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**Airports and Bicycles:
what are the obstacles and incentives for operators to improve bicycle access?**

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1 **Airports and Bicycles: what are the obstacles and incentives for operators to improve bicycle**
2 **access?**

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1 **Airports and Bicycles: what are the motivations and obstacles for operators to improve bicycle** 2 **access?**

4 **Abstract**

5 In this paper we use a case study approach to examine how airport operators are addressing bicycle access
6 to their properties and the motivations and obstacles they face, in light of new policies to integrate
7 bicycles, along with transit and walking, into transportation planning, design and construction, and to
8 increase bicycles' role in the transportation system.

9 Eight influential elements emerged from our review of policy documents and research literature. We used
10 them to guide interviews with key informants. The eight elements are: governance structure, location,
11 access roads, self-perceived environmental stewardship, spending restrictions on non-aviation
12 transportation improvements, proximity to transit, policies and mandates to reduce environmental impacts
13 and land use constraints. We report on seven cases, selected on the basis of inclusion in studies on key
14 aspects of airport ground access and, for one, identification as exemplary. They are: Oakland International
15 Airport, San Francisco International Airport, Los Angeles International Airport, Seattle-Tacoma
16 International Airport, Boston Logan International Airport Minneapolis-St. Paul International Airport, and
17 Portland, an exemplar recommended by several key informants.

18 We limit our discussion to employee bicycle access because that has been the focus of airport operators
19 that have made these investments and programs to reduce single-occupancy vehicle travel at airports.

20
21 In aggregating the interviews, we identified replicable approaches to improving bicycle access. We also
22 identified examples of innovative funding for multi-modal access using revenues generated by airport
23 Passenger Facilities Charges. Finally, we identified areas for additional research: airport employee
24 commute needs, ground access mode choice and operator costs and benefits of bicycle access investments.

25 **1.0 Introduction**

26 Bicycle transportation is increasingly being incorporated into planning, design and construction of the
27 transportation system (1, 2, 3). This has led to new policy approaches that address the needs of all road
28 users, including bicyclists, pedestrians and transit users, in transportation system design (4) and
29 increasing emphasis on bicycling and walking as it can help achieve greenhouse gas reduction goals and
30 contribute to community livability (5, 6) and public health through promoting physical activity (7).

31 In large part, airports have not been included in this reconsideration of the transportation system. There
32 are a number of reasons: their physical layout and remote location can present physical and safety barriers
33 to bicycle access (8); their customers (airline passengers) are usually weighed down with luggage and do
34 not have strong economic motivation to sacrifice the convenience of motorized travel for bicycling (or
35 even transit) access (9); and airport operators must secure exceptions from Federal Aviation
36 Administration (FAA) rules to use a major revenue source, Passenger Facilities Charges (PFCs), for any
37 transportation improvements whose benefits extend beyond the airport's employees, air travel passengers,
38 and airport tenants, causing operators to give priority to ground access projects that rely on cars, taxis, and
39 shuttles (9).

40 However, it is increasingly clear that airports play a larger role in stimulating regional economies and
41 growth of intellectual capital (10, 11). Additionally, as major employment centers, airports can have a
42 meaningful impact on regional travel patterns through the volume of commuter traffic generated by their
43 workforces (12, 13).

44 Some airport operators have begun to rethink the role that bicycle transportation can play in their ground
45 access system, especially in view of parking constraints and environmental regulations that require them

1 to reduce vehicle trips to and from and on their facilities (8, 15). These constraints promise to only grow
2 as projected increases in airport passenger and cargo volume are realized (16).

3 In this paper, we use a case study approach (17) to examine how airport operators are addressing bicycle
4 access to their properties and the motivations and obstacles they face as part of a broader strategy to
5 encourage multi-modal transportation and move away from single vehicle trips. We focus on seven cases:
6 Portland International Airport, Oakland International Airport, San Francisco International Airport, Los
7 Angeles International Airport, Seattle-Tacoma International Airport, Boston Logan International Airport
8 and Minneapolis-St. Paul International Airport. Our work also presents a preliminary understanding of the
9 basic elements that comprise bicycle access at airports.

10 Our findings suggest that there is growing airport operator interest in bicycle accommodations, and we
11 identify generalizable approaches to improving bicycle access, ranging from basic investments such as
12 bicycle racks at main terminals or transit connectors to more comprehensive efforts, e.g., secure parking
13 and bicycle route construction. Our work identifies factors that could encourage greater investment:
14 completion of anticipated direct transit links to airports, regulatory requirements for greenhouse gas and
15 other impact reductions, expanded efforts to reduce private-vehicle commute trips and land use
16 constraints. It also identifies barriers: lack of data about employee commute needs, difficulty in
17 coordinating trip-reduction programs across multiple work sites and schedules, safety concerns about
18 airport approach roads, airports' remote locations and FAA policies that discourage investments in non-
19 aeronautical airport projects.

20 **2.0 Setting the Context and Research Approach**

21 The literature on bicycle access at airports is sparse, as this is a relatively new area of consideration. A
22 handful of airport operators have developed bicycle plans (18, 19). None of the regional transportation
23 plans and bicycle master plans in our review contained substantial information referencing airport bicycle
24 access. Indeed, the state of knowledge about airport ground transportation in general is still taking shape.
25 Some work has been done on passenger ground transportation demand and mode choice (12, 20), but
26 many gaps remain, and there is little work on or knowledge of employees (12). Transit service needs for
27 large airports have received some attention (9, 20), as have the effects of parking constraints, which affect
28 nearly every major airport (8), and airport operational needs for landside roadways and remote facilities
29 (21, 22).

30 Airports are unlike other transportation facilities in many respects, including: a large physical footprint,
31 the imperative to maintain physical separation from non-aeronautical land uses and a role as an economic
32 engine through employment and investment (10, 11). Additionally, the around-the-clock nature of their
33 operation creates unique ground access system demands (12). Finally, employee and passenger ground
34 access needs diverge widely; within those groups, there are additional divergences. Employee schedules
35 are comprised of "daylight" administrative workers, shift workers who often commute outside peak hours,
36 and flight crews, whose "shifts" can span three or four days (12, 13, 20). Passengers are those who come
37 from home and those visiting the region, those who are traveling from the airport to home or to a tourist
38 destination (12). Most passengers are dropped off or picked up. That can generate twice the required
39 vehicle trips, as the driver dropping off/picking up makes two trips to the airport for the air passenger's
40 one (23).

41 There is no comprehensive source of data for airport ground access transportation mode choice splits, but
42 a 2008 survey of 700 respondents out of more than 10,000 workers at SFO shows the following: 71
43 percent drive alone to work; 12 percent carpool; 13 percent use public transit; and 4 percent use other
44 modes (24).

45 We conducted semi-structured interviews with nearly 30 airport managers and planners, regional and
46 Metropolitan Planning Organization planning staff and aviation planning specialists. Our interviews

1 produced a preliminary first look at basic bicycle access measures at the seven sites, along with some
 2 salient characteristics of the operators (see Figure 1).

Bicycle Access Elements and Airport Characteristics							
	PDX ^a	OAK ^b	LAX ^c	SFO ^d	SEA ^e	BOS ^f	MSP ^g
Employees: Airport Operator Entire Site	400 11,000	300 7,680	3,000 47,000	1,400 10,000	800 15,000	3,200 14,000	565 28,545
Distance from CBD (miles) ^h	9.2	10.5	14	12.3	13.5	7.8	13.2
Secure Bicycle Parking, etc.	X	--	X	--	--	X	--
Outdoor Racks	X	X	X	X	X	X	X
Trail/Convenient Bike Access	X	X	--	--	--	X	--
Bicycle Master Plan	X	--	--	--	--	--	--
Employee Groups/TMAs	X	X	X	--	X	X	X
Hub Classification ⁱ	Medium	Medium	Large	Large	Large	Large	Large
-- = data not applicable ^a Portland International Airport ^b Oakland International Airport ^c Los Angeles International Airport ^d San Francisco International Airport ^e Seattle-Tacoma International Airport ^f Boston International Airport ^g Minneapolis-St. Paul International Airport ^h As calculated by inputting airport location as origin and “downtown cityname” as destination into Google directions. ⁱ Based on FAA definition for commercial service airports as their share of total annual U.S. passenger boardings. Large hubs carry 1% or more; medium-hub airports accommodate at least 0.25%. (8)							

3

4 **FIGURE 1 Elements of Bicycle Access and Selected Characteristics of Case Study Airports.**

5 Eight influential elements emerged from our review of policy documents and research literature:
 6 internal—governance structure, geographic location, high-speed access roads, degree of self-perceived
 7 environmental stewardship; and external—FAA spending constraints, proximity to transit, environmental
 8 mitigation policies and regulatory mandates and land use constraints. We used these influencers to guide
 9 our interviews. Aggregating the interview results shows which of these influencers play a stronger role at
 10 each case study, though all of them figure in decision making to some extent, and each was influential
 11 enough that describing it will add to understanding of airport operator decision making about bicycle
 12 access. Our findings contribute to the knowledge base of the types of measures that are being used or
 13 considered by their peers. We selected the seven case studies on the basis of their inclusion in studies on
 14 airport employee commute needs, terminal road operations and transit access or, in the case of PDX, SFO
 15 and LAX, because they exemplify bicycle access investment approaches that are more broadly applicable.
 16 We limit our discussion primarily to employee bicycle access because that has been the focus of airport

1 operators that have invested in bicycle access, and programs to reduce single-occupancy vehicle travel at
2 airports have focused on employee trips as part of an overall strategy to encourage multi-modal access.

3 Our work identified evidence of potential interest among airport operators. There is an active
4 subcommittee devoted to environmental planning at the main airport operator trade association, Airports
5 Council International (ACI) North America (24). Interviewees were nearly unanimous in observing the
6 importance of transit access. Airports' needs to satisfy regulatory measures, e.g., carbon and trip
7 reduction programs, and land use constraints imposed by airports' overall projected growth (8, 14, 16),
8 also were cited often.

9 **3.0 Findings from the Field**

10 In this section we present the findings from our seven case studies.

11 **3.1 More Extensive Bicycle Access**

12 Here we present findings from four airports with more extensive bicycle access facilities and policies.

13 **3.1.1 Portland International Airport (PDX)**

14
15 **Bicycle Facilities/Policies:** Bicycle master plan, trail access, secure parking for employees and
16 passengers, in-terminal assembly station for passengers' boxed bikes, conventional bicycle parking

17 **Size:** Medium hub

18 **Number of employees:** 400 airport operator / 11,000 total

19 Portland International Airport (PDX) can be reached by bicycle by a multi-use path. The airport
20 discourages bicyclists from using the main approach roads out of safety concerns, interviewees noted. It
21 has extensive bicycle facilities. In addition to standard bicycle racks in two locations, there is covered
22 secure bicycle parking for employees and passengers (added more recently after local bicycle advocates
23 expressed interest). Employees are given access to lockers. The airport offers a facility where airline
24 passengers can assemble bicycles that they have brought with them.

25 PDX is owned and operated by the Port of Portland, which is exempt from state planning requirements
26 (19). Nevertheless, PDX has an extensive Bicycle Master Plan—the only such plan among the airports in
27 this study—first developed in 1999 and since updated. Its goals include incorporating pedestrian and
28 bicycle facilities into the entire PDX complex (19, 26).

29 The plan cites as motivations for its development increased employee demand for bicycle facilities and
30 federal and state policy shifts toward more support for multi-modal transportation under the Intermodal
31 Surface Transportation Efficiency Act of 1991 and the early 1990s Oregon Transportation Planning Rule
32 (19).

33 PDX is also mindful of the popularity of bicycling and walking in the region and the City of Portland's
34 extensive support of them. Portland was one of nine cities included in a national case study of North
35 American cities with noteworthy bicycling growth (2). It has the largest share of bike commuters per
36 10,000 population among the 100 largest U.S. cities (2) and has passed regulations requiring private
37 provision of bike parking in commercial and residential buildings (27). The City of Portland's Bicycle
38 Plan mentions PDX several times in discussions of inter-city travel and integrating bicycling with other
39 travel modes, specifically, expanding secure parking options at PDX, investigating feasibility of bicycle
40 rentals there and providing more trail access to PDX (28, 29).

41 PDX also has regulatory incentives to improve bicycle access. One is Oregon's Employee Commute
42 Options (ECO) Rule, which requires employers with more than 100 employees to provide commute
43 options that can reduce employee auto trips by 10 percent within a three-year period and continue to
44 provide them on an ongoing basis (30). With roughly 400 employees, PDX is subject to ECO. Of note,

1 interviewees emphasized its importance in influencing decisions to enhance bicycle access as a means of
2 reducing employee trips.

3 A second regulatory lever is the fact that PDX operates under a conditional-use permit from the City of
4 Portland, which imposes a cap on the number of public parking spaces that can be added at the airport,
5 restrictions on where they can be located and a requirement that PDX impose a parking fee on airport
6 employees, to limit automobile trips and foster use of alternate modes (8).

7 Opportunities to enhance bicycle facilities also came with major construction and development projects,
8 including a large mixed-used development associated with the \$143-million light-rail extension, the
9 TriMet Airport MAX, which has bicycle parking at nearly all its stations (8, 19).

10 The Airport MAX project brought into relief an institutional barrier to bicycle access projects at airports:
11 FAA restrictions on spending revenues from Passenger Facilities Charges (PFCs), which as a rule are
12 only permitted to be used for expenditures directly affecting airline passengers (19). In order to finance
13 the airport's \$43 million share of program costs, the airport was required to secure a "Record of Decision"
14 from the FAA in order to use PFCs for the transit station (19, 31).

15 Interviewees also highlighted institutional barriers to enhancing bicycle access: "Internally, a lot of airport
16 people are airport people. The world ends at the airport boundary." In the case of PDX, bicycling
17 advocates' political clout outweighed this internal resistance, interviewees said.

18 Another source of conflict, surprisingly, was the bicycling community and City of Portland bicycle
19 planning rules. In the mixed-used development associated with the Airport MAX station, the city had
20 originally called for multi-purpose trails connecting to the main PDX access road (19). After PDX
21 operators expressed concerns about safety on the airport access road, the airport and the City reached an
22 agreement that PDX would not be required to provide the trail connection to the main airport entrance
23 (19).

24 **3.1.2 Oakland International Airport (OAK)**

25 **Bicycle Facilities/Policies:** Trail access, bicycle lane construction on access road, conventional bicycle
26 parking

27 **Size:** Medium hub

28 **Number of employees:** 300 airport operator / 7,683 total

29 Oakland International Airport (OAK) is one of three airports in this study that is safely accessible by
30 bicycle by surface roads—to the extent that it attracts non-airport users for recreational rides and those
31 who cut through on their way to other destinations. OAK's road network connects to the San Francisco
32 Bay Trail, a Class 1 multi-use trail currently approximately 310 miles long and which will eventually
33 form a complete 500-mile loop around San Francisco Bay (32).

34 The airport's bicycle access efforts have been centered on ground access improvements and
35 improvements to nearby Bay Trail segments. These include a small land donation and a monetary
36 contribution to the neighboring City of San Leandro for construction of a pedestrian/bicycle bridge that
37 linked the trail network to the airport (33, 34) and closed the final gap between the cities of Hayward and
38 Oakland (35). OAK also received a grant from the Association of Bay Area Governments (ABAG) to
39 build 1 mile of trail leading up to the bridge (36).

40 On its own road network, the airport redesigned a main service road, taking advantage of a previously
41 scheduled repaving project to eliminate a traffic lane in each direction, widen shoulders and add bicycle
42 lanes, the first elimination of a traffic lane in memory, according to an interviewee. A Class 1 trail on
43 airport property is also planned.

44 Two sets of outside policy instruments provided motivations for the enhancements. The trail work was

1 part of an environmental mitigation package under the National Environmental Protection Act (NEPA),
2 the California Environmental Quality Act (CEQA) and the Bay Conservation and Development
3 Commission (BCDC), a state agency that administers the Bay Trail to offset impacts on the Bay Trail by
4 airport development projects (37).

5 A second policy instrument is the Regional Airport Plan, administered by ABAG, BCDC and the
6 Metropolitan Transportation Commission (MTC), the Bay Area's MPO, which mandates trip reduction in
7 airport ground access transportation (38).

8 Trip reduction efforts are also a component of the airport's Mitigation Monitoring and Reporting Program
9 (MMRP) under CEQA (39), though compliance is voluntary. Among the projects listed in the airport's
10 current MMRP are "airport roadway bike lanes and racks/showers in [employee] facilities," though
11 showers at airport employee facilities remain to be completed. OAK also self-identifies as supporting
12 progressive environmental issues, an interviewee said, pointing to a recent installation of charging
13 stations for electric vehicles in parking lots.

14 There are obstacles to obtaining a better understanding of employee mode choice and travel demand. The
15 MMRP cites "multiple challenges a work site such as the Airport poses (multiple employers, shiftwork,
16 abundance of low-cost or free parking)" (39). There have been studies of passenger demand for a new
17 transit link to BART, but they do not break out data for employees (40, 41). It has been suggested in the
18 literature that employee badge records could be used to generate employee origins at an aggregated level
19 (35).

20 Operator costs for various employee modes have not been collected and analyzed, interviewees said,
21 which may cause an understatement of the potential benefits of reduced vehicle trips. Currently, the
22 airport subsidizes AirBART bus tickets for employees, but there is very low participation in the
23 commuter reimbursement program, according to the MMRP (39).

24 Barriers to learning more about employee travel needs are identified in the MMRP and would be
25 transferable to other airport sites. They include: "coordinating with multiple employers, no central
26 communication device to tenants and employees, multiple work areas and break rooms distributed
27 throughout the airport, lack of email for many employees, coordinating pay cycles for distribution of
28 paper survey, lack of budget for incentives to participate, and lack of tenant awareness or importance of
29 survey as it related to Airport's air quality goals" (39).

30 Among the staff recommendations: hire a transportation coordinator to collect and analyze data and
31 coordinate among tenants, and alter parking policies to encourage more ridesharing and vanpools and
32 discourage solo vehicle trips. An annual employee transportation survey is also recommended (39).

33 **3.1.3 Los Angeles International Airport (LAX)**

34

35 **Bicycle Facilities/Policies:** Trail nearby, bicycle lane on service road, bicycle lockers, showers and
36 changing area, Bicycle Working Group, pre-tax allowance of \$20/month for bicycle commuters,
37 conventional bicycle parking

38 **Size:** Large hub

39 **Number of employees:** 3,000 airport operator / 47,000 total

40 Los Angeles International Airport (LAX) is owned and operated by Los Angeles World Airports
41 (LAWA), a department of the City of Los Angeles that also owns and operates LA/Ontario International
42 (ONT) and Van Nuys (VNY) airports and a property in Palmdale. LAWA is governed by a seven-
43 member Board of Airport Commissioners, who are appointed by the Mayor and approved by the City
44 Council (42).

45 While there is no direct bicycle access to the terminal's main entrance, LAX has reconstructed a service

1 road with bicycle lanes to provide a connection to recreational bicycle paths. It was a joint project with
2 the Los Angeles City Department of Transportation and LA Metro, which is the MPO, together with a
3 local bicycle advocacy group, the LA County Bicycle Coalition. As with OAK and SFO, the project took
4 advantage of an already-planned pavement rehabilitation. Vehicle lanes were reduced to provide bicycle
5 lanes and widened shoulders, marking the first time in memory in the City of Los Angeles that vehicle
6 lanes had been removed for bicycle lanes, according to interviewees.

7 In another enhancement, bicycle lockers were re-located to make them more convenient and were quickly
8 filled by LAWA employees. Some store bicycles for recreational riding during breaks. There is a waiting
9 list, but there is a lack of funds to add more (42). There are also showers and changing areas, a Bicycle
10 Working Group and safety classes.

11 One obstacle to bicycle use at the airport, interviewees noted, were security concerns that employees and
12 passengers will ride their bicycles into the terminals. Some employees use their bicycles to ride to work
13 from lower-cost satellite parking lots, because it is faster and more convenient than walking or taking the
14 airport-supplied free shuttle. Passenger demand for bicycle parking and access is evidenced through what
15 one informant termed the “bicycle underworld,” passengers who share information about safe places to
16 park their bicycles. One airline tenant, concerned about seeing bicycles locked at random spots, prevailed
17 upon the operator to install more racks.

18 A major policy lever for LAWA’s bicycle enhancements are its obligations under South Coast Air
19 Quality Management District (SCAQMD) Rule 2202, which requires employers with 250 or more
20 employees to reduce average weekly employee solo commute trips by one-third each year (43). This is
21 similar to the Oregon rule (44).

22 Bicycle facility enhancements are part of an extensive employee trip reduction program, including
23 vanpools and transit subsidies (up to \$110 a month), which have earned LAWA awards for its commuter
24 programs (45). Vanpool vehicles are equipped with rear bicycle racks; this enables vanpool riders to
25 bicycle to the stop. The federal pre-tax allowance of \$20 per month for bicycle commuters can be
26 included as part of the LAWA transit subsidy (46).

27 These efforts compare with the \$60 yearly investment that employers subject to Rule 2202 can pay in lieu
28 of implementing trip reduction programs (43). Informants said the airport operator considered the added
29 investment a way of cultivating goodwill with neighbors.

30 Additional potential policy levers are a “Greening LAX” City Council motion passed in early 2007, and
31 Executive Directive Number 10-Sustainable Practices in the City of Los Angeles, which requires all city
32 agencies, including the airport, to develop sustainability programs. Objective 6 of LAWA’s Sustainability
33 Program includes support for bicycle lockers, showers and a “Bike Valet” for LAWA staff who bike to
34 work (42).

35 Bicycling and walking together represent 0.3 percent of the commute trips reported by employees polled
36 in the annual peak hour survey of 1,700 employees, according to findings from discussions with airport
37 managers. By contrast, nearly half of the employees rideshare (47).

38 **3.1.4 San Francisco International Airport (SFO)**

39
40 **Bicycle Facilities/Policies:** Trail nearby, bicycle lane on service road, conventional bicycle parking

41 **Size:** Large hub

42 **Number of employees:** 1,400 airport operator / 10,000 total

43

44 San Francisco International Airport (SFO) has one of the more unusual governance structures in relation
45 to its physical location. Owned and operated by the City of San Francisco, and governed by an Airport

1 Commission, all of whose members must be San Francisco residents (48), it is located in another
2 jurisdiction, San Mateo County, where it is the largest single employment site (8).

3
4 SFO features bicycle parking prominently on its Web site, and, in a nod toward passengers, has
5 established methods for them to register their bicycles if they are parking them for more than 24 hours.

6
7 SFO is well served by transit: from the south, SamTRANS provides access with overnight service
8 subsidized by the Airport Commission (8); and from the north there is transit access via BART, though
9 bicycles are subject to BART's restrictions. Also there is a surcharge to travel to the airport. Although
10 SFO employees can receive discounts on BART tickets, SFO Commissioners have criticized the
11 surcharge as an unfair burden on SFO employees (49).

12
13 As was the case with OAK and LAX, the airport is completing a service road reconstruction to replace
14 vehicle lanes with bicycle lanes, the first time in the airport's history that a traffic lane has been
15 eliminated for bicycle use, according to interviewees. The impetus came from airport leadership's
16 awareness of growing bicycle use and desire to support the City of San Francisco's pro-bicycling stance
17 (3). Another internal influence is the SFO Climate Action Plan, which mentions employee bicycle use
18 (23). The Airport is evaluating plans to contract with a bikesharing company for internal airport employee
19 use. Additional internal motivations, according to interviewees, are employee well-being, reduction in the
20 use of automobile travel and credit from the community.

21
22 External influences included the airport's mitigation agreement required by the Bay Conservation and
23 Development Commission (BCDC), a state agency that oversees the Bay's shoreline, as part of the
24 permitting process for two major projects. As a mitigation measure for airport development, the service
25 road project could be financed with PFCs, according to an interviewee.

26 27 **3.2 Other Airports**

28
29 The remaining three airports in our study—Seattle-Tacoma International Airport, Boston Logan
30 International and Minneapolis-St. Paul—have less developed bicycle enhancement policies or plans, but
31 are important because they have been or are subject to more than one of the eight influencers in our table
32 and have some bicycle access improvements.

33 **3.2.1 Seattle-Tacoma International Airport (SEA)**

34 **Bicycle Facilities/Policies:** Conventional bicycle parking

35 **Size:** Large hub

36 **Number of employees:** 800 airport operator / 15,000 total

37 Seattle-Tacoma International Airport (SEA) has added bicycle racks in two locations, in response to
38 passenger and employee interest. However, there are no bike paths or bike lanes to the terminal, and the
39 road approaches are challenging for bicycle travel, an interviewee said. With the arrival of a light rail
40 station in 2009, which connects to the terminal with a footbridge, bicyclists are able to store their bicycles
41 in racks at the station. Although there have been efforts to put together a dedicated bikeway or
42 combination of bike trails and bike lanes connecting SEA to downtown, no final plan has been realized
43 (50, 51). SEA is promoting non-airport use of the transit connection by offering discount parking on game
44 weekends so that sports fans can leave their cars at the airport and take light rail downtown (52).

45 The strong bicycle culture in Seattle is a strong external influencer. In addition to a bicycle plan that has
46 the declared goal of making Seattle "the best community for bicycling in the United States" (53), a 2006
47 voter initiative supplies dedicated funding for bicycle and pedestrian improvements. The Port has
48 included improved bicycle connections between the airport and downtown in its business strategies (50).

1 SEA takes part in the King County State Commuter Trip Reduction (CTR) Program, similar to LAX and
 2 PDX. Any employer with 100 or more employees traveling during the morning commute must designate
 3 an Employee Transportation Coordinator, distribute information to employees about alternatives to drive-
 4 alone commuting at least one a year and provide support for at least one program to reduce single-
 5 occupancy vehicle (SOV) trips (54). It requires a “good faith effort.” Suggested program elements include
 6 bicycle parking, lockers, changing areas and showers for employees (54). The Port offers free parking for
 7 vanpools and various incentives to employees to travel to work by bus or rail.

8 Another external policy influence is the neighboring City of Sea-Tac’s prohibition on the airport using
 9 land within city limits for off-airport parking (8).

10 **3.2.2 Boston Logan International Airport (BOS)**

11
 12 **Bicycle Facilities/Policies:** Conventional bicycle parking, close to local bicycle facilities

13 **Size:** Large hub

14 **Number of employees:** 3,200 airport operator / 14,000 total

15

16 Boston Logan International Airport (BOS) is located closest to the downtown of the seven sites, just
 17 under 8 miles distant, and adjacent to the East Boston neighborhood, which has bicycle facilities and
 18 roads that connect with airport service roads, which the airport is working to improve using airport land
 19 where possible. Many East Boston locations are no more than 20 minutes away by bicycle, and most
 20 employees who bicycle to the airport ride from this area, interviewees said. Commuters from downtown
 21 must make detours because bicycles are prohibited from many of the roadways leading to the airport. The
 22 MBTA is testing a policy that would allow bicycles on one line that runs from Boston to the airport
 23 during the morning commute. There is direct transit access to the airport, via the Massachusetts Bay
 24 Transportation Authority (MBTA) T trains, buses and ferry. There is no long-term bike parking at the
 25 airport, making it impractical for passengers (55).

26 A very strong external policy lever was the 1975 freeze on parking spaces at BOS to comply with state air
 27 quality requirements(8). BOS travel demand management for passengers and employees dates back to the
 28 1980s (9), and the Port’s employee transportation management association (8) claims 2,746 members (56).
 29 Employees receive transit subsidies (up to \$100 a month), cash incentives, ridematching services and
 30 information on alternatives (8). The Port runs its own buses that carry 1.2 million people (passengers and
 31 employees) a year from outlying areas, one interviewee said.

32 The 2008 Massachusetts Bicycle Transportation Plan mentions bicycle parking, showers and changing
 33 facilities at workplaces (57), but an interviewee at BOS said that, while the airport shared the bicycle
 34 plan’s overall goals, it did not have direct influence on BOS bicycle access policies.

35 One internal incentive for undertaking bicycle enhancements was the airport’s desire to qualify for LEED
 36 certification, which it achieved for the reconstruction in 2004 of an air terminal, an interviewee said. The
 37 airport installed bicycle racks outside, which are primarily used by employees. Another internal incentive
 38 is the airport’s desire to be a good neighbor, especially in the case of East Boston.

39 **3.2.3 Minneapolis-St. Paul International Airport (MSP)**

40

41 **Bicycle Facilities/Policies:** Conventional bicycle parking

42 **Size:** Large hub

43 **Number of employees:** 565 / 28,545

44 Minneapolis is cited in the literature as a bicycle-friendly city, with numerous paths and bike lanes, a high
 45 commuter bike mode share, extensive bicycle parking and a high bicycling usage rate (3). However,

1 Minneapolis-St. Paul International Airport (MSP) has few bicycle enhancements and is difficult to reach
2 by bicycle, according to interviewees.

3 MSP has bicycle racks at its two terminals, but they are not used regularly, because of the many months
4 of inclement weather and dangerous roads leading to the airport, an interviewee said. Bicycle use
5 increased when light rail came to MSP in 2004, but it remains low.

6 MSP is owned and operated by the Metropolitan Airports Commission (MAC), whose 14 members are
7 appointed by the governor and the Mayors of Minneapolis and St. Paul (58).

8 While MSP included sustainability components in its recently adopted Long Term Plan, there is little
9 reference to bicycle access. It is not mentioned in the 2010 report on airport greenhouse gas emissions
10 required by the state (59).

11
12 Because the area is in compliance with the National Ambient Air Quality Standards for criteria pollutants,
13 air quality attainment goals are not relevant, an interviewee said. However, the 2010 baseline inventory of
14 greenhouse gas emissions shows that ground access transportation accounts for more than half the carbon
15 emissions from activities under the airport's control (albeit a very small fraction of the total inventory)
16 (59).

17 **4.0 Policy Implications and Future Directions**

18 This study provides an early, first look at the incentives and disincentives to airport operator investment
19 in enhancements to bicycle access to their properties. With the exception of PDX, passenger bicycle
20 access was not considered an important segment by the operators in our study: passengers were free to
21 use bicycle facilities, but there were questions of convenience and logistics. Our findings suggest that
22 employee bicycle access is the areas of greatest interest and potential for these operators. Some
23 interviewees contended that developing employee facilities will lead to demand from passengers, as was
24 the case at PDX. While we found relatively few cases to draw on, in aggregating the interviews, we
25 identified approaches to improving bicycle access that could be combined with other multi-modal
26 approaches to improve employee travel options.

27 Eight influencers on bicycle access emerged from our literature review and were in evidence to varying
28 degrees across our seven cases. Governance structure (whether local or regional governments were
29 represented on the airport's governing body), geographic location (whether the airport was located in
30 close proximity to downtown on bicycle-accessible routes), the nature of airport access roads (high-speed,
31 elevated freeways, or surface roads with slower traffic), self-perceived environmental stewardship,
32 restrictions on spending for non-aviation transportation improvements (specifically the ability to access
33 Passenger Facilities Charges for improvements aiding bicycles and transit), proximity to transit,
34 environmental impact reduction policies and regulatory mandates and land use constraints are all
35 contributory.

36 While we found relatively few cases to draw on, in aggregating the interviews, we identified approaches
37 to improving bicycle access that could be combined with other approaches to improve employee travel
38 options (see Figure 2). Notable are the extensive policies and facilities at PDX, such as secured bicycle
39 parking for employees and diversion of Passenger Facilities Charges to bicycle improvements. Our
40 findings show incentives in a wide assortment of federal, state, regional and local regulations governing
41 various aspects of airports' transportation systems, their greenhouse gas emissions and their impacts on
42 neighboring eco-systems and communities.

43

Airport Bicycle Access Enhancement Influencers							
	PDX ^a	OAK ^b	LAX ^c	SFO ^d	SEA ^e	BOS ^f	MSP ^g
Internal							
Governance structure	X	--	--	X	--	--	--
Geographic location	X	X	X	X	X	--	X
High-speed access roads	X	X	X	X	X	X	X
Environmental stewardship	X	X	X	X	X	X	--
External							
FAA restrictions on PFCs	X	--	--	--	--	--	--
Proximity to transit	X	X	X	X	X	X	X
Environment/Transp. Regs.	X	X	X	X	X	X	--
Land use constraints	X	--	--	--	X	X	--
-- = data not applicable ^a Portland International Airport ^b Oakland International Airport ^c Los Angeles International Airport ^d San Francisco International Airport ^e Seattle-Tacoma International Airport ^f Boston International Airport ^g Minneapolis-St. Paul International Airport							

1 **FIGURE 2 Eight Influencers for Airport Bicycle Enhancement and Their Distribution Across the Seven Case**
 2 **Studies.**

3 Despite the fact that only one of the seven airports in our case studies had a bicycle master plan, and that
 4 informants knew of little if any activity on this front, there is evidence of potential interest among airport
 5 operators. In reviewing policy papers and aggregating the interviews, a robust environmental planning
 6 element in airport management emerged. At the main airport operator trade association, Airports Council
 7 International (ACI) North America, one of its 17 member subcommittees, with representatives from
 8 major airports, is devoted to environmental planning, which is supplement by a biennial member survey
 9 to measure their activities in this area (25). While the number of respondents in the 2010 survey was not
 10 representative (fewer than 60 out of more than 600), 42 percent said they provided bicycle parking and 91
 11 percent reported transit access (25).

12 Through our interviews, we found near unanimous agreement that transit access makes bicycling more
 13 practical for airport access, and a number suggested that anticipated transit improvements would prompt
 14 them to make bicycle enhancements. Our findings in this paper strongly suggest that bicycle access could
 15 figure in airports’ future plans to fashion carbon and trip reduction programs, improve employee travel
 16 options and respond to land use constraints imposed by airports’ projected growth (8, 14, 16).

17 Our work also identifies policies that can be obstacles: specifically FAA rules on Passenger Facilities
 18 Charges. We find that some airports have secured exceptions to these rules by working collaboratively
 19 with FAA to develop an alternative spending plan, which could be emulated elsewhere.

20 Our work identifies several useful next steps: more study of mode choice and travel demand among
 21 airport employees, better understanding of costs incurred by airport operators for employee transportation
 22 options (notably parking), further exploration of alternative spending strategies to use Passenger Facilities
 23 Charges for multi-modal investments and cost-benefit analyses of airport owners' trip reduction strategies.
 24 These would build on earlier work (8, 9, 12, 13, 20, 21, 61). Finally, a pre- and post-enhancements study
 25 of airport employee attitudes toward bicycling and other alternative modes could add to the knowledge of

1 bicycling as well as other multi-modal options.

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