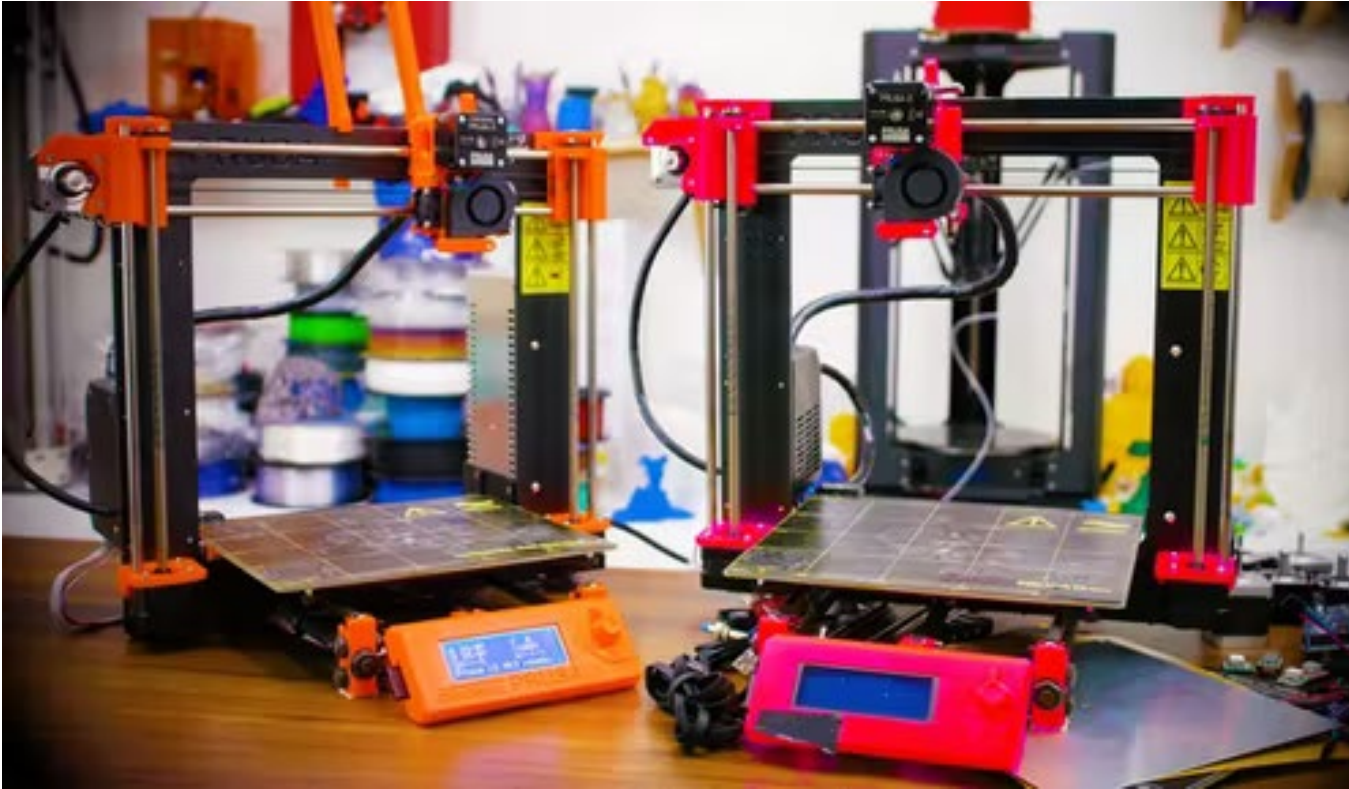
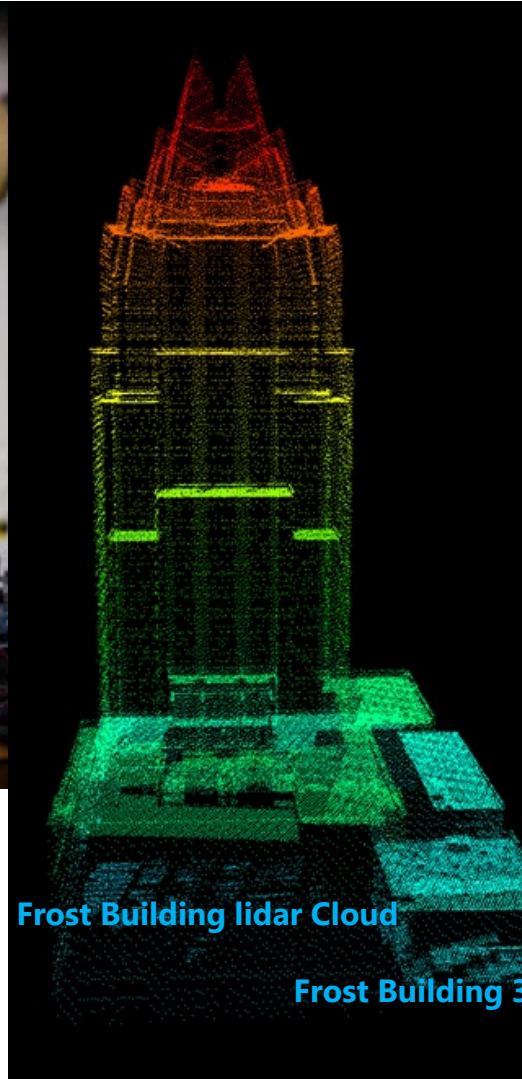


The Trials and Tribulations of 3D Buildings



Prusa i3 MK2 3D Printer Image courtesy of toms3d.org

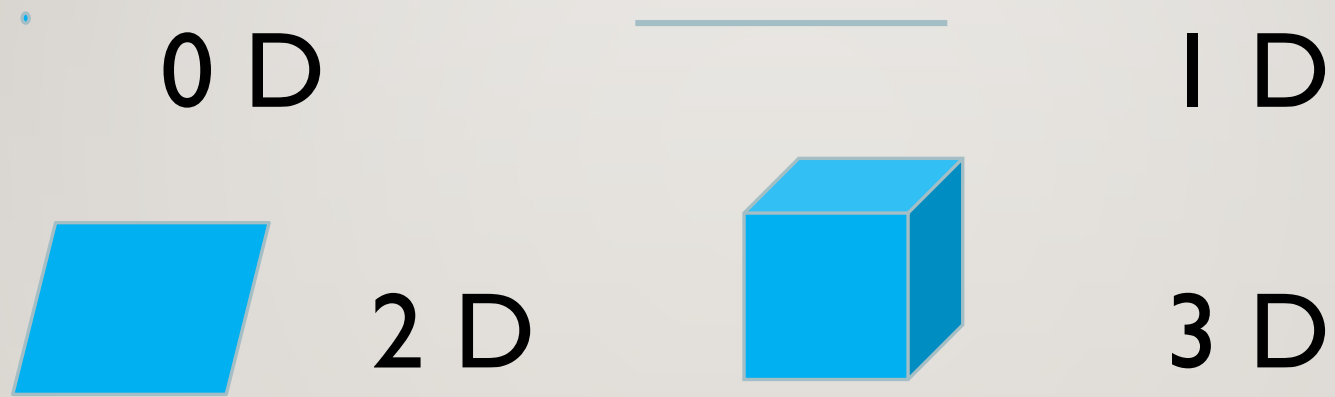


Frost Building lidar Cloud



Frost Building 3D rendering selected (blue).

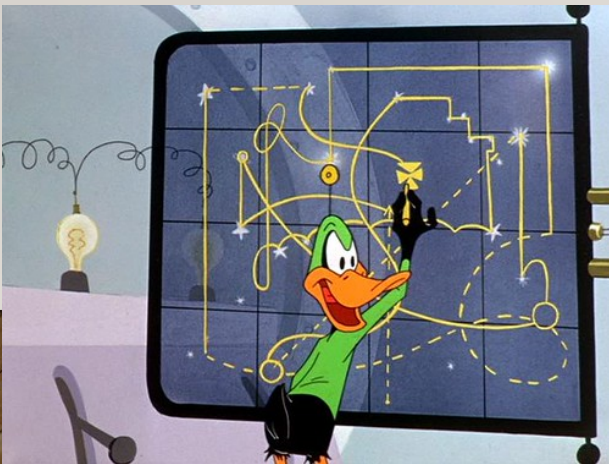
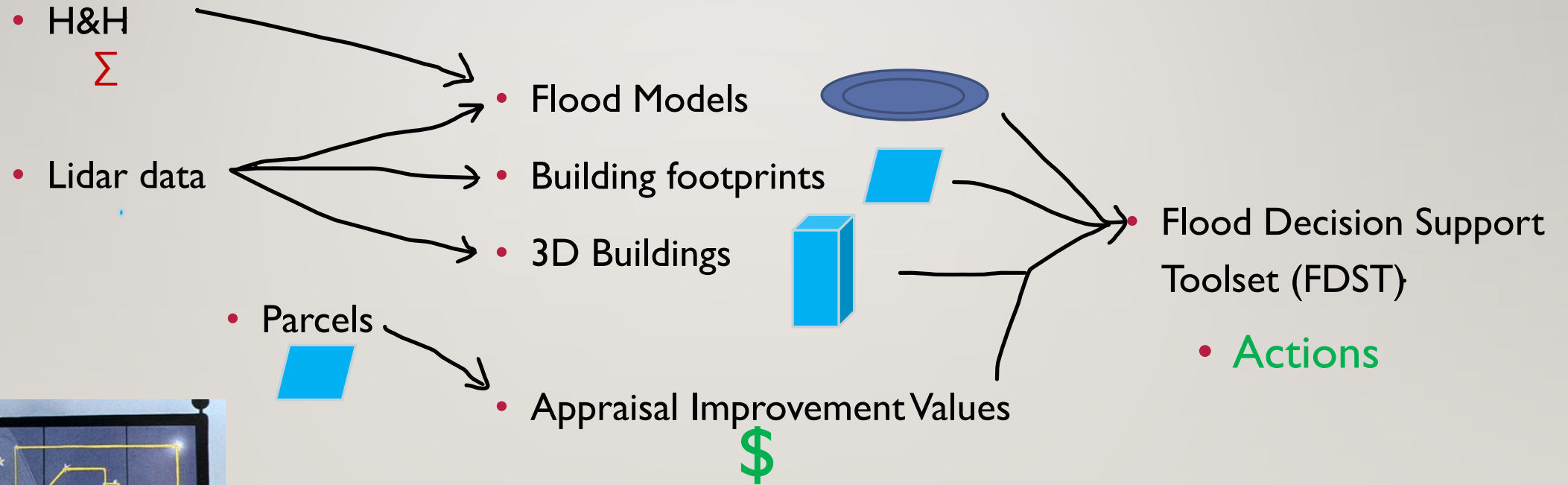
GETTING CONSENSUS ABOUT DIMENSIONS



GEOGRAPHIC INFORMATION SYSTEMS

- GIS is composed of 5 key elements:
 - **hardware, software, data, people, and methods**
- GIS is about uncovering meaning, trends, decisions from data.
- GIS allows us to get from data to information.
- GIS information allows us to make decisions.
- Decisions help us take informed actions.

LIDAR, PARCELS AND DECISION MAKING DIAGRAM FOR PLANNING



lidar Search collections by geolocation Draw search area on map

Availability Category File Type Date Range Sort by: NEWEST Clear all filters

Show Map 1 - 60 of 78 1 2 60 / page

Bois D'Arc Lidar 2021 Elevation Lidar Download	McLennan County Lidar 2021 Elevation Lidar Download	North and Central Texas Lidar 2020 Elevation Lidar Download	Collin Van Zandt Lidar 2020 Elevation Lidar Download	Balmorhea & Davis Mountain State Parks... 2020 Elevation Imagery Lidar Download	Desert Mountain 2019 Elevation Lidar Download	Pecos Dallas Lidar 2019 Elevation Lidar Download	West Texas Lidar 2019 Elevation Lidar Download
Missouri City Lidar 2019 Elevation Lidar Download	Brown County Lidar 2019 Elevation Lidar Download	Hurricane Lidar 2019 Elevation Lidar Download	Matagorda Bay Lidar 2019 Elevation Lidar Download	Lower Colorado San Bernard Lidar 2018 Elevation Lidar Download	Texas West Central Lidar 2018 Elevation Lidar Download	Panhandle Lidar 2018 Lidar Download	Crockett County Lidar 2018 Elevation Lidar Download
Upper Coast Lidar 2018 Elevation Lidar Download	Eastern Texas Lidar 2018 Elevation Lidar Download	Buffalo Bayou Lidar 2018 Elevation Lidar Download	South Texas Lidar 2018 Elevation Lidar Download	South Central Texas Lidar 2018 Elevation Lidar Download	Lavaca & Wharton Counties Lidar 2018 Elevation Lidar Download	Lake Amistad National Recreation Area Lidar 2017 Elevation Lidar Download	East Texas Lidar 2017 Elevation Lidar Download
Jefferson, Liberty, & Chambers Counties... 2017 Elevation Lidar Download	Red River Lidar 2017 Elevation Lidar Download	Brazos, Freestone, & Robertson Counties... 2017 Elevation Lidar Download	Neches River Basin Lidar 2017 Elevation Lidar Download	Central Texas Lidar 2016 Elevation Lidar Download	Brazos River Basin Lidar 2016 Elevation Lidar Download	Middle Brazos-Lake Whitney Watershed... 2016 Elevation Lidar Download	DeWitt County Lidar 2016 Elevation Lidar Download

File Explorer window titled "Lidar (I:)" showing a list of folders. The "stratmap-2009-1m-mcmullen" folder is selected, and a tooltip is displayed over it.

Navigation pane (left):

- Presentations
- solar
- Week11
- OneDrive
- This PC
 - 3D Objects
 - Apple iPhone
 - Desktop
 - Documents
 - Downloads
 - Music
 - Pictures
 - Videos
 - Local Disk (C:)
 - New Volume (D:)
 - Old_D (E:)
 - THUMB_DRIVE (G:)
 - mpavon (\\twdb4aefssvr\users) (H:)
 - Lidar (I:)**
 - Data-Transfer (J:)
 - Scanner (K:)
 - GIS (L:)
 - TheVault (M:)
 - TNRIS-Data (N:)
 - DIV (O:)
 - Apps (P:)
 - RDC (Q:)
 - Projects (R:)
 - SHARED (S:)
 - software (\\Gorgoroth) (Z:)
 - THUMB_DRIVE (G:)
 - Network

Main pane (right):

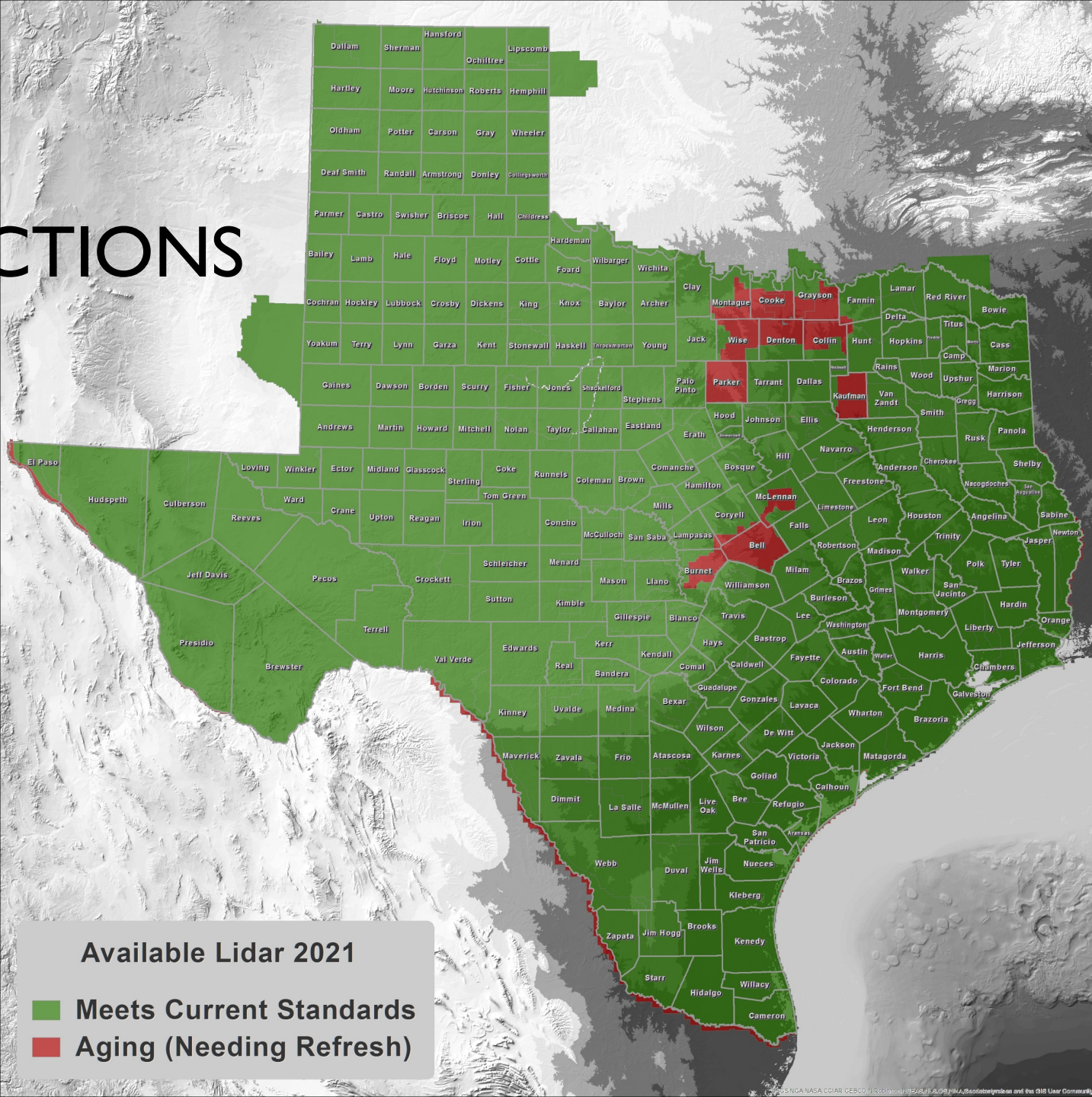
Name	Date modified	Type	Size
stratmap-2009-1m-goliad	6/18/2018 1:45 PM	File folder	
stratmap-2009-1m-mcmullen	10/17/2017 11:13 AM	File folder	
stratmap-2009-1m-zapata		File folder	
stratmap-2009-50cm-tarrant		File folder	
stratmap-2010-1m-lee-leon-madison-milam		File folder	
stratmap-2010-50cm-bexar	10/17/2017 11:27 AM	File folder	
stratmap-2010-50cm-cooke-grayson-montague-wise	10/17/2017 11:30 AM	File folder	
stratmap-2011-1m-sabine-shelby-newton	12/4/2017 10:21 AM	File folder	
stratmap-2011-50cm-austin-grimes-walker	11/14/2017 11:01 AM	File folder	
stratmap-2011-50cm-bell-burnet-mclennan	8/6/2018 9:23 AM	File folder	
stratmap-2011-50cm-blanco-kendall-kerr	10/17/2017 1:55 PM	File folder	
stratmap-2011-50cm-caldwell-gonzales	5/31/2018 1:28 PM	File folder	
stratmap-2011-50cm-collin-denton-kaufman	5/31/2018 1:30 PM	File folder	
stratmap-2012-1m-dewitt	12/4/2017 2:53 PM	File folder	
stratmap-2012-50cm-tceq-dam-sites	12/21/2017 11:33 AM	File folder	
stratmap-2013-50cm-ellis-henderson-hill-johnson-navarro	3/28/2018 8:11 AM	File folder	
stratmap-2013-50cm-karnes-wilson	12/5/2017 7:40 AM	File folder	
stratmap-2014-50cm-bandera	12/5/2017 8:20 AM	File folder	
stratmap-2014-50cm-fort-bend	12/5/2017 9:05 AM	File folder	
stratmap-2014-50cm-henderson-smith-van-zandt-trinity-river	12/7/2017 3:43 PM	File folder	
stratmap-2014-50cm-lampasas	12/11/2017 7:48 AM	File folder	
stratmap-2015-50cm-brazos	12/11/2017 8:23 AM	File folder	
stratmap-2017-35cm-chambers-liberty	4/27/2018 10:10 AM	File folder	
stratmap-2017-50cm-central-texas	4/3/2018 7:11 AM	File folder	
stratmap-2017-50cm-east-texas	12/11/2017 8:57 AM	File folder	
stratmap-2017-50cm-jefferson	6/14/2018 7:26 AM	File folder	
stratmap-2018-50cm-crockett	10/4/2018 11:08 AM	File folder	
stratmap-2018-50cm-upper-coast	2/1/2019 9:26 AM	File folder	
tpwd-2014-50cm-palo-pinto-state-park	12/28/2017 8:55 AM	File folder	
tpwd-2015-20cm-galveston-island-state-park	10/12/2017 12:25 PM	File folder	
usgs-2008-120cm-kenedy-kleberg	12/28/2017 2:23 PM	File folder	
usgs-2011-150cm-calhoun-hidalgo-nueces	12/29/2017 8:33 AM	File folder	
usgs-2014-70cm-archer-jack	8/24/2018 11:33 AM	File folder	
usgs-2016-70cm-middle-brazos-lake-whitney	8/24/2018 11:21 AM	File folder	
usgs-2016-70cm-neches-river-basin	8/29/2018 10:38 AM	File folder	
usgs-2017-70cm-amistad-nra	9/26/2018 1:44 PM	File folder	

Tooltip for "stratmap-2009-1m-mcmullen":

- Type: File folder
- Date modified: 10/17/2017 11:13 AM
- Size: 47.6 GB
- Folders: breaklines, dem, hypso, las, metadata, qaqc, ...

61 items

LIDAR COLLECTIONS 2021



<https://data.tnris.org/>

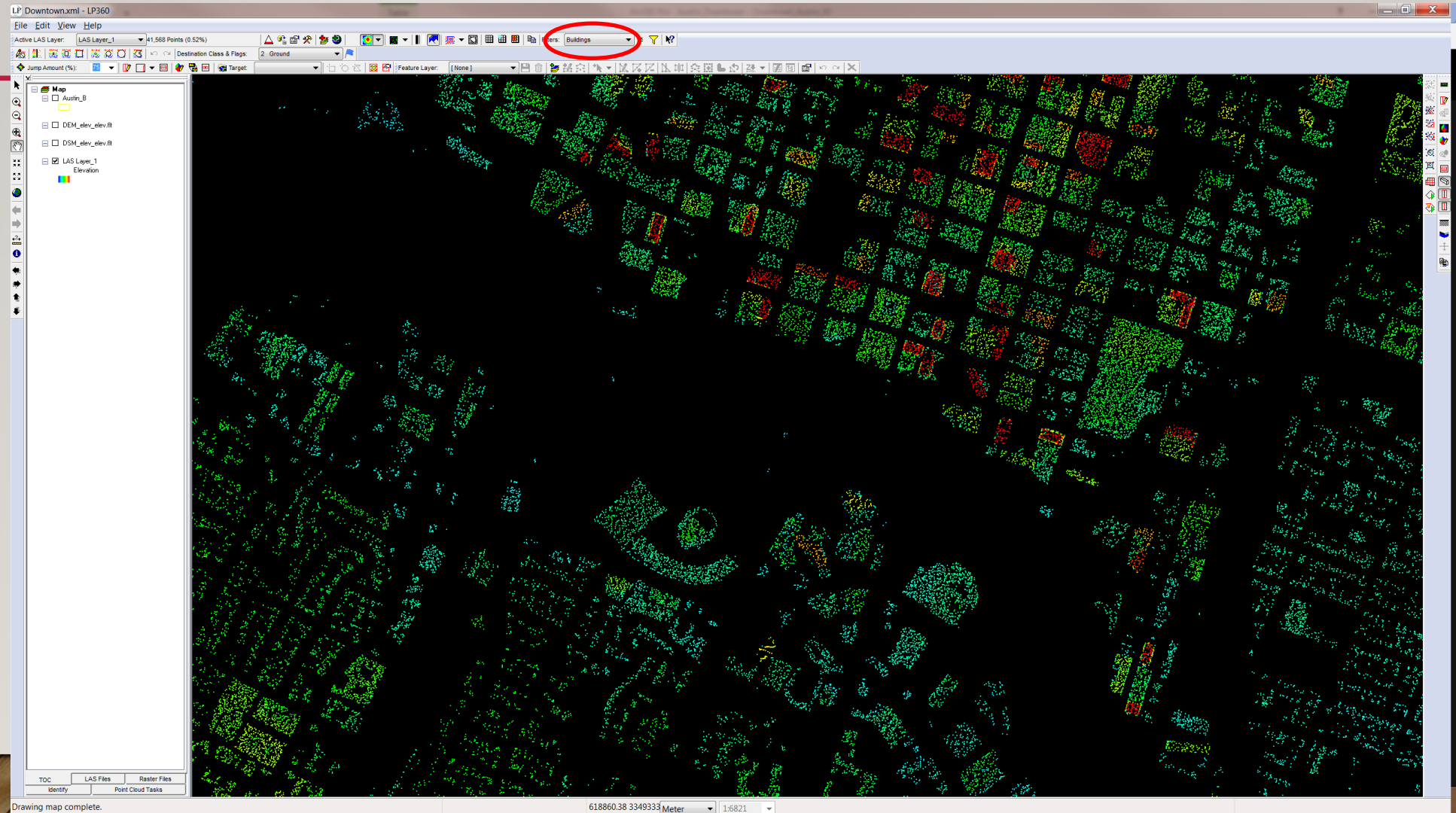
Available Lidar 2021

- Meets Current Standards
- Aging (Needing Refresh)

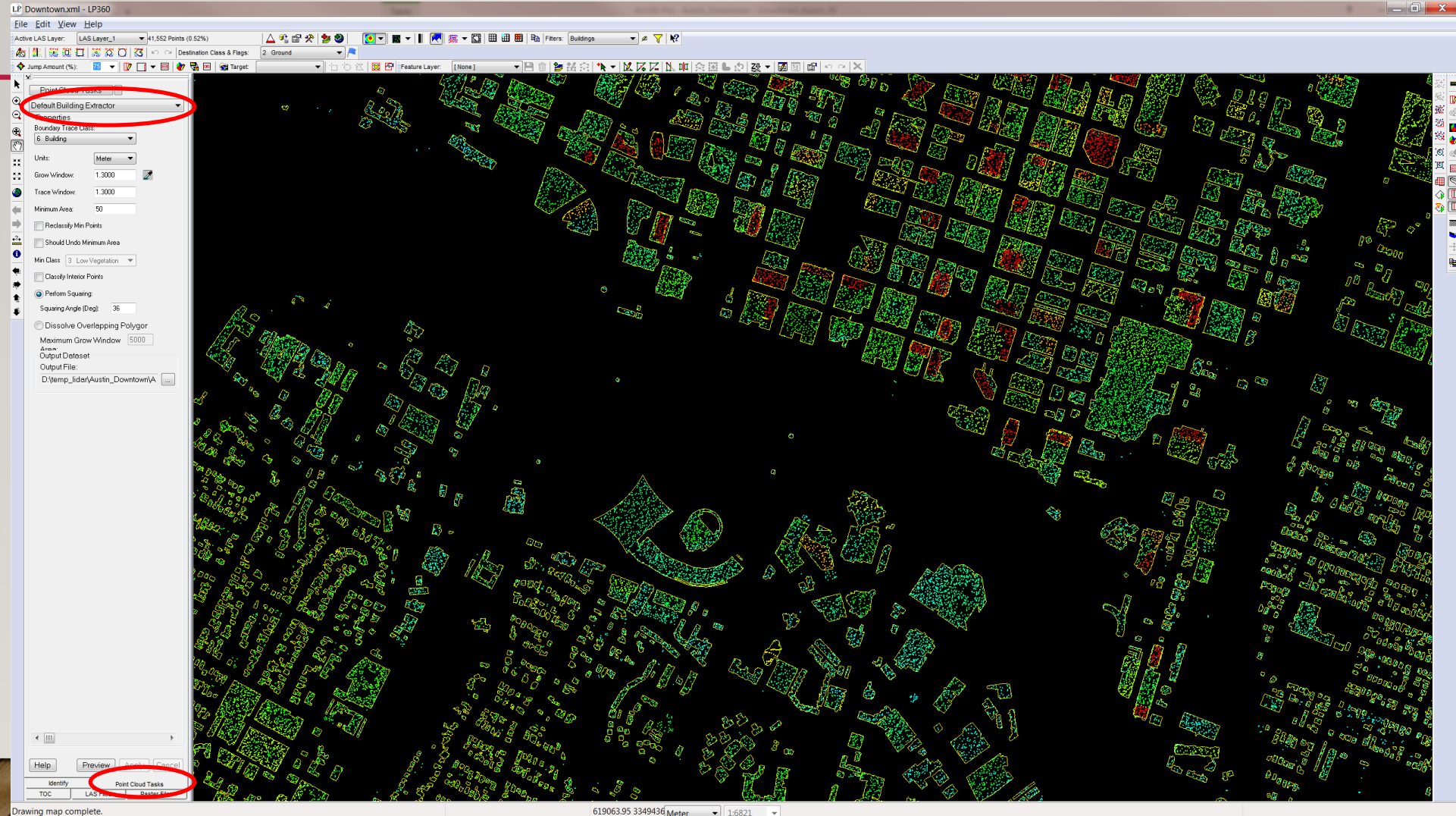
CHECK THAT THE LIDAR COLLECTION HAS “BUILDINGS” AS A CLASS



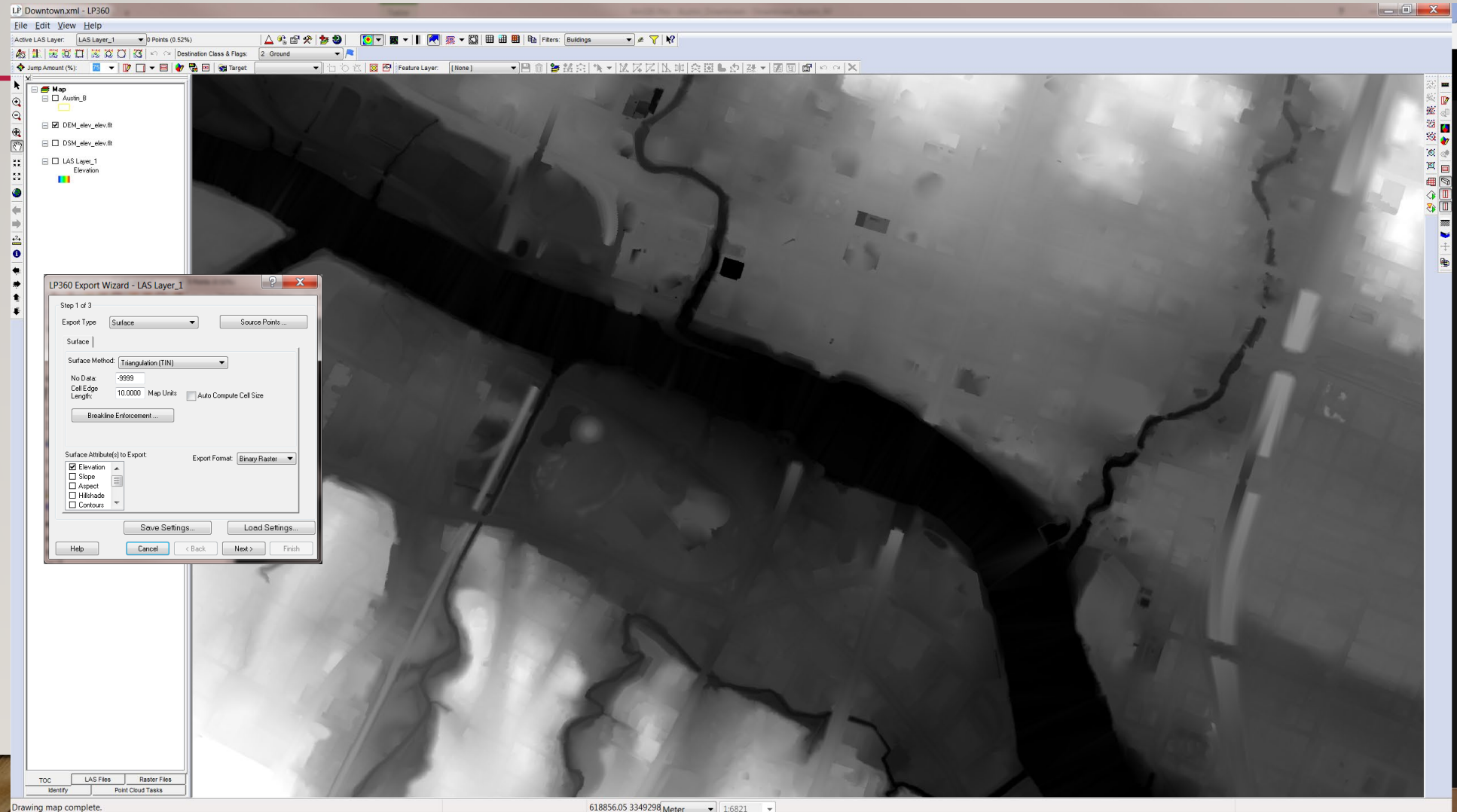
BUILDINGS CLASS



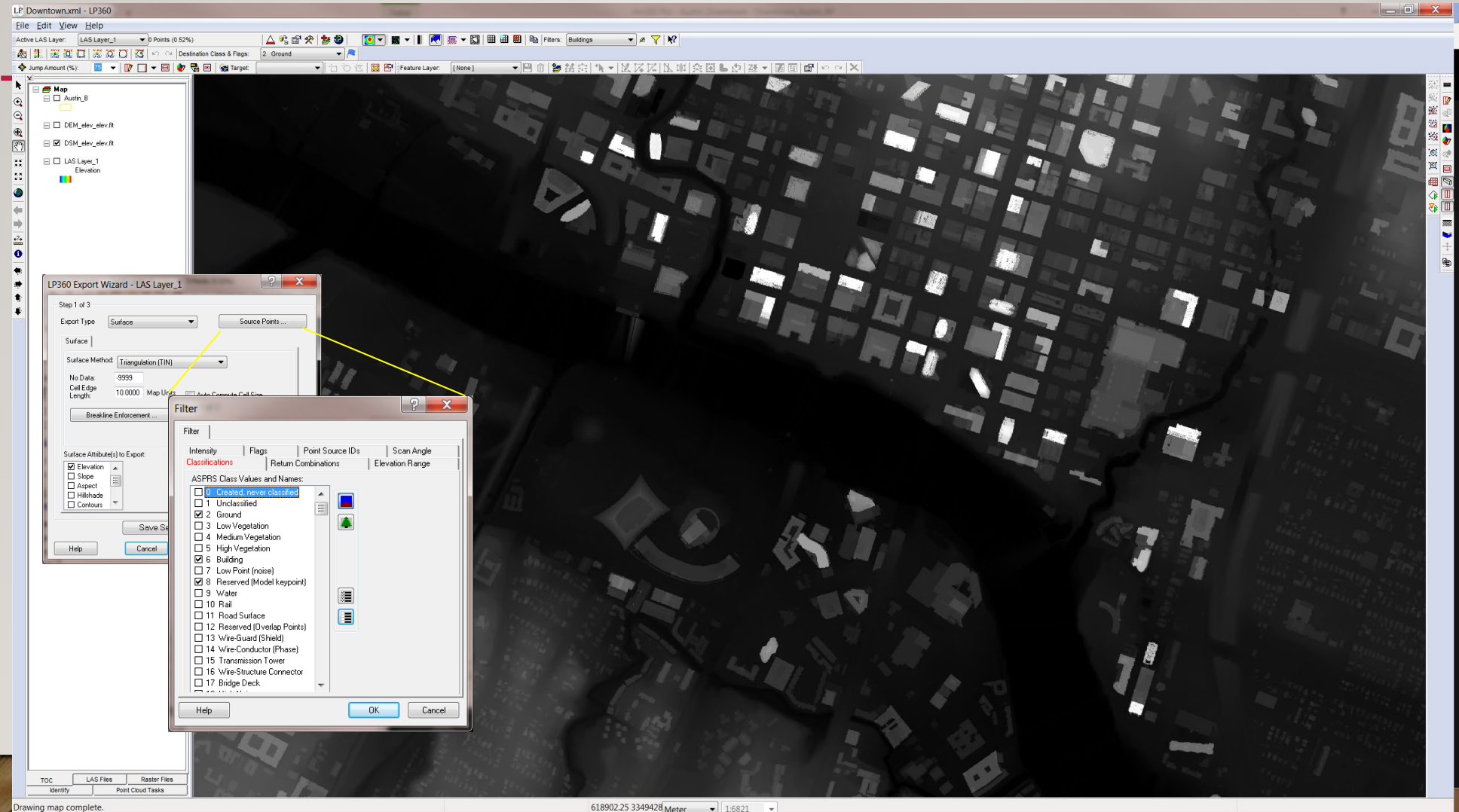
CREATE BUILDING FOOTPRINT POLYGONS (LP360)



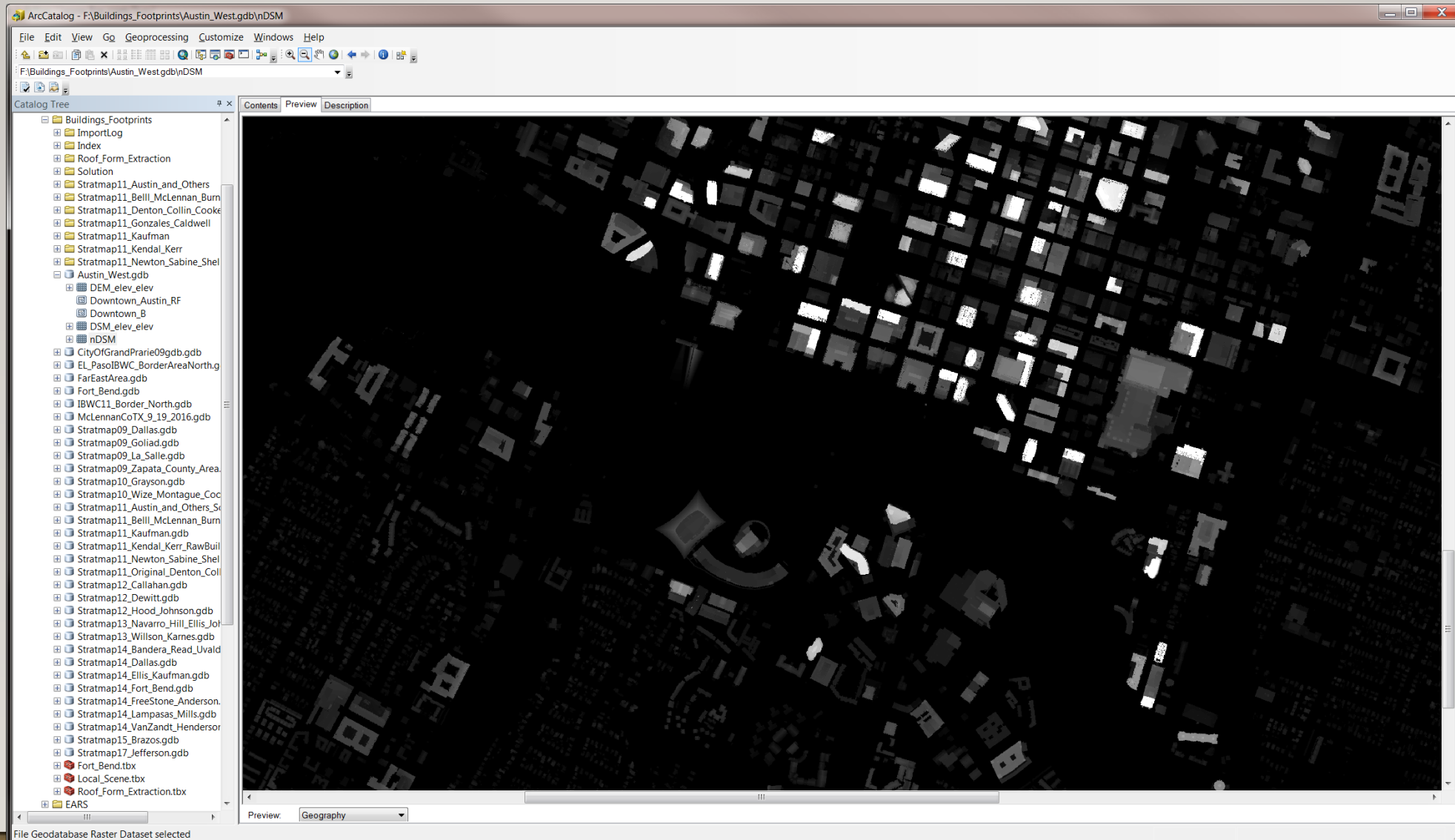
CREATE DIGITAL ELEVATION MODEL (DEM) FOR GROUND



CREATE A DIGITAL SURFACE MODEL TILES USING “GROUND” AND “BUILDING” CLASSIFIED POINTS



CREATE A NORMALIZED DIGITAL SURFACE MODEL (NDSM) = DSM-DEM



USING DEM, DSM, NDSM AND BUILDING FOOTPRINTS EXTRACT THE ROOF FORMS

The screenshot displays the ArcGIS Pro interface for a scene titled "Austin_Downtown". The main map area shows a grayscale aerial view of a city grid. On the left, the "Tasks" pane is open, showing a task titled "Extract the roof forms of buildings" with a list of six numbered steps. Below the steps is a "Parameters" section with fields for "Buildings", "DSM", "DTM", "nDSM", "Minimum Flat Roof Area" (set to 250), "Minimum Slope Roof Area" (set to 75), "Minimum Roof Height" (set to 8), and "Output Building Polygons". There are also checkboxes for "Simplify Buildings" and a "Simplify Tolerance" field. On the right, the "Geoprocessing" pane is open, displaying a list of tools. The tool "Extract Roof Form (RoofFormExtract...)" is highlighted with a red circle. The bottom status bar shows coordinates (91.7615499°W 30.2705649°N) and a scale of 3,683 m.

Tasks

Extract the roof forms of buildings

1. Extract the roof forms of buildings

- Under **Buildings**, choose the building footprints layer.
- Under **DSM**, **DTM**, and **nDSM**, choose the corresponding elevation layers.
- If necessary, change the **Minimum Flat Roof Area**, the **Minimum Slope Roof Area**, and the **Minimum Roof Height** to values large enough to prevent non-roof features from being included, but not so high as to exclude actual roofs. The default values are in feet or square feet. If your data uses meters, change the values accordingly.
- Choose the name and location of the **Output Building Polygons**.
- If you want, check **Simplify Buildings** to remove extra vertices from the building footprints.
- If necessary, choose a **Simplify Tolerance** to be the maximum degree of simplification allowed.

Pending edits. Save edits to commit changes.

Parameters | Environments

- Buildings
- DSM
- DTM
- nDSM
- Minimum Flat Roof Area: 250
- Minimum Slope Roof Area: 75
- Minimum Roof Height: 8
- Output Building Polygons
- Simplify Buildings
- Simplify Tolerance

Progress (1/1)

Contents | Tasks

2,354 m

91.7615499°W 30.2705649°N 3,683 m

Selected Features: 0

Symbology | Geoprocessing

Geoprocessing

Find Tools

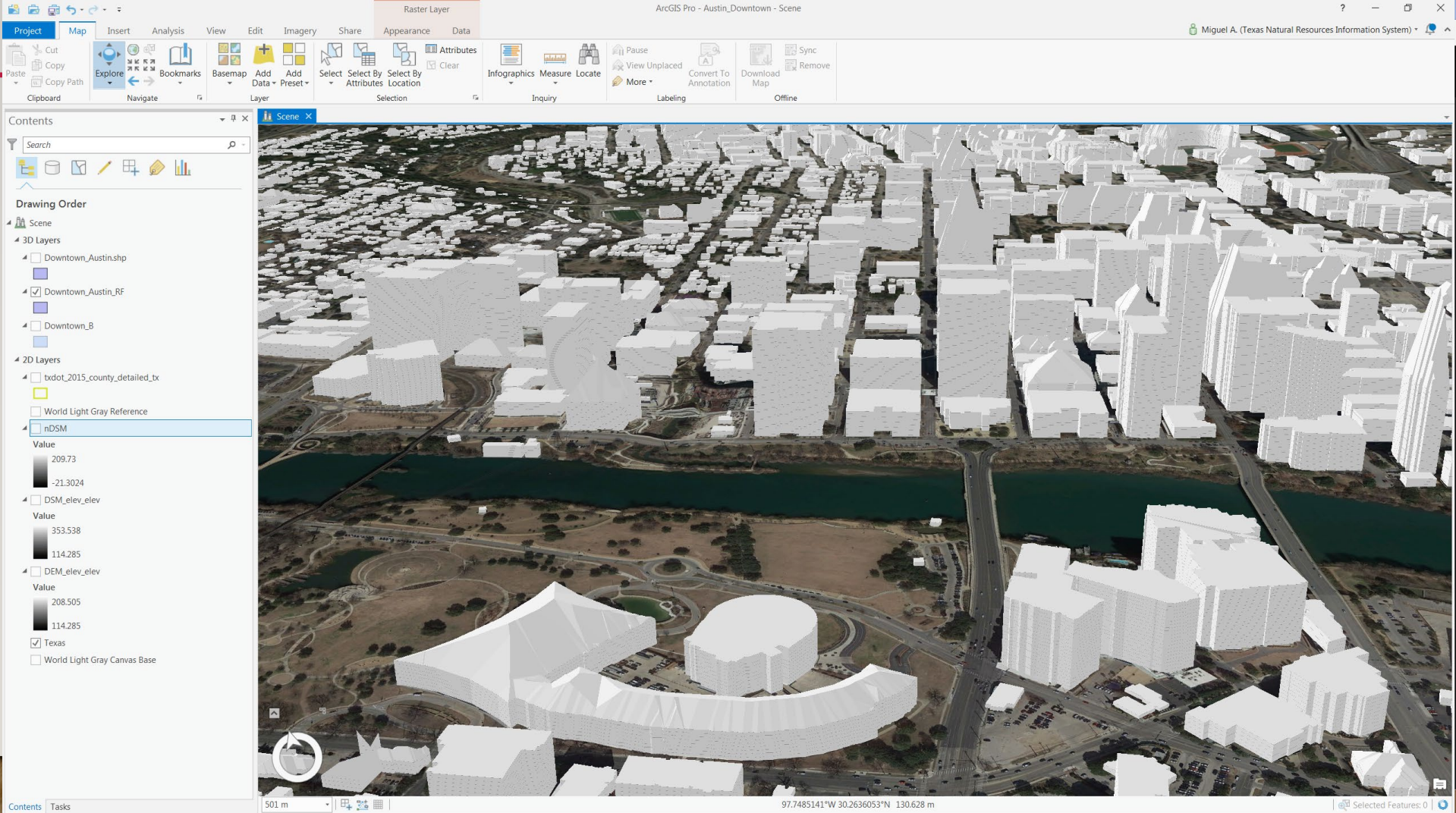
Favorites | Toolboxes | Portal

- Calculate Field (Data Management Tools)
- Buffer (Analysis Tools)
- Near (Analysis Tools)
- Spatial Join (Analysis Tools)
- Intersect (Analysis Tools)

Recent Tools

- Copy Features (Data Management Tools)
- Apply Symbology From Layer (Data Management Tools)
- Extract Roof Form (RoofFormExtract...)**

ENABLE AND SYMBOLIZE 3D BUILDINGS IN A 3D SCENE



REVIEW BUILDINGS AND QA/QC THE ATTRIBUTES, FIX INCORRECT ROOF FORMS

The screenshot shows the ArcGIS Pro interface with a 3D city model. A building is highlighted in cyan. The Table view at the bottom displays the following data:

OBJECTID	Shape	Shape_Length	Shape_Area	BLDGHEIGHT	EAVEHEIGHT	ROOFORM	BuildingFID	BASEELEV	ROOFDIR	RoofDirAdjust
23752	Polygon M	62.512923	162.447888	6.2765	<Null>	Flat	Building_23752	139.4542	<Null>	0
23753	Polygon M	550.417078	15754.480573	29.5984	<Null>	Flat	Building_23753	164.2857	<Null>	0
23754	Polygon M	1241.905208	29864.513593	22.9098	<Null>	Hip	Building_23754	136.6866	<Null>	0
23755	Polygon M	375.385079	8126.423513	32.6285	<Null>	Flat	Building_23755	135.2196	<Null>	0
23756	Polygon M	737.519646	9541.908656	63.5947	<Null>	Flat	Building_23756	134.878	<Null>	0
23757	Polygon M	1447.426177	19921.688289	55.0999	<Null>	Hip	Building_23757	155.7147	<Null>	0
23758	Polygon M	174.637081	937.42655	15.3075	<Null>	Gable	Building_23758	159.4721	0	0
23759	Polygon M	262.218994	4280.417255	30.1136	<Null>	Flat	Building_23759	159.1924	<Null>	0

WHAT CAN GO WRONG?

- Pilot Test,
- Review (people will begin to ask for them)
- Review some more
- Get somebody else to review for you ...
- (Soft)Release first iteration

McLennan - Scene - ArcGIS Pro

Linear Referencing LAS Dataset Layer

Project Map Insert Analysis View Edit Imagery Share Data Appearance Data Classification

Command Search (Alt+Q) Miguel A. (Texas Natural Resources Information System)

In Beyond: <None> Out Beyond: <None> Clear Limits

Transparency: 0.0% Layer Blend: Normal Feature Blend: Normal

Swipe Flicker: 500.0 ms

File Extent Symbology

Display Limit: 4,000,000 Density Min: Min to Max Dynamic Level of Detail

LAS Points Surface Constraints Eye-Dome Lighting

Radius: 2 px Strength: 50 %

Visibility Range Effects Compare Drawing Point Thinning Filters Lighting and Shading

Contents

Search

Drawing Order

- Scene
 - 3D Layers
 - Capcog_2012_140cm_travis_HR
 - stratmap_2017_50cm_central_texas_
 - McLennan_ExtractRoofForm
 - stratmap_2017_50cm_central_texas_
 - Capitol_16.lasd
 - 2D Layers
 - World Imagery
 - Elevation Surfaces
 - Ground
 - WorldElevation3D/Terrain3D

3,102 ft



McLennan - Scene - ArcGIS Pro

Linear Referencing LAS Dataset Layer

Project Map Insert Analysis View Edit Imagery Share Data Appearance Data Classification

Command Search (Alt+Q) Miguel A. (Texas Natural Resources Information System)

In Beyond <None> Transparency 0.0% Swipe

Out Beyond <None> Layer Blend Normal Flicker 500.0 ms Symbology

Clear Limits Feature Blend Normal

Visibility Range Effects Compare Drawing

File Extent

Display Limit 4,000,000

Density Min Max

Dynamic Level of Detail

Point Thinning

LAS Points Surface Constraints

Eye-Dome Lighting

Radius 2 px

Strength 50 %

Lighting and Shading

Contents

Search

Drawing Order

- Scene
 - 3D Layers
 - Capcog_2012_140cm_travis_HR
 - stratmap_2017_50cm_central_texas_
 - McLennan_ExtractRoofForm
 - stratmap_2017_50cm_central_texas_
 - Capitol_16.lasd
 - 2D Layers
 - World Imagery
 - Elevation Surfaces
 - Ground
 - WorldElevation3D/Terrain3D



Visibility Range

In Beyond <None> Transparency 40.0%

Out Beyond <None> Layer Blend Normal

Clear Limits Feature Blend Normal

Effects

Swipe

Flicker 500.0 ms

Compare

Symbology

Masking

Display Filters

Aggregation

Import

Drawing

Field

Type

Unit

Extrusion

Face Culling

Lighting

Enable Lighting

Faces

Lighting and Shading

Contents

Search

Drawing Order

Scene

3D Layers

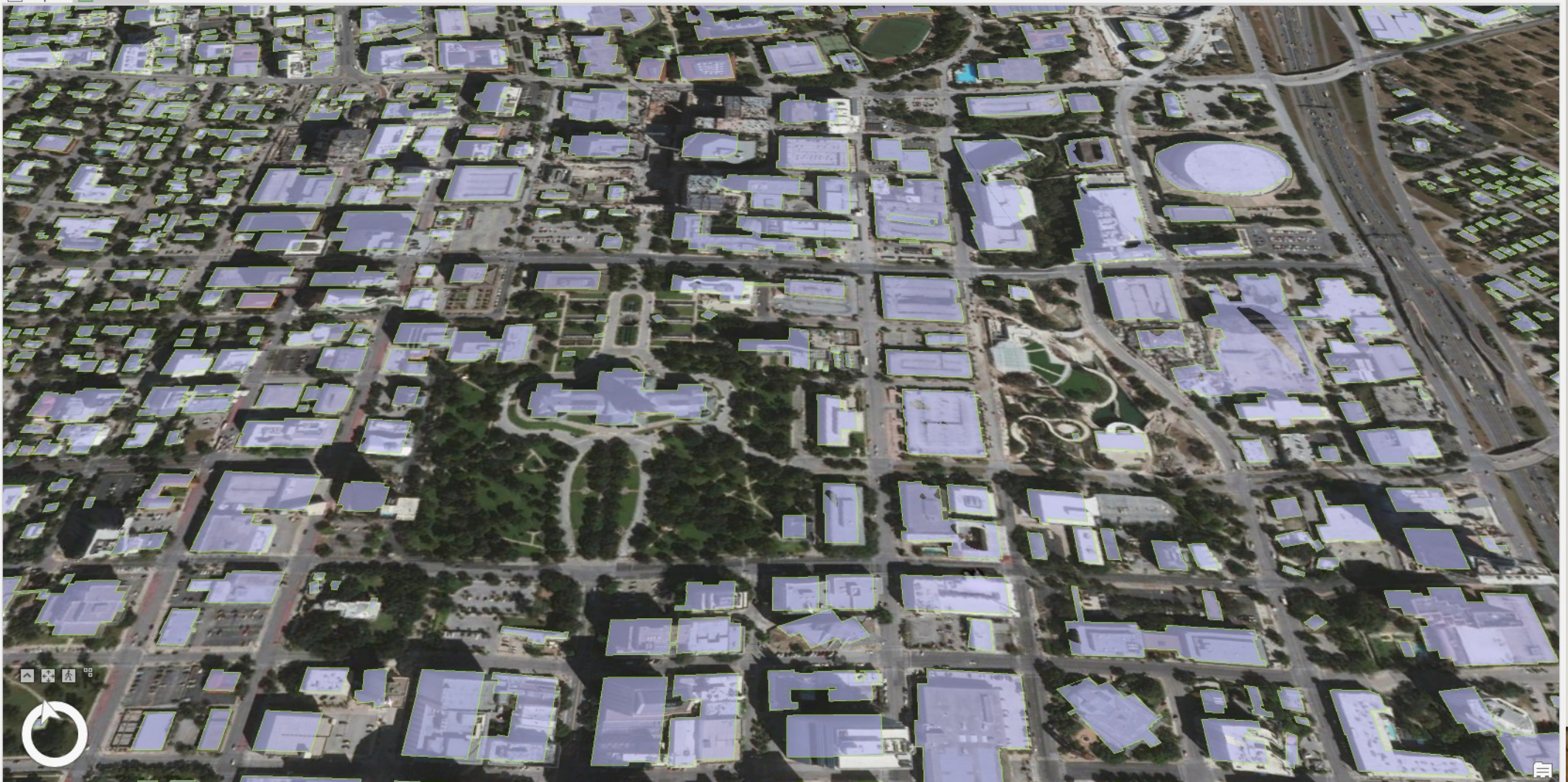
- Capcog_2012_140cm_travis_HR
- stratmap_2017_50cm_central_texas
- McLennan_ExtractRoofForm
- stratmap_2017_50cm_central_texas
- Capitol_16.lasd

2D Layers

- World Imagery

Elevation Surfaces

- Ground
- WorldElevation3D/Terrain3D



McLennan - Scene - ArcGIS Pro

Feature Layer | Linear Referencing

Project | Map | Insert | Analysis | View | Edit | Imagery | Share | Appearance | Labeling | Data | Data

Command Search (Alt+Q) Miguel A. (Texas Natural Resources Information System)

In Beyond <None> Transparency 40.0% Swipe
 Out Beyond <None> Layer Blend Normal Flicker 500.0 ms
 Clear Limits Feature Blend Normal

Visibility Range Effects Compare

Symbology Masking Display Filters Aggregation Type Unit
 Import

Extrusion Face Culling Lighting
 Enable Lighting

Lighting and Shading

Contents

Search

Drawing Order

- Scene
 - 3D Layers
 - Capcog_2012_140cm_travis_HR
 - stratmap_2017_50cm_central_texas
 - McLennan_ExtractRoofForm
 - stratmap_2017_50cm_central_texas
 - Capitol_16.lasd
 - 2D Layers
 - World Imagery
 - Elevation Surfaces
 - WorldElevation3D/Terrain3D

Tasks



McLennan - Scene - ArcGIS Pro

Project Map Insert Analysis View Edit Imagery Share

Appearance Labeling Data Data

Command Search (Alt+Q) Miguel A. (Texas Natural Resources Information System)

In Beyond <None> Transparency 40.0% Swipe
Out Beyond <None> Layer Blend Normal Flicker 500.0 ms
Clear Limits Feature Blend Normal

Symbology Masking Display Filters Aggregation Type Unit
Import

Extrusion Face Culling Lighting
Enable Lighting

Visibility Range Effects Compare Drawing Extrusion Faces Lighting and Shading

Contents

Search

Drawing Order

- Scene
 - 3D Layers
 - Capcog_2012_140cm_travis_HR
 - stratmap_2017_50cm_central_texas
 - McLennan_ExtractRoofForm
 - stratmap_2017_50cm_central_texas
 - Capitol_16.lasd
 - 2D Layers
 - World Imagery
 - Elevation Surfaces
 - Ground
 - WorldElevation3D/Terrain3D



While reviewing we find:

LIDAR COLLECTIONS WITH NO BUILDINGS CLASS

Texas West Central Lidar 2018 Imagery OFF

Metadata Downloads Custom Order Contact

This USGS lidar project covers portions of 70 counties across west Texas and northern central Texas. The acquisition was conducted from February 1, 2018, thru May 27, 2018. Reflights were collected on November 5, 2018. Dewberry served as the prime contractor for the project. In addition to project management, Dewberry was responsible for LAS classification, all lidar products, breakline production, Digital Elevation Model (DEM) production, and quality assurance.

The primary purpose of this project is to support the 3DEP mission and the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment and Planning (MAP) program across the project area.

Further details regarding this acquisition can be found by downloading the USGS 2018 West Central Texas Project Reports.

Points are classified based on the following classifications.

- Class 1 = Unclassified
- Class 2 = Bare-Earth Ground
- Class 7 = Low Noise
- Class 9 = Water
- Class 10 = Ignored Ground
- Class 17 = Bridge Decks
- Class 18 = High Noise

ABOUT LIDAR DATA

Lidar data for Texas is available online through the use of [LASTools](#), an open-source collection of tools for lidar data viewing and manipulation.

Click [here](#) to download a complete index of all available lidar data at TNRIS.

METADATA

SUPPLEMENTAL DOWNLOADS

Supplemental Report	Download
Lidar Breaklines	Download

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Legal Copyright Programs Contact

OMISIONS, MICROSOFT AI

The screenshot displays the ArcGIS Pro software interface. The title bar indicates the current project is "OSM_and_AI_Buildings - Map1 - ArcGIS Pro". The ribbon menu at the top includes tabs for Project, Map, Insert, Analysis, View, Edit, Imagery, Share, Appearance, Labeling, and Data. The Contents pane on the left shows the following layers:

- Map1
- TX_Buildings_MS
- buildings18_OSM
- Buildings_OSM_MS2
- TX_OSM_MS_Build_PPPP (Selected)

The main map area shows a detailed view of a residential area in West Lake Hills, Texas. The map displays a topographic background with building footprints overlaid in purple. The interface also shows various toolbars and a status bar at the bottom with coordinates: 97.8093014°W 30.3185080°N.

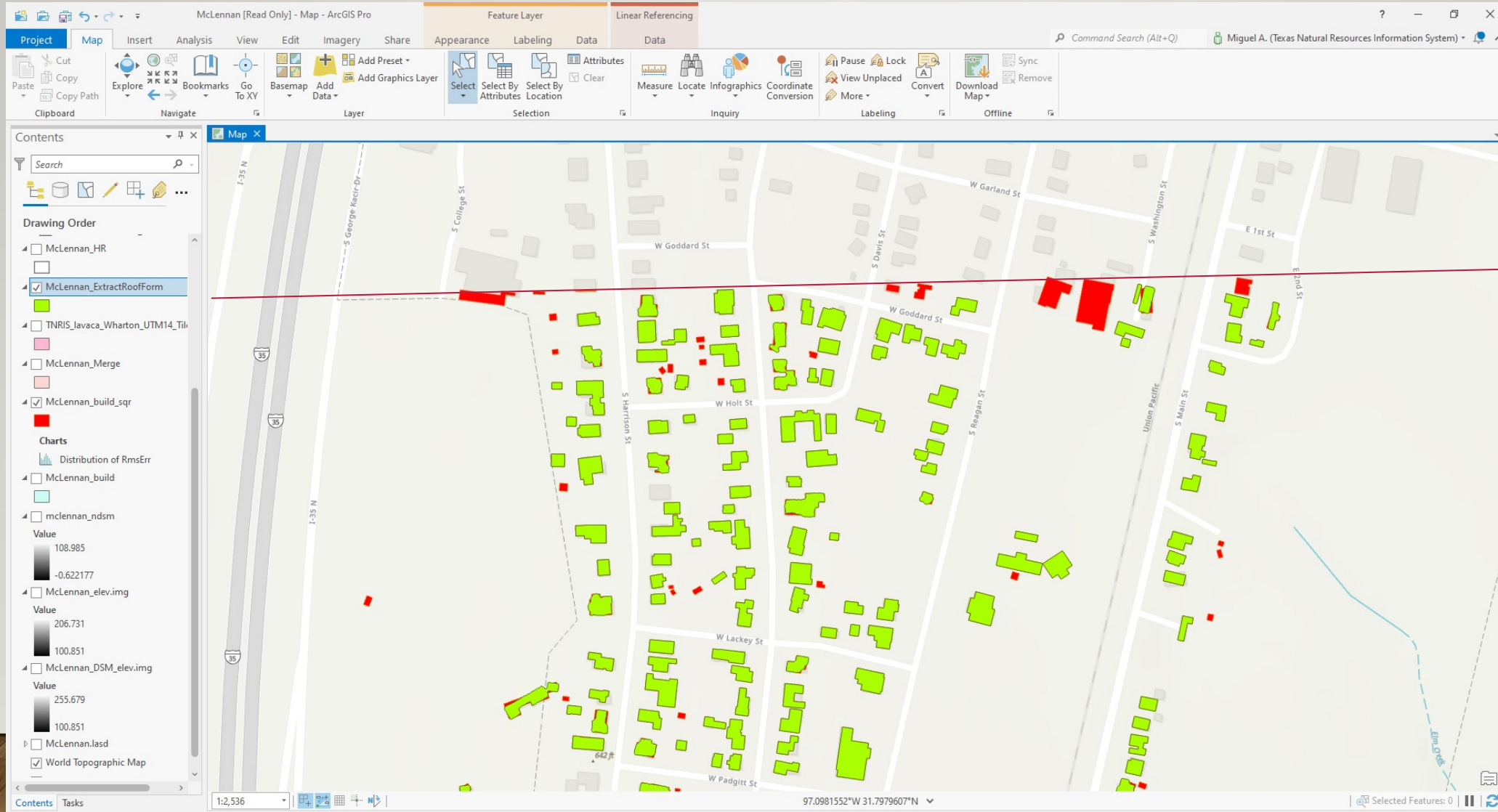
OMISIONS, OPEN STREET MAP

The screenshot displays the ArcGIS Pro interface for a map titled "OSM_and_AI_Buildings - Map1 - ArcGIS Pro". The ribbon at the top includes toolbars for Project, Map, Insert, Analysis, View, Edit, Imagery, and Data. The Contents pane on the left shows the following layers and settings:

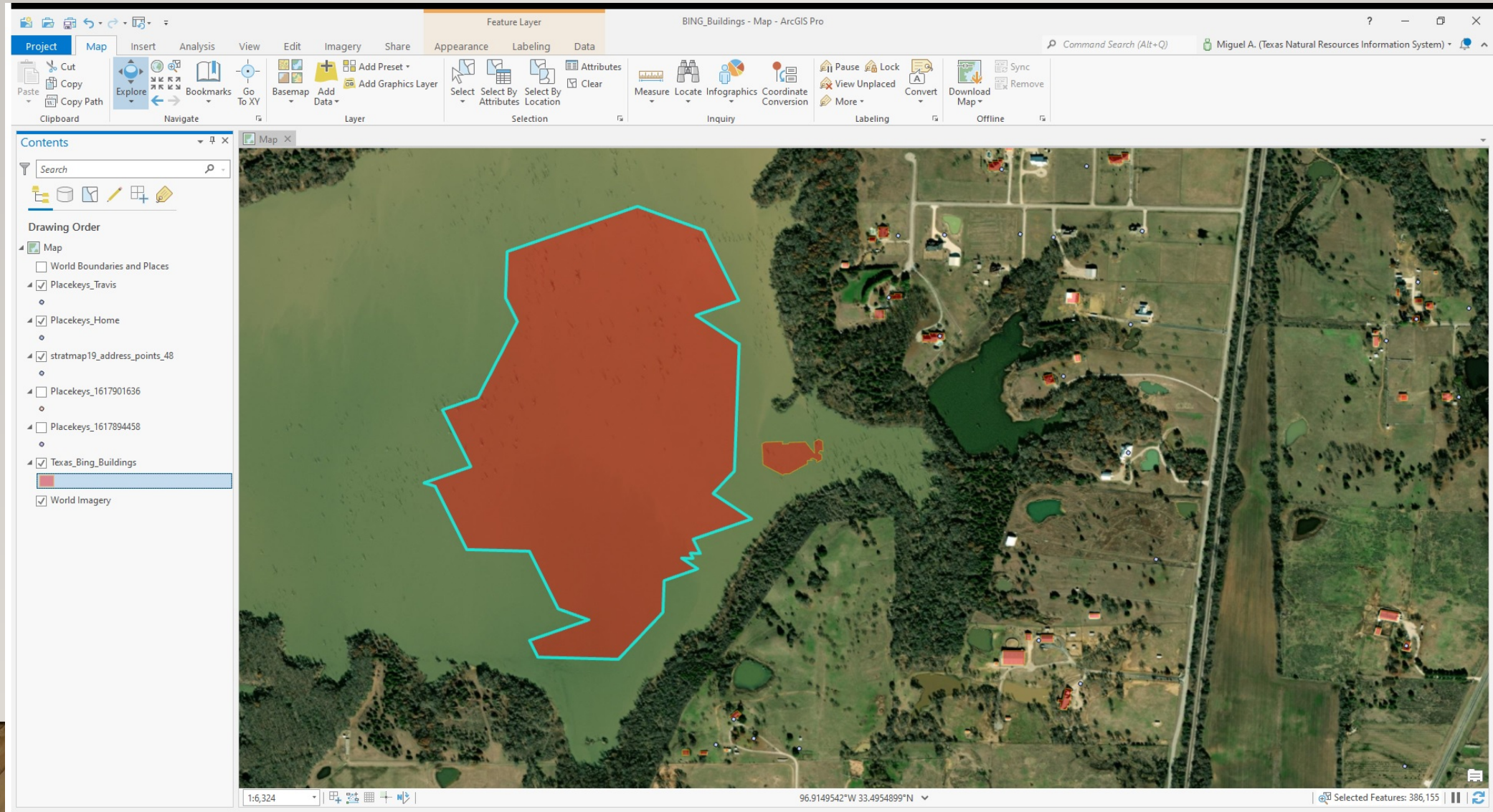
- Map1
 - TX_Buildings_MS
 - buildings18_OSM
 - Buildings_OSM_MS2
 - TX_OSM_MS_Build_PPPP
 - Distribution of Price_SQFT
 - World Topographic Map
 - World Hillshade
 - Standalone Tables
 - TX_OSM_MS_Build_PPPP_Statist
 - TX_OSM_MS_Build_PPPP_Statist1

The map area shows a detailed view of Austin, Texas, with a layer of buildings overlaid in orange. The map includes labels for streets, parks, and landmarks such as the University of Texas at Austin and Hancock Golf Course. The status bar at the bottom indicates a scale of 1:27,938 and coordinates of 97.8194611°W 30.3185653°N.

BOUNDARY EFFECT ON LIDAR COLLECTIONS



FALSE POSITIVES, MICROSOFT AI



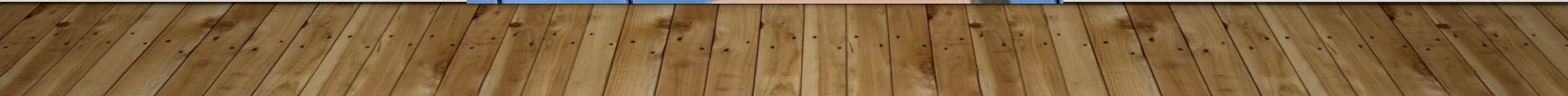
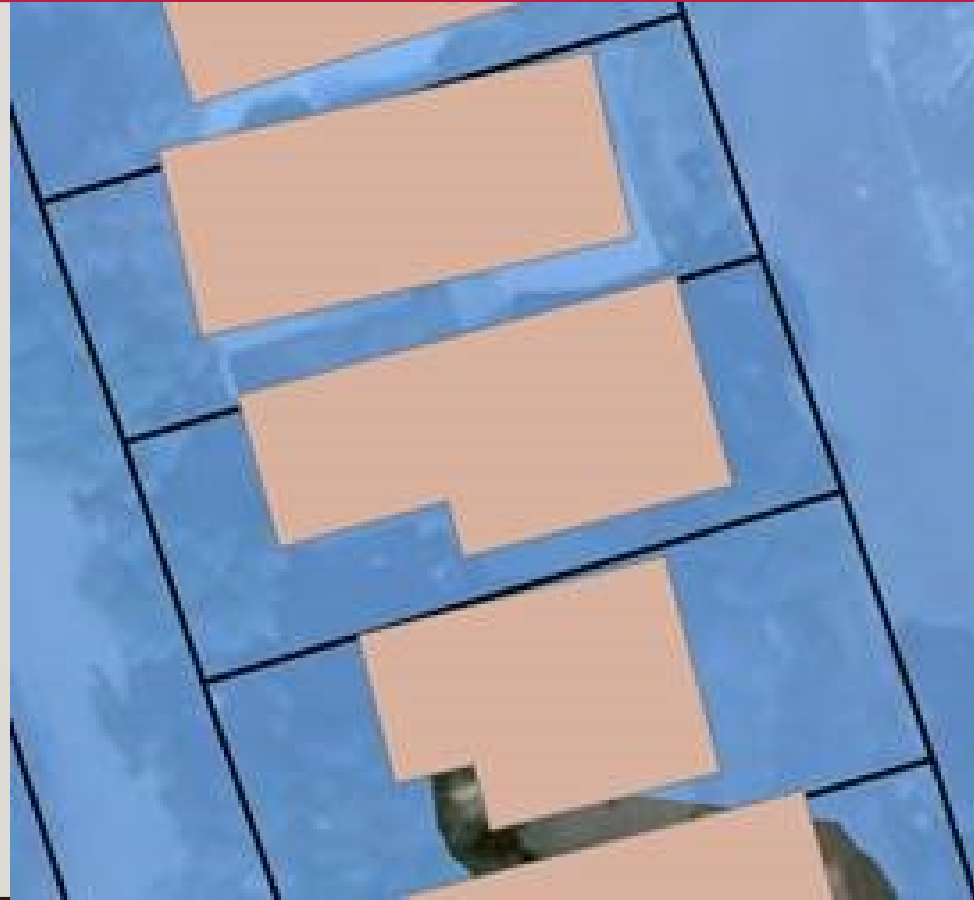
ONE BUILDING, MANY PARCELS



ONE PARCEL, MANY BUILDINGS



BUILDING – PARCELS, SPATIAL DIFFERENCES



HATE TO BREAK THIS NEWS FOR YOU GUYS

- Size matters!
 - It is not the same 100 features than 12M features!

LIDAR COLLECTIONS SO BIG THAT HAVE TO BE TILED FOR PROCESSING

- Consider billions of points as a portion of one collection (T2995 is one portion, Stratmap_2018_Upper_TX_Coast has 10 portions)
- Get a Desktop computer with resources to process thousands of points a second for i.e.: 2D Buildings footprint delineation.
- $1\text{B points} / 1\text{K points/s} = 1\text{ M seconds}$
- $1\text{M Seconds} / 60\text{ s/min} = 16,660\text{ minutes}$
- $16,660\text{ min.} / 60\text{ min/hr} = 277\text{ hours}$
- $277\text{ hr.} / 24\text{ hr/day} = 12\text{ days}$ to process 1.3 TB

Sum: 42,927,629,474 Total: 1,287.43 GB

File	Points	Size (MB)	Map Layer	Message	Version	PDRF
stratmap18-50cm_2995011a1_1.las	15,085,517	452.57	LAS Layer_1		1.4	6
stratmap18-50cm_2995011a2_1.las	16,384,797	491.55	LAS Layer_1		1.4	6
stratmap18-50cm_2995011a3_1.las	14,695,685	440.87	LAS Layer_1		1.4	6
stratmap18-50cm_2995011a4_1.las	16,174,016	485.22	LAS Layer_1		1.4	6
stratmap18-50cm_2995011b1_1.las	15,775,119	473.26	LAS Layer_1		1.4	6
stratmap18-50cm_2995011b2_1.las	15,156,537	454.70	LAS Layer_1		1.4	6
stratmap18-50cm_2995011b3_1.las	15,779,517	473.39	LAS Layer_1		1.4	6
stratmap18-50cm_2995011b4_1.las	15,315,803	459.48	LAS Layer_1		1.4	6
stratmap18-50cm_2995011c1_1.las	15,178,798	455.37	LAS Layer_1		1.4	6
stratmap18-50cm_2995011c2_1.las	16,085,329	482.56	LAS Layer_1		1.4	6
stratmap18-50cm_2995011c3_1.las	14,890,038	446.70	LAS Layer_1		1.4	6
stratmap18-50cm_2995011c4_1.las	15,206,346	456.19	LAS Layer_1		1.4	6
stratmap18-50cm_2995011d1_1.las	16,061,627	481.85	LAS Layer_1		1.4	6
stratmap18-50cm_2995011d2_1.las	15,552,405	466.58	LAS Layer_1		1.4	6
stratmap18-50cm_2995011d3_1.las	15,208,025	456.24	LAS Layer_1		1.4	6
stratmap18-50cm_2995011d4_1.las	15,424,848	462.75	LAS Layer_1		1.4	6

NO IMPROVEMENT VALUES FROM CAD

OSM_and_AI_Buildings - TX_OSM_MS_Build_PPPP - ArcGIS Pro

Miguel A. (Texas Natural Resources Information System)

Contents

- Travis, TX Point Parcel
- TX_Buildings_MS
- buildings18_OSM
- Buildings_OSM_MS2
- TX_OSM_MS_Build_PPPP**
 - IMP_VALUE
 - ≤1888877.000000
 - ≤6205701.000000
 - ≤14399262.000000
 - ≤30518605.000000
 - ≤65527125.000000
 - <out of range>
 - Charts
 - Distribution of Price_SQFT
- Travis, TX Area Parcel
 - ASSD_IMP
 - ≤1888877.000000
 - ≤6205701.000000
 - ≤14399262.000000
 - ≤30518605.000000
 - ≤65527125.000000
 - <out of range>
 - World Topographic Map
 - World Hillshade
- Standalone Tables
 - TX_OSM_MS_Build_PPPP_Statist
 - TX_OSM_MS_Build_PPPP_Statist1

Map1

1:27,938 97.7584364°W 30.2913338°N Selected Features: 0

TX_OSM_MS_Build_PPPP

Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy

OBJECTID	Shape	Join_Count	Source	Tax year	Year build	Assessed_Calculation	Number of Stories	Building Ur	Address Numbe	Director	Street
1338962	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	7227	<Null>	KELLEF
1338963	Polygon	1	buildings18_OSM	2018	0	Assessed	1.5	1	504	<Null>	OLD B
1338964	Polygon	1	buildings18_OSM	<Null>	<Null>	Assessed	<Null>	1	106	<Null>	TEAKM
1338965	Polygon	1	buildings18_OSM	2018	0	Assessed	2	1	2903	<Null>	OVERL
1338966	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	7831	<Null>	ARBER
1338967	Polygon	1	buildings18_OSM	2018	0	Assessed	1.5	1	506	<Null>	OLD B
1338968	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	7307	<Null>	LINDEF
1338969	Polygon	2	buildings18_OSM	<Null>	<Null>	Estimated	1	1	6016	<Null>	RANDL
1338970	Polygon	1	buildings18_OSM	2018	0	Assessed	1	1	2809	<Null>	OVERL
1338971	Polygon	1	buildings18_OSM	<Null>	<Null>	Estimated	1	2	7202	<Null>	NARCI
1338972	Polygon	1	buildings18_OSM	2018	0	Assessed	1.5	1	4903	<Null>	MEAD
1338973	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	7825	<Null>	ARBER
1338974	Polygon	2	buildings18_OSM	<Null>	<Null>	Assessed	1	1	4902	<Null>	MEAD
1338975	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	6952	<Null>	ILEX
1338976	Polygon	3	buildings18_OSM	<Null>	<Null>	Assessed	1	1	7607	<Null>	KERNE
1338977	Polygon	2	buildings18_OSM	<Null>	<Null>	Assessed	1	1	7821	<Null>	ARBER
1338978	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	7311	<Null>	LINDEF
1338979	Polygon	2	buildings18_OSM	<Null>	<Null>	Estimated	2	1	6024	<Null>	RANDL
1338980	Polygon	2	buildings18_OSM	<Null>	<Null>	Assessed	1	2	7202	<Null>	NARCI
1338981	Polygon	2	buildings18_OSM	<Null>	<Null>	Assessed	1	1	4902	<Null>	MEAD
1338982	Polygon	1	buildings18_OSM	2019	2005	Assessed	1	1	7813	<Null>	ARBER

0 of 9,950,837 selected

Symbology - TX_OSM_MS_Build_PPPP

Primary symbology

Graduated Colors

Field: Improvement Value

Normalization: <None>

Method: Natural Breaks (Jenks)

Classes: 5

Color scheme: [Color Scale]

Classes Histogram Scales

Symbol	Upper value	Label
[Yellow]	≤ 1888877.0	≤1888877.000000
[Light Orange]	≤ 6205701.0	≤6205701.000000
[Orange]	≤ 14399262.0	≤14399262.000000
[Dark Orange]	≤ 30518605.0	≤30518605.000000
[Red]	≤ 65527125.0	≤65527125.000000
[White]	<out of range>	<out of range>

Symbology Geoprocessing

V2_lidar_A - Mean_PriceSQFT - ArcGIS Pro

Command Search (Alt+Q) Miguel A. (Texas Natural Resources Information System)

Project Map Insert Analysis View Edit Imagery Share View Data

ModelBuilder Python Ready To Use Tools Tools

Buffer Summarize Within Spatial Join Clip Optimized Hot Spot Analysis Feature Analysis Raster Analysis Data Engineering Suitability Modeler Visibility Analysis 3D Analysis Network Analysis Geostatistical Wizard Business Analysis Data Interop Raster Functions Function Editor

Geoprocessing

Contents

Map Model

Drawing Order

- Map
 - V2_Lidar_OSM_MSAI_SJoin
 - TX_CRANE_Parcel_Undefined
 - txdot-2015-county-generalized_tx
 - TX_ANDERSON_Parcel_Undefined
 - TX_ANDERSON_Parcel_Res
 - TX_ANDERSON_Parcel_Non_Res
 - Land_Parcels
 - stratmap19_land_parcels_48
 - World Topographic Map
 - World Hillshade
- Standalone Tables
 - Parcel_IMP_SQFT_Sum
 - Mean_PriceSQFT

Map Scale: 1:3,603

Selected Features: 10,752,548

Calculate Field

This tool modifies the input data.

Parameters

- Input Table: Mean_PriceSQFT
- Field Name (Existing or New): Mean_Price_SQFT
- Expression Type: Python 3

Expression

Fields: OBJECTID, Build_Type_County, FREQUENCY, MEAN_AreaSQFT, MEAN_Frac_Imp_Val, Mean_Price_SQFT

Helpers: .as_integer_ratio(), .capitalize(), .center(), .conjugate(), .count(), .decode(), .denominator()

Insert Values: * / + - =

Code Block

```
Mean_Price_SQFT =
!MEAN_Frac_Imp_Val! / !MEAN_AreaSQFT!
```

Enable Undo Apply OK

Field:	OBJECTID *	Build_Type_County	FREQUENCY	MEAN_AreaSQFT	MEAN_Frac
1	1	-	41446	2587.089463	4254
2	2	-	254	2602.468601	5337
3	3	_ANDERSON	720	3951.515679	9156
4	4	_ANDREWS	24	2380.642172	4908
5	5	_ARANSAS	118	2886.097701	13943
6	6	_ARCHER	460	2851.734184	72305.587058
7	7	_ARMSTRONG	7	3607.204282	237460
8	8	_AUSTIN	411	2146.841412	29794.464738
9	9	_BAILEY	974	2849.817579	53903.955592
10	10	_BANDERA	49	1734.989211	56995.306935
11	11	_BASTROP	1565	1900.786763	53290.999293
12	12	_BAYLOR	12	2784.853788	30418.333333
13	13	_BELL	755	7433.390017	124189.910109

0 of 1,845 selected

Filters: 100%

Geoprocessing

Calculate Field

This tool modifies the input data.

Parameters

- Input Table
- Field Name (Existing or New)
- Expression Type: Python 3
- Expression

Fields: Helpers:

Insert Values: * / + - =

Code Block

Enforce Domains

Enable Undo Run

WORK WITH USGS, USACE AND PUT IT ALL TOGETHER, FDST

The screenshot displays the InFRM Flood Decision Support Toolbox web application. The browser address bar shows the URL <https://webapps.usgs.gov/infrm/fdst/?region=tx>. The application header includes the InFRM logo (Interagency Flood Risk Management) and the Texas Water Development Board logo. The main content area features a map of Texas with numerous river measurement stations marked by green and blue icons. A tooltip box is visible, stating: "Click a river measurement station to select a Flood Map Library". The map interface includes a left sidebar with navigation controls (home, zoom in, zoom out, full screen) and a top right menu with options for Flood Map, Layers, Legend, and Tools. The bottom of the page contains a footer with links for Privacy Policy, Legal, Accessibility, Site Map, Contact USGS, and USGS Provisional Statement, along with social media icons for Facebook, Twitter, YouTube, and Instagram. A scale bar indicates 300 km and 100 mi, and the scale is noted as 7,395,719.

WORK WITH USGS, USACE AND PUT IT ALL TOGETHER, FDST

Cannot Connect | Hazus_floodII.pdf | hazus flood model depth d | Calculate field values—Arc | Structural-depth-damage-c | lastools - Bing | InFRM | Flood Decision

https://dev-webapps.usgs.gov/fdst/map.html?region=tx

InFRM Texas Water Development Board Flood Decision Support Toolbox

Select a river stage from the Flood Map Library to view flood maps. Off

Flood Map Layers Legend Tools

Current Conditions

COLORADO RV AT AUSTIN, TX

River Stage 10.71 feet
61 minutes ago
2020-10-16 10:45:00 CDT
NOT FLOODING

Hydrograph Historical Peaks

Flood Map Library

Simulated River Stage

Select Stage

Opacity

Library Info Print Map

Buildings

Select Layer

All buildings

OFF

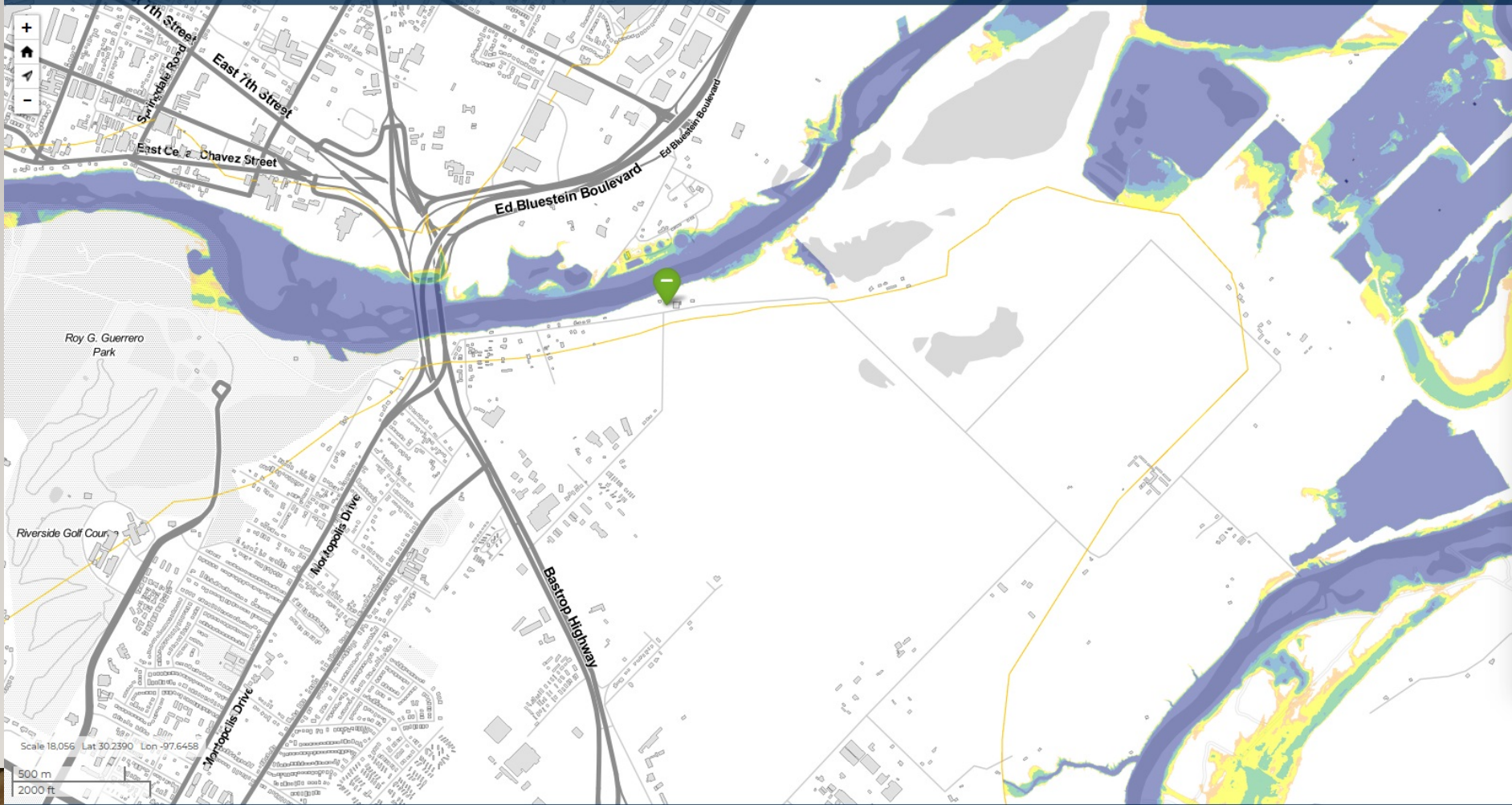
Report

Return to Home View

Scale 50,557
2 km
1 mi

Privacy Policy | Legal | Accessibility | Site Map | Contact USGS | USGS Provisional Statement
U.S. Department of the Interior | DOI Inspector General | White House | E-Gov | USA.gov | No FEAR Act Data | FOIA

Follow [Social Media Icons]



Flood Map

Current Conditions

COLORADO RV AT AUSTIN, TX

River Stage 10.71 feet
62 minutes ago
2020-10-16 10:45:00 CDT
NOT FLOODING

Hydrograph | Historical Peaks

Flood Map Library

Simulated River Stage
40.5 feet - moderate flood

Opacity

Library Info | Print Map

Buildings

Select Layer
All buildings

ON

Report

Return to Home View



Flood Map

Current Conditions

COLORADO RV AT AUSTIN, TX

River Stage 10.71 feet
63 minutes ago
2020-10-16 10:45:00 CDT
NOT FLOODING

Hydrograph Historical Peaks

Flood Map Library

Simulated River Stage

40.5 feet - moderate flood

Opacity

Library Info Print Map

Buildings

Select Layer

Inundated buildings only

OFF

Report

Return to Home View

FDST LEGEND

Cannot Connect | Hazus_floodII.pdf | hazus flood model depth d | Calculate field values—ArcC | Structural-depth-damage-c | lastools - Bing | InFRM | Flood Decision

https://dev-webapps.usgs.gov/fdst/map.html?region=tx

InFRM Texas Water Development Board Flood Decision Support Toolbox

Flood Map Layers Legend 3 Tools

Legend

Flood Map

- ≤ 1 foot
- > 1 to 3 feet
- > 3 to 6 feet
- > 6 to 9 feet
- > 9 feet
- Flood map limits

Comments: Value indicates estimated water depth. Depths outside of the flood map limits are unknown.

Data Source: Data prepared by the USGS Texas Water Science Center. Click [here](#) for additional information and data sources.

TIP – Click colored flood areas to show estimated water depth.

River Measurement Stations

STATUS – COLOR

- Major flooding
- Moderate flooding
- Minor flooding
- Action flood stage
- Not flooding
- Flood stages not established
- Not flowing (0 ft³/sec)

TREND – SYMBOL

River rising > 0.05 foot/hour

Follow

Scale 18,056
500 m
2000 ft

Privacy Policy | Legal | Accessibility | Site Map | Contact USGS | USGS Provisional Statement
U.S. Department of the Interior | DOI Inspector General | White House | E-Gov | USA.gov | No FEAR Act Data | FOIA



Estimated Water Depth
4.6 feet
Zoom Close

Flood Map

Current Conditions

COLORADO RV AT AUSTIN, TX

River Stage 11.15 feet
33 minutes ago
2021-11-16 08:45 CST
NOT FLOODING

Hydrograph Historical Peaks

Flood Map Library

Simulated River Stage

43.5 feet - major flood

Opacity

Library Info Print Map

Buildings

Select Layer

All buildings

ON

DAMAGE ESTIMATES

Inundated Buildings: 64
Estimated Total Cost: \$19,457,000

Report

Return to Home View

REPORTING

InFRM | Flood Decision Support x InFRM | Print Map +

https://webapps.usgs.gov/infrm/fdst/print.html?options={"SiteNumber"%

Getting Started Most Visited Getting Started www.youtube.com Netflix Other Bookmarks

Print

TIP – You can adjust the map view by dragging and using the zoom controls before printing.

TIP – Use the URL to share or bookmark this report.

Flood Decision Support Toolbox

COLORADO RV AT AUSTIN, TX

Simulated river stage 43.5 feet above gage datum

Flood Map, Feet			Buildings, Feet		
≤ 1	> 1 to 3	> 3 to 6	≤ 1	> 1 to 2	> 2 to 3
> 6 to 9	> 9	Limits	> 3 to 4	> 4 to 5	> 5

This map depicts a simulated scenario and does not necessarily reflect actual conditions.

500 m
2000 ft

InFRM Flood Decision Support Toolbox

REPORTING

InFRM | Flood Decision Support x InFRM | Print Map x


https://webapps.usgs.gov/infrm/fdst/print.html?options={"SiteNumber"%

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Print

TIP - You can adjust the map view by dragging and using the zoom controls before printing.

TIP - Use the URL to share or bookmark this report.

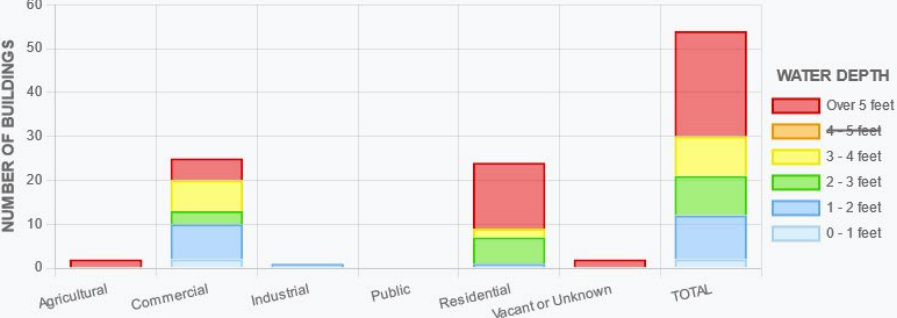


InFRM
INTERAGENCY FLOOD RISK MANAGEMENT

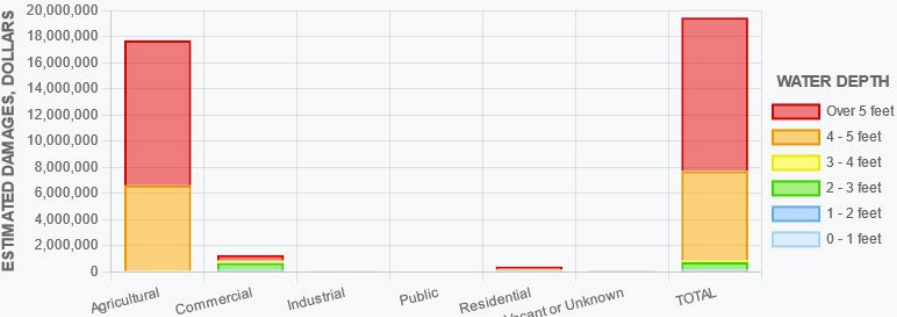
Flood Decision Support Toolbox

COLORADO RV AT AUSTIN, TX
Simulated river stage 43.5 feet above gage datum.

64 Inundated Buildings



\$19,457,000 Total Estimated Building Damages



Water Depth, Feet	Agricultural		Commercial		Industrial		Public		Residential		Vacant or Unknown		TOTAL	
	Count	Damages	Count	Damages	Count	Damages	Count	Damages	Count	Damages	Count	Damages	Count	Damages
Over 5	2	\$11,099,000	5	\$387,000	0	\$0	0	\$0	15	\$241,000	2	\$36,000	24	\$11,763,000
4-5	1	\$6,603,000	3	\$103,000	0	\$0	0	\$0	4	\$83,000	2	\$28,000	10	\$6,817,000

REPORTING

InFRM | Flood Decision Support x InFRM | Print Map x

https://webapps.usgs.gov/infrm/fdst/print.html?options={"SiteNumber"%} ☆

Getting Started Most Visited Getting Started www.youtube.com Netflix Other Bookmarks

2-3	0	\$0	3	\$549,000	0	\$0	0	\$0	6	\$38,000	0	\$0	9	\$587,000
		\$0	8	\$99,000	1	\$13,000	0	\$0	1	\$5,000	0	\$0	10	\$117,000
		\$0	2	\$19,000	0	\$0	0	\$0	0	\$0	0	\$0	2	\$19,000
		\$702,000	28	\$1,280,000	1	\$13,000	0	\$0	28	\$398,000	4	\$64,000	64	\$19,457,000

Print

TIP – You can adjust the map view by dragging and using the zoom controls before printing.

TIP – Use the URL to share or bookmark this report.

ounts are estimates rounded to the nearest \$1,000.
dings may be impacted outside of the inundation extent.

Flood Decision Support Toolbox

RIVER MEASUREMENT STATION

USGS STREAMGAGE	08158000 Colorado Rv at Austin, TX
GAGE DATUM	392.0 feet above NAVD88
NWS ACTION STAGE	25 feet above gage datum
NWS MINOR FLOOD STAGE	33 feet above gage datum
NWS MODERATE FLOOD STAGE	38 feet above gage datum
NWS MAJOR FLOOD STAGE	42 feet above gage datum

FLOOD MAP LIBRARY

CREATED BY	USGS
CREATION YEAR	2019
DEM USED	LiDAR-derived raster grid with cell resolution of 1-meter, from Strategic Mapping Program (StratMap) Central Texas Lidar, 2017-01-01.
DEM PUBLISHED	2017
ALTITUDE RANGE	18.0 feet
MINIMUM ALTITUDE	425.0 feet above NAVD88
MAXIMUM ALTITUDE	443.0 feet above NAVD88
ALTITUDE INTERVAL	0.5 feet
NUMBER OF MAPS	37

FLOOD INUNDATION MODEL

PROVIDED BY	USACE
PUBLISHED	2002
RANKING	Tier B (includes hydraulic models that are similar in quality to those used by FEMA for Base Level Engineering flood risk analysis and mapping)
MODEL – RATING CURVE RMSE	4.1 feet
RMSE NOTES	Rating curve extrapolated beyond 48.5 ft
MODEL NOTES	This map library was generated using an engineering-scale HEC-RAS model for the lower Colorado River. For more information, please contact InFRM@usgs.gov
CONTACT	InFRM@usgs.gov

[NAVD88, North American Vertical Datum of 1988; NWS, National Weather Service; USGS, United States Geological Survey; FEMA, Federal Emergency Management Agency; DEM, Digital Elevation Model; RMSE, Root-mean-square error; N/A, Not Available]

THANKS

QUESTIONS?

Miguel Pavon
Miguel.Pavon@twdb.Texas.gov

