Water, Green Infrastructure & Climate Change

Blueprint Denver Task Force
August 24, 2017
Temperature will increase

Fewer extreme cold months, more extreme warm months

Urban heat island: 3rd worst

Vegetation stress

Increased wildfire risk & threat to watersheds

Lower stream flows
Climate Change Impacts

**Precipitation** *variability* will increase

Wetter-than-normal years

Drought years expected to increase in severity and frequency
Climate Change in the Urban Environment

- Building over natural waterways
- Deteriorating Infrastructure
- Increasing imperviousness
- Precipitation Variability

Growing Water Quality & Quantity Challenges
More Density = More Impervious Area

47% of Denver* is currently covered in impervious surfaces

57% of Denver* is projected to have impervious cover by 2020 based on future land use

Source: CCD Drainage Master Plan, 2014
Projected land-use change on Blueprint Denver, 2002
CU Boulder Study (*draft*)

Impervious Cover by Neighborhood, 2016

Top 10 Neighborhoods

<table>
<thead>
<tr>
<th>Rank</th>
<th>Neighborhood</th>
<th>Impervious Land Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CBD</td>
<td>90.3%</td>
</tr>
<tr>
<td>2</td>
<td>North Capitol Hill</td>
<td>80.3%</td>
</tr>
<tr>
<td>3</td>
<td>Civic Center</td>
<td>77.6%</td>
</tr>
<tr>
<td>4</td>
<td>Union Station</td>
<td>72.6%</td>
</tr>
<tr>
<td>5</td>
<td>Capitol Hill</td>
<td>72.4%</td>
</tr>
<tr>
<td>6</td>
<td>Cherry Creek</td>
<td>67.3%</td>
</tr>
<tr>
<td>7</td>
<td>Five Points</td>
<td>65.2%</td>
</tr>
<tr>
<td>8</td>
<td>City Park West</td>
<td>65.0%</td>
</tr>
<tr>
<td>9</td>
<td>Sun Valley</td>
<td>63.9%</td>
</tr>
<tr>
<td>10</td>
<td>Auraria</td>
<td>63.7%</td>
</tr>
</tbody>
</table>
Cory-Merrill Neighborhood (draft)
Development Pattern, 2004-2016

<table>
<thead>
<tr>
<th>Element</th>
<th>2004</th>
<th>2016</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Structures</td>
<td>42</td>
<td>36</td>
<td>-6</td>
</tr>
<tr>
<td># of Garages/Sheds(Detached)</td>
<td>18</td>
<td>12</td>
<td>-6</td>
</tr>
<tr>
<td>Area of Structures(SqFt.)</td>
<td>42561</td>
<td>54500</td>
<td>11939</td>
</tr>
<tr>
<td># of Driveways/Parking</td>
<td>22</td>
<td>27</td>
<td>5</td>
</tr>
<tr>
<td>Area of Driveways/Parking(SqFt.)</td>
<td>8846</td>
<td>7942</td>
<td>-904</td>
</tr>
<tr>
<td>Total Area(SqFt.)</td>
<td>51407</td>
<td>62442</td>
<td>11035</td>
</tr>
</tbody>
</table>

Development patterns project how change occurs in future
Why Green Infrastructure

Natural or built systems that use vegetation and soils to manage stormwater runoff

More resilient approach than relying on gray alone

# benefits

# scales
Benefits of Green Infrastructure

- Improve water quality
- Reduce flood risks
- Reduce Urban Heat Island effect
- Improve air quality
- Absorb local carbon emissions
- Improve public health outcomes
  - Increase physical activity
  - Improve mental wellbeing
  - Reduce stress
  - Lower traffic speeds and reduce injury crashes
- Improve property values
Sub/Regional Scale Projects

Site-Scale Projects
Green Infrastructure Planning

Data driven analysis

Implementation strategy that meets multiple city goals
BMP OPPORTUNITIES

Regional and Sub-Regional Opportunities
- City-Owned Parcels
- High Opportunity Parks
- Medium Opportunity Parks

Green Street Opportunities
- High Water Quality Opportunities
- Water Quality Opportunities

Opportunities
- Concepts

[central platte valley opportunities]

1. Speer Boulevard
   Proposed: Rain Gardens in Median

2. Acoma Street
   Proposed: Urban Neighborhood Greenway (Golden Triangle Neighborhood Plan)

3. Frog Hollow
   Proposed: Extended Detention Basin

green streets
9.74 miles | high priority green street opportunities
16.98 miles | green street opportunities

The process to identify site-scale opportunities (Section 4.4) resulted in a network of green street opportunities in each basin. Streets projects were considered high priority if potential partner opportunities exist and/or the project would offer significant water quality benefits. While streets represent one of the largest sources of urban stormwater pollution, they also represent one of the best opportunities for the installation of green infrastructure. Practices suitable for use within the right-of-way are illustrated in Denver’s Ultra-Urban Green Infrastructure Guidelines: https://www.denvergov.org/content/denvergov/en/wastewater-management/stormwater-quality/ultra-urban-green-infrastructure.html.

park opportunities

High Potential Park Opportunities:
- Frog Hollow Park
- Platte River Park
- Speer Boulevard Park
- Miskein Park

Medium Potential Park Opportunities:
- Centennial Park
- Gates Crescent Park
- Sunken Gardens Park

New water quality facilities in parks will be considered if they do not impact or limit park use or function. All park related projects will require further study, approval by the Department of Parks and Recreation (DPR), and a public involvement process. The designer must work with Denver Parks Planning during all phases to ensure compliance with DPR standards and specifications.
[Enhancing Colfax Multi-Modal Connections]

Collaboration Opportunity

Proposed Bus Rapid Transit Along East Colfax

After an extensive study of Colfax Corridor Connections and mobility attributes, the City and County of Denver, the City of Aurora, and the Regional Transportation District (RTD) are working together to pursue federal funding for a proposed Bus Rapid Transit (BRT) line that would extend the length of the East Colfax Corridor. Initial targets for anticipated construction would be 2018-2020. In addition to addressing the growing need for improved transportation along the Colfax Corridor, the project will add numerous street-level amenities, resulting in a much more inviting and safer corridor for pedestrians and bicyclists. The study anticipates that the implementation of a BRT line will significantly increase property values along the corridor as a result of the investment; the project is expected to attract.

The proposed BRT improvements span two of the city’s high priority basins for water quality (City Park/Park Hill and Central Platte Valley) and three medium priority basins (Five Points/Capitol Hill, NE Park Hill, and Westley Creek). A green streets analysis identified Colfax and many intersecting streets as high priority streets for water quality improvements. This, combined with the momentum of the project and its partners, and the engagement of the Colfax corridor (particularly the Business Improvement Districts or BIDs), presents a unique opportunity for the city to implement green infrastructure along the corridor. Dumpsprouts that are already planned to increase pedestrian safety at crossings can be designed to be stormwater planters that improve water quality and add green space. Trees will be important tools for shading BRT stops, and if designed as tree trenches or pits, can also help manage stormwater on-site while cooling the overall environment of the street.

Green Infrastructure and Transit

Incorporating green infrastructure in transit street design is an important way to ensure water quality treatment is located in one of the places it is needed most: the public right-of-way. Treating street runoff is critical to improving the health of Denver’s urban watersheds. Not only are streets a major source of stormwater runoff, they also represent the largest source of urban pollutants including sediment, heavy metals, automotive fluids, nutrients, and trash. As part of the stormwater conveyance system, streets collect and carry runoff directly to the underground storm drain network which then pipes those pollutants directly to receiving waterways.

In addition to playing an important role in improving Denver’s water quality, green infrastructure complements transit goals by calming traffic, enhancing rider comfort while waiting for transit, and by creating opportunities for safer pedestrian crossings when used in bus bulbs and curb extensions. Green infrastructure also enhances the pedestrian environment by improving aesthetics, helping cool local temperatures, improving air quality, and providing a buffer between vehicles and pedestrians and cyclists. Green infrastructure investments, particularly in commercial corridors, also help create a sense of place and can increase property values.

Business Improvement Districts and Streetscape Design

As the City and RTD make significant investments along the Colfax corridor, several Business Improvement Districts (BIDs) are also looking to enhance the corridor by establishing their own Streetscape Design Standards. The timing of these many activities present an opportunity to work with the community to incorporate green infrastructure practices in proposed design standards and guidelines along the highly visible corridor that is also in one of the city’s high priority water quality basins.

Colfax BIDs

Upper Colfax BID (est. 1995)
- Grant St. - Colfax Ave.
- Streetscape design effort taking place in 2016

Bluebird BID (est. 2014)
- St Paul St. - Colorado Blvd.

Colfax-Mayfair BID (est. 2014)
- Federal St. - Monaco St. + Mayfair Town Center (14th and Krameria)
- Streetscape design effort taking place in 2016
In Summary:
Already have challenges due to historical development patterns

Current development patterns are adding to challenges; in particular the increase in impervious surfaces

Green Infrastructure addresses and solves many environmental, economic, and social challenges

Discussion
• How can Blueprint direct growth patterns with impervious cover and other climate change challenges in mind?

• Can green infrastructure be prioritized in all contexts and typologies?

• Are there high level policy recommendations that can be incorporated into BP that establish impervious limits?

• What planning tools can be used to:
  - Limit the increase of impervious areas while promoting density?
  - Encourage implementation of more green infrastructure?
  - Establish qualitative standards for green infrastructure?