ORANGE COUNTY TRANSPORTATION AUTHORITY (OCTA) TRAVEL DEMAND FORECASTING

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PROBLEM STATEMENT

- Projected increases in travel demand from 2016 to 2045 due to population growth and urbanization could overwhelm current infrastructure, leading to congestion and inefficiency. To meet future needs, significant investments in sustainable transportation, public transit, and new technologies will be required to maintain mobility and support economic growth.

CHALLENGES FACED

Faced performance issues with large datasets, leading to slow data processing.

Cleaning data required meticulous attention to remove inconsistencies and outliers, which was time-consuming.
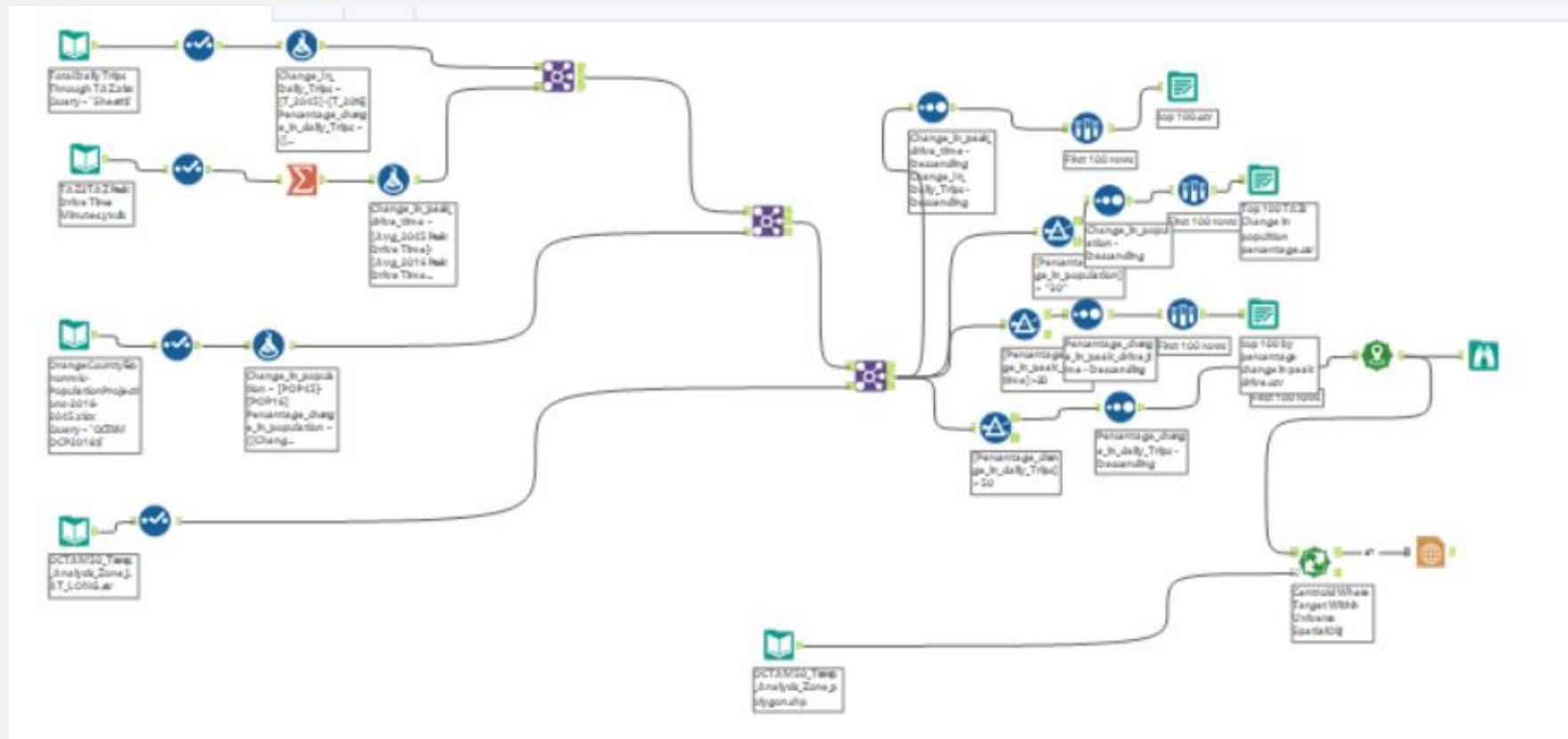
Encountered difficulties in joining multiple datasets and ensuring proper alignment.

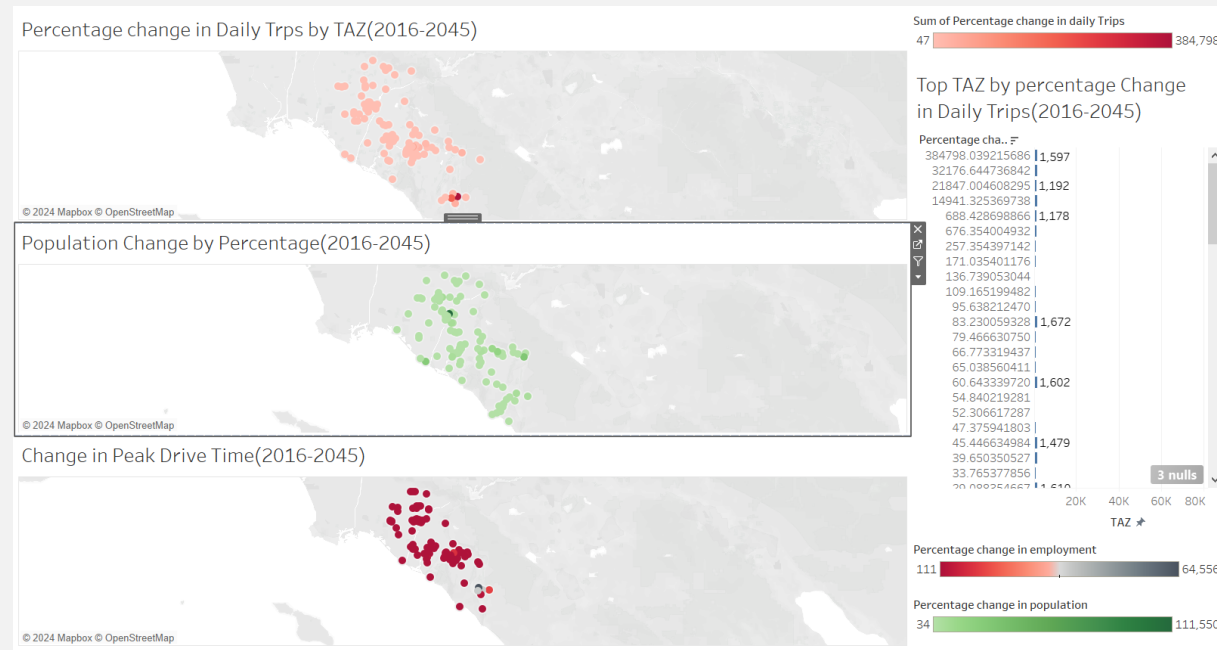Filtering and sorting the data for analysis were complex tasks.

Applying the correct formulas for calculations added complexity.

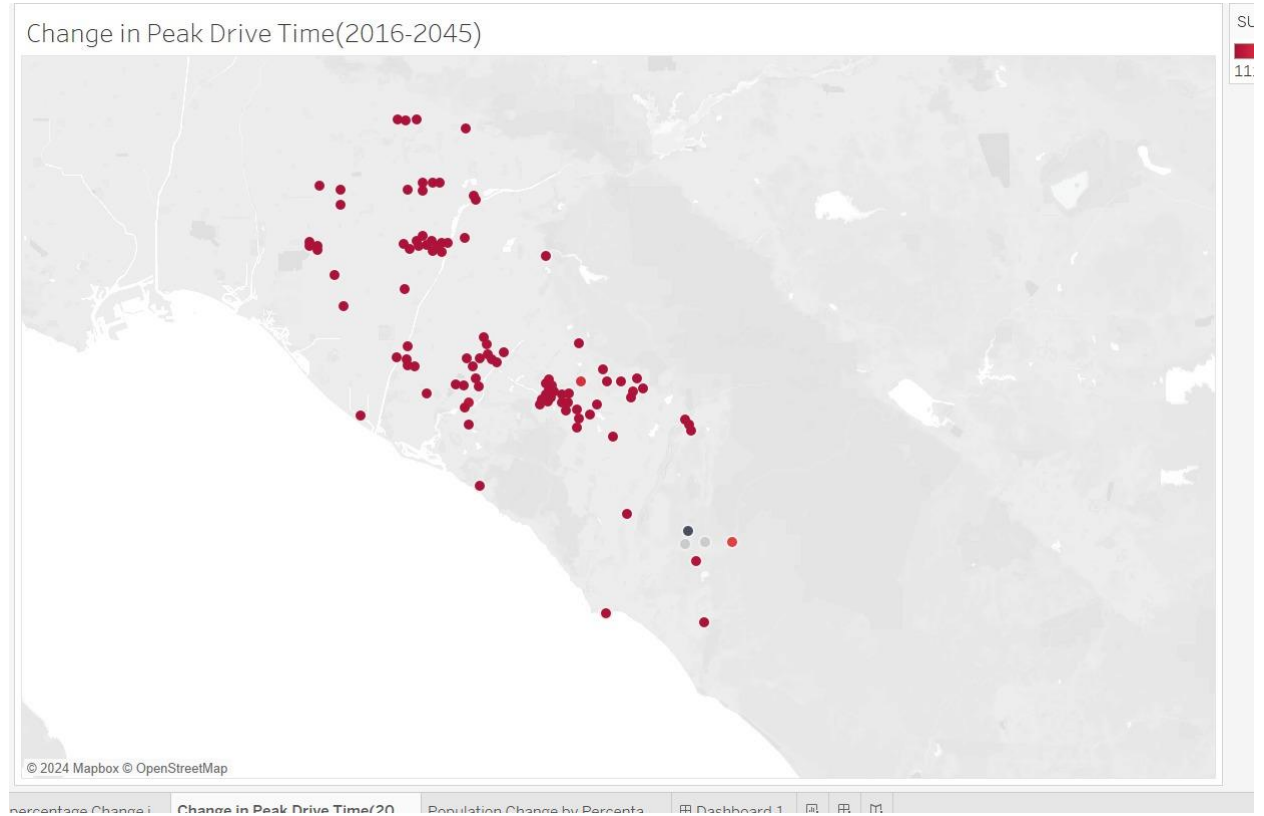Dealing with inconsistent data types required frequent adjustments to ensure compatibility

ALTERYX

PERCENTAGE CHANGE IN DAILY TRIPS

TOP TAZ PERCENTAGE CHANGE IN DAILY TRIPS

Top TAZ by percentage Change in Daily Trips(2016-2045)

Percentage cha..	Value
384798.039215686	1,597
32176.644736842	
21847.004608295	1,192
14941.325369738	
688.428698866	1,178
676.354004932	
257.354397142	
171.035401176	872
136.739053044	
109.165199482	875
95.638212470	
83.230059328	1,672
79.466630750	
66.773319437	856
65.038560411	
60.643339720	1,602
54.840219281	
52.306617287	
47.375941803	
45.446634984	1,479
39.650350527	
33.765377856	
29.088354667	1,610
24.851935129	
24.647926014	1,150
18.573677201	
15.925295362	
15.042079056	1,254
14.409586006	
10.877033033	
9.413177661	1,741

TAZ ✈

PERCENTAGE CHANGE IN DAILY TRIPS BY TAZ

Percentage change in Daily Trps by TAZ(2016-2045)

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PERCENTAGE CHANGE BY POPULATION

Population Change by Percentage(2016-2045)

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TRAVEL DEMAND CHANGES

- **Comparison of 2016 and 2045 Trip Data:**

  - The data shows an overall increase in travel demand from 2016 to 2045, as indicated by the increase in daily trips for many Traffic Analysis Zones (TAZs).

  - In some TAZs, the daily trips increase by over 4% (e.g., TAZ 457 with a 4.39% increase), while others see a slight decline (e.g., TAZ 77 with a decrease of 0.59%).

  - Along with an increase in trips, the average peak drive time for many areas is expected to rise, reflecting greater congestion and the need for more time to travel during peak hours.

  - The projected population growth, particularly in certain TAZs, plays a key role in driving this increased travel demand. For example, TAZ 457 shows a 39% increase in population by 2045.

INFRASTRUCTURE IMPROVEMENTS

- **Expansion of Road Networks:** Many TAZs, especially those showing increased peak drive times, will require additional road infrastructure to handle the higher volume of vehicles and reduce congestion.

- **Public Transit Investment:** With higher travel demand, there is a need for expanding public transit services to ease the pressure on road networks and provide efficient alternatives to driving.

- **Technological Upgrades:** Intelligent traffic systems and smart infrastructure solutions (e.g., real-time traffic management, autonomous vehicles) will be necessary to optimize traffic flow and reduce delays during peak hours.

- **Airport and Rail Expansions:** In TAZs connected to broader regional or national networks, such as those with airports or train stations, expansions may be necessary to handle increased passenger volumes.
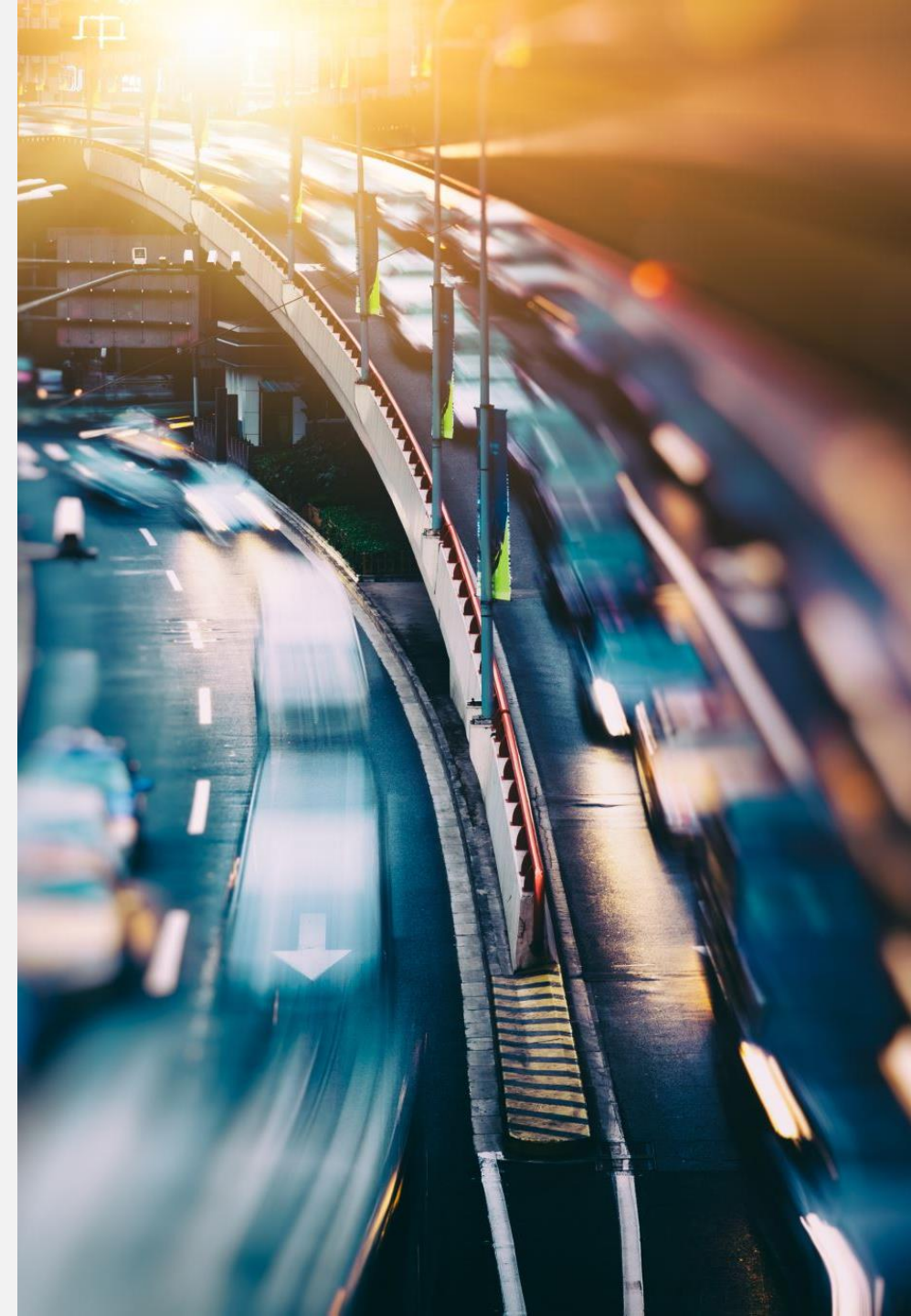
SOCIAL, DEMOGRAPHIC, AND ECONOMIC FACTORS IMPACTING CHANGES

- **Population Growth:** TAZs with significant population increases (like TAZ 457 with a 39% rise) will experience a corresponding increase in trips. Growing residential areas generate higher demand for commuting and personal travel.

- **Economic Development:** In TAZs with robust employment growth or economic activity, such as TAZs in developing urban centers, travel demand will rise due to increased business activities and the need for commuting.

- **Urbanization:** As cities expand and more suburban areas become part of metropolitan regions, these TAZs will experience a higher number of trips due to urban sprawl.

- **Age and Socioeconomic Factors:** Younger populations and higher-income groups may drive an increase in trips due to preferences for private transportation or frequent travel for work and leisure. Conversely, aging populations or low-income areas may see reduced travel demand.

EXCEL FOR DAILY TRIPS

TAZ	DU_diff	Pop_Diff	GQPOP_D	RPOP_Dif	SFD_Diff	MFD_Diff	TOCDU_D	OCSDU_D	OCMDU_I	Sen_Diff	UEN_Diff	REM_Diff	EMP_Diff	RE_Diff	SE_Diff	OTH_Diff	PSCH_Dif	TAZ Desti	2016 Daily	2045 Daily	DailyTrip_Diff
408	4627	10851	0	10851	0	4627	4688	0	4688	0	0	6879	9381	3525	3701	2155	0	408	299.535	12171.7	11872.2
1596	1998	5388	0	5388	1713	285	1978	1697	281	920	0	3111	5916	727	3740	1429	20	1596	1.14675	6232.37	6231.23
450	945	2231	0	2231	0	945	906	0	906	0	0	1116	11919	1785	3369	6765	0	450	220.827	5895.56	5674.73
474	1904	4569	0	4569	0	1904	1933	0	1933	0	0	2939	1622	971	627	24	0	408	780.495	5659.47	4878.97
408	4627	10851	0	10851	0	4627	4688	0	4688	0	0	6879	9381	3525	3701	2155	0	474	772.625	5557.52	4784.9
1596	1998	5388	0	5388	1713	285	1978	1697	281	920	0	3111	5916	727	3740	1429	20	1589	0	4311.73	4311.73
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1596	0	4311.38	4311.38
407	5066	11613	0	11613	0	5066	4900	0	4900	0	0	7886	7174	454	1820	4900	0	407	177.334	4258.03	4080.7
1593	3500	8298	0	8298	0	3500	3441	0	3441	400	0	4789	1677	242	1174	201	60	1593	0	3983.16	3983.16
282	1000	2378	0	2378	0	1000	1068	0	1068	0	0	1519	3706	197	3509	0	0	282	628.703	4470.4	3841.69
407	5066	11613	0	11613	0	5066	4900	0	4900	0	0	7886	7174	454	1820	4900	0	408	159.808	3759.24	3599.43
408	4627	10851	0	10851	0	4627	4688	0	4688	0	0	6879	9381	3525	3701	2155	0	407	157.653	3659.72	3502.07
1596	1998	5388	0	5388	1713	285	1978	1697	281	920	0	3111	5916	727	3740	1429	20	1593	0	3321.55	3321.55
1593	3500	8298	0	8298	0	3500	3441	0	3441	400	0	4789	1677	242	1174	201	60	1596	0	3320.73	3320.73
1596	1998	5388	0	5388	1713	285	1978	1697	281	920	0	3111	5916	727	3740	1429	20	1597	0.0096	2971.35	2971.34
1597	3500	16520	0	16520	0	3500	3497	0	3497	0	0	10695	2063	0	2063	0	0	1596	0.00961	2969.84	2969.83
1217	1532	1908	0	1908	0	1532	1474	0	1474	0	0	1209	2039	77	1070	892	0	1217	4513.78	6700.55	2186.77
326	726	2102	0	2102	1	725	719	6	713	0	0	1102	1145	214	873	58	0	326	3533.74	5400.89	1867.15
1178	3368	7487	0	7487	138	3230	3197	129	3068	0	0	0	864	116	0	748	0	1202	0.44218	1835.14	1834.7
1202	251	577	0	577	89	162	238	84	154	0	0	0	2674	0	2674	0	0	1178	0.44113	1831.06	1830.62
1597	3500	16520	0	16520	0	3500	3497	0	3497	0	0	10695	2063	0	2063	0	0	1593	0	1819.42	1819.42
1593	3500	8298	0	8298	0	3500	3441	0	3441	400	0	4789	1677	242	1174	201	60	1597	0	1796.71	1796.71
1219	1424	1860	0	1860	0	1424	1438	0	1438	0	0	1193	2873	86	1451	1336	0	1219	2602.36	4333.71	1731.36
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1593	0	1648.44	1648.44
1597	3500	16520	0	16520	0	3500	3497	0	3497	0	0	10695	2063	0	2063	0	0	1597	0	1646.76	1646.76
1593	3500	8298	0	8298	0	3500	3441	0	3441	400	0	4789	1677	242	1174	201	60	1589	0	1632.98	1632.98
1133	648	1534	0	1534	0	648	622	0	622	0	0	0	3977	1469	2058	350	100	1133	0	1506.75	1506.75
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1597	0	1388.41	1388.41
715	83	440	0	440	0	83	103	0	103	-32	0	4	1950	235	1380	335	0	715	776.871	2161.47	1384.6

EXCEL FOR PEAK DRIVE DIFFERENCE

TAZ	DU_diff	Pop_Diff	GQPOP_D	RPOP_Dif	SFD_Diff	MFD_Diff	TOCDU_D	OCSDU_D	OCMDU_D	Sen_Diff	UEN_Diff	REM_Diff	EMP_Diff	RE_Diff	SE_Diff	OTH_Diff	PSCH_Diff	TAZ Origin	TAZ Desti	2016 Peak	2045 Peak	Peak_Diff
871	12	28	0	28	12	0	11	11	0	0	0	17	8	0	0	8	0	871	198	78.3661	106.744	28.3777
871	12	28	0	28	12	0	11	11	0	0	0	17	8	0	0	8	0	871	181	79.7376	107.968	28.2307
871	12	28	0	28	12	0	11	11	0	0	0	17	8	0	0	8	0	871	176	81.179	109.259	28.0797
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1217	35.4365	63.5099	28.0735
871	12	28	0	28	12	0	11	11	0	0	0	17	8	0	0	8	0	871	258	79.5442	107.098	27.5538
871	12	28	0	28	12	0	11	11	0	0	0	17	8	0	0	8	0	871	257	80.9806	108.38	27.3999
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1231	35.9787	62.4242	26.4455
871	12	28	0	28	12	0	11	11	0	0	0	17	8	0	0	8	0	871	193	81.0044	106.29	25.2853
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1219	35.8984	61.0828	25.1844
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1364	36.5817	61.6697	25.088
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1363	38.5812	63.6451	25.0639
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1205	36.5034	61.5557	25.0523
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1210	35.732	60.7838	25.0517
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1216	36.8424	61.8553	25.0129
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1367	37.1341	62.1306	24.9965
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1362	37.385	62.3477	24.9627
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1366	39.1846	64.1142	24.9296
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1238	37.6149	62.5061	24.8912
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1365	37.9084	62.7702	24.8618
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1250	38.0101	62.8712	24.8611
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1251	38.6584	63.4136	24.7552
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1371	40.9302	65.6605	24.7303
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1369	40.8047	65.5257	24.721
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1193	37.4145	62.0636	24.6492
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1263	37.0694	61.4515	24.3822
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1368	40.6444	64.9776	24.3332
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1271	39.0652	63.2971	24.2319
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1179	36.508	60.6894	24.1814
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1212	35.0494	59.2219	24.1725
1589	829	1672	0	1672	0	829	813	0	813	0	0	668	2712	253	1954	505	0	1589	1406	36.1281	60.2834	24.1533

RECOMMENDATIONS

Integrated Approach Adopt a holistic view of urban development, considering the interplay between population growth, employment changes, and economic factors in shaping travel demand.

Flexible Infrastructure Design adaptable transportation systems that can evolve with changing travel patterns, incorporating smart technologies for real-time adjustments.

Sustainable Solutions Prioritize environmentally friendly transportation options, balancing the need for increased mobility with goals for reducing carbon emissions and improving urban livability.

Continuous Monitoring Implement ongoing data collection and analysis to refine projections and adjust planning strategies in response to emerging trends and unforeseen changes.