Engineering Division
55 Moore Street (PO Box 478), Walla Walla, WA 99362-0216
(509) 527-4537 FAX (509) 525-0845

WALLA WALLA URBAN AREA
TRANSPORTATION IMPACT ANALYSIS
GUIDELINES
WALLA WALLA, WA

January 2007

WALLA WALLA URBAN AREA
TRANSPORTATION IMPACT ANALYSIS GUIDELINES

What is a Transportation Impact Analysis?

A Transportation Impact Analysis (TIA) is an engineering study of the effects to an area transportation network by a proposed development or zone change. The study addresses multi-modal transportation that is within the area of the site. Multi-modal means basically all forms of transportation or anything that transports goods and/or people. Modes of transportation can include vehicular, pedestrian, bicycle, rail, marine, or even equestrian transportation. TIAs provide an objective engineering assessment of both the anticipated impacts and needs of the proposed development.

Why a Transportation Impact Analysis is needed?

The City of Walla Walla is responsible for ensuring the public health, safety, and welfare associated with new development and redevelopment. The City is striving to provide a high level of mobility to support a desirable quality of life and encourage a vibrant economy. Limitations on financial resources are limiting the capability of the City to continue expanding roadway capacity. A TIA is an important tool in the overall development planning process (residential, commercial, industrial, institutional, etc.). A TIA provides decision makers with a basis by which to assess transportation implications of approving proposed developments and zoning changes. The TIA aids in keeping short and long-range plans current; provides a basis for assessing existing or future localized transportation system deficiencies; addresses transportation related issues associated with development proposals that may be of concern to neighboring residents, businesses, and property owners; provides a basis for negotiations for improvements and funding participation in conjunction with proposed developments or zoning changes.

When is a Transportation Impact Analysis required?

The checklist, on the following page, should assist you in determining when a TIA is required. In general, a TIA is required by the City when a site under development or with a pending zone change could generate more than:

- 20 vehicle trip ends in any hour of the day;
- 100 vehicle trip ends in one day; or
- the traffic generated is expected to detract from the safety of the roadway network.

The full criteria is provided in Appendix A.

Public Right of Way Access

Checklist

SECTION ONE

- ❑ ***Is the proposed driveway/road (access) to a public road new?***
- ❑ ***Is this an existing access that is being altered in any way? (Changing location, width, grade, radius, etc.)***
- ❑ ***Is the property being accessed changing ownership or use?***

**** IF YOU CHECKED ANY OF THE BOXES IN SECTION ONE, PLEASE CONTINUE WITH THE CHECKLIST. IF NO BOXES WERE CHECKED YOU ARE NOT REQUIRED TO COMPLETE THIS FORM***

SECTION TWO

If there is a change inland use do any of the following apply:

- ❑ **The new use is expected to increase traffic from less than five (5) trips an hour to more than ten (10) trips an hour.**
- ❑ **The new use will generate more than twenty (20) vehicle trips an hour.**
- ❑ **The new use will generate more than 100 vehicle trips in one day.**

If this is a new access point for an existing or proposed development do any of the following apply:

- ❑ **The development will/does generate more than twenty (20) vehicle trips an hour.**
- ❑ **The development will/does generate more than 100 vehicle trips in one day.**

*** IF YOU CHECKED ANY OF THE ABOVE BOXES A TRANSPORTATION IMPACT ANALYSIS IS REQUIRED. PLEASE FOLLOW INSTRUCTIONS IN THE GUIDELINES. IF YOU DID NOT CHECK ANY BOXES IN SECTION TWO PLEASE FILL OUT AN APPLICATION FOR A DRIVEWAY PERMIT. THE PERMIT WILL BE REVIEWED BY THE CITY ENGINEER TO DETERMINE IF A TRANSPORTATION IMPACT ANALYSIS WILL BE NEEDED.**

What is an Access Point application?

An Application to Construct/Maintain an Access Point on the Public Right of Way, or Access Point application for short, is a necessary tool for the City to account for all access points within the public right of way. The City must balance the access needs of the adjacent property owners and the safety requirements of the traveling public. Property owners abutting roadway right of ways are normally allowed access to the roadway. However, even where the property owner is allowed access, the physical design of the driveways may be restricted to maintain the safety or efficiency of the public roadways. In some instances, the City may place or have in place a physical divider in the public roadway to prevent left turns into and/or out of a driveway. It should be noted, that when balancing the needs of the property owner with that of public safety, that the safety of the public must be held paramount.

A TIA is required; what is next?

When a TIA is required, an initial meeting should be set up with the City Engineer. At that time, the limits of the analysis will be determined. The following items will be decided based on proposed land use and location:

- Limits of the study area;
- Intersections to be evaluated;
- Modes of transportation to be included (pedestrian, bicycles, rail, mass transit, vehicular, truck routes, equestrian etc);
- Background projects (public and known private);
- Growth Rate;
- Study Conditions and Horizon Year if required;
- Other possible additional analysis (sight distances, signal warrants, etc.)
- Peak-Hour of count/counts will be designated; and
- Any additional project specific requirements will be specified.

Revisions to the TIA may be required. The need for revisions will be based on the completeness of the traffic study, the thoroughness of the impact evaluation, and the compatibility of the study with the proposed access and development plans.

What standards must be followed in the TIA?

The City has established standards for all TIAs to provide consistency in the request, preparation, and review of transportation impact analyses. These standards help to ensure that critical transportation and development issues are addressed.

The TIA shall be the responsibility of the applicant, and should follow the City of Walla Walla standards. A professional engineer registered in the State of Washington shall prepare or be in responsible charge of any transportation analyses conducted within the City of Walla Walla. The City Engineer shall determine when the report has satisfied all the requirements of the impact analysis. The final report will be stamped and signed by the aforementioned registered engineer.

STUDY CONDITIONS

Measuring existing and future traffic provides a representation of traffic flow within the study area. To assess quality of flow, roadway capacity analyses are required under the conditions agreed upon with the City. The following is a list of possible conditions:

- Existing
- No Build (Construction Year)
- Build (Construction Year)
- No Build (Per Project Phase)
- Build (Per Project Phase)
- No Build (Horizon Year)
- Build (Horizon Year)

The analysis should include the following short-term time frames; existing conditions, and construction year conditions. The intent of the short-term analysis would be to investigate the early impact of the proposed project on the existing roadway network. The short-term horizon year, referred to as construction year, is defined, as the calendar year after construction of the development is complete.

At the discretion of the City Engineer an analysis of a long-term horizon year may also be required. The long-term analysis would provide a snapshot of expected future traffic conditions in the development study area. This analysis would include both public and private improvements (if any) that could reasonably be expected to occur in the study area within the long term planning horizon. A Metropolitan Planning Organization's (MPO) Regional Model may determine the long-term horizon year. Generally the long-term horizon year changes each year to reflect a 20-year period. If a regional model is not in place, the City Engineer will base the horizon year on the design life of study area roadways or the horizon year of the Comprehensive Plan. The horizon year can be set by the City Engineer as much as 20 years after construction.

The long-term analysis should discuss transportation conditions in the future based on known and expected development, which could have either positive or negative effects on the transportation systems in the study area. The intent would be to identify, to the extent possible, changes which could reasonably be expected to occur over time in the study area and to relate those changes to future traffic impacts. Such information would be useful to the City in determining and/or confirming the future adequacy of existing and planned transportation improvements in the study area. It would also provide a reasonable basis for evaluating thoroughfare plans and identifying offsite improvements, which should be discussed with future developers in the study area.

The No Build condition evaluates future traffic in the project area without the proposed development. It includes at a minimum, an annual growth rate and future traffic from other proposed (approved) developments to be located within the vicinity of the site. Both the annual growth rate and list of approved developments may be obtained during the initial meeting with the City Engineer.

STUDY AREA

The area should include at a minimum, the site access points and nearest most likely utilized arterial or collector intersection. Additional intersections will be included at the discretion of the City Engineer. The limits of the study area should be based on the size and extent of the proposed development, and an understanding of existing and future land use, as well as traffic conditions in and around the site. The City Engineer, after possible consultation with other affected jurisdictions, will make the final determination of the study area limits.

TRAFFIC COUNTS

In order to determine the existing traffic demands and flow patterns within the study area, automatic traffic recorder (ATR) data, and manual turning movements need to be compiled. The Average Daily Traffic (ADT) data collected from the ATRs may be available from the City and/or Washington State Department of Transportation (WSDOT). If current data (less than 18 months) is not available, an updated traffic count would have to be performed. If count information is available the applicant is still responsible to make visual observations, and may have to collect additional counts and turning movements.

Peak hour counts should also be current (less than 18 months). They should be conducted at study area intersections during weekday evenings (4:00 pm to 6:00pm) at a minimum. The City Engineer may also require peak hour counts for weekday mornings (7:00 pm to 9:00 am), weekday midday (11:30 am to 1:30 pm), Saturday midday (11:30 am to 1:30 pm), and/or during the anticipated peak hour of the development. In general evening peak hours are needed for residential, lodging, industrial, medical and office developments. Medical and industrial developments may also need weekday morning and midday peak hour counts. Retail and recreational developments may need Saturday midday counts in addition to the evening peak hour count.

For weekday counts, the counts should be taken on the days of the week that provides the average weekday condition. For most developments this is between Tuesday and Thursday. The counts should be conducted during weeks which have no holidays and if possible during the school year. In addition, counts should be avoided during adverse weather or abnormal traffic patterns, such as near by construction or road closures.

TRIP GENERATION

Trip generation calculations shall be based on Institute of Transportation Engineers (ITE) studies, as summarized in the current edition of ITE's Trip Generation Manual. The following table provides some common non-commercial trip generation rates:

Table 1: Trip Generation Table Using WSDOT Trip Generation rates (6th edition, 1997).						
			ITE Average Rate			
Land Use	**Units**	**WSDOT**	**Weekday**	**PM Peak Hour**	**PM Directional Distribution** In	Out
Single Family home	Dwelling Unit	210	9.57	1.01	64%	36%
Residential Condominium Townhouse	Dwelling Unit	230	5.86	0.54	67%	33%
Church	1000 SF Gross	560	9.11	0.66	54%	46%

Traffic volumes, expected to be generated by the proposed development should be calculated using the latest edition of the Institute of Transportation Engineers' (ITE),Trip Generation Manual. The calculation of traffic volumes used to determine impacts of the development should be based on the maximum land use intensity allowed under the existing (or proposed) Zoning Ordinance or the Comprehensive Plan.

Trip Generation adjustment for internal capture and/or pass-by traffic may be justified for some developments. Any adjustments must follow ITE procedures as defined in the Trip Generation Handbook. Internal capture and pass-by traffic adjustments can be important factors in projection of site impacts. Internal capture can be described as trips that are satisfied on the site which do not need to utilize the external roadway network. (Example: An individual who goes to a shopping mall and then decides to drive to a restaurant on mall property.) A pass-by trip is considered a "non-diverted" trip that is already on the roadway and which now stops at the site. (Example: An individual who stops at a new gas station built along their regular route.)

TRIP DISTRIBUTION AND ASSIGNMENT

After the trip generation analysis for the proposed site has been completed, the traffic must be distributed and assigned to the roadway system for the impacts to be determined. Trip distribution refers to the direction a vehicle will take to access or leave the project site and can vary depending on:

- Type of proposed development;
- Type of development surrounding site;
- Similar land uses in vicinity;
- Size of proposed development; and
- Condition (Congestion, Delay, etc.) of the roadway network in site vicinity

Trip assignment identifies the actual routes taken by project traffic to and from the site. Trip assignment can be rounded to the nearest five percent.

TRAFFIC ANALYSIS OPERATIONS

The capacity analysis methodology used, should be based on the concepts and procedures in the most current edition of the Transportation Research Boards' Highway Capacity Manual (HCM). Capacity analyses provide an indication of how well the study area intersections serve existing and future traffic demands. A primary result of capacity analysis is the assignment of Levels of Service (LOS) to traffic facilities under various traffic flow conditions. LOS is defined by the delay in seconds per vehicle caused by the traffic control of the intersection.

For signalized intersections, control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The HCM methodology calculates LOS for each movement and for the intersection as a whole.

The following narrative from Chapter 9 of the 1997 HCM defines LOS for signalized intersections. (Note that this definition has not changed with the 2000 edition of HCM)

> *LOS A* describes operations with very low control delay, up to 10 seconds per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
>
> *LOS B* describes operations with control delay greater than 10 and up to 20seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.
>
> *LOS C* describes operations with control delay greater than 20 and up to 35seconds per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.
>
> *LOS D* describes operations with control delay greater than 35 and up to 55seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high *v/c (volume to capacity)* ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
>
> *LOS E* describes operations with control delay greater than 55 and up to 80 seconds per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high *v/c* ratios. Individual cycle failures are frequent occurrences.

LOS F describes operations with control delay in excess of 80 seconds per vehicle. This level, considered unacceptable to most drivers, often occurs with over saturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high *v/c* ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delay levels.

Unsignalized intersection and commercial driveway LOS is also defined by control delay. However, the methodology only presents LOS for the minor movements of the intersection, which include the minor street approaches under sign, or major movements that must yield to oncoming traffic, such as left-turning traffic. There is no overall unsignalized intersection LOS. Unsignalized LOS is defined as follows.

LOS A: ≤10 seconds per vehicle

LOS B: >10 and ≤15 seconds per vehicle

LOS C: >15 and ≤25 seconds per vehicle

LOS D: >25 and ≤35 seconds per vehicle

LOS E: >35 and ≤50 seconds per vehicle

LOS F: >50 seconds per vehicle

With the exception of the following arterial segments: Myra Road, Poplar Street (Myra Road to Ninth Ave.), Rose Street (Myra Road to Ninth Ave.), Second Ave.(excluding CBD), Isaacs Ave. (Wilbur to Airport Way), and Tietan Street, an over all intersection LOS D will be considered acceptable for signalized intersections and for all critical movements of an arterial or collector unsignalized intersection. An LOS E will be acceptable for all critical movements at local roadways. In addition, no existing intersection or critical movement should worsen by more than two levels of service. For example, it would not be acceptable for an intersection currently operating at an overall LOS A to drop to a LOS D. If an existing or no-build condition intersection or critical movement is operating at an acceptable or less than acceptable LOS than any proposed additional traffic must not increase the delay by more than10 seconds. For Myra Road, Poplar Street (Myra Road to Ninth Ave.), Rose Street (Myra Road to Ninth Ave.), Second Ave.(excluding CBD), Isaacs Ave. (Wilbur to Airport Way), and Tietan Street through- movements, an LOS C will be considered acceptable.

The analysis should also include the volume to capacity (v/c) ratios for each lane group or movement. The v/c ratio indicates the amount of congestion for each movement. Any v/c ratio greater than one indicates that the movement is operating above capacity.

Peak Hour Factors

In the absence of field measurements of peak-hour factor (PHF), approximations can be used. For congested conditions, 0.92 is a reasonable approximation for PHF. For conditions in which there is fairly uniform flow throughout the peak hour but a recognizable peak does occur, 0.88 is a reasonable estimate for PHF. In generally, the following should be used:

- For a total intersection approach volume of 2000 vehicles per hour or more use a PHF of 0.95.
- 1000 vph to < 2000 vph use a PHF of 0.93
- 500 vph to < 1000 vph use a PHF of 0.92
- 200 vph to < 500 vph use a PHF of 0.87
- 100 vph to < 200 vph use a PHF of 0.83
- 50 vph to < 100 vph use a PHF of 0.78

In general a PHF of 1.0 is not justified for use in the Walla Walla urban area.

ADDITIONAL ANALYSES

The following additional analyses may be required depending on the characteristics of the proposed development, its impacts, and the transportation system within the study area. The need for additional analysis should be discussed at the initial meeting with the City Engineer:

<u>Sight Distance</u> –Identify potential safety concerns associated with site access and egress, sight distance at intersections (stopping sight distance and corner sight distance) measurements should be conducted at all proposed access points. The measured site distance should be compared with minimum requirements, as currently established by the American Association of State Highway and Transportation Officials (AASHTO) and WSDOT.

<u>Acceleration and/or Deceleration Lanes</u> – Acceleration and/or deceleration lanes may be needed in areas with significant grade change and/or along primary roadways. If an acceleration and/or deceleration lane is needed calculations for their proposed length should be provided.

<u>Multi-Modal Access and Circulation</u> –Identify practical methods to enhance circulation, increase pedestrian safety, increase bicycle mobility/safety, and enhance on-street and off-street parking access, efficiencies, and opportunities. The analysis should also address mass transit usage and possible improvements. At a minimum existing school, bicycle, and transit routes in the study area should be identified and any impacts from the proposed developments should be included.

<u>Accidents</u> – Five years of the most current accident data should be obtained from the City or WSDOT for intersections within the study area. If an existing intersection has had more than five accidents in a 12-month period and/or an accident resulting in a fatality, the City Engineer should be consulted. Based on the City Engineer's judgment, the applicant may be required to complete a traffic safety analysis.

Queuing and Blocking – In congested conditions or for roadways with coordinated signals, queuing and blocking should also be analyzed. The queue is the line of vehicles, bicycles, or persons waiting at an intersection and is described in terms of the length of the queue. Blocking is described by the percentage of time the queue is blocking access to an upstream intersection or driveway.

Signal Warrants – Unsignalized intersections experiencing significant deficiencies (delays) should be evaluated for potential signalization. Signal Warrants should be completed for these locations using the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD), published by the U.S. Department of Transportation Federal Highway Administration as currently adopted by WSDOT.

Capacity Analysis of Roadway Segments – Intersection level of service statistically controls the design of a roadway. However, further analysis of the roadway segments adjacent to and/or near the development may be warranted.

MITIGATION AND RECOMMENDATIONS

The final phase of the analysis process is to identify the improvement measures necessary to minimize the impact of the "project" on the transportation system. Intersections must be mitigated if any year of the Build Condition is expected to operate below the City's acceptable levels. Measures considered necessary to mitigate future roadway system deficiencies under Build Conditions should be recommended as they relate to impacts of the proposed project within the designated study area. These intersections should be mitigated to operate at an acceptable level based on the calculated v/c ratio, LOS, and queue length of the overall intersection (signalized) and critical movement (unsignalized). If an existing or no-build condition intersection or critical movement is operating at an acceptable or less than acceptable LOS than any proposed additional traffic must not increase the delay by more than 10 seconds. The report shall recommend traffic mitigation to off set other safety and/or capacity issues, or specific neighborhood traffic impacts caused by an increase of 25%, or greater, in average daily traffic (ADT) on adjacent local or collector streets due to the development.

Mitigation recommendations must include at least one, but preferable two design alternatives with full analysis for horizon year Build Condition. For example, if installation of a signal is recommended as part of the mitigation than a signal-warrant analysis and capacity analysis of the study area should be completed at a minimum. Recommended improvements should be clearly described and conceptual drawings depicting the location, nature, and extent of the proposed improvement should be provided. A suggested time schedule for all mitigation should be included in the report.

Clear recommendations of the installation and cost responsibilities for the mitigation measures/improvements should be provided.

OR

Applicants will be responsible for the cost and implementation of identified improvements which mitigates the traffic impact of their proposed development. Since some improvements will not be implemented until additional phases are complete, funding will be placed into an escrow account for that specific improvement.

REPORT

All transportation impact analyses should be documented in a report. In order to provide consistency and facilitate review of traffic studies, the format identified by the outline on the following pages should be followed. Expanded explanations of the content required under each heading are provided following the outline.

CITY OF WALLA WALLA
TRANSPORTATION IMPACT ANALYSIS

Example Outline

I. EXECUTIVE SUMMARY

A. Project Description, Existing Conditions, Proposed Use, Probable Impact of Project (Build – No-Build)

B. Traffic Operations Analysis (Existing, No-Build, Build)

C. Mitigation Measures

D. Recommendations

E. Conclusions

II INTRODUCTION

A. Project Description

1. Site and study area boundaries.

2. Existing and proposed site uses (includes intensity) (include phases and schedules).

3. Existing and proposed nearby uses (i.e. land uses and zoning).

4. Existing and proposed roadway and intersections.

5. Planned or anticipated area land uses, proposed zone changes.

III EXISTING CONDITIONS

A, Geometrics, Traffic Control, Traffic Volumes, Sight Distance, Accidents

B. Include All Modes of Transportation and Availability to Site.

IV NO-BUILD

A. Background Traffic Volumes for each analysis year (annual growth plus other Approved projects in area)

B. Planned Future Street/Highway Improvements

C. Explain Methodology of Projections

V BUILD

A. Trip Generation, Adjustments to Trip Generation (bypass), Trip Distribution and Assignment, Possible Project Phasing, Add background volumes for each Analysis year.

B. Explain Methodology and Document Assumptions, Include Pass-by Trips

VI TRAFFIC OPERATIONS ANALYSIS

A. Methodology, Analysis Results for Each Scenario (PM is standard but some Developments need AM, midday or weekend, or any combination)

B. Evaluate Site Access

C. Sight Distance

D Accidents

E. Queuing/blocking analysis (including blocking adjacent driveways).

VII MITIGATION MEASURES OR RECOMMENDED IMPROVEMENTS

A. Off-Site Improvement Needs, Proposed Site Access

B. Analysis Results with Mitigated Measures Implemented (if applicable)

a. Methodology, Analysis Results for Each Scenario (PM is standard but some developments need AM, midday or weekend, or any combination)

b. Signal Warrants (if applicable)

c. Sight Distance (if applicable)

d. Queuing/blocking

C. <u>Schedule & implementation of proposed improvements</u>

VIII CONCLUSION

IX APPENDIX

A. Traffic Count Data, Average Daily Traffic, Peak Hour Turning Movements

B. Capacity Analysis Summary Sheets (for each condition)

C. Signal Warrants

D. Turn Lane Warrants

EXAMPLE LIST OF FIGURES

Vicinity Map*

Conceptual Site Plan*

Existing Geometrics*

(Year) Existing Weekday Morning Peak-Hour Traffic Volumes

(Year) Existing Weekday Evening Peak-Hour Traffic Volumes

(Year) Existing Weekday Midday Peak-Hour Traffic Volumes

(Year) Existing Saturday Midday Peak-Hour Traffic Volumes

(Year) Existing Sunday Midday Peak-Hour Traffic Volumes

(Year) No Build Weekday Morning Peak-Hour Traffic Volumes

(Year) No Build Weekday Evening Peak-Hour Traffic Volumes

(Year) No Build Weekday Midday Peak-Hour Traffic Volumes

(Year) No Build Saturday Midday Peak-Hour Traffic Volumes

(Year) No Build Sunday Midday Peak-Hour Traffic Volumes

Project Trip Assignments (Percentages) per intersection*

Site Generated Weekday Morning Peak-Hour Traffic Volumes

Site Generated Weekday Evening Peak-Hour Traffic Volumes

Site Generated Weekday Midday Peak-Hour Traffic Volumes

Site Generated Saturday Midday Peak-Hour Traffic Volumes

Site Generated Sunday Midday Peak-Hour Traffic Volumes

(Year) Build Weekday Morning Peak-Hour Traffic Volumes

(Year) Build Weekday Evening Peak-Hour Traffic Volumes

(Year) Build Weekday Midday Peak-Hour Traffic Volumes

(Year) Build Saturday Midday Peak-Hour Traffic Volumes

(Year) Build Sunday Midday Peak-Hour Traffic Volumes

(Year) Build Mitigated Weekday Morning Peak-Hour Traffic Volumes

(Year) Build Mitigated Weekday Evening Peak-Hour Traffic Volumes

(Year) Build Mitigated Weekday Midday Peak-Hour Traffic Volumes

(Year) Build Mitigated Saturday Midday Peak-Hour Traffic Volumes

(Year) Build Mitigated Sunday Midday Peak-Hour Traffic Volumes

** Always required, others based on development and decided at initial meeting.*

EXAMPLE LIST OF TABLES

* *Always required, others based on development and decided at initial meeting.*

Transportation Impact Analysis Format

In order to provide consistency and facilitate review of transportation Impact Analyses, the format below should be followed. Under each heading, the content and methodologies to be utilized are discussed. (Items marked * are not required for minor reports)

*I. * EXECUTIVE SUMMARY*

The Executive Summary should provide a clear and concise description of the study findings. This should include a general description of the project's proposed use; the sites existing conditions; probable impacts of proposed use; summary of traffic operations study; conclusions of analysis, mitigation measures (if any),and recommendations. Calculations, documentation, data reporting, and detailed design should not be included in this section. The executive summary should be complete in itself, and not dependent on supplementary data included by reference.

*II. *INTRODUCTION*

The Introduction should supply the reader with the location of the project site. As part of the description, a site location map should be provided. The map should include roadways that afford access to the site and all that are part of the study area. The map should also include a North arrow. A detailed description of the project should be provided. This description should include the size of the parcel, general terrain features, access available to site, anticipated completion date, and the existing and proposed uses of the site. Any construction phasing should also be provided. The square footage of each use or number and size of units that are proposed should be included. Parking and internal circulation should also be included in this section if requested by City Engineer. The intent of the study is to evaluate worst-case transportation impacts. If the specific use of the site is not known and if several different uses are permitted, the land use with the greatest overall traffic impact should be assumed in the study.

*III. *EXISTING CONDITIONS*

Geometrics and Traffic Control - The TIA must identify the existing conditions in the vicinity of the project site, including a description of the study area. This is necessary to provide a comparison of the impacts over time on land use and circulation.

A comprehensive field inventory of the site and study are should be conducted. The field study should include collection of geometric data (number of lanes, intersection configurations, etc.), traffic controls and traffic volumes. Bicycle, pedestrian, or other transportation facilities should be included if required by City Engineer. The results of the inventory should then be depicted graphically.

Traffic Volumes – Average daily traffic volumes should be summarized in tabular form within the report. Existing peak hour traffic volumes should be depicted graphically. Actual count summary sheets should be submitted within the appendix.

IV. ***NO BUILD***

Background Traffic Volumes –The report should specify the No Build Volumes associated with each peak hour condition. Results should be presented in both graphic and tabular form.

Planned Roadway Improvements – Any planned (funded) roadway improvements to be completed within the study area should be identified and discussed within the TIA. These improvements should be reflected in the No Build and Build an analyses.

Horizon Year –The No Build volumes for the horizon year should be provided in the report for each required peak hour condition. The results should be presented in both graphic and tabular form.

V. ***BUILD***

Trip Generation –A summary table listing each type of land use, corresponding size or number of units (sq. ft., dwelling units, etc.), the average trip generation rates used (AM, PM, and/or Midday peak hours of the adjacent street) and the resultant total trips generated must be provided for the project site.

* Adjusted Trip Generation –Any adjustments for internal capture and pass-by traffic should be explained and summarized in tabular form.

Trip Distribution and Trip Assignment – The report should include reasoning and discussion of all trip distribution and assignments. Graphic presentations of the trip distribution and assignment for each intersection should be provided in the report.

* Phasing of Project and Horizon Year – For each phase year and/or the horizon year, the distribution of project trips should be shown in graphic format using percentages of project traffic by geographical direction. The text should describe the methodology and assumptions, which are used in the determination of trip distribution.

Build Traffic Volumes – In order to develop mitigation measures, conditions with the project in place must be known. Project generated and distributed traffic should be added to the No Build traffic volumes. The resulting Build traffic volumes should be depicted graphically.

*VI. **TRAFFIC OPERATIONS ANALYSIS***

The traffic study should specify the Existing, No Build, and Build (for each required horizon year), LOS, delay, and v/c ratio associated with the required peak hour conditions. Results should be presented in tabular form and can also be shown graphically. Calculations and worksheets should be submitted in the appendix.

Any additional analysis required by the City Engineer should be provided.

• Roadway Segment Capacity Analysis – Discussion of findings should be included within the text of the report. A summary of the analysis should be presented in tabular form.

• Sight Distance – Discussion of findings should be included within the text of the report. A summary of the sight distance analysis should be presented in tabular form.

•Multi-Modal Access and Circulation Study – Discussion of findings and any recommendations should be included within the text of the report.

• Accidents –This data should be summarized within the report in tabular or graphical form with a brief description at each critical location.

• Queuing and Blocking – The analysis should identify the impacts to driveways and intersections caused by excess queue length and blockage. Queue length for each lane and percentage of blocking for each intersection should be provided in graphical or tabular form.

VII. ***MITIGATION MEASURES/RECOMMENDATIONS***

Off Site Improvement Needs Proposed off Site Improvements should be fully described and addressed in the report. Any geometric improvements should include a conceptual layout plan.

Proposed Site Access – A complete description of the access/egress of the site should be explained and depicted. It should include number of driveways, their locations, distances between driveways and intersections, types of driveways, (two-way, one-way, etc.), traffic controls, etc. Capacity analysis should be completed for all project driveways.

Proposed Mitigation Alternatives – A complete description of all proposed improvements and/or alternatives. Should include operational analysis with mitigation implemented, and full traffic operational analysis of proposed improvements, including all additional analysis required and a signal warrant analysis if applicable:

Signal Warrants – Results of the analysis should be discussed and recommendations established and presented in this section of the TIA.

Schedule & Implementation – A time schedule for the construction of any improvements should be discussed in the text and provided in tabular form or as part of the appendix. Recommendations for responsibility allocation should be discussed in the text.

VIII. ***CONCLUSIONS***

This section of the transportation analysis should summarize the required improvements and the proposed mitigation measures. This should include at a minimum:

- Existing and future LOS results;
- Recommended Roadway Improvements; and
- Resultant LOS with proposed improvements in place.

IX. ***APPENDIX***

The final section of the TIA should include average daily and peak hour turning movement traffic count data collected and/or obtained from other sources. Summary sheets for all capacity analyses completed should also be included within the appendix of the TIA.