APPENDIX II

AIRPORT GROUND ACCESS IMPROVEMENT PROGRAM

for California Redwood Coast–Humboldt County Airport (ACV)

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PROGRAM PURPOSE

CALIFORNIA MANDATE

HCAOG fits the two conditions that require this program: 1) The California Redwood Coast–Humboldt County Airport (formerly the Arcata-Eureka Airport) is a primary air carrier airport within HCAOG's planning area; and 2) HCAOG is updating its regional transportation plan.

An airport is a primary air carrier if it has annual enplanements over 10,000. California Redwood Coast-Humboldt County Airport (ACV) had 61,705 enplanements in 2012 (70,455 in 2011). Therefore, HCAOG must include an airport ground access improvement program (AGAIP) in conjunction with preparing an updated regional transportation plan (California Government Code §65081.1(a)). HCAOG's past RTP updates have not included an AGAIP.

California law (§65081.1) further stipulates that:

> (b) The program shall address the development and extension of mass transit systems, including passenger rail service, major arterial and highway widening and extension projects, and any other ground access improvement projects the planning agency deems appropriate.
>
> (c) Highest consideration shall be given to mass transit for airport access improvement projects in the program.
>
> (d) If federal funds are not available to a transportation planning agency for the costs of preparing or updating an airport ground access improvement program, the agency may charge the operators of primary air carrier airports within its planning area for the direct costs of preparing and updating the program. An airport operator against whom charges are imposed pursuant to this subdivision shall pay the amount of those charges to the transportation planning agency.

FHWA & FAA GUIDANCE

HCAOG is relying on the "Airport Ground Access Planning Guide," (Guide) to prepare this initial AGAIP. The Guide was prepared jointly by the FHWA and FAA in 1996. Although the guide is old, its basic information still applies to current circumstances. This is the only guidance, federal, state or local, that HCAOG staff was able to find for this mandated program. Most of the information in this AGAIP comes straight from the Guide.

OVERVIEW OF THE PLANNING PROCESS

The FHWA and FAA deem the full planning process for an airport ground access improvement program to be long term, at twenty years or longer. "This time frame allows the thoughtful analysis of such issues as land use change and land use policy," the Guide states, "that require the longer time orientation."

The seven steps of the AGAIP planning process, summarized by FHWA-FAA, are:

1. Define the problem: What is the policy issue being addressed?
2. Given the understanding of the policy issue, establish performance measures to monitor and evaluate the program.
3. Collect data needed to apply performance measures.
4. Understand the system's patterns, demand, and performance, and estimate future demands.
5. Develop candidate strategies and actions.
6. Assess effectiveness of alternative strategies and actions; select cost-effective actions.
7. Implement selected policy interventions/strategies; monitor established performance measures; adapt management based on feedback.

Table 1 (next page) shows the purpose and examples of carrying out the seven steps. The AGAIP for ACV will follow the seven steps, revising, expanding, or combining steps as warranted. This AGAIP defines the problem (step one), which is described below under "ACV's Dominant Policy Issues," and identifies preliminary concepts for solving the problem. Stakeholders will continue with the next steps to further develop and implement the AGAIP. Stakeholders include, but are not limited to, County staff from the Aviation Division/ACV and Fly Humboldt!, the Humboldt County Aviation Advisory Committee, and HCAOG committees, as well as interested members of the general public.

AIRPORT GROUND ACCESS POLICY ISSUES

COMMON AIRPORT GROUND ACCESS ISSUES

Airports, in general, develop their airport ground access improvement programs to address one or more of the following issues or needs:

- **Localized air quality problems**, such that a jurisdiction is not meeting an air quality standard for a criteria pollutant or greenhouse gas emissions. Solutions could be to reduce motorized vehicle trips and to upgrade vehicles and machinery to more efficient and/or cleaner-fuel engines (e.g., replace all diesel equipment on the airside with electric or compressed natural gas).
- **Quality of multi-modal access & service for passengers**, where the airport managers are motivated to improve ground transportation choices for airport users, and reduce the number of motorized vehicle trips or single-occupancy vehicle (SOV) trips that the airport generates.

Table 1. FHWA's Seven-Step Airport Planning Process

Step	Purpose	Examples in Airport Access
One: Define Problem and Policy Context	Determine central policy issues faced by the airport. Its characteristic and setting defines what kind of performance is important to monitor.	The need to: expand airport capacity; provide accessibility and support economic development in key areas; lower airport-related total VMT (vehicle miles travelled); minimize environmental damage to neighboring communities.
Two: Define Performance Measures	Measures are selected only after agreement on the nature (and priority) of challenges faced in and around the subject airport. Establish the measures to be used to determine success or failure of the system performance.	Examples: traffic flow on the access roads; amount of choice offered to arriving passenger; percentage of region served by shared-ride services; percentage of passengers who arrive by other than private vehicle; cost and volumes for moving cargo and passengers.
Three: Collect Data Needed to Apply Performance Measures	Document both asset condition and level of performance, with a base-year inventory of intermodal systems' physical and operational characteristics.	Data sources to examine airport access patterns include: periodic ground access surveys, ridership and revenue data, and regional trip tables based on a simulated process. Operational characteristics may include time, cost capacity and usage.
Four: Understand Patterns and Demands	Utilizing performance measures data, understand existing and projected conditions and patterns in ground access.	Is demand skewed toward the central business district? Is congestion better or worse than it was five years ago? At times of greatest congestion, is the airport serving primarily resident non-business travelers or nonresident business travelers? What will conditions be like 5, 10 or 20 years from now?
Five: Develop Alternative Strategies and Actions	Determine what project or combination of projects would most effectively address the identified policy issue/need.	Policies range from curb striping that encourages non-SOV airport access, to creating exclusive right-of-way service
Six: Evaluate Alternative Strategies and Actions	Use established performance measures to analyze and evaluate alternatives; choose actions and policies to implement.	Evaluating alternative strategies can go beyond analyzing vehicle flows, and include concepts such as the mobility of people and goods, and accessibility to various destinations.
Seven: Implement and Monitor Selected Policy Interventions	Solve identified problem(s); understand effectiveness of implemented strategies. Revise strategies to increase or expand effectiveness.	A series of comprehensive ground access surveys are taken every five years, to track changes in different users'/market segments' travel behaviors.

- **Airport-related congestion in ground transportation** that negatively impacts roads on and near the airport. The traffic congestion may be contributing negatively to air quality, noise quality, mobility (e.g. travel times to/from airport for airport users and ground transportation services), fuel consumption, and may create localized impacts to nearby neighborhoods, as well as local to global environmental impacts.
- **Poor ground access for freight businesses** that use the airport. Bad circulation design, congestion, and lack of space are examples of factors that may be hindering goods movement and economic opportunities.
- **Poor ground access/circulation for emergency response**, which diminishes the effectiveness of emergency response and evacuations.
- **Airport expansion plans**, which opens opportunities for (and may require) redesigning ground transportation circulation, access, parking facilities, public transit services, etc.

- **A need to increase airport revenues/reduce costs**, which motivates airport managers to reconsider, for example, parking fees, shuttle services, or switching airport transport services to private or in-house operations.

ACV'S POLICY CONTEXT

The AGAIP shall be guided by and consistent with adopted plans, as well as updates, of the *Arcata-Eureka Airport Master Plan Report*, the *County of Humboldt Airport Land Use Compatibility Plan–Humboldt County Airports* (amended 1998), and the *Humboldt County Regional Transportation Plan*.

Arcata-Eureka Airport Master Plan Report (September 2005)

"Arcata-Eureka Airport's principal role," says the Master Plan Report, "is to serve as a base of operations for scheduled airline services." The airport's role is also to serve as:

- A Source of Scheduled Passenger and Cargo Service
- A Point of Air Access to the Community
- A Site for Emergency Access to the Community
- A Place to Conduct Business
- A Base for Humboldt County Region Pilots

"For the foreseeable future," the report states,

> it is anticipated that the operational role of Arcata-Eureka Airport as a commercial airport will remain essentially the same as at present. … It is anticipated that with future development of the airport facilities that the airport will experience moderate growth over the long run.

Regional Transportation Plan (RTP) Update

HCAOG's Draft RTP Update (2014), "*VROOM*," states the goal and objectives for the region's transportation system:

> **Overall Goal**: HCAOG's goal is for Humboldt County to have a comprehensive, coordinated and balanced multi-modal transportation system, so that people in the region can travel and move goods safely and efficiently by the modes that best suit the individual or business/industry, and society at large.
>
> **Overall Objective:** Program all funds based on multi-modal transportation goals and objectives, and needs and priorities as established in the Regional Transportation Plan.
>
> To achieve the overall goal and objective, HCAOG pursues six main objectives/planning priorities for planning projects and programs (in alphabetical order):
>
> - Balanced Mode Share/Complete Streets
> - Economic Vitality
> - Efficient & Viable Transportation System
> - Environmental Stewardship
> - Equitable & Sustainable Use of Resources
> - Safety

Federal "Moving Ahead for Progress in the 21st Century Act" (MAP-21)

The federal transportation bill passed in 2012, MAP-21, supports a national intermodal transportation system. Below are policies that set a national context for developing AGAIPs (Title 49-Transportation, Subtitle VII-Aviation Programs, USC §47101; laws in effect on March 10, 2014).

(a) General.-It is the policy of the United States-

(5) to encourage the development of intermodal connections on airport property between aeronautical and other transportation modes and systems to serve air transportation passengers and cargo efficiently and effectively and promote economic development;

(6) that airport development projects under this subchapter provide for the protection and enhancement of natural resources and the quality of the environment of the United States;

(7) that airport construction and improvement projects that increase the capacity of facilities to accommodate passenger and cargo traffic be undertaken to the maximum feasible extent so that safety and efficiency increase and delays decrease;

(b) National Transportation Policy.-

(1) It is a goal of the United States to develop a national intermodal transportation system that transports passengers and property in an efficient manner...

(3) A national intermodal transportation system is a coordinated, flexible network of diverse but complementary forms of transportation that transports passengers and property in the most efficient manner. By reducing transportation costs, these intermodal systems will enhance the ability of the industry of the United States to compete in the global marketplace.

(4) All forms of transportation, including aviation and other transportation systems of the future, will be full partners in the effort to reduce energy consumption and air pollution while promoting economic development.

(5) An intermodal transportation system consists of transportation hubs that connect different forms of appropriate transportation and provides users with the most efficient means of transportation and with access to commercial centers, business locations, population centers, and the vast rural areas of the United States, as well as providing links to other forms of transportation and to intercity connections.

(6) Intermodality and flexibility are paramount issues in the process of developing an integrated system that will obtain the optimum yield of United States resources.

General Conformity Rule for Air Quality

There State of California, federal government, and regional and local agencies set air quality standards, which may be different for some pollutants. A jurisdiction that meets an air quality standard is "in attainment" for that pollutant; otherwise it is "in non-attainment." Air quality in Humboldt, Del Norte, and Trinity County is regulated by the North Coast Unified Air Quality Management District. The air in the district "is considered to be 'in attainment' of state and federal ambient air quality standards except for the State's 24-hour PM_{10} standard. The two pollutants of greatest concern are ozone and particulate matter" (http://ncuaqmd.org, April 3, 2014).

The FHWA-FAA Guide gives direction regarding the federal General Conformity Rule:

> It is important to understand the type of air quality impacts that an airport must examine. The U.S. Environmental Protection Agency (EPA) has made it clear that the general conformity rule will cover new emissions, both direct and indirect, which the airport agency can practicably control, and which it will maintain control over due to a continuing operational responsibility. Therefore, airports should check with the appropriate FAA Airports District Office to determine the need for determining air quality impacts under the general conformity rule.
>
> The regulation establishes that when an airport operator intends to spend federal funds on a project within the boundaries of the airport, the air pollution emissions impacts experienced off the facility must be documented to the standards required by the State Implementation Plan (SIP). In short, this means that airport operators must become involved in developing mitigation measures that minimize the growth of SOV (single-occupancy vehicle) travel.

Relatively more recently, the FAA and US EPA directed a "Proactive Role for Airports," including the following:

> First, general conformity evaluations are generally based upon emissions estimates. Therefore, EPA and FAA encourage airport operators to develop comprehensive emissions inventories for their facilities as well as estimates of future activity levels and emissions. This should include information on all sources of emissions, including passenger and employee commuting, aircraft, ground support equipment (GSE), stationary sources, and construction activities. Next, operators should work closely with local and State air quality agencies to ensure that the SIP accurately reflects all emissions at the airport and growth rates for operations at the airport. Airport operators should also evaluate the sources of pollutant within their control to determine how the pollution can be reduced or eliminated. This information can be very useful in designing a project to keep the emissions below the de minimis levels or to mitigate the increase in emissions from the project. (FAA & EPA, 2002)

ACV'S DOMINANT POLICY ISSUES

HCAOG staff consulted with the Humboldt County Aviation Advisory Committee and County Aviation Division staff to identify ACV's dominant policy issue(s).[12] They confirmed that this comment in the FHWA-FAA Guide does apply: "For the airport manager in a region that has attained the national air quality standards, and that does not suffer from significant levels of congestion, the ground access issue turns to the standards of accessibility experienced by the user." The dominant ground transportation issue is the lack of pedestrian and bicycle connectivity to access the airport terminal from adjacent properties. Ground access to ACV is via Airport Road, which is between a major arterial road (Central Avenue) and a US 101 highway interchange. There is no crosswalk at either intersection or at the airport entrance (intersection of Airport Road and Airport Loop Road). Anecdotal testimony reports that most drivers drive faster than 35 mph, the posted speed limit. A portion of Airport Road on the southwest side (across from the airport) has a curb and a tread-worn pedestrian trail, but it is not continuous. The northeast side of Airport Road, which accesses the airport, has no sidewalk/trail or curb. Airport Road has striped shoulders, but

[12] Discussions during Humboldt County Aviation Advisory Committee's regular monthly meetings, May and June, 2014.

no designated bikeway. Airport Loop Road has neither sidewalk nor bikeways for access between Airport Road and the terminal.

A McKinleyville resident wrote to HCAOG, during the RTP Update process, to give input regarding access to ACV. His concerns mirror what the Aviation Advisory Committee and County staff said. He wrote,

> There is no pedestrian access from ACV to Airport Road. A few of us who live locally, walk to and from the airport, especially when renting cars. There is a worn path on the SW side that goes to the fence line. To get there, one needs to walk on the entrance road with a blind curb.[13]

The HCAAC has identified possible projects to improve pedestrian and bicycle access to the airport. Preliminary ideas are:

- install sidewalk on Airport Road;
- install a pedestrian crosswalk at Airport Road and Airport Loop Road;
- improve the walkway from the Airport Business Park (Concorde Drive and Boeing Avenue) to the airport (Airport Road);
- improve walkways from Airport Road to the terminal;
- provide covered walkways to terminal (within airport grounds);
- provide an overhang to cover passenger loading/unloading zone; and
- install bicycle lockers.

This is not an exhaustive list and ideas are listed in no particular order. These ideas are concepts only and need further study to determine if they are feasible.

PERFORMANCE MEASURES

After the airport manager and the advisory committee define the dominant policy issue(s) for the AGAIP and the corresponding intervention strategies, they will choose the parameters that will best measure and evaluate how well the strategy is doing. These parameters, or performance measures, evaluate the strategies and the system changes that the strategies are meant to induce.

The FHWA-FAA Guide presents an example of Logan International Airport, in Boston, where the policy issue was the environmental damage to communities located adjacent to the airport. The Boston planners wanted a policy and an intervention strategy to minimize the number of people who were driving through the neighborhoods to get to the airport. They focused on measuring the relationship between the primary mode choices and the actual number of vehicle trips using the roadways near the airport (i.e., average number of vehicle trips per passenger, VTPP).[14] The higher the VTPP is for a mode, the higher is airport-related congestion and air pollution. (For regions that

[13] E-mail from M. Schaffner to O. Smith (HCAOG), dated December 6, 2013.

[14] Developed by Boston Central Transportation Planning staff based on information from a 1987 Air Passenger Survey. (FHWA-FAA 1996)

do not have to examine a wide variety of policies to deal with congestion and air quality issues, the VTPP performance measure may require a more detailed level of analysis than is warranted.)

Table 2. Ground Access Vehicle Trips per Air Passenger Trip

MODE	VTTP*
Pick-Up/Drop-Off	1.29
Taxi	1.09
Parking	0.74
Rental Car	0.69
Door-to-Door Shuttle	0.33
Scheduled Bus	0.10
Rapid Transit	0.0

*Vehicle trips per air passenger Source: FHWA-FAA 1996

The FHWA-FAA Guide summarizes Boston's program thusly:

> Table 2 shows that in the common pick up/drop off mode, 1.29 vehicle trips are generated for each one-way air passenger trip. For the drive/park mode, only 0.74 vehicle trips are generated per air passenger trip. Therefore, one intervention policy might be to encourage the pick-up/drop-off trip to become a drive alone/park trip. A vehicle with two persons—one of whom will then return home after dropping off the air passenger—is not considered to be more efficient than a vehicle with one passenger going directly to the parking garage. Table 2 shows that moving 100 passengers from drop-off mode to park-alone mode would decrease vehicle trips by 55. (Similarly, moving 100 passengers from taxi to door-to-door shuttle would decrease vehicle trips by 41.)
>
> In this innovative evaluative method, any policy action that has the effect of moving the passenger to a lower ranking on the levels shown in Table 2 is considered to be positive, and vice-versa. For planning multimodal ground access, this method is exemplary in that it is modally blind and can be applied to a wide variety of possible policy interventions.
>
> The policy implications of the data on Table 2 are extremely important; for the data shows that influencing modal choices within the auto mode must be part of comprehensive access strategy, in addition to the traditional study of shifting passengers from automobiles to transit.

Other performance measures, of course, can be used to evaluate the AGAIP's policies and strategies. Parameters might include total travel time, cost and volumes for moving cargo and passengers, capacity versus demand, accidents, perceived quality and the average time to transfer people or freight from one mode to another. Table 3 shows examples from the FHWA-FAA Guide.

Table 3. Examples of Performance Evaluation Measures

Goals	Objectives	Performance Measures	Data Needed	Source of Data
Mode Split to Non-SOV* Modes	Increase balance of use across ground modes.	Percent of total airport users to shared ride services.		User surveys, as updated with mode-specific reports.
Existence of Choices for Ground Access	Have non-motorized and HOV* motorized options to airport.	Number and availability of ground access options, including pedestrian and bicycle facilities that connect to airport.	Inventory of existing facilities and services.	Site inventories, schedules, operating agreements, permits etc.
Accessibility	Minimize travel time.	Travel time to major destinations {This measure requires a method of calculating change in door-to-door times.}	Airport and state transportation facility information, population and employment data, regional transportation simulations.	State, regional, and local agencies.
	Optimize ADA access for ground transportation	Extent of ADA compliance	Airport compliance schedules	On-site inventory of compliance
Quality of ground service to airport.	Provide high quality ground access.	Headways, layover times, HOV vehicle cleanliness. Speeds and volume-to-capacity ratio (V/C) on transit, access roads, bikeways, walkways, parking lots. Structural condition, design standards.	Condition of access facility, perceptions and ratings from ridership/users.	Field examinations/ inspections, performance audits, maintenance logs, user surveys. Traffic and ridership counts, capacity data.
Affordability/ Cost Minimization	Minimize social costs.	Subsidies and environmental costs.	Revenue recovery, quantified pollution costs.	FAA summaries including subsidies, environmental models.
	Minimize capital costs.	Meet short-term budgets. Meet long-term budgets (assumes long-range capital improvements, minimal/no backlog maintenance).	Cost/revenue balances (budgets), cost models, condition ratings.	Master plans, construction cost data; inventory.
Connectivity Between Modes	Promote easy transfer between modes.	Service availability between modes; time and distance of transfer between modes less than N minutes and N feet.	Layover times travel times	Schedules/timetables, facility and service specifications, plans, surveys.
Convenience	Make transit as convenient as possible.	Availability of remote intermodal ticketing and luggage support.	Existing ticketing choices.	Inventory of services.
Mobility	Make bus/airport shuttles competitive with autos.	Ratio of travel times.	Travel times and speeds, average time to transfer people or freight from one mode to another.	Travel time studies, schedules, surveys.
	Provide capacity for peak hour loads	Extent of vehicle queuing, and overall delay	Quantification of observed delay/back-up.	Carriers' logs of on-time performance
Reliability	Improve on-time performance at terminals	Percent of ground transport on-time departures.	On-time performance.	Carriers' internal logs.
Safety	Improve safety in motion connecting modes.	Accidents per passenger mile, community concerns.	Accident frequency and severity data, community perceptions/experiences.	Sheriff's/Police Depts. and FAA records, surveys, interviews.

*SOV=single occupancy vehicle; HOV=high occupancy vehicle. Source: FHWA-FAA 1996.

ALTERNATIVES FOR IMPROVING AIRPORT GROUND ACCESS

AIRPORT CIRCULATION

The different transportation modes that serve multi-modal ground access are:

- Private automobile, motorcycle (drop-off/pick-up (kiss-n-ride), park-n-ride, short/long-term/employee parking, package drop-off, rental car)
- Pedestrian (abled and disabled)
- Public transit buses (local, express, intercity, tour, paratransit)
- Private shuttles, limousines, taxis
- Bicycles
- Delivery vehicles (packages, mail, freight, baggage)

When planning, designing, and managing a multi-modal ground access system, airport planners and managers consider the balance and circulation of modes to and around the airport. The components of airport land-side circulation include the following:

- Airport Roads
  - Primary airport access roads
  - Terminal area access roads
  - Recirculation roads
  - Terminal frontage roads
  - Service roads: General-use and restricted-use
- Public Transportation Areas
  - Bus stops
  - Bus Pullouts
  - Bus staging and parking areas
- Rental Car Areas
  - Parking area entrances and exits
  - Access road
- Terminal curb areas
  - Curb frontage
  - Sidewalk platforms
  - Terminal entranceways
  - Pedestrian crossings and walkways
- Public Parking Facilities
  - Short-term and long-term parking areas and/or structure
  - Parking lot entrances and exits
- Taxicab, Shuttle, and other commercial vehicles
  - Terminal curbside for pick-up and drop-off
  - Staging and parking areas
  - Storage (staging) and dispatching of taxi cabs,

MARKET SEGMENTATION

Air travelers can be segmented by purpose of their trip (e.g., business or non-business) and residency (e.g., resident of airport service area or visitor). The trip purpose will determine the importance of different ground access modes at a given airport. For example, airports that primarily serve tourists often have higher taxicab and rental car use than other airports. Residents are more likely to use a private automobile to get to and from the airport. Airport employees are an important market segment that accesses the airport by transit.

The FHWA-FAA Guide reports on five large airports in areas with mature transit systems:

> Between 10 and 21 percent of employee trips to these airports use transit, and less than 10 percent arrive as auto passengers. Even though these airports are in metropolitan

> areas with the best transit systems in the country, over 70 percent of the airport employees drive to work. …(T)hese data illustrate the importance of different modes for providing service to different market segments and the importance of market segmentation for airport access planning.

Below are excerpts of what the FHWA-FAA Guide suggests for improving airport ground transportation for:

- Access roads (off-airport, near-airport, and on-airport)
- Pedestrian and bicycle
- Public transit
- Automobile parking
- High occupancy vehicles (HOVs)
- Travel demand management (TDM)

ACCESS ROADS

When designing for multi-modal access, airport circulation designs should:

- Separate pedestrians and vehicular traffic.
- Establish pedestrian/bicycle networks.
- Establish bicycle travel ways, separated from auto and bus lanes whenever possible.
- Design pedestrian crossings with adequate sight distance, signing, and pavement markings to maximize safety.
- Minimize the number of at-grade crossing points. Especially where the number of conflicts between pedestrians and vehicles are expected to be high, consider grade-separated pedestrian walkways.

"Not to be overlooked when examining the regional context of airports are needs related to emergency vehicle access to and from airports. To ensure adequate emergency medical service response times, the highway segments that constitute the shortest routes between hospitals/major medical centers and the airport, as well as redundant routes, should be identified and considered for improvements. In addition, the shortest routes from existing and planned local fire and rescue stations that support the airport should be identified and reviewed. Potential highway capacity bottlenecks for these vehicles should be identified and mitigated through geometric or operational changes" (FHWA-FAA 1996).

PEDESTRIAN & BICYCLE

Virtually all trips include walking, so almost all airport users will be pedestrians for at least a leg of their journey. Bicycle travel will be used by airport passengers, employees, and visitors, too, although employees are presumably the most likely. Bicycle trips will also be combined with transit trips (e.g., a transit rider will being his/her bicycle on the bus to the airport).

For airports, typical ground access enhancements include the following:

- Provide covered walkways from public parking lots to entrances of terminal buildings.
- Improve markings and lighting of pedestrian routes.
- Improve ADA access from parking to curbside to terminals.
- Install secured bicycle parking (short-term, long-term, covered, lockers).

- Improve pedestrian and bicycle trails and walkways, especially those that connect intermodal terminals.

PUBLIC TRANSIT

Multiple-stop routes serving the airport, because of frequency of stops and associated travel times, are usually less attractive to airport passengers and visitors than to airport employees. Public transit's "marketability," generally, is considered high for employees, medium for resident passengers, and low for non-resident passengers.

The FHWA-FAA Guide offers these ingredients for success:

- Express or semi-express service to major activity areas (e.g., central commercial area/business district, tourist centers, residential areas with high density of airport employees).
- Convenient schedule aligned with airport peak times (for air passengers and airport employees).
- Competitive fare (transit fares cost less than parking).
- Sheltered waiting areas for shuttle/bus stops.
- Good visibility of signs and markers denoting shuttle/bus stops.
- Passive and active security features (e.g., video or audio monitoring of platforms and station areas, well-lit corridors, visible elevators, roving security personnel).

HIGH OCCUPANCY VEHICLES (HOVS)

High occupancy vehicle services at airports are usually managed by the private sector. The most common HOV services are door-to-door shuttles (i.e. shared ride vans), courtesy vehicles, and charter buses. Large (international) airports will often manage HOV inter-terminal and parking shuttles.

The service and operational issues that should be considered when designing HOV services include:

- Maximize passenger comfort and convenience on vehicles (e.g., seating configuration and capacity, baggage storage space, the width and height of vehicle doors and steps, passenger shelter amenities, speed and reliability of service).
- Minimize the frequency of stops, necessary transfers, and dwell times.
- Reserve curb space for boarding/de-boarding at convenient, visible locations.
- Develop desired performance measures (e.g., passengers per hour, vehicles per hour, minimum headway).
- Establish operating procedures, including information regarding passenger pickup and drop-off, driver and vehicle requirements, and staging areas.
- Consider the needs of disabled passengers in the provision of services (e.g., lift-equipped vehicles, audio information systems or driver announcements of stops, color and size of passenger wayfinding signs and symbols).
- Identify fare collection methods and procedures that minimize passenger delay.

Good wayfinding systems include:

- Clear signage and graphics, posted in highly visible locations at frequent intervals throughout the terminal to facilitate passenger wayfinding.

- Information describing fares, schedules, and best routes to popular destinations.
- Pathways that allow passengers to identify their destination and minimize their reliance on signs.
- Staffed information booths to supplement available signs and computerized terminals.

AUTOMOBILE PARKING

Generally speaking, options for improving airport parking conditions include the following:

- Reallocate space to match parking demand (air passenger, visitor, employee, rental car company).
- Modify parking operations or rates.
- Increase parking capacity by redesigning and/or constructing facilities.

Airport parking can be allocated for different users (e.g., employees, air passengers, rental cars), different parking durations (e.g. long term, short term), or different levels of service (e.g., self-park, valet). Sometimes an airport will have enough total spaces, but too much is allocated to one user group and not enough to the other. For example, if the airport needs more long-term public parking, more spaces could be created by moving employee lots or converting them to long-term/remote parking lots.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

Transportation demand management measures are designed to reduce the number of vehicle trips made, by shifting trips to higher-occupancy modes. Employees and travelers are the two major travel markets that access an airport, and each group demands different travel times and peak volume capacities. "A study of California airports estimated that 40 percent of all vehicle trips to the airport and 20 percent of all airport-related vehicle miles traveled (VMT) are by employees," says the FHWA-FAA Guide. "These estimates are probably transferrable to airports nationwide…" Most TDM measures are designed to encourage employees to use HOVs.

The FHWA-FAA Guide also remarks that,

> Having a TDM program successfully reduce air passenger ground access trips is considerably more difficult than for employee trips. Air passengers are concerned about getting to and from the airport as quickly, conveniently and reliably as possible. Air passenger traveling on business, in particular, are often less price-sensitive to the cost of the access trip, including parking charges, and are willing to pay for the convenience of taking a taxi or parking at an airport. However, experience with work travelers has shown that if the cost of driving alone is increased and quality alternatives are provided, passengers making business and pleasure trips will be more likely to shift to higher occupancy modes.

Some typical TDM strategies, described more below and in Table 4, include:

- Managing High Occupancy Vehicles (HOV)
- Financial incentives
- Information and marketing
- Parking management
- Airport access fees and circulation control

Managing HOVs

Employers can support vanpooling by:

- Providing ride-matching assistance
- Buying or leasing vans for employees use
- Subsidizing employee ownership or lease
- Subsidizing vanpools or riders by paying operational expenses and parking costs
- Insuring vans
- Maintaining and/or fueling vehicles

Financial Incentives

Employers can offer positive economic incentives to shift SOV drivers to ridesharing. Employees who use car/vanpools, transit, bicycles, or other alternatives to driving alone, can be enticed and rewarded with direct and indirect financial incentives. Rideshare subsidies, for example, pay employees either a pre-set amount, a reimbursement for actual travel costs, or pre-paid transit passes or coupons. Indirect financial incentives are measurable benefits with monetary, but non-cash, value. Examples of indirect financial incentives are: use of fleet vehicles for ridesharing; subsidized fuel or maintenance (provided on-site or with vouchers accepted at local gas stations); extra vacation time accumulated; "catalog points" awarded for ridesharing and redeemable for merchandise; free or discounted equipment (e.g., walking shoes, bicycles, etc.).

Parking Management Program

Perhaps the most effective TDM measure for airports is managing parking. Higher charges for airport parking will encourage employees and some passengers to look for alternatives to driving their automobile to the airport. However, there is a risk that higher parking prices will increase the drop-off of passengers, increasing airport-related congestion and air pollution.

Table 4. TDM Strategies for Airport Ground Access

TDM Strategies	Characteristics	Market Segment				
		Employee	Visitors/ Tourists	Local Residents	Airport Visitors	Meeter/ Greeter
Parking Prices/ Fees	Parking rates can change based on modes or time of day.	X	X	X	X	X
Reduce Parking Supply	Limit amount of parking available.	X	X	X	X	X
Employer-Sponsored Ride-Matching Program	Program matches employees who want to use commute alternatives.	X				
Preferential Parking for Ride Sharing	Reserved parking spaces near entrance to building/work site for employees who rideshare.	X				
Guaranteed Ride Home	Commuters using a high-occupancy mode get free or subsidized emergency transportation, generally by taxi or rental car, for the trip home.	X	X	X		X
Information, Marketing, and Promotions	Post information via kiosks, bulletin boards, posters, flyers, website. Contests, prize drawings, rideshare fairs, commuter and bike clubs.	X	X	X	X	X

Transportation Coordinator	Offers individual trip planning assistance, and actively encourages HOV modes through marketing and information.	X	X	X	X

Source: FHWA-FAA 1996.

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