

CITY OF MANOR ROADWAY Service unit and vehicle mile calculations

Service Units - recap

WHAT IS A SERVICE UNIT?

- ❖ FOR ROADWAY IMPACT FEES THE SERVICE UNIT IS A VEHICLE MILE
- ❖ IN ORDER TO DETERMINE THE COST PER SERVICE UNIT, THE ESTIMATED GROWTH IN VEHICLE MILES IN EACH SERVICE AREA NEEDS TO BE CALCULATED FOR A TEN-YEAR PERIOD (2023-2033)
- ❖ ALL CURRENTLY DEVELOPED LAND AND ALL DEVELOPABLE LAND WILL BE CATEGORIZED AS EITHER RESIDENTIAL OR NON-RESIDENTIAL.
- ❖ NON-RESIDENTIAL WILL BE BROKEN INTO THREE (3) CATEGORIES:
 - ❖ RETAIL, SERVICE, AND BASIC

Non-residential

- ❖ RETAIL WOULD BE LAND-USE ACTIVITIES THAT PROVIDE FOR THE SALE OF GOODS. THIS WOULD INCLUDE SUCH ITEMS AS GROCERY STORES AND RESTAURANTS.
- ❖ SERVICE IS ACTIVITIES THAT PROVIDE PERSONAL AND PROFESSIONAL SERVICES AND WOULD INCLUDE GOVERNMENT AND PROFESSIONAL OFFICES AS WELL AS EDUCATIONAL USES.
- ❖ BASIC WOULD-BE ACTIVITIES THAT PRODUCE GOODS AND SERVICES THAT WOULD BE EXPORTED OUT OF THE LOCAL ECONOMY AND WOULD INCLUDE SUCH THINGS AS MANUFACTURING, CONSTRUCTION, TRANSPORTATION, WHOLESALE, TRADE, WAREHOUSING AND OTHER INDUSTRIAL USES.

TRANSPORTATION demand factor

- ❖ THE PROPOSED TRANSPORTATION FACTORS WILL COME FROM THE ITE TRIP GENERATION MANUAL, 11TH EDITION.
- ❖ THE ITE TRIP GENERATION MANUAL, 11TH EDITION PROVIDES THE NUMBER OF TRIPS THAT ARE PRODUCED BY THE PROPOSED LAND USE FOR EACH DWELLING UNIT, SQUARE FOOT OF BUILDING, OR OTHER CORRESPONDING UNITS.

Variables:

$$TDF = T * (1 - P_b) * L_{\max}$$

$$\text{where... } L_{\max} = \min(L * OD \text{ or } 6)$$

TDF = Transportation Demand Factor,
T = Trip Rate (peak hour trips / unit),
P_b = Pass-By Discount (% of trips),
L_{max} = Maximum Trip Length (miles),
L = Average Trip Length (miles), and
OD = Origin-Destination Reduction (50%)

Transportation demand factor

- ❖ THE MAXIMUM TRIP LENGTH WILL VARY BETWEEN THE THREE SERVICE AREAS.
- ❖ FOR SERVICE AREA 1, THE MAXIMUM TRIP LENGTH IS 2 MILES.
- ❖ FOR SERVICE AREA 2, THE MAXIMUM TRIP LENGTH IS 3 MILES.
- ❖ FOR SERVICE AREA 3, THE MAXIMUM TRIP LENGTH IS 4 MILES.
- ❖ THE ORIGIN-DESTINATION REDUCTION (OD) IS USED TO ADJUST THE AVERAGE TRIP LENGTH IN THE COMPUTATION OF THE MAXIMUM TRIP LENGTH. THIS WILL PREVENT TRIPS FROM BEING COUNTED TWICE AS BOTH RESIDENTIAL AND NON-RESIDENTIAL. IF THIS WAS NOT ADJUSTED, THEN A TRIP FROM HOME TO WORK WITH A STOP AT A STORE WOULD RESULT IN THIS BEING COUNTED AS TWO TRIPS. ONLY HALF OF THE TRIP WOULD BE COUNTED AS RESIDENTIAL AND THE OTHER HALF WOULD BE COUNTED AS NON-RESIDENTIAL.

Transportation demand factor calculations

Variable	Residential Single Family	Residential Multifamily	Basic	Service	Retail
T	0.94	0.51	0.65	1.44	2.24
P _b	0%	0%	0%	0%	35%
L	8.59	8.59	12.89	6.76	6.35
L _{max}	4.30	4.30	6.00	3.38	3.18
TDF	4.04	2.19	3.90	4.87	4.62
	The max length is less than 6 miles for each of the service areas, so the lower trip length is used rather than 6 miles.				

Variables:

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$$\text{where... } L_{max} = \min(L * OD \text{ or } 6)$$

- TDF = Transportation Demand Factor,
- T = Trip Rate (peak hour trips / unit),
- P_b = Pass-By Discount (% of trips),
- L_{max} = Maximum Trip Length (miles),
- L = Average Trip Length (miles), and
- OD = Origin-Destination Reduction (50%)

Existing vehicle miles

Service Area	Residential Vehicle Miles (Existing)				Nonresidential SF (Existing)			Trans. Demand Factor			Nonresidential Vehicle Miles (Existing)				Total Vehicle Miles (Existing)		
	Single Family Units	Trip Rate TDF	Multifamily	Trip Rate TDF	Vehicle Miles	Basic	Service	Retail	Basic	Service	Retail	Basic	Service	Retail	Total		
		0.94		0.51					0.65	1.44	2.24						
1	1519	4.04	1870	2.19	10,232	443,218	1,249,580	457,950	3.9	4.87	4.62	1,729	6,085	2,116	9,930	20,162	
2	1845		0		7,454	0	35,000	0				0	0	162	0	162	7,616
3	1961		0		7,922	0	0	0				0	0	0	0	0	7,922
TOTALS	5325		1870		25,608	443,218	1,284,580	457,950				1,729	6,247	2,116	10,091	35,700	

Vehicle miles calculations

- ❖ THE VEHICLE MILES FOR RESIDENTIAL ARE CALCULATED BY MULTIPLYING THE TDF FOR EITHER SINGLE-FAMILY OR MULTIFAMILY BY THE NUMBER OF DWELLING UNITS
- ❖ THE NON-RESIDENTIAL VEHICLE MILES WERE CALCULATED BY ESTIMATING THE SQUARE FOOTAGE OF EACH NON-RESIDENTIAL USE AND THEN MULTIPLYING THE TDF BY THE NUMBER OF THOUSAND SQUARE FEET FOR EACH LAND USE.
- ❖ THE RESIDENTIAL AND NON-RESIDENTIAL VEHICLE MILES WERE ADDED TOGETHER TO GET A TOTAL VEHICLE MILES FOR EACH SERVICE AREA.

Future vehicle miles

10-YEAR GROWTH PROJECTIONS	
SERVICE AREA	VEHICLE-MILES
1	15,787
2	12,312
3	13,500

Future vehicle miles

Service Area	Residential Vehicle Miles (Future)				Nonresidential SF (Future)			Trans. Demand Factor			Nonresidential Vehicle Miles (Future)				Total Vehicle Miles (Future)	
	Single Family Units	Trip Rate TDF	Multifamily	Trip Rate TDF	Vehicle Miles	Basic	Service	Retail	Basic	Service	Retail	Basic	Service	Retail	Total	
		0.94		0.51					0.65	1.44	2.24					
1	1500	4.04	1000	2.19	8,250	351,470	155,144	1,171,220	3.9	4.87	4.62	1,371	756	5,411	7,537	15,787
2	2584		224		10,930	100,000	50,000	162,000				390	244	748	1,382	12,312
3	1961		0		7,922	250,000	300,000	680,000				975	1,461	3,142	5,578	13,500
TOTALS	6045		1224		27,102	701,470	505,144	2,013,220				2,736	2,460	9,301	14,497	41,599

NEXT STEPS

- ❖ MAXIMUM ASSESSABLE ROADWAY IMPACT FEE CALCULATION
 - ❖ ROADWAY IMPACT FEE CIP PROJECTS WILL NEED TO BE DETERMINED
 - ❖ THE ROADWAY IMPACT FEE CIP WILL CONSIST OF ROADWAY SEGMENT IMPROVEMENTS.

Roadway impact fee calculation steps

- ❖ STEP 1: CALCULATE THE TOTAL NUMBER OF VEHICLE MILES ADDED TO THE SERVICE AREA BASED ON THE CAPACITY, LENGTH, AND NUMBER OF LANES IN EACH PROPOSED CIP PROJECT.
 - EACH PROJECT IDENTIFIED IN THE RIF CIP WILL ADD A CERTAIN AMOUNT OF CAPACITY TO THE CITY'S ROADWAY NETWORK. BASED ON ITS LENGTH AND CLASSIFICATION. THIS WOULD BE THE TOTAL AMOUNT ADDED WITHIN EACH SERVICE AREA.

Roadway impact fee calculation steps

- ❖ STEP 2: TOTAL VEHICLE MILES OF EXISTING DEMAND. A MEASURE OF THE AMOUNT OF TRAFFIC CURRENTLY USING THE ROADWAY FACILITIES UPON WHICH CAPACITY IS BEING ADDED
 - A NUMBER OF FACILITIES IDENTIFIED IN THE RIF CIP HAVE TRAFFIC CURRENTLY UTILIZING A PORTION OF THEIR EXISTING CAPACITY. THIS LINE DISPLAYS THE TOTAL AMOUNT OF CAPACITY ALONG THESE FACILITIES CURRENTLY BEING USED BY EXISTING TRAFFIC.

Roadway impact fee calculation steps

❖ STEP 3: CALCULATION OF THE TOTAL VEHICLE MILES OF EXISTING DEFICIENCIES. NUMBER OF VEHICLE-MILES OF TRAVEL THAT ARE NOT ACCOMMODATED BY THE EXISTING ROADWAY SYSTEM

- IN ORDER TO ENSURE THAT EXISTING DEFICIENCIES ON THE CITY'S ROADWAY NETWORK ARE NOT RECOVERABLE THROUGH IMPACT FEES, THIS IS BASED ON THE ENTIRE ROADWAY NETWORK WITHIN THE SERVICE AREA. ANY ROADWAY WITHIN THE SERVICE AREA THAT IS DEFICIENT – EVEN THOSE NOT IDENTIFIED ON THE ROADWAY IMPACT FEE CIP – WILL HAVE THESE ADDITIONAL TRIPS REMOVED FROM THE CALCULATION.

Roadway impact fee calculation steps

- ❖ **STEP 4: CALCULATION OF THE NET AMOUNT OF VEHICLE MILES OF CAPACITY ADDED. A MEASUREMENT OF THE AMOUNT OF VEHICLE MILES ADDED BY THE RIF CIP THAT WILL NOT BE UTILIZED BY EXISTING DEMAND.**
 - THIS CALCULATION IDENTIFIES THE PORTION OF THE RIF CIP (IN VEHICLE MILES) THAT MAY BE RECOVERABLE THROUGH THE COLLECTION OF IMPACT FEES.

Roadway impact fee calculation steps

❖ STEP 5: TOTAL COST OF THE ROADWAY IMPACT FEE CIP WITHIN EACH SERVICE AREA IS CALCULATED.

- THIS WILL IDENTIFY THE TOTAL COST OF ALL THE ROADWAY PROJECTS IDENTIFIED IN EACH SERVICE AREA.

Roadway impact fee calculation steps

❖ STEP 6: CALCULATION OF COST OF NET CAPACITY SUPPLIED.

- USING THE RATIO OF VEHICLE-MILES ADDED BY THE ROADWAY IMPACT FEE CIP AVAILABLE TO SERVE FUTURE GROWTH TO THE TOTAL VEHICLE-MILES ADDED, THE TOTAL COST OF THE RIF CIP IS REDUCED TO THE AMOUNT AVAILABLE FOR FUTURE GROWTH (I.E. EXCLUDING EXISTING USAGE AND DEFICIENCIES).

Roadway impact fee calculation steps

❖ STEP 7: CALCULATION OF THE COST TO MEET EXISTING NEEDS AND USAGE

- THIS IS USED TO IDENTIFY THE PORTION OF THE TOTAL COST OF THE ROADWAY IMPACT FEE CIP THAT IS REQUIRED TO MEET EXISTING DEMAND.

Roadway impact fee calculation steps

- ❖ STEP 8: TOTAL VEHICLE MILES OF NEW DEMAND CALCULATED FOR THE NEXT TEN YEARS. THIS IS BASED ON GROWTH PROJECTIONS. IT WILL ESTIMATE THE NUMBER OF NEW VEHICLE MILES IN EACH SERVICE AREA OVER THE 10-YEAR PERIOD.

Roadway impact fee calculation steps

- ❖ STEP 9: PERCENT OF CAPACITY ADDED THAT CAN BE ATTRIBUTED TO NEW GROWTH IN THE SERVICE AREA. THIS IS REQUIRED BY CHAPTER 395.
 - THIS IS TO VERIFY THAT ANY VEHICLE MILES ADDED BY PROPOSED ROADWAY CIP PROJECTS DO NOT EXCEED THE AMOUNT THAT IS NEEDED TO ACCOMMODATE GROWTH IN THE 10-YEAR PERIOD.

Roadway impact fee calculation steps

❖ **STEP 10: THE COST OF ROADWAY IMPACT FEE CIP THAT CAN BE ATTRIBUTED TO NEW GROWTH IN EACH SERVICE AREA.**

- THIS CALCULATION IS FOR THE TOTAL ROADWAY IMPACT FEE CIP PROJECT COSTS (EXCLUDING FINANCIAL COSTS) THAT MAY BE RECOVERED THROUGH IMPACT FEES.

Roadway impact fee calculation steps

❖ **STEP 11: CALCULATE CREDIT FOR PREVIOUS CONTRIBUTIONS. THE TOTAL CONTRIBUTIONS BY DEVELOPMENT TOWARD THE BUILDING OF IMPROVEMENTS IN THE ROADWAY IMPACT FEE CIP.**

- THIS IS THE TOTAL OF ALL FINANCIAL CONTRIBUTIONS TOWARDS FUTURE IMPROVEMENTS IN THE ROADWAY IMPACT FEE CIP. THIS WILL BE USED AS A CREDIT TO DEVELOPMENT IN ORDER TO NOT DOUBLE CHARGE FOR PREVIOUS CONTRIBUTIONS FOR ROADWAY CAPACITY IMPROVEMENTS.

Roadway impact fee calculation steps

- ❖ STEP 12: COST OF TOTAL ROADWAY IMPACT FEE CIP PROJECTS THAT CAN BE ATTRIBUTED TO NEW GROWTH OVER THE TEN-YEAR PERIOD. THE CALCULATION INCLUDES ADDING THE COST OF THE ROADWAY IMPACT FEE CIP ATTRIBUTABLE TO NEW GROWTH MINUS ANY CREDITS FOR PREVIOUS CONTRIBUTIONS MADE BY THE DEVELOPER.
 - THIS VALUE IS THE TOTAL ROADWAY IMPACT FEE CIP PROJECT COST (EXCLUDING FINANCIAL COSTS) THAT MAY BE RECOVERED THROUGH IMPACT FEES AND IS DETERMINED USING THE LIMITATIONS TO IMPACT FEES REQUIRED BY THE TEXAS LEGISLATURE (CHAPTER 395).

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