

Re-assessing TOD index in DVRPC for the max Public Good

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MUSA Capstone

Transit-Oriented Development

“TOD is a type of urban development that maximizes the amount of residential, business and leisure space within walking distance of public transport.”



Wikipedia Commons

Rail Stops in DVRPC

Philadelphia, PA

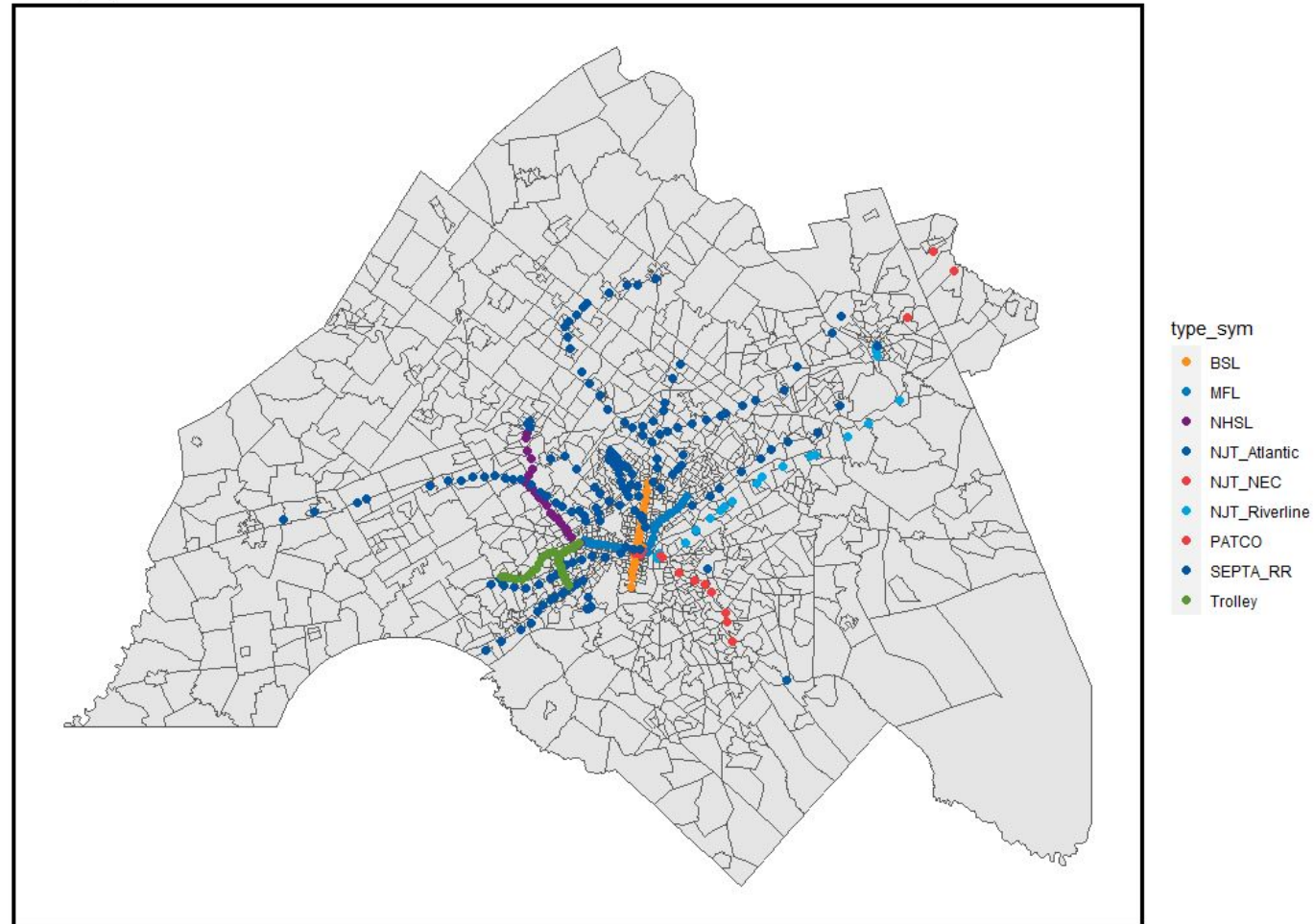


Figure xx

Greater Philadelphia is not good at TOD

MUSA508 Takeaway

From the first lesson of MUSA 508, we learned that SEPTA's two subway lines did not create significant TOD effect.

<https://urbanspatial.github.io/PublicPolicyAnalytics/TOD.html>

DVRPC Index

Assesses every station's TOD Index based on infrastructure, connectivity to center Philly while ignoring social factors

<https://www.dvrpc.org/webmaps/TOD/>

Feasibility Dilemma

Gentrification in marginalized community;

NIMBY in wealthy community;

BUILDING ON OUR STRENGTHS

Evaluating Transit-Oriented Development (TOD) Opportunities in Greater Philadelphia

City Hall Station - PATCO

Location: **Camden City, Camden County**

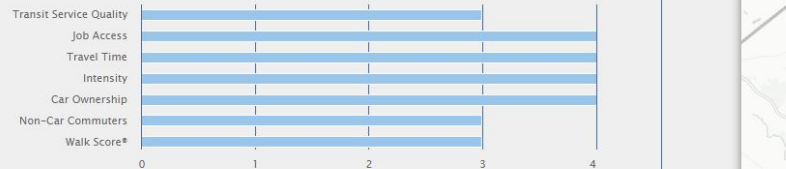
1 Station Area Type: **Urban Center**

1 Planning Area Context: **Core City**

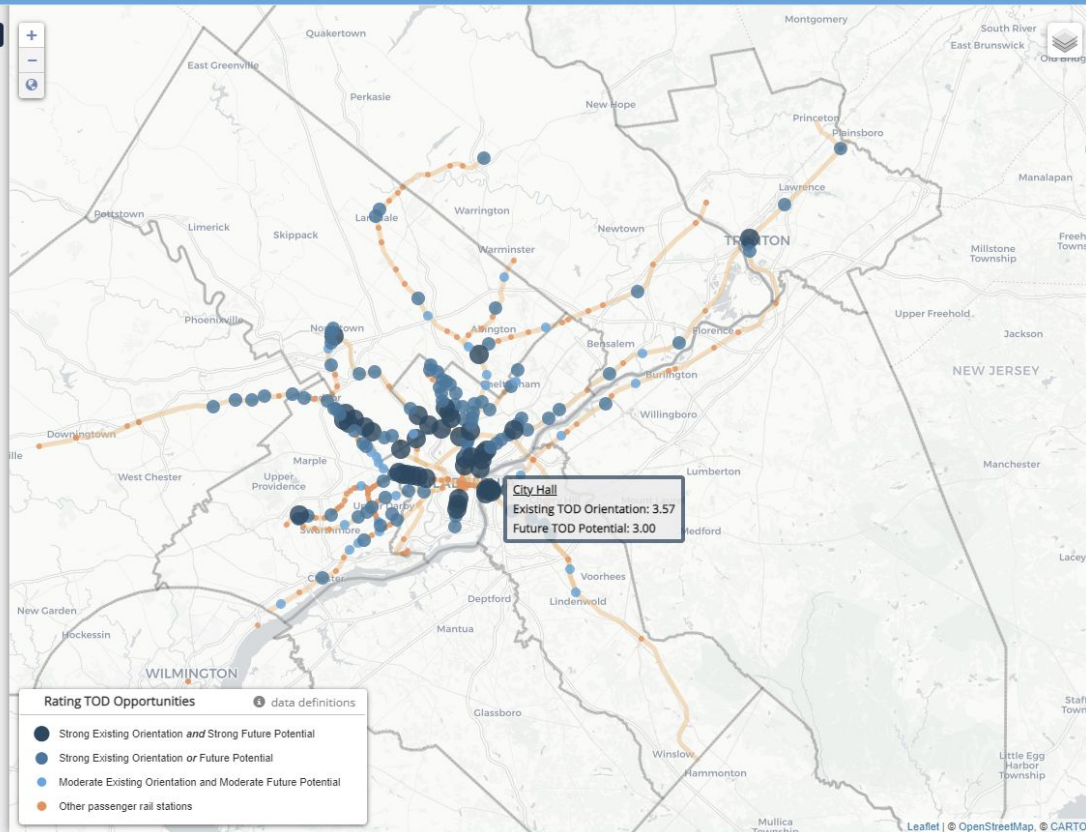
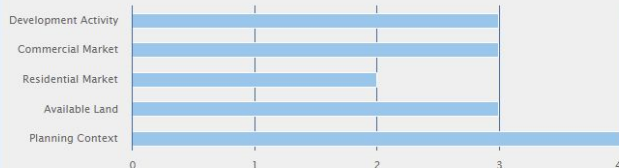
Select a scoring method:

☒ Category Scoring ☐ Data Measurement

1 Existing TOD Orientation: 3.57 / 4



1 Future TOD Potential: 3 / 4



New Index: TODPhilly

It reassess suitability for TOD redevelopment around all rail stations in Philadelphia MSA (DVRPC) using Multi-Criteria Decision Analysis (MCDA).

Process



Data Collection

Import and wrangling

Exploratory analysis for the MCDA.

Build MCDA model

Assign weights

Some factors might be complementary, some be contradicting.

Tweak

Compare

Compare scenarios with actual situations

MCDA Factors (Data)

DVRPC Index

Tweak on DVRPC's index based on our exploratory analysis results

- Connectivity
- Weights

Social Data

Tidy Census

- Tracts within TOD
- Race, Household Size, Commuting
- Income
- Vacant Lots

Crimes (rastering?)

Parcel Data

Find Parcels suitable for redevelopment:

- Parking Lots
- Agriculture
- Forest (?)
- Schools, Colleges

Exploratory Results

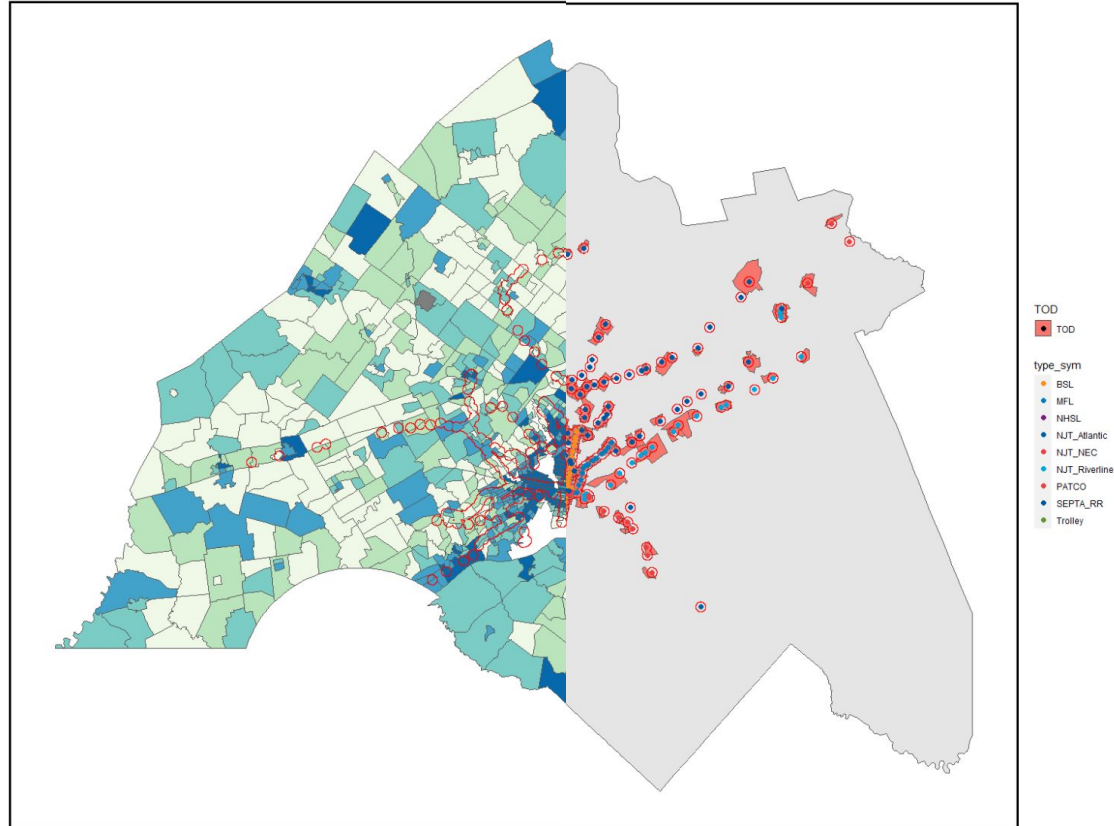
DVRPC Data

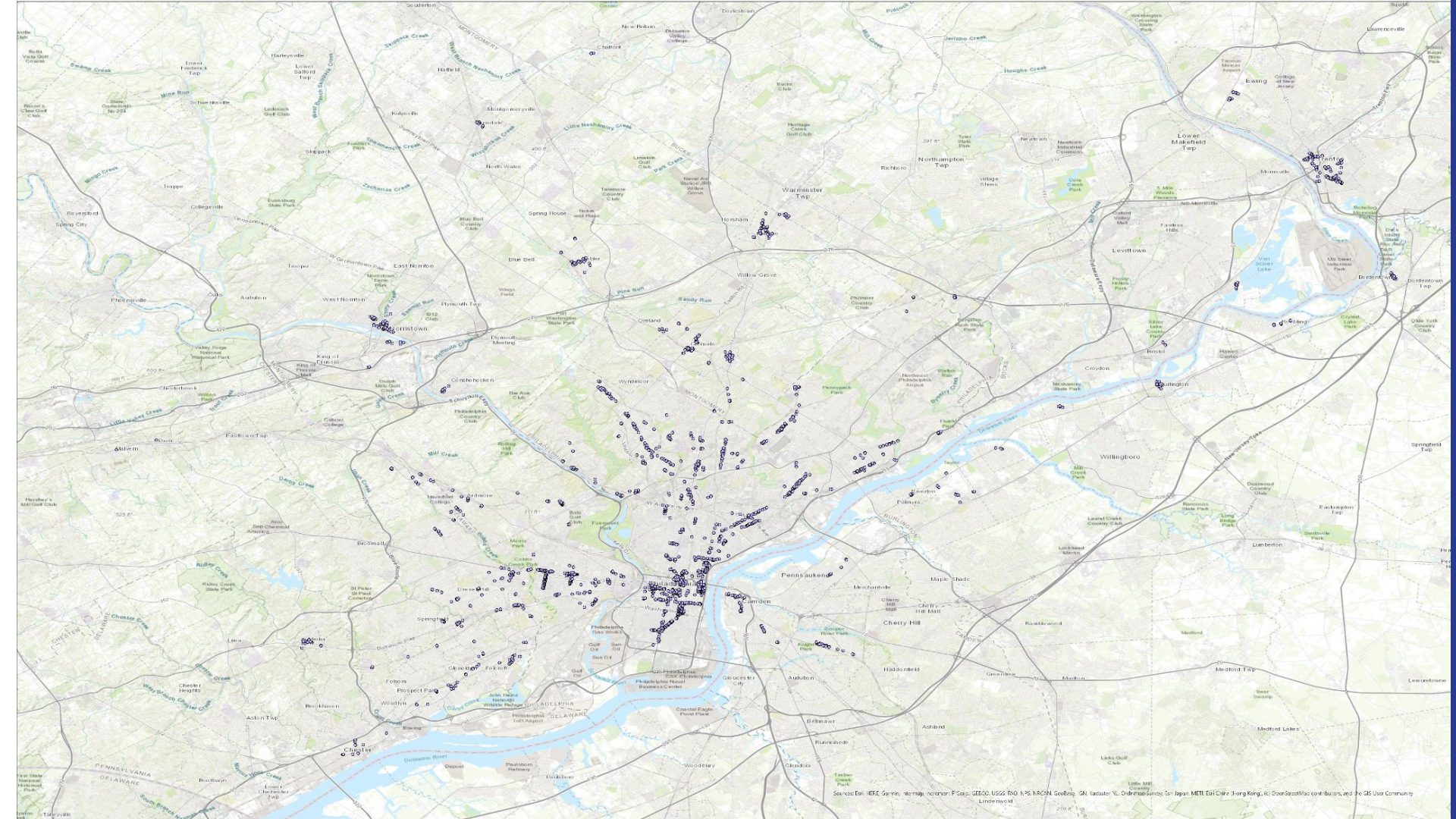
Time_Score	Int_Data	Int_Score	Car_Data	Car_Score	Com_Data	Com_Score	Walk_data	Walk_Score	Land_Score	Dev_Data	Dev_Score	ResRent_Da	ResRent_Sc	CommRent_D	CommRent_S	Planning_S	ExistingOr	FuturePote	ExO_Quad	FP_Quad	QUAD
3	6942	2	63.43	3	25.85	3	85	3	1	0	1	1.70	4	28.04	4	1	2.571429	2.2	above	above	above
3	10968	3	52.87	2	9.61	1	85	3	2	366	4	1.35	3	16.80	2	4	2.000000	3.0	below	above	below
3	8528	2	43.45	1	7.03	1	92	4	1	0	1	1.60	4	19.23	3	2	1.857143	2.2	below	above	below
4	4254	1	37.18	1	4.06	1	66	2	1	0	1	1.26	2	14.38	1	4	1.571429	1.8	below	below	below
4	12305	3	61.62	3	16.29	2	60	2	1	0	1	1.50	3	21.12	3	3	2.428571	2.2	below	above	below
4	8605	2	51.23	2	9.96	1	84	3	3	0	1	1.30	2	17.00	2	4	2.142857	2.4	below	above	below
2	7936	2	52.37	2	24.74	2	75	3	1	90	2	1.30	2	23.11	4	1	2.285714	2.0	below	below	below
4	8534	2	59.32	2	20.43	2	81	3	1	7	1	1.15	1	17.53	2	2	2.571429	1.4	above	below	above
4	18896	4	80.61	4	39.16	4	89	3	2	5	1	1.00	1	14.02	1	4	3.714286	1.8	above	below	above
4	13917	3	80.49	4	35.96	3	83	3	2	0	1	1.20	2	17.70	2	1	3.285714	1.6	above	below	above
4	20710	4	81.59	4	44.21	4	85	3	2	0	1	0.92	1	5.73	1	1	3.714286	1.2	above	below	above
4	13729	3	69.56	3	40.47	4	94	4	4	1543	4	1.90	4	18.64	2	1	3.714286	3.0	above	above	above
4	17104	4	76.73	3	42.18	4	88	3	1	40	1	1.85	4	18.66	2	1	3.571429	1.8	above	below	above
4	19018	4	80.85	4	49.34	4	91	4	2	0	1	0.95	1	18.15	2	1	4.000000	1.4	above	below	above
2	8363	2	53.31	2	16.54	2	86	3	2	0	1	1.45	3	21.92	3	2	2.000000	2.2	below	above	below
2	18061	4	76.64	3	26.22	3	60	2	1	59	2	1.40	3	20.21	3	3	3.000000	2.4	above	above	above
4	3539	1	51.27	2	10.01	1	48	1	2	0	1	1.30	2	14.67	1	2	1.714286	1.6	below	below	below
3	8579	2	48.01	1	25.42	3	85	3	1	20	1	1.85	4	25.33	4	2	2.428571	2.4	below	above	below
3	8737	2	72.56	3	31.17	3	78	3	2	0	1	1.00	1	8.80	1	2	2.571429	1.4	above	below	above
4	4821	1	45.81	1	7.47	1	55	2	3	190	3	1.80	4	20.08	3	2	1.571429	3.0	below	above	below
3	4035	1	44.00	1	15.69	2	38	1	1	101	2	1.00	1	20.89	3	3	1.428571	2.0	below	below	below
4	10628	3	63.43	3	25.45	3	93	4	2	264	3	1.55	4	20.56	3	1	2.857143	2.6	above	above	above
2	6401	1	52.07	2	34.21	3	73	3	2	185	3	1.70	4	27.95	4	1	2.714286	2.8	above	above	above
4	5642	1	37.43	1	9.17	1	32	1	2	365	4	1.65	4	26.78	4	1	1.571429	3.0	below	above	below
3	7905	2	53.75	2	18.70	2	32	1	1	0	1	1.20	2	18.60	2	1	2.142857	1.4	below	below	below
3	8822	2	50.98	2	13.29	1	67	2	1	0	1	1.10	1	11.46	1	1	2.142857	1.0	below	below	below
4	9967	3	62.13	3	18.64	2	67	2	1	0	1	1.10	1	12.07	1	1	2.571429	1.0	above	below	above
2	9625	3	81.23	4	42.16	4	68	2	3	0	1	1.15	1	15.80	2	2	3.000000	1.8	above	below	above
3	21265	4	92.11	4	63.07	4	72	3	3	0	1	1.11	1	21.99	4	1	3.714286	2.0	above	below	above
4	5332	1	25.21	1	9.49	1	37	1	1	0	1	1.28	2	17.98	2	1	1.714286	1.4	below	below	below

TOD tracts & Vacancy

Percentage of Vacant lot

DVRPC

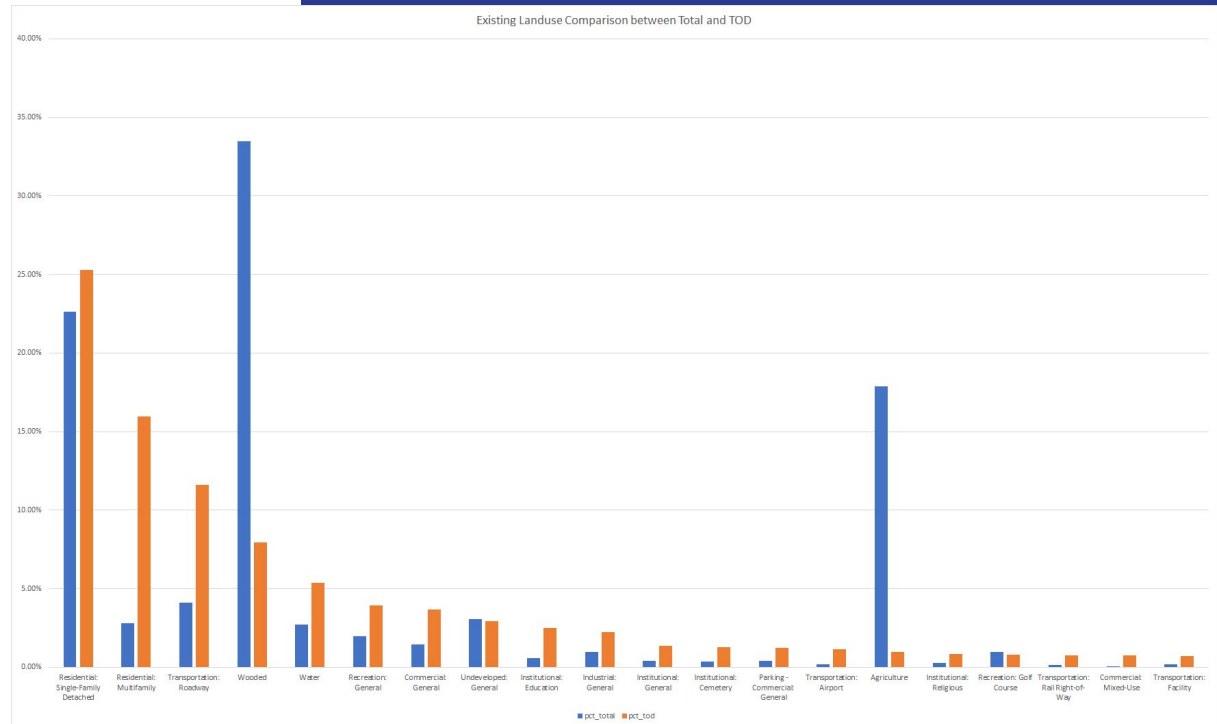




Comparison

Existing TOD & Total

landuse	pct_total	pct_tod
Residential: Single-Family Detached	22.64%	25.28%
Residential: Multifamily	2.78%	15.98%
Transportation: Roadway	4.11%	11.61%
Wooded	33.48%	7.93%
Water	2.73%	5.37%
Recreation: General	1.99%	3.93%
Commercial: General	1.43%	3.68%
Undeveloped: General	3.06%	2.93%
Institutional: Education	0.57%	2.50%
Industrial: General	0.97%	2.22%
Institutional: General	0.41%	1.38%
Institutional: Cemetery	0.35%	1.27%
Parking - Commercial: General	0.41%	1.25%
Transportation: Airport	0.21%	1.14%
Agriculture	17.87%	0.98%
Institutional: Religious	0.26%	0.83%
Recreation: Golf Course	0.95%	0.82%
Transportation: Rail Right-of-Way	0.13%	0.74%
Commercial: Mixed-Use	0.06%	0.74%
Transportation: Facility	0.18%	0.70%



- Factors
- Large Data
- Weighting
- Measure Gentrification

Challenges

Weighting Thoughts: Complementary Factors

Convert P+R



Hamilton Station, NJ

More reading: [TOD and Park-and-Ride: Which is Appropriate Where?](#)

College Proximity



Princeton Station, NJ

Old Town



Narberth Station, PA