**PERMEABLE STREETS**

**LOOK**

[Images of permeable streets in different locations]

**PLAN VIEW**

- No changes to existing parking configurations or drive lanes
- Permeable pavement absorbs stormwater, filters to ground or pipes below

**AT A GLANCE**

<table>
<thead>
<tr>
<th>ABOUT</th>
<th>LOW</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A permeable street is paved with a porous material that allows stormwater to filter through to the soil below. Commonly used materials include permeable interlocking concrete pavement, porous asphalt, and previous concrete. Permeable pavement is appropriate on low volume residential streets with minimal slope. Recently, Denver installed permeable paving along a parking lane on Cherry Creek Drive South (pictured at top right).</td>
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</tbody>
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<th>FLOOD MITIGATION</th>
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<td>Permeable pavements help to reduce stormwater runoff volume by trapping and slowly releasing water into the ground instead of allowing it to flow directly into storm drains. This same process can also reduce peak flow rates by preventing large, fast pulses of precipitation into the stormwater system.</td>
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<td>Permeable pavement can help improve water quality by filtering chemicals and pollutants. Contaminants become trapped in the pavement as water filters through and microorganisms in the soil beneath can help breakdown other harmful pollutants.</td>
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</tr>
</tbody>
</table>

**WHAT DO YOU THINK?**

How comfortable are you with these types of green streets intervention in your neighborhood? Please place one dot along the spectrum below to indicate your level of comfort.

- NO WAY, NO HOW
- SKEPTICAL
- INTERESTED, BUT CONCERNED
- EAGER
- YES! BUILD IT TODAY
GREEN ALLEYS

LOOK

PLAN VIEW

No changes to existing parking configurations or drive lanes on main streets

Permeable pavement absorbs stormwater, filters to ground or pipes below

Permeable pavers can support heavy trucks or large vehicles that service alleys

Alley reconstruction could help support re-use of neighborhood 'carriage lots'

AT A GLANCE

ABOUT
Similar to permeable streets, a green alley is constructed with porous materials that allows stormwater to filter through to an underground system. Pavement can be used on the full width of the alley, or in a center trench where water collects. While types of pavement can vary, each treatment is designed to withstand current servicing needs by garbage, fire, or other vehicles. Designs can generally feature more vegetation than permeable streets.

FLOOD MITIGATION
Green alleys help to reduce stormwater runoff volume by trapping and slowly releasing water into the ground instead of allowing it to flow directly into storm drains. This same process can also reduce peak flow rates by preventing large, fast pulses of precipitation into the stormwater system.

WATER QUALITY
Permeable pavement can help improve water quality by filtering chemicals and pollutants. Microorganisms in the soil beneath can help breakdown harmful pollutants. Green alleys often also feature plants or other vegetation that support cleaner water and more attractive alleys.

WHAT DO YOU THINK?
How comfortable are you with these types of green streets intervention in your neighborhood? Please place one dot along the spectrum below to indicate your level of interest.

NO WAY, NO HOW  SKEPTICAL  INTERESTED, BUT CONCERNED  EAGER  YES! BUILD IT TODAY
**PROJECT PARTNERS**

**TREE LAWN BIOSWALES**

**LOOK**

**PLAN VIEW**

*No changes to existing parking configurations or drive lanes*

*Bioswales are constructed in the tree lawn behind the existing curb line*

*In areas with mature trees, bioswales may not be appropriate*

*Existing curb to curb street width does not change*

**AT A GLANCE**

**ABOUT**

Located behind curb in the existing tree lawns, this type of **bioswale** is designed to have minimal impact on existing parking or transportation facilities. Bioswales are designed to remove silt, pollution and other harmful chemicals from our water while also slowing the conveyance of stormwater. Generally designed as shallow trapezoids, these areas can be planted with native grasses, herbaceous perennials or other drought tolerant native materials.

**FLOOD MITIGATION**

Bioswales mimic natural processes of valleys and streams that once existed prior to urban development. Precipitation is directed into these swales and then slowly released, absorbed or conveyed. When designed and installed correctly, flood alleviation, especially in smaller events, can be significant.

**WATER QUALITY**

A primary benefit of bioswales is addressing stormwater quality. When properly maintained, bioswales provide an effective and cost-efficient way to remove pollutants, pathogens, or other chemicals. The longer stormwater can stay in the bioswale area, the more pollutants are filtered out.

**WHAT DO YOU THINK?**

*How comfortable are you with these types of green streets intervention in your neighborhood?*

*Please place one dot along the spectrum below to indicate your level of comfort.*

---

**NO WAY, NO HOW**

**SKEPTICAL**

**INTERESTED, BUT CONCERNED**

**EAGER**

**YES! BUILD IT TODAY**
INTERSECTION BULB-OUTS

LOOK

PLAN VIEW

Intersection bulb-outs provide traffic calming and reduce high speed turns

No changes to existing parking configurations or drive lanes

Rain gardens, bioswales, or other engineered facilities located at intersection

Existing curb to curb street width does not change

AT A GLANCE

ABOUT

Intersection bulb-outs are green infrastructure treatments placed at the intersection of streets and avoid any major impacts to parking. These landscaped areas are designed as rain gardens or vegetated swales that filter and capture stormwater. Intersection bulb-outs extensions can add green space, increase wildlife habitats and reduce impervious surfaces in the neighborhood.

FLOOD MITIGATION

Bulb-outs function similarly to bioswales by trapping some stormwater runoff and the slowly releasing or absorbing precipitation. Usually size-constrained, intersection bulb-outs may not provide as much water retention as other green infrastructure strategies but are still effective in smaller rain events.

WATER QUALITY

Intersection bulb-outs can look similar to rain gardens, often filled with deep-rooted plants and native grasses. Pollutants or other debris in stormwater runoff is filtered through soils before returning to our streams, lakes and rivers. Water quality is a significant benefit of these intersection bulb-outs.

WHAT DO YOU THINK?

How comfortable are you with these types of green streets intervention in your neighborhood?

Please place one dot along the spectrum below to indicate your level of comfort.

NO WAY, NO HOW  SKEPTICAL  INTERESTED, BUT CONCERNED  EAGER  YES! BUILD IT TODAY
MIDBLOCK BULB-OUTS

LOOK

PLAN VIEW

Large midblock bulb-outs can extend a half block

Smaller bulb-outs can create a 'neck-down' effect to slow speeds

Alternate bulb-outs calm traffic and allow on-street parking

Bulb-outs extend into the street to create more space for water quality and retention

AT A GLANCE

ABOUT

Midblock bulb-outs function similarly to intersection bulb-outs, but can provide a larger and more linear space for water retention. Bulb-outs extend into the existing street and may not have any effect on existing tree lawns. They can vary largely in size, based on available space and desired effectiveness, and create many ancillary benefits including traffic calming, improving pedestrian safety, reducing heat island effects, and increasing native vegetation.

FLOOD MITIGATION

Stormwater runoff is directed into midblock bulb-outs where it is conveyed or stored. Larger midblock bulb-outs can have the capacity to significantly reduce overall stormwater runoff during even larger, more intense storm events. Certain projects have seen an 85% reduction in 25-year storm events.

WATER QUALITY

Water quality improvements is another major benefit of midblock bulb-outs. As water enters the bulb-outs, it becomes filtered by soils and vegetation. The longer stormwater can stay in the bioswale area, the more pollutants are filtered out.

WHAT DO YOU THINK?

How comfortable are you with these types of green streets intervention in your neighborhood?  
Please place one dot along the spectrum below to indicate your level of comfort.

NO WAY, NO HOW

SKEPTICAL

INTERESTED, BUT CONCERNED

EAGER

YES! BUILD IT TODAY
CORRIDOR PROJECTS

WHAT DO YOU THINK?
How comfortable are you with these types of green streets intervention in your neighborhood?
Please place one dot along the spectrum below to indicate your level of comfort.

NO WAY, NO HOW  SKEPTICAL  INTERESTED, BUT CONCERNED  EAGER  YES! BUILD IT TODAY

ABOUT
A corridor project may have larger impacts on stormwater conveyance and water quality and completely re-imagines a neighborhood street. Entire traffic lanes or corridors could be re-purposed for green infrastructure solutions, creating the opportunity for major impacts. This intervention may be most appropriate on low volume residential streets where automobiles are deemphasized.

FLOOD MITIGATION
These projects function similar to bulb-outs or rain gardens, but the larger scale creates a more impactful intervention. Depending on size and scale of adoption, these corridor length projects can significantly reduce the need and cost of traditional gray infrastructure improvements.

WATER QUALITY
Corridor length projects have the ability to treat a major amount of water. As with other green infrastructure strategies, pollutants and chemicals are removed from stormwater runoff as the water filters through soils and vegetation. The size and scale of these improvements is key.
EXISTING CONDITIONS
LONG BLOCK TYPE

TYPICAL LONG BLOCK - PLAN VIEW
- on-street parking, both sides
- 6-8 ft. tree lawn
- north/south-facing home entrances
- trees vary in age and location

TYPICAL LONG BLOCK - SECTION VIEW
- detached, 5ft sidewalks
- 5' 8'
- 30' Curb-Curb
- 60' ROW

EXAMPLE OF LONG BLOCK TYPE - AT BATAVIA PL AND ALBION ST - LOOKING WEST
EXISTING CONDITIONS
SHORT BLOCK TYPE

TYPICAL SHORT BLOCK - PLAN VIEW
- on-street parking, both sides
- alleys
- detached, 5ft sidewalks
- east/west-facing home entrances
- tree lawn, 8 ft. Trees vary in age and location
- 330 ft block (Street to Street)

TYPICAL SHORT BLOCK - SECTION VIEW
- 5' 8'
- 30' Curb-Curb
- 60' ROW
- sanitary main (27" on 16th, east of Dahlia)
- storm main (60" on 16th, east of Dahlia)

EXAMPLE OF SHORT BLOCK TYPE - AT DAHLIA ST AND 16TH AVE - LOOKING EAST
COMMUNITY VISION AND GOALS

16TH STREET

**Primary Goals**

- Alleviate flooding
- Improve water quality

**Complementary Neighborhood Goals**

- Reduce impervious surfaces within the neighborhood
- Explore green infrastructure projects within the neighborhood
- Maintain neighborhood character and aesthetics
- Find co-benefits: slow traffic speeds and encourage walking or biking
- Increase education and awareness of stormwater through local projects
- Incentivize homeowners to participate in flood proofing
WHERE WOULD YOU LIKE TO SEE THIS INTERVENTION?

PLACE A ● WHERE YOU WOULD LIKE TO SEE POROUS PAVEMENT

THESE ACTIVITIES ARE TO GET A GENERAL SENSE OF COMMUNITY SUPPORT OR DISAPPROVAL. THESE IDEAS ARE NOT FINAL DECISIONS AND ARE NOT CURRENTLY BEING DESIGNED FOR THE PROJECT SITE.
WHERE WOULD YOU LIKE TO SEE THIS INTERVENTION?

PLACE A WHERE YOU WOULD LIKE TO SEE MIDBLOCK BULB-OUTS

These activities are to get a general sense of community support or disapproval. These ideas are not final decisions and are not currently being designed for the project site.
WHERE WOULD YOU LIKE TO SEE THIS INTERVENTION?

PLACE A ● WHERE YOU WOULD LIKE TO SEE CORRIDOR PROJECTS

These activities are to get a general sense of community support or disapproval. These ideas are not final decisions and are not currently being designed for the project site.
WHERE WOULD YOU LIKE TO SEE THIS INTERVENTION?

PLACE A ☺ WHERE YOU WOULD LIKE TO SEE INTERSECTION BULB-OUTS OR BIOSWALES

These activities are to get a general sense of community support or disapproval. These ideas are not final decisions and are not currently being designed for the project site.