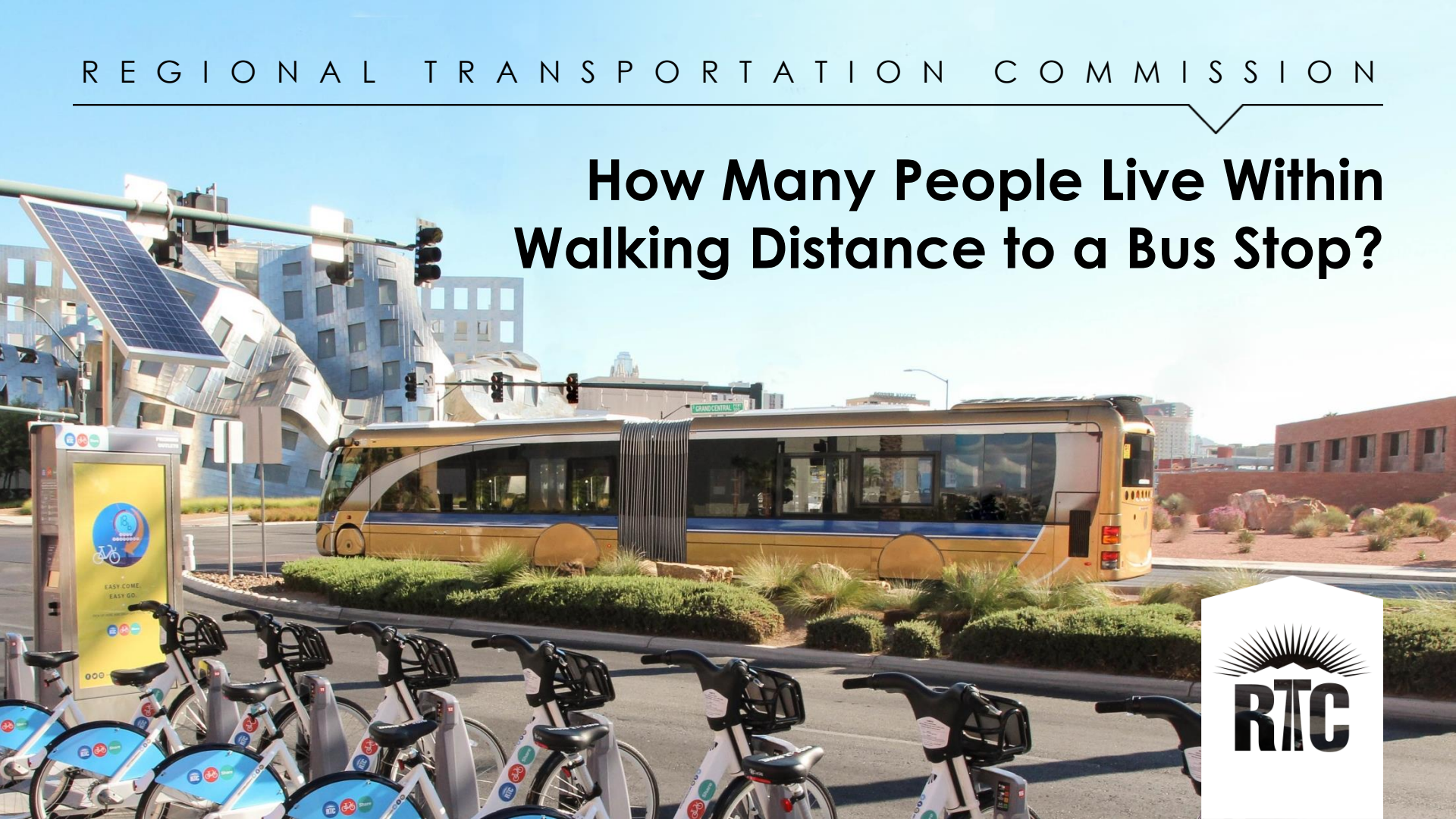
REGIONAL TRANSPORTATION COMMISSION

How Many People Live Within Walking Distance to a Bus Stop?



RTC

Thinking About Mode Choice

Whether it's down a sidewalk or across a parking lot, all transit trips require a discrete duration of active locomotion (e.g. walking) to access the public transportation network. When a typical traveler determines their preferred mode of travel, time to destination often dominates any other factor. In this regard, fixed-route transit is at a disadvantage to driving as it usually consumes more time. Even in the most advantageous of circumstances, each minute of additional time walking to transit stops broadens transit's handicap.

How much walking time do residents need to account for to access the current transit system?

Steps To An Estimate

1. **Constrict Block Group Geometry to Residential Parcels**
2. **Build a Transit Network Dataset Connected to Bus Stops**
3. **Perform a Service Area Analysis to Generate Walking Time Bands**
4. **Overlay and Proportionally Aggregate Block Groups and Time Bands**

Thinking About Population

Block Group is the most granular offering offered by the Census Bureau. However, It's not granular enough to answer the question we are asking.

What's smaller than block group that is readily available?

Parcels

Data Sources:

GISMO for Parcel Data

gismo.GISSDE.PCL_PARCEL_P

"APN" JOIN "PARCEL"

gismo.GISSDE.PCL_AOEXT

Resident Parcels Step 1

The following Structured Query Language (SQL) statement goes a long ways toward isolating residential parcels. It selects plats and condos.

(Label_Class = 701 Or Label_Class = 703 Or Label_Class = 704 Or Label_Class = 705 Or Label_Class = 803 Or Label_Class = 807 Or Label_Class = 811) And PARCELTYPE <> 2

701 = “Acreage 200”
703 = “Sub/Platted Parcel 200”
704 = “Sub/Platted Parcel 800”
705 = “Residential Condo Boundary 200”
803 = “Commercial Condo Unit 200”
807 = “Commercial Ground 200”
811 = “Sub/Platted Acreage Parcel 200”
2 = “Air Rights”
<> = “Is Not Equal To”

Resident Parcels Step 2

The following SQL statement removes remaining parcels that otherwise wouldn't house any population (golf course, etc.) by referencing single family residential, multi-residential land use codes.

```
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '30.120' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '31.110' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '32.100' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '32.130' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '32.140' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '32.140.C' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '33.100' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '33.150' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '34.150' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '35.180' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '36.100' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '37.100' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '39.100' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '20.110' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '21.150.C' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '21.170.C' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '22.110' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '23.185' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '23.188' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '24.150' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '24.150.C' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '24.160' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '24.160.C' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '26.110' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '27.100' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '27.195' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '28.199' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '28.710' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE = '29.110' Or
gismo.GISSDE.PCL_AOEXT.STATELANDUSE IS NULL
```

Resident Parcels Step 3

Use the Simplify Polygon Tool on the remaining parcels to reduce vertice count. This helps speed up processing time.

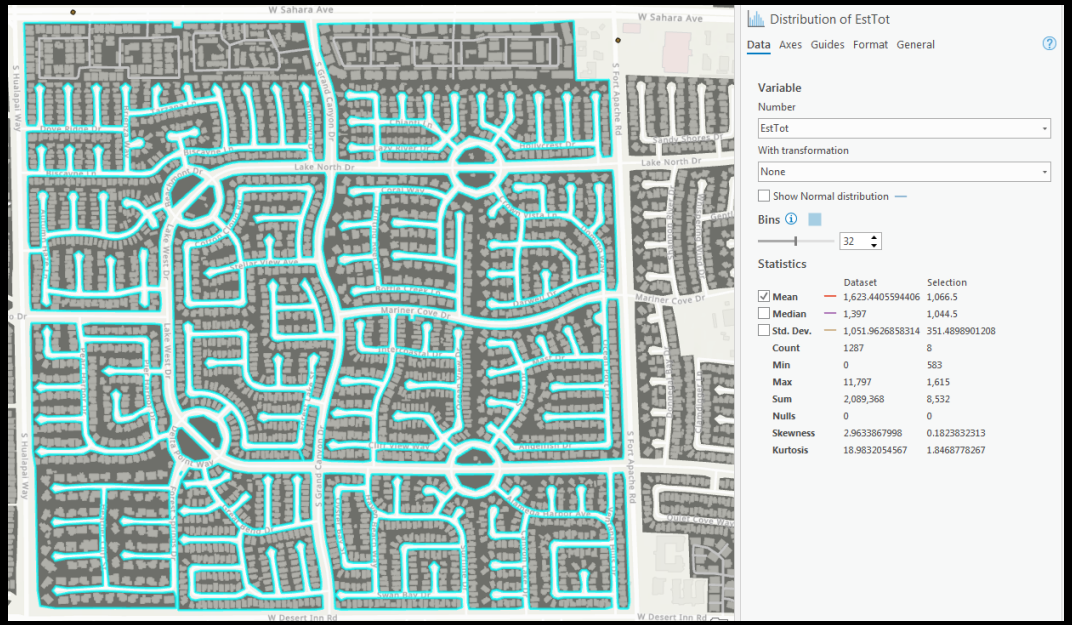
Clip block groups with the now simplified residential parcels. This restricts the total area of block groups to the areas more relevant to population statistics. This improves the validity of overlay estimates.

Join Census Population to Block Groups

ACS_17_5YR_B25008

Pop In Occupied Housing Units

Resident Parcels Result



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Transit Network Functionality

What's new and improved in ArcGIS Pro 2.4 (released on June 27th, 2019).

- You can now perform network analysis using public transit data. To do this, configure your network dataset to include public transit stops, lines, and schedules in the format defined in the new public transit data model. Configure a cost attribute on the network dataset to use the Public Transit evaluator, which calculates the travel time along a public transit line segment based on the scheduled public transit service.

- Create and populate the public transit data model feature classes and tables from GTFS public transit data by running the GTFS to Network Dataset Transit Sources and Connect Network Dataset Transit Sources to Streets geoprocessing tools.

- Requires network analyst license.

Transit Network Data Inputs

GTFS Data – Open Mobility Data Website
10 March 2019 - 7 December 2019

GISMO Street Center Lines
SCL_Streets_L

After reviewing the data, it is of fairly high quality and suitable for use with the tool. However, In order for our street center lines to be compatible with ESRI's public transit data model, two fields are required to be calculated: "ROAD_CLASS" and "RestrictPedestrians".

Road_Class Python Function

```
reclass(!STRCLASS!)

def reclass(STRCLASS):
    if STRCLASS == "Tributary":
        return 1
    elif STRCLASS == "Local":
        return 1
    elif STRCLASS == "Access":
        return 1
    elif STRCLASS == "4WD High Clearance":
        return 2
    elif STRCLASS == "Rural Travel":
        return 2
    elif STRCLASS == "Emerg Vehicles Only":
        return 2
    elif STRCLASS == "Interstate":
        return 2
    elif STRCLASS == "State Highway":
        return 2
    elif STRCLASS == "County Highway":
        return 2
    elif STRCLASS == "US Highway":
        return 2
    elif STRCLASS == "Collector":
        return 6
    elif STRCLASS == "Major Street":
        return 6
    elif STRCLASS == "Ramp":
        return 3
    else:
        return 99
```

Road class value	Type of road class	Example directions text
1	Local roads	Turn left on Main St.
2	Highways	Go east on I-55.
3	Ramps	Take ramp and go on US-59 N.
4	Ferries	Take Lake Expy ferry.
5	Roundabouts	Take roundabout and proceed south on Main St.
6	Major roads	Turn left on Redlands Blvd.
10	Walkways	Turn left.
11	Turning arcs	Turn left and go through M1w Hallway.
12	Stairs	Take the stairs up.
13	Escalator	Take the escalator up.
14	Elevator	Take the elevator up.
15	Pedestrian Ramp	Take the ramp up to level 2.

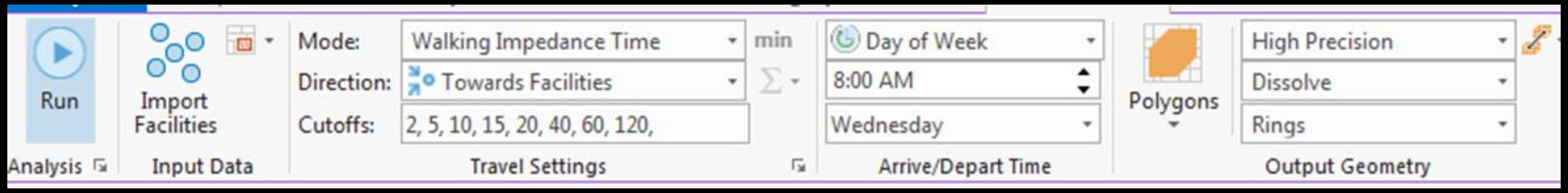
RestrictPedestrians SQL Statement

RestrictPedestrians = "Y“

STRCLASS = 'Ramp' Or
STRCLASS = 'County Highway' Or
STRCLASS = 'US Highway' Or
STRCLASS = 'Interstate' Or
STRCLASS = 'State Highway' Or
STREET LIKE '%Summerlin Pkwy%' Or
STREET LIKE '%Airport N Connector%' Or
STREET LIKE '%Airport S Connector %' Or
STREET LIKE '%W Boulder City Pkwy%' Or
STREET LIKE '%E Boulder City Pkwy%'

Transit Network Creation

Tutorial Link



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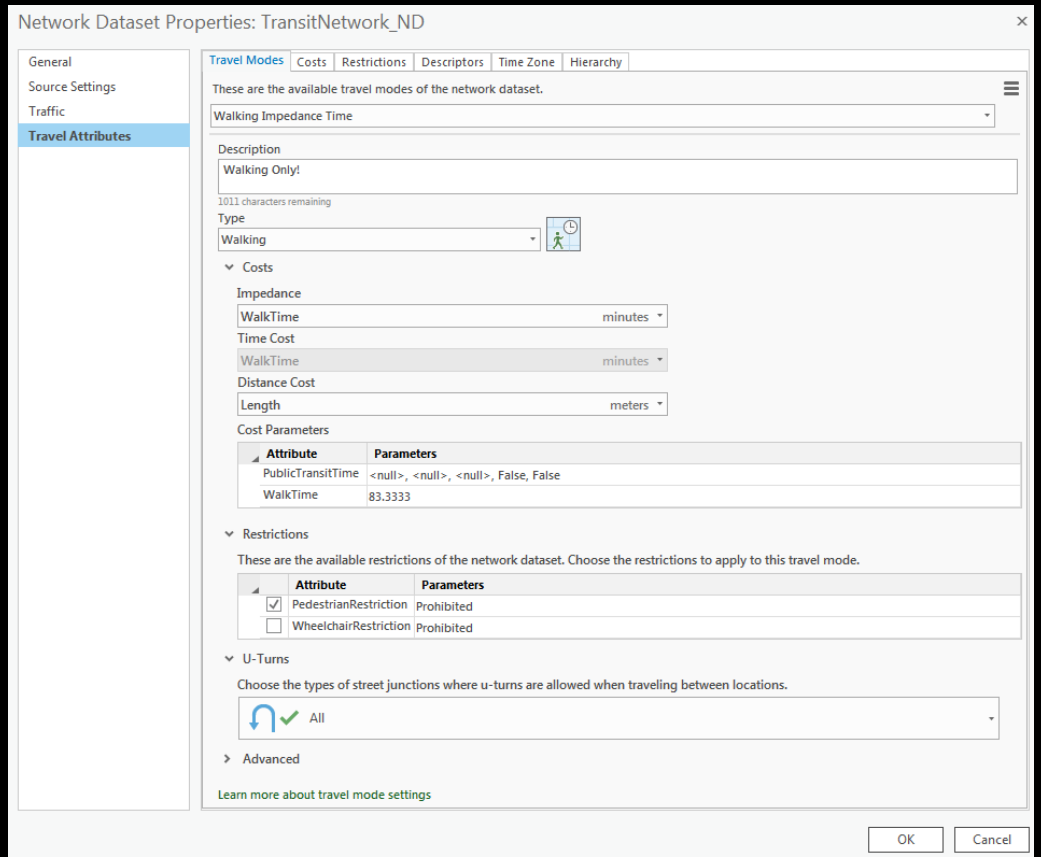
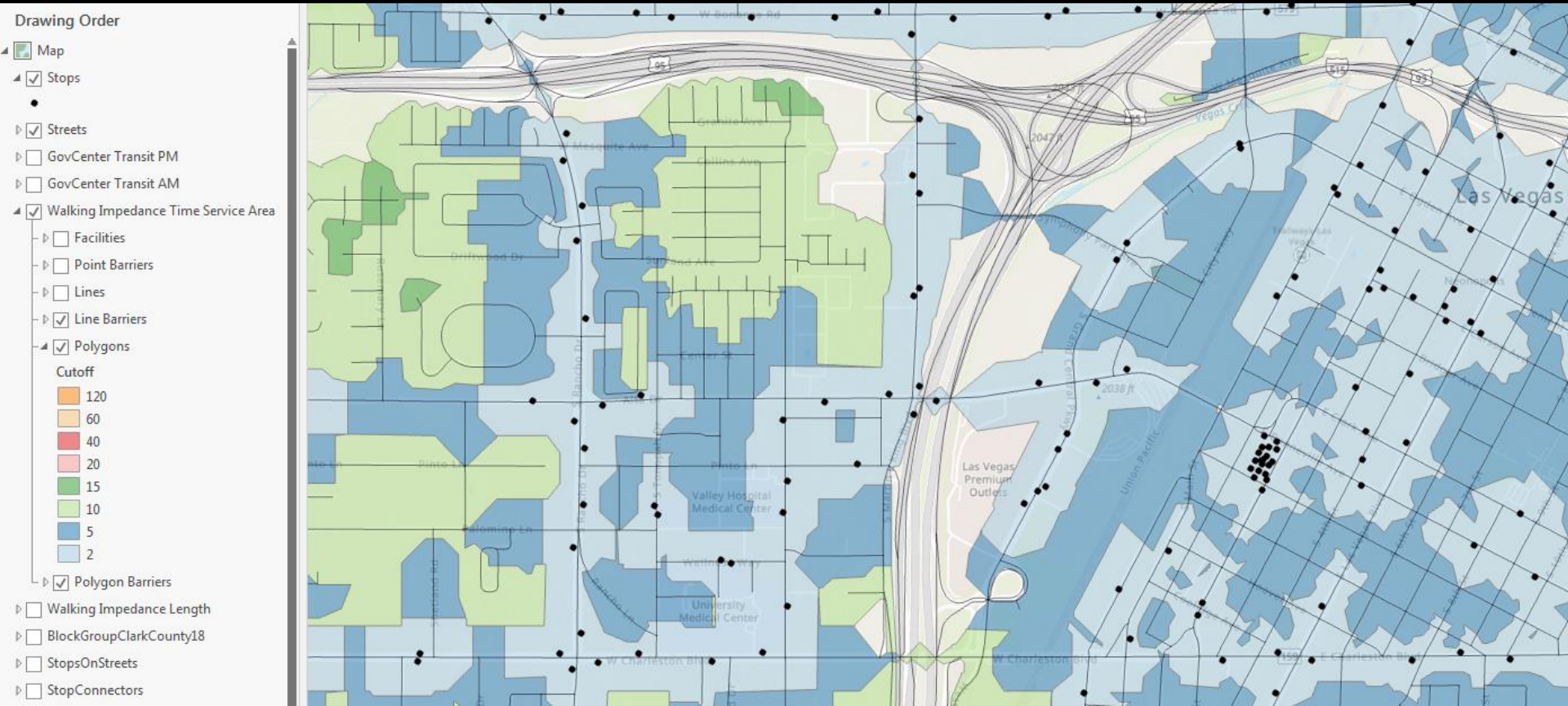
Add Walking Only Travel Mode

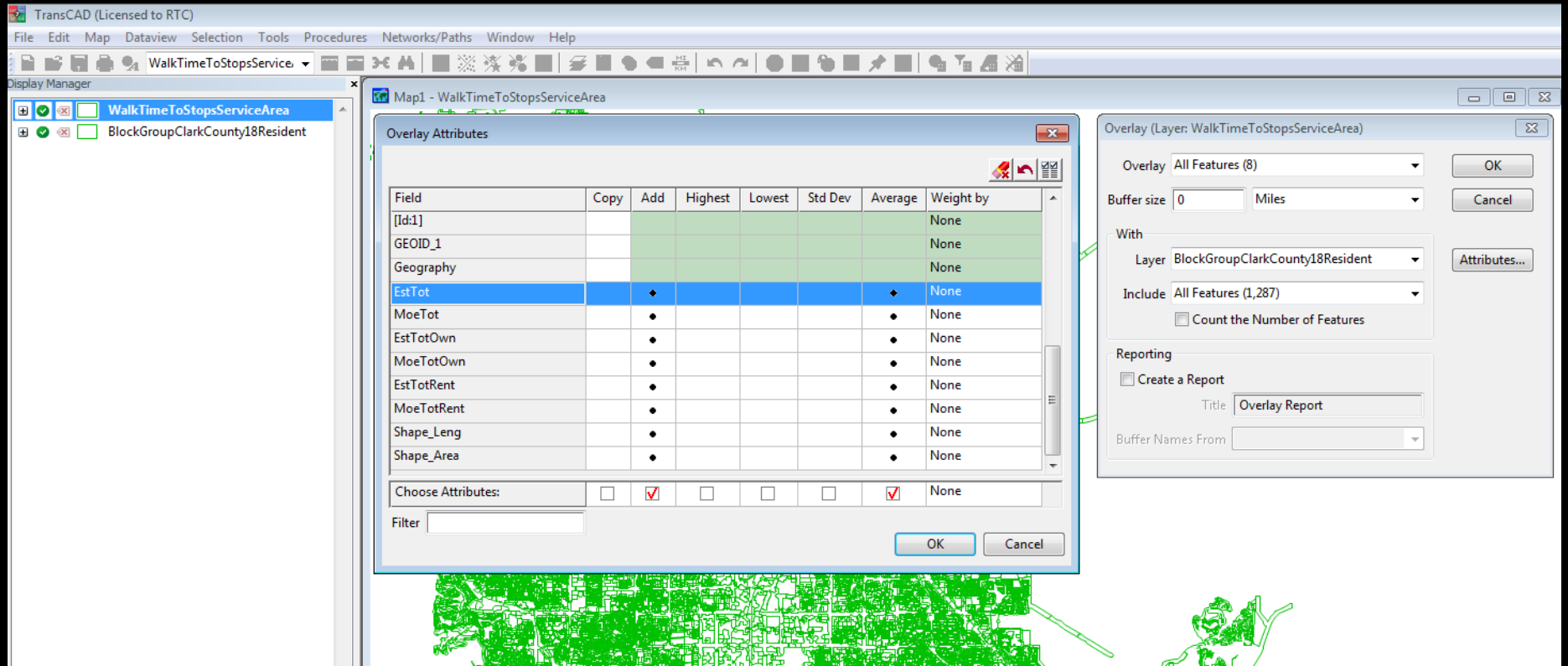


Service Area Analysis Results



TransCAD Overlay Analysis

Inputs: Block Group Shapefile & Service Area Shapefile



TransCAD Overlay Analysis Results

Clark County Population in Occupied Housing Units - 2,089,601; ACS 17 5yr

Dataview1 - Overlay

ToBreak	WalkTimeToStopsServiceArea.Shape_Leng	WalkTimeToStopsServiceArea.Shape_Area	BlockGroupClarkCounty18Reside.ID	[N BlockGroupClarkCounty18Resident]	ALAND	[Avg ALAND]	AWATER	[Avg AWATER]	OBJECTID_1	[Avg OBJECTID_1]	EstTot	[Avg EstTot]	MoeTot
120.00000000000	1205175.96425000000	978736433.84300005000	1	55	574587434.45	20790405.64	928810.97	33607.34	30658.67	1109.33	77062.20	2788.36	10126.42
60.00000000000	1552085.58636000010	743701322.96899998000	2	104	470547310.37	12924190.87	82624.89	2269.40	29894.51	821.09	83704.51	2299.05	15017.90
40.00000000000	2987023.61443000010	1704226995.55000000000	3	256	529614366.07	5222253.47	306801.79	3025.21	80563.43	794.39	203492.51	2006.53	37686.94
20.00000000000	3724540.69558000010	844669611.48399997000	4	364	131883267.98	1943569.99	43832.13	645.96	50279.18	740.97	127999.75	1886.34	24649.97
15.00000000000	6638961.13946000020	1472083194.08999990000	5	721	212793524.93	1295385.82	82029.97	499.36	116257.57	707.72	283035.63	1722.99	61633.57
10.00000000000	10523299.81810000000	2650998009.53000020000	6	1073	371405188.87	892153.33	94238.96	226.37	251019.59	602.97	641706.95	1541.45	157291.94
5.00000000000	10709933.95800000100	1822834065.80000000000	7	1015	208111950.33	669405.18	26303.20	84.61	164947.32	530.56	441448.48	1419.95	114889.50
2.00000000000	5732684.53871999960	1224566835.96000000000	8	950	70261708.75	622437.36	14732.59	130.51	58004.93	513.86	157250.78	1393.06	41888.54

TimeBreakMins	EstPopWithin	EstPopUnder	EstPctUnder
60 - 120	77,062	2,015,701	96%
40 - 60	83,705	1,938,639	93%
20 - 40	203,493	1,854,934	89%
15 - 20	128,000	1,651,442	79%
10 - 15	283,036	1,523,442	73%
5 - 10	641,707	1,240,406	59%
2 - 5	441,448	598,699	29%
0 - 2	157,251	157,251	8%

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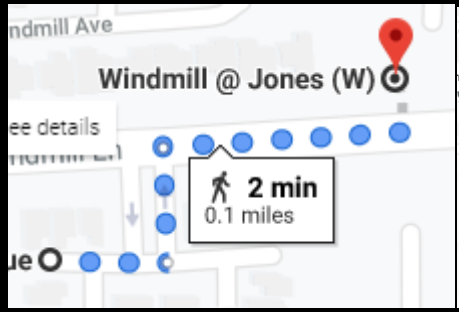
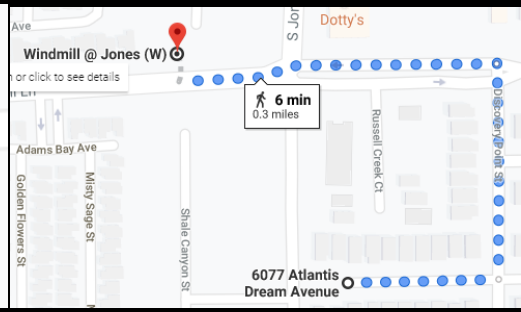
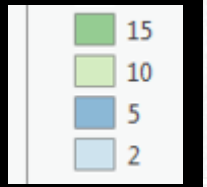
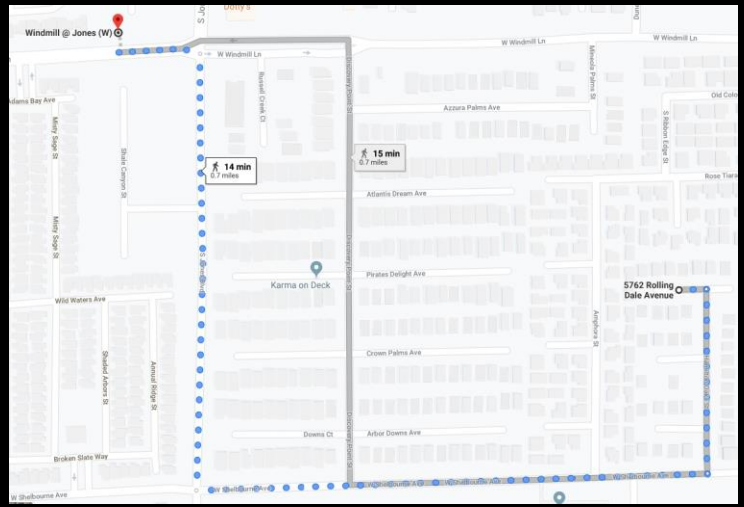
Spot Validity Check, Windmill & Jones







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