

Utah Department of Transportation

# STATE BICYCLE PLAN

Bicycle Facility Gap Analysis &  
Utah Collaborative Active  
Transportation Study

2014



**UTDOT**  
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- Active Transportation Committee
- Mountainland Association of Governments (MAG)
- Salt Lake County
- UCATS Project Team
- UDOT Region Staff
- UDOT Bicycle Coordinator
- Utah Transit Authority (UTA)
- Wasatch Front Regional Council (WFRC)
- City and County Planners



## LIST OF ACRONYMS AND ABBREVIATIONS

AADT	Average annual daily traffic
AASHTO	American Association of State Highway and Transportation Officials
FHWA	Federal Highway Administration
Gaps	Bicycle facility gap or route with insufficient conditions for bicycle travel
GIS	Geographic information system
MAG	Mountainland Association of Governments
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
Plan	Region bike plan
ROW	Right-of-Way
UCATS	Utah Collaborative Active Transportation Study
UDOT	Utah Department of Transportation
UTA	Utah Transit Authority
WFRC	Wasatch Front Regional Council



## EXECUTIVE SUMMARY

The Utah Department of Transportation (UDOT) State Bike Plan (Plan) is an opportunistic plan composed of separate Bike Plans from each UDOT Region. The goal of the Plan is to enhance bicycle safety and mobility throughout Utah. As stated in the UDOT 'Inclusion of Active Transportation' policy: "It is the policy of the Department that the needs of bicyclists, pedestrians, and other Active Transportation users will be routinely considered as an important aspect in the funding, planning, design, construction, operation, and maintenance of Department transportation facilities" (UDOT 2013). This Plan will aid project managers, designers, and planners in decision making; to know where efforts and limited funds can make the biggest impact for bicycle transportation in support of this policy.

UDOT's individual Regions provided input on their bicycle needs following a similar method so that the information would support one statewide Plan. The Plan presented here represents the initial stages of a more comprehensive Plan that will eventually comprise many different types of UDOT facilities in both urban and rural settings across the state. This document reviews the pieces of this Plan that fall within the Wasatch Front metropolitan areas of UDOT Regions 1, 2, and 3, and throughout Region 4. The next step in the process will move the northern UDOT Regions' Plans beyond the metropolitan areas. The process in Region 4 will delve deeper into solutions that meet the increasing needs of the growing number of bicyclists in central and southern Utah.

The basis of the UDOT State Bike Plan is a Bicycle Facility Gap Analysis. This analysis is a data-driven assessment method used to identify areas with insufficient conditions for bicycle travel, or "gaps", on state routes. All state routes in Utah were assessed. Bicycle facility gaps (gaps) are defined as any state route segment not meeting the standards of bicycle travel. Additional information was gathered for each of these areas related to prioritization of the gaps including whether or not the facility is on a local plan and other public input received about the facility.

The gaps were identified during region meetings, using existing data for state routes and an analysis of road characteristics. The following datasets were used to identify gaps:

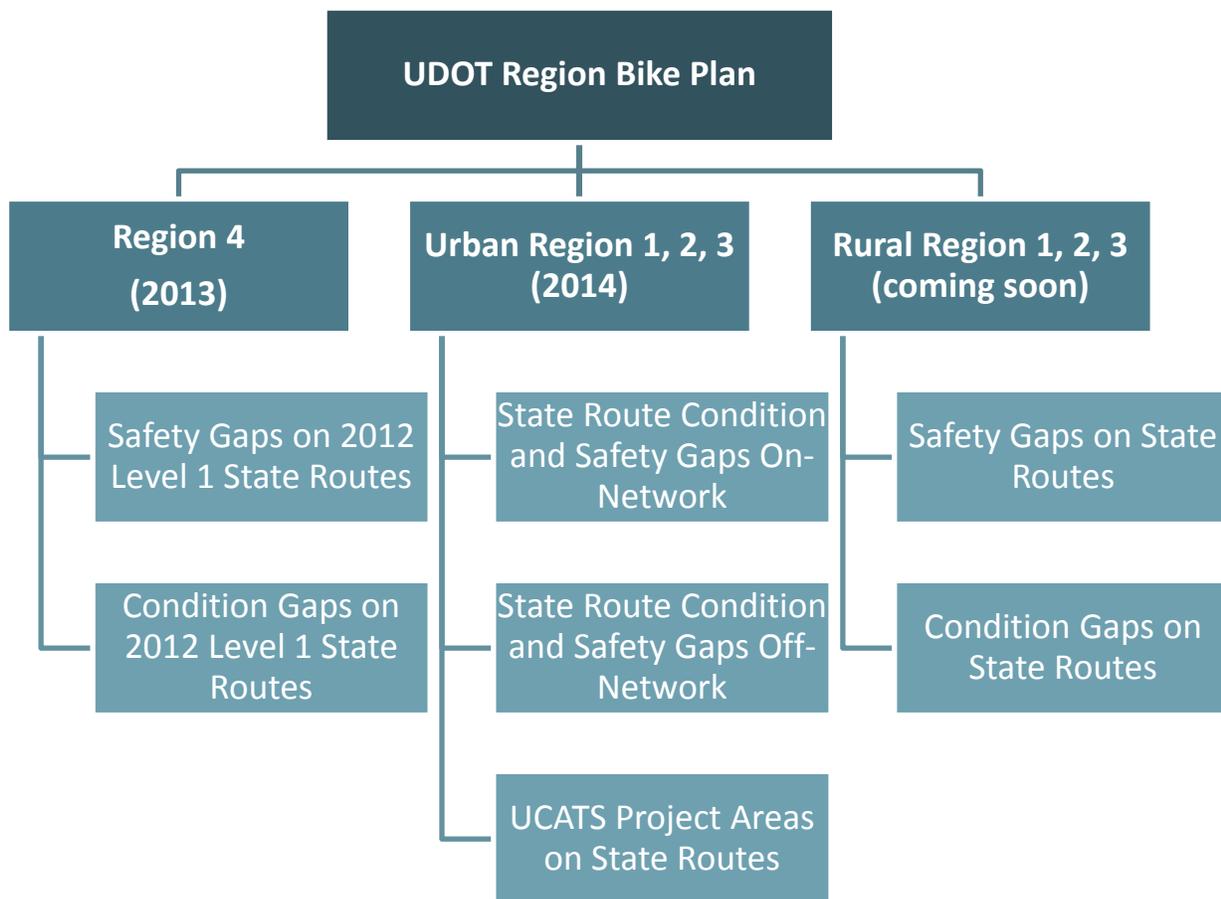
- AADT
- Existing bike facility locations (bike lanes, trails, etc.)
- Existing conditions data (2009 study)
- Safety (bicycle-motor vehicle collision locations)
- Shoulder widths
- Speed limits
- State bicycle route restrictions
- Street parking restrictions
- Truck traffic volume

The gaps and supporting data used to create the UDOT Region Bike Plan can be found on UPlan, UDOT's interactive data tool, in the [Region Bike Plans Gallery](#). A series of maps detailing all of the information have been developed and are displayed in the gallery. The characteristics of each gap are detailed in the data attributes accessed through the UPlan maps, to assist UDOT planners and engineers in making decisions.



In addition to the Bicycle facility Gap Analysis, the UDOT Region Bike Plan project for the Wasatch Front metropolitan area of Regions 1, 2, and 3 was conducted in concert with the current Utah Collaborative Active Transportation Study (UCATS) that reviewed bicycle needs on state and local roads along the urbanized Wasatch Front. The UCATS effort identified a regional bicycle network that includes key connections to transit and existing bicycle facilities, as well as 25 project areas that provide a focus to encourage the development of the regional bicycle network. The UCATS regional bicycle network is the foundation of the Plan in the Wasatch Front metropolitan area of Regions 1, 2 and 3. It was determined during meetings with the UCATS project team, stakeholders and the UDOT Regions, based on reviews of existing and proposed facilities, safety data, and latent bicycle travel demand.

The figure below highlights the unique focus of each Region’s plan and the three planning efforts to complete the Plan.



## INTRODUCTION AND BACKGROUND

*The Region Bike Plan (Plan) is an opportunistic plan to enhance bicycle safety and mobility in UDOT Regions 1, 2, 3, and 4. The need for the plan stems from safety, mobility, and economic factors associated with bicycling in Utah.*

Accommodating bicycles is a key component of a comprehensive transportation system. Bicycling is becoming increasingly popular amongst Utahans for both recreation and commuting. Because of this, cars and bicycles sometimes interact on roads with negative outcomes such as bicycle-motor vehicle collisions. From 2003 to 2012 the State of Utah recorded 7,283 bicycle-motor vehicle collisions; 90 percent of the collisions resulted in injury to the bicyclist (Dept. of Safety 2012). Injury-related bicycle/motor vehicle collisions have increased since 2007. The counties with the highest number of bicycle/motor vehicle collisions in 2012 were Salt Lake (484), Utah (164), Weber (83), and Davis (64) (Dept. of Safety 2012).

UDOT's individual Regions provided input on their bicycle needs using a consistent method to form one statewide Plan. The UDOT Region 4 bike plan was completed in 2013, the urban areas of Regions 1, 2, and 3 were completed in 2014, and the rural areas of Regions 1, 2, and 3 will be completed soon. The Region Bicycle Plan effort serves and reflects UDOT's mission to provide a complete, safe, efficient transportation system for the state. The plan supports UDOT goals for Zero Fatalities and Optimizing Mobility through the emphasis area of Integrated Transportation.

### Region 4 Plan

Work on the Region 4 plan was started in 2012 and completed in 2013. It was the first of the Region Bike Plans to be completed and builds off of previous studies conducted in 2008 and 2009. The basis for the Region 4 plan is the

Bicycle Facility Gap Analysis for Level 1 State Routes as defined in 2012.

The Plan included all state routes of Region 4; however, it was determined that Level 1 roads would be the primary focus due to potential bicycle improvement funding constraints. In 2012, Level 1 state roads were defined as non-interstate routes that have either an average annual daily traffic (AADT) of 2,000 vehicles or greater, or have a daily truck traffic average of 500 combo trucks or greater. Shoulder widening projects for the benefit of bicyclists would be funded through road capacity projects and Level 2 roads do not receive funding for capacity. In Region 4, level 1 roads connect major communities and popular cycling routes enhancing the cycling experience across the region. A map displaying the 2012 pavement management levels for UDOT Region 4 is available on UPlan. The pavement management levels changed in 2013 and were not used in this study's analysis due to project timing.

### Urban Region 1, 2, and 3 Planning Process

The Region Bike Plan project for the Wasatch Front metropolitan area of Regions 1, 2, and 3 was conducted in concert with the Utah Collaborative Active Transportation Study (UCATS). UCATS and the UDOT Region Bike Plan process took place concurrently so that the two planning efforts would support each other and result in a consistent proposed bicycle network.

The Plan for the Wasatch Front metropolitan area of Regions 1, 2, and 3 reflects the regional bicycle network determined by the UCATS



effort; all other off-network considerations on state routes are secondary for this area of the state. The Plan is essentially the UCATS regional network on state routes with the addition of insufficient condition gaps that were not identified as part of the UCATS Regional Network. The UCATS project only impacted the urban part of Region 1, 2, and 3. The gaps and supporting data used to create the plan for all regions can be found on UPlan, UDOT's interactive mapping tool, in the [Region Bike Plan Gallery](#). A series of maps detailing all of the information have been developed and displayed in the gallery. The characteristics of the gaps are detailed in the data attributes accessed through the UPlan maps to assist UDOT planners and engineers in making decisions for the route.

## Policy

As stated in the UDOT 'Inclusion of Active Transportation' policy: "It is the policy of the Department that the needs of bicyclists, pedestrians, and other Active Transportation users will be routinely considered as an important aspect in the funding, planning, design, construction, operation, and maintenance of Department transportation facilities"(UDOT 2013). This Plan will aid project managers, designers, and planners in decision making; to know where efforts and limited funds can make the biggest impact for bicycle transportation in support of this policy.



## APPROACH

*This section provides an overview of the Bicycle Facility Gap Analysis methodology used to identify gaps or road segments with insufficient conditions for bicycle travel.*

### Bicycle Facility Gap Analysis Methodology

The gaps were identified through Region meetings and existing data for state routes and are based on road characteristics. The following datasets were used to identify gaps:

- Average annual daily traffic (AADT)
- Existing bike facility locations (bike lanes, trails, etc.)
- Existing conditions data (2009 study)
- Safety (bicycle-motor vehicle collision locations)
- Shoulder widths
- Speed limits
- State bicycle route restrictions
- Street parking restrictions
- Truck traffic volume

The gaps were identified using standard criteria established by the Federal Highway Administration (FHWA) for road conditions, a safety data analysis, and by the UDOT Regions.

#### Existing Conditions Study

In 2009 a study was conducted for the State of Utah to catalog the existing road conditions for bicyclists. This study compiled information collected in the field on shoulder widths, road debris, speed limit, traffic, and pavement condition to provide a suitability rating for the route. The existing conditions GIS data created by the study was remotely updated for the gap analysis to reflect current conditions as a result of recent UDOT bicycle facility and road widening projects, as well as new data collected by UDOT. The UDOT Mandli shoulder width and bike lane data was incorporated into the analysis as soon as it was available in late 2013. In addition to the available data, input on

current conditions was received during the Region project meetings and attributed to the data. The resulting existing conditions data and the gaps identified with the data are current as of January 2014.

#### Public Input

In conjunction with the 2009 Existing Conditions Study a series of public meetings were held to identify bicycle facility needs in Utah. These meetings identified locations of poor road conditions, safety issues, sign needs, and road debris issues. Public input was also gathered through a public website during the UCATS study.

#### FHWA Standards for Cyclists

The FHWA has developed bicycle facility standards for rural and urban riders of different experience levels based on road characteristics (FHWA 1994). For this study, state routes were categorized using standards for advanced bicyclists (Class A) in settings with and without street parking (see Figures 1 through 3). Road characteristics data were used to identify the bicycle facility quality of routes. A four-tiered system was used to describe the conditions. A bicycle facility gap is any length of state route that is a tier 3 or 4. The tier descriptions are:

1. Presence of a bike lane or trail
2. Conditions met for urban Class A cyclists
3. Insufficient conditions for urban Class A cyclists
4. Route not recommended for urban Class A cyclists (urban, with street parking category) due to high vehicle speeds along route



## Safety Data Analysis

UDOT Traffic and Safety provided bicycle-motor vehicle collision locations data for 2006-2011 for the study area (UDOT 2012). For Region 4 safety was a characteristic used to describe the facility gaps. No location with bicycle-vehicle collisions in Region 4 met the FHWA standards; however, in Regions 1, 2, and 3 there were locations with bicycle vehicle collisions that met the FHWA standards or had bike facilities. Therefore, in Regions 1, 2, and 3 it was necessary to identify areas of safety concerns in addition to the facility gaps.

A kernel density analysis was conducted on the point locations of bicycle-motor vehicle collisions to identify road segments of concern. The Kernel density analysis provided a visual representation of bicycle-motor vehicle collision

high concentrations or hotspots. The route segments constrained within these hotspots that had two or more collisions and/or a fatality collision were identified as safety concerns.

A secondary analysis of intersections was conducted on the data. Any intersection with an average of one or more collisions per year over the 5-year period of the data was highlighted as a high-risk intersection. A safety concern located on the regional network is highlighted as a safety gap in the plan. And, a safety concern that is located on an off-network route is considered a safety consideration in the plan data. The safety designations are in addition to the FHWA conditions and UCATS designations in the data. All road designations, on and off network, are detailed on UPlan in the UDOT [Region Bike Plans Gallery](#).

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h	wc 14	truck, bus, rv		wc 14	wc 14	truck, bus, rv		wc 14	wc 14	truck, bus, rv		wc 14
		wc 14	wc 14			wc 14	wc 14			wc 15	wc 15	
30-40 mi/h	wc 14	wc 14	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15
41-50 mi/h	wc 15	wc 15	wc 15	wc 15	wc 15	wc 16	wc 16	wc 16	wc 15	wc 15	wc 16	wc 16
over 50 mi/h	na	na	na	na	na	na	na	na	na	na	na	na

Figure 1: FHWA bicycle facility standards for Class A cyclists in urban areas with street parking.



average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h		truck, bus, rv				truck, bus, rv				truck, bus, rv		
	sl 12	sl 12	wc 14	wc 14	sl 12	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14	wc 14
30-40 mi/h	wc 14	wc 14	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15	wc 14	wc 15	wc 15	wc 15
41-50 mi/h	wc 15	wc 15	wc 15	wc 15	wc 15	wc 15	sh 6	sh 6	wc 15	wc 15	sh 6	sh 6
over 50 mi/h	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6

Figure 2: FHWA bicycle facility standards for Class A cyclists in urban areas without street parking.

average motor vehicle operating speed	average annual daily traffic (AADT) volume											
	less than 2,000				2,000-10,000				over 10,000			
	adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance		adequate sight distance		inadequate sight distance	
less than 30 mi/h		truck, bus, rv				truck, bus, rv				truck, bus, rv		
	sl 12	sl 12	wc 14	wc 14	sl 12	wc 14	wc 14	wc 14	wc 14	wc 14	sh 4	sh 4
30-40 mi/h	wc 14	wc 14	sh 4	sh 4	wc 14	wc 15	sh 4	sh 4	sh 4	sh 4	sh 4	sh 4
41-50 mi/h	sh 4	sh 4	sh 4	sh 4	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6
over 50 mi/h	sh 4	sh 6	sh 6	sh 4	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6	sh 6

Figure 3: FHWA bicycle facility standards for Group A cyclists in rural areas.



## FINAL PRODUCT

*This section provides an overview of the series of maps detailing the plan and supporting data information were made available on UPlan. In addition to these maps a project prioritization matrix was developed for Region 4 and a series of UCATS project areas were developed for the urban part of Regions 1, 2, and 3. The Region 4 Project Prioritization matrix can be found in Appendix B. The UCATS project area information can be accessed through UPlan.*

### Region Bike Plan Gallery

The Region Bike Plans Gallery on UPlan is the information source for project managers, planners, and designers. The maps display the gap areas by region, the data used to identify the gaps, and the data attributes within the maps provide information on the amount of additional width necessary to bring the route up to standard. The additional width can be provided as a bike lane, a trail in the right-of-way, or wider shoulder. The characteristics of the road and the cycling needs of the area will determine the best facility to remedy the gap as constrained by project scope and budget. The purpose of this Plan is to be opportunistic, to allow project managers, planners, and designers the flexibility to choose the best facilities that can be implemented based on project constraints. Information on bicycle facility design can be found here:

- 1) FHWA Office of Planning, Environment, and Realty (HEP): Bicycle and Pedestrian:  
[http://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/guidance/design\\_guidance/](http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/)
- 2) AASHTO Guide for the Development of Bicycle Facilities, 4<sup>th</sup> Edition  
[https://bookstore.transportation.org/collection\\_detail.aspx?ID=116](https://bookstore.transportation.org/collection_detail.aspx?ID=116)
- 3) National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide  
<http://nacto.org/cities-for-cycling/design-guide/>

### Map Information

The following provides some information on each of the 14 maps available for users on the UPlan Region Bike Plans Gallery. Map details can also be accessed on UPlan.



#### Region 1 Bike Plan: Projects and Gaps

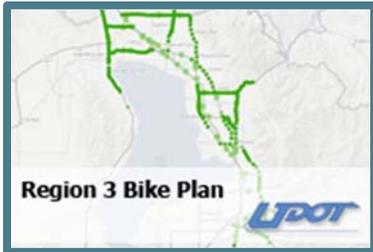
This map displays the existing and proposed bicycle network, facility conditions and gaps on state routes, safety considerations, and UCATS project areas for Region 1.





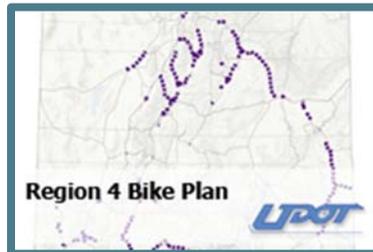
### Region 2 Bike Plan: Projects and Gaps

This map displays the existing and proposed bicycle network, facility conditions and gaps on state routes, safety considerations, and UCATS project areas for Region 2.



### Region 3 Bike Plan: Projects and Gaps

This map displays the existing and proposed bicycle network, facility conditions and gaps on state routes, safety considerations, and UCATS project areas for Region 3.



### Region 4 Bike Plan: Gaps

This map displays the bicycle facilities, road conditions and gaps for Region 4. The analysis has been updated in 2013 to include all state routes in Region 4; however, the original analysis and plan focused on Level 1 roads as defined in 2012.



### UCATS Project Areas

This map displays UCATS project areas and feasibility studies on state and local routes within the urban areas of Region 1, 2, and 3.



### UCATS Regional Bicycle Network

This map displays the existing and planned bicycle infrastructure for state and local roads developed through UCATS. The planned infrastructure is the regional bicycle network that influenced the plan. The UCATS boundary encompasses the urban area of UDOT Regions 1, 2, and 3.





### 2011 AADT for Utah Routes

This map displays 2011 AADT. AADT is a component for determining suitable conditions based on FHWA standards for the gap analysis.



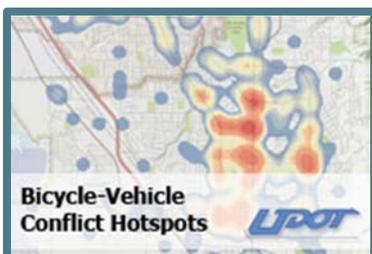
### Bicycle Latent Demand

This "Latent Demand Index" displays the estimated pedestrian and bicycling demand (not necessarily usage) in a given area, based on land use, demographic and built environment factors. Latent demand refers to the number of people who would walk or bike if active transportation infrastructure existed. A higher index score indicates a higher likelihood of pedestrian and bicycling activity.



### State Bicycle Restrictions Map

This map displays the bicycle restrictions for the State of Utah. Route restrictions are set by legislature and include urban segments of interstates where more suitable alternatives exist. This data was used for the gap analysis.



### Bicycle-Vehicle Conflict Hotspots

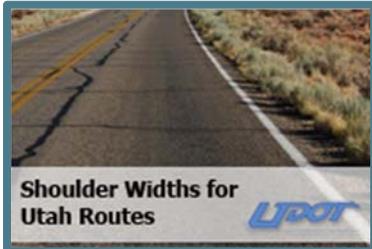
This heat map was created using point data provided by UDOT Traffic and Safety. Only bicycle collision data from 2006 to 2011 was used. Kernel density calculates the density of features in a neighborhood around those features. Low represents 1 collision; high represents 12 or greater collisions depending on the size of the area. This map provides a visual representation of the areas of high bicycle-vehicle collision activity for reference purposes only. The original point data was used to determine safety concerns for the gap analysis. For access to this map, please contact UDOT Planning or UDOT Central GIS staff.





### No On-Street Parking

This map displays areas of no on-street parking for UDOT Regions 1, 2, and 3. Street parking is a component for determining suitable conditions based on FHWA standards for the gap analysis.



### Shoulder Widths for Utah Routes

This map displays shoulder widths from the UDOT lidar-generated dataset. Shoulder widths is a component for determining suitable conditions based on FHWA standards for the gap analysis.



### Speed Limit for Utah Routes

This map displays 2012 speed limit data for UDOT Regions 1, 2, and 3; and, 2011 speed limit data for Region 4. Speed limit is a component for determining suitable conditions based on FHWA standards for the gap analysis.



### Truck Traffic Percentage

This map displays the truck volume percentage on Utah Roads. Truck traffic percentage is a component for determining suitable conditions based on FHWA standards for the gap analysis.

## FUTURE STEPS

The UDOT Region Bike Plan and Bicycle Facility Gap Analysis effort will be expanded to include the rural areas of UDOT Regions 1, 2, and 3. Region 4 will begin re-examining and expanding their Plan. The final project goal is an integrated statewide UDOT Bicycle Plan that seamlessly connects all Regions. To meet the unique needs of each UDOT Region, the Plans for all four will continue to be developed separately. This will provide increased opportunity for focused input. The goal of this process is to eventually combine the Region Plans to create a consistent statewide Plan.

The UCATS project will continue through 2014 and will further define project areas within the urbanized areas of UDOT Regions 1, 2, and 3. The UCATS team will work in conjunction with UDOT and local governments to define project needs and expectations.



## REGION IMPLEMENTATION PLANS

*This section contains the Implementation Plan developed by each Region. Each Region will manage these implementation plans as determined by the Region Senior Leadership.*

### Region Bike Plan Update Procedure

The Plan is not static. It will require updating as bicycle facilities are built, as network changes are proposed, and as road characteristics and safety data are updated. Many stakeholders were involved in various aspects in the development of this Plan; therefore, any future updates should respect this prior effort and those involved before changes are made. The regional network is the basis of the Plan and was developed through a series of stakeholder meetings. *No singular entity can make updates to the network without involving all stakeholders, otherwise, the plan will become disconnected and possibly contradict local bicycle planning efforts.*

### Statewide Active Transportation Coordination Committee & UDOT AT Committees

A Statewide Active Transportation Coordination Committee (SATCC) has been proposed to coordinate bicycle and pedestrian planning activities across the state to reduce duplication of efforts, manage resources, generate ideas to improve programs and policies in place, and build support and funding. The goal of SATCC is to make Utah a leader in active transportation. The SATCC would act as an umbrella committee and would include:

*Steering Committee*--oversight for general communications and SATCC organization

*Sub-Committees*-- act autonomously, determining the timing and frequency of meetings, basic structure and the specific activities.

One of the sub-committees proposed within the SATCC will consider and make recommendations regarding active transportation infrastructure. The State Infrastructure Sub-Committee will be comprised of representatives from UDOT, Metropolitan Planning Organizations (MPOs), Rural Planning Organizations (RPOs), and Association of Governments (AOG) in Utah.

A UDOT Active Transportation Coordination Committee (UATCC) will be established within the Department. Each UDOT Region will designate one Active Transportation Committee Liaison to serve on the UATCC and oversee the Plan within the Region.

### UDOT Active Transportation Coordination Committee (UATCC) Liaison

The first step towards uniform implementation of the Plan is the designation of UDOT Active Transportation Committee Liaison (Liaison) within the Region. The Liaison will be responsible for:

- Maintaining and updating the Plan for the Region,
  - Communicating proposed local changes with the Region,
  - Communicating approved changes with UDOT Planning point of contact to update the GIS data on UPlan on a regular schedule,
- Disseminating information and gathering feedback about UDOT's active transportation programs
- Working with the UATCC to help foster new programs



- Building support and understanding for active transportation policies and procedures within the Region
- Serving as the funding information coordinator for Region Transportation Alternatives Program (TAP) fund,
- Attending local Active Transportation Committee meetings or other local government bike planning meetings,
- Attending the Statewide Active Transportation Coordination Committee (SATCC) meetings as requested,
- Working within the UATCC to provide information to the State Infrastructure Sub-Committee
- Attending UDOT Active Transportation Coordination Committee (UATCC) meetings as requested, and
- Providing Region input on design standards and plan updates

3. Active Transportation Liaison meets and coordinates with Program Manager to communicate active transportation needs for funded projects.
4. Program Manager distributes this information to Project Managers.
5. Project Managers discuss active transportation needs with the Active Transportation Liaison and the project team during project planning and concept stages to aid the inclusion of active transportation in the development of the Project Development Document (PDD).
6. Project Managers include this information in the PDD.
7. Program Manager and Active Transportation Liaison check PDD for inclusion.
8. At Region Senior Leadership Meeting, Senior Leadership will review PDD for content and return to Project Manager with any comments for revision if necessary.
9. Active Transportation Liaison reports active transportation projects funded on a yearly basis to the UDOT Bike and Pedestrian Coordinator and with the UDOT Active Transportation Committee at a regularly scheduled meeting.
10. Bike and Pedestrian Coordinator will ensure the updates are reflected in the Region Bike Plan.

### Plan Update Process

The Plan is not static. It will require updating as bicycle facilities are built, as network changes are proposed, and as road characteristics and safety data are updated. Many stakeholders were involved in various aspects in the development of the Plan; therefore, any future updates should respect this prior effort and those involved before changes are made. The Plan should be reviewed and assessed for implementation opportunities once every year in conjunction with the STIP workshop. The following outlines this process:

1. Active Transportation Liaison reviews funded projects to compare with the Bike Plan and identify active transportation projects that can be accommodated in conjunction with the funded projects.
2. The Active Transportation Liaison reviews the proposed projects and opportunities with the UDOT Bike and Pedestrian Coordinator to identify potential solutions.

### Project Selection Process

#### Design Guidelines

The Liaison will work within the UATCC to help determine flexible, and consistent, design guidelines to assist in identifying the type of facilities that would be best suited based on the roadway characteristics. The Plan does not currently identify specific facilities (i.e., bike lanes) or design guidelines for each gap; it only identifies areas in need of improvement to support active transportation. Design guidelines should include criteria for selecting facility types



and suggestions for a range of solutions that meet multiple needs on various types of facilities. The guidelines should take into consideration connectivity to existing infrastructure, future plan incorporation, and updating of existing conditions data. Design guidelines will follow established information from the Federal Highways Administration (FHWA), National Association of City Transportation Officials (NACTO), American Association of State Highway and Transportation Officials (AASHTO), and the Manual on Uniform Traffic Control Devices (MUTCD). The design guidelines will establish how the existing information available from AASHTO, FHWA, MUTCD, and NATCO will be applied to the state routes identified in the Plan.

### Selection Criteria

The Liaison will work with Region representatives to identify what criteria are important for identifying bicycle projects. The criteria may include: demonstrated need, design considerations, proposed facility type, transportation project type, connectivity to existing bicycle facilities, local plan projects, and existing roadway conditions.

### Project Selection Criteria Meeting and Task Process

Project selection criteria and design standards should be developed with Region input to ensure the Plan is implemented realistically and with the support of project engineers. The following outlines the project selection criteria process:

SATCC Meeting (Liaison only)

- Design standards
- Identify potential active transportation projects in support of the Plan and UDOT's construction schedule

Region Meetings

- Meeting Organizer:
  - The Liaison
- Meeting Attendees:
  - Traffic and Safety,

- Project Development,
- Maintenance,
- Project Engineers,
- Active Transportation Committee Members
- First Region Meeting Topics:
  - Review of the Plan
  - Discuss possible project selection criteria and gather input
    - Selection criteria may include: design considerations, proposed facility type, transportation project type, connectivity to existing bicycle facilities, local plan projects, and existing roadway conditions, etc.
  - Discuss design standards and how they may influence selection criteria
    - What types of road characteristics are necessary for the construction of certain bicycle facilities? I.e., bike lanes, wide shoulders, etc.
- Second Region Meeting Topics:
  - Review selection criteria and design guidelines and gather final comments
- Email meeting attendees final selection criteria and design guidelines

### Funding Active Transportation Projects

Helping to identify funds for active transportation projects will be the most important task of the Liaison. Active transportation projects should be part of the STIP funding request. Until a dedicated funding source is established the incorporation of active transportation projects will depend on transportation project goals and funding



restrictions determined by transportation project type. The Liaison will work to form partnerships with the local governments for funding of active transportation projects.

### Project Implementation

The Liaison will work with project engineers to incorporate the Plan and active transportation projects into the concept document as well as the Project Development Document (PDD) forms. Bicycle and pedestrian projects should be considered early in the programming process and not be an afterthought once the design phase has begun.

### Project Implementation Meeting and Task Process

To ensure that the Plan is considered early in the programming process the Liaison will work with Region representatives to identify how projects can be incorporated as part of existing projects. The following outlines the project implementation discussion process:

- Meeting Organizer:
  - The Liaison
- Meeting Attendees:
  - Traffic and Safety,
  - Project Development,
  - Maintenance,
  - Project Engineers,
  - Active Transportation Committee Members
- First Region Meeting Topics:
  - Review of the Plan
  - Review of the Long-Range Plan and STIP projects
  - Discuss possible project incorporation ideas, i.e., concept document, PDD forms
- Second Region Meeting Topics:
  - Review implementation process and gather final comments
- Email meeting attendees final project implementation process

### UCATS and the Regional Bicycle Network

In 2014 the UCATS effort will continue to work with the local communities on the regional bicycle network and the project areas. In the future, regional bicycle network changes may be instigated by local plan changes, bicycle facility construction on local streets, or by UDOT. UCATS will establish a process for making changes to the UCATS regional bicycle network understanding that many stakeholders were involved and continue to be involved in its development. In the meantime, the Liaison will represent UDOT's interests in the ongoing planning process.

### Gap Analysis

The gaps identified for the UDOT Regions are only as current as the data used in the analysis. Traffic volume changes, speed limit changes, road construction projects, and bike lane projects will change the gaps identified by this study. It is proposed that an updating procedure be implemented to maintain the most current data and identify the gaps correctly on the regional network.

AADT, truck traffic, and speed limits are updated annually by UDOT and are publically available. Safety and street parking restrictions data are also updated annually; however, they are not publically available. And, route restrictions, shoulder width, and bike facility location data are datasets without a predetermined update schedule that will need to be updated by Region input. It is proposed that the analysis be re-run with the current available data at minimum every 3 years concurrent with the STIP. Ideally the gap analysis would be updated annually to reflect all road changes throughout the year.

Region meetings may be necessary to identify new or planned bicycle facility locations, and road construction projects that either expanded or restricted shoulder widths. Maintaining this information while using the current methodology will provide an up-to-date list of



gaps both on and off network for the Regions to consider as projects are scheduled for their routes. The following work plan is suggested:

1. Meet with Region representatives to provide a refresh on the project goals, review the previous data, identify new route restrictions if applicable, identify areas of recent bicycle facility improvements, and identify areas of road widening or other construction that may have impacted shoulder widths where not reflected in the data.
2. Access current data for AADT, truck traffic, speed limits, safety, route and street parking restrictions data.
3. Discuss local bike plans at local government meetings to identify when and where proposed and existing bike facilities interact with state routes.
4. Perform an overlay analysis using the updated data based on the FHWA road characteristics criteria.
  - a. All data must be tied to the LRS. All datasets are unioned by using the overlay tables tool in ArcMap producing one table with segment breaks at each informational change.
5. Identify and attribute the gaps based on current standards.
6. Identify the gaps on the regional bicycle network, and the secondary considerations off network.

7. Follow outlined procedures for updating the UPlan maps with new data.
8. Update Region Bike Plan document if necessary.
9. Meet with Region representatives to review and QA/QC the results.
10. Follow outlined procedures for updating the UPlan maps and data, and the Region Bike Plan document, if necessary, based on input received at Region meetings.

### Proposed Schedule

Appendix A contains a proposed meeting and task schedule for the Liaison to implement the Plan. The tasks are on a yearly cycle to coordinate with the STIP schedule. The schedule may be modified and added to the plan at the discretion of each Region.

In addition to the meetings and tasks outlined in Appendix A, the Liaison will also be responsible for the following tasks on their own schedule: disseminating information and gather feedback about UDOT's active transportation programs, devising the process for Plan implementation and updates, working with the UATC to set direction within the Region for active transportation, informing the Region of programs in place, fostering new programs, and building support and understanding for active transportation policies and procedures within UDOT.





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## APPENDIX A: Proposed Implementation Schedule

### Active Transportation Region Liaison Meeting and Task Schedule for Implementation

TASKS*	YEAR 1	YEAR 2	YEAR 3
<b>January</b>			
SATCC Meeting	X	X	X
UATCC Meeting	X	X	X
SATCC attends Region Workshops	X	X	X
Meet with appropriate parties to discuss funding	X	X	X
Review and update the Plan			X
<b>February</b>			
Develop selection criteria	X		
Meet with Region representatives to review criteria	X		
Review criteria annually with the Region		X	X
Meet with Region to review Plan and update needs			X
<b>March</b>			
Update the Plan on UPlan			X
<b>April</b>			
SATCC Meeting			
UATCC Meeting	X	X	X
Review STIP projects for bicycle opportunities	X	X	X
Identify bicycle opportunities and contact project managers	X	X	X
<b>May</b>			
Region Meeting to discuss STIP bicycle opportunities	X	X	X
Program managers include bicycle opportunities in PDD	X	X	X
<b>June</b>			
State Infrastructure Sub-Committee Meeting	X	X	X
<b>July</b>			
SATCC Meeting			
UATCC Meeting	X	X	X
<b>August</b>			
Update Region representatives on Active Transportation efforts	X	X	X
<b>September</b>			
Identify active transportation projects to be included in STIP development and PDD	X	X	X
<b>October</b>			
SATCC Meeting			
UATCC Meeting	X	X	X
<b>November</b>			
Regions compile projects for the STIP	X	X	X
<b>December</b>			
State Infrastructure Sub-Committee Meeting	X	X	X

\* Local government meetings as needed throughout.



## APPENDIX B: Region 4 Prioritization Matrix and Methodology

### REGION 4 BICYCLE PLAN

The UDOT Region 4 Bike Plan included a prioritization matrix in addition to the Bicycle Facility Gap Analysis. This appendix includes this matrix along with the detailed methodology.

### AASHTO BICYCLE PROJECT PHASING RECOMMENDATIONS

The American Association of State Highway and Transportation Officials have established phasing recommendations for bicycle plans. The recommendations include six criteria for establishing bicycle project priority (AASHTO 2012):

- Bicycle Travel Demand
- Route Connectivity and Directness
- Crash/Conflict Analysis
- Barriers (Identified Issues)
- Ease of Implementation
- System Integration

The gaps were prioritized using the six AASHTO criteria. The results of the prioritization process are summarized in the prioritization matrix.

### LOCAL JURISDICTION INTERVIEWS

In 2012, the city and county planners in Region 4 were interviewed to understand the local jurisdictional perspective on bicycling in their communities to provide information for the prioritization matrix. If the planner did not feel confident in their knowledge of bicycling in the area they offered alternate contacts for interview. The planners were asked the following questions:

1. Do you have any Bike Plans for your city/county?
2. Where are the majority of cyclists riding to and from in your city/county?
3. What are the routes currently most used or preferred by cyclists in your city/county?
4. What obstacles may be preventing your citizens from riding?
5. What facility improvements along state routes would benefit cyclists?
  - a. Gaps in routes?
  - b. Shoulder projects?
  - c. Existing conditions
  - d. Safety concerns
6. How important is bicycling to the economic vitality of your city/county?
7. How important are ATV riders to the economic vitality of your city/county?

### PRIORITIZATION MATRIX

Identified bicycle facility gaps (gaps) were grouped based on proximity and quality and assigned a 'Gap ID'. The gaps are compiled in a matrix which neatly summarizes the main characteristics of each gap and the route with a color code.



1. Dark blue
2. Medium blue
3. Light blue

The categories of the matrix follow the AASHTO phasing recommendation criteria. The following details each category of the matrix.

### **FHWA STANDARDS**

This category is a summary of the FHWA ranking. The FHWA ranking is not consistent through the length of each gap because gaps were grouped based on proximity. Because of this, the category is symbolized by the most deficient ranking found in the gap. The following is the matrix color code:

1. A segment of the gap does not meet FHWA standards (tier 4)
2. A segment of the gap does not meet FHWA standards; however, a minimum 2 foot shoulder is present (tier 3)
3. A segment of the gap does not consistently meet FHWA standards (tier 2)

### **CRASH/CONFLICT ANALYSIS**

This category is a summary of the UDOT Bicycle Crash data for 2001-2010 (UDOT 2012). The average per mile bicycle-vehicle collision on Region 4 gaps was 0.6 per mile. The following is the matrix color code for safety:

1. The gap had above average bicycle-vehicle collisions or 1 fatality between 2001-2010
2. The gap had below average bicycle-vehicle collisions between 2001-2010
3. There are no recorded bicycle-vehicle collisions for the gap between 2001-2010

### **BICYCLE TRAVEL DEMAND**

#### ***Planner Identified Need***

This category is a summary of the bicycle project needs identified by city and county planners during the region-wide interviews. The following is the color code for planner identified need:

1. The gap was identified by a planner as a project need
2. A portion of the gap was identified by a planner as a project need
3. The gap was not identified by a planner as a project need

#### ***Tourism Dependence***

This category is a summary of the current and projected tourism employment dependence of the county from by the Governor's Office of Planning and Budget (GOPB). The following is the color code for tourism dependence:

1. Both current and projected tourism employment are above state average
2. Either current or projected tourism employment is above state average
3. Current and projected tourism employment is below state average

#### ***Planner Perceived Economic Impact***

This category is a summary of the perceived economic impact of bicyclists by county and city planners interviewed for this project. The following is the color code for planner perceived economic impact:



1. The planner stated that bicycling and related events are important to the local economy and/or they are actively encouraging bicycle improvement projects
2. The planner mentioned bicycling and related events as having a positive impact on their economy; however, other activities drove the tourism and recreation in their area
3. The planner stated that bike use is low in their city or county

### *High Population Growth and Density*

This category combines the population density of the area within 2 miles of the gap and the county growth rate. An average was calculated for the population growth and density using the information available for all of the gaps in Region 4. The following is the color code for high population growth and density:

1. Both the population growth and density for the gap are above average relative to all Region 4 gaps
2. Either the population growth or density for the gap are above average relative to all Region 4 gaps
3. Both the population growth and density for the gap are below average relative to all Region 4 gaps

### *Located Near Trip Generators*

This category summarizes the presence of schools, parks, and commercial and residential zones intersected by the bicycle facility gap. All schools were counted as trip generators. Park acreage was averaged for all parks intersected by Region 4 gap projects. An average percent of right-of-way (ROW) acreage was calculated for both commercial and residential zones intersected by Region 4 gap projects.

1. A school, above average park acreage, and above average residential and commercial zone acreage relative to all Region 4 gaps was intersected
2. One school, or above average park acreage, or above average residential and commercial zone acreage relative to all Region 4 gaps was intersected
3. The characteristics of the area are below average relative to all Region 4 gaps and no schools are present

## **EASE OF IMPLEMENTATION**

### *Cost*

Bicycle construction projects can have great variability in cost depending on the site conditions and number and quality of enhancements. For this study the gaps were estimated at \$40 per square foot, an average cost for shoulder widening projects, for the square footage necessary to provide adequate facilities. The following is the color code for cost:

1. Improvement needs are estimated to be greater than 10 million dollars
2. Improvement needs are estimated to be between 1-10 million dollars
3. Improvement needs are estimated to be less than 1 million dollars

### *Potential Environmental Issues*

The Planning and Environmental Linkages (PEL) Analysis Tool was used to determine potential environmental impacts of the gap. The following categories were used in the analysis: streams, lakes, wetlands, canals, floodplains, wildlife conservation species, rare plants, hazardous wastes, paleontological sensitivity, and archaeological sites. Potential environmental impacts can overlap the



same location therefore the impact acreage can be greater than 100% of the right-of-way acreage. The following is the color code for potential environmental issues:

1. The potential environmental impact acreage is equal to or greater than the ROW acreage due to overlapping environmental concerns
2. The potential environmental impact acreage is greater than 30% and less than 100% of the ROW acreage
3. The potential environmental impact is less than 30% of the ROW acreage

## **ROUTE CONNECTIVITY AND DIRECTNESS**

### ***Trip Generator Connections***

This category summarizes the bike routes found within 2 miles of the gap that were identified in the previous 2009 Existing Conditions Study and UDOT Final Priorities Study and the number of towns connected by the gap. An average percent of the bicycle route miles per gap miles was calculated as well as the average number of towns intersected by a gap for Region 4. The following is the color code for trip generator connections:

1. Both the bicycle routes and number of towns intersected by the gap are above average relative to all Region 4 gaps
2. Either the bicycle routes or the number of towns intersected by the gap is above average relative to all Region 4 gaps
3. Both the bicycle routes and number of towns intersected by the gap are below average relative to all Region 4 gaps

### ***Within 25 miles of a National Park***

This category details whether or not a gap is within 25 mile of a National Park. The following is the color code for National Parks:

1. The gap is within 25 miles of a National Park
3. The gap is not within 25 miles of a National Park

### ***Connectivity to High Standard Routes***

This category summaries the ability of the gap to connect routes with high FHWA standard rankings (tier 1) in the region. The following is the color code for connectivity to high standard routes:

1. The gap is a deficient segment within high standard bicycle routes
2. One end of the gap connects to high standard bicycle routes
3. The gap is a deficient segment within a series of deficient segments

### ***National and State Bicycle Trail Route***

There are two national bicycle trail routes found in southern Utah: the Western Express Bicycle Route and the Grand Canyon Connector Bicycle Route. There are eight road bicycle loop routes in the State of Utah. Gaps found on national or state bicycle routes are identified using the following color code:

1. The gap is on a national bicycle route and/or on a state bicycle loop route
2. A portion of the gap is on a national or state bicycle route or it is a locally important trail route used for annual events
3. The gap is not found on a national or state bicycle route



### *Scenic Byway*

There are two levels of scenic byways within Utah: National Scenic Byways and Scenic Byways identified by the state of Utah. Gaps found on scenic byways are identified using the following color code:

1. The gap is on a national scenic byway
2. The gap is on a state designated scenic byway
3. The gap is not found on a scenic byway of either type

### **BARRIERS (IDENTIFIED ISSUES)**

This category combines the planner identified needs and the needs identified during the public workshops on 2012 level 1 roads. The following is the color code for overcomes identified issue:

1. Both the planner and the public have identified the route as a need
2. Either the planner or the public have identified the route as a need, but not both
3. Neither the planner or public identified the route as a need

### **SYSTEM INTEGRATION**

#### *Proximity to Intermodal Hub*

A limited number of intermodal hubs can be found in southern Utah. Gaps found within 2 miles of an intermodal hub are identified using the following color code:

1. The gap is within 2 miles of an intermodal hub
3. The gap is not within 2 miles of an intermodal hub

