectively.
<table>
<thead>
<tr>
<th>ID</th>
<th>Project Name</th>
<th>Project Description</th>
<th>Location</th>
<th>Improvement Type</th>
<th>Length (ft)</th>
<th>Identified in Campus Bicycle Master Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>400 South bike box to turn queue box to University Street bike lane</td>
<td>Provide bike box on 400 South eastbound. Install bicycle detection and bike signal for contra-flow bike lane.</td>
<td>400 S / University St.</td>
<td>Bike Box &amp; Two stage turn queue box</td>
<td>N/A</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>Left turn markings to Law building after intersection</td>
<td>Intersection markings to clarify bicycle positioning</td>
<td>University St.</td>
<td>Intersection Improvements</td>
<td>N / A</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Marriott Library southwest corner bicycle ramp/runnels Guardsman/1500 East fix for bike traffic, leading to off-road east and west paths (parking lot and next to roundabout)</td>
<td>Provide bicycle runnels on stairs and bicycle-friendly alternative route</td>
<td>Marriott Library</td>
<td>Spot Improvement</td>
<td>N / A</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>Provide a bike box on northbound Guardsman bike lane to facilitate easier access to the existing and future (east-west paths) north of the intersection</td>
<td>Greensman / 500 S</td>
<td>Bike box</td>
<td>N/A</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>South Campus road diet: two-way bike path and TRAX plaza</td>
<td>Consider a road diet and two-way protected bike lane along the north side of South Campus Drive</td>
<td>South Campus Dr. (Roundabout to Mario Capecchi)</td>
<td>Two Way Protected Bike Lane</td>
<td>2,100</td>
<td>No, Requires further study</td>
</tr>
<tr>
<td>6</td>
<td>North Campus Drive improvements for bike/ped (crosswalk/signal, path through parking lot and on widened sidewalk)</td>
<td>Develop shared use path connection along North Campus Drive adjacent to the parking lots connecting to the Wasatch Dr. shared use path</td>
<td>North Campus Drive (100 S to Wasatch Dr.)</td>
<td>Shared Use Path</td>
<td>2,600</td>
<td>Yes</td>
</tr>
<tr>
<td>ID</td>
<td>Project Name</td>
<td>Project Description</td>
<td>Location</td>
<td>Improvement Type</td>
<td>Length (ft)</td>
<td>Identified in Campus Bicycle Master Plan</td>
</tr>
<tr>
<td>----</td>
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<td>-------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>Central Campus Drive shared use path, connecting to Engineering Mall</td>
<td>Provide shared use path along Central Campus Drive connecting North Campus Drive shared use path to the interior of campus</td>
<td>Central Campus Dr. (North Campus Dr. to Engineering Mall)</td>
<td>Shared Use Path</td>
<td>1,175</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Wasatch Drive bicycle lanes</td>
<td>Provide bicycle lanes along Wasatch Drive</td>
<td>Wasatch Dr. (North Campus Dr. to Mario Capecchi)</td>
<td>Bicycle Lanes</td>
<td>2,140</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>Legacy Bridge west end bicycle ramp</td>
<td>Provide a spiral ramp down from the west end of the Legacy Bridge. Project will be cost intensive.</td>
<td>Legacy Bridge</td>
<td>Spot Improvement</td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>Sunnyside bike path from 1300 East to Hogle Zoo/This is the Place</td>
<td>Provide a shared use path from 1300 E to the Hogle Zoo along the north side of Sunnyside Ave.</td>
<td>Sunnyside Ave. (1300 East to Hogle Zoo)</td>
<td>Shared Use Path</td>
<td>11,500</td>
<td>No, project requires further study and coordination with SLC Transvalley Corridor Plan</td>
</tr>
<tr>
<td>11</td>
<td>Pathway from Arapeen (Research Park) to Mario Capecchi via Salt Lake Water Tower (connection to South Campus bike path)</td>
<td>Provide a shared use path connection from Arapeen to Mario Capecchi over Red Butte Creek through Fort Douglas and connecting to the proposed South Campus Drive two-way protected bike lane</td>
<td>Research Park / Fort Douglas</td>
<td>Shared Use Path / Shared lanes through Fort Douglas</td>
<td>2,800</td>
<td>Yes</td>
</tr>
<tr>
<td>ID</td>
<td>Project Name</td>
<td>Project Description</td>
<td>Location</td>
<td>Improvement Type</td>
<td>Length (ft)</td>
<td>Identified in Campus Bicycle Master Plan</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>12</td>
<td>Medical TRAX station bike path/ramp to Wasatch Drive, with bike parking at Medical TRAX station</td>
<td>Provide a bike path alternative to the existing flights of stairs. Provide secure bicycle parking at the Medical TRAX Station</td>
<td>Medical TRAX Station to Wasatch Dr.</td>
<td>Bike Path</td>
<td>600</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>Research Park to Health Sciences shared-use path</td>
<td>Provide a shared use path from Chipeta Way to the Health Sciences Library</td>
<td>Research Park / Medical campus</td>
<td>Shared use path / shared lanes in places</td>
<td>2,200</td>
<td>No</td>
</tr>
<tr>
<td>14</td>
<td>University Student Apartments to south campus via Guardsman/VA (Red Butte/SLC trail connection)</td>
<td>Shared Use path linking University Student apartments to south Campus via the Red Butte Creek corridor</td>
<td>Red Butte Creek</td>
<td>Shared Use Path</td>
<td>5,000</td>
<td>Yes</td>
</tr>
<tr>
<td>15</td>
<td>Mario Capecchi bike lane from Foothill to S. Campus Drive</td>
<td>Install bicycle lanes along Mario Capecchi in existing shoulder area</td>
<td>Mario Capecchi (Foothill to South Campus Dr)</td>
<td>Bicycle Lanes</td>
<td>1,950</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Proposed Projects
(Transportation Master Plan)

1. 495 South bike box to run lane to University Street bike path
2. Left turn markings to LRT headway after intersection
3. Marriott Library southwestern corner bike path
4. University Street bike
5. South Campus road bike
6. North Campus bike lane
7. Central Campus shared use path
8. Legacy Bridge bike
9. Legacy Bridge bike
10. Medical TRAX station bike path
11. Research Park to Health Sciences
12. University Student Apartments to South Campus via Guardians
13. University Student Apartments to South Campus via Guardians
14. University Student Apartments to South Campus via Guardians
15. Designed:
   - Bike Path Markings
   - Legacy Bridge Bike Path Markings

Priority Projects
(Transportation Master Plan)

1. 495 South bike box to run lane to University Street bike path
2. Left turn markings to LRT headway after intersection
3. Marriott Library southwestern corner bike path
4. University Street bike
5. South Campus road bike
6. North Campus bike lane
7. Central Campus shared use path
8. Legacy Bridge bike
9. Legacy Bridge bike
10. Medical TRAX station bike path
11. Research Park to Health Sciences
12. University Student Apartments to South Campus via Guardians
13. University Student Apartments to South Campus via Guardians
14. University Student Apartments to South Campus via Guardians
15. Designed:
   - Bike Path Markings
   - Legacy Bridge Bike Path Markings

Figure 7-8
Bicycle Recommendations (1)

In addition to the priority projects identified above, many recommendations from the Campus Bicycle Master Plan have yet to be implemented on the University of Utah campus.

**High priority recommendations**

Figure 7-9 and Table 7-4 show the short term recommendations, which are those that could generally be completed within three years. They consist of facilities that can be constructed through re-striping of existing roads or pathways, striping of new paths on current campus pathways, inclusion within campus redevelopment projects planned for the short term, or new construction that does not require major modification of existing infrastructure.

**Medium priority recommendations**

Figure 7-10 and Table 7-5 show the medium term recommendations, which consist of facilities that could be constructed within four to nine years. They require moderate changes to existing infrastructure, longer coordination times, environmental review, higher costs relative to short-term facilities, or could be constructed along with campus redevelopment projects planned for the medium-term.

**Low priority recommendations**

Figure 7-11 and Table 7-6 show the projects that would require major changes to existing infrastructure, significant funding, or could be accomplished through currently undefined campus redevelopment projects that likely would not occur before 2025. The anticipated time horizon for long-term recommendations is 10 years or longer.
Recommended Short Term Bicycle Facilities

Type

- Shared Lane
- Bike Lane
- Shared Lane/Bike Lane
- Bike Path
- Shared Use Path
- SLC Shared Lane
- SLC Bike Lane
- SLC Buffered or Protected Bike Lane
- SLC Shared Use Path

Recommended Short Term Spot Improvements

Spot Improvement
<table>
<thead>
<tr>
<th>Project</th>
<th>From</th>
<th>To</th>
<th>Bikeway Type</th>
<th>Length (ft)</th>
<th>Cost Estimate</th>
<th>Outside Coordination</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guardsman Way</td>
<td>Foothill Dr</td>
<td>South Campus Dr</td>
<td>Shared Lane</td>
<td>450</td>
<td>$2,200</td>
<td>UDOT</td>
<td></td>
</tr>
<tr>
<td>South Campus Drive</td>
<td>Guardsman Way</td>
<td>Mario Capecchi Top of</td>
<td>Shared Lane</td>
<td>2,940</td>
<td>$14,500</td>
<td>UDOT</td>
<td></td>
</tr>
<tr>
<td>Stadium Connector</td>
<td>Stadium TRAX Station</td>
<td>Top of north tunnel ramp</td>
<td>Bicycle Path</td>
<td>1,050</td>
<td>$20,300</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>North Campus Path #1</td>
<td>Federal Way</td>
<td>JCC Access Road</td>
<td>SUP</td>
<td>4,100</td>
<td>$145,500</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>North-South Path</td>
<td>Business Loop</td>
<td>Merrill Building North Campus Dr</td>
<td>Bicycle Path</td>
<td>3,300</td>
<td>$94,800</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Northeast Parking Lot</td>
<td>Red Butte Canyon Rd</td>
<td>North Campus Dr</td>
<td>Shared Lane</td>
<td>3,920</td>
<td>$19,250</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>1500 E Connector</td>
<td>Guardsman Way</td>
<td>1500 East Parking Lot</td>
<td>SUP</td>
<td>565</td>
<td>$3,900</td>
<td>UDOT</td>
<td></td>
</tr>
<tr>
<td>Foothill Dr Path #2</td>
<td>Foothill mid-block crosswalk</td>
<td>Guardsman Way</td>
<td>SUP</td>
<td>1,075</td>
<td>$7,300</td>
<td>UDOT</td>
<td></td>
</tr>
<tr>
<td>HPER Mall Path</td>
<td>Wasatch Dr</td>
<td>End of existing HPER Mall path</td>
<td>Bicycle Path</td>
<td>1,515</td>
<td>$208,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>VA Western Route</td>
<td>Sunnyside Ave</td>
<td>Foothill Dr</td>
<td>Shared Lane</td>
<td>2,100</td>
<td>$10,300</td>
<td>VA, Salt Lake City</td>
<td></td>
</tr>
</tbody>
</table>

Dismount zone at top of ramps on both sides of tunnel. Most useful in conjunction with intersection modifications at Penrose and Federal Heights Dr.

Part of existing pilot project.

Most useful in conjunction with moving stop bars back on Guardsman and 1725 East.

Part of existing pilot project.

South VA gate is sometimes locked (mainly weekends and evenings).
<table>
<thead>
<tr>
<th>Project</th>
<th>From</th>
<th>To</th>
<th>Bikeway Type</th>
<th>Length (ft)</th>
<th>Cost Estimate</th>
<th>Outside Coordination</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chipeta Way/Connor Rd</td>
<td>Wakara Way</td>
<td>Red Butte Canyon Rd</td>
<td>Shared Lane</td>
<td>1,580</td>
<td>$7,750</td>
<td>U of U</td>
<td>Chipeta west of Wakara could have bike lanes with a lane reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Markings placed only in one direction since it is a one-way road.</td>
</tr>
<tr>
<td>Federal Way</td>
<td>South Temple</td>
<td>1450 E</td>
<td>Shared Lane</td>
<td>1,000</td>
<td>$4,900</td>
<td>Salt Lake City</td>
<td>Markings placed only in one direction since it is a one-way road.</td>
</tr>
<tr>
<td>Fieldhouse/ Library Connector</td>
<td>Prop. Fieldhouse Path</td>
<td>1500 East</td>
<td>Shared Lane</td>
<td>525</td>
<td>$2,600</td>
<td>U of U</td>
<td>Markings placed only in one direction since it is a one-way road.</td>
</tr>
<tr>
<td>HPER Mall Bisect</td>
<td>Business Loop</td>
<td>Central Campus Dr</td>
<td>Bicycle Path</td>
<td>1,500</td>
<td>$193,200</td>
<td>U of U</td>
<td>Coordinate with HPER Mall and shuttle bus projects</td>
</tr>
<tr>
<td>Legacy Bridge Path</td>
<td>Fort Douglas Blvd</td>
<td>SW End of Legacy Bridge</td>
<td>Bicycle Path</td>
<td>950</td>
<td>$23,800</td>
<td>U of U</td>
<td>Part of existing pilot project</td>
</tr>
<tr>
<td>Presidents Circle</td>
<td>University Street</td>
<td>University Street</td>
<td>Shared Lane</td>
<td>1,725</td>
<td>$8,500</td>
<td>U of U</td>
<td>Markings placed only in one direction since it is a one-way road.</td>
</tr>
<tr>
<td>Red Butte Canyon Rd</td>
<td>Connor Rd</td>
<td>Bonneville Shoreline Trail</td>
<td>Shared Lane</td>
<td>1,220</td>
<td>$6,000</td>
<td>U of U</td>
<td>Uphill bike lane/downhill shared lane combo is desirable, but would require widening</td>
</tr>
<tr>
<td>Research Park Connector</td>
<td>Wakara Way</td>
<td>Pollock Rd</td>
<td>SUP</td>
<td>980</td>
<td>$62,900</td>
<td></td>
<td>Requires coordination with the Army to re-open access</td>
</tr>
<tr>
<td>Project</td>
<td>From</td>
<td>To</td>
<td>Bikeway Type</td>
<td>Length (ft)</td>
<td>Cost Estimate</td>
<td>Outside Coordination</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>South Temple</td>
<td>University St</td>
<td>Wolcott St</td>
<td>Shared Lane</td>
<td>960</td>
<td>$4,700</td>
<td>Salt Lake City</td>
<td>Extension of existing shared lane markings on South Temple</td>
</tr>
<tr>
<td>Student Life Connector</td>
<td>Legacy Bridge</td>
<td>HPER Mall Path</td>
<td>Bicycle Path</td>
<td>660</td>
<td>$85,000</td>
<td>U of U</td>
<td>Most useful along with phasing/access changes at Foothill intersection</td>
</tr>
<tr>
<td>VA Eastern Route</td>
<td>VA Central Route</td>
<td>Foothill Dr</td>
<td>Shared Lane</td>
<td>1,200</td>
<td>$6,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>2030 E</td>
<td>South Medical Dr</td>
<td>North Campus Dr</td>
<td>Shared Lane</td>
<td>2,175</td>
<td>$10,700</td>
<td>U of U</td>
<td>Could be converted to bicycle lanes in future along with development</td>
</tr>
<tr>
<td>Business Loop</td>
<td>South Campus Dr</td>
<td>South Campus Dr</td>
<td>Shared Lane</td>
<td>2,270</td>
<td>$11,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Institute Loop</td>
<td>South Campus Dr</td>
<td>South Campus Dr</td>
<td>Shared Lane</td>
<td>2,060</td>
<td>$10,000</td>
<td>LDS Institute</td>
<td>Most useful along with phasing/access changes at Foothill intersection</td>
</tr>
<tr>
<td>VA Central Route</td>
<td>VA Western Route</td>
<td>Foothill Dr</td>
<td>Shared Lane</td>
<td>2,960</td>
<td>$14,500</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Wolcott Extension</td>
<td>100 South/Wolcott</td>
<td>Prop. North-South Path</td>
<td>Shared Lane</td>
<td>915</td>
<td>$5,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>1500 E/Olpin Union Connector</td>
<td>1500 East</td>
<td>Prop. 1500 East Connector Path</td>
<td>Bicycle Path</td>
<td>715</td>
<td>$18,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>1500 East</td>
<td></td>
<td>Proposed North-South Path</td>
<td>Shared Lane</td>
<td>1,280</td>
<td>$6,300</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>From</td>
<td>To</td>
<td>Bikeway Type</td>
<td>Length (ft)</td>
<td>Cost Estimate</td>
<td>Outside Coordination</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>----------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hempstead Rd</td>
<td>Mario Capecchi Dr</td>
<td>Fort Douglas Blvd</td>
<td>Bicycle Lane</td>
<td>1,080</td>
<td>$7,700</td>
<td>U of U</td>
<td>Most effective along with shared lanes or bicycle lanes on South Campus</td>
</tr>
<tr>
<td>South Medical Dr</td>
<td>Mario Capecchi Dr</td>
<td>Prop. NE Parking Lot</td>
<td>Bicycle Lane/Shared Lane</td>
<td>2,090</td>
<td>$15,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Wakara</td>
<td>Chipeta Way Prop. NE</td>
<td>Red Butte Gardens</td>
<td>Shared Lane</td>
<td>1,400</td>
<td>$6,800</td>
<td>Salt Lake City</td>
<td></td>
</tr>
<tr>
<td>2000 E #2</td>
<td>Heritage Center Path</td>
<td>S. Medical Dr</td>
<td>Shared Lane</td>
<td>530</td>
<td>$2,600</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Ctrl Campus Dr #2</td>
<td>Warnock Building</td>
<td>Warnock Building</td>
<td>Shared Lane</td>
<td>2,100</td>
<td>$10,300</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Medical School Access</td>
<td>S. Medical Dr</td>
<td>School of Medicine Prop.</td>
<td>Bicycle Lane/Shared Lane</td>
<td>740</td>
<td>$5,400</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Pollock</td>
<td>Connor Rd</td>
<td>Research Park Connector</td>
<td>Shared Lane</td>
<td>1,570</td>
<td>$7,700</td>
<td>Army</td>
<td></td>
</tr>
<tr>
<td>2000 E #1</td>
<td>Stover St</td>
<td>Prop. Heritage Center Path</td>
<td>Shared Lane</td>
<td>415</td>
<td>$2,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Army Rd</td>
<td>Pollock Rd</td>
<td>Hempstead Rd</td>
<td>Shared Lane</td>
<td>1,415</td>
<td>$7,000</td>
<td>Army</td>
<td></td>
</tr>
<tr>
<td>Central Campus Dr #1</td>
<td>Warnock Building</td>
<td>North Campus Dr</td>
<td>Bicycle Lane</td>
<td>1,250</td>
<td>$9,000</td>
<td>U of U</td>
<td>Lane conversion from four traffic lanes to three plus bicycle lanes</td>
</tr>
<tr>
<td>Project</td>
<td>From</td>
<td>To</td>
<td>Bikeway Type</td>
<td>Length (ft)</td>
<td>Cost Estimate</td>
<td>Outside Coordination</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-------------------</td>
<td>-------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Connor-Fort Douglas Connector</td>
<td>Parking lot SW of Connor</td>
<td>Parking lot NE of Fort Douglas Blvd</td>
<td>Bicycle Path</td>
<td>160</td>
<td>$20,600</td>
<td>U of U</td>
<td>Could probably also be a shared use path</td>
</tr>
<tr>
<td>Foothill Dr Path #1</td>
<td>Mario Capecchi Dr</td>
<td>Research Rd</td>
<td>SUP</td>
<td>700</td>
<td>$44,900</td>
<td>U of U</td>
<td>Most useful with Institute Loop short-term shared lane recommendation</td>
</tr>
<tr>
<td>Fort Douglas Blvd</td>
<td>Hempstead Rd</td>
<td>Pollock Rd</td>
<td>Bicycle Lane</td>
<td>880</td>
<td>$6,300</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hempstead Rd</td>
<td>S. Medical Dr</td>
<td>Shared Lane</td>
<td>1,715</td>
<td>$8,400</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Heritage Center Path</td>
<td>Parking lot SE of Heritage Center Proposed Heritage Center Path</td>
<td>Road NW of Heritage Center</td>
<td>Bicycle Path</td>
<td>475</td>
<td>$12,000</td>
<td>U of U</td>
<td>Part of existing pilot project</td>
</tr>
<tr>
<td>Heritage/ Officers Circle Connector</td>
<td>Officers Circle</td>
<td>Prop. Connor-Ft Douglas Connector Path</td>
<td>Bicycle Path</td>
<td>175</td>
<td>$18,000</td>
<td>U of U</td>
<td>Existing stairs at SW end of this proposed path</td>
</tr>
<tr>
<td>Stover St #1</td>
<td>Ft Douglas Blvd</td>
<td>Prop. Connor-Ft Douglas Connector Path</td>
<td>Shared Lane</td>
<td>220</td>
<td>$1,000</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Stover St #2</td>
<td>Prop. Connor-Ft Douglas Cntr. Path</td>
<td>Connor Rd</td>
<td>Shared Lane</td>
<td>145</td>
<td>$700</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Exploration Way</td>
<td>Central Campus Dr</td>
<td>Wasatch Dr</td>
<td>Shared Lane</td>
<td>800</td>
<td>$4,000</td>
<td>U of U</td>
<td>Markings placed only in one direction since it is a one-way road</td>
</tr>
<tr>
<td>Officers Circle</td>
<td>Fort Douglas Blvd</td>
<td>Fort Douglas Blvd</td>
<td>Shared Lane</td>
<td>1,300</td>
<td>$6,400</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Project</td>
<td>From</td>
<td>To</td>
<td>Bikeway Type</td>
<td>Length (ft)</td>
<td>Cost Estimate</td>
<td>Outside Coordination</td>
<td>Notes</td>
</tr>
<tr>
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<td>----------------</td>
<td>-------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Research Rd</td>
<td>Institute Loop</td>
<td>Mario Capecchi Dr</td>
<td>Shared Lane</td>
<td>775</td>
<td>$3,800</td>
<td>Salt Lake City</td>
<td>Eastern part of this segment may be wide enough for bike lanes</td>
</tr>
</tbody>
</table>
Bicycling

Recommended Medium Priority Bicycle Facilities

Existing
- Short-Term Parking
- Long-Term Parking
- Bike Lane
- Multi-Use Path

Existing Trailheads
- Bonneville Shoreline Trail Trailhead

Recommended Medium Term Bicycle Facilities

Type
- Bike Lane
- Bike Path
- Shared Use Path
- SLC Shared Lane
- SLC Buffered or Protected Bike Lane
- SLC Shared Use Path

Recommended Medium Term Spot Improvements
- Spot Improvement
<table>
<thead>
<tr>
<th>Project</th>
<th>From</th>
<th>To</th>
<th>Bikeway Type</th>
<th>Length (ft)</th>
<th>Cost Estimate</th>
<th>Outside Coordination</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Campus East-West Path</td>
<td>Junction SE of Library</td>
<td>University Street/300 South</td>
<td>Bicycle Path</td>
<td>1,270</td>
<td>$127,600</td>
<td>U of U</td>
<td>Stairs on SE side of library would likely require code-compliant bike wheel trough</td>
</tr>
<tr>
<td>Guardsman Way</td>
<td>Foothill Dr</td>
<td>South Campus Dr</td>
<td>Bicycle Lane</td>
<td>450</td>
<td>$3,200-$27,200</td>
<td>UDOT</td>
<td>May be done through lane conversion or reconstruction</td>
</tr>
<tr>
<td>South Campus Dr</td>
<td>Guardsman Way</td>
<td>Mario Capecchi Dr</td>
<td>Bicycle Lane</td>
<td>2,940</td>
<td>$21,000-$179,400</td>
<td>UDOT</td>
<td>May be done through lane conversion or reconstruction</td>
</tr>
<tr>
<td>Arapen</td>
<td>Sunnyside Ave</td>
<td>Wakara Way</td>
<td>Bicycle Lane</td>
<td>2,935</td>
<td>$177,200</td>
<td>Salt Lake City</td>
<td>Bringing existing bicycle lanes up to standard; may require roadway reconstruction</td>
</tr>
<tr>
<td>Mario Capecchi Path</td>
<td>Ballif Rd</td>
<td>Prop. Interdisciplinary Mall Path</td>
<td>SUP</td>
<td>2,120</td>
<td>$136,000</td>
<td>U of U</td>
<td>Would run adjacent to TRAX most of the way</td>
</tr>
<tr>
<td>Red Butte Creek Trail – Seg. 3</td>
<td>Foothill Dr</td>
<td>Prop. Research Park Connector</td>
<td>SUP</td>
<td>1,250</td>
<td>$80,200</td>
<td>Army</td>
<td>Space available on west side of the creek</td>
</tr>
<tr>
<td>Stadium/President’s Circle Connector</td>
<td>Top of north tunnel ramp</td>
<td>President’s Circle</td>
<td>Bicycle Path</td>
<td>1,185</td>
<td>$91,200</td>
<td>U of U</td>
<td>Dismount zone at top of ramps on both sides of tunnel</td>
</tr>
<tr>
<td>Chipeta</td>
<td>Arapen Dr</td>
<td>Wakara Way</td>
<td>Bicycle Lane</td>
<td>2,740</td>
<td>$165,400</td>
<td>Salt Lake City</td>
<td>May be done through lane conversion or reconstruction</td>
</tr>
<tr>
<td>Red Butte Creek Trail – Seg. 1</td>
<td>Existing path north of Sunnyside</td>
<td>VA road across from Wakara</td>
<td>SUP</td>
<td>1,600</td>
<td>$102,600</td>
<td>Salt Lake City</td>
<td>Requires clearing and earthwork; may require environmental review</td>
</tr>
<tr>
<td>Wakara</td>
<td>Foothill Dr</td>
<td>Chipeta Way</td>
<td>Bicycle Lane</td>
<td>2,975</td>
<td>$179,600</td>
<td>Salt Lake City</td>
<td>Bringing existing bicycle lanes up to standard; may require roadway reconstruction</td>
</tr>
<tr>
<td>Project</td>
<td>From</td>
<td>To</td>
<td>Bikeway Type</td>
<td>Length (ft)</td>
<td>Cost Estimate</td>
<td>Outside Coordination</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Foothill Dr Path #3</td>
<td>Western-most VA road</td>
<td>Foothill mid-block crosswalk</td>
<td>SUP</td>
<td>180</td>
<td>$1,200</td>
<td>UDOT</td>
<td>Potential utility conflicts; most useful in tandem with moving stop bars back on Guardsman</td>
</tr>
<tr>
<td>Foothill Dr Path #4</td>
<td>Guardsman way</td>
<td>Stadium TRAX Station</td>
<td>SUP</td>
<td>1,640</td>
<td>$12,000-$105,200</td>
<td>UDOT</td>
<td>In conjunction with USTAR and Ambulatory Care projects</td>
</tr>
<tr>
<td>Interdisciplinary Mall</td>
<td>Primary Children’s Hospital Prop. Research Park Connector</td>
<td>Merrill Building Bicycle Path</td>
<td>SUP</td>
<td>2,670</td>
<td>$136,200</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Red Butte Creek Trail – Segment 4</td>
<td>Red Butte Canyon Rd</td>
<td>S. Medical Dr Bicycle Path</td>
<td>SUP</td>
<td>1,270</td>
<td>$124,100</td>
<td>U of U</td>
<td></td>
</tr>
<tr>
<td>Student Housing Path</td>
<td>Middle Campus East-West Connector</td>
<td>North-South Path President’s Circle Bicycle Path</td>
<td>820</td>
<td>$20,600</td>
<td>U of U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000 East Extension</td>
<td>South Medical Dr</td>
<td>School of Medicine Bicycle Path</td>
<td>880</td>
<td>$31,900</td>
<td>U of U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Butte Creek Trail – Segment 2</td>
<td>VA road across from Wakara</td>
<td>Foothill Dr SUP</td>
<td>425</td>
<td>$27,300</td>
<td></td>
<td>VA; building owners SE of Foothill</td>
<td></td>
</tr>
</tbody>
</table>
University of Utah Parking & Transportation Master Plan

Existing
- Short-Term Parking
- Long-Term Parking
- Shared Lane
- Bike Lane
- Multi-Use Path

Existing Trailheads
- Bonneville Shoreline Trailhead

Recommended Long Term Bicycle Facilities
- Bike Lane
- Bike Path
- Shared Use Path
- SLC Shared Lane
- SLC Bike Lane
- SLC Bike Boulevard
- SLC Buffered or Protected Bike Lane
- SLC Shared Use Path

Recommended Long Term Spot Improvements
- Spot Improvement

Bicycling
Recommended Low Priority Bicycle Facilities
Table 7-6 Low Priority Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>From</th>
<th>To</th>
<th>Bikeway Type</th>
<th>Length (ft)</th>
<th>Cost Estimate</th>
<th>Outside Coordination</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fieldhouse Path</td>
<td>Top of north tunnel ramp</td>
<td>Parking lot north of Fieldhouse</td>
<td>Bicycle Path</td>
<td>500</td>
<td>$49,000</td>
<td>U of U</td>
<td>May require major reconstruction</td>
</tr>
<tr>
<td>Mario Capecchi Dr</td>
<td>South Campus Dr/Hempstead Rd</td>
<td>North Campus Dr</td>
<td>Bicycle Lane</td>
<td>4,350</td>
<td>$31,000-$187,300</td>
<td>UDOT; UTA</td>
<td>May require major reconstruction</td>
</tr>
<tr>
<td>100 South</td>
<td>University St</td>
<td>North Campus Dr</td>
<td>Bicycle Lane</td>
<td>1,400</td>
<td>$10,000</td>
<td>Salt Lake City</td>
<td>May require lane reduction; alternative is shared lane markings</td>
</tr>
<tr>
<td>North Campus Dr</td>
<td>100 South</td>
<td>Mario Capecchi Dr</td>
<td>Bicycle Lane</td>
<td>4,370</td>
<td>$264,000</td>
<td>UDOT</td>
<td>May require major reconstruction</td>
</tr>
<tr>
<td>North Campus Path #2</td>
<td>End of prop. N/S Path at Merrill Bldg</td>
<td>Hospital area</td>
<td>SUP</td>
<td>3,120</td>
<td>$250,000</td>
<td>U of U</td>
<td>Need to mitigate high-speed bicycles coming downhill in opposite direction of traffic</td>
</tr>
<tr>
<td>Shuttle Route Bicycle Lanes</td>
<td>Fort Douglas</td>
<td>Wasatch Dr</td>
<td>Bicycle Lane</td>
<td>525</td>
<td>Unk.</td>
<td>UDOT; UTA</td>
<td>Would likely only occur as part of undefined shuttle bus project</td>
</tr>
<tr>
<td>Foothill Dr Path #5</td>
<td>End of existing SUP</td>
<td>Prop. bridge over Mario Capecchi</td>
<td>SUP</td>
<td>120</td>
<td>$7,700</td>
<td>UDOT</td>
<td>Facility only makes sense in conjunction with bridge over Foothill</td>
</tr>
</tbody>
</table>

Transformative Projects (7.A)

The preceding sections identified in detail the projects recommended to achieve the goals of the University, Medical Center, and Research Park to maintain a sustainable, safe, and efficient pedestrian and bicycle network. **Table 7-7** and **Table 7-8** summarize the capital project recommendations, establishes a prioritized timeline for each project and a cost to implement each project. Projects are listed as HIGH, MEDIUM and LOW priorities. **Table 7-9** includes pedestrian and bicycle policy recommendations.
### Table 7-7 Pedestrian Project List

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campus Wide Connectivity</td>
<td>Complete campus wide sidewalk network</td>
<td>$1,050,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Wasatch Drive</td>
<td>Road diet, enhanced pedestrian facilities</td>
<td>$1,000,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Mario Capecchi Drive</td>
<td>Pedestrian Underpass</td>
<td>$10,000,000</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Wakara Way</td>
<td>Pedestrian Underpass</td>
<td>$10,000,000</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

### Table 7-8 Bicycle Project List

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Cost</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 South Bike Turn Queue Box</td>
<td>Bike Box/Bicycle Detection</td>
<td>$12,500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Left Turn Markings to Law Bldg.</td>
<td>Intersection Markings</td>
<td>$500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Marriott Library Bicycle Ramp/Runnels</td>
<td>Ramp/Runnels</td>
<td>$18,500</td>
<td>HIGH</td>
</tr>
<tr>
<td>Guardsman Way</td>
<td>Bike Box</td>
<td>$3,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>South Campus Road Diet</td>
<td>Protected bike lanes</td>
<td>$200,000-$500,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>North Campus Drive Improvements</td>
<td>Shared Use Path</td>
<td>$175,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Central Campus Drive Improvements</td>
<td>Shared Use Path</td>
<td>$115,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Wasatch Drive Bicycle Lanes</td>
<td>Bicycle Lanes</td>
<td>$15,300</td>
<td>HIGH</td>
</tr>
<tr>
<td>Legacy Bridge Ramp</td>
<td>Spiral Ramp on West Side</td>
<td>$250,000-$400,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Sunnyside Bike Path</td>
<td>Bike Path</td>
<td>$1,100,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Arapeen Dr. to Mario Capecchi Path</td>
<td>Shared Use Path</td>
<td>$140,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Medican TRAX Station</td>
<td>Bike Path/Ramp</td>
<td>$115,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Research Park to Health Sciences</td>
<td>Shared Use Path</td>
<td>$175,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>University Student Apt. to S. Campus</td>
<td>Shared Use Path</td>
<td>$350,000</td>
<td>HIGH</td>
</tr>
<tr>
<td>Mario Capecchi Bike Lane</td>
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Table 7-9 Pedestrian and Bicycle Policy Recommendations

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<tbody>
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<td>Additional Staff</td>
<td>Staff a bicycle and pedestrian safety coordinator</td>
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<tr>
<td>Website</td>
<td>Enhance and maintain university bicycle website</td>
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<tr>
<td>Data Collection</td>
<td>Collect bicycle and pedestrian data annually</td>
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<td>New students</td>
<td>Expand bike orientation efforts</td>
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<tr>
<td>Media</td>
<td>Enhance bicycle safety media campaign</td>
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<tr>
<td>Certification</td>
<td>Seek higher level of Bicycle Friendly Community certification</td>
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<tr>
<td>Fleet</td>
<td>Provide a bicycle fleet for faculty, staff and students</td>
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<tr>
<td>Events</td>
<td>Provide valet event bicycle parking</td>
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</tr>
<tr>
<td>Incentives</td>
<td>Develop an incentive program for bicycle use</td>
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Chapter 8 Conclusion

The Campus Parking and Transportation Master Plan and Research Park Mobility Plan has looked comprehensively at the parking and transportation issues on the main University of Utah Campus, Research Park, and the University Medical Center. Neighboring roadways and jurisdictions to these areas have also been analyzed and considered where appropriate.

Goals and objectives have been identified which outline the guiding principles of the plan and have provided the direction for recommendations. The overriding goals included creating a connected and inviting campus for all users with the express desire to reduce single occupancy vehicle trips to account for only 50% of all campus trips. This goal will be achieved as the University works closely with UDOT, UTA, and Salt Lake City to implement the policies and transformative projects outlined in this report.

The strategies suggested fall into two distinct categories; Transformative or Capital Projects and Policies. Each recommendation is independent of all others, but when implemented as part of a group of recommendations, will provide the necessary synergy to accomplish the University goals. For example, creating safe and attractive walking routes on campus is an effective strategy to create a walkable and attractive campus, but when this is coupled with a new Intermodal Transportation Hub and expanded TRAX service, its effectiveness in reducing SOV trips will be greatly magnified. Similarly, creating the Intermodal Hub without the connected walking routes, although still a worthwhile project, diminishes its effectiveness.

The timing of the projects recommended will depend on several factors, including available funding; the need to partner with other jurisdictions and the completion of the Transformative Projects outlined in the Medical Center, Campus and Research Park master plans. Each recommendation will be best achieved in conjunction with larger capital projects as they come online. Completing the sidewalk network in Research Park, for example, can be achieved as buildings/parking areas are reconstructed.

Possibly the most important recommendation from this plan is to revisit it regularly. Any plan that is approved, printed, and left on a shelf quickly becomes outdated and ultimately obsolete. This plan should be modified as projects come online, industry practices change, and University politics and policy alters. We recommend that at a minimum the plan be revisited annually to ensure its relevance remains and University officials can make the best use of available resources.