

GRTA DRI REVIEW PACKAGE

TECHNICAL GUIDELINES

**GEORGIA REGIONAL TRANSPORTATION
AUTHORITY**

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GRTA DRI REVIEW PACKAGE TECHNICAL GUIDELINES

ARTICLE 1 GRTA DRI REVIEW PACKAGE PURPOSE

Section 1-101. Purpose.

The purpose of the GRTA DRI Review Package is to establish the technical guidelines for data and analysis required to be submitted to GRTA in order to provide GRTA with the information necessary to determine whether a DRI should be approved. All defined terms used in this document shall have the same meaning as set forth in the GRTA DRI Procedures and Principles.

ARTICLE 2 GRTA DRI REVIEW PACKAGE OVERVIEW

Section 2-101. Contents of the GRTA DRI Review Package.

The GRTA DRI Review Package shall include the following:

- A description of the proposed DRI and a site plan showing the location and intensity of proposed land uses;
- A description of the Area of Influence (“Area”) for the proposed DRI and information describing the number of jobs by salary ranges or averages, numbers and value of housing units and existing land use in the Area;
- An analysis of the transportation impacts of the proposed DRI including traffic impacts in the vicinity of the proposed development;
- Identification of planned and programmed transportation improvements within the Study Network;
- Identification of transportation services and access improvements that are required to serve the proposed DRI which may require federal or state funding; and
- A detailed assessment of the extent to which the proposed DRI may satisfy the DRI review criteria for non-expedited DRI Review.

Section 2-102. Transportation Analysis.

The transportation analysis required to be included in the GRTA DRI Review Package is to be prepared in accordance with the methodologies in these Technical Guidelines.

- A. Intersection Analysis.** Intersection analyses shall be conducted according to Transportation Research Board (TRB) Report 209, The Highway Capacity Manual (HCM) and the Highway Capacity Software developed by the Federal Highway Administration (FHWA) or other comparable software which complies with the HCM.
- B. Roadway Segment Analysis.** The Highway Capacity Manual is the preferred method of analysis for roadway segments. However, the simplified analysis developed by Florida Department of Transportation (available on the their website at

<http://www.dot.state.fl.us/Planning/>) or any other previously approved methodology may also be used.

- C. **Service Volume Thresholds.** Table 5, included in the appendices, (an excerpt from FDOT’s Level of Service Handbook) sets forth the generalized service volume thresholds for given levels of service for varying facility types and the input assumptions for the level of service standards. These tables may be modified to reflect area-specific conditions, if approved by GRTA at the DRI Review Pre-Application Conference based on appropriate documentation, and may be used as an alternative to detailed link analysis using HCM analysis procedures. A more detailed analysis may be employed at the applicant’s option.
- D. **Level of Service Standards (Analysis).** The level of service standards (“LOS”) established in the *Highway Capacity Manual*, published by the Transportation Research Board shall be used in the analysis of traffic impacts. (See Table 1).

TABLE 1 - LEVEL OF SERVICE (LOS) DESCRIPTIONS

General Roadway Segments

LOS	General Characteristics
A	Nearly free-flow conditions; full freedom to maneuver within traffic stream
B	Nearly free-flow conditions; with some restrictions on maneuverability
C	Nearly free-flow conditions; with noticeable restrictions on maneuverability
D	Declining speeds; increasing densities; restricted maneuverability
E	At capacity; unstable flow; reasonable speeds; very little, if any, freedom to maneuver
F	Unstable flow conditions; low speeds; significant queuing at constricted points

Measurement Statistics: For rural and suburban roadways, LOS is a function of the volume to capacity ratio (v/c). For urban roadways, LOS is defined by the average travel speed along a roadway segment.

- E. **Level of Service Standards (Assessment and Mitigation).** The LOS standards adopted within the transportation element of the local government’s Comprehensive Plan shall be used for impact assessment and mitigation analysis. If the local government does not have adopted LOS standards, then the following shall apply:
 - Expressway facilities
 - within urban area – LOS D
 - within rural areas – LOS C
 - Major arterials, as defined by GDOT or jurisdictional MPO
 - within urban areas – LOS D or E (see note below)
 - within rural areas – LOS C or D (see note below)
 - Minor Arterials, as defined by GDOT or jurisdictional MPO
 - within urban areas – LOS D or E
 - within rural areas – LOS C or D
 - Collectors and others
 - within urban areas – LOS D or E
 - within rural areas – LOS C or D

The areas to be considered urban and rural for the purposes of the LOS shall be based on Georgia DOT’s designation of urban and rural routes.

For DRIs located in Major Activity Centers as defined by ARC, a LOS standard one level lower than the standard set out above, provided that the reduced level of service is no lower than LOS E.

Where roadways are parallel to a fixed guideway or busway transit facilities, such roads will be evaluated at one LOS lower than the standard set out above.

Section 2-103. Report Outline.

The GRTA DRI Review Package for a particular DRI shall be prepared according to the outline in Table 2 below.

TABLE 2 - GRTA DRI REVIEW PACKAGE OUTLINE

- | | |
|--|--|
| 1. Project Description | |
| 2. Site Plan | |
| 3. Consistency with Adopted Comprehensive Plans | |
| 4. Project Phasing Schedule | |
| 5. Bicycle and Pedestrian Facilities Description (On-site and Off-site) | |
| 6. Transit Facilities and Capacity Description (On-site and Off-site) | |
| 7. Trip Generation | |
| 8. Gross Trip Ends Analysis | |
| 9. Net Trip Ends Analysis | |
| 10. Mixed Use Reduction Analysis (If applicable) | |
| 11. Modal Analysis (If applicable) | |
| 12. Pass-by Trips Analysis (If applicable) | |
| 13. Trip Distribution and Assignment | |
| 14. Study Network Determination – “Study Area” | |
| 15. Existing Conditions | |
| 16. Planned and Programmed Improvements in Study Area | |
| 17. Description of Transportation Facilities in Study Network | |
| 18. Analysis Summary | |
| 19. Future Year Background Traffic | |
| 20. Future Year Total Traffic | |
| 21. Facility Needs Analysis (Background and Future) | |
| 22. Roadway Segment and Intersection Analysis | |
| 23. Site Access Analysis | |
| 24. Other Pertinent Information | |
| 25. Significant Impacts Analysis | |
| 26. Traffic Movement Diagrams Required If Not Otherwise Included in Package (turning movements and intermediate balanced one-way segment volumes showing each peak period on each diagram) | |
| 27. Existing Traffic | |
| 28. Background Future Traffic (one for each phase) | |
| 29. Site Traffic (based on net trip generation; one for each phase) | |
| 30. Total Future Traffic (one for each phase) | |

Use this list as a Checklist to aid in the Completeness Review.

ARTICLE 3 GRTA DRI REVIEW PACKAGE METHODOLOGY & PRE-APPLICATION CONFERENCE

Section 3-101. Pre-Application Conference.

The methodology to be employed in the preparation of a GRTA DRI Review Package shall be discussed at the Pre-Application Conference jointly hosted by the GRTA and the Regional Development Center (RDC).

Section 3-102. Required Information for Pre-Application Conference.

The applicant should be prepared to present the following information at the Pre-Application Conference:

- Project location, size, and character.
- Proposed methodology to be used for traffic distribution and assignment.
- Assumptions related to data collection activities. For example, what is the acceptable age of old traffic counts to be used, and how will they be factored to existing conditions?
- Method to be used to project future year background traffic.
- Assumptions related to use of TIP or RTP projects as part of existing or future conditions analysis.
- Capacity analysis procedures.
- Trip generation data sources, including all variables and assumptions used to calculate proposed trip generation.
- Mode split assumptions.
- LOS standards for area roadways.
- Other pertinent factors.

ARTICLE 4 GRTA DRI REVIEW ELEMENTS

Section 4-101. Project Description.

A project description shall be provided for the project, including a locational map and aerial photograph and a tabular description of site area, natural features, existing land uses, proposed land uses and intensity of uses, off-street parking, access points and any features which relate to the interaction between uses, trip making and alternative modes of transportation.

Section 4-102. Local Plan Summary.

An explanation as to how the proposed DRI relates to the local government's Comprehensive Plan and, in particular the transportation and capital improvements element, and any transportation improvements listed in the Short-Term Work Program(s) within the vicinity of the DRI.

Section 4-103. Project Phasing.

A phasing schedule shall be provided for any proposed DRIs involving multiple phases. The phasing schedule shall include the types and amounts of land uses to be developed and should be identified by phase, the site location of each land use by phase, the amenities to be developed with each phase, and all transportation elements.

Section 4-104. Site Plan.

A site plan in paper and digital form (.jpeg, .png, .gif, dxf or .tif formats) shall be provided, depicting the location, size, and character of the proposed development, including the number and location of parking spaces to be provided and the location, size and character of all site access locations. The site plan shall be accompanied by a description of: 1) any unique features or characteristics (for instance, if a retail center is composed of specialty uses, without large anchor tenants, etc); 2) required and provided parking by land use, together with any shared parking anticipated for the development; 3) an explanation of the physical relationship between the different uses; and 4) any design features that encourage interactions between uses.

The site plan shall also be accompanied by: 1) an explanation of the anticipated function of site access during peak periods; 2) the form, if any, of traffic control which is planned; and 3) a turning movement analysis for all site access locations and any unique geometric features of the access points, if any.

Section 4-105. Bicycle and Pedestrian Facilities Description.

A description of any on and/or off-site provisions for non-motorized travel should be described, including:

- The location and character of any nearby local or regional trails;
- The location of bicycle paths or sidewalks in the immediate vicinity of the proposed DRI;
- Proposed bicycle and/or pedestrian connections between the proposed DRI and existing or planned off-site facilities;

- A description of proposed bicycle and pedestrian connections between uses within the proposed DRI to encourage interaction between the uses;
- Existing or proposed connections between the proposed DRI and any nearby transit facilities.

If a proposed DRI relies upon bicycle and/or pedestrian travel as a basis for reducing off-site traffic impacts through on-site interactions between land uses, the AGDR shall include a detailed explanation of the justification for the proposed reductions and the assumptions on which the explanation is based.

Section 4-106. Transit Facilities.

A description of transit facilities in the vicinity of the DRI, including a capacity analysis, shall be included. Transit capacity analysis should indicate whether the transit facility impacted by the DRI and additional development in the area has sufficient capacity to accommodate potential trips to and from the DRI. If a reduction in off-site vehicle trips through the use of transit to and from the DRI is anticipated, the amenities, facilities or programs to be included in the proposed DRI that justify these reductions should be described. Identify the location and character of connections to off-site transit facilities or bus stops. If bus stops are proposed on-site, provide a description of the on-site design features that allow access to these stops. If the location of additional bus stops will require existing bus routes, identify the affected routes. If the project is located within one half of one mile of the pedestrian entrance to an existing or proposed fixed guideway transit facility, describe how the project will connect to and interact with these facilities. For a DRI not located within one half of one mile of the pedestrian entrance to a fixed guideway transit facility, some reduction in off-site trips to and from the DRI may also be justified if shuttle services are provided between the transit facility and the DRI on a regular basis. Changes in transit service or bus stop location should be discussed with the local transit provider prior to including proposed changes in service or bus stop locations in DRI application.

Section 4-107. Trip Generation.

GRTA DRI Review Package shall include an explanation of all assumptions used and calculations performed to estimate the total of trip ends to be generated by or attracted to the proposed DRI, including any reduction attributable to mixed use interactions, transit or modal splits, and pass-by trips. In the case of proposed DRIs to be developed in phases, trip generation analyses shall be reported by project phase.

- A. **Gross Trip Ends Analysis.** The gross trip ends to be generated by the proposed DRI shall be identified in tabular format based on the most recent edition of Trip Generation, published by the Institute of Transportation Engineers. The table to be included in the AGDR shall identify the use, the ITE Trip Generation land use category, the daily, AM and PM peak period generation rates and generated trips. The standard procedure is to include AM and PM peak and daily trip generation analyses of traffic conditions; however, GRTA may request other peak periods (e.g., Saturday midday peak period or Sunday peak period for a church) or may waive requirements for the A.M. peak period. Such requests or waivers must be discussed and agreed upon at the Pre-application Conference based on local conditions and the peaking characteristics of the proposed land uses.

All analysis of trip generation shall follow the recommended procedures for selecting rates and equations shown in Figure 3.1 in Trip Generation Handbook—A Proposed Recommended Practice of the Institute of Engineers.

If ITE Trip Generation rates are not available or applicable, trip generation rates shall be provided by the applicant and the data collection methodology shall follow the guidelines established in Chapter 4, “Conducting a Trip Generation Study”, in Trip Generation Handbook—A Proposed Recommended Practice of the Institute of Engineers. Any proposed trip generation study methodology (and potentially, preliminary results) must be discussed and agreed upon at the Pre-Application Conference.

- B. **Net Trip Ends Analysis.** The gross trips calculated through application of the ITE rates or special studies may be reduced based on the interaction between land uses, modal split assumptions, or pass-by trips.

Net trip ends to be generated by the site will be defined as the total off-site trips to be generated by or attracted to the site. Analysis of these trips will be provided in the AGDR for peak periods and for the daily trip generation and will be performed on a directional basis.

The net trip ends analysis will be summarized in matrix format, with trip reduction assumptions and actual numbers clearly identified.

1. **Mixed Use Reduction.** In the event that complementary land use types are to be developed in a proposed DRI and the GRTA DRI Review Package relies upon a “mixed use reduction” or “internal capture,” the amount of the reduction and the interaction on which the reduction is based shall be documented by the applicant. Trip reduction analysis shall be prepared in accordance with the ITE Trip Generation Handbook, Chapter 7: Multi-Use Development.

Except as provided in Table 3 of these Technical Guidelines, Tables 7.1 and 7.2 of the ITE Trip Generation Handbook establish the maximum mixed use reductions which may be considered as a part of the trip reduction analysis. [In the case of a conflict between Table 3 and Table 7.1 and 7.2 of the Handbook, Table 3 controls.] In order to qualify for a reduction in trip generation, the GRTA DRI Review Package shall demonstrate that site design features incorporated in the site plan justify the application of mixed use reductions to the proposed DRI. The limitations in Table 3 shall apply to any mixed use reduction analysis for a proposed DRI in addition to the provisions of the ITE Trip Generation Handbook.

Any proposed trip generation reductions should be discussed at the Pre-Application Conference. If there are other considerations beyond those described in the *ITE Trip Generation Handbook* or Table 3 that justify additional trip reductions, they should be presented to GRTA for approval prior to submitting an GRTA DRI Review Package.

TABLE 3 - ADJUSTMENTS TO ITE HANDBOOK MIXED USE REDUCTIONS

	Distance Between Complementary Uses			
	¼ miles	¼-½ miles	½-¾ miles	>¾ miles
Bicycle/Pedestrian Facilities Provided	Full reductions allowed	Allowed 67% of reductions	Allowed 33% of reductions	No reductions allowed
Bicycle/Pedestrian Facilities Not Provided	Allowed 67% of reductions	Allowed 33% of reductions	No reductions allowed	No reductions allowed

2. **Alternative Modes of Transportation.** Reductions in off-site vehicle trips may also be recognized for anticipated use of alternative modes of transportation including transit, bicycle or pedestrian access if trips generated by the proposed DRI will use transit, bicycle or pedestrian modes of transportation.

If trip generation reductions are assumed based on modal splits, the justifications for these assumptions shall be described in the GRTA DRI Review Package. In the case of transit, existing or proposed routes that service the site should be identified. In the case of non-motorized trips, the discussion of internal capture in the *ITE Trip Generation Handbook* may be used as a basis for the degree of interaction between adjacent land uses. Appendix B, Tables B.1 through B.3 sets out appropriate transit reduction factors that may be considered.

3. **Pass-by Trips.** In the case of retail and other applicable uses, an additional adjustment in trip generation may be made to account for “pass-by capture”. For these land uses, some portion of the total trips generated will be trips which are already on the road that will be diverted from the adjacent traffic stream as the trip maker passes by the use while on the way to another destination. These trips are already present in the traffic stream and do not create additional trips on the adjacent roadway facilities, beyond those impacts associated with turning movements at the project driveways.

In the preparation of a GRTA DRI Review Package for a proposed DRI, trip reduction for pass-by trips shall be determined as follows:

- a. Calculate passerby trips as provided for in the *ITE Trip Generation Handbook*
 - b. Perform a limits test, limiting the total pass-by trips associated with a site to 10% of the adjacent roadway’s projected traffic capacity.
4. **Order of Trip Reduction.** The order of analysis for mode split reduction, mixed-use reduction, and passer-by reduction shall be: mixed use reductions, modal split reductions, then pass-by reductions. Each of the reductions should be applied to the net trips after the application of the immediately previous reduction.

Section 4-108. Trip Distribution.

There are three methods of trip distribution that are acceptable to GRTA for use in DRI analyses:

- Census tract analysis
- Market Analyses
- TRANPLAN-based analysis

If methods other than these are proposed, they will require prior approval by GRTA. Any method proposed should be reviewed with GRTA at the pre-application meeting.

A. **Census Tract Analysis.** For the census tract analysis, population and employment projections in the project vicinity shall be obtained from ARC, and shall serve as the basis for this method. This method will develop site project traffic distribution by evaluating the distribution of productions or attractions near the site. For instance, for a retail facility, the distribution of population near the site would be reviewed. The distance of census tracts from the site to be used in the analysis should be proposed by the applicant. In general, the larger the site, the larger an area it will draw employees and patrons from, and so the larger an area of census tracts should be analyzed. For a housing-based DRI, the distribution of employment near the site would similarly be investigated.

In either case, the future year census projections to be used should be the projections that most closely approximate the anticipated build-out year of the project. For instance, a project with a proposed opening day in 2005 should use ARC's 2005 projections.

After deciding upon which tracts to use, the population or employment in the total study area is summed, and the percentage of the total represented in each tract is calculated. These percentages are then overlaid on a transportation map, and distributions to major transportation facilities are estimated.

B. **Market Analyses.** For many projects, a market analysis may have already been completed that identifies target demographics for the proposed site, and the distribution of these targeted populations in the project vicinity. For instance, a housing development may have a targeted income range, and the distribution of jobs in this range in the project vicinity may have been calculated. Similarly, many retail facilities target specific population segments, and the distribution of these demographics is part of the decision process related to the targeted tenants for the facility.

In cases where market analyses have been conducted for a property or development, it may be appropriate to use the results of this analysis as a means of developing project traffic distribution, and may be so used at the option of the applicant.

C. **TRANPLAN-Based Analysis.** Given that the adopted TRANPLAN model embodies the assumptions made in the development of the Regional Development Plan and Regional Transportation Plan, another method of developing project traffic distribution would be the use of the TRANPLAN model. The simplest method in using the model would be the following:

- Locate the traffic analysis zone within which the project lies.
- Calculate the number of trips produced by and attracted to that zone.
- Execute a select zone analysis to identify the amount of traffic assigned by TRANPLAN to and from that zone to/from the surrounding transportation network.
- Calculate the percentage of trips assigned for to each segment.
- The resulting percentage calculated would represent the project trip distribution to be used for project traffic assignment.

D. **TRANPLAN Distribution Methodology.** The regional model in use in the Metro Atlanta area contains data and assumptions related to the Regional Development Plan, the Regional Transportation Plan, and the Regional Transportation Improvement Plan. The regional TRANPLAN model is an approved method of identifying traffic distribution and assignment for DRI projects under GRTA's review. GRTA recognizes that the model may not always be the best method for these analyses.

If trip distribution and assignment is based on TRANPLAN, the following methodology shall be used to develop projected traffic distribution and assignment:

- Start with the regional TRANPLAN model.
- Interpolate the land use and socioeconomic data sets to project conditions for the buildout year of the phase or project.
- Verify that the transportation network includes only existing plus committed facilities.
- Create a new traffic analysis zone for the proposed project. Within this new zone, input the amount of development proposed for the project. Execute the model as described previously to determine the project traffic distribution.
- Determine total trips generated by the new zone, so that the percentage of project trips assigned by the model can be determined.
- If there are additional roadways which should be part of the study area network and are not included in the model, then a post-model adjustment can be made to distribute traffic to these facilities.
- Calculate the percentage of trips assigned to each roadway segment in the project vicinity.
- Multiply the percentage of project traffic by the external trips generated by the site as determined previously under the new trips section of the analysis.

E. **Traffic Assignment.** The methodology to be employed for traffic assignment shall be discussed and agreed upon at the Pre-Application Conference and shall be documented in the GRTA DRI Review Package.

Section 4-109. Study Network.

The roadway segments and intersections which carry significant amount of trips generated by a proposed DRI shall comprise the “Study Network”. This network shall be the geographic basis for the transportation analysis in a GRTA DRI Review Package for a proposed DRI.

The study network, as a minimum, should include the primary access and / or all accesses on major roads and extend in each direction to the nearest intersection with a major roadway. All intersections between the DRI and these endpoints shall also be included in the study network.

To determine if additional intersections are required, the following steps shall be taken:

- Assign trips generated by a proposed DRI to the road network according to the methodology set out in these Technical Guidelines using daily Gross Trip Ends Analyses.
- Compare project traffic assignments to the adjusted two-way generalized roadway service volumes at the appropriate level of service standard.
- Where the trips generated by a proposed DRI exceed 7% of the two-way, daily service volumes at the appropriate level of service standard, the segment will be included in the study network.
- All signalized intersections and any major unsignalized intersections, which are located within or at either end of roadway segments, which are a part of the Study, shall be included in the study network.

GRTA may, at its discretion, agree to a smaller study network under these technical guidelines, where the reduction in the study network is justified by a clear and convincing demonstration at the Pre-Application Conference that analysis of the full study network will serve no useful purpose.

GRTA may, at its discretion, agree to reduce the number of intersections to be studied within the study network in cases if minor intersections are signalized, and do not significantly impede traffic flow along a corridor. The applicant may remove these intersections from the analysis with prior approval from GRTA.

An example application of the study network determination is provided in Table 4, which follows.

Table 4 - STUDY NETWORK DETERMINATION EXAMPLE

Proposed Project: 1,000 single-family dwelling units

Trip Generation, per ITE: 8,622 trip ends per day

Study area road network assumptions:

Roadway A – 4 lane undivided urban roadway with turn lanes– 1 signal per mile – 4 LD-1

Roadway B – 4 lane divided urban roadway with turn lanes– 2 signals per mile – 4LD-2

Roadway C – 2 lane undivided unsignalized roadway without turn lanes – 2L -0

Roadway D – 2 lane divided – 1.5 signals per mile with turn lanes – 2L-1

Level of Service Standards:

Roadway A is a protected high-capacity corridor, with a LOS Standard of C
 Roadway B is a typical urban facility, with a LOS Standard of D
 Roadway C is a typical urban facility, with a LOS Standard of D
 Roadway D is in a LOS maintenance area with a LOS Standard of E

Traffic Distribution:

Shown in Example table.

Presumptive Impact/Significance Threshold:

Project traffic >7% of facility capacity will be on study area network for further analysis.

Roadway Segment	Facility Type	Facility LOS Standard	Facility Service Volume @ Standard (vpd)	Adjusted Facility Service Volume @ Standard (vpd)*	Project Traffic Distribution	Project Trips Assigned	% Service Volume Consumed	Presumptive Impact (>7%)?
Roadway A	4LD-1	C	33,200	31,540	30%	2,587	8.2%	Yes
Roadway A	4LD-1	C	33,200	31,540	25%	2,156	6.8%	No
Roadway A	4LD-1	C	33,200	31,540	18%	1,552	4.9%	No
Roadway B	4LD-2	D	33,500	33,500	35%	3,018	9.0%	Yes
Roadway B	4LD-2	D	33,500	33,500	25%	2,156	6.4%	No
Roadway B	4LD-2	D	33,500	33,500	17%	1,466	4.4%	No
Roadway C	2L-0	D	24,800	24,800	15%	1,293	5.2%	No
Roadway C	2L-0	D	24,800	24,800	12%	1,035	4.2%	No
Roadway C	2L-0	D	24,800	24,800	10%	862	3.5%	No
Roadway D	2L-1	E	16,600	17,430	20%	1,724	9.9%	Yes
Roadway D	2L-1	E	16,600	17,430	15%	1,293	7.4%	Yes
Roadway D	2L-1	E	16,600	17,430	5%	431	2.5%	No

*Left-turn lane and divided roadway adjustments from Table 5-4

Section 4-110. Existing Conditions.

A GRTA DRI Review Package for a proposed DRI shall include a description of existing traffic conditions in the Study Network.

- A. **Description of Transportation Facilities in Study Network.** The AGDR shall include a description of the existing major transportation facilities in the study network, including the number of lanes, existing traffic volumes, and other pertinent data. The information shall be shown on a map and shall include existing turn lanes and other geometric features of roadway segments and intersections that lie within the study network.
- B. **Summary.** A summary of the existing conditions in the study network describing the intersection and roadway segment capacity analyses shall be included.

For roadway segments, signalized and unsignalized intersections the procedures in the Highway Capacity Manual (HCM) should be utilized. However, other methodologies may be used if approved by GRTA prior to submittal of the GRTA DRI Review Package.

In situations where a roadway segment or intersection is currently operating at or below the appropriate level of service standard, an improvements analysis shall be conducted to determine the minimum improvements required to provide the appropriate LOS standard

for existing traffic. The improvements analyses shall utilize procedures outlined in the Highway Capacity Manual for both intersections and roadway segments.

The summary of the existing LOS analysis should be presented in tabular form and graphics shall be provided showing the improvements required (if any) to provide acceptable operating conditions for all roadway segments and intersections in the study network.

Section 4-111. Planned and Programmed Improvements in Study Network.

As part of the GRTA DRI Review Package, the applicant will review the Transportation Improvement Program, the Regional Transportation Plan, MARTA's work program, and GDOT's Construction Work Program. The purpose of this review will be to identify projects planned or programmed within the study network during the development schedule of the proposed DRI. A list of projects, including the project name, the character of the improvement, the time frame in which the transportation improvement will be open to the public, the increase in capacity (if applicable), the information source, and the adoption date of the information shall be provided in tabular form in the report. If desired by the applicant, this information may also be shown on a map.

The applicant and GRTA must agree at the Pre-Application Conference the planned and programmed improvements for which a proposed DRI may consider new capacity for the purpose of level of service analyses, the timing of the improvements and the capacity added from such improvements.

Section 4-112. Future Year Background Traffic.

Future traffic on the study network, not including the trips generated by a proposed DRI, shall be estimated for each phase of a proposed DRI. There are two methods that the applicant may use to determine future year background traffic: 1) growth rates developed from historic traffic growth patterns; and 2) model-developed growth rates.

The preferred method for developing background traffic growth rates is historic traffic counts in the study network. These growth rates are applied to existing year traffic volumes to estimate future year background traffic. The growth rates may be reduced where the applicant makes a credible showing at the Pre-Application Conference that the trips generated by a proposed DRI are a natural extension of historical growth rates and thereby already reflected in the historical rate of traffic growth.

In the event that historic growth rates vary by facility within the study network, the traffic analysis may be prepared using the actual rates by facility, or an average growth rate by major facility or facility type, or for the study network as a whole may be used subject to GRTA's approval at the Pre-Application Conference.

Model developed growth rates may also be used in developing background traffic. Two variations of using the model are allowed:

- A. **Running the model.** Subtract the data from an existing year run of the TRANPLAN, from a model run based on an interpolated data set for the future year date. Comparison of the modeled link volumes for roadways in the study network will result in a growth rate predicted for each segment.
- B. **Using model output.** Obtain the latest approved regional travel demand model output from GRTA and identify volumes from the random roadways in the study network for two years—one nearest the existing conditions and one nearest the buildout year and use the difference between the two numbers to calculate an annual growth rate.

In cases where significant differences in traffic growth exist on the various roadways contributing to an intersection, the applicant may wish to use the projection procedures established in National Cooperative Highway Research Center (NCHRP) Report 253 in lieu of direct application of a standard rate to all intersection turning movements.

Section 4-113. Future Year Total Traffic.

After future year background traffic has been developed, trips generated by the proposed DRI shall be added to existing and background traffic to establish future year total traffic. Graphics shall be provided for each phase of development that identify background traffic, project traffic, and total traffic for intersections and roadway segments within the study area.

Section 4-114. Facility Needs Analysis.

After background and total traffic are identified, then a facility needs analysis shall be conducted to identify road and intersection improvements required to maintain an acceptable level of service. The GRTA DRI Review Package shall include documentation of the analysis assumptions, methods, and results.

- A. **Roadway Segment and Intersection Analysis.** In order to identify the mitigation that is required due to the DRI, the following analyses should be performed:
 - 1. Analyze background volumes with planned and programmed improvements that will be in place in the horizon year, including any improvements required in the existing conditions analysis.

If background conditions do not operate at the appropriate LOS standard, identify improvements needed to restore the LOS standard.
 - 2. Analyze future conditions with any geometric improvements added in the background condition. If future conditions do not operate at the appropriate LOS standard, identify additional improvements required to restore the LOS standard.

Changes to signal timing splits or cycle lengths should not be considered mitigation. Changes to phasing, except in cases where there is a new approach to an intersection, should be considered mitigation. However, all the timing parameters should comply with the general signal timing practices of the jurisdiction maintaining the signal. (An intersection analysis example is included in the Appendices in Table 6.)

If the traffic volumes in the area are low and it appears that the future operations will meet the required LOS standard, the future conditions may be analyzed first, with no improvements. If the future levels of service are at or better than the established standard, no further analysis is necessary.

3. The results of these analyses shall be presented in tabular form showing the following:

- The LOS under each scenario;
- Improvements necessary under background and total traffic conditions; and,
- Required improvements shall be depicted on a map series, separately showing the improvements required for background traffic and the improvements required for total traffic.

B. **Site Access Analysis.** Capacity and traffic generation analysis shall be prepared for all access between the proposed DRI and public roads. This analysis shall identify the level of service, geometric requirements, and control methods required for each access location to public roadway facilities. The geometrics required at each intersection shall be included on the graphic described under Total Traffic Analysis.

Section 4-115. Other Pertinent Information.

Other pertinent information may be provided at the applicant's option. Pertinent information could be anything germane to the project that GRTA could use to consider the merits of the project beyond the technical aspects of the transportation and air quality analysis. For instance, if a project represents an opportunity to create infill development in a desirable infill area, then this could be noted as other information important to the project. Similar items could include projects, which promote affordable housing, transit oriented development, developer mitigation commitments, or other information as deemed appropriate by the applicant.

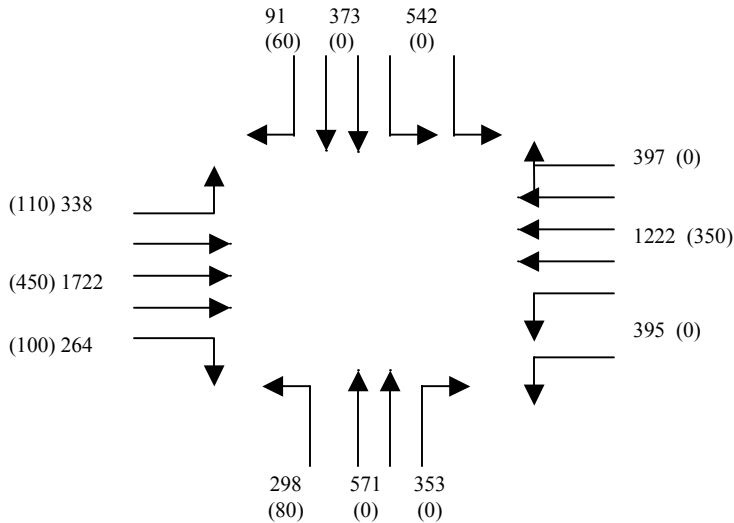
APPENDICES

TABLE 5

Generalized Annual Average Daily Volumes for Use in GRTA's DRI Review											
State Two-Way Arterials			Freeways								
Unsignalized (Uninterrupted Flow)			Group I (w/in urban area 500,000+ w/in 5 miles of CBD)								
Lanes /Divided	Level of Service					Lanes	Level of Service				
	A	B	C	D	E		A	B	C	D	E
2/undivided	8,900	13,900	18,900	24,800	33,100	4	21,200	34,300	51,500	66,200	81,700
4/divided	21,500	35,800	50,100	60,100	71,600	6	32,600	52,700	79,000	101,600	125,400
6/divided	32,200	53,700	75,200	90,200	107,400	8	44,500	71,800	107,800	138,600	171,100
						10	55,600	89,800	134,700	173,200	213,800
						12	65,200	105,400	158,100	203,200	250,900
Interrupted Flow			Group II (w/in urban area 500,000+ not included in Group I)								
Class I (> 2 signalized intersections per mile)			Level of Service			Level of Service			Level of Service		
Lanes /Divided	A**	B	C	D***	E***	Lanes	A	B	C	D	E
2/undivided	N/A	10,800	15,600	16,600	16,600	4	20,900	32,800	49,200	62,600	74,500
4/divided	N/A	23,500	33,200	35,000	35,000	6	32,100	50,400	75,600	96,200	114,500
6/divided	N/A	35,800	49,900	52,500	52,500	8	43,800	68,800	103,200	131,300	156,300
8/divided	N/A	45,300	61,400	64,400	64,400	10	54,700	86,000	129,000	164,200	195,400
						12	64,100	100,800	151,200	192,400	229,100
Class II (2-4.5 signalized intersections per mile)			Level of Service			Non-State Roadways (Major City/County Roads)					
Lanes /Divided	A**	B**	C	D	E	Level of Service					
2/undivided	N/A	N/A	9,900	14,900	16,200	Lanes	A**	B**	C	D	E
4/divided	N/A	N/A	22,900	32,500	34,300	2/undivided	N/A	N/A	8,600	14,600	16,000
6/divided	N/A	N/A	35,500	48,900	51,700	4/divided	N/A	N/A	19,800	31,700	33,900
8/divided	N/A	N/A	44,700	60,100	63,400	6/divided	N/A	N/A	30,800	47,800	51,000
Class III (> 4.5 signalized intersections per mile but not in CBD)			Level of Service			Other Signalized Roadways (Signalized Intersection Analysis)					
Lanes /Divided	A**	B**	C	D	E	Level of Service					
2/undivided	N/A	N/A	3,300	12,100	15,800	Lanes	A**	B**	C	D	E
4/divided	N/A	N/A	7,800	27,800	33,600	2/undivided	N/A	N/A	4,800	10,900	11,900
6/divided	N/A	N/A	12,100	43,300	50,500	4/divided	N/A	N/A	11,600	23,800	25,400
8/divided	N/A	N/A	15,300	54,200	62,100	Adjustments (Divided/Undivided)					
Class IV (> 4.5 signalized intersections per mile within CBD)			Level of Service			Left Turn Adjustment					
Lanes /Divided	A**	B**	C	D	E	Lanes	Median	Bays	Adjustment Factor		
2/undivided	N/A	N/A	3,700	13,800	15,300	2	divided	Yes	+5%		
4/divided	N/A	N/A	8,900	29,900	32,600	2	undivided	No	-20%		
6/divided	N/A	N/A	14,000	45,500	49,000	Multi	undivided	Yes	-5%		
8/divided	N/A	N/A	17,500	56,200	60,100	Multi	undivided	No	-25%		
<p>* This table is based on the 1997 Highway Capacity Manual and data generated by the Florida DOT. For the purposes of GRTA review this table can be used for Level of Service Analysis in Section 2.2.</p> <p>** Cannot be achieved.</p> <p>*** Volumes are comparable because intersection capacities have been reached.</p>						One-Way Adjustment					
						One-Way					
One-Way						Equivalent 2-Way Lanes					
Lanes						Adjustment Factor					
2						4					
3						6					
4						8					
5						8					
						-40%					
						-40%					
						-40%					
						-25%					
<p>SOURCE: The Florida Department of Transportation, Systems Planning Office, 605 Suwannee Street - Mail Station # 19, Tallahassee, Florida, 32399-0450 September 1998 - www.dot.state.fl.us/planning <<<The assumptions made in the development of this table appear in the 1998 Level of Service Handbook published by Florida DOT.>>></p>											

TABLE 6 - SAMPLE SIGNALIZED INTERSECTION ANALYSIS

Intersection Geometry and Volumes:



Where:

- The number not in parentheses represents total traffic, and
- The number in parentheses represents project traffic only
- Arrows indicate number of lanes for each movement
- All left turns are made from exclusive lanes

Proportionate Share Calculation (all data obtained from HCS worksheets):

Step 1: Determine critical movements (from HCS Capacity Analysis Worksheet):

Step 2: Develop adjusted project traffic volumes

Step 3: Calculate total adjusted project volumes for critical movements

Step 4: Calculate total capacity for critical movements

Step 5: Calculate capacity consumed by project

Critical Movement	(A) Total Traffic	(B) Project Traffic	(C) Adjusted Flow Rate	(D) Adjustment Factor {C/A}	(E) Adjusted Project Traffic {A*D}	(F) Movement Capacity
Eastbound through	1,722	450	1,813	1.05	473	1,810
Westbound left	395	0	416	1.05	0	465
Northbound through	571	0	601	1.05	0	670
Southbound left	542	0	571	1.05	0	633
TOTALS					473	3,578

Step 5:

Total adjusted project traffic: 473

Total capacity: 3,578

Capacity Consumed: 13.2%