The Transportation Security Index:
Measuring a predictor of wellbeing and program access

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Presentation Agenda

- Why focus on transportation?
- Transportation: more than car ownership
- Current measures
- Toward a new measure
  - Cognitive interviews
  - Survey
  - Long form Transportation Security Index (TSI)
- Next steps

Why Transportation?

Transportation:
More than car ownership

Defining transportation insecurity

Transportation insecurity: a condition in which one is unable to regularly move from place to place in a safe and timely manner because one lacks material, economic or social resources
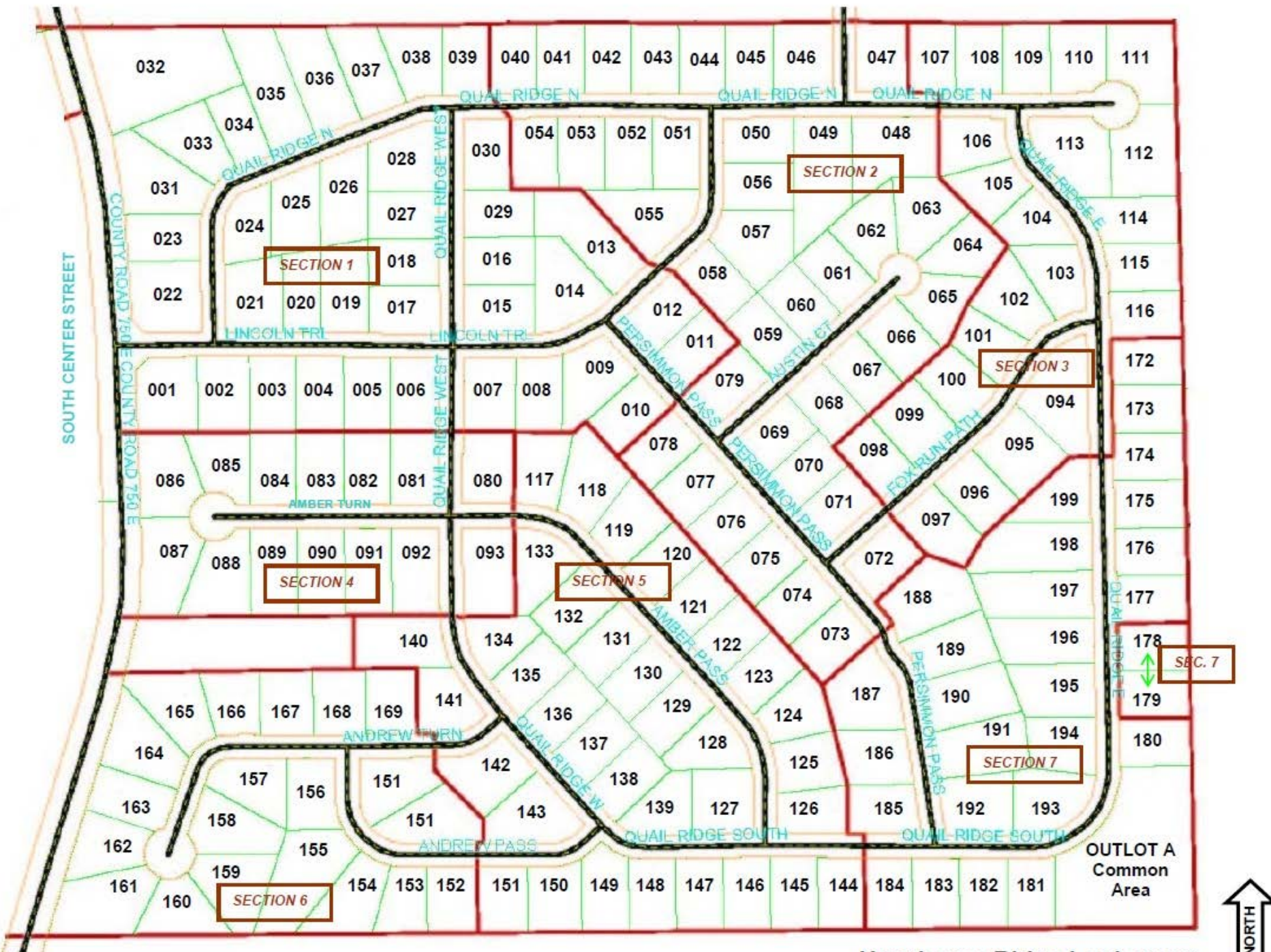
Current Measures of Transportation Access are Limited
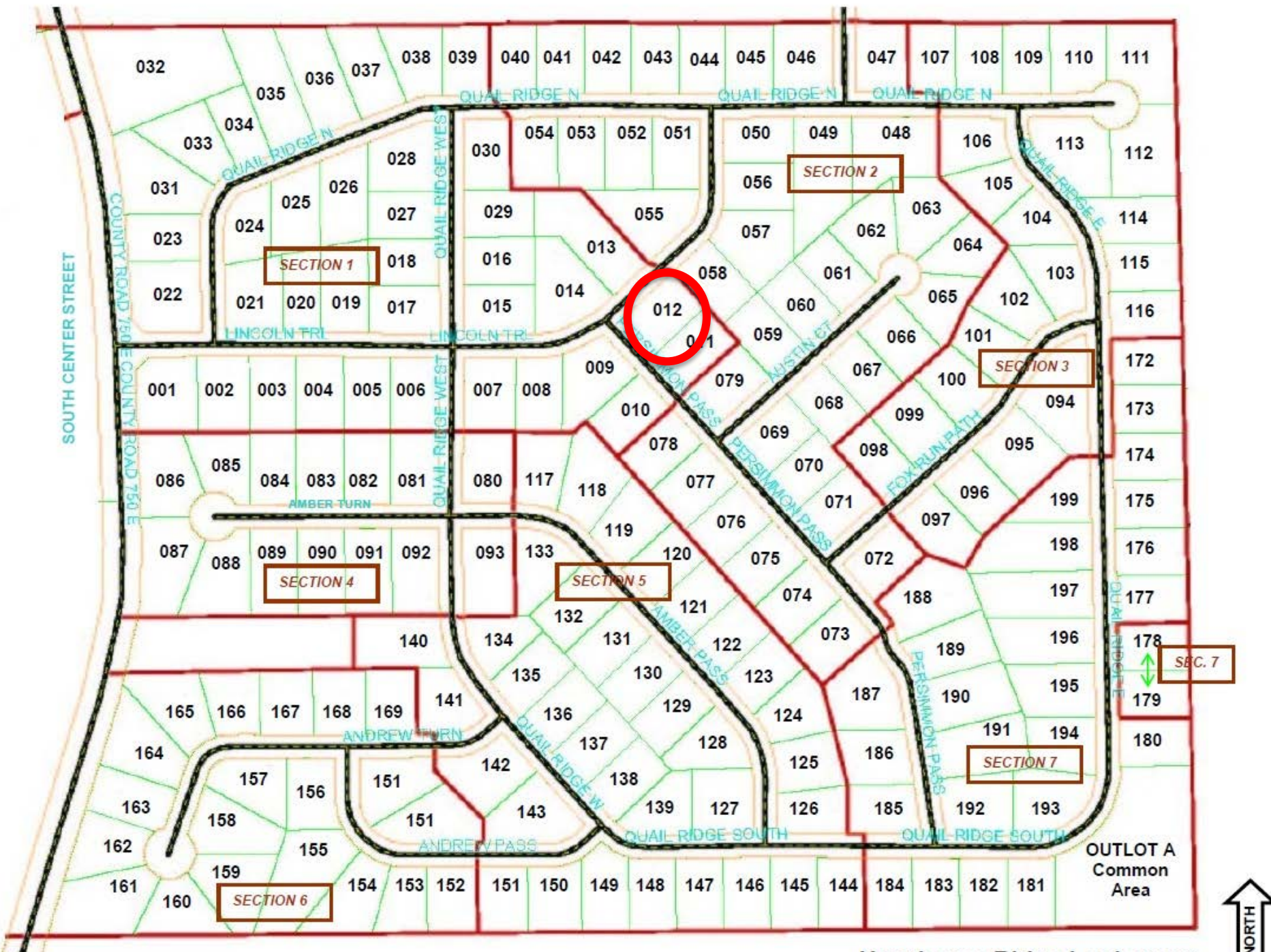
Car/No Car

Do you or anyone else in your family living there own or lease a car or other vehicle for personal use? (PSID)

Gravity Scores
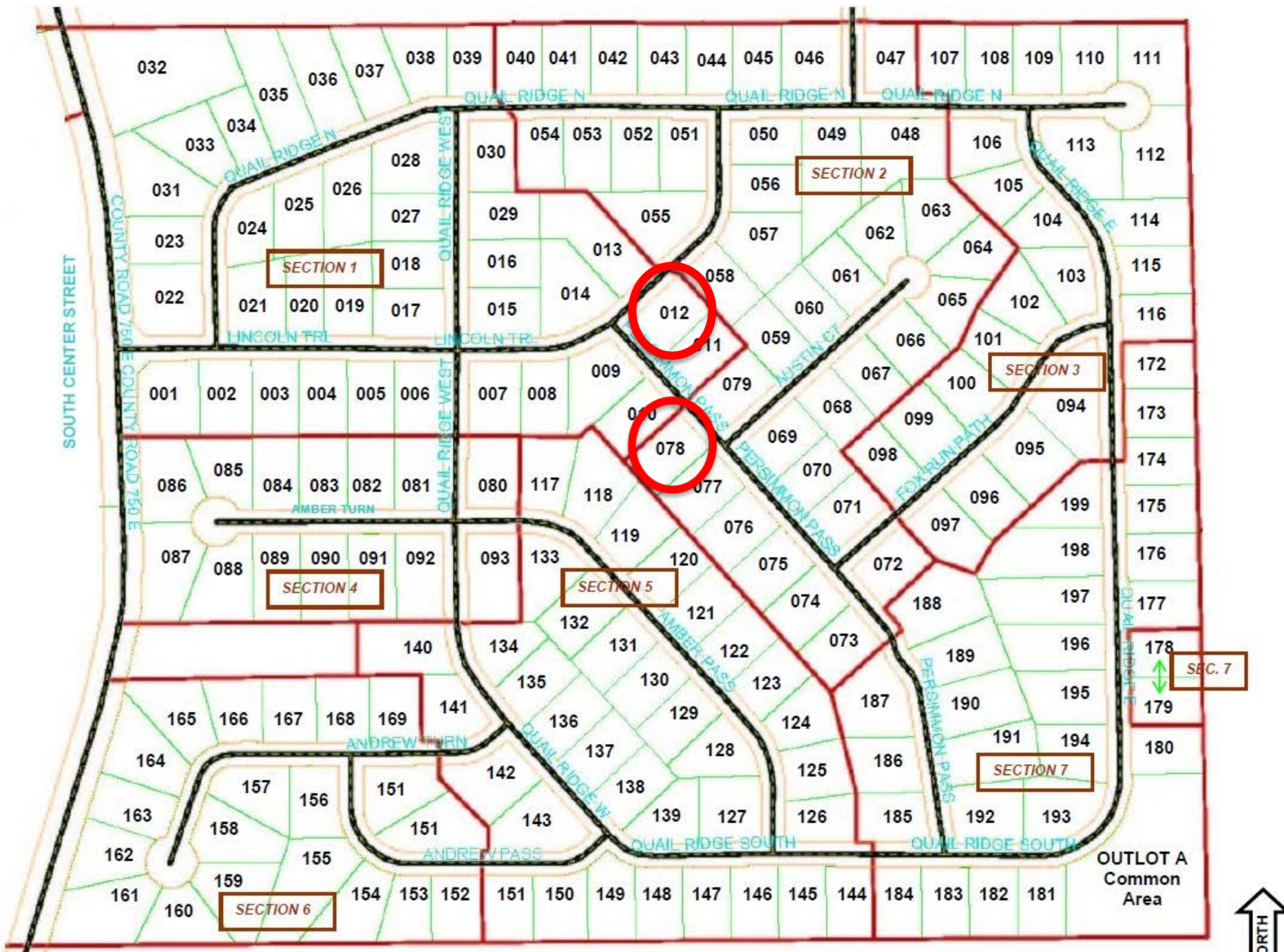
Hawthorne Ridge Lot Layout

SOUTH CENTER STREET

COUNTY ROAD 750 E / COUNTY ROAD 750 E

QUAIL RIDGE N — QUAIL RIDGE N — QUAIL RIDGE N
QUAIL RIDGE WEST
QUAIL RIDGE E
QUAIL RIDGE W
QUAIL RIDGE E
LINCOLN TR. — LINCOLN TR.
AMBER TURN
ANDREW TURN
ANDREW PASS
QUAIL RIDGE SOUTH — QUAIL RIDGE SOUTH
PERSIMMON PASS
AUSTIN CT
FOX RUN PATH
AMBER PASS

SECTION 1
SECTION 2
SECTION 3
SECTION 4
SECTION 5
SECTION 6
SECTION 7
SEC. 7

OUTLOT A Common Area

NORTH

Lot numbers:
032, 035, 036, 037, 038, 039, 040, 041, 042, 043, 044, 045, 046, 047, 107, 108, 109, 110, 111
034, 033, 028, 030, 054, 053, 052, 051, 050, 049, 048, 106, 113, 112
031, 025, 026, 056, 105, 063, 104, 114
023, 024, 027, 029, 055, 057, 062, 064, 103, 115
022, 021, 020, 019, 018, 016, 013, 058, 060, 061, 065, 102, 116
017, 015, 014, 012, 011, 059, 066, 101, 100, 172
001, 002, 003, 004, 005, 006, 007, 008, 009, 079, 067, 099, 094, 173
010, 068, 069, 098, 095, 174
085, 086, 084, 083, 082, 081, 080, 117, 078, 077, 070, 071, 097, 096, 199, 175
087, 088, 089, 090, 091, 092, 093, 133, 118, 119, 076, 075, 072, 198, 176
120, 074, 073, 188, 197, 177
140, 134, 135, 132, 121, 122, 123, 124, 187, 189, 196, 178, 179
141, 136, 131, 130, 129, 128, 125, 186, 190, 195, 180
165, 166, 167, 168, 169, 142, 137, 138, 139, 127, 126, 185, 191, 194
164, 157, 156, 151, 143, 191, 192, 193
163, 158, 151, 155, 154, 153, 152, 151, 150, 149, 148, 147, 146, 145, 144, 184, 183, 182, 181
162, 161, 159, 160

Hawthorne Ridge Lot Layout

Hawthorne Ridge Lot Layout

Commute Time

A new measure is needed

- We need to measure transportation insecurity at the individual level to determine its effects on well-being and program access

- Existing measures are not sufficient

- But variation in geography and individual circumstance makes it difficult to construct a precise measure that can be administered easily

Toward a new measure

Inspiration: Food Security

- "The food that we bought just didn't last, and we didn't have money to get more." Was that often, sometimes, or never true for your household in the last 12 months?

- In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

Goal: 3-5 easily replicable items that capture one's level of transportation security regardless of one's mode of transportation or geographic location.

Theory: Transportation Insecurity manifests in five measurable domains

- Lateness
- Skipped trips
- Time taken
- Social ties strained
- Psycho-social

Types of items

- In the past 30 days, has the following statement ever been true for you: "I worried about inconveniencing family, friends, or neighbors because I needed help with transportation"?

- In the past 30 days, how often have you not been able to leave the house when you wanted to because of a problem with transportation?

2

Cognitive Interviews

Cognitive interviews

- ~30 potential survey items
- Convenience sampling, n=52

	Low SES	Middle/High SES
Ann Arbor	2	8
Chicago	9	4
Detroit	3	3
Flint	4	2
Rural Michigan	10	2
Ypsilanti	4	1

Cognitive interview results

- Refined wording and rejected some items
- Identified particularly compelling constructs for the transportation insecure
- Identified problem with false positives among transportation secure users of public transit

Survey

Summer Survey Fielding

- Contracted with Knowledge Networks/GfK to administer a survey with their nationally representative panel

- Ten minutes

- Fielded in August 2016

- n = 508 with oversample (n=150) of low-income respondents

Analysis

- Examined correlations and removed redundant and "wonky" items

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  - Items from UCLA loneliness scale:
    - In the past 30 days, have you felt that you lack companionship because you did not have the transportation you needed?
    - In the past 30 days, have you felt isolated from others because you did not have the transportation you needed?

Analysis

- Examined correlations and removed redundant and "wonky" items
  - Items from UCLA loneliness scale:
    - In the past 30 days, have you felt that you lack companionship because you did not have the transportation you needed?
    - In the past 30 days, have you felt isolated from others because you did not have the transportation you needed?
  - "I usually go places only if it is really important to go."

Analysis

- Conducted exploratory factor analysis
  - One factor solution (RMSEA=.091)
  - Two factor solution (RMSEA=.063)

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Long form TSI

Material- Time and Place	Relational
How often did it take you longer to get somewhere than it would have taken you if you had different transportation?	Do you think that someone did not invite you to something because of problems with transportation?
How often have you been late getting somewhere because of a problem with transportation?	Have you felt left out because you did not have the transportation you needed?
How often did you have to arrive someplace early and wait because of the schedule of the bus, train, or person giving you a ride?	Have you felt like friends, family, or neighbors were avoiding you because you needed help with transportation?
How often have you spent a long time waiting because you did not have the transportation that would allow you to come and go when you wanted?	Have you ever worried about inconveniencing your family, friends, or neighbors because you needed help with transportation?
How often have you had to reschedule an appointment because of a problem with transportation?	Have you ever felt bad because you did not have the transportation you needed?
How often have you skipped going someplace because of a problem with transportation?	Have problems with transportation affected your relationships with others?
How often have you not been able to leave the house when you wanted to because of a problem with transportation?	Have you ever felt embarrassed because you did not have the transportation you needed?
How often have you worried about whether or not you would be able to get someplace because of a problem with transportation?	
How often did you feel stuck at home because of a problem with transportation?	

Next Steps

Additional analysis

- Reliability analysis
  - Estimate coefficient alpha (scale reliability) for each scale
  - Examine alpha-if-item-deleted for each item to determine whether other items are candidates for deletion (i.e., whether scale reliability improves)
- Validity analysis
  - Examine distributions of scale scores (i.e., simple sums) among various groups (e.g., car/no car)

Winter survey

- N= ~1,000
- Nationally representative
- Compare to existing measures
- Use the TSI as a predictor
- Define short-form TSI

Thanks!

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Example Comparison Measures

- Do you or anyone else in your [household] own or lease a car or other vehicle for personal use? (PSID)

- How many minutes did it usually take you to get from home to work LAST WEEK? (MTO)

Hypothesized/Causes Consequences

- How many hours did you work last week, at all jobs? (CPS)

- People sometimes look to others for companionship, assistance, or other types of support. How often is each of the following kinds of support available to you if you need it?

  - Someone who understands your problems
  - Someone to prepare your meals if you were unable to do it yourself
  - Someone to love and make you feel wanted

Cognitive interview results

Refined wording and rejected some items:

- *Sometimes people are exposed to very hot or cold temperatures or storms while going places. This might be because they are riding in a car with a broken window, walking long distances, or waiting outside. How often have you been exposed to conditions like these because of the transportation you used IN THE PAST YEAR?*

Cognitive interview results

Identified particularly compelling constructs for the transportation insecure:

- *It can take time to plan out how to get to the places we need to go. We may need to figure out the schedule of busses or trains, who can give us a ride, or figure out how to come up with the money we need for gas, fare, or to otherwise pay for the ride. Please indicate your level of agreement with the following statement:*

  "When I need to get somewhere, I usually spend some time planning out how I will get there."

Cognitive interview results

Identified problem with false positives among transportation secure users of public transit:

- *In the past 30 days, how often did it take you longer to get somewhere than it would have taken if you had different transportation?*

Selected Demographic Characteristics

- Education
- Race
- Gender
- Children in Household
- Age
- Immigration status
- Disability status
- Household size

	Advance planning	Backup plan	Important to go	Took longer	Waiting	Early	Late	Reschedule	Skipped	Not able to leave house	Stuck	Worried	Felt bad	Isolated	Embarrassed	Left out	Lack companionship	Did not get invited	Avoiding	Burden	Relationship effects
Important to go	0.388	0.415		0.256	0.263	0.306	0.259	0.235	0.265	0.307	0.301	0.327	0.34	0.455	0.321	0.41	0.48	0.375	0.377	0.318	0.391
Took longer	0.542	0.454	0.256		0.824	0.793	0.737	0.726	0.746	0.747	0.704	0.731	0.631	0.658	0.566	0.642	0.661	0.615	0.604	0.555	0.691
Waiting	0.551	0.411	0.263	0.824		0.836	0.71	0.8	0.782	0.792	0.742	0.755	0.699	0.698	0.657	0.716	0.703	0.725	0.714	0.65	0.698
Early	0.533	0.415	0.306	0.793	0.836		0.668	0.775	0.739	0.761	0.718	0.739	0.662	0.625	0.616	0.666	0.647	0.727	0.689	0.584	0.661
Late	0.432	0.436	0.259	0.737	0.71	0.668		0.738	0.725	0.727	0.661	0.716	0.561	0.588	0.481	0.571	0.504	0.649	0.527	0.498	0.581
Reschedule	0.465	0.403	0.235	0.726	0.8	0.775	0.738		0.859	0.864	0.822	0.843	0.693	0.702	0.66	0.719	0.729	0.703	0.653	0.648	0.74
Skipped	0.472	0.455	0.265	0.746	0.782	0.739	0.725	0.859		0.873	0.866	0.853	0.699	0.73	0.653	0.774	0.772	0.781	0.681	0.703	0.743
Not able to leave house	0.453	0.332	0.307	0.747	0.792	0.761	0.727	0.864	0.873		0.891	0.892	0.732	0.755	0.687	0.737	0.756	0.753	0.719	0.662	0.728
Stuck	0.459	0.389	0.301	0.704	0.742	0.718	0.661	0.822	0.866	0.891		0.909	0.782	0.806	0.739	0.849	0.824	0.772	0.774	0.753	0.804
Worried	0.471	0.449	0.327	0.731	0.755	0.739	0.716	0.843	0.853	0.892	0.909		0.737	0.755	0.709	0.778	0.732	0.748	0.688	0.724	0.822
Felt bad	0.565	0.424	0.34	0.631	0.699	0.662	0.561	0.693	0.699	0.732	0.782	0.737		**0.975**	0.936	**0.956**	0.909	0.906	0.884	0.867	0.935
Isolated	0.541	0.449	0.455	0.658	0.698	0.625	0.588	0.702	0.73	0.755	0.806	0.755	**0.975**		0.943	**0.956**	0.936	0.913	0.914	0.881	0.923
Embarrassed	0.513	0.419	0.321	0.566	0.657	0.616	0.481	0.66	0.653	0.687	0.739	0.709	0.936	0.943		0.889	0.855	0.887	0.855	0.856	0.934
Left out	0.562	0.44	0.41	0.642	0.716	0.666	0.571	0.719	0.774	0.737	0.849	0.778	**0.956**	**0.956**	0.889		0.938	0.924	0.933	0.88	0.917
Lack companionship	0.515	0.407	0.48	0.661	0.703	0.647	0.504	0.729	0.772	0.756	0.824	0.732	0.909	0.936	0.855	0.938		0.834	0.901	0.808	0.906
Advance planning		0.741	0.388	0.542	0.551	0.533	0.432	0.465	0.472	0.453	0.459	0.471	0.565	0.541	0.513	0.562	0.515	0.542	0.564	0.549	0.502
Backup plan	0.741		0.415	0.454	0.411	0.415	0.436	0.403	0.455	0.332	0.389	0.449	0.424	0.449	0.419	0.44	0.407	0.372	0.345	0.415	0.383
Police stop	0.523	0.272	0.281	0.635	0.522	0.56	0.588	0.61	0.662	0.615	0.569	0.55	0.701	0.739	0.611	0.695	0.739	0.772	0.688	0.682	0.586
Felt unsafe	0.37	0.39	0.212	0.635	0.604	0.657	0.635	0.643	0.728	0.668	0.712	0.73	0.641	0.658	0.674	0.656	0.612	0.702	0.567	0.646	0.675
Did not get invited	0.542	0.372	0.375	0.615	0.725	0.727	0.649	0.703	0.781	0.753	0.772	0.748	0.906	0.913	0.887	0.924	0.834		**0.958**	0.8	0.821
Avoiding	0.564	0.345	0.377	0.604	0.714	0.689	0.527	0.653	0.681	0.719	0.774	0.688	0.884	0.914	0.855	0.933	0.901	**0.958**		0.852	0.821
Burden	0.549	0.415	0.318	0.555	0.65	0.584	0.498	0.648	0.703	0.662	0.753	0.724	0.867	0.881	0.856	0.88	0.808	0.8	0.852		0.861
Relationship effects	0.502	0.383	0.391	0.691	0.698	0.661	0.581	0.74	0.743	0.728	0.804	0.822	0.935	0.923	0.934	0.917	0.906	0.821	0.821	0.861	