Meeting Agenda

• Welcome & Introductions

• Check in with Sites
  o In Person – VTrans HQ
  o RPC hubs
  o Live streaming

• Presenters
  o Kevin Marshia, VTrans Chief Engineer, Highway Division
  o Phil Goff, Alta Planning + Design

• Q & A
  o Each location and live chat will be given opportunity to comment
  o Technical Panel available
Purpose of Meeting

• Review Scope of Phase II
  o Gap analysis on high use/priority corridors
  o Bicycle safety hot spot analysis

• Opportunities to Participate
  o Online survey
  o Phase II WikiMap

• Sign up for project updates at vermontbike@gmail.com

• Comment Period closes December 16
Purpose of Phase I

*Categorize state roads:*

- Into high-, moderate-, and low use/priority
- Based on current and potential bicycle use
- Accounts for transportation and recreational use

Result:
- High use
- Moderate use
- Low use
Purpose of Phase II

Three Primary Goals:
1. Conduct Safety Analysis
2. Develop Roadway Evaluation Criteria to identify Gaps
3. Evaluate High-Use Corridors

Next Steps (Phase III):
• Information will be used to identify opportunities for bicycle improvements along the high priority bicycle corridors
VTrans Current Initiatives

- Design Considerations
  - 11 ft Lanes
  - Adding shoulder widths
- Maintenance Activities
  - Shoulder sweeping
  - Pot holes
  - Minor pavement Maintenance
- Incorporating Bicycle Facilities
  - Road Diets
  - Bicycle Pavement Markings
Summary of Phase II Project Tasks

- Task 1 – Outreach/Public Participation
- Task 2 – I.D. and Analyze Safety Hotspots
- Task 3 – Develop Roadway Evaluation Criteria
- Task 4 – Evaluate High Use/Priority Corridors
- Task 5 – Final Report
Phase II Public Meeting Schedule

**Statewide Public Meeting #1**
- Review of Phase I results
- Scope and goals for Phase II
- Preliminary findings of the hotspot analysis
- Next steps
- Q&A

**Statewide Public Meeting #2**
- Summary of Meeting #1
- Review of roadway evaluation criteria
- Draft gap analysis map
- Q&A
Task 3: Evaluation Criteria Development  
(December 2016/January 2017)

- Online survey will be used to ask public to rate draft evaluation criteria
- Survey will provide opportunity to add additional criteria to be considered

Task 4: Evaluation of High Priority Corridors (April/May 2017)

- Preliminary results of gap analysis will be provided to the public via WikiMap
- Public will be asked to review the results and provide feedback
Overview of Crash Analysis

- Map Reported Bicycle Crashes
- Map Difficult Bicycling Location Points
- Conduct Analysis of Overall Crash Trends
- Conduct Analysis of Contributing Factors
- Develop Hot Spot Scoring Methodology
- Identify Top 10 Hotspots
Bicycle Crash Data

Summary

- State Roads only
- 10 years total (2006 – 2015)
- 419 *reported* crash records analyzed
Conduct Analysis of Overall Crash Trends
### Overall Crash Trends (2006-2015)

419 Crashes included:

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>% of Reported Bike Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>FATAL</td>
<td>2</td>
<td>0.5%</td>
</tr>
<tr>
<td>INCAPACITATING</td>
<td>56</td>
<td>13.4%</td>
</tr>
<tr>
<td>MINOR INJURY/DAMAGE</td>
<td>263</td>
<td>62.8%</td>
</tr>
<tr>
<td>NO INJURY</td>
<td>80</td>
<td>19.1%</td>
</tr>
<tr>
<td>UNKNOWN</td>
<td>18</td>
<td>4.3%</td>
</tr>
</tbody>
</table>
# Crash Trends Analysis Findings

<table>
<thead>
<tr>
<th>Trends</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severity</strong></td>
<td>Most collisions result in Minor Injury (62.8%)</td>
</tr>
<tr>
<td><strong>Annual # of Reported Bicycle Crashes</strong></td>
<td>Crashes per year have been trending slightly down; The average crashes per year = 42</td>
</tr>
<tr>
<td><strong>Roads with Most Crashes</strong></td>
<td>Some roads are disproportionately represented with crashes based upon their total lane miles</td>
</tr>
<tr>
<td><strong>Time of Day</strong></td>
<td>The great majority of collisions occur during the day (75.4%)</td>
</tr>
<tr>
<td><strong>Day of Week</strong></td>
<td>Crashes happen more frequently during the weekdays than weekends</td>
</tr>
<tr>
<td><strong>Age of Bicyclist</strong></td>
<td>17–54 years olds were involved in 60% of crashes</td>
</tr>
<tr>
<td><strong>Gender of Bicyclists</strong></td>
<td>4 of 5 crashes involve a male bicyclist</td>
</tr>
<tr>
<td><strong>Location of Collision</strong></td>
<td>Most collisions occur at intersections (59%)</td>
</tr>
<tr>
<td><strong>Traffic Controls Present</strong></td>
<td>Most collisions occur at uncontrolled intersection (55%)</td>
</tr>
</tbody>
</table>
Conduct Analysis of Contributing Factors
Roadway Design Factor Contributions

- Compared prevalence of factors in crashes with prevalence on Vermont State road network design
- *Overrepresentation* in crashes suggests factor may influence crash frequency
- Does not account for the number of bicyclists on a roadway segment

<table>
<thead>
<tr>
<th>Design Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
</tr>
<tr>
<td>Number of lanes</td>
</tr>
<tr>
<td>Lane width</td>
</tr>
<tr>
<td>Shoulder width</td>
</tr>
<tr>
<td>Typical speed</td>
</tr>
<tr>
<td>Annualized Average Daily Traffic (AADT)</td>
</tr>
<tr>
<td>Turn lane present</td>
</tr>
<tr>
<td>Median type</td>
</tr>
</tbody>
</table>
Roadway Design Factor Findings

- Density and AADT have the highest overrepresentations
- Shoulders appear to significantly reduce crashes
- Trends related to bicycle crashes are noticeable in all design factors

<table>
<thead>
<tr>
<th>Design Factor</th>
<th>Overrepresented in…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>Urban areas</td>
</tr>
<tr>
<td>Annualized Average Daily Traffic (AADT)</td>
<td>Higher volumes (5,000 vehicles or more per day)</td>
</tr>
<tr>
<td>Number of lanes</td>
<td>More than two lanes</td>
</tr>
<tr>
<td>Lane width</td>
<td>12 feet wide or more</td>
</tr>
<tr>
<td>Shoulder width</td>
<td>No shoulder present</td>
</tr>
<tr>
<td>Typical speed</td>
<td>Slower roads (35 mph or less)</td>
</tr>
<tr>
<td>Turn lane present</td>
<td>Presence of a turn lane</td>
</tr>
<tr>
<td>Median type</td>
<td>Presence of a median</td>
</tr>
</tbody>
</table>
Develop Hot Spot Scoring Methodology
Hotspot Methodology

**INPUT VARIABLES**

<table>
<thead>
<tr>
<th>Safety Issue Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported Bicycle Crashes</td>
</tr>
<tr>
<td>Difficult Bicycling Location Votes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bicycling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I Use Score</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway Segment Length</td>
</tr>
</tbody>
</table>

**SOURCE INFORMATION**

- **Safety Issue Data**
  - Reported Bicycle Crashes
    - VTrans - 2006 to 2015 (419 records)
  - Difficult Bicycling Location Votes
    - Phase I Online Input Map (358 records)

- **Bicycling Rate**
  - Phase I Use Score
    - Developed through Phase I

- **Length**
  - Roadway Segment Length
    - VTrans Road Centerline Data
Difficult Bicycling Location Data

Summary

- Data from Phase I Wikimap
- 358 records analyzed
- 845 total “votes”
Top 10 Hot Spots

• Methodology
  • 5 spots **within** Chittenden County
  • 5 spots **outside** Chittenden County

• The Hot Spots represent 0.11% of the total miles of state roadways, but account for:
  o 16% of *bicycle crashes* statewide
  o 18% of the *difficult bicycling locations* statewide
Identify Top 10 Hotspots
Hot Spots within Chittenden County

1. S Winooski Ave (ALT-7), Burlington
2. Williston Rd (Rt. 2), South Burlington
3. Pearl St (Rt. 15), Essex
4. Riverside Ave. (Rt. 2), Burlington
5. Colchester Ave (Rt. 2), Burlington
Hot Spots outside Chittenden County

1. Main St (Rt. 5), Brattleboro
2. State St (BUS-4), Rutland
3. North St. (Rt. 7) & Main St (Rt. 9), Bennington
4. Elm St (Rt. 105), Enosburg
5. Route 30N, Castleton
Detailed Review of Hotspots

- Reviewed detailed crash narratives for all hotspot crashes
- 67 of 72 crashes had narratives available
- Crash narratives were reviewed for themes and correctable conditions
FOUR MAIN THEMES WERE IDENTIFIED:

1. Vehicle driver inattention when turning
   • Exacerbated by complex roadway conditions
     o Large number (>2) of travel lanes
     o Frequent curb cuts

2. Parking related

3. Bicycle riding on sidewalks

4. Bicycle equipment or cyclist-related
FOUR MAIN THEMES WERE IDENTIFIED:

1. Vehicle driver inattention when turning
2. Parking related
   - Vehicle occupants opening doors into bicyclist
   - Vehicles moving into the bicycle path while parking
3. Bicycle riding on sidewalks
4. Bicycle equipment or rider-related
FOUR MAIN THEMES WERE IDENTIFIED:

1. Vehicle driver inattention when turning
2. Parking related
3. Bicycle riding on sidewalks
   - Drivers do not anticipate a bicyclist at driveways and crosswalks
   - Bicyclists do not anticipate vehicles
4. Bicycle equipment or rider-related
FOUR MAIN THEMES WERE IDENTIFIED:

1. Vehicle driver inattention when turning
2. Parking related
3. Bicycle riding on sidewalks
4. Bicycle equipment or cyclist-related
   - Failure to obey traffic laws
   - Faulty equipment
     - Inoperable brakes
     - No working lights at night
Summary of Crash Analysis
Overall Findings from Crash Analysis

• The data shows bicycle crashes greatest in downtown/village centers
  o Greatest number of conflicts points (turning vehicles, driveways, pedestrian, intersections)
  o Presence of on-street parking
  o Greater density of both bicyclists and motorists
• 9 out of 10 hotspots on Class 1 Town Highways
• Crashes concentrated on roads with higher traffic volumes and no roadway shoulders
Incorporating the Crash Analysis

• Incorporate the findings in the evaluation criteria for Phase II
• Evaluate opportunities to incorporate into existing grant programs (e.g. Transportation Alternatives)
• Use this analysis as an input in Phase III
• Use this analysis for VTrans projects, as applicable (e.g. bridges, paving)
Next Steps
1. **Evaluation Criteria Inputs:**
   - Phase I Use Scores (transportation, recreation, or both)
   - Roadway Variables

2. **On-line Survey:**
   Seek feedback to inform the final evaluation criteria

3. **Finalize Evaluation Criteria**
   For use in Task 4
Research indicates that certain roadway variables make bicycling more comfortable:

- Presence/Absence of designated bicycle facility
- Presence/Absence of shoulder
- Presence/Absence of a Median
- Presence of a traffic control
- Pavement Condition
- Number of Travel Lanes
- AADT
- Speed
- Percentage of Heavy Trucks
Task 4: Evaluate High Use Corridors

1. Use the evaluation criteria to **score the high use corridors** identified in Phase I

2. **Seek Feedback** – via the Phase II Wikimap

3. **Revise results** of scoring process based on public feedback

4. **Final Gap Analysis Map** showing the comfort levels for bicycling on the high use bicycle corridors
Phase II Public Participation

December/January: On-line Survey to seek input on the draft roadway evaluation criteria

March/April: Phase II Wikimap

Throughout: Project web site to provide draft materials and solicit additional public input
Questions?

• Panelists
  • Amy Bell
    • VTrans Policy Planning & Intermodal Development Division - Planning Coordinator
  • Jesse Devlin
    • VTrans Project Delivery Bureau, Highway Safety & Design - Manager
  • Jon Kaplan
    • VTrans Municipal Assistance Bureau - Bicycle and Pedestrian Program Manager
  • Erica Wygonik
    • RSG – Senior Engineer
  • Sam Piper
    • Alta Planning + Design – Senior Planner
Comment Period until December 16, 2016

Project email:  
vermontbike@gmail.com

Project Manager:  
Sommer Roefaro Bucossi, 802-828-3884

Project Webpage:  
http://vtrans.vermont.gov/planning/bikeplan

Consultant Team:  
Phil Goff, Alta Planning + Design  
Sam Piper, Alta Planning + Design  
Erica Wygonik, RSG