Healthy Communities:

GETTING CONNECTED

Why connectivity is important and how to improve it
GETTING CONNECTED
Why connectivity is important and how to improve it
20% of school-aged children (ages 6–19) has obesity.

Source: Centers for Disease Control and Prevention, 2014
Comparison of the Usual Travel Mode to School for K-8th Grade Students, 1969 and 2009

Source: National Center for Safe Routes to School
Comparison of Walk/Bike to School for K-8th Grade Students, 1969 and 2009

Source: National Center for Safe Routes to School
Across the state, people want to...

- **70%** walk more
- **58%** bike more
- **46%** take transit more

*Source: Utah Statewide Household Travel Survey*
Utahns want better accessibility…

- 23% Improving how convenient it is to get around without a car
- 22% Limiting traffic congestion
- 18% Making sure daily services and amenities are close to where people live

Source: Envision Utah
Utahns want their destinations close…

- Parks and recreational fields: 74%
- Elementary, middle and high schools: 76%
- Open spaces or natural lands: 44%
- Entertainment and Restaurants: 50%
- Your place of work: 34%

Source: Utah Values and Future Growth, Harris Interactive, 2007. N=1,262; +/- 3%
A top transportation priority should be to improve the connectivity of streets and sidewalks for shorter distance trips.

Source: Utah Statewide Household Travel Survey
What can we do about it?
Provide infrastructure
But infrastructure is only part of the answer
Street networks matter, connectivity matters
What is street connectivity?

Connectivity is... **multiple routes** and connections serving the same origins and destinations... An area with high connectivity has multiple points of access around its perimeter as well as a dense system of **parallel routes and cross-connections** within the area.

Jim Daisa
Metro Regional Street Design Study

Source: ITE
Why improve connectivity?
Why Improve Connectivity?

Connected streets led to more walking

88% of students in Daybreak walk to school

17% Of students in similar, less walkable neighborhoods walk to school

High intersection density is the best predictor for use of active transportation.

Adding 300 feet of roadway between two subdivisions in Charlotte, N.C., increased the fire station service area by 17 percent.

The highest risks of fatal or severe crashes tend to occur in areas with low intersection densities.

Compact, connected, walkable neighborhoods can command a price premium of 40 to 100 percent compared to nearby less-connected neighborhoods.

Source: Utah Street Connectivity Guide
Utah Street Connectivity Guide

» Define benefits of street connectivity
» Inform decision makers
» Provide guidelines for implementation
Case Studies

Benefits
Street connectivity benefits

In all areas, improving the connectivity improved traffic mobility:

<table>
<thead>
<tr>
<th></th>
<th>Lehi</th>
<th>Layton</th>
<th>Tooele Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay</td>
<td>-24%</td>
<td>-4%</td>
<td>-18%</td>
</tr>
<tr>
<td>Travel time</td>
<td>-13%</td>
<td>-9%</td>
<td>Small increase</td>
</tr>
</tbody>
</table>

Compared connectivity scenario to a widening scenario:

- **Widening** attracted **more traffic** on major streets.
- **Connectivity** scenario **distributed traffic better** – reduced VMTs on major streets by up to 10 percent.
- **Connectivity** scenario **reduced delay as well as or better** than widening scenario.
- **Connectivity** scenario **created more overall network capacity** – generally 10 to 13 percent over base scenario.
How does this improve walking, biking, and health?
## Estimate active transportation benefits - Lehi

<table>
<thead>
<tr>
<th></th>
<th>Existing</th>
<th>Future mid-level estimate</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle commute mode share</td>
<td>0.25%</td>
<td>1.75%</td>
<td>+1.5%</td>
</tr>
<tr>
<td>Walk commute mode share</td>
<td>0.85%</td>
<td>4.46%</td>
<td>+3.61%</td>
</tr>
<tr>
<td>Hours of physical activity</td>
<td>319,000</td>
<td>844,000</td>
<td>+525,000</td>
</tr>
<tr>
<td>Residents who met recommended physical activity</td>
<td>4.72%</td>
<td>12.49%</td>
<td>+7.77%</td>
</tr>
<tr>
<td>Healthcare cost savings</td>
<td>$60,000</td>
<td>$338,000</td>
<td>+$278,000</td>
</tr>
</tbody>
</table>
How can we improve connectivity?
Get out there – walk and ride!
One size does NOT fit all
How can we improve connectivity?

» Metrics

» Plans & policies

» Street & development standards

» Retrofit tools
Metrics, plans, & policies

» Assess where you are:
  » Connectivity index - the relative level of connection
  » Intersection density - network density
  » Travel sheds - ability to connect to specific destinations
  » Walk shed/pedestrian gaps - accommodation of most vulnerable users
Street & development standards

Source: Lehi City
Connecting stub streets

Source: LVPC.org
Retrofits

Source: Lehi City and Sugar House Business District Circulation Plan
Cul-de-sac flashpoint
Survey respondents were split on generally connecting cul-de-sacs through to other streets, for all traffic.

However, 73% supported connecting cul-de-sacs for pedestrians and cyclists only – only 11% against.
Cul-de-sac connections
Pedestrian links *between* developments
Get connected!

» Connectivity provides multiple wins
» The Utah Street Connectivity Guide can help
» It’s never too late!
For more information, contact:

Julie Bjornstad
julieb@wfrc.org

http://wfrc.org/studies/utah-street-connectivity/
DRAPER CITY TRAILS AND OPEN SPACE

- Open Space Land Acquisitions
- Open Space Master Plan
- Infrastructure
- Public Education
- City Staff
- Volunteers
Open Space Acquisitions

4,600 acres of city owned open space along Traverse Range (Point of the Mountain to Corner Canyon)

• 2005 – Corner Canyon Purchase ($13.6 M) - 1,021 acres
  • Citizen Bond Election (passed at 59%)
  • Partnership between Draper City, Salt Lake County, and State

• 2009 – Little Valley Purchase ($2.75 M)– 142 acres
  • Partnership between Draper City and Salt Lake County

• 2012 – Suncrest Open Space Purchase ($5.6 M) – 2,400 acres
  • City purchased land from Zion’s Bank after development bankruptcy

• Various Open Space Parcels Deeded with Development
Open Space Master Plan

GUIDING INITIATIVES

#7 Opening New Opportunities

Policies

Facilitating opportunities for new open space acquisitions and more efficient management and operation conditions are encouraged. Phone improvements based on the availability of funding and community desires.

Official Partnership: Continue to partner with local businesses to create and maintain a wide range of passive recreation and scenic spaces that are compatible with the protection of natural and cultural resource objectives.

Local: Continue to work to identify important, and maintain a new strategy that includes partnerships and grants.

Lea Foundation: Provide additional support for existing and new programs to create and maintain a wide range of passive recreation and scenic spaces that are compatible with the protection of natural and cultural resource objectives.

Commercial and Local Special Events: Support appropriate events and activities that improve awareness and support of the open space management system and other related areas, including local businesses, organizations, and residents.

Acreage for Open Space: Provide support for open space acquisitions (e.g., for permanent and non-seasonal activities) to ensure that the area's open space capacity is maintained.

Area Open Space Access: Establish appropriate access controls (e.g., for permanent and non-seasonal activities) to ensure that the area's open space capacity is maintained.

Eagle Ridge

RECREATION OPPORTUNITIES

1. Day hiking trails for family-friendly recreation and exploration.
2. Off-road biking and hiking trails.
3. Beta Field for soccer and other sports.
4. Hiking trails for nature exploration.
5. Picnic areas and grilling stations.
7. Festive activities and events.
8. Equestrian trails for horseback riding.
10. Picnic areas and grilling stations.
11. Picnic areas and grilling stations.
12. Picnic areas and grilling stations.

Management Zones:

Legend:
- Public Use
- Recreational Use
- Conservation Use
- Natural Resource Areas
- Equestrian Use
- Developed Areas
- Resource Recovery Areas
- Open Space Protection Areas

For more information and resources, contact:

[Contact Information]

Eagle Ridge

[Map of Eagle Ridge with highlighted areas and trails]
Through a public process, city staff and the committee developed the following:

- Need Multi-Use Trails for linkages and loops (BST, Ann’s Trails, Eagle Crest)
- Provides loops for different user groups
- No downhill bike travel benefits all users, including bikers
## Open Space Master Plan
### User Specific Trails

**TRAIL TYPE MIX & AMOUNT RECOMMENDATIONS**

<table>
<thead>
<tr>
<th>Trail Type</th>
<th>2006</th>
<th>2016 (Current)</th>
<th>2018 (2-yr plan)</th>
<th>2025 (Master Plan)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Approx. Miles</td>
<td>%</td>
<td>Approx. Miles</td>
<td>%</td>
</tr>
<tr>
<td>Multi-use</td>
<td>32</td>
<td>100%</td>
<td>45</td>
<td>82%</td>
</tr>
<tr>
<td>Equestrian/Hiking/Uphill Bike</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Equestrian/Hiking/Nature Path</td>
<td>0</td>
<td>0%</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Mountain Bike Only (Downhill single direction)</td>
<td>0</td>
<td>0%</td>
<td>6</td>
<td>11%</td>
</tr>
<tr>
<td>Total Miles/Percent</td>
<td>32</td>
<td>100%</td>
<td>55</td>
<td>100%</td>
</tr>
</tbody>
</table>
Little Valley Instructional Trails

TRAILS

**Main Trail** (Beginner) -
A 0.2 mile, double track, two-way multi-use trail that leads you to the top of the other instructional trails. This wide trail can be used in both directions to help first time riders become more comfortable before using the more narrow trails.

**A Line Trail** (Beginner) -
A 0.2 mile, wide, one-way (down hill traffic only), bike only trail. This flow-type trail has some smaller humps and wide turns.

**B Line Trail** (Intermediate) -
A 0.2 mile, single track, one-way (down hill traffic only), bike only trail. This flow-type trail has larger humps and tighter turns than the A Line Trail. The last segment of the trail combines with the A Line Trail.

**C Line Trail** (Intermediate) -
A 0.4 mile, single track, two-way, multi-use trail that is typical of many machine built trails in the area. This trail incorporates different switch back styles, and bridge crossings.

**D Line Trail** (Intermediate) -
A 0.2 mile, single track, two-way, multi-use trail that is typical of many hand built trails in the area. This trail width is more narrow than the C Line Trail.

**Technical Trail (coming in 2018)**
Little Valley Instructional Trails

**Climbing Techniques**
- Raise seat and stay seated
- Shift down early and keep pedaling
- Lean forward to keep weight on front wheel

**Descending Techniques**
- Lower seat
- Keep weight back
- Keep pedals parallel to ground
- Brake before any obstacles & let off to roll over them

**Protect the Land**
- Stay on designated trails
- Do not make short-cuts
- Do not use trails when muddy, if mud sticks to your tires it’s too muddy

**Safety 1st**
- Wear your helmet
- Helmet to be level & fit snugly
- Keep hydrated, drink before you’re thirsty
- Be aware of changing conditions on trails
- Always ride in control and stay within your ability level

**Courtesy Rules**
- Bikes yield to all other users
- Yield to uphill riders
- Alert other users when passing

**General Techniques**
- Look ahead and pick a path
- Gently squeeze both brakes to avoid skidding
- Expect obstacles plan ahead

**Turning Techniques**
- Start at the outside then cut thru corner
- Lean bike into corner, turn head & upper body in direction of turn
- Drop outside pedal
• Public Education
• Online video  https://www.youtube.com/watch?v=W-FtYo_KAbI
• Education pamphlet
• Trail Ambassador Program
City Staff

- Trails and Open Space Division
  - 2 Full-time Employees & 3-4 Seasonal Employees
  - Trained in trail design and open space management

Trail Dozer Video
• City Staff
• Park Ranger
VOLUNTEERS
Parks and Trails Committee

Staff
- Parks & Rec.
- Engineering
- Police – Park Ranger
- Animal Control
- Water Co.
- County

Committee

City Officials
- City Council
- Planning Comm.

Public
- Volunteers
- Scouts
- Foundation
- Developers
• VOLUNTEER LABOR & FUNDING
  • Volunteer Labor (4,000 to 5,000 hours/year)
    • City staff member assigned to oversee volunteers
  • Corner Canyon Trails Foundation
    • Funded over half of new trails past year
  • Partnerships w/ Groups/Business/Agencies
    Healthy Draper – Little Valley Instructional Trails
    Ralph Wadsworth - Bear Canyon Suspension Bridge
Building Healthy Communities

Shawn Seager, Director of Regional Planning
Mountainland Association of Governments
Trail User Counts – Utah County

Annual Trips: 2,189,598

Daily Average: 5,164

Highest Month: June = 252,817

Lowest Month: January = 49,998
Trail User Counts – Utah County

Annual Trips: 2,189,598

Daily Average: 5,164

Highest Month: June = 252,817

Lowest Month: January = 49,998
Trail User Survey Results

• 54% are over 45 years

• 89% visit 3 or more times per week

• Even split between male and female

• Use for commute (19%) and for recreation (77%)
Proximity is key:

86% live within 1 mile of trail
Life Enhancing
Next Up:

• Bridge at Provo Intermodal Center (TIGER)
• Bridge over SR 92 (TIGER)
• Provo River Trail Gap
Provo Pedestrian Bridge ($4.3 m)
SR 92 Pedestrian Bridge ($5.3 m)
Provo River Trail Gap
($4.0 m)
Healthy physical activity near North Temple: 
Design realities and possibilities

Wasatch Choice 2050 and Mayor's Metro Solutions
1/23/18, Salt Lake City

Barbara B. Brown

The MAPS (Moving Across Places Study) team: Ken Smith, 
Carol Werner, Wyatt Jensen, Calvin Tribby, et al.

Funding: Research reported in this publication was supported (in part) by 
grant number CA157509 from the National Cancer Institute at the National 
Institutes of Health and the Robert Wood Johnson Foundation.
Bad news: Insufficient physical activity can be deadly

- Puts you at greater risk for
  - Type 2 diabetes
  - Cardiovascular disease
  - Some cancers, especially colon & breast
  - Sleep apnea
  - Mental health risks
  - Bone health risks
  - Early death

- Lee et al., 2012, The Lancet
Good news: Gym membership not required

- Physical activity public health goals are clear
  - 150 minutes (2.5 hrs) per week
  - Moderately intense physical active
  - In “bouts” of activity ≥ 10 minutes at a time

- What % of adults do you guess achieves this?
% in U.S. who **say** they achieve 150 min./wk of physical activity in 10-min bouts *(BRFSS 2005)*

Kruger et al. MMWR 2007;56(46):1209-1212  from Pate 2008
% in U.S. who achieve 150 min./wk of physical activity in 10-min bouts using objective measures (NHANES data)
Back to good news:
Just walking more would improve health

- Walking is a moderate intensity activity (3 “METS” or metabolic units)
- About a normal walking pace in healthy adults
  - About 2.7-3.1 mph (Rowe et al, 2013; Ainsworth et al., 2011)
- Walking = the most popular physical activity in U.S.
  
  (Simpson et al., 2003)
But we designed the U.S. for cars, not active travel

Figure 2 — Obesity (BMI ≥ 30 kg · m⁻²) prevalence and rates of active transportation (defined as the combined percentage of trips taken by walking, bicycling, and public transit) in countries of Europe, North America, and Australia. BMI was computed from self-reported height and weight. Data were obtained from national surveys of travel behavior and health indicators conducted between 1994 and 2006 (see text for details).

Bassett et al., 2008, JPAH
Do “Complete Street” interventions support healthier physical activity?

- Reconceptualize roads as places for pedestrians & cyclists—as well as cars
Complete Street policies booming in popularity

Policy adoptions:
- By 33 states
- >1200 policies (2015)

But
- Implementation is still a work-in-progress
- Evaluation for health benefits is rare
We test whether N. Temple Complete Streets makeover + TRAX supports physical activity

- Emphasis on transit riders because each transit trip involves 4 walks
- We counted
  - People at N. Temple transit stops
  - People along N. Temple sidewalks
  - Nearby residents who used TRAX, parks, & rec centers
- Also measured psychological orientations that predict transit ridership
5 new rail TRAX stops

- Added April 2013
- Connects airport to downtown
Before & after Complete Street makeover

- No TRAX light rail
  - No bike lane
  - Narrow sidewalk
  - 3 lanes, each direction
  - No pedestrian lighting
  - Overhead power lines

- TRAX light rail
  - Bike lane
  - Wide sidewalk
  - 2 lanes, each direction
  - Landscaping
  - Pedestrian lights
  - No overhead power lines
Travel patterns measured by GPS data loggers & accelerometers

Worn together for a week

Wearable GPS
GlobalSat DG-100

Activity Monitor
Actigraph GT3X+
Procedures: sampling & data collection

- Adults living near (<1km) and far (1-2 km) from N. Temple sampled
- Visited at home
  - Surveys given
  - Height & weight measured
- Before & after TRAX started (2012 & 2013)
- 536 adult residents with data both times
Does Complete Street → more transit users? Yes

- 677% more people waiting for transit in 2013 (bus & TRAX) than 2012 (bus only)

- (Werner et al., 2016)

Fig. 3. Ridership count locations and ridership changes.
Does Complete Street → more pedestrians overall? Yes

- We counted changes in all street users, not just those at transit stops
- Users of the Complete Street increased from 2011 to 2013 & 2015, especially for blocks:
  - In the less urban (western) section
  - On weekends

![Image showing changes in street users over weekdays and weekends for Complete Street and Complete less-urban sections.](Jensen et al.)
Our objective physical activity measure = accelerometer “counts per minute” (CPM)

- CPMs relate to weight
- Compared to healthy weight people:
  - Overweight get 12 CPM less
  - Obese get 57 CPM less 287 CPM (Tudor-Locke, 2010)
Transit use changes & activity changes: Mean change over time (unadjusted)

Change in accelerometer counts per minute (2013 - 2012, all wear time)

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Continued</th>
<th>Former</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>391</td>
<td>51</td>
<td>42</td>
<td>52</td>
</tr>
<tr>
<td>Mean</td>
<td>11.75</td>
<td>-9.25</td>
<td>-41.64</td>
<td>46.82**</td>
</tr>
</tbody>
</table>

*p<.05 Effect contrasts significant, controlling for age, female, Hispanic, college grad, married, self-reported health, days between measures, temperature differences (Brown et al., PMR, 2017)
Park use changes & activity changes: Mean change over time

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Continued</th>
<th>Former</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>394</td>
<td>31</td>
<td>61</td>
<td>50</td>
</tr>
<tr>
<td>Change in accelerometer counts per minute (2013 - 2012, all wear time)</td>
<td>10.36</td>
<td>22.32</td>
<td>-31.58**</td>
<td>39.21*</td>
</tr>
</tbody>
</table>

* *p<.05 Effect contrasts significant, controlling for age, female, college grad, time1 wear time & accelerometer counts, & changes in employment, temperature, health, automotive time, days between measures, and wear time (Brown et al., PMR, 2017)
Recreation center use changes & activity changes: Mean change over time

<table>
<thead>
<tr>
<th>Change in accelerometer counts per minute (all wear time)</th>
<th>Never (n=486)</th>
<th>Continued (n=9)</th>
<th>Former (n=17)</th>
<th>New (n=24)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8.82</td>
<td>10.12</td>
<td>-58.97</td>
<td>59.68*</td>
</tr>
</tbody>
</table>

* $p<.05$ Effect contrasts significant, controlling for age, female, college grad, time1 wear time & accelerometer counts, & changes in employment, temperature, health, automotive time, days between measures, and wear time (Brown et al., PMR, 2017)
Psychological orientations predict ridership: Transit riders are neighborhood optimists

- Greater place attachment
  - Neighborhood pride & sense of belonging

- More positive city & TRAX attitudes
  - TRAX makes me eager to go downtown, live near TRAX, learn about places near TRAX, and generally like SLC more (Brown et al., JEP, 2016)

- Among those expecting to use TRAX, actual users had more optimism about
  - TRAX economic boosts: Housing improvements/values
In sum, TRAX is more than just transportation

- TRAX use reflects **neighborhood optimism**
- TRAX supports **healthy activity—objectively measured**
  - U.S. adults need every opportunity for moderate walking
- TRAX activity gains **comparable to park & rec center use**
  - But serves a different subset of people, making it more important to provide that activity opportunity
Complete Streets can be encouraged for health reasons

- We planned & built it
- Residents use it
- And gain “stealth health”

- Can we think of designs & policies to transform more residents into “neighborhood optimist riders?”
- Cities might want to employ place-attached residents as “transit ambassadors”

Before:

After:
Can we brainstorm more ways to promote ridership?

- Prioritize transit riders by design & development
- Promote designs & policies that encourage pride in place
- Involve residents & highlight positive changes to the neighborhood

Paris bookstall/phone recharge bus stop

Montreal’s musical swings at transit stop
Questions?