

Section 2 - Chapter 5

Evaluation of Alternative Solution Concepts





5 Evaluation of Alternative Solution Concepts

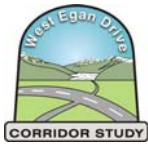
The purpose of this chapter of the report is to summarize the assessment of the alternative solution concepts developed to date and identify the most viable alternatives to be evaluated in more detail during the next task.

The study began with a review of the previous studies undertaken within the study area. Numerous new concepts were developed at a scaled sketch level for easy and quick evaluation. They were presented at a brainstorming meeting with staff and consultants where additional ideas were developed by combining, refining, and/or eliminating combinations of these scaled sketch level options. This set of initial concepts was presented at the second CAC meeting and the first public event. Comments from the public and ADOT&PF staff were incorporated into the final list of alternatives identified for the evaluation task now underway.

Parallel to the development of the concepts, the evaluation criteria for this project were developed. The purpose of the criteria is to help compare, rank and screen the concepts. The criteria are based on the project's Purpose and Need and the Project Goals identified by the CAC. Capacity and level of service, system linkage, airport access, safety, and pedestrian and bicycle facilities are addressed. (Details were provided in Chapter 4 of this report.)

This chapter addresses the following:

- Description of the process
- Summary of previous studies
- Outline of the applicable design standards
- Description of the evaluation criteria and process
- Discussion of the range of concepts and summary of the evaluation results by comparing the different concepts
- General considerations
- Discussion of the most viable alternatives and summary of the evaluation results.



Project Process

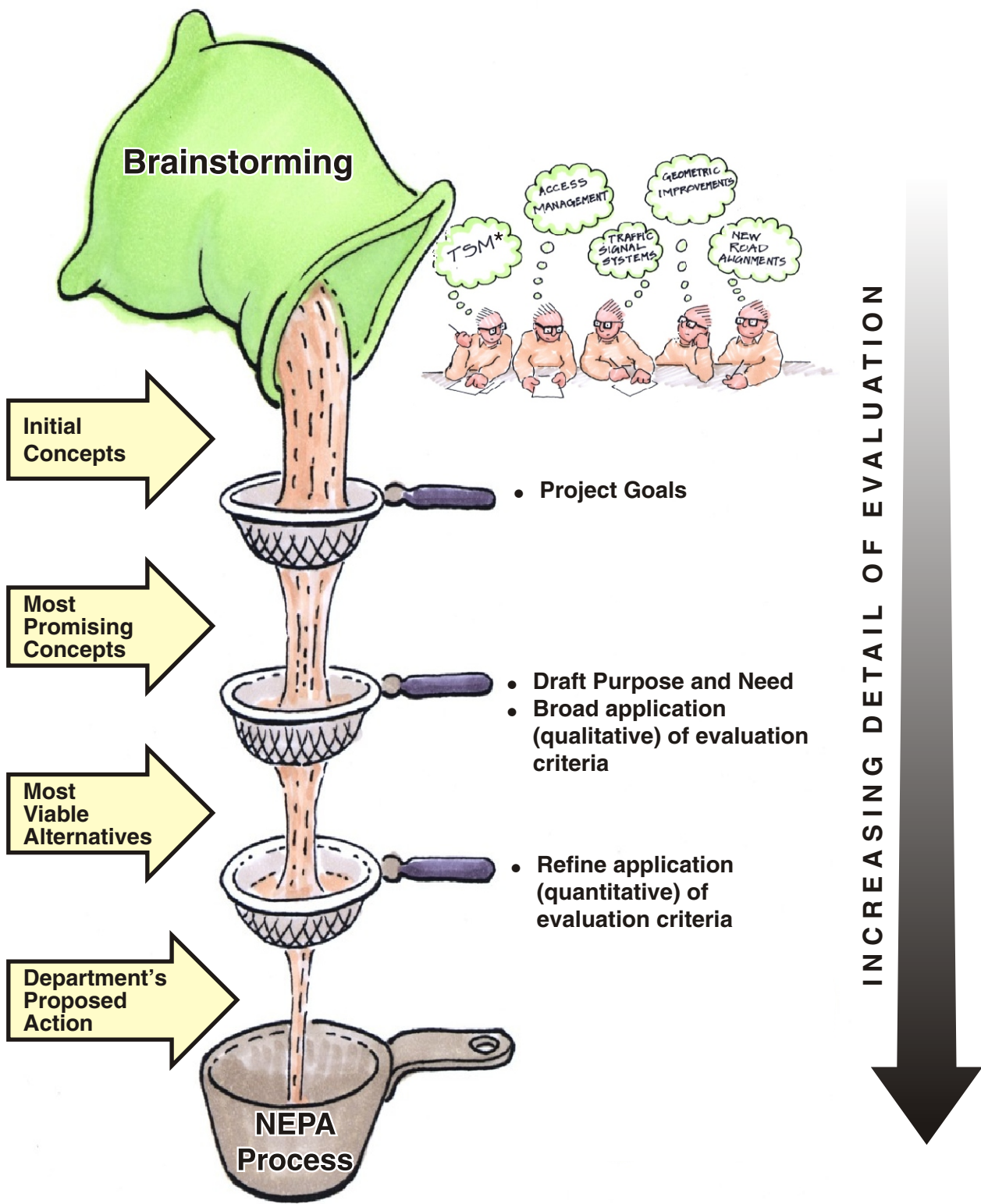
The process of developing and evaluating the concepts to different levels of detail is shown in Figure 5-1. The first level required review of previous studies undertaken within the study area. These concepts were discussed at a brainstorming meeting between the consultant and ADOT&PF and CBJ staff. From this meeting, the project team developed more ideas by combining, refining, and/or eliminating different combinations of these scaled sketch level options. This first level produced initial concepts for presentation and discussion at the second Citizens Advisory Committee (CAC) meeting and the first public event.

In the second level, these multiple concepts were compared to the project goals established at the first meeting of the CAC. As the concepts were subjected through this screening and public comment process, they were refined and continually compared to the Project Goals and Purpose and Need Statement. The result of this second level was a list of twelve concepts for more detailed evaluation.

In the third level, the twelve concepts were compared to the evaluation criteria. The criteria relate directly to the Purpose and Need and Project Goals. These criteria were considered in a generally qualitative fashion. The most viable alternatives were selected and evaluated during level four of the process.

Each of the most viable alternatives scrutinized in level four is a complete, stand-alone plan for the study area, to enable direct quantitative comparison of transportation, environmental, and economic impacts. The outcome of the level four analysis is presented as the Department's Proposed Action. This is divided into projects that can be implemented in phases to address near and longer-term operational or safety deficiencies, while maintaining the final proposed concept.

The Proposed Action will be carried into the next level of environmental evaluation as specified by the National Environmental Policy Act (NEPA). Though the NEPA process is not part of this study, its outcome of this study will form the foundation for this process.



* Transportation System Management



PROJECT PROCESS

West Egan Drive Corridor Study

DATE
JULY 2003

FIGURE
5-1

Alaska Department of Transportation & Public Facilities

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Previous Studies

ADOT&PF has conducted a variety of studies on Egan Drive in the study area over the past decade. These three were published:

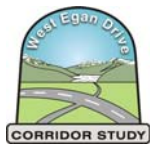
- Fred Meyer to McNugget Traffic Study (December 1991)
- Glacier Highway, McNugget to Egan/Loop Study (March 1993)
- Egan, McNugget to Vanderbilt Study (March 1994).

In October 1996, ADOT&PF drafted but did not publish the *Egan Drive, McNugget to Industrial and Loop Road, Egan to Back Loop Road* study. This covers Mendenhall Loop Road between Egan Drive and Back Loop Road and Egan Drive between Yandukin Drive and Industrial Boulevard. It developed, evaluated and prioritized alternatives with the goal of optimizing highway operations and safety. The study addresses problems at different intersections and road sections with several concepts, including at-grade improvements, grade separations, different types of interchanges and adding lanes to specific sections for the road network. The following preferred alternatives were identified at intersections along the Egan Drive corridor within the study area:

- A diamond interchange is the preferred alternative for the Mendenhall Loop Road/Egan Drive intersection, due to its ability to accommodate the highest growth scenario; frontage roads are envisioned for the future.
- At the Glacier Highway (Airport)/Egan intersection, a partial diamond interchange with one-way frontage roads to Mendenhall Loop Road/Egan Drive interchange is identified as the most desirable grade-separated alternative. This alternative provides full access to the airport commercial area without weaving or capacity problems.
- The study recommends a diamond interchange at the Yandukin Drive/Egan Drive intersection as it is consistent with the proposed interchanges to the west, has the smallest footprint, and has no loop ramps, which may be difficult to maneuver in icy conditions. This alternative also accommodates a possible second channel crossing recommended in the “*Second Gastineau Channel Crossing Feasibility Study, 1984*”.

A more detailed discussion of these previous concepts is provided in Appendix A.

A follow-up study, *Egan Drive – 10th Street to Brotherhood Bridge, Value Engineering Briefing Paper*, was prepared in September 1998. Its primary purpose was to consolidate information to develop a conceptual long-term master plan for Egan Drive from 10th Street to the Brotherhood Bridge. No new concept solutions are identified.



Design Standards

The design standards shown in Table 5-1 are qualitative measurements used in the next task when the most viable alternatives are studied in more detail. They are in accordance with ADOT&PF Highway Pre-Construction Manual, or as otherwise noted. They are also consistent with CBJ 49.35, Article II. The purpose for outlining the standard at this stage is to establish the foundation upon which the project team will work.

Table 5-1 Roadway Design Standards

Criteria	Design Speed (mph)		
	35	45	55
Horizontal Curve Radii			
• Desirable	485 feet	965 feet	2,340 feet
• Minimum	390 feet	685 feet	1,055 feet
Maximum Grades (Level Terrain)			
• Arterial	5%	5%	4%
• Collector	7%	7%	6%
Vertical Curve K-value ¹			
• Crest	29	61	114
• Sag	49	79	115
Ramp Design ¹			
• Speed (middle range, 70%)	25 mph	33 mph	40 mph
• Grades for passenger cars	7 to 8%	7 to 8%	7 to 8%
• Grades for trucks: uphill	5%	5%	5%
• Grades for trucks: downhill (straight/curvature)	8% / 3-4%	8% / 3-4%	8% / 3-4%
Lane Width			
• Desirable	12		
• Minimum	11		
Shoulder Width			
• Desirable (inside / outside)	4 feet / 8 feet		
• Minimum (inside / outside)	0 feet / 0 feet		
Minimum Horizontal Clearance ¹			
• Rural Roads	7 to 10 feet		
• Urban Roads	1.5 feet		
Vertical Clearance (Over passing facility)			
• State Highway, Local Street and Railroad	17 feet		
• Pedestrian Structure	18 feet		

¹: Based on AASHTO (American Association of State Highway and Transportation Officials), *A Policy on Geometric Design of Highways and Streets*, 4th Edition, 2001.



Evaluation Criteria

The evaluation criteria were developed to relate directly to the Project Goals and Purpose and Need Statements and to provide concept assessments specific enough so that the CAC and project team can be certain that the concepts will support community goals. These criteria have been applied in a qualitative fashion for determining the most viable alternatives and will be applied in a more quantitative fashion to help select the Department's Proposed Action.

The following summarizes the evaluation criteria and how they relate to the project goals and purpose and need statement, and how the criteria were applied.

List of Evaluation Criteria

To address the project goals developed by the CAC and the Purpose and Need Statement developed by the project team, the project team assembled a broad range of evaluation criteria. These criteria ensure that each concept is evaluated for consistency with the overall intent of the community (as expressed in the Project Goals) and with the overall requirements of the project (as expressed in the Purpose and Need Statement). Table 5-2 presents the eighteen criteria that were used for the evaluation of the different concepts.

As can be seen in Table 5-2, the evaluation criteria have been grouped into four general categories to facilitate discussion. These categories are as follows:

- *Traffic Considerations*: This category consists of those criteria that assess the ability for motor vehicles to travel through and within the study area. Considerations in this category include safety, emergency vehicle access and circulation, traffic operations (delay and queues), access to Juneau International Airport, and vehicle circulation between points within the study area.
- *Non-Motorized Users and Public Transit*: This category consists of those criteria that assess the ability for non-motorized modes (pedestrians and bicycles) and public transit to travel through and within the study area.
- *Environmental and Planning*: This category consists of those criteria that assess the degree to which an alternative is compatible with the natural and built environment and the degree to which it is compatible with the long-term vision for the area.
- *Practical Considerations*: This category consists of those criteria that assess the practicality of an alternative, both from the funding and costs of constructing the alternative, as well as the ability for the alternative to be built in stages and maintained after construction.

Of these categories, the first two directly address the needs identified in the Purpose and Need Statement and have thus been put at the top of the list. In addition, the criteria have been listed in the general order of importance inspired by comments from the CAC and the public.



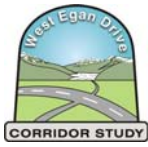
Evaluation Criterion	Description
Traffic Considerations	
#1. Safety	Qualitatively addresses the degree to which existing safety problems are addressed and future safety issues minimized.
#2. Emergency Vehicle Access and Circulation	Qualitative consideration of access and circulation for emergency vehicles in the study area.
#3. Traffic Operations	Quantifies and interprets the quality of traffic flow (e.g., level of service, volume to capacity ratio, and queuing).
#4. Airport Access	Qualitative assessment of how well the concept under consideration accommodates the movement of people between and among air, and ground transportation in and around the study area.
#5. Local Circulation	Qualitative consideration of the benefits to local circulation. Evaluates the ability to provide alternate routing options.
Non-Motorized Users and Public Transit	
#6. Compatibility with Public Transportation	Qualitative evaluation of the degree to which the proposed solutions would facilitate transit service in the study area.
#7. Compatibility with Pedestrians	Qualitative consideration of the degree to which the proposed network provides safe and desirable access and circulation for pedestrians.
#8. Compatibility with Bicyclists	Qualitative consideration of the degree to which the proposed network provides safe and desirable access and circulation for bicyclists.
Environmental and Planning	
#9. Environmental Impacts	Qualitative evaluation of the environmental impacts of the alternatives. This category includes the impact to streams, wetlands, noise/air impacts, and other natural resource impacts.
#10. Consistency with Other Planning Efforts	Qualitative consideration of how well the concepts integrates with ongoing CBJ or ADOT&PF planning efforts.
#11. Compatibility with Built Environment	Qualitative assessment of degree and efficiency of access the concept provides to development within the study area.
Practical Considerations	
#12. Constructability	Qualitative evaluation of the ability to physically construct improvements.
#13. Funding Feasibility	Qualitative consideration of the ability for the design alternative to be funded through identified monetary resources including Federal, State, local government, and private sources.
#14. Phased Implementation & Expandability	Qualitative consideration of the feasibility of constructing the design alternative in phases in order to optimize capital improvement budgets. Also considers the feasibility of expanding the design alternative to accommodate changes in future traffic volumes and patterns.
#15. Construction Costs	Qualitative consideration of the relative overall costs of construction including engineering, roadway construction, and structures. Includes right-of-way acquisition and utilities costs as provided by ADOT&PF.
#16. Maintenance Requirements	Qualitative consideration of annual costs to maintain (e.g. snow removal, landscaping, striping) the concept under consideration.
#17. Satisfies Design Requirements	Considers ability to comply with AASHTO, ADOT&PF, and local design guidelines.
#18. Right-of-way Requirements	Qualitative consideration of the extent of right-of-way acquisition required for each alternative.



As indicated, the evaluation criteria have been established to directly relate to both the project goals and the Draft Purpose and Need Statement. Table 5-3 depicts the relationships between these elements.

Table 5-3 Relationship Between Goals, Draft Purpose and Need Statement, and Evaluation Criteria

Goal	Purpose and Need	Evaluation Criteria
Balance connectivity and efficiency for all	Capacity and Level of Service Safety Pedestrian and Bicycle Facilities	Traffic Operations Safety Compatibility with Public Transportation Compatibility with Pedestrians Compatibility with Bicyclists Local Circulation
Integrate the transportation system with existing and future development in the area	System Linkage Airport Access Pedestrian and Bicycle Facilities	Compatibility with Pedestrians Compatibility with Bicyclists Local Circulation Compatibility with Built Environment Consistency with Other Planning Efforts Airport Access
Avoid creating new barriers to travel	System Linkage Airport Access Safety Pedestrian and Bicycle Facilities	Compatibility with Public Transportation Compatibility with Pedestrians Compatibility with Bicyclists Local Circulation Emergency Vehicle Access and Circulation Airport Access
Provide reasonable access for existing and projected development, both locally and in the surrounding transportation system	Capacity and Level of Service Airport Access Safety Pedestrian and Bicycle Facilities	Traffic Operations Local Circulation Compatibility with Built Environment Airport Access
Improve safe and efficient access for emergency vehicles.	System Linkage Safety	Traffic Operations Safety Emergency Vehicle Access and Circulation
Meet engineering standards, while being sensitive to the needs of all users	Capacity and Level of Service System Linkage	Traffic Operations Safety Environmental Impacts Satisfies Design Requirements Phased Implementation & Expandability Funding Feasibility
Minimize and mitigate impacts to natural resources		Compatibility with Built Environment Environmental Impacts Right-of-way Requirements
Minimize and mitigate social, economic and aesthetic impacts.		Compatibility with Built Environment Right-of-way Requirements
Develop and prioritize cost effective solutions that can be carried out by ADOT&PF and City and Borough of Juneau		Right-of-way Requirements Phased Implementation & Expandability Constructability Construction Costs Funding Feasibility
Reduce impacts to and from maintenance activities		Environmental Impacts Constructability Maintenance Requirements

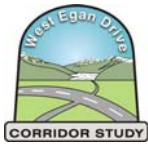


Evaluation Process

This section describes the steps taken to evaluate the various concepts and are listed below. The evaluation of each of the Group #2 concepts was conducted according to the following steps.

- For each criterion there were nodal and system considerations:
 - Nodal considerations of the concept relate to the concept at Industrial Boulevard, Vintage Boulevard, Riverside Drive, Mendenhall Loop Road, Glacier Highway (McNugget) and Yandukin Drive intersections in context of the criteria under which it is being evaluated.
 - System considerations relate to the concept's performance in specific geographic areas. The areas are as follows: north of Egan Drive and west of Jordan Creek (Mendenhall Mall and valley residential areas); south of Egan Drive and west of Jordan Creek (Airport, Glacier Highway Commercial Area); north of Egan Drive and east of Jordan Creek (Fred Meyer area); south of Egan Drive and east of Jordan Creek (Nugget Mall, industrial and commercial area).
- Each node or system consideration received a +2, +1, 0, -1, or -2 score according to the level of effect as described in Appendix C. Brief evaluation notes are provided to explain the reason for the scoring.
- After applying the evaluation criteria to each node or system for each concept, scores for the evaluation criteria under consideration were averaged for each solution concept.
- Each solution concept was then assigned a good, fair, or poor rating for each of the evaluation criteria. This type of rating establishes whether the concept meets the basic requirements of the purpose and need for the project and enables comparison of alternatives. These ratings have been defined according to the following thresholds:
 - GOOD: Average score rating among the top third of the concepts (approximately);
 - FAIR: Average score rating among the middle third of the concepts (approximately); and
 - POOR: Average score rating among the bottom third of the concepts (approximately).

The results of this process and key findings of the evaluation are presented in the next section.



Concept Development

As previously discussed, Section 2-Chapter 3, *Existing and Future No-Build Transportation Conditions*, and Section 2-Chapter 4, *Purpose and Need Statement* formed the basis for developing the range of concepts. The process to develop the concepts evaluated in this chapter of the report involved the development of a set of initial concepts that was then refined into a set of twelve most promising concepts for evaluation. The following describes the process used to develop the various concepts.

Initial Concepts

To make best use of the previous work in the corridor, the project team blended the previous ideas with the new perspectives of the project team to develop a set of initial concepts. These concepts were presented, discussed, and refined at a brainstorming session with ADOT&PF and CBJ staff and project team. The concepts were divided into three groups representing different types of systems, as listed below. These systems address driver expectancy, design standards and consistency along Egan Drive and through the study area. Detailed descriptions and conceptual layout plans of the initial concepts are shown in Appendix B.

- System #1 - At-grade intersection concepts: All intersections with Egan Drive are at-grade. Maximum accessibility is maintained by allowing full traffic exchange between Egan Drive and each intersecting cross street.
- System #2 - Grade-separation (no traffic exchange)/interchange concepts: These concepts improve mobility along Egan Drive but limit access to the study area. Traffic conflicts with cross streets are eliminated through the use of over-crossings. Various combinations of interchanges and new connections provide for traffic exchange and circulation.
- System #3 - Interchanges and frontage road concepts: These concepts provide maximum mobility along Egan Drive with access through frontage roads parallel an elevated Egan Drive, increasing capacity and improving traffic exchange and circulation.

Twelve Most promising concepts

The initial concepts identified above were compared to the project goals established at the project CAC Meeting #1. Comments and suggestions from CAC Meeting #2 and the Public Event #1 were received and integrated into the solution development process. As the project team and ADOT&PF considered the multiple concepts and reviewed the public comments, concepts were eliminated, refined, or created to provide potential solutions to congestion and safety problems on Egan Drive in the study area. Based on these comments, the following items were considered to be fatal flaws:

- A substantial impact on any church, and
- A substantial impact on the airport property located south of Yandukin Drive between Old Dairy Road and Glacier Highway (Fred Meyer).



- In addition, interchanges with loop ramps were eliminated from consideration due to potential concerns with driver expectancy and safety during icy conditions.

This review and refinement process yielded the twelve most promising concepts for qualitative evaluation. To assist with this, the study area was divided into three areas as shown in Figure 5-2. These sub-areas also allow simplified development of future combinations of solution concepts. The following describes the sub-areas.

- Area #1 covers Egan Drive and the road network off Egan Drive east of the Mendenhall River. Twelve concepts were developed to represent the different types of systems as described under Group #1.
 - System #1: At-grade Intersections Concepts 1A through 1C (3 concepts).
 - System #2: Grade-Separation (no traffic exchange)/Interchange Concepts 2A through 2F (6 concepts).
 - System #3: Interchange and Frontage Roads Concepts 3A through 3C (3 concepts).
- Area #2 focuses on Glacier Highway west of Mendenhall River and specifically how Industrial Boulevard connects with Glacier Highway (Concepts 4A through 4C [3 concepts]). Any concept developed for Area #2 can generally be combined with any of the concepts for Area #1. However, concepts for Area #1 that have an interchange at Vintage Boulevard will influence the location for the Industrial Boulevard/Glacier Highway intersection and/or the type of intersection (at-grade versus interchange).
- Area #3 addresses a possible second river crossing (Concepts 4D and 4E [2 concepts]) and again can be combined with any of the other concepts developed for Areas #1 and #2.

The next section describes each concept briefly and summarizes the result of evaluation process for each of the system concepts.



NORTH
(NOT TO SCALE)

AREA 2

WILDMEADOW LN

GLACIER HWY

Legend

Area #1:



East of Mendelhall River
(Concepts 1A-1C, 2A-2F, 3A-3C)

Area #2:



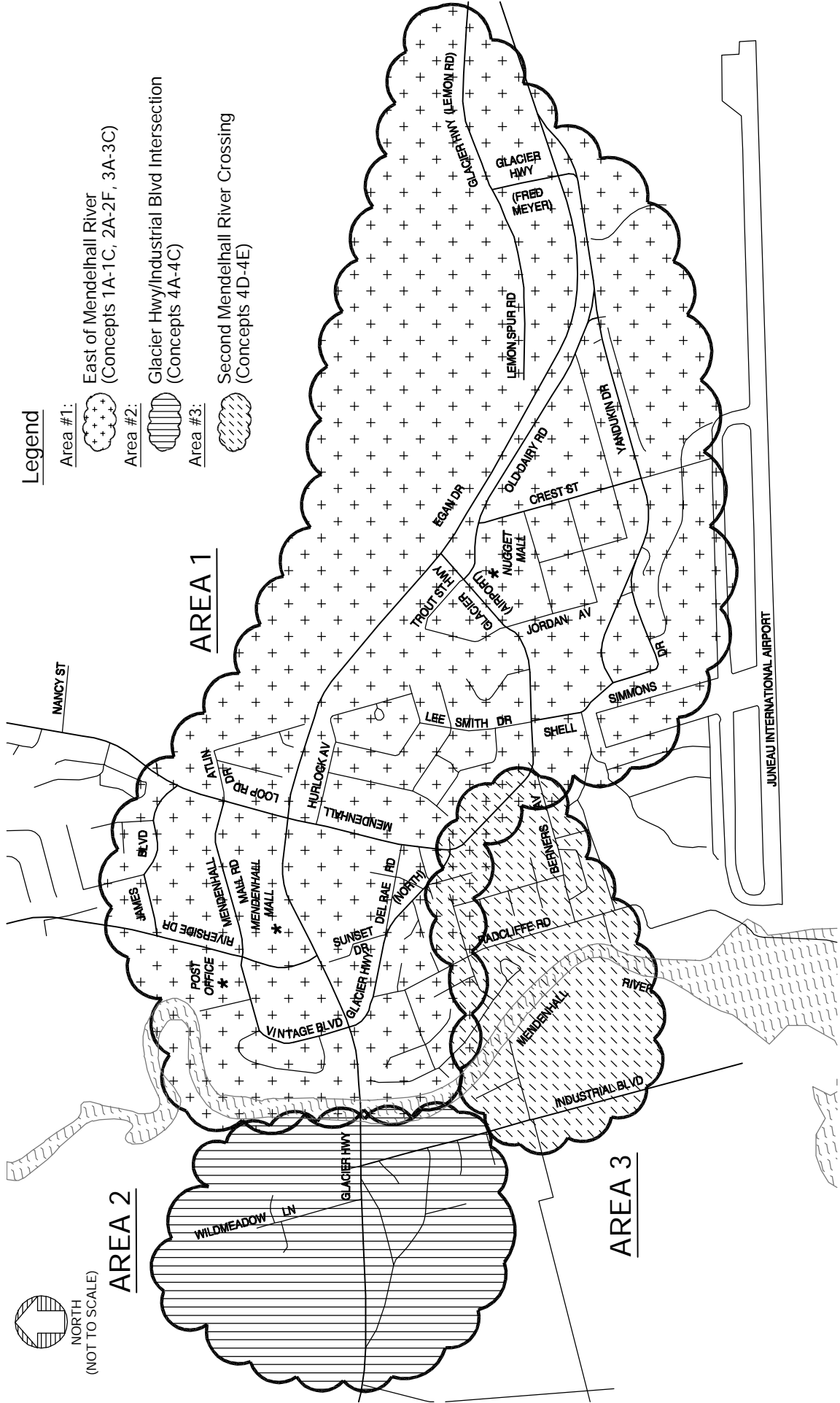
Glacier Hwy/Industrial Blvd Intersection
(Concepts 4A-4C)

Area #3:



Second Mendelhall River Crossing
(Concepts 4D-4E)

AREA 1



AREA 3

**KEY MAP
IDENTIFIED AREAS FOR EVALUATION**
West Egan Drive Corridor Study

DATE: JULY 2003
FIGURE: 5-2

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CORRIDOR STUDY
Kiteleson & Associates, Inc. in
association with CH2M Hill
Cogan Owens Cogan and
Southeast Strategies

Alaska Department of Transportation & Public Facilities