

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

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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.”



New Index: TODPhilly

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

Process

Data Collection

Field Trip

Import and wrangling

Exploratory Analysis

Build MCDA model

Data Wrangling (cont.)

**Analytic Hierarchy
Process (AHP)**

~~Tweak~~ Validation

Compare

Compare scenarios with
actual situations

Compare with TOD
analysis by hand

Apply to a comparable
city

- Census Data
- Join parcel to TOD tracts
- Join parcel to TOD buffers
- Develop the model

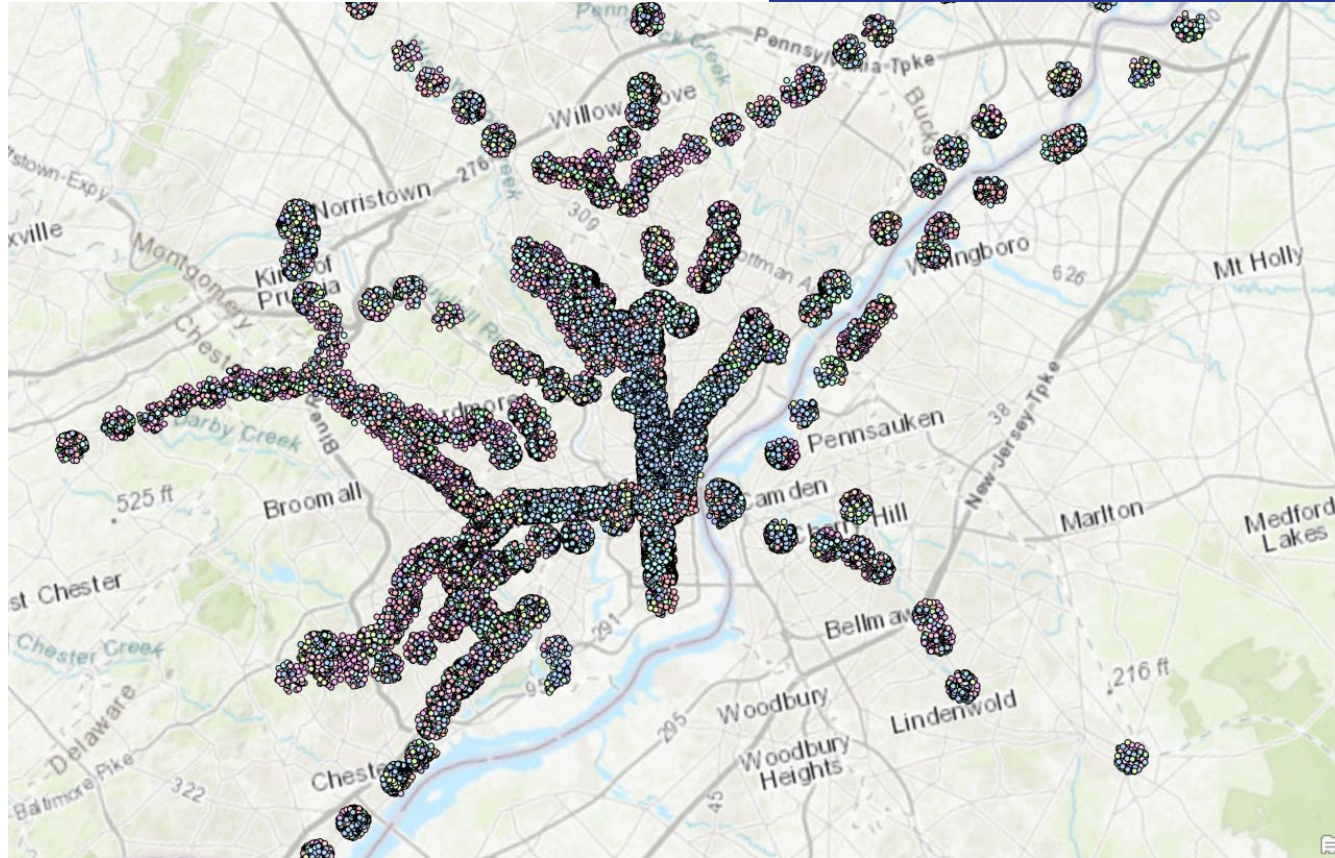
Achievements

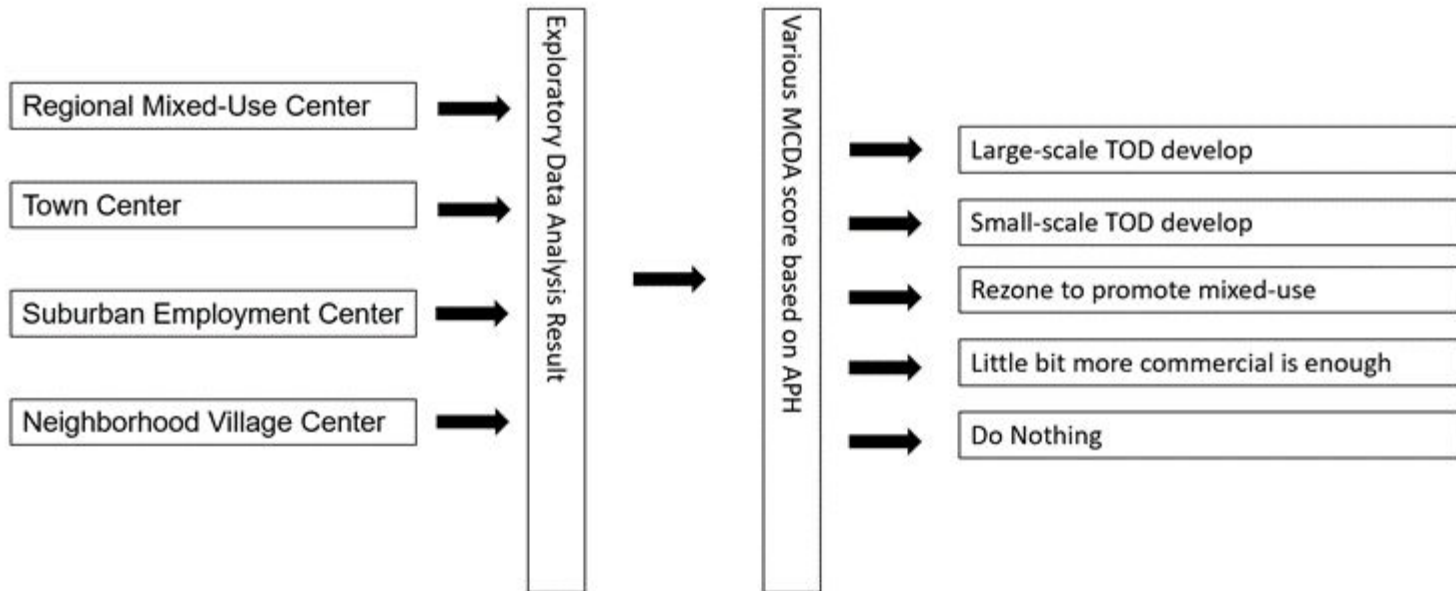
Social Milieu

From Proposal 1

	Suburban	Median Income	Poverty Rate	Median Rent	Ownership
Norristown, PA	Yes				
North Philadelphia	No				
West Philadelphia	No				
Camden DT, NJ	No				
Cinnaminson, NJ	Yes				
Trenton, NJ	No				
Media/Elwyn, PA	Yes				
NHSL eastern	Yes				

Parcels within Buffers





Ideas

Vision	Vision_Case	Detailed existing condition
Large-scale TOD	> 5 acres, tower mansion, with garage	<ul style="list-style-type: none"> • Very extra-large parcels (per size) • OK Transit Time
Small-scale TOD develop	1 – 5 acres, multi-storey, mixed-use, with garage	<ul style="list-style-type: none"> • Large underused land (per size) • OK Transit Time • Proximity to attraction • Relative denser
Little bit more commercial is enough	Town Center Convenient Shop at Station	<ul style="list-style-type: none"> • Outside Center City • Some Mixed-used • Densely developed • Some Multifamily
Little bit more apt is enough	Regional Mixed-use Center Suburban Employment Center	<ul style="list-style-type: none"> • Outside Center City • Some Mixed-Use
Do nothing	Very good TOD	<ul style="list-style-type: none"> • 0 Transit Time • Lots of Job Access • Little underused land • Lots of Attraction
	Very bad (too remote)	<ul style="list-style-type: none"> • Long Transit Time • Low Job Access

Factors

- Transit Time to Center City
- Job Access
- Underused land (Parking)
- Attraction Proximity
- Parcel type and percentage

Gentrification by vision

Do they meet the goal?

DVRPC's analysis of Station area
DVRPC

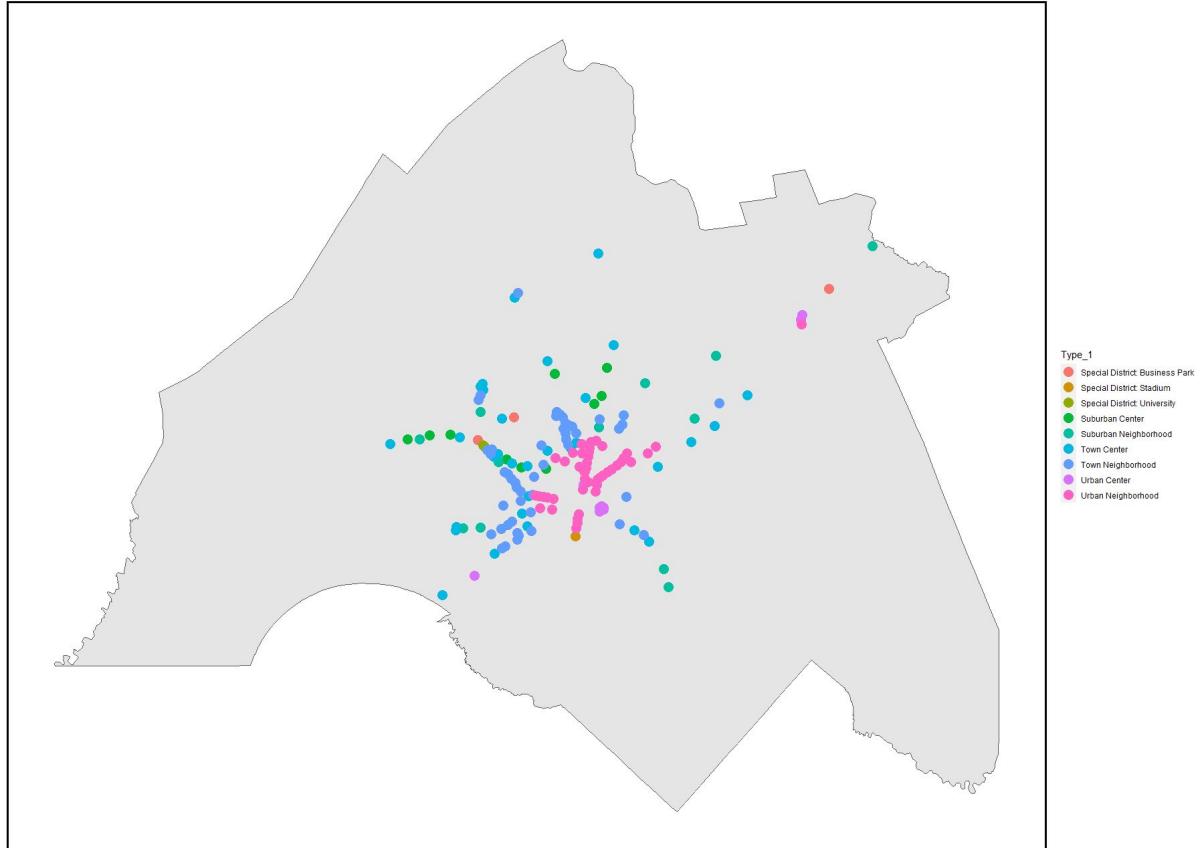


Figure 11

Mixed-use

Mixed-use parcel percentage of TOD-buffers in DVRPC
Philadelphia, PA

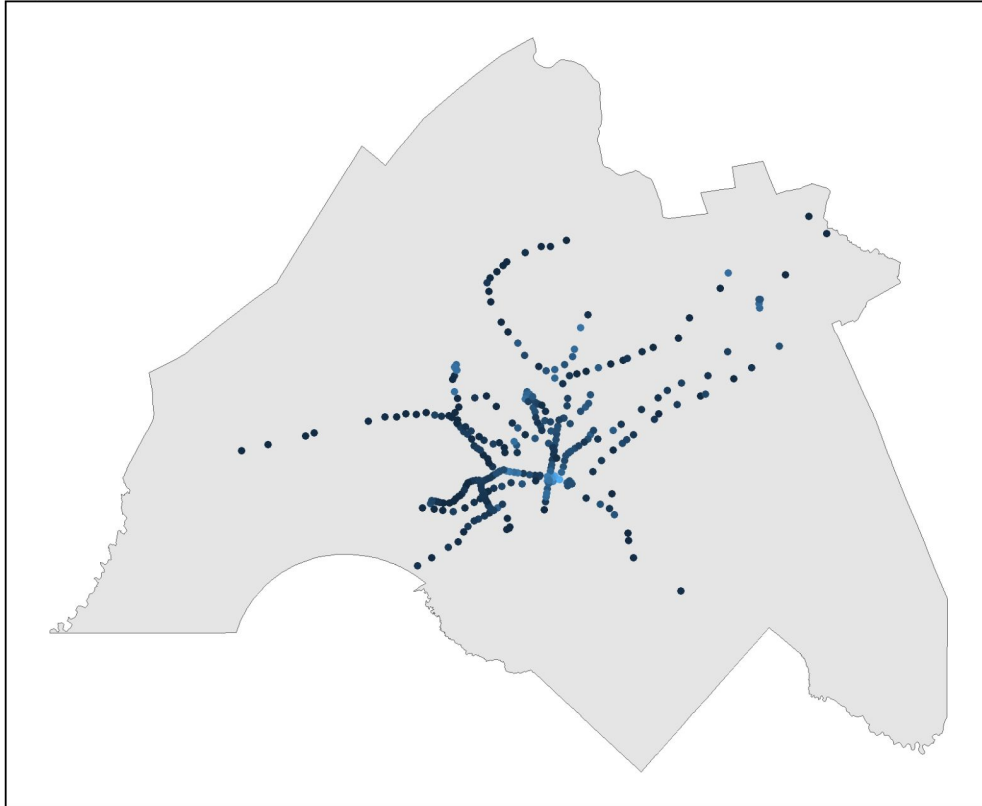


Figure 11

```
> summary(TOD_station_parcel$Mixedpct)
Min. 1st Qu. Median Mean 3rd Qu. Max.
0.0000 0.5051 2.4897 3.8172 5.5729 19.2308
```

```
> summary(TOD_station_parcel$MixedUse_yes)
Min. 1st Qu. Median Mean 3rd Qu. Max.
0.00 1.00 7.00 13.24 17.00 87.00
```

Most mixed-use parcels

- Chinatown, Center City
- 52th, 60th St
- Norristown DT

Transportation

*Parking lot, Railyard

Transportation parcel percentage of TOD-buffers in DVRPC
Philadelphia, PA

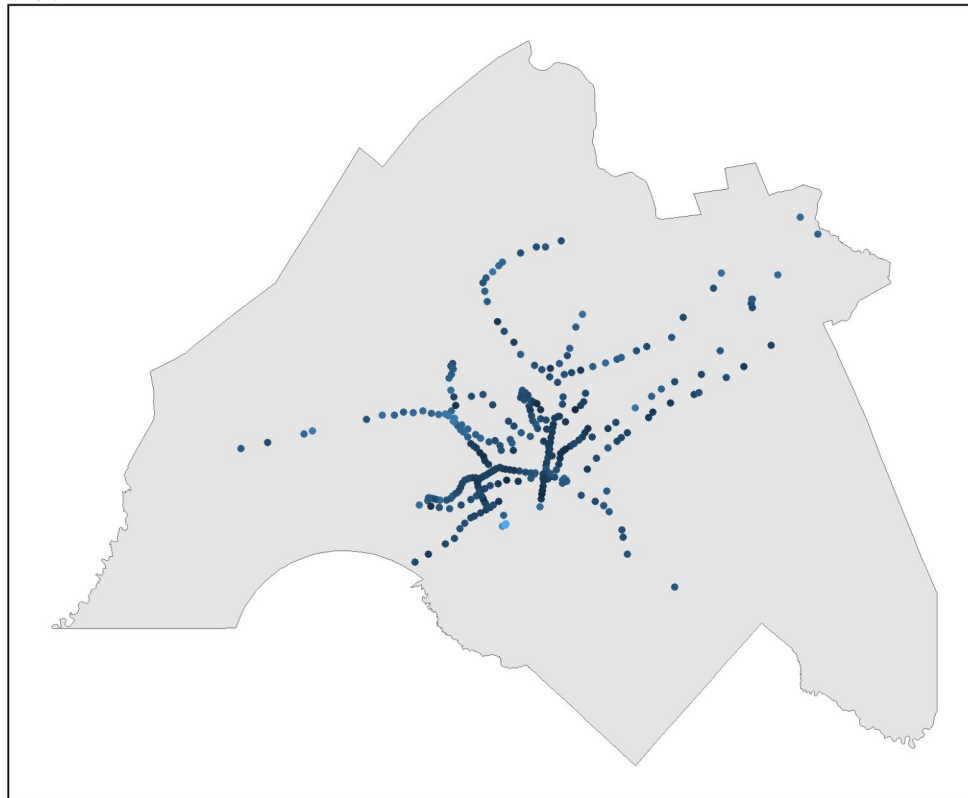


Figure 10

```
> summary(TOD_station_parcel$Transpct)
Min. 1st Qu. Median Mean 3rd Qu. Max.
0.000 1.852 3.245 4.796 5.641 76.190
```

```
summary(TOD_station_parcel$Transportation)
Min. 1st Qu. Median Mean 3rd Qu. Max.
0.00 5.00 7.00 9.16 12.00 49.00
```

Most transportation parcels
(exclude Airport, NRG):

- Atco (Atlantic)
- Woodcrest (PATCO)
- Wissahickon (Manayunk)
- Exton (Paoli/Thorndale)
- Hamilton (NEC)
- Villanova (both NHSL and RR)

...

Civil

Institution, Recreation, Utility

Civil parcel percentage of TOD-buffers in DVRPC
(Institutional + Recreation + Utility)

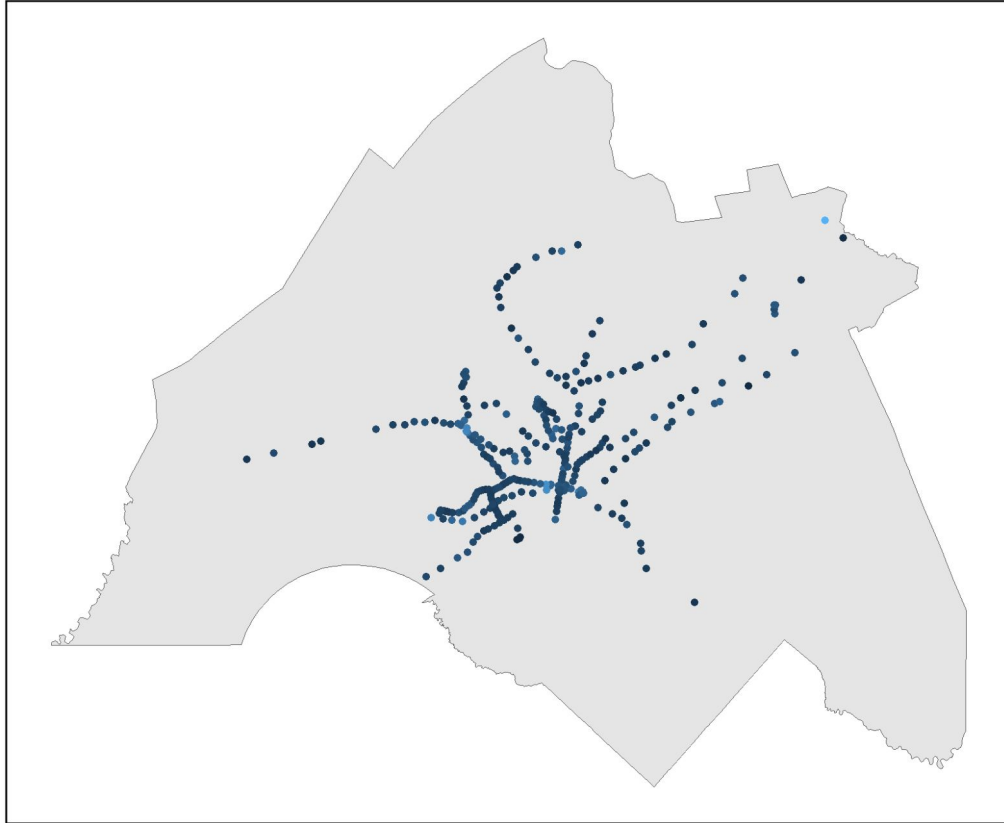


Figure 33

Clustered at

- Upenn + Drexel
- Rutgers Camden
- Princeton
- Swarthmore
- Jefferson
- Villanova

...

station	line
Princeton	Northeast Corridor
34th Street	Market/Frankford Line
University City	Glenside Combined
Villanova	Paoli/Thorndale Line
Elwyn	Media/Elwyn Line
Villanova	Norristown High Speed Line
Aquarium	RiverLine
Swarthmore	Media/Elwyn Line
Stadium (Ithan Avenue)	Norristown High Speed Line
Cooper Street/Rutgers University	RiverLine
Germantown	Chestnut Hill East Line
Delaware Valley College	Lansdale/Doylestown Line
County Line	Norristown High Speed Line
Wallingford	Media/Elwyn Line

Underdeveloped

*Agriculture, Forest

Underdeveloped parcels (Agriculture + Forests) percentage of TOD-buffers in DVRPC
Philadelphia, PA

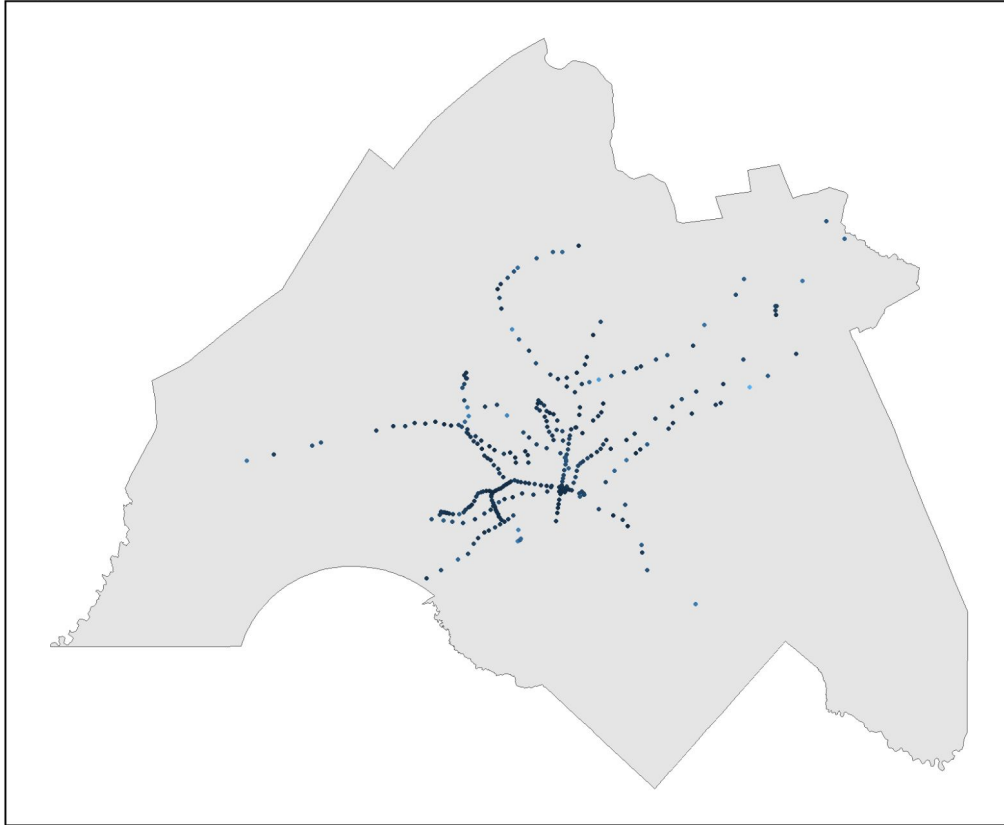


Figure 11

```
> summary(TOD_station_parcel$underpct)
Min. 1st Qu.  Median    Mean 3rd Qu.   Max.
0.0000  0.5435  2.0906  3.6120  4.5156 34.0425
```

```
> summary(TOD_station_parcel$Undeveloped)
Min. 1st Qu.  Median    Mean 3rd Qu.   Max.
 0.00   3.00   6.00  11.64  13.00  95.00
```

>20% Undeveloped:

- Meadowbrook (West Trenton)
- Gwynedd Valley (Lansdale/Doylestown)
- Miquon (Manayunk/Norristown)
- Gulph Mills, Matsonford (NHSL)
- Florence (Riverline)

...

Parcel numbers

Within buffers

Total parcel numbers of TOD-buffers
DVRPC



Figure 10

```
> summary(TOD_station_parcel$totalpc)
Min. 1st Qu.  Median   Mean 3rd Qu.   Max.
 21.0  160.5  245.5  262.8  355.8  620.0
```

Rural buffers have fewer/larger parcels

<60 parcels

- Airport
- Gwynedd Valley (Lansdale/Doylestown)
- County Line (NHSL)
- Meadowbrook, Rydal (West Trenton)
- Miquon (Manayunk/Norristown)
- Matsonford, Gulph Mills (NHSL)

...

Weighting Method: APH

- Weights are calculated based on its relationship of importance with other factors
- Pairwise Comparison: compare factors
- Minimize Bias
- Using Excel

ComPcr : Resi PCT

Within buffers

Total Civil-use parcel numbers of TOD-buffers
DVRPC



Figure 11

- Does not distinguish Urban retail & Strip Malls
- Need to group summarize the size of each type of parcels

- Rail companies can close some stations :(
- Look at DVRPC data
- Analyze parcels weighted by area
- Incorporate Social Factors
- Quantify Factors
- Develop and Implement AHP
- Testing & Validation

Thoughts & Next Step
