
US 202 TRAVEL PATTERN ANALYSIS
SECTION 400
SWEDESFORD ROAD TO I-76



SECTION 400

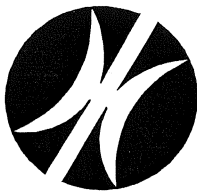
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Delaware Valley Regional Planning Commission

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DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

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ABSTRACT

US 202 section 400 extends from Swedesford Road in Chester County to the Schuylkill Expressway (I-76) in Montgomery county, a distance of 5.4 miles. Due to the traffic congestion experienced at the confluence of US 202, US 422, and I-76 efforts to improve this section were undertaken in the mid 1980's. PennDOT, as part of an Enviromental Assessment that is under way, must conduct a Major Investment Study of the corridor. This report presents information on 1990 and 2020 commuter travel patterns within the study area and between the study area and the Philadelphia Central Business District. Home-base work trips were focused on due to the fact that this type of trip is most susceptible for diversion to transit.

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EXECUTIVE SUMMARY

US 202 Section 400 extends northeastward from Swedesford Road in Chester County to the Schuylkill Expressway (I-76) in Montgomery County, a distance of 5.4 miles (see Figure 1). It is a four-lane limited access highway with interchanges at Swedesford Road, Chesterbrook Boulevard, PA 252, Valley Forge Road, US 422, Warner Road and I-76. Major employment centers along Section 400 include King of Prussia Mall, King of Prussia Industrial Park, Chesterbrook Corporate Center and Valley Forge Executive Mall. Other key roads in the corridor include I-76 which connects the PA Turnpike to Center City Philadelphia and US 422 which extends from US 202 to Pottstown.

In addition to highways, the corridor contains an extensive transit network. The R5 Regional Rail Line operates with half hour service between Paoli and Center City; less frequent service is available to Downingtown and Parkesburg. A fair number of reverse commuters use the R5 Line and series 200 buses to travel between Philadelphia and businesses along the corridor. Access to King of Prussia Mall is available from Philadelphia via the Route 100 Norristown High Speed Line and Route 124 bus from Gulph Mills Station.

Two underutilized freight rail lines in the study area have been identified as potential rights of way for passenger rail service. The proposed Cross County Metro would parallel US 202 and the PA Turnpike from Exton in Chester County to Morrisville in Bucks County via the Trenton Cutoff; the other proposed passenger service would parallel US 422 along the Schuylkill River to Pottstown.

Traffic congestion is a daily occurrence during both peaks and frequently during the day, at the confluence of US 202, US 422 and I-76. Typically, northbound US 202 backs up from I-76 to PA 252 during both peak periods; US 422 backs up from US 202 beyond the PA Turnpike in the morning; and I-76 backs up about one mile from US 202 during both peak periods.

Efforts to improve US 202 Section 400 were initiated in the mid 1980's by Upper Merion and Tredyffrin Townships. Recognizing the importance of US 202 as a high-tech growth corridor, the Pennsylvania Department of Transportation (PennDOT) in July 1989 created an Executive Committee to oversee and expedite the development of improvement plans including Section 400.

PennDOT is conducting an Environmental Assessment (EA) of widening US 202 to six lanes, reconfiguring the US 202/US 422/I-76 interchange, and constructing ancillary improvements to the cross streets and Swedesford Road. As part of the EA process, PennDOT must conduct a Major Investment Study (MIS) of the corridor. Federal planning regulations state that when a major investment is proposed, such as widening a limited access highway, a major investment

study must be conducted. The objective of an MIS is to link the project development process and the planning process by insuring earlier consideration of a full range of strategies, and to incorporate the financial and air quality implications of the project into the planning process.

To coordinate the MIS for Section 400, PennDOT established a steering committee composed of Federal Highway Administration (FHWA), Federal Transit Administration (FTA), PennDOT, SEPTA, Chester and Montgomery Counties, Upper Merion and Tredyffrin Townships, the Delaware Valley Regional Planning Commission (DVRPC) and the Greater Valley Forge TMA.

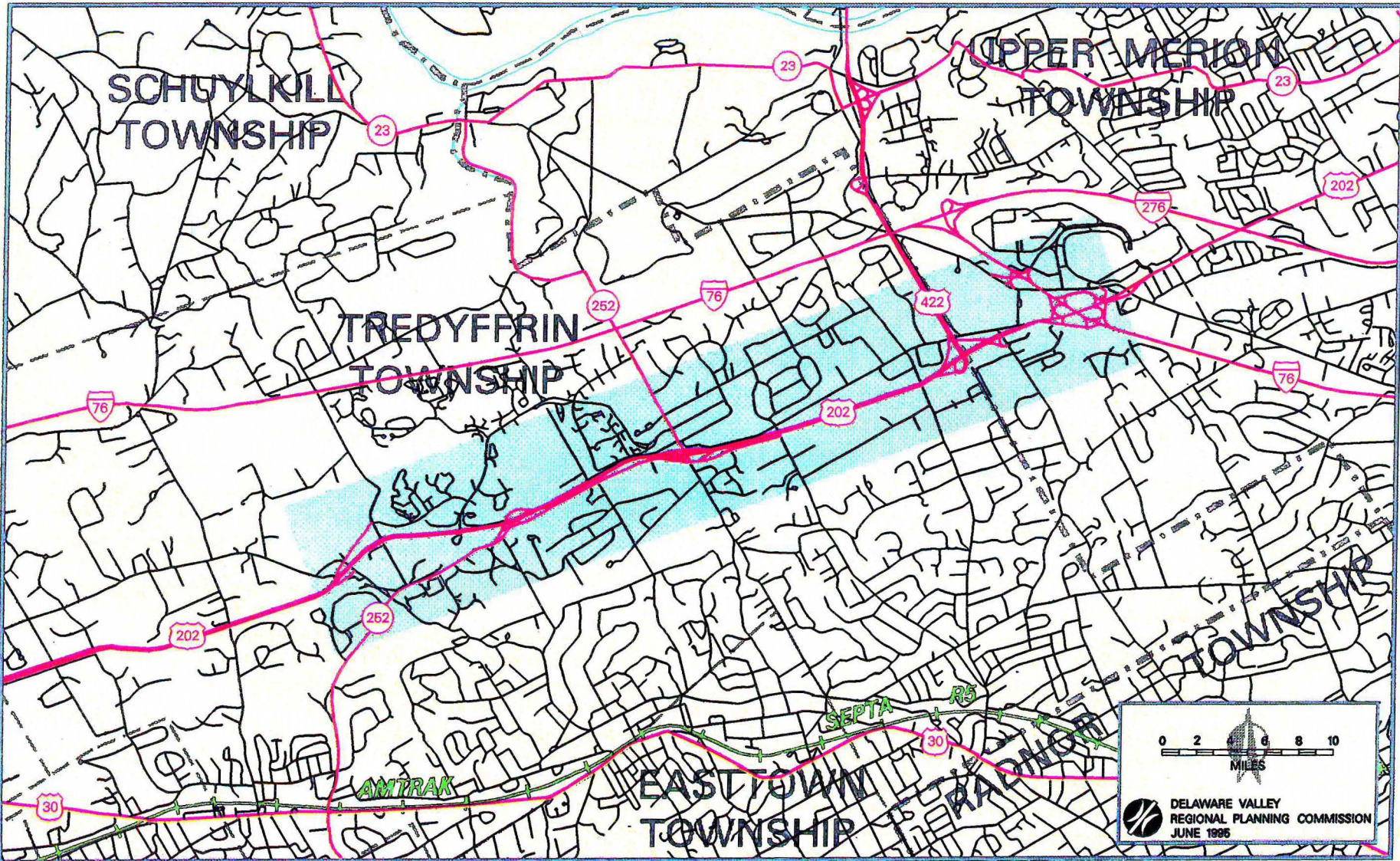
For MIS purposes, US 202 Section 400 is considered a "pipeline" project because the EA was underway prior to the MIS regulations taking effect and no Finding Of No Significant Impact (FONSI) was issued by FHWA. In accordance with the federal regulations, the steering committee met to determine whether a full range of alternatives was considered as part of the EA. At a July 26, 1994 meeting, the committee deemed that the range of alternatives examined as part of the EA studies was satisfactory and the consultant should document the EA planning process in the MIS.

When the MIS work program was presented to DVRPC's Regional Citizens Committee (RCC) some committee members questioned whether the MIS was giving adequate consideration to transit as a viable alternative. Specifically, would the construction of a passenger rail line between Pottstown and Norristown sufficiently lower traffic volumes through the US 422/US 202 bottleneck; would the construction of the Cross County Metro be more effective than widening US 202; and was it possible to extend the Route 100 Norristown High Speed Line to King of Prussia Mall?

As a consequence of these questions, PennDOT and their consultant Boles, Smyth Associates requested DVRPC to document travel patterns in the study area. This report presents information on 1990 and 2020 commuter travel patterns within the study area and between the study area and the Philadelphia Central Business District (CBD). It focuses on home-based work trips, the type of trips most susceptible for diversion to transit. By presenting background information on existing and future commuter travel patterns it is hoped that decision-makers will be able to judge whether transit should be considered as a viable option.

The analysis should not be construed as a travel demand forecast but rather as a limited sketch planning analysis. Questions such as ridership demand for the Cross County Metro or projections for rail service between Pottstown and King of Prussia require a full-scale travel simulation with more detailed assumptions regarding growth patterns, stations, fares and service frequencies and transit connections.

FIGURE 1
US 202 SECTION 400
LOCATION MAP



U. S. CENSUS JOURNEY TO WORK DATA

Journey to work data from the 1990 census forms the basis of the forgoing analysis. Journey to work trip patterns are obtained from the long-form census questionnaire distributed to about 17 percent of all households (reported results are adjusted to reflect the total population). Besides journey to work, the long-form also obtains information on employment and other socioeconomic variables.

Transportation information available from the Census includes work trip origins and destinations, mode of transportation, auto vehicle occupancy, mean travel time and departure time for work. Mode of transportation is classified by automobile, public transit, walked, bicycle, work at home and other means. Auto mode is further subdivided into drive alone and carpool; public transit into bus, railroad, or subway. Census transportation data is available in three formats - residence based data, workplace based data or travel origin/destination based data. The U.S. Census Bureau provides the data in CD format; the information is easily extractable through standard data base programs.

To simplify analysis of the US 202 Corridor, the study area was divided into 23 traffic zones (see Figure 2). Along the periphery of the study area, analysis zones are composed of groups of municipalities that reflect common impacts on Section 400. Towards the core of the study area, the analysis zones are on a municipal basis. In the immediate vicinity of Section 400, travel patterns are delineated at the census tract level. The analysis zones are defined in more detail in Table 1.

For the Center City component of the analysis, the Philadelphia CBD was defined as the area bounded by Spring Garden Street, Washington Avenue, the Delaware River and University City.

Even though journey to work travel data produced by the U.S. Census focuses on "home-based work trips," the definition of these trips is different from the traditional home-based work trips in the four-step travel simulation process employed by DVRPC. According to the traditional definition used by DVRPC and other planning agencies, home-based work trips represent travel to and from work. Under the definition used by the Census Bureau only work trips from home to the primary place of employment is counted.

FIGURE 2: STUDY AREA

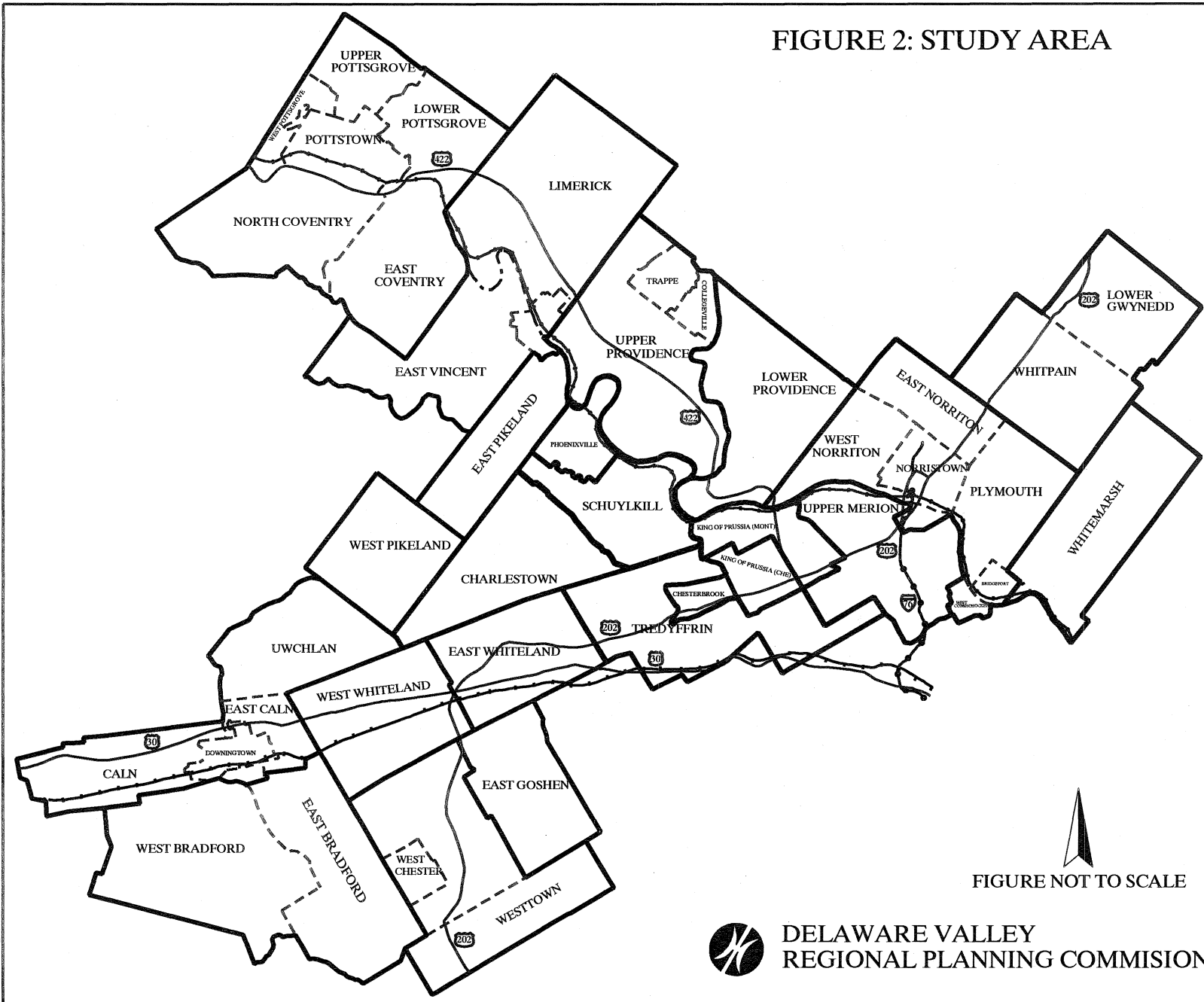


TABLE 1: TRAFFIC ANALYSIS ZONES	
TRAFFIC ANALYSIS ZONE	MUNICIPALITIES
POTTSTOWN AREA	EAST COVENTRY, LOWER POTTS GROVE, POTTSTOWN, SOUTH COVENTRY, UPPER POTTS GROVE, WEST POTTS GROVE
LIMERICK	LIMERICK, EAST VINCENT, SPRING CITY, ROYERSFORD
UPPER PROVIDENCE	UPPER PROVIDENCE, TRAPPE, COLLEGEVILLE
PHOENIXVILLE	PHOENIXVILLE
SCHUYLKILL	SCHUYLKILL
EAST PIKELAND	EAST PIKELAND
LOWER PROVIDENCE	LOWER PROVIDENCE
KING OF PRUSSIA (MONTGOMERY)	UPPER MERION CENSUS TRACT 205898
KING OF PRUSSIA (CHESTER)	TREDYFFRIN CENSUS TRACT 300101
CHESTERBROOK	TREDYFFRIN CENSUS TRACT 300106
TREDYFFRIN	TREDYFFRIN EXCLUDING CENSUS TRACTS 300101 AND 300106
EAST WHITELAND	EAST WHITELAND
WEST WHITELAND	WEST WHITELAND
WEST GOSHEN	WEST CHESTER, WEST GOSHEN, WESTTOWN
DOWNINGTOWN AREA	CALN, DOWNINGTOWN, EAST CALN, UWCHLAN
BRADFORDS	EAST BRADFORD, WEST BRADFORD
EAST GOSHEN	EAST GOSHEN
NORRISTOWN AREA	BRIDGEPORT, EAST NORRITON, NORRISTOWN, PLYMOUTH, WEST NORRITON
WHITPAIN	LOWER GWYNEDD, WHITPAIN
UPPER MERION	UPPER MERION EXCLUDING CENSUS TRACT 205898
WHITEMARSH	WHITEMARSH
WEST PIKELAND	WEST PIKELAND
CHARLESTOWN	CHARLESTOWN

Existing and Future Study Area Travel Patterns

Table 2 presents 1990 journey to work data for the study area. It consists of a twenty-three by twenty-three matrix of work trips to and from each zone in the study area. Each row in the table displays a breakdown of the number of work trips originating from a particular zone and going to any other zone in the study area. The columns of the table represent the destination zones, showing a breakdown of how many people are coming to a particular zone from anywhere in the study area. For example, there are 606 trips originating in the Limerick zone (row two) destined for the Norristown zone (column 18); conversely there are 286 work trips arriving in Lower Providence from the Limerick zone. Generally speaking, the highest trip interchange values are associated with trips internal to its own zone. This is attributable to the tendency of workers to select a residence close to their place of employment, or vice versa.

As illustrated in Table 3 over 60 percent of the work trips that originate in the study area from employed residents are bound for other locations within the study area. An additional 3 percent of the work trips are destined to Center City Philadelphia. The remaining 35 percent of the work trips originating in the study area terminate at other locations throughout the region.

To investigate the future travel patterns in the study area, DVRPC obtained growth factors for the Year 2020 by comparing 1990 and 2020 home-base work trips from the DVRPC's Travel Simulation Model and then applied these growth factors to the 1990 journey to work data. Table 4 presents the resultant 2020 study area travel patterns in a similar manner as the 1990 commuter patterns.

Projected growth in work trips in the study area, on the whole, is high compared to the remainder of the region, see Table 5. Two factors that directly affect work trips are employed residents and employment; growth in employed residents is associated with additional trips emanating from a zone, while growth in employment is identified with additional trips destined to a zone. The growth in commuter trips from each zone in the study area, between 1990 to 2020, is graphically displayed in Figure 3; Figure 4 displays the growth of trips into each zone. Limerick and the Bradfords zones are projected to experience high percent increases of trips emanating from a zone, while the highest growth in work trips into a zone will occur in Upper Providence.

A series of figures included in the Appendix give a graphical representation of 1990 and 2020 work trip patterns presented in Tables 2 and 4 respectively. To simplify the graphical presentation, the zones in the figures are actually "super zones" which are a combination of the original zones from the tables. Each map contains a series of arrows emanating from a designated origin "super zone." For each one of these arrows there is a corresponding number in black representing the amount of 1990 work trips and a corresponding red number

representing the magnitude of 2020 work trips. In general, the figures show that the highest number of work trips made outside of a "super" zone are to those zones that are closest to the origin "super" zone. The further away a destination zone is from an origin zone, the number of trips destined to that zone declines. As an example, Figure A10 in the Appendix, which has the Downtown Area as its origin "super" zone, shows that, in 1990, the most popular destination for work trips is the Goshens "super" zone (4175 trips); as you move further away from Downtown, the number of trips decrease, with 1017 trips to King of Prussia and only 202 trips to the Central Montgomery County zone.

TABLE 2: 1990 STUDY AREA WORK TRIP PATTERNS

ORIGIN ZONE	DESTINATION ZONE																						
	POTTSTOWN AREA	LIMERICK	UPPER PROVIDENCE	PHOENIXVILLE	SCHUYLKILL	EAST PIKELAND	LOWER PROVIDENCE	KING OF PRUSSIA (MONT.)	KING OF PRUSSIA (CHE.)	CHESTERBROOK	TREDYFFRIN	EAST WHITELAND	WEST WHITELAND	WEST GOSHEN	DOWNINGTOWN AREA	BRADFORDS	EAST GOSHEN	NORRISTOWN AREA	WHITPAIN	UPPER MERION	WHITEMARSH	WEST PIKELAND	CHARLESTOWN
POTTSTOWN AREA	10668	1395	1006	545	182	56	472	662	35	37	372	364	181	233	174	132	25	1093	159	467	68	42	17
LIMERICK	740	1861	902	545	206	73	286	359	69	24	222	221	79	143	70	40	19	606	95	330	41	54	19
UPPER PROVIDENCE	251	466	1406	289	115	49	495	713	35	21	197	233	44	45	35	10	8	951	181	268	127	0	0
PHOENIXVILLE	189	254	411	1564	353	45	201	551	73	53	242	624	217	222	131	164	28	428	27	225	27	15	39
SCHUYLKILL	23	12	34	144	136	41	45	340	41	8	193	104	29	18	11	19	0	175	6	68	4	10	30
EAST PIKELAND	101	139	128	405	133	61	63	258	41	0	107	357	76	46	58	42	8	106	15	87	29	6	8
LOWER PROVIDENCE	78	74	312	88	69	0	1313	1027	29	34	215	277	91	85	18	26	24	1983	319	502	186	0	0
KING OF PRUSSIA (M.)	15	13	9	0	44	0	6	442	69	0	41	63	41	25	13	0	0	92	9	161	21	0	0
KING OF PRUSSIA (C.)	4	0	29	14	18	0	20	154	43	18	124	41	24	13	0	8	0	36	32	75	0	0	0
CHESTERBROOK	18	0	0	24	31	0	28	275	92	30	185	136	63	34	25	16	12	39	59	272	34	12	0
TREDYFFRIN	49	23	40	43	79	0	89	651	138	60	1150	495	123	152	70	0	60	264	143	288	69	0	0
EAST WHITELAND	0	0	0	37	14	16	35	270	33	7	232	971	236	185	98	13	43	76	14	67	35	7	15
WEST WHITELAND	32	6	7	61	16	9	23	203	73	18	239	606	773	1155	215	136	142	110	76	106	15	0	0
WEST GOSHEN	66	22	44	83	33	0	40	461	78	64	547	1238	1188	9963	593	351	604	300	58	124	23	0	11
DOWNINGTOWN AREA	18	37	43	133	67	24	76	608	175	20	705	1553	1717	1843	3201	1552	301	193	88	807	79	76	26
BRADFORDS	9	22	24	18	46	0	26	175	59	0	170	364	477	1880	667	1193	151	100	20	35	17	5	11
EAST GOSHEN	28	9	0	20	6	7	37	251	46	18	257	494	359	1553	109	103	367	100	40	102	0	0	0
NORRISTOWN AREA	221	17	548	166	236	22	1366	2602	269	42	694	549	308	247	112	156	55	17289	2544	2036	1993	0	0
WHITPAIN	41	23	22	0	35	6	186	233	32	6	106	73	50	20	22	5	8	1460	2169	255	409	0	0
UPPER MERION	15	0	155	51	140	0	125	2163	162	30	407	298	101	110	20	40	14	1534	286	2243	127	8	27
WHITEMARSH	0	13	28	18	12	0	30	127	32	0	69	50	9	48	6	0	0	1132	333	132	1018	0	0
WEST PIKELAND	5	0	0	7	6	13	6	74	0	0	42	45	34	74	59	6	13	50	18	24	5	93	5
CHARLESTOWN	114	14	6	227	60	31	0	139	5	0	98	220	93	89	20	17	20	7	6	44	0	0	158

TABLE 3: COMPARISON OF STUDY AREA AND CBD WORK TRIPS TO TOTAL WORK TRIPS					
ZONE	EMPLOYED RESIDENTS	EMPLOYED IN STUDY AREA	EMPLOYED IN CBD	EMPLOYED IN STUDY AREA (%)	EMPLOYED IN CBD (%)
POTTSTOWN AREA	25278	18385	147	72.7%	0.5%
LIMERICK	9787	7004	133	71.6%	1.4%
UPPER PROVIDENCE	8779	5939	151	67.7%	1.7%
PHOENIXVILLE	8120	6083	137	74.9%	1.7%
SCHUYLKILL	2859	1491	110	52.2%	3.8%
EAST PIKELAND	3152	2274	37	72.1%	1.2%
LOWER PROVIDENCE	10264	6750	218	65.8%	2.1%
TREDYFFRIN *	16127	6024	1526	37.4%	9.5%
EAST WHITELAND	4663	2404	235	51.6%	5%
WEST WHITELAND	7034	4021	253	57.2%	3.6%
WEST GOSHEN	25522	15891	649	62.3%	2.5%
DOWNINGTOWN AREA	19256	13342	319	69.3%	1.7%
BRADFORDS	8872	5469	249	61.6%	2.8%
EAST GOSHEN	8408	3906	355	46.5%	4.2%
NORRISTOWN	43673	31472	1167	72.1%	2.7%
WHITPAIN	12919	5161	756	39.9%	5.9%
UPPER MERION **	15761	9120	678	57.9%	4.3%
WHITEMARSH	8006	3057	664	38.2%	8.3%
WEST PIKELAND	1159	579	78	49.9%	6.7%
CHARLESTOWN	1450	1368	56	94.3%	3.9%
TOTAL	241089	149740	7918	62.1%	3.3%

* Includes King of Prussia (Chester) and Chesterbrook zones.

** Includes King of Prussia (Montgomery) zone

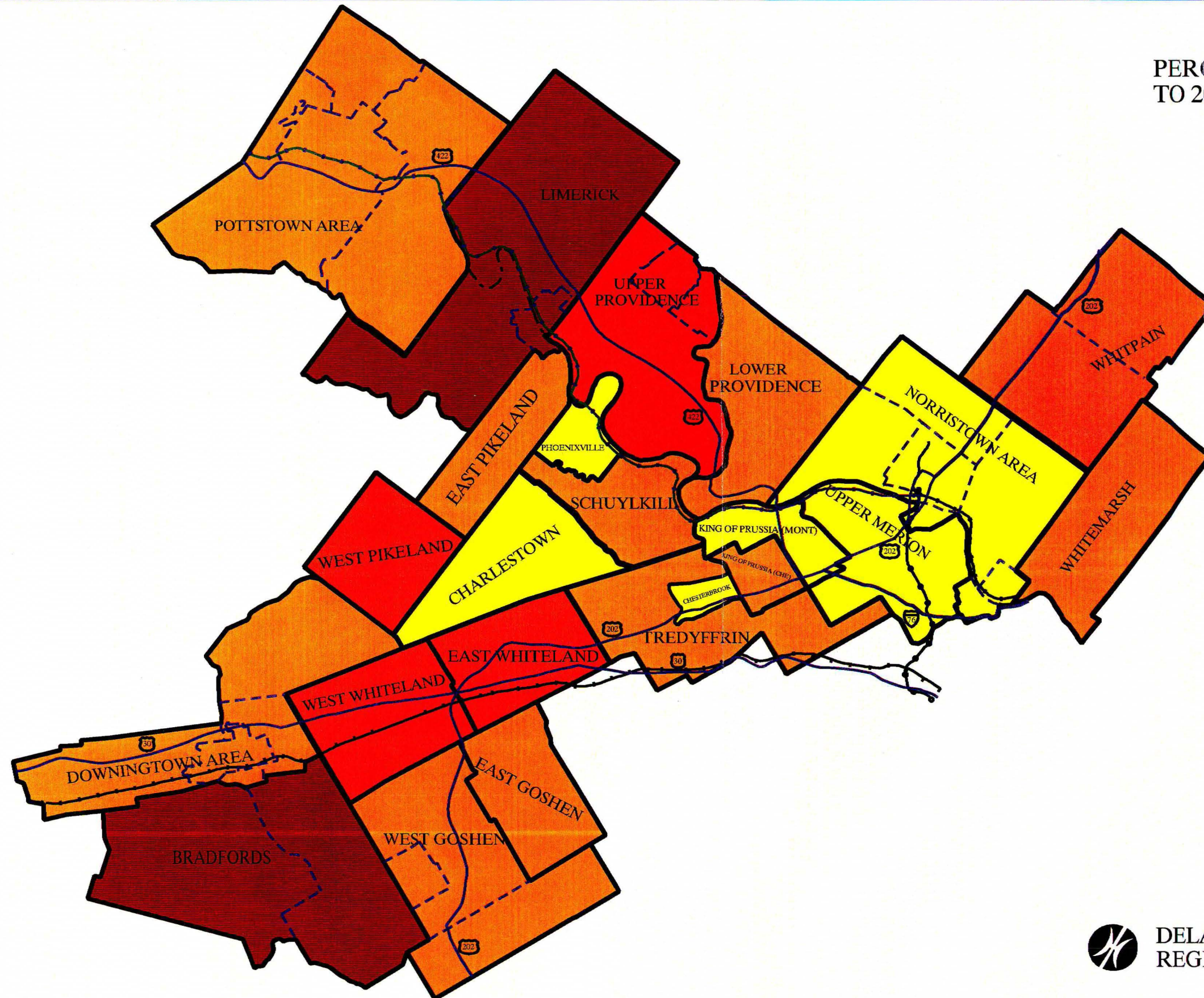
TABLE 4: 2020 STUDY AREA WORK TRIP PATTERNS

ORIGIN ZONE	DESTINATION ZONE																						
	POTTSTOWN AREA	LIMERICK	UPPER PROVIDENCE	PHOENIXVILLE	SCHUYLKILL	EAST PIKELAND	LOWER PROVIDENCE	KING OF PRUSSIA (MONT.)	KING OF PRUSSIA (CHEST.)	CHESTERBROOK	TREDYFFRIN	EAST WHITELAND	WEST WHITELAND	WEST GOSHEN	DOWNINGTOWN AREA	BRADFORDS	EAST GOSHEN	NORRISTOWN AREA	WHITPAIN	UPPER MERION	WHITEMARSH	WEST PIKELAND	CHARLESTOWN
POTTSTOWN AREA	12695	1841	1861	665	242	76	788	953	70	71	751	517	295	291	226	152	41	1904	243	710	103	47	25
LIMERICK	1436	3964	2309	801	344	119	669	711	181	59	591	393	160	227	120	44	24	1439	225	680	90	72	36
UPPER PROVIDENCE	387	774	2924	409	193	84	975	1248	92	49	492	412	92	69	54	27	19	1331	319	501	217	0	0
PHOENIXVILLE	208	334	633	1784	378	49	269	639	117	81	387	705	291	248	154	196	39	603	32	274	31	15	47
SCHUYLKILL	25	13	57	153	166	49	68	445	74	14	347	131	44	19	13	19	0	283	9	93	5	10	40
EAST PIKELAND	111	157	220	437	160	75	96	338	76	0	194	453	141	51	70	63	12	172	20	118	40	6	11
LOWER PROVIDENCE	80	82	462	90	169	0	1773	1243	49	54	363	332	126	89	19	35	35	2836	405	643	225	0	0
KING OF PRUSSIA (M.)	16	15	13	0	44	0	7	473	101	0	76	66	49	25	15	0	0	123	10	180	23	0	0
KING OF PRUSSIA (C.)	4	0	40	17	19	0	26	169	60	26	190	45	31	13	0	8	0	51	37	86	0	0	0
CHESTERBROOK	18	0	0	27	31	0	34	289	132	42	268	141	77	35	26	16	15	53	63	302	37	12	0
TREDYFFRIN	57	31	57	49	97	2	113	807	192	83	1679	510	149	153	72	4	76	359	154	317	75	3	5
EAST WHITELAND	4	10	0	43	17	18	56	362	59	12	427	1130	352	211	122	15	68	132	19	95	48	7	21
WEST WHITELAND	41	8	15	85	24	12	44	309	170	39	516	915	1260	1490	297	166	260	231	125	73	24	0	0
WEST GOSHEN	79	28	75	90	39	0	62	599	148	108	979	1585	1687	11358	670	421	930	491	79	169	28	0	15
DOWNINGTOWN AREA	21	42	80	158	86	32	130	837	352	38	1375	2190	2627	2156	3713	1599	518	353	130	1202	110	79	39
BRADFORDS	15	38	63	30	91	0	63	359	173	0	479	739	1064	3252	1021	1801	371	262	44	75	35	7	12
EAST GOSHEN	33	12	0	21	6	8	54	314	83	30	442	613	492	1762	125	128	528	160	50	135	0	0	0
NORRISTOWN AREA	221	17	674	189	334	25	1557	2862	371	55	958	648	354	257	119	156	65	20920	2820	2138	1994	0	0
WHITPAIN	41	25	31	0	37	12	240	261	56	8	165	82	61	21	27	5	8	2059	2516	301	466	0	0
UPPER MERION	15	0	219	51	140	0	151	2336	227	42	606	317	123	112	21	40	18	2025	315	2467	136	8	30
WHITEMARSH	0	14	41	20	12	0	38	142	51	0	106	53	13	48	6	0	0	1800	380	157	1191	0	0
WEST PIKELAND	8	0	0	10	9	22	11	125	0	0	99	75	66	108	94	21	26	109	34	44	10	118	9
CHARLESTOWN	124	15	8	257	36	31	0	142	7	0	138	235	110	92	22	17	24	9	6	49	0	0	171

TABLE 5: CHANGE IN WORK TRIPS FROM 1990 TO 2020

	1990 TRIPS FROM ZONE	2020 TRIPS FROM ZONE	ACTUAL CHANGE	PERCENT CHANGE	1990 TRIPS TO ZONE	2020 TRIPS TO ZONE	ACTUAL CHANGE	PERCENT CHANGE
POTTSTOWN AREA	18385	24567	6182	34%	12685	15639	2954	23%
LIMERICK	7004	14694	7690	110%	4400	7420	3020	69%
UPPER PROVIDENCE	5939	10668	4729	80%	5154	9782	4628	90%
PHOENIXVILLE	6083	7514	1431	24%	4482	5451	969	22%
SCHUYLKILL	1491	2077	586	39%	2037	2659	622	31%
EAST PIKELAND	2274	3021	747	33%	453	617	164	36%
LOWER PROVIDENCE	6750	9110	2360	35%	4968	7224	2256	45%
KING OF PRUSSIA (M.)	1064	1236	172	16%	12738	15963	3225	25%
KING OF PRUSSIA (C.)	653	822	169	26%	1629	2841	1212	74%
CHESTERBROOK	1385	1618	233	17%	490	811	321	66%
TREDYFFRIN	3986	5041	1055	26%	6614	11628	5014	76%
EAST WHITELAND	2404	3360	956	40%	9376	12419	3043	32%
WEST WHITELAND	4021	6120	2099	52%	6313	9664	3351	53%
WEST GOSHEN	15891	19640	3749	24%	18183	22087	3904	21%
DOWNINGTOWN AREA	13342	17867	4525	34%	5727	7002	1275	22%
BRADFORDS	5469	9994	4525	83%	4029	4947	918	23%
EAST GOSHEN	3906	4996	1090	28%	1902	3077	1175	62%
NORRISTOWN AREA	31472	36937	5465	17%	28124	37373	9249	33%
WHITPAIN	5161	6422	1261	24%	6697	8035	1338	20%
UPPER MERION	8056	9428	1372	17%	8718	10809	2091	24%
WHITEMARSH	3057	4072	1015	33%	4327	5091	764	18%
WEST PIKELAND	579	998	419	72%	328	384	56	17%
CHARLESTOWN	1368	1493	125	9%	366	461	95	26%
TOTAL	149740	201695	51955	35%	149740	201384	51644	34%

FIGURE 3



PERCENT CHANGE FROM 1990 TO 2020 IN TOTAL WORK TRIPS FROM A ZONE

- 0-19
- 20-39
- 40-79
- 80+

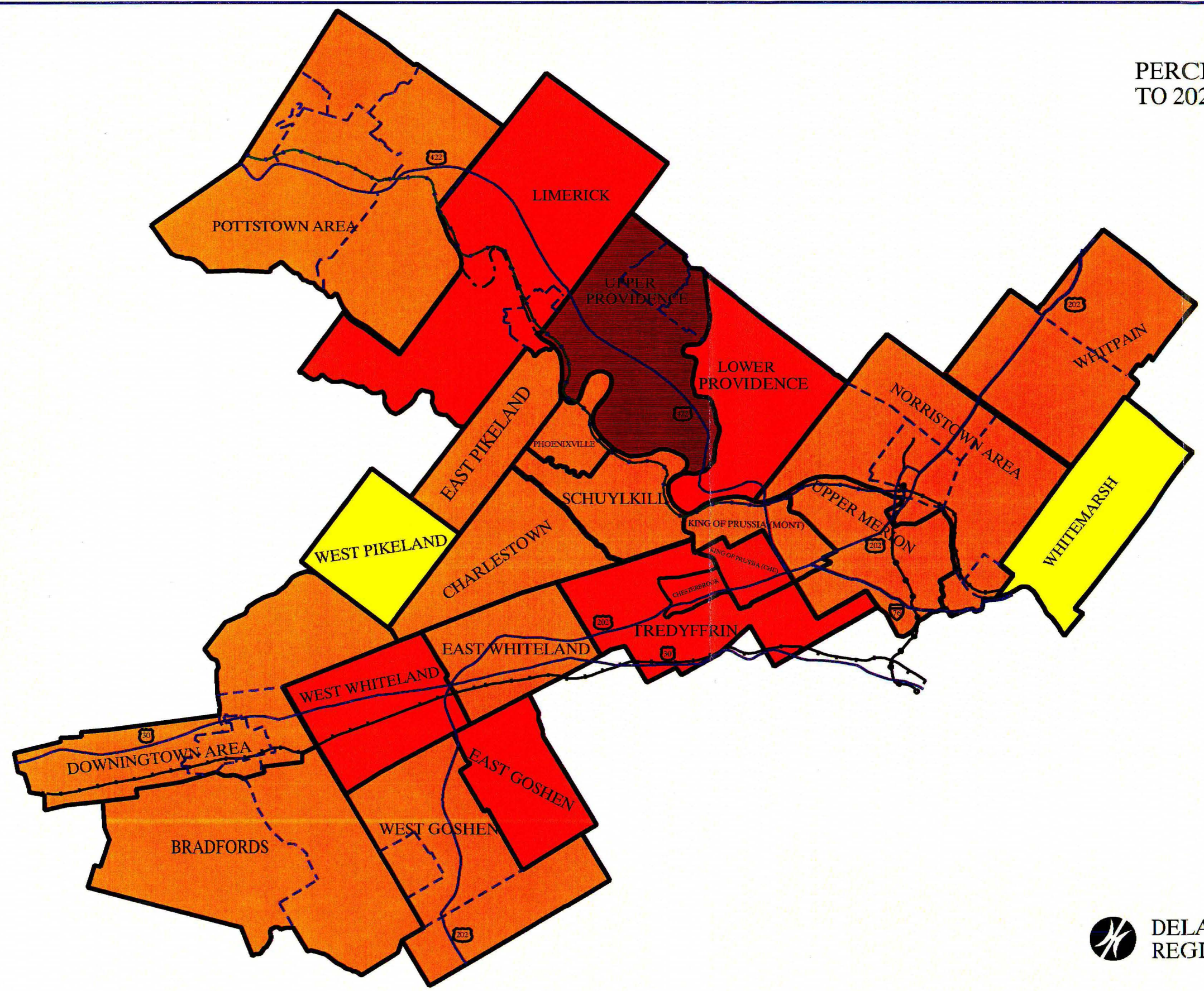


FIGURE NOT TO SCALE



DELAWARE VALLEY REGIONAL PLANNING COMMISSION

FIGURE 4



PERCENT CHANGE FROM 1990
TO 2020 IN TOTAL WORK TRIPS
TO A ZONE

- 0-19
- 20-39
- 40-79
- 80+



FIGURE NOT TO SCALE



DELAWARE VALLEY
REGIONAL PLANNING COMMISSION

Travel Patterns to and from Philadelphia CBD

Table 6 presents 1990 journey to work travel patterns between the origin zones in the study area and the Philadelphia CBD; Figure 6 graphically portrays this information. As the table and figure show, commutation to Center City is much higher in the US 202 corridor than in the US 422 corridor; however, the greatest commute is from the Norristown Area/Upper Merion/ Tredyffrin Township sub-region outside the US 202 and US 422 corridors. Trip making patterns reflect the historical impact of the Main Line and Norristown Line in spawning bedroom communities for Center City workers.

Modal distribution of work trips to the Philadelphia CBD is also shown in Table 6. In aggregate, 47 percent of the work trips from the study area to Center City are drive alone trips; 9 percent are by carpooling and 44 percent by transit. Modal distribution varies significantly among the corridors with 54 percent of the commuters in the US 202 corridor using transit and 29 percent of the commuters in the US 422 corridor using transit. High transit use along the US 202 corridor (see Figure 7), is again a reflection of the historical development of the Main Line as a Center City transit-oriented corridor.

The analysis of potential transit demand is based upon the concept of "capture ratio." For this study, the "capture ratio" is defined as the share of all work trips destined to Center City using SEPTA regional rail. This factor is important for a transit agency; it lets the agency know what share of the total commuting market it serves. "Capture ratio" is a function of several factors: service frequency, fare zone structure, parking availability, comparative travel times to driving, and historical implications. DVRPC has studied "capture ratios" along assorted regional rail line segments for SEPTA. In these studies several patterns have emerged; while it is not possible to associate a particular "capture ratio" with specific service levels, it may be possible to make an educated guess as to the magnitude of mode share or capture ratio increase possible in a corridor by comparisons with other corridors. For this study, "capture ratios" offer a quick sketch planning tool to estimate the number of motorists diverted to transit, and off the highway system, under various transit scenarios. Whether it is totally attainable to reach specified "capture ratios" or what specific service improvements are required to achieve them is immaterial to measuring the theoretical benefits that transit improvements may accomplish in reducing highway demand.

The last column in Table 6, titled *Transit Trips Percentage*, in effect presents the "capture ratio" for all of the zones in the study area. While the study area's average "capture ratio" is 44 percent, there is considerable variation, with King of Prussia (Chester) zone having the highest "capture ratio" at 68 percent, and the Limerick zone having the lowest at 9 percent (see Figure 8). Zones along the US 202 corridor have much higher "capture ratios" than the zones along the US 422 corridor. The R5 Line in the US 202 corridor displays the highest "capture ratios" so far observed in the Regional Rail system.

DVRPC examined the travel demand implications of a 60 percent "capture ratio" for the US 422 corridor. A 60 percent capture ratio was selected based upon the high "capture ratios" observed along US 202. Since one purpose of this exercise is to provide information on the impact transit may have in reducing travel demand in Section 400, it also was felt an over-estimate of demand would be more beneficial than an under-estimate. For the US 202 corridor, the implications of a 60 percent and 70 percent "capture ratio" were evaluated. The former was selected because it represents the upper range of the existing "capture ratios," the latter value represents an optimistic value (similar to the 60 percent used in the US 422 corridor).

Tables 7 and 8 respectively present the 1990 transit demand analysis for the US 422 and US 202 corridors. If a 60 percent "capture ratio" was achieved in the US 422 corridor, the number of transit trips would nearly double from 301 trips to slightly over 600 trips. A good portion of the 600 trips would be removed from the US 202/US 422/I-76 bottleneck. In the US 202 corridor, approximately 280 and 650 additional commuters would divert to transit if a 60 or 70 percent "capture ratio" was achieved through service improvements.

DVRPC estimated 2020 commuter trips between the study area and Philadelphia CBD by applying the 1990 - 2020 growth factors obtained from the Travel Simulation Model in a manner similar to estimating future work trips within the study area. Table 9 presents the change in total trips between 1990 and 2020 between the study area and Center City; Figure 9 graphically shows total 2020 work trips to Center City from the study area. Overall, there will be a 14 percent increase in work trips to Center City. In largely builtout areas such as Upper Merion or Tredyffrin, the increase is minimal (less than 5 percent). In the outer fringes of the study area where residential development is more dramatic, increases of over 50 percent are possible.

We estimated base case 2020 transit trips by applying 1990 "capture ratios" to the total work trips to Center City, as presented in Table 9 for the Year 2020. "Capture ratios" may vary over time due to increases in the number of autos per household, increasing auto congestion, deterioration in rail service or other external factors. However, since this is a sketch planning analysis, DVRPC decided to employ the same 1990 "capture ratios." The resultant number transit trips to Center City is shown in Table 10 and graphically displayed in Figure 10.

Tables 11 and 12 respectively present the transit demand analysis for US 422 and US 202 corridors based upon 2020 travel patterns and increased "capture ratios." In 1990, in the US 422 corridor, there were 1030 commuter trips to Center City, with 300 using transit. By 2020 the total number of trips will increase to 1355, with 381 taking transit. If rail service was instituted in the corridor, and a 60 percent "capture ratio" was achieved, more than 800 commuters might use transit. Since this is a sketch planning analysis, other factors associated with the proposed rail service, such as changes in land use patterns or the inducement of additional Center City-bound commuters to the corridor, were not accounted for. In the US 202 corridor, the total number of commuters to Center City will increase from 4000 to 4800 over 20 years; base transit trips will increase from 2160 to 2590. Achieving a 60 percent capture ratio may generate 350 additional transit trips; a 70 percent "capture ratio" may generate 780 new transit trips.

Reverse commute trips from Philadelphia to the study area are shown in Table 13. DVRPC analyzed six origin zones in Philadelphia based on county planning area.

Table 14 shows transit trips from Philadelphia to the study area. South Philadelphia and Lower North Philadelphia each generate over 1000 reverse trips to the study area, West Philadelphia generates over 2,300 reverse commute trips. The most common destinations are the Norristown Area, King of Prussia (Montgomery County) and Upper Merion. Generally, there are relatively few reverse transit trips from Philadelphia to the study area, the exceptions are West Philadelphia and Lower North Philadelphia, each with over 400 trips; major destinations by transit are the Norristown Area, King of Prussia (Montgomery County) and Upper Merion.

TABLE 6: 1990 MODAL DISTRIBUTION TO PHILADELPHIA CBD							
ORIGIN ZONE	TOTAL TRIPS	DRIVE ALONE	DRIVE ALONE (%)	CARPOOL	CARPOOL (%)	TRANSIT TRIPS	TRANSIT TRIPS (%)*
POTTSTOWN AREA	147	114	78%	17	12%	16	11%
LIMERICK	133	114	86%	7	5%	12	9%
UPPER PROVIDENCE	151	61	40%	28	19%	62	42%
PHOENIXVILLE	137	66	48%	34	25%	37	27%
SCHUYLKILL	110	42	38%	16	15%	52	47%
EAST PIKELAND	37	7	19%	14	38%	16	43%
LOWER PROVIDENCE	218	112	51%	38	17%	68	31%
KING OF PRUSSIA (M.)	97	44	45%	15	15%	38	39%
KING OF PRUSSIA (C.)	152	34	22%	11	7%	104	68%
CHESTERBROOK	302	117	39%	10	3%	175	58%
TREDYFFRIN	1072	347	32%	61	6%	664	62%
EAST WHITELAND	235	105	45%	0	0%	130	55%
WEST WHITELAND	253	102	40%	7	3%	144	57%
WEST GOSHEN	649	330	51%	52	8%	258	40%
DOWNINGTOWN AREA	319	103	32%	28	9%	188	59%
BRADFORDS	249	92	37%	15	6%	142	57%
EAST GOSHEN	355	132	37%	26	7%	188	53%
NORRISTOWN AREA	1167	525	45%	120	10%	516	44%
WHITPAIN	756	429	57%	36	5%	285	38%
UPPER MERION	678	339	50%	82	12%	257	38%
WHITEMARSH	664	457	69%	86	13%	121	18%
WEST PIKELAND	78	41	53%	13	17%	24	31%
CHARLESTOWN	56	20	36%	0	0%	36	64%
TOTAL	8015	3733	47%	716	9%	3533	44%

*Also known as Capture Ratio.

FIGURE 5

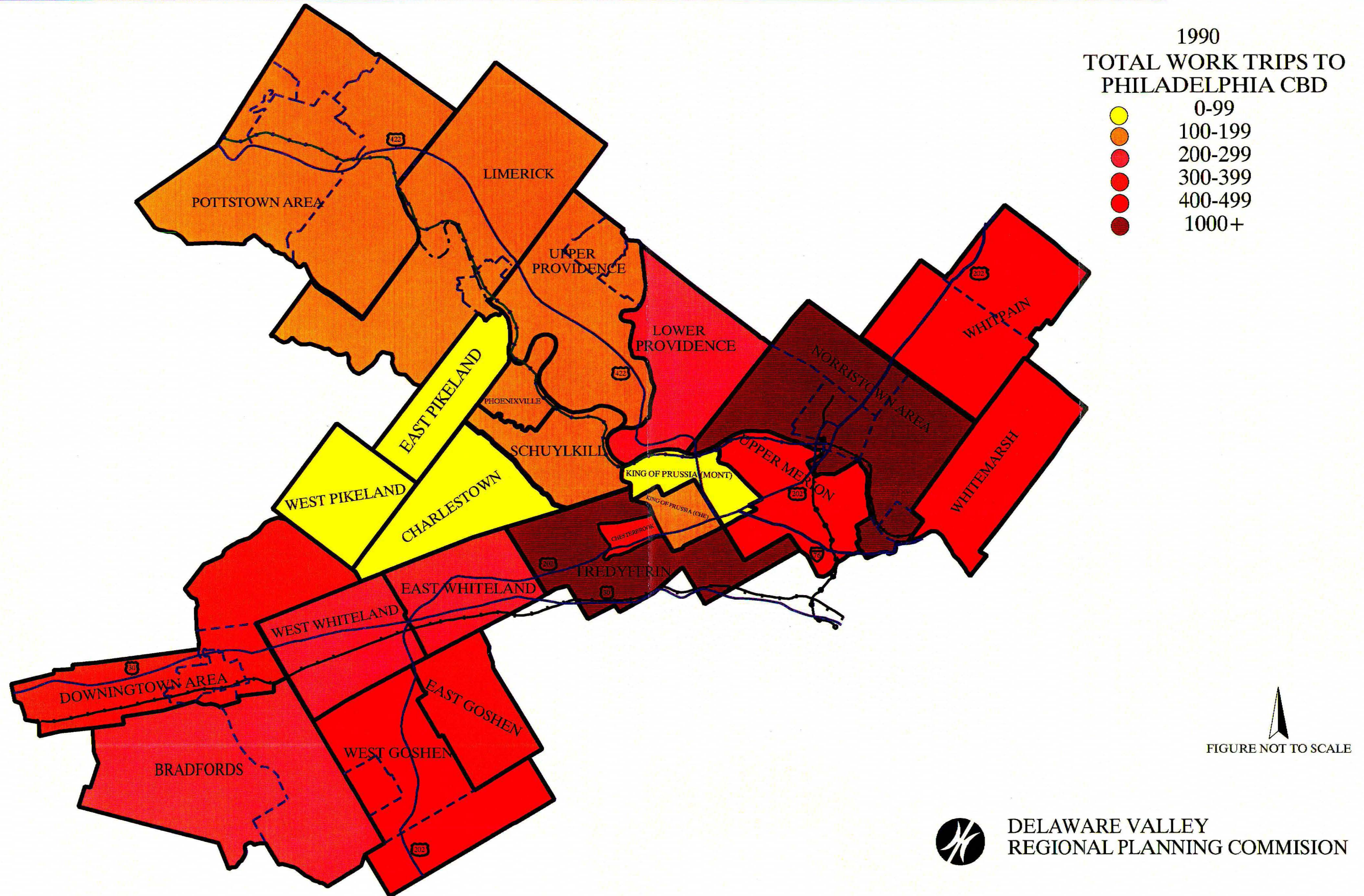


FIGURE 6

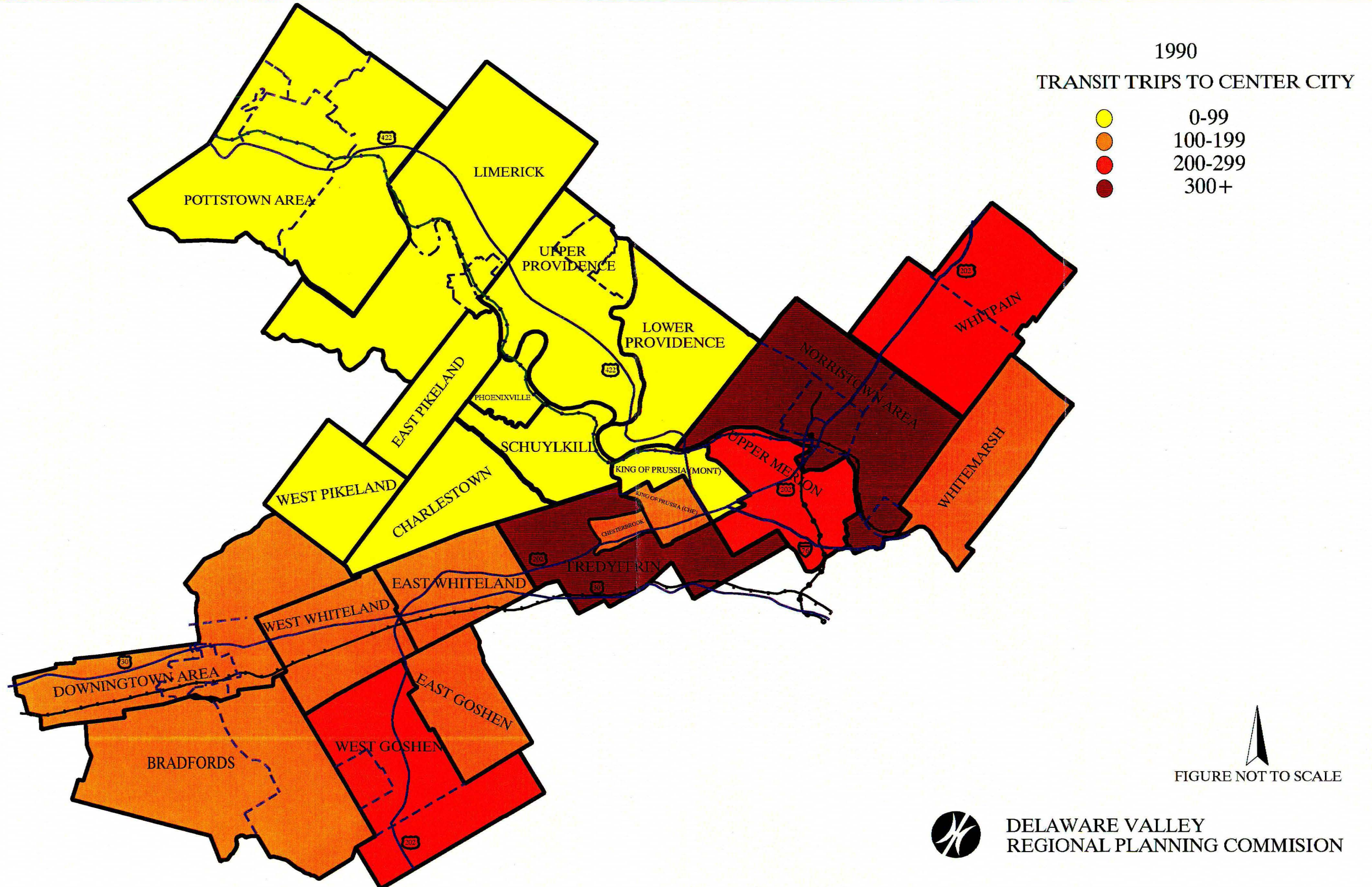


FIGURE NOT TO SCALE

TABLE 7: 1990 US 422 CORRIDOR TRANSIT DEMAND					
ZONE	EXISTING TOTAL TRIPS	EXISTING TRANSIT TRIPS	CAPTURE RATIO	PROPOSED CAPTURE: 60%	
				ADDITIONAL TRANSIT	ESTIMATED TRANSIT
POTTSTOWN AREA	147	16	11%	72	88
LIMERICK	133	12	9%	68	80
UPPER PROVIDENCE	151	62	41%	29	91
PHOENIXVILLE	137	37	27%	45	82
SCHUYLKILL	110	52	47%	14	66
EAST PIKELAND	37	16	43%	6	22
LOWER PROVIDENCE	218	68	31%	63	131
KING OF PRUSSIA (M.)	97	38	39%	20	58
TOTAL	1030	301	29%	317	618

FIGURE 7

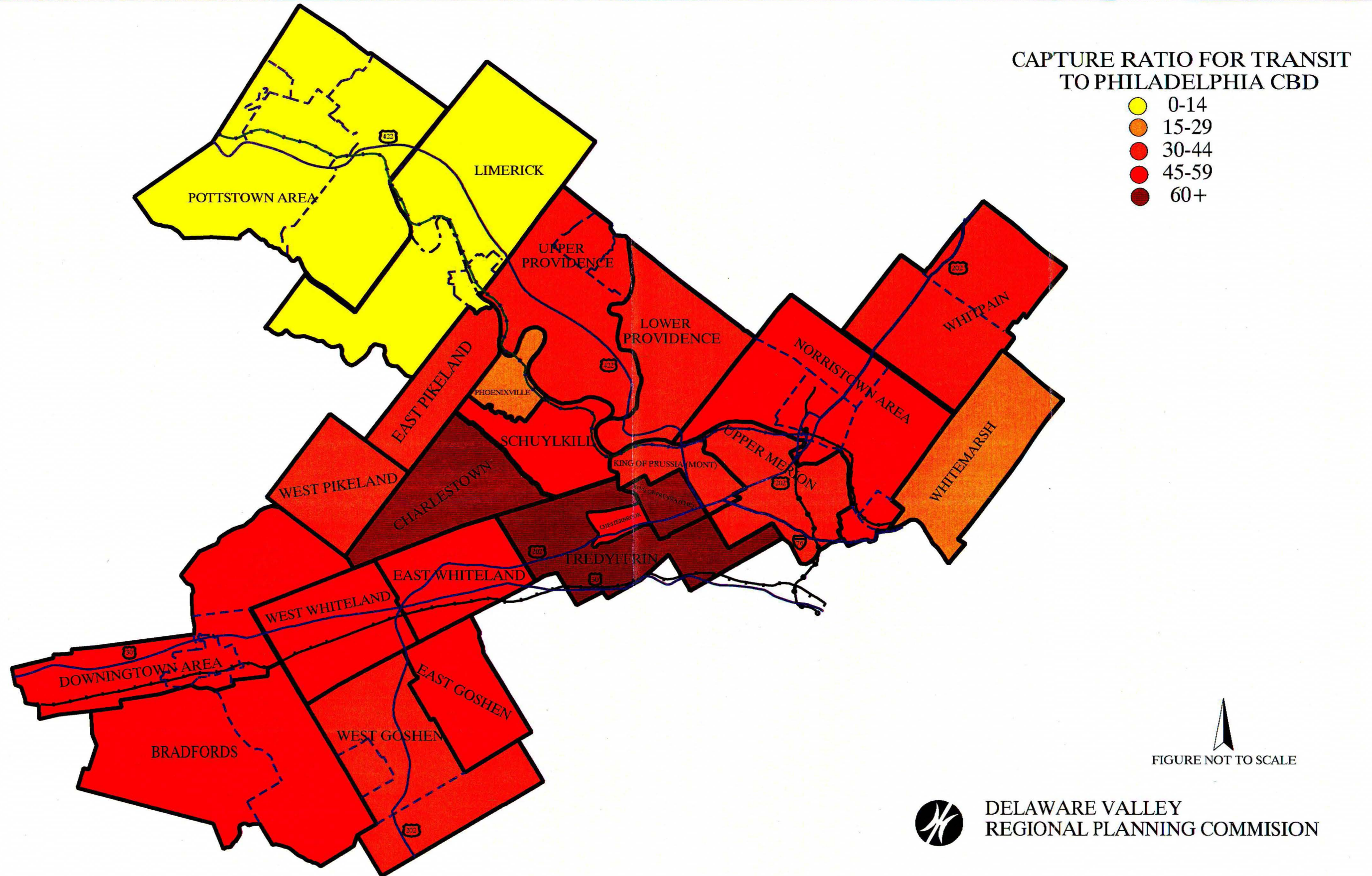


TABLE 8: 1990 US 202 CORRIDOR TRANSIT DEMAND							
ZONE	EXISTING TOTAL TRIPS	EXISTING TRANSIT TRIPS	CAPTURE RATIO	PROPOSED CAPTURE: 60%		PROPOSED CAPTURE: 70%	
				ADDITIONAL TRANSIT	ESTIMATED TRANSIT*	ADDITIONAL TRANSIT	ESTIMATED TRANSIT
PHOENIXVILLE	137	37	27%	45	82	59	96
SCHUYLKILL	110	52	47%	14	66	25	77
EAST PIKELAND	37	16	43%	6	22	10	26
KING OF PRUSSIA (C.)	152	104	68%	0	104	2	106
CHESTERBROOK	302	175	58%	6	181	36	211
TREDYFFRIN	1072	664	62%	0	664	86	750
EAST WHITELAND	235	130	55%	11	141	35	165
WEST WHITELAND	253	144	57%	8	152	33	177
WEST GOSHEN	649	258	40%	131	389	196	454
DOWNINGTOWN AREA	319	188	59%	3	191	35	223
BRADFORDS	249	142	57%	7	149	32	174
EAST GOSHEN	355	188	53%	25	213	61	249
WEST PIKELAND	78	24	31%	23	47	31	55
CHARLESTOWN	56	36	64%	0	36	3	39
TOTAL	4004	2158	54%	279	2437	644	2802

*Note: Where existing capture ratio exceeds 60%, existing number of transit trips was used.

TABLE 9: DIFFERENCE IN 1990 AND 2020 TOTAL TRIPS TO PHILADELPHIA CBD				
ORIGIN ZONE	1990 TOTAL TRIPS	2020 TOTAL TRIPS	CHANGE IN TRIPS	% CHANGE IN TRIPS
POTTSTOWN AREA	147	196	49	33%
LIMERICK	133	246	113	85%
UPPER PROVIDENCE	151	248	97	64%
PHOENIXVILLE	137	145	8	6%
SCHUYLKILL	110	132	22	20%
EAST PIKELAND	37	44	7	19%
LOWER PROVIDENCE	218	242	24	11%
KING OF PRUSSIA (M.)	97	102	5	5%
KING OF PRUSSIA (C.)	152	158	6	4%
CHESTERBROOK	302	308	6	2%
TREDYFFRIN	1072	1093	21	2%
EAST WHITELAND	235	287	52	22%
WEST WHITELAND	253	372	119	47%
WEST GOSHEN	649	785	136	21%
DOWNINGTOWN AREA	319	412	93	29%
BRADFORDS	249	463	214	86%
EAST GOSHEN	355	408	53	15%
NORRISTOWN AREA	1167	1179	12	1%
WHITPAIN	756	772	16	2%
UPPER MERION	678	685	7	1%
WHITEMARSH	664	677	13	2%
WEST PIKELAND	78	122	44	56%
CHARLESTOWN	56	60	4	7%
TOTAL	8015	9136	1121	14%

FIGURE 8

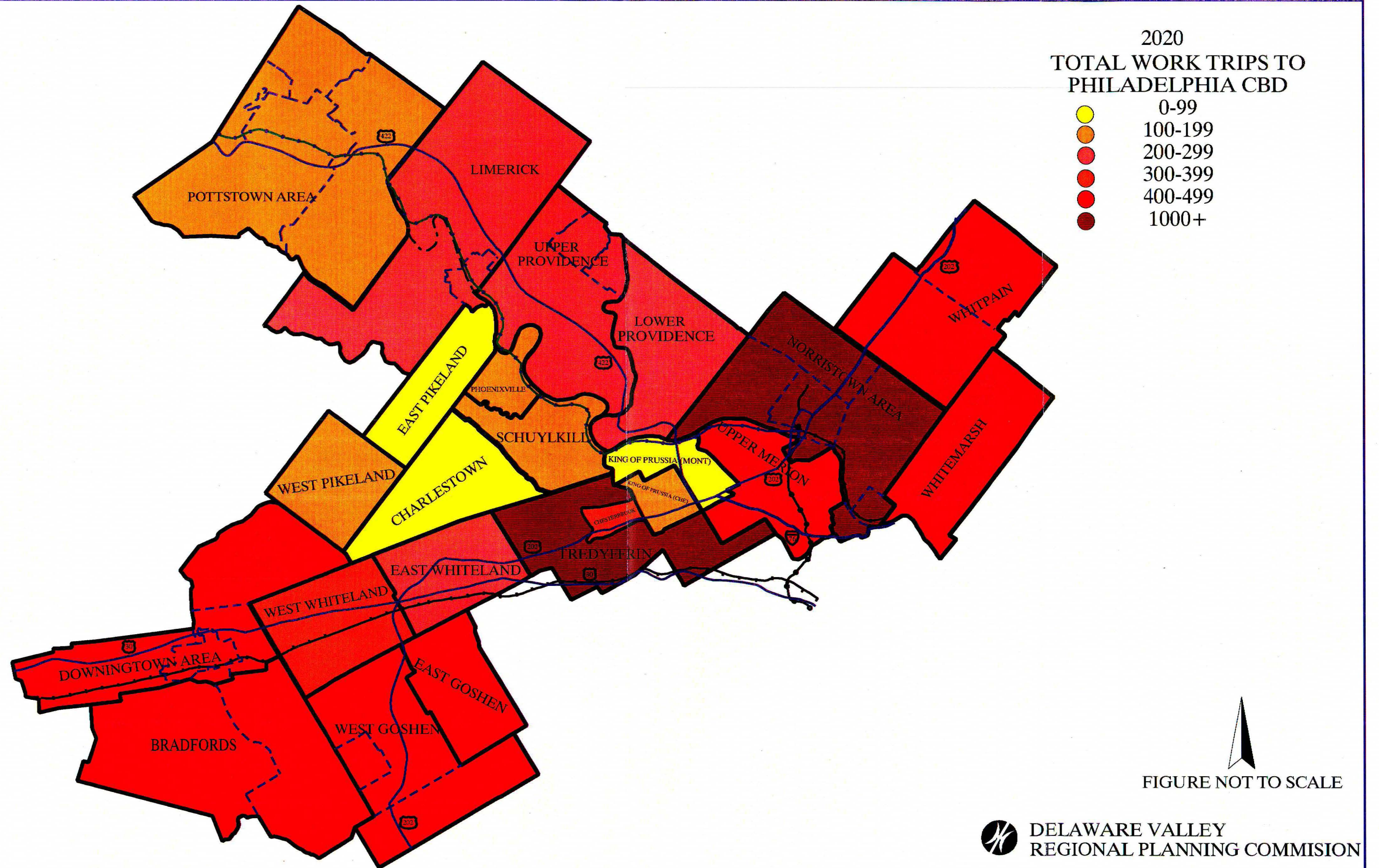


TABLE 10: 2020 WORK TRIPS TO PHILADELPHIA CBD			
ORIGIN ZONE	TOTAL TRIPS	CAPTURE RATIO	TRANSIT TRIPS
POTTSTOWN AREA	196	11%	22
LIMERICK	246	9%	22
UPPER PROVIDENCE	248	41%	102
PHOENIXVILLE	145	27%	39
SCHUYLKILL	132	47%	62
EAST PIKELAND	44	43%	19
LOWER PROVIDENCE	242	31%	75
KING OF PRUSSIA (M.)	102	39%	40
KING OF PRUSSIA (C.)	158	68%	107
CHESTERBROOK	308	58%	179
TREDYFFRIN	1093	62%	678
EAST WHITELAND	287	55%	158
WEST WHITELAND	372	57%	212
WEST GOSHEN	785	40%	314
DOWNINGTOWN AREA	412	59%	243
BRADFORDS	463	57%	264
EAST GOSHEN	408	53%	216
NORRISTOWN AREA	1171	44%	515
WHITPAIN	772	38%	293
UPPER MERION	681	38%	259
WHITEMARSH	677	18%	122
WEST PIKELAND	122	31%	38
CHARLESTOWN	60	64%	38
TOTAL	9124	44%	4015

NOTE: Assumes 1990 Capture Ratio.

FIGURE 9

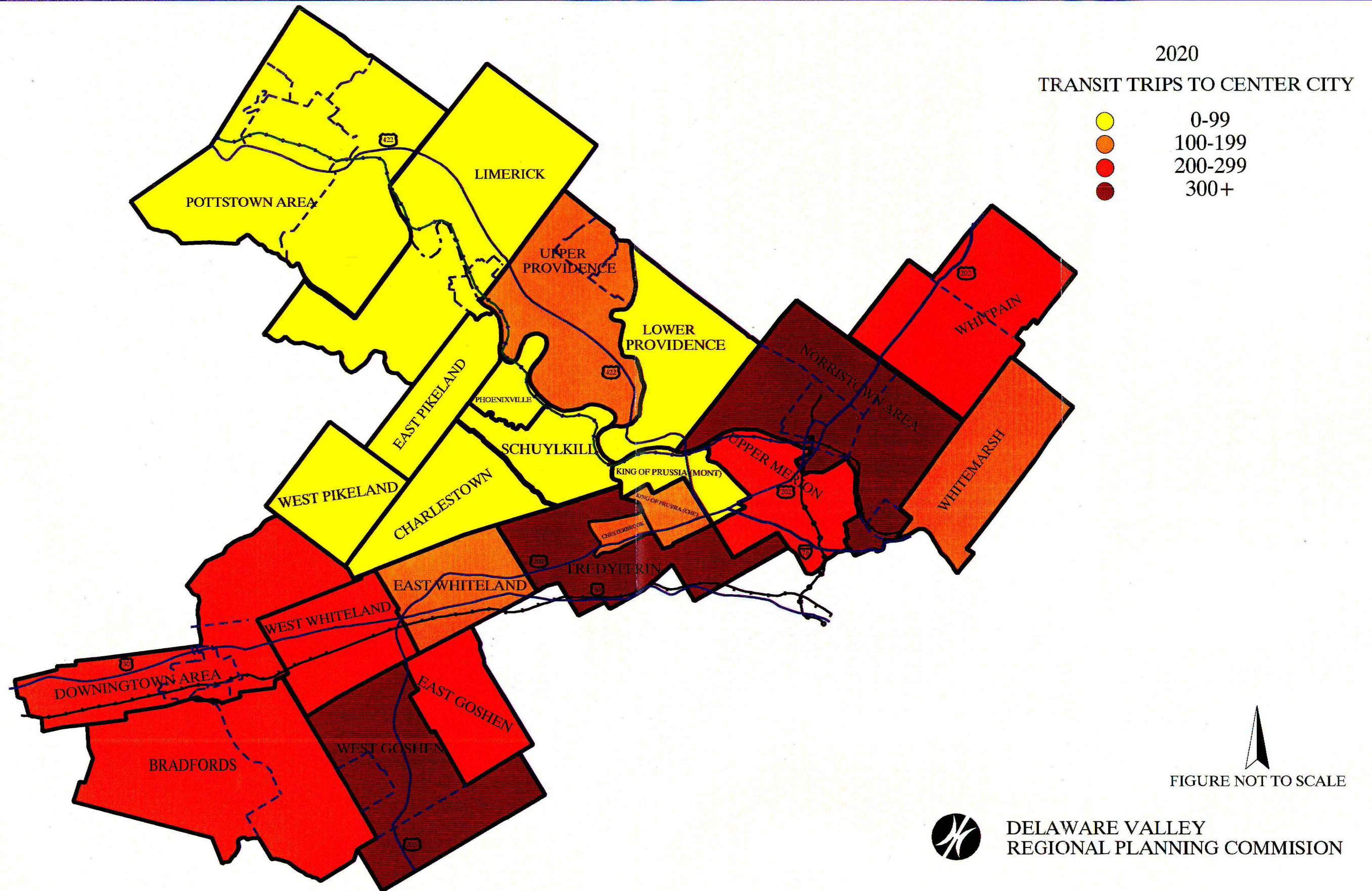


TABLE 11: 2020 US 422 CORRIDOR TRANSIT DEMAND					
ZONE	TOTAL TRIPS	CAPTURE RATIO	TRANSIT TRIPS	PROPOSED CAPTURE: 60%	
				ADDITIONAL TRANSIT	ESTIMATED TRANSIT
POTTSTOWN AREA	196	11%	22	96	118
LIMERICK	246	9%	22	126	148
UPPER PROVIDENCE	248	41%	102	47	149
PHOENIXVILLE	145	27%	39	48	87
SCHUYLKILL	132	47%	62	17	79
EAST PIKELAND	44	43%	19	7	26
LOWER PROVIDENCE	242	31%	75	70	145
KING OF PRUSSIA (M.)	102	39%	40	21	61
TOTAL	1355	28%	381	432	813

TABLE 12: 2020 US 202 CORRIDOR TRANSIT DEMAND							
ZONE	TOTAL TRIPS	CAPTURE RATIO	TRANSIT TRIPS	PROPOSED CAPTURE: 60%		PROPOSED CAPTURE: 70%	
				ADDITIONAL TRANSIT	ESTIMATED TRANSIT*	ADDITIONAL TRANSIT	ESTIMATED TRANSIT
PHOENIXVILLE	145	27%	39	48	87	63	102
SCHUYLKILL	132	47%	62	17	79	30	92
EAST PIKELAND	44	43%	19	7	26	12	31
KING OF PRUSSIA (C.)	158	68%	107	0	107	4	111
CHESTERBROOK	308	58%	179	6	185	37	216
TREDYFFRIN	1093	62%	678	0	678	87	765
EAST WHITELAND	287	55%	158	14	172	43	201
WEST WHITELAND	372	57%	212	11	223	48	260
WEST GOSHEN	785	40%	314	157	471	235	549
DOWNINGTOWN AREA	412	59%	243	4	247	45	288
BRADFORDS	463	57%	264	14	278	60	324
EAST GOSHEN	408	53%	216	29	245	70	286
WEST PIKELAND	122	31%	38	35	73	47	85
CHARLESTOWN	60	64%	38	0	38	4	42
TOTAL	4789	54%	2567	342	2909	785	3352

*Note: Where existing capture ratio exceeds 60%, existing number of transit trips was used.

TABLE 13: 1990 REVERSE COMMUTE TOTAL TRIPS TO STUDY AREA

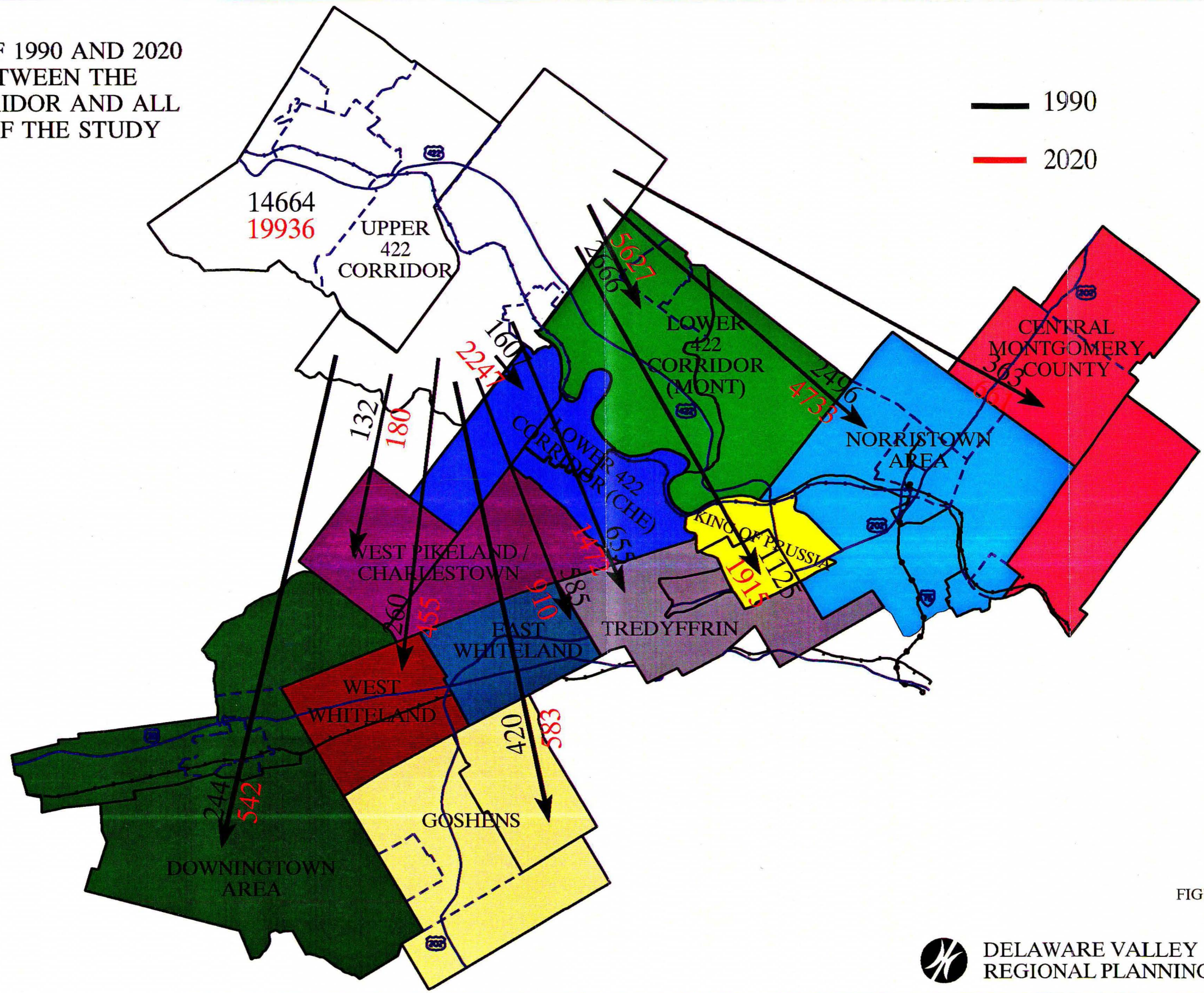
ORIGIN ZONE	DESTINATION ZONE																						
	POTTSTOWN AREA	LIMERICK	UPPER PROVIDENCE	PHOENIXVILLE	SCHUYLKILL	EAST PIKELAND	LOWER PROVIDENCE	KING OF PRUSSIA (MONT.)	KING OF PRUSSIA (CHEST.)	CHESTERBROOK	TREDYFRIN	EAST WHITELAND	WEST WHITELAND	WEST GOSHEN	DOWNINGTOWN AREA	BRADFORDS	EAST GOSHEN	NORRISTOWN AREA	WHITPAIN	UPPER MERION	WHITEMARSH	WEST PIKELAND	CHARLESTOWN
CENTER CITY	6	0	0	0	0	0	7	86	2	1	15	0	13	0	0	0	21	121	55	69	35	0	0
SOUTH PHILA.	17	0	26	0	42	0	48	142	5	3	33	150	0	133	48	38	0	197	70	114	116	0	0
S. W. PHILA.	13	9	0	10	0	0	0	117	0	0	0	50	8	148	0	0	22	93	48	93	8	0	0
WEST PHILA.	49	0	13	19	47	0	66	342	29	17	191	101	25	113	38	95	48	555	192	274	145	0	0
LOWER N. PHILA.	0	0	71	62	31	0	91	152	12	7	76	22	44	39	11	29	7	255	36	122	180	0	0
UPPER N. PHILA.	0	0	35	12	0	0	105	100	2	1	15	17	12	0	0	9	8	115	32	80	66	0	0
KENSINGTON	0	8	45	0	0	0	19	57	3	2	19	23	8	0	10	5	10	86	55	46	39	0	0
TOTAL	85	17	190	103	120	0	336	996	53	31	349	363	110	433	107	176	116	1422	488	798	589	0	0

TABLE 14: 1990 REVERSE COMMUTE TRANSIT TRIPS TO STUDY AREA

ORIGIN ZONE	DESTINATION ZONE																						
	POTTSTOWN AREA	LIMERICK	UPPER PROVIDENCE	PHOENIXVILLE	SCHUYLKILL	EAST PIKELAND	LOWER PROVIDENCE	KING OF PRUSSIA (MONT.)	KING OF PRUSSIA (CHEST.)	CHESTERBROOK	TREDYFFRIN	EAST WHITELAND	WEST WHITELAND	WEST GOSHEN	DOWNTOWN AREA	BRADFORDS	EAST GOSHEN	NORRISTOWN AREA	WHITPAIN	UPPER MERION	WHITEMARSH	WEST PIKELAND	CHARLESTOWN
CENTER CITY	6	0	0	0	0	0	0	16	1	1	6	0	0	0	0	0	0	22	12	12	0	0	0
SOUTH PHILA.	0	0	0	0	0	0	0	27	3	1	16	0	0	11	19	0	0	66	0	21	15	0	0
S. W. PHILA.	13	0	0	0	0	0	0	0	0	0	0	0	8	22	0	0	0	29	0	0	0	0	0
WEST PHILA.	36	0	0	8	25	0	13	67	3	2	22	14	0	67	0	15	7	93	67	54	19	0	0
LOWER N. PHILA.	0	0	0	28	22	0	60	86	0	0	0	0	0	30	0	20	0	37	0	69	60	0	0
UPPER N. PHILA.	0	0	0	12	0	0	30	21	1	1	9	0	0	0	0	0	0	10	13	16	30	0	0
KENSINGTON	0	0	0	0	0	0	0	9	2	1	14	0	0	0	0	0	0	0	8	8	7	0	0
TOTAL	55	0	0	48	47	0	103	226	10	6	67	14	8	130	19	35	7	257	100	180	131	0	0

APPENDIX

FIGURE A1:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN THE
UPPER 422 CORRIDOR AND ALL
OTHER ZONES OF THE STUDY
AREA



— 1990
 — 2020

FIGURE NOT TO SCALE

FIGURE A2:
 COMPARISON OF 1990 AND 2020
 WORK TRIPS BETWEEN THE
 LOWER 422 CORRIDOR (CHE)
 AND ALL OTHER ZONES OF THE
 STUDY AREA

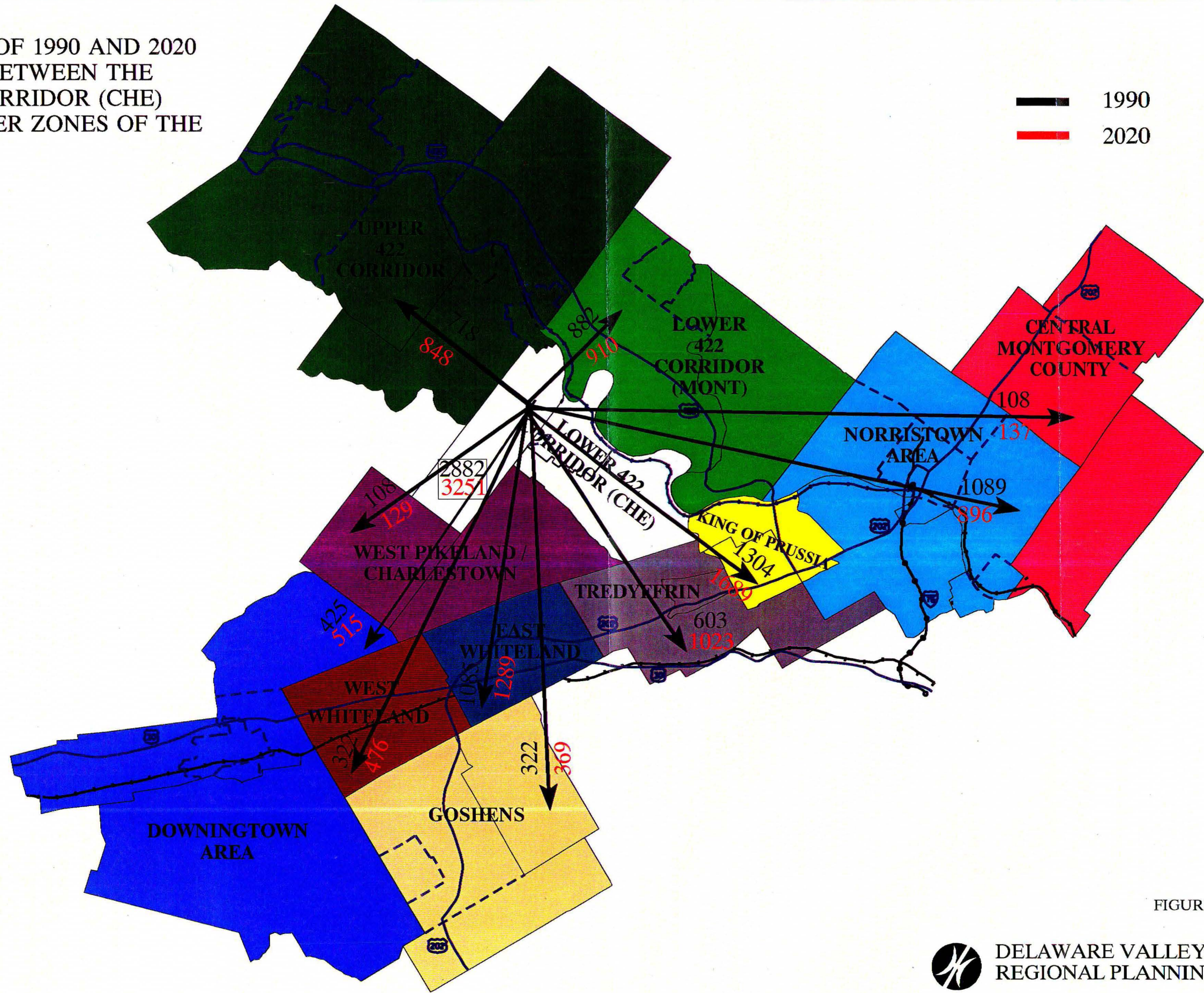


FIGURE NOT TO SCALE

FIGURE A3:
 COMPARISON OF 1990 AND 2020
 WORK TRIPS BETWEEN THE
 LOWER 422 CORRIDOR (MONT)
 AND ALL OTHER ZONES OF THE
 STUDY AREA

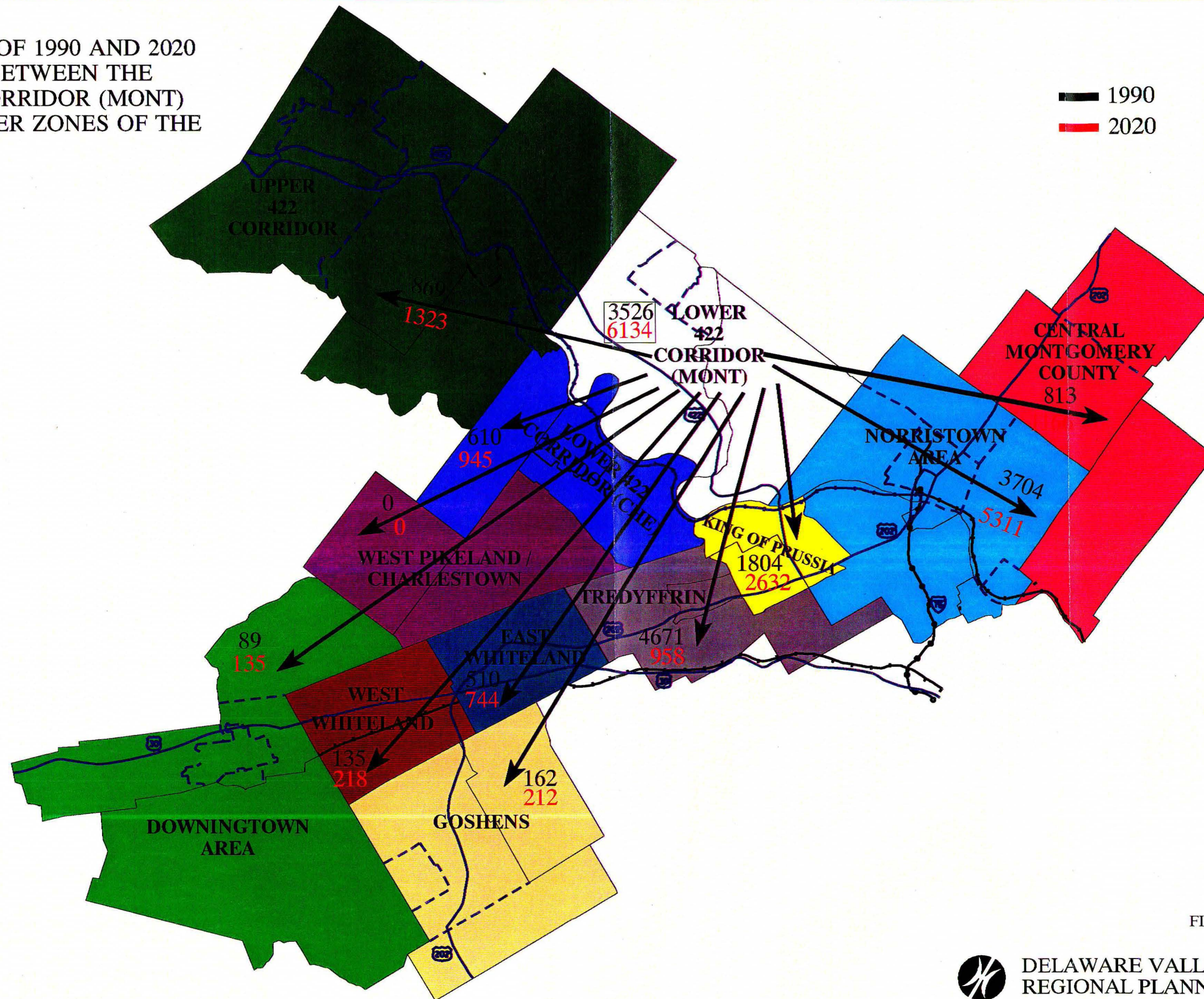


FIGURE NOT TO SCALE



FIGURE A4:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN THE
NORRISTOWN AREA AND ALL
OTHER ZONES OF THE STUDY
AREA

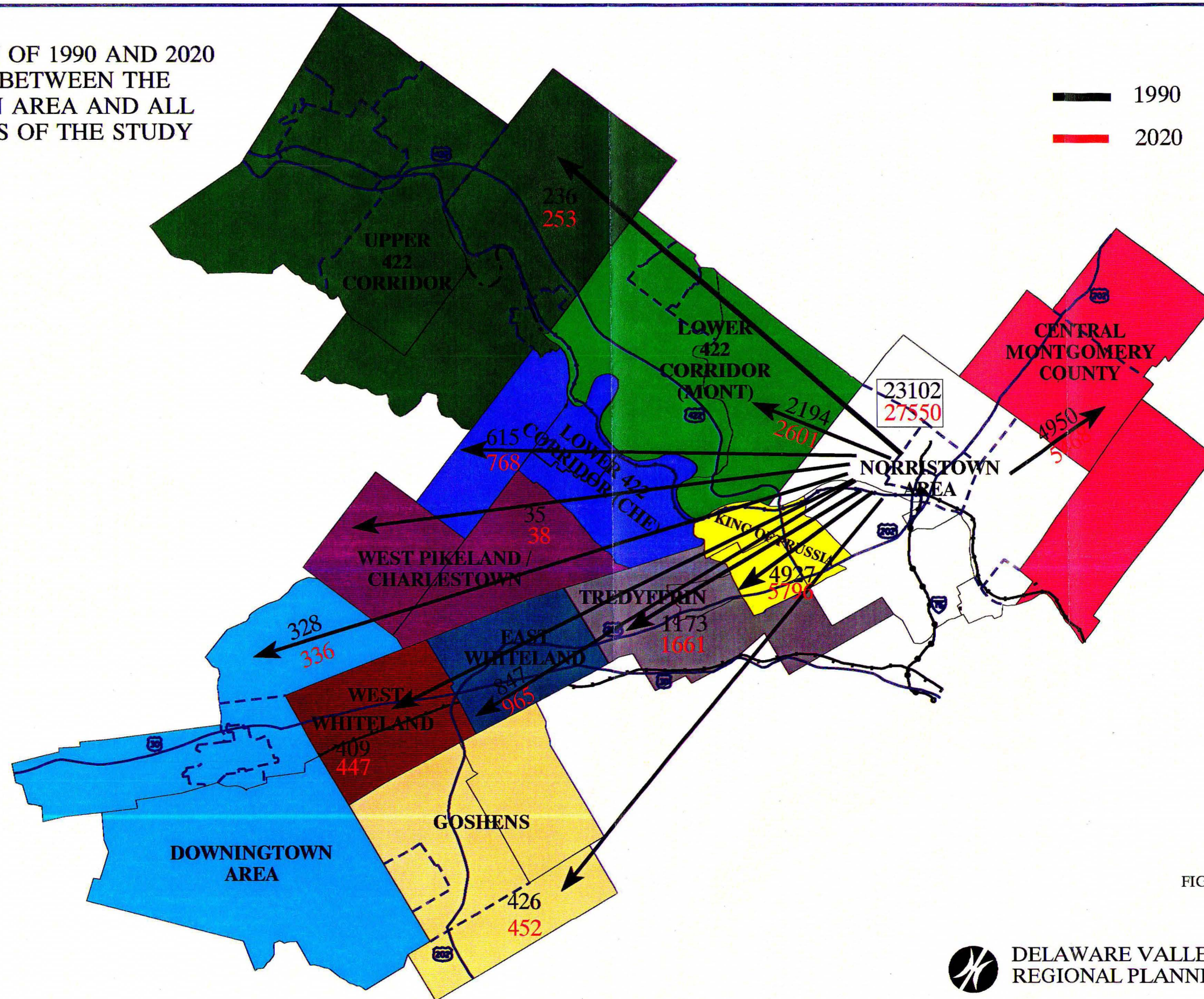


FIGURE NOT TO SCALE

FIGURE A5:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN CENTRAL
MONTGOMERY COUNTY AND
ALL OTHER ZONES OF THE
STUDY AREA

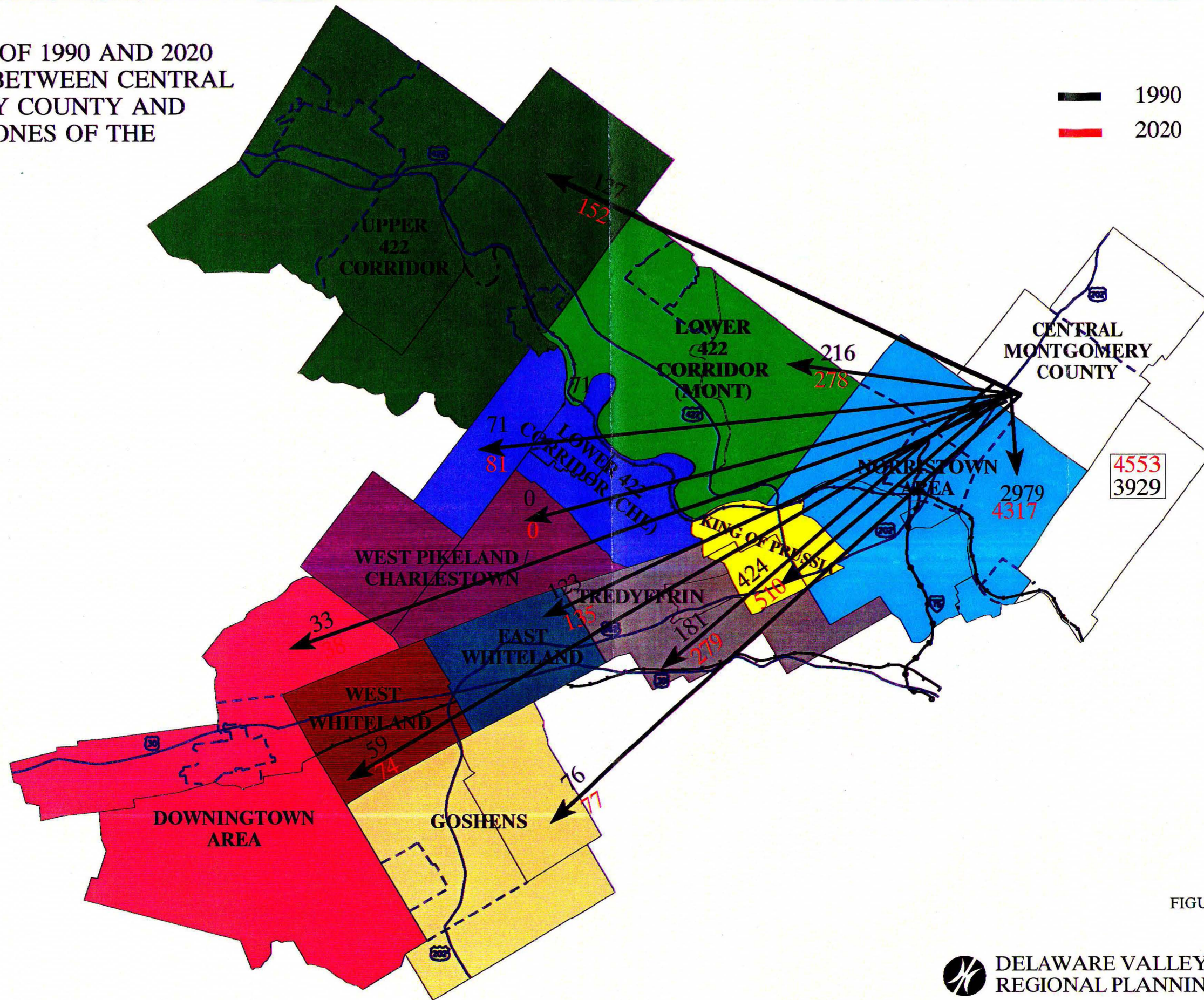


FIGURE NOT TO SCALE

FIGURE A6:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN
TREDYFFRIN AND ALL OTHER
ZONES OF THE STUDY AREA

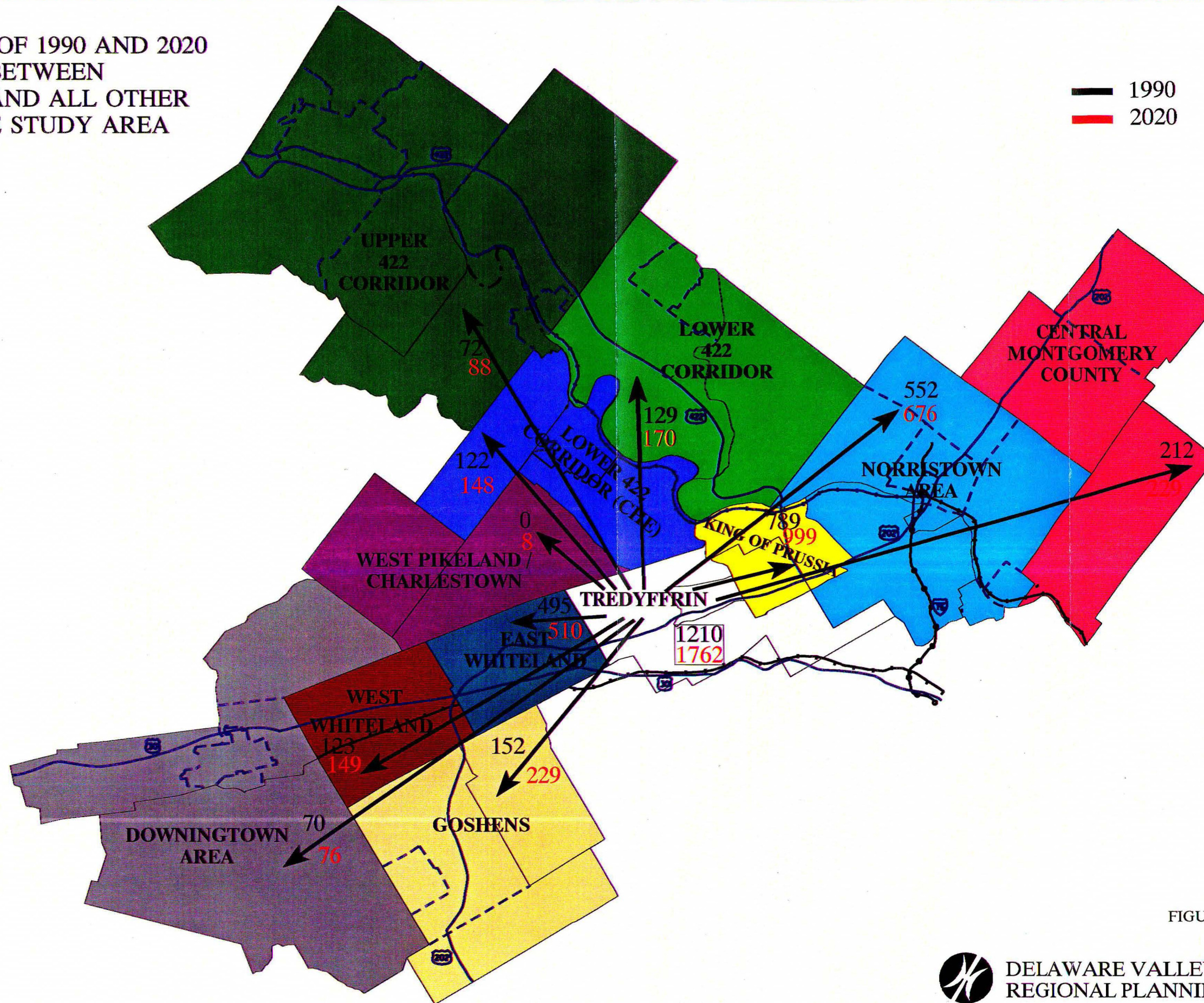


FIGURE NOT TO SCALE

FIGURE A7:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN EAST
WHITELAND AND ALL OTHER
ZONES OF THE STUDY AREA

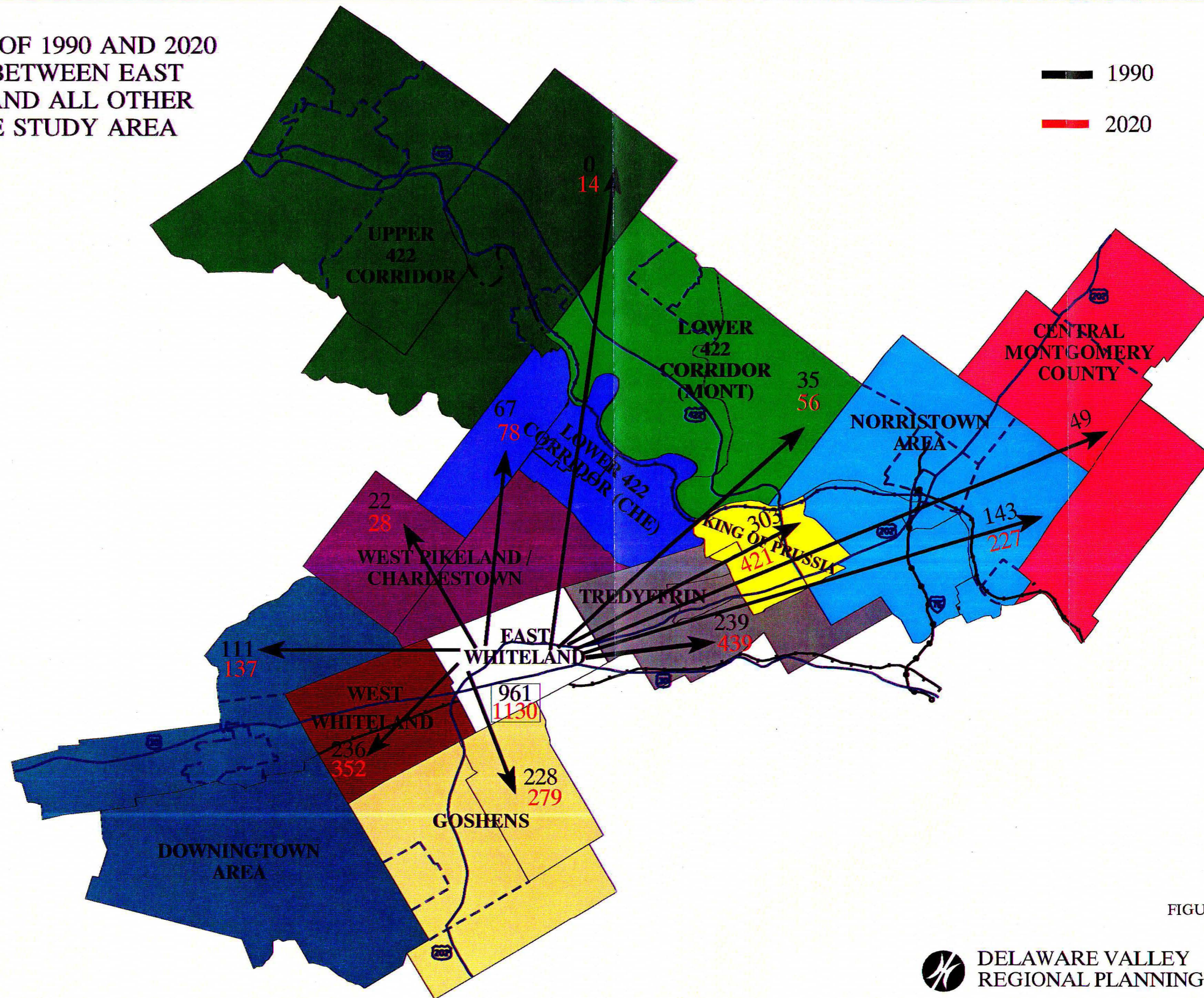


FIGURE NOT TO SCALE

FIGURE A8:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN WEST
WHITELAND AND ALL OTHER
ZONES OF THE STUDY AREA

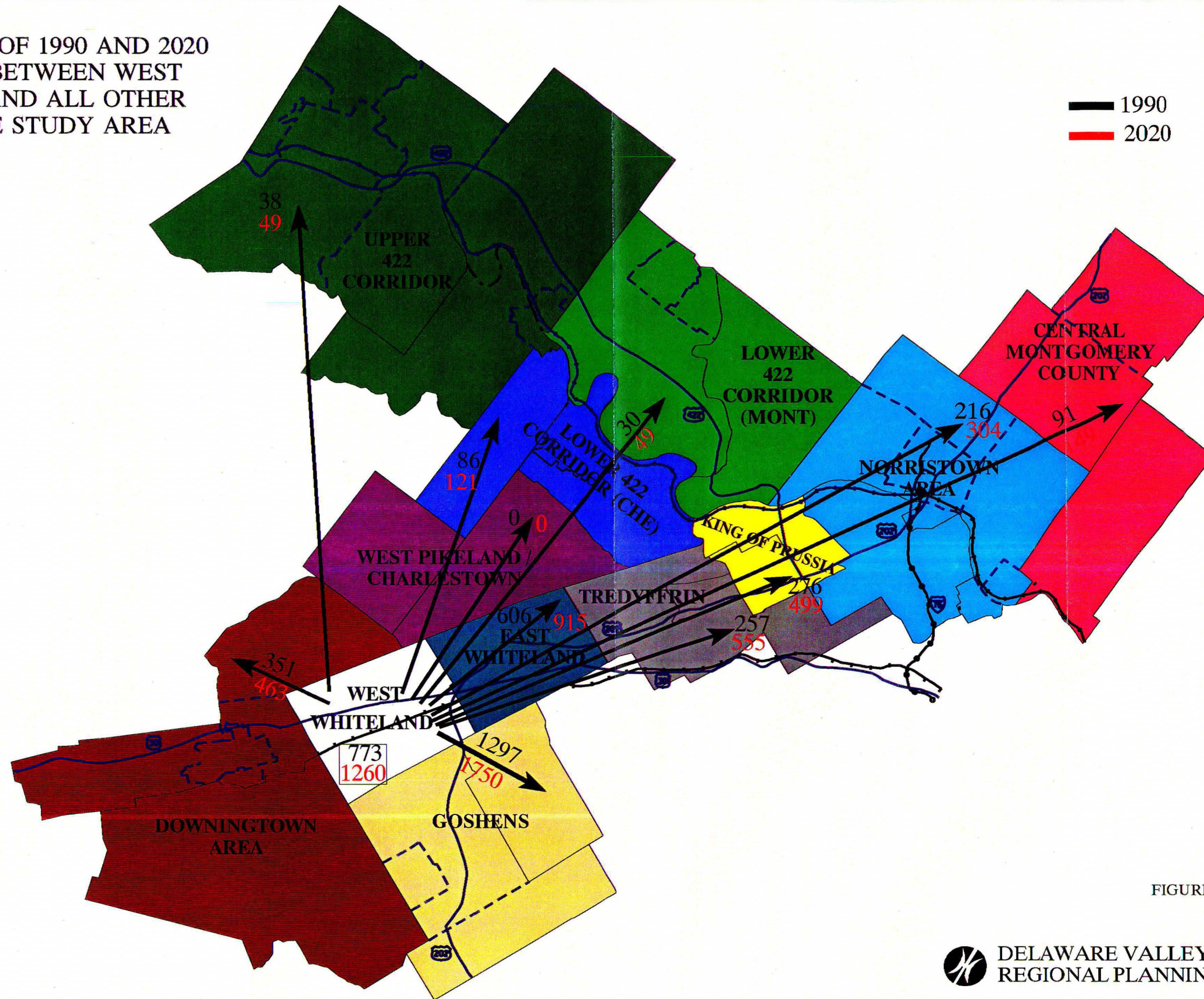


FIGURE NOT TO SCALE

FIGURE A9:
COMPARISON OF 1990 AND 2020
WORK TRIPS BETWEEN THE
GOSHENS AND ALL OTHER
ZONES OF THE STUDY AREA

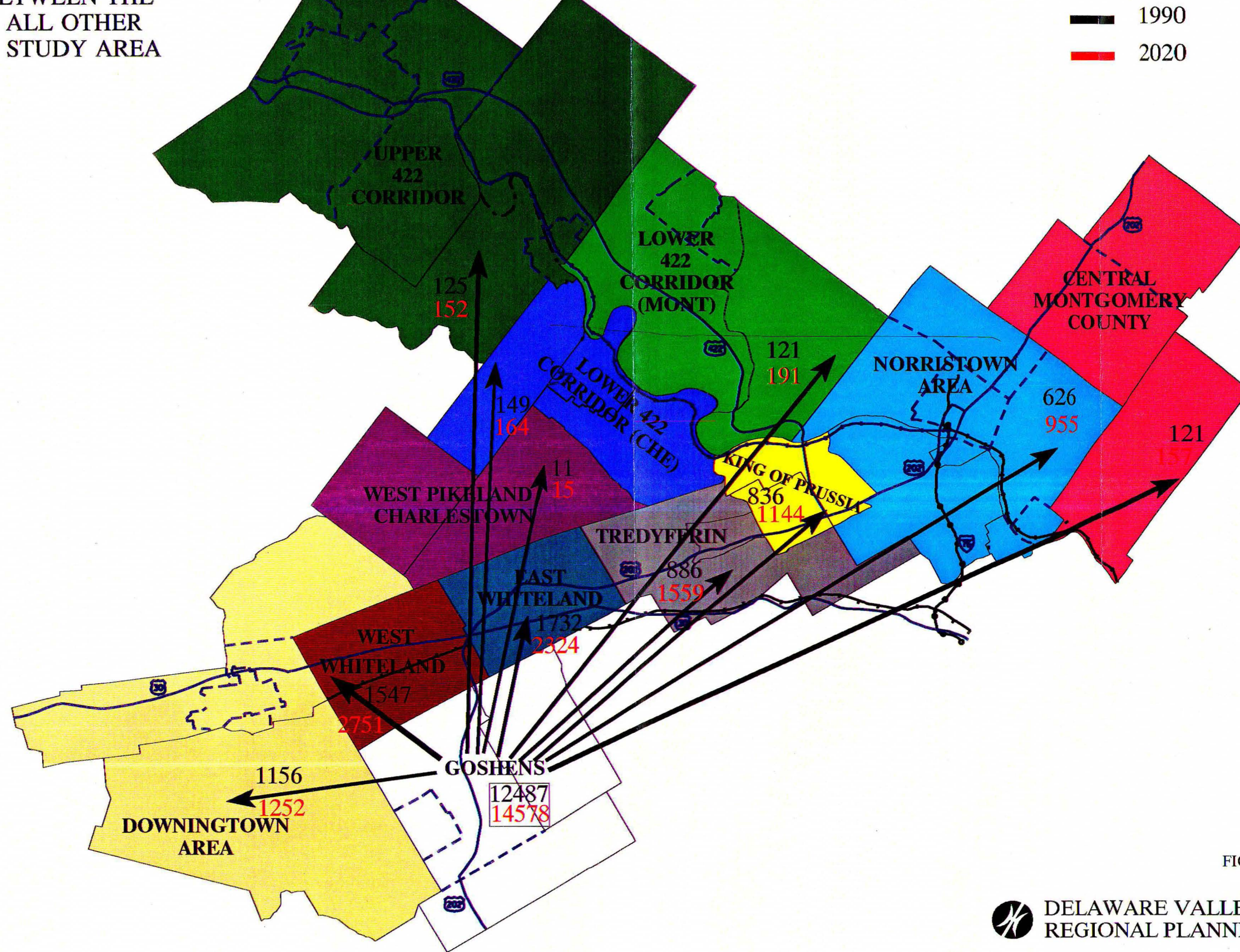


FIGURE NOT TO SCALE

FIGURE A10:
 COMPARISON OF 1990 AND 2020
 WORK TRIPS BETWEEN THE
 DOWNINGTOWN AREA AND ALL
 OTHER ZONES OF THE STUDY
 AREA

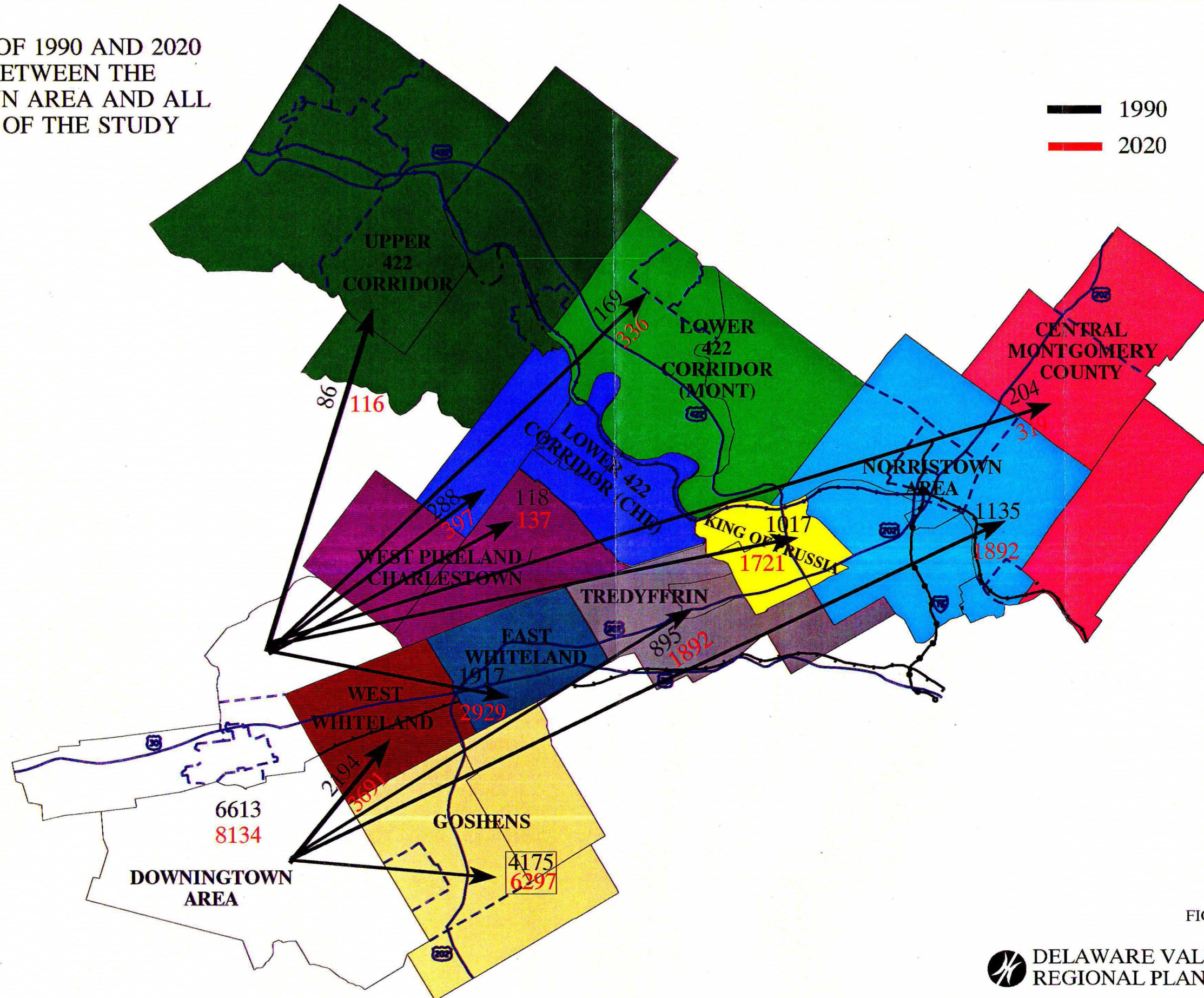


FIGURE NOT TO SCALE