Agenda

• Welcome and Introductions
• Funding
• Features
• Frequency
• Extents
• Attribution
• Next Steps

If on the webinar, use chat to ask questions.

If in the room, please use mics!
Planimetrics by the numbers

- 2014 & 2016
- 21 - 27 partners
- ~1100 square miles covered
- 9 features captured

Initial collection is expensive but maintenance is reasonable as long as we keep up with it.
A Look at Funding

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partners</td>
<td>$480,902</td>
<td>$248,931</td>
</tr>
<tr>
<td>DRCOG</td>
<td>$281,363</td>
<td>$78,010</td>
</tr>
<tr>
<td>Grants</td>
<td>$88,124</td>
<td>-</td>
</tr>
</tbody>
</table>

2016 Building Roofprints

- **DRCOG Funded Update**
- **Partner Funded Update**
- **Partner Funded New**

**IMPORTANT:** The cost is kept low IF we buy a relatively contiguous area.
Discussion: Funding

New funding ideas

• Grants?
• New Partners?
• What else…
• Who else…
### Favorite Features 2016

<table>
<thead>
<tr>
<th>Feature</th>
<th>No. Partners Purchased</th>
<th>Ranked in the Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Roofprints</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>EOP poly</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>Parking</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>EOP line</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Ramps</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>Sidewalk poly</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>Trail line</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Driveways</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Sidewalk line</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

*DRCOG required that all partners buy building roofprints in 2016 and a bundle of multiple features in 2014. Sidewalk centerlines were purchased for most of the area by RTD so this chart is not indicative of their true value to the partners.*
Too many features?

Nope – 73% say DRCOG should not decrease the number of features offered in an effort to streamline delivery.
Missing Features

What should we add?

- 50% say: Pavement markings
- 33.3% say: Impervious surfaces
- 25% say: Poles and signs

Write-in options:
- Routable Street Centerlines

We already have some components of *impervious surface*. We are missing things like:
- Concrete pads
- Curbs and steps
- Pools
- Patios
- Private sidewalks

An impervious surface layer would merge all the features we are already getting, add more in, and then dissolve everything into one layer with no attribution.
Feature Packages

Basic Package + Buy-up Options

Example:
All partners buy basic package:
1. Building roofprints
2. Edge of pavement
3. Parking
4. Sidewalk centerlines
5. Trails
6. Ramps

And can buy-up:
1. Driveway polygons
2. Sidewalk polygons

Alternating Years

Example:
Every 2 years, all partners buy:
1. Building roofprints
2. Sidewalk centerlines

Every 4 years, all partners buy:
1. EOP
2. Parking
3. Trails
4. Ramp

For every project, partners can buy up whatever isn’t required.
Building Roofprint Expansion?
Discussion: Features

• What do you think about how features were ranked or prioritized?

• Do you think we are missing features?

• What is the ideal feature package?
## Change by Feature

<table>
<thead>
<tr>
<th>Feature</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Roofprints</td>
<td>7%</td>
</tr>
<tr>
<td>EOPL</td>
<td>6%</td>
</tr>
<tr>
<td>EOPP</td>
<td>13%</td>
</tr>
<tr>
<td>Parking</td>
<td>14%</td>
</tr>
<tr>
<td>Sidewalk line</td>
<td>8%</td>
</tr>
<tr>
<td>Sidewalk poly</td>
<td>15%</td>
</tr>
<tr>
<td>Ramps</td>
<td>7%</td>
</tr>
<tr>
<td>Driveways</td>
<td>6%</td>
</tr>
<tr>
<td>Trail line</td>
<td>18%</td>
</tr>
</tbody>
</table>

*Features classified as “add” or “modified” in the update areas, not in areas of new collection in 2016.

There are more modifications than brand new features.
Discussion: Frequency

How much change warrants a project?

Should we change the frequency of the project?
## Matching Extents

<table>
<thead>
<tr>
<th>Feature</th>
<th>Current Extent</th>
<th>Gap SMQI</th>
<th>Cost to Fill Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Roofprints</td>
<td>1116</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EOPL</td>
<td>1116</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EOPP</td>
<td>1116</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Parking</td>
<td>1116</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sidewalk line</td>
<td>1272</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sidewalk poly</td>
<td>667</td>
<td>449</td>
<td>~$70,000</td>
</tr>
<tr>
<td>Ramps</td>
<td>1262</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Driveways</td>
<td>725</td>
<td>391</td>
<td>~$50,000</td>
</tr>
<tr>
<td>Trail line</td>
<td>1322</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

New collection is expensive…
Discussion: Extents

Should we try to match the extents?

Yes – 75% say we should capture all features at the same extent.

But...how?
Specs – Building Roofprints

Geometry: Polygon
Extraction: 3D

Attributes:
Unique ID
Height (feet)
Ground Elevation (ft)
Building Type (Residential, Commercial, Industrial, Medical, Public, Garage/Shed, Parking Structure, Tank, Foundation/Ruin, Misc.)
Source of Building Type

Delineate outlines of visible structures captured at the corners of the roof (eave). Collect buildings with area \( \geq 48 \) sq. ft. and over 5 ft. in height. Arms and indentations should be 2.5 ft or greater to be captured. Canopies, carport covers, and sheds should be included. For multi-level commercial/industrial buildings, capture each level as a unique record IF the building is \( \geq 1000 \) sq. ft. and the multi-level roof levels are \( \geq 400 \) sq. ft. in area and over 5.0 ft. in height. Each polygon should be a separate record. Polygons that are part of the same building should have a matching building ID. For pitched roofs, collect the highest point to get the building height. The lowest point will be a common lowest point if multi-level. Only permanent structures should be captured.

100% say No Change
Edge of paved and unpaved streets/roads with width >= 9ft intended for street-legal vehicle use. A road/street is defined as having consistent material from edge to edge. Edge should be the flowline (lowest point in curb). Breaks should occur at intersections and where surface type or curb type changes.

For overpass/underpass situations, keep features continuous on overpass, and break features underneath by the bridge deck. For drive-through or building overhangs (like entrance of hotels), collect the structures and break parking polygons. Unpaved trail is not included in this layer. Paved road polygons take precedence over sidewalk polygons, but unpaved roads do not. Must be topologically coincident with EOP polygons.

90% say No Change
Outline of paved and unpaved streets/roads with width >= 9ft intended for street-legal vehicle use. A road/street is defined as having consistent material from edge to edge. Edge should be the flowline (lowest point in curb). Medians are delineated by a curb or raised surface but not a paint line. Median is any section within a corridor that you can't drive on. Medians can contain any ground cover (grass. Concrete, gravel, plantings, etc). Medians includes traffic islands. Islands in cul-de-sacs should be captured. Unpaved trail is not included in this layer. Paved road polygons take precedence over sidewalk polygons, but unpaved roads do not.
Specs – Parking Lots

Geometry: Polygon
Extraction: 2D

Attributes:
Type (Impervious, Pervious, Mixed)

Delineate outlines of paved, impervious surface parking lots with an area >=400 sq. ft. Include the entrance into the lot. Connect to road features. Pervious features within parking lots (islands) that are >= 50 sq ft should be captured. This layer does not include on-street parking or parking garages (the latter are captured by the building roofprints layer). When sidewalk polygons meeting parking apron, the sidewalk breaks and parking polygon continues - unless you can visibly see the sidewalk crossing the parking lot. Dumpster areas in the parking lot should be included.

100% say No Change
Specs – Sidewalk centerlines

Geometry: Polyline
Extraction: 2D

Attributes:
Type (Sidewalk, Crosswalk, Missing Sidewalk, Other crossing, best-fit line)

Note that “missing sidewalk” is a new domain that was not previously collected. Only new features need to use this new schema – the 2014 dataset will not be retrofitted with this attribution change.

A "sidewalk" is a paved path for pedestrians; most often on the side of the road.

A "crosswalk" is a marked part of the paved road where pedestrians have right of way to cross.

A “missing sidewalk” is an area on the side of a road where a sidewalk appears to be missing. An indication of a missing sidewalk would be existing sidewalks in the surrounding blocks. The "missing sidewalk" should be used to connect features in this layer that are separated by an average city block or less (~650ft); this feature does not have to be paved; it will only be collected if there is visible and reasonable access (wheelchair accessible) or connection between the sidewalks/crosswalks to be connected.

An "other crossing" is a line segment that maintains connectivity within this layer but is not a sidewalk, missing sidewalk, or crosswalk. The "other crossing" should be used to connect other features in this layer that are separated by an average city block or less (~650ft); this feature does not have to be paved; it will only be collected if there is visible and reasonable access (wheelchair accessible) or connection between the sidewalks/crosswalks to be connected.

A “best-fit line” is a straight feature drawn through a decorative sidewalk pattern (e.g. on a school campus). It indicates that a sidewalk is there but does not trace all pedestrian possibilities.

82% say No Change
Geometry: Polyline
Extraction: 2D

Attributes:
Type (Sidewalk, Crosswalk, Missing Sidewalk, Other crossing, best-fit line)

NOTE: We need to add language to the description about TOD areas and maintaining connectivity in/out of them – including covered sidewalks.

The main goal of this feature dataset is connectivity; it will be used for routing and modeling of pedestrian trips. Delineate paved sidewalks and paved trails with width > 5ft as centerlines. Sidewalks are paved paths for pedestrians, "Point A to Point B" use. Trails in this layer are public paved walkways intended for recreational purposes. This layer includes all public sidewalks (e.g. adjacent to a public building, schools, or roads, adjacent to commercial buildings, maintained by a public entity) and trails (e.g. in public parks, maintained by a public entity). The sidewalks layers will not include private sidewalks (i.e. serving individual residences, contained within campuses, mails or commercial complexes) EXCEPT where the sidewalk maintains connectivity with the public sidewalk network. In these instances, if the private sidewalk is too complex (i.e. multiple, indirect paths, or with many branches), a best-fit line may be drawn to maintain connectivity with the public sidewalks. If the sidewalk widens and the centerline shifts, create a "jig" to keep the centerline connected. The sidewalk does not stop at intersections or at parking aprons or at driveways, BUT these areas should be separate segments within the line feature and attributed differently. For sidewalk centerlines meeting a parking apron, the portion of sidewalk centerline within the apron always breaks into a different line segment, and has a type of "other crossing" unless the sidewalk crossing the parking lot is readily visually apparent, in which case the sidewalk centerline simply continues unbroken. For sidewalk centerlines meeting a driveway apron, the sidewalk continues.

82% say No Change
Delineate centerlines for unpaved trails with a width greater than 5ft and less than 9ft. The primary use of "trails" is for recreation purposes. If the trail widens and the centerline shifts, create a "jig" to keep the centerline connected (just as with centerline sidewalks). A goal of this feature dataset is connectivity; it may be used for routing and modeling of pedestrian trips. Connect to the sidewalk centerline layer when appropriate. This layer will only include public, but not private trails. Break all trail centerlines at intersections.
Specs – Ramps

Geometry: Point
Extraction: 2D

Attributes:
Unique ID

Capture the location of sidewalk ramps. Ramps do not have to connect to other layers (e.g. sidewalk centerlines). Ramps do not have to be ADA accessible to be captured (imagery resolution is not high enough to discern this characteristic).

100% say No Change
Outline paved sidewalks and paved trails with width > 5ft as polygons. Sidewalks are paved walks for pedestrians, "Point A to Point B" use. Trails in this layer are paved walkways intended for recreational purposes. Polygon sidewalks and trails do not cross road intersections. Connectivity does not need to be maintained as in the centerline sidewalk dataset. For sidewalk polygons meeting driveway apron, sidewalk always stays continuous and breaks driveway polygons. For sidewalk polygons meeting parking apron, sidewalk always breaks and parking polygon continuous- unless you can visibly see the sidewalk crossing the parking lot. Sidewalks will not be delineated in areas where they don't provide connectivity (i.e. in a parking lot median). This layer will not include private sidewalks/trails. This layer includes all public sidewalks (e.g. adjacent to a public building, schools, or roads, adjacent to commercial buildings, maintained by a public entity) and trails (e.g. in public parks, maintained by a public entity). Extend the polygon sidewalks to include areas with the tree plantings, but only exclude the pervious part if it is over 50 square feet (this threshold is also used in the parking layer).
Geometry: Polygon
Extraction: 2D

Attributes:
Unique ID

Delineate paved polygon driveways - includes public and private. For sidewalk polygons meeting driveway apron, sidewalk always stays continuous and breaks driveway polygons.

100% say No Change
“We’ve found that the 2D feature mapping (EOP, sidewalks, ramps, parking, driveways) is affected by building lean in the taller building area, as the lean of the buildings in the source orthoimagery can obscure features near buildings.

We found features missed in our mapping from the 2014 orthoimagery due to being obscured by building lean which were visible in the 2016 orthoimagery due to building lean being in a different direction.

This increased the amount of update mapping required. We discussed the possibility of doing all 3D stereo capture (not impacted by building lean) for the tall building areas or the entire project on future updates.”
Discussion: Attribution

Any other thoughts on attribution or capture specs?
Next Steps

• By March 1: Determine what we’re offering
  • Do we need another meeting or a survey?
• By April 1: Estimate costs with existing bids
• By April 15: Send potential partners a cost estimate

82% say to choose between Sanborn or Kucera instead of doing an RFP
QUESTIONS?

Email me at a summers@drcog.org