Procedurally Crafting Manhattan for Marvel’s Spider-Man

GDC, March 2019

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David Santiago

Principal Technical Artist

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SPOILER ALERT!

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The Reveal

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SPIDER-MAN
Are you kidding?
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Are you kidding?

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Related GDC Talks

Challenges

Thursday, March 21 | 11:30am - 12:30pm

CONQUERING THE CREATIVE CHALLENGES IN 'MARVEL'S SPIDER-MAN'

Speaker: Bryan Intihar (Insomniac Games)

Location: Room 303, South Hall

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Overview

- The Challenge
- Spider-Man Procedural Systems
- Original pipeline integration
- Production happens
- Finish the game
- What we learned.

What is Spider-Man?

6 km x 3 km

9 districts

544 Roads, 1202 alleys

> 8,300 buildings

> 3,250 edifice prefabs

> 350 storefronts

> 3000 crimes

> 3000 vignettes

story
missions
hero guy
villains

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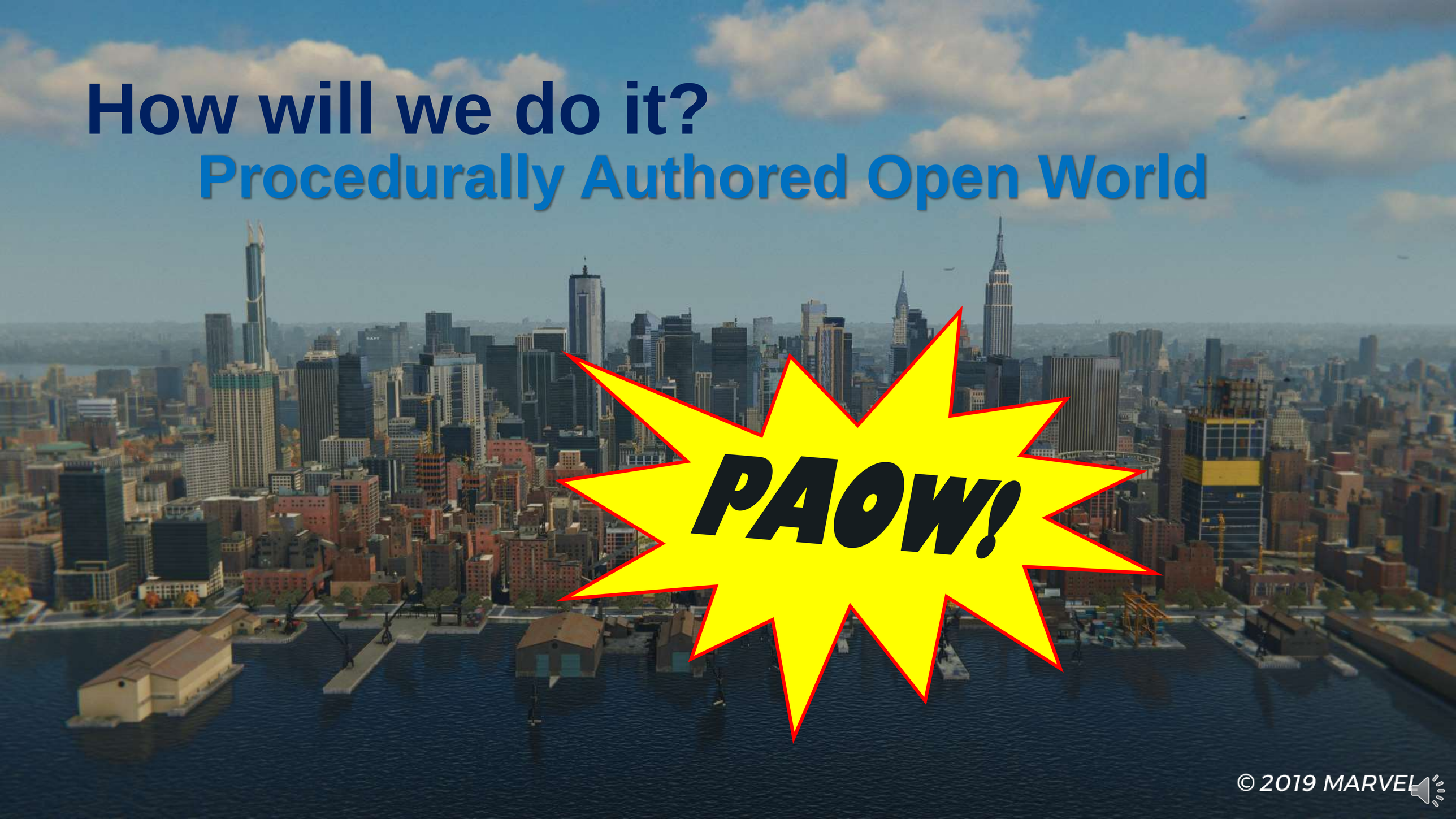
How will we do it?

Procedurally Authored Open World



Hand Crafting

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First Steps

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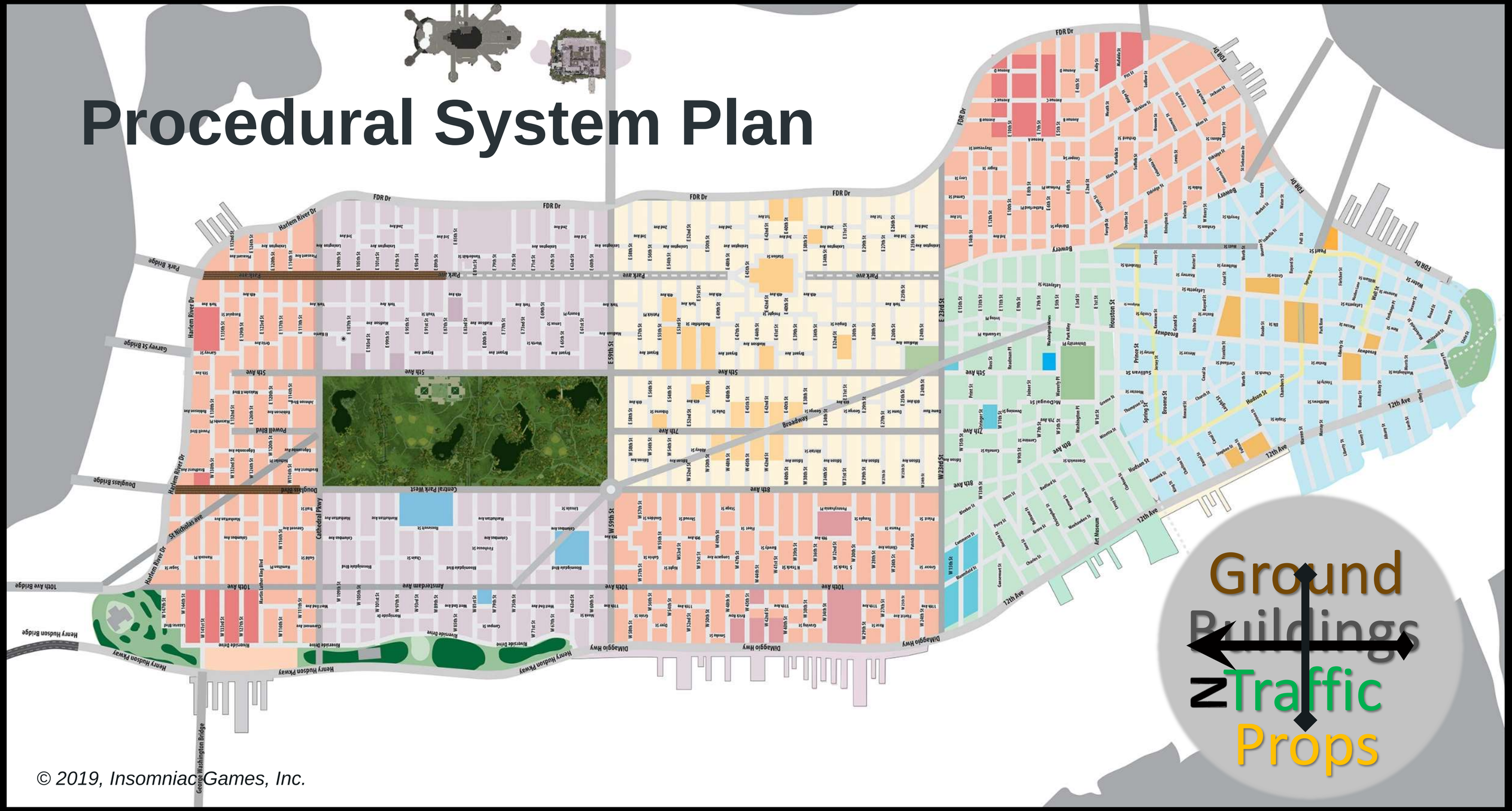
Procedural System Plan



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Define Roads and Alleys

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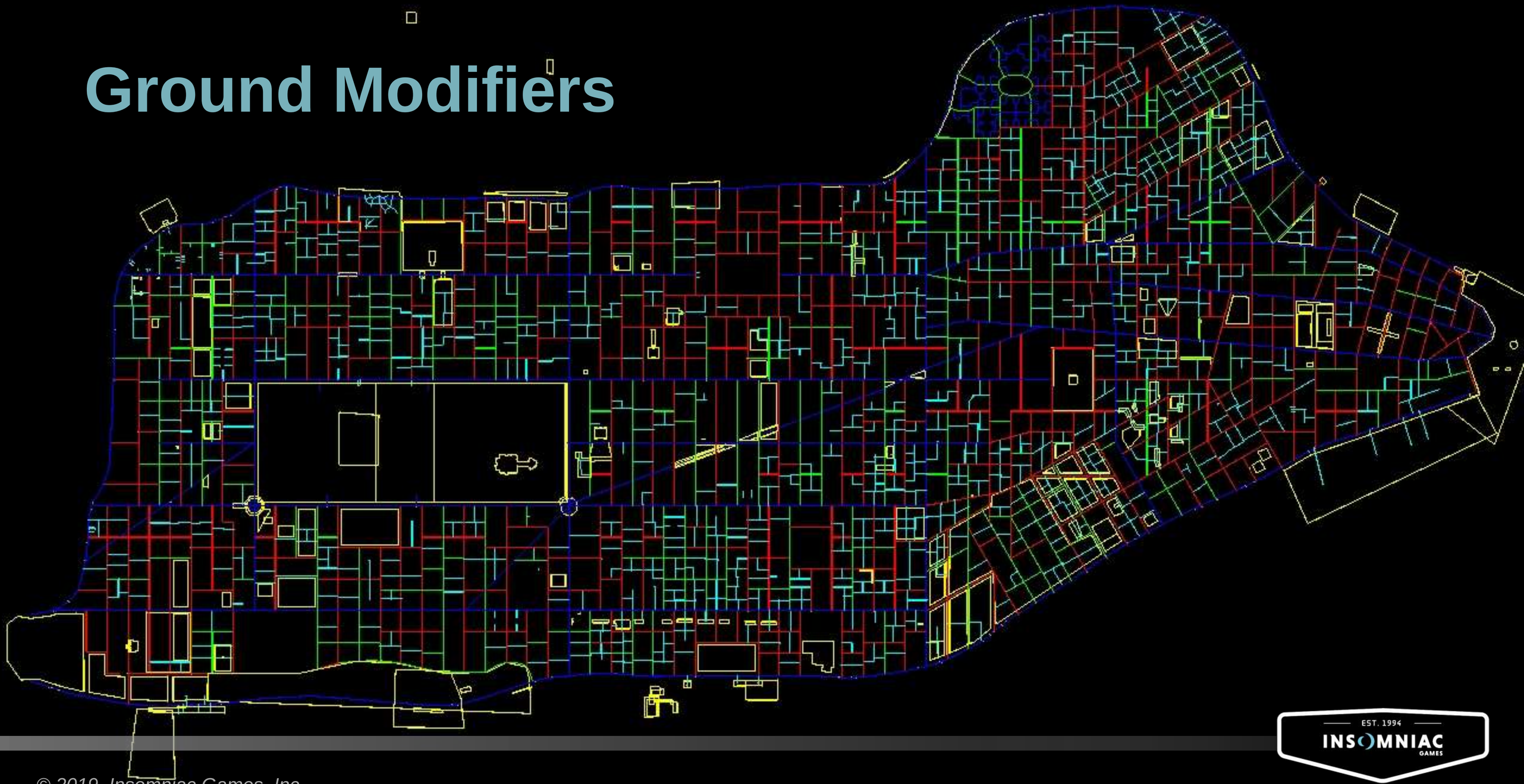
Ground Modifiers



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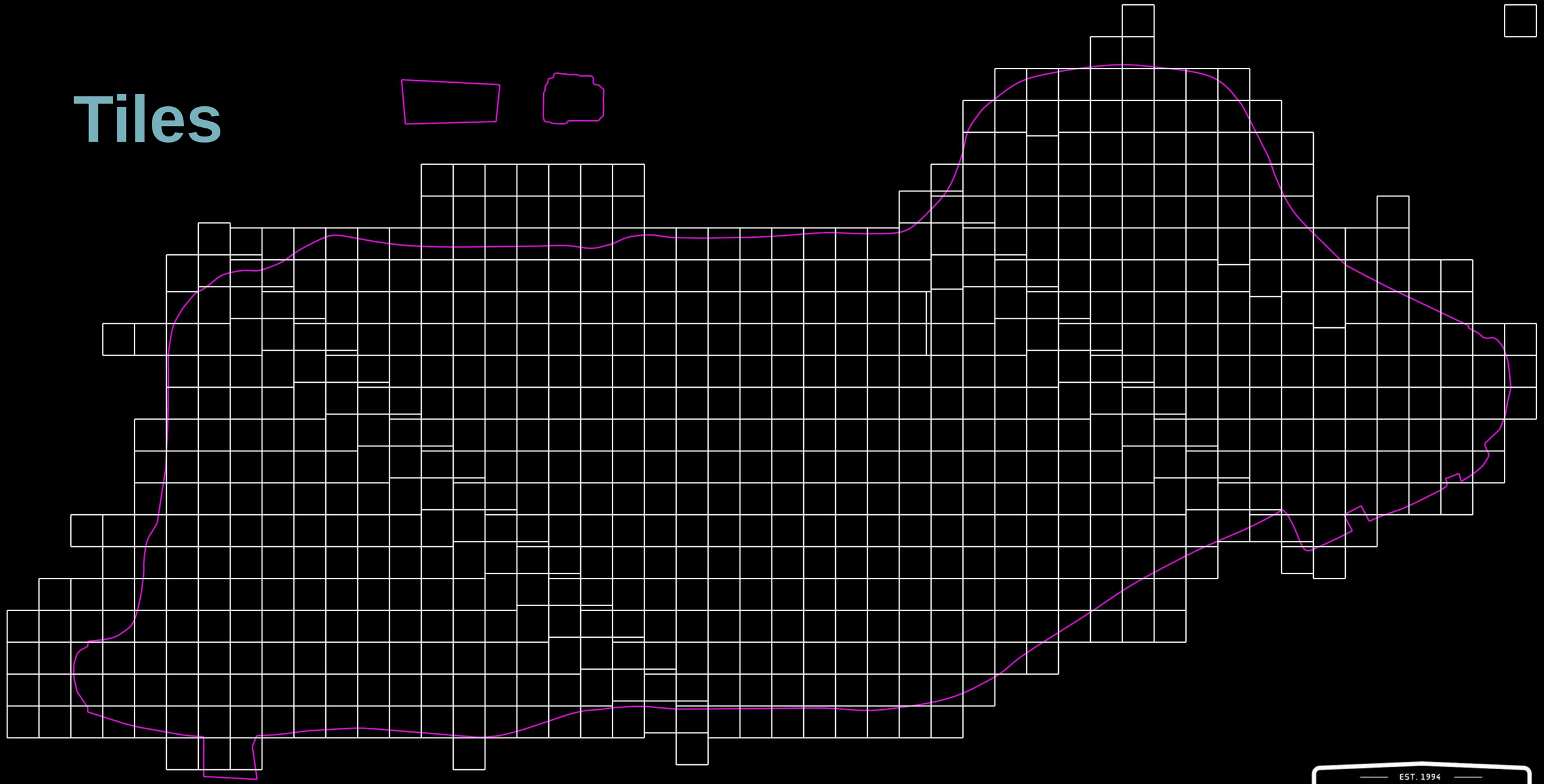
Tiles



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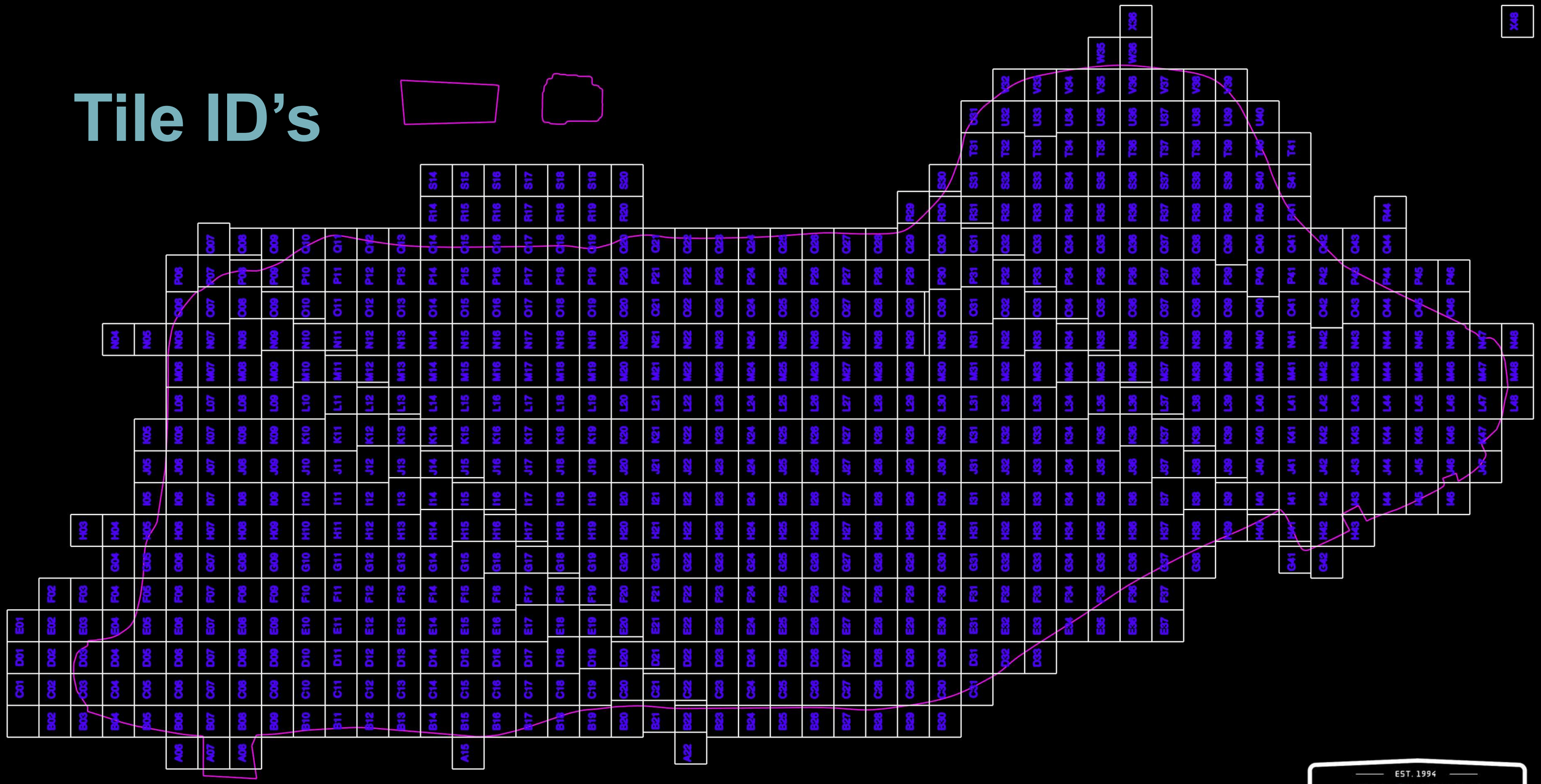
Tile ID’s



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Ground

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Ground Details

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Buildings

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Curve allocation failed
SNC
Verts:5324 Tris:5164 Visual Effects:0 Models:1 Lights:0 Actors:0
Maya Cam Pos:-338.6 105.8 976.9 Cam Dir: 0.4 -0.5 -0.8 Far Clip:10000 FPS:9 PID:26528
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Related GDC Talks

Open World

Friday, March 22 | 10:00am - 11:00am
CONCRETE JUNGLE GYM: BUILDING TRAVERSAL IN MARVEL'S SPIDER-MAN
Speaker: Doug Sheahan (Insomniac Games)
Location: Room 2005, West Hall

Friday, March 22 | 3:00pm - 4:00pm
TOOLS FOR MARVEL'S SPIDER-MAN: EDITING WITH IMMUTABLE DATA
Speaker: Ronald Pieket (Insomniac Games)
Location: Room 2001, West Hall

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Traffic System

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Pedestrians

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Path Choices

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Vehicles

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Route Choices

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Traffic Light Phase: Phase1
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Traffic Light Phase: Phase1
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Traffic Light Phase: Phase1
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Decor

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Curve allocation failed
OPEN
BUS
STOP
Verts:0 Tris:0 Visual Effects:1 Models:0 Lights:0 Actors:0
Maya Cam Pos:185.0 7.3 387.6 Cam Dir: -0.4 -0.4 -0.8 Far Clip:10000 FPS:16 PID:26528

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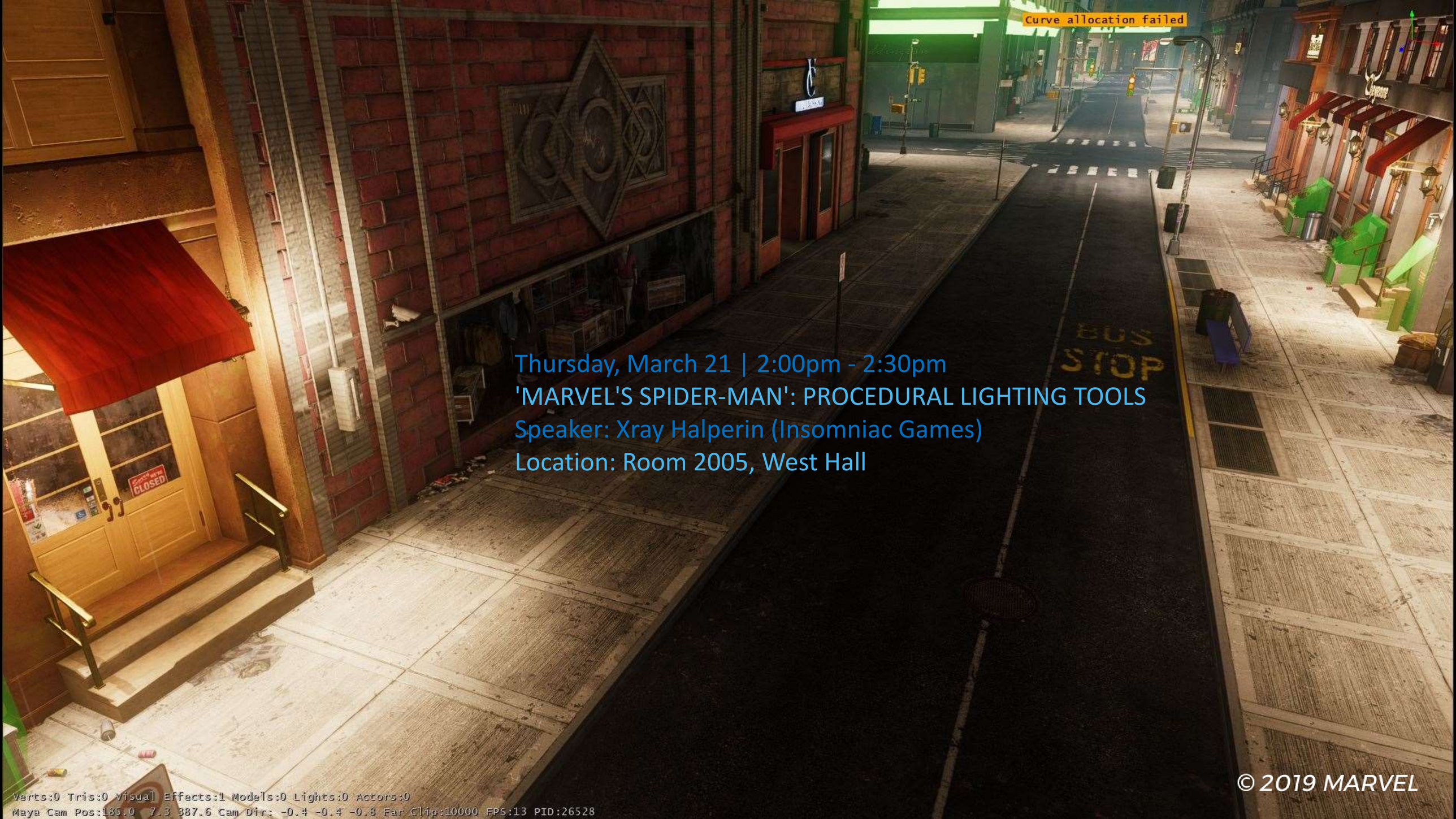

Thursday, March 21 | 2:00pm - 2:30pm

'MARVEL'S SPIDER-MAN': PROCEDURAL LIGHTING TOOLS

Speaker: Xray Halperin (Insomniac Games)

Location: Room 2005, West Hall

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Curve allocation failed
BUS
STOP
CLOSED
Verts:0 Tris:0 Visual Effects:0 Models:0 Lights:0 Actors:0
Maya Cam Pos:185.0 7.3 387.6 Cam Dir: -0.4 -0.4 -0.8 Far Clip:10000 FPS:14 PID:26528

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Impostors

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All wrapped up!

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Party Time!!!

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New Challenges

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尚品水果店
视力检测
天藝畫廊
KONVENIENT
MART
便利店
心心相印内衣店
CONVENIENCE
MART
BROOME ST

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You want me to
do what?
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THE FAT PANDA
THE FAT PANDA
銀山銀行
天藝畫廊
KARAOKE LOUNGE
ALLEN ST
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Related GDC Talks

Audio

Friday, March 22 | 10:00am - 11:00am

DESIGNING THE BUSTLING SOUNDSCAPE OF NEW YORK CITY IN MARVEL'S SPIDER-MAN

Speakers: Alex Previty (Insomniac Games), Blake Johnson (Insomniac Games)

Location: Room 3006, West Hall

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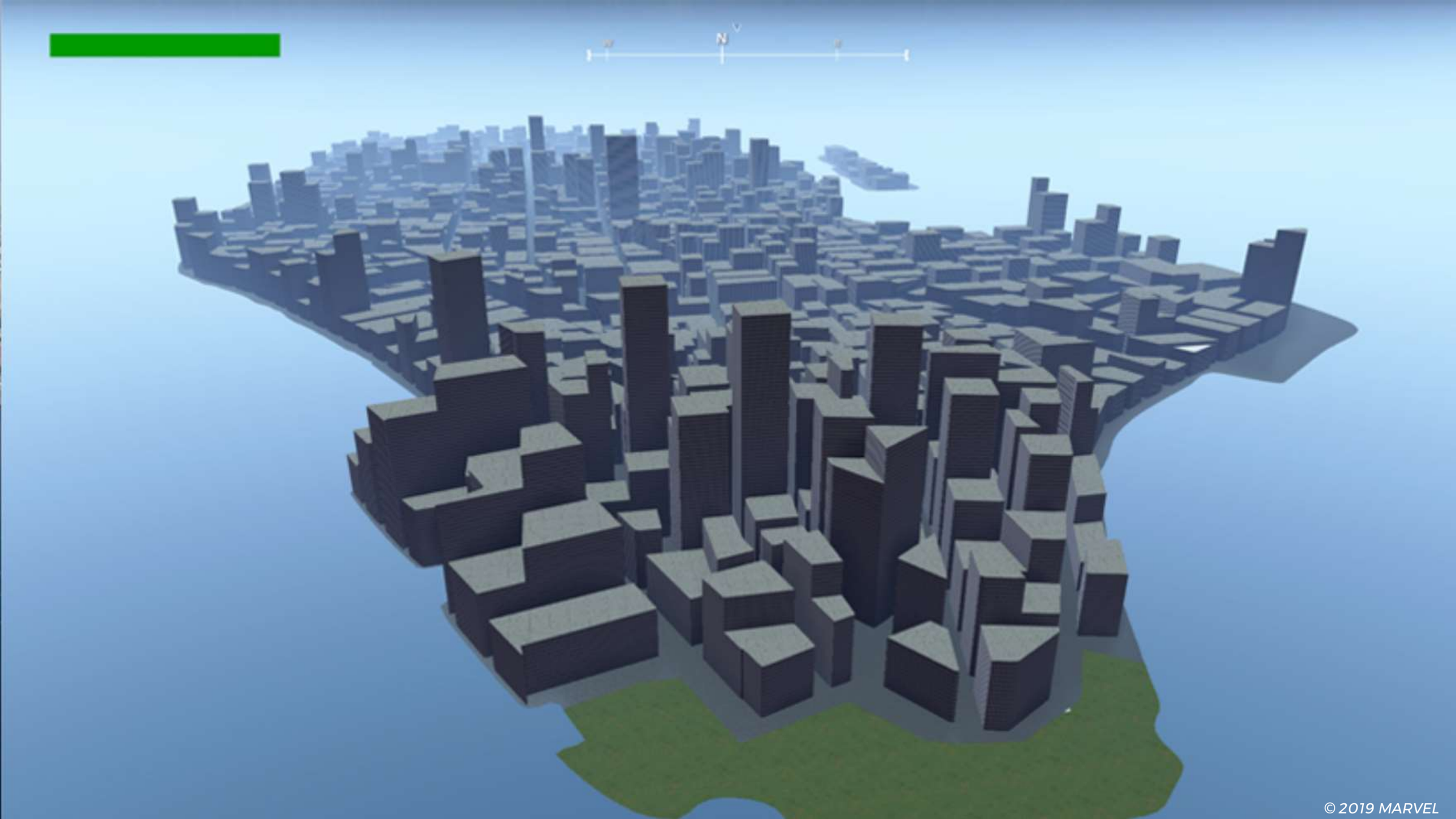
Crimes
Impostors
Lighting
Audio
Vignettes
Props
Pedestrians
Vehicles
Markup
Ground
Buildings
THE FAT PANDA
THE FAT PANDA
銀山銀行
天藝畫廊
上皇娛樂
KARAOKE LOUNGE
滷肉飯
王氏診所
味美面包房
LIFE BAKERY
市价外币兑换
BAR
ALLEN ST

That’s a lot



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Houdini™ in the House!

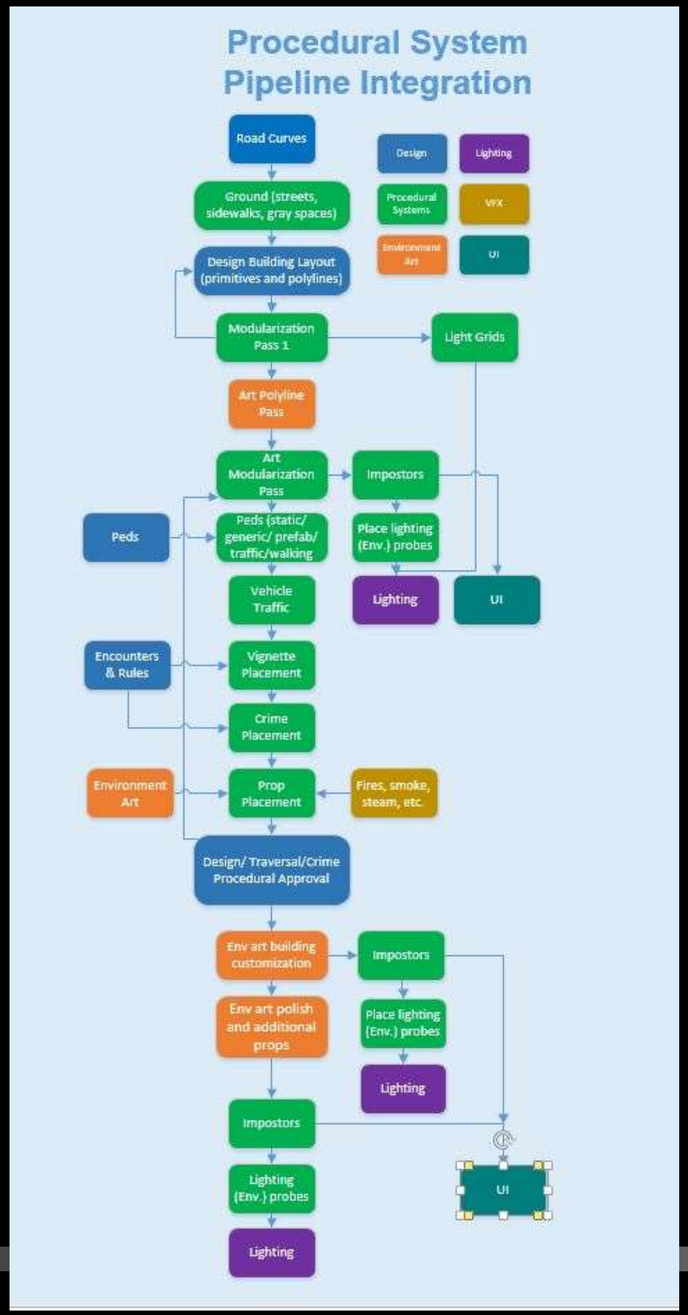
First integration implementation

- World Layout
- Procedural Details
- Release to polish

Phase 1

Phase 2

Phase 3



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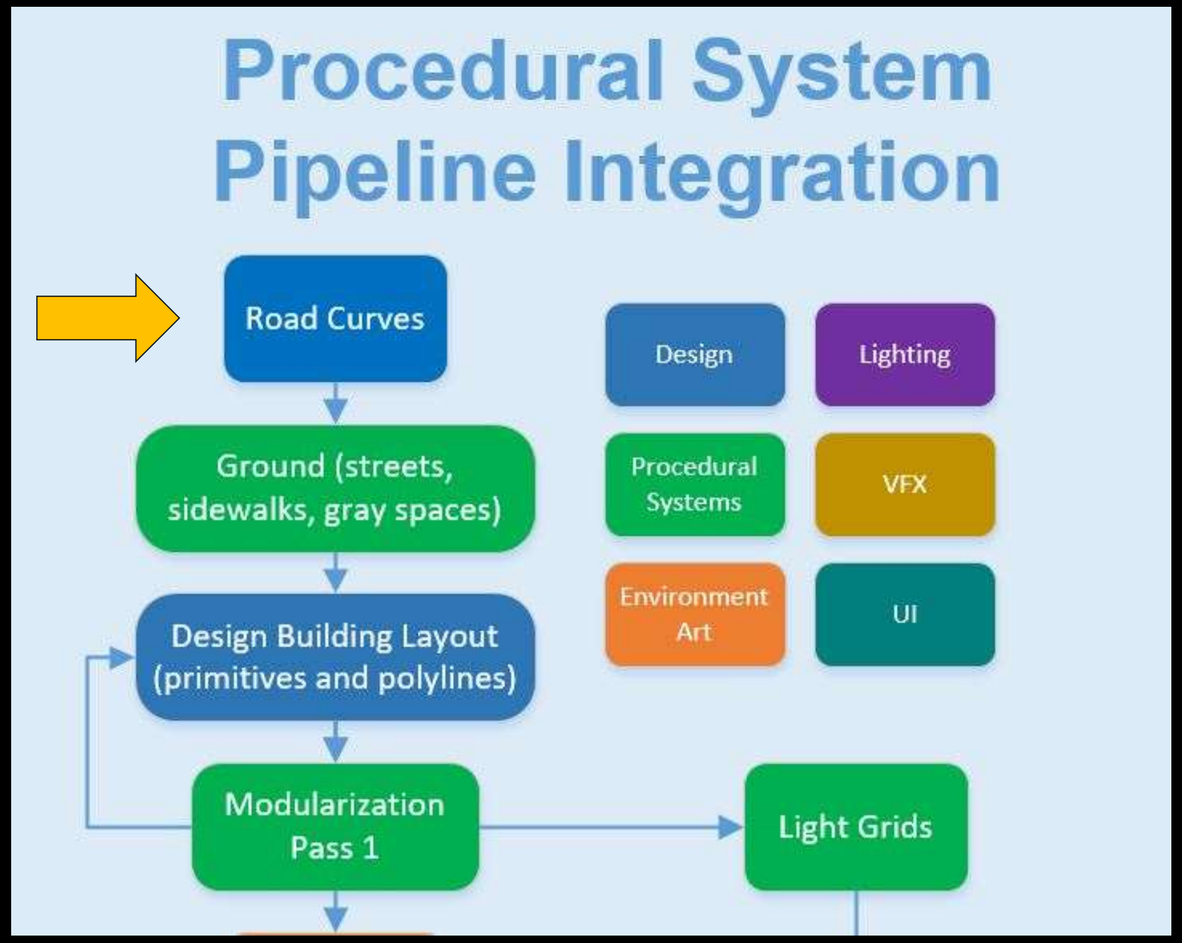
Top of the Pipe – Phase 1

Approve Ground –Iterate building layout

- Curves define streets and alleys
- Ground system makes island
- Primitive buildings modularized with instanced architecture



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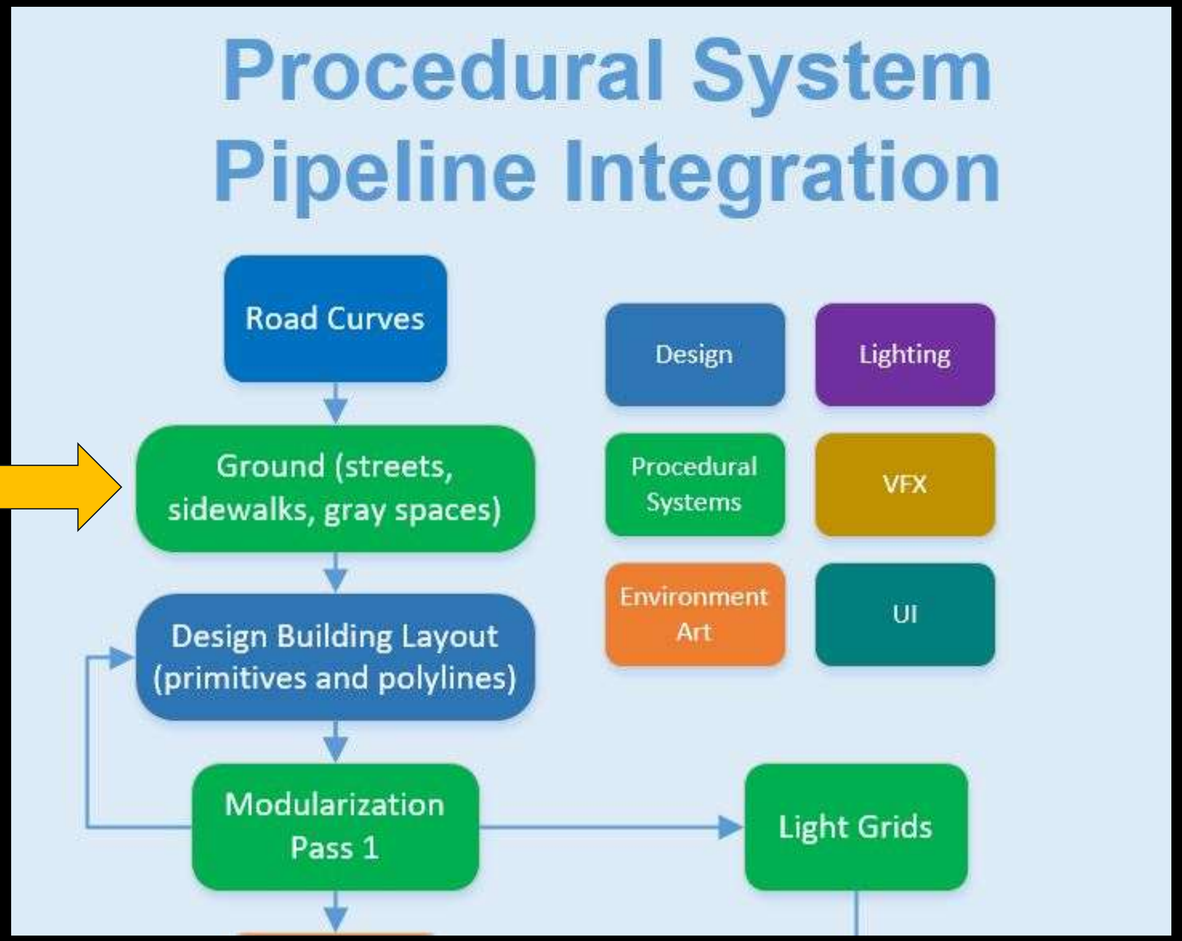

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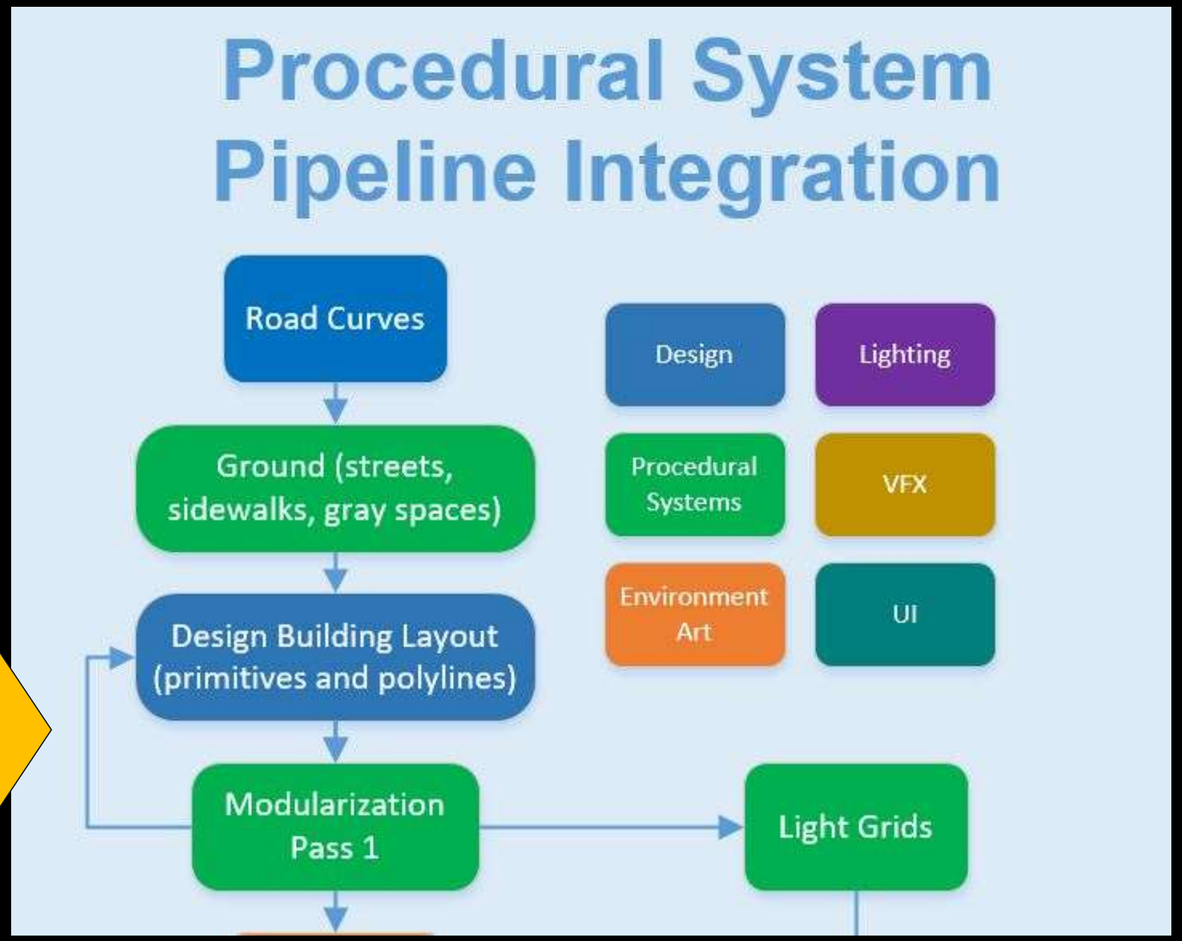

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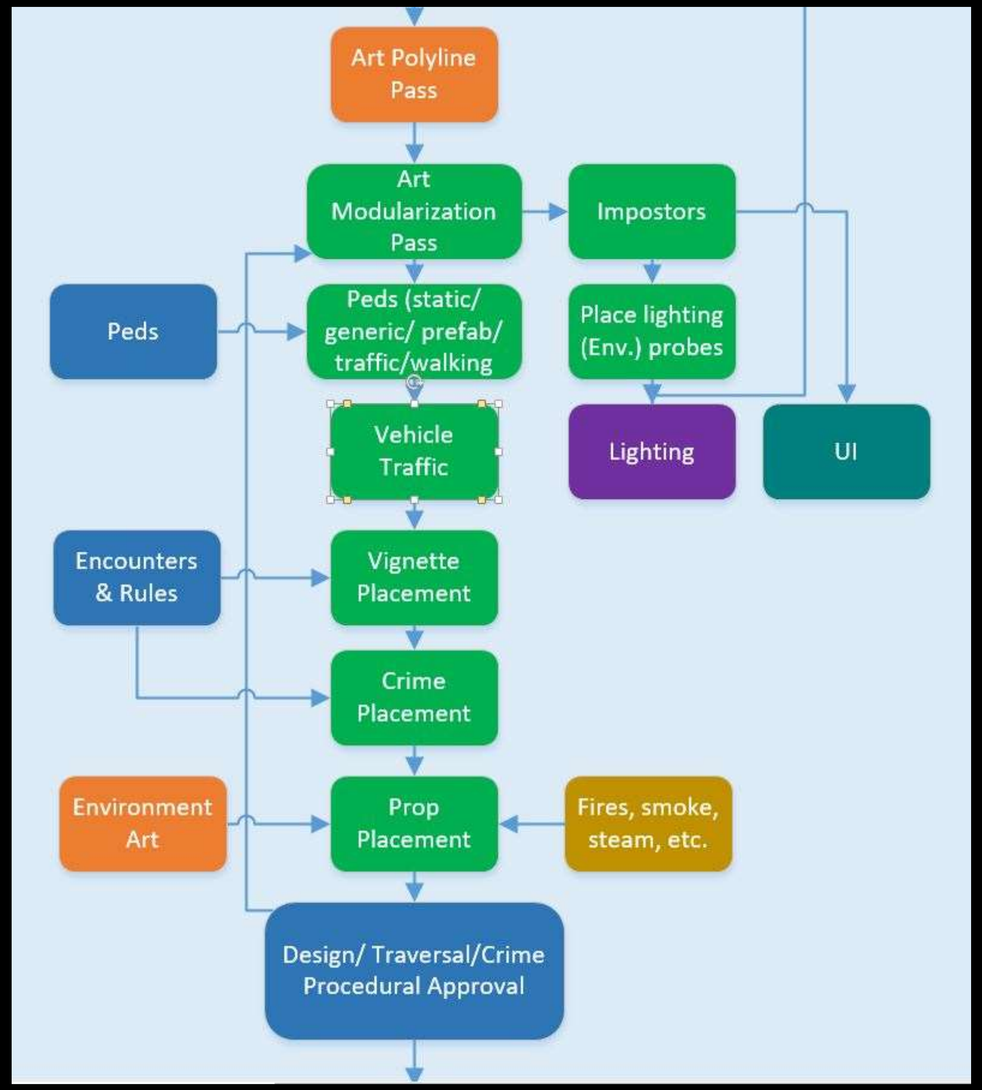
Heavy Lifting – Phase 2

Procedurally generate bulk of the content

- Upstream changes affect downstream processes
- Game always playable with latest assets
- Do not manually adjust procedurally generated assets



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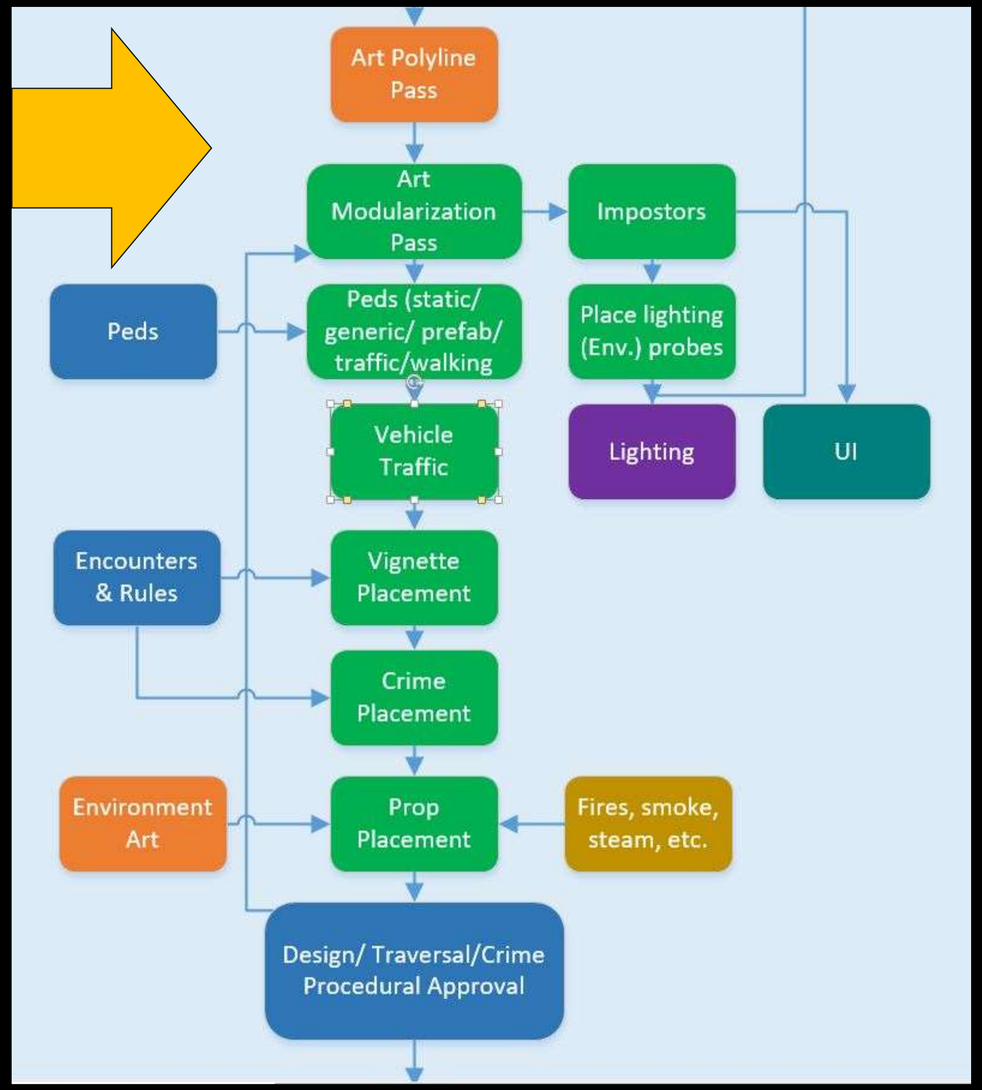

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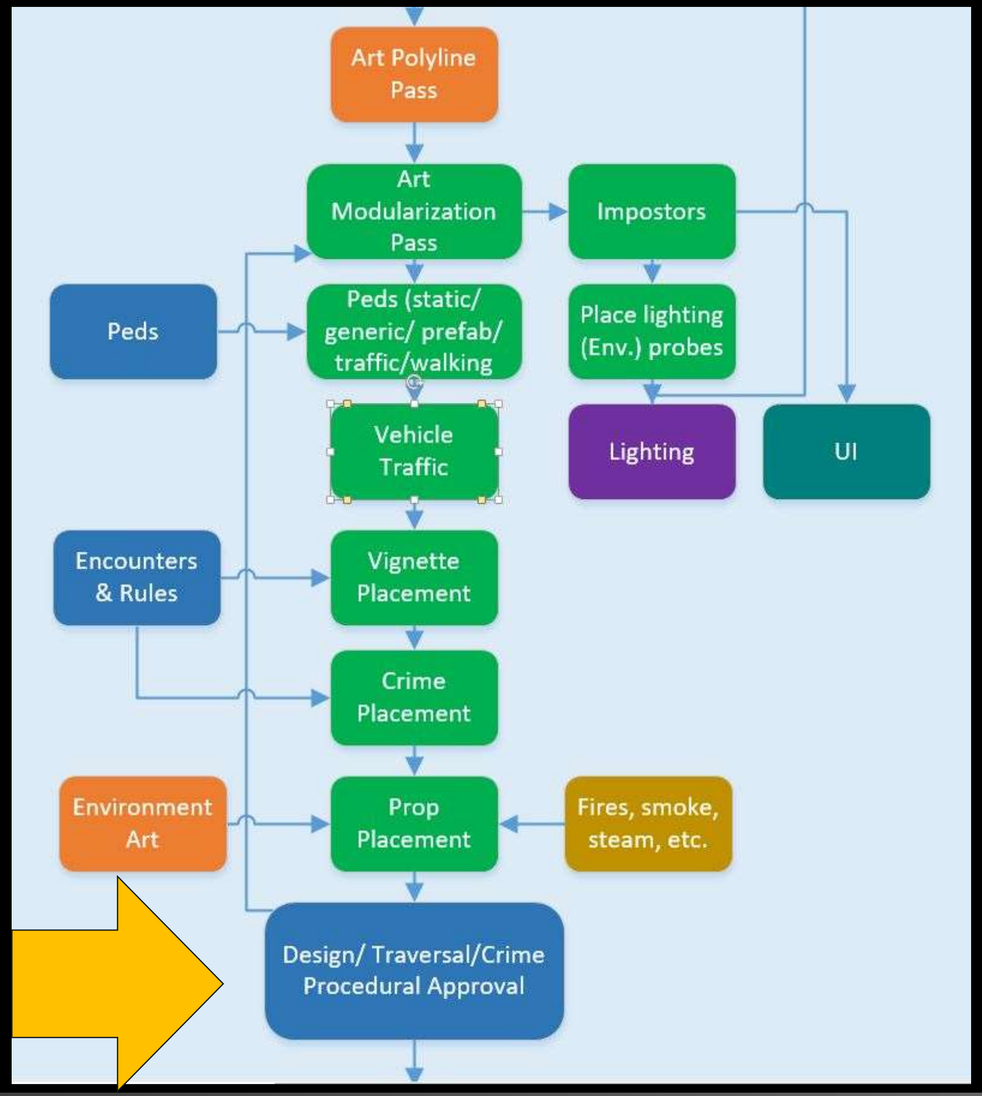

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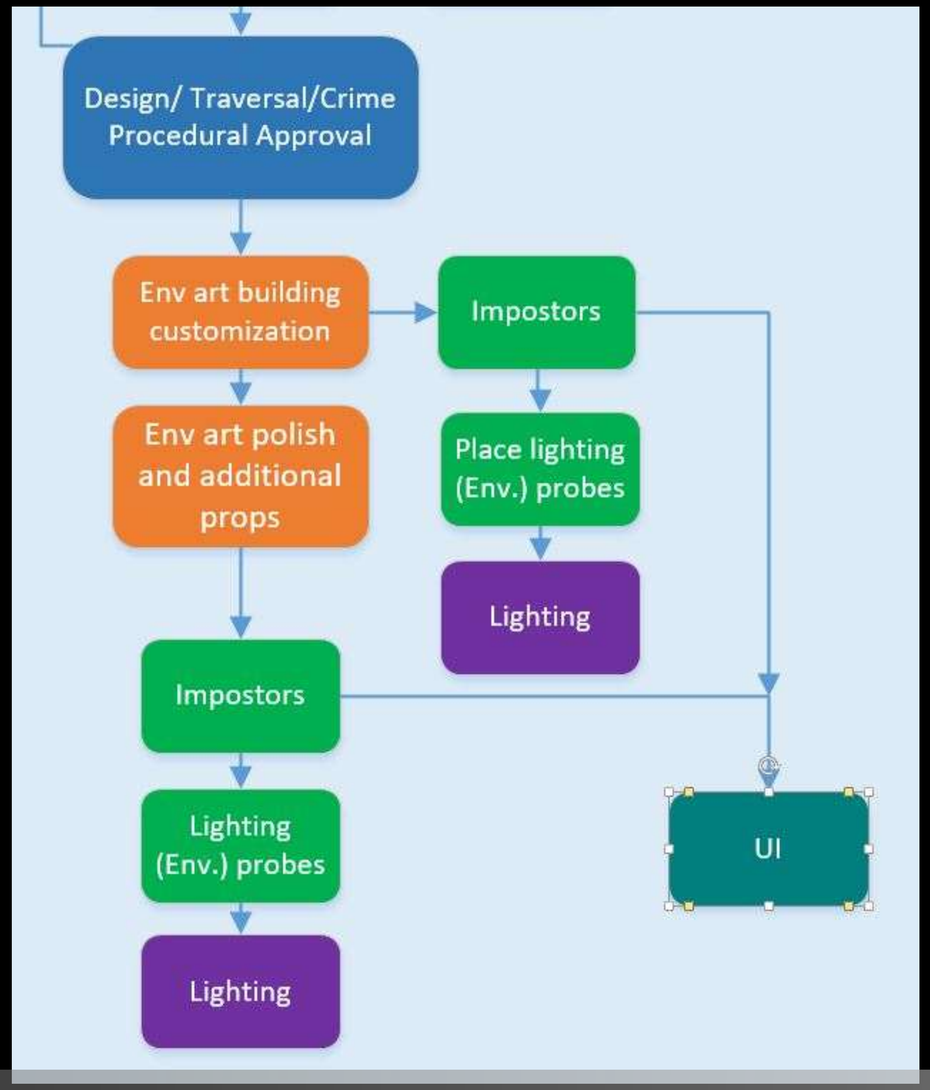
Polish – Phase 3

Traditional hand crafting process

- Procedural systems regenerate based on “tweaks”
- Add automation to regeneration
- Apply tech to optimization and validation



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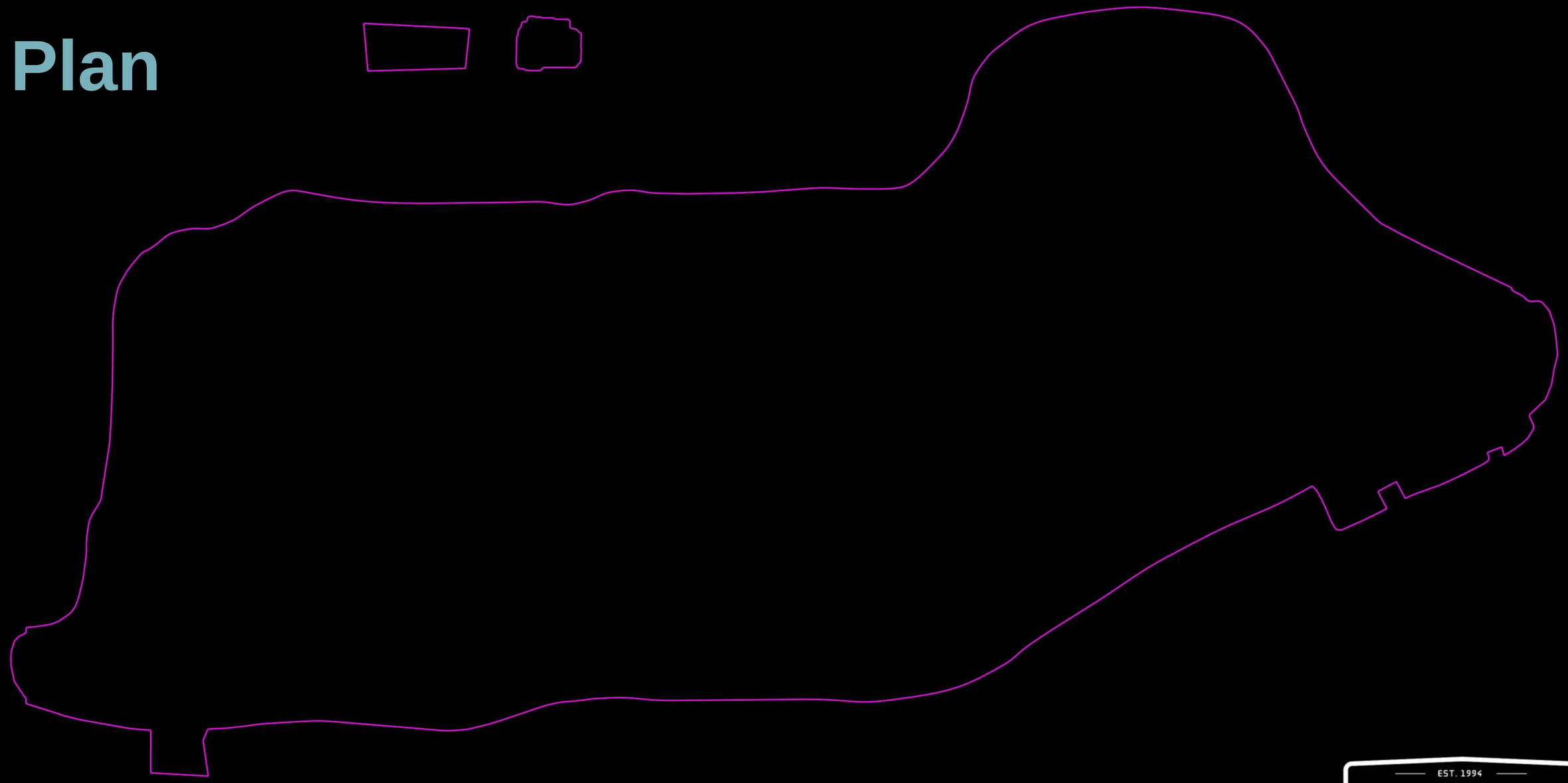
Plan



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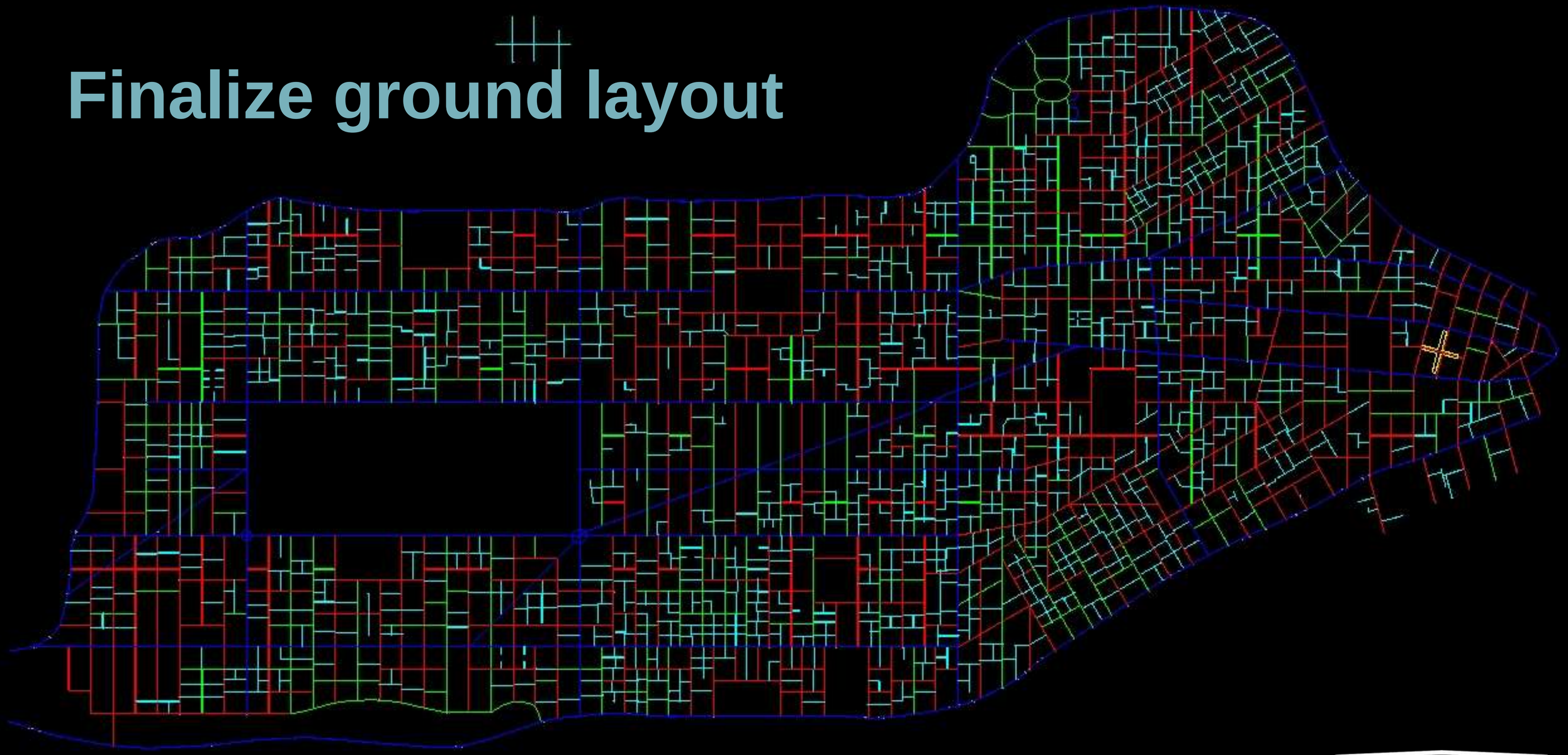
Finalize ground layout



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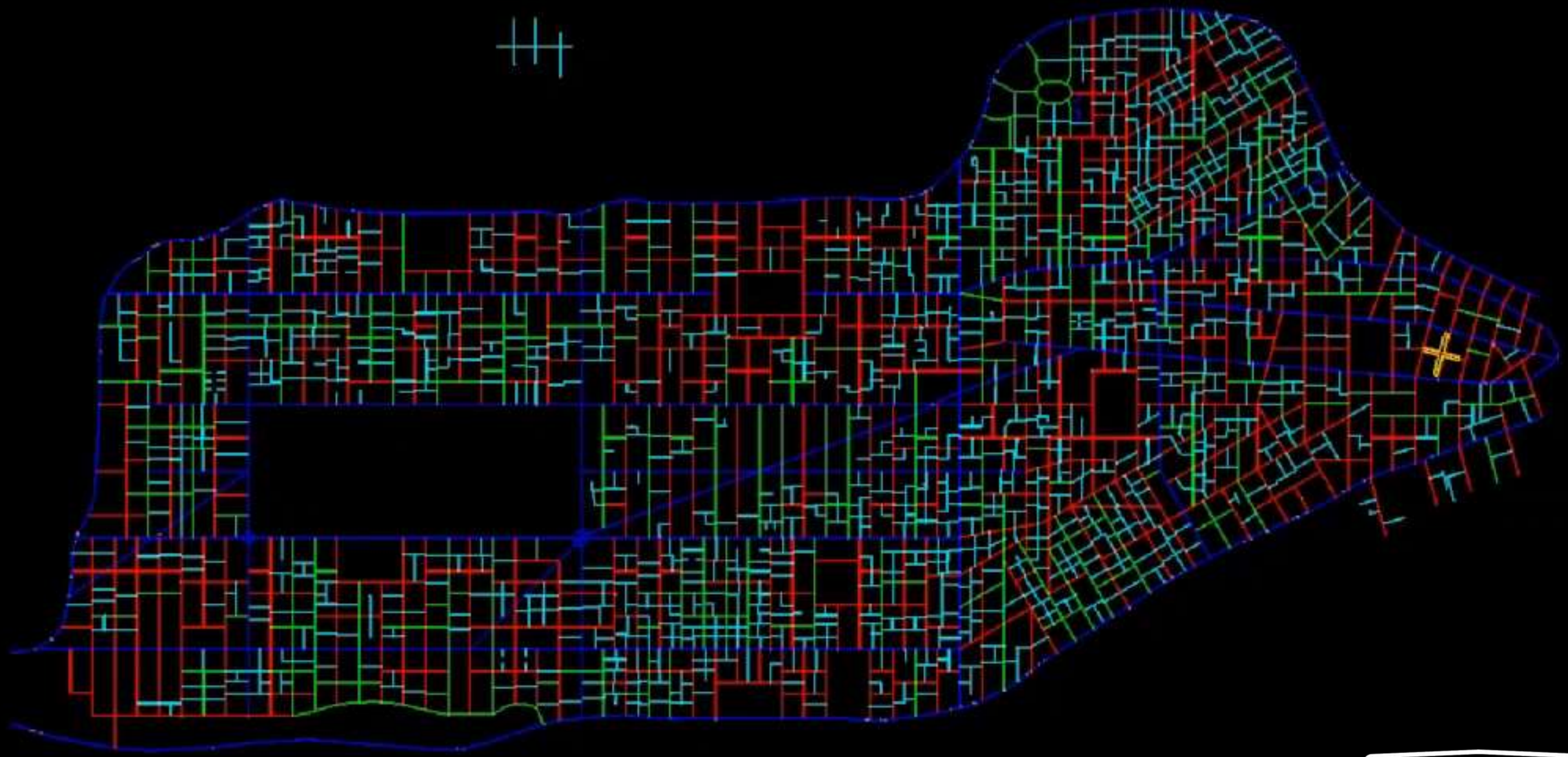

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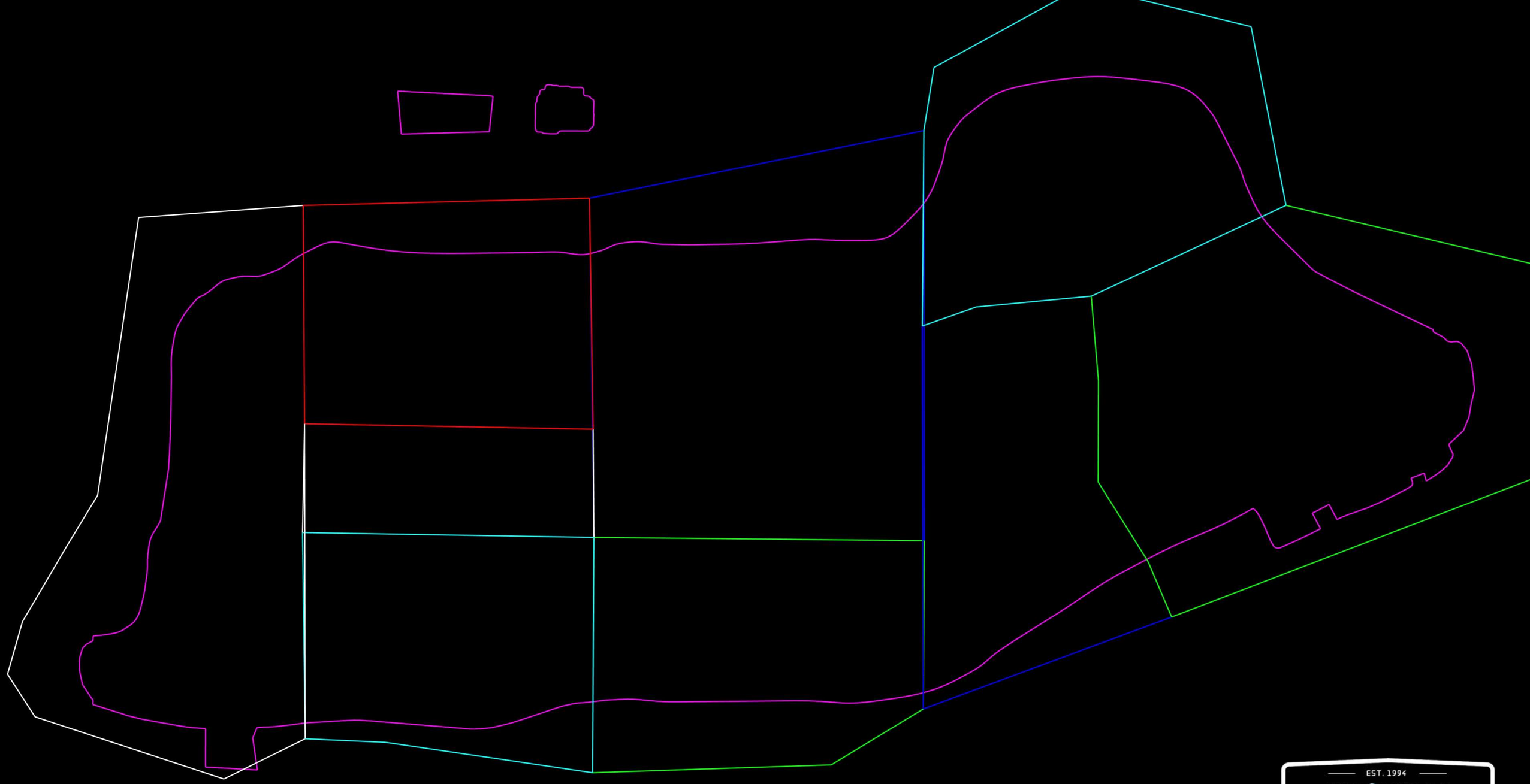

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One district at a time

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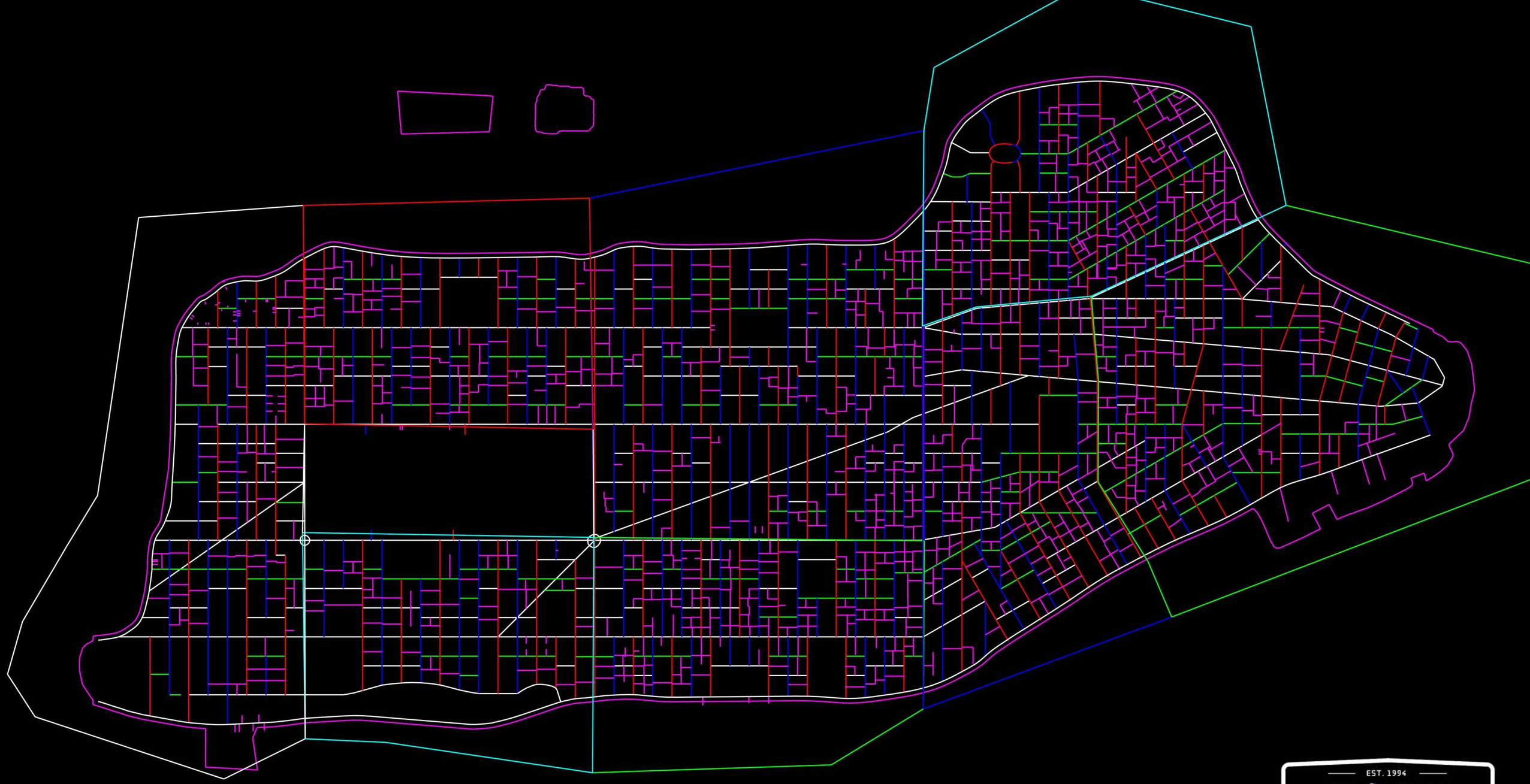

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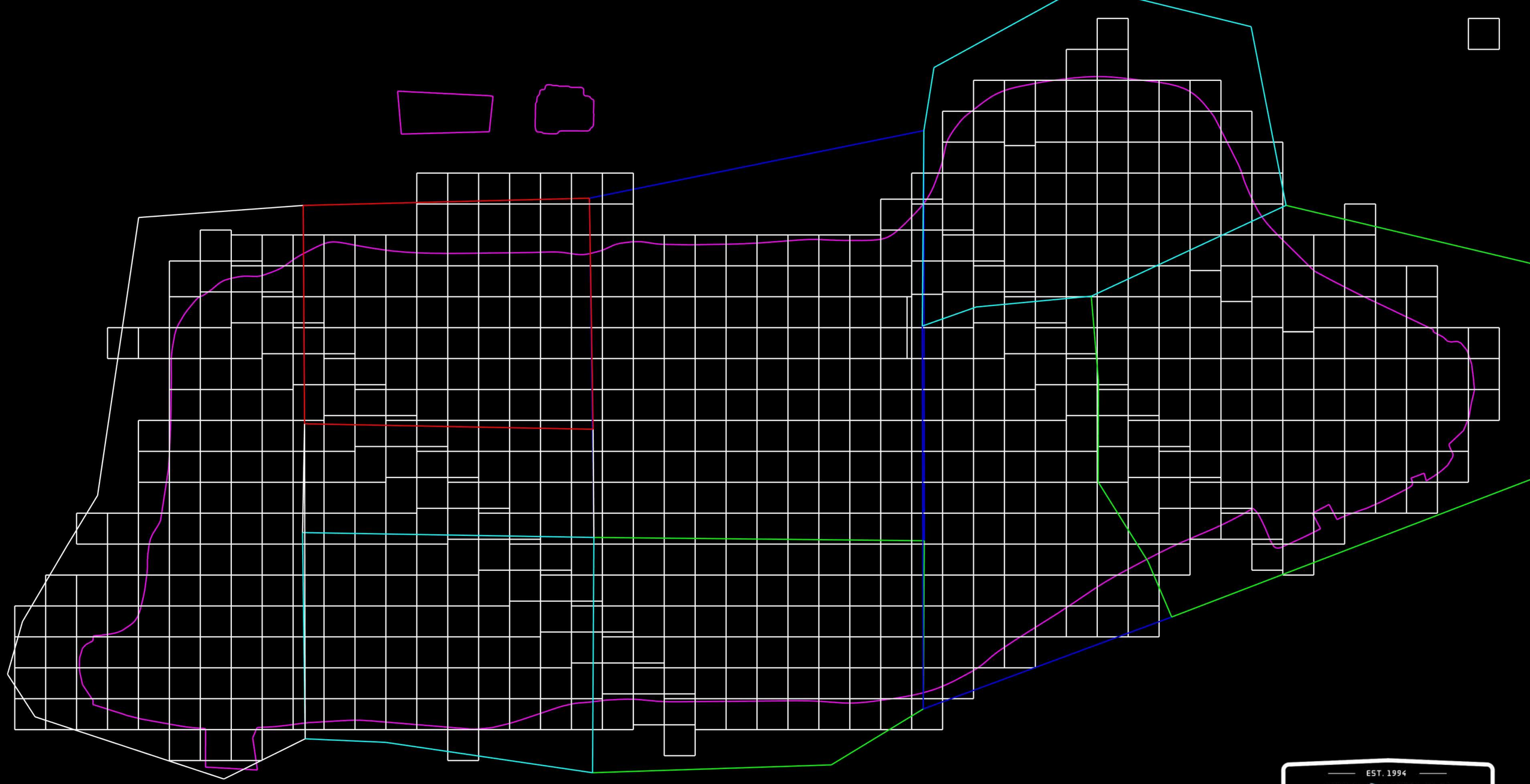

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Disturbing the Neighbors

Even small change cascades through many dependencies

- UV continuity around block
- Prop positions
- Crimes
- Vignettes

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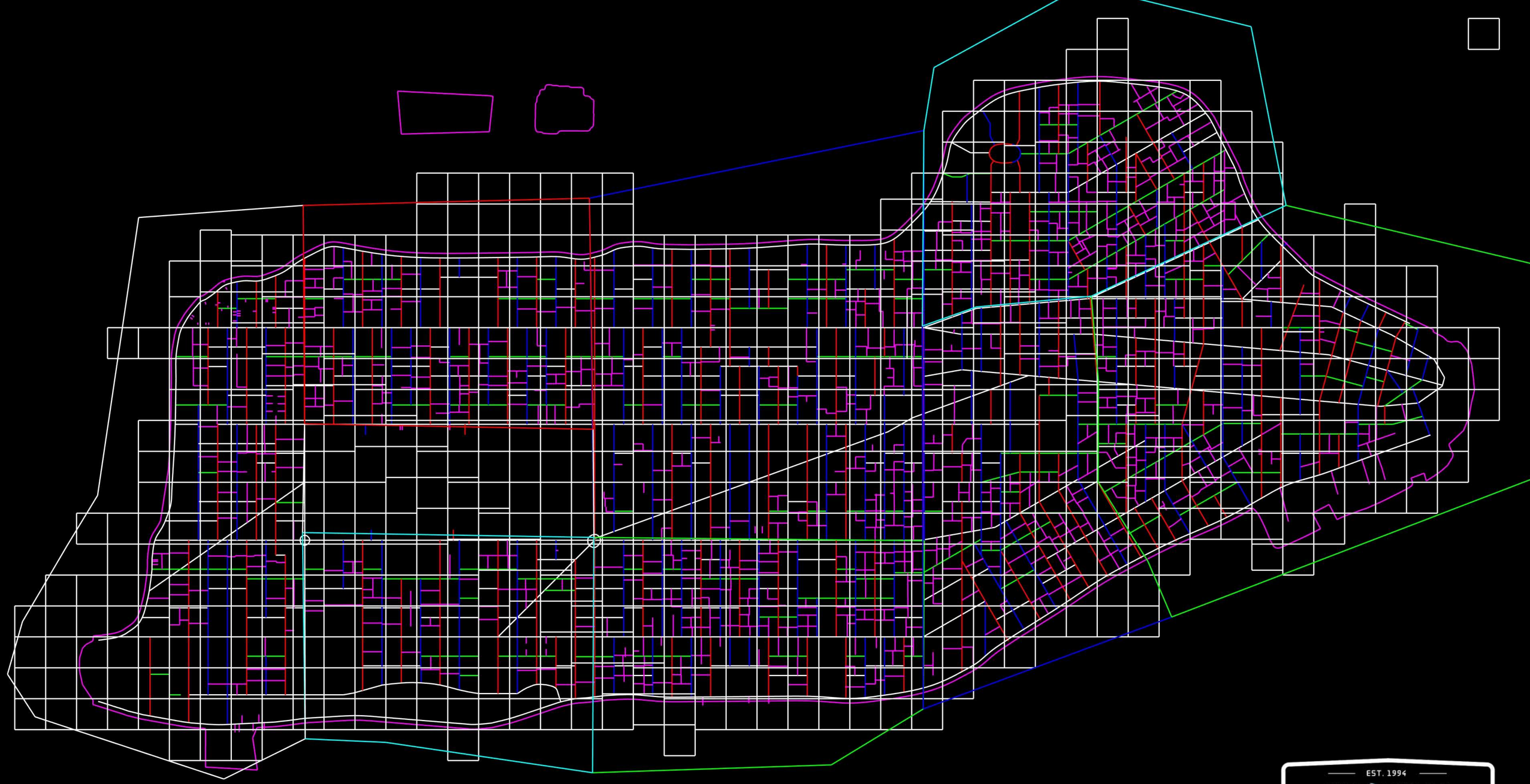

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A lot of balls in the air
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Down in flames?

Things aren’t going as planned ☹

- Reality of Production
  - Non-linear, asynchronous
  - New Story
  - New Art
  - New Design
  - Key features implemented late

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What do we do?

Work together

- Update Goals
- Handoff states
- Define “Done”

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Related GDC Talks

Environment Team

Friday, March 22 | 1:30pm - 2:30pm

MARVEL'S NEW YORK: A CASE STUDY IN EMPOWERING YOUR ARTISTS

Speaker: Jason Hickey (Insomniac Games)

Location: Room 2002, West Hall

New Plan

Handle the workflows

More Complex Integration

- More parallel
- More modularized
- Tighter dependencies
- Targeting results

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Clean up

Bring order to a city

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Finishing the Game

Challenge~~r~~s just keep coming

Adapting to Late Challenges

- Wall Crawling
- The Act System
- Mission Space Updates

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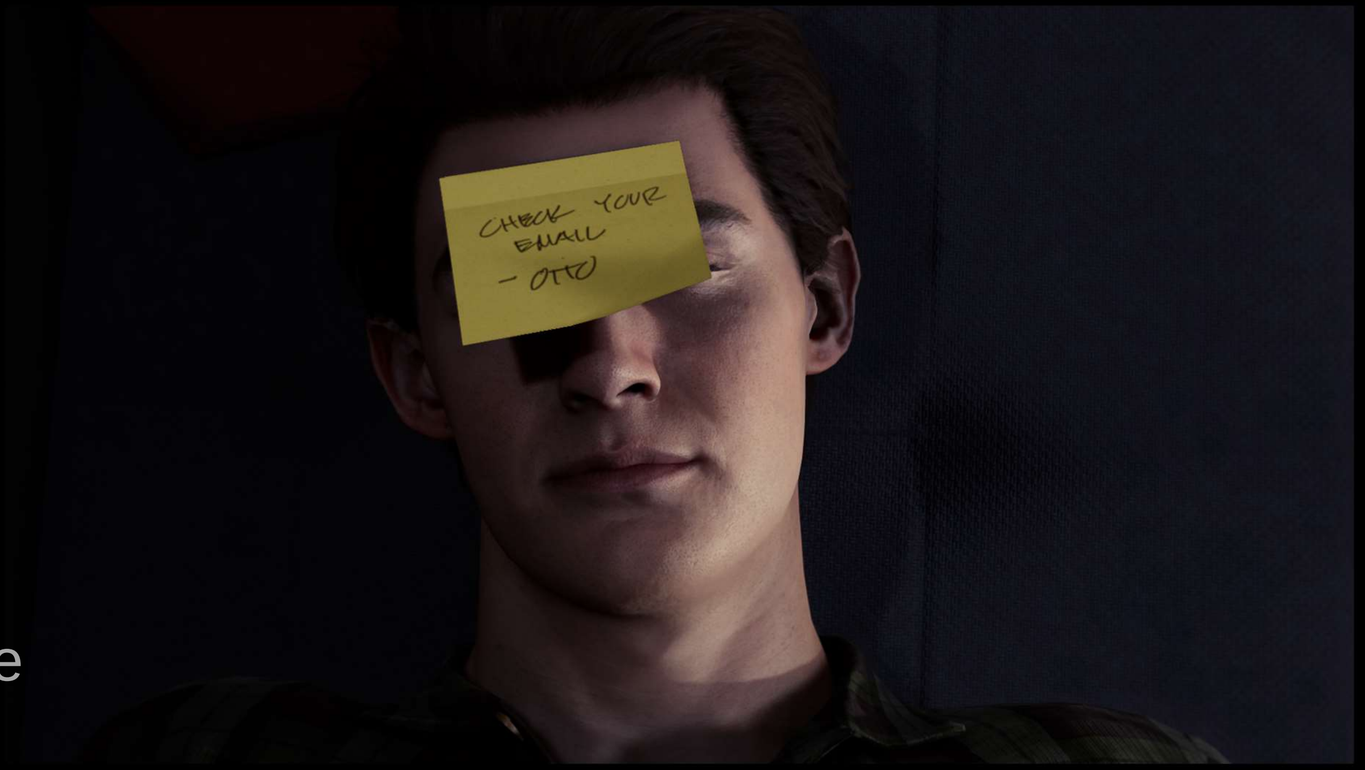
Lessons Learned

Strict workflow is best

- Lock procedurally generated elements with many dependencies as soon as possible
- Hierarchically modularize procedurally generated content to reduce dependencies for each stage of production



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Lessons Learned

Don’t overly restrict procedural systems

- Increases system dev time
- Limits artist/designer options
- Increases dependencies

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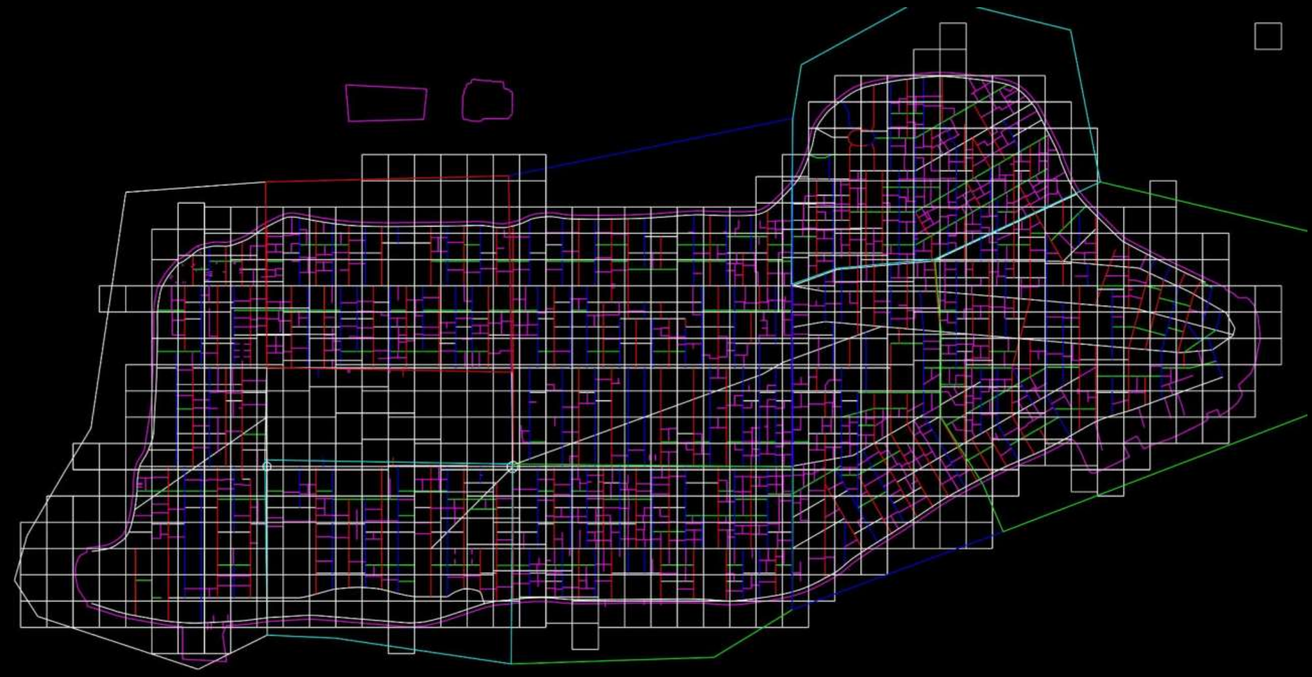
Lessons Learned

Integrate Hand-Authoring

- Non-destructive tools
  – different modes
- Avoid Compounded dependencies



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Lessons Learned

Identify procedural content with tags

- Easily found for reauthoring
- Handcrafting opportunities

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Lessons Learned

Procedurally validate content

- Identify issues and their risk
- Modify automatically when absolutely certain
- Let the humans decide

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Conclusion

Success

- Always things to do better
  Thursday, March 21 | 5:30pm - 6:30pm
  MARVEL'S SPIDER-MAN:
  A TECHNICAL POSTMORTEM
  Speaker: Elan Ruskin (Insomniac Games)
  Location: Room 3016, West Hall
- Satisfied our goals
- Base of technology for all projects

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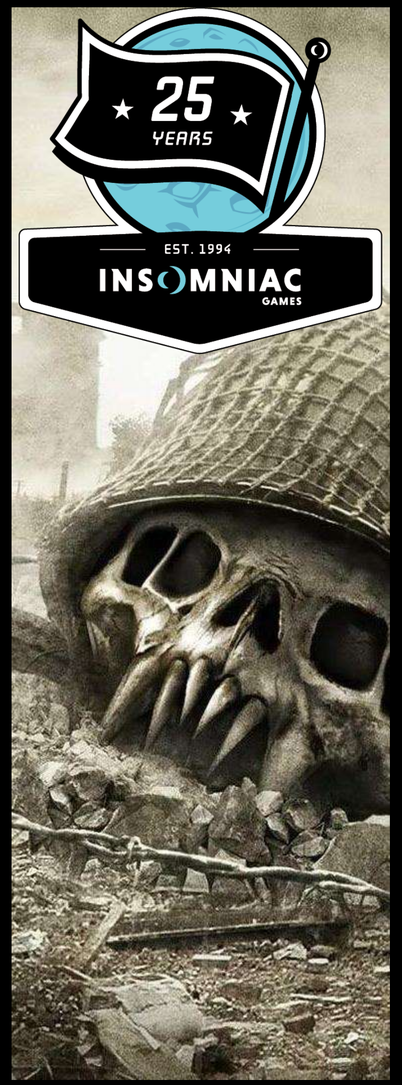
Thank You!

Sony Interactive Entertainment
Sony PlayStation
Marvel Games

SideFX®
Jeff Hanna (GDC Advisor)
Everyone at INSOMNIAC GAMES



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