About this project

*From the RFP:*

The study will address alternatives to improve north/south and east/west connectivity for bicycles and pedestrians through the downtown.

It will include analyzing traffic control techniques at intersections as well as possible connectivity improvements using adjacent streets, pedestrian crossing locations, and on road bicycle facilities.

*Study Area:*
Project Team

ADVISORY COMMITTEE

Heather Voisin – MTIC
Constantinos Stivaros – MTIC
Celia Riechel – MTIC
Katie Budreski – Montpelier Alive
Jonathan Harries – MTIC
Dona Bate – MTIC and City Council

STAFF

City of Montpelier
Corey Line, PE, Public Works; City Project Manager
Kevin Casey – Montpelier Planning & CD
Consultants | DuBois & King
Lucy Gibson, PE, Project Manager
Sophie Sauve, PLA
Julia Ursaki, EI

STAFF
## Project Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>January</th>
<th>February</th>
<th>March</th>
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* Project Steering Committee, MTIC, City Management
Public Input
Town Meeting Day and Online Map combined
Top Hot Spots

Barre St & Main St Intersection
- Traffic control is needed; roundabout or signal
- Walking across Main St feels unsafe, with chaotic vehicular traffic and width

Barre St
- Concerns about sight lines from driveways blocked by parked cars and narrow width
- Consider removing parking on one side or converting to one-way operation

Main St Crossing @ Langdon St
- Yielding to pedestrians is poor during peak hours; anxiety about getting rear-ended
- Queued vehicle block sight lines of crossing pedestrians

State St & Main St Intersection
- Make more bicycle friendly
- Waiting time is long, some crossers don’t wait for walk signal

School St & Main St Intersection
- Crosswalk is long; higher speeds due to width and turning lane
- Traffic control is needed; consider 4-way stop (like Spring & Elm)
Riding a bike in Montpelier
Infrastructure | Road Cycling Routes

- Bicycle Lane
- Shared Use Path
- Planned Extension of the Shared Use Path

Strava Rides (2014)
- 10 - 25
- 26 - 50
- 51 - 150
Infrastructure | Road Cycling Routes

- Bicycle Lane
- Shared Use Path
- Planned Extension of the Shared Use Path

Strava Rides (2014)
- 10 - 25
- 26 - 50
- 51 - 150
Who are we designing this for?

Interested but Concerned
60% of population

Casual and Somewhat Confident
7%

Experienced and Confident
1%

Lower stress tolerance

Higher stress tolerance
Bicycle Infrastructure Options

Lower Stress Levels
Project Design Goals

Address pedestrian safety and comfort

Provide “low stress” bicycle infrastructure for all ages and abilities

Consider traffic circulation issues

Maintain on-street parking where possible

Consider all modes and users

- Pedestrian
- Bicycle
- Motor vehicle traffic
- Transit
<table>
<thead>
<tr>
<th>Alternative</th>
<th>Notes</th>
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<tbody>
<tr>
<td>M1 Signals with bike lanes</td>
<td>Three travel lanes (left turn lanes at each intersection) Parallel parking on one side where there is room</td>
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<tr>
<td>M2 Roundabouts with bike lanes</td>
<td>Two travel lanes (left turn lanes not needed at roundabouts) Parallel parking both sides if there is room</td>
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<tr>
<td>M3 Hybrid – Roundabout and Signals</td>
<td>Mini roundabout at Main &amp; Barre, keep signals at other intersections; parallel parking on both sides where there is room</td>
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<tr>
<td>M4 Green Capitol + Elm Street bikeway</td>
<td>Two travel lanes (left turn lanes not needed at roundabouts) Shared lanes on Main St + Protected 2-way bike lanes on Elm St + Shared lanes through Heney/Jacobs Festival Street</td>
</tr>
</tbody>
</table>
Main St M1
Signals and bike lanes
Langdon St Crosswalk

Crossing through queued traffic can be unsafe
  ◦ Queued vehicles obscure pedestrians

Vehicles stopping for pedestrians block traffic, leading to poor yielding behavior
Options to Consider

Strong desire line between City Center and Main St retail block

Removing crossing

M1 – Relocate crosswalk further away from signal (Hazen Place)

M2 – Raised crosswalk at Langdon St

M3 – Relocate East State & Main Crossing and push back stop bar for southbound Main St
Main & School

Public Concerns

- difficulty crossing due to width
- need for traffic control like Elm & Spring

**Meets** traffic signal warrants

**Does not meet** all-way stop warrant
Main St M2
Roundabouts and bike lanes
State & Main Roundabout

- Explored in Greening America’s Capitals
- Intersection offset necessitates right turns only from East State St
- Bicycles must share sidewalk with pedestrians or travel lane with vehicles
Diversion of East State St Traffic
Main St M3
Hybrid – Roundabouts, signals and bike lanes
Main St M4
Greening America’s Capital
Main St M4
Greening America’s Capital
*Elm Street Bike Route*
Convert Elm Street to One-Way

Allows room for protected bike lanes

On-street parking important due to lack of off-street parking

Traffic impacts vary with direction of one-way travel
Southbound volume is higher than northbound; morning and afternoon

Adds left turns to Main & State, which has greater impact to level of service
## Main Street Options | Summary

<table>
<thead>
<tr>
<th>Option</th>
<th>Pros</th>
<th>Cons</th>
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<tbody>
<tr>
<td>M1-Signals</td>
<td>✓ Least change to curb lines/lowest impact</td>
<td>➢ Greatest reduction of parking</td>
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<td></td>
<td>✓ Affordable cost</td>
<td>➢ No improvement on traffic flow</td>
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<td>➢ More lanes to cross as pedestrian at Barre</td>
</tr>
<tr>
<td>M2-Roundabouts</td>
<td>✓ Safest for all users</td>
<td>➢ High cost</td>
</tr>
<tr>
<td></td>
<td>✓ Most improvement in traffic flow</td>
<td>➢ ROW impact</td>
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<tr>
<td></td>
<td>✓ Preserves more parking</td>
<td>➢ Inconvenient diversion for traffic at State/Main</td>
</tr>
<tr>
<td></td>
<td>✓ Reduces lanes for pedestrians crossing Main St at Barre</td>
<td>➢ Bicycles mixed with pedestrians at State/Main roundabout</td>
</tr>
<tr>
<td>M3-Hybrid</td>
<td>✓ Affordable cost</td>
<td>➢ Potential peak hour traffic backups through Barre/Main roundabout</td>
</tr>
<tr>
<td></td>
<td>✓ Reduces lanes for pedestrians crossing Main St at Barre</td>
<td>(may not be much different than current conditions)</td>
</tr>
<tr>
<td></td>
<td>✓ Preserves more parking</td>
<td></td>
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<tr>
<td>M4-Green Capitol</td>
<td>✓ Preserves most parking</td>
<td>➢ High cost</td>
</tr>
<tr>
<td></td>
<td>✓ Attractive Main St design features</td>
<td>➢ No bicycle facilities on Main St</td>
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<tr>
<td></td>
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<td>➢ Inconvenience diversion for Elm St traffic</td>
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<tr>
<td></td>
<td></td>
<td>➢ Inconvenient diversion for traffic at State/Main</td>
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</table>
### Barre Street Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Notes</th>
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<tbody>
<tr>
<td>B1</td>
<td>Shared use path</td>
</tr>
<tr>
<td>B2</td>
<td>Two-way protected bike lane</td>
</tr>
<tr>
<td>B3</td>
<td>One-way protected bike lane on each side</td>
</tr>
</tbody>
</table>
Barre St B1a
Shared Use Path with Roundabout

May require small right-of-way at intersections and relocation of 6 catch basins
Barre St B1b
Shared Use Path with Signal

- Fewer parking spaces impacted
- Preserves parking at Church and laundromat
- No need to cross Barre St
Barre St B2
Two-Way PBLs

“Combination of minimums” will continue issues with parking and traffic conflicts
## Barre Street Options

<table>
<thead>
<tr>
<th>Barre Option</th>
<th>Pros</th>
<th>Cons</th>
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</thead>
</table>
| B1-Shared Use Path with Roundabout  | ✓ Maintains facility type between the existing and future shared use paths  
                                           ✓ Maintains parking on one side | ➢ Requires curb and catch basin relocation  
                                           ➢ Higher cost than protected bike lanes  
                                           ➢ Requires two additional crossings |
| B1b-Shared Use Path with Signal     | ✓ Maintains facility type between the existing and future shared use paths  
                                           ✓ Maintains parking on one side  
                                           ✓ Minimizes need for crossings | ➢ Requires curb and catch basin relocation  
                                           ➢ Higher cost than protected bike lanes |
| B2-Two-way protected bike lane      | ✓ Lowest cost  
                                           ✓ Maintains parking on one side | ➢ Introduces new type of facility between existing/planned shared use path  
                                           ➢ Narrower travel lanes may increase conflict between moving and parked cars |
| B3 – One-way protected bike lanes   | ✓ Safest design | ➢ Not consistent with other facility types  
                                           ➢ Removes all parking from Barre St |
### Summary | Parking

#### On-Street Parking

<table>
<thead>
<tr>
<th></th>
<th>Barre St</th>
<th>Main - Barre to State</th>
<th>Main - State to School</th>
<th>Upper Main</th>
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<tbody>
<tr>
<td>Existing</td>
<td>31</td>
<td>22</td>
<td>14</td>
<td>33</td>
</tr>
<tr>
<td>M1</td>
<td>14</td>
<td>16</td>
<td>17</td>
<td>14</td>
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<tr>
<td>M2</td>
<td>14</td>
<td>12</td>
<td>21</td>
<td>16</td>
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<tr>
<td>M3</td>
<td>14</td>
<td>24</td>
<td>35</td>
<td>10</td>
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<tr>
<td>M4</td>
<td>32</td>
<td>10</td>
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*Space dedicated to vehicles*
Recommendations
## Preferred Alternative

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<thead>
<tr>
<th>Element</th>
<th>Short Term</th>
<th>Long Term</th>
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<tbody>
<tr>
<td>Main Street</td>
<td>Conventional bicycle lanes</td>
<td>Protected bicycle lanes with access management</td>
</tr>
<tr>
<td>Barre/Main Intersection</td>
<td>Traffic signal at Barre/Main with pedestrian crossings and signals</td>
<td>Adaptive Signal Control with Memorial Dr and State Street</td>
</tr>
<tr>
<td>Barre Street</td>
<td>Protected bike lanes</td>
<td>Shared Use Sidepath</td>
</tr>
<tr>
<td>School/Main Intersection</td>
<td>Mini-roundabout with quick build materials</td>
<td>Mini-roundabout designed to downtown streetscape plan</td>
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Why Signals

CONCERNS ABOUT ROUNDABOUTS

- Require shared bike/walk use on downtown sidewalks
- Roundabout require walkers to divert from a straight path
- Traffic diversion required for State/Main Roundabout
- Barre/Main Roundabout encroaches onto railroad
- Queues from signals in hybrid alternative could lock up roundabout

ADVANTAGES OF SIGNALS

- Avoids need for bike crossing of Barre St
- Allows for Adaptive Signal Control to be implemented
- Coordination with other signals will reduce stops and delays throughout downtown
Why Protected Bike Lanes

- Best Practice for providing a low stress bicycle network to meet the goals of Montpelier in Motion and the Complete Streets plan
- Takes advantage of opportunity to bring people on bikes enjoying the Central Vermont Path into downtown

Cambridge Becomes First U.S. City to Make Protected Bike Lanes Mandatory

By Angie Schmitt | Apr 9, 2019 | 1

Photo: Cambridgema.gov
Long Term

At Rite Aid:
Examples

Cambridge MA

Chicago IL
Sidewalks will be the same or wider
Short Term

Restriping Main and Barre Streets within existing curbs

Curb extensions at mid-block crossings

Minimize loss of parking by providing conventional bike lanes

Rapid implementation of School Street Mini-Roundabout
Rapid Implementation Strategy

Some projects can be implemented with low cost materials until long term capital project can be completed

- Barre Street Protected Bike Lanes
- School Street Mini-Roundabout

**WHAT IS A QUICK-BUILD PROJECT?**

- **QUICK BUILD**
- **DEMONSTRATION**
- **PILOT PROJECT**
- **INTERIM DESIGN**
- **PERMANENT INSTALLATION**
Quick Build

Burlington and beyond!

Quick Build bike lane on North Union, Burlington

Quick Build curb extension on Pearl St, Burlington

Pilot roundabout, Sao Paolo, Brazil
Parking | Short & Long Term

Parking changes by 40 spaces with access management
## Cost Estimate – Short Term

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<th>Element</th>
<th>Short Term</th>
<th>Project Cost</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Main Street</td>
<td>Conventional bicycle lanes</td>
<td>$565,000</td>
<td>Remove 1 inch pavement; resurface</td>
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<tr>
<td>Barre/Main Intersection</td>
<td>Traffic signal at Barre/Main</td>
<td>$200,000</td>
<td>Traffic signal only</td>
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<tr>
<td>Barre Street</td>
<td>Protected bike lanes</td>
<td>$50,000</td>
<td>Quick Build budget allowance</td>
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<tr>
<td>School/Main Intersection</td>
<td>Mini-roundabout with quick build materials</td>
<td>$30,000</td>
<td>Quick Build budget allowance</td>
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## Cost Estimate – Long Term

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<th>Element</th>
<th>Long Term</th>
<th>Project Cost</th>
<th>Notes</th>
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<tr>
<td>Main Street</td>
<td>Protected bicycle lanes with access management</td>
<td>$1,210,000</td>
<td>Relocating curbs, stormwater infrastructure, traffic control. Does not include other streetscape amenities; master plan underway</td>
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<tr>
<td>Barre/Main Intersection</td>
<td>Adaptive Signal Control with Memorial Dr and State Street</td>
<td>$200,000</td>
<td>Coordinated adaptive system with downtown intersections</td>
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<tr>
<td>Barre Street</td>
<td>Shared Use Sidepath</td>
<td>$250,000</td>
<td>Asphalt sidepath, relocation of utilities and parking meters</td>
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<tr>
<td>School/Main Intersection</td>
<td>Mini-roundabout designed to downtown streetscape plan</td>
<td>$175,000</td>
<td>Curb and utility relocation, new curbs</td>
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Implementation Priorities

1) Barre Street Signal with Pedestrian Crossing
2) School Street Mini-roundabout
3) Barre Street Protected bike lanes – open with Central Vermont Path
4) Barre Street Sidepath – as funds are available
5) Main Street Design informed by Downtown Master Plan
Next Steps

- Obtain Input from Committee, City Council and Staff (through April)
- VTrans Review (early to mid-May)
- Final revisions and submit report (by May 31, 2019)
- Final City Council presentation (by May 31, 2019)
Thank you!

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COREY LINE, PE, CLine@montpelier-vt.org