Tier 1 Analysis

Tier 1 Analysis is a high-level interpretation of Existing and No Build Analysis results. It identifies preliminary alternatives for further investigation that address the purpose and need while considering project constraints.

Alternatives are options that include one or more improvements meant to solve the identified problem. The alternative must address the purpose and need, be technically and economically feasible, be consistent with policy, conform with management plans of the area, and be substantially different in design and effects to another analyzed alternative. Minor adjustments within the main course of action are not a separate alternative. See Figures 1 and 2 for further clarification.

Alternatives	Improvements
1 – Unsignalized with Turn Lanes	Adds NB and SB left turn lanes
2 – All-way Stop Control	All approaches stop controlled
3 – Roundabout	Single lane roundabout with NB right slip lane
4 – Signalized with turn lanes	Adds traffic signal with NB and SB left turn lanes
5 – Unsignalized Continuous Green T	Adds SB left turn lane and NB receiving lane

Figure 1: Examples of Alternatives

Alternatives	Improvements
1 – Unsignalized with Turn Lanes	Adds NB and SB left turn lanes
2 –Roundabout	Single lane roundabout with NB and SB right slip lanes
3 – Roundabout	Multilane roundabout
4 – All-way Stop	All approaches stop controlled
5 – Signalized	Adds traffic signal
6 – Signalized with turn lanes	Adds traffic signal with NB and SB left turn lanes

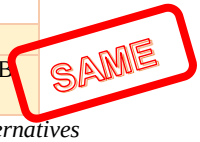

Figure 2: Examples of Improvements Labeled as Alternatives

The minimum alternatives types considered are different for interchanges and non-interchanges, but all alternatives must be compiled in a matrix format for examination. See below for specific requirements for each and criteria for matrices.

A. Alternative Considerations

1. Interchanges

   If multiple interchanges are analyzed, then consult Traffic Engineering Management for Tier 1 guidance.

   All interchange configurations for the area (rural or urban) and its connection type (freeway to freeway, freeway to arterial/collector, freeway to local road, etc.) shall be included for initial consideration within the matrix. Multiple analysis tools can be used for the selection process, but FHWA's Capacity Analysis for Planning of Junctions (CAP-X) shall be used.

At a minimum, the following basic interchange types shall be considered in the selection process:

- T and Y interchanges (three-leg interchanges)
  - Trumpet
  - Two loop
  - Directional
- Diamond interchanges
  - Rural
  - Compressed
  - Tight-Urban
  - Single-Point (SPUI)
  - Split
  - Three-Level
  - Diverging
- Cloverleaf interchange
- Partial cloverleaf interchanges
  - Parclo-A
  - Parclo-A (2 Quad)
  - Parclo-B
  - Parclo-B (2 Quad)
  - Parclo-AB
  - Paclo-AB (2 Quad)
  - Single Loop Parclo (4 Variations)
- Directional interchanges
  - All Directional
  - Directional with loops

For Interchange Modifications - each alternative should satisfy all eight (8) traffic movements with the proposed interchange modification.

For Interchange Justifications - each alternative that is advanced should not be a variation of the same interchange type. For example, a diamond interchange with signalized ramp terminal intersections and a diamond interchange with roundabout ramp terminal intersections are not considered two different alternatives.

2. Non-Interchange

Critical intersections, segments and/or corridors studied may consider more alternative types, but at a minimum, shall examine the following:

- Conventional
- Quad Road
- Full Displaced Left
- Partial Displaced Left
- Michigan U-turn
- R-CUT
- Partial Median U-turn
- Roundabout

If a new access connection with low volumes is considered, then DOTD may waive these requirements and only look at criteria such as, but not limited to, a left turn lane, right turn lane, full access driveway or restricted driveway.

B. Comparison Criteria and Matrix

The alternatives selected for inclusion in the Comparison Matrix will be ranked using high level criteria such as, but not limited to, Operations, Right Of Way (ROW), Cost, and Environmental Impacts. Criteria used should be quantified with thresholds that allow for a scored comparison between all alternatives and will vary depending on the defined problem. Documentation explaining all alternatives for or against consideration for Tier 2 shall be included. Depending on complexity, this could be a Notes column in the Evaluation Matrix or several paragraphs of explanation.

Operations

Alternatives may be graded for capacity if it was identified as a problem during previous analysis. If used, the capacity of each alternative may use general rules of thumb based on areas of concern identified in the results of the Existing Network Analysis. Capacity thresholds should be defined and expressed with a range of low to high. Tools such as FHWA's Capacity Analysis for Planning of Junctions (CAP-X) may be used to assist in this evaluation.

Right of Way (ROW)

Site specific conditions, such as existing structures and constraints identified in the Existing Network Analysis, should be taken into consideration when evaluating alternatives. ROW thresholds should be defined and expressed within a range of low to high.

Cost

Construction costs for each alternative may be evaluated using a rough estimate of the required area of construction and a dollar amount per square foot. Cost thresholds should be defined and expressed within a range of low to high.

Environmental/Social Impacts

Environmental and social impacts, such as changes in existing access, affected residential or commercial buildings, wetland impacts, and/or noise mitigation should be considered when evaluating alternatives. Impacts identified as a criterion within the matrix should have their thresholds defined and expressed within a range of low to high.

Other Impacts

Other specific constraints such as railroads, frontage roads, control of access, etc. may be added as criterion if they have an impact or to help differentiate between alternatives.

All alternatives will be compiled in a table format with a description and/or figure of each alternative and its associated ranking within the defined criteria. Selected alternatives should be based on a comparative evaluation using the total ranking.

Figures 3, 4 and 5 below are three examples of a matrix at different levels of complexity:

Driveway Access on a corner lot : 4-lane Divided Mainline Road and 2-lane Side street (Existing Right in/Right out)

	Recommended Access	Adjacent Property Impacts	Safety Conflict Points	Side Street/Access Delay	Notes
1	One Right-in, right out access on Mainline	Impacts Owner's Frontage Only	4 new conflict points on the main highway	100 trips added at one connection to mainline will have a moderate effect	Consider further HCM analysis to quantify mitigation
2	One Right-in, right out on Mainline, and one full access on side street	No access to side street due to private owner	4 new conflict points on the highway, and 9 new conflicts on Sidestreet	100 trips will have less of an effect because they are spread out between 2 connections	Consider meeting with property owner to share access, if agreement is made, then further HCM analysis to quantify mitigation
3	One Full Access on side street ONLY	No access to side street due to private owner	9 new conflicts points on Sidestreet	100 trips will have more of a negative impact because they will be mixed with existing side street traffic	Consider meeting with property owner to share access, if agreement is made, then further HCM analysis to quantify mitigation

Scale			
Extreme Negative Effect	Impacts other Owners	Conflict Points added on Mainline and on Sidestreet	High Side street volume (Heavy Delay)
Moderate Effect		Conflict Points added on Mainline Only	Moderate Side street volume (Moderate Delay)
Little or No Effect	No Impacts to other Owners	Conflict Points added on Sidestreet Only	Low Side street volume (Low Delay)

Figure 3: Example of a Screening Matrix for Driveway Access

Intersection Delay: 2-lane Roadway 2-way Stop

	Improvement	Utilities	R.O.W. (DOTD)	Safety	Operations	Tier 2	Notes on elimination
1	Full Access Signal with turn Lanes	Relocate low cost utilities	Right-of-way needed with no adverse affect	Minimal increase in conflict points	Increase in Capacity	Yes	
2	Restricting to Right-in, right out	Increase in Capacity	Right-of-way needed with no adverse affect	No change or reduction in conflict points	Increase in Capacity	Yes	
3	Roundabout	Relocated High Cost/Transmission Lines	Right-of-way needed with no adverse affect	No change or reduction in conflict points	Increase in Capacity	No	Utility Cost outside of budget
4	2-Way Stop with Adding Turn Lanes	Relocate low cost utilities	Right-of-way needed with no adverse affect	Minimal increase in conflict points	No change in Capacity	Yes	
5	All-Way Stop	No Utilities Relocated	Construct within right-of-way	No change or reduction in conflict points	Decrease in Capacity	No	Doesn't support Purpose and Need

Scale				
High	Relocated High Cost/Transmission Lines	Taking/relocating Residental and Commercial Buildings	Increasing conflict Points	Decrease in Capacity
Medium	Relocate low cost utilities	Right-of-way needed with no adverse affect	Minimal increase in conflict points	No change in Capacity
Low	No Utilities Relocated	Construct within right-of-way	No change or reduction in conflict points	Increase in Capacity

Figure 4: Example of a Screening Matrix for Intersection Delay at a Two Way Stop on a Two Lane Road

Objectives Screening Evaluation Matrix of Preliminary Alternatives

Objective	(1) Minimize ROW Impacts		(2) Avoid/Minimize Impacts to Existing Infrastructure		(3) Minimize Roadway Disruptions During Construction		(4) Optimize Cost			(5) Minimize Construction Risk in EDC Contamination Area			(6) Supports/Consistent with Economic Development and Transportation Plans	
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Criteria/ Measures	New ROW (acres)	Parcels Impacted (#)	Major Utilities Crossed (#)	Railroad Crossing Impacts	I-10 Full Road Closures (#)	Arterial Full Road Closures (#)	Estimated Construction Cost in Millions (M)	Estimated ROW Cost in Millions (M)	Estimated Operations and Maintenance Cost in Thousands (K)	Potential Impacts to Soil Pressure - Sampson St. Construction	Potential Impacts to Soil Pressure - Calcasieu River Bridge Construction	Potential Impacts to Project Cost and Schedule	Supports Economic Development	Supports Transportation Plans Identified in MTP and LA STP
No-Build	0	0	0	HIGH	0	0	$0	$0	**	LOW	LOW	LOW	HIGH	HIGH
PBA 1-F	61.6	60	102	LOW	48	230	$599.8	$28.8	$630	HIGH	HIGH	HIGH	MEDIUM	LOW
PBA 2-A	84.7	85	100	MEDIUM	48	226	$770.3	$34.6	$930	LOW	MEDIUM	MEDIUM	MEDIUM	LOW
PBA 2- B	105.3	146	105	MEDIUM	40	214	$795.2	$39.4	$930	LOW	MEDIUM	MEDIUM	LOW	LOW
PBA 2-C	98.0	110	107	MEDIUM	48	226	$778.4	$38.2	$930	LOW	MEDIUM	MEDIUM	MEDIUM	LOW
PBA 2-D	122.3	173	112	MEDIUM	40	214	$803.3	$41.9	$930	LOW	MEDIUM	MEDIUM	LOW	LOW
PBA 2-E	93.5	90	104	MEDIUM	56	222	$803.6	$36.7	$930	LOW	MEDIUM	MEDIUM	MEDIUM	LOW
PBA 3-A	85	85	100	MEDIUM	48	226	$821.0	$34.6	$930	LOW	LOW	LOW	MEDIUM	LOW
PBA 3-B	105	146	105	MEDIUM	40	214	$845.9	$39.4	$930	LOW	LOW	LOW	LOW	LOW
PBA 3-C	98	110	107	MEDIUM	48	226	$829.1	$38.2	$930	LOW	LOW	LOW	MEDIUM	LOW
PBA 3-D	122	173	112	MEDIUM	40	214	$853.9	$41.9	$930	LOW	LOW	LOW	LOW	LOW
PBA 3-E	93	90	104	MEDIUM	56	222	$854.2	$36.7	$930	LOW	LOW	LOW	MEDIUM	LOW
PBA 4-A	174.9	95	131	MEDIUM	64	222	$990.9	$27.6	$930	LOW	LOW	LOW	MEDIUM	LOW
PBA 4-B	195.0	161	136	MEDIUM	56	214	$1,012.2	$31.3	$930	LOW	LOW	LOW	LOW	LOW
LOW	0-75	0-60	0-99	Eliminates at-grade crossings	0-39	0-100	$0 - $450M	$0-$30M	$0 - $450K	No construction in EDC area	No construction in EDC area	No additional cost and schedule impacts.	Improvements generally support established economic development goals	Generally consistent with MTP and STP
MEDIUM	75-150	61-120	100-120	Reduces vehicular at-grade crossings	40-50	101-200	$450M - $900M	$30-$40M	$450K -$900K	Foundation concept to equalize/minimize soil pressure	Foundation concept to equalize/minimize soil pressure	Some potential for cost and schedule impacts.	Potential exists for economic development opportunities	Neutral
HIGH	150 +	121 +	121 +	No reduction in vehicular at-grade crossings	51 +	201 +	$900M +	$40M +	$900K +	Increase in soil pressure	Increase in soil pressure	Increased potential for cost and schedule impacts.	No improvements to support established economic development goals	Inconsistent with MTP and STP

Figure 5: Example of a Complex Screening Matrix for an Interchange

Tier 1 Analysis Deliverables

- Summary of Screening Criteria
- Critical Intersection Type Matrix and Results
- Any additional tools & outputs used in decision making process (e.g., CAP-X)
- Documentation explaining why alternatives were, or were not, considered in Tier 2.