Standard Energy Efficiency Data Platform™



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Energy Efficiency & Renewable Energy



SEED PLATFORMTM 2.5.0 GIS Features

Created Augus<u>t 26, 2019</u>

GIS Features in SEED

- Automatic generation of Latitude and Longitude for imported data from
 - Address data
 - Mapped to specific SEED database fields, not user defined fields (see import section for more details)
 - UBID / ULID
 - Unique Building ID
 - Unique Land ID
- Export to GeoJSON format
 - Latitude / Longitude data if available
 - Includes bounding box from UBID/ULID if available

GIS Formats

WKT (Well-known text)

- Text markup language for representing vector geometry objects on a map and spatial reference systems of spatial objects
- WKT can represent the following distinct geometric objects: Point, Line String, Polygon, Polyhedral Surface, Triangulated irregular network, geometry collection
- https://en.wikipedia.org/wiki/Well-known_text_representation_of_geometry
- SEED imports only the Polygon WKT format

GeoJSON

- Open standard format to represent simple geographical features.
- Can include points (addresses and locations), line strings (streets, highways, boundaries), polygons (tracts of land), and multi-part collections of these things (https://en.wikipedia.org/wiki/GeoJSON)
- SEED can export a GeoJSON file with Latitude and Longitude (generated automatically on import to SEED if there is enough information to generate Lat/Long)
 - It does not include polygon information (building or parcel shapes)



'type'	": "Feat	ure",				
"geome	etry": {					
"typ	pe": "Po	lygon"	,			
"coo	ordinate	s": [
[63 - 193 I 7 3				
	[100.0,	0.0],	[101.0,	0.0],	[101.0,	1.0],
	[100.0,	1.0],	[100.0,	0.0]	-	-
1	S 6			-		

Automatic generation of Latitude and Longitude requires either:

Address Data

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- Data should include (for best results)
 - Street Address
 - City
 - State
 - Zip Code
- Need
 - MapQuest API key, which generates the Lat/Long values from the address (see next slide for instructions to generate API key)
- UBID / ULID
 - **Generated outside SEED** (see later description)
 - UBID: Unique Building ID (for Property data)
 - ULID: Unique Lot ID (for Tax Lot data)
 - Import with Property (UBID) or Tax Lot (ULID) data
 - Can generate the Lat/Long data without any address information

Generate Latitude and Longitude: by Address

Step 1: Generate MapQuest API key

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This is required when generating the Lat/Long via address information https://developer.mapquest.com/documentation/

Create a

MapQuest Developer account

- Setting up an account allows 15,000 free transactions / month
- Create a MapQuest API key

Join the Community

You'll need to sign up for an account with MapQuest. An API key is provided upon sign up and is required when accessing MapQuest services.

🕈 Sign Up

Get Coding

Once you have an account, get started making. We have tons of APIs to try including Mapping, Geocoding, Directions, and Search.

& Grab the Key

Add MapQuest API key to SEED in Organizations / **Settings**

Enter the MapQuest API key	in
Organizations / Settings	

Click the Save Changes button .

	Settings Sharing Column Settin
Ø ₈ Settings	
Organization Name	
LBNL 101	
Measurement unit display	for energy use intensities (EUI)
kBtu/sq. ft./year	•
Meter energy display unit	s (change one at a time)
Choose energy type	-
Change display unit	¥
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square feet	٣
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Thermal Conversion Assur	mption
US	•
ManQuest API Key	
Mapquest Arritey	

- Step 2: Make sure imported data has enough information for SEED to generate the Latitude and Longitude:
 - Address info -

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- Street Address
- City
- State
- Zip Code

\rightarrow	1	A	В	C	D
	1	Street Address	City	State	Zip
	2	3115 Yosemite Ave	El Cerrito	California	94530
	3	400 Colusa Ave	El Cerrito	California	94530
	4	11157 San Pablo Ave	El Cerrito	California	94530
	5	5205 Potreto Ave	El Cerrito	California	94530
	6	9889 San Pablo Ave	El Cerrito	California	94530

• Step 3: Import the data

- Mapping:
 - Street Address \Rightarrow Address Line 1
 - City \Rightarrow City
 - State ⇒ State
 - Zip Code \Rightarrow Postal Code

INVENTORY TYPE	SEED HEADER	MEASUREMENT UNITS	DATA FILE HEADER
Property 🔻	Address Line 1		Street Address
Property 🔻	City		City
Property v	State		State
Property v	Postal Code		Zip
Property 🔻	For Sale		For Sale
Property 🔻	Property Type		Property Type
Property 🔻	Price		Price
Property v	Property name		Property name

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Generate Latitude and Longitude: by Address



Step 4: View the Results in Inventory / Property List

A Geocoding Confidence field was automatically added with codes to indicate the confidence in the generated values

Latitude and Longitude

fields area added -- SEED determined a valid value for most of the records

	View by Property		View by Tax Lot								
	0				Address Line 1 ~	City ~	State ~	Postal Code 🛛 🗠	Geocoding Confidence Y	Latitude 🗡	Longitude ~
				0	3115 Yosemite Ave	El Cerrito	California	94530	High (P1AAA)	37.902093	-122.306234
This address has a low				0	400 Colusa Ave	El Cerrito	California	94530	High (P1AAA)	37.904588	-122.290881
Geocoding Confidence;		\sim	9	0	11157 San Pablo Ave	El Cerrito	California	94530	High (P1AAA)	37.918827	-122.314409
the Latitude and		Y	2	•	5205 Potreto Ave	El Cerrito	California	94530	Low - check address (B3BAA)		
not generated		4		0	9889 San Pablo Ave	El Cerrito	California	94530	High (P1AAA)	37.898619	-122.302027
0		\sim	9	0	10579 San Pablo Ave	El Cerrito	California	94530	High (P1AAA)	37.910962	-122.308913
You could try to		~	9	0	601 Lexington Ave	El Cerrito	California	94530	High (P1AAA)	37.904929	-122.302897
determine the correct				0	6501 Fairmount Ave	El Cerrito	California	94530	High (P1AAA)	37.901502	-122.300678
the record in SEED (see		4		0	1715 Elm Street	El Cerrito	California	94530	High (P1AAA)	37.923418	-122.312955
next page) or reimport it		\sim	9	0	101 Colusa Ave	El Cerrito	California	94530	High (P1AAA)	37.907439	-122.286751

https://developer.mapguest.com/documentation/geocoding-api/guality-codes/

UBID / ULID Description

DATA

• Generated outside of SEED

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Using PNNL developed tools (see Open Source repo link below)

 Open Source Repository: <u>https://github.com/pnnl/buildingid</u> is the "landing site" repository that contains the documentation and write-ups, and links to the programming-language-specific repositories.

- Steps to generate a UBID
 - Step 1: Determine shape of the building or parcel footprint/
 - Step 2: Calculate the center of mass of the footprint shape -
 - Step 3: Identify the grid cell (using the Open Location Code (OLC) by Google Zurich) that contains the center of mass shape <u>https://plus.codes/map/</u> (87C4VW7W+JWH)
 - Step 4: Measure the extent of the bounding box for the shape using the grid cell (12-15-9-9)
 - Step 5: Write UBID string: 87C4VW7W+JWH-12-15-9-9
- UBID: Unique Building ID (Property)
 - Need building geometry / footprint data
 - Some cities have already developed this from GIS data
 - Microsoft US Building Footprints
 <u>https://github.com/microsoft/USBuildingFootprints</u>
 - GeoJSON format
 - Zip files by state
- ULID: Unique Land ID (Tax Lot)
 - Need parcel/land geometry/footprint data



Fig 2: UBID assignment for 300 Army Navy Dr., Arlington, VA 22202.

State	Number of Buildings	Unzipped MB
Alabama	2,460,404	526
Alaska	110,746	26
Arizona	2,555,395	584
Arkansas	1,508,657	321
California	10,988,525	2,537

• Step 1: Make sure imported data has a properly defined UBID / ULID value:



• Step 2: Import the data

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• Mapping:

DATA

- Property (buildings)
 - UBID \Rightarrow UBID
- Tax Lot (parcels)
 - ULID ⇒ ULID

INVENTORY TYPE	SEED HEADER	MEASUREMENT UNITS	DATA FILE HEADER
Property v	FACILITYID		FACILITYID
Property 🔻	UBID		UBID
Property V	AREA		AREA
riopeity			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
INVENTORY TYPE	SEED HEADER	MEASUREMENT UNITS	DATA FILE HEADER
INVENTORY TYPE	SEED HEADER	MEASUREMENT UNITS	DATA FILE HEADER
INVENTORY TYPE Tax Lot	SEED HEADER FID FACILITYID	MEASUREMENT UNITS	DATA FILE HEADER FID FACILITYID

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Generate Latitude and Longitude: by UBID / ULID



unsuccessful, the Lat/Long values are actually generated (bug to be fixed)

Step 4: View the Results in Inventory List

١	/iew l	by Pro	perty	View by	Tax Lot			
Ð	×,			FACILITYID~	UBID ~	Latitude ~	Longitude ~	Geocoding Confidence
			0	1	849W93W8+MMM-2-2-1-1	37.396725	-121.9333125	Manually geocoded (N/A)
			0	2	849W93W7+G8X-12-12-11-12	37.396375	-121.936640625	Manually geocoded (N/A)

1	/iew t	by Pro	perty	View by Tax Lot				
0				Jurisdiction Tax Lot ID ${}^{\scriptstyle \vee}$	ULID ~	Latitude ~	Longitude ~	Geocoding Confidence ~
			0	100	849WF33C+H7X-12-19-15-19	37.45395	-121.929265625	Missing address components (N/A)
			0	101	849WC2CG+44P-20-19-22-21	37.4203125	-121.974703125	Missing address components (N/A)

Note: any records with "Manually gecoded (N/A)" will not be processed when a user tries to use "**Geocode selected**" from the Inventory List Action choices

Property tab: When SEED determines the Lat/Long values from the UBID, the Geocoding Confidence field will display "Manually geocoded (N/A)"

Tax Lot tab:

When SEED determines the Lat/Long values from the ULID, the Geocoding Confidence field will display "Missing Address Components (N/A)" (due to the mistaken result that the geocoding was unsuccessful. 10 If the Property records were not geocoded (to generate Latitude and Longitude values) on import, they can be geocoded from the Actions menu in the Inventory list view.

- All the same caveats apply as if they were geocoded on import
 - Need MapQuest API key to generate Lat/Long from address data
 - Need as much address information as possible



Program reports what the status of the geocoding is

You've selected the following to be geocoded. Please verify before continuing.

Not geocoded previously for the following:

- 762 properties
- 774 tax lots

Geocoding now...

As with geocoding on import, the program will report the status of the geocoded results Note: any records with "Manually gecoded (N/A)" will not be processed when a user tries to use "**Geocode selected**" from the Inventory List Action choices

Fixing Problem Data: by Address

Address Line 1 Y	City Y Geocodin	ng Confidence 🗠	Latitude 🛩 Longitude 🗠
5205 Potreto Ave	El Cerrito Low - che	eck address (B	
Properties	Pro	operty Detail	
	Property Detail	Meters Notes	Settings
Property : 5205 Pot	trero Ave		Save Changer Can
Actions 🗸			Grate: CIS MapOur
Labels: (no labels applied)			
Labels: (no labels applied) etail Settings Profile: GIS	Property Detail Fields	X	
Labels: (no labels applied) tail Settings Profile: GIS	Property Detail Fields Ma	• ster	Commercial Real Estate for sale in B Cerrito.xlsx
Labels: (no labels applied) etail Settings Profile: GIS Field	Property Detail Fields Ma	ster 205 Potrero Ave	Commercial Real Estate for sale in B Cerrito.xlsx 5205 Potreto Ave
Labels: (no labels applied) Atail Settings Profile: GIS Field Address Line 1 Property Type	Property Detail Fields Ma	• ster 205 Potrero Ave	Commercial Real Estate for sale in B Cerrito.xlsx 5205 Potreto Ave Commercial
Labels: (no labels applied) Atail Settings Profile: GIS Field Address Line 1 Property Type City	Property Detail Fields Ma 5 C	• ster 205 Potrero Ave commercial commercial	Commercial Real Estate for sale in B Cerrito.xlsx 5205 Potreto Ave Commercial El Cerrito
Labels: (no labels applied) tail Settings Profile: GIS field Address Line 1 Property Type Lity itate	Property Detail Fields Ma 5 C C C C C C C C C C C C C C C C C C	ster 205 Potrero Ave Commercial Commercial Control Cerrito California	Commercial Real Estate for sale in I Cerrito.xlsx 5205 Potreto Ave Commercial El Cerrito California
Labels: (no labels applied) tail Settings Profile: GIS field ddress Line 1 Property Type Lity state Postal Code	Property Detail Fields Ma 5 C C 9	ster 205 Potrero Ave Commercial Commercial California California	Commercial Real Estate for sale in I Cerrito.xlsx 5205 Potreto Ave Commercial El Cerrito California 94530
Labels: (no labels applied) etail Settings Profile: GIS Field Address Line 1 Property Type City State Postal Code Latitude	Property Detail Fields Ma	ster 205 Potrero Ave commercial california 44530	Commercial Real Estate for sale in B Cerrito.xlsx 5205 Potreto Ave Commercial Commercial EL Cerrito California 94530

Step 1: Edit street address, city, state, zip data, as needed (in this case a misspelled street name), to improve auto-generation of Lat/Long

Alternatively, the data can be fixed outside SEED and reimported

Step 2: From the Inventory List view, select the records to Geocode and select Geocode Selected from the Actions menu



BUG: both "Geocode Selected" and "Decode UBID/ULID" currently result in a 403 forbidden error. This will be fixed in future releases.

Geocode after Import: by UBID / ULID

Actions - Filter by label: Add a label Merge Selected Delete Selected	From the Inventory List view, select the records to Ge and select Geocode Selected from the Actions menu	Note: any records with "Manually gecoded (N/A)" will not be processed when a user tries to use " Geocode selected " from the Inventory List Action choices
Export Selected	1: Preview of results if lat/long don't already exist	
Data Quality Check	Decode UBIDs/ULIDs	
Geocode Selected	Total Selected: 1 Here's a summary of the properties selected to have their UBID decoded. Please verif	2: Actual results if lat/long don't already exist
Decode UBID/ULID for Selected	continuing.	Decoding UBIDs/ULIDs Complete
Only Show Populated Columns	1 with UBID populated but not decoded 0 with ULID populated but not decoded	Total Selected: 1
 9889 San Pablo Ave 10579 San Pablo Ave 	• 0 with olid populated but not decoded	 1 with UBID populated but not decoded 0 with ULID populated but not decoded
	Decode UBID/ULID	Results
		1 with decoded UBIDs - These have bounding boxes and centroids geocoded.

3: Preview of results if lat/long **already** exist

Decode UBIDs/ULIDs	4: Actual results if lat/long already exist	
	Decoding UBIDs/ULIDs Complete	
Total Selected: 1 Here's a summary of the properties selected to have their UBID decoded. Please verify before	Total Selected: 1	
Lonanaing.	• 1 with UBID already decoded (Decoding will happen again, likely, with the same result.)	
• 1 with UBID already decoded (Decoding will happen again, likely, with the same result.)		
	Results	
	• 1 with decoded UBIDs - These have bounding boxes and centroids geocoded.	
Decode UBID/ULID Cance	el	

Export to GeoJSON format

Export of GeoJSON data

- When the Lat/Long have been generated by SEED (or exist from some other source)
 - Can view building locations (based on Lat/Long) in apps (<u>http://geojson.io</u> geojson.io)





If UBID imported into SEED

- Can view (based on Lat/Long) in apps (geojson.io) •
- Can see bounding rectangle around building footprint (from UBID definition) Building footprint "bounding

rectangle" from UBID



Building location (from Lat/Long in SEED) **Building footprint** (from geojson.io not from SEED)

Export to GeoJSON format

Step 1: In the Inventory List view, select the records to export (by "checking" them, then select "Export Selected" from the Action pulldown list

Actions	-	Fi	lter by label:	Add a la	abel				
Merg Delet	ie Sel te Se	ecte lecte	d d	_	•				
Expo	rt Se	lecte	d	t					
A n d/l Data	Remo Qual	ity C	abels heck		~	City ~	Geocoding Confidence ~	Latitude ~	Longitude ~
Geocode Selected			El Cerrito	High (P1AAA)	37.902093	-122.306234			
Deco	de Ul	BID/l	JLID for Sele	cted		El Cerrito	High (P1AAA)	37.904588	-122.290881
Only	Shov	v Pop	oulated Colun	nns		El Cerrito	High (P1AAA)	37.918827	-122.314409
	1	0	5205 Potrero	o Ave		El Cerrito	Low - check address (B		
~	9	0	9889 San Pa	blo Ave		El Cerrito	High (P1AAA)	37.898619	-122.302027
~	9	0	10579 San P	ablo Ave		El Cerrito	High (P1AAA)	37.910962	-122.308913
~	9	0	601 Lexington Ave		El Cerrito	High (P1AAA)	37.904929	-122.302897	

Step 2: In the **Export** dialog box that appears, type the name of the file you want to export the records into, then click the "Export GeoJSON" button. SEED will add the extension ".geojson" to the filename

	_			ommercial Properti	es GeoJSON.ge
Export Name	Comi	mercial Properti	es GeolyON		
Expo	rt CSV	Export Buildi	ingSync in Excel fo	rmat Export	GeoJSON

Step 3: Opening the geoJSON file with a text editor will show the values in the file

🔚 Commercial Properties GeoJSON.geojson 🖾						
1 {						
2 "type": "FeatureColl	ection",					
3 "crs": {	(PCNC) 0.000 80					
4 "type": "EPSG",	The Let /Leng values					
5 "properties": {	The Lat/Long values					
6 "code": 4326	allow the data to be					
7 }	plattad on a man					
8 },						
9 "features": [(see next page)					
10 {						
11 "type": "Fea	ture",					
12 "properties"	: {					
13 "Address	Line 1": "3115 Yosemite Ave",					
14 "City":	"El <u>Cerrito</u> ",					
15 "State":	"California",					
16 "Postal	Code": "94530",					
17 "Latitud	e": 37.902093,					
18 "Longitu	de": -122.306234,					
19 "Geocodi	ng Confidence": "High (P1AAA)",					
20 "Propert	y Type": "Commercial",					
21 "For Sal	"For Sale": "Yes",					
22 "Price":	1950000,					
23 "10": 83	6635,					
24 Hotes_c	v state id": 4905916					
25 propert	y_state_id": 9505510,					
27 Propert	y_view_id . 505052,					
28 "Propert	v Labels": "".					
29 "stroke"	: "#185189".					
30 "marker-	color": "#E74C3C".					
31 "fill-op	acity": 0					
32 },						
33 "geometry":	{					
34 "type":	"GeometryCollection",					
35 "geometr	ies": [
36 {						
37	"coordinates": [
38	-122.306234,					
39	37.902093					
40	1,					
41	"type": "Point"					
42 }						
43]						
44 }						
45 },						

INVENTORY

View GeoJSON file

- If the data in SEED has Latitude and Longitude, the exported GeoJSON file will include those values.
- Those Lat/Long locations can be viewed in an app that reads GeoJSON data, such as geojson.io

Locations are mapped in geojson.io app, based on Lat/Long data from GeoJSON file

GeoJSON data from SEED

