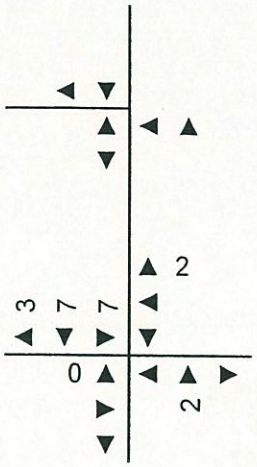
TECHNICAL APPENDIX

The Appendix contains the following:

1. Turning Movement Counts 2006
2. Turning Movement Counts 2007
3. Network Sheets
4. Crash Data Calculations
5. March 26, 2008 Memo

Appendix 1 - Turning Movement Counts 2006

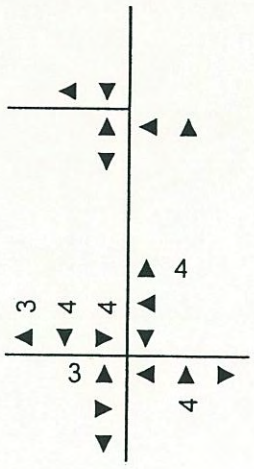
19-35 Race Point Road Residential Development Weekday Morning Peak Hour Traffic Volumes



Dwelling Units	**35**
Trip Equation	**T = 0.49(X) + 3.73**
Trip Split	**20% Entering**
	80% Exiting

Trips	
In	**4**
Out	**17**
Total	**21**

19-35 Race Point Road Residential Development Weekday Midday Peak Hour Traffic Volumes

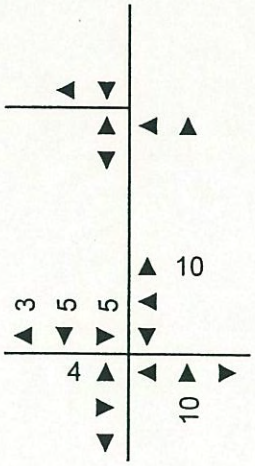


Dwelling Units	**35**
Trip Equation*	**T = 6.01(X) + 150.35**
Trip Split*	**50% Entering**
	50% Exiting

Trips	
In	**11**
Out	**11**
Total	**22**

**Average Daily Trip Rate used and scaled to midday levels*
Note: Midday 'K' factor approximately 6% (737/12,641)
Count volume west of Conwell Street (from TMCs) = 737
CCC Count Station AADT Volume (21017) = 12,641

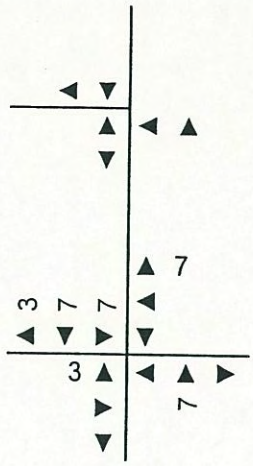
19-35 Race Point Road Residential Development Weekday Evening Peak Hour Traffic Volumes



Dwelling Units	**35**
Trip Equation	**T = 0.55(X) + 17.65**
Trip Split	**65% Entering**
	35% Exiting

Trips	
In	**24**
Out	**13**
Total	**37**

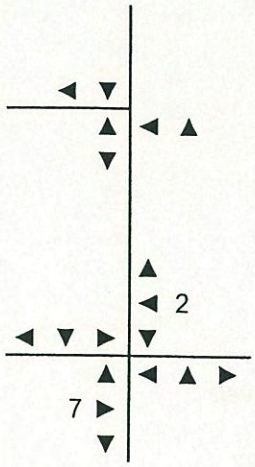
19-35 Race Point Road Residential Development Weekday Evening Peak Hour Traffic Volumes



Dwelling Units	**35**
Trip Equation	**T = 0.41(X) + 19.23**
Trip Split	**50% Entering**
	50% Exiting

Trips	
In	**17**
Out	**17**
Total	**34**

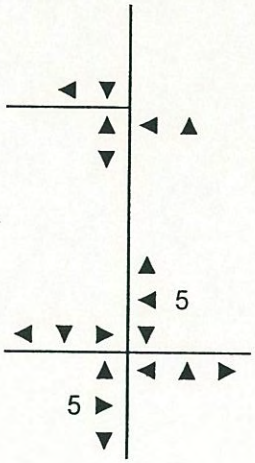
Shanks Painter Road Residential Development Weekday Morning Peak Hour Traffic Volumes



Dwelling Units	**40**
Trip Equation	**T = 0.49(X) + 3.73**
Trip Split	**20% Entering**
	80% Exiting

Trips	
In	**5**
Out	**18**
Total	**23**

Shanks Painter Road Residential Development Weekday Midday Peak Hour Traffic Volumes

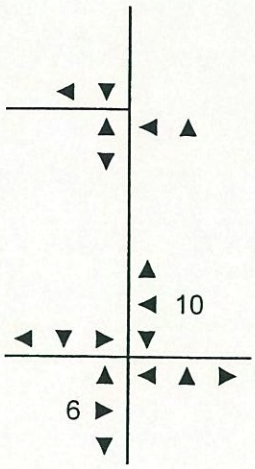


Dwelling Units	**40**
Trip Equation*	**T = 6.01(X) + 150.35**
Trip Split*	**50% Entering**
	50% Exiting

Trips	
In	**12**
Out	**12**
Total	**24**

**Average Daily Trip Rate used and scaled to midday levels*
Note: Midday 'K' factor approximately 6% (737/12,641)
Count volume west of Conwell Street (from TMCs) = 737
CCC Count Station AADT Volume (21017) = 12,641

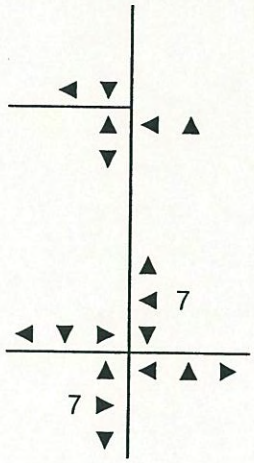
Shanks Painter Road Residential Development Weekday Evening Peak Hour Traffic Volumes



Dwelling Units	**40**
Trip Equation	**T = 0.55(X) + 17.65**
Trip Split	**65% Entering**
	35% Exiting

Trips	
In	**26**
Out	**14**
Total	**40**

Shanks Painter Road Residential Development Weekday Evening Peak Hour Traffic Volumes



Dwelling Units	**40**
Trip Equation	**T = 0.41(X) + 19.23**
Trip Split	**50% Entering**
	50% Exiting

Trips	
In	**18**
Out	**18**
Total	**36**

Appendix 2 - Turning Movement Counts 2007

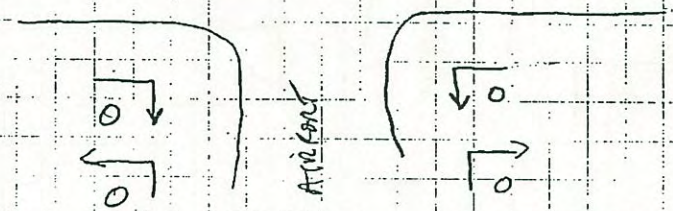
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT Turning Counts — FILE NO.
SUBJECT Race Point Road + Airport Drive — SHEET NO. OF
COMPUTED BY MT — CHECKED BY MG — DATE Friday 8/24/07

7:00 AM – 7:15 AM

7 Autos
0 Ped
0 Airport

Race Point Road

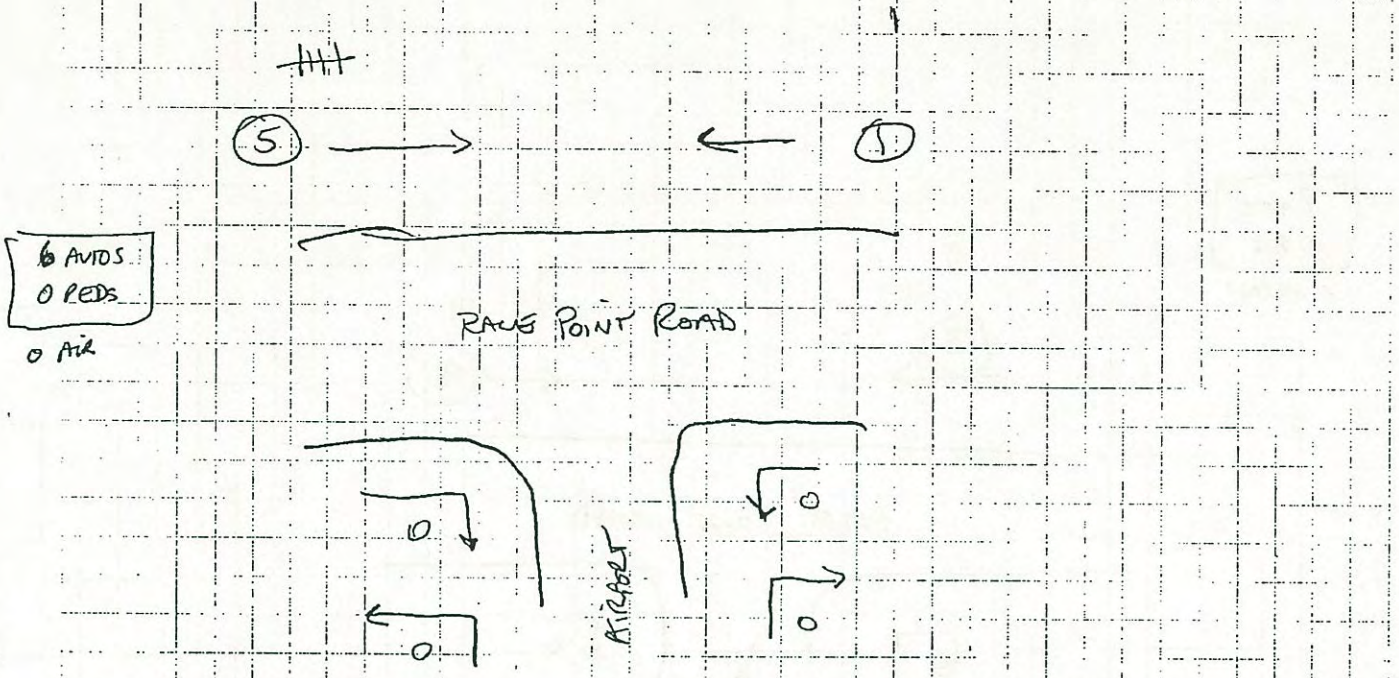


No Pedestrians
No Bicycles

EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

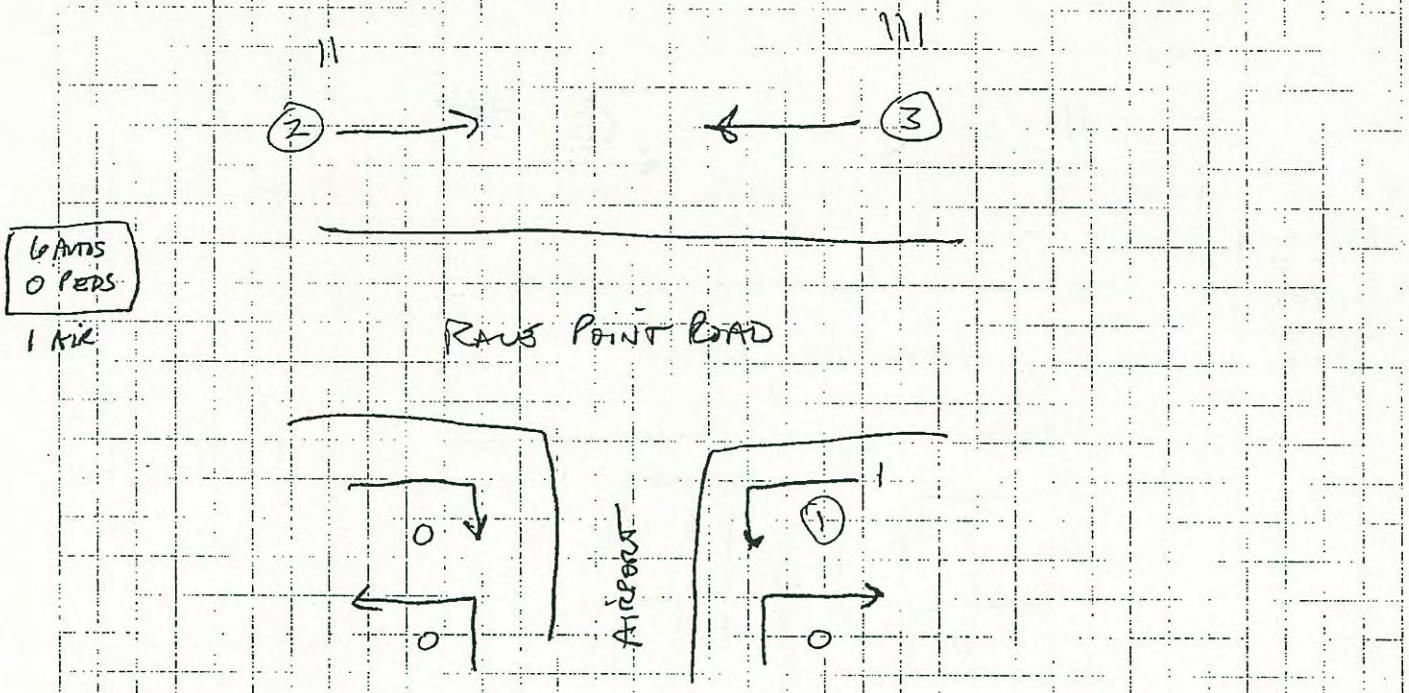
7:15 AM – 7:30 AM



EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

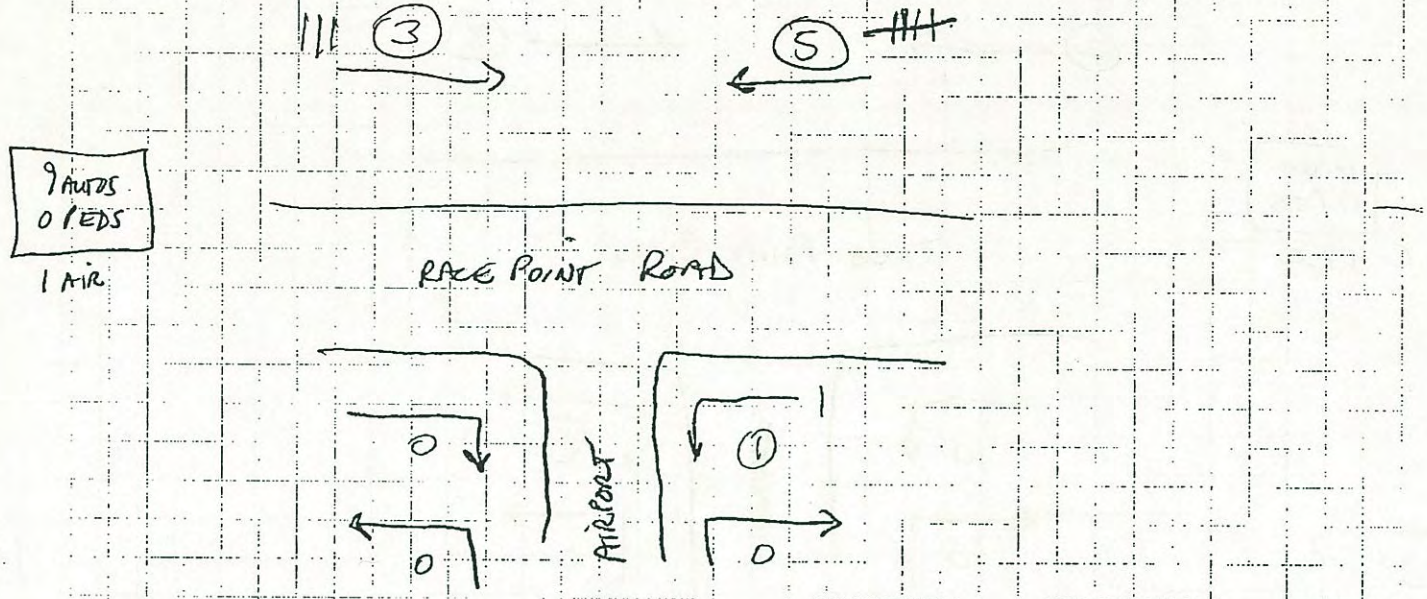
7:30 Am - 7:45 Am



EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

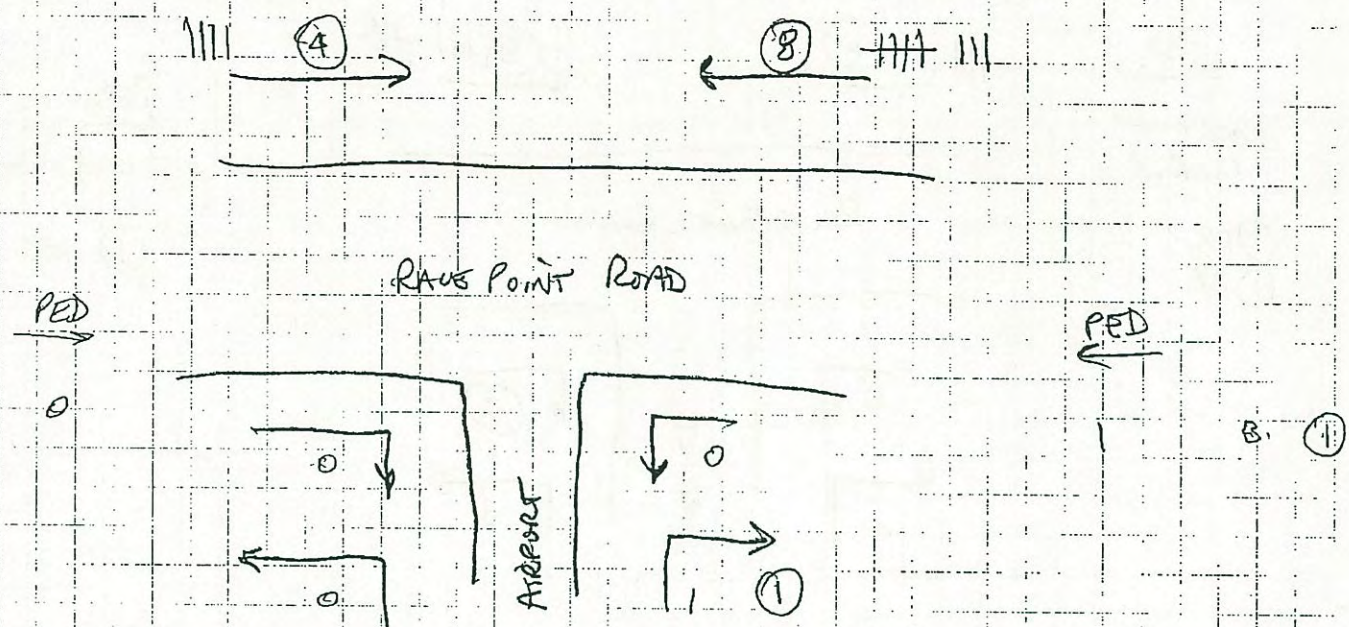
7:45 AM – 8:00 AM



EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

8:00 AM – 8:15 AM

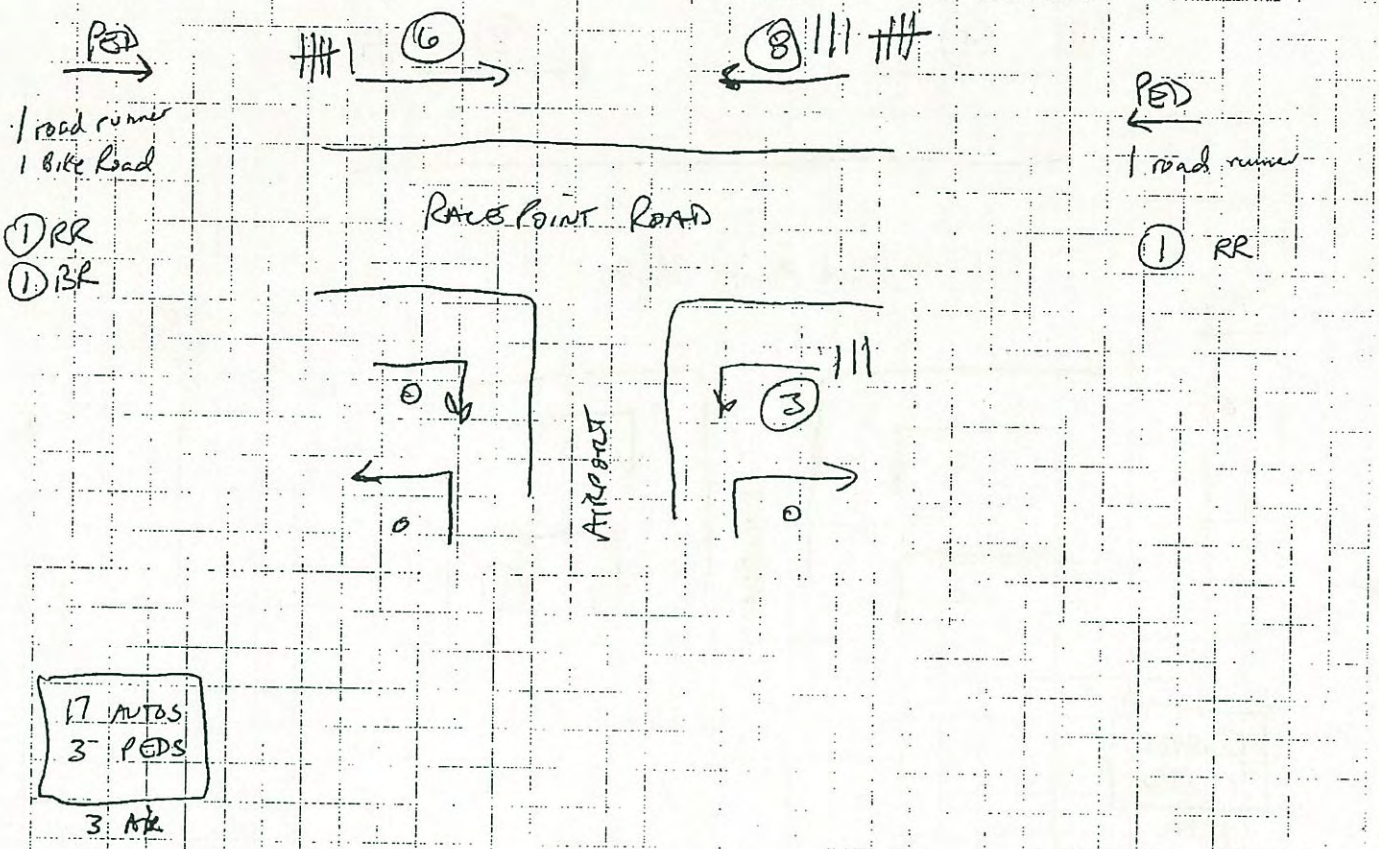


13 AUTOS
1 PED
1 AIR

EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. ..... OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

8:15 AM — 8:30 AM



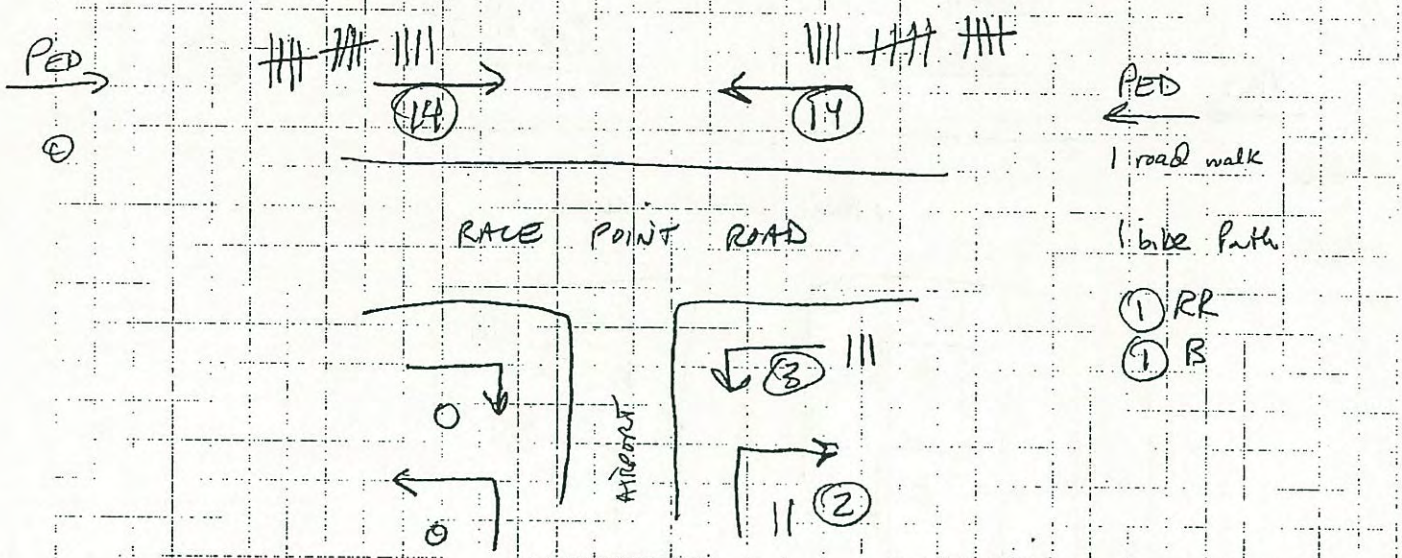
17 AUTOS
3 PEDS

3 AM

EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

8:30 AM — 8:45 AM



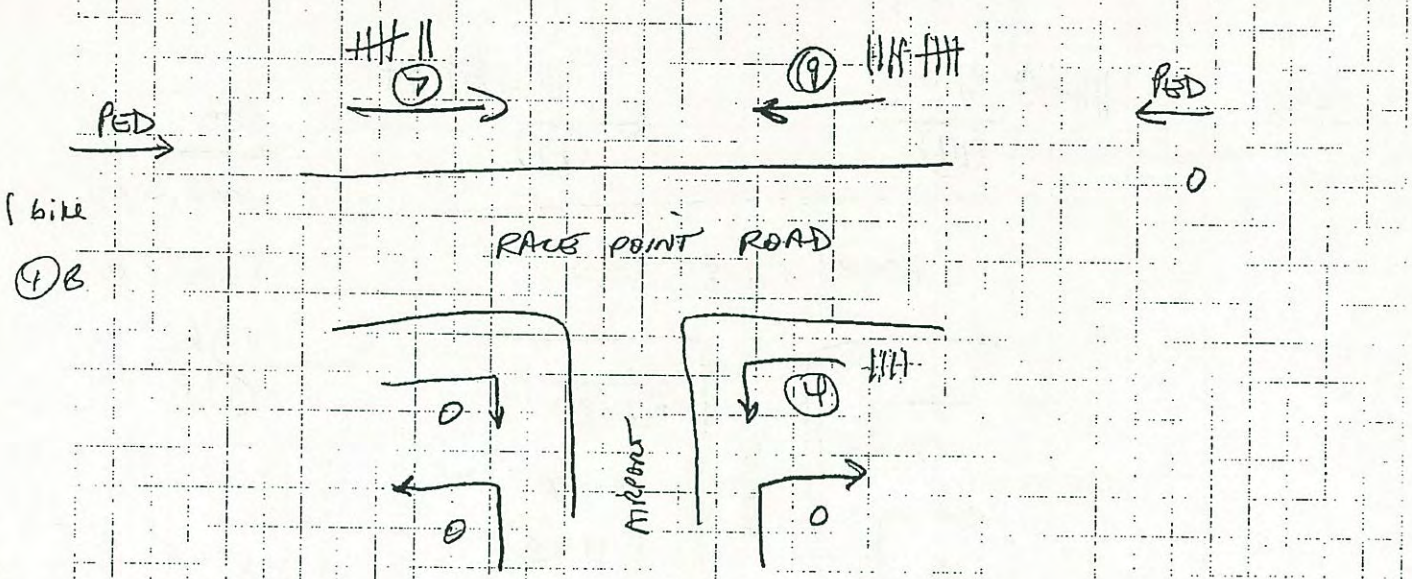
33 AUTOS
2 PEDS

5 AIR

EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

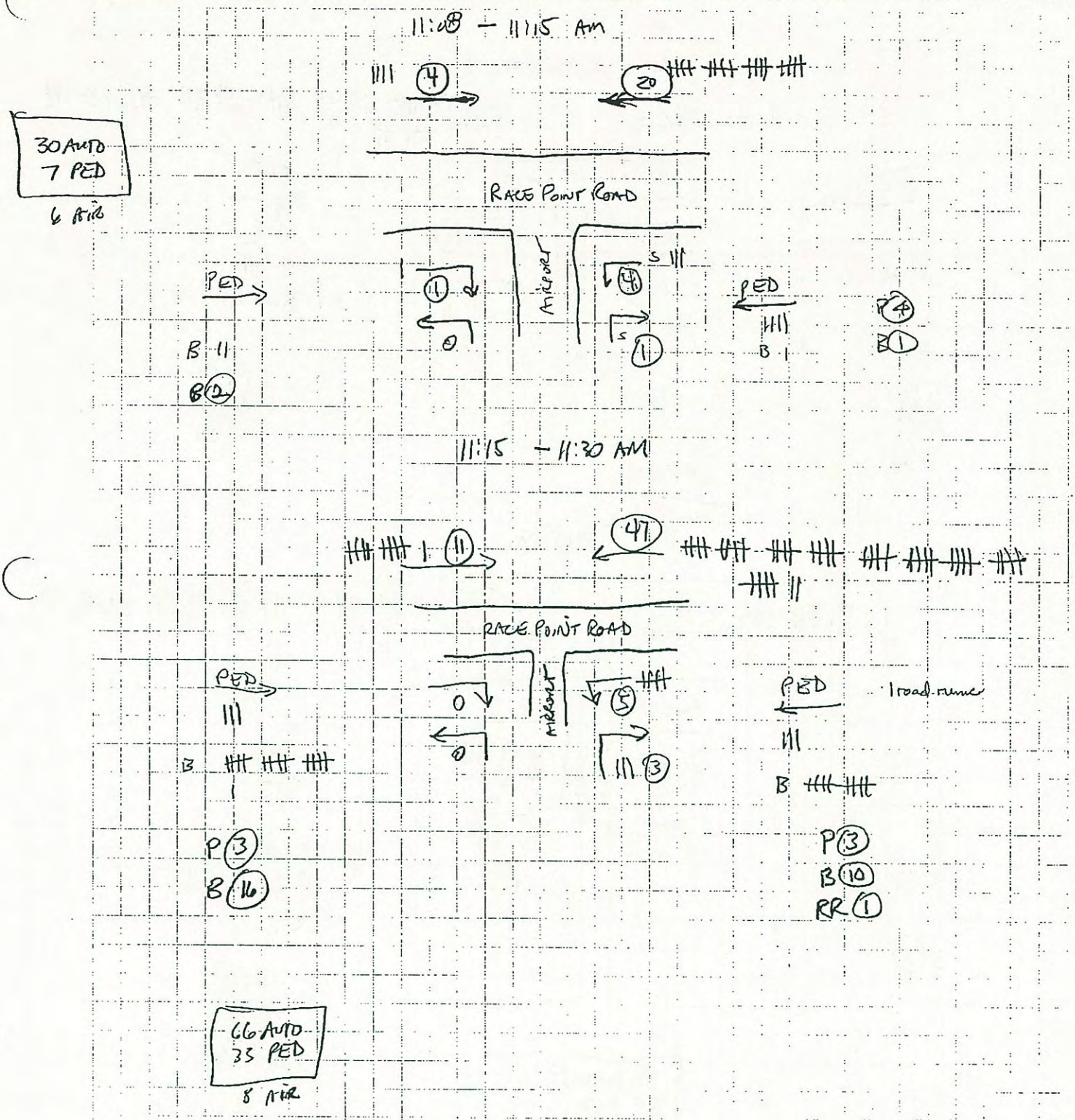
8:145 AM – 9:100 AM



20 AUTOS
1 PED
4 BIR

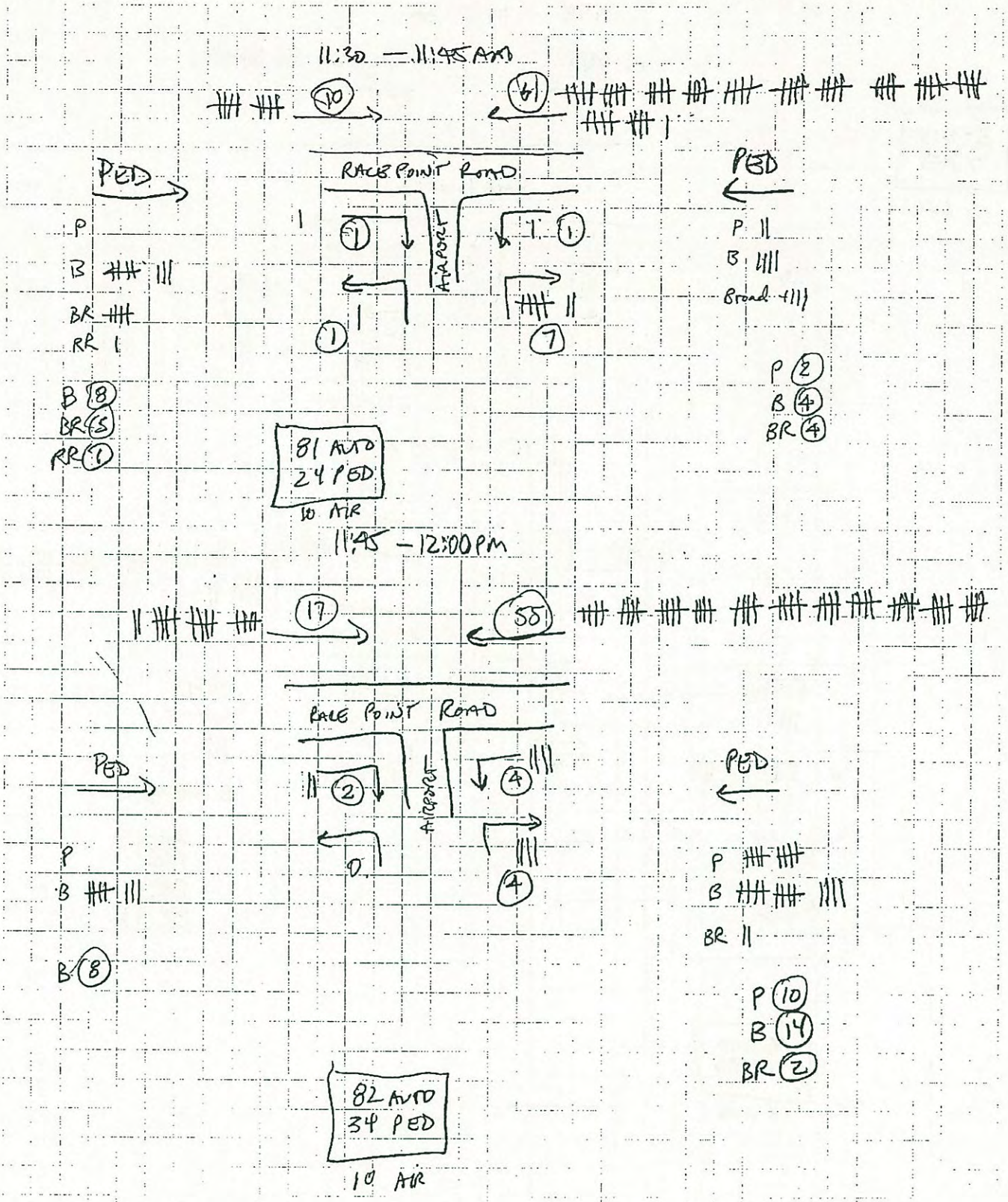
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



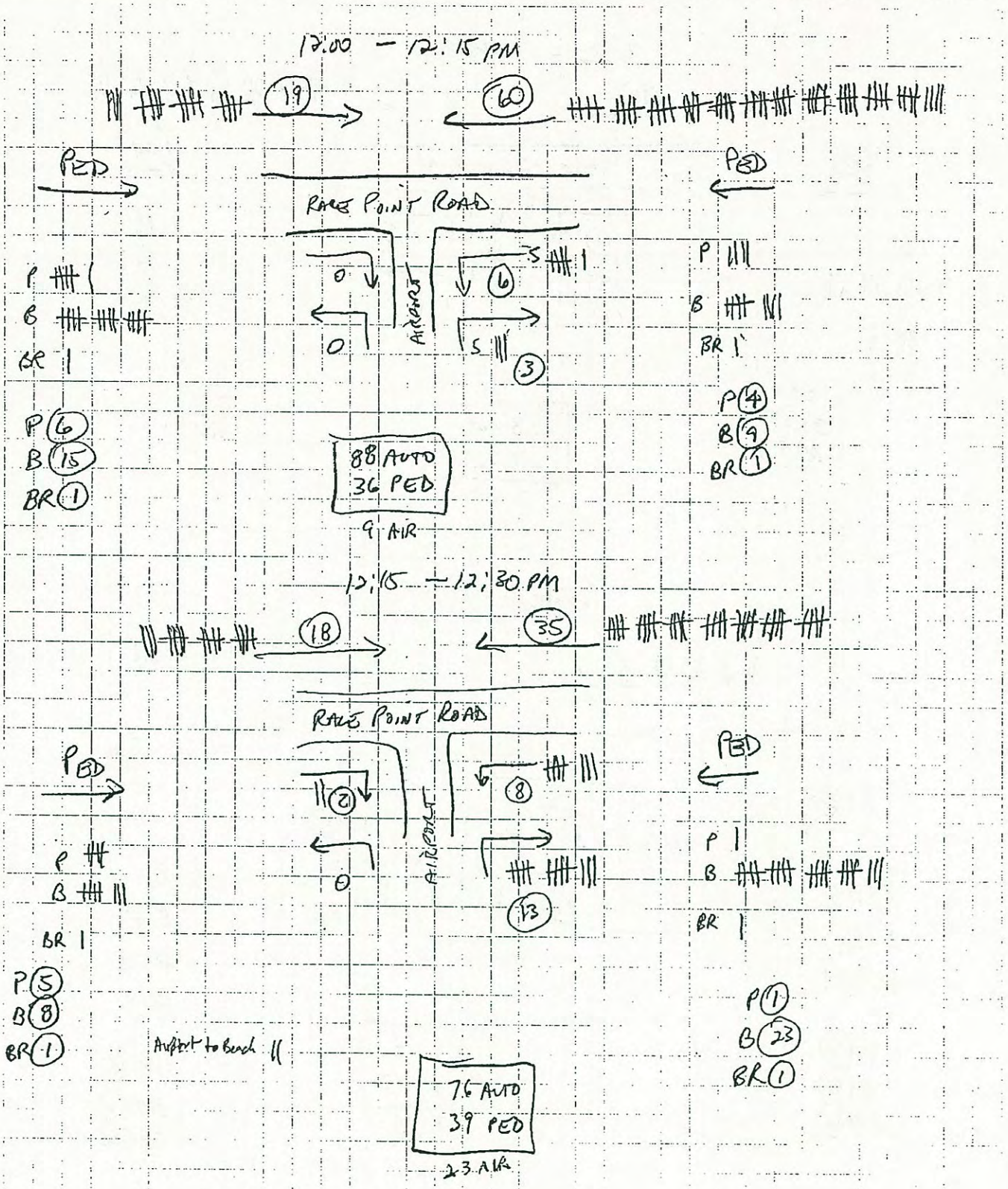
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. ..... OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



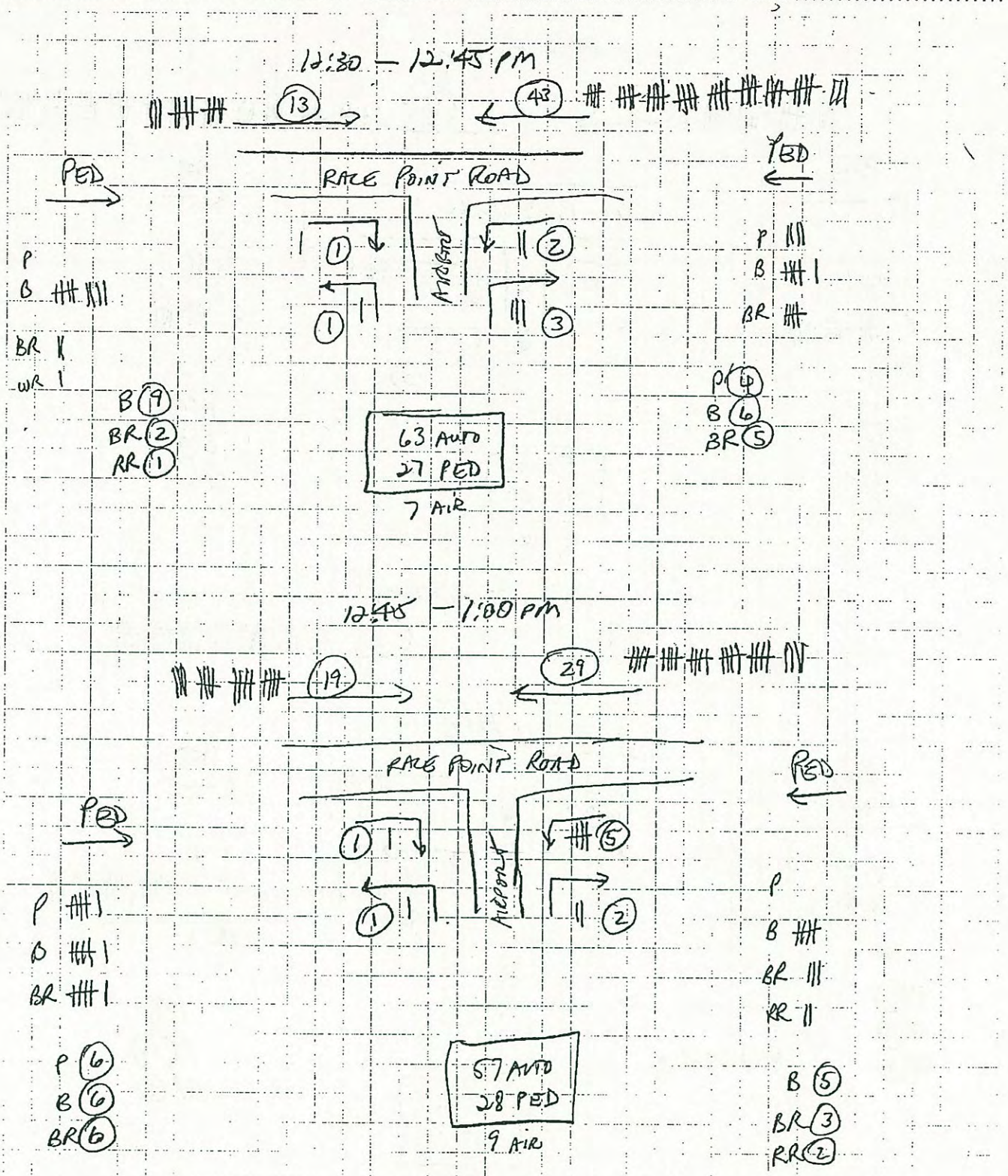
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



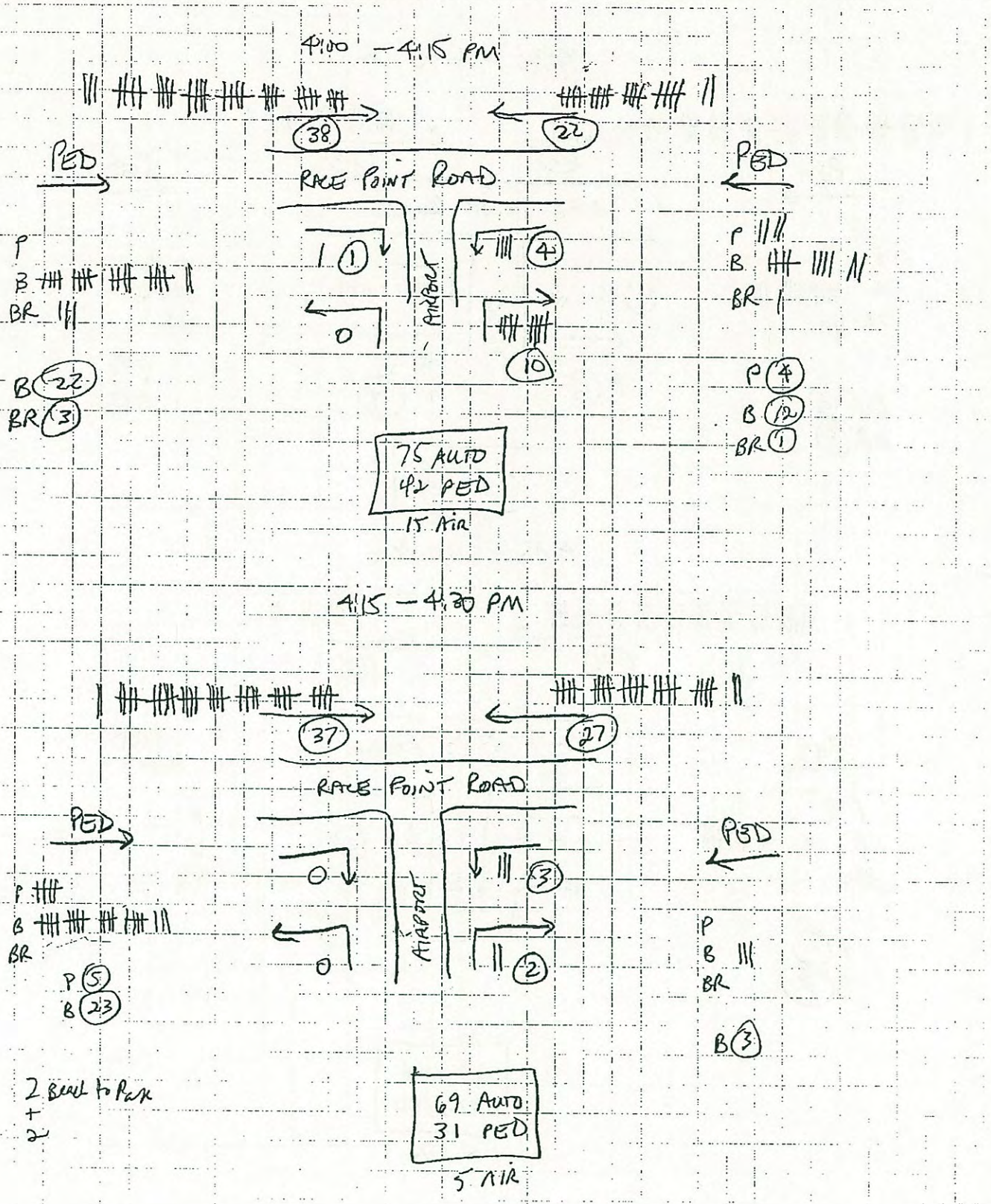
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



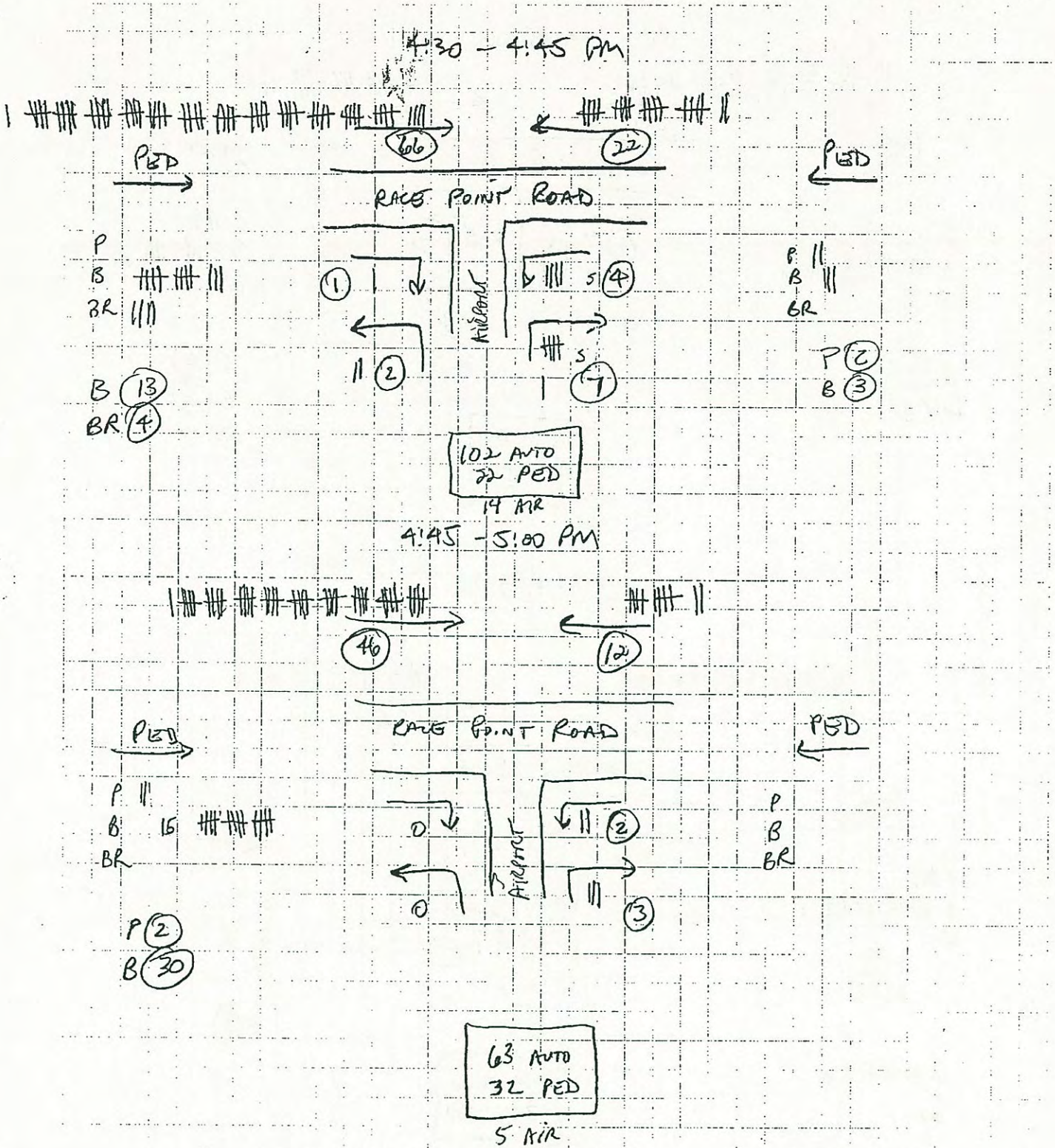
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. ..... OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



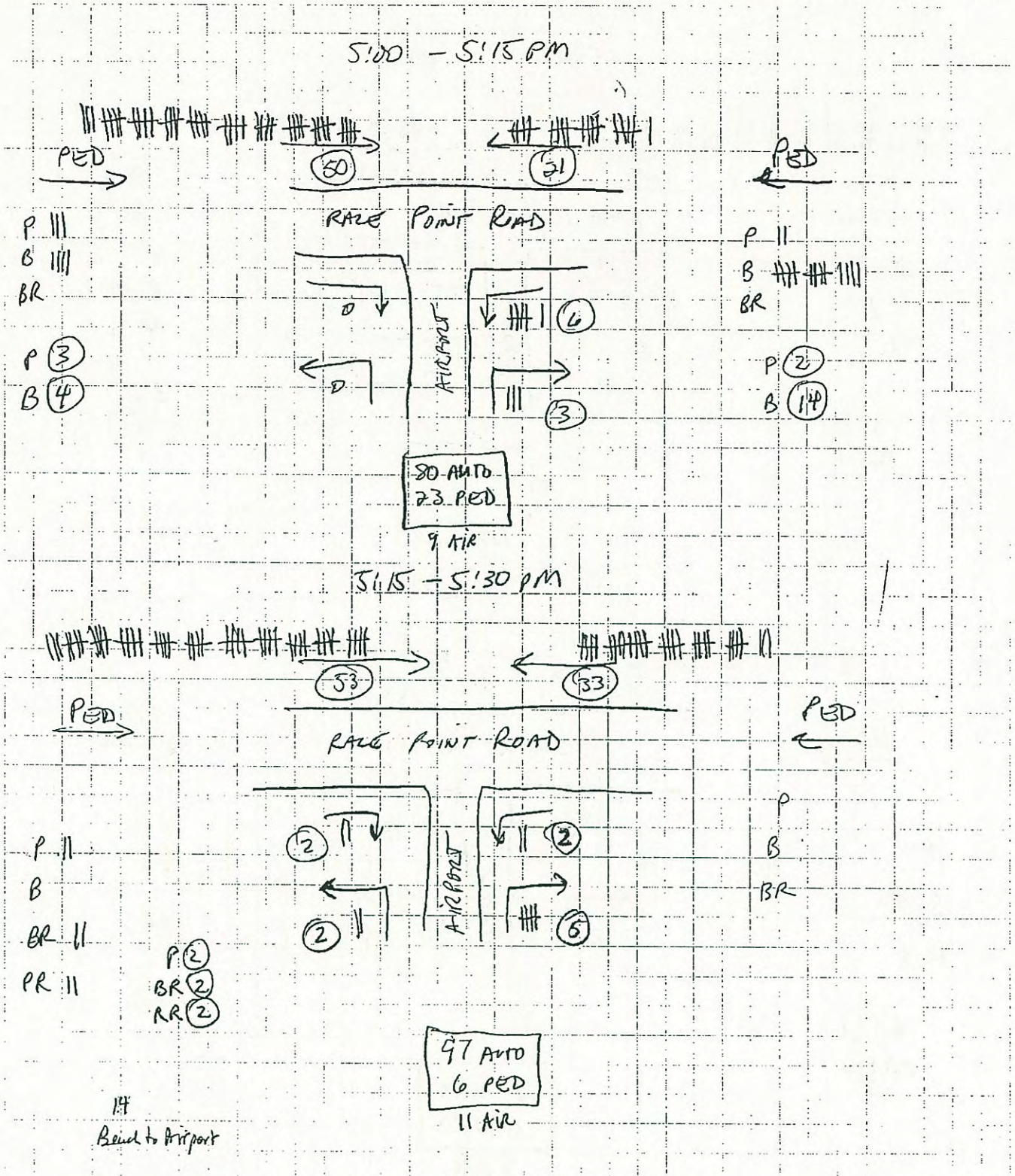
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. .....OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



EDWARDS AND KELCEY
CONSULTING ENGINEERS

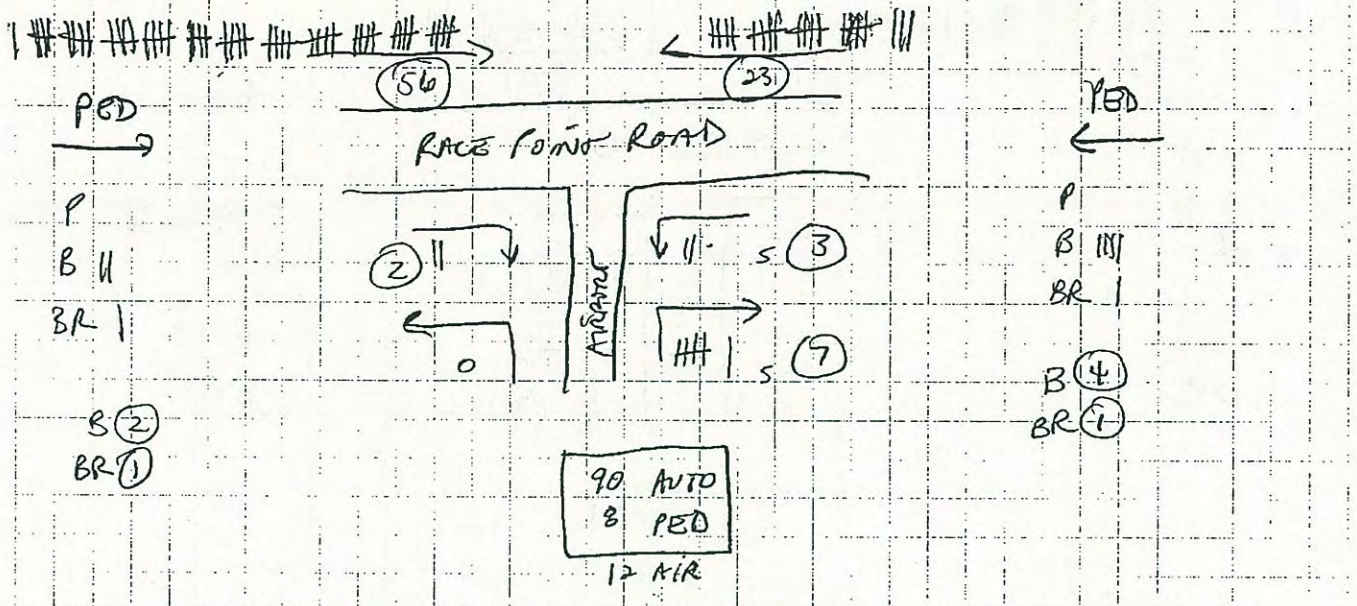
PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. ..... OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....



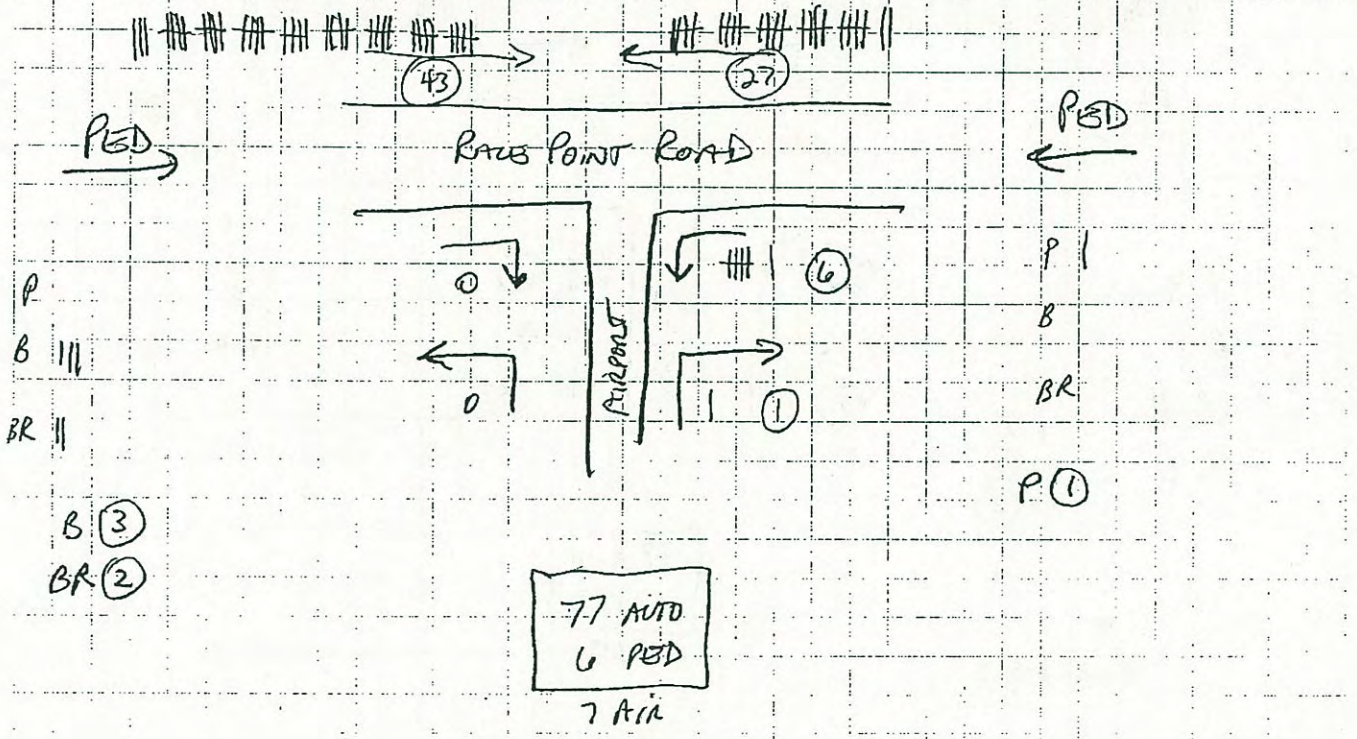
EDWARDS AND KELCEY
CONSULTING ENGINEERS

PROJECT ..... FILE NO. .....
SUBJECT ..... SHEET NO. ..... OF .....
COMPUTED BY ..... CHECKED BY ..... DATE .....

5:30 – 5:45 PM



5:45 – 6:00 PM



Appendix 3 - Network Sheets

Edwards and Kelcey
343 Congress Street
Boston MA, 02210

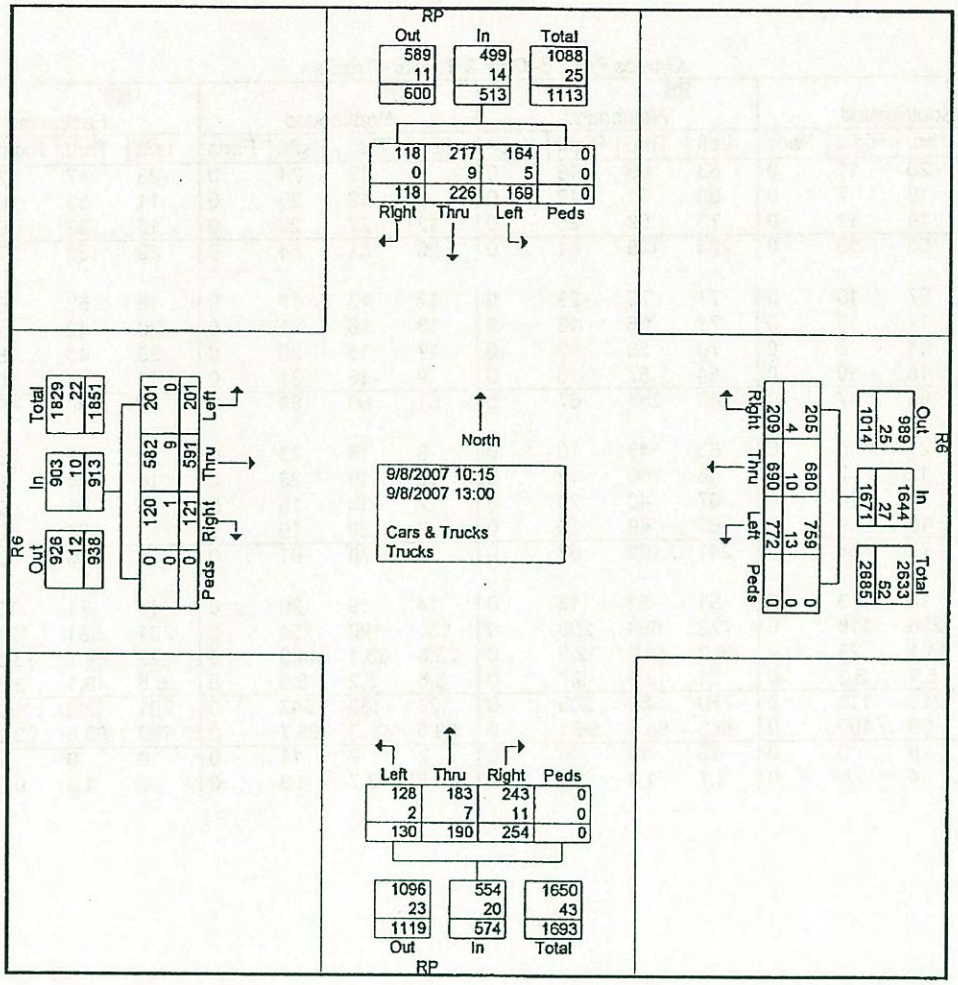
File Name : rte6_conwell_sat
Site Code : 00000000
Start Date : 9/8/2007
Page No : 1

Groups Printed- Cars & Trucks - Trucks

	RP Southbound				R6 Westbound				RP Northbound				R6 Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
10:15	15	20	11	0	63	65	16	0	9	12	24	0	23	47	12	0	317
10:30	8	16	7	0	68	71	19	0	5	12	20	0	11	53	10	0	300
10:45	9	19	12	0	73	59	26	0	12	27	20	0	15	32	5	0	309
Total	32	55	30	0	204	195	61	0	26	51	64	0	49	132	27	0	926
11:00	9	27	10	0	71	72	23	0	12	13	17	0	18	52	6	0	330
11:15	10	17	19	0	71	66	16	0	13	16	21	0	20	42	11	0	322
11:30	17	21	8	0	70	56	12	0	17	15	20	0	25	40	18	0	319
11:45	17	18	10	0	54	57	16	0	9	16	31	0	16	54	10	0	308
Total	53	83	47	0	266	251	67	0	51	60	89	0	79	188	45	0	1279
12:00	11	27	8	0	63	43	16	0	8	18	23	0	16	46	6	0	285
12:15	16	12	7	0	46	60	12	0	16	19	23	0	14	44	6	0	275
12:30	16	14	14	0	67	40	20	0	7	13	16	0	13	55	9	0	284
12:45	16	19	9	0	65	49	20	0	8	20	19	0	12	55	12	0	304
Total	59	72	38	0	241	192	68	0	39	70	81	0	55	200	33	0	1148
13:00	25	16	3	0	61	52	13	0	14	9	20	0	18	71	16	0	318
Grand Total	169	226	118	0	772	690	209	0	130	190	254	0	201	591	121	0	3671
Apprch %	32.9	44.1	23	0	46.2	41.3	12.5	0	22.6	33.1	44.3	0	22	64.7	13.3	0	
Total %	4.6	6.2	3.2	0	21	18.8	5.7	0	3.5	5.2	6.9	0	5.5	16.1	3.3	0	
Cars & Trucks	164	217	118	0	759	680	205	0	128	183	243	0	201	582	120	0	3600
% Cars & Trucks	97	96	100	0	98.3	98.6	98.1	0	98.5	96.3	95.7	0	100	98.5	99.2	0	98.1
Trucks	5	9	0	0	13	10	4	0	2	7	11	0	0	9	1	0	71
% Trucks	3	4	0	0	1.7	1.4	1.9	0	1.5	3.7	4.3	0	0	1.5	0.8	0	1.9

Edwards and Kelcey
343 Congress Street
Boston MA, 02210

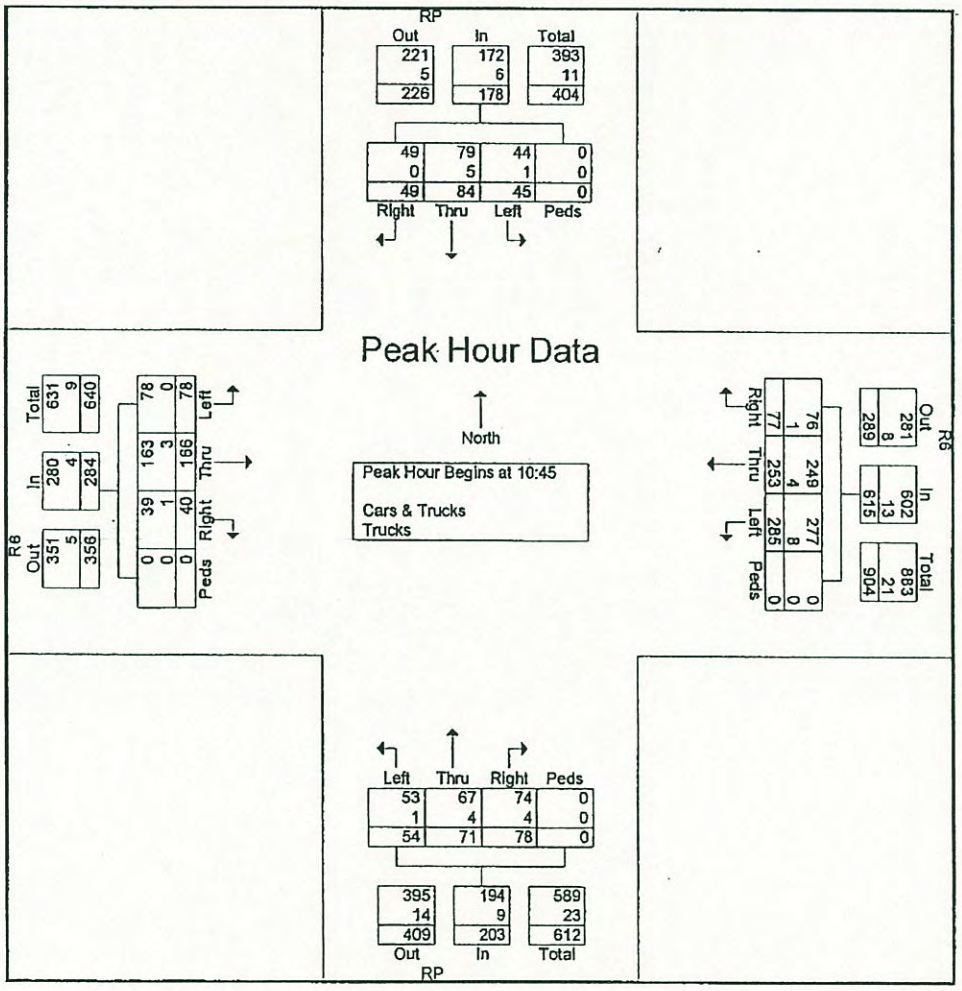
File Name : rte6_conwell_sat
Site Code : 00000000
Start Date : 9/8/2007
Page No : 2



Edwards and Kelcey
343 Congress Street
Boston MA, 02210

File Name : rte6_conwell_sat
Site Code : 00000000
Start Date : 9/8/2007
Page No : 3

	RP Southbound					R6 Westbound					RP Northbound					R6 Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:15 to 13:00 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 10:45																					
10:45	9	19	12	0	40	**73**	59	**26**	0	158	12	**27**	20	0	**59**	15	32	5	0	52	309
11:00	9	**27**	10	0	**46**	71	**72**	23	0	**166**	12	13	17	0	42	18	**52**	6	0	76	**330**
11:15	10	17	19	0	46	71	66	16	0	153	13	16	**21**	0	50	20	42	11	0	73	322
11:30	**17**	21	8	0	46	70	56	12	0	138	**17**	15	20	0	52	**25**	40	**18**	0	**83**	319
Total Volume	45	84	49	0	178	285	253	77	0	615	54	71	78	0	203	78	166	40	0	284	1280
% App. Total	25.3	47.2	27.5	0		46.3	41.1	12.5	0		26.6	35	38.4	0		27.5	58.5	14.1	0		
PHF	.662	.778	.645	.000	.967	.976	.878	.740	.000	.926	.794	.657	.929	.000	.860	.780	.798	.556	.000	.855	.970
Cars & Trucks	44	79	49	0	172	277	249	76	0	602	53	67	74	0	194	78	163	39	0	280	1248
% Cars & Trucks	97.8	94.0	100	0	96.6	97.2	98.4	98.7	0	97.9	98.1	94.4	94.9	0	95.6	100	98.2	97.5	0	98.6	97.5
Trucks	1	5	0	0	6	8	4	1	0	13	1	4	4	0	9	0	3	1	0	4	32
% Trucks	2.2	6.0	0	0	3.4	2.8	1.6	1.3	0	2.1	1.9	5.6	5.1	0	4.4	0	1.8	2.5	0	1.4	2.5



Appendix 4 - Crash Data Calculations

MassHighway

CRASH RATE WORKSHEET

CITY/TOWN : Provincetown COUNT DATE : 2007

DISTRICT : 5 UNSIGNALIZED : [ ] SIGNALIZED : [X]

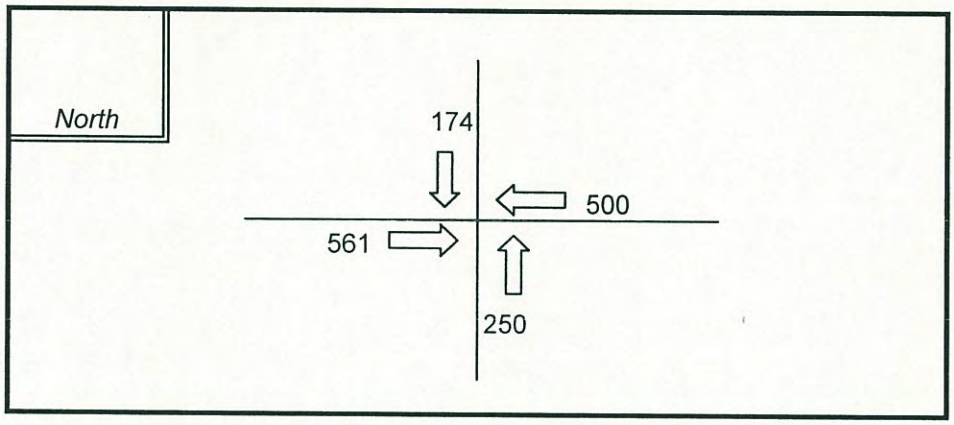
~ INTERSECTION DATA ~

MAJOR STREET : Route 6

MINOR STREET(S) : Race Point Road

Conwell Street

INTERSECTION DIAGRAM (Label Approaches)



Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (AM/**PM**) :	250	174	561	500		1,485

" K " FACTOR : 0.090 APPROACH ADT : 16,500 **ADT** = TOTAL VOL/"K" FACT.

TOTAL # OF CRASHES : 6 # OF YEARS : 3 AVERAGE # OF CRASHES (**A**) : 2.00

CRASH RATE CALCULATION : 0.33 RATE = $\frac{(A * 1{,}000{,}000)}{(ADT * 365)}$

Comments :

Appendix 5 - March 26, 2008 Memo

Technical Memorandum

Date: March 26, 2008

To: Project File

Attn: Michael Garrity

From: Andrew J. Arseneault

Subject: Trip Generation Methodology
Project Study Area
Provincetown Municipal Airport (CIP)

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1. BACKGROUND

A traffic study (*Traffic Operation Report and Parking Analysis*, November 2006) was prepared to support preparation of the Draft Environmental Impact Report (DEIR) for the Provincetown Airport Capital Improvement Project (CIP). The study was prepared in response to the Certificate on the Environmental Notification Form (ENF), comment letters, and the MEPA traffic guidelines. The MEPA Certificates for the ENF and the DEIR (EOEEA No. 13789) scoped the inclusion of two intersections: Route 6 at Conwell Street and Race Point Road, and Race Point Road at Airport Drive. Comments were received on the DEIR from MEPA, the CCC and other agencies. Some of the comments questioned the trip generation methodology used to generate the anticipated motor vehicles accessing the site and subsequently the impact of the generated trips on the study area. This memorandum seeks to offer a recommendation on both of these outstanding issues. Additionally, the traffic operations and parking analysis study will be revised for the Final EIR in response to the MEPA Certificate and other comments on the DEIR.

The CIP project will also be reviewed by the Cape Cod Commission (CCC) as a Development of Regional Impact (DRI). As part of the review process, a pre-application meeting for the project was held with several CCC staff on August 19, 2007. Several issues related to the traffic impacts for the CIP were discussed at that meeting, in addition to other environmental issues. After that meeting a follow-up meeting specific to traffic was held with Robert Munford and B. Clay Schofield, CCC staff traffic specialists, on August 27, 2007 to further discuss the two issues of trip generation and study area. It is recommended that this memo be forwarded to the CCC staff for their review and comment prior to submission of the FEIR and DRI application.

The traffic study prepared for the DEIR included trip generation based on the standard methodology published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Handbook*, 7th Edition. In addition to investigating the ITE methodology, the CCC transportation staff suggested using an alternative trip generation methodology, similar to the one used for the Barnstable Municipal Airport DRI. These two methods are compared in this memo and a recommendation is made.

2. TRIP GENERATION

ITE Trip Generation

The standard method of generating projected traffic volumes for transportation projects is from the Institute of Traffic Engineers (ITE) Trip Generation Handbook 7th Edition. The ITE Trip Generation Handbook is based on several field investigations of various land uses (i.e. Commercial Airport, General Aviation Airport, waterport/marine terminal, truck terminal, park-and-ride lot with bus service, light rail transit station with parking). It provides a statistical breakdown of the motor vehicle trips generated by a project based on various independent factors (i.e. employees, commercial flights, motor vehicle trips versus based aircraft, motor vehicle trips versus scheduled flights). The land use deemed most appropriate for the CIP project at the Airport is Land Use Code (LUC) 22, General Aviation Airport. Although the project meets many of the criteria for a commercial airport designation it functions more appropriately as a GA airport in terms of traffic. The trip generation calculation worksheets, as well as the applicable Demand Forecasts Tables of the Provincetown Municipal Airport 2005 Master Plan, are included in the Appendix for this memorandum.

The standard ITE method estimates a relatively small increase in motor vehicle trips, as shown in Table 1a and 1b. Both the independent variables of trips versus based aircraft, and trips versus scheduled flights have been analyzed and are shown on Tables 1a and 1b respectively. Trip generation calculations were performed for all periods available from the ITE method. Saturday periods are not included with the ITE method.

Table 1a Trip Generation Versus Based Aircraft Using ITE Method

	(A) Trip Generation Rate[1]	(B) Existing Based Aircraft[2]	(C=BxA) Calculated Existing Airport Generated Trips[3]	(D) Projected Based Aircraft[2]	(E=DxA) Projected Airport Generated Trips[3]	**(F=E–C) Trip Increase**	**(G=F/C) Percentage of Trip Generation Increase**
Weekday Morning Peak Hour	0.24	6	1	7	2	**1**	***100%***
Entering	*(83%)*		*1*		*2*	***1***	***100%***
Exiting	*(17%)*		*0*		*0*	***0***	***0%***
Weekday Evening Peak Hour	0.37	6	2	7	3	**1**	***50%***
Entering	*(45%)*		*1*		*1*	***0***	***0%***
Exiting	*(55%)*		*1*		*2*	***1***	***100%***

[1]Based on ITE LUC 22, General Aviation Airport, vs. Based Aircraft.
[2]Based on the Demand Forecasts Section of the Provincetown Municipal Airport 2005 Master Plan.
[3]Based on ITE Average Trip Generation Rate.

Table 1b Trip Generation Versus Scheduled Flights Using ITE Method							
	(A) Trip Generation Rate[1]	(B) Existing Scheduled Flights[2]	(C=BxA) Calculated Existing Airport Generated Trips[3]	(D) Projected Scheduled Flights[2]	(E=DxA) Projected Airport Generated Trips[3]	**(F=E-C) Trip Increase**	**(G=F/C) Percentage of Trip Generation Increase**
Weekday Morning Peak Hour	0.24	40	10	44	11	**1**	***10.0%***
Entering	*(83%)[4]*		*8*		*9*	***1***	***12.5%***
Exiting	*(17%)[4]*		*2*		*2*	***0***	***0.0%***
Weekday Evening Peak Hour	0.30	40	12	44	13	**1**	***8.3%***
Entering	*(45%)[4]*		*6*		*6*	***0***	***0.0%***
Exiting	*(55%)[4]*		*6*		*7*	***1***	***16.7%***
Saturday Midday Peak Hour	0.20	40	8	44	9	**1**	***12.5%***
Entering	*(50%)[4]*		*4*		*5*	***1***	***25.0%***
Exiting	*(50%)[4]*		*4*		*4*	***0***	***0.0%***

[1]Based on ITE LUC 22, General Aviation Airport, vs. Average Flights per Day.
[2]Based on the Demand Forecasts Section of the 2005 Airport Master Plan.
[3]Based on ITE Average Trip Generation Rate.
[4]No value provided, split assumed based on other Independent Variables for LUC 22.

Empirical Trip Generation

An alternative methodology was suggested by the CCC at the August 27, 2007 meeting which determines a trip generation rate based on the existing number of passengers (as reported by Cape Air and included in the 2005 Master Plan). This trip rate would then be applied to the 2024 forecasted number of passengers (as stated in the 2005 Master Plan). This method of determining trip generation is based on the method that the CCC accepted in the Barnstable Municipal Airport DRI.

Presently, 141 passengers use the Provincetown Airport on an average peak weekday. Traffic counts were taken at the site driveway and indicate that 13 vehicles access the site (10 enter, 3 exit) during the weekday morning peak period, 52 vehicles access the airport during the weekday midday peak period (24 enter, 28 exit), 39 access the airport during the weekday evening peak period (21 enter, 18 exit) and 41 access the airport during the Saturday midday peak period (21 enter, 20 exit). Projecting these volumes based on the anticipated future passenger count results in motor vehicle trip increases ranging from 2 to 8 vehicles during the peak periods. The analysis results are summarized in Table 2.

Table 2 Trip Generation Using Empirical Method							
	(A) Existing Number of Daily Passengers[1]	(B) Existing Airport Generated Trips[2]	(C=A/B) Trip Generation Rate	(D) Projected Number of Daily Passengers[1]	(E=DxC) Projected Airport Generated Trips	**(F=E-B) Trip Increase**	**(G=F/B) Percentage of Trip Generation Increase**
Weekday Morning Peak Hour	141	13	0.09	162	15	**2**	***15.4%***
Entering		*10*			*12*	***2***	***20.0%***
Exiting		*3*			*3*	***0***	***0.0%***
Weekday Midday Peak Hour	141	52	0.37	162	60	**8**	***15.4%***
Entering		*24*			*28*	***4***	***16.7%***
Exiting		*28*			*32*	***4***	***14.3%***
Weekday Evening Peak Hour	141	39	0.28	162	45	**6**	***15.4%***
Entering		*21*			*24*	***3***	***14.3%***
Exiting		*18*			*21*	***3***	***16.7%***
Saturday Midday Peak Hour	141	41	0.29	162	47	**6**	***14.6%***
Entering		*21*			*24*	***3***	***14.3%***
Exiting		*20*			*23*	***3***	***15.0%***

[1]Based on the Demand Forecasts Section of the 2005 Airport Master Plan.
[2]As observed in August 2007.

Trip Generation Summary and Recommendations

Of the two different methods of determining the projects impact on trip generation, the Empirical Trip Generation procedure results in more conservative (i.e. higher) traffic volume increases during the peak periods compared to the ITE method. Both methods estimate trip increases within the same order of magnitude and have increases during the same periods. Additionally, the percentage of increased trips, when compared to existing trips (using the scheduled flights independent variable), is comparable under both methods.

Based on the trip generation methodologies discussed above and standard engineering practices, it is recommended that the conservative Empirical Trip Generation method (as calculated in Table 2) be used to develop the anticipated trip increases for the Provincetown Municipal Airport.

3. STUDY AREA

Based on CCC guidelines, the study area associated with a development should include every intersection which has an increase greater than 1% in vehicular traffic. However, it is unclear

whether this parameter would be applicable for this project since it is projected that there will be relatively minor traffic volume increase. A study of the surrounding roadways was investigated. When investigating the existing traffic flow patterns within the area, it was determined that approximately 40% of site related traffic will travel to and from the east on Route 6, 40% to/from the south on Conwell Street and 20% to/from the east on Route 6.

Applying these percentages to the most conservative trip generation estimate, it was shown that approximately 1 to 4 vehicles would be added to Route 6 east of the Conwell Street/Race Point Road intersection during the peak periods (1 during the weekday morning, 4 during the weekday midday and 2 during the weekday evening). The nearest intersection to the east is the intersection of Route 6 at Howland Street, a tee-intersection located approximately 0.5 miles away. Based on traffic volumes collected by the CCC, the traffic volume increases at this intersection are expected to be less than 1%. The vehicle increases south of the study area also ranged from 1 to 4 vehicles (1 during the weekday morning, 4 during the weekday midday and 2 during the weekday evening). The closest intersection south of the study area is Conwell Street at Hensche Lane, another tee-intersection approximately 550 feet to the south. Again, based on the latest CCC Traffic Counting Report, these increases were anticipated to be less than 1%. Two additional vehicles were projected to exit the study area east during the weekday evening peak period, with no vehicles projected during the weekday morning and midday periods. The closest intersection east of the study area is Sandy Hill Lane, a tee-intersection 625 feet east of Conwell Street/Race Point Road. This intersection is also projected to result in a less than 1% increase to traffic volumes.

Study Area Recommendation

Based on the relatively small traffic increases projected at the intersections, it is recommended that the current study area is retained. This study area was scoped by the MEPA Certificate on the ENF.

ATTACHMENTS

1. Trip Generation Work Sheets, August 2007
2. Demand Forecast Tables, 2005 Master Plan

1. Trip Generation Work Sheets, August 2007

General Aviation Airport

Current Peak Day Based Aircraft	6
Anticipated Peak Day Based Aircraft	7

Weekday Morning Peak Hour

Current Peak Day Based Aircraft

$T = 0.24 * X$
$T = 0.24 * 40$
$T = 1$
$T \approx 1$

Anticipated Peak Day Based Aircraft

$T = 0.24 * X$
$T = 0.24 * 44$
$T = 1.68$
$T \approx 2$

Projected New

$\Delta = 2-1$
$\Delta = 1$

Weekday Evening Peak Hour

Current Peak Day Based Aircraft

$T = 0.37 * X$
$T = 0.37 * 40$
$T = 2$
$T \approx 2$

Anticipated Peak Day Based Aircraft

$T = 0.37 * X$
$T = 0.37 * 44$
$T = 3$
$T \approx 3$

Projected New

$\Delta = 3-2$
$\Delta = 1$

General Aviation Airport

Current Peak Day Scheduled Flights	40
Anticipated Peak Day Scheduled Flights	44

Average Weekday Daily

Current Peak Day Scheduled Flights

T = 1.97 * X
T = 1.97 * 40
T = 78.80
T ≈ 79

Anticipated Peak Day Scheduled Flights

T = 1.97 * X
T = 1.97 * 44
T = 86.68
T ≈ 87

Projected New

Δ = 87-79
Δ = *8*

Weekday Morning Peak Hour

Current Peak Day Scheduled Flights

T = 0.24 * X
T = 0.24 * 40
T = 9.60
T ≈ 10

Anticipated Peak Day Scheduled Flights

T = 0.24 * X
T = 0.24 * 44
T = 10.56
T ≈ 11

Projected New

Δ = 11-10
Δ = *1*

Weekday Evening Peak Hour

Current Peak Day Scheduled Flights

T = 0.30 * X
T = 0.30 * 40
T = 12.00
T ≈ 12

Anticipated Peak Day Scheduled Flights

T = 0.30 * X
T = 0.30 * 44
T = 13.20
T ≈ 13

Projected New

Δ = 13-12
Δ = *1*

Appendix 2. Forecast Demand Tables

Table 4-4 Forecast Scheduled Aircraft Operations (2004-2024)

Year	Annual Operations	Peak Month	Peak Day	Peak Hour
2004	4,140	1,035	40	10
2009	4,245	1,062	41	11
2014	4,352	1,088	42	11
2024	4,574	1,144	44	12

Source: Final-2005 Master Plan, Provincetown Municipal Airport

Table 4-5 Forecast of PVC Scheduled Passenger Enplanements

Year	Enplaned Passengers	Peak Month	Average Day	Peak Hour
2004	10,792	2,698	141	46
2009	11,175	2,794	146	47
2014	11,572	2,893	151	49
2024	12,408	3,102	162	52

Source: Final-2005 Master Plan, Provincetown Municipal Airport

Appendix 4.2 Supplemental Parking Memo, Jacobs Engineering, September, 2008

343 Congress Street
Boston, MA 02210 U.S.A.
1.617.242.9222 Fax 1.617.242.9824

Memorandum

Date **September 2008**

To File E2X32200_Traffic

From Michael Garrity

Subject **Supplemental Parking Memo,** July 2008
Provincetown Municipal Airport

Background

A supplemental parking study was conducted at the Airport to provide an additional data point. This study supplements the November 2006 study conducted at the Airport. The previous study was conducted during August 2006 to reflect the peak summer season. The supplemental study reflects data collected during a peak weekend in 2008.

Parking Observations Data Collection

The parking study was conducted on two separate weekdays, Friday, July 4th, 2008, and Monday, July 7th, 2008. Observations were taken during three separate time periods, from 8:00 AM to 9:30 AM, 1:00 PM to 2:30 PM, and 6:00 PM to 7:30 PM. Parking observations were recorded during three half-hour intervals within each time period. Data collection included license plate recordings and occupancy rate.

Parking Observations Data Review

The existing Airport public parking lot has a total of 62 spaces, including 3 spaces designated for handicapped plate vehicles and 5 for the Enterprise Rental Car Company. Employee parking is in a separate area and is not included in this analysis. The parking occupancy data was analyzed and sub-divided into three categories: regular passenger parking, rental car spaces, and handicapped spaces. The following table shows the average parking space occupancy rate for the existing parking lot, taken during two weekdays in July 2008.

Parking Lot Weekday Occupancy Rate Table

	AM Period	Midday Period	PM Period
Passenger Parking	104.6 %	105.7 %	102.4 %
Rental Cars	100.0 %	100.0 %	100.0 %
Handicapped	100.0 %	100.0 %	100.0 %
Overall	105.1 %	106.3 %	103.7 %

As shown in the table above, the parking lot was fully occupied during each time period observed. The average usage was 100 percent or above. Occupancy above 100 percent reflects parking along Airport Road, outside of the parking area. From three to nine autos were parking in non-

spaces or along the road during these periods. Automobiles were lined along the Airport Road waiting for flights to arrive. The rental car spaces were always occupied because the car rental company transfers cars as needed from the employee lot.

This occupancy rate is higher than the August 2006 parking demand study, when approximately 85 percent of the parking lot was occupied during the study periods.

Field Interviews

During this study, an interview with the rental agency staff was conducted. The rental agency staff noted that they shift automobiles from the employee lot to the 5 spaces in the parking lot dedicated as rental spaces in response to demand.

An interview with a cab driver was also conducted. The cab companies encourage ride sharing during peak periods, with a standard six dollar rate per person to go into town. This decreases the number of cabs at the Airport

Cape Air provides service during peak periods by adding sections (additional planes) to each scheduled flight period as necessary. In other words, as the demand increases above the number of seats in the aircraft, Cape Air increases the number of aircraft to meet this demand. Therefore, each scheduled flight period could provide service to between nine and 54 passengers (one to six airplanes).

APPENDIX 5

NPS Agreements and other Documents

The following items are included in this Appendix:

1. **NPS Special Use Permit NES CACO 2170-02047, May 3, 2002**
2. **Runway Extension Agreement (Attachment 1)**
3. **FAA ROD, November 16, 2000**
4. **NPS ROD, November 28, 2001**
5. **NPS letter to FAA, February 21, 2001**

Appendix 5.1 NPS Special Use Permit NES CACO 2170-02047, May 3, 2002

Form 10-114
Rev. DEC. 99

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use Airport Operations

Date Permit Reviewed 20 02 5/1
Reviewed 20 ____
Reviewed 20 ____
Expires 20 22 6/1

Long Term X

Short Term ____

Permit # NES CACO 2170 02047
Region Park Type No.

Cape Cod National Seashore
Name of Area

Town of Provincetown
Provincetown Airport Commission of 260 Commercial St. Provincetown, MA 02657 508-487-0241
Name or Permittee Address Phone

Is hereby authorized during the period from (Time 8:00AM day 01 Month 06 20 02), through (Time 11:59PM day 31 Month 12 20 22), to use the following described land or facilities in the above named area: The Commission will use the Portion of Tract # 01-8633 for the purpose(s) of Airport and Airport Guidance Equipment Operations. NPS authorizes the Commission to conduct airport operations within Area A and airport guidance equipment operations in Area B as depicted on the map entitled 2002 Agreement Area by Edwards and Kelsey dated March 2001 which is attached hereto and incorporated herein by reference.

For the purpose(s) of: see attached

Authorizing legislation or other authority (RE - DO-53): 16 USC 7 a-e

NEPA Compliance: CATEGORICALLY EXCLUDED ___ EA/FONSI ___ EIS X OTHER APPROVED PLANS ___

PERFORMANCE BOND: Required ____ Not Required X Amount $_____

LIABILITY INSURANCE: Required ____ Not Required _____ Amount $ see condtions

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of $ waived

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE Richard Silva 5/3/02
Signature RICHARD SILVA CHAIRMAN AIRPORT COMMISSION Date

Authorizing Official Matthew Huston Superintendent 5/3/02
Signature Date

Additional Authorizing Official _____ Tom Manager 5/3/02
(If Required) Signature KEITH BERGMAN TOWN MANAGER Title Date

CONDITIONS OF THIS PERMIT

1 The permittee shall exercise this privilege subject to the supervision of the Superintendent, and shall comply with all applicable laws and regulations of the area.

2 Damages - The permittee shall pay the United States for any damage resulting from this use which would not reasonably be inherent in the use which the permittee is authorized to make of the land described in this permit.

3 Benefit - Neither Members of, nor Delegates to Congress, or Resident Commissioners shall be admitted to any share or part of this permit or derive, either directly or indirectly, any pecuniary benefits to arise therefrom: Provided, however, that nothing herein contained shall be construed to extend to any incorporated company, if the permit be for the benefit of such corporation.

4 Assignment - This permit may not be transferred or assigned without the consent of the Superintendent, in writing.

5 Revocation - This permit may be terminated upon breach of any of the conditions herein or at the discretion of the Superintendent.

6 The permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(a)(4)].

7 Permittee will comply with applicable public health and sanitation standards and codes.

8 At all times during the Term and at its sole cost and expense, Commission shall obtain and keep in force General Liability Insurance in the amount of one million dollars [($1,000,000.00)] and an Umbrella policy in the amount of ~~five~~ three million dollars [($~~5~~3,000,000.00)]

9 In addition to the insurance requirements set forth elsewhere in this permit, Commission shall provide the NPS with evidence of the following insurance if, during the construction of Commission improvements or alterations, the Commission or Commission's agents transport Hazardous Materials off-site from the Premises for disposal: Pollution Legal Liability Insurance maintained by the off-site disposal operator for losses arising from the insured facility's accepting Hazardous Materials.

10 The Commission shall not do anything, or permit anything to be done, in or about the Premises or the Seashore that would: (i) invalidate or be in conflict with the provisions of any insurance policies covering the Premises or any property located therein, or (ii) result in a refusal by insurance companies of good standing to insure the Premises or other property in amounts required under this permit.

11 All liability policies shall specify that the insurance company shall have no right of subrogation against the United States of America and/or shall provide that the United States of America is named an additional insured.

12 This permit does not authorize an extension of the runway.

Special Use Permit NES CACO 6000-0032C, authorizing Provincetown's use of federal lands for airport operations and NES CACO 6000-032D authorizing Provincetown's use of federal lands for airport operations and guidance equipment is combined and renumbered to Special Use Permit NES-CACO-2170-02047 and is also amended to extend the expiration date to December 31, 2022. All other conditions of the Permit Number NES CACO 6000-0032C (and previous permit NAR CACO 6000-0006 and CX1730-9-0007) and CACO 6000-0032D (and previous permit NAR CACO 6000-0014 and CX 1730-9-0008) remain in effect.

The extension is contingent upon the Town of Provincetown receiving in fiscal year 2002 funds from the Federal Aviation Administration's Airport Improvement Program. If Provincetown does not obtain these federal funds in fiscal year 2002, this permit shall not be extended and will expire on December 31, 2019.

Please note: These extensions are granted as an interim measure pending completion and signature of an Agreement, currently in draft, between the Town and the National Park Service, which will replace this permit. The Agreement is proposed for a term of 30 years once it is finalized. This permit extension will expire automatically upon completion of the Agreement and is granted upon condition of diligent and timely work by the Town/Airport Commission to reach accord with NPS regarding the contents of the Agreement.

Special Use Permit NES CACO 2170-02047 combines:
NES CACO 6000-032C (1998) and NES CACO 6000-032D (1998)

Special Use Permit: NES CACO 2170-02047 was formerly numbered:
NES CACO 6000-032C (1999)
NES CACO 6000-032G (1998)
NES CACO 6000-032E (1997):
NES CACO 6000-032C (1996);
NAR CACO 6000-0032 (1995);
NAR CACO 6000-0006 (1993);
CX1730-9-0007 (1990)

Special Use Permit: NES CACO 2170-02047 was formerly numbered:
NES CACO 6000-032D(1999)
NES CACO 6000-032H (1998)
NES CACO 6000-032F (1997):
NES CACO 6000-032D (1996);
NAR CACO 6000-032B (1995);

ACORD CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY) 05/06/02

PRODUCER

BENSON YOUNG & DOWNS INS AGNCY
32 HOWLAND STREET
PO BOX 559
PROVINCETOWN MA 02657

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED

TOWN OF PROVINCETOWN
PROVINCETOWN AIRPORT COMM.
260 COMMERCIAL ST
PROVINCETOWN MA 02657

COMPANIES AFFORDING COVERAGE

COMPANY A: LEGION INSURANCE COMPANY

COMPANY B: COREGIS

COMPANY C:

COMPANY D:

COVERAGES

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO TR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY	GL11565412	10/01/01	10/01/02	GENERAL AGGREGATE	$3,000,000
X	COMMERCIAL GENERAL LIABILITY				PRODUCTS - COMP/OP AGG	$1,000,000
	CLAIMS MADE [X] OCCUR				PERSONAL & ADV INJURY	$1,000,000
	OWNER'S & CONTRACTOR'S PROT				EACH OCCURRENCE	$1,000,000
					FIRE DAMAGE (Any one fire)	$ 100,000
					MED EXP (Any one person)	$ 10,000
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	$
	ANY AUTO					
	ALL OWNED AUTOS				BODILY INJURY (Per person)	$
	SCHEDULED AUTOS					
	HIRED AUTOS				BODILY INJURY (Per accident)	$
	NON-OWNED AUTOS					
					PROPERTY DAMAGE	$
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	ANY AUTO				OTHER THAN AUTO ONLY:	
					EACH ACCIDENT	$
					AGGREGATE	$
	EXCESS LIABILITY	503200557	10/01/01	10/01/02	EACH OCCURRENCE	$3,000,000
X	UMBRELLA FORM				AGGREGATE	$3,000,000
	OTHER THAN UMBRELLA FORM					$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				WC STATUTORY LIMITS / OTHER	
	THE PROPRIETOR PARTNERS/EXECUTIVE OFFICERS ARE: INCL / EXCL				EL EACH ACCIDENT	$
					EL DISEASE-POLICY LIMIT	$
					EL DISEASE-EA EMPLOYEE	$
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

PROVINCETOWN AIRPORT - RACE POINT ROAD, PROVINCETOWN MA 02657;
CERTIFICATE HOLDER IS INCLUDED AS AN ADDITIONAL INSURED;

CERTIFICATE HOLDER

UNITED STATES OF AMERICA
NATIONAL PARK SERVICE
CAPE COD NATIONAL SEASHORE
WELLFLEET MA 02667

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 10 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

Carl R. Goveia CG A

Appendix 5.2 Runway Extension Agreement (Attachment 1)

Attachment 1

RUNWAY EXTENSION AGREEMENT

The National Park Service (NPS) and the Federal Aviation Administration (FAA) recognize that the need for a future runway extension at the Provincetown Municipal Airport is dependent on future conditions that either might not occur or might be precluded by factors presently unforeseen. This affects the ability to conclude a Section 4(f) determination that there is "no prudent or feasible alternative" to the proposed runway extension, as specified by the DOT Act of 1966, as well as NPS policies and authorities which must be addressed prior to issuing a special use permit.

For the reasons specified in the Final Environmental Impact Statement (FEIS) including growth in passenger levels and the need to efficiently and economically serve that growth by replacing existing aircraft with faster, larger aircraft, the Federal Aviation Administration (FAA) believes that the need for a 700-foot-long runway extension is reasonably foreseeable within the next 3-5 years. The NPS agrees that the FAA may identify this need in the future, and if it does, the documentation of the need and the alternatives discussed in this EIS will require reevaluating, and updating if necessary, before they will support the NPS permit actions. The steps to accomplish this are outlined below.

Because of changing aircraft needs to serve Provincetown the extension is reasonably foreseeable and because the FAA is assessing the extension's environmental impact in this EIS, the FAA intends to approve a 700-foot runway extension on the official Airport Layout Plan, for planning purposes only and not as a commitment for federal funding, to be included in the FEIS. Both the NPS and FAA agree that the discussion in this EIS of the alternative configurations for the physical location of such a runway extension is adequate, and that the

evaluation of certain conditions and equipment alternatives available to the carrier cannot be completed presently for a decision which is not being made now.

When the FAA becomes aware of airline proposals that would require a runway extension, it will notify the NPS. The FAA will initiate a subsequent reevaluation of several of the factors that affect the Federal decision making process for selecting the runway extension alternatives and the adequacy of the current Record of Decision (ROD), in the form of an Environmental Assessment (EA).

These would include purpose and need of the project, and alternatives that could affect the need for a runway extension. This reevaluation would include alternatives related to runway length requirements for the actual aircraft proposed by the carrier, alternative aircraft (requiring less runway length), and then-existing airport standards or navigational aid technology that could affect runway length requirements. Assuming that FAA's review concludes that the market conditions and the subsequent EA's discussion of alternatives available at that future time show no prudent or feasible alternative, and the initial environmental impact analysis remains current and accurate, a new ROD including a FONSI and a Section 4(f) determination would be issued to document the runway extension decision. The FAA will coordinate its review and ROD with the NPS. The goal is to produce a document that will satisfy FAA and NPS needs.

If the review process concludes that substantial changes have occurred since the original EIS publication affecting the alternatives analysis, or additional alternatives exist, the FAA will develop a Supplemental Environmental Impact Statement (SEIS). It is intended that the SEIS would be a less demanding and lengthy document than the original, concentrating specifically and only on the runway extension and any of the identified alternatives. For example, it may involve only one alternative in addition to the runway extension, a "no action" alternative. As another example, if the review found three new potential alternatives that could affect runway extension design, the SEIS would analyze

those along with the original runway extension. The reevaluation in the SEIS will also include a re-assessment of purpose and need, incorporating a review of passenger forecasts to determine their continued utility. The reevaluation will include alternative proposals such as high-speed ferry service or major highway improvements. The FAA will coordinate any of these actions with the NPS.

If the FAA concludes through a Section 4(f) Statement that there is no feasible and prudent alternative to a runway extension, it will then issue a new Record of Decision for that project consulting with the NPS prior to issuing both.

Appendix 5.3 FAA ROD, November 16, 2000

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

RECORD OF DECISION
AIRPORT LAYOUT PLAN APPROVAL
FEDERAL FUNDING OF AIRPORT DEVELOPMENT

PROVINCETOWN MUNICIPAL AIRPORT
PROVINCETOWN, MASSACHUSETTS

FAA NEW ENGLAND REGION

November 16, 2000

RECORD OF DECISION
AIRPORT LAYOUT PLAN APPROVAL
APPROVAL OF FEDERAL FUNDING OF AIRPORT DEVELOPMENT

PROVINCETOWN MUNICIPAL AIRPORT
PROVINCETOWN, MASSACHUSETTS

I. PURPOSE

This Record of Decision (ROD) documents environmental, aviation safety and airport efficiency in the Federal Aviation Administration's (FAA) decision to approve an Airport Layout Plan and to fund Runway Safety Area (RSA), apron construction and replacement of an approach light system. This has been coordinated with the National Park Service, a cooperating agency for the Environmental Impact Statement. These decisions constitute Federal actions requiring compliance with the National Environmental Policy Act, implementing regulations and directives of the Council on Environmental Quality and the FAA.

This ROD follows issuance of a Final Environmental Impact Statement and Department of Transportation Act Section 4(f) Statement (FEIS) and addresses extension of RSAs at both ends of the runway and aircraft parking apron expansion. An existing Approach Light System (ALS) will be replaced as part of the runway shift needed to accommodate the RSAs. A runway extension was also analyzed in the EIS. This ROD does not approve the funding of the runway extension. Any runway extension will be further evaluated in accordance with an agreement between the National Park Service and the FAA (attachment 1). The improvements are depicted on Figures 53, 19A and 12 of the FEIS (attached). Figure 3 (attached) shows the access road depicted in Figure 12 but as modified in a permit process after the FEIS was completed.

The Federal Aviation Act charges the FAA with providing for a safe and efficient national airspace system. FAA accomplishes this in part by funding airport development that contributes to this system. The construction of RSAs would enhance aviation safety, as does the replacement of the ALS. The expansion of aircraft parking apron responds to the current and forecasted demand, particularly during the peak season.

II. Background

The Federal Aviation Act of 1958, as amended and recodified (49 U.S.C. § 40101 et. seq.) charges the FAA with providing for a safe and efficient national airspace system. FAA accomplishes this in part by funding airport development that enhances aviation safety. RSAs and ALS are examples of airport development that help to accomplish this mission.

Provincetown Municipal Airport (PVC) is located at the extreme northeastern tip of Cape Cod. It provides scheduled commercial service that links municipalities of the Outer Cape (Provincetown, Truro, Wellfleet and Eastham) to the rest of the national airspace system. The airport is located within the Cape Cod National Seashore, a management unit of the National Park Service. The Cape Cod National Seashore was authorized in 1961 and formally established in 1966. The airport was constructed in 1947. The deed of conveyance from the Commonwealth of Massachusetts for the land to become the Cape Cod National Seashore recognizes the continued existence of the airport and it allows for airport improvements and expansion. The deed states in condition # 2, "Such additional area as shall be agreed upon between the Secretary of the Interior or his designee and the Town of Provincetown, acting through its airport commission shall be made available by lease or otherwise to said town for public airport and access purposes".

PVC has a single runway, 7-25 that was last overlaid in 1971. The runway lacks standard RSAs. These areas enhance the safety of airplanes that undershoot, overrun or veer off the runway and they provide greater accessibility for firefighting and rescue equipment during such incidents.

PVC also has a shortage of aircraft parking apron space to accommodate existing and projected demand. General Aviation aircraft currently are manually pushed into parking positions since there is not enough room for them to safely taxi into a space under their own power. Aircraft are also parking during peak periods on grass areas not designed to be an apron.

PVC is one of seven Massachusetts Primary Service airports contained in FAA's *National Plan of Integrated Airport Systems (1998-2002).* This designation recognizes the significant role that PVC plays in providing access to the national air transportation system. The airport is also a destination for a substantial number of tourists each year and provides a vital link between the Town of Provincetown and the City of Boston. Scheduled air service began at PVC in 1949 and continues to this day.

In June of 1992 the airport completed a comprehensive Airport Master Plan that recommended certain improvements including construction of RSAs, runway overlay, apron expansion, security fencing, terminal area renovation, equipment acquisition and construction of a garage to house the equipment as well as several other short term projects/purchases. The Master plan also forecasted the need for a 1,000-foot runway extension. Approximately 17 acres of wetland and 20 acres of upland were estimated to be affected by the improvements shown in the Master Plan.

Total project impacts were reduced dramatically from those in the Master Plan through the EIS process, alternatives analysis and agency and public input. One impact not included in the original Master Plan impacts relates to the airport's Approach Light System. During the EIS process, the ALS, owned by the Massachusetts Aeronautics Commission, became dilapidated and in need of replacement. The FAA will replace the Approach Light System. This was added after the DEIS was issued. Total cumulative

wetland impacts for all the projects in the EIS now total 2.3 acres. For the projects FAA intends to approve and fund at this time, the RSAs (no wetland impact), aircraft apron (0.06 ac.) and replacement ALS (0.44ac.), wetland impacts, including temporary impacts, total 0.5 ac. The wetland impacts for the runway extension described in the EIS are 1.8 ac.

In 1993, after review of the Master Plan, it was determined that a combined Environmental Impact Statement (EIS for the Federal process)/Environmental Impact Report (EIR for the Commonwealth's process) should be prepared to assess environmental impact. Scoping meetings were held on May 11, 1993 and August 23, 1993. The Notice of Intent to Prepare the EIS was published in the Federal Register on September 24th, 1993 and the opportunity for an additional scoping meeting was offered in that notice. The National Park Service was a Cooperating Agency for the EIS.

A Technical Advisory Committee, including representatives from state and federal agencies, local communities and the Airport Commission was formed to provide a forum to provide input from local, state and federal agencies. This committee met four times during the preparation of the EIS. A public agency coordination group was also formed to discuss regulatory and permitting issues for the airport improvements. This group met several times during the preparation of the EIS.

The availability of the DEIS and solicitation of comments was published in the Federal Register on April 17, 1998. Comments were also solicited in the Commonwealth of Massachusetts Environmental Monitor at various stages of the environmental process. Three public information meetings/workshops were also held for the EIS/EIR. Two public hearings were held. One by the FAA to solicit comments on the Draft EIS was held on May 18, 1998. The Cape Cod Commission, a regional agency established by the Commonwealth of Massachusetts, held another on April 14, 2000 as part of their permit process. Numerous other meetings were held both on site and offsite with various regulatory agencies and the National Park Service.

III. Aviation Safety Issues

In 1997, a White House commission on aviation safety charged FAA with the initiation of a major aviation safety program called Safer Skies. This program looks comprehensively at aviation safety and has a component that addresses airport approaches and landings. Aviation safety specialists have been conducting a detailed analysis of approach and landing accidents, with particular emphasis on interventions that might be implemented to break the chain of events that typically leads to such accidents.

There have been several incidents and accidents at PVC over the years related to the Runway Safety Areas. At least three aircraft have run off the end of the runway in the last 15 years. One of these aircraft sustained substantial damage and the other two sustained minor damages. Fortunately, there have been no injuries or fatalities to date associated with insufficient RSAs. Construction of the RSA is needed to help prevent future

incidents and accidents and to allow fire, safety and rescue equipment access should an aircraft leave the runway.

The Approach Light System is an important safety feature at PVC. The airport's proximity to the water produces a black hole effect for approaching aircraft. At least one aircraft accident has occurred when a pilot became disoriented close to the runway and crashed. This occurred in 1975 when the original Omnidirectional Approach Light System was in place. A Medium Intensity Approach Light System was installed in 1978. That system is in disrepair both due to age, a hostile environment and difficulty in maintaining the system due to poor access. A replacement system that can be properly maintained is needed.

IV. Alternatives Considered

In regard to the Runway Safety areas, shortening the runway to use some of its length as safety area instead of runway, realigning the runway, and limiting construction on only the East Side of the airport were alternatives screened out early in the process as either being too environmentally damaging or not practicable.

Other alternatives considered included:

- RSA1, 500' wide by 1,000' long (R/W 7 end) and 500' wide by 800' long (R/W 25 end)
- RSA2, 300' wide by 600' long, all new construction to the east, relocate Race Point Road
- RSA3A, 300' by 600', beyond both ends of the existing runway
- RSA3B, 400' by 800', beyond both ends of the existing runway
- RSA3C, use of gravel or foam beds, safety nets and ramps
- RSA3D, 300' by 600', use of declared distances
- RSA4, 150' by 300' with 200' runway shift to the east
- No Action

In order to accommodate all aircraft that use PVC, a runway safety area 500 feet wide, extending 1,000 feet from the end of each runway would be required. This was the RSA recommended in the Master Plan. The EIS analysis showed that the most demanding aircraft that would require such a RSA comprise less than 1% of the operations at PVC. Based on the fleet that currently operates at PVC on a regular basis and the fleet that was forecasted to operate in the future, FAA safety standards require RSAs of 150 feet in width extending 300 beyond each runway end (Advisory Circular 150/5300-13). Use of gravel or foam beds, safety nets and ramps either do not actually constitute RSAs, are not FAA approved and/or are not designed to accommodate the type of aircraft operating at PVC. Alternative RSA4, 150' by 300', meets the minimum requirements for RSAs at PVC and was selected as the preferred alternative. RSA4 requires no wetland fill and is the least environmentally damaging of the build alternatives.

Four alternatives were considered for the aircraft-parking apron.

- A1, a paved extension of the existing apron (850' by 65')
- A2, constructing new aprons south of the runway (765' by 122' paved and 650' by 122' turf)
- A3 (850' by 15' paving over turf, 510' by 70' turf north of the taxiway and 650' by 45' turf)
- A4 was the No-Action alternative

Alternative A3 was selected as the preferred alternative. It has the least amount of wetland fill (0.06 ac.) of the practicable alternatives. Alternative A2 does not require wetland fill but is not practicable as it would require continual crossing of the runway by General Aviation pilots and passengers to access the terminal area. This is a public safety concern.

Five alternatives were considered for constructing and providing access to the Approach Light System.

- Alternative 1, construction of a 10' wide travel lane, approximately 1,200 feet long, with a raised catwalk for the last 150' of the light system
- Alternative 1a. construction of a 5' wide access way for its entire length
- Alternative 2, access from a roughly parallel road constructed by the NPS by constructing a series of roads perpendicular to the light lane
- Alternative 3, use of a temporary wooden pallet road for construction only of the light system
- Alternative 4, No-Action.

Alternative 1 was selected as the preferred alternative. This alternative was modified somewhat by the Cape Cod Commission Decision after the FEIS was published to include additional walkway to the last two light stations instead of just the last station. This alternative has a minimal amount of wetland impact (0.44 ac. total, permanent wetland fill is 0.27 ac.) fill is confined to a wetland area already used for the existing light lane unlike Alternative 2 and provides adequate access for constructing and maintaining the replacement lights unlike Alternatives 1a, 3 and 4.

Eleven alternatives were considered for the Runway Extension.

- Construction on the west side of the airport only
- Realigning the runway (2-20, 16-34 and 9-27 configurations screened out)
- RE1, 700' extension to the west, 300' extension to the east
- RE2, 700' extension to the east, relocate Race Point Road
- RE3A through E, 700',650', 500', 500' and 700' to the east and 500', 650' , 800', 500' and 300' to the west respectively with variations on the Declared Distance concept
- RE4, 350' extension to the west and 150' extension to the east
- No-Action

RE4 was selected as the preferred alternative. It would require the least amount of wetland impact of all the build alternatives other than RE2 and less Section 4(f) impacts than RE2. RE2 requires the relocation of Race Point Road and would result in a significant impact to Section 4(f) lands.

The environmentally preferable alternatives would be the "No Action" alternatives. However, these would result in an airport with substandard safety areas, continued crowding of aircraft on the apron as well as aircraft parking on areas not designed as apron and the continued degradation of the approach light system until it became inoperative. The loss of the approach light system would make it more difficult for pilots to locate the runway and would result in difficulty for pilots to land under adverse conditions. This would degrade the safety, utility and efficiency of the airport. The runway extension was analyzed in the EIS process to fully disclose potential cumulative impacts and to avoid segmentation of any of the projects. As stated earlier, the funding of the runway extension is not approved at this time and will be subject to the agreement detailed in Attachment 1. The lack of a future runway extension could limit the utility and efficiency of the airport and would require the use of multiple aircraft to provide the same service that could be provided by the use of larger aircraft. RE4 could have environmental benefit, i.e. less cumulative noise impact, since there would be fewer operations by larger, potentially quieter, aircraft that could carry the same number of passengers as multiple operations of the 9 seat Cessna 402s that currently provide the scheduled air service.

V. Environmental Issues

The EIS examined 20 Areas of potential environmental impact, aircraft noise, land use, social impacts, induced socioeconomic impacts, air quality, water quality, DOT 4(f) impacts, historic/archaeological/cultural resources, biotic communities, endangered and threatened species, wetlands, floodplains, Coastal Zone Management/barriers, scenic/visual quality, energy supply, solid waste impacts, light emissions, wild and scenic rivers, farmlands, construction impacts and environmental justice.

Conclusions related to various potentially adverse environmental impact areas are as follows:

- **Wetlands**

The build alternative RSA4 would require a total of 0.5 acres of wetland fill for the ALS (0.44 ac.) and the aircraft parking apron (0.06ac.). Since publication of the EIS, the Cape Cod Commission (CCC) has required that a longer portion of the access to the lights be a walkway instead of a fill road. This results in the reduction in the area of permanent wetland fill by 0.17 ac. The CCC decision also requires a series of culverts to be placed under the road to minimize harm to wetlands. Temporary impacts during construction for the ALS remain at 0.44 ac. All of the wetland fill is confined to the managed (mowed) wetland in which the existing light system is located. These projects were the subject of a rigorous alternatives analysis. In accordance with Executive Order 11990, there are no

practicable alternatives to this work in wetland areas and the preferred alternatives/proposed actions include all practicable measures to minimize harm to wetlands.

The runway extension alternative RE4 would require 1.8 ac. of wetland to be filled. The funding of the runway extension is not approved, as it is not necessary at this time. The determination of compliance with Executive Order 11990 for the runway extension will occur in the future after reevaluation of the runway extension as specified in Attachment 1.

- **Floodplains**

All of the build alternatives are located in floodplain. In fact the entire airport is below the 100-year flood elevation. However since the floodplain is in such close proximity to the ocean and lack of any structures "downstream" except those constructed to control hydrology, floodplain impacts are negligible. The encroachment into the floodplain is not considered significant. In accordance with Executive Order 11988, there are no practicable alternatives for the aprons, RSA and ALS work to occur in the floodplain and the actions conform to applicable state and local floodplain protection standards.

The determination of compliance with Executive Order 11988 for the runway extension will occur in the future after reevaluation of the extension as specified in Attachment 1.

- **Department of Transportation 4(f) Impacts (recodified at Section 303(b))**

The Department of Transportation 4(f) impacts for the preferred RSA alternative involve the use of approximately 0.69 acres of existing parkland between the existing airport boundary and Race Point Road. The 0.69 acres of National Park land must be used since the runway 7 localizer must be relocated when the runway is shifted to construct the RSA. It should be noted that the runway was shifted to minimize wetland impacts at the runway 7-approach end. There are no prudent and feasible alternatives to relocating the localizer. The NPS concurs with this determination. The project includes all possible planning to minimize harm to the land resulting from the use. Any vegetation removal that affects scenic quality from the bike trail near the relocated localizer will be mitigated by construction of a small vegetated berm to replace the screening effect of the vegetation.

The aircraft parking apron has no 4(f) impacts.

The runway extension would not require the use of any 4(f) lands not currently permitted for airport use but would require a change in the special use permit issued by the NPS to allow use of an area specified for the operation of navigational aids (the ALS) to be used for navigational aids and RSA. At this time we can not conclude that there are no prudent and feasible alternatives to the runway extension since it is dependent on future conditions. Section 4(f) compliance will be determined in the future in accordance with Attachment 1.

VI. Mitigation

The FAA is committed to assure compensation for unavoidable wetland impacts. The EIS describes the Hatches Harbor restoration project to be used as mitigation for wetland impacts. The National Park Service, the restoration proponent, agreed to use the Hatches Harbor restoration as mitigation for all of the projects described in the EIS with the provision that the environmental documents are satisfactorily completed for the projects. The FAA has issued a grant to the airport to fund approximately 20% of the restoration project. The project, initiated in 1999, is anticipated to restore up to 90 acres of former saltmarsh that is now freshwater marsh as well as create approximately 7 acres of wetland from the creation of wetland hydrology in areas of low lying upland.

FAA is also committed to approving a change to the Airport Layout Plan showing that the airport will exchange 2 acres of land permitted for airport use, more remote from runway operations to compensate for the 0.69 acres of park land needed to relocate the localizer and its associated critical area. The 2 acres of compensatory land is located on the SSE side of the airport in the area of the old crosswind runway. The 0.69 ac. of parkland is located in between the airport permit area and Race Point Road. The 2 acres of compensatory land provide dune habitat that is more valuable than the land being used between the end of the runway and Race Point Road. The Cape Cod National Seashore has stated they intend to take favorable action on permitting the use of this land. It should be noted that the net area used for airport purposes is decreased slightly by the land exchange.. Additionally, the ALS will be moved closer in to the area that is already developed, i.e. the runway, terminal area and Race Point Road and it is shifted so it does not intrude as far as it does now into the Hatches Harbor Restoration area.

A berm to visually screen the airport from a bicycle path as well as provide some ground noise attenuation has been included along Race Point Road and further discussion and design will be coordinated with the National Park Service.

VII. Comments on Final Environmental Impact Statement

The availability of the FEIS was published in the Federal Register on April 7, 2000 with a due date of May 1, 2000. The FAA received two comment letters after the publication of the FEIS. They came from the Department of the Interior and the Environmental Protection Agency.

The Department of the Interior (DOI) letter, dated May 5, 2000, stated that the Executive Summary was ambiguous in regard to cumulative wetland impacts. As we responded in a letter to the DOI dated May, 15, 2000, we do not believe that the Executive Summary was ambiguous, highlighted the wetland impacts shown in the Executive Summary and

also provided the DOI with the summary page from the Cumulative Impacts section of the EIS where the cumulative impacts are clearly shown.

The DOI also believed that RSA4 encroached into an area permitted for navigational equipment only. In fact, RSA4 ends approximately 200 feet outside of the permit boundary in question. If the runway extension were to take place in the future, the RSA extending from the new end of the runway would extend into area specified for navigation aids. Coordination with the National Park Service on that issue will occur as described in Attachment 1. We intend to approve the RSA with the replacement ALS at this time.

The DOI also stated that the FAA needed to determine compliance with Executive Orders 11988 and 11990 as well as Section 4(f) of the Department of Transportation Act. These determinations are made in this Record of Decision in Section V.

The Environmental Protection Agency (EPA) in a letter Dated May 9, 2000 stated that they have no objections to the recommended actions in the EIS.

VIII. Decision

I have considered the environmental impact and enhancement of aviation safety of the proposed projects. Subject to the mitigation measures specified above, I am directing unconditional approval of the Provincetown Municipal Airport Layout Plan, as modified to depict the projects, including Runway Safety Areas, Approach Light System, Aircraft Parking Apron and Runway Extension, as specified in the Final EIS and modified in this Record of Decision. In addition, funding of the RSAs, ALS and Aircraft Parking Aprons is approved at this time. The funding of the Runway Extension is not approved. Its approval will require a reevaluation process that was the result of an agreement between the FAA and the NPS. This reevaluation process was described in the FEIS and is also included here as Attachment 1. The EPA supports this process and requested that they be notified concurrently with the NPS about any reevaluation proceedings. The FAA will do this as requested.

Under the authority delegated to me, I find that the federal actions stated here are reasonably supported. These actions are taken pursuant to 49 U.S.C. § 40101 *et seq.*, and constitute orders of the Administrator that are subject to review by the appropriate Court of Appeals of the United States in accordance with the provisions of 49 U.S.C. § 46110.

11/21/00

Vincent A. Scarano
Manager, Airports Division
New England Region

Date

Attachment 1

RUNWAY EXTENSION AGREEMENT

The National Park Service (NPS) and the Federal Aviation Administration (FAA) recognize that the need for a future runway extension at the Provincetown Municipal Airport is dependent on future conditions that either might not occur or might be precluded by factors presently unforeseen. This affects the ability to conclude a Section 4(f) determination that there is "no prudent or feasible alternative" to the proposed runway extension, as specified by the DOT Act of 1966, as well as NPS policies and authorities which must be addressed prior to issuing a special use permit.

For the reasons specified in the Final Environmental Impact Statement (FEIS) including growth in passenger levels and the need to efficiently and economically serve that growth by replacing existing aircraft with faster, larger aircraft, the Federal Aviation Administration (FAA) believes that the need for a 700-foot-long runway extension is reasonably foreseeable within the next 3-5 years. The NPS agrees that the FAA may identify this need in the future, and if it does, the documentation of the need and the alternatives discussed in this EIS will require reevaluating, and updating if necessary, before they will support the NPS permit actions. The steps to accomplish this are outlined below.

Because of changing aircraft needs to serve Provincetown the extension is reasonably foreseeable and because the FAA is assessing the extension's environmental impact in this EIS, the FAA intends to approve a 700-foot runway extension on the official Airport Layout Plan, for planning purposes only and not as a commitment for federal funding, to be included in the FEIS. Both the NPS and FAA agree that the discussion in this EIS of the alternative configurations for the physical location of such a runway extension is adequate, and that the

evaluation of certain conditions and equipment alternatives available to the carrier cannot be completed presently for a decision which is not being made now.

When the FAA becomes aware of airline proposals that would require a runway extension, it will notify the NPS. The FAA will initiate a subsequent reevaluation of several of the factors that affect the Federal decision making process for selecting the runway extension alternatives and the adequacy of the current Record of Decision (ROD), in the form of an Environmental Assessment (EA).

These would include purpose and need of the project, and alternatives that could affect the need for a runway extension. This reevaluation would include alternatives related to runway length requirements for the actual aircraft proposed by the carrier, alternative aircraft (requiring less runway length), and then-existing airport standards or navigational aid technology that could affect runway length requirements. Assuming that FAA's review concludes that the market conditions and the subsequent EA's discussion of alternatives available at that future time show no prudent or feasible alternative, and the initial environmental impact analysis remains current and accurate, a new ROD including a FONSI and a Section 4(f) determination would be issued to document the runway extension decision. The FAA will coordinate its review and ROD with the NPS. The goal is to produce a document that will satisfy FAA and NPS needs.

If the review process concludes that substantial changes have occurred since the original EIS publication affecting the alternatives analysis, or additional alternatives exist, the FAA will develop a Supplemental Environmental Impact Statement (SEIS). It is intended that the SEIS would be a less demanding and lengthy document than the original, concentrating specifically and only on the runway extension and any of the identified alternatives. For example, it may involve only one alternative in addition to the runway extension, a "no action" alternative. As another example, if the review found three new potential alternatives that could affect runway extension design, the SEIS would analyze

those along with the original runway extension. The reevaluation in the SEIS will also include a re-assessment of purpose and need, incorporating a review of passenger forecasts to determine their continued utility. The reevaluation will include alternative proposals such as high-speed ferry service or major highway improvements. The FAA will coordinate any of these actions with the NPS.

If the FAA concludes through a Section 4(f) Statement that there is no feasible and prudent alternative to a runway extension, it will then issue a new Record of Decision for that project consulting with the NPS prior to issuing both.

Appendix 5.4 NPS ROD, November 28, 2001

Record of Decision/Statement of Findings: Issuance of Permits, Which Would Allow for Safety Improvements at the Provincetown Municipal Airport, Provincetown, MA

[Federal Register: January 31, 2002 (Volume 67, Number 21)]
[Notices]
[Page 4732-4733]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr31ja02-95]

DEPARTMENT OF THE INTERIOR
National Park Service

Record of Decision/Statement of Findings: Issuance of Permits, Which Would Allow for Safety Improvements at the Provincetown Municipal Airport, Provincetown, MA

ACTION: Notice of approval of Record of Decision.

SUMMARY: Pursuant to subsection 102(2) of the National Environmental Policy Act of 1969, and the regulations promulgated by the Council on Environmental Quality (40 CFR 1505.2), the National Park Service, U.S. Department of the Interior has prepared a Record of Decision and Statement of Findings for Executive Orders 11988 (``Floodplain Management'') and 11990 (``Protection of Wetlands'').

DATES: The Record of Decision was recommended by the Superintendent of Cape Cod National Seashore, and approved by the Director of the Northeast Region on November 28, 2001. The Statement of Findings was also recommended by the Superintendent of Cape Cod National Seashore, certified for technical adequacy and servicewide consistency by both the Chief of the Water Resources Division and the Northeast Region Compliance Officer and approved by the Director of the Northeast Region on November 28, 2001.

ADDRESSES: Inquires regarding the Record of Decision or the Statement of Findings should be submitted to the Superintendent, Cape Cod National Seashore, 99 Marconi Site Road, Wellfleet, Massachusetts 02667. Telephone (508) 349-3785 or e-mail to CACO__Superintendent@NPS.Gov.

SUPPLEMENTARY INFORMATION: The summary of the Record of Decision/ Statement of Findings follows:

The Department of the Interior, National Park Service (NPS) has prepared this Record of Decision (ROD)/Statement of Findings (SOF) concerning the issuance of special use permits, which would allow for safety improvements at the Provincetown Municipal Airport, Provincetown, Massachusetts. This ROD/SOF responds to and references the Final Environmental Impact Statement (FEIS), of April 7, 2000, for the Provincetown Municipal Airport, Provincetown, Massachusetts, and Department of Transportation Section 4(F) Statement as prepared by the Federal Aviation Administration (FAA). This ROD provides a statement of the decision made; a summary description of the alternatives analyzed by FAA in their

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FEIS; the decision rationale; identification of the environmentally preferable alternative; a description of mitigation measures; and a discussion of impairment.

The U.S. Department of the Interior owns the land under the airport. Two twenty-year Special Use Permits have been issued and/or updated to the Town of Provincetown, as of 6/01/98 and 6/19/98, to operate a municipal airport within a prescribed permit area boundary indicated in the NPS permit(s) for aviation operations. One covers the runway area and operational facilities and the other relates to navigational lighting and instrumentation facilities. Section 4(f) of the Department of Transportation Act of 1966 (recodified at 49 U.S.C. 303) requires ``that the Secretary shall not approve any program or project which requires the use of any public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance as determined by the officials having jurisdiction thereof unless there is no feasible and prudent alternative to the use of such land and such program or project includes all possible planning to minimize harm resulting from the use.'' The pending issuance of permits covered by this ROD for safety improvements necessitated an impact analysis of 4(f) land, as parkland beyond that currently permitted for the various airport purposes was requested by FAA. A Statement of Findings on wetland protection was also prepared to address wetland and floodplain impacts.

The FEIS for the Provincetown Municipal Airport was prepared by the FAA to cover their actions related to implementing the airport Master Plan. The NPS cooperated in the development of the FEIS by providing technical input and review/commentary on impact analysis. The Airport Master Plan is basic to FAA's procedures to develop an Airport Layout Plan that guides physical airport development and improvement such as alterations to runway safety areas, the apron area, and replacement of an approach light system.

A runway extension was evaluated in the FEIS on the basis of current development interests and currently feasible alternative considerations; however, funding for the project is not being approved at this time and further evaluation of this action will be pursued according to conditions outlined in a General Agreement prepared by the FAA and NPS, the essential text of which is presented in the FEIS. The inclusion of the runway extension in the FEIS and the Airport Layout Plan was for planning consideration only. Basically, the agreement between NPS and FAA states that when the FAA detects a need to further consider runway extension, the FAA will fully document the need and initiate re-evaluation of the several factors that affect the Federal decision making process for identifying and selecting the runway

extension alternatives and the adequacy of the FAA ROD, by way of an Environmental Assessment (EA). Section 4(f) and Executive Order 11990 compliance for runway extension will be duly accomplished at that time. NPS decision-making on the runway extension is also deferred to that time.

Decision (Selected Action)

The National Park Service will adjust the parkland area permitted for airport use based only on the proposed actions related to the Runway Safety Area, parking aprons, and lighting system as described for safety improvements in the FEIS for the Provincetown Municipal Airport issued in April 2000 and the FAA's ROD, signed November 21, 2000. This will involve exchange and re-designation of the airport land use footprint, by returning two acres of previously permitted land, back to parkland use, and permitting 0.96 acres (incorrectly described in the FAA FEIS and FAA ROD as 0.69 acres) of parklands needed to serve navigational localizer relocation and its associated critical area use. The two acres of previously permitted parklands are being relinquished by FAA to revert to parkland uses, in compensation for the new acreage provided for the localizer. These two acres are located in a surficially undisturbed dune area which possess greater ecological value than the portion of land being exchanged, located between the eastern end of the runway and Race Point Road.

Dated: November 28, 2001.
Marie Rust,
Northeast Regional Director, National Park Service.
[FR Doc. 02-2286 Filed 1-30-02; 8:45 am]
BILLING CODE 4310-76-P

Appendix 5.5 NPS letter to FAA, February 21, 2001

United States Department of the Interior

NATIONAL PARK SERVICE
Northeast Region
United States Custom House
200 Chestnut Street
Philadelphia, PA 19106

IN REPLY REFER TO:

February 21, 2001

Robert Bartanowicz
Regional Administrator
Federal Aviation Administration
12 New England Executive Park
Burlington, MA 01802

Dear Mr. Bartanowicz:

We have reviewed the Record of Decision (ROD) for the Airport Layout Plan Approval for the Provincetown Municipal Airport, Provincetown, Massachusetts, dated November 16, 2000, and received on January 22, 2001. We appreciate the opportunity to provide comments on this document.

Some editing from the last draft (dated July 14, 2000) has inadvertently resulted in a substantive change in the decision by eliminating a clear reference to conditions that constrain the runway extension. These conditions are clearly outlined in Appendix 1 and are referred to throughout the ROD; however, Section VIII of the Decision states that the runway extension is "unconditionally approved" which would be in conflict with the intent of the rest of the ROD's language and the agreement provided in Appendix 1. Cape Cod National Seashore provided oral comment on that draft in order to expedite its finalization. In that discussion, the sentence originally read "...unconditional approval of the Provincetown Municipal Airport Layout Plan, as modified to depict the projects as specified in the Final EIS." The Seashore requested a change that stated "...unconditional approval of the Provincetown Municipal Airport Layout Plan, as *modified by this ROD* to depict the *RSA and ALS* projects as specified in the Final EIS." So although, we believe the intent was not to supercede the agreement presented in Appendix 1, we wish to clarify our position that the evaluation of future factors which may influence the decision with regard to a runway extension is still necessary as outlined in Appendix 1.

We note that the agreement attached (Attachment 1) to the ROD does not include a signature page. In review of our files, we found clear reference to the fact that the agreement recorded in Attachment 1 was approved by both the National Park Service (Service) and the Federal Aviation Administration (Administration). Although this agreement is not formally signed, we consider it binding and relevant to both the Service and the Administration, and that it will guide our future discussions with regard to any further airport improvements, namely the potential runway extension.

Lastly, there is reference in the ROD (Section VI) to the 2 acres of land, which will no longer be permitted for airport uses, in exchange for the permitting of 0.69 acres of land needed for the localizer improvements. We would like to have the 2 acres and the 0.69 acres clearly identified on a map or figure so we may adjust the permit boundaries and so that the administrative record clearly reflects this change in use.

Thank you for your consideration of these points and if we can provide further clarification please contact Nancy Finley at (508) 349-3785, extension 216.

Sincerely,

Marie Rust
Northeast Regional Director

cc: Superintendent, CACO

APPENDIX 6
FAA /TSA/MAC
Standards / Regulations / Guidelines

The following items are included in this Appendix:

1. List of FAA Advisory Circulars required for use in AIP Funded Projects, March 21, 2007
2. 14 CFR FAR Part 77.25(d)
3. FAA Waiver No. 55, August 1, 1980
4. AC 150/5300-13, Section 2
5. AC 150/5300-13, Section 3
6. AC 150/5300-13, Section 4
7. AC 150/5300-13, Section 6, paragraph 614
8. AC 150/5300-13, Section 8
9. AC 150/5300-13, Table A16-1A, Appendix 16
10. DOT/FAA/AR-04/10, Section 4
11. Order 6940.1
12. TSA Guidelines, Part III, Section A, June 2006
13. MAC Agency Directive AD-001a, November 14, 2001
14. AC 150/5320-6D, Chapter 3, Paragraph 302a
15. 49 CFR Part 1542.103(14) and Part 1544

1. List of FAA Advisory Circulars required for use in AIP Funded Projects, March 21, 2007

CURRENT FAA ADVISORY CIRCULARS REQUIRED FOR USE IN AIP FUNDED AND PFC APPROVED PROJECTS

Dated: 3/21/2007

View the most current versions of these ACs and any associated changes at http://www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/.

NUMBER	TITLE
70/7460-1K*	Obstruction Marking and Lighting
150/5000-13	Announcement of Availability--RTCA Inc., Document RTCA-221, Guidance and Recommended Requirements for Airport Surface Movement Sensors
150/5020-1	Noise Control and Compatibility Planning for Airports
150/5070-6B	Airport Master Plans
150/5070-7	The Airport System Planning Process
150/5200-28C	Notices to Airmen (NOTAMS) for Airport Operators
150/5200-30A and Changes 1 through 8	Airport Winter Safety and Operations
150/5200-33A	Hazardous Wildlife Attractants On or Near Airports
150/5210-5B	Painting, Marking and Lighting of Vehicles Used on an Airport
150/5210-7C	Aircraft Fire and Rescue Communications
150/5210-13B	Water Rescue Plans, Facilities, and Equipment
150/5210-14A	Airport Fire and Rescue Personnel Protective Clothing
150/5210-15	Airport Rescue & Firefighting Station Building Design
150/5210-18	Systems for Interactive Training of Airport Personnel
150/5210-19	Driver's Enhanced Vision System (DEVS)
150/5220-4B	Water Supply Systems for Aircraft Fire and Rescue Protection
150/5220-10C	Guide Specification for Water/Foam Type Aircraft Rescue and Firefighting Vehicles
150/5220-13B	Runway Surface Condition Sensor Specification Guide
150/5220-16C	Automated Weather Observing Systems for Non-Federal Applications
150/5220-17A and Change 1	Design Standards for Aircraft Rescue Firefighting Training Facilities
150/5220-18	Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials
150/5220-19	Guide Specification for Small, Dual-Agent Aircraft Rescue and Firefighting Vehicles
150/5220-20 and Change 1	Airport Snow and Ice Control Equipment
150/5220-21B	Guide Specification for Lifts Used to Board Airline Passengers With Mobility Impairments

FAA Advisory Circulars Required For Use In AIP Funded And PFC Approved Projects
March 21, 2007

NUMBER	TITLE
150/5220-22A	Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns
150/5300-13 and Changes 1 through 10	Airport Design
150/5300-14 and Changes 1 through 2	Design of Aircraft Deicing Facilities
150/5300-16	General Guidance and Specifications for Aeronautical Surveys: Establishment of Geodetic Control and Submission to the National Geodetic Survey
150/5300-17	General Guidance and Specifications for Aeronautical Survey Airport Imagery Acquisition and Submission to the National Geodetic Survey
150/5300-18	General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards
150/5320-5B	Airport Drainage
150/5320-6D and Changes 1 through 4	Airport Pavement Design and Evaluation
150/5320-12C and Changes 1 through 8	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces
150/5320-14	Airport Landscaping for Noise Control Purposes
150/5320-15 and Change 1	Management of Airport Industrial Waste
150/5325-4B	Runway Length Requirements for Airport Design
150/5335-5A	Standardized Method of Reporting Pavement Strength PCN
150/5340-1J	Standards for Airport Markings
150/5340-5B and Change 1	Segmented Circle Airport Marker System
150/5340-18D	Standards for Airport Sign Systems
150/5340-30B	Design and Installation Details for Airport Visual Aids
150/5345-3E	Specification for L821 Panels for Control of Airport Lighting
150/5345-5B	Circuit Selector Switch
150/5345-7E	Specification for L824 Underground Electrical Cable for Airport Lighting Circuits
150/5345-10F	Specification for Constant Current Regulators Regulator Monitors
150/5345-12E	Specification for Airport and Heliport Beacon
150/5345-13A	Specification for L841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits
150/5345-26C	Specification for L823 Plug and Receptacle, Cable Connectors

FAA Advisory Circulars Required For Use In AIP Funded And PFC Approved Projects
March 21, 2007

NUMBER	TITLE
150/5345-27D	Specification for Wind Cone Assemblies
150/5345-28F	Precision Approach Path Indicator (PAPI) Systems
150/5345-39C	FAA Specification L853, Runway and Taxiway Retroreflective Markers
150/5345-42F	Specification for Airport Light Bases, Transformer Housings, Junction Boxes and Accessories
150/5345-43F	Specification for Obstruction Lighting Equipment
150/5345-44G	Specification for Taxiway and Runway Signs
150/5345-45B	Low-Impact Resistant (LIR) Structures
150/5345-46C	Specification for Runway and Taxiway Light Fixtures
150/5345-47B	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
150/5345-49B	Specification L854, Radio Control Equipment
150/5345-50A	Specification for Portable Runway and Taxiway Lights
150/5345-51A	Specification for Discharge-Type Flasher Equipment
150/5345-52	Generic Visual Glideslope Indicators (GVGI)
150/5345-53C	Airport Lighting Equipment Certification Program
150/5345-54A and Change 1	Specification for L-1884 Power and Control Unit for Land and Hold Short
150/5345-55	Lighted Visual Aid to Indicate Temporary Runway Closure
150/5345-56	Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS)
150/5360-9	Planning and Design of Airport Terminal Facilities at NonHub Locations
150/5360-12D	Airport Signing and Graphics
150/5360-13 and Change 1	Planning and Design Guidance for Airport Terminal Facilities
150/5370-2E	Operational Safety on Airports During Construction
150/5370-10B	Standards for Specifying Construction of Airports
150/5370-11A	Use of Nondestructive Testing Devices in the Evaluation of Airport Pavement
150/5380-6A	Guidelines and Procedures for Maintenance of Airport Pavements
150/5390-2B	Heliport Design
150/5390-3	Vertiport Design
150/5395-1	Seaplane Bases

*This AC is available at http://www.faa.gov/ats/ata/ai/index.html or http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/MainFrame?OpenFrameSet.

FAA Advisory Circulars Required For Use In AIP Funded And PFC Approved Projects
March 21, 2007

THE FOLLOWING ADDITIONAL APPLY to AIP PROJECTS ONLY
Dated: 3/21/2007

NUMBER	TITLE
150/5100-14D	Architectural, Engineering, and Planning Consultant Services for Airport Grant Projects
150/5100-15A	Civil Rights Requirements for the Airport Improvement Program
150/5100-17 and Changes 1 through 6	Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects
150/5200-37	Introduction to Safety Management Systems (SMS) for Airport Operators
150/5300-15	Use of Value Engineering for Engineering Design of Airports Grant Projects
150/5320-17	Airfield Pavement Surface Evaluation and Rating (PASER) Manuals
150/5370-6B	Construction Progress and Inspection Report—Airport Grant Program
150/5370-11A	Use on Nondestructive Testing Devices in the Evaluation of Airport Pavements
150/5370-12	Quality Control of Construction for Airport Grant Projects
150/5370-13A	Offpeak Construction of Airport Pavements Using Hot-Mix Asphalt
150/5380-7A	Airport Pavement Management System
150/5380-8	Handbook for Identification of Alkali-Silica Reactivity in Airfield Pavements

THE FOLLOWING ADDITIONAL APPLY to PFC PROJECTS ONLY
Dated: 3/21/2007

NUMBER	TITLE
150/5000-12	Announcement of Availability—Passenger Facility Charge (PFC) Application (FAA Form 5500-1)

2. 14 CFR FAR Part 77.25(d)

used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:

(1) Seventeen feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.

(2) Fifteen feet for any other public roadway.

(3) Ten feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.

(4) Twenty-three feet for a railroad, and,

(5) For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

[Doc. No. 10183, 36 FR 5970, Apr. 1, 1971]

§ 77.25 Civil airport imaginary surfaces.

The following civil airport imaginary surfaces are established with relation to the airport and to each runway. The size of each such imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway. The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach existing or planned for that runway end.

(a) *Horizontal surface.* A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is:

(1) 5,000 feet for all runways designated as utility or visual;

(2) 10,000 feet for all other runways.

The radius of the arc specified for each end of a runway will have the same arithmetical value. That value will be the highest determined for either end of the runway. When a 5,000-foot arc is encompassed by tangents connecting two adjacent 10,000-foot arcs, the 5,000-foot arc shall be disregarded on the construction of the perimeter of the horizontal surface.

(b) *Conical surface.* A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

(c) *Primary surface.* A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway; but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is:

(1) 250 feet for utility runways having only visual approaches.

(2) 500 feet for utility runways having nonprecision instrument approaches.

(3) For other than utility runways the width is:

(i) 500 feet for visual runways having only visual approaches.

(ii) 500 feet for nonprecision instrument runways having visibility minimums greater than three-fourths statute mile.

(iii) 1,000 feet for a nonprecision instrument runway having a nonprecision instrument approach with visibility minimums as low as three-fourths of a statute mile, and for precision instrument runways.

The width of the primary surface of a runway will be that width prescribed in this section for the most precise approach existing or planned for either end of that runway.

(d) *Approach surface.* A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end.

(1) The inner edge of the approach surface is the same width as the primary surface and it expands uniformly to a width of:

(i) 1,250 feet for that end of a utility runway with only visual approaches;

(ii) 1,500 feet for that end of a runway other than a utility runway with only visual approaches;

(iii) 2,000 feet for that end of a utility runway with a nonprecision instrument approach;

(iv) 3,500 feet for that end of a nonprecision instrument runway other than utility, having visibility minimums greater than three-fourths of a statute mile;

(v) 4,000 feet for that end of a nonprecision instrument runway, other than utility, having a nonprecision instrument approach with visibility minimums as low as three-fourths statute mile; and

(vi) 16,000 feet for precision instrument runways.

(2) The approach surface extends for a horizontal distance of:

(i) 5,000 feet at a slope of 20 to 1 for all utility and visual runways;

(ii) 10,000 feet at a slope of 34 to 1 for all nonprecision instrument runways other than utility; and,

(iii) 10,000 feet at a slope of 50 to 1 with an additional 40,000 feet at a slope of 40 to 1 for all precision instrument runways.

(3) The outer width of an approach surface to an end of a runway will be that width prescribed in this subsection for the most precise approach existing or planned for that runway end.

(e) *Transitional surface.* These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

[Doc. No. 10183, 36 FR 5970, Apr. 1, 1971; 36 FR 6741, Apr. 8, 1971]

§ 77.27 [Reserved]

§ 77.28 Military airport imaginary surfaces.

(a) *Related to airport reference points.* These surfaces apply to all military airports. For the purposes of this section a military airport is any airport operated by an armed force of the United States.

(1) *Inner horizontal surface.* A plane is oval in shape at a height of 150 feet above the established airfield elevation. The plane is constructed by scribing an arc with a radius of 7,500 feet about the centerline at the end of each runway and interconnecting these arcs with tangents.

(2) *Conical surface.* A surface extending from the periphery of the inner horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation.

(3) *Outer horizontal surface.* A plane, located 500 feet above the established airfield elevation, extending outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.

(b) *Related to runways.* These surfaces apply to all military airports.

(1) *Primary surface.* A surface located on the ground or water longitudinally centered on each runway with the same length as the runway. The width of the primary surface for runways is 2,000 feet. However, at established bases where substantial construction has taken place in accordance with a previous lateral clearance criteria, the 2,000-foot width may be reduced to the former criteria.

(2) *Clear zone surface.* A surface located on the ground or water at each end of the primary surface, with a length of 1,000 feet and the same width as the primary surface.

(3) *Approach clearance surface.* An inclined plane, symmetrical about the runway centerline extended, beginning 200 feet beyond each end of the primary surface at the centerline elevation of the runway end and extending for 50,000 feet. The slope of the approach clearance surface is 50 to 1 along the runway centerline extended until it reaches an elevation of 500 feet above the established airport elevation. It then continues horizontally at this elevation to a point 50,000 feet from the point of beginning. The width of this surface at

3. FAA Waiver No. 55, August 1, 1980

WAIVER OF AIRPORT STANDARDS Waiver No. 55
(or Deviation)

Airport: Provincetown Municipal Airport

Deviation Summary: Penetration of primary and transitional surfaces.

Standard: FAR Part 77, Para. 77.25, for other than utility airports with a precision instrument approach: Primary 1000' wide and 7:1 transitional surfaces. Approach 10,000' at 50:1 and an additional 40,000 at 40:1 with 7:1 transitions.

Deviation: Existing primary is only 500' wide without transitions. ANE-436 has requested a waiver of the 1000' primary to allow the existing 500' with 34:1 approach surface 1000' wide at the inner surface for an ILS to Runway 7.

Justification: The clearing of a 1000' primary with 7:1 transitions would cause irreparable environmental harm to the Cape Cod National Seashore Park in which the airport is located. It would have an adverse affect on the esthetics of the park as well as create potential erosion problems and constitute a major loss of wild life habitat in the area, conditions totally unacceptable to the Department of the Interior, National Park Services. This is a 3500' runway used primarily by small GA type aircraft with commuter service provided by Provincetown-Boston Airlines utilizing DC-3's* Based on the type and use of aircraft the installation of the ILS will greatly increase safety at the airport even with the reduced width of the primary surface.

(cont. on separate sheet)

Additional documentation filed:

1. Evalutation of environmental impact report by National Park Service cooperative Research Unit of the University of Massachusetts is attached.
2. ANE-436's letter dated July 1, 1980.

Coordination:

ANE-620 (certification) 8/1/80

ANE-220 8/1/80

Authority to waive Order 5300.1A

Recommended Chief, Airports Engineering & Safety Branch Date 8/1/80

Approved Chief, Airports Division Date 8/1/80

Prepared by: Bradley A. Davis

Coordinated: ANE-610 8/11/80

Justification: (cont.)

This waiver will not relieve the sponsor of the responsibility of providing the 7:1 transitional surfaces along both the primary and approach nor the requirements of an approach surface 1000' wide at the inner surface with a 34:1 approach slope.

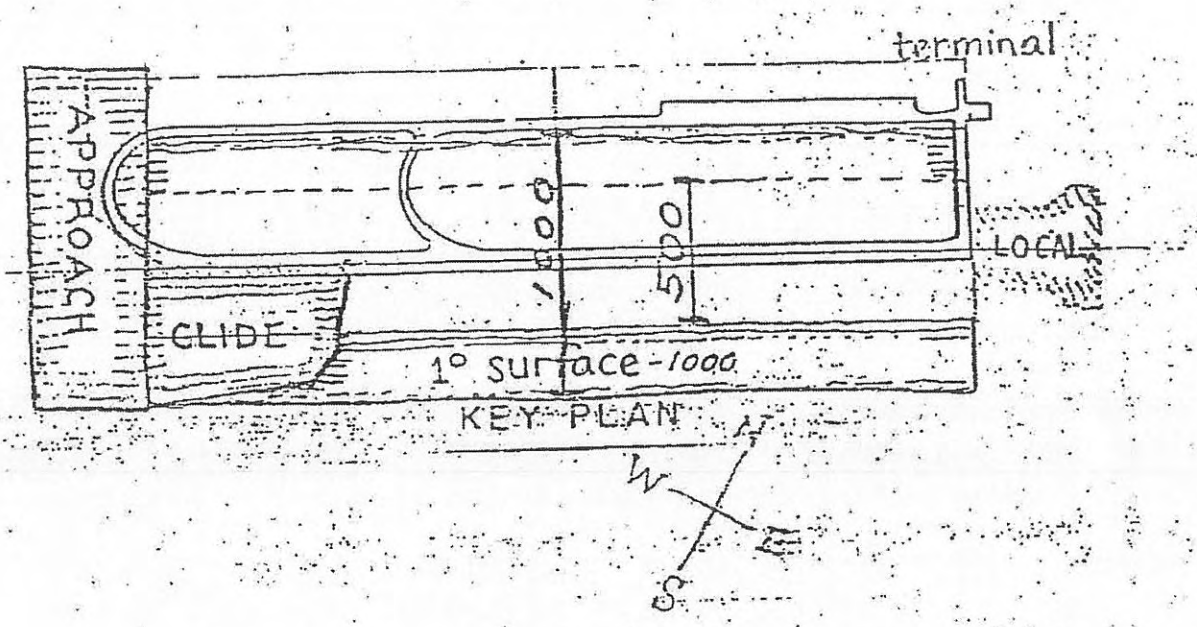
*The DC-3's are used only during the summer months to augment the normal commuter schedule.

The standard (FAR Part 77) requires a 1,000' wide primary surface with 7:1 transitions.

This waiver allows a 500' wide primary surface with 7:1 transitions and maximum penetrations beyond that on the north side of 9' and maximum penetrations beyond that on the south side of 16'.

These obstructions are determined to be non-hazardous, and need not be romoved or lighted since:

a) The runway is 3500' in length
b) Primary use is by small general aviation aircraft less than 12,500 lbs.
c) The maximum penetration is less than 20'
d) There are no future plans to extend the runway
(The current 500' ext. on the ALP was not economically and environmentally justified accorded to FAA funded study.)



EVALUATION OF ENVIRONMENTAL IMPACTS AND REPLANTING OF SITES AFFECTED BY PROPOSED NAVIGATIONAL AIDS FOR PROVINCETOWN MUNICIPAL AIRPORT

NATIONAL PARK SERVICE
COOPERATIVE RESEARCH UNIT
UNIVERSITY OF MASSACHUSETTS
AMHERST 01003

I. GENERAL REMARKS

A. Endangered or threatened species. Neither endangered nor threatened species were encountered during field investigations within the areas affected by the proposal.

B. Groundwater. The proposed work at the airport would not be expected to alter the quality of the local groundwater, since any leachate from regraded or developed areas should be inert.

C. Habitat Changes. The proposal (exclusive of the 1000' primary surface clearance) does require the removal of shrubby vegetation, which would constitute a habitat loss for local fauna. The revegetation of these areas would provide some new, but different, habitat.

D. Visual effects. The Provincetown Airport has not been in compliance with FAA standards for clearance of either the Primary Surface or Approach Surface. To comply with present regulations, shrubs within 200 feet northwest of the runway must be removed so that no vegetation exceeds the elevation of the runway surface. Vegetation has not been cleared in recent years, and its removal will cause the airport to become more conspicuous when viewed from Race Point Beach and Visitor Center. The paved airport areas are now partially screened from view by shrubs growing in proposed cleared areas.

The proposed work at the Glide Slope, Localizer, and Approach Surface will not cause these areas to appear substantially different to visitors once these areas are revegetated.

The proposed expansion of the runway to 1000' centered at the runway centerline would cause a major change in the airport area's appearance. Trees to the southeast of the runway would be cleared under the proposal, making the runway highly visible from the Race Point Visitor Center. The removal of this vegetation would also expose some barren or low dune areas presently sheltered by the wooded strip. Thus, clearing of trees at this critical location would cause the total continuously open area created to significantly exceed the 500' cleared zone. Furthermore, to provide a 7:1 clearance beyond 500' would require the removal of some vegetation along the northern slope of this dune ridge, opening an even larger area to visitors' view. From the Race Point bathhouse, visitors look directly into this area.

E. Potential erosion problems. Under the 1000' clearance proposal, the loss of the windbreak provided by the existing stand of pitch pines will make adjacent barren dune areas more susceptible to wind erosion than they are with the present natural windbreak.

II. IMPACT ON AREAS PROPOSED FOR ALTERATIONS

A. Localizer

B. Glide Slope

C. Middle Marker

D. Approach Surface

E. Runway Primary Surface – 500 feet

F. Runway Primary Surface expansion – 1000 feet

1. Visual effects

2. Possible erosion problems

3. Expansion of the runway primary surface to 1000 feet centered on the runway centerline would involve the elimination of approximately 20 acres of pitch pine. These trees and their understory are used as shelter and browse for deer, fox, and birds, and are the only substantial continuous stand of trees on the Race Point swale area west of Race Point Road. The loss of these trees would constitute a major loss of wildlife habitat in the area.

III. REVEGETATION OF LOCALIZER, GLIDE SLOPE, AND MIDDLE MARKER AREAS

A. Type of fill. Glacial outwash sand has been imported previously to construct the existing runway primary surface. This material appears to support the local flora adequately. It is recommended that glacial outwash sand be used where fill is needed. This material can be acquired at the Noons pit in Truro. Analyses of sand from Noons pit for pH, primary nutrients, and possible metal toxicity are being conducted at the University to Massachusetts.

B. Cover of fill. It is recommended that the upper 4-8 inches of existing soil be removed prior to site grading, and be reapplied as a veneer to the graded surface after construction. This local soil will provide plant seeds and fragments that will help to revegetate the area.

It is also recommended that no topsoil (loam), fertilizer, or wood chips be applied to any of the areas to be revegetated, since these amendments would encourage the establishment of vegetation uncharacteristic of the area.

C. Sources of vegetation. If nothing were done to the graded areas, local vegetation would completely cover the areas in an estimated three to five years. Abundant plant seeds and fragments incorporated in the soil scraped from the original surface, once spread back over the disturbed area, will favor very rapid revegetation.

Plugs of Hudsonia (beach-heather) and Arctostaphylos (bearberry) can also be removed prior to construction, and then be replanted on the altered surface after final grading. These two species are slower to establish than other local species.

Seeds of Deschampsia (hairgrass), Arctostaphylos, and Trifolium (hare's foot clover can be obtained in quantity and sown in the area.

D. Wind erosion. If it appears that the regraded surface deflates significantly after construction, measures should be taken to mitigate erosion

IV. RECOMMENDATIONS TO MINIMIZE ADVERSE EFFECTS OF CONSTRUCTION:

A. Work should be limited to only those areas specified in the proposal.

B. In order to minimize the creation of ruts in damp areas, areas adjacent to alteration sites should not be used by big equipment during construction.

C. Shrubs and trees should be removed from the approach surface and the area between the runway and taxiway during the winter when the ground is frozen.

D. Brush cut during the airport alteration should be removed from Seashore property.

E. Trenching for the electrical line in the intertidal zone at Hatches Harbor should be as deep as possible to avoid exposure. This electrical line should be inspected periodically, since both dune and intertidal areas are unstable.

F. Access to Hatches Harbor should be limited to the access road used in the 1978 repairs to the dike. Vehicles should not turn on either the marsh surface or in the dunes to the northwest of the dike.

G. Fill can be obtained at the Noons pit in Truro, or any other area, but sand should first be tested for primary nutrients, pH, and potential toxicity.

H. The Seashore must not be used for a source of fill or plant material (except as designated), nor as a site for disposing unwanted vegetation.

I. The entire project should be monitored periodically by a representative of the Seashore to assure compliance with recommendations.

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

NEW ENGLAND REGION
12 NEW ENGLAND EXECUTIVE PARK
BURLINGTON, MASS. 01803

TE: AUG 1 1980

TO: ANE-620

CT: Aeronautical Study 80-002, Provincetown Municipal Airport, Provincetown, Massachusetts

OM: Civil Engineer, ANE-620

TO: Aeronautical Study File

An Aeronautical Study was conducted by the FAA Airports Division on August 1, 1980, to establish the acceptable hazard lighting required to safely and efficiently define the penetrations to FAR Part 77 imaginary surfaces about Provincetown Municipal Airport, Provincetown, Massachusetts.

The following were consulted with:

Howard Maser, Flight Standards Division, ANE-221
Charles Taylor, Air Traffic Division, ANE-535
William Cronan, James Dirko and Bradley Davis, Airports Division, ANE-620

Background: As a result of the proposed installation of a full ILS by the FAA, the primary surface width will be increased from the present 500' width to 1000' in accordance with FAR Part 77, Paragraph 77.25. Additionally Part 77 would require a 50:1 approach slope for the first 10,000' and a 40:1 for an additional 40,000'.

Discussion: Granting a waiver to the Part 77 surfaces as requested by ANE-436 would leave a 500' primary surface with 7:1 transitions and an approach surface 1000' wide at the inner surface cleared to a 34:1 approach slope with 7:1 transitions. (see sketch)

There exist a small number of tree penetrations of the 1000' primary surface on the north side of the runway the maximum being a 9' penetration. On the southern side there are numerous penetrations caused by a grove of scrub pines with a maximum penetration of 16'.

Do to the esthetic concerns of the U. S. Department of the Interior, National Park Services to preserve the natural environment of the Cape Cod National Seashore Park any form of obstruction lighting outside the 500' primary surface would be totally unacceptable.

Summary: Based on the activity at this airport, primarily small GA type aircraft with commuter service augumented by the use of DC-3's during the summer only, the penetrations outside the 500' primary surface should not require obstruction lighting. The cost of providing obstruction lighting

in these areas would provide little benefit to safety at this airport as compared to the benefit of the full ILS with or without such lighting.

James A. Dirko

BRADLEY A. DAVIS

Concur:

William M. Cronan 8/16/00

WILLIAM M. CRONAN, ANE-620

Concur:

Howard B. Maser

HOWARD MASER, ANE-220

Concur:

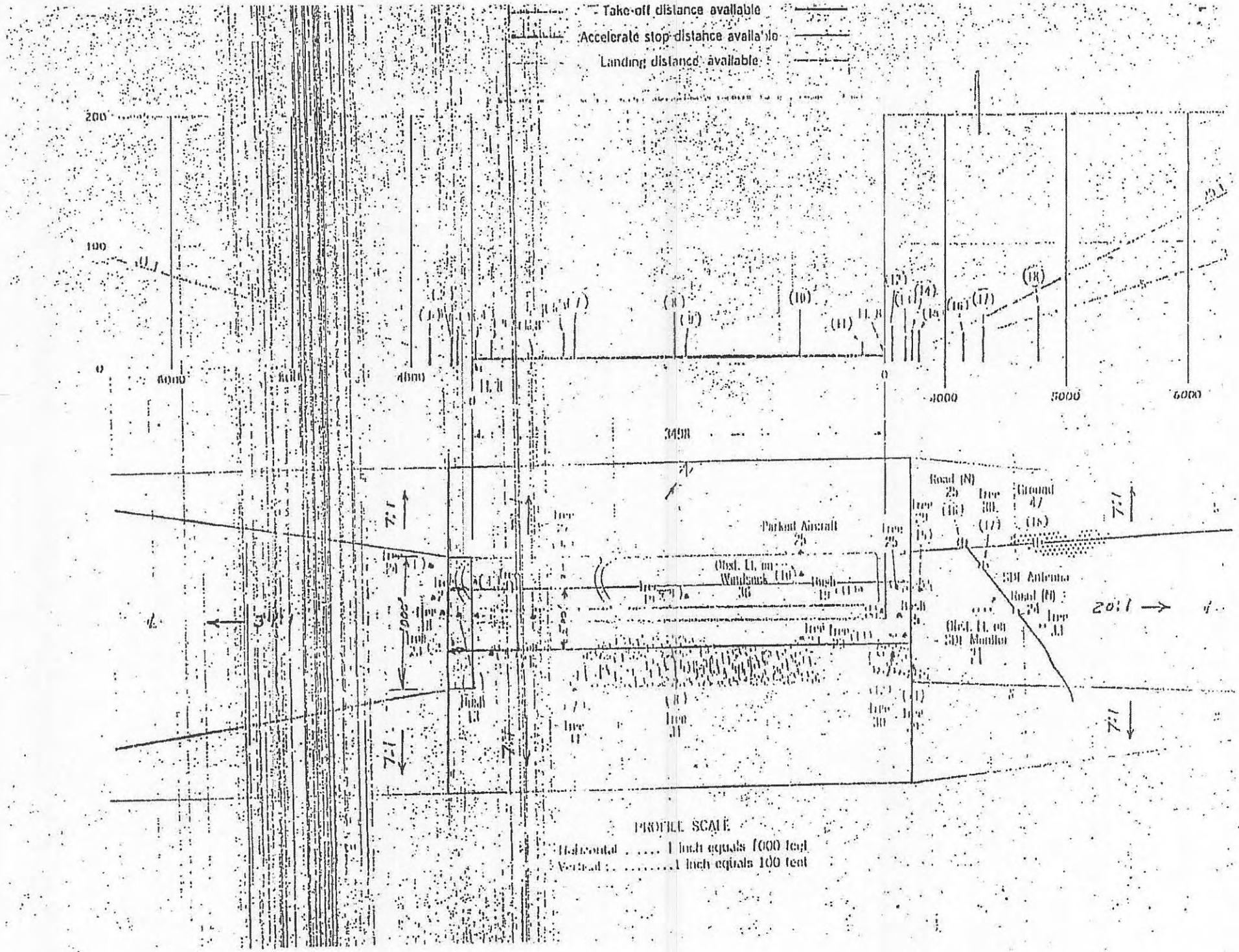
Charles M. Taylor

CHARLES TAYLOR, ANE-530

Concur

James A. Dirko

JAMES A. DIRKO, ANE-620


Take-off distance available
Accelerate stop distance available
Landing distance available
200
100
0
6000
4000
3000
5000
6000
3498
Road (N)
Ground
Parked Aircraft
Obst. Lt. on Windsock
Obst. Lt. on 300 Monitor
330 Antenna
Road (E)
Tree
Bush
20:1
7:1
PROFILE SCALE
Horizontal ..... 1 inch equals 1000 feet
Vertical ..... 1 inch equals 100 feet

4. AC 150/5300-13, Section 2

Chapter 2. AIRPORT GEOMETRY

200. INTRODUCTION. This chapter presents the airport geometric design standards and recommendations to ensure the safety, economy, efficiency, and longevity of an airport.

201. PRINCIPLES OF APPLICATION.

a. Need to Plan. The significance of the interrelationship of the various airport features cannot be overemphasized. It is important that airport owners look to both the present and potential functions of the airport.

(1) Existing and planned airspace required for safe and efficient aircraft operations should be protected by acquisition of a combination of zoning, easements, property interests, and other means. AC 150/5190-4, A Model Zoning Ordinance to Limit Height of Objects Around Airports, presents guidance for controlling the height of objects around airports.

(2) All other existing and planned airport elements, including the following, should be on airport property:

(a) Object free areas;

(b) Runway protection zones;

(c) Areas under the 14 CFR Part 77 Subpart C airport imaginary surfaces out to where the surfaces obtain a height of at least 35 feet (10 m) above the primary surface; and

(d) Areas, other then those which can be adequately controlled by zoning, easements, or other means to mitigate potential incompatible land uses.

b. Airport Functions. Coordination with the FAA and users of the airport should assist in determining the airport's immediate and long range functions which will best satisfy the needs of the community and traveling public. This involves determining the following:

(1) The operating characteristics, sizes, and weights of the airplanes expected at the airport;

(2) The airport reference code (ARC) resulting from (1);

(3) The most demanding meteorological conditions in which airplanes will operate;

(4) The volume and mix of operations;

(5) The possible constraints on navigable airspace; and

(6) The environmental and compatible land-use considerations associated with topography, residential development, schools, churches, hospitals, sites of public assembly, and the like.

c. Airport Layout Plan. When developing the airport layout plan, application of the standards and recommendations in this publication to the long range functions of the airport will establish the future airport geometry. See appendices 6 and 7 for detailed information on the development of the airport layout plan.

202. RUNWAY LOCATION AND ORIENTATION. Runway location and orientation are paramount to airport safety, efficiency, economics, and environmental impact. The weight and degree of concern given to each of the following factors depend, in part, on: the airport reference code; the meteorological conditions; the surrounding environment; topography; and the volume of air traffic expected at the airport.

a. Wind. Appendix 1 provides information on wind data analysis for airport planning and design. Such an analysis considers the wind velocity and direction as related to the existing and forecasted operations during visual and instrument meteorological conditions. It may also consider wind by time of day.

b. Airspace Availability. Existing and planned instrument approach procedures, missed approach procedures, departure procedures, control zones, special use airspace, restricted airspace, and traffic patterns influence airport layouts and locations. Contact the FAA for assistance on airspace matters.

c. Environmental Factors. In developing runways to be compatible with the airport environs, conduct environmental studies which consider the impact of existing and proposed land use and noise on nearby residents, air and water quality, wildlife, and historical/archeological features.

d. Obstructions to Air Navigation. An obstruction survey should identify those objects which may affect airplane operations. Approaches free of obstructions are desirable and encouraged, but as a minimum, locate and orient runways to ensure that the

approach areas associated with the ultimate development of the airport are clear of hazards to air navigation.

e. Topography. Topography affects the amount of grading and drainage work required to construct a runway. In determining runway orientation, consider the costs of both the initial work and ultimate airport development. See chapter 5 and AC 150/5320-5 for further guidance.

f. Airport Traffic Control Tower Visibility. The location and orientation of runways and taxiways must be such that the existing (or future) airport traffic control tower (ATCT) has a clear line of sight to: all traffic patterns; the final approaches to all runways; all runway structural pavement; and, other operational surfaces controlled by ATC. A clear line of sight to taxilane centerlines is desirable. Operational surfaces not having a clear unobstructed line of sight from the ATCT are designated by ATC as uncontrolled or nonmovement areas through a local agreement with the airport owner. See chapter 6 for guidance on airport traffic control tower siting.

g. Wildlife Hazards. In orienting runways, consider the relative locations of bird sanctuaries, sanitary landfills, or other areas that may attract large numbers of birds or wildlife. Where bird hazards exist, develop and implement bird control procedures to minimize such hazards. See AC 150/5xxx-xx, *Announcement of Availability,* FAA/USDA manual *Wildlife Hazard Management at Airports.* This manual may be used to determine, on a case-by-case basis, what uses may be compatible with a particular airport environment with respect to wildlife management. Guidance is also available through local FAA Airports Offices.

203. ADDITIONAL RUNWAYS. An additional runway may be necessary to accommodate operational demands, minimize adverse wind conditions, or overcome environmental impacts.

a. Operational Demands. An additional runway, or runways, is necessary when traffic volume exceeds the existing runway's operational capability. With rare exception, capacity-justified runways are parallel to the primary runway. Refer to AC 150/5060-5 for additional discussion.

b. Wind Conditions. When a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. The 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for Airport Reference Codes A-I and B-I, 13 knots for Airport Reference Codes A-II and B-II, 16 knots for Airport Reference Codes A-III, B-III, and C-I through D-III, and 20 knots for Airport Reference Codes A-IV through D-VI. See Appendix 1 for the methodology on computing wind coverage.

c. Environmental Impact. An additional runway may be needed to divert traffic from overflying an environmentally sensitive area.

204. TAXIWAY SYSTEM. As runway traffic increases, the capacity of the taxiway system may become the limiting operational factor. Taxiways link the independent airport elements and require careful planning for optimum airport utility. The taxiway system should provide for free movement to and from the runways, terminal/cargo, and parking areas. It is desirable to maintain a smooth flow with a minimum number of points requiring a change in the airplane's taxiing speed.

a. System Composition. Through-taxiways and intersections comprise the taxiway system. It includes entrance and exit taxiways; bypass, crossover or transverse taxiways; apron taxiways and taxilanes; and parallel and dual parallel taxiways. Chapter 4 discusses taxiway design.

b. Design Principles:

(1) Provide each runway with a parallel taxiway or the capability therefore;

(2) Build taxiways as direct as possible;

(3) Provide bypass capability or multiple access to runway ends;

(4) Minimize crossing runways;

(5) Provide ample curve and fillet radii;

(6) Provide airport traffic control tower line of sight; and

(7) Avoid traffic bottlenecks.

205. AIRPORT APRONS. Chapter 5 contains gradient standards for airport aprons. The tables cited in paragraph 206 present separation criteria applicable to aprons. For other apron criteria, refer to AC 150/5360-13 and Appendix 5 herein.

206. SEPARATION STANDARDS. Tables 2-1, 2-2, and 2-3 present the separation standards depicted in figure 2-1. *The separation distances may need to be increased with airport elevation to meet the runway obstacle free zone (OFZ) standards.* The

computer program cited in appendix 11 may be used to determine the increase to these separation distances for elevation.

207. PARALLEL RUNWAY SEPARATION--SIMULTANEOUS VFR OPERATIONS.

a. Standard. For simultaneous landings and takeoffs using visual flight rules (VFR), the minimum separation between centerlines of parallel runways is 700 feet (214 m).

b. Recommendations. The minimum runway centerline separation distance recommended for Airplane Design Group V and VI runways is 1,200 feet (366 m). Air traffic control practices, such as holding airplanes between the runways, frequently justify greater separation distances. Runways with centerline spacings under 2,500 feet (762 m) are treated as a single runway by ATC when wake turbulence is a factor.

208. PARALLEL RUNWAY SEPARATION--SIMULTANEOUS IFR OPERATIONS. To attain instrument flight rule (IFR) capability for simultaneous (independent) landings and takeoff on parallel runways, the longitudinal (in-trail) separation required for single runway operations is replaced, in whole or in part, by providing lateral separation between aircraft operating to parallel runways. Subparagraphs a and b identify the minimum centerline separations for parallel runways with operations under instrument flight rules (IFR). Where practical, parallel runway centerline separation of at least 5,000 feet (1 525 m) is recommended. Placing the terminal area between the parallel runways minimizes taxi operations across active runways and increases operational efficiency of the airport. Terminal area space needs may dictate greater separations than required for simultaneous IFR operations.

a. Simultaneous Approaches. Precision instrument operations require electronic navigational aids and monitoring equipment, air traffic control, and approach procedures.

(1) Dual simultaneous precision instrument approaches are normally approved on parallel runway centerline separation of 4,300 feet (1 310 m). Further on a case-by-case basis, the FAA will consider proposals utilizing separations down to a minimum of 3,000 feet (915 m) where a 4,300 foot (1 310 m) separation is impractical. This reduction of separation requires special high update radar, monitoring equipment, etc..

(2) Triple simultaneous precision instrument approaches for airports below 1,000 feet (305 m) elevation normally require parallel runway centerline separation of 5,000 feet (1 525 m) between adjacent runways. Triple simultaneous precision instrument approaches for airport elevations at and above 1,000 feet (305 m) and reduction in separation are currently under study by the FAA. In the interim, the FAA, on a case-by-case basis, will consider proposals utilizing separations down to a minimum of 4,300 feet (1 310 m) where a 5,000-foot (1 525 m) separation is impractical or the airport elevation is at or above 1,000 feet (305 m). Reduction of separation may require special radar, monitoring equipment, etc..

(3) Quadruple simultaneous precision instrument approaches are currently under study by the FAA. In the interim, the FAA, on a case-by-case basis, will consider proposals utilizing separations down to a minimum of 5,000 feet (1 525 m). Quadruples may require special radar, monitoring equipment, etc..

b. Simultaneous Departures or Approaches and Departures. Simultaneous departures do not always require radar air traffic control facilities. The following parallel runway centerline separations apply:

(1) Simultaneous Departures.

(a) Simultaneous nonradar departures require a parallel runway centerline separation of at least 3,500 feet (1 067 m).

(b) Simultaneous radar departures require a parallel runway centerline separation of at least 2,500 feet (762 m).

(2) Simultaneous Approach and Departure. Simultaneous radar-controlled approaches and departures require the following parallel runway centerline separations:

(a) When the thresholds are not staggered, at least 2,500 feet (762 m).

(b) When the thresholds are staggered and the approach is to the near threshold, the 2,500-foot (762 m) separation can be reduced by 100 feet (30 m) for each 500 feet (150 m) of threshold stagger to a minimum separation of 1,000 feet (305 m). For Airplane Design Groups V and VI runways, a separation of at least 1,200 feet (366 m) is recommended. See figure 2-2 for a description of "near" and "far" thresholds.

(c) When the thresholds are staggered and the approach is to the far threshold, the minimum 2,500-foot (762 m) separation requires an increase of 100 feet (30 m) for every 500 feet (152 m) of threshold stagger.

209. RUNWAY TO PARALLEL TAXIWAY AND TAXILANE SEPARATION.

a. Standards. Tables 2-1 and 2-2 present the runway centerline to parallel taxiway/taxilane centerline separation standard. This distance is such to satisfy the requirement that no part of an aircraft (tail tip, wing tip) on taxiway/taxilane centerline is within the runway safety area or penetrates the obstacle free zone (OFZ). The computer program cited in appendix 11 may be used to determine the increase to these separation distances for elevation.

b. Recommendations. To have room for the acute-angled exit taxiway, provide a runway centerline to parallel taxiway centerline of at least 400 feet (120 m) for Airplane Design Groups I and II, 500 feet (150 m) for Airplane Design Group III, and 600 feet (180 m) for Airplane Design Groups IV, V, and VI.

210. BUILDING RESTRICTION LINE (BRL). A BRL should be placed on an airport layout plan for identifying suitable building area locations on airports. The BRL should encompass the runway protection zones, the runway object free area, the runway visibility zone (see paragraph 503), NAVAID critical areas, areas required for terminal instrument procedures, and airport traffic control tower clear line of sight.

211. OBJECT CLEARING CRITERIA. Safe and efficient operations at an airport require that certain areas on and near the airport be clear of objects or restricted to objects with a certain function, composition, and/or height. The object clearing criteria subdivides the 14 CFR Part 77, Subpart C, airspace and the object free area (OFA) ground area by type of objects tolerated within each subdivision. Aircraft are controlled by the aircraft operating rules and not by this criteria.

a. Standards. Object clearance requirements are as follows:

(1) Object Free Area (OFA). Object free areas require clearing of objects as specified in paragraph 307, Runway Object Free Area, and paragraph 404, Taxiway and Taxilane Object Free Area (OFA).

(2) Runway and Taxiway Safety Areas. Runway and taxiway safety areas require clearing of objects, except for objects that need to be located in the runway or taxiway safety area because of their function. Objects higher than 3 inches (7.6 cm) above grade should be constructed on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches (7.6 cm) above grade. Other objects, such as manholes, should be constructed at grade. In no case should their height exceed 3 inches (7.6 cm) above grade. Underground fuel storage facilities should not be located within runway and taxiway safety areas (see AC 150/5230-4), Aircraft Fuel Storage, Handling, and Dispensing on Airports). Tables 3-1, 3-2, 3-3, and 4-1 specify runway and taxiway safety area standard dimensions.

(3) Obstacle Free Zone (OFZ). Obstacle Free Zones require clearing of object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function. Paragraph 306 specifies OFZ standard dimensions.

(4) Threshold. The threshold obstacle clearance surfaces, defined in Appendix 2, paragraph 5, require clearing of object penetrations.

(5) NAVAIDs. Certain areas require clearing for the establishment and operation of NAVAIDs. These NAVAID critical areas are depicted in chapter 6.

(6) 14 CFR Part 77 Obstructions to Air Navigation. Obstructions to air navigation must be removed unless an FAA aeronautical study, based on proposed operations, determined otherwise. To determine otherwise, the FAA must find no substantial adverse effect as defined in Order 7400.2, Procedures for Handling Airspace Matters, Chapter 7, Evaluating Aeronautical Effect, Section 1, General. The FAA, normally, limits aeronautical studies of existing objects to obstructions to air navigation which are not included in the criteria cited in paragraphs 211a(1) through (5).

(7) Runway Protection Zone (RPZ). The RPZ requires clearing of incompatible objects and activities as specified in paragraphs 212a(1)(a) and 212a(2).

(8) General. Other objects which require clearing are those which generally can have an adverse effect on the airport. These include objects in the inner part of the approach area (coinciding with the RPZ) such as fuel handling and storage facilities, smoke and dust generating activities, misleading lights, and those which may create glare or attract wildlife.

b. Recommendations. Other objects that are desirable to clear, if practicable, are objects that do not have a substantial adverse effect on the airport but, if removed, will enhance operations. These include objects in the controlled activity area and obstructions to air navigation that are not covered in paragraph 211.a, especially those penetrating an approach surface. On a paved runway, the approach surface starts 200 feet (61 m) beyond the area usable for takeoff or landing, whichever is more demanding. On an unpaved runway, the approach surface starts at the end of the area usable for takeoff or landing.

212. RUNWAY PROTECTION ZONE (RPZ). The RPZ's function is to enhance the protection of people and property on the ground. This is achieved through airport owner control over RPZs. Such control includes clearing RPZ areas (and maintaining them clear) of incompatible objects and activities. Control is preferably exercised through the acquisition of sufficient property interest in the RPZ.

a. Standards.

(1) RPZ Configuration/Location. The RPZ is trapezoidal in shape and centered about the extended runway centerline. The central portion and controlled activity area the two components of the RPZ (see Figure 2-3). The RPZ dimension for a particular runway end is a function of the type of aircraft and approach visibility minimum associated with that runway end. Table 2-4 provides standard dimensions for RPZs. Other than with a special application of declared distances, the RPZ begins 200 feet (60 m) beyond the end of the area usable for takeoff or landing. With a special application of declared distances, see Appendix 14, separate approach and departure RPZs are required for each runway end.

(a) The Central Portion of the RPZ. The central portion of the RPZ extends from the beginning to the end of the RPZ, centered on the runway centerline. Its width is equal to the width of the runway OFA (see Figure 2-3). Paragraph 307 contains the dimensional standards for the OFA.

(b) The Controlled Activity Area. The controlled activity area is the portion of the RPZ to the sides of the central portion of the RPZ.

(2) Land Use. In addition to the criteria specified in paragraph 211, the following land use criteria apply within the RPZ:

(a) While it is desirable to clear all objects from the RPZ, some uses are permitted, provided they do not attract wildlife (see paragraph 202.g., *Wildlife Hazards,* and Appendix 17 for dimensional standards), are outside of the Runway OFA, and do not interfere with navigational aids. Automobile parking facilities, although discouraged, may be permitted, provided the parking facilities and any associated appurtenances, in addition to meeting all of the preceding conditions, are located outside of the central portion of the RPZ. Fuel storage facilities may not be located in the RPZ.

(b) Land uses prohibited from the RPZ are residences and places of public assembly. (Churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons typify places of public assembly.) Fuel storage facilities may not be located in the RPZ.

b. Recommendations. Where it is determined to be impracticable for the airport owner to acquire and plan the land uses within the entire RPZ, the RPZ land use standards have recommendation status for that portion of the RPZ not controlled by the airport owner.

c. FAA Studies of Objects and Activities in the Vicinity of Airports. The FAA policy is to protect the public investment in the national airport system. To implement this policy, the FAA studies existing and proposed objects and activities, both off and on public-use airports, with respect to their effect upon the safe and efficient use of the airports and safety of persons and property on the ground. These objects need not be obstructions to air navigation, as defined in 14 CFR Part 77. As the result of a study, the FAA may issue an advisory recommendation in opposition to the presence of any off-airport object or activity in the vicinity of a public-use airport that conflicts with an airport planning or design standard or recommendation.

213. RUNWAY HOLDING POSITION (HOLDLINE). At airports with operating airport traffic control towers, runway holding positions (holdlines) identify the location on a taxiway where a pilot is to stop when he/she does not have clearance to proceed onto the runway. At airports without operating control towers, these holdlines identify the location where a pilot should assure there is adequate separation with other aircraft before proceeding onto the runway. The holdline standards, which assume a perpendicular distance from a runway centerline to an intersecting taxiway centerline, are in Tables 2-1 and 2-2. However, these distance standards may need to be longer and placed in such a way to take into account the largest aircraft (tail, body, or wing tip) expected to use the runway from penetrating the Obstacle Free Zone.

214. to 299. RESERVED

Table 2-1. Runway Separation Standards for aircraft approach categories A & B

ITEM	DIM 1/	AIRPLANE DESIGN GROUP				
		I 2/	I	II	III	IV
Visual runways and runways with not lower than ¾-statue mile (1200m) approach visibility minimums Runway Centerline to:						
Parallel Runway Centerline	H	Refer to paragraphs 207 and 208				
Holdline		125ft 7/ 38m	200ft 60m	200ft 60m	200ft 5/ 60m	250ft 75m
Taxiway/Taxilane/ Centerline 3/	D	150ft 45m	225ft 67.5m	240ft 72m	300ft 90m	400ft 120m
Aircraft Parking Area	G	125ft 37.5m	200ft 60m	250ft 75m	400ft 120m	500ft 150m
Helicopter Touchdown Pad		Refer to Advisory Circular 150/5390-2				
Runways with lower than ¾-statue mile (1200m) approach visibility minimums 4/ Runway Centerline to:						
Parallel Runway Centerline	H	Refer to paragraphs 207 and 208				
Holdline		175ft 7/ 53m	250ft 75m	250ft 75m	250ft 5/ 75m	250ft 6/ 75m
Taxiway/Taxilane/ Centerline 3/	D	200ft 60m	250ft 75m	300ft 90m	350ft 105m	400ft 120m
Aircraft Parking Area	G	400ft 120m	400ft 120m	400ft 120m	400ft 120m	500ft 150m
Helicopter Touchdown Pad		Refer to Advisory Circular 150/5390-2				

1/ Letters correspond to the dimensions on Figure 2-1.

2/ These dimensional standards pertain to facilities for small airplanes exclusively.

3/ The taxiway/taxilane centerline separation standards are for sea level. At higher elevations, an increase to these separation distances may be required to keep taxiing and holding airplanes clear of the OFZ (refer to paragraph 206).

4/ For approaches with visibility less than ½-statue miles, runway centerline to taxiway/taxilane centerline separation increases to 400 feet (120m).

5/ This distance is increased 1 foot for each 100 feet above 5,100 feet above sea level.

6/ This distance is increased 1 foot for each 100 feet above sea level.

7/ The holdline dimension standards pertains to facilities for small airplanes exclusively, including airplane design groups I & II

Table 2-2. Runway Separation Standards for aircraft approach categories C & D 7/

ITEM	DIM 1/	AIRPLANE DESIGN GROUP					
		I	II	III	IV	V	VI
Visual runways and runways with not lower than ¾-statue mile (1200m) approach visibility minimums Runway Centerline to:							
Parallel Runway Centerline	H	Refer to paragraphs 207 and 208					
Holdline		250ft 75m	250ft 75m	250ft 75m	250ft 75m	250ft 6/ 75m	280ft 6/ 85m
Taxiway/Taxilane/ Centerline 2/	D	300ft 90m	300ft 90m	400ft 120m	400ft 120m	3/ 3/	500ft 150m
Aircraft Parking Area	G	400ft 120m	400ft 120m	500ft 150m	500ft 150m	500ft 150m	500ft 150m
Helicopter Touchdown Pad		Refer to Advisory Circular 150/5390-2					
Runways with lower than ¾-statue mile (1200m) approach visibility minimums Runway Centerline to:							
Parallel Runway Centerline	H	Refer to paragraphs 207 and 208					
Holdline		250ft 75m	250ft 75m	250ft 75m	250ft 6/ 75m	280ft 6/ 85m	280ft 6/ 85m
Taxiway/Taxilane/ Centerline 2/	D	400ft 120m	400ft 120m	400ft 120m	400ft 120m	3/ 4/ 3/ 4/	5/ 5/
Aircraft Parking Area	G	500ft 150m	500ft 150m	500ft 150m	500ft 150m	500ft 150m	500ft 150m
Helicopter Touchdown Pad		Refer to Advisory Circular 150/5390-2					

1/ Letters correspond to the dimensions on Figure 2-1.

2/ The taxiway/taxilane centerline separation standards are for sea level. At higher elevations, an increase to these separation distances may be required to keep taxiing and holding airplanes clear of the OFZ (refer to paragraph 206).

3/ For Airplane Design Group V, the standard runway centerline to parallel taxiway centerline separation distance is 400ft (120m) for airports at or below an elevation of 1,345feet (410m); 450feet (135m) for airports between elevations for 1,345 feet (410m) and 6,560 feet (2,000m); and 500 feet (150m) for airports above an elevation of 6,560 feet (2,000m).

4/ For approaches with visibility less than ½-statue mile, the separation distance increases to 500 feet (150m) plus required OFZ elevation adjustment.

5/ For approaches with visibility down to ½-statue mile, the separation distance increases to 500 feet (150m) plus elevation adjustment. For approaches with visibility less than ½-statue mile, the separation distance increases to 550 feet (168m) plus required OFZ elevation adjustment.

6/ This distance is increased 1 foot for each 100 feet above sea level.

7/ For all airplane design groups under aircraft approach category D, this distance is increased 1 foot for each 100 feet above sea level.

Table 2-3. Taxiway and taxilane separation standards

ITEM	DIM 1/	AIRPLANE DESIGN GROUP					
		I	II	III	IV	V	VI
Taxiway Centerline to:							
Parallel Taxiway/ Taxilane Centerline	J	69 ft 21 m	105 ft 32 m	152 ft 46.5 m	215 ft 65.5 m	267 ft 81 m	324 ft 99 m
Fixed or Movable Object 2 and 3/	K	44.5 ft 13.5 m	65.5 ft 20 m	93 ft 28.5 m	129.5 ft 39.5 m	160 ft 48.5 m	193 ft 59 m
Taxilane Centerline to:							
Parallel Taxilane Centerline		64 ft 195. m	97 ft 29.5 m	140 ft 42.5 m	198 ft 60 m	245 ft 74.5 m	298 ft 91 m
Fixed or Movable Object 2 and 3/		39.5 ft 12 m	57.5 ft 17.5 m	81 ft 24.5 m	112.5 ft 34 m	138 ft 42 m	167 ft 51 m

1/ Letters correspond to the dimensions on Figure 2-1.

2/ This value also applies to the edge of service and maintenance roads.

3/ Consideration of the engine exhaust wake impacted from turning aircraft should be given to objects located near runway/taxiway/taxilane intersections.

The values obtained from the following equations may be used to show that a modification of standards will provide an acceptable level of safety. Refer to paragraph 6 for guidance on modification of standard requirements.

Taxiway centerline to parallel taxiway/taxilane centerline equals 1.2 times airplane wingspan plus 10 feet (3 m).

Taxiway centerline to fixed or movable object equals 0.7 times airplane wingspan plus 10 feet (3 m).

Taxilane centerline to parallel taxilane centerline equals 1.1 times airplane wingspan plus 10 feet (3 m).

Taxilane centerline to fixed or movable object equals 0.6 times airplane wingspan plus 10 feet (3 m).

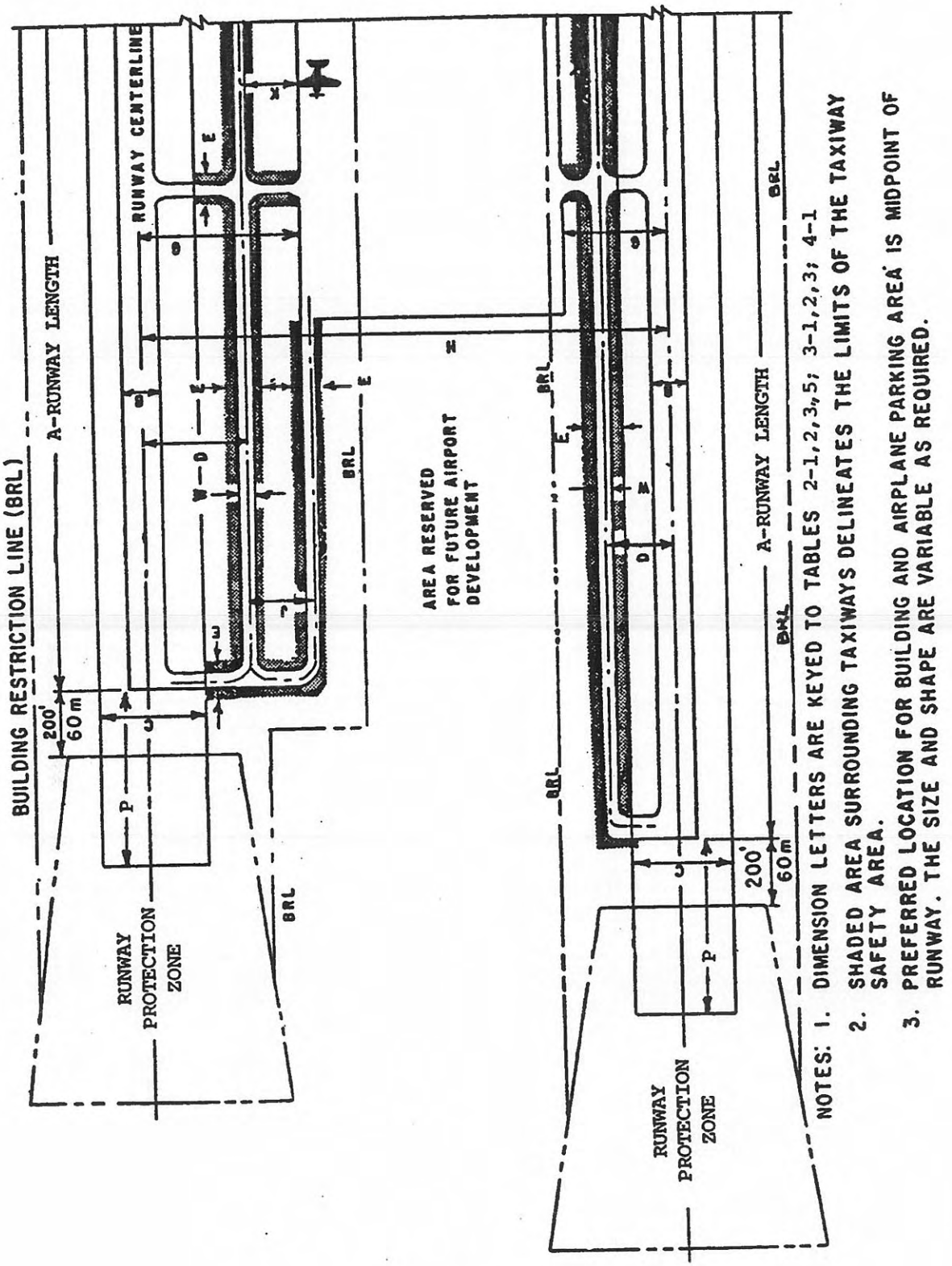
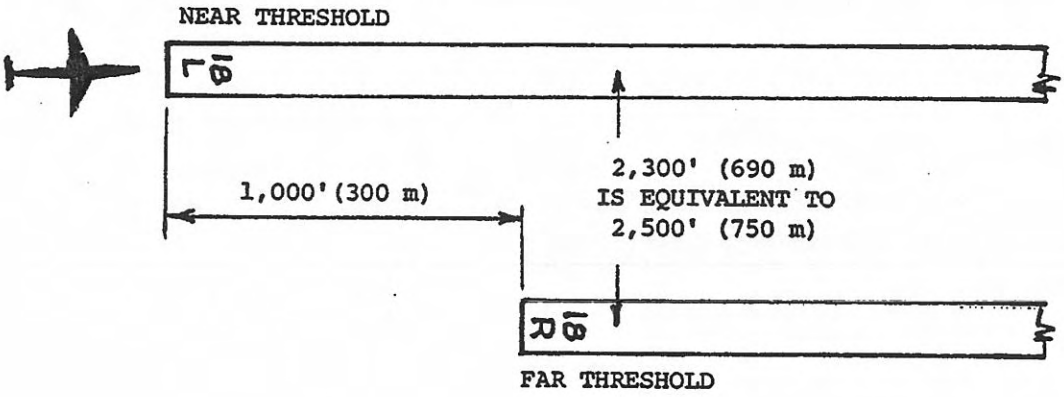


Figure 2-1. Typical airport layout



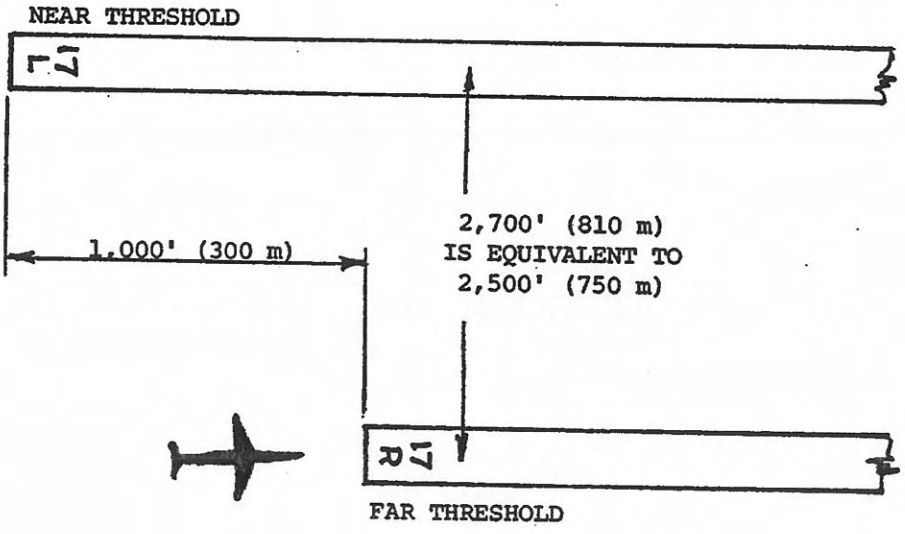


Figure 2-2. Parallel runway separation

Table 2-4. Runway protection zone (RPZ) dimensions

Approach Visibility Minimums 1/	Facilities Expected To Serve	Dimensions			
		Length L Feet (meters)	Inner Width W_1 feet (meters)	Outer Width W_2 feet (meters)	RPZ acres
Visual And Not lower than 1-Mile (1 600 m)	Small Aircraft Exclusively	1,000 (300)	250 (75)	450 (135)	8.035
	Aircraft Approach Categories A & B	1,000 (300)	500 (150)	700 (210)	13.770
	Aircraft Approach Categories C & D	1,700 (510)	500 (150)	1,010 (303)	29.465
Not lower than ¾-Mile (1 200 m)	All Aircraft	1,700 (510)	1,000 (300)	1,510 (453)	48.978
Lower than ¾-Mile (1 200 m)	All Aircraft	2,500 (750)	1,000 (300)	1,750 (525)	78.914

1/ The RPZ dimensional standards are for the runway end with the specified approach visibility minimums. The departure RPZ dimensional standards are equal to or less than the approach RPZ dimensional standards. When a RPZ begins other than 200 feet (60 m) beyond the runway end, separate approach and departure RPZs should be provided. Refer to Appendix 14 for approach and departure RPZs.

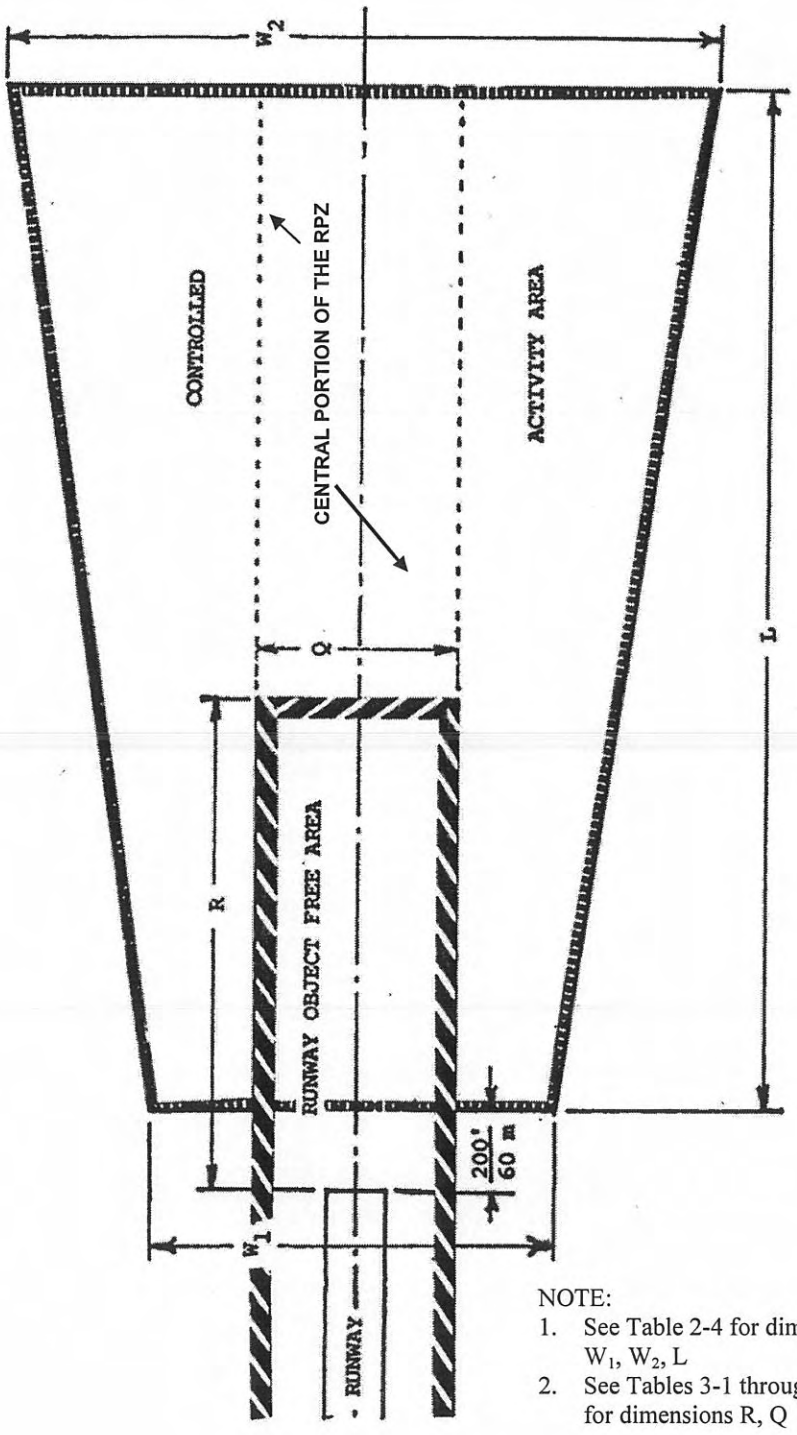


Figure 2-3. Runway protection zone

5. AC 150/5300-13, Section 3

310. RESCUE AND FIREFIGHTING ACCESS. Rescue and firefighting access roads are normally needed to provide unimpeded two-way access for rescue and firefighting equipment to potential accident areas. Connecting these access roads, to the extent practical, with the operational surfaces and other roads will facilitate aircraft rescue and firefighting operations.

a. Recommendation. It is recommended that the entire runway safety area (RSA) and runway protection zone (RPZ) be accessible to rescue and firefighting vehicles so that no part of the RSA or RPZ is more than 330 feet (100 m) from either an all weather road or a paved operational surface. Where an airport is adjacent to a body of water, it is recommended that boat launch ramps with appropriate access roads be provided.

b. All Weather Capability. Rescue and firefighting access roads are all weather roads designed to support rescue and firefighting equipment traveling at normal response speeds. Establish the widths of the access roads on a case-by-case basis considering the type(s) of rescue and firefighting equipment available and planned at the airport. The first 300 feet (90 m) adjacent to a paved operational surface should be paved. Where an access road crosses a safety area, the safety area standards for smoothness and grading control. For other design and construction features, use local highway specifications.

c. Road Usage. Rescue and firefighting access roads are special purpose roads that supplement but do not duplicate or replace sections of a multi-purpose road system. Restricting their use to rescue and firefighting access equipment precludes their being a hazard to air navigation.

311. to 399. RESERVED.

6. AC 150/5300-13, Section 4

Chapter 4. TAXIWAY AND TAXILANE DESIGN

400. INTRODUCTION. This chapter presents the design standards for taxiways, taxilanes, and associated airport elements.

401. DIMENSIONAL STANDARDS. Tables 4-1 and 4-2 present the dimensional standards for taxiway, taxilanes, and associated elements. Appendix 9 discusses the relationship between airplane physical characteristics and the design of taxiway and taxilane elements. The rationale presented there is useable, on a case-by-case basis, to adapt separation standards to meet unusual local conditions or to accommodate a specific airplane within an airplane design group.

402. TAXIWAY SHOULDERS. Provide stabilized or paved shoulders to reduce the possibility of blast erosion and engine ingestion problems associated with jet engines that overhang the edge of the taxiway pavement. Table 4-1 presents taxiway shoulder width standards. Soil with turf not suitable for this purpose requires a stabilized or low-cost paved surface. Chapter 8 contains additional information on this subject.

403. TAXIWAY SAFETY AREA (TSA). The taxiway safety area is centered on the taxiway centerline. Table 4-1 presents taxiway safety area dimensional standards.

a. Design Standards. The taxiway safety area shall be:

(1) cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;

(2) drained by grading or storm sewers to prevent water accumulation;

(3) capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft, and

(4) free of objects, except for objects that need to be located in the taxiway safety area because of their function. Objects higher than 3 inches (7.6 cm) above grade should be constructed on low impact resistant supports (frangible mounted structures) of the lowest practical height with the frangible point no higher than 3 inches (7.6 cm) above grade. Other objects, such as manholes, should be constructed at grade. In no case should their height exceed 3 inches (7.6 cm) above grade.

b. Construction Standards. Compaction of taxiway safety areas shall be to FAA specification P-152 found in AC 150/5370-10.

404. TAXIWAY AND TAXILANE OBJECT FREE AREA (OFA). The taxiway and taxilane OFAs are centered on the taxiway and taxilane centerlines as shown in figures A9-2, A9-3, and A9-4.

a. The taxiway and taxilane OFA clearing standards prohibit service vehicle roads, parked airplanes, and above ground objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. Vehicles may operate within the OFA provided they give right of way to oncoming aircraft by either maintaining a safe distance ahead or behind the aircraft or by exiting the OFA to let the aircraft pass. Provide vehicular exiting areas along the outside of the OFA where required. Table 4-1 specifies the standard dimensions for OFAs.

b. OFA clearance fillets shall be provided at intersections and turns where curved taxiway or taxilane centerline pavement markings, reflectors, or lighting are provided. The OFA clearance fillets shall be configured to provide the standard wingtip clearance for the using aircraft. Appendix 9 provides guidance for finding the wingtip trace and Table 4-3 specifies the standard wingtip clearances.

c. Offset taxilane pavement markings may be used at existing facilities where it is impracticable to upgrade the facility to existing standards or as a temporary measure to assure adequate wingtip clearance until upgraded facilities meeting design standards are completed. The offset taxilane pavement markings should be located on an arc offset and parallel to the curved centerline. The radius of the offset arc should be approximately $(R^2 + d^2)^{0.5}$. R being the radius of the taxilane turn and d being a representative distance from the center of cockpit to the center of the main undercarriage of the larger wingspan aircraft. Increasing the offset radius increases the clearance inside of the curve while decreasing the clearance outside of the curve. Both clearances for each of the larger wingspan aircraft need to be examined. Where offset taxilane pavement markings are provided, centerline lighting or reflectors are required.

405. PARALLEL TAXIWAY. A basic airport consists of a runway with a full-length parallel taxiway, an apron, and connecting transverse taxiways between the runway, parallel taxiway, and the apron.

a. Separation Distance. Tables 2-1 and 2-2 show the standard separation distances between parallel taxiways and runways.

b. Centerline Profile. The centerline profile of a parallel taxiway should prevent excessive longitudinal grades on crossover or transverse taxiways. Chapter 5 provides the standards for taxiway longitudinal grades.

406. TAXIWAY INTERSECTIONS. An airplane pilot may negotiate a taxiway turn by either maintaining the cockpit over the centerline or by judgmental oversteering.

a. Cockpit Over Centerline. Taxiway intersections designed to accommodate cockpit over centerline steering require more pavement, but enable more rapid movement of traffic with minimal risk of aircraft excursions from the pavement surface. Intersections should be designed to accommodate cockpit over centerline steering to the extent practicable. Where taxiway centerline lighting or reflectors are installed, intersections shall be designed for cockpit over centerline steering.

b. Judgmental Oversteering. Taxiway intersections designed to accommodate the judgmental oversteering method of maneuvering require the least pavement widening. However, judgmental oversteering requires complex maneuvering, increases the risk of aircraft excursions from the pavement surface, and slows the flow of traffic.

c. Design. Figure 4-1 shows the most common designs of taxiway-taxiway intersections and tables 4-1 and 4-2 present associated dimensional standards. The designs also apply to taxiway-apron intersections. Adjusting these shapes to achieve more efficient construction procedures may be desirable and should be a cost basis consideration. For example, squaring the venturi areas or designing the pavement fillets, by using either the methodology presented in appendix 10 or a computer program to provide the standard taxiway edge safety margin, may produce a more cost-effective design. Figure 4-4 is a printout from such a program that is operable on an IBM PC compatible computer. Appendix 11 gives details on availability of this program.

d. Limitations. The criteria depicted in figure 4-1 apply to taxiway-taxiway intersections and taxiway-apron intersections and not to runway-taxiway intersections. Discussion and details on runway-taxiway intersections with accompanying figures are in subsequent paragraphs.

407. ENTRANCE TAXIWAYS.

a. Dual Use. An entrance taxiway also serves as the final exit taxiway on a bidirectional runway. It is normally in the form of an "L" taxiway intersection with a right angle connection to the runway.

b. Radius. The centerline radius of curvature should be as large as possible to accommodate higher speeds. The radius is dependent on the separation distance between the runway and parallel taxiway.

c. Design. The entrance design shown in figure 4-5, with a centerline radius of 200 feet (60 m), will allow entrance speeds of 20 mph (30 km per hour), the minimum design speed for the taxiway system. Larger radii will permit higher entrance speeds. The design width requires at least the taxiway edge safety margin specified in table 4-1.

408. BYPASS TAXIWAYS. Air traffic personnel at busy airports encounter occasional bottlenecks when moving airplanes ready for departure to the desired takeoff runway. Bottlenecks result when a preceding airplane is not ready for takeoff and blocks the access taxiway. Bypass taxiways provide flexibility in runway use by permitting ground maneuvering of steady streams of departing airplanes. An analysis of existing and projected traffic indicates if a bypass taxiway will enhance traffic flow.

a. Location. Bypass taxiway locations are normally at or near the runway end. They can be parallel to the main entrance taxiway serving the runway, as shown in figure 4-6, or used in combination with the dual parallel taxiways, as depicted in figure 4-7.

b. Design. Bypass taxiway widths require at least the standard taxiway edge safety margin. The separation and clearance standards are the same as for parallel taxiways.

409. HOLDING BAYS. Providing holding bays instead of bypass taxiways also enhances capacity. Holding bays provide a standing space for airplanes awaiting final air traffic control (ATC) clearance and to permit those airplanes already cleared to move to their runway takeoff position. By virtue of their size, they enhance maneuverability for holding airplanes while also permitting bypass operations. A holding bay should be provided when runway operations reach a level of 30 per hour.

a. Location. Although the most advantageous position for a holding bay is adjacent to the taxiway serving the runway end, it may be satisfactory in other locations. Place holding bays to keep airplanes out of the OFZ and the runway safety area, as well as avoiding interference with instrument landing system operations.

b. Design. Figure 4-8 shows some typical holding bay configurations. Paving the area between dual parallel taxiways may provide an acceptable holding bay.

410. TURNAROUNDS. A turnaround can serve as a combination holding bay and bypass taxiway, when it is not economically feasible to provide a parallel taxiway. The turnaround needs to extend far enough away from the runway so airplanes will be able to remain behind the hold line. Figure 4-9 shows a taxiway turnaround.

411. DUAL PARALLEL TAXIWAYS. To accommodate high-density traffic, airport planners should consider multiple access to runways. For example, to facilitate ATC handling when using directional flow releases, e.g., south departure, west departure, etc., airplanes may be selectively queued on dual (or even triple) parallel taxiways. A dual parallel taxiway need not extend the full length of runway. Crossover taxiways between dual parallel taxiways increase flexibility. See figure 4-10.

412. TAXIWAY BETWEEN PARALLEL RUNWAYS. A taxiway located between two parallel runways requires a centerline separation from each runway to meet the standard separation distance specified in table 2-1.

413. EXIT TAXIWAYS. Design and locate exit taxiways to meet the operational requirements of the airport.

a. Efficiency. Appendix 9 provides guidance on exit taxiway location utilization. AC 150/5060-5 provides guidance on the effect of exit taxiway location on runway capacity. Exit taxiways should permit free flow to the parallel taxiway or at least to a point where air traffic control considers the airplane clear of the runway.

b. Type. A decision to provide a right-angled exit taxiway or a standard acute-angled exit taxiway rests upon an analysis of the existing and contemplated traffic. The purpose of an acute-angled exit taxiway, commonly referred to as a "high speed exit," is to enhance airport capacity. However, when the design peak hour traffic is less than 30 operations (landings and takeoffs), a properly located right-angled exit taxiway will achieve an efficient flow of traffic.

c. Separation. The type of exit taxiway influences runway and taxiway separation. The standard runway-taxiway separations specified in tables 2-1 and 2-2 are satisfactory for right-angled exit taxiways. A separation distance of at least 600 feet (180 m) is necessary for an efficient acute-angled exit taxiway, which includes a reverse curve for "double-back" operations. The runway-taxiway separations specified in tables 2-1 and 2-2 are adequate for acute-angled exits where the taxiway traffic flow is in the direction of landing.

d. Configuration. Figure 4-1 illustrates the configuration for a right-angled exit taxiway. An entrance spiral of at least 30 degrees and 300 feet (90 m) in length should be provided. Figure 4-12 illustrates the standard acute-angled exit taxiway with a 30-degree angle of intersection and a 1,400-foot (420 m) entrance spiral. When runway capacity needs justify the additional cost, high-visibility taxiway centerline lights can be added and the exit taxiway widened by doubling the taxiway edge safety margin. These design enhancements will increase pilot acceptance of an exit. Figures 4-13 and 4-14 present a computer printout of layout data for a 1,400-foot (420 m) spiral exit using a program operable on IBM compatible equipment. Appendix 11 gives details on the availability of this program.

414. APRON TAXIWAYS AND TAXILANES. Requirements often exist to provide through-taxi routes across an apron and to provide access to gate positions or other terminal areas.

a. Apron Taxiways. Apron taxiways may be located either inside or outside the movement area. Apron taxiways require the same separations as other taxiways. When the apron taxiway is along the edge of the apron, locate its centerline inward from the apron edge at a distance equal to one-half of the width of the taxiway structural pavement. A shoulder is necessary along the outer edge in addition to the taxiway safety area and the separations specified in tables 2-1, 2-2, 2-3, and 4-1.

b. Taxilanes. Taxilanes are located outside the movement area. Taxilanes provide access from taxiways (usually an apron taxiway) to airplane parking positions and other terminal areas. When the taxilane is along the edge of the apron, locate its centerline inward from the apron edge at a distance equal to one-half of the width of the taxiway structural pavement and satisfy other apron edge taxiway criteria, i.e., a shoulder, safety area, and the separations specified in tables 2-1, 2-2, 2-3, and 4-1.

c. Visibility. Airport traffic control tower personnel require a clear line of sight to all apron taxiways under air traffic control (ATC). Although ATC is not responsible for controlling taxilane traffic, a clear line of sight to taxilanes is desirable.

415. END-AROUND TAXIWAYS. In an effort to increase operational capacity, airports have added dual and sometimes triple parallel runways, which can cause delays when outboard runway traffic has to cross active inboard runways to make its way to the terminal. To improve efficiency and provide a safe means of movement around the departure end of a runway, it might be feasible to construct a taxiway that allows aircraft to transition around the ends of the runway. This type of taxiway is called an End-Around Taxiway (EAT). Due to the safety critical nature of these operations, it is necessary for planners to work closely with the FAA prior to considering the use of an EAT. EATs should be done only to enhance safety and capacity. Before EAT projects are proposed and feasibility studies and/or design started, they must be pre-approved by the FAA Office of Airport Safety and Standards, Airport Engineering Division (AAS-100). Submission for project approval is through the local Airports District Office for coordination with the approval authority (AAS-100). See figure 4-15.

a. Design Considerations. End-around taxiways must remain outside of the standard runway safety area (RSA), which extends 1,000 feet along the centerline extended of the departure end of the runway (DER). In addition, the EAT must be entirely outside of the ILS critical area. An airspace study for each site should be performed to verify if the tail height of the critical design group aircraft operating on the EAT does not penetrate any FAA Order 8260.3 TERPS surface and meets the requirements of 14 CFR 121.189 for the net takeoff flight path to clear all obstacles either by a height of at least 35 feet vertically, or by at least 200 feet horizontally within the airport boundaries.

b. Visual Screen. The placement and configuration of EATs must take into account additional

restrictions to prevent interfering with navigational aids, approaches and departures from the runway(s) with which they are associated. In order to avoid potential issues where pilots departing from a runway with an EAT might mistake an aircraft taxiing on the EAT for one actually crossing near the departure end of the runway, a visual screen type device may be required, depending on the elevation changes at a specific location. Through a partial or complete masking effect, the visual screen will enable pilots to better discern when an aircraft is crossing the active runway versus operating on the EAT. The intent is to eliminate any false perceptions of runway incursions, which could lead to unnecessary aborted takeoffs, and alert pilots to actual incursion situations. A visual screen is required for any new EAT unless the elevation of the EAT centerline, at a point in line with the extended runway centerline, is at least 29 feet below the elevation at the DER, so the terrain creates a natural masking of the aircraft on the EAT. Research has shown that "masking" is accomplished at a height where a critical design group aircraft's wing-mounted engine nacelle would be blocked from view, as discerned from the V-1 point during take-off. DO not locate the visual screen structure within any runway safety area, taxiway obstacle free zone, critical ILS area, or should it penetrate the inner approach OFZ, the approach light plane or other TERPS surfaces.

(1) Screen Sizing. The size of the EAT visual screen is dependent on the runway geometry, the size of the critical design group aircraft operating at that particular airport (on both the departing and EAT), and the elevation relationship between the EAT and the departing runway.

(a) Horizontal Geometry. The width of the screen should be designed to be perceived to originate and end at the taxiway/runway hold line(s) at the DER from a position on the runway equivalent to V1 (take-off decision speed under maximum conditions) for the critical design group aircraft. In order to calculate the screen width, the distance to where the screen will be located beyond the runway end must first be determined. From the runway centerline location of V1 for the design aircraft, lines are drawn through the runway hold line position closest to the DER (normally derived from the Aircraft Holding Position Location in Advisory Circular 150/5340-18) and extended until they intersect with a line perpendicular to the runway at the screen location. See figure 4-16. Use the formula in Figure 4-17 to calculate the width of the visual screen.

(b) Vertical Geometry. The vertical height of the screen must be designed so the top of the screen will mask that portion of an aircraft that extends up to where the top of a wing-mounted engine nacelle would be of a critical design group aircraft taxiing on the EAT, as viewed from the cockpit of the same design group aircraft at the typical V1 point on the departure runway. In a situation where the EAT and the DER elevation are the same, the lower edge of the visual panels should be at the same vertical height as the centerline of the DER. The visual panels of the screen should extend from that point, up to the heights shown in table 4-4, depending on the design group aircraft. For the higher design groups, it is permissible to have the lower limit of the visual screen up to two (2) feet above the DER elevation, as shown in table 4-4. Variations in terrain at the site where the screen is to be constructed will need to be considered, and they may result in the screen being a sizeable distance off the ground. In the event the EAT and DER are at different elevations, either higher or lower, the overall screen height will have to be adjusted to ensure the same masking capability. Tables 4-5, 4-6, and 4-7 provide guidance on determining the height of the visual screen for the respective design groups if the elevation of the EAT is below the elevation of the DER. If the EAT is lower than 29 feet in elevation as compared to the centerline of the DER, a screen is not required. Table 4-8 provides guidance on determining the height of the visual screen for design groups 3 through 6 if the elevation of the EAT is above the elevation of the DER. It may be feasible to grade the site of the visual screen to allow for an additional 2-foot separation between the visual screen panels and the ground for mowing access.

(2) Screen Construction. The visual screen must be constructed to perform as designed and be durable, resistant to weather, frangible, and resistant to excessive wind speeds. The visual screen comprises foundations, frame, connection hardware, and front panels.

(a) Foundations. The foundation of the screen structure should be sufficient to hold the visual screen in position. The base of the foundation should have a sufficient mow strip around it to provide a safety buffer between mowing equipment and the screen structure.

(b) Frame. The frame structure of the screen should be constructed so it is durable, able to withstand wind loading, and frangible in construction. Figure 4-18 illustrates three methods for constructing the frame structure, depending on the overall height of the structure. The visual screen structure should be constructed to allow the front panels of the screen to be angled upward 12 (±1°) degrees from the vertical plane. All connections within the frame structure, the panels, and the foundations should be designed to break away from the structure in the event an aircraft impacts them.

(c) Front Panel. The front panel of the visual screen should be designed so it is conspicuous from the runway side of the screen. The front panel should be constructed of aluminum honeycomb material, as described in the next paragraph. The replaceable front panels should be 12 feet long and 4

feet high and attached to the frame structure so as to allow easy replacement if necessary. See figure 4-19.

(i) Aluminum Honeycomb Performance Criteria. The screen panels should be constructed of aluminum honeycomb material, as described in this section. The front panel of the screen should be constructed of 4-foot-tall panels, with the remaining difference added as required. For example, three 4-foot-high panels plus one 1-foot-tall panel would be used to create a 13-foot-tall screen. These panels should be undersized by 0.50 inches to allow for thermal and deflection movements. The front and back panel faces should be specified to meet the required deflection allowance and should be a minimum 0.04 inches thick. The honeycomb material should be of sufficient thickness to meet the required deflection allowance, but should not be more than 3 inches thick. The internal aluminum honeycomb diameter should be of sufficient strength to meet the required deflection allowance, but should not be more than 0.75 inches in diameter. The panel edge closures should be of aluminum tube that is 1 inch times the thickness of the honeycomb and sealed. The deflection allowance for the screen is 0.50 inches maximum at the center of the panel when supported by four points at the corner of the panel. The panel faces should have a clear anodized finish on both front and back. The wind-loading deflection should be as specified in table 4-9.

(ii) Pattern. The front panel of the screen should visually depict a continuous, alternating red and white, diagonal striping of 12-foot-wide stripes set at a 45-degree angle ± five (5) degrees, sloped either all to the left or all to the right. To provide maximum contrast, the slope of the diagonal striping on the screen should be opposite the slope of aircraft tails operating in the predominant flow on the EAT, as shown in Figure 4-20.

(iii) Color. The front panel of the screen should be reflective red and white. The colors of the retroreflective sheeting used to create the visual screen must conform to Chromaticity Coordinate Limits shown in table 4-10, when measured in accordance with Federal Specification FP-85, Section 718.01(a), or ASTM D 4956.

(iv) Reflectivity. The surface of the front panel should be reflective on the runway side of the screen. Measurements should be made in accordance with ASTM E810, *Standard Test Method for Coefficient of Retro-reflection of Retro-reflective Sheeting*. The sheeting must maintain at least 90 percent of its values, as shown in table 4-11, with water falling on the surface, when measured in accordance with the standard rainfall test of FP-85, Section 718.02(a), and Section 7.10.0 of AASHTO M 268.

(v) Adhesion. The screen surface material must have a pressure-sensitive adhesive, which conforms to adhesive requirements of FP-85 (Class 1) and ASTM D 4956 (Class 1). The pressure-sensitive adhesive is recommended for application by hand or with a mechanical squeeze roller applicator. This type adhesive lends itself to large-scale rapid production of signs. Applications should be made with sheeting and substrate at temperatures above 65° F (18°C).

(3) Environmental Performance. The front panel of the screen surface material and all its required components must be designed for continuous outdoor use under the following conditions:

(a) Temperature. Screen surface material must withstand the following ambient temperature ranges: -4 degrees to +131 degrees F (-20 degrees to +55 degrees C).

(b) Wind Loading. The screen must be able to sustain exposure to wind velocities of at least 90 mph or the appropriate velocity rating anticipated for the specific airport location, whichever is greater.

(c) Rain. The screen surface material must withstand exposure to wind-driven rain.

(d) Sunlight. The screen surface material must withstand exposure to direct sunlight.

(e) Lighting. If required, the top edge of the visual screen should be illuminated with steady burning, L-810 FAA-approved obstruction lighting, as provided in the current version of AC 150/5345-43, and positioned as specified in paragraph 58(b) of the current version of AC 70/7460-1.

(4) Provision for Alternate Spacing of Visual Screen. If access is needed through the area where the visual screen is constructed, various sections of the screen may be staggered up to 50 feet from each other, as measured from the runway end, so an emergency vehicle can safely navigate between the staggered sections of screen. The sections of screen must be overlapped so the screen appears to be unbroken when viewed from the runway, at the V1 takeoff position.

(5) Frangibility. The screen structure, including all of its components, should be of the lowest mass possible to meet the design requirements so as to minimize damage should the structure be impacted. The foundations at ground level should be designed so they will shear on impact, the vertical supports should be designed so they will give way, and the front panels should be designed so they will release from the screen structure if impacted. The vertical support posts should be tethered at the base so they will not tumble when struck. Figure 4-21 provides information on how this level of frangibility can be achieved.

(6) Navigational Aid Consideration. The following considerations should be given when determining

the siting and orientation of the visual screen. The visual screen may have adverse affects on navigational aids if it is not sited properly. The uniqueness and complexity of the airport siting environment requires that all installations be addressed on a case-by-case basis, so mitigations can be developed to ensure the installation of the visual screen does not significantly navigational aid performance.

(a) Approach Light Plane. No part of the visual screen may penetrate the approach light plane.

(b) Radar Interference. Research has shown that a visual screen erected on an airport equipped with Airport Surface Detection Equipment (ASDE) may reflect signals that are adverse to the ASDE operation. To avoid this, the visual screen should be tilted back/away (on the side facing the ASDE) 12 degrees (±1°). This will minimize or eliminate false radar targets generated by reflections off the screen surface. Examples of this tilting are shown in figure 4-18.

(c) Instrument Landing System (ILS) Interference. Research has shown that the presence of visual screens on a runway instrumented with an ILS system (localizer and glide slope) will generally not affect or interfere with the operation of the system. An analysis must be performed for glide slopes, especially null reference glide slopes, prior to the installation of the screens. The uniqueness and complexity of the airport siting environment requires that all installations be addressed on a case-by-case basis, so mitigations can be developed to ensure the installation of the visual screen does not significantly impact the performance of the ILS.

416. to 499. RESERVED.

Table 4-1. Taxiway dimensional standards

ITEM	DIM 1/	AIRPLANE DESIGN GROUP					
		I	II	III	IV	V	VI
Taxiway Width	W	25 ft	35 ft	50 ft 2/	75 ft	75 ft	100 ft
		7.5 m	10.5 m	15 m 2/	23 m	23 m	30 m
Taxiway Edge Safety Margin 3/		5 ft	7.5 ft	10 ft 4/	15 ft	15 ft	20 ft
		1.5 m	2.25 m	3 m 4/	4.5 m	4.5 m	6 m
Taxiway Pavement Fillet Configuration		- Refer to Table 4-2 -					
Taxiway Shoulder Width		10 ft	10 ft	20 ft	25 ft	35 ft 5/	40 ft 5/
		3 m	3 m	6 m	7.5 m	10.5 m 5/	12 m 5/
Taxiway Safety Area Width	E	49 ft	79 ft	118 ft	171 ft	214 ft	262 ft
		15 m	24 m	36 m	52 m	65 m	80 m
Taxiway Object Free Area Width		89 ft	131 ft	186 ft	259 ft	320 ft	386 ft
		27 m	40 m	57 m	79 m	97 m	118 m
Taxilane Object Free Area Width		79 ft	115 ft	162 ft	225 ft	276 ft	334 ft
		24 m	35 m	49 m	68 m	84 m	102 m

1/ Letters correspond to the dimensions on figures 2-1 and 4-1.

2/ For airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet (18 m), the standard taxiway width is 60 feet (18 m).

3/ The taxiway edge safety margin is the minimum acceptable distance between the outside of the airplane wheels and the pavement edge.

4/ For airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet (18 m), the taxiway edge safety margin is 15 feet (4.5 m).

5/ Airplanes in Airplane Design Groups V and VI normally require stabilized or paved taxiway shoulder surfaces.

Consideration should be given to objects near runway/taxiway/taxilane intersections, which can be impacted by exhaust wake from a turning aircraft.

The values obtained from the following equations may be used to show that a modification of standards will provide an acceptable level of safety. Refer to paragraph 6 for guidance on modification of standards requirements.

Taxiway safety area width equals the airplane wingspan;

Taxiway OFA width equals 1.4 times airplane wingspan plus 20 feet (6 m); and

Taxilane OFA width equals 1.2 times airplane wingspan plus 20 feet (6 m).

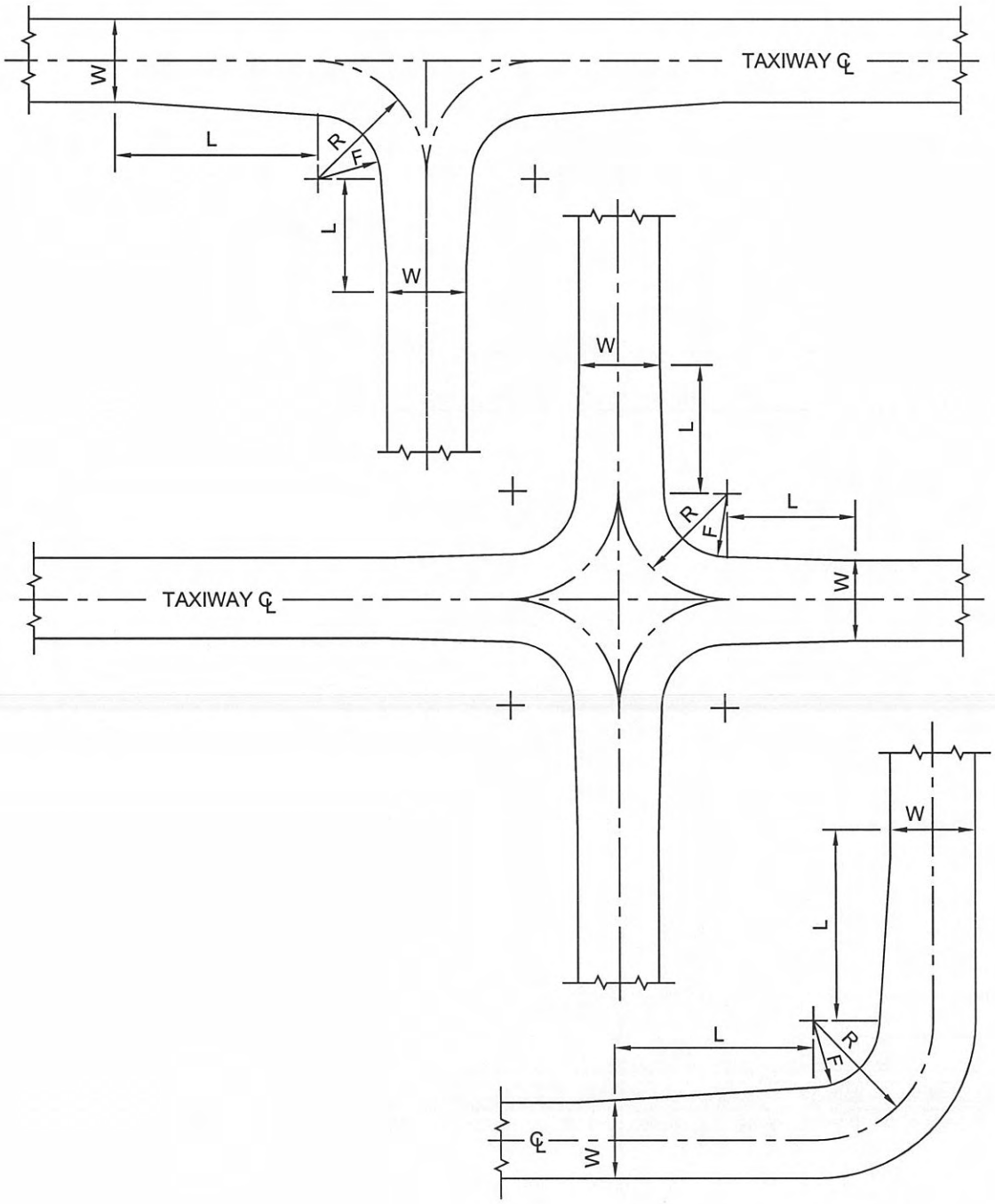


Figure 4-1. Taxiway intersection details

Table 4-2. Taxiway fillet dimensions

ITEM	DIM 1/	AIRPLANE DESIGN GROUP					
		I	II	III 2/	IV	V	VI
Radius of Taxiway Turn 3/	R	75 ft 22.5 m	75 ft 22.5 m	100 ft 30 m	150 ft 45 m	150 ft 45 m	170 ft 51 m
Length of Lead-in to Fillet	L	50 ft 15 m	50 ft 15 m	150 ft 45 m	250 ft 75 m	250 ft 75 m	250 ft 75 m
Fillet Radius for Tracking Centerline	F	60 ft 18 m	55 ft 16.5 m	55 ft 16.5 m	85 ft 25.5 m	85 ft 25.5 m	85 ft 25.5 m
Fillet Radius for Judgmental Oversteering Symmetrical Widening 4/	F	62.5 ft 18.75 m	57.5 ft 17.25 m	68 ft 20.4 m	105 ft 31.5 m	105 ft 31.5 m	110 ft 33 m
Fillet Radius for Judgmental Oversteering One Side Widening 5/	F	62.5 ft 18.75 m	57.5 ft 17.25 m	60 ft 18 m	97 ft 29 m	97 ft 29 m	100 ft 30 m

1/ Letters correspond to the dimensions on figure 4-1.

2/ Airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet (18 m) should use a fillet radius of 50 feet (15 m).

3/ Dimensions for taxiway fillet designs relate to the radius of taxiway turn specified. Figures 4-2 and 4-3 show taxiway fillet designs that provide the standard taxiway edge safety margin for a range of wheelbase and undercarriage width combinations. Custom-designed pavement fillet are necessary when the specified "R" or the undercarriage (also undercarriage to cockpit) dimensions fall outside of the standard taxiway edge safety margin of figures 4-2 and 4-3. The equations in appendix 10 or the use of a computer program offer this ability. Appendix 11 gives details on availability of this program.

4/ The center sketch of figure 4-1 displays pavement fillets with symmetrical taxiway widening.

5/ The lower sketch of figure 4-1 displays a pavement fillet with taxiway widening on one side.

Table 4-3. Wingtip clearance standards

ITEM	DIM	AIRPLANE DESIGN GROUP					
		I	II	III	IV	V	VI
Taxiway Wingtip Clearance		20 ft 6 m	26 ft 8 m	34 ft 10.5 m	44 ft 13.5 m	53 ft 16 m	62 ft 19 m
Taxilane Wingtip Clearance		15 ft 4.5 m	18 ft 5.5 m	22 ft 6.5 m	27 ft 8 m	31 ft 9.5 m	36 ft 11 m

The values obtained from the following equations may be used to show that a modification of standards will provide an acceptable level of safety. Refer to paragraph 6 for guidance on modification of standards requirements.

Taxiway wingtip clearance equals 0.2 times airplane wingspan plus 10 feet (3 m) and

Taxilane wingtip clearance equals 0.1 times airplane wingspan plus 10 feet (3 m).

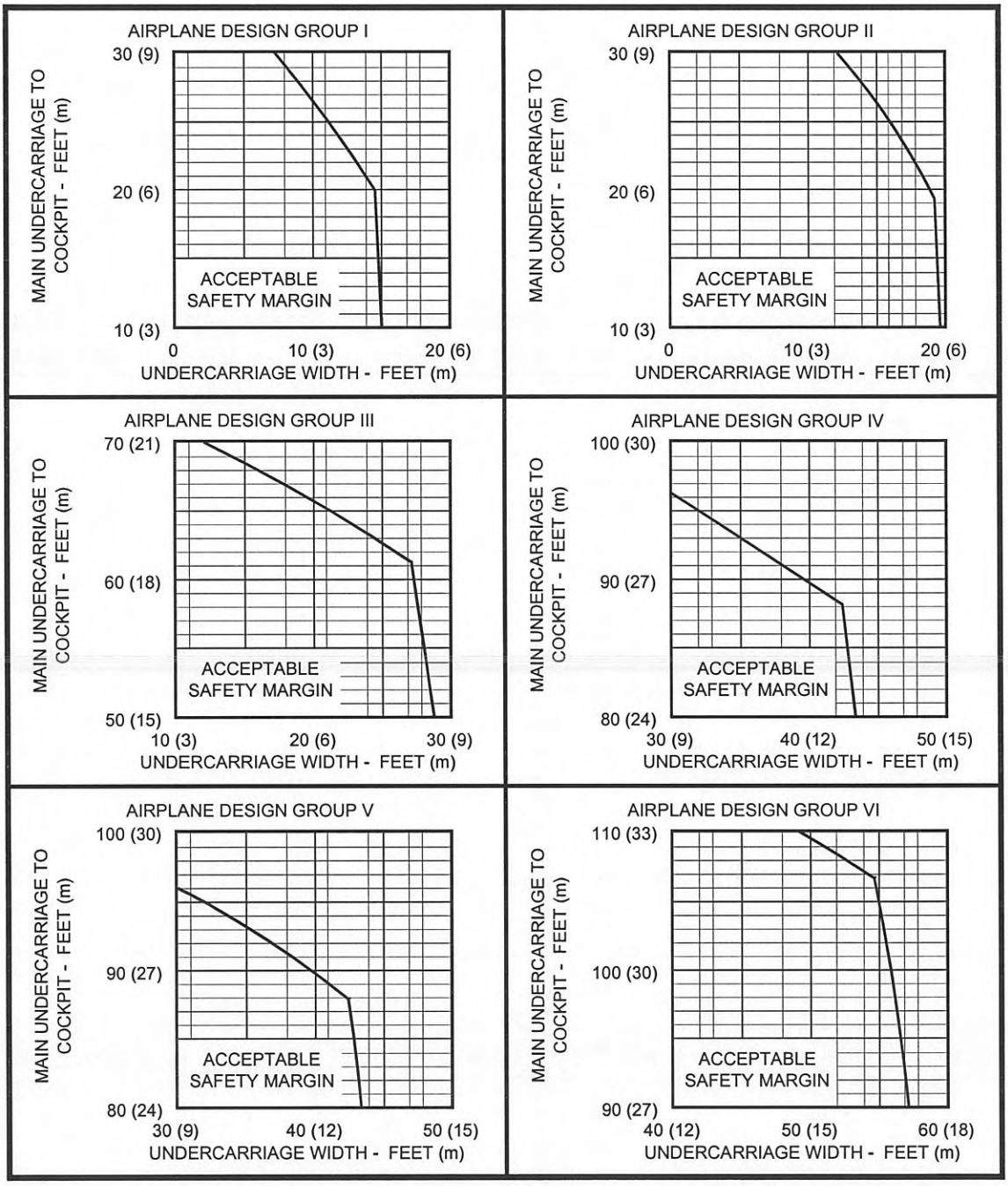


Figure 4-2. Maintaining cockpit over centerline

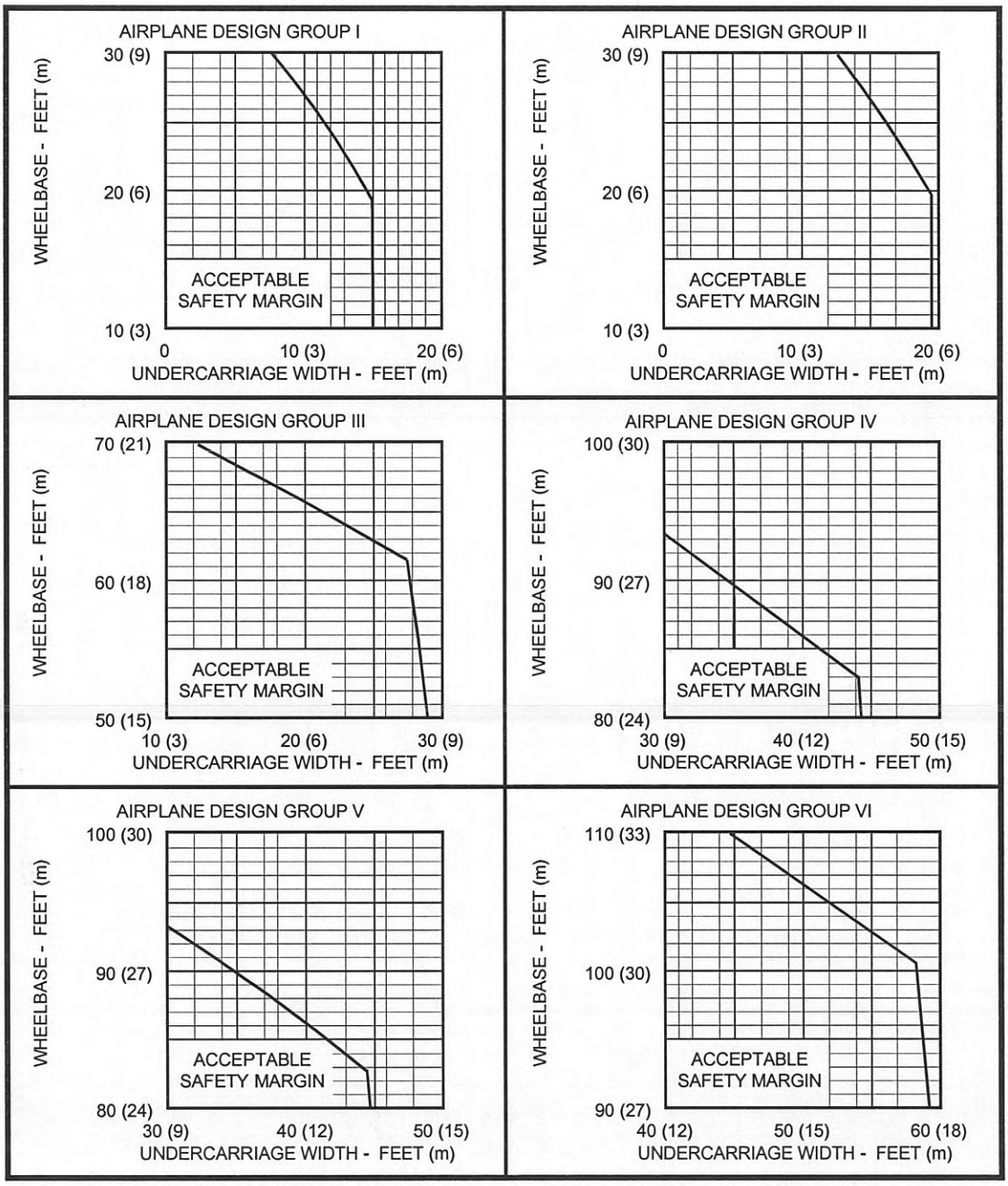


Figure 4-3. Judgmental oversteering

OFFSET DISTANCES ON A TAXIWAY INTERSECTION OR CURVE

Airplane wheelbase	84.000
Center of airplane cockpit to nosewheel	6.000
Airplane undercarriage width [1.15 x main gear track]	41.000
Taxiway edge safety margin	15.000
Taxiway width	75.000

AIRPLANE COCKPIT ON CENTERLINE

Entrance Station	0.000	Radius	150.000
Tangent Length	**********		
Intersection Angle	180.00000	Curve Length	471.239
Tangent Length	**********		
Exit Station	471.239	Radius	150.000

Entrance Station	471.239
Tangent Length	328.761
Exit Station	800.000

STATION	LEFT OFFSET	RIGHT OFFSET	STEERING ANGLES	X COORDINATE	Y COORDINATE	CENTERLINE ANGLE
0.000	43.57	28.58	0.000	0.000	0.000	0.00000
50.000	51.88	19.58	14.676	49.079	8.256	19.09859
100.000	56.92	15.00	23.246	92.755	32.117	38.19718
150.000	60.05	15.00	28.382	126.221	68.955	57.29577
200.000	62.03	15.00	31.528	145.791	114.714	76.39436
250.000	63.28	15.00	33.486	149.311	164.359	95.49295
300.000	64.08	15.00	34.717	136.395	212.422	114.59153
350.000	64.59	15.00	35.496	108.463	253.614	133.69012
400.000	64.74	15.00	35.992	68.591	283.399	152.78871
450.000	61.62	15.00	36.308	21.168	298.499	171.88730
471.239	58.29	15.00	36.405	0.000	300.000	180.00000
471.239	58.29	15.00	36.405	0.000	300.000	180.00000
500.000	51.79	19.88	26.870	-28.761	300.000	180.00000
550.000	44.70	26.51	15.609	-78.761	300.000	180.00000
600.000	40.74	30.32	8.993	-128.761	300.000	180.00000
650.000	38.50	32.52	5.167	-178.761	300.000	180.00000
700.000	37.22	33.79	2.966	-228.761	300.000	180.00000
750.000	0.00	0.00	1.702	-278.761	300.000	180.00000
800.000	0.00	0.00	0.977	-328.761	300.000	180.00000

NOTE: The offset distance is a perpendicular distance measured from the taxiway centerline. The hard surface needs to be widened at stations where the offset distance extends beyond the hard surface.

REFERENCE: AC 150/5300-13, AIRPORT DESIGN.

Figure 4-4. Example of pavement fillet computer program printout

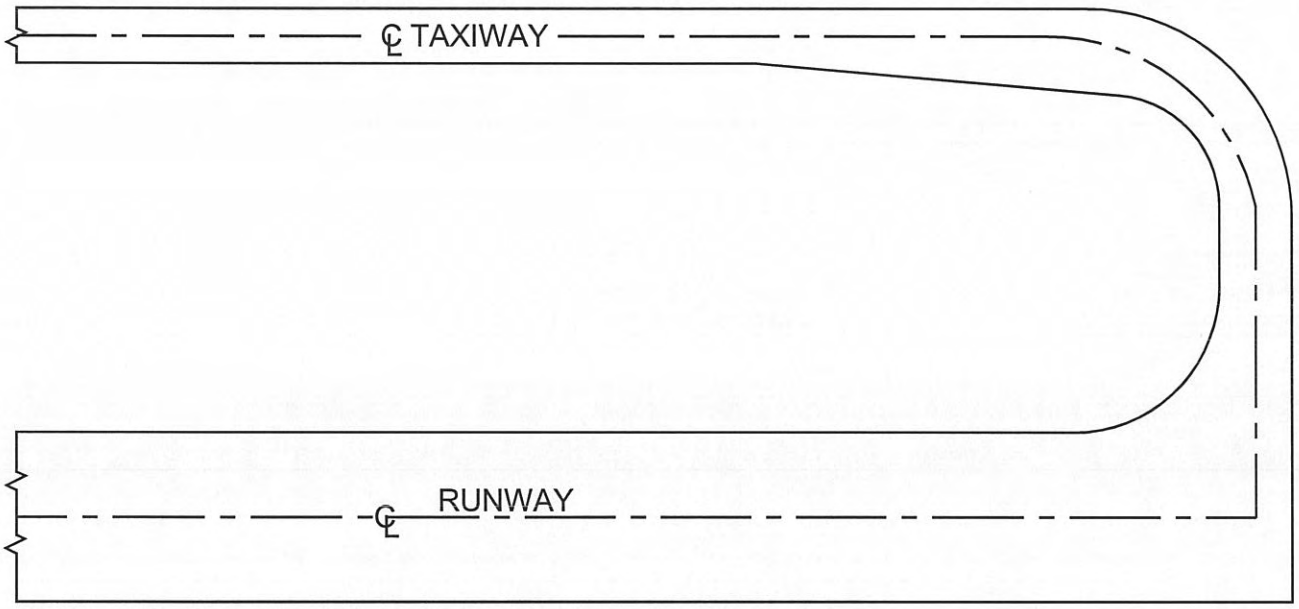


Figure 4-5. Entrance taxiway

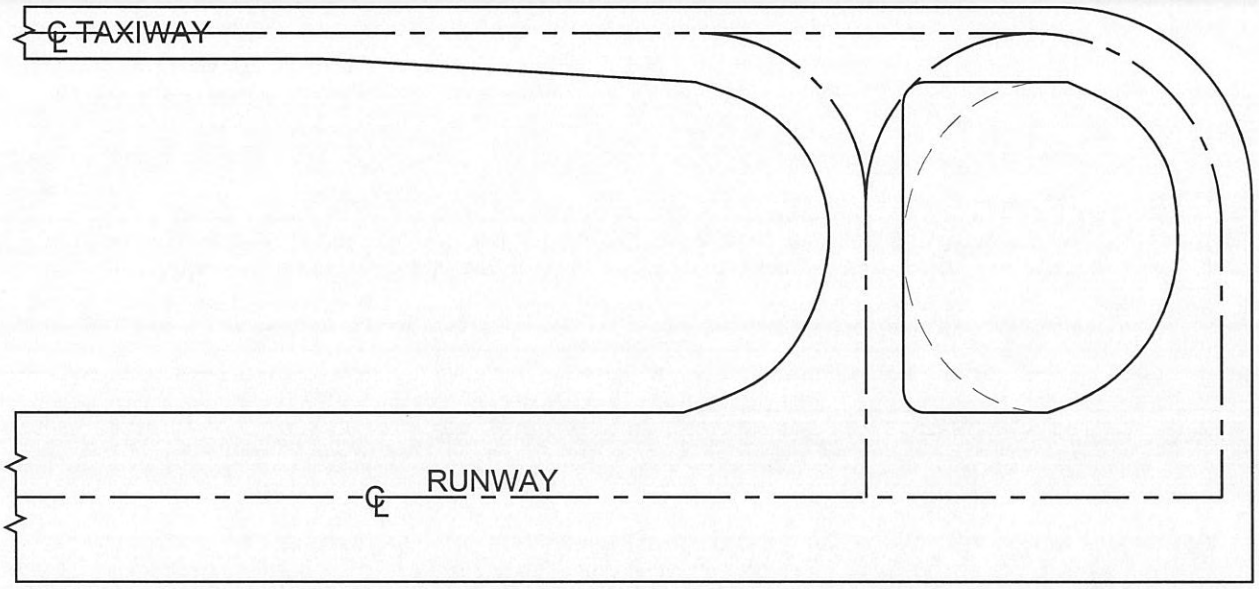
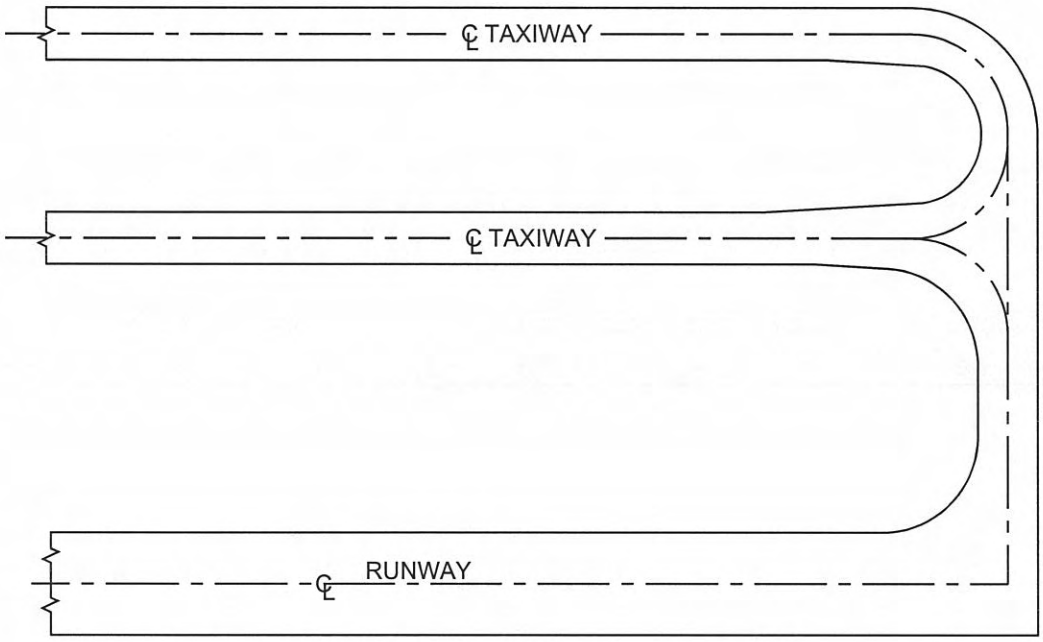


Figure 4-6. Bypass taxiway



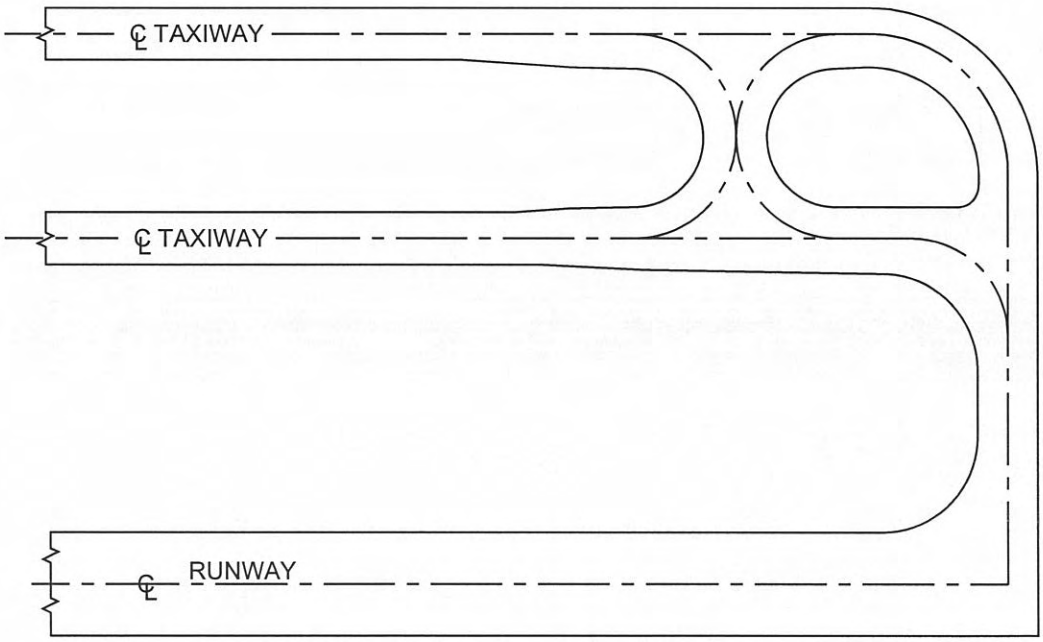


Figure 4-7. Dual parallel taxiway entrance

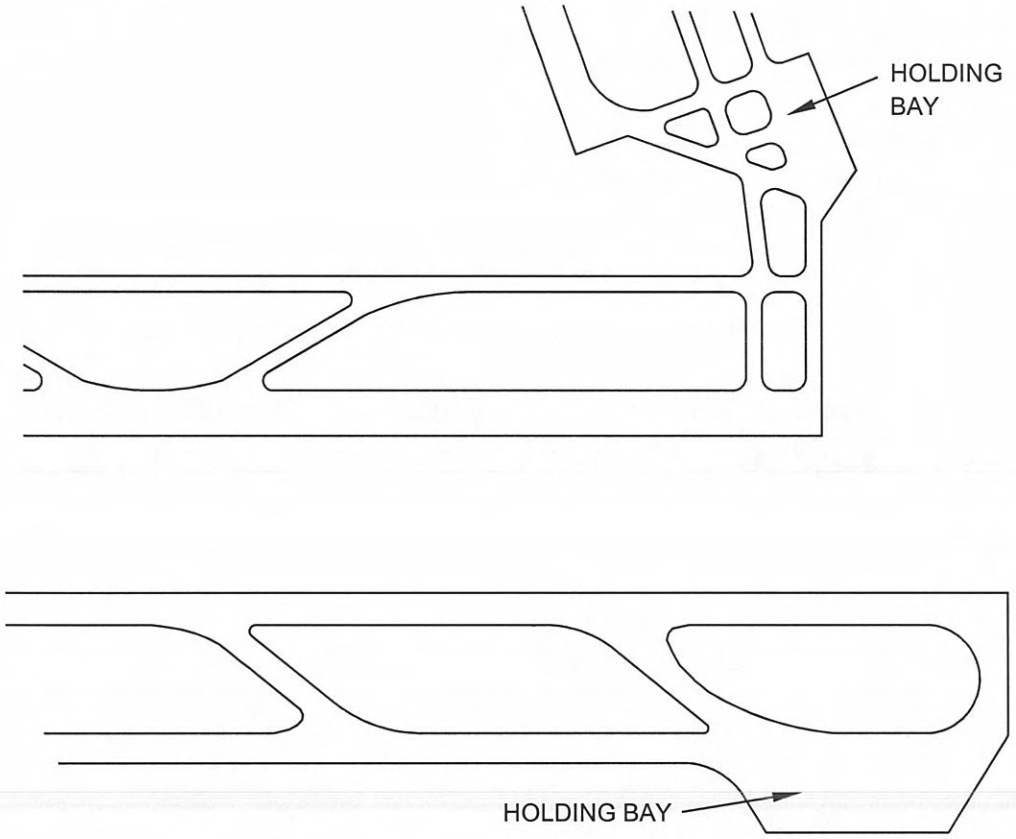


Figure 4-8. Typical holding bay configurations

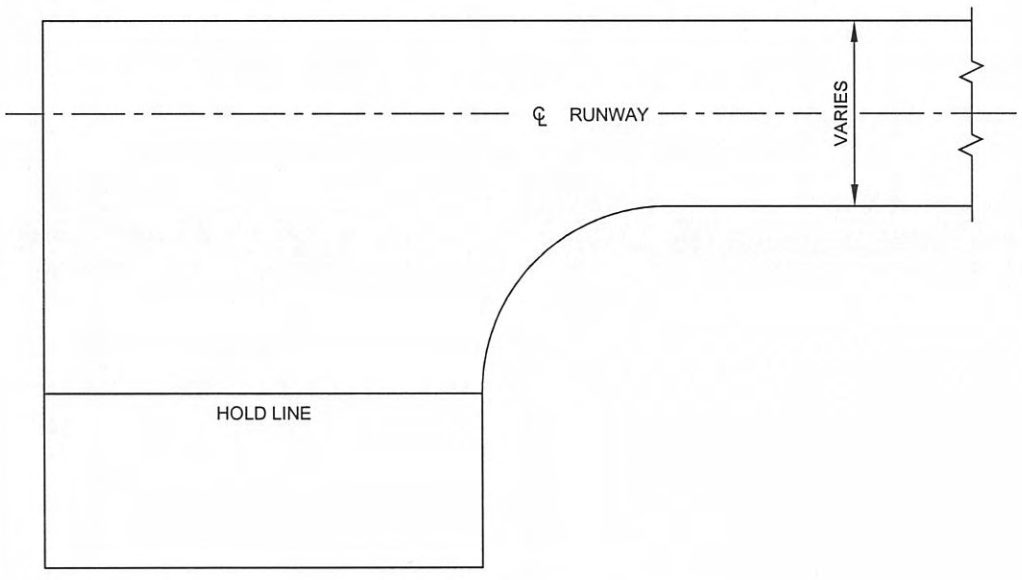


Figure 4-9. Taxiway turnaround

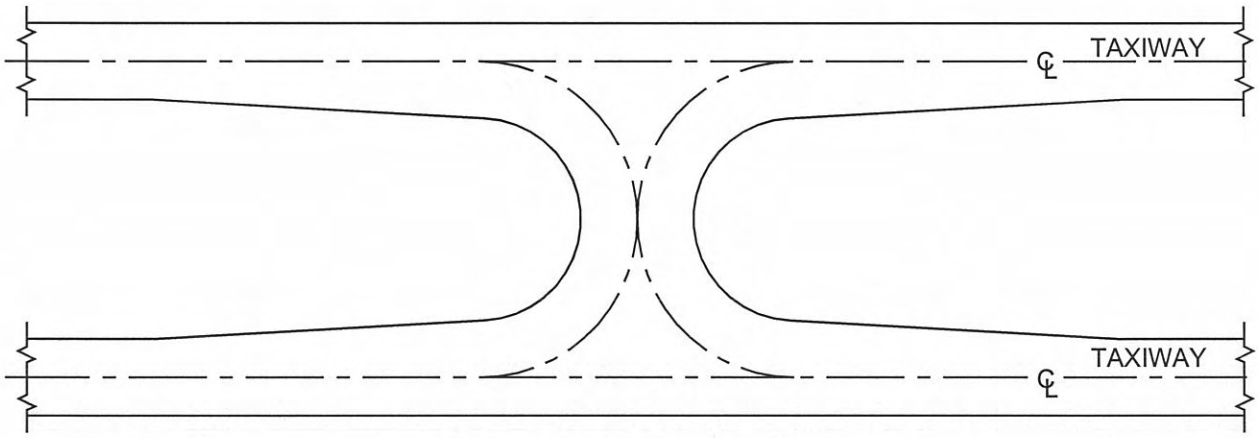


Figure 4-10. Crossover taxiway

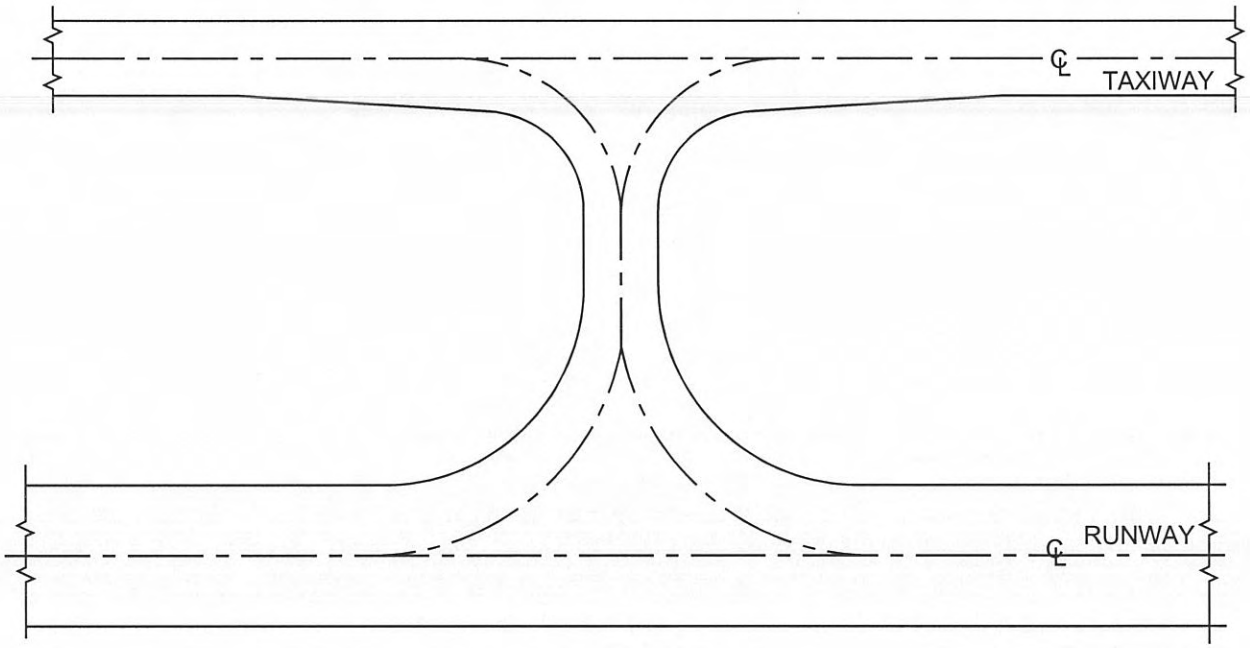


Figure 4-11. Right-angled exit taxiway

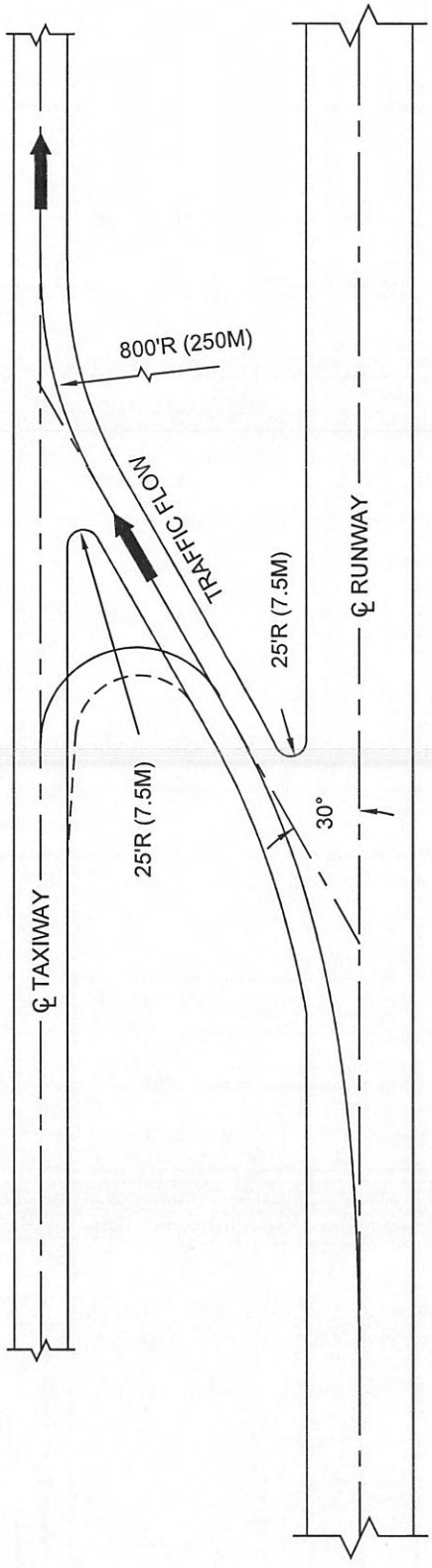


Figure 4-12. Acute-angled exit taxiway

OFFSET DISTANCES ON A RAPID RUNOFF EXIT TAXIWAY

Airplane wheelbase	84.000
Center of airplane cockpit to nosewheel	6.000
Airplane undercarriage width [1.15 x main gear track]	41.000
Taxiway edge safety margin	15.000
Taxiway width	75.000
Runway width	150.000
Runway centerline to parallel taxiway centerline	600.000

AIRPLANE COCKPIT ON CENTERLINE

Entrance Station	0.000		
Tangent Length	947.098		
Intersection Angle	30.00000	Spiral Length	1400.000
Tangent Length	479.205		
Exit Station	1400.000	Radius	1336.902
Entrance Station	1400.000		
Tangent Length	506.435		
Exit Station	1906.435		
Entrance Station	1906.435	Radius	800.000
Tangent Length	214.359		
Intersection Angle	-30.00000	Curve Length	418.879
Tangent Length	214.359		
Exit Station	2325.314	Radius	800.000
Entrance Station	2325.314		
Tangent Length	274.686		
Exit Station	2600.000		

STATION	LEFT OFFSET	RIGHT OFFSET	STEERING ANGLES	X COORDINATE	Y COORDINATE	CENTERLINE ANGLE
0.000	75.01	74.99	0.000	0.000	0.000	0.00000
50.000	75.06	74.94	0.032	50.000	0.011	0.03827
100.000	75.13	74.86	0.109	100.000	0.089	0.15306
150.000	75.20	74.76	0.212	149.999	0.301	0.34439
200.000	75.27	74.63	0.330	199.998	0.712	0.61224
250.000	75.33	74.49	0.456	249.993	1.391	0.95663
300.000	75.37	74.32	0.587	299.983	2.404	1.37755
350.000	75.38	74.12	0.721	349.963	3.818	1.87500
400.000	75.36	73.89	0.857	399.927	5.698	2.44898
450.000	75.31	73.62	0.994	449.868	8.113	3.09949
500.000	75.22	73.31	1.131	499.777	11.127	3.82653
550.000	75.09	72.96	1.268	549.641	14.808	4.63010
600.000	74.90	72.57	1.406	599.445	19.222	5.51020
650.000	74.67	72.11	1.543	649.172	24.432	6.46684
700.000	74.38	71.61	1.681	698.802	30.506	7.50000
750.000	74.02	71.04	1.819	748.308	37.506	8.60969
800.000	73.61	70.40	1.956	797.665	45.497	9.79592

Figure 4-13. Example of acute-angled exit taxiway computer layout data page 1

850.000	73.12	69.70	2.094	846.839	54.541	11.05867
900.000	72.56	68.92	2.232	895.795	64.699	12.39796
950.000	71.92	68.07	2.370	944.493	76.031	13.81378
1000.000	71.20	67.13	2.508	992.887	88.595	15.30612
1050.000	70.40	66.11	2.646	1040.928	102.447	16.87500
1100.000	69.51	65.00	2.784	1088.562	117.640	18.52041
1150.000	68.52	63.80	2.921	1135.729	134.227	20.24235
1200.000	67.45	62.51	3.059	1182.363	152.255	22.04082
1250.000	66.27	61.11	3.197	1228.396	171.768	23.91582
1300.000	64.99	59.62	3.335	1273.752	192.807	25.86735
1350.000	63.53	58.11	3.473	1318.349	215.408	27.89541
1400.000	61.32	57.15	3.611	1362.102	239.603	30.00000
1400.000	61.32	57.15	3.611	1362.102	239.603	30.00000
1450.000	58.78	56.38	2.072	1405.404	264.603	30.00000
1500.000	56.62	55.25	1.189	1448.705	289.603	30.00000
1550.000	54.68	53.89	0.682	1492.006	314.603	30.00000
1600.000	52.87	52.42	0.391	1535.307	339.603	30.00000
1650.000	51.13	50.87	0.225	1578.609	364.603	30.00000
1700.000	49.43	49.28	0.129	1621.910	389.603	30.00000
1750.000	47.75	47.66	0.074	1665.211	414.603	30.00000
1800.000	46.08	46.04	0.042	1708.512	439.603	30.00000
1850.000	44.35	44.48	0.024	1751.814	464.603	30.00000
1900.000	41.70	43.86	0.014	1795.115	489.603	30.00000
1906.435	41.24	43.91	0.013	1800.688	492.820	30.00000
1906.435	41.24	43.91	0.013	1800.688	492.820	30.00000
1950.000	38.43	43.96	-2.465	1838.991	513.565	26.87989
2000.000	36.05	43.54	-4.163	1884.266	534.763	23.29890
2050.000	34.28	42.90	-5.138	1930.776	553.092	19.71791
2100.000	32.94	42.21	-5.699	1978.341	568.480	16.13693
2150.000	31.94	41.58	-6.022	2026.774	580.867	12.55594
2200.000	31.21	41.08	-6.208	2075.886	590.205	8.97495
2250.000	30.75	40.72	-6.314	2125.485	596.457	5.39397
2300.000	31.03	40.03	-6.376	2175.378	599.599	1.81298
2325.314	31.82	39.22	-6.396	2200.688	600.000	0.00000
2325.314	31.82	39.22	-6.396	2200.688	600.000	0.00000
2350.000	32.70	38.32	-4.864	2225.374	600.000	0.00000
2400.000	33.89	37.12	-2.792	2275.374	600.000	0.00000
2450.000	34.58	36.43	-1.602	2325.374	600.000	0.00000
2500.000	34.97	36.03	-0.919	2375.374	600.000	0.00000
2550.000	0.00	0.00	-0.527	2425.374	600.000	0.00000
2600.000	0.00	0.00	-0.303	2475.374	600.000	0.00000

NOTE:. The offset distance is a perpendicular distance measured from the taxiway centerline. The hard surface needs to be widened at stations where the offset distance extends beyond the hard surface.

REFERENCE: AC 150/5300-13, AIRPORT DESIGN.

Figure 4-14. Example of acute-angled exit taxiway computer layout data page 2

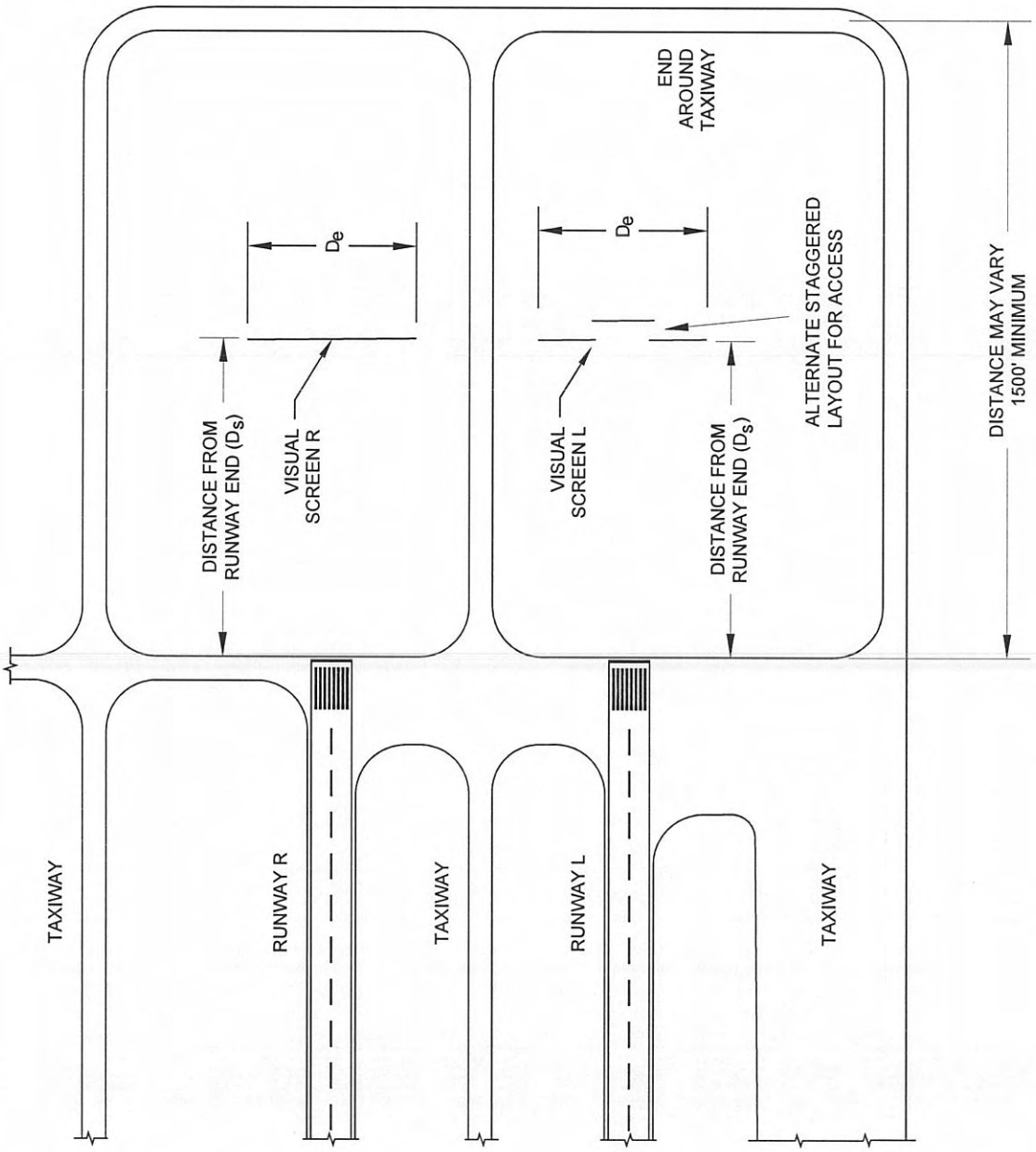


Figure 4-15. Typical end-around taxiway layout

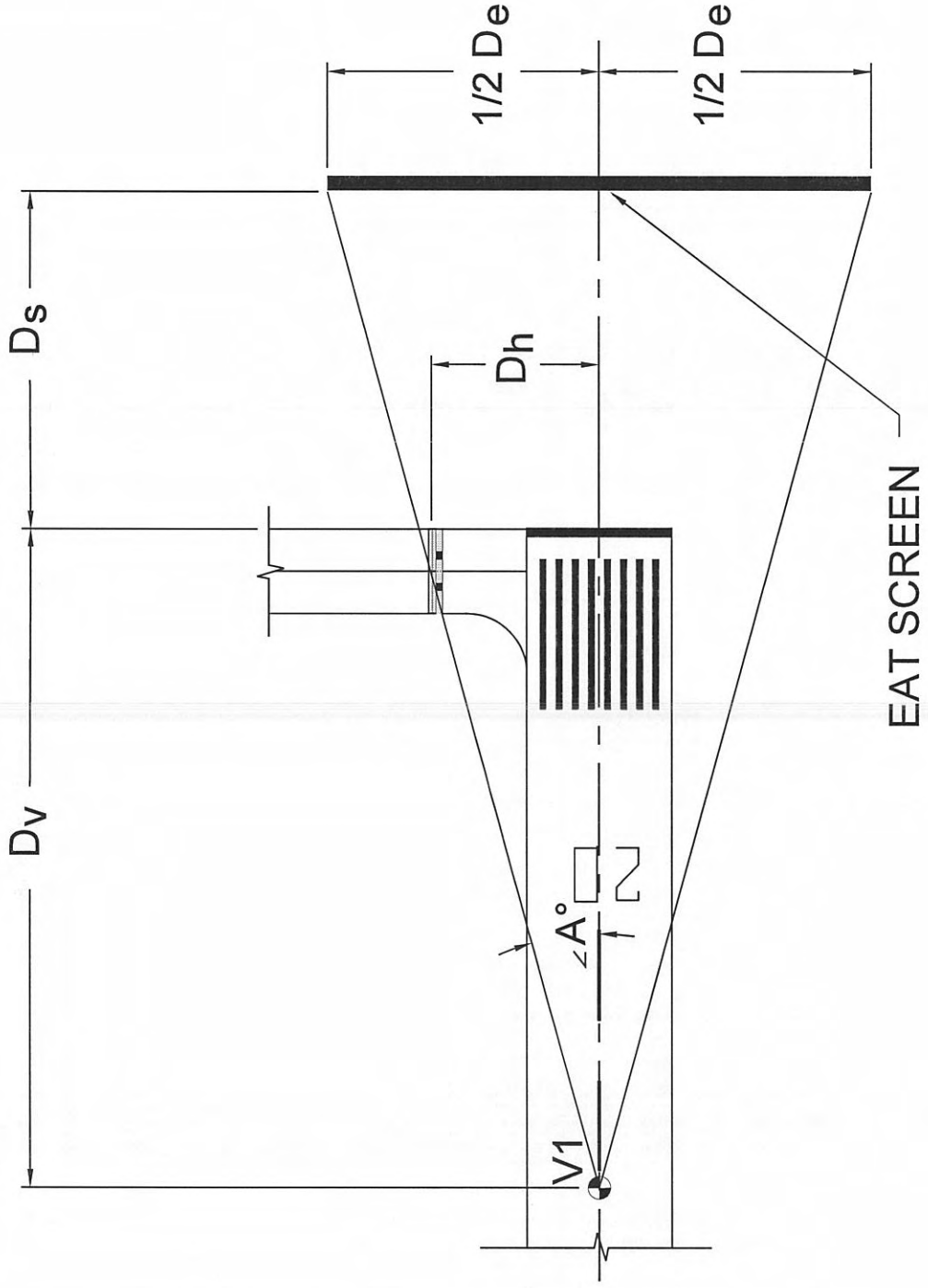


Figure 4-16. End-around taxiway visual screen width calculations

$$\angle A = \arctan\frac{D_h}{D_v}$$

$$\left(\tan \angle A(D_v + D_s)\right) = \frac{1}{2} D_e$$

Where: D_v = Distance from Average V1 location (defined in Federal Aviation Regulation 1.2 as takeoff decision speed) for Design Group aircraft to Departure Runway End.
D_s = Distance from Departure Runway End to the EAT Visual Screen Location
D_h = Distance from the Departure Runway End Centerline to the Centerline of Taxiway at Hold Position Marking
D_e = Total Width of EAT Visual Screen

Figure 4-17. Visual screen width calculation formula

Table 4-4. Visual screen height calculation formula (same elevation as runway)

EAT Visual Screen Height Calculation – EAT and Runway at Same Elevation

Design Group	Typical Design Group Engine Nacelle Height	Required Screen Surface Height	Required Height of Top Edge of Screen (Above Runway Centerline Elevation)
III	9 ft	10 ft	10 ft
IV	12 ft	13 ft	13 ft
V	18 ft	16 ft	18 ft
VI	18 ft	16 ft	18 ft

Table 4-5. Visual screen height calculation formula (EAT below DER elevation) for Design Group III

Design Group III Aircraft
EAT Visual Screen Height Calculation –
EAT At or Below DER Elevation

Elevation Difference (ft)	Required Screen Surface Height (ft)	Required Height of Top Edge of Screen (+ DER Centerline Elevation) (ft)
0	10	10
1	10	10
2	10	10
3	10	10
4	10	10
5	10	10
6	10	10
7	10	10
8	10	10
9	10	10
10	10	10
11	9	9
12	9	9
13	9	9
14	9	9
15	9	9
16	9	9
17	9	9
18	9	9
19	9	9
20	8	8
21	8	8
22	8	8
23	8	8
24	8	8
25	8	8
26	8	8
27	8	8
28	8	8
29+	0	0

Table 4-6. Visual screen height calculation formula (EAT below DER elevation) for Design Group IV

Design Group IV Aircraft
EAT Visual Screen Height Calculation –
EAT At or Below DER Elevation

Elevation Difference (ft)	Required Screen Surface Height (ft)	Required Height of Top Edge of Screen (+/- DER Centerline Elevation) (ft)
0	13	13
1	13	13
2	13	13
3	13	13
4	13	13
5	13	13
6	13	13
7	13	13
8	13	13
9	13	13
10	13	13
11	13	13
12	13	13
13	13	13
14	12	12
15	12	12
16	12	12
17	11	11
18	11	11
19	11	11
20	10	10
21	10	10
22	10	10
23	9	9
24	9	9
25	9	9
26	8	8
27	8	8
28	8	8
29+	0	0

Table 4-7. Visual screen height calculation formula (EAT below DER elevation) for Design Groups V and VI

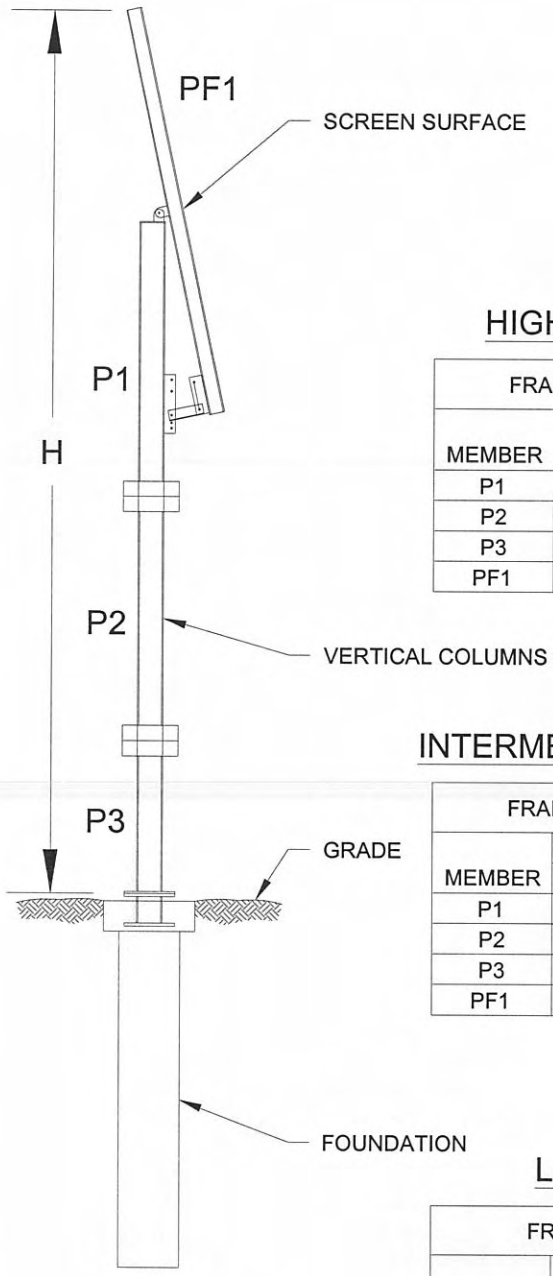
Design Group V and VI Aircraft
EAT Visual Screen Height Calculation –
EAT At or Below DER Elevation

Elevation Difference (ft)	Required Screen Surface Height (ft)	Required Height of Top Edge of Screen (+/- DER Centerline Elevation) (ft)
0	13	18
1	13	18
2	13	18
3	13	18
4	13	18
5	13	17
6	13	16
7	13	15
8	13	14
9	13	13
10	13	13
11	13	13
12	13	13
13	13	13
14	12	12
15	12	12
16	12	12
17	11	11
18	11	11
19	11	11
20	10	10
21	10	10
22	10	10
23	9	9
24	9	9
25	9	9
26	8	8
27	8	8
28	8	8
29+	0	0

Table 4-8. Visual screen vertical height calculation tables

Design Group III -VI Aircraft EAT Visual Screen Height Calculation – EAT Above DER Elevation

Design Group	Required Height of Top Edge of Screen (Above Runway Centerline Elevation) (ft)	Add Elevation Difference – EAT above DER	Calculate: NEW Required Height of Top Edge of Screen (Above DER Centerline Elevation) (ft)
III	10	+ Elevation Difference	= New Required Height of Top Edge of Screen
IV	13		
V	18		
VI	18		



HIGH FRAME ELEV: 26'<H≤32'

FRAMING SCHEDULE - VISUAL SCREEN 26'<H≤ 32'			
	WIND SPEED (MPH)		
MEMBER	90	130	150
P1	HSS 8x6x5/16	HSS 8x8x1/2	HSS 12x8x3/8
P2	HSS 10x6x1/2	HSS 12x8x9/16	HSS 16x8x1/2
P3	HSS 12x6x1/2	HSS 16x8x1/2	HSS 20x8x1/2
PF1	HSS 6x4x3/16	HSS 6x4x5/16	HSS 6x4x5/16

INTERMEDIATE FRAME ELEV: 18'<H≤26'

FRAMING SCHEDULE - VISUAL SCREEN 18'<H≤ 26'			
	WIND SPEED (MPH)		
MEMBER	90	130	150
P1	HSS 8x6x5/16	HSS 8x8x1/2	HSS 12x8x3/8
P2	HSS 10x6x1/2	HSS 12x8x9/16	HSS 16x8x1/2
P3			
PF1	HSS 6x4x3/16	HSS 6x4x5/16	HSS 6x4x5/16

LOW FRAME ELEV: H≤18'

FRAMING SCHEDULE - VISUAL SCREEN H≤18'			
	WIND SPEED (MPH)		
MEMBER	90	130	150
P1	HSS 8x6x5/16	HSS 8x8x1/2	HSS 12x8x3/8
P2			
P3			
PF1	HSS 6x4x3/16	HSS 6x4x5/16	HSS 6x4x5/16

Figure 4-18. Examples of mounting screen to vertical column

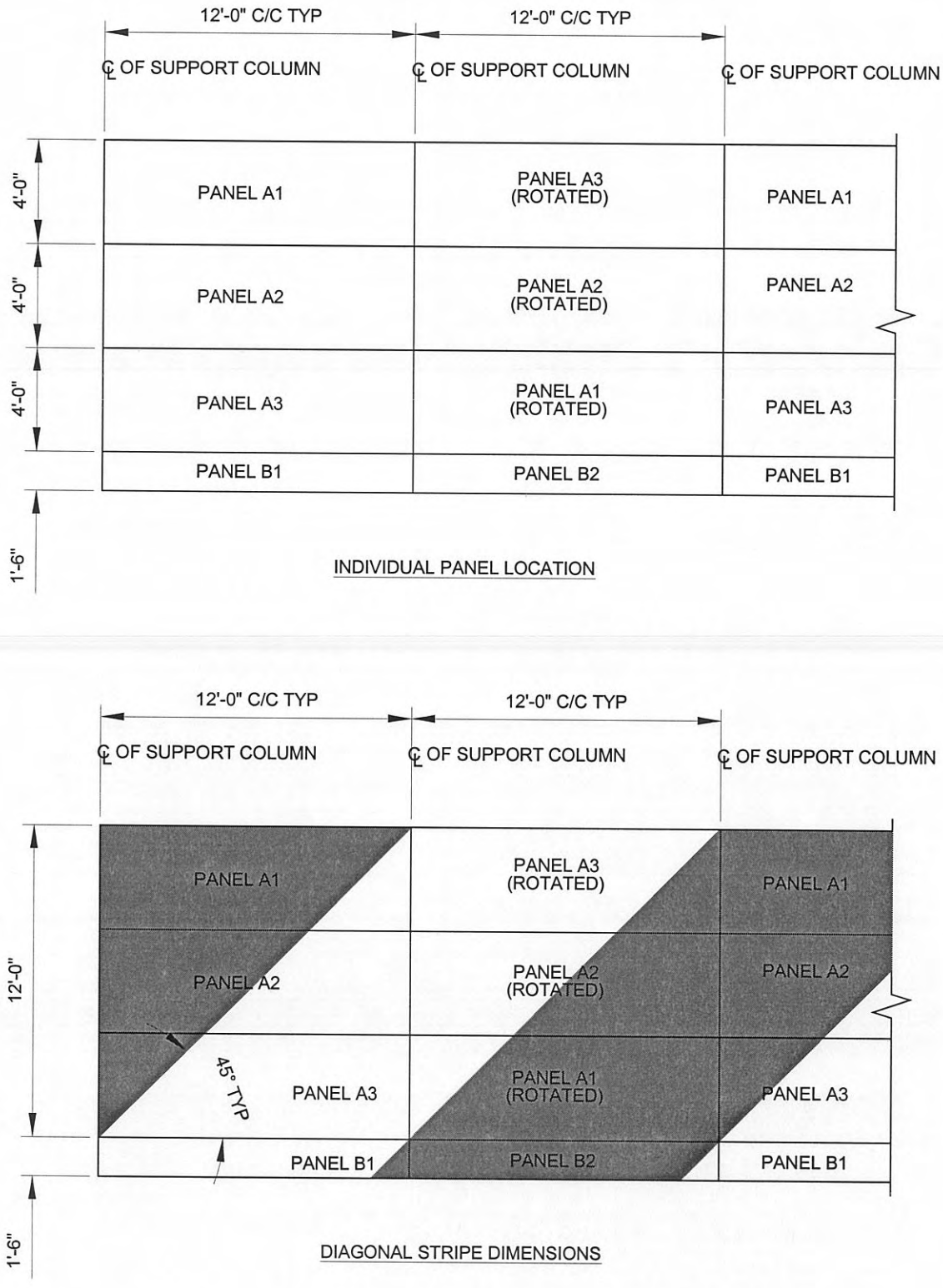


Figure 4-19. Examples of panel layout for 13-foot-high screen

Table 4-9. Visual screen panel wind-loading deflection allowance

WIND SPEED (3 SEC GUST)	DEFLECTION	STRENGTH
90 MPH	.074 PSI	.17 PSI
130 MPH	.074 PSI	.35 PSI
150 MPH	.074 PSI	.47 PSI

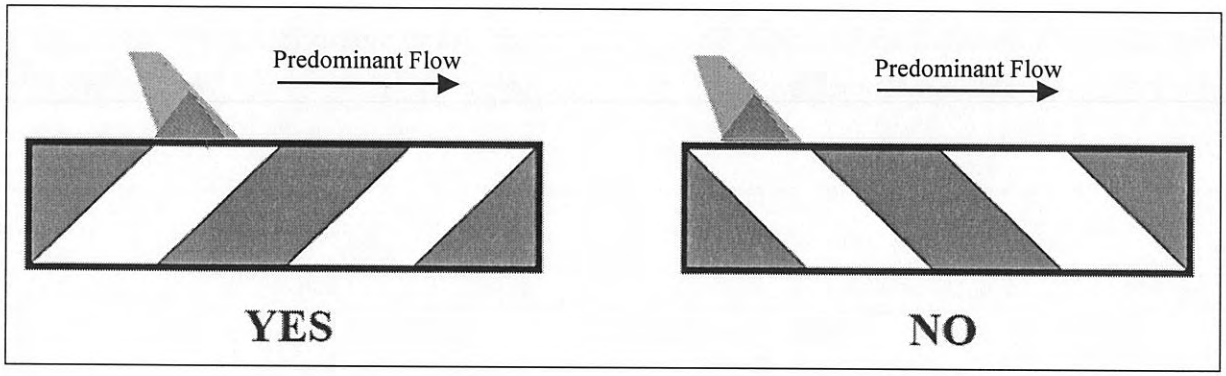


Figure 4-20. Diagonal stripe orientation

Table 4-10. CIE chromaticity coordinate limits

Color	x	y	X	Y	x	y	x	y	Min	Max	Munsell Paper
White	.303	.287	.368	.353	.340	.380	.274	.316	35.0		6.3GY 6.77/0.8
Red	.613	.297	.708	.292	.636	.364	.558	.352	8.0	12.0	8.2R 3.78/14.0

Table 4-11. Minimum reflection levels

Minimum Coefficient of Retroreflection Candelas/Foot Candle/Square Foot/Candelas/Lux/Square Meter

Observation Angle 1/ (degrees)	Entrance Angle 2/ (degrees)	White	Red
0.2	-4	70	14.5
0.2	+30	30	6.0
0.5	-4	30	7.5
0.5	+30	15	3.0

(Reflectivity must conform to Federal Specification FP-85 Table 718-1 and ASTM D 4956.)

1/ Observation (Divergence) Angle–The angle between the illumination axis and the observation axis.

2/ Entrance (Incidence) Angle–The angle from the illumination axis to the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

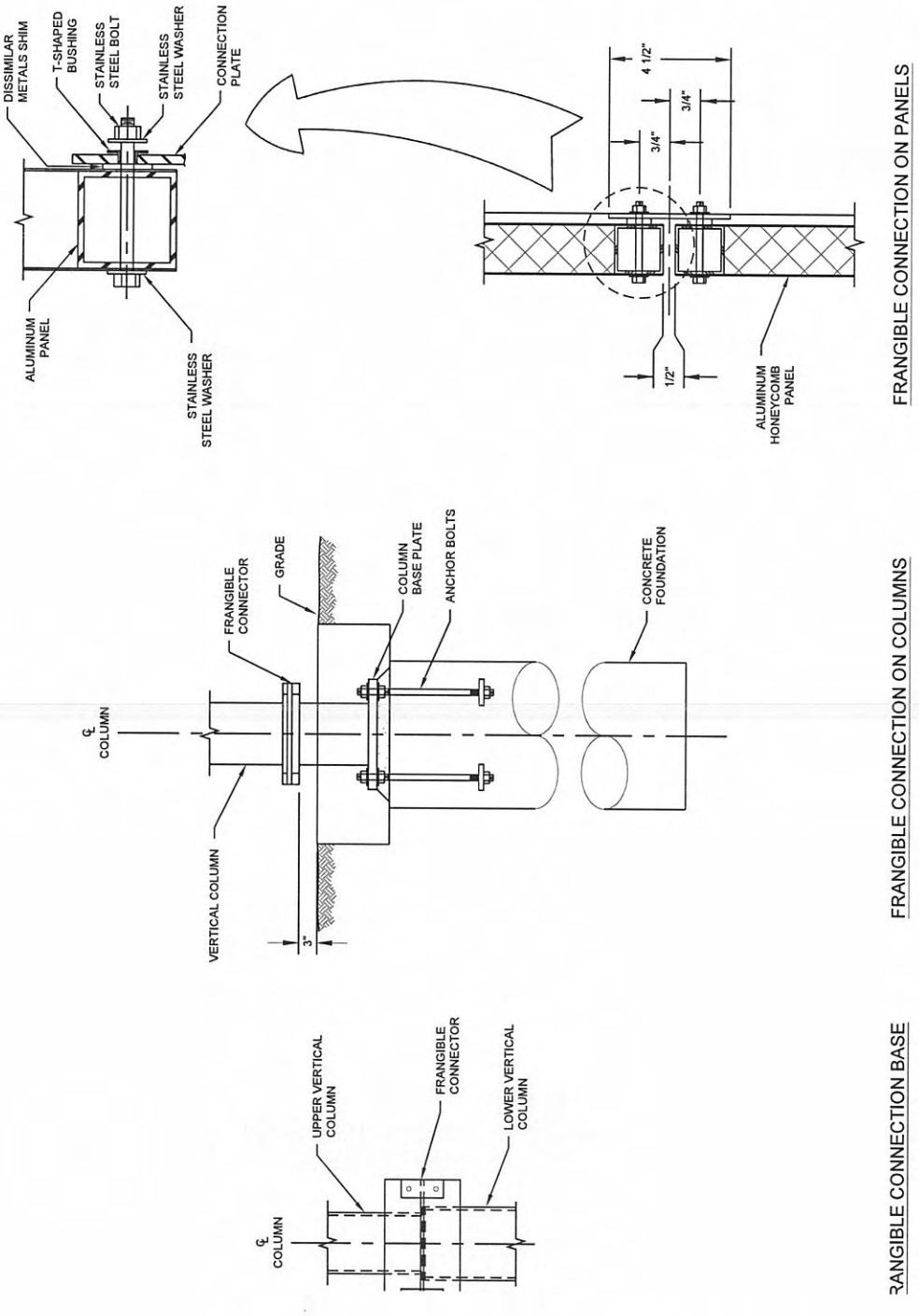


Figure 4-21. Examples of frangibility connections

7. AC 150/5300-13, Section 6, paragraph 614

614. PHYSICAL SECURITY. Airport facilities require protection from acts of vandalism. To provide a measure of protection, unauthorized persons must be precluded from having access to NAVAIDs and ATC facilities. Perimeter fencing should be installed to preclude inadvertent entry of people or animals onto the airport. In addition to airport perimeter fencing, the following security measures are recommended:

a. Off-Airport Facilities. Navigational and ATC facilities located off an airport, and in a location that is accessible to animals or the public, shall have a security perimeter fence installed at the time of construction.

b. On-Airport Facilities. Navigational and ATC facilities located on the airport have at least the protection of the operational areas. Any protection device, e.g., a guard rail or security fence, which penetrates an FAR Part 77 surface is an obstruction to air navigation. As such, it is presumed to be a hazard to air navigation until an FAA study determines otherwise.

615. CABLE PROTECTION. Most NAVAID and ATC facilities discussed in this chapter are served by buried power and control cables. FAA cables are typically buried approximately 24 inches (.6 m) below ground. They should be installed in conduit or duct beneath runways and taxiways, and in duct and manhole systems under aprons and paved parking areas. Information regarding the location of FAA cables and ducts may be obtained from the Manager of the Airways Facilities Maintenance Office serving the NAVAID or ATC facility. Questions relative to protecting or relocating cables can be obtained from the FAA Regional Airways Facilities Division Office.

616. to 699. RESERVED

8. AC 150/5300-13, Section 8

803. SHOULDERS AND BLAST PADS. Unprotected soils adjacent to runways and taxiways are susceptible to erosion. A dense, well-rooted turf cover can prevent erosion and support the occasional passage of aircraft, maintenance equipment, or emergency equipment under dry conditions. Paved shoulders are recommended for runways, taxiways, and aprons which will accommodate Group III and higher aircraft. Turf, aggregate-turf, soil cement, lime or bituminous stabilized soil are recommended adjacent to paved surfaces provided for Group I and II aircraft.

a. Shoulder and Blast Pad Dimensions. Paved shoulders should run the full length of the runway(s) and taxiway(s). Blast pads at runway ends should extend across the full width of the runway plus the shoulders. Table 3-1, 3-2, and 3-3 specify the standard blast pad dimensions and runway shoulder widths. Table 4-1 specifies the standard taxiway shoulder widths. Increases to these standard dimensions are permissible for unusual local conditions.

b. Pavement Strength. Shoulder and blast pad pavement needs to support the occasional passage of the most demanding airplane as well as the heaviest existing or future emergency or maintenance vehicle for the design life of the full strength pavement. These pavements may be constructed of bituminous or Portland Cement concrete materials. Specifications for materials and constructions standards for these pavements should be based on state highway requirements.

(1) For Airplane Design Groups III and IV, the minimum bituminous concrete surface thickness, constructed on an aggregate base, is 2 inches (51 mm) for shoulders and 3 inches (76 mm) for blast pads. These thicknesses should be increased by 1 inch (25 mm) for Airplane Design Groups V and VI. Aggregate base and subbase thicknesses should be determined using state highway design standards.

(2) The thickness of shoulders and blast pads constructed of Portland Cement concrete should be based on state highway standards. The minimum thickness of these pavements, as recommended in AC 150/5320-6, is 5 inches (127 mm).

(3) Shoulders and blast pads may have stabilized subbase and base. The stabilized subbase and base thicknesses should be determined using the equivalency factors in AC 150/5320-6 for converting aggregate subbase and base to stabilized subbase and base.

c. Drainage. Surface drainage should be maintained or improved in the shoulder and blast pad areas. Where a paved shoulder or blast pad abuts the runway, the joint should be flush, however, the shoulder may retain a 5 percent transverse slope. A 1.5 inch (3.8 cm) step is the standard at the edge of paved shoulders and blast pads to enhance drainage and to prevent fine graded debris from accumulating on the pavement. Base and subbase courses shall be of sufficient depth to maintain the drainage properties of granular base or subbase courses under the runway, taxiway, or apron pavement. An alternative is to provide a subdrain system with sufficient manholes to permit observation and flushing of the system.

d. Marking and Lighting. AC 150/5340-1 provides guidance for marking shoulders and blast pads. New construction should provide for edge lights to be base mounted and for the installation of any cable under the shoulder or blast pad pavement to be in conduit. When adding shoulders or blast pads to existing runways or taxiways, the existing runway or taxiway edge lighting circuitry, if not suitable, should be updated/modified prior to shoulder or blast pad paving.

9. AC 150/5300-13, Table A16-1A, Appendix 16

Table A16-1A. Precision Instrument Approach Requirements.

Visibility Minimums[1]	<3/4 statute mile	< 1-statute mile
Height Above Touchdown (HAT)[2]	200	
TERPS Glidepath Qualification Surface (GQS)[3]	Table A2-1, Row 7, Criteria, and Appendix 2, par. 5a Clear	
TERPS precision "W" surfaces[4]	Clear	See Note 5
TERPS Paragraph 251	34:1 Clear	20:1 Clear
Precision Obstacle Free Zone (POFZ) 200 x 800[6]	Required	Not Required
Airport Layout Plan[7]	Required	
Minimum Runway Length	4,200 ft (1,280 m) (Paved)	
Runway Markings (See AC 150/5340-1)	Precision	Nonprecision
Holding Position Signs & Markings (See AC 150/5340-1 and AC 150/5340-18)	Precision	Nonprecision
Runway Edge Lights[8]	HIRL / MIRL	
Parallel Taxiway[9]	Required	
Approach Lights[10]	MALSR, SSALR, or ALSF	Recommended
Runway Design Standards; e.g., Obstacle Free Zone (OFZ)[11]	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums
Threshold Siting Criteria To Be Met[12]	Table A2-1, Row 9, Criteria	Table A2-1, Row 8, Criteria
Survey Required for Lowest Minima	Vertically Guided Airport Airspace Analysis Survey	

1. Visibility minimums are subject to application of FAA Order 8260.3 (TERPS) and associated orders or this table, whichever are higher.
2. The HAT indicated is for planning purposes only. Actual obtainable HAT is determined by TERPS.
3. The GQS is applicable to approach procedures providing vertical path guidance. It limits the magnitude of penetration of the obstruction clearance surfaces overlying the final approach course. The intent is to provide a descent path from DA to landing free of obstructions that could destabilize the established glidepath angle. The GQS is centered on a course from the DA point to the runway threshold. Its width is equal to the precision "W" surface at DA, and tapers uniformly to a width 100 feet from the runway edges. If the GQS is penetrated, vertical guidance instrument approach procedures (ILS/MLS/WAAS/LAAS/Baro-VNAV) are not authorized
4. The "W" surface is applicable to precision approach procedures. It is a sloping obstruction clearance surface (OCS) overlying the final approach course centerline. The surface slope varies with glidepath angle. The "W" surface must be clear to achieve lowest precision minimums. Surface slope varies with glide path angle, 102/angle; e.g., for optimum 3° glide path 34:1 surface must be clear.
5. If the W surface is penetrated, HAT and visibility will be increased as required by TERPS.
6. This is a new airport surface (see paragraph 306).
7. An ALP is only required for airports in the NPIAS; it is recommended for all others.
8. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums.
9. A parallel taxiway must lead to the threshold and, with airplanes on centerline, keep the airplanes outside the OFZ.
10. To achieve lower visibility minimums based on credit for lighting, a TERPS specified approach light system is required.
11. Indicates what chart should be followed in the related chapters of this document.
12. Circling procedures to a secondary runway from the primary approach will not be authorized when the secondary runway does not meet threshold siting (reference Appendix 2), OFZ (reference paragraph 306) criteria, and TERPS Order paragraph 251 criteria.

10. DOT/FAA/AR-04/10, Section 4

4. CONCLUSIONS.

Increasing the size of the markers from 96 square inches to 200 square inches would provide only a slight improvement over the standard marker for most aircraft types, and even less of an increase in effectiveness for aircraft having the less advantageous wing taxi lamp placement.

For aircraft that have the taxi lamps located immediately in line with the pilot's eye, the standard 96-square-inch markers are effective and adequate. The majority of smaller aircraft, the principal users of unlighted airports, do have this central taxi lamp placement. For those aircraft having wing-mounted taxi lamps, markers of any size provide marginal guidance at best, and the pilots must primarily rely on painted surface markings. As an aircraft moves closer to the marker, the aircraft taxi lamp passes the main marker and the reduction in marker effectiveness is even more pronounced. The brightness of the standard 96-square-inch marker is decreased to approximately 40 to 50 percent when the taxi lamp is located to the side by as little as 5 feet. Locating the lamp even further away from the pilot's eye, 15 feet right of center, as in a Learjet 25 (not evaluated) wing tip tank location, decreased the returned light to only 10 to 30 percent.

In general, the acquisition ranges were found to be the following.

- 96 square inches of blue type III grade retro-reflective sheeting for cylindrical markers was seen at a distance of 500 feet away.
- 200 square inches of blue type IX grade retro-reflective sheeting for cylindrical markers was seen at a distance of 700 feet away.
- 96 square inches of white type III grade retro-reflective sheeting for cylindrical markers was seen at a distance of 400 feet away.
- 200 square inches of white type IX grade retro-reflective sheeting for cylindrical markers was seen at a distance of 500 feet away.

The range of the blue taxiway markers is from 500 to 700 feet, whereas the range for the white runway markers is 400 to 500 feet. It would appear that the blue taxiway markers, having a retro-reflectivity high enough to be seen at a minimum distance of 300 feet, provided adequate taxi guidance. To be effective at much higher rollout speeds, the white runway markers will need to have acquisition ranges of 800 to 1000 feet, considerably greater than the ranges provided by the white markers evaluated in this test.

11. Order 6940.1

ORDER

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

6940.1

1/13/70

SUBJ: ACCESS ROADS TO FAA OWNED AND OPERATED FACILITIES

1. PURPOSE. This Order sets forth the requirement for establishing access roads to FAA owned and operated facilities, both on or off airports, and specific pavement requirements for these roads (existing or new) when they join runways and taxiways on airports.

2. CANCELLATIONS. None.

3. REQUIREMENT. Access roads with turn around areas shall be provided to all FAA facilities or installations where a road is considered to be the best means of ingress and egress. Determination of need shall be based on frequency of use, travel time, and comparative costs.

   Where these access roads are on airports and intersect or terminate at paved runways and/or taxiways, the initial 300-feet adjacent to the runway or taxiway shall be paved. It is desirable to keep to the minimum access roads which would be within the runway primary surface as defined in FAR Part 77. At no time shall an access road be constructed parallel to a runway closer than 200-feet edge to edge and 100-feet edge to edge when parallel to a taxiway. Final siting and layout of these access roads on airports shall be coordinated with the Chief, Airports Branch of the local FAA area office.

4. IMPLEMENTATION

   A. Construction.

      (1) The practicability of construction of an access road shall be determined by the regional director.

      (2) All roads shall be of the most economical type that will provide satisfactory and safe transportation of personnel, equipment, and material in the types of weather and climatic conditions normally encountered at the location. They shall be constructed in accordance with Specification FAA-C-95, "Construction of Driveway," modified to meet local requirements. Where paving is required, the pavement shall be asphalt or portland cement concrete in accordance with AC-150/5370-1A, Standard Specifications for Construction of Airports. In the areas of high snowfall, turn around areas shall be of sufficient size to accommodate supply support vehicles and snow removal equipment.

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Distribution: WAT/FS/LG/RD/BU-2; WAS/SM-3; RAT/FS-2; RAS/AF-3; MAT/AF/AS/FS-2; N-2

~~AOR-400~~ ATC Facilities

B. Funding.

(1) Funding for the initial installation of access roads or relocation, replacement, modification, or improvement of existing access roads shall be in accordance with Order 2500.8, "Operations vs F&E Funding." Funds to accomplish initial installation or relocation, replacement, or modification shall be requested through the normal budgetary process.

(2) On airports where facilities must be relocated, replaced, or modified, because of improvements or changes to the airport, access roads are considered as part of these facilities and funding for their construction shall be in accordance with FAA Order 6030.1.

(3) FAA should enter into an agreement with the responsible party for reimbursement of the cost of relocation or replacement of access roads to facilities located off airports, which is caused by highway relocations, installation of power lines, etc.

(4) Funds for maintaining access roads to these facilities shall be included in the operations budget. Where access roads or facilities are jointly used, a maintenance agreement should be negotiated with the joint user on a reimbursable basis.

C. Maintenance.

Access roads shall be maintained in accordance with FAA Handbook AF P 6940.7, "Maintenance of Roads."

Joe D. Sanerly
for John A. Weber, Director
Systems Research and
Development Service

12. TSA Guidelines, Part III, Section A, June 2006

Recommended Security Guidelines for Airport Planning, Design and Construction

Revised June 15, 2006

Transportation Security Administration

PART III

RECOMMENDED GUIDELINES

Section A - Airport Layout and Boundaries

The first step in the integration of security into airport planning, design or major renovation is the analysis and determination of the airport's general security requirements, layout and boundaries. These decisions are critical to the efficient, safe and secure operation of an airport. While existing airports may not have great leeway in redesigning the general layout, adjustments to the location of access roads or types of boundaries for security areas may be beneficial and integrated into adjacent construction projects. Periodic review of an airport's boundary system and locations is recommended to assure that the airport's needs are met, particularly since aviation security requirements and surrounding environments may frequently change.

1. General Airport Layout

The general layout of an airport consists of three (3) areas generally referred to in the industry as Airside, Landside, and Terminal. While the terminal area generally lies on the boundary of the airside and landside (as may other buildings), due to the nature of its use and the special requirements that apply to airport terminals, it is best treated for security purposes as a distinct area.

Each major area of the airport (airside, landside, terminal) has its own special requirements. Airside/landside requirements and operational parameters should be carefully considered when planning and designing a new airport or facility. The requirements, barrier and boundary measures that delineate airside from landside, may have major effects on the facility's efficiency, employee and public accessibility, and overall aesthetics.

Maintaining the integrity of airside/landside boundaries plays a critical role in reducing unauthorized access to, attacks on, or the introduction of dangerous devices aboard, passenger aircraft. Effective airside security relies heavily on the integrated application of physical barriers, identification and access control systems, surveillance or detection equipment, the implementation of security procedures, and efficient use of resources.

a. *Airside*

The airside of an airport is the movement area of an airport, adjacent terrain and buildings or portions thereof, access to which is controlled. Typically, the airside is beyond the security screening stations and restricting perimeters (fencing, walls or other boundaries) and includes runways, taxiways, aprons, aircraft parking and staging areas and most facilities which service and maintain aircraft. For operational, geographic, safety, or security reasons, other facilities such as tenant and cargo facilities may be located within the airside as well.

As the airside generally includes security areas to which certain requirements apply under 49 CFR 1542; e.g., the Aircraft Operations Area (AOA), Security Identification Display Area (SIDA) and Secured Areas, the airside, by nature, must be nonpublic. Further information on these security requirements is contained in *Security Areas* on page 15.

The choice as to where this airside perimeter fencing or barrier may be located is often subject to the surrounding environment and access roads and may be one of the most critical decisions in designing or renovating an airport. In addition to the factors discussed in *Facilities, Areas and Geographical Placement* on page 41, the following factors should be considered when determining airside boundaries and orientation:

1) Dangerous or hazardous areas that could affect the safety or security of a parked or moving aircraft;
2) Concealed/overgrown areas that could hide persons or objects that might endanger aircraft or critical airport systems;
3) Adjacent facilities having their own security concerns and provisions, e.g., correctional, military or other facilities that could affect or be affected by the proximity of airside operations;

4) Natural features, large metal structures/buildings or electronics facilities that might affect ground or aircraft communications or navigational systems; (Reduced or limited communications can endanger not only aircraft and airport personnel safety, but also limit security response capabilities and information availability during emergency as well as routine situations.)

5) Adjacent schools, hotels, parks or community facilities that might affect or be affected by the proximity of aircraft and the related safety and security concerns. (While safety concerns exist, the increased possibility of airside penetrations and/or vandalism is a security concern.)

For an airport to obtain the certification required for operations, the airside must be able to maintain required operational clear areas, have adequate emergency response routes and response times, and have in place required safety measures.

b. *Landside*

Excluding terminals, which are treated separately below, the landside of an airport is that area of an airport and buildings to which both traveling passengers and the non-traveling public have unrestricted access. Typically, the landside facilities include patron and other public parking areas, public access roadways, rental car facilities, taxi and ground transportation staging areas, and any on-airport hotel facilities.

Since the landside includes all non-airside areas (other than the terminal(s)), its location is determined by the airside and perimeter boundary. Within landside, factors affecting the location of facilities are discussed in *Facilities, Areas and Geographical Placement* on page 41

Since the landside is not directly affected by the operation of aircraft, it generally has less stringent security requirements than the airside. However, some clear area and communication requirements may still affect landside design and layout, such as an airside fence/boundary, aircraft approach glide slopes, communications and navigational equipment locations and non-interference areas, and heightened security in the terminal area. Further information on these requirements is contained in *Security Areas* on page 15.

The landside in general must meet the local jurisdictional standards for public safety and security, which may result in special safety requirements that will interface with the airport's overall security and fire safety system.

c. Terminal

An airport terminal is a building or buildings designed to accommodate the enplaning and deplaning activities of aircraft operator passengers. Larger airports or those with general aviation areas often have more than one terminal. For purposes of this document, the term "terminal" typically refers to that main building or group of buildings where the boarding of public, scheduled commercial aircraft occurs or from which persons who have passed through a security screening process will proceed to boarding facilities located elsewhere on the airside.

When considering passenger and baggage screening security provisions, it is important for planners and designers to distinguish the commercial terminal from the general aviation terminal where charter and private passenger activity typically occur. However, it is also important to note that security requirements may affect charter and private aviation as well as scheduled commercial aviation. Planners and designers are encouraged to discuss security considerations with the FSD when developing charter or private aviation facilities as well as when developing facilities intended for use by scheduled commercial air carriers or aircraft operators. .

The terminal is typically the area of the airport with the most security, safety, and operational requirements. Many of these requirements are closely linked to the location of *security areas* within, and in close proximity to, the terminal. Since the terminal usually straddles the boundary between airside and landside, certain portions must meet the requirements of both of these areas.

When designing a new facility, the terminal should be centrally located on the airport site when possible. This not only provides for efficient aircraft access to most runways and facilities, but can benefit terminal security as well. A centralized terminal buffers the terminal from outside-airport threats and security risks due to distance. A fundamental concept in security planning, "distance," provides the flexibility for the airport operator to put in place systems, measures or procedures to detect, delay, and respond (DDR) to

unauthorized penetration. Providing additional "standoff" distance from a potential Large Vehicle Improvised Explosive Device (LVIED) is highly beneficial when addressing blast protection measures. A centralized terminal can also minimize the communications interference that might be caused by adjacent, non-airport facilities.

Section III-A-1 - Airport Layout and Boundaries Checklist:

- ☐ **Analysis of General Security Requirements**
- ☐ **Security & Safety Considerations**
  - Separate dangerous or hazardous areas
  - Minimize concealed/overgrown areas
  - Effects on/by adjacent facilities
  - Natural features that might allow access
  - Prevent communications interference due to natural features, buildings & equipment
  - Public safety & security concerns
  - Criminal Activity
- **Airside**
  - Nonpublic
  - Maintain airside/landside boundaries
  - Maintain security clear areas and zones
  - Adequate emergency response routes
  - Required safety measures & clearances
- ☐ **Landside**
  - Public safety & security
  - Maintain airside/landside boundaries
  - Maintain security clear zones
  - Deter criminal activity
- ☐ **Terminal**
  - Maintain public/nonpublic boundaries
  - Maintain security area boundaries
  - Meet security regulations
  - Personnel security & safety
  - Public security & safety

2. *Security Areas* (Refer also to *Figure II-C-1* on page 9)

   The Airport Security Program (ASP) required under 49 CFR 1542.101 contains specific descriptions of the following areas in which security measures are specified in 49 CFR 1540.

   a. Air Operations Area (AOA)

      An AOA is a portion of an airport, specified in the ASP, in which security measures specified in 49 CFR 1542 are carried out. This area includes aircraft movement areas, aircraft parking areas, loading ramps, and safety areas, for use by aircraft regulated under 49 CFR 1544 and 49 CFR 1546, and any adjacent areas (such as general aviation areas) that are not separated by adequate security systems, measures, or procedures. This area does not include the secured area.

      The airport operator is required to control and prevent access to the AOA; control movement within the AOA; and control unauthorized penetrations of the AOA. TSA regulations do not specify how to accomplish this, but rather, leaves the solution to the local authorities, subject to TSA approval.

      In most cases, it is advantageous to align the AOA boundary with other boundaries or with physical barriers. Typically, the AOA is a major portion of the area within the fence or other barrier that defines the airside/landside boundary of the airport. Exceptions to this may occur when electronic barriers or natural barriers such as rivers are being used to delineate boundaries. The AOA is required to have a distinct, securable boundary line. Refer to *Boundaries* on page 22 for more information.

      When allocating AOA space, and since the AOA requires less specific security measures than SIDAs or secured areas, consider whether to locate construction staging areas, in-flight kitchens, commissaries, and other facilities outside those critical areas within the AOA. This will facilitate implementation and may reduce the cost of access control and identification system measures for such areas. Locating most non-terminal areas outside of the SIDA may also reduce the amount of man-hours needed for identification media issuance and revalidation, background checks, and security training. Further discussion on *Facilities, Areas and Geographical Placement* is included on page 41.

   b. Security Identification Display Area (SIDA)

      A SIDA is a portion of an airport, specified in the ASP, in which security measures specified in 49 CFR 1542 are carried out. This area includes the secured area and may include other areas of the airport. Generally, the SIDA is an area requiring display of an authorized identification media.

The airport operator has the responsibility to secure SIDAs and prevent or respond immediately to access by unauthorized persons and vehicles. SIDAs may lie within AOAs; a secured area is by definition always a SIDA, in that all SIDA requirements within 49 CFR 1542.205 must be met within a secured area.

In general, SIDA layouts should be held to the smallest manageable size to provide the level of protection sought for the area or facility. The SIDA is the area that requires the greatest continuous procedural attention from employees. The number of SIDA access points should be limited to the minimum necessary for operational practicality.

c. Secured Area

A Secured Area is a portion of an airport, specified in the ASP, in which certain security measures specified in 49 CFR 1542 are carried out. This area is where aircraft operators and foreign air carriers, that have a security program under 49 CFR 1544 or 1546, enplane, deplane passengers and sort and load baggage, and any adjacent areas that are not separated by adequate security measures.

Each secured area must independently meet all the requirements placed upon it by the ASP, including control of access, challenge procedures, law enforcement officer (LEO) response, display of ID, etc., particularly where the various secured areas may not enjoy common boundaries or access points. A secured area is by definition always a SIDA, in that all SIDA requirements within 49 CFR 1542.205 must be met within a secured area.

Although the secured area generally includes portions of the landside and terminal, it is desirable to locate secured areas contiguously or as close together as possible to maximize access by response personnel, utilize common areas of closed circuit television (CCTV) surveillance coverage, and minimize requirements for redundant boundaries and electronic access controls. Where there are several unconnected secured areas - baggage makeup areas, movement areas, safety areas, etc. - each may require separate but integrated electronic controls.

d. Sterile Area

A Sterile Area is a portion of an airport, specified in the airport security program that provides passengers access to boarding aircraft and to which access generally is controlled by TSA, or by an aircraft operator under 49 CFR 1544 or a foreign air carrier under 49 CFR 1546, through the screening of persons and property.

TSA, the aircraft operator, or designated foreign air carrier must use adequate facilities and procedures to screen persons and property prior to entry into the Sterile Area to prevent or deter the carriage aboard aircraft of any explosive, incendiary, or deadly or dangerous weapon on or about each individual's person or accessible property. In addition, the aircraft operator must prevent or deter the carriage of any explosive or incendiary in any checked baggage brought into the sterile area.

Sterile areas require physical, financial and manpower resources dedicated to providing screening. These should be held to an operational minimum so that appropriate surveillance and control resources can be concentrated where necessary, rather than scattered among less security-related areas. Sterile areas may include various revenue-generating facilities, particularly concessions, which may be impacted by periods of heightened threat. Designers and planners should allow flexibility within sterile areas such that added security measures during times of heightened alert will have the least possible negative impact.

e. Exclusive Area

An Exclusive Area is any portion of a secured area, AOA, or SIDA, including individual access points, for which an aircraft operator or foreign air carrier that has a security program under 49 CFR 1544 or 49 CFR 1546 has assumed responsibility under 49 CFR 1542.111.

Within the Exclusive Area, the responsible signatory aircraft operator or designated foreign air carrier must perform security control requirements described in the exclusive area agreement. The aircraft operator, not the airport, may control access and movement within the Exclusive Area.

Specific requirements and conditions must appear in the exclusive area agreement, which is approved by TSA. Such conditions include a delineation of very specific areas for which the aircraft operator assumes

security responsibilities. Like SIDAs and Sterile Areas, Exclusive Areas should be held to an operational minimum so that appropriate surveillance and control resources can be concentrated where necessary, rather than scattered among less security-related areas.

f. Airport Tenant Security Program (ATSP) Area

An ATSP Area is an area specified in an agreement between the airport operator and an airport tenant that specifies the measures by which the tenant will perform specified security functions, authorized by the TSA, under 49 CFR 1542.113.

Subject to a tenant-area-specific security program approved by TSA, the airport tenant has responsibility for specific security systems, measures or procedures.

Where tenants other than air carriers elect to undertake under their own security programs 49 CFR 1542, such areas should be limited to the tenants' immediate boundaries and sphere of influence, and should accommodate security requirements for contiguous boundaries with other tenants and/or the airport and airlines.

Section III-A-2- Security Areas Checklist:

- ☐ **AOA**
  - Align AOA boundary with fences or natural boundaries
- ☐ **SIDA**
  - Part of AOA
  - Smallest manageable contiguous size(s)
- ☐ **Secured Area**
  - Consider general aviation, cargo, maintenance, and other facilities in a manner consistent with latest TSA regulation and policy guidance.
- ☐ **Sterile Area**
  - Minimize size to help surveillance and control
- ☐ **Exclusive Area**
  - Minimize areas to be monitored/controlled
- ☐ **ATSP Areas**
  - Minimize areas to be monitored/controlled

3. Assessment of Vulnerable Areas

a. Basic concepts of security risk management dictate that the security system provide the appropriate level of security to all of the assets to be protected, in light of the perceived threat to those assets. Therefore, at the facility planning stage it is prudent to consider all of the assets (or targets of a terrorist or criminal attack), considering their relative "value" (or consequence of loss) and economical impact. There are many possible high value assets at an airport to consider, such as: aircraft (with or without passengers aboard); air traffic support facilities (tower, radar, weather, communications); terminal building(s), groups of members of the public or employees; fuel storage; critical infrastructure (power, water, communications) and railway, roadway or vehicle access way and surrounding waterways/intermodal transportation facilities.

b. One of the fundamental concepts for airport security is the establishment of a boundary between the public areas and the areas controlled for security purposes (such as the AOA, Secured Areas, SIDA, ATSP Areas and Exclusive Areas). Since barriers and controls are required to differentiate these areas and to limit access to them, this may lead to the assumption that anyone or anything found in the area is authorized. This suggests a common vulnerability; once inside the controlled area, an intruder may move about without encountering additional controls. For example, if an intruder breaches the fence line (considered to be easily and quickly achieved), he may find no further physical barriers to control access to aircraft, the baggage makeup area (BMA), maintenance facilities, and other areas. Security measures often employed to mitigate this situation include challenge procedures augmented by ramp patrols, electronic monitoring (such as by CCTV), personnel surveillance, ground radar or intrusion detection sensors, and others, all of which have planning and design implications.

c. Other means of achieving unauthorized access exist, such as through reverse use or other misuse of emergency exits (for example, from public side to the secured area) or unauthorized use of a controlled access portal opened by an authorized user, a practice often called "piggybacking." New construction designs should minimize the number of emergency exits that lead to the secured area from public areas.

Some fire codes allow the use of delayed egress hardware on emergency exit doors. Where authorized for use by fire or building code officials, delayed egress hardware should be considered for use as a deterrent to discourage unauthorized, non-emergency use of emergency exit doors. Where necessary, these doors should be supported by comprehensive surveillance (such as CCTV) on both sides of the door for alarm assessment. Ideally the airside surveillance would include an intruder tracking capability to allow for directing the response force. Attentive planning and incorporation of appropriate surveillance or control devices can significantly improve the identification and control of piggybacking, as well as the deployment and efficient use of manpower resources to respond to anomalies. Contact the airport security coordinator and local FSD for current sensor evaluation (pilot program) reports that may be applicable at a particular airport.

d. Another area of concern is unauthorized entry or breach in the sterile area. Any open boundary between the public area and the sterile area is a candidate for such a breach. Typically, the breach will occur either through the passenger security screening checkpoint or via the exit lane (bypassing the security checkpoint). From the planning and design standpoint, the most significant considerations for implementing a physical breach control system are: 1) source and location of breach identification alarm generator; 2) location of physical barriers which respond to the breach alarm; and 3) sufficient separation distance between 1 & 2 to allow safe and sure closure prior to intruder's further penetration which could result in terminal evacuation. Other concerns such as fire and safety codes must also be considered.

e. All public access facilities, within which large congregations of people are customary, suffer from a fundamental vulnerability to terrorist bombing or armed attack. Considering blast mitigation at the planning and design stage can reduce this vulnerability significantly. For the threat of large vehicle bombs, the primary blast mitigating consideration is separation distance. This consideration runs counter to the passenger convenience consideration of minimized transit distances. [Refer to charts in *Appendix C*]. Innovative designs that satisfy both passenger convenience and separation distance for blast mitigation should be sought, including potential facility design to minimize large congregations of people close to points of vehicle access or drop-off, or to redirect or otherwise mitigate blast effects.

f. The threat of an armed attack on the terminal as well as the threat of an abandoned article containing an explosive device raises attention to another form of vulnerability. As long as there is a "public side" within the terminal, where congregations are expected, there are limited means by which a security system can prevent an attack. To assure that LVIEDs, IEDs, or terrorists with weapons do not enter the terminal requires moving the point of screening "to the front door." Here again, architects and designers may seek innovative designs that can accommodate all of the passenger convenience issues, as well as accommodating screening of all people and items before entering the terminal (creating a "sterile terminal"), to significantly reduce this vulnerability. Many other issues that may not be readily apparent require that a "front door" option be carefully considered in close coordination with aircraft operators, the airport authority, and the local FSD.

g. A potential vulnerability also exists at any facility using an access media/identification system that grants access privileges to employees and others. These "insiders" have legitimate needs to access the portions of the airport controlled for security purposes and are granted access to those areas, and in some cases to the workings of the security system itself. However, threats from insiders, acting alone or in collusion with outsiders, pose a criminal and terrorist threat to airports. The need to inspect individuals, their identification media, and their possessions as they cross the security boundary using their access privileges, may increase in the future. The need to identify and control individuals under escort within the controlled portions of the airport may also increase in the future, affecting the design of access gates and the procedures used to authorize access to the airside. At the planning and design stage, one goal should be to minimize the number of access points that employees use to gain access to their work site in the secure area. Infrastructure provisions for screening equipment at these locations would enable future inspection capability with significantly less impact. The same locations may also be considered as sites for inspection of deliveries of commercial goods. Although challenging in the absence of specific security requirements, designers and planners should consider throughput in the event security requirements are mandated for employee access portals.

h. There are numerous areas in and around an airport, its terminal building complex, support facilities, utility tunnels, storm sewers, construction entrances, public roadways, parking lots, maintenance areas, cargo and

general aviation facilities, commercial and industrial buildings, etc., which, while not necessarily recognized as a target of terrorist activity, might still be in the path of such an attack, or at the very least might be subject of common crime such as theft or vandalism, and thus might require varying levels of security protection. These may or may not fall under the jurisdiction or responsibility of the airport, but it is important to look at the entire airport environment, make those determinations, and bring every affected entity into the early planning discussions, if for no other reason than to establish early on where the lines of responsibility lie. The airport must also keep careful records of these determinations, and consider putting those agreements and lines of demarcation in writing, possibly as conditions of the lease, or into exclusive area or ATSP agreements.

i. Utility Infrastructure

1) Utility sources, equipment and supply potential should be protected and/or monitored to the extent warranted by a threat and vulnerability assessment. Contact the airport security coordinator and local FSD for any current studies relating to utility infrastructure security. The design of these systems should also reflect their importance for mission-critical operations of airports, with due consideration given to redundancy, backup systems, alternative sources and the required levels of service, response times during emergency situations, and associated airport and non-airport organizational responsibilities.

2) In this context, 'utilities' encompasses electrical power including both external services and on-airport generation and distribution systems; lighting; water and drainage systems; fuel farms including pipeline distribution and pumping stations; telecommunications (voice, video, data) including external wired and wireless services as well as on-airport networks and trunked radio systems used for public safety functions; and facility heating, ventilation and Cooling (HVAC).

3) Electrical power is critical to an airport's operation. No major airport should be without alternatives to its primary electrical power supply, such as linkage to a second substation or, where feasible, a second regional grid, generated secondary power, and/or battery back-up or an Uninterrupted Power Supply (UPS) system with appropriate switching capability. Individual battery back-up or UPS units to support access control systems during power outages are also highly desirable. Furthermore, the security design must provide distributed essential power for priority provisions (i.e., lighting, communications, etc.). Consideration should also be given to providing essential power to support defined secondary (limited use) requirements that may be needed during outages.

4) HVAC systems have important functions during extreme weather conditions because they control and maintain ambient temperatures for thousands of passengers and employees. HVAC equipment provides fresh air or heat circulation, and an attractive target or vector for attack. The security design should consider providing a capability to monitor publicly accessible air intakes (e.g., use of video cameras), the capability to isolate sections of the building, and to extract and vent sections of the building by using a positive air pressure. *See Appendix G, Airport Chem-Bio Protection and Response.* For more on design to prevent or mitigate chem-bio events.

5) Tunnels and drainage provisions provide apertures into the building that may be exploited by an adversary. Airport design should consider the security of the routes by which utilities enter and exit the terminal building.

6) Fuel supplies may support vehicle and/or aircraft operations that require protecting the pipelines, fuel farms, or other facilities that are operationally sensitive and vulnerable to attack.

7) Water sources may merit protection, keeping in mind the function of the water. Whether water's source is external or internal, the designer should assess the level of risk for all aspects of the system. The designer may consider protecting the water supply from interruption or the introduction of a contaminant. An alternative source of water may be appropriate, particularly for fire-fighting and other emergency purposes.

8) Telecommunications services and the networks on which they run provide essential services for airport operations. Service entrance points for carrier services should be protected against both accidental and deliberate damage. Telecommunications rooms and operations centers should be designated as

"critical assets" and secured by ACAMS and CCTV systems in the same manner as other critical airport facilities. When network cabling traverses public areas, metal conduit should be used to protect the cabling.

9) In emergencies, having reliable, robust, and capable wireless communications for management, operations, and public safety functions will be essential. Public safety departments will often have their own trunked radio systems, which should also support airport operations and other departments. Dependence on carrier cellular services should be minimized as these networks can be saturated by traffic during emergencies. A standards-based wireless extension of the airport local area network (LAN) can be valuable in emergencies provided that operating frequencies and access point coverage have been properly designed and coordinated with all users including tenants.

10) Seismic Requirements

Seismic requirements, while not innately a security issue, are relevant to security guidelines in that the continuity of operations of an airport is paramount to airport security.

This section provides information referencing various state and federal legislation addressing seismic safety. While much seismic engineering and mitigation guidance exists in the form of state and local codes, directives and ordinances, these requirements focus only on acts that are currently in effect, not those being proposed for future planning and design needs.

The existence of these laws does not necessarily indicate that they fully meet their intent, or that they necessarily accomplish their objectives. Some are considered more or less effective than others, and even some weaker ones may be enforced to a greater extent than others. Architects, engineers and contractors should refer to further resources for information or expert opinion about the appropriateness and effectiveness of any specific seismic requirement as it affects their airport design. It is also important to note that the burden of conformance may rest solely on the Architect, Engineer and Contractor and to remember that the guidelines and regulations supporting the implementation of individual acts often contain the most important detail.

In recent years enforcement of the earthquake protection requirements in the Model Codes for nonstructural building components has also become commonplace. Model Codes provide for nonstructural, infrastructure elements of the building design, such as electrical enclosures, control consoles, conduits, cable trays, etc. Architects, Engineers and Contractors are relied upon to know, understand, design and install earthquake protection in accordance with the requirements of these Codes.

It is important to note that all of the Seismic Laws and the Executive Orders apply to virtually all new construction that is federally owned, leased or regulated or other new construction that receives federal financial assistance through loans, loan guarantees, grants or federal mortgage insurance. Additionally, several states require seismic mitigation in the design of all projects.

When designing a project, it is important to meet the federal, state and local code and standard elements applicable to the project location. Although the following list is not intended to be comprehensive and complete, as an aid to the designer, the TSA recommends that the following sources of information be checked to determine the requirements to be applied.

a) Public Laws 95-124 and 101-614 "The Earthquake Hazards Reduction Act of 1977 as Amended"
b) Executive Order 12699 of January 5, 1990 "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction"
c) Executive Order 12941 of December 1, 1994 "Seismic Safety of Existing Federally Owned or Leased Buildings"
d) ICBO (International Conference of Building Officials) "Uniform Building Code (UBC)," 1994, and amendments to include the 1994 NFPA-13 Standard for Building Fire Sprinkler Systems
e) BOCA (Building Officials Code Authority) "National Building Code"
f) SBCCI (Southern Building Code Congress International) "Standard Building Code"

g) Section 13080 of the Corps of Engineers Guide Specifications with Fire sprinkler Sections 15330, 15331, and 15332 revised in March 1995 to unequivocally require seismic bracing on the small diameter piping.

h) Various State Building Codes, e.g., California, Washington, Alaska, Missouri, New York, etc., which may require mitigation elements in addition to the national standards.

Section III-A-3 - Vulnerable Areas Checklist:

- ☐ **Vulnerability Assessment (see *Appendix A*)**
- ☐ **Consider all assets, targets, and their relative value/loss consequence**
  - Aircraft
  - Communications
  - Support Facilities
  - Terminal
  - Public and Employees
  - Fuel Areas
  - Utilities
  - Roadways and Access Way
  - Storage Areas
- ☐ **Establish a security boundary between public and secured areas**
  - Barriers
  - Patrols
  - Surveillance/CCTV
  - Sensors
- ☐ **Minimize means of unauthorized access**
  - Access Controls
  - Emergency Exits
  - Delays
  - Piggybacking
  - Surveillance/CCTV
- ☐ **Plan for breach control measures and procedures**
  - Physical Barriers
  - Separation Distance
- ☐ **Reduce bombing/armed attack vulnerability**
  - Blast Mitigation
  - Separation Distance
  - Minimization of Large Congregations
  - Placement of Screening Checkpoint
- ☐ **Minimize vulnerability from employees**
  - Minimize numbers of employee access points
  - Capability for Employee Screening
- ☐ **Consider vulnerability of adjacent areas and paths of travel**

4. Chemical and Biological Agents

When considering overall layout, it is prudent to take some precautions to prevent attacks by non-conventional means, such as the use of chemical and biological agents, to attack civil aviation. The possibilities for such attacks include the use of chemical or biological agents to attack persons in an aircraft in flight, as well as in public areas of airports, (see *Terminal* on page 58) or persons in areas controlled for security purposes.

Some measures that should be considered to help mitigate a potential chemical/biological attack include:

- Locate mailrooms and airport loading docks at the perimeter of the terminal or at a remote location with "screening" devices in place that can detect explosives and chemical/biological contaminants.
- If the mailroom and loading docks are in or near the terminal, consider having a dedicated ventilation system for those rooms and dedicate an emergency shut-off device for the ventilation system.
- Take measures to seal off these areas from the rest of the terminal to minimize the potential for contaminants to migrate to other areas of the terminal. Maintain a slight negative pressure in these rooms to help prevent the spread of the contaminants to other areas.
- Locate air intakes to HVAC systems so they are not accessible to the public. Preferably, locate air intake as high as practical on a wall or on the roof; if vents are ground level, they should be protected if possible with screens or grates, and turned away from public exposure.
- Coordinate the smoke control system and emergency power with the chemical/biological alarms and ventilation system.
- Consider installing special air filtration in critical ventilation systems that captures chemical/biological agents.

Additionally, at the direction of the Department of Homeland Security (DHS) Science and Technology Directorate through the PROACT (Protective and Responsive Options for Airport Counter-Terrorism) program, the Sandia National Laboratories issued "Guidelines to Improve Airport Preparedness Against Chemical and Biological Terrorism," co-authored with the Lawrence Berkeley National laboratories. These guidelines are available for review from the TSA Federal Security Director at your airport or directly from Sandia National Laboratories upon request. An extract of the Sandia National Laboratories document is available in *Appendix G* of this document.

Section III-A-4 - Chemical & Biological Agent Checklist:

- ☐ **Sources of guidance may include TSA, Federal Emergency Management Agency (FEMA), Federal Bureau of Investigation (FBI), Department of Energy (DOE), Center for Disease Control (CDC) and Office for Domestic Preparedness Support.**
- ☐ **The *Bibliography* lists several relevant chem.-bio documents.**
- ☐ **Report Card for *airport Chem-Bio Protection and Response***

5. Boundaries and Access Points

To delineate and adequately protect the AOA, SIDA, and other security areas from unauthorized access, it is important to consider boundary measures such as fencing, walls, or other physical barriers, electronic boundaries (e.g. sensor lines, alarms), and natural barriers in the planning and design process of an airport. Access points for personnel and vehicles through the boundary lines, such as gates, doors, guard stations, and electronically controlled or monitored portals must also be considered. In addition, there are other security measures which should be part of the design that enhance these boundaries and access points such as clear zones on both sides of fences, security lighting, locks, monitoring systems such as CCTV, and signage.

The choice of an appropriate security boundary design is not only affected by the cost of equipment, installation, and maintenance, but also by the more important aspects of effectiveness and functionality. Certainly the highest consideration in an effective boundary measure is its ability to prevent unauthorized penetration. Thus, any access points through a boundary line must not only be able to prevent access, but differentiate between an authorized and an unauthorized user. At an airport, access through boundary lines can be frequent, and must be quick to prevent unacceptable delays. In addition, if a boundary access point is not user-friendly, it may be abused, disregarded, or subverted and thus, pose a security risk and possible financial liability to the airport.

Regardless of boundary location or type, the number of access points should be minimized for both security and cost efficiency. Proper planning and design can often create fewer, more functional and maintainable access points that will benefit the airport in the long run.

Various boundary/barrier and access point types as well as security measures which can enhance them are described below:

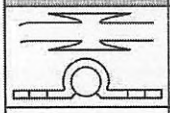
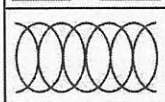
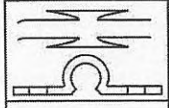
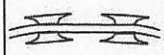
a. Physical Barriers

Physical barriers can be used to deter and delay the access of unauthorized persons into nonpublic areas of airports. These are usually permanent barriers and designed to be an obvious visual barrier as well as a physical one. They also serve to meet safety requirements in many cases. Where possible, security fencing or other physical barriers should be aligned with security area boundaries.

1) Fencing

Fencing is available in several designs that are difficult to climb or cut as well as those which are provided with motion, tension or other electronic sensing means. For fences with sensors, either mounted on the fencing or covering areas behind fencing, there are other elements to the security system for monitoring of the sensors and response to intrusion alarms. *Table III-A-1* below shows some of the available types of fence fabrics.

Table III-A-1 - Fence Types and Fabric

	PRODUCT	APPLICATION	SIZES	WT / ROLL	MATERIAL	ATTACHMENT SPACING LENGTH	BREAK LOAD
	RAZOR RIBBON - Single Coil with Core Wire	Medium Security Fence Topping	18″ 24″ 30″	13 lbs. 17 lbs. 21 lbs.	AISI 430 Stainless Steel, .098 dia. high Tensile Wire	6″ - 16.67′ 9″ - 25′ 18″ - 50′	2800 lbs.
	RAZOR RIBBON MAZE - Single Coil with Wire, Concertina Style	Ground Barrier Max. Security Fence Topping	24″ 30″ 36″	15 lbs. 19 lbs. 23 lbs.	AISI 430 Stainless Steel, .098 dia. high Tensile Wire	12″ - 15′ 16″ - 20′	2800 lbs.
	RAZOR RIBBON MAZE - Concertina Style, Double Coil	Ground Barrier Max. Security Fence Topping	24″ inside 30″ outside	34 lbs.	AISI 430 Stainless Steel, .098 dia. high Tensile Wire	12″ - 15′ 16″ - 20′	2800 lbs.
	MIL-B-52775 B Type II - Austenitic Double Coil	Ground Barrier Max. Security Fence Topping	24″ inside 30″ outside	35 lbs.	AISI 301 / 304 Stainless Steel .047 dia. Stainless Wire Rope	24″ - 66′	2250 lbs.
	MIL-B-52775 B Type IV - Austenitic Double Coil	Ground Barrier Max. Security Fence Topping	24″ inside 30″ outside	35 lbs.	AISI 316 Stainless Steel .047 dia. Stainless Wire Rope	24″ - 66′	2250 lbs.
	RAZOR RIBBON - Single Coil	Min. Security Fence Topping. Commercial Use	18″ 24″	9 lbs. 12 lbs.	AISI 430 Stainless Steel	6″ - 16.67′ 9″ - 25′ 18″ - 50′	1260 lbs.
	BAYONET BARB - Concertina	Ground Barrier	27 1/2″ 37 1/2″	23 lbs. 34 lbs.	ASTM A 526 Zinc Galvanized .098 dia. high Tensile Wire	20″ - 50′	1300 lbs.

Chain link fencing is a common type of fencing and is often the most cost-effective solution when deterrence, as opposed to the prevention of forced entry, is the primary security objective. Chain link fences are typically constructed with 7 feet of fabric plus one or more coils of stranded barbed wire on top, which may be angled outward at a 45 degree incline from the airside. Fences configured in this manner are shown in *Figure III-A-1* below.

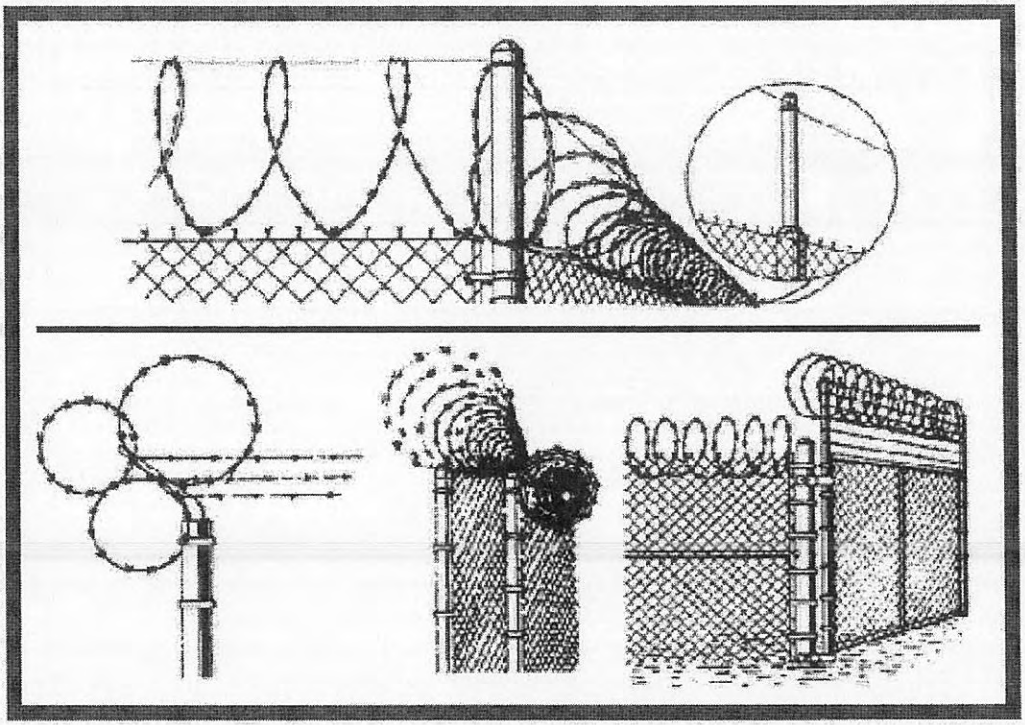


Figure III-A-1 - Chain Link Fence Barbed Wire Configurations

Chain link fencing is normally the most suitable and economic physical barrier for securing the airside, although this may vary somewhat with airport-specific conditions and topography. It is also readily available through a large variety of sources and is easily and inexpensively maintained. This type of fence provides clear visibility for security patrols, and is available in varieties that can be installed in almost any environment. Barbed wire, razor wire and other available toppings increase intrusion difficulty. For locations with aesthetic concerns, there are also a large variety of decorative yet functional styles available as well as opaque styles that limit public visibility of service, storage or other non-aesthetic areas. On boundaries coinciding with property lines, locate the fence line should be located inside the airport property line to prevent encroachment on adjacent property by the barbed wire angled topping or its outriggers.

Another common type of fencing is constructed of vertical bars which have curved spiked tops as shown in *Figure III-A-2* below. Depending on the diameter and materials used for the bars, this design can provide additional protection against forced entry.

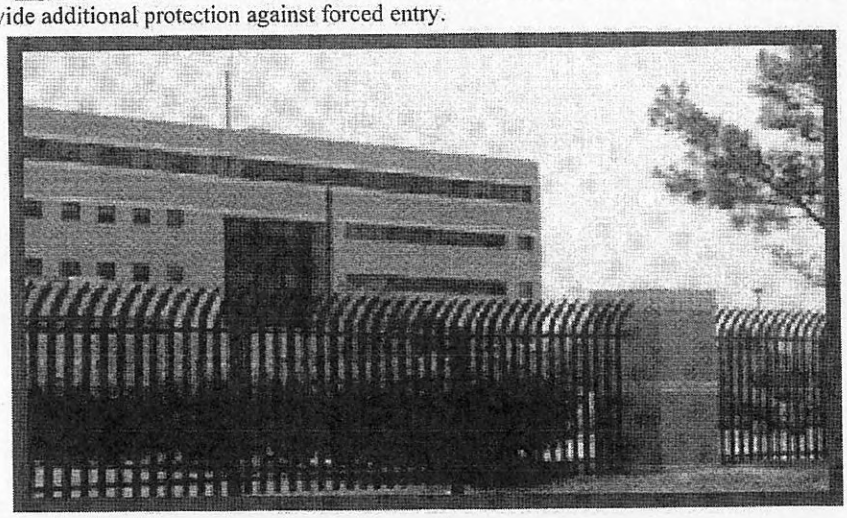


Figure III-A-2 - Vertical Bar Fence

There are several means of constructing fences to provide a higher level of protection against forced entry. Chain link fences, for example, can be reinforced with posts and rails, as shown in *Figure III-A-3* below, with rails being either solid material or stranded-steel cable encased in hollow pipe. The posts and rails can also be designed to blend into the fence. This type of reinforced fencing has been has successfully tested to the U.S. Department of State's K8 Anti-Ram rating, stopping a 15,000 pound truck traveling at 40 mph within 3 feet of the fence line.

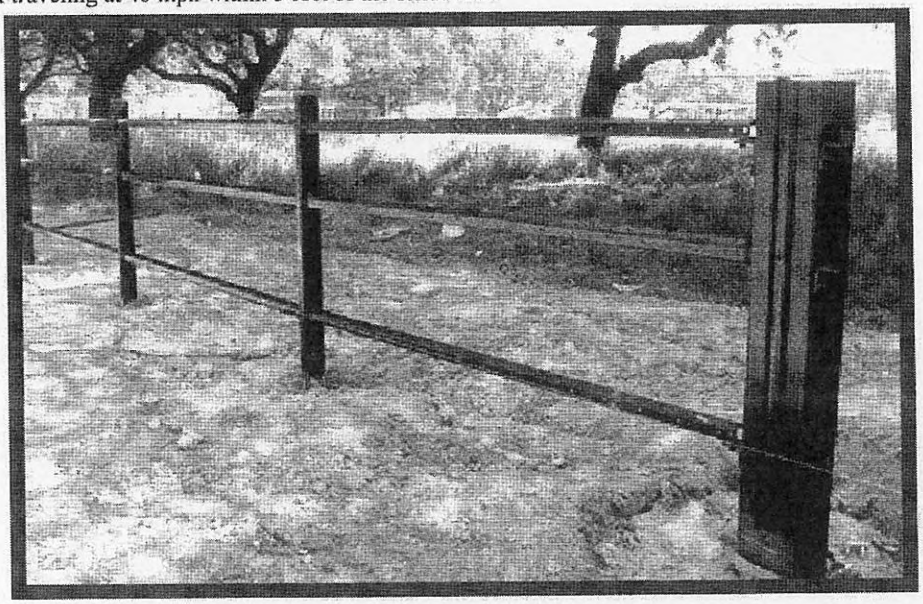


Figure III-A-3 - Fence Post and Rail Reinforcement

When utilizing fencing as a security boundary, care must be taken to ensure that the provision of fencing does not conflict with the operational requirements of the airport. Access points must permit passage of authorized vehicles and persons with relative ease. While the number of access points should be kept to a minimum, adequate access points must be planned for routine operations, maintenance operations, and emergency operations. For further information on fencing access points see *Gates* on page 29 or *Guard Stations* on page 31.

To assist in surveillance and security patrol inspection, keep fences as straight and uncomplicated as possible. This will minimize installation and maintenance costs.

Wind is often an issue when designing chain link fencing to be instrumented with intrusion detection sensors, including wind-induced fence motion caused by proximity of fencing to runways. A taut fence fabric is often required under such circumstances.

Effectiveness of fencing in critical areas can be improved by anchoring or burying the bottom edge of the fence fabric to prevent it from being pulled out or up to facilitate unauthorized entry. Use of concrete mow strips below the fence line and/or burying the bottom of the fence fabric can also deter tunneling underneath the fence by persons and animals. Mowing strips may also reduce security and maintenance man-hours and costs.

For safety or operational reasons (e.g. presence of navigational systems) some sections of perimeter fencing may not be able to meet standard security specifications. Special surveillance or detection measures may need to be applied to improve the safeguarding of these areas.

More specific information on fencing materials and installation, including the use of barbed wire outriggers, is available in FAA Advisory Circular 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities; and Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports, among others.

In summary, fences are the most basic first line of deterrence and defense. There is excellent guidance available from the Chain Link Manufacturers Institute, including detailed technical and procurement guidelines and specifications such as the Security Fencing Recommendations..

2) Buildings

Buildings and other fixed structures may be used as a part of the physical barrier and be incorporated into a fence line if access control or other measures to restrict unauthorized passage through the buildings or structures are taken at all points of access. Whether those points are located on the airside or landside boundaries, or perhaps through the middle of such buildings, may be dependent upon the nature of the business being conducted inside, and the level of continuous access required by personnel.

3) Walls

Walls are one of the most common types of physical barriers. Various types of walls are used for interior as well as exterior security boundary separation. In addition, walls play an important part as visual barriers and deterrents.

a) Interior Walls

When interior walls are to be used as security barriers, consideration should be made to the type, construction material used, and their height. When possible, security walls should be full height, reaching not just suspended ceilings, but complete floor to ceiling or slab.

Interior walls may be used as part of the security boundary, with appropriate attention paid to maintaining the integrity of the boundary and the level of access control to a degree at least equal to that of the rest of the boundary.

b) Exterior Walls

While typically not as economical as chain link fencing, the use of exterior walls as physical barriers and security boundaries is frequently necessary. Walls provide less visibility of storage or secured areas and can be matched to the surrounding architecture and buildings. In addition, some varieties of exterior walls are less climbable and thus more secure than security fencing or other barriers that offer hand-holds.

Walls of solid materials should not have hand or foot holds that can be used for climbing. The tops of walls should be narrow to prevent perching, and should have barbed wire or other deterrent materials. Blast walls are not necessarily good security fences, although appropriate design can aid in incorporating features of both, spreading the cost over more than one budget.

As in the case of interior walls, exterior building walls may also be used as part of the security boundary as long as the integrity of the secured area is maintained to at least the level maintained elsewhere along the boundary.

b. Electronic Boundaries

In the case of boundaries which are monitored by electronic sensors, motion detectors, infrared or microwave sensors, etc., it is clear that these are intended to serve essentially the same security functions as other detectors, but are simply employing other technologies, usually with somewhat higher maintenance costs. Typically they will be used in conjunction with other technologies such as alarms, CCTV, or other reporting and assessment methods. Nonetheless, there are appropriate places for using such applications, especially where normal conduit and cabling might be impractical, or where excessive trenching might be required. In addition, new technologies involving existing FAA ground radar surveillance can be incorporated for use in a security mode. See also Radio Technical Commission for Aeronautics (RTCA) Document DO-221, "Guidance and Recommended Requirements for Airport Surface Movement Sensors."

1) New Electronic Boundary Technologies

This document is focused on planning and design during the initial planning for current projects, even though new facilities such as terminals may sometimes be 4 or 5 years from the drawing board to processing the first aircraft and its passengers. When planning that terminal, and all other related facilities requiring a security perspective, one must also take account of continuing developments throughout the airport industry and the technologies that contribute to its secure well-being. While it may not be possible, or even prudent, to adopt first-generation beta-version technologies (although there may also be some corresponding advantages in such an approach), it is virtually certain that technology developments in many areas will afford new security capabilities and new requirements in the easily foreseeable future.

Among these is a rather broad concept called "data fusion", in which a wide array of sensors, surveillance techniques, data analysis and communications capabilities and procedures are brought together to enhance the ability of airport security to monitor and respond to a wide range of alarms, including the use of automated system analyses and alerts, thereby expanding an operator's "vision" and capability several fold.

Whether this is a necessary, immediate, or even desirable course of action for your airport, nevertheless as new technology becomes tested and available, it may not only be useful but also very cost-effective to consider such expansion early-on when designing infrastructure such as cabling to perimeter locations, power sources, lighting, communications, and more, so as to avoid the need for such costly things as re-trenching, replacing limited panels, relocating camera positions, etc.

One such technology being tested in a major Category X environment is the adaptation of the existing FAA ASDE ground surveillance radar signal to also monitor non-aircraft movement on the AOA as well as along external boundaries of an airport. This concept is illustrated in *Figure III-A-4* and *Figure III-A-5* below.

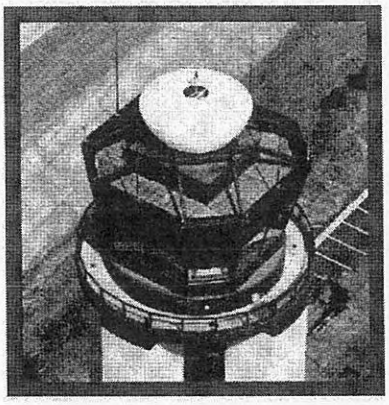


Figure III-A-4 - ASDE Radar

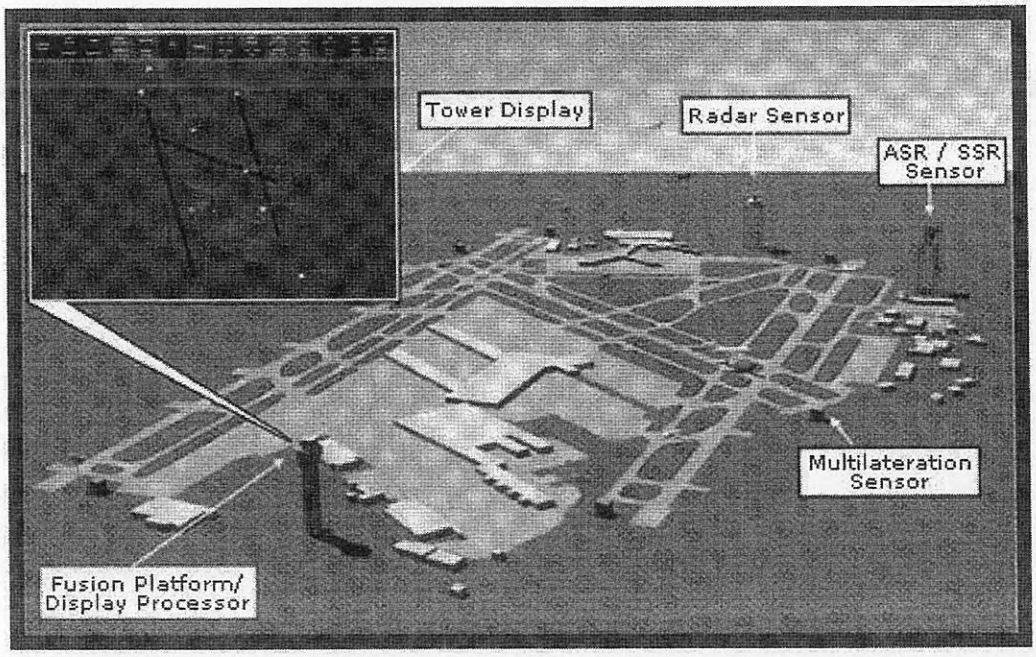


Figure III-A-5 - ASDE Radar & Its Adaptation for Surface Security and Intrusion Detection

Tests by TSA's Transportation Security Laboratory are designed to demonstrate that modified ASDE radar could differentiate between "approved" and "unauthorized" targets, including persons and ground vehicles as well as marine craft approaching a waterside perimeter. The radar is intended to determine the origin and track the paths of movement of these targets. With further development, the system is expected to classify an object, to predict its likely next movements or directions, and to assist the

operator in providing an appropriate level of response. Some of these functions can also be automated and applied to pre-programmed zones of priority to enhance security decision-making.

c. Natural Barriers

The use of natural barriers may be necessary or advantageous at an airport in areas that cannot structurally support physical barriers or fencing, or where the use of fencing or physical barriers would cause conflict with aircraft navigation, communications, or runway clear areas beneath approach paths. With TSA approval, natural barriers may be incorporated into the security boundary of an airport in lieu of standard physical barriers or in conjunction with and as a complement to additional security measures or procedures.

Natural barriers may include bodies of water, expanses of trees, swampland, dense foliage areas, cliffs, and other such areas.

Earthen material may also be used to create a visual barrier between any public road and the AOA. This can be accomplished through various methods such as trenching or the stockpiling of earthed materials. Trenching may be done below the grade of any adjacent airfield surface such as the perimeter road and at a slope that would prevent an individual from achieving a visual reference of the airfield. The stockpiling of material can also be used to create a visual barrier, but must not impact any protected surfaces or create an impact to the safe and efficient operation of aircraft or any airport operation. It is in the interest of the airport operator to have an above grade barrier on the airport property for ease of maintenance and control. A fence may be constructed atop the barrier

Using "time and distance" from critical facilities to be protected is another optional natural barrier. This concept suggests that if an unauthorized entry were to occur at a particular location, the amount of time and distance, combined with a high level of visibility would significantly reduce the likelihood of the intruder reaching the critical area without detection and/or intervention. "Time and distance" may be considered as an enhancement to standard physical barriers/boundaries when barriers or boundaries are relatively removed from the critical areas they are protecting.

Another common security design principle is known as "DDR: Detect, Delay, Respond", in which protection of a relatively remote perimeter or facility may require only moderate security measures if it is sufficiently removed from the primary security-related areas to allow the airport to detect an intrusion, and delay its progress until an appropriate security response can be implemented.

d. Access Points

Typically there are access points through fencing or other barriers for both vehicles and pedestrians. Access points through buildings or walls are typically doors; guard points or electronic means or controls may be also used. In all cases, the access point type and design may be the determining factor in the effectiveness of the security boundary and control in that area. So, in all cases, the number of access points should be minimized and their use and conditions closely monitored.

1) Gates

While the number of access points should be kept to a minimum, adequate pedestrian and vehicle access points must be planned for routine operations, maintenance operations, and emergency operations.

a) Routine Operations

Routine operational gates at an airport are typically those used by operations personnel, police patrols and response teams, catering, fuel and belly cargo vehicles and tugs, scheduled delivery vehicles, and ground service equipment and maintenance vehicles.

Most airport gates used for routine operations are typically high-throughput and should be designed for high-activity and long-life. These gates will take the most wear and tear, and should be designed to minimize delays to users, particularly where piggybacking may be a concern.

SIDA, secured area, AOA, and other security boundary gates that are high-throughput are the most likely candidates for automation and electronic access control. See *Electronic Access Points* on page 31 for further information

b) Maintenance Operations

Maintenance operations gates at an airport are typically those used by the airport, tenant and FAA personnel to perform regular and periodic maintenance to remote grounds or equipment. Typical maintenance tasks include mowing, utility service, navigational and communications equipment maintenance.

These gates, unless high-throughput or jointly used for routine operations, are typically non-automated, non-electronic.

c) Emergency Operations

Emergency operations gates are gates used by on-airport and mutual aid emergency response vehicles responding to emergency situations, especially those involving an aircraft, but may also be used for regular operations

Airport emergency operations gate controls may be controlled from an emergency operations center; or from the ARFF response vehicles themselves.

A capability for emergency response vehicles to crash through frangible mounts at emergency operations gates should be considered during the gate design, as should alarms on those gates. Consider special paint markings to identify the frangible fence or gate sections to approaching response vehicles.

Gates should be constructed and installed to the same or greater standard of security as any adjacent fencing to maintain the integrity of the area.

All gates should be equipped to be securely closed and locked, where enhanced security conditions require it. Swing gate hinges should be of the non-liftoff type or provided with additional welding to prevent the gates from being removed.

Security provided by gates can be improved if they are designed and installed with no more than 4'-6" of ground clearance beneath the gate. Where cantilever (slide) and/or rolling gates are used, consideration should be made during planning and design to curb heights, wheel paths, potential obstructions, local weather/wind phenomena, and drainage issues throughout the full path of the gate and in its adjacent areas. Proper drainage grading, planned gaps in curbs, installation of concrete channels or mow strips below the gate path, and use of bollards to prevent obstructions within the gate path and protect gate equipment are all design considerations which may prolong the efficient operation of a slide gate.

If "tailgating" entry is a concern at un-staffed vehicle access points, the first response is usually procedural rather than design, since it is the responsibility of the person authorized to use the gate to be certain tailgating does not occur. However, if a fence design solution is desired, an automated two-gate system (also known as a "vehicle entrapment gate") is one method that could help prevent "tailgate" entry. Such gates are separated one vehicle length apart and are sequenced so that the second gate does not open until the first has fully closed. Time-delayed closures are a viable alternative; sensor arrays have also been used to successfully monitor vehicle movement and assist in detection of "tailgate" entries. "Tailgating" and "reverse tailgating" (where a vehicle enters a gate opened by an exiting vehicle) at automated gates may also be reduced by use of a security equipment layout that provides space for waiting vehicles to stop, which obstructs, or at least deters other vehicles from passing through. CCTV may deter breaches at those facilities, and may provide an improved response when breaches occur. Additionally, CCTV may provide a visual record that can be used to document breaches that become the subject of investigations.

More specific information on gate materials and installation is available in FAA Advisory Circular 150/5360-13, Planning and Design Guidelines for Airport Terminal Facilities, and Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports, among others.

2) Doors

To prevent unauthorized access to the airside, doors leading from unsecured areas of the terminal to the airside, and which are under visual control of authorized personnel, should be limited to the operational minimum. Nevertheless, where they are necessary, electronic devices or closely controlled lock and key procedures may best control these doors. It may, however, be preferable to include the

use of electronic control devices, such as CCTV or cardreader/pinpads, to minimize labor costs and to be able to track personnel using specific doors to the AOA.

Unsupervised emergency exit doors providing egress from the terminal to the airside should be avoided if possible. If essential, these doors should be equipped with audio and visual alarms. Consider mounting a police-blue lens (to differentiate security from fire alarms), preferably located on both sides of the door, which can be monitored from a supervised location such as an airport security control center. Consider the possibility of CCTV cameras on both sides of certain high risk or high traffic doors. The use of frangible devices or covers over emergency exit activation bars deters misuse. Some codes allow for special locking arrangements for emergency exits that provide delays of up to 45 seconds, depending on local fire and life safety codes, as long as reasonable life safety is assured. Building codes establish specific performance requirements for doors with delay egress hardware. Each airport must work with local fire and building code officials to determine the best systems allowable to accommodate both emergency and security needs. See also *Emergency Exits* on page 70 for information regarding NFPA fire codes on emergency exits.

Passenger gates, aircraft loading walkways and other devices used for aircraft loading must be capable of being locked or otherwise secured to prevent unauthorized access to the airside and parked aircraft.

3) Guard Stations

Manned guard stations to control access into a security area may be appropriate at some locations. The purpose of such guard stations is to provide a point of entry at which personal identification can be established and persons and vehicles can be permitted to enter according to local security program requirements which vehicles require search.

a) Devices such as turnstiles, tire shredders, roll gates, pop-up barriers, or a remotely operated drop arm barrier gate may be used at guard stations to impede passage through the guard station until access authority is verified.

b) Use of a sheltered checkpoint station is recommended for gates secured by security personnel. The shelter can be designed to permit maximum visibility over the immediate area of the gate and to provide easy access for the guard to carry out the duties of inspecting vehicles and their contents.

c) Sufficient space should be provided to direct a person or vehicle to one side for further inspection without blocking access for those following. Space should also be provided to allow vehicles refused entry to turn and exit. Vehicle lanes and inspection stations should be provided in sufficient quantity to meet the expected traffic volumes, average inspection and processing times, and size of the largest vehicle entering the checkpoint. Stations may employ vehicle manifest pre-clearance checkpoints and special expedited clearance lanes for recognized deliveries, by agreement between the airport and the TSA. Dependable and instant communications from these stations to a central location must be installed, maintained, and frequently tested.

d) It is essential to provide communications between any sheltered security checkpoint station and the airport security services office, as well as to provide a duress alarm by which emergency assistance may be summoned.

e) In some applications, a vehicle access point may be remotely controlled by use of a card reader or similar credential verification device, in conjunction with CCTV monitoring taking place at the Security/Communications Center.

4) Electronic Access Points

a) Automatic Gates

In cases where gates are automated and induction loops are used on the airside of gates for free vehicle exit, ensure the loop is located so as to minimize the possibility of objects being thrown or pushed from the public side to activate the loop. Additional access control measures, such as microwave, infrared or other vehicle sensors or CCTV monitoring may be desirable in addition to loops where space is limited or additional security is desired.

Consider means of protecting access control devices (such as card readers or other monitors) serving exterior vehicle gates to reduce possible physical damage from passing vehicles. Properly placed

curbing, bollards, and highway railing are useful for this purpose. Consider also protection of equipment from weather elements, including protection from extreme heat or cold inside equipment enclosures, which can affect the operation of electronic and mechanical components. Heaters and/or fans are available as standard options for most access control devices, housings and operators.

b) Doors with Access Controls

There are numerous technologies available for controlling access through doors (magnetic stripe, Weigand, proximity, Smart card, etc.) and there are numerous ways of implementing their use at any kind of doorway – wooden doors, glass, metal, single or double doors, roll-up doors, or indeed at electronic barriers where there is no physical door at all. The designer should take into account any existing systems the airport might wish to retain and integrate with new systems, and whether newer advances in technology might suggest a complete or partial replacement of the old systems to provide better security and security management. An extensive discussion of this issue is found in the RTCA document DO-230A, "Standards for Airport Security Access Control Systems." Recent technological advances may provide additional solutions including biometrics.

c) Sensor Line Gates

Sensor line gates and/or electronic gates function as typical access controlled gates, except that a sensor line (microwave, infrared, etc.) is used instead of a mechanical barrier. Depending on the electronic sensor technology used (see *Electronic Boundaries* on page 27 for further information), sensor line gates may be comparable in cost to mechanical ones.

The use of sensor line gates is typically the most feasible as a second, interior boundary where delays due to the mechanical operation of a physical gate are not practical, where space is limited, or where additional vehicle monitoring is desired. Sensor line gates are most often used to control vehicle access into a secured area or in cargo or maintenance areas where time is critical.

d) Automated Portals

Automated access portals are designed for high-throughput, performing access control and/or providing sensing technology in a high-speed, multi-user fashion, yet also providing a positive means of access denial of unauthorized persons. They typically provide an unobstructed pathway with the capability of preventing access if multiple or unauthorized persons attempt to enter. Where these are employed, the delay induced by door opening/closing is eliminated. These portals are designed to replace high-throughput doors where piggybacking is a concern or to add additional explosives, drug, or weapon sensing technology to high-throughput areas.

There are also portals and sensing technologies under development that are sensitive to the direction of the intruder's movement, and automatically provide photographs of security violators, and/or detain unauthorized individuals. As technology advances, the capability and affordability of automatic portals will increase and should be evaluated for high-throughput and/or special-use access point locations.

5) Vehicle Inspection Stations, Blast Protection, and Road Barriers

Manned vehicle inspection stations and vehicle crash barriers in roadways may be necessary to control access in and around the airport terminal and other airport facilities. Additional, non-permanent measures may also be necessary during elevated threat levels or high-risk areas. This aspect of airport design should begin with the results of the vulnerability assessment undertaken during the planning phase.

The purpose of vehicle inspection stations is to provide a location outside of the "blast envelope" in which to inspect vehicles that are approaching the airport terminal on the access roadway. Vehicle inspection stations may also be necessary at vehicle parking locations that are located within the blast envelope. Consideration should be given to including the following features at vehicle inspection stations.

a) Turnstiles, roll gates, or vehicular crash barriers should be provided that will stop or impede "gate crashing."

b) A sheltered checkpoint station is recommended. The shelter should be designed to permit maximum visibility over the immediate area of the station and to provide easy access for the guard to carry out the duties of inspecting vehicles and their contents.

c) Sufficient space should be considered to direct a person or vehicle to one side for further inspection without blocking access for those following. Dependable and instant communications from these stations to the Security Operations Center (SOC) or other appropriate central location should be installed, maintained, and frequently tested. Sufficient space should be provided for emergency vehicles and other pre-authorized vehicles to by pass the vehicle inspection stations to access the terminal.

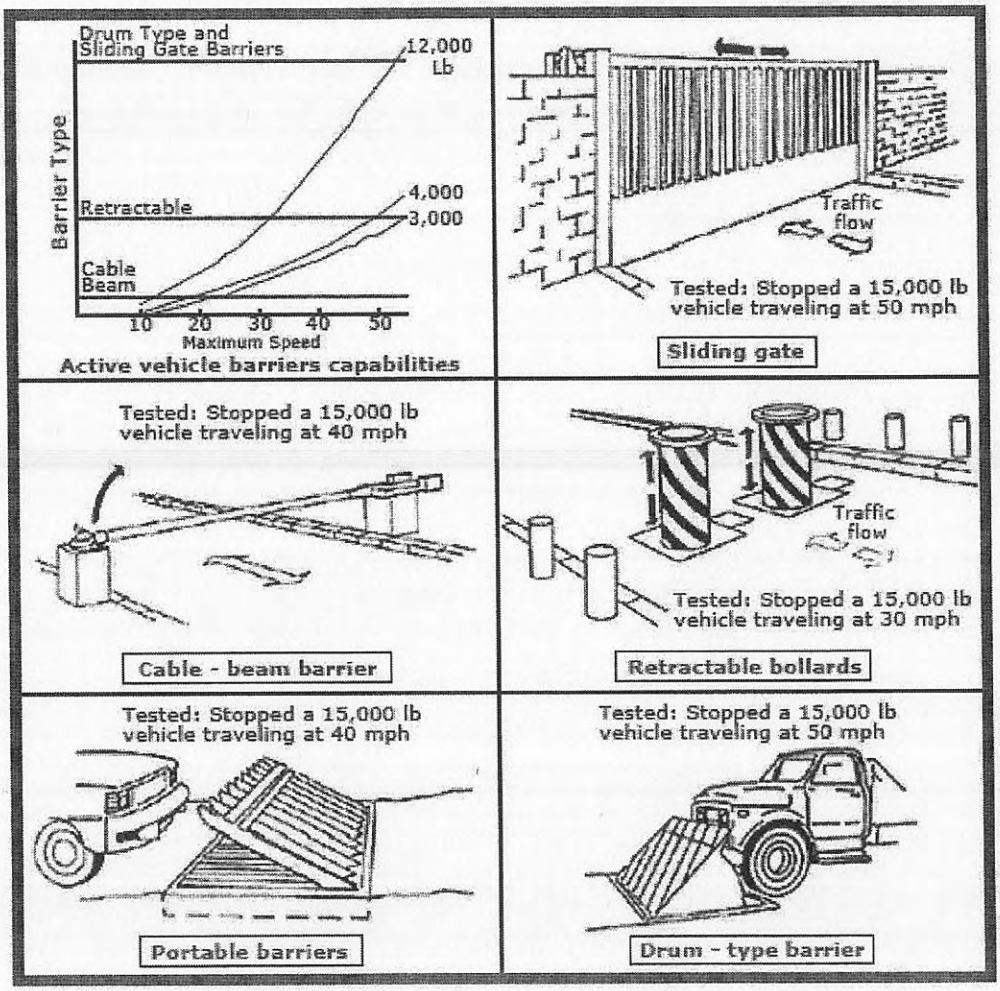
d) A duress alarm system should be provided.

e) Provide ample vehicle queuing distance and vehicle inspection portals to avoid long traffic backups and delays.

Airports are faced with the possibility of attack by explosive-laden vehicles. Fortunately, there is a considerable body of knowledge on blast effects and protective measures available at U.S. government laboratories and agencies. In addition, the U.S. Department of State (DoS) has developed standards for vehicle crash barriers which airport designers can apply with confidence in the level of protection afforded.

Figure III-A-6 below illustrates the types of barriers that might be employed for various airport security applications, depending on the severity of the threat and the level of protection required. Barriers should also be designed to work with other measures, such as physical setbacks of buildings and natural barriers such as berms, on developing a blast protection solution.

Figure III-A-6 - Types of Road Barriers



Blast effects and protective measures have been extensively studied and tested. *Table III-A-2* below and *Table III-A-3* on page 36 show the lethal blast radii for various types of threats and the types of blast-protection measures that barriers might be considered to protect against each type of threat.

Table III-A-2 - Lethal Radius of Various Explosive Packages

Type of Expolsive	Expolsive Capacity in TNT Equivalents	Lethal Air Blast Range
Pipe Bomb	5 lbs. (2.3 kg)	
Briefcase, Backpack, or Suitcase Bomb	50 lbs. (23 kg)	
Compact Sedan (in trunk)	500 lbs. (227 kg)	100 ft. (30 m)
Full Size Sedan (in trunk)	1,000 lbs. (454 kg)	125 ft. (38 m)
Passenger or Cargo Van	4,000 lbs. (1,814 kg)	200 ft. (61 m)
Small Box Van (14th ft box)	10,000 lbs. (4,536 kg)	300 ft. (91 m)
Box Van or Water/Fuel Truck	30,000 lbs. (13,608 kg)	450 ft. (137 m)
Semi-trailer	60,000 lbs. (27,216 kg)	600 ft. (183 m)

Source: Transportation Security Working Group, "Terrorist Bomb threat Standoff (Card)," Government Printing Office (1999).

Table III-A-3 - Comparative Effectiveness of Barrier Types

		Vehicle		Protection Level (0-10)
		Weight	Speed	10
Passive Barrier Test Results	Concrete Filled Steel Bollards	4,500	30	1
	Jersey Barrier	4,000	50	2.6
	Straight Retaining Wall	15,000	30	3.6
	Sloped Back Retaining Wall	15,000	40	6.4
	Concrete Planter Retaining Wall	15,000	50	10
Active Barrier Test Results	Cable - Beam Barrier	10,000	15	.6
	Rectractable Bollards	15,000	30	3.6
	Portable Barriers	15,000	40	6.4
	Drum Type Barriers	15,000	50	10
	Sliding Gate	15,000	50	10

Source: Military FM 5-114

DoS performance requirements for vehicle crash barriers are based the kinetic energy represented by the mass of a vehicle and its impact velocity. These "K" ratings are:

K4 15,000 lb vehicle impacting at 30 mph
K8 15,000 lb vehicle impacting at 40 mph
K12 15,000 lb vehicle impacting at 50 mph

To be certified with a Department of State "K" rating, a barrier must demonstrate the ability to stop a 15,000 vehicle and the bed of the vehicle must not penetrate the barrier by more than 36 inches. Additional information on DoS security measures can be obtained from the Bureau of Diplomatic Security, Physical Security Programs, Physical Security Division (DS/PSP/PSD).

DoS certified barriers can be configured as pop-up wedge type barriers, as illustrated in *Figure III-A-7* below, or as vertical bollards or any other configuration which meets the above performance requirements.

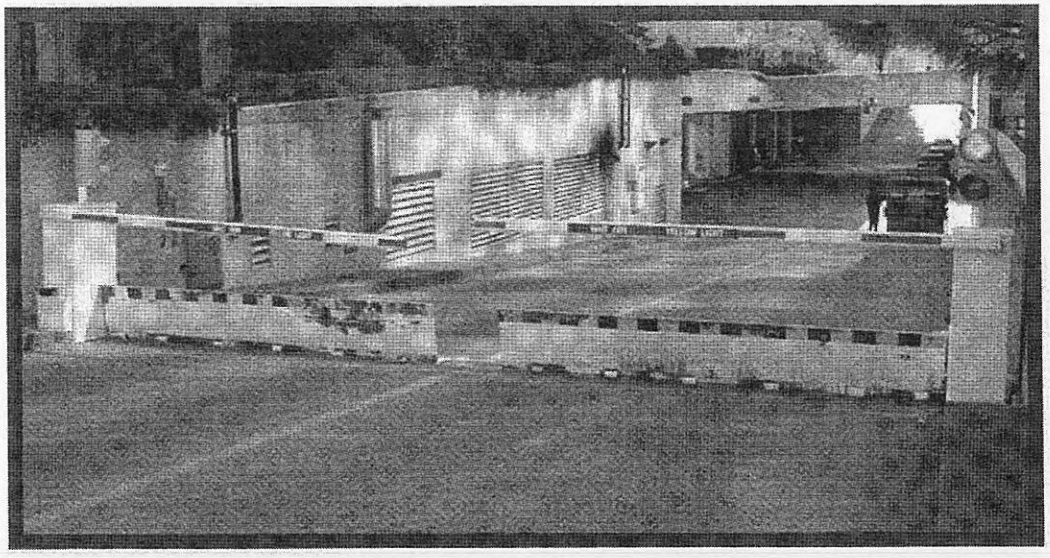


Figure III-A-7 - Example of Pop-Up Wedge Vehicle Crash Barrier

e. Other Security Measures

1) Fence Clear Zones

a) Security effectiveness of perimeter fencing is materially improved by the provision of clear zones on both sides of the fence, particularly in the vicinity of the terminal and any other critical facilities. Such clearance areas facilitate surveillance and maintenance of fencing and deny cover to vandals, trespassers and contraband.

b) Within clear zones there should be no climbable objects, trees, or utility poles abutting the fence line nor areas for stackable crates, pallets, storage containers, or other materials. Likewise, the parking of vehicles along the fence should also be prevented. In addition, landscaping within the clear zone should be minimized or eliminated to reduce potential hidden locations for persons, objects, fence damage, and vandalism.

c) There have been cases in which individuals have gained access to passenger aircraft by scaling or crashing through perimeter fencing. To deter or delay attacks, sufficient distance should be maintained between the perimeter fencing and aircraft parking areas.

2) Security Lighting

Lighting of the area on both sides of gates and selected areas of fencing is highly recommended. Lighting beneficial for security inspection, and to assure that fence/gate signage is readable and card readers, keypads, phones, intercoms, and/or other devices at the gate are visible and usable. Similarly, sufficient lighting is required for any area in which a CCTV camera is intended to monitor activity. Reduced lighting or sensor activated lighting may be considered in areas which have minimal traffic throughput in the off-peak hours.

3) Locks

Advanced electronic key technologies should be considered as well as the time-honored deadbolt lock, built-in door handle lock, or padlock and metallic key to secure a portal, particularly those that are

low-risk, low throughput, or significantly distant from the main areas of concern or from the central control station. Note that securing perimeter access portals through the use of locks necessarily involves procedural elements such as a key management system and the difficulties of recording usage at numerous locations and reissuing all keys when some are lost or stolen. An important consideration in choosing lock systems is total life-cycle cost.

4) CCTV Coverage
   a) While gates, like all other access points, should be kept to a minimum and, where physically and economically feasible, should be considered for treatment with access control and CCTV monitoring, it is recognized that certain low-traffic gates, maintenance access points and gates well removed from the principal areas of security concern may be candidates for greater reliance on time-and-distance considerations.
   b) Further information on CCTV Systems and coverage is contained in *Surveillance and Video Detection Systems* on page 162.

5) Signage
   a) TSA requires signage on certain security boundaries and access points. Specific requirements are found in the ASP pursuant to 1542.201 (secured area) and 1542.203 (AOA). Signs should be located such that when standing at one sign, the observer should be able to see the next sign in both directions.
   b) The use of signage, even in some non-required locations, provides a deterrent by calling attention to the boundary and stating the consequences of violating.
   c) Many locations with access control or surveillance equipment such as CCTV may warrant signage for either directional or legal purposes (e.g. "Alarm will sound if opened", "Authorized personnel only", "Notice: All activities in this area are being recorded via CCTV", etc.)
   d) While signage for security purposes should be designed to draw attention, it should be coordinated with the airport for policy, style and consistency. Based on local environment, the use of multi-lingual security signage should also be considered.
   e) Refer to the *Terminal Section* on page 58 for additional signage information.

Section III-A-5 - Boundaries & Access Points Checklist:

- ☐ **Boundary Choice Factors**
  - Equipment Cost
  - Installation Cost
  - Maintenance Cost
  - Effectiveness
  - Functionality
- ☐ **Physical Barriers**
  - Align with security area boundaries
  - Fencing
    - Select fencing type based on threat and vulnerability assessments, aesthetic considerations, and cost
    - Typically 7' chain link fabric + 1' barbed wire
    - Fence designs are available which are difficult to climb or cut
    - Select barrier types based on threat and vulnerability assessments, aesthetic considerations, and cost
      - Permanent barriers
      - Movable barriers
      - Bollards
      - Vehicle crash barriers
    - Motion, tension or other electronic sensing means available
    - Allow access points for vehicles and persons
    - In critical areas, anchor or bury the fence bottom
    - Keep lines straight and noncomplex
    - FAA References include:
      - Advisory Circular 150/5360-13
      - Advisory Circular 150/5370-10
      - 49 CFR 1542.201 & 1542.203
  - Buildings
    - May be used as a physical barrier
    - May be incorporated into a fence line
    - Assess security access points
  - Interior Walls
    - Security walls should be full height, floor-to-solid ceiling or to slab
  - Exterior Walls
    - Aesthetic designs available
    - Minimize hand & foot holds that can be used for climbing
    - Consider topping walls with barbed wire or other deterrent materials
- ☐ **Electronic Boundaries**
  - Electronic sensors
  - Motion detectors
  - Infrared sensors
  - Stand-alone or used with other barriers
- ☐ **Natural Barriers**
  - Bodies of water
  - Expanses of trees
  - Swampland
  - Dense foliage
  - Cliffs
  - Other areas difficult to traverse
  - Natural barriers may provide "time and distance" protection
- ☐ **Access Points**
  - Minimize the number of access points
  - Gates
    - Plan for routine, maintenance, and emergency operations:
      - Patrols
      - Emergency Response Teams
      - Service Vehicles and Tugs
      - Delivery Vehicles

- Maintenance Vehicles
- Design for high activity/long gate life
- Gate hinges should be non-liftoff or have welding to prevent removal
- Automate/Monitor gates as necessary
- Reduce ground clearance beneath, typically to no more than 4-6 inches
- Two-gate systems can help prevent "tailgate" entry (sally ports)
- FAA References include:
  - Advisory Circular 150/5300-13
  - Advisory Circular 150/5360-9
  - Advisory Circular 150/5360-13
  - Advisory Circular 150/5370-10

- Doors
  - Avoid unsupervised emergency exit doors to the AOA
  - Automate/Monitor doors as necessary
  - Coordinate hardware with building and fire codes
- Guard Stations
  - Manned access control and search capability
  - Size number of inspection lanes against predicted traffic volumes and inspection processing rates
  - Vehicle lane widths and heights should be matched to largest vehicle accessing the airport
  - Provide sheltered checkpoint station
  - Provide adequate secondary inspection space
  - Dependable communications required
- Electronic Access Points
  - Automatic Gates
    - Locate induction loop to minimize objects from the public-side activating loop
    - Consider bollards to reduce equipment damage by vehicles
    - Protect of electronic equipment from weather and temperature
  - Doors with Access Controls
    - Numerous technologies available
    - See RTCA DO-230A, "Standards for Airport Security Access Control Systems"
  - Sensor Line Gates
    - Function as access-controlled gates
    - Reduced delay time for access
    - Higher risk due to lack of barrier
  - Automated Portals
    - Designed for high-throughput
    - Can include screening technologies
    - Direction sensitive capabilities
    - Can detain violators
- Other Security Measures
  - Fencing Clear Zones
    - Both sides of fence
    - No obstructions
    - Minimal landscape
    - No climbable objects
  - Security Lighting
    - Both sides of gates and fencing is highly recommended
  - Locks
    - Various key technologies available
    - Consider total life cycle costs, not just initial capital cost
  - CCTV Coverage
    - CCTV can be used to enhance detection and/or response
  - Signage
    - Specific requirements are in ASP
    - TSA/FAA-required signage per Advisory Circular 150/5360-12C
    - Deterrent signage
    - Instructional and/or legal signage
    - Coordinate with airport signage policy

6. Facilities, Areas and Geographical Placement

When determining the security requirements of all airport facilities, examine the interaction and relationships among the various areas, the types of activity within each area, the flow of public and employee traffic to and through each area, the flow and type of delivery and maintenance traffic, potential needs for and frequency of security escorts, and the manner in which each such area is addressed in the airport's ASP. A facility's placement in relation to the airside/landside boundary, commercial passenger terminal, and regulated security areas will heavily affect what security and access control requirements exist and who has responsibility for security.

a. Aircraft Maintenance Facilities

Aircraft maintenance facilities may be completely landside, completely airside or part of the airside/landside boundary line. As these facilities contain aircraft ramp and/or hangar areas as well as involve public access and supply delivery, their property and/or buildings are typically parts of the airside/landside boundary line and as such require coordination with the airport operator for access control.

Security considerations for aircraft maintenance facility layout and placement include:

- Compliance with 49 CFR 1542
- Prevention of unauthorized access to the aircraft
- Prevention of unauthorized access to and tampering with aircraft parts and equipment
- Non-reliance on large hangar doors/opening as a security boundary/demarcation line
- Location of loading/delivery docks landside

b. Aircraft Movement Areas

By definition, aircraft movement areas (runways, taxiways, aircraft ramps) are completely airside, are required to be within the AOA or secured area, and require security measures per 49 CFR 1542 as well as adherence to appropriate Federal Aviation Regulations (FARs).

Detailed information is contained in *Aircraft Movement Areas* on page 47 under the *Airside* section.

c. Aircraft Rescue and Fire Fighting (ARFF) Facilities

ARFF stations and their equipment are a requirement of 14 CFR 139, Subpart D, Certification and Operations: Land Airports Serving Certain Air Carriers, which is administered by FAA. These facilities are clearly critical to an airport's operations. Typically, even in a multi-station scenario, the primary ARFF station may be located straddling the airside and landside boundary. This positioning may be necessary for a variety of reasons, but public access to the ARFF station may be needed, as well as for mutual aid responders and for ease of landside access to the ARFF station for the fire fighters themselves. However, public access in a multi-station scenario should be limited to the primary ARFF station, not the substation(s).

Positioning of each ARFF station must consider emergency response times and routes. Thus, stations are located for minimum response times to 14 CFR 139 required locations. ARFF vehicles may need landside access for response to landside incidents.

ARFF stations generally include a training classroom that is often used for training airport tenant employees and related activities. If possible, portions of the ARFF station should be accessible without requiring persons to pass though access controls. However, other portions of the ARFF station must be controlled to prevent unauthorized access to the airside.

Similarly, the administrative office area of an ARFF station may be open to public access, enabling persons having business with ARFF officers to access these areas without access control.

In all cases listed for this section, coordinate ARFF facilities with airport staff to determine design direction and resulting operations.

d. Security Operations Center (SOC)/Airport Emergency Command Post (CP)

The title for locations where an airport operates from during normal security operations, as well as during an emergency, event or incident varies by individual airport. Typical titles for facilities where normal security dispatch and operations occur include Security Operations Center (SOC) and Airport Operations Center (AOC). Typical titles for facilities where airport emergency operations occur include Airport Emergency Command Post (CP) and Airport Emergency Operations Center (EOC). For purposes of this document, the standardized terminology SOC and CP shall be used.

When addressing SOC and CP facilities, it should be noted that demand for their use may be for a single or potentially, multiple events happening concurrently. It may also be necessary to address redundant systems, or at least redundancy of primary components installed in a SOC and/or CP, for location in other areas of the airport is it within a terminal or an alternate facility. In addition, links to other government emergency facilities may enhance the operation of an airport's CP.

There are no hard and fast rules for these locations though most are in or attached to the main terminal. In all cases they should be located within a secure area. The designer must be certain to discuss alternative proposed locations with all departments who will use the SOC and/or CP. Indeed, secondary or satellite locations may be valuable for those instances when the primary SOC or CP is out of service. While ease of access to the airside is one primary consideration, there are numerous other concerns such as sufficient operating space for police and other support personnel, central location for access to or dispatch to any point on the airport, technical considerations such as cable routing for all necessary equipment, or support services such as restroom or break room amenities. Considerations for public accessibility should also be considered for SOC facilities based on procedures for such public-related systems and services such as paging, lost and found, or first aid.

For a full discussion on these areas and their contents, see *Security Operations Center* on page 78 and *Airport Emergency Command Post* on page 79 under the *Terminal* section.

e. Airport Personnel Offices

Most personnel and administrative offices typically have landside and/or public access during business hours. During non-business hours they are usually secured, and may be included in the airport's overall access control system, particularly if located within the terminal complex. In addition, some personnel offices, such as airfield maintenance or operations, may be completely airside.

Most airport personnel offices are located in or near the terminal, and are secured (nonpublic) at least part of the time. See *Airport Personnel Offices* on page 76 under the *Terminal Nonpublic Areas* section.

f. Belly Cargo Facility

Belly cargo is carried on passenger aircraft rather than all-cargo or freighter aircraft. Belly cargo facilities share many of the same security requirements as standard cargo areas, and in many airports may be part of one joint cargo facility or area. However, some airports maintain a completely separate area for belly cargo that will be traveling in passenger aircraft rather than cargo planes. One of the primary differences between most dedicated belly cargo facilities and other cargo facilities is that the belly cargo facility may not need to be attached to or adjacent to an aircraft ramp. Since most belly cargo is handled via tugs, a belly cargo facility can be located either adjacent to the terminal where its aircraft operator aircraft are, or at any point along a service roadway which connects to the terminal. A standard cargo facility on the other hand may need to handle aircraft cargo directly where the plane actually pulls up to a fixed or movable loading bridge.

The added flexibility in the location of a belly cargo facility, as well as the fact that it can be separate from the general cargo facility, enables a belly cargo facility to be designed with potentially higher or stricter security levels. Since belly cargo usually involves smaller quantities of public air cargo and U.S. mail, belly cargo facilities can be designed which have the potential for 100% Explosives Detection System (EDS) screening of cargo, and have more flexibility than direct "cargo to plane" operations in that the facility can be either landside or airside and still be isolated from critical passenger aircraft areas. Refer to the *Security Screening* section on page 87 for further information.

A facility for shared cargo screening, including belly cargo and regular cargo, should be considered.

g. All-Cargo Area

A general all-cargo area includes all the ground space and facilities provided for cargo handling. It also includes airport ramps, cargo buildings and warehouses, parking lots and roads associated therewith.

Refer to the *Security Screening* section on page 87 for further information.

h. FAA Airport Traffic Control Tower (ATCT) and Offices

The FAA ATCT and its administrative offices may be located within or adjacent to a terminal complex or in an airside or landside area. ATCT location is dependent upon runway configuration and line of site criteria. ATCT security needs should be addressed by the airport planner and designer such that an interface takes place with FAA security requirements for FAA ATCT design criteria. When the ATCT is in a remote airport location, it may require significant levels of protection as one of an airport's most critical operational facilities. Coordination with the FAA, TSA and the airport is necessary in order to address all ATCT security impacts or requirements to airport operations.

i. Fuel Facilities

Fuel farms are often placed in a remote location of the airport, often with underground hydrant systems feeding fuel to the ramp areas and require attention. Security fences should surround the fuel tanks, and should be access-controlled whenever possible to monitor all movements, including authorized traffic. Where distance precludes hard wiring to the main system, there are wireless technologies as well as freestanding electronic locking mechanisms available. Closed circuit television monitoring, alarms and sensing should be considered in and around fuel farms and storage tanks to alert law enforcement/security personnel of potential intruders or tampering.

j. General Aviation (GA) and Fixed Base Operator (FBO) Areas

GA and FBO areas at commercial passenger airports are airport tenant areas typically consisting of aircraft parking areas, aircraft storage and maintenance hangars, and/or tenant terminal facilities. GA/FBO areas will typically be part of the airside/landside boundary; with aircraft parking areas/ramps located completely airside.

For information on security at non-commercial general aviation airports, see TSA Information Publication (IP) A-001, "Security Guidelines for General Aviation Airports", issued in May 2004. The TSA document is available on the Internet at

http://www.tsa.gov/interweb/assetlibrary/security_guidelines_for_general_aviation_airports_may_2004_a-001.pdf

This material should be considered a living document which will be updated and modified as new security enhancements are developed and as input from the industry is received.

Further information is in *General Aviation (GA) Parking Area* on page 47 under the *Airside* section.

k. Ground Service Equipment Maintenance (GSEM) Facility

Many airports today maintain specialized areas for storage and maintenance of ground service equipment (baggage tugs, push-back vehicles, refueling trucks). These areas are often referred to as Ground Service Equipment Maintenance (GSEM) facilities and may also be used to service and maintain other airport and maintenance vehicles. As with other maintenance facilities, these areas may be landside or airside depending upon their needs, and the amount and frequency of landside/airside travel.

As with other service and maintenance areas, particular attention should be paid to material and vehicle parking/storage areas and assuring they do not compromise airside fencing clear zones or security.

l. Ground Transportation Staging Area (GTSA)

A GTSA is a designated area where taxis, limos, buses and other ground transportation vehicles are staged prior to the terminal. By nature, these areas are always landside as it involves public and private off-airport transportation services.

Refer to the *Ground Transportation Staging Area (GTSA)* section on page 52 under *Landside* Facilities.

m. Hotels and On-Airport Accommodations

By nature, hotels and on-airport accommodations are always landside as they are public facilities.

Refer to the *Hotel and On-Airport Accommodations* above under *Landside* Facilities.

n. Industrial/Technology Parks

Industrial/technology Parks may be landside, airside or both. Many airports have land available or in use as industrial/technology parks. Evaluate this land use for security impacts to the airport's operations.

o. In-Flight Catering Facility

On-airport facilities for in-flight catering service may be located landside, airside, or may be a boundary facility with portions of both. Due to the nature of the facility, as well as its typical placement near the passenger terminal, security needs and choices may require substantial amounts of coordination, both architecturally and procedurally. Determination of the security risk involving catering operations should be evaluated in advance of design or construction of these facilities.

p. Intermodal Transportation Area

While *intermodal* transportation areas vary greatly in function and location, they are typically always completely landside facilities. The function of an intermodal transportation area is to transfer passengers or cargo from one mode of transportation to another (i.e., train to plane, bus to plane).

Detailed information is contained in Intermodal Transportation Areas under Landside Facilities.

q. Isolated Security Aircraft Parking Position

The Isolated Security Aircraft Parking Position is a location within the airside used for parking an aircraft when isolation is required due to security or other concerns. This location is subject to special security requirements as identified in the airport's ASP.

Detailed information is contained in *Isolated Security Aircraft Parking Position* on page 48 within the *Airside* section.

r. Military Facilities

Some airports may have adjacent or on-airport military facilities such as Reserve, National Guard or active duty units. Since each of these situations is unique, and since these facilities may be partially airside, or adjacent; detailed coordination between the airport, FAA, TSA, and the military facility must occur for both design and procedure. Typical areas of coordination include access control, identification systems and background check requirements, areas of access, security patrol boundaries, blast protection, security response responsibilities, and joint and/or shared security system data and equipment. Proper coordination should also occur to assure that the security and safety of such military facilities are not compromised by the placement of airport CCTV and access control equipment. See Unified Facilities Criteria UFC 4-010-01 for Department of Defense (DOD) Minimum Anti-Terrorism Standards for buildings used by the military.

s. Navigational & Communications Equipment

Since the placement of navigational and communications equipment is typically driven by functionality, not security, most airports typically have equipment both airside and landside. Where equipment cannot be included within the airside, it should be at a minimum fenced for both safety and security. In addition, electronic monitoring and/or controlling of access to critical equipment may be desirable.

t. Passenger Aircraft Loading/Unloading Parking Areas

Passenger aircraft loading/unloading parking areas are required to be airside and are typically at or near the passenger terminal, are required to be within the secured area, and require security measures per 49 CFR 1542.

Detailed information is contained in Passenger Aircraft Loading/Unloading Parking Areas within Airside.

u. Passenger Aircraft Overnight Parking Areas

Passenger aircraft overnight parking areas are required to be airside and are typically adjacent to the passenger terminal, but may also normally be on a designated ramp located remotely from the terminal. These areas are required to be within the AOA or secured area, and require security measures per 49 CFR 1542.

Detailed information is contained in Passenger Aircraft Overnight Parking Areas within Airside.

v. Rental Car and Vehicle Storage Facilities

Rental car facilities and vehicle storage are usually landside.

See the *Rental Car Storage Areas* section on page 52 under *Landside* Facilities.

w. State/Government Aircraft Facilities

Some airports include areas for non-military government aircraft support facilities. For the most part, these facilities should be given the same considerations as GA/Fixed Base Operator (FBO) areas. However, because of their nature, non-military government aircraft support facilities are typically isolated from other GA/FBO areas and require stricter, and more extensive, security measures. In many cases these areas will have their own, independent security/access control/CCTV system, as well as their own monitoring and security personnel.

x. Terminal Patron Parking Areas

Terminal patron parking areas are public areas and are required to be completely landside. Parking areas are typically at or near the passenger terminal, but may also be located remotely. Security requirements for patron parking areas varies greatly dependent upon the area's proximity to the passenger terminal, security areas and perimeter fencing, and methods used to control entry to the parking areas.

Detailed information is contained in Terminal Patron Parking Areas within Landside.

y. Utilities and Related Equipment

Design and location of utilities and related equipment and service areas should be coordinated with security and fencing design to minimize security risks and vandalism potential. While it is beneficial from a safety and vandalism standpoint to locate utility equipment airside when possible, maintenance contracts, and service personnel identification media issuance and access may require utilities to be landside. Special emphasis should be given to aboveground electrical substations.

Where underground service ducts, storm drains, sewers, tunnels, air ducts, trash chutes, drainage structures, and other openings provide access to the airside or other restricted area, security treatments such as bars, grates, padlock, or other effective means may be required to meet practical maximum opening size requirements. For structures or openings that involve water flow, consider in the security treatment design the direction of flow, type, and size of potential debris, and frequency and method of maintenance access required for debris removal, as well as the potential for flood and/or erosion during heavy flow/debris periods.

Section III-A-6 - Facilities, Areas and Geographical Placement Checklist

☐ **Facility Placement Considerations:**
- Interaction and relationships among areas
- Types of activity within each area
- Flow of public/employees to/through areas
- Flow and type of delivery traffic
- Flow and type of maintenance traffic
- Need for and frequency of security escorts
- How each area is addressed in the ASP

☐ **Each Airport is Unique**

☐ **Facilities:**
- Aircraft Maintenance Facilities
  - Airside, Landside or Both
  - Security the responsibility of the facility
- Aircraft Movement Areas
  - Airside
  - Requires controlled access
- Passenger Aircraft Overnight Parking Area
  - Airside
  - Requires controlled access
- ARFF Facilities
  - Either Airside or Both
  - Consider response routes and times
  - Facility may require public access
- SOC/CP
  - Secure location
  - Consider alternate/back-up locations
  - Ease of airside access
  - Sufficient operating space for personnel
  - Central location for dispatching
  - See Terminal Nonpublic Areas Checklist
- Airport Personnel Offices
  - Airside, Landside or Both
  - Consider security needs
  - See Terminal Nonpublic Areas Checklist
- Belly Cargo Facility
  - Airside, Landside or Both
  - Flexible Placement
  - Terminal Access (via roads) required
  - Consider cargo screening needs
- Cargo Area
  - Typically Airside or Both
  - Screening and inspection needs
  - Secure cargo-holding area
  - Postal facility inclusion possible
  - Doors must be lockable and controlled
  - Consider fence protection measures
- FAA ATCT and Offices
  - Landside or Airside
  - May require airport security controls
- Fuel Area
  - Landside or Airside
  - Typically remote from terminal
  - Safety and security fencing required
  - Consider access controls to area
- GA Areas
  - Typically Airside on Both
  - Boundaries based on function
- GSEM Facility
  - Landside or Airside
  - Consider airside travel frequency
  - Maintain fencing clear zones
- GTSA
  - Landside
  - Public Safety and Security Concerns
- Hotels and On-Airport Accommodations
  - Landside
  - Public Safety and Security Concerns
- Industrial/Technology Parks
  - Landside, Airside or Both
- In-Flight Catering Facility
  - Landside, Airside or Both
  - Typically adjacent to terminal
- Intermodal Transportation Area
  - Typically Landside
- Military Facilities
  - Substantial coordination required
- Navigation and Communications Equipment
  - Airside and Landside
  - Driven by functionality
  - Control access to critical equipment
- Rental Car Facilities
  - Landside
  - Public Safety and Security Concerns
- State/Government Aircraft Facilities
  - Both airside and landside
  - Security typically independent
  - Coordinate security requirements
- Utilities and Related Equipment
  - Locate airside when possible
  - Control access
  - Secure access points and equipment

13. MAC Agency Directive AD-001a, November 14, 2001

The Commonwealth of Massachusetts
AERONAUTICS COMMISSION
AGENCY DIRECTIVE

Date: 11/14/2001

TITLE: AIRPORT SECURITY — MAC AD – 001a

PURPOSE. The purpose of this DIRECTIVE is to establish minimum airport security standards for public-use airports located in the Commonwealth of Massachusetts. This DIRECTIVE also provides guidance to airport sponsors for implementing the security standards recommended herein.

APPLICABILITY. This DIRECTIVE applies to all public-use airports located in the Commonwealth of Massachusetts. However it is not intended to replace or supercede airport security standards required by the FAA under FAR Part 107 or airline security standards required by FAR Part 108. Therefore, any part of this DIRECTIVE found to be inconsistent with, or contrary to, the security standards required by the FAA shall be deemed inapplicable.

CANCELLATION. This DIRECTIVE hereby cancels and replaces the emergency DIRECTIVE, dated October 2, 2001 titled "*Implementation of Airport Security Measures*" that was issued by the Commission under emergency conditions in response to the September 11th terrorist attacks.

BACKGROUND. On September 11, 2001, the United States of America experienced a series of terrorist attacks that involved the mid-air highjacking and subsequent destruction of four commercial passenger jets, their occupants, and nearly 5,000 people on the ground. Most horrific of all was the intentional use of the airplanes as weapons.

All four planes involved in the attacks originated from major air carrier airports subject to FAA security regulations. In the immediate wake of the terrorist attacks, government regulators and airport professionals alike assessed the vulnerability of airport security across the country. Sensitive to the fact that aircraft were used as weapons, the Massachusetts Aeronautics Commission issued the initial DIRECTIVE on October 2, 2001.

DEFINITIONS. The following terms used in this document shall be defined as follows:

AOA shall mean Aircraft Operating Area
Commission shall mean the Massachusetts Aeronautics Commission
DIRECTIVE shall mean this AGENCY DIRECTIVE
FAA shall mean the Federal Aviation Administration
FAR shall mean Federal Aviation Regulation
FBO shall mean Fixed Base Operator
FDA shall mean the federal Food and Drug Administration
GA shall mean General Aviation, referring to a type of airport or operational characteristic
Restricted area shall mean any area designated on the airport security plan as requiring ID card access
Sponsor shall mean the legal owner and/or operator of a public-use airport
Tenant shall mean any person or legal entity to receive written permission to establish a leasehold at the airport

1. AIRPORT CLASSIFICATION

The public-use airports in Massachusetts range in size from small rural GA facilities with only a few based aircraft operating under visual flight rule conditions to large commercial service airports accommodating jet aircraft operating in all-weather flight conditions. It is generally accepted that small airports which can only accommodate single-engine aircraft pose much less of a security risk than large airports offering scheduled airline passenger service using jet aircraft. Recognizing the difficulty of developing one standard to suit all airports, the following airport categories are defined to accommodate the varied level of (security) risk posed by each facility.

Class 1 – Airports with scheduled airline passenger service
Class 2 – Municipally owned airports without scheduled airline passenger service
Class 3 – Privately owned airports

The above-noted airport classifications will be referenced throughout this DIRECTIVE, and minimum security standards will be developed, and shall be enforced, for each classification.

2. SECURITY STANDARDS

Regardless of the size or operational characteristics of a particular facility, the Commission hereby directs that all public-use airport sponsors in Massachusetts adopt reasonable security standards to (a) monitor and protect airport users and airport property including buildings, facilities and equipment, (b) control the movement of persons and ground vehicles on airport property, especially in the AOA, (c) prevent unauthorized access of persons and ground vehicles into unauthorized areas on airport property, especially into the AOA, (d) detect and prevent unauthorized deadly or dangerous weapons or devices from being transferred into the AOA or onto aircraft, and (e) prevent the theft and subsequent illegal operation of aircraft.

The following guidance applies to Class 1, 2 and 3 Airports except as noted below:

a. **Monitoring & Protecting Airport Users and Property.** Airport sponsors shall take reasonable measures to monitor and protect airport users, visitors and guests, and airport property including buildings, facilities and equipment. Depending on the class of airport, reasonable measures may include the following:

i) Installation of security fencing to protect against inadvertent or unauthorized access to the AOA.
ii) Closing vehicular and pedestrian gates leading into the AOA and locking them when not in use.
iii) Installing access control devices on gates to manage and control the movement of people into the AOA.
iv) Periodically changing access codes and locks to vehicular and pedestrian gates leading into the AOA.
v) Installing locks on fuel cabinets, fill hatches and pumps, and power shutoff switches on fueling facilities.
vi) Installing locks on airfield electrical vaults and other electrical systems, including (non-FAA) NAVAIDS.
vii) Installing barriers to protect fueling facilities, HazMat storage areas and other areas of concern.
viii) Installing sufficient outside lighting fixtures to illuminate buildings, walkways, aircraft ramps and aprons.
ix) Monitoring airport property by performing regular inspections, and by means of video surveillance if warranted.
x) Requesting periodic inspections / patrols of the airport by local law enforcement officers.
xi) If warranted, employment of local law enforcement officers on a regular or part time basis.
xii) Developing an airport security plan and updating the plan periodically.
xiii) Requiring tenants to develop their own security plan and to comply with the sponsor's airport security plan.

EXCEPTIONS: None.

b. **Controlling Movement on the Airport.** Airport sponsors shall take reasonable steps to control the movement of persons, aircraft and ground vehicles on airport property by installing airport user signs, aircraft guidance signs, airfield lights and markers, and pavement markings, as appropriate. Airport sponsors shall:

i) Manage and operate their airport facility in a safe and efficient manner pursuant to all laws, rules, regulations, directives, orders and advisories of applicable federal, state and local authorities. To this end, sponsors are expected to utilize an adequate number of people to control and direct the movement of people, aircraft and ground vehicles on airport property including airside and landside. This may be accomplished by any combination of qualified airport staff, lease or contract employees, or volunteer staff.
ii) Install signs to direct the movement of people and inform patrons of pertinent information regarding the safe and efficient use and operation of the facility. This may include, but is not limited to, parking and directional signs, informational signs, do-not-enter signs, warning signs, etc. Whatever the sign type, it should communicate the proper message to the appropriate party at the right time and place.
iii) Install airfield guidance signs and airfield lights and markers, as appropriate, to direct and control the movement of aircraft and ground vehicles within the AOA. The installation and operation of airfield guidance signs and airfield lights and markers should be accomplished pursuant to applicable FAA standards.
iv) Install pavement markings to direct and control the movement of aircraft and ground vehicles on airport property. The installation of pavement markings in the AOA and elsewhere on the airfield should be accomplished pursuant to applicable FAA standards. Pavement markings used to control ground vehicles that operate on airport property but off the airfield should meet applicable Highway Dept. standards.

EXCEPTIONS: As noted below.

iii) Aircraft guidance signs and airfield lights/markers should be installed at Class 3 Airports as funding permits. Aircraft guidance signs and airfield lights/markers are not required for Class 3 Airports that possess a MAC issued Airport Operating Certificate with the following limitation(s): *Day VFR Only*.

c. **Preventing Unauthorized Access.** Airport sponsors shall take necessary steps to prevent unauthorized access of persons and ground vehicles into unauthorized areas on airport property. This includes, among other things, preventing unauthorized access into the AOA, moving between areas within the AOA, and separating / segregating

persons and ground vehicles from aircraft, fueling facilities, and other areas of concern within the AOA. Airport sponsors shall:

i) Install security fencing, and access gates where appropriate, to enclose the AOA and to protect other sensitive areas on airport property including all fuel farms and HazMat storage areas. Whenever possible, the sponsor should enclose fuel farms with sufficient fencing to include parking spaces for all fuel trucks. Until such time as the entire AOA is enclosed, priority should be given to areas where easy public access to the AOA is of most concern, spanning open areas with fence and using terrain, existing vegetative cover and environmental conditions as natural barriers. Fencing specifications should meet the following standard: eight foot chain-link-fence, black vinyl-coated, with one foot of barbed wire on top, installed per manufacturer's recommendations. Barbed wire is not recommended for fencing located in the immediate vicinity of the airport terminal building. The location and height of fencing should not violate applicable airspace standards or negate airport master plan improvements. Security fencing should receive high priority in an airport's Capital Improvement Plan.

ii) Discourage unnecessary pedestrian and vehicular access to, and movement within, the AOA. For example, aircraft owners should park their cars outside the AOA and walk to their planes.

iii) Restrict pedestrian and vehicular access into the AOA to as few locations as possible, balancing the need for access by emergency, safety and maintenance personnel inside and outside the AOA.

iv) Install access control devices (e.g. card readers, mechanical pin latch mechanisms, etc.) on fence gates leading into the AOA, where appropriate.

v) Install video surveillance & detection equipment. The Commission recommends installing video cameras to monitor access gates leading into the AOA, where appropriate. Class 1 airports should also consider installing video cameras to monitor areas in the terminal building, where appropriate.

vi) Install heavy-duty barriers to protect fuel farm areas and other areas of special concern from inadvertent or deliberate damage by ground vehicles or aircraft. Concrete bollards are the preferred method for protecting above ground fueling facilities. Any combination of jersey barriers, concrete blocks, large boulders, telephone poles and heavy duty chains may also suffice for protecting or blocking access to other areas of concern.

vii) Require the use of identification (ID) badges for allowing access to anyone wishing to enter the AOA and for controlling the movement of persons within the AOA. Sponsors shall also implement procedures for challenging persons who are not displaying the proper identification. Any person authorized to enter the AOA or move within the AOA shall display a standard ID badge with sufficient information to clearly identify the individual and ascertain the level of security authorization. Anyone without the proper identification must be escorted at all times while in restricted areas of the AOA by another person with the proper ID badge.

Applications for ID badges should be submitted to the Commission by December 31, 2001. With approval from the Commission, sponsors may develop their own distinct ID badge format. Upon request, the Commission will supply each airport sponsor with a sufficient number of ID badges for use at their facility, at no cost to the sponsor.

EXCEPTIONS: As noted below.

i) Other types of fencing may be substituted for standard security fencing recommended by the Commission. Examples of this include the use of wooden or plastic fencing within the critical area of a NAVAID facility, or the use of wildlife fencing required by environmental regulators to allow for the migration of small mammals.

Class 3 airports are exempt from the standard specification for eight-foot chain-link-fence with barbed wire due to the length of the runway, size of the aircraft and type of operation at these facilities. Instead, the Commission recommends that Class 3 airports install four foot fencing, either: black vinyl-coated chain-link-fence, wooden fencing (post & rail, split rail, etc.) or some other type of low-profile fencing that is functional (i.e. prevents unauthorized vehicular access into the AOA) but not too obtrusive.

iv) Class 3 airports are exempt from this requirement. Class 2 airports should comply as funding permits.

v) Class 2 and 3 airports are exempt from this requirement, however Class 2 airports are encouraged to comply.

vii) Operators of transient aircraft and their guests are not expected, and thus not required, to possess the standard ID badge. Nevertheless, the requirement for escorting unidentified individuals while in the AOA still applies.

Notwithstanding the requirement to possess and display the proper ID Badge to enter and move about within the AOA, the sponsor may authorize unescorted access to the following individuals: an employee of federal and state government agencies including the FAA and the Commission who, by job function, are required to work inside the AOA.

d. **Detecting and Preventing Weapons into the AOA.** The FAA imposes federal screening requirements on certain airlines under FAR Part 108 titled "Airplane Operator Security". More specifically, FAR Part 108 applies to the operations of holders of FAA air carrier operating certificates or operating certificates engaging in scheduled passenger operations or public charter passenger operations. Notwithstanding FAA security requirements on airports under FAR Part 107 or airlines under FAR Part 108, the Commission recommends that Class 1 airports take reasonable measures to detect and prevent the transfer of unauthorized deadly or dangerous weapons or devices into the AOA or onto aircraft carrying ticketed passengers for all regularly scheduled airline flights. Accordingly, the Commission recommends that Class 1 airports voluntarily screen all passengers, all checked baggage and all carry-on baggage for every person intending to board a regularly scheduled airline flight.

In lieu of any federal screening requirements for Class 1 Airports that are not subject to FAR Part 107, the Commission offers the following guidance for consideration:

i) Electronic metal detection equipment and cabinet X-ray machines should be installed for detecting unauthorized guns, knives and other deadly or dangerous weapons being carried by any person prior to entering the AOA in advance of boarding a departing aircraft of a regularly scheduled airline flight. Only equipment approved by the FDA for this intended use should be installed. The sponsor should assure that such equipment meets or exceeds the current standards for installation, operation and performance established by the FDA. The equipment should be subject to regular testing in order to maintain operational and performance standards set by the FDA. All records of installation and testing should be made available for inspection by the Commission, the FAA and the FDA.

ii) The sponsor should develop a program for initial and recurrent training of staff responsible for the safe, efficient and proper use and operation of the screening equipment.

iii) Appropriate signage should be conspicuously located to notify the general public of screening operations.

iv) A local law enforcement officer should be stationed at all screening check points to monitor and assist airport security personnel during the screening process.

v) All baggage, whether carried on board by crewmembers or passengers or destined for storage as cargo, should be screened by electronic means for detecting unauthorized guns, knives and other deadly or dangerous weapons prior to entering sterile passenger holding areas or the AOA.

vi) All crewmembers and passengers of a departing (scheduled airline) aircraft should be subject to metal detection screening, questioning, and to bodily search if necessary, for reasonable cause or suspicion of attempting to transfer an unauthorized deadly or dangerous weapon into the AOA or onto the aircraft.

vii) All unauthorized guns, knives and other deadly or dangerous weapons found on a person or in baggage should be confiscated by the local law enforcement officer stationed at the screening checkpoint. Airport security personnel shall complete a detailed log of information about the confiscation including the location, date and time of the event, the person's name, address and phone number, and a detailed description of the confiscated weapon. A copy of the event log shall be supplied to any of the following representatives upon written request: the Commission, the FAA or any federal, state or local law enforcement official.

viii) Any person refusing to consent to the sponsor's screening program should be refused permission to enter the AOA and to board any departing aircraft. If such an event occurs, airport security personnel should complete a detailed log of the event. If warranted, local police should be called for assistance.

ix) Boarding procedures should be established for segregating screened passengers from those who have not been screened so as to keep screened passengers isolated in a sterile environment while waiting to board, and during boarding, a departing aircraft.

x) Airport sponsors should implement other security screening procedures and systems that they believe are necessary for detecting unauthorized deadly or dangerous weapons being carried by any person prior to entering the AOA through airline passenger screening check points in advance of boarding a departing aircraft.

EXCEPTIONS: As noted below.

i-x) Class 2 and 3 airports are exempt (by definition) from this requirement.

vii) Law enforcement officers, government officials and other individuals possessing legal authorization to carry guns or other weapons are exempt from confiscation but shall notify airport security personnel in advance of passing through screening procedures.

e. **Preventing Theft and Illegal Operation of Aircraft.** Airport sponsors shall require that all based aircraft owners take reasonable measures of preventing the theft and illegal operation of their aircraft. Consider the following:

i) Aircraft owners should install anti-theft devices on their aircraft when not in use.

ii) Aircraft owners should install devices to lock aircraft flight control surfaces when not in use.

iii) Aircraft owners should remove the keys to their aircraft, if applicable, and lock all doors when not in use.

iv) Aircraft owners should consider lockable devices to secure their aircraft.
v) Doors on aircraft storage hangars should be kept locked at all times when not in use.
vi) Aircraft owners and pilots should report suspicious activity to airport management or other authorities.
vii) Airport sponsors and tenants should install sufficient lighting equipment to illuminate aircraft ramps and aprons.

EXCEPTIONS: None.

3. AIRPORT SECURITY PLANS

The Commission hereby directs that all public-use airport sponsors in Massachusetts create an *Airport Security Plan* incorporating the applicable security standards noted in Section 2 above. However, creating and implementing such a plan will take a team effort, requiring a lot of coordination and cooperation of local, state and federal authorities as well as private end users. Therefore the Commission also directs that sponsors assemble an *Airport Security Team* to advise the sponsor in developing its *Airport Security Plan*.

a. **Airport Security Team**. Sponsors shall assemble an Airport Security Team (AST). The AST should be made up of representatives from the airport, airport tenants and users including based aircraft owners, local public safety officials (police, fire, etc.), local emergency management personnel, and representation of other appropriate parties. The purpose of the AST is to advise the sponsor regarding issues to consider in planning for security improvements. Good communication and cooperation between all parties is essential for balancing the desire for public access and utility against the need for public safety and security. The AST shall:

i) List and clearly define the different types of airport users. The list may include airlines, FBOs, maintenance facilities, fueling operators, flight schools, based aircraft owners, restaurants, etc. Based aircraft owners can be considered as a user group.
ii) Document the hours of operation for each user listed above. Aircraft owners can be considered as one group.
iii) Discuss the access requirements for each specific user, with particular emphasis on those that require access to the AOA. Access to the AOA by employees, visitors and guests, and mail & package delivery requirements should be discussed in detail.
iv) Discuss the security requirements for each user. Aircraft owners can be considered as a group.
v) Discuss emergency response issues.
vi) Advise the sponsor on all security requirements recommended for inclusion on the Airport Security Plan.

b. **Airport Security Plan**. Based on input from the Airport Security Team, Sponsors shall create an Airport Security Plan that incorporates the applicable security standards and guidance provided in this DIRECTIVE. This requirement is not intended to replace any such requirement promulgated by the FAA or other federal authority. In fact, FAA mandated security plans may be substituted for this state requirement, however these airports are still encouraged to create an Airport Security Team to advise airport management on airport security issues.

The airport sponsor shall develop a written Airport Security Plan pursuant to the following guidance:

i) Reference the list of airport users developed by the AST. Review it for accuracy, update as necessary, and incorporate the list into the plan. The list should include every based aircraft owner. Briefly describe the type of operation for each user. Special consideration should be given to agricultural spraying operations, aerial demonstrations, blimp operations, banner towers and site-seeing operations.
ii) Document the normal hours of operation for each user listed above.
iii) Document the location and access requirements for each specific user, with particular emphasis on those that require access to the AOA. Incorporating a scaled airport map may be helpful. Aircraft owners can be located by apron or hangar in lieu of showing each one individually.
iv) Document the security requirements for each user. Aircraft owners can be considered as a group.
v) Document the likely AOA access points for each user.
vi) Incorporate the security standards and applicable guidance from Section 2.
vii) Incorporate procedures for reporting suspicious activity from Section 4.
viii) Incorporate emergency response considerations recommended by the AST and from Section 5.
ix) Periodically review the plan, consulting with the AST, and update as necessary.

Given the sensitive nature of this issue, the Commission advises against distribution, disclosure and availability of any sensitive information that could compromise airport security. The sponsor should consider seeking legal advice regarding applicable public disclosure laws.

4. REPORTING SUSPICIOUS ACTIVITY

Airport sponsors shall implement procedures for reporting unusual or suspicious activity to the proper authorities:

a. Develop a list of unusual or suspicious activity that warrants particular attention, such as:

   i) Aircraft with unusual or unauthorized modifications.
   ii) Persons loitering for extended periods of time in the vicinity of parked aircraft or elsewhere in the AOA.
   iii) Pilots who appear to be under the control of other persons.
   iv) Persons wishing to obtain aircraft without presenting proper credentials or persons who present apparently valid credentials but do not have a corresponding level of aviation knowledge.
   v) Witnessing deadly or dangerous weapons or explosives being loaded onto an aircraft.
   vi) Anything that doesn't look right such as events or circumstances that does not fit the pattern of normal lawful activity at the airport.

b. Include the following 24 hour phone numbers on their contact list:

   i) Airport Manager..... (###) ###-####
   ii) Local Police Department.....(###) ###-####
   iii) Massachusetts State Police Headquarters.....(508) 820-2121
   iv) Massachusetts Aeronautics Commission.....(508) 301-2118
   v) Federal Bureau of Investigation (FBI), Boston Field Office.....(617) 742-5533
   vi) FAA, Regional Command Center.....(781) 238-7001

c. Develop a process to facilitate determining whom to call.

d. Add any other appropriate contact numbers to the list.

e. Circulate these reporting procedures to all tenants and others who have a regular presence on the airport.

f. Encourage all tenants and based aircraft owners to comply with the sponsor's reporting procedures.

5. EMERGENCY RESPONSE PROCEDURES

Airport sponsors shall develop and implement emergency procedures to respond to regional disasters, acts of terrorism, and other situations deemed to be an emergency by state or federal authorities. Airport sponsors shall:

a. Develop a list of reasonably potential emergency situations that could involve the airport either directly or indirectly.

b. Address ways to adequately respond to each emergency situation noted above, including the development of a "communication tree" for prioritizing the proper authorities to contact in emergency situations.

c. Designate a primary (airport) respondent and two alternates to respond to emergency situations at the airport.

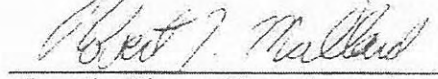
d. Maintain a list of contact data for all designated respondents and other potential persons likely to be involved in emergency situations including their names, various phone numbers (home, work, cell, pager, etc.), fax numbers and email addresses.

e. Share the information noted above with the Commission, FAA, MEMA (Massachusetts Emergency Management Agency), and other local, state and federal authorities as necessary.

f. Periodically review the procedures noted above and update as necessary.

6. STATE FUNDING OF AIRPORT SECURITY IMPROVEMENTS

The Commission considers airport security to be a high priority objective. Eligibility for state funding assistance will be subject to an approved *Airport Security Plan* consistent with the guidance contained herein.



Executive Director, *Massachusetts Aeronautics Commission*

14. AC 150/5320-6D, Chapter 3, Paragraph 302a

CHAPTER 3. PAVEMENT DESIGN

SECTION 1. DESIGN CONSIDERATIONS

300. SCOPE. This chapter covers pavement design for airports serving aircraft with gross weights of 30,000 pounds (13 000 kg) or more. Chapter 5 is devoted to the design of pavements serving lighter aircraft with gross weights under 30,000 pounds (13 000 kg).

301. DESIGN PHILOSOPHY. The FAA policy of treating the design of aircraft landing gear and the design and evaluation of airport pavements as three separate entities is described in the Foreword to this advisory circular. The design of airport pavements is a complex engineering problem which involves a large number of interacting variables. The design curves presented in this chapter are based on the CBR method of design for flexible pavements and a jointed edge stress analysis for rigid pavements. Other design procedures such as those based on layered elastic analysis and those developed by The Asphalt Institute and the Portland Cement Association may be utilized to determine pavement thicknesses when approved by the FAA. These procedures will yield slightly different design thicknesses due to different basic assumptions. All pavement designs should be summarized on FAA Form 5100-1, Airport Pavement Design, which is considered to be part of the Engineer's Report. An Engineer's Report should be prepared for FAA review and approval along with initial plans and specifications. Because of thickness variations, the evaluation of existing pavements should be performed using the same method as was employed in the design. Procedures to be used in evaluating pavements are described in detail in Chapter 6 of this advisory circular. Details on the development of the FAA method of design are as follows:

a. **Flexible Pavements.** The flexible pavement design curves presented in this chapter are based on the California Bearing Ratio (CBR) method of design. The CBR design method is basically empirical; however, a great deal of research has been done with the method and reliable correlations have been developed. Gear configurations are related using theoretical concepts as well as empirically developed data. The design curves provide the required total thickness of flexible pavement (surface, base, and subbase) needed to support a given weight of aircraft over a particular subgrade. The curves also show the required surface thickness. Minimum base course thicknesses are given in a separate table. A more detailed discussion of CBR design is presented in Appendix 2.

b. **Rigid Pavements.** The rigid pavement design curves in this chapter are based on the Westergaard analysis of edge loaded slabs. The edge loading analysis has been modified to simulate a jointed edge condition. Pavement stresses are higher at the jointed edge than at the slab interior. Experience shows practically all load induced cracks develop at jointed edges and migrate toward the slab interior. Design curves are furnished for areas where traffic will predominantly follow parallel or perpendicular to joints and for areas where traffic is likely to cross joints at an acute angle. The thickness of pavement determined from the curves is for slab thickness only. Subbase thicknesses are determined separately. A more detailed discussion of the basis for rigid pavement design is presented in Appendix 2.

302. BACKGROUND. An airfield pavement and the operating aircraft represent an interactive system which must be addressed in the pavement design process. Design considerations associated with both the aircraft and the pavement must be recognized in order to produce a satisfactory design. Careful construction control and some degree of maintenance will be required to produce a pavement which will achieve the intended design life. Pavements are designed to provide a finite life and fatigue limits are anticipated. Poor construction and lack of preventative maintenance will usually shorten the service life of even the best designed pavement.

a. **Variables.** The determination of pavement thickness requirements is a complex engineering problem. Pavements are subject to a wide variety of loadings and climatic effects. The design process involves a large number of interacting variables which are often difficult to quantify. Although a great deal of research work has been completed and more is underway, it has been impossible to arrive at a direct mathematical solution of thickness requirements. For this reason the determination of pavement thickness must be based on the theoretical analysis of load distribution through pavements and soils, the analysis of experimental pavement data, and a study of the performance of pavements under actual service conditions. Pavement thickness curves presented in this chapter have been developed through correlation of the data obtained from these sources. Pavements designed in accordance with these standards are intended to provide a structural life of 20 years that is free of major maintenance if no major changes in forecast traffic are encountered. It is

likely that rehabilitation of surface grades and renewal of skid resistant properties will be needed before 20 years due to destructive climatic effects and deteriorating effects of normal usage.

b. **Structural Design.** The structural design of airport pavements consists of determining both the overall pavement thickness and the thickness of the component parts of the pavement. There are a number of factors which influence the thickness of pavement required to provide satisfactory service. These include the magnitude and character of the aircraft loads to be supported, the volume of traffic, the concentration of traffic in certain areas, and the quality of the subgrade soil and materials comprising the pavement structure.

303. AIRCRAFT CONSIDERATIONS.

a. **Load.** The pavement design method is based on the gross weight of the aircraft. For design purposes the pavement should be designed for the maximum anticipated takeoff weight of the aircraft. The design procedure assumes 95 percent of the gross weight is carried by the main landing gears and 5 percent is carried by the nose gear. AC 150/5300-13, Airport Design, lists the weight of nearly all civil aircraft. Use of the maximum anticipated takeoff weight is recommended to provide some degree of conservatism in the design and is justified by the fact that changes in operational use can often occur and recognition of the fact that forecast traffic is approximate at best. By ignoring arriving traffic some of the conservatism is offset.

b. **Landing Gear Type and Geometry.** The gear type and configuration dictate how the aircraft weight is distributed to the pavement and determine pavement response to aircraft loadings. It would have been impractical to develop design curves for each type of aircraft. However, since the thickness of both rigid and flexible pavements is dependent upon the gear dimensions and the type of gear, separate design curves would be necessary unless some valid assumptions could be made to reduce the number of variables. Examination of gear configuration, tire contact areas, and tire pressure in common use indicated that these follow a definite trend related to aircraft gross weight. Reasonable assumptions could therefore be made and design curves constructed from the assumed data. These assumed data are as follows:

(1) **Single Gear Aircraft.** No special assumptions needed.

(2) **Dual Gear Aircraft.** A study of the spacing between dual wheels for these aircraft indicated that a dimension of 20 inches (0.5 1 m) between the centerline of the tires appeared reasonable for the lighter aircraft and a dimension of 34 inches (0.86 m) between the centerline of the tires appeared reasonable for the heavier aircraft.

(3) **Dual Tandem Gear Aircraft.** The study indicated a dual wheel spacing of 20 inches (0.51 m) and a tandem spacing of 45 inches (1.14 m) for lighter aircraft, and a dual wheel spacing of 30 inches (0.76 m) and a tandem spacing of 55 inches (1.40 m) for the heavier aircraft are appropriate design values.

(4) **Wide Body Aircraft.** Wide body aircraft; i.e., B-747, DC-10, and L-101 1 represent a radical departure from the geometry assumed for dual tandem aircraft described in paragraph (c) above. Due to the large differences in gross weights and gear geometries, separate design curves have been prepared for the wide body aircraft.

c. **Tire Pressure.** Tire pressure varies between 75 and 200 PSI (516 to 1 380 kPa) depending on gear configuration and gross weight. It should be noted that tire pressure asserts less influence on pavement stresses as gross weight increases, and the assumed maximum of 200 PSI (1 380 kPa) may be safely exceeded if other parameters are not exceeded and a high stability surface course is used.

d. **Traffic Volume.** Forecasts of annual departures by aircraft type are needed for pavement design. Information on aircraft operations is available from Airport Master Plans, Terminal Area Forecasts, the National Plan of Integrated Airport Systems, Airport Activity Statistics and FAA Air Traffic Activity. These publications should be consulted in the development of forecasts of annual departures by aircraft type.

304. DETERMINATION OF DESIGN AIRCRAFT. The forecast of annual departures by aircraft type will result in a list of a number of different aircraft. The design aircraft should be selected on the basis of the one requiring the

15. 49CFR Part 1542.103(14) and Part 1544

(4) Includes an index organized in the same subject area sequence as §1542.103; and

(5) Has been approved by TSA.

(b) The airport operator must maintain one current and complete copy of its security program and provide a copy to TSA upon request.

(c) Each airport operator must—

(1) Restrict the distribution, disclosure, and availability of sensitive security information (SSI), as defined in part 1520 of this chapter, to persons with a need to know; and

(2) Refer all requests for SSI by other persons to TSA.

§1542.103 Content.

(a) *Complete program.* Except as otherwise approved by TSA, each airport operator regularly serving operations of an aircraft operator or foreign air carrier described in §1544.101(a)(1) or §1546.101(a) of this chapter, must include in its security program the following:

(1) The name, means of contact, duties, and training requirements of the ASC required under §1542.3.

(2) [Reserved]

(3) A description of the secured areas, including—

(i) A description and map detailing boundaries and pertinent features;

(ii) Each activity or entity on, or adjacent to, a secured area that affects security;

(iii) Measures used to perform the access control functions required under §1542.201(b)(1);

(iv) Procedures to control movement within the secured area, including identification media required under §1542.201(b)(3); and

(v) A description of the notification signs required under §1542.201(b)(6).

(4) A description of the AOA, including—

(i) A description and map detailing boundaries, and pertinent features;

(ii) Each activity or entity on, or adjacent to, an AOA that affects security;

(iii) Measures used to perform the access control functions required under §1542.203(b)(1);

(iv) Measures to control movement within the AOA, including identification media as appropriate; and

(v) A description of the notification signs required under §1542.203(b)(4).

(5) A description of the SIDA's, including—

(i) A description and map detailing boundaries and pertinent features; and

(ii) Each activity or entity on, or adjacent to, a SIDA.

(6) A description of the sterile areas, including—

(i) A diagram with dimensions detailing boundaries and pertinent features;

(ii) Access controls to be used when the passenger-screening checkpoint is non-operational and the entity responsible for that access control; and

(iii) Measures used to control access as specified in §1542.207.

(7) Procedures used to comply with §1542.209 regarding fingerprint-based criminal history records checks.

(8) A description of the personnel identification systems as described in §1542.211.

(9) Escort procedures in accordance with §1542.211(e).

(10) Challenge procedures in accordance with §1542.211(d).

(11) Training programs required under §§1542.213 and 1542.217(c)(2), if applicable.

(12) A description of law enforcement support used to comply with §1542.215(a).

(13) A system for maintaining the records described in §1542.221.

(14) The procedures and a description of facilities and equipment used to support TSA inspection of individuals and property, and aircraft operator or foreign air carrier screening functions of parts 1544 and 1546 of this chapter.

(15) A contingency plan required under §1542.301.

(16) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(17) Procedures for posting of public advisories as specified in §1542.305.

(18) Incident management procedures used to comply with §1542.307.

(19) Alternate security procedures, if any, that the airport operator intends to use in the event of natural disasters, and other emergency or unusual conditions.

(20) Each exclusive area agreement as specified in § 1542.111.

(21) Each airport tenant security program as specified in § 1542.113.

(b) *Supporting program.* Except as otherwise approved by TSA, each airport regularly serving operations of an aircraft operator or foreign air carrier described in § 1544.101(a)(2) or (f), or § 1546.101(b) or (c) of this chapter, must include in its security program a description of the following:

(1) Name, means of contact, duties, and training requirements of the ASC, as required under § 1542.3.

(2) A description of the law enforcement support used to comply with § 1542.215(a).

(3) Training program for law enforcement personnel required under § 1542.217(c)(2), if applicable.

(4) A system for maintaining the records described in § 1542.221.

(5) The contingency plan required under § 1542.301.

(6) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(7) Procedures for public advisories as specified in § 1542.305.

(8) Incident management procedures used to comply with § 1542.307.

(c) *Partial program.* Except as otherwise approved by TSA, each airport regularly serving operations of an aircraft operator or foreign air carrier described in § 1544.101(b) or § 1546.101(d) of this chapter, must include in its security program a description of the following:

(1) Name, means of contact, duties, and training requirements of the ASC as required under § 1542.3.

(2) A description of the law enforcement support used to comply with § 1542.215(b).

(3) Training program for law enforcement personnel required under § 1542.217(c)(2), if applicable.

(4) A system for maintaining the records described in § 1542.221.

(5) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(6) Procedures for public advisories as specified in § 1542.305.

(7) Incident management procedures used to comply with § 1542.307.

(d) *Use of appendices.* The airport operator may comply with paragraphs (a), (b), and (c) of this section by including in its security program, as an appendix, any document that contains the information required by paragraphs (a), (b), and (c) of this section. The appendix must be referenced in the corresponding section(s) of the security program.

§ 1542.105 Approval and amendments.

(a) *Initial approval of security program.* Unless otherwise authorized by the designated official, each airport operator required to have a security program under this part must submit its initial proposed security program to the designated official for approval at least 90 days before the date any aircraft operator or foreign air carrier required to have a security program under part 1544 or part 1546 of this chapter is expected to begin operations. Such requests will be processed as follows:

(1) The designated official, within 30 days after receiving the proposed security program, will either approve the program or give the airport operator written notice to modify the program to comply with the applicable requirements of this part.

(2) The airport operator may either submit a modified security program to the designated official for approval, or petition the Administrator to reconsider the notice to modify within 30 days of receiving a notice to modify. A petition for reconsideration must be filed with the designated official.

(3) The designated official, upon receipt of a petition for reconsideration, either amends or withdraws the notice, or transmits the petition, together with any pertinent information, to the Administrator for reconsideration. The Administrator disposes of the petition within 30 days of receipt by either directing the designated official to withdraw or amend the notice to modify, or by affirming the notice to modify.

(b) *Amendment requested by an airport operator.* Except as provided in

(2) Refer all requests for SSI by other persons to TSA.

§ 1542.103 Content.

(a) *Complete program.* Except as otherwise approved by TSA, each airport operator regularly serving operations of an aircraft operator or foreign air carrier described in § 1544.101(a)(1) or § 1546.101(a) of this chapter, must include in its security program the following:

(1) The name, means of contact, duties, and training requirements of the ASC required under § 1542.3.

(2) [Reserved]

(3) A description of the secured areas, including—

(i) A description and map detailing boundaries and pertinent features;

(ii) Each activity or entity on, or adjacent to, a secured area that affects security;

(iii) Measures used to perform the access control functions required under § 1542.201(b)(1);

(iv) Procedures to control movement within the secured area, including identification media required under § 1542.201(b)(3); and

(v) A description of the notification signs required under § 1542.201(b)(6).

(4) A description of the AOA, including—

(i) A description and map detailing boundaries, and pertinent features;

(ii) Each activity or entity on, or adjacent to, an AOA that affects security;

(iii) Measures used to perform the access control functions required under § 1542.203(b)(1);

(iv) Measures to control movement within the AOA, including identification media as appropriate; and

(v) A description of the notification signs required under § 1542.203(b)(4).

(5) A description of the SIDA's, including—

(i) A description and map detailing boundaries and pertinent features; and

(ii) Each activity or entity on, or adjacent to, a SIDA.

(6) A description of the sterile areas, including—

(i) A diagram with dimensions detailing boundaries and pertinent features;

(ii) Access controls to be used when the passenger-screening checkpoint is non-operational and the entity responsible for that access control; and

(iii) Measures used to control access as specified in § 1542.207.

(7) Procedures used to comply with § 1542.209 regarding fingerprint-based criminal history records checks.

(8) A description of the personnel identification systems as described in § 1542.211.

(9) Escort procedures in accordance with § 1542.211(e).

(10) Challenge procedures in accordance with § 1542.211(d).

(11) Training programs required under §§ 1542.213 and 1542.217(c)(2), if applicable.

(12) A description of law enforcement support used to comply with § 1542.215(a).

(13) A system for maintaining the records described in § 1542.221.

(14) The procedures and a description of facilities and equipment used to support TSA inspection of individuals and property, and aircraft operator or foreign air carrier screening functions of parts 1544 and 1546 of this chapter.

(15) A contingency plan required under § 1542.301.

(16) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(17) Procedures for posting of public advisories as specified in § 1542.305.

(18) Incident management procedures used to comply with § 1542.307.

(19) Alternate security procedures, if any, that the airport operator intends to use in the event of natural disasters, and other emergency or unusual conditions.

(20) Each exclusive area agreement as specified in § 1542.111.

(21) Each airport tenant security program as specified in § 1542.113.

(b) *Supporting program.* Except as otherwise approved by TSA, each airport regularly serving operations of an aircraft operator or foreign air carrier described in § 1544.101(a)(2) or (f), or § 1546.101(b) or (c) of this chapter, must include in its security program a description of the following:

(1) Name, means of contact, duties, and training requirements of the ASC, as required under § 1542.3.

(2) A description of the law enforcement support used to comply with § 1542.215(a).

(3) Training program for law enforcement personnel required under § 1542.217(c)(2), if applicable.

(4) A system for maintaining the records described in § 1542.221.

(5) The contingency plan required under § 1542.301.

(6) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(7) Procedures for public advisories as specified in § 1542.305.

(8) Incident management procedures used to comply with § 1542.307.

(c) *Partial program.* Except as otherwise approved by TSA, each airport regularly serving operations of an aircraft operator or foreign air carrier described in § 1544.101(h) or § 1546.101(d) of this chapter, must include in its security program a description of the following:

(1) Name, means of contact, duties, and training requirements of the ASC as required under § 1542.3.

(2) A description of the law enforcement support used to comply with § 1542.215(b).

(3) Training program for law enforcement personnel required under § 1542.217(c)(2), if applicable.

(4) A system for maintaining the records described in § 1542.221.

(5) Procedures for the distribution, storage, and disposal of security programs, Security Directives, Information Circulars, implementing instructions, and, as appropriate, classified information.

(6) Procedures for public advisories as specified in § 1542.305.

(7) Incident management procedures used to comply with § 1542.307.

(d) *Use of appendices.* The airport operator may comply with paragraphs (a), (b), and (c) of this section by including in its security program, as an appendix, any document that contains the information required by paragraphs (a), (b), and (c) of this section. The appendix must be referenced in the corresponding section(s) of the security program.

§ 1542.105 Approval and amendments.

(a) *Initial approval of security program.* Unless otherwise authorized by the designated official, each airport operator required to have a security program under this part must submit its initial proposed security program to the designated official for approval at least 90 days before the date any aircraft operator or foreign air carrier required to have a security program under part 1544 or part 1546 of this chapter is expected to begin operations. Such requests will be processed as follows:

(1) The designated official, within 30 days after receiving the proposed security program, will either approve the program or give the airport operator written notice to modify the program to comply with the applicable requirements of this part.

(2) The airport operator may either submit a modified security program to the designated official for approval, or petition the Under Secretary to reconsider the notice to modify within 30 days of receiving a notice to modify. A petition for reconsideration must be filed with the designated official.

(3) Ensure that all parties involved know their responsibilities and that all information contained in the plan is current.

(b) TSA may approve alternative implementation measures, reviews, and exercises to the contingency plan which will provide an overall level of security equal to the contingency plan under paragraph (a) of this section.

§ 1542.303 Security Directives and Information Circulars.

(a) TSA may issue an Information Circular to notify airport operators of security concerns. When TSA determines that additional security measures are necessary to respond to a threat assessment or to a specific threat against civil aviation, TSA issues a Security Directive setting forth mandatory measures.

(b) Each airport operator must comply with each Security Directive issued to the airport operator within the time prescribed in the Security Directive.

(c) Each airport operator that receives a Security Directive must—

(1) Within the time prescribed in the Security Directive, verbally acknowledge receipt of the Security Directive to TSA.

(2) Within the time prescribed in the Security Directive, specify the method by which the measures in the Security Directive have been implemented (or will be implemented, if the Security Directive is not yet effective).

(d) In the event that the airport operator is unable to implement the measures in the Security Directive, the airport operator must submit proposed alternative measures and the basis for submitting the alternative measures to TSA for approval. The airport operator must submit the proposed alternative measures within the time prescribed in the Security Directive. The airport operator must implement any alternative measures approved by TSA.

(e) Each airport operator that receives a Security Directive may comment on the Security Directive by submitting data, views, or arguments in writing to TSA. TSA may amend the Security Directive based on comments received. Submission of a comment does not delay the effective date of the Security Directive.

(f) Each airport operator that receives a Security Directive or an Information Circular and each person who receives information from a Security Directive or an Information Circular must:

(1) Restrict the availability of the Security Directive or Information Circular, and information contained in either document, to those persons with an operational need-to-know.

(2) Refuse to release the Security Directive or Information Circular, and information contained in either document, to persons other than those who have an operational need to know without the prior written consent of TSA.

§ 1542.305 Public advisories.

When advised by TSA, each airport operator must prominently display and maintain in public areas information concerning foreign airports that, in the judgment of the Secretary of Transportation, do not maintain and administer effective security measures. This information must be posted in the manner specified in the security program and for such a period of time determined by the Secretary of Transportation.

§ 1542.307 Incident management.

(a) Each airport operator must establish procedures to evaluate bomb threats, threats of sabotage, aircraft piracy, and other unlawful interference to civil aviation operations.

(b) Immediately upon direct or referred receipt of a threat of any of the incidents described in paragraph (a) of this section, each airport operator must—

(1) Evaluate the threat in accordance with its security program;

(2) Initiate appropriate action as specified in the Airport Emergency Plan under 14 CFR 139.325; and

(3) Immediately notify TSA of acts, or suspected acts, of unlawful interference to civil aviation operations, including specific bomb threats to aircraft and airport facilities.

(c) Airport operators required to have a security program under § 1542.103(c) but not subject to 14 CFR part 139, must develop emergency response procedures to incidents of threats identified in paragraph (a) of this section.

(d) To ensure that all parties know their responsibilities and that all procedures are current, at least once every 12 calendar months each airport operator must review the procedures required in paragraphs (a) and (b) of this section with all persons having responsibilities for such procedures.

6. Add new part 1544 to Chapter XII, Subchapter C.

PART 1544—AIRCRAFT OPERATOR SECURITY: AIR CARRIERS AND COMMERCIAL OPERATORS

Subpart A—General

Sec.

Subpart B—Security Program

Subpart C—Operations

Subpart D—Threat and Threat Response

Subpart E—Screener Qualifications When the Aircraft Operator Performs Screening

Authority: 49 U.S.C. 114, 5103, 40119, 44901–44905, 44907, 44913–44914, 44916–44918, 44932, 44935–44936, 44942, 46105.

Subpart A—General

§ 1544.1 Applicability of this part.

(a) This part prescribes aviation security rules governing the following:

(1) The operations of aircraft operators holding operating certificates under 14 CFR part 119 for scheduled passenger operations, public charter passenger operations, private charter passenger operations, and other aircraft operators

adopting and obtaining approval of an aircraft operator security program.

(2) Each law enforcement officer flying armed aboard an aircraft operated by an aircraft operator described in paragraph (a)(1) of this section.

(3) Each aircraft operator that receives a Security Directive or Information Circular and each person who receives information from a Security Directive or Information Circular issued by TSA.

(b) As used in this part, "aircraft operator" means an aircraft operator subject to this part as described in § 1544.101.

§ 1544.3 TSA inspection authority.

(a) Each aircraft operator must allow TSA, at any time or place, to make any inspections or tests, including copying records, to determine compliance of an airport operator, aircraft operator, foreign air carrier, indirect air carrier, or other airport tenants with—

(1) This subchapter and any security program under this subchapter, and part 1520 of this chapter; and

(2) 49 U.S.C. Subtitle VII, as amended.

(b) At the request of TSA, each aircraft operator must provide evidence of compliance with this part and its security program, including copies of records.

(c) TSA may enter and be present within secured areas, AOA's, and SIDA's without access media or identification media issued or approved by an airport operator or aircraft operator, in order to inspect or test compliance, or perform other such duties as TSA may direct.

(d) At the request of TSA and the completion of SIDA training as required in a security program, each aircraft operator must promptly issue to TSA personnel access and identification media to provide TSA personnel with unescorted access to, and movement within, areas controlled by the aircraft operator under an exclusive area agreement.

Subpart B—Security Program

§ 1544.101 Adoption and implementation.

(a) *Full program.* Each aircraft operator must carry out subparts C, D, and E of this part and must adopt and carry out a security program that meets the requirements of § 1544.103 for each of the following operations:

(1) A scheduled passenger or public charter passenger operation with an aircraft having a passenger seating configuration of 61 or more seats.

(2) A scheduled passenger or public charter passenger operation with an aircraft having a passenger seating configuration of 60 or fewer seats when passengers are enplaned from or deplaned into a sterile area.

(b) *Partial program—adoption.* Each aircraft operator must carry out the requirements specified in paragraph (c) of this section for each of the following operations:

(1) A scheduled passenger or public charter passenger operation with an aircraft having a passenger-seating configuration of 31 or more but 60 or fewer seats that does not enplane from or deplane into a sterile area.

(2) A scheduled passenger or public charter passenger operation with an aircraft having a passenger-seating configuration of 60 or fewer seats engaged in operations to, from, or outside the United States that does not enplane from or deplane into a sterile area.

(c) *Partial program—content.* For operations described in paragraph (b) of this section, the aircraft operator must carry out the following, and must adopt and carry out a security program that meets the applicable requirements of § 1544.103(c):

(1) The requirements of §§ 1544.215, 1544.217, 1544.219, 1544.235, 1544.301, 1544.303, and 1544.305.

(2) Such other provisions of subparts C, D, and E of this part as TSA has approved upon request.

(3) The remaining requirements of subparts C, D, and E of this part when TSA notifies the aircraft operator in writing that a security threat exists concerning that operation.

(d) [Reserved]

(e) [Reserved]

(f) *Private charter program.* Each aircraft operator must carry out §§ 1544.201, 1544.207, 1544.209, 1544.211, 1544.213, 1544.215, 1544.217, 1544.219, 1544.229, 1544.233, 1544.235, 1544.303, and 1544.305, and subpart E of this part and must adopt and carry out a security program that meets the applicable requirements of § 1544.103 for each private charter operation in which passengers are enplaned from or deplaned into a sterile area.

(g) *Limited program.* TSA may approve a security program after receiving a request by an aircraft operator, holding a certificate under 14 CFR part 119 other than one identified in paragraph (a), (b), or (c) of this section. The aircraft operator must—

(1) Carry out selected provisions of subparts C, D, and E of this part,

(2) Carry out § 1544.305, as specified in its security program, and

(3) Adopt and carry out a security program that meets the applicable requirements of § 1544.103(c).

§ 1544.103 Form, content, and availability.

(a) *General requirements.* Each security program must:

(1) Provide for the safety of persons and property traveling on flights provided by the aircraft operator against acts of criminal violence and air piracy, and the introduction of explosives, incendiaries, or weapons aboard an aircraft.

(2) Be in writing and signed by the aircraft operator or any person delegated authority in this matter.

(3) Be approved by TSA.

(b) *Availability.* Each aircraft operator having a security program must:

(1) Maintain an original copy of the security program at its corporate office.

(2) Have accessible a complete copy, or the pertinent portions of its security program, or appropriate implementing instructions, at each airport served. An electronic version of the program is adequate.

(3) Make a copy of the security program available for inspection upon request of TSA.

(4) Restrict the distribution, disclosure, and availability of information contained in the security program to persons with a need-to-know as described in part 1520 of this chapter.

(5) Refer requests for such information by other persons to TSA.

(c) *Content.* The security program must include, as specified for that aircraft operator in § 1544.101, the following:

(1) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.201 regarding the acceptance and screening of individuals and their accessible property.

(2) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.203 regarding the acceptance and screening of checked baggage.

(3) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.205 regarding the acceptance and screening of cargo.

(4) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.207 regarding the screening of individuals and property.

(5) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.209 regarding the use of metal detection devices.

(6) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.211 regarding the use of x-ray systems.

(7) The procedures and description of the facilities and equipment used to comply with the requirements of § 1544.213 regarding the use of explosives detection systems.

(8) The procedures used to comply with the requirements of § 1544.215 regarding the responsibilities of security coordinators. The names of the Aircraft Operator Security Coordinator (AOSC) and any alternate, and the means for contacting the AOSC(s) on a 24-hour basis, as provided in § 1544.215.

(9) The procedures used to comply with the requirements of § 1544.217 regarding the requirements for law enforcement personnel.

(10) The procedures used to comply with the requirements of § 1544.219 regarding carriage of accessible weapons.

(11) The procedures used to comply with the requirements of § 1544.221 regarding carriage of prisoners under the control of armed law enforcement officers.

(12) The procedures used to comply with the requirements of § 1544.223 regarding transportation of Federal Air Marshals.

(13) The procedures and description of the facilities and equipment used to perform the aircraft and facilities control function specified in § 1544.225.

(14) The specific locations where the air carrier has entered into an exclusive area agreement under § 1544.227.

(15) The procedures used to comply with the applicable requirements of § 1544.229 regarding fingerprint-based criminal history record checks.

(16) The procedures used to comply with the requirements of § 1544.231 regarding personnel identification systems.

(17) The procedures and syllabi used to accomplish the training required under § 1544.233.

(18) The procedures and syllabi used to accomplish the training required under § 1544.235.

(19) An aviation security contingency plan as specified under § 1544.301.

(20) The procedures used to comply with the requirements of § 1544.303 regarding bomb and air piracy threats.

§ 1544.105 Approval and amendments.

(a) *Initial approval of security program.* Unless otherwise authorized by TSA, each aircraft operator required to have a security program under this part must submit its proposed security program to the designated official for approval at least 90 days before the intended date of passenger operations. The proposed security program must meet the requirements applicable to its operation as described in § 1544.101. Such requests will be processed as follows:

(1) The designated official, within 30 days after receiving the proposed aircraft operator security program, will either approve the program or give the aircraft operator written notice to modify the program to comply with the applicable requirements of this part.

(2) The aircraft operator may either submit a modified security program to the designated official for approval, or petition the Under Secretary to reconsider the notice to modify within 30 days of receiving a notice to modify. A petition for reconsideration must be filed with the designated official.

(3) The designated official, upon receipt of a petition for reconsideration, either amends or withdraws the notice, or transmits the petition, together with any pertinent information, to the Under Secretary for reconsideration. The Under Secretary disposes of the petition within 30 days of receipt by either directing the designated official to withdraw or amend the notice to modify, or by affirming the notice to modify.

(b) *Amendment requested by an aircraft operator.* An aircraft operator may submit a request to TSA to amend its security program as follows:

(1) The request for an amendment must be filed with the designated official at least 45 days before the date it proposes for the amendment to become effective, unless a shorter period is allowed by the designated official.

(2) Within 30 days after receiving a proposed amendment, the designated official, in writing, either approves or denies the request to amend.

(3) An amendment to an aircraft operator security program may be approved if the designated official determines that safety and the public interest will allow it, and the proposed amendment provides the level of security required under this part.

(4) Within 30 days after receiving a denial, the aircraft operator may petition the Under Secretary to reconsider the denial. A petition for reconsideration must be filed with the designated official.

(5) Upon receipt of a petition for reconsideration, the designated official either approves the request to amend or transmits the petition, together with any pertinent information, to the Under Secretary for reconsideration. The Under Secretary disposes of the petition within 30 days of receipt by either directing the designated official to approve the amendment, or affirming the denial.

(6) Any aircraft operator may submit a group proposal for an amendment that is on behalf of it and other aircraft operators that co-sign the proposal.

(c) *Amendment by TSA.* If safety and the public interest require an amendment, TSA may amend a security program as follows:

(1) The designated official notifies the aircraft operator, in writing, of the proposed amendment, fixing a period of not less than 30 days within which the aircraft operator may submit written information, views, and arguments on the amendment.

(2) After considering all relevant material, the designated official notifies the aircraft operator of any amendment adopted or rescinds the notice. If the amendment is adopted, it becomes effective not less than 30 days after the aircraft operator receives the notice of amendment, unless the aircraft operator petitions the Under Secretary to reconsider no later than 15 days before the effective date of the amendment. The aircraft operator must send the petition for reconsideration to the designated official. A timely petition for reconsideration stays the effective date of the amendment.

(3) Upon receipt of a petition for reconsideration, the designated official either amends or withdraws the notice or transmits the petition, together with any pertinent information, to the Under Secretary for reconsideration. The Under Secretary disposes of the petition within 30 days of receipt by either directing the designated official to withdraw or amend the amendment, or by affirming the amendment.

(d) *Emergency amendments.* If the designated official finds that there is an emergency requiring immediate action with respect to safety in air transportation or in air commerce that makes procedures in this section contrary to the public interest, the designated official may issue an amendment, without the prior notice and comment procedures in paragraph (c) of this section, effective without stay on the date the aircraft operator receives notice of it. In such a case, the designated official will incorporate in the notice a brief statement of the reasons and findings for the amendment to be adopted. The aircraft operator may file a petition for reconsideration under paragraph (c) of this section; however, this does not stay the effective date of the emergency amendment.

Subpart C—Operations

§ 1544.201 Acceptance and screening of individuals and accessible property.

(a) *Preventing or deterring the carriage of any explosive, incendiary, or deadly or dangerous weapon.* Each aircraft operator must use the measures in its security program to prevent or deter the carriage of any weapon, explosive, or incendiary on or about each individual's person or accessible property before boarding an aircraft or entering a sterile area.

(b) *Screening of individuals and accessible property.* Except as provided in its security program, each aircraft operator must ensure that each individual entering a sterile area at each preboard screening checkpoint for which it is responsible, and all accessible property under that individual's control, are inspected for weapons, explosives, and incendiaries as provided in § 1544.207.

(c) *Refusal to transport.* Each aircraft operator must deny entry into a sterile area and must refuse to transport—

(1) Any individual who does not consent to a search or inspection of his or her person in accordance with the system prescribed in this part; and

(2) Any property of any individual or other person who does not consent to a search or inspection of that property in accordance with the system prescribed by this part.

(d) *Prohibitions on carrying a weapon, explosive, or incendiary.* Except as provided in §§ 1544.219, 1544.221, and 1544.223, no aircraft operator may permit any individual to have a weapon, explosive, or incendiary, on or about the individual's person or accessible property when onboard an aircraft.

(e) *Staffing.* Each aircraft operator must staff its security screening checkpoints with supervisory and non-supervisory personnel in accordance with the standards specified in its security program.

§ 1544.203 Acceptance and screening of checked baggage.

(a) *Preventing or deterring the carriage of any explosive or incendiary.* Each aircraft operator must use the procedures, facilities, and equipment described in its security program to prevent or deter the carriage of any unauthorized explosive or incendiary onboard aircraft in checked baggage.

(b) *Acceptance.* Each aircraft operator must ensure that checked baggage carried in the aircraft is received by its authorized aircraft operator representative.

(c) *Screening of checked baggage.* Except as provided in its security program, each aircraft operator must ensure that all checked baggage is inspected for explosives and incendiaries before loading it on its aircraft, in accordance with § 1544.207.

(d) *Control.* Each aircraft operator must use the procedures in its security program to control checked baggage that it accepts for transport on an aircraft, in a manner that:

(1) Prevents the unauthorized carriage of any explosive or incendiary aboard the aircraft.

(2) Prevents access by persons other than an aircraft operator employee or its agent.

(e) *Refusal to transport.* Each aircraft operator must refuse to transport any individual's checked baggage or property if the individual does not consent to a search or inspection of that checked baggage or property in accordance with the system prescribed by this part.

(f) *Firearms in checked baggage.* No aircraft operator may knowingly permit any person to transport in checked baggage:

(1) Any loaded firearm(s).

(2) Any unloaded firearm(s) unless—

(i) The passenger declares to the aircraft operator, either orally or in writing before checking the baggage that any firearm carried in the baggage is unloaded;

(ii) The firearm is carried in a hard-sided container;

(iii) The container in which it is carried is locked, and only the individual checking the baggage retains the key or combination; and

(iv) The checked baggage containing the firearm is carried in an area that is inaccessible to passengers, and is not carried in the flightcrew compartment,.

(3) Any unauthorized explosive or incendiary.

(g) *Ammunition.* This section does not prohibit the carriage of ammunition in checked baggage or in the same container as a firearm. Title 49 CFR part 175 provides additional requirements governing carriage of ammunition on aircraft.

§ 1544.205 Acceptance and screening of cargo.

(a) *General requirements.* Each aircraft operator must use the procedures, facilities, and equipment described in its security program to prevent or deter the carriage of unauthorized explosives or incendiaries in cargo onboard a passenger aircraft.

(b) *Screening of cargo baggage.* Each aircraft operator must ensure that, as required in its security program, cargo is inspected for explosives and incendiaries before loading it on its aircraft in accordance with § 1544.207.

(c) *Control.* Each aircraft operator must use the procedures in its security program to control cargo that it accepts for transport on an aircraft in a manner that:

(1) Prevents the carriage of any unauthorized explosive or incendiary aboard the aircraft.

(2) Prevents access by persons other than an aircraft operator employee or its agent.

(d) *Refusal to transport.* Each aircraft operator must refuse to transport any cargo if the shipper does not consent to a search or inspection of that cargo in accordance with the system prescribed by this part.

§ 1544.207 Screening of individuals and property.

(a) *Applicability of this section.* This section applies to the inspection of individuals, accessible property, checked baggage, and cargo as required under this part.

(b) *Locations within the United States at which TSA conducts screening.* Each aircraft operator must ensure that the individuals or property have been inspected by TSA before boarding or loading on its aircraft. This paragraph applies when TSA is conducting screening using TSA employees or when using companies under contract with TSA.

(c) *Aircraft operator conducting screening.* Each aircraft operator must use the measures in its security program and in subpart E of this part to inspect the individual or property. This paragraph does not apply at locations identified in paragraphs (b) and (d) of this section.

(d) *Locations outside the United States at which the foreign government conducts screening.* Each aircraft operator must ensure that all individuals and property have been inspected by the foreign government. This paragraph applies when the host government is conducting screening using government employees or when using companies under contract with the government.

§ 1544.209 Use of metal detection devices.

(a) No aircraft operator may use a metal detection device within the United States or under the aircraft operator's operational control outside the United States to inspect persons, unless specifically authorized under a security program under this part. No aircraft operator may use such a device contrary to its security program.

(b) Metal detection devices must meet the calibration standards established by TSA.

§ 1544.211 Use of X-ray systems.

(a) *TSA authorization required.* No aircraft operator may use any X-ray system within the United States or under the aircraft operator's operational control outside the United States to inspect accessible property or checked baggage, unless specifically authorized under its security program. No aircraft operator may use such a system in a manner contrary to its security program. TSA authorizes aircraft operators to use X-ray systems for inspecting accessible property or checked baggage under a security program if the aircraft operator shows that—

(1) The system meets the standards for cabinet X-ray systems primarily for the inspection of baggage issued by the Food and Drug Administration (FDA) and published in 21 CFR 1020.40;

(2) A program for initial and recurrent training of operators of the system is established, which includes training in radiation safety, the efficient use of X-ray systems, and the identification of weapons, explosives, and incendiaries; and

(3) The system meets the imaging requirements set forth in its security program using the step wedge specified in American Society for Testing Materials (ASTM) Standard F792–88 (Reapproved 1993). This standard is incorporated by reference in paragraph (g) of this section.

(b) *Annual radiation survey.* No aircraft operator may use any X-ray system unless, within the preceding 12 calendar months, a radiation survey is conducted that shows that the system meets the applicable performance standards in 21 CFR 1020.40.

(c) *Radiation survey after installation or moving.* No aircraft operator may use any X-ray system after the system has been installed at a screening point or after the system has been moved unless a radiation survey is conducted which shows that the system meets the applicable performance standards in 21 CFR 1020.40. A radiation survey is not required for an X-ray system that is designed and constructed as a mobile unit and the aircraft operator shows that it can be moved without altering its performance.

(d) *Defect notice or modification order.* No aircraft operator may use any X-ray system that is not in full compliance with any defect notice or modification order issued for that system by the FDA, unless the FDA has advised TSA that the defect or failure to comply does not create a significant risk of injury, including genetic injury, to any person.

(e) *Signs and inspection of photographic equipment and film.* (1) At locations at which an aircraft operator uses an X-ray system to inspect accessible property the aircraft operator must ensure that a sign is posted in a conspicuous place at the screening checkpoint. At locations outside the United States at which a foreign government uses an X-ray system to inspect accessible property the aircraft operator must ensure that a sign is posted in a conspicuous place at the screening checkpoint.

(2) At locations at which an aircraft operator or TSA uses an X-ray system to inspect checked baggage the aircraft operator must ensure that a sign is posted in a conspicuous place where the aircraft operator accepts checked baggage.

(3) The signs required under this paragraph (e) must notify individuals that such items are being inspected by an X-ray and advise them to remove all X-ray, scientific, and high-speed film from accessible property and checked baggage before inspection. This sign must also advise individuals that they may request that an inspection be made of their photographic equipment and film packages without exposure to an X-ray system. If the X-ray system exposes any accessible property or checked baggage to more than one milliroentgen during the inspection, the sign must advise individuals to remove film of all kinds from their articles before inspection.

(4) If requested by individuals, their photographic equipment and film packages must be inspected without exposure to an X-ray system.

(f) *Radiation survey verification after installation or moving.* Each aircraft operator must maintain at least one copy of the results of the most recent radiation survey conducted under paragraph (b) or (c) of this section and must make it available for inspection upon request by TSA at each of the following locations—

(1) The aircraft operator's principal business office; and

(2) The place where the X-ray system is in operation.

(g) *Incorporation by reference.* The American Society for Testing and Materials (ASTM) Standard F792–88 (Reapproved 1993), "Standard Practice for Design and Use of Ionizing Radiation Equipment for the Detection of Items Prohibited in Controlled Access Areas," is approved for incorporation by reference by the Director of the Federal Register pursuant to 5 U.S.C. 552(a) and 1 CFR part 51. ASTM Standard F792–88 may be examined at the Department of Transportation (DOT) Docket, 400 Seventh Street SW, Room Plaza 401, Washington, DC 20590, or on DOT's Docket Management System (DMS) web page at *http://dms.dot.gov/search* (under docket number FAA–2001–8725). Copies of the standard may be examined also at the Office of the Federal Register, 800 North Capitol St., NW, Suite 700, Washington, DC. In addition, ASTM Standard F792–88 (Reapproved 1993) may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959.

(h) *Duty time limitations.* Each aircraft operator must comply with the X-ray operator duty time limitations specified in its security program.

§ 1544.213 Use of explosives detection systems.

(a) *Use of explosive detection equipment.* If TSA so requires by an amendment to an aircraft operator's security program, each aircraft operator required to conduct screening under a security program must use an explosives detection system approved by TSA to screen checked baggage on international flights.

(b) *Signs and inspection of photographic equipment and film.* (1) At locations at which an aircraft operator or TSA uses an explosives detection system that uses X-ray technology to inspect checked baggage the aircraft operator must ensure that a sign is posted in a conspicuous place where the aircraft operator accepts checked baggage. The sign must notify individuals that such items are being inspected by an explosives detection system and advise them to remove all X-ray, scientific, and high-speed film from checked baggage before inspection. This sign must also advise individuals that they may request that an inspection be made of their photographic equipment and film packages without exposure to an explosives detection system.

(2) If the explosives detection system exposes any checked baggage to more than one milliroentgen during the inspection the aircraft operator must post a sign which advises individuals to remove film of all kinds from their articles before inspection. If requested by individuals, their photographic equipment and film packages must be inspected without exposure to an explosives detection system.

§ 1544.215 Security coordinators.

(a) *Aircraft Operator Security Coordinator.* Each aircraft operator must designate and use an Aircraft Operator Security Coordinator (AOSC). The AOSC and any alternates must be appointed at the corporate level and must serve as the aircraft operator's primary contact for security-related

activities and communications with TSA, as set forth in the security program. Either the AOSC, or an alternate AOSC, must be available on a 24-hour basis.

(b) *Ground Security Coordinator.* Each aircraft operator must designate and use a Ground Security Coordinator for each domestic and international flight departure to carry out the Ground Security Coordinator duties specified in the aircraft operator's security program. The Ground Security Coordinator at each airport must conduct the following daily:

(1) A review of all security-related functions for which the aircraft operator is responsible, for effectiveness and compliance with this part, the aircraft operator's security program, and applicable Security Directives.

(2) Immediate initiation of corrective action for each instance of noncompliance with this part, the aircraft operator's security program, and applicable Security Directives. At foreign airports where such security measures are provided by an agency or contractor of a host government, the aircraft operator must notify TSA for assistance in resolving noncompliance issues.

(c) *In-flight Security Coordinator.* Each aircraft operator must designate and use the pilot in command as the In-flight Security Coordinator for each domestic and international flight to perform duties specified in the aircraft operator's security program.

§ 1544.217 Law enforcement personnel.

(a) The following applies to operations at airports within the United States that are not required to hold a security program under part 1542 of this chapter.

(1) For operations described in § 1544.101(a) each aircraft operator must provide for law enforcement personnel meeting the qualifications and standards specified in §§ 1542.215 and 1542.217 of this chapter.

(2) For operations described in § 1544.101(b) or (c) each aircraft operator must—

(i) Arrange for law enforcement personnel meeting the qualifications and standards specified in § 1542.217 of this chapter to be available to respond to an incident; and

(ii) Provide its employees, including crewmembers, current information regarding procedures for obtaining law enforcement assistance at that airport.

(b) The following applies to operations at airports required to hold security programs under part 1542 of this chapter. For operations described in § 1544.101(c), each aircraft operator must—

(1) Arrange with TSA and the airport operator, as appropriate, for law enforcement personnel meeting the qualifications and standards specified in § 1542.217 of this chapter to be available to respond to incidents, and

(2) Provide its employees, including crewmembers, current information regarding procedures for obtaining law enforcement assistance at that airport.

§ 1544.219 Carriage of accessible weapons.

(a) *Flights for which screening is conducted.* The provisions of § 1544.201(d), with respect to accessible weapons, do not apply to a law enforcement officer (LEO) aboard a flight for which screening is required if the requirements of this section are met. Paragraph (a) of this section does not apply to a Federal Air Marshal on duty status under § 1544.223.

(1) Unless otherwise authorized by TSA, the armed LEO must meet the following requirements:

(i) Be a Federal law enforcement officer or a full-time municipal, county, or state law enforcement officer who is a direct employee of a government agency.

(ii) Be sworn and commissioned to enforce criminal statutes or immigration statutes.

(iii) Be authorized by the employing agency to have the weapon in connection with assigned duties.

(iv) Has completed the training program "Law Enforcement Officers Flying Armed."

(2) In addition to the requirements of paragraph (a)(1) of this section, the armed LEO must have a need to have the weapon accessible from the time he or she would otherwise check the weapon until the time it would be claimed after deplaning. The need to have the weapon accessible must be determined by the employing agency, department, or service and be based on one of the following:

(i) The provision of protective duty, for instance, assigned to a principal or advance team, or on travel required to be prepared to engage in a protective function.

(ii) The conduct of a hazardous surveillance operation.

(iii) On official travel required to report to another location, armed and prepared for duty.

(iv) Employed as a Federal LEO, whether or not on official travel, and armed in accordance with an agency-wide policy governing that type of travel established by the employing agency by directive or policy statement.

(v) Control of a prisoner, in accordance with § 1544.221, or an armed LEO on a round trip ticket returning from escorting, or traveling to pick up, a prisoner.

(vi) TSA Federal Air Marshal on duty status.

(3) The armed LEO must comply with the following notification requirements:

(i) All armed LEOs must notify the aircraft operator of the flight(s) on which he or she needs to have the weapon accessible at least 1 hour, or in an emergency as soon as practicable, before departure.

(ii) Identify himself or herself to the aircraft operator by presenting credentials that include a clear full-face picture, the signature of the armed LEO, and the signature of the authorizing official of the agency, service, or department or the official seal of the agency, service, or department. A badge, shield, or similar device may not be used, or accepted, as the sole means of identification.

(iii) If the armed LEO is a State, county, or municipal law enforcement officer, he or she must present an original letter of authority, signed by an authorizing official from his or her employing agency, service or department, confirming the need to travel armed and detailing the itinerary of the travel while armed.

(iv) If the armed LEO is an escort for a foreign official then this paragraph (a)(3) may be satisfied by a State Department notification.

(4) The aircraft operator must do the following:

(i) Obtain information or documentation required in paragraphs (a)(3)(ii), (iii), and (iv) of this section.

(ii) Advise the armed LEO, before boarding, of the aircraft operator's procedures for carrying out this section.

(iii) Have the LEO confirm he/she has completed the training program "Law Enforcement Officers Flying Armed" as required by TSA, unless otherwise authorized by TSA.

(iv) Ensure that the identity of the armed LEO is known to the appropriate personnel who are responsible for security during the boarding of the aircraft.

(v) Notify the pilot in command and other appropriate crewmembers, of the location of each armed LEO aboard the aircraft. Notify any other armed LEO of the location of each armed LEO, including FAM's. Under circumstances described in the security program, the aircraft operator must not close the doors until the notification is complete.

(vi) Ensure that the information required in paragraphs (a)(3)(i) and (ii) of this section is furnished to the flight

crew of each additional connecting flight by the Ground Security Coordinator or other designated agent at each location.

(b) *Flights for which screening is not conducted.* The provisions of § 1544.201(d), with respect to accessible weapons, do not apply to a LEO aboard a flight for which screening is not required if the requirements of paragraphs (a)(1), (3), and (4) of this section are met.

(c) *Alcohol.* (1) No aircraft operator may serve any alcoholic beverage to an armed LEO.

(2) No armed LEO may:

(i) Consume any alcoholic beverage while aboard an aircraft operated by an aircraft operator.

(ii) Board an aircraft armed if they have consumed an alcoholic beverage within the previous 8 hours.

(d) *Location of weapon.* (1) Any individual traveling aboard an aircraft while armed must at all times keep their weapon:

(i) Concealed and out of view, either on their person or in immediate reach, if the armed LEO is not in uniform.

(ii) On their person, if the armed LEO is in uniform.

(2) No individual may place a weapon in an overhead storage bin.

§ 1544.221 Carriage of prisoners under the control of armed law enforcement officers.

(a) This section applies as follows:

(1) This section applies to the transport of prisoners under the escort of an armed law enforcement officer.

(2) This section does not apply to the carriage of passengers under voluntary protective escort.

(3) This section does not apply to the escort of non-violent detainees of the Immigration and Naturalization Service. This section does not apply to individuals who may be traveling with a prisoner and armed escort, such as the family of a deportee who is under armed escort.

(b) For the purpose of this section:

(1) "High risk prisoner" means a prisoner who is an exceptional escape risk, as determined by the law enforcement agency, and charged with, or convicted of, a violent crime.

(2) "Low risk prisoner" means any prisoner who has not been designated as "high risk."

(c) No aircraft operator may carry a prisoner in the custody of an armed law enforcement officer aboard an aircraft for which screening is required unless, in addition to the requirements in § 1544.219, the following requirements are met:

(1) The agency responsible for control of the prisoner has determined whether the prisoner is considered a high risk or a low risk.

(2) Unless otherwise authorized by TSA, no more than one high risk prisoner may be carried on the aircraft.

(d) No aircraft operator may carry a prisoner in the custody of an armed law enforcement officer aboard an aircraft for which screening is required unless the following staffing requirements are met:

(1) A minimum of one armed law enforcement officer must control a low risk prisoner on a flight that is scheduled for 4 hours or less. One armed law enforcement officer may control no more than two low risk prisoners.

(2) A minimum of two armed law enforcement officers must control a low risk prisoner on a flight that is scheduled for more than 4 hours. Two armed law enforcement officers may control no more than two low risk prisoners.

(3) For high-risk prisoners:

(i) For one high-risk prisoner on a flight: A minimum of two armed law enforcement officers must control a high risk prisoner. No other prisoners may be under the control of those two armed law enforcement officers.

(ii) If TSA has authorized more than one high-risk prisoner to be on the flight under paragraph (c)(2) of this section, a minimum of one armed law enforcement officer for each prisoner and one additional armed law enforcement officer must control the prisoners. No other prisoners may be under the control of those armed law enforcement officers.

(e) An armed law enforcement officer who is escorting a prisoner—

(1) Must notify the aircraft operator at least 24 hours before the scheduled departure, or, if that is not possible as far in advance as possible of the following—

(i) The identity of the prisoner to be carried and the flight on which it is proposed to carry the prisoner; and

(ii) Whether or not the prisoner is considered to be a high risk or a low risk.

(2) Must arrive at the check-in counter at least 1 hour before to the scheduled departure.

(3) Must assure the aircraft operator, before departure, that each prisoner under the control of the officer(s) has been searched and does not have on or about his or her person or property anything that can be used as a weapon.

(4) Must be seated between the prisoner and any aisle.

(5) Must accompany the prisoner at all times, and keep the prisoner under control while aboard the aircraft.

(f) No aircraft operator may carry a prisoner in the custody of an armed law enforcement officer aboard an aircraft unless the following are met:

(1) When practicable, the prisoner must be boarded before any other boarding passengers and deplaned after all other deplaning passengers.

(2) The prisoner must be seated in a seat that is neither located in any passenger lounge area nor located next to or directly across from any exit and, when practicable, the aircraft operator should seat the prisoner in the rearmost seat of the passenger cabin.

(g) Each armed law enforcement officer escorting a prisoner and each aircraft operator must ensure that the prisoner is restrained from full use of his or her hands by an appropriate device that provides for minimum movement of the prisoner's hands, and must ensure that leg irons are not used.

(h) No aircraft operator may provide a prisoner under the control of a law enforcement officer—

(1) With food or beverage or metal eating utensils unless authorized to do so by the armed law enforcement officer.

(2) With any alcoholic beverage.

§ 1544.223 Transportation of Federal Air Marshals.

(a) A Federal Air Marshal on duty status may have a weapon accessible while aboard an aircraft for which screening is required.

(b) Each aircraft operator must carry Federal Air Marshals, in the number and manner specified by TSA, on each scheduled passenger operation, and public charter passenger operation designated by TSA.

(c) Each Federal Air Marshal must be carried on a first priority basis and without charge while on duty, including positioning and repositioning flights. When a Federal Air Marshal is assigned to a scheduled flight that is canceled for any reason, the aircraft operator must carry that Federal Air Marshal without charge on another flight as designated by TSA.

(d) Each aircraft operator must assign the specific seat requested by a Federal Air Marshal who is on duty status. If another LEO is assigned to that seat or requests that seat, the aircraft operator must inform the Federal Air Marshal. The Federal Air Marshal will coordinate seat assignments with the other LEO.

(e) The Federal Air Marshal identifies himself or herself to the aircraft operator by presenting credentials that include a clear, full-face picture, the signature of the Federal Air Marshal, and the signature of the FAA Administrator. A badge, shield, or similar device may not

be used or accepted as the sole means of identification.

(f) The requirements of § 1544.219(a) do not apply for a Federal Air Marshal on duty status.

(g) Each aircraft operator must restrict any information concerning the presence, seating, names, and purpose of Federal Air Marshals at any station or on any flight to those persons with an operational need to know.

(h) Law enforcement officers authorized to carry a weapon during a flight will be contacted directly by a Federal Air Marshal who is on that same flight.

§ 1544.225 Security of aircraft and facilities.

Each aircraft operator must use the procedures included, and the facilities and equipment described, in its security program to perform the following control functions with respect to each aircraft operation:

(a) Prevent unauthorized access to areas controlled by the aircraft operator under an exclusive area agreement in accordance with § 1542.111 of this chapter.

(b) Prevent unauthorized access to each aircraft.

(c) Conduct a security inspection of each aircraft before placing it into passenger operations if access has not been controlled in accordance with the aircraft operator security program and as otherwise required in the security program.

§ 1544.227 Exclusive area agreement.

(a) An aircraft operator that has entered into an exclusive area agreement with an airport operator, under § 1542.111 of this chapter must carry out that exclusive area agreement.

(b) The aircraft operator must list in its security program the locations at which it has entered into exclusive area agreements with an airport operator.

(c) The aircraft operator must provide the exclusive area agreement to TSA upon request.

(d) Any exclusive area agreements in effect on November 14, 2001, must meet the requirements of this section and § 1542.111 of this chapter no later than November 14, 2002.

§ 1544.229 Fingerprint-based criminal history records checks (CHRC): Unescorted access authority, authority to perform screening functions, and authority to perform checked baggage or cargo functions.

(a) *Scope.* The following individuals are within the scope of this section. Unescorted access authority, authority to perform screening functions, and authority to perform checked baggage or cargo functions, are collectively referred to as "covered functions."

(1) *New unescorted access authority or authority to perform screening functions.* (i) Each employee or contract employee covered under a certification made to an airport operator on or after December 6, 2001, pursuant to 14 CFR 107.209(n) in effect prior to November 14, 2001 (see 14 CFR Parts 60 to 139 revised as of January 1, 2001) or § 1542.209(n) of this chapter.

(ii) Each individual issued on or after December 6, 2001, an aircraft operator identification media that one or more airports accepts as airport-approved media for unescorted access authority within a security identification display area (SIDA), as described in § 1542.205 of this chapter (referred to as "unescorted access authority").

(iii) Each individual, on or after December 6, 2001, granted authority to perform the following screening functions at locations within the United States (referred to as "authority to perform screening functions")—

(A) Screening passengers or property that will be carried in a cabin of an aircraft of an aircraft operator required to screen passengers under this part.

(B) Serving as an immediate supervisor (checkpoint security supervisor (CSS)), and the next supervisory level (shift or site supervisor), to those individuals described in paragraph (a)(1)(iii)(A) of this section.

(2) *Current unescorted access authority or authority to perform screening functions.* (i) Each employee or contract employee covered under a certification made to an airport operator pursuant to 14 CFR 107.31(n) in effect prior to November 14, 2001 (see 14 CFR Parts 60 to 139 revised as of January 1, 2001), or pursuant to 14 CFR 107.209(n) in effect prior to December 6, 2001 (see 14 CFR Parts 60 to 139 revised as of January 1, 2001).

(ii) Each individual who holds on December 6, 2001, an aircraft operator identification media that one or more airports accepts as airport-approved media for unescorted access authority within a security identification display area (SIDA), as described in § 1542.205 of this chapter.

(iii) Each individual who is performing on December 6, 2001, a screening function identified in paragraph (a)(1)(iii) of this section.

(3) *New authority to perform checked baggage or cargo functions.* Each individual who, on and after February 17, 2002, is granted the authority to perform the following checked baggage and cargo functions (referred to as "authority to perform checked baggage or cargo functions"), except for individuals described in paragraph (a)(1) of this section:

(i) Screening of checked baggage or cargo of an aircraft operator required to screen passengers under this part, or serving as an immediate supervisor of such an individual.

(ii) Accepting checked baggage for transport on behalf of an aircraft operator required to screen passengers under this part.

(4) *Current authority to perform checked baggage or cargo functions.* Each individual who holds on February 17, 2002, authority to perform checked baggage or cargo functions, except for individuals described in paragraph (a)(1) or (2) of this section.

(b) *Individuals seeking unescorted access authority, authority to perform screening functions, or authority to perform checked baggage or cargo functions.* Each aircraft operator must ensure that each individual identified in paragraph (a)(1) or (3) of this section has undergone a fingerprint-based CHRC that does not disclose that he or she has a disqualifying criminal offense, as described in paragraph (d) of this section, before—

(1) Making a certification to an airport operator regarding that individual;

(2) Issuing an aircraft operator identification medium to that individual;

(3) Authorizing that individual to perform screening functions; or

(4) Authorizing that individual to perform checked baggage or cargo functions.

(c) *Individuals who have not had a CHRC.* (1) *Deadline for conducting a CHRC.* Each aircraft operator must ensure that, on and after December 6, 2002:

(i) No individual retains unescorted access authority, whether obtained as a result of a certification to an airport operator under 14 CFR 107.31(n) in effect prior to November 14, 2001 (see 14 CFR parts 60 to 139 revised as of January 1, 2001), or under 14 CFR 107.209(n) in effect prior to December 6, 2001 (see 14 CFR Parts 60 to 139 revised as of January 1, 2001), or obtained as a result of the issuance of an aircraft operator's identification media, unless the individual has been subject to a fingerprint-based CHRC for unescorted access authority under this part.

(ii) No individual continues to have authority to perform screening functions described in paragraph (a)(1)(iii) of this section, unless the individual has been subject to a fingerprint-based CHRC under this part.

(iii) No individual continues to have authority to perform checked baggage or

cargo functions described in paragraph (a)(3) of this section, unless the individual has been subject to a fingerprint-based CHRC under this part.

(2) *Lookback for individuals with unescorted access authority or authority to perform screening functions.* When a CHRC discloses a disqualifying criminal offense for which the conviction or finding was on or after December 6, 1991, the aircraft operator must immediately suspend that individual's unescorted access authority or authority to perform screening functions.

(3) *Lookback for individuals with authority to perform checked baggage or cargo functions.* When a CHRC discloses a disqualifying criminal offense for which the conviction or finding was on or after February 17, 1992, the aircraft operator must immediately suspend that individual's authority to perform checked baggage or cargo functions.

(d) *Disqualifying criminal offenses.* An individual has a disqualifying criminal offense if the individual has been convicted, or found not guilty by reason of insanity, of any of the disqualifying crimes listed in this paragraph in any jurisdiction during the 10 years before the date of the individual's application for authority to perform covered functions, or while the individual has authority to perform covered functions. The disqualifying criminal offenses are as follows:

(1) Forgery of certificates, false marking of aircraft, and other aircraft registration violation; 49 U.S.C. 46306.

(2) Interference with air navigation; 49 U.S.C. 46308.

(3) Improper transportation of a hazardous material; 49 U.S.C. 46312.

(4) Aircraft piracy; 49 U.S.C. 46502.

(5) Interference with flight crew members or flight attendants; 49 U.S.C. 46504.

(6) Commission of certain crimes aboard aircraft in flight; 49 U.S.C. 46506.

(7) Carrying a weapon or explosive aboard aircraft; 49 U.S.C. 46505.

(8) Conveying false information and threats; 49 U.S.C. 46507.

(9) Aircraft piracy outside the special aircraft jurisdiction of the United States; 49 U.S.C. 46502(b).

(10) Lighting violations involving transporting controlled substances; 49 U.S.C. 46315.

(11) Unlawful entry into an aircraft or airport area that serves air carriers or foreign air carriers contrary to established security requirements; 49 U.S.C. 46314.

(12) Destruction of an aircraft or aircraft facility; 18 U.S.C. 32.

(13) Murder.

(14) Assault with intent to murder.

(15) Espionage.

(16) Sedition.

(17) Kidnapping or hostage taking.

(18) Treason.

(19) Rape or aggravated sexual abuse.

(20) Unlawful possession, use, sale, distribution, or manufacture of an explosive or weapon.

(21) Extortion.

(22) Armed or felony unarmed robbery.

(23) Distribution of, or intent to distribute, a controlled substance.

(24) Felony arson.

(25) Felony involving a threat.

(26) Felony involving—

(i) Willful destruction of property;

(ii) Importation or manufacture of a controlled substance;

(iii) Burglary;

(iv) Theft;

(v) Dishonesty, fraud, or misrepresentation;

(vi) Possession or distribution of stolen property;

(vii) Aggravated assault;

(viii) Bribery; or

(ix) Illegal possession of a controlled substance punishable by a maximum term of imprisonment of more than 1 year.

(27) Violence at international airports; 18 U.S.C. 37.

(28) Conspiracy or attempt to commit any of the criminal acts listed in this paragraph (d).

(e) *Fingerprint application and processing.* (1) At the time of fingerprinting, the aircraft operator must provide the individual to be fingerprinted a fingerprint application that includes only the following—

(i) The disqualifying criminal offenses described in paragraph (d) of this section.

(ii) A statement that the individual signing the application does not have a disqualifying criminal offense.

(iii) A statement informing the individual that Federal regulations under 49 CFR 1544.229 impose a continuing obligation to disclose to the aircraft operator within 24 hours if he or she is convicted of any disqualifying criminal offense that occurs while he or she has authority to perform a covered function.

(iv) A statement reading, "The information I have provided on this application is true, complete, and correct to the best of my knowledge and belief and is provided in good faith. I understand that a knowing and willful false statement on this application can be punished by fine or imprisonment or both. (See section 1001 of Title 18 United States Code.)"

(v) A line for the printed name of the individual.

(vi) A line for the individual's signature and date of signature.

(2) Each individual must complete and sign the application prior to submitting his or her fingerprints.

(3) The aircraft operator must verify the identity of the individual through two forms of identification prior to fingerprinting, and ensure that the printed name on the fingerprint application is legible. At least one of the two forms of identification must have been issued by a government authority, and at least one must include a photo.

(4) The aircraft operator must:

(i) Advise the individual that a copy of the criminal record received from the FBI will be provided to the individual, if requested by the individual in writing; and

(ii) Identify a point of contact if the individual has questions about the results of the CHRC.

(5) The aircraft operator must collect, control, and process one set of legible and classifiable fingerprints under direct observation by the aircraft operator or a law enforcement officer.

(6) Fingerprints may be obtained and processed electronically, or recorded on fingerprint cards approved by the FBI and distributed by TSA for that purpose.

(7) The fingerprint submission must be forwarded to TSA in the manner specified by TSA.

(f) *Fingerprinting fees.* Aircraft operators must pay for all fingerprints in a form and manner approved by TSA. The payment must be made at the designated rate (available from the local TSA security office) for each set of fingerprints submitted. Information about payment options is available though the designated TSA headquarters point of contact. Individual personal checks are not acceptable.

(g) *Determination of arrest status.* (1) When a CHRC on an individual described in paragraph (a)(1) or (3) of this section discloses an arrest for any disqualifying criminal offense listed in paragraph (d) of this section without indicating a disposition, the aircraft operator must determine, after investigation, that the arrest did not result in a disqualifying offense before granting authority to perform a covered function. If there is no disposition, or if the disposition did not result in a conviction or in a finding of not guilty by reason of insanity of one of the offenses listed in paragraph (d) of this section, the individual is not disqualified under this section.

(2) When a CHRC on an individual described in paragraph (a)(2) or (4) of this section discloses an arrest for any disqualifying criminal offense without

indicating a disposition, the aircraft operator must suspend the individual's authority to perform a covered function not later than 45 days after obtaining the CHRC unless the aircraft operator determines, after investigation, that the arrest did not result in a disqualifying criminal offense. If there is no disposition, or if the disposition did not result in a conviction or in a finding of not guilty by reason of insanity of one of the offenses listed in paragraph (d) of this section, the individual is not disqualified under this section.

(3) The aircraft operator may only make the determinations required in paragraphs (g)(1) and (g)(2) of this section for individuals for whom it is issuing, or has issued, authority to perform a covered function; and individuals who are covered by a certification from an aircraft operator under § 1542.209(n) of this chapter. The aircraft operator may not make determinations for individuals described in § 1542.209(a) of this chapter.

(h) *Correction of FBI records and notification of disqualification.* (1) Before making a final decision to deny authority to an individual described in paragraph (a)(1) or (3) of this section, the aircraft operator must advise him or her that the FBI criminal record discloses information that would disqualify him or her from receiving or retaining authority to perform a covered function and provide the individual with a copy of the FBI record if he or she requests it.

(2) The aircraft operator must notify an individual that a final decision has been made to grant or deny authority to perform a covered function.

(3) Immediately following the suspension of authority to perform a covered function, the aircraft operator must advise the individual that the FBI criminal record discloses information that disqualifies him or her from retaining his or her authority, and provide the individual with a copy of the FBI record if he or she requests it.

(i) *Corrective action by the individual.* The individual may contact the local jurisdiction responsible for the information and the FBI to complete or correct the information contained in his or her record, subject to the following conditions—

(1) For an individual seeking unescorted access authority or authority to perform screening functions on or after December 6, 2001; or an individual seeking authority to perform checked baggage or cargo functions on or after February 17, 2002; the following applies:

(i) Within 30 days after being advised that the criminal record received from the FBI discloses a disqualifying criminal offense, the individual must notify the aircraft operator in writing of his or her intent to correct any information he or she believes to be inaccurate. The aircraft operator must obtain a copy, or accept a copy from the individual, of the revised FBI record or a certified true copy of the information from the appropriate court, prior to authority to perform a covered function.

(ii) If no notification, as described in paragraph (h)(1) of this section, is received within 30 days, the aircraft operator may make a final determination to deny authority to perform a covered function.

(2) For an individual with unescorted access authority or authority to perform screening functions before December 6, 2001; or an individual with authority to perform checked baggage or cargo functions before February 17, 2002; the following applies: Within 30 days after being advised of suspension because the criminal record received from the FBI discloses a disqualifying criminal offense, the individual must notify the aircraft operator in writing of his or her intent to correct any information he or she believes to be inaccurate. The aircraft operator must obtain a copy, or accept a copy from the individual, of the revised FBI record, or a certified true copy of the information from the appropriate court, prior to reinstating authority to perform a covered function.

(j) *Limits on dissemination of results.* Criminal record information provided by the FBI may be used only to carry out this section and § 1542.209 of this chapter. No person may disseminate the results of a CHRC to anyone other than:

(1) The individual to whom the record pertains, or that individual's authorized representative.

(2) Officials of airport operators who are determining whether to grant unescorted access to the individual under part 1542 of this chapter when the determination is not based on the aircraft operator's certification under § 1542.209(n) of this chapter.

(3) Other aircraft operators who are determining whether to grant authority to perform a covered function under this part.

(4) Others designated by TSA.

(k) *Recordkeeping.* The aircraft operator must maintain the following information.

(1) *Investigation conducted before December 6, 2001.* The aircraft operator must maintain and control the access or employment history investigation files, including the criminal history records results portion, for investigations conducted before December 6, 2001.

(2) *Fingerprint application process on or after December 6, 2001.* The aircraft operator must physically maintain, control, and, as appropriate, destroy the fingerprint application and the criminal record. Only direct aircraft operator employees may carry out the responsibility for maintaining, controlling, and destroying criminal records.

(3) *Protection of records—all investigations.* The records required by this section must be maintained in a manner that is acceptable to TSA and in a manner that protects the confidentiality of the individual.

(4) *Duration—all investigations.* The records identified in this section with regard to an individual must be maintained until 180 days after the termination of the individual's authority to perform a covered function. When files are no longer maintained, the criminal record must be destroyed.

(l) *Continuing responsibilities.* (1) Each individual with unescorted access authority or the authority to perform screening functions on December 6, 2001, who had a disqualifying criminal offense in paragraph (d) of this section on or after December 6, 1991, must, by January 7, 2002, report the conviction to the aircraft operator and surrender the SIDA access medium to the issuer and cease performing screening functions, as applicable.

(2) Each individual with authority to perform a covered function who has a disqualifying criminal offense must report the offense to the aircraft operator and surrender the SIDA access medium to the issuer within 24 hours of the conviction or the finding of not guilty by reason of insanity.

(3) If information becomes available to the aircraft operator indicating that an individual with authority to perform a covered function has a possible conviction for any disqualifying criminal offense in paragraph (d) of this section, the aircraft operator must determine the status of the conviction. If a disqualifying criminal offense is confirmed the aircraft operator must immediately revoke any authority to perform a covered function.

(4) Each individual with authority to perform checked baggage or cargo functions on February 17, 2002, who had a disqualifying criminal offense in paragraph (d) of this section on or after February 17, 1992, must, by March 25 2002, report the conviction to the aircraft operator and cease performing check baggage or cargo functions.

(m) *Aircraft operator responsibility.* The aircraft operator must—

(1) Designate an individual(s) to be responsible for maintaining and controlling the employment history investigations for those whom the aircraft operator has made a certification to an airport operator under 14 CFR 107.209(n) in effect prior to November 14, 2001 (see 14 CFR Parts 60 to 139 revised as of January 1, 2001), and for those whom the aircraft operator has issued identification media that are airport-accepted. The aircraft operator must designate a direct employee to maintain, control, and, as appropriate, destroy criminal records.

(2) Designate an individual(s) to maintain the employment history investigations of individuals with authority to perform screening functions whose files must be maintained at the location or station where the screener is performing his or her duties.

(3) Designate an individual(s) at appropriate locations to serve as the contact to receive notification from individuals seeking authority to perform covered functions of their intent to seek correction of their FBI criminal record.

(4) Audit the employment history investigations performed in accordance with this section and 14 CFR 108.33 in effect prior to November 14, 2001 (see 14 CFR Parts 60 to 139 revised as of January 1, 2001). The aircraft operator must set forth the audit procedures in its security program.

§ 1544.231 Airport-approved and exclusive area personnel identification systems.

(a) Each aircraft operator must establish and carry out a personnel identification system for identification media that are airport-approved, or identification media that are issued for use in an exclusive area. The system must include the following:

(1) Personnel identification media that—

(i) Convey a full face image, full name, employer, and identification number of the individual to whom the identification medium is issued;

(ii) Indicate clearly the scope of the individual's access and movement privileges;

(iii) Indicate clearly an expiration date; and

(iv) Are of sufficient size and appearance as to be readily observable for challenge purposes.

(2) Procedures to ensure that each individual in the secured area or SIDA continuously displays the identification medium issued to that individual on the outermost garment above waist level, or is under escort.

(3) Procedures to ensure accountability through the following:

(i) Retrieving expired identification media.

(ii) Reporting lost or stolen identification media.

(iii) Securing unissued identification media stock and supplies.

(iv) Auditing the system at a minimum of once a year, or sooner, as necessary to ensure the integrity and accountability of all identification media.

(v) As specified in the aircraft operator security program, revalidate the identification system or reissue identification media if a portion of all issued, unexpired identification media are lost, stolen, or unretrieved, including identification media that are combined with access media.

(vi) Ensure that only one identification medium is issued to an individual at a time. A replacement identification medium may only be issued if an individual declares in writing that the medium has been lost or stolen.

(b) The aircraft operator may request approval of a temporary identification media system that meets the standards in § 1542.211(b) of this chapter, or may arrange with the airport to use temporary airport identification media in accordance with that section.

(c) Each aircraft operator must submit a plan to carry out this section to TSA no later than May 13, 2002. Each aircraft operator must fully implement its plan no later than November 14, 2003.

§ 1544.233 Security coordinators and crewmembers, training.

(a) No aircraft operator may use any individual as a Ground Security Coordinator unless, within the preceding 12-calendar months, that individual has satisfactorily completed the security training as specified in the aircraft operator's security program.

(b) No aircraft operator may use any individual as an in-flight security coordinator or crewmember on any domestic or international flight unless, within the preceding 12-calendar months or within the time period specified in an Advanced Qualifications Program approved under SFAR 58 in 14 CFR part 121, that individual has satisfactorily completed the security training required by 14 CFR 121.417(b)(3)(v) or 135.331(b)(3)(v), and as specified in the aircraft operator's security program.

(c) With respect to training conducted under this section, whenever an individual completes recurrent training within one calendar month earlier, or one calendar month after the date it was required, that individual is considered to have completed the training in the calendar month in which it was required.

§ 1544.235 Training and knowledge for individuals with security-related duties.

(a) No aircraft operator may use any direct or contractor employee to perform any security-related duties to meet the requirements of its security program unless that individual has received training as specified in its security program including their individual responsibilities in § 1540.105 of this chapter.

(b) Each aircraft operator must ensure that individuals performing security-related duties for the aircraft operator have knowledge of the provisions of this part, applicable Security Directives and Information Circulars, the approved airport security program applicable to their location, and the aircraft operator's security program to the extent that such individuals need to know in order to perform their duties.

Subpart D—Threat and Threat Response

§ 1544.301 Contingency plan.

Each aircraft operator must adopt a contingency plan and must:

(a) Implement its contingency plan when directed by TSA.

(b) Ensure that all information contained in the plan is updated annually and that appropriate persons are notified of any changes.

(c) Participate in an airport-sponsored exercise of the airport contingency plan or its equivalent, as provided in its security program.

§ 1544.303 Bomb or air piracy threats.

(a) *Flight: Notification.* Upon receipt of a specific and credible threat to the security of a flight, the aircraft operator must—

(1) Immediately notify the ground and in-flight security coordinators of the threat, any evaluation thereof, and any measures to be applied; and

(2) Ensure that the in-flight security coordinator notifies all crewmembers of the threat, any evaluation thereof, and any measures to be applied; and

(3) Immediately notify the appropriate airport operator.

(b) *Flight: Inspection.* Upon receipt of a specific and credible threat to the security of a flight, each aircraft operator must attempt to determine whether or not any explosive or incendiary is present by doing the following:

(1) Conduct a security inspection on the ground before the next flight or, if the aircraft is in flight, immediately after its next landing.

(2) If the aircraft is on the ground, immediately deplane all passengers and submit that aircraft to a security search.

(3) If the aircraft is in flight, immediately advise the pilot in

APPENDIX 7
Glossary

Appendix 7.1 A glossary of common terms and acronyms

AVIATION GLOSSARY

Advisory Circulars – FAA Advisory Circulars provide *recommendations* to airports that do not receive federal funding and for those airports that do receive federal funds, the guidelines within the advisory circulars are *required* to be met by airports.

49 CFR 1542 Airports

Air Carrier - Aircraft operating under certificates of public convenience and necessity issued by the FAA, which authorizes scheduled air transportation over specified routes.

Air Taxi – Aircraft operated by a company or individual that provides transportation on a non-scheduled basis over unspecified routes.

Aircraft Approach Category – A grouping of aircraft based on speed. The categories are A through E.

Airplane Design Group (ADG) – A grouping of airplanes based on wingspan. The groups are Group I through VI.

Airport Environmental Handbook Order 5050.4B – This order provides instructions and guidance for preparing and processing the environmental assessments, findings of no significant impact (FONSI), and environmental impact statements (EIS) for airport development proposals and other airport actions as required by various laws and regulations.

Airport Information Management System (AIMS) – A database system used by Massachusetts Aeronautics Commission to track airport data.

Airport Elevation – The highest point on an airport's usable runway given in feet above mean sea level (MSL).

Airport Layout Plan (ALP) – The plan of an airport showing the layout of existing and proposed airport facilities. This becomes a legal document once signed by the Airport Sponsor, the Federal Aviation Administration (FAA), and the Massachusetts Aeronautics Commission (MAC).

Airport Master Plan Update (AMPU) – The Sponsor's conceptual design for the long-term development of the Airport. A long-range business plan normally updated every 20 years for those airports in the NPIAS that outlines existing as well as future airport development.

Airport Reference Code (ARC) – A coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the Airport. It is comprised of a letter and number designation. The letter represents the approach category, which is based on an aircrafts' approach speed. The number designation represents the aircraft design group.

Airport Service Level – Classification of an airport based on its functional role. Service levels include Commercial Service, General Aviation and reliever Airport.

Approach Clear Zone – See clear zone.

Automatic Terminal Information System (ATIS) – Automatic continuous broadcast over a VHF radio frequency of weather and non-control information related to the airport.

Airside – The portion of an airport that contains the facilities necessary for the operation of aircraft. Used generically to include runways, taxiways, navigational aids, aircraft parking aprons, tie-downs, hangars and fuel farms within the airport environment.

Air Traffic Control Tower (ATCT) – A terminal facility that uses air/ground communication, visual signaling, and other devices to provide aircraft separation and guidance in the vicinity of the airport as well as authorize takeoff and landings.

Aircraft Parking Apron and Ramp – These terms are used synonymously and are defined as an airport surface area designated solely for the purpose of parking aircraft.

Approach Light Systems (ALS) – Provide visual guidance to pilots navigating an approach to a runway. Approach light systems may be precision or non-precision and may be in any one of several configurations.

Approach Surface – Described as an imaginary obstruction limiting surface defined in FAR Part 77, which is longitudinally centered on the extended runway centerline and extending outward and upward form the primary surface. The size of the approach surface is dependant on the type of instrument approach to a runway end.

Area of Critical Environmental Concern (ACEC) – Those areas within the Commonwealth of Massachusetts where unique clusters of natural and human resource values exist and which are worthy of a high level of concern and protection.

Automated Weather Observing Station (AWOS) – A system that collects weather data from sensors, and automatically formulates and distributes weather reports to airport control facilities.

Based Aircraft – An aircraft permanently stationed at an airport.

Capital Improvement Program (CIP) – List of projects determined to be eligible for federal and or state funding for typically a five year period.

Clear Zone – Formally, the inner portion of the runway approach zone, now called the Runway Protection Zone.

Commercial Service Airport – A public airport providing scheduled passenger service that enplanes at least 2,500 annual enplanements. A primary commercial service airport has more than 10,000 annual passenger boardings (enplanements).

Conical Surface – An imaginary obstruction limiting surface defined in FAR Part 77 that extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000'.

Critical Design Airplane – Category and class of airplane (as related to ARC) that utilizes, or is expected to utilize, the airport on a regular basis (500 or more operations per year).

Crosswind Runway/Secondary Runway – A runway at a multiple runway airport, which increases airport utilization during periods when crosswind conditions limit the primary runway use. The FAA recommends an evaluation for constructing a crosswind runway when the runway provides less than 95% wind coverage.

Department of Homeland Security (DHS) – The DHS has three primary missions: Prevent terrorist attacks within the United States, reduce America's vulnerability to terrorism, and minimize the damage from potential attacks and natural disasters.

Department of Environmental Management (DEM) – The DEM functions as Massachusetts' primary land management and natural resource planning agency.

Design Aircraft – The aircraft with the most critical ARC using, or expected to use the Airport.

Distance Measuring Equipment (DME) – A combination of air/ground navigational equipment that displays the slant range distance to a ground station from the aircraft.

Enplanements – The number of passengers boarding a departing aircraft at an airport.

Environmental Assessment (EA) – An FAA document evaluating impacts and mitigation measures taken for specific airport improvements.

Environmental Impact Report (EIR) – A MEPA document evaluating impacts and mitigation measures taken for specific airport improvements.

FAR Part 77 – The section of FAA regulations that relates to obstructions to air navigation.

Federal Aviation Administration (FAA) – United States Government agency responsible for the regulation and oversight of the National Airspace System and pilot and aircraft certification.

Fixed Base Operator (FBO) – The term for aviation related businesses on the airport that provide services fro aircraft or pilots, such as maintenance, painting, avionics installation, fuel sales, and flight training.

Fleet Mix – The proportion of aircraft types or models expected to operate at an airport.

General Aviation (GA) – That portion of civilian aviation that includes all types of activities except for certified Air Carrier operations by scheduled airlines.

Glide Slope – the vertical guidance component of an ILS.

Global Positioning System (GPS) – The GPS utilizes satellite coverage to aid pilots in navigation. Currently, GPS is approved for use in non-precision instrument approaches and it is expected that in the near future, GPS will be able to be used for precision approaches.

Ground Service Equipment (GSE) – Service equipment such as auxiliary power units, tractor tugs, and boarding ramps used to service aircraft while they are on the ground.

High Intensity Runway Lights (HIRL) – The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

Horizontal Surface – A horizontal plane situated 150' above the airport surface.

Interim Wellhead Protection Area (IWPA) – Defined as a 750' circle around a wellhead.

Instrument Approach Procedure (IAP) – Any approach to land at an airport while operating in IMC or under and IFR flight plan.

Instrument Flight Rules (IFR) – This set of flight rules applies when weather minimums fall below those specified under VFR (generally when visibility falls below 1 statute mile and cloud height below 1,000'). Pilots operating under IFR must be certified and maintain a certain level of proficiency to operate safely and within the law.

Instrument Landing System (ILS) – The ILS is a two-part system (glide slope and localizer) providing precision approach guidance to a specific runway end when both the glide slope and localizer are used together. Currently, it is the only approach aid that allows descent below 200' above the airport surface. The localizer may be used as a sole source for a non-precision instrument approach.

Instrument Meteorological Conditions (IMC) – Used to describe the set of weather minima that constitutes flight under Instrument Flight Rules (IFR).

Itinerant Operations - All aircraft arrivals and departures other than local operations.

Landside – Generally this term describes airport access roads, automobile parking areas and the airport terminal/administration building.

Limited Aviation Weather Reporting Station (LAWRS) – program in which an Air Traffic Controller augments missing or incorrect information should the airports weather reporting station malfunction.

Local Operations – Operations performed by aircraft which operate in the local traffic pattern or within sight of the airport; are known to be departing for or arriving from flight in a local practice area within a 20-mile radius of the airport; or execute simulated instrument approaches or low passes at the airport.

Localizer (LOC) – One of two parts to an ILS. The localizer provides lateral guidance to the runway and is considered a non-precision approach. When used in conjunction with a glide slope the approach procedure becomes a precision approach.

Maximum Gross Takeoff Weight (MGTOW) – The maximum weight of the aircraft at takeoff including fuel and passengers.

Massachusetts Aeronautics Commission (MAC) – State agency responsible for the regulation and oversight of the Massachusetts Airport System of General Aviation and Reliever Airports, with the exception of Logan, Hanscom and Worcester Airports.

Massachusetts Environmental Policy Act (MEPA) – This is a set of state environmental regulations used to evaluate development projects within the state.

Mean Sea Level (MSL) – Elevation in feet above the ocean.

Medium Intensity Approach Light System with Sequenced Flashers (MALSF) – An approach light system with sequenced flashing lights at the runway end that provide a means for the pilot to transition from instrument flight to visual flight.

Medium Intensity Runway Lighting System (MIRLs) – Lights that run along the sides of a runway that denote the runway pavement during night conditions.

Medium Intensity Taxiway Lighting (MITL) – Lights that run along the sides of a taxiway that denote the taxiway pavement during night conditions.

Middle Marker – Part of an ILS that defines a point along the glide slope normally at or near the point of decision height.

Minimum Descent Altitude (MDA) – The altitude given on an IAP that designates the lowest possible altitude a pilot may descend an aircraft to while following the given IAP.

National Plan of Integrated Airport Systems (NPIAS) – The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs. The plan summarizes development plans for public-use airports that are eligible for federal funding.

Navigational Aids (NAVAIDS) – Ground-based systems that allow a pilot to guide an aircraft to a specific point, usually a runway end.

Non-Directional Beacon (NDB) – Navigation aid that emits a low or medium frequency that a properly equipped aircraft and trained pilot can track and navigate by. When used as part of an instrument approach procedure, the NDB provides a non-precision approach to the airport.

Non-Precision Approach – An instrument approach procedure that provides only lateral guidance to the runway end.

Obstacle Free Zone (OFZ) – An imaginary object free area which is clear of object penetrations other than frangible NAVAIDS.

Operation – An aircraft arrival (landing) or departure (takeoff).

Precision Approach – An instrument approach procedure that provides lateral and vertical guidance to the runway end.

Precision Approach Path Indicator (PAPI) – Uses a single row of either two to four light units to provide vertical guidance to the runway end.

Primary Runway – Paved, gravel or turf surface designated solely for the purposes of takeoff and landing of aircraft that provides at least 95% wind coverage.

Primary Surface – A rectangular surface longitudinally centered on a runway. The primary surface extends 200' beyond the runway end for runways with a specially prepared hard surface.

Rotating Beacon – Displays alternative white and green flashes, indicating a civilian airport.

Runway End Identifier Lights (REILs) – Provides identification of the runway end by using a pair of synchronized flashing lights at the approach end of a runway.

Runway Object Free Area (ROFA) – The ROFA is rectangular in shape and is centered on the runway centerline. Its purpose is to provide a clear area between the runway centerline and parked airplanes and equipment shelters.

Runway Protection Zone (RPZ) – The RPZ is an imaginary surface that is trapezoidal in shape and it is located at each runway end. Its purpose is to provide for the protection of people and property on the ground in the event an aircraft over or undershoots the runway.

Runway Safety Area (RSA) – The RSA is an imaginary surface that is rectangular in shape. Its purpose is to provide a clear and graded surface to reduce the impact on property and aircraft in the event an aircraft departs the side or end of the runway for any reason.

Segmented Circle – A visual aid identifying the traffic pattern direction at the airport.

Small Aircraft Transportation System (SATS) – Government sponsored program that promotes the research and development of small aircraft to more effectively use the National Airspace System.

Snow Removal Equipment (SRE) – Equipment used for the removal of snow from airport surfaces. Typically this includes a pick-up truck with snowplow and loader with attachments.

Taxilane - A paved, gravel or turf surface that allows aircraft to move from a parking area to the active runway or other airport surface. Movement on the taxilane is not controlled.

Taxiway – A paved, gravel or turf surface that allows aircraft to move from a parking area to the active runway or other airport surface. Movement on the taxiway is controlled by the Air Traffic Control Tower if one is present.

Taxiway Safety Area (TSA) – The TSA is centered on the taxiway centerline and provides a clear and graded area capable of supporting the design aircraft, airfield maintenance equipment and Aircraft Rescue and Firefighting Equipment should it exit the taxiway.

Taxiway Object Free Area (TOFA) – The TOFA is centered on the taxiway centerline and provides an area free of obstructions and vehicles for taxiing aircraft.

Terminal Area Forecast (TAF) – Prepared by the FAA, the TAF projects historical airport operations through a 15-year forecast.

Transient Operations – An operation performed at an airport by an aircraft that is not based at the airport.

Transitional Surface – Extends outward and upward at right angles to the runway centerline and extended runway centerline at a slope of 7:1 from the sides of the primary and approach surfaces.

Vegetation Management Plan (VMP) – Airport plan to effectively manage vegetation at the airport.

Very Light Jets (VLJ) –A new breed of aircraft that incorporates lightweight jet engines with sophisticated technology.

Visibility Minimums – Indicate the minimum forward horizontal distance (in statute miles) from the cockpit that a pilot must be able to see, reported as statute miles, hundreds of feet, or meters.

Visual Approach – Type of approach to land at an airport while operating under IFR flight when conditions in the vicinity of the airport allow the pilot to see the airport visually. Weather at the airport must be reported as having a cloud ceiling greater than 1,000' and visibility greater than 3 miles.

Visual Flight Rules (VFR) – These are the rules of the sky for those pilots flying in good weather. Depending on the type of airspace (controlled or uncontrolled) generally good weather means visibility greater than 1 mile and clear of clouds during the day and 3 miles, clear of clouds at night.

Visual Meteorological Conditions (VMC)– Used to describe the set of weather minima that constitutes flight under VFR.

Wetlands Protection Act (WPA) – The Wetlands Protection Act is outlined in Chapter 131 s. 40 of the Massachusetts State Regulations. This act governs the alteration or impact on wetlands

within the state. The act specifically outlines the criteria for evaluating wetland impacts and potential mitigation measures that will need to be taken to address the alteration.

Wind Cone – Conical wind direction indicator.

APPENDIX 8

CCC DRI Application Elements

The following items are included in this Appendix:

1. Summary Table: CCC Minimum Performance Standards
2. Outline of DRI Application
3. CCC Staff Meeting Minutes

Appendix 8.1 Summary Table: CCC Minimum Performance Standards

CCC RPP Minimum Performance Standards Summary
Provincetown Municipal Airport - DRI
Prepared by: Horsley Witten Group, Inc.

CCC RPP MPS Number	Description	Regulatory Compliance
1	**Land Use/Growth Management**	
Keeping development consistent with the carrying capacity of Cape Cod's natural environment.		
1.1.1	Promote Growth/Activity Centers and Growth Incentive Zones.	N/A
1.1.2	Strip development not permitted.	N/A
1.1.3	Setbacks to encourage village style development.	N/A
1.1.4	Parking should reinforce character of existing buildings.	YES
Protect open space, minimize environmental and community impacts of growth, and promote compact development.		
1.2.1	Residential subdivisions shall be clustered.	N/A
1.2.2	Commercial subdivisions shall be clustered.	N/A
1.2.3	Direct development away from Significant Natural Resource Areas	N/A
Preserve and enhance rural land uses, including agriculture.		
1.3.1	Vegetated buffer requirements.	N/A
1.3.2	Minimize agricultural land impacts.	N/A
2	**Natural Resources**	
WATER RESOURCES		
Maintain quality and quantity of Cape Cod's water resources.		
2.1.1.1	No exceedence of 5 ppm N loading standard.	YES
2.1.1.2	All development and redevelopment shall comply with the Minimum Performance Standards outlined in the water resources classification system.	YES
Wellhead Protection Areas		
2.1.1.2.A.1	Maximum loading standard of 5 ppm Nitrogen.	N/A
2.1.1.2.A.2	Use, treatment, generation, storage, disposal of hazardous wastes or materials prohibited.	N/A
2.1.1.2.A.3	Public and private sewage or treatment facilities with flows greater than 10,000 gpd prohibited.	N/A
2.1.1.2.A.4	Uses prohibited in Zone IIs not permitted.	N/A
2.1.1.2.A.5	Adopt a turf and landscape management plan.	N/A
Freshwater Recharge Areas		
2.1.1.2.B.1	No subsurface disposal systems within 300 feet of maximum high water of freshwater ponds.	N/A
2.1.1.2.B.2	Delineate groundwater recharge areas to potentially affected freshwater ponds.	N/A
2.1.1.2.B.3	Public and private sewage treatment facilities may be used.	N/A
Marine Water Recharge Areas		
2.1.1.2.C.1	No exceedence of critical nitrogen loading standard, if determined.	N/A
2.1.1.2.C.2	Maintain or improve existing levels of nitrogen loading if existing watershed development exceeds identified critical loading standards.	N/A
2.1.1.2.C.3	Attain nitrogen loading limit in watershed nutrient management plan.	N/A
2.1.1.2.C.4	Public and private sewage treatment facilities may be used.	N/A
Impaired Areas		
2.1.1.2.D.1	Meet 5-ppm Nitrogen loading standard.	N/A
Water Quality Improvement Areas		
2.1.1.2.E.1	No exceedence of nitrogen loading standards for Wellhead Protection Areas or an identified marine water quality standard.	N/A
2.1.1.2.E.2	Public and private sewage treatment facility usage regulations.	N/A
2.1.1.2.E.3	Requirements for development within Growth/Activity Centers and Growth Incentive Zones within Water Quality Improvement Areas.	N/A
Potential Public Water Supply Areas		N/A
2.1.1.2.F.1	No development within 400 feet of identified future well site.	N/A
2.1.1.2.F.2	Maximum nitrogen loading standard shall be 1 ppm.	N/A
2.1.1.2.F.3	Standards A.2 and A.5 of Wellhead Protection Areas apply.	N/A
2.1.1.3	Private well impact assessment.	N/A
2.1.1.4	Conversion from seasonal to year-round use in A-zones or 100-ft from wetlands will demonstrate no adverse impacts on groundwater, adjacent surface water and wetlands.	N/A
2.1.1.5	Groundwater study required for water withdrawals >20,000 gallons per day.	N/A
Use public and private sewage treatment facilities in appropriate areas.		
2.1.2.1	Allowance for Private Sewage Treatment Facility (PSTF).	YES
2.1.2.2	Tertiary treatment required.	YES
2.1.2.3	PSTF density limitation.	YES
2.1.2.4	PSTF construction shall be consistent with municipal plans.	YES
2.1.2.5	No PSTFs in wetland resource areas.	YES
2.1.2.6	PSTF ownership and O&M requirements.	YES
2.1.2.7	Sludge disposal plans required.	YES
Provide adequate stormwater management and treatment.		
2.1.3.1	Direct discharge of untreated stormwater, parking-lot runoff, and/or wastewater into marine and fresh surface water and natural wetland prohibited.	YES
2.1.3.2	Stormwater managed and infiltrated on site.	YES
2.1.3.3	BMPs shall be used for treatment prior to infiltration.	YES
2.1.3.4	Structured detention basins, infiltration basins, and galleries may be used in Growth Incentive Zones.	N/A
2.1.3.5	Two-foot separation between maximum high water table and point of infiltration for Infiltration basins or other leaching structures.	N/A
2.1.3.6	Stormwater maintenance and operation plan required.	YES
2.1.3.7	In wellhead protection areas, mechanical shut-off valve used in stormwater systems for land uses with high risk of contaminating groundwater.	N/A
COASTAL RESOURCES		
Protect public and traditional maritime interests in the coast.		
2.2.1.1	Coastline development shall not interfere with existing public access to shoreline.	N/A
2.2.1.2	Public access provided at all publicly funded beach-nourishment sites.	N/A
Limit development in areas subject to coastal storm flow.		
2.2.2.1	No development in FEMA flood V-zones.	YES
2.2.2.2	Regulations for development in FEMA A-zones.	NO
2.2.2.3	No development or redevelopment on barrier beaches or coastal dunes.	NO
2.2.2.4	No new non-water-dependent development within 100 feet of top of a coastal bank, dune crest or beach.	YES
2.2.2.5	Regulations for fire, storm damage in FEMA-A- and V-zones, on barrier beaches, coastal banks and dunes.	N/A
2.2.2.6	No new public infrastructure or expansion of infrastructure in flood hazard zones.	YES
2.2.2.7	No increase in existing site elevations that would displace or otherwise change flows within land subject to coastal storm flow.	YES
2.2.2.8	No impeding the landward migration of resource areas within the 100-year floodplain.	YES
2.2.2.9	No development within the V-zone of a beach, dune, barrier beach or coastal bank.	YES
2.2.2.10	Permitted activities in areas subject to coastal storm flow.	N/A
2.2.2.11	Monitoring/maintenance plans required when placing dredged material on public or private beaches.	N/A
2.2.2.12	Dredge material should be used for nourishment on public beaches subject to erosion.	N/A

* This table only summarizes MPSs and does not include "Other Developmental Review Policies" as detailed in the CCC RPP.

Updated 12/4/2008

CCC RPP Minimum Performance Standards Summary
Provincetown Municipal Airport - DRI
Prepared by: Horsley Witten Group, Inc.

CCC RPP MPS Number	Description	Regulatory Compliance
2.2.2.13	Regulations for alternative flood reduction practices in historic areas.	N/A
Maintain and improve coastal water quality for shellfishing and swimming.		
2.2.3.1	Mounded septic systems in FEMA V-zones prohibited.	N/A
2.2.3.2	Discharge of untreated stormwater into coastal waters or wetlands prohibited.	YES
2.2.3.3	Stormwater management systems proposed in V-zones incorporate historic rate of relative sea-level rise in Massachusetts.	N/A
2.2.3.4	Community docks and piers required in place of separate structures for individual lots.	N/A
2.2.3.5	Marinas required to have boat sewage pump-out facilities and restrooms.	N/A
2.2.3.6	New dredging prohibited.	N/A
2.2.3.7	No adverse impacts to eelgrass beds.	N/A
2.2.3.8	Minimal direct and secondary impacts to fish, shellfish, and crustaceans.	N/A
2.2.3.9	Regulations for projects proposed as maintenance dredging.	N/A
2.2.3.10	Coastal aquaculture facilities should not impact water quality or chemical composition and habitat value of marine sediment.	N/A
2.2.3.11	Maintain 100-foot buffer for coastal wetlands and/or landward of the mean high water mark.	NO
WETLANDS		
Preserve and protect quality and quantity of inland and coastal wetlands.		
2.3.1.1	Wetland alteration prohibited.	NO
2.3.1.2	Maintain 100-foot buffers from edge of wetland.	NO
2.3.1.3	Disturbance of wetlands and buffers for operation and maintenance of utility lines may occur.	N/A
2.3.1.4	No discharge of untreated stormwater into natural wetlands and water bodies.	YES
WILDLIFE AND PLANT HABITAT		
Prevent loss or degradation of critical wildlife and plant habitat.		
2.4.1.1	Natural Resources Inventory required when altering undeveloped areas.	YES
2.4.1.2	Minimize clearing vegetation and alteration of natural topography.	YES
2.4.1.3	Minimize fragmentation of wildlife and plant habitat.	YES
2.4.1.4	Natural Heritage Program will review DRIs in critical wildlife and plant habitat areas.	YES
2.4.1.5	350-foot buffer around vernal pool or wetland-dependant rare species habitat.	NO
2.4.1.6	Management and restoration plan for invasive plant species identified in natural resources inventory.	YES
OPEN SPACE PROTECTION AND RECREATION (Not Applicable - Municipal Entity)		N/A
Preserve and enhance availability of open space.		
2.5.1.1	Clustered development and continuous corridors in Significant Natural Resource Areas.	N/A
2.5.1.2	Open space should be contiguous and with permanent conservation restrictions.	N/A
2.5.1.3	Permanently restricted upland open space requirements.	N/A
2.5.1.4	Open space requirements for redevelopment.	N/A
2.5.1.5	Protect significant natural and fragile areas.	N/A
2.5.1.6	Prevent adverse impacts to adjacent lands held for conservation and preservation purposes and maximize contiguous open space.	N/A
2.5.1.7	Open space requirements reduced in Growth Incentive Zones.	N/A
2.5.1.8	Open space credit offered for projects with below-building parking or multi-storied parking garages.	N/A
Preserve and enhance opportunities for passive and active recreation in the natural environment.		
2.5.2.1	Recreational needs identified in state, regional, and local recreation plans should be addressed.	N/A
2.5.2.2	Provide suitable recreation and play areas for residents of development.	N/A
AIR QUALITY		
Maintain and improve air quality.		
2.6.1.1	Compliance with Massachusetts State Implementation Plan (SIP) and DEP's Air Pollution Control Regulations, 310 CMR 7.00.	NO
3	**Economic Development**	
Encourage businesses compatible with Cape Cod's environmental, cultural and economic strengths.		
3.1.1	Economic data required for commercial and industrial development.	N/A
Locate Development to preserve Cape Cod's environmental and cultural heritage.		
3.2.1	Incentives to encourage development in certified Growth/Activity Centers.	N/A
3.2.2	If not proposing to locate in Growth/Activity Center, must justify why.	N/A
4	**Community Facilities and Services**	
TRANSPORTATION		
Maintain an acceptable level of safety on all Cape Cod roads.		
4.1.1.1	Maintain safety for pedestrians, bicyclists, or motor vehicles operators or passengers.	YES
4.1.1.2	Analysis of crashes and potential safety impacts.	N/A
4.1.1.3	Regulations for access and egress locations.	YES
4.1.1.4	No direct access or egress onto Route 6 in Bourne, Eastham, Wellfleet, Truro, or Provincetown.	N/A
4.1.1.5	Signage, utility poles and boxes and lighting located to minimize visual obstruction.	YES
4.1.1.6	Site planning and access/egress should minimize impacts on adjacent road system.	YES
4.1.1.7	Meet sight distances at all access/egress locations.	YES
4.1.1.8	Safety mitigation shall occur prior to occupancy.	N/A
4.1.1.9	Width of driveway and/or curb-cut openings shall not exceed Massachusetts Highway Department design standards.	N/A
4.1.1.10	Trip-generation data sources utilized.	YES
Reduce/offset increase of motor vehicle trips and dependency on automobiles.		
4.1.2.1	If not located in Growth Incentive Zones, reduce and/or offset 25% of the expected increase in summer site traffic.	YES
4.1.2.2	In Growth Incentive Zones, reduce and/or offset 12.5% of the expected increase in summer site traffic.	N/A
4.1.2.3	Requirements for reduction in estimated traffic increases on adjacent streets.	N/A
4.1.2.4	Trip-reduction credit granted for development with bus service.	N/A
4.1.2.5	Accommodate needs of bicyclists, pedestrians, and other non-automobile users.	YES
4.1.2.6	Maximum number of parking spaces shall be no more than minimum required under zoning.	YES
4.1.2.7	Strategies for meeting trip-reduction requirements.	N/A
4.1.2.8	Reduction in trip generation allowed for purpose of meeting MPS 4.1.3.4.	N/A
Maintain travel times/level of service on regional roads and intersections, ensure community character on historic/scenic resources.		
4.1.3.1	Regional road system for Cape Cod includes all roads with a functional classification higher than local roads.	N/A
4.1.3.2	Level of Service analysis required at all access/egress points onto regional road system.	YES
4.1.3.3	May reduce estimated trip generation by 10% in Growth/Activity Centers, and 25% in Growth Incentive Zones.	N/A
4.1.3.4	Perform Level of Service analysis and provide for full mitigation of project impacts on all regional road links.	N/A
4.1.3.5	Turn restrictions at intersections or directional flow restrictions on regional road links not allowed.	N/A
4.1.3.6	Traffic signals located at intersections of public roads.	N/A
4.1.3.7	Development must not require road widening within 5 years after completion.	N/A
4.1.3.8	Road widening and new traffic signals shall include bicycle and pedestrian accommodation.	N/A

* This table only summarizes MPSs and does not include "Other Developmental Review Policies" as detailed in the CCC RPP.

Updated 12/4/2008

CCC RPP Minimum Performance Standards Summary
Provincetown Municipal Airport - DRI
Prepared by: Horsley Witten Group, Inc.

CCC RPP MPS Number	Description	Regulatory Compliance
4.1.3.9	Transportation rights-of-way shall be preserved.	N/A
4.1.3.10	Road widening limited to that which is necessary based on average year-round traffic conditions.	N/A
4.1.3.11	Capacity of limited-access highways shall be maintained, but not increased.	N/A
4.1.3.12	Road and intersection widening shall be consistent with local and regional plans.	N/A
4.1.3.13	Road and intersection widening or new traffic signals shall be consistent with community character.	N/A
4.1.3.14	Traffic recording devices included in road widening, intersection signals and other roadway alterations.	N/A
4.1.3.15	Parking to serve travel to Martha's Vineyard and Nantucket consistent with Regional Transportation Plan.	N/A
SOLID WASTE MANAGEMENT		
Use integrated solid waste management systems, divert 40% of municipal solid waste from incinerators and landfills.		
4.2.1.1	Address both construction and post-construction phases.	YES
4.2.1.2	Written notification requirements when generating construction/demolition debris.	YES
4.2.1.3	Provide locations for collection, storage, and removal of recyclable materials.	YES
HAZARDOUS MATERIALS AND WASTE MANAGEMENT		
Dispose of Cape household hazardous waste in an environmentally friendly manner.		
4.3.1.1	Minimize use of hazardous materials.	YES
4.3.1.2	Comply with Massachusetts Hazardous Waste Regulations.	YES
4.3.1.3	No development that involves the use of hazardous materials allowed within Wellhead Protection Areas.	N/A
4.3.1.4	Prepare emergency response plan.	YES
CAPITAL FACILITIES AND INFRASTRUCTURE		
Provide state-of-the-art community/ regional facilities that are consistent with goals of local comprehensive plans, RPP, and Capewide Regional		
4.4.1.1	Approval based on existing infrastructure and system capacity.	N/A
4.4.1.2	Analysis required for new infrastructure.	N/A
4.4.1.3	Privately provided infrastructure shall be consistent with Local Comprehensive Plan.	N/A
Encourage telecommunication infrastructure to promote economic development, telecommuting, and preservation of the visual character of the Cape.		
4.4.2.1	New wireless telecommunication facilities shall be located on existing structures.	N/A
ENERGY		
Encourage energy conservation and improved energy efficiency		
4.5.1.1	New utility lines required to be underground.	N/A
4.5.1.2	Energy-saving transportation encouraged.	YES
5	**Affordable Housing**	
Promote fair, decent, safe, affordable housing for rental or purchase for present and future Cape residents.		
5.1.1	Provide at least 10% of proposed residential units as affordable for development/redevelopment projects of 10 units or more.	N/A
5.1.2	Provide at least 10% of proposed residential units as affordable for subdivision projects of 10 lots or more.	N/A
5.1.3	Demonstrate that off-site lots are buildable and/or units habitable.	N/A
5.1.4	Locate units or lots resulting from Performance Standards 5.1.1 and 5.1.2 in the town where the DRI is located.	N/A
5.1.5	Initiate affordable housing contributions upon conveyance of subdivision lots or issuance of building permits.	N/A
5.1.6	Develop on-site affordable housing at a rate/time frame determined by the Commission.	N/A
5.1.7	Use deed restrictions that require the units to remain affordable in perpetuity.	N/A
5.1.8	Integrate affordable housing units with the rest of the development.	N/A
5.1.9	Type, bedroom composition, and unit size of the affordable housing units is subject to the area's priority housing needs.	N/A
5.1.10	Submit a marketing plan describing marketing to potential residents.	N/A
5.1.11	Demonstrate that the occupants are income-eligible prior to occupancy.	N/A
5.1.12	Round all numbers calculating affordable housing contribution to the highest whole figure.	N/A
5.1.13	Prohibition of projects resulting in the reduction of noncondemned residential units.	N/A
5.1.14	An act of dislocating existing residents is subject to the Federal Uniform Relocation Act.	N/A
Promote equal opportunity in housing and give special consideration to the needs of most vulnerable segments of the Cape's population.		
5.2.1	Prevent discrimination in housing.	N/A
5.2.2	Provide at least 10% or one unit as legally accessible handicapped units.	N/A
Provide and encourage the development of innovative strategies to address Cape housing needs.		
5.3.1	Provide an analysis of affordable housing needs generated by the project.	N/A
5.3.2	Make provisions for employee housing for projects with high need of seasonal employees.	N/A
6	**Heritage Preservation/Community Character**	
Protect and preserve the important historic and cultural features of the Cape landscape and built environment.		
6.1.1	Preserve Historic Structures.	N/A
6.1.2	Preserve Historic and Cultural Landscapes.	YES
6.1.3	Maintain/Enhance Archaeological and/or National Register Sites.	N/A
Encourage redevelopment as an alternative to new construction to respect traditions and distinctive character of historic village centers.		
6.2.1	Preserve Village Boundaries.	N/A
6.2.2	Preserve character of existing local and regional roadways.	YES
6.2.3	Preserve distinctive features of scenic roads.	YES
6.2.4	Development adjacent to/within historic districts retains the distinctive features of the neighborhood.	YES
6.2.5	Restrictions of building footprints (new development footprint shall not exceed 15,000 sq. ft./ redevelopment shall not exceed 50,000).	N/A
6.2.6	Allowance of nontraditional materials and forms in industrial parks and areas not visible from roadways.	N/A
6.2.7	Building and layout of parking lots shall reinforce the character of existing buildings and traditional village streetscapes.	YES
6.2.8	Provide adequate buffers between parking areas and the street in strip-redevelopment.	N/A
6.2.9	Implementation of a landscaping plan, maintenance of existing vegetation in buffer areas.	YES
6.2.10	Compliance with Exterior Lighting Design Standards, Technical Bulletin 95-001.	YES
6.2.11	Prohibition of billboards, offsite advertising, and internally lit or flashing signs.	YES
6.2.12	Place utilities underground except in the presence of natural features.	YES

* This table only summarizes MPSs and does not include "Other Developmental Review Policies" as detailed in the CCC RPP.

Updated 12/4/2008

Appendix 8.2 Outline of DRI Application

Cape Cod Commission Development of Regional Impact Elements

DRI OUTLINE

DRI Cover Letter

DRI Application Cover Sheet and Attachments
- Certified Abutters List
- Required Filing Fee – Fee Exempt
- USGS Topographic Map

Application Checklists
- Attachment 1 – DRI Application Checklist
- Attachment 3 – Hardship Exemption Application Checklist
- Attachment 6 – Request for Joint MEPA/DRI Review

Distribution List
Project Notification Form
Certification of Local Filing
Project Narrative
Regional Policy Plan Minimum Performance Standards
Hardship Exemption Request
Proposed Mitigation Measures
Supporting Studies, Reports, And Information

Appendix 8.3 CCC Staff Meeting Minutes

JACOBS™

Memorandum

343 Congress Street
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Date **November 3, 2008**

To File E2X32200

From Maryann Magner

Subject October 30, 2008 Traffic Meeting with CCC Staff

At the request of Jacobs, a meeting was held at the Cape Cod Commission's office on October 30, 2008 to discuss the traffic/parking review for the DRI for the Provincetown Airport CIP projects.

The following attended:

Martha Hevenor, CCC Planner and Project Manager
Glenn Cannon, CCC Transportation Engineer
Andy Arseneault, Jacobs Transportation Engineer
Maryann Magner, Jacobs, Environmental Planner

Earlier in the week, Jacobs had emailed three documents to Martha. These were the Traffic Operations and Parking Analysis, the Supplemental Parking Study, and the Transportation RPP MPS Applicability and Compliance Document.

Glenn stated that he had not had a chance to read the documents since they were only able to open them yesterday. Glenn also mentioned that he was not familiar with the Airport or the CIP projects. Using one of the figures from the EIR, Maryann gave an overview of the Airport facilities, and the proposed projects.

Maryann explained that there were three questions: 1). Does CCC agree with the trip generation methodology, 2). Does CCC agree with the study area, and 3) Does CCC agree that the projects are in compliance with the applicable transportation MPS as discussed in the Compliance Documentation submitted, or will additional information be needed for the DRI. Maryann explained that it is expected that the traffic studies will satisfy the MEPA Scope.

Glenn said that he would have to read the reports before he could give us an opinion. A few specific traffic items were then discussed. Glenn asked how the trip generation was calculated and Andy referred to Table 4 and the supplemental memorandum in the report appendix. Based on this analysis the trip increases ranged from 4 to 8 vehicles during the peak periods. Glenn asked why we were showing any increase in traffic volumes since we were not increasing capacity. Andy responded that trips were estimated in order to conform to the minimal trip increases reported in the 2005 Master Plan. Glenn asked if there were any safety deficiencies that anyone was aware of; Maryann, Martha and Andy were not aware of any. Glenn again reiterated that he would review the reports prior to forming an opinion.

After the discussion on the traffic study, there was a general discussion on parking. Maryann mentioned that NPS has questioned the rationale behind the proposed increase in parking capacity. The different seasonal use of the lot was discussed. In the winter there is more long term parking. The difficulty in managing a fee system with a small staff, the logistics of sharing the NPS visitor parking lot, and other TDM/TSM measures were discussed. It was pointed out that the Airport has

recently installed a free phone to call taxis and the shuttle since there is poor cell phone service at the Airport. Glenn mentioned that CCC would not require a parking fee but that other TDM measures may be considered, such as signage for designated long term parking. Glenn asked if the taxi companies have vans since this is considered a TDM measure. Maryann stated that the Airport was willing to incorporate TDM measures but that few seemed feasible for this specific Airport.

Martha said that CCC typically contacts the Town to find out if they support the project and would also consider comments from NPS. Maryann gave Martha a copy of the July 2008 NPS comment letter.

Glenn said that he would give us his comments in writing. Martha reinforced the desire for issues to be resolved at the staff level, prior to going before the sub-committee and full Commission.

Maryann said that Mike Garrity would contact Glenn to arrange a tour of the Airport.