LiDAR Pilot Project Results

LOS ANGELES REGION
LAR|IAC
imagery acquisition consortium

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What is Drainage Modeling?

- Use elevation data to:
  - Show the drainage network – where runoff flows over land.
  - Develop catchments

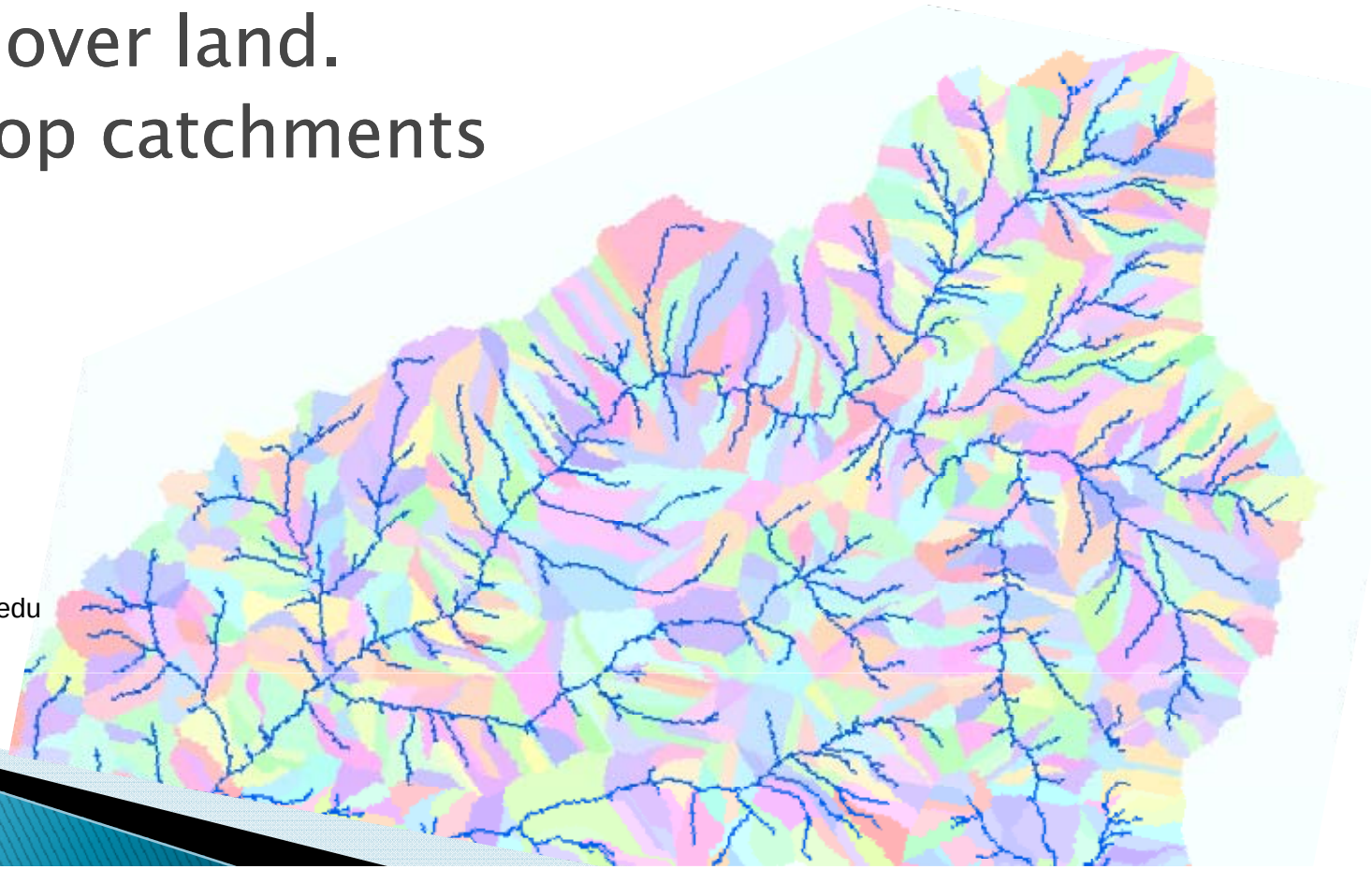
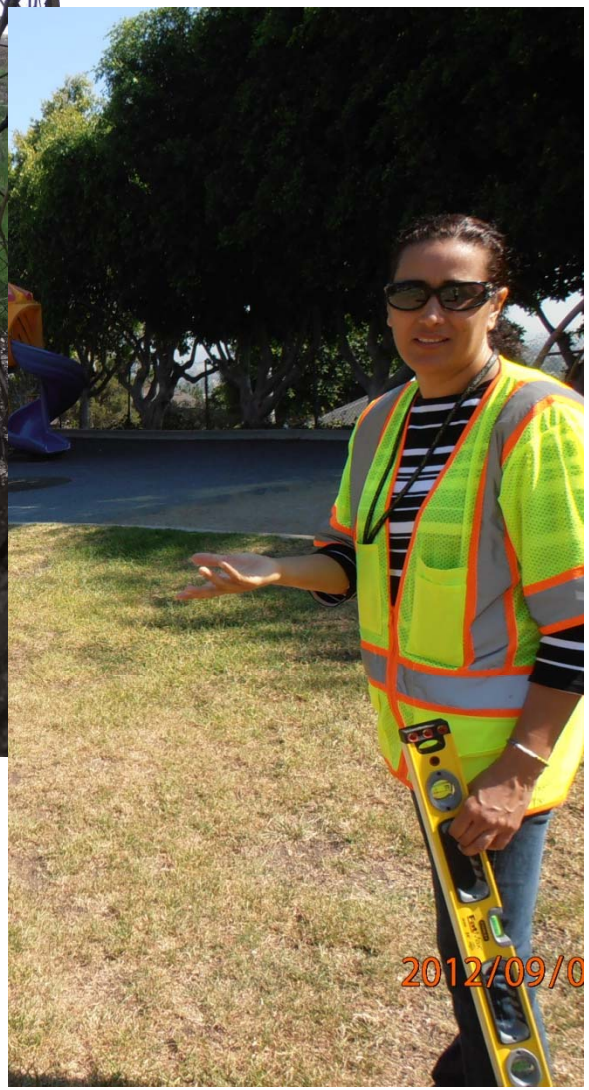


Image courtesy of hydrology.usu.edu
TauDEM 5.1 Quick Start Guide

Why?

- MS4 Permit Compliance
- Catchment Characteristics
- Infrastructure design
- Watershed Studies
- Flood response

Infiltration islands in a parking lot in San Mateo, California, help reduce runoff. (Photo courtesy of John Kosco) water.epa.gov



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LA Pilot Area– Characteristics

- FLAT
- No streams or ditches
- Gutter flow
- 6” curbs often define flow
- Extensive storm drain network

Target Deliverables

- Acceptable Lidar Point Resolution
- Final Surface Model
- Artificial Stream Network
- Catchment area polygons for:
  - Catch Basins (known)
  - Collection Points (theoretical)
  - MS4 Outfalls (regulatory)

Point Cloud Resolution

Table 1. Point Cloud Resolution/DEM Matrix

DEM	35cm	70cm	1.4m
1ft		n/a	n/a
3ft			n/a
5ft			

* the default standard for 1ft contour development

Point Cloud Resolution

35cm Point spacing

70cm Point spacing

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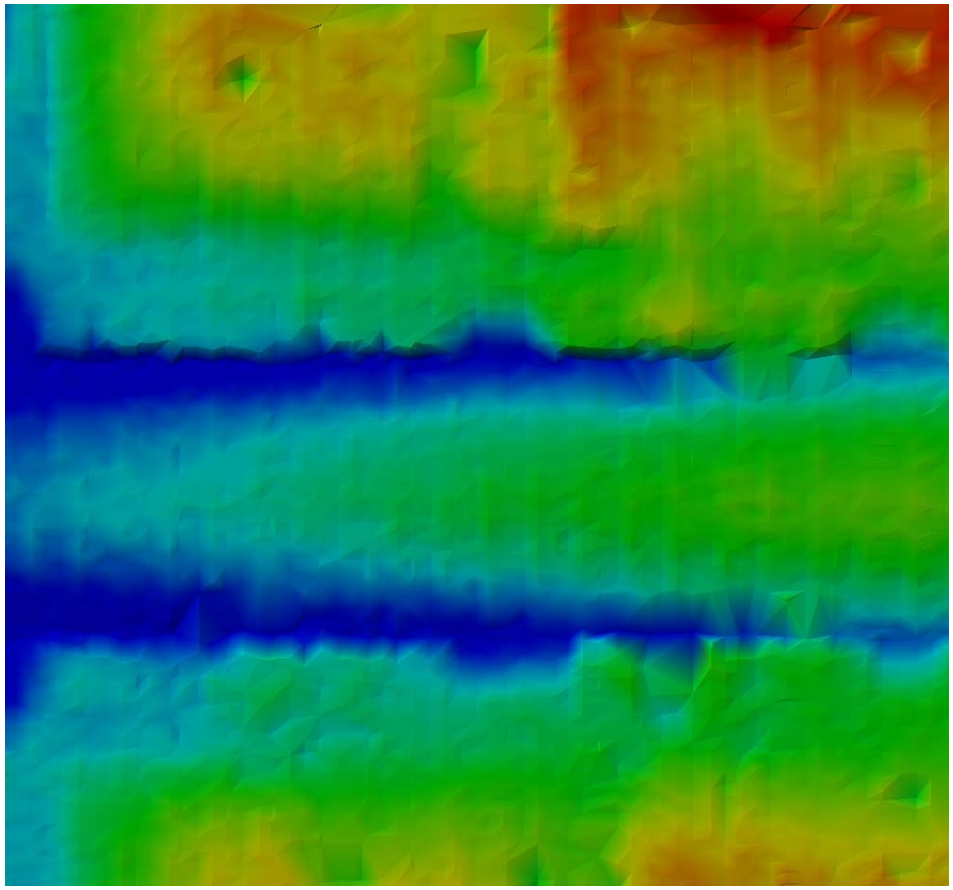
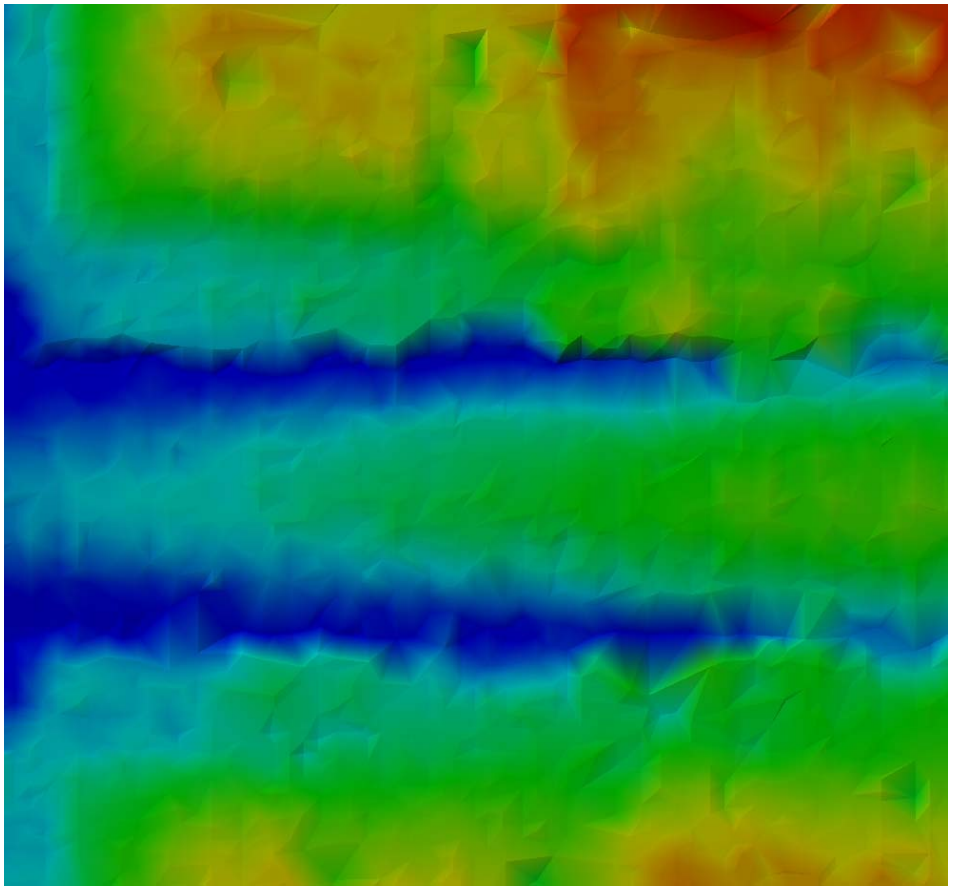
Point Cloud Resolution

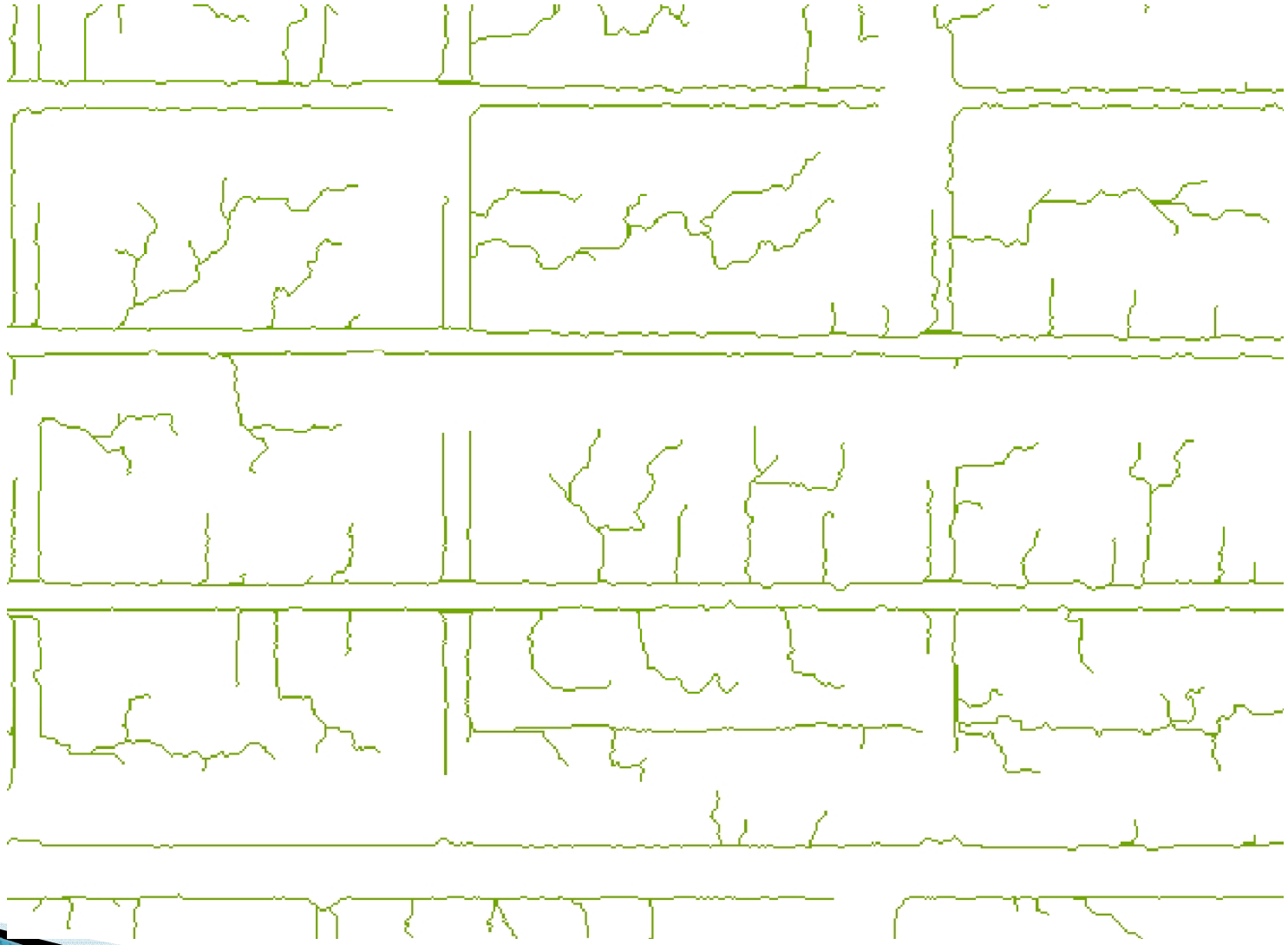


35cm Point spacing



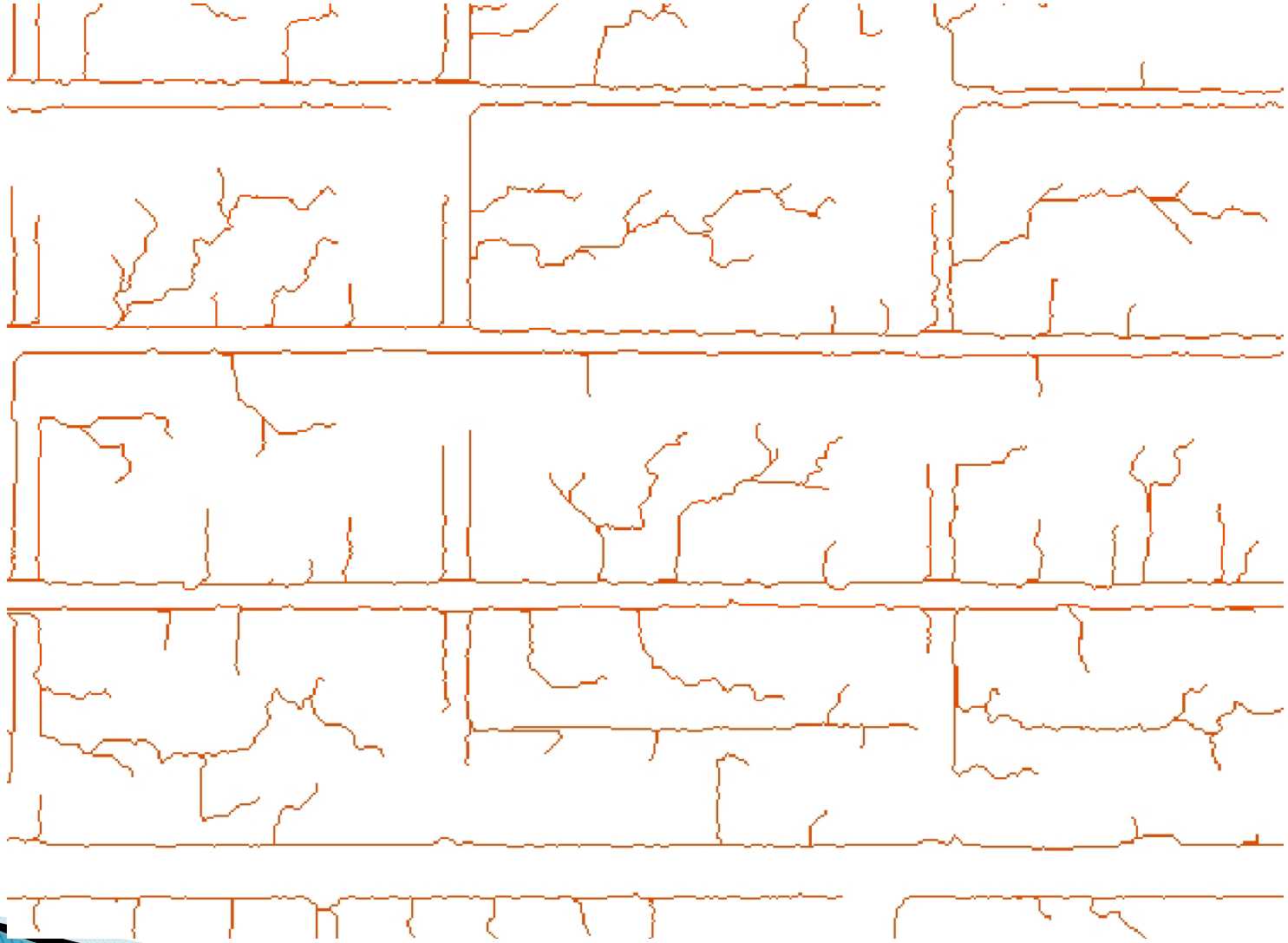
70cm Point spacing

Point Cloud Resolution



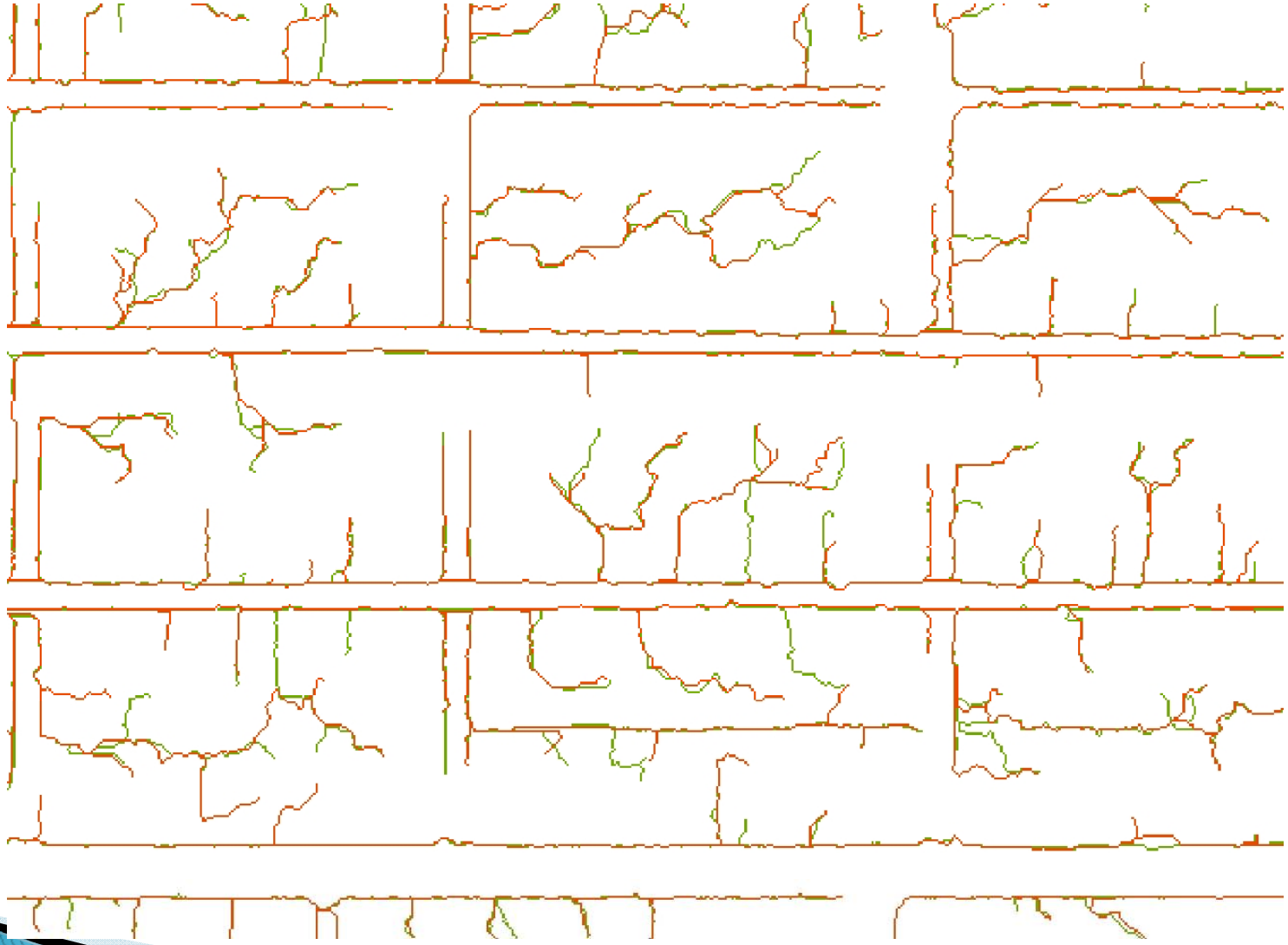
Drainage Network – 35cm post spacing

Point Cloud Resolution



Drainage Network – 70cm post spacing

Point Cloud Resolution



Drainage Network – 35cm green
70cm orange

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  - Catchment area polygons
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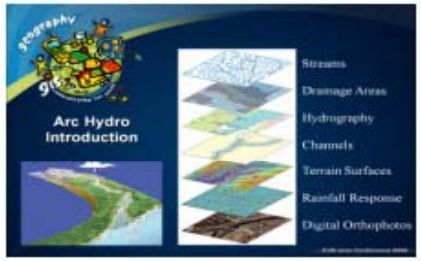
Software Tools?

ArcGIS Resources

Home | Communities | Help

Arc Hydro Overview

Communities / Hydrology / Surface Water



Arc Hydro is a set of data models and tools that operates within ArcGIS to support geospatial and temporal data analyses.

SCALABLE ALGORITHMICS

technology | solutions | company

› introduction | desktop | analysis | live

Turning big terrain data into knowledge.

UtahState UNIVERSITY

Hydrology Research Group
David Tarboton

System-Wide Water Resources Program SWWRP

Hydrologic terrain analysis with parallel processing developed with support from the US Army Corps of Engineers, System Wide Water Resources Program

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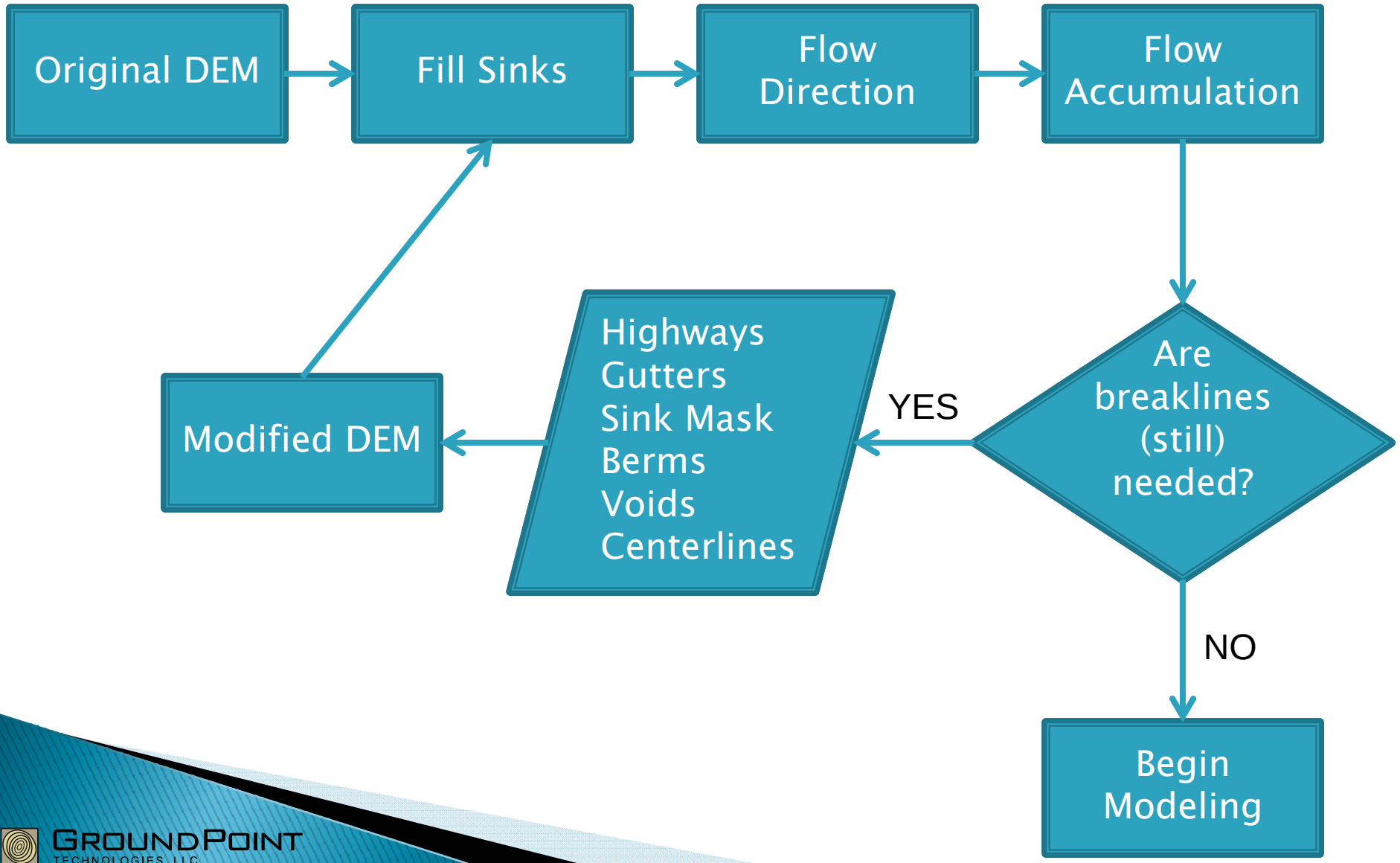
TERRAIN ANALYSIS USING DIGITAL ELEVATION MODELS (TAUDEM)

Workflow– Surface Prep



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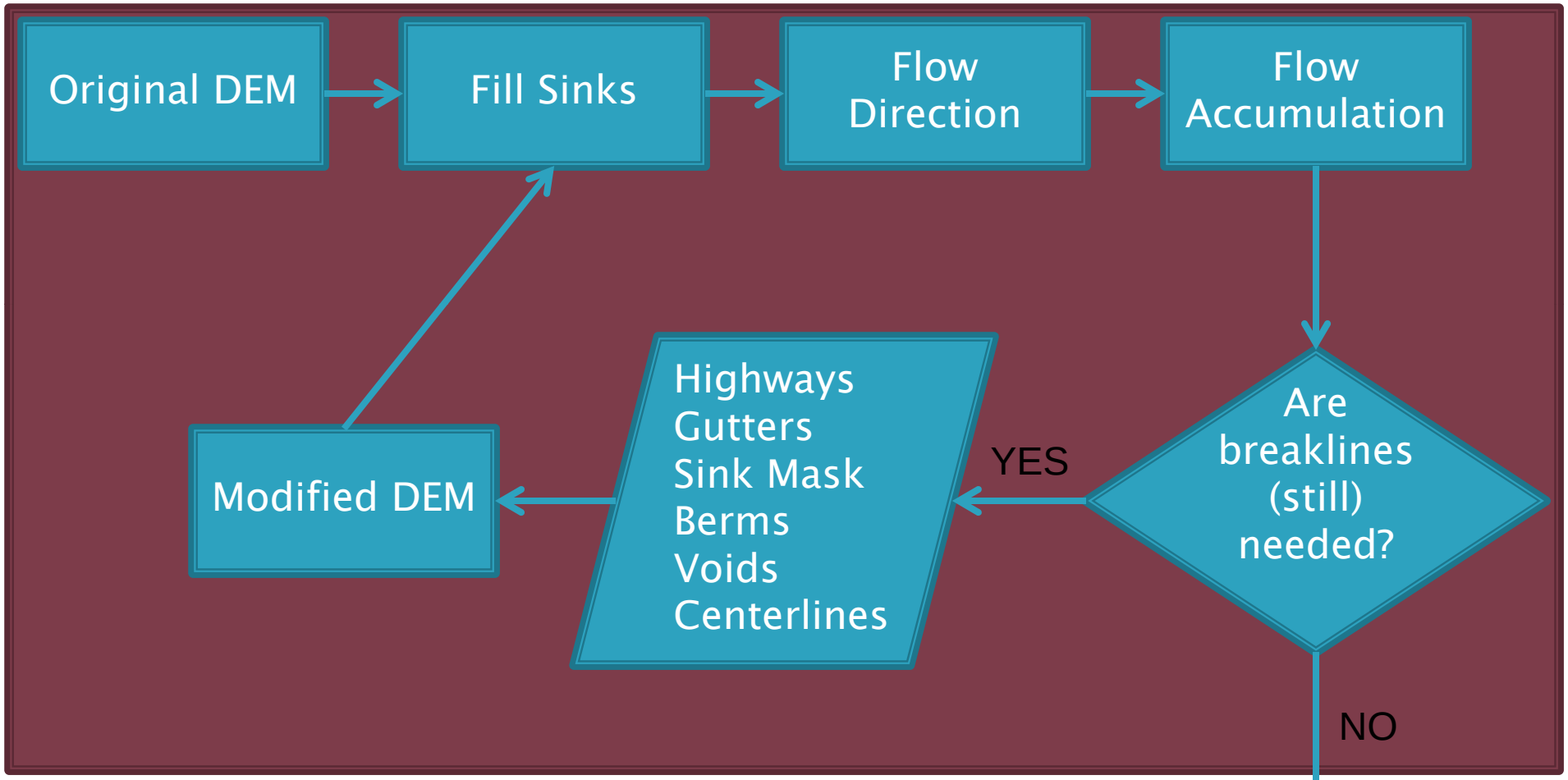
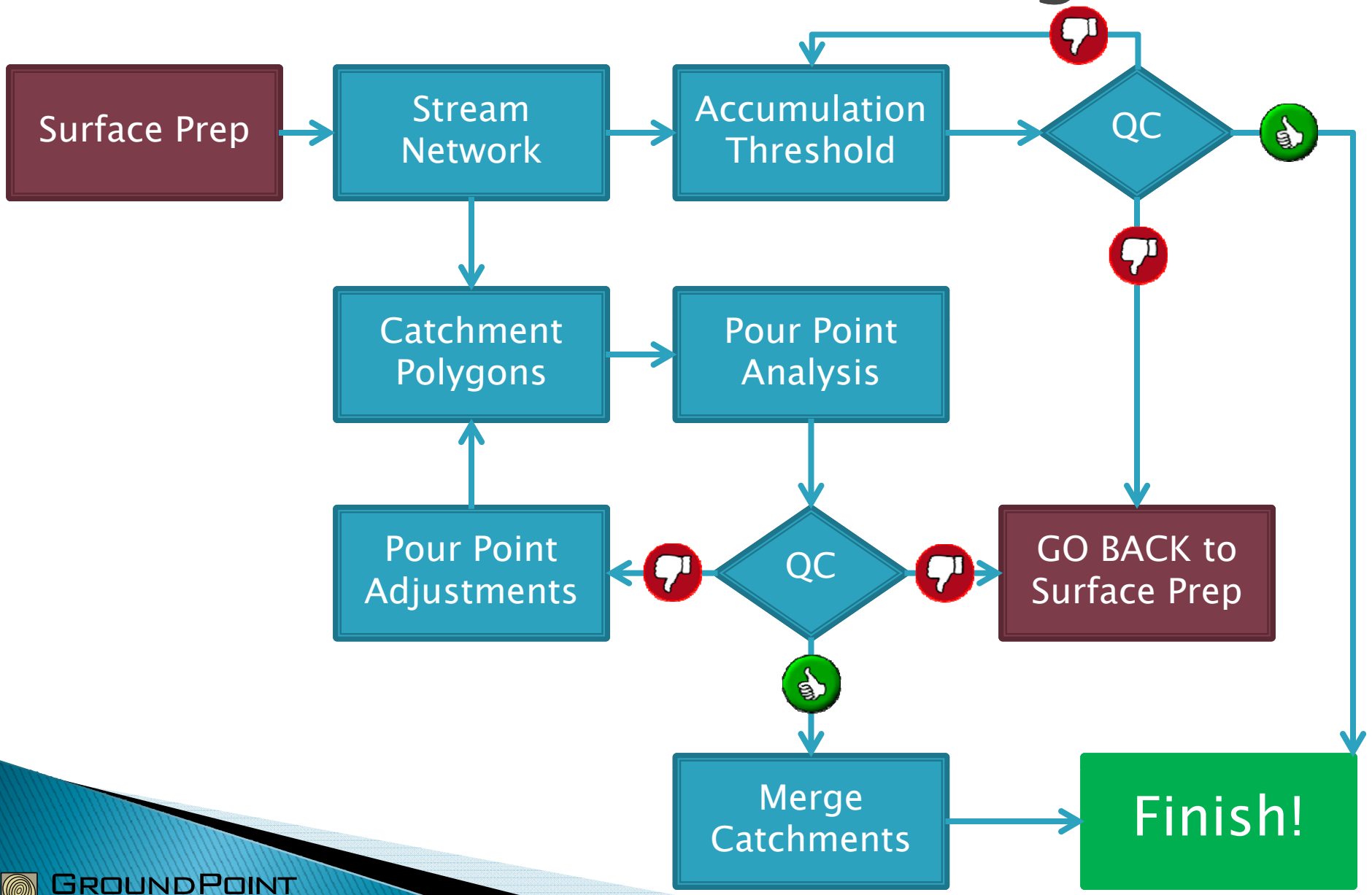
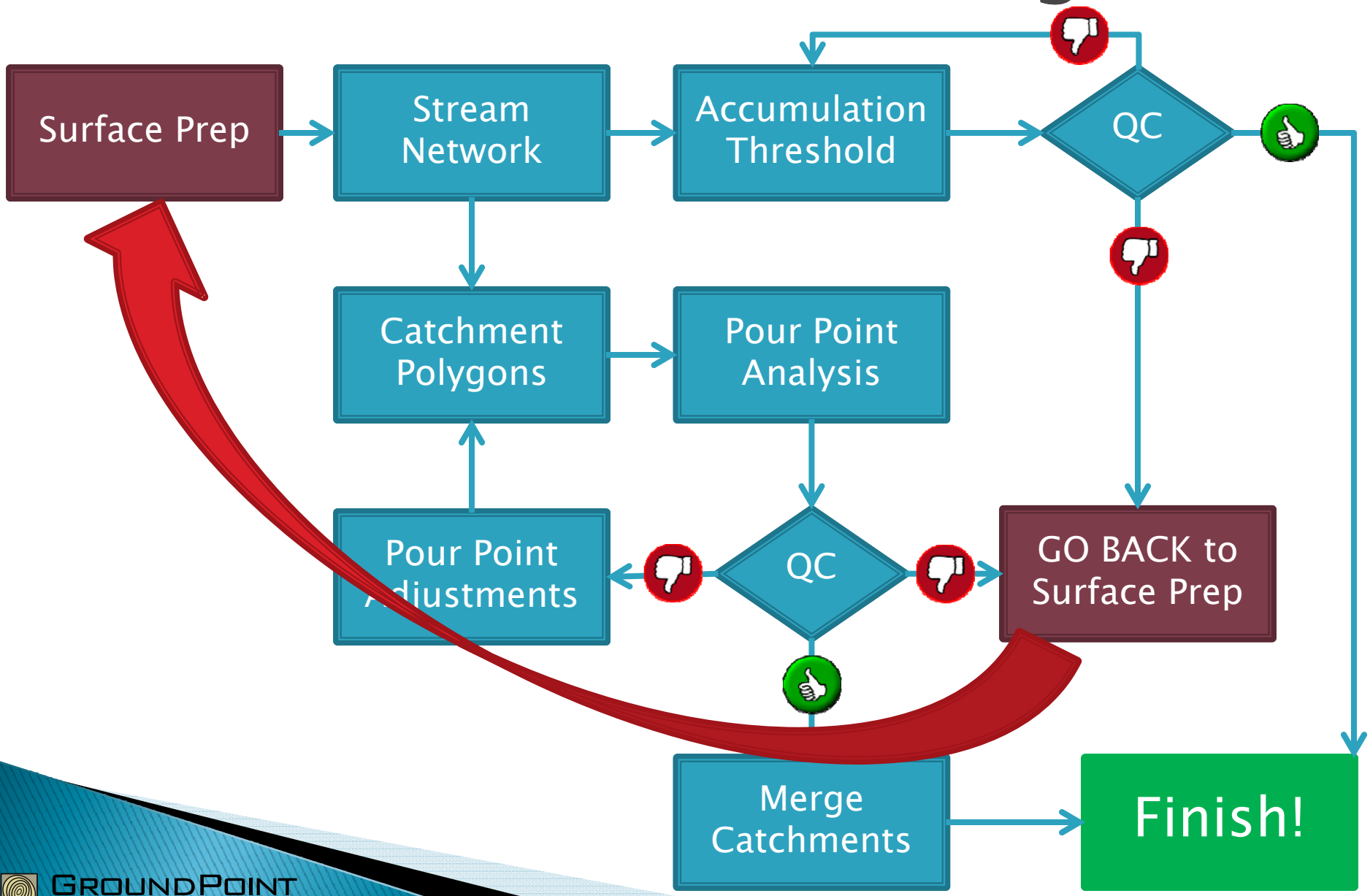


Workflow– Modeling

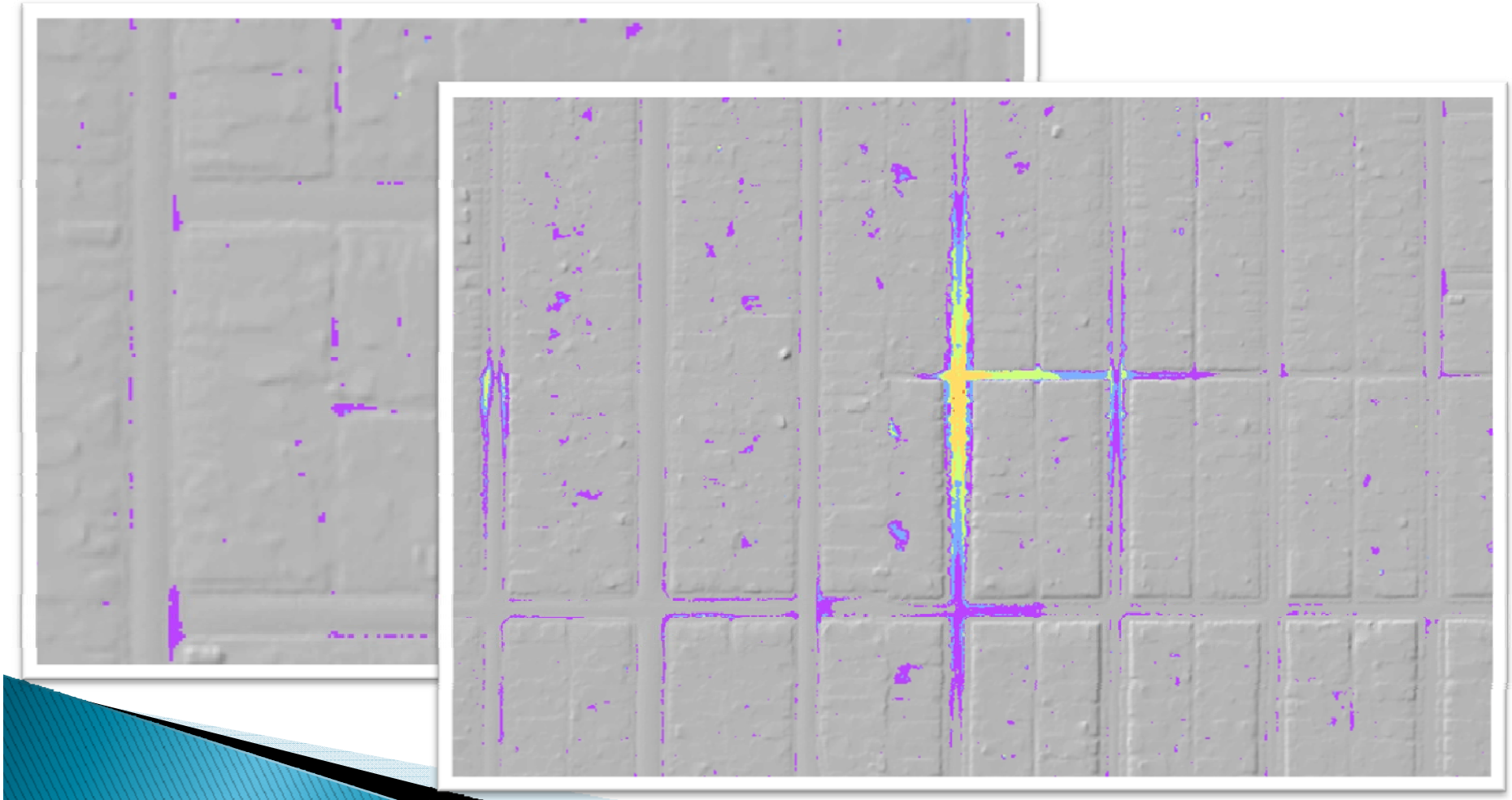


Workflow– Modeling



Workflow– Surface Prep

Fill Sinks



Workflow- Surface Prep

Workflow- Surface Prep

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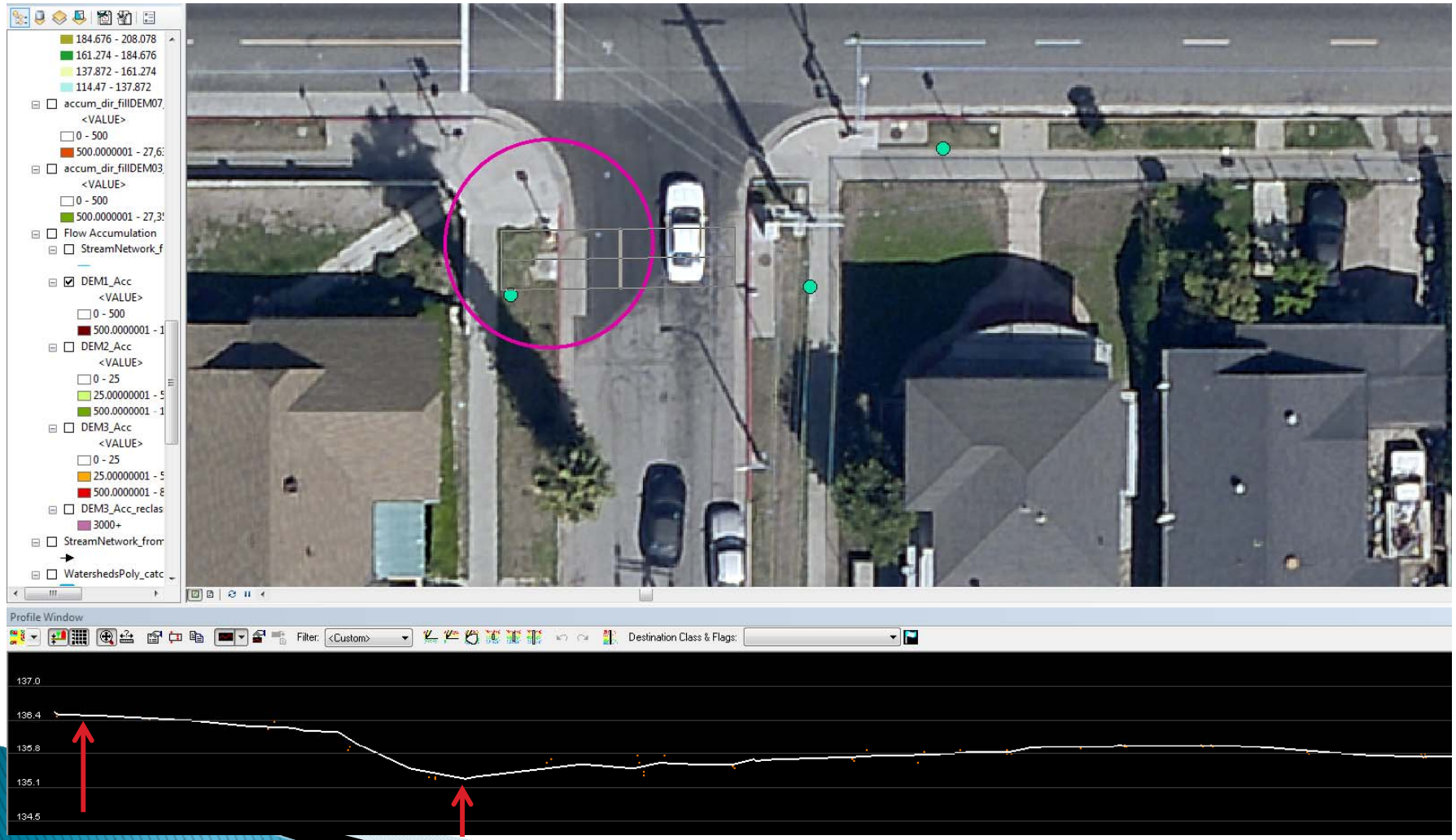
Workflow – Modeling

- Pour points must be moved



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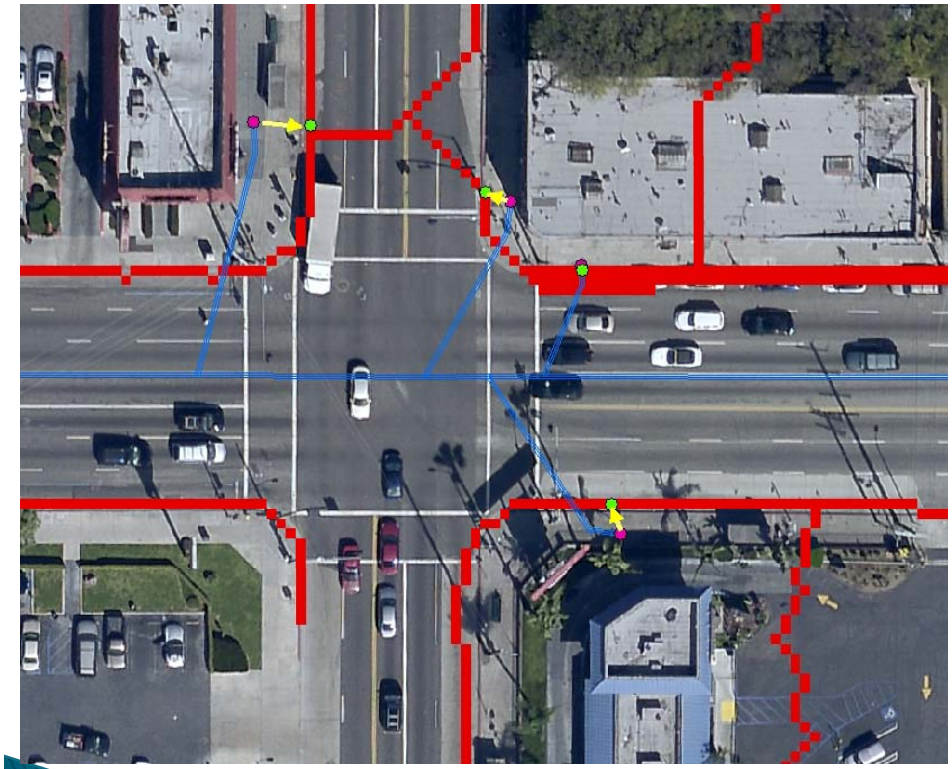
137.0
136.4
135.8
135.1
134.5

Workflow – Modeling

- Pour points must be moved

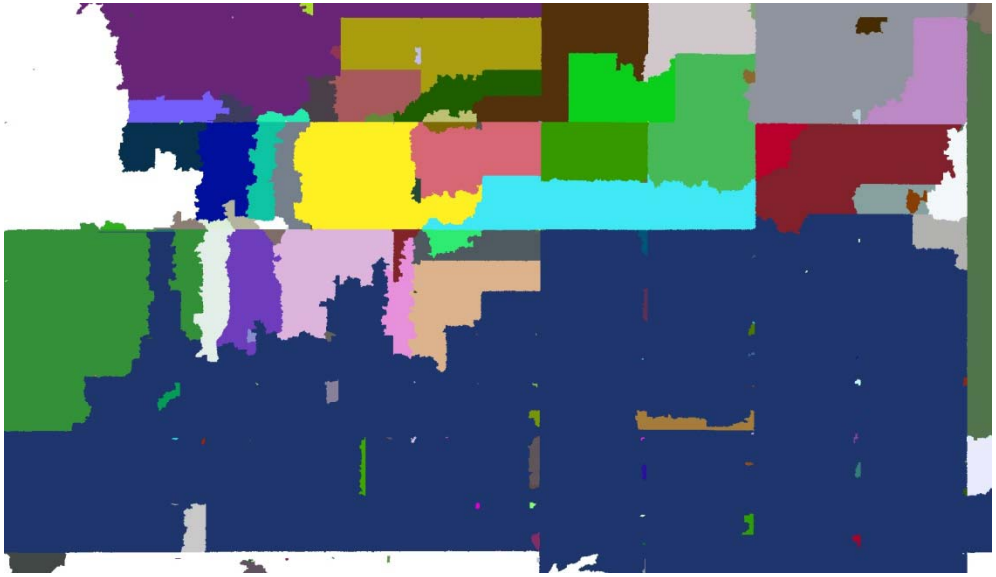


Workflow – Modeling

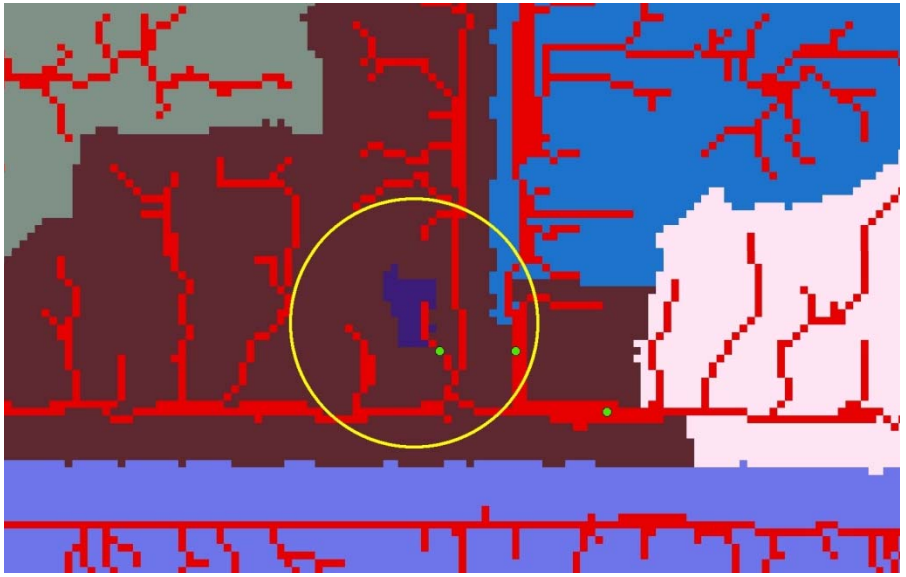
- Pour Point Locations Matter
  - Unexpected results
    - Could be a surface issue
    - Could be a Point location issue

Workflow – Modeling

Unexpected results



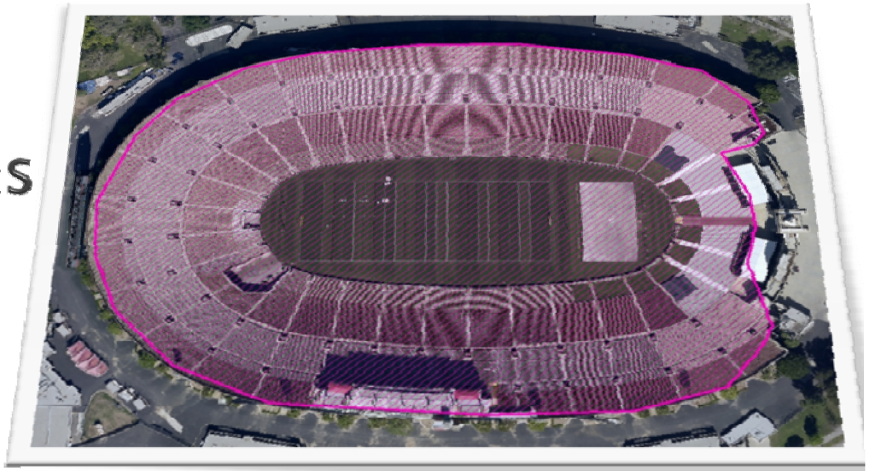
Dark Blue Watershed Too Large – surface prep issue - need a sink mask.



Flow Accum Threshold too low – tiny watershed, surface is correct.

Lessons Learned

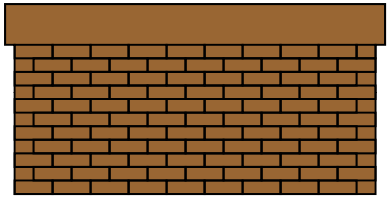
- You have to Prepare the Surface!
  - Modified DEM
    - Fill sinks
    - Mask areas – don't fill
    - Build Walls– block flow
    - Dig Trenches
      - Culverts
      - Edge of road breaklines



Mask the Stadium so that it doesn't get filled.

Lessons Learned

Build Walls



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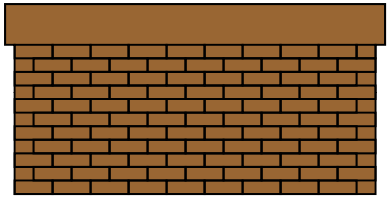
Lessons Learned

Build Walls



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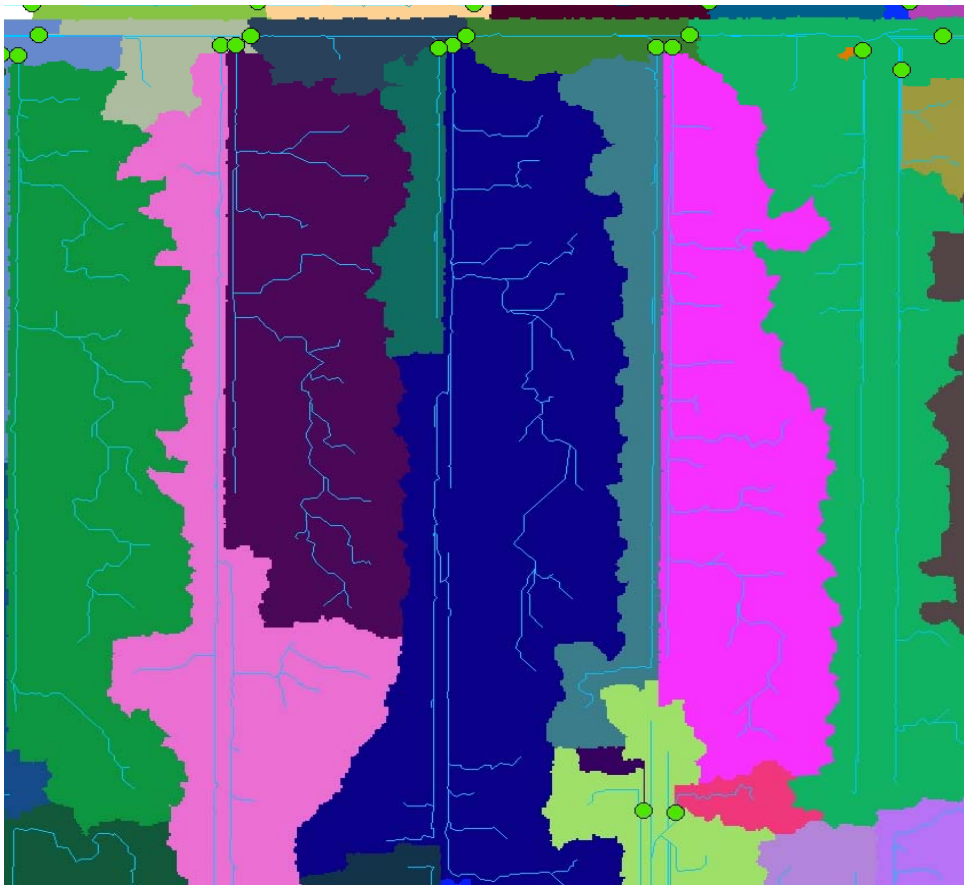
Lessons Learned

- Stakeholder engagement
  - Get them involved in QC
  - Expectations: goals and priorities
- Process is iterative
  - You don't just line it up and hit the "GO" button!
- Current estimate is this approach may save as much as 70-80% in labor over a manual surveying methodology.

Conclusions

- LiDAR for 1’ contours is sufficient
- ArcGIS still comes out ahead
- 3 Most Important:
  - Prepare the surface
  - Prepare the surface
  - Prepare the surface
- Workflow is iterative
- It works



PICTOMETRY
AN EAGLEVIEW COMPANY

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