Appendix 2 – Aeronautical Survey Guidance and Specifications

Section 2-1: Airport Reference Point Computation

Compute the Airport Reference Point (ARP) using the centerline end positions of all usable runways based on the ultimate configuration of the airport. However, since runways without specially prepared hard surfaces are most often not required to be surveyed, the ARP position for these airports will be approximate. The ARP will be tagged with the year of the most recent runway end survey used in the ARP computation, such as, "ARP (1995)".

The Airport Reference Point (ARP) is the approximate geometric center of all usable runways based on the ultimate configuration for the airport. The ARP position computation is somewhat similar to a center of mass computation, except that only two dimensions are considered. The following section identifies how to compute the ARP.

ARP Computation Methodology

The datums used in the computations are normally selected as the lowest absolute value latitude and longitude coordinates, respectively, of all runway ends used in the computation. This convention eliminates computing with negative moments.

ARP_{LAT} = Latitude Datum + (Sum of Runway Moments about the Latitude Datum/Sum of Runway Lengths)

ARP_{LON} = Longitude Datum + (Sum of Runway Moments about the Longitude Datum/Sum of Runway Lengths)

Runway Moment about the Latitude Datum = Runway Ground Length times the Distance in Seconds between the approximate Runway Center Point* and the Latitude Datum

Runway Moment about the Longitude Datum = Runway Ground Length times the Distance in Seconds between the approximate Runway Center Point* and the Longitude Datum

Runway Coordinates must be entered as absolute values.

Runway Lengths must be entered as Ground Length, rounded to the nearest whole foot.

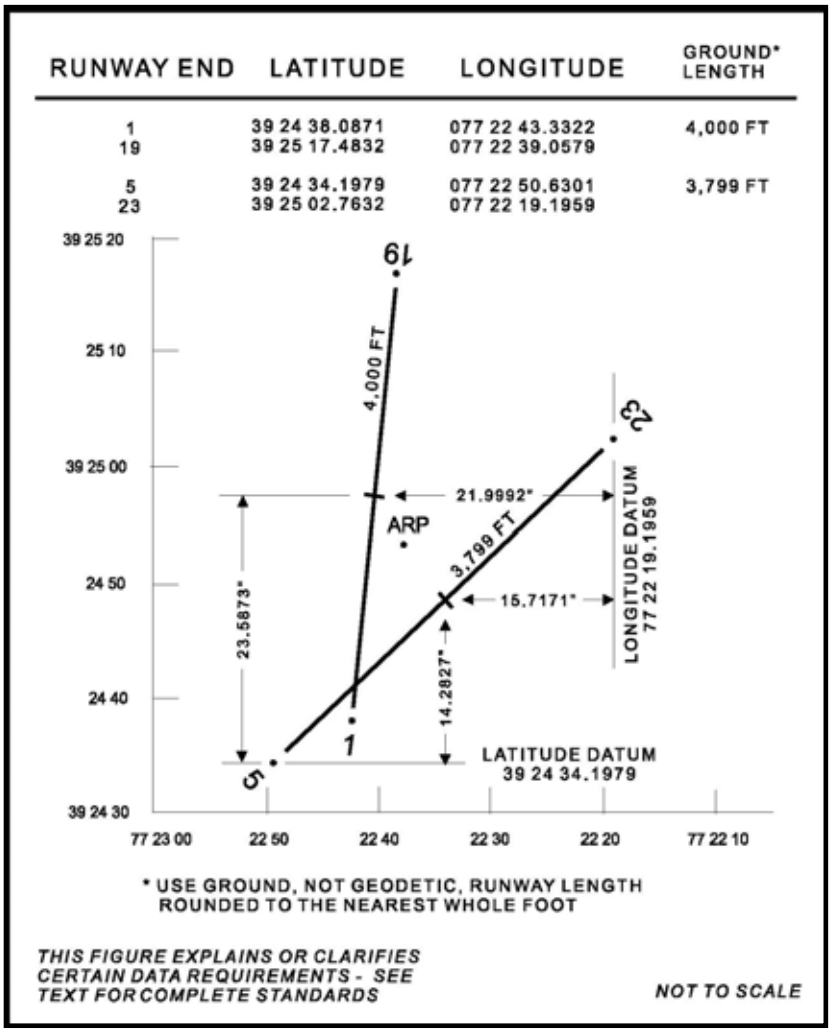
*** The approximate Runway Center Point is the mean of the Latitudes and Longitudes of a Runway's Ends. This convention eliminates the need for complex geodetic formulas to compute the precise Runway Center Point, thus allowing simple and consistent ARP computations after only brief instructions.**

A Sample ARP Computation follows (See Figure 2.1 of this appendix):
Approximate Runway Center Pts:

RWY 1/19 LAT = 39 24 57.7852
LON = 77 22 41.1951
RWY 5/23 LAT = 39 24 48.4806
LON = 77 22 34.9130

ARP_{LAT} = 39 24 34.1979 + (4,000 FT (23.5873 SEC) + 3,799 FT (14.2827 SEC))/7,799 FT
= 39 24 34.1979 + 19.0549 SEC
= 39 24 53.3
ARP_{LON} = 77 22 19.1959 + (4,000 FT (21.9992 SEC) + 3,799 FT (15.7171 SEC))/7,799 FT
= 77 22 19.1959 + 18.9391 SEC
= 77 22 38.1

APPENDIX 2 FIGURE 2.1
AIRPORT REFERENCE POINT COMPUTATION



Section 2-2: Suggested Data Collection Forms

FORM NAME	Blank	Page	Example	Page
FACILITIES ABSTRACT	Y		Y	
FACILITIES ABSTRACT (Continuation Sheet)	Y		N	
AIRPORT FIELD SURVEY CHECK LIST (General)	Y		Y	
AOC CHECKLIST	Y		Y	
ANA CHECKLIST	Y		Y	
RUNWAY DATA SHEET	Y		Y	
FIELD SURVEY SKETCH	Y		N	
KINEMATIC GPS OBSERVATION LOG	Y		Y	

(For the GPS log for static observations, see http://www.ngs.noaa.gov/PROJECTS/GPSmanual/data.htm#obslog, click on A-4. Observation Log: “Blank Form” or “Sample Entries”.

Contractors may use company-developed forms containing the same data elements and “look and feel” of the forms listed above. The NGS versions of the forms can be accessed from the Airport Surveying-GIS website (see http://airports-gis.faa.gov/airport/surveyors_intro.htm) by selecting “Download NGS Forms”.

U.S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

PAGE OF PAGES

FACILITIES ABSTRACT

AERONAUTICAL SURVEY PROGRAM

O.C. NUMBER

AIRPORT NAME	CITY	STATE
CHIEF OF PARTY	PARTY NUMBER	DATE

INSTRUCTIONS

Under Facility, indicate specific runway served or facility identifier, whichever is applicable

FACILITY	FACILITY INDICATED ON	HORIZONTAL FILE	VERTICAL FILE	REMARKS
1. ATCT				
2. APBN				
3. GS				
4. LOC				
5. DME				
6. IM				
7. MM--LMM				
8. OM--LOM				
9. NDB				
10. VOR/DME				
11. VORTAC - TACAN				
12. ASR - ARSR				
13. APP LTS				
14. REIL				
15. VASI - PAPI - (Other)				
16. Other (Specify)				

U. S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION				PAGE OF
FACILITIES ABSTRACT CONTINUATION SHEET AERONAUTICAL SURVEY PROGRAM				O.C. NUMBER
AIRPORT NAME		CITY		STATE
INSTRUCTIONS Under Facility, indicate specific runway served or facility identifier, whichever is applicable				
FACILITY	FACILITY LOCATED ON	HORIZONTAL FILE	VERTICAL FILE	REMARKS
1. GS				
2. LOC				
3. DME				
4. IM				
5. MM-LMM				
6. OM-LOM				
7 APP LTS				
8. REIL				
9. VASI-PAPI-(Other)				
10. Other (Specify)				
1. GS				
2. LOC				
3. DME				
4. IM				
5. MM-LMM				
6. OM-LOM				
7 APP LTS				
8. REIL				
9. VASI-PAPI-(Other)				
10. Other (Specify)				

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION — NATIONAL GEODETIC SURVEY

Airport Field Survey Check List

OC NUMBER

AIRPORT NAME	CITY	STATE
PARTY CHIEF	START DATE	END DATE

Check each item. Place an "X" or "NA" (not applicable) after each item to designate all requirements have been met.
Place an "*" after any item requiring more explanation and explain in field report.

Data Collection Printout	1.	All field observation printouts checked for correct input and all manual input checked	
	2.	All notes properly cross referenced and all rejected values noted	
	3.	Positions computed for observed objects	
	4.	Azimuth checks within acceptable allowance	
	5.	Sketch for observations (if needed)	
	6.	Field forms edited (if needed)	
GPS Control	7.	GPS observation times correct for type of observation (position = 15 min & vertical = 30 min)	
	8.	GPS log sheets properly filled out	
	9.	GPSurvey computations meet all requirements and have been checked for correct input and output	
	10.	3-D Inverses computed for PACS to SACS check and for runway lenths	
Leveling	11.	All third-order control level printouts checked for correct input and closure for length of line	
	12.	ATCT cab floor elevation determined (if necessary)	
	13.	Master GPN file edited for correct base elevations	
NAVAIDs	14.	Positions computed for facilities located by conventional methods	
	15.	Facilities directly observed by GPS methods entered into Master GPN List	
Obstructions	16.	Elevations determined for all traverse ways (if necessary) and vehicle height allowance added	
	17.	All 200 ft AGL obstructions have base elevations field determined or noted to be determined by	
	18.	Obstruction lighted objects noted	
	19.	Obstructing pole lines and fence lines inked on the photos. Catenary computed if obstructing	
	20.	Baseline observations tied to local control, sketches submitted, and computations check for adequate	
	21.	Items on field plot sheet properly annotated	
	22.	Mobile crane working limits delineated on photo	
Miscellaneous	23.	Field report proof read and checked for content concerning non-standard items mentioned in project	
	24.	All sketches have north arrows	
	25.	New runway ends and displaced thresholds sketched	
	26.	Taxiway and ramp delineation inked on photo and new areas & hangars sketched with dimensions	
	27.	Photoidentified control points sketched and inked on photo	
	28.	Final master GPN printouts annotated and cross-referenced where needed	

AOC OBSTRUCTION CHECKLIST

Revised Version: 09/04/2002

AIRPORT_____ OC/AL#_____ RWY ____/___

CITY_____ STATE_____ DATE _____

Complete a checklist for each runway; complete Item #5 for the Low-numbered End only. Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the Obstruction Identification Surface, "object" shall mean an item that does not *necessarily* penetrate the OIS. Use "NA" for "Not Applicable".

"L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft. Refer to FAA405 Section 6.4 for clarification of requirements.

		Low-numbered End	High-numbered End
1. Highest object in the first 2000 ft. of approach		_____	_____
2. Most penetrating obstruction in the first 2,000 ft. of approach		_____	_____
3. Highest obstruction in the first	10,000 ft. of approach	_____	_____
	20,000 ft. of approach	_____	_____
	30,000 ft. of approach	_____	_____
	40,000 ft. of approach	_____	_____
	entire approach	_____	_____
4. Highest obstruction in primary outward from the runway end		_____	_____

		L	R
5. Highest obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	_____	_____
	3,000 - 6,000	_____	_____
	6,000 - 9,000	_____	_____
	9,000 - 12,000	_____	_____
Highest non-manmade obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	_____	_____
	3,000 - 6,000	_____	_____
	6,000 - 9,000	_____	_____
	9,000 -12,000	_____	_____
Highest obstruction in each 3000 ft. section of transition from primary to Horizontal	0 - 3,000	_____	_____
	3,000 - 6,000	_____	_____
	6,000 - 9,000	_____	_____
	9,000 -12,000	_____	_____

	L	R	L	R
6. Highest obstruction in each transition from approach to Horizontal	_____	_____	_____	_____
7. Highest obstruction in each approach transition in the first 20,000 ft. beyond the Horizontal	_____	_____	_____	_____
8. Highest obstruction in each approach transition beyond the Horizontal	_____	_____	_____	_____

9. Highest obstruction in either the Horizontal or Conical area in each quadrant (centered on ARP position).	(NE)	(SE)	(SW)	(NW)
	_____	_____	_____	_____

IMPORTANT NOTES:

Obstruction representation within each obstructing area must include the highest obstruction in the area and the highest obstruction within that portion of the area that penetrates an approach or primary surface.
Remember to check for any ***200' AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS*** and any ***VESSELS.***

ANA OBSTRUCTION CHECKLIST

Revised Version: 11/03/2006

(Based on FAA Publication 405, including the April 1998 changes)

AIRPORT_____ OC/AL #_____ RWY APP_____

CITY _____ STATE_____ DATE_____

Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the OIS, "object" shall mean an item that does not *necessarily* penetrate the OIS."L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft.

APPROACH AND TRANSITIONS:

		APP	LEFT TRANS	RIGHT TRANS
1) Two most penetrating ***OBSTRUCTIONS*** in the first 2566 ft.	#1	_____		
	#2	_____		
2) Most penetrating ***MAN-MADE OBSTRUCTION*** in the first 2566 ft.		_____		
3) Two highest ***OBJECTS*** in first 2566 ft. (These must be higher than threshold.)	#1	_____		
	#2	_____		
4) Two highest ***OBSTRUCTIONS*** in first 2566 ft.			#1 _____	#1 _____
			#2 _____	#2 _____
5) The highest **OBSTRUCTION** between 2566 ft. and 10,000 ft.		_____		
6) The highest ***OBSTRUCTION*** in the first 10,000 ft.			_____	_____
7)	20,000 ft.	_____	_____	_____
8)	30,000 ft	_____	_____	_____
9)	40,000 ft	_____	_____	_____
10) The highest ***OBSTRUCTION*** in the approach or transition area		_____	_____	_____

PRIMARY:

11) The highest ***OBSTRUCTION*** on the approach side of the threshold _____

12) If approach is CAT II or CAT III, the highest ***OBSTRUCTION*** each side of C/L in the primary between thresholds _____

MISSED APPROACH:

	LEFT	RIGHT
13) The highest ***OBSTRUCTION*** each side of runway C/L or C/L extended	_____	_____
14) The most penetrating ***OBSTRUCTION*** each side of runway C/L or C/L extended	_____	_____

NOTE: Remember to check for any ***200 AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS***, and any ***VESSELS***.

U.S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Revised Version : 1/23/2001

RUNWAY DATA SHEET

AIRPORT OBSTRUCTION CHART PROGRAM

O.C. NUMBER	DATE

AIRPORT NAME	NAME AND TITLE OF PERSON INTERVIEWED
	MAILING ADDRESS
CITY / STATE / OFFICE PHONE	

ALL DIMENSIONS SHALL BE SHOWN TO NEAREST FOOT
(if any dimension has changed, show both the published and re-surveyed dimension)

RUNWAY	WIDTH		LENGTH		DISPLACED LENGTH		STOPWAY LENGTH		BLAST PAD LENGTH	
	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV

CHIEF OF PARTY	PARTY NUMBER

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATOMOSPHERIC ADMINIST
NATIONAL GEODETIC SURVEY

FILE/NUMBER	OC	PAGE OF
PHOTO NUMBER		DATE

FIELD SURVEY SKETCH

AIRPORT NAME	STATE

SUBJECT

REVISION DATE: NOVEMBER 7, 2000
Last Modified
11/02/2000

KINEMATIC OBSERVATION LOG

Operator Name:	UTC Date:	Day of Year:	Airport ID:
Airport Name / Location: State:			Observation Agency:
Project Name:		Task Number:	Project Number:
GPS Receiver: Manufacturer: Model: P/N#: S/N#	GPS Antenna: Manufacturer: Model: P/N#: S/N#	Tripod Type: Manufacturer: Model: Cable Length: _____ M	Recording Interval: Sec PAC Station (4-Char ID)

STOP AND GO DATA

	File Name: Start Time:	File Name: Start Time:	
4-Char ID: (Point ID)	Station Name:	Recorded Epochs Stop & Go # 1	Recorded Epochs Stop & Go # 2	Antenna Heights (meters) Note Changes

PROFILE DATA

File Name:	Antenna Height (M)	Initialization Point	Initialization Location: Runway (R), Other (Explain)

REMARKS: Measurements required at beginning of each profile run. Note changes as needed. Use separate form for each day.
Antenna constants are 22020-00 & 33429.00 = 0.0625 14532-00 = 0.069

Pole height (- tip) _____ + Wheel height _____ + Antenna const _____ = Antenna height _____

U.S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION — PAGE 1 OF 1 PAGES

FACILITIES ABSTRACT
AERONAUTICAL SURVEY PROGRAM

O.C. NUMBER: 5081

AIRPORT NAME	CITY	STATE
SIERRA VISTA MUNICIPAL AIRPORT- LIBBY AAF	SIERRA VISTA	AZ

CHIEF OF PARTY	PARTY NUMBER	DATE
D. L. ADAMS	80	14 JUNE 2000

INSTRUCTIONS
Under Facility, indicate specific runway served of facility identifier, whichever is applicable

FACILITY		FACILITY INDICATED ON	HORIZONTAL FILE	VERTICAL FILE	REMARKS
1. ATCT		OC-5081			POSITION VERIFIED BY PT NEW TOP ELEVATON
2. APBN		OC-5081			VERIFIED BY PT
3. GS	26	OC-5081			VERIFIED BY PT POS. & BASE ELEV UPDATED
4. LOC	26	OC-5081			VERIFIED BY PT POS. & BASE ELEV UPDATED
5. DME					N/A
6. IM					N/A
7. MM--LMM					N/A
8. OM--LOM					N/A
9. NDB	DAO	OC-5081			NEW THIS SURVEY
10. VOR	FHU	OC-5081			VERIFIED BY PT POSITION UPDATED
11. TACAN	ARH	OC-5081			VERIFIED BY PT POSITION UPDATED
12. ASR	FHU	OC-5081			VERIFIED BY PT POSITION UPDATED
13. APP LTS					N/A
14. REIL	12		HV 5		NEW THIS SURVEY
15. VASI - PAPI - (Other)	12 & 30	RATIO 0962			NEW THIS SURVEY PHOTO IDENTIFIED
16. Other (Specify)					
REIL	26	RATIO 0962			NEW THIS SURVEY PHOTO IDENTIFIED
VASI	8	OC-5081			VERIFIED BY PT
VASI	26	RATIO 0962			NEW THIS SURVEY PHOTO IDENTIFIED

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION — NATIONAL GEODETIC SURVEY

Airport Field Survey Check List

OC NUMBER: 6807

AIRPORT NAME	CITY	STATE
NAMPA MUNICIPAL AIRPORT	NAMPA	ID

PARTY CHIEF	START DATE	END DATE
JIM HARRINGTON	JULY 15 1997	JULY 21 1997

Check each item. Place an "X" or "NA" (not applicable) after each item to designate all requirements have been met.
Place an "*" after any item requiring more explanation and explain in field report.

Data Collection Printout	1. All field observation printouts checked for correct input and all manual input checked	X
	2. All notes properly cross referenced and all rejected values noted	X
	3. Positions computed for observed objects	X
	4. Azimuth checks within acceptable allowance	X
	5. Sketch for observations (if needed)	X
	6. Field forms edited (if needed)	X
GPS Control	7. GPS observation times correct for type of observation (position = 15 min & vertical = 30 min)	X
	8. GPS log sheets properly filled out	X
	9. GPSurvey computations meet all requirements and have been checked for correct input and output	X
	10. 3-D Inverses computed for PACS to SACS check and for runway lenths	X
Leveling	11. All third-order control level printouts checked for correct input and closure for length of line	X
	12. ATCT cab floor elevation determined (if necessary)	X
	13. Master GPN file edited for correct base elevations	X
NAVAIDs	14. Positions computed for facilities located by conventional methods	X
	15. Facilities directly observed by GPS methods entered into Master GPN List	X
Obstructions	16. Elevations determined for all traverse ways (if necessary) and vehicle height allowance added	X
	17. All 200 ft AGL obstructions have base elevations field determined or noted to be determined by	NA
	18. Obstruction lighted objects noted	X
	19. Obstructing pole lines and fence lines inked on the photos. Catenary computed if obstructing	X
	20. Baseline observations tied to local control, sketches submitted, and computations check for adequate	X
	21. Items on field plot sheet properly annotated	X
	22. Mobile crane working limits delineated on photo	X
Miscellaneous	23. Field report proof read and checked for content concerning non-standard items mentioned in project	X
	24. All sketches have north arrows	X
	25. New runway ends and displaced thresholds sketched	X
	26. Taxiway and ramp delineation inked on photo and new areas & hangars sketched with dimensions	X
	27. Photoidentified control points sketched and inked on photo	X
	28. Final master GPN printouts annotated and cross-referenced where needed	X

AOC OBSTRUCTION CHECKLIST

Revised Version: 09/04/2002

AIRPORT Fort Wayne International Airport OC/AL# 156 RWY 5 / 23

CITY Fort Wayne STATE IN DATE 07/13/2002

Complete a checklist for each runway; complete Item #5 for the Low-numbered End only. Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the Obstruction Identification Surface, "object" shall mean an item that does not *necessarily* penetrate the OIS. Use "NA" for "Not Applicable".

"L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft. Refer to FAA405 Section 6.4 for clarification of requirements.

		Low-numbered End 5	High-numbered End 23
1. Highest object in the first 2000 ft. of approach		NONE	429
2. Most penetrating obstruction in the first 2,000 ft. of approach		NONE	428
3. Highest obstruction in the first	10,000 ft. of approach	NONE	428
	20,000 ft. of approach	NONE	NA
	30,000 ft. of approach	NONE	NA
	40,000 ft. of approach	NONE	NA
	entire approach	NONE	428
4. Highest obstruction in primary outward from the runway end		NONE	458

		L	R
5. Highest obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	325	NONE
	3,000 - 6,000	NONE	309
	6,000 - 9,000	NONE	399
	9,000 - 12,000	NONE	458
Highest non-manmade obstruction in each 3000 ft. section of primary along each side of each runway	0 - 3,000	NONE	NONE
	3,000 - 6,000	NONE	309
	6,000 - 9,000	NONE	399
	9,000 -12,000	NONE	NONE
Highest obstruction in each 3000 ft. section of transition from primary to Horizontal	0 - 3,000	NONE	374
	3,000 - 6,000	NONE	394
	6,000 - 9,000	NONE	393
	9,000 -12,000	NONE	458

	L	R	L	R
6. Highest obstruction in each transition from approach to Horizontal	NONE	NONE	NONE	NONE
7. Highest obstruction in each approach transition in the first 20,000 ft. beyond the Horizontal	NONE	NONE	NA	NA
8. Highest obstruction in each approach transition beyond the Horizontal	NONE	NONE	NA	NA

9. Highest obstruction in either the Horizontal or Conical area in each quadrant (centered on ARP position).

NONE (NE) NONE (SE) NONE (SW) NONE (NW)

IMPORTANT NOTES:

Obstruction representation within each obstructing area must include the highest obstruction in the area and the highest obstruction within that portion of the area that penetrates an approach or primary surface.
Remember to check for any ***200' AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS*** and any ***VESSELS.***

ANA OBSTRUCTION CHECKLIST

Revised Version: 11/03/2000

(Based on FAA Publication 405, including the April 1998 changes)

AIRPORT RONALD REAGAN WASHINGTON NATIONAL AIRPORT OC/AL # 443 RWY APP 15

CITY WASHINGTON D.C. STATE D.C. DATE 6/10/1999

Write the obstruction number in the blank for each entry; if you have investigated thoroughly and there are no qualifying obstructions or objects, write "NONE" in the blank. For the purposes of this document, "obstruction" shall mean an item that *penetrates* the OIS, "object" shall mean an item that does not *necessarily* penetrate the OIS."L" (LEFT) OR "R" (RIGHT) is relative to an observer facing forward in a landing aircraft.

APPROACH AND TRANSITIONS:

		APP	LEFT TRANS	RIGHT TRANS
1) Two most penetrating ***OBSTRUCTIONS*** in the first 2566 ft.	#1	#323		
	#2	#460		
2) Most penetrating ***MAN-MADE OBSTRUCTION*** in the first 2566 ft.		#323		
3) Two highest ***OBJECTS*** in first 2566 ft. (These must be higher than threshold.)	#1	#323		
	#2	#463		
4) Two highest ***OBSTRUCTIONS*** in first 2566 ft.	#1		#323	#490
	#2		#486	#384
5) The highest **OBSTRUCTION** between 2566 ft. and 10,000 ft.		#500		
6) The highest ***OBSTRUCTION*** in the first 10,000 ft.			#330	#490
7)	20,000 ft.	#500	#330	#490
8)	30,000 ft	#500	#330	#490
9)	40,000 ft	#500	#330	#490
10) The highest ***OBSTRUCTION*** in the approach or transition area		#500	#330	#490

PRIMARY:

11) The highest ***OBSTRUCTION*** on the approach side of the threshold: #449

12) If approach is CAT II or CAT III, the highest ***OBSTRUCTION*** each side of C/L in the primary between thresholds: NONE

MISSED APPROACH:

	LEFT	RIGHT
13) The highest ***OBSTRUCTION*** each side of runway C/L or C/L extended	#487	#481
14) The most penetrating ***OBSTRUCTION*** each side of runway C/L or C/L extended	#487	#383

NOTE: Remember to check for any ***200 AGL OBSTRUCTIONS***, any ***MOBILE OBSTRUCTIONS***, and any ***VESSELS***.

U.S. DEPARTMENT OF COMMERCE — NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Revised Version : 12/1/2000

RUNWAY DATA SHEET

AIRPORT OBSTRUCTION CHART PROGRAM

O.C. NUMBER: OC-6807

DATE: 21 JULY 1997

AIRPORT NAME: NAMPA MUNICIPAL AIPORT

NAME AND TITLE OF PERSON INTERVIEWED: Mr. Jo Smith, AIRPORT MANAGER

MAILING ADDRESS: 001 MUNICIPAL DR, NAMPA, IDAHO 83687

CITY: NAMPA | STATE: ID | OFFICE PHONE: (000) 500-0000

ALL DIMENSIONS SHALL BE SHOWN TO NEAREST FOOT
(if any dimension has changed, show both the published and re-surveyed dimension)

RUNWAY	WIDTH		LENGTH		DISPLACED LENGTH		STOPWAY LENGTH		BLAST PAD LENGTH	
	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV	PUB	SURV
11	75	75	4050	5000	N/A	N/A	N/A	N/A	N/A	N/A
29					N/A	N/A	N/A	N/A	N/A	N/A

CHIEF OF PARTY: JIM HARRINGTON

PARTY NUMBER: 80

KINEMATIC OBSERVATION LOG

Operator Name:	UTC Date:	Day of Year:	Airport ID:
JDR	2001-02-01	032	TOA

Airport Name / Location: Zamperini Field Airport
State: CA

Observation Agency: NGS

Project Name: Zamperini Field Airport

Task Number: RK6C0400

Project Number:

GPS Receiver:	GPS Antenna:	Tripod Type:	Recording Interval:
Manufacturer: TRIMBLE Model: 4000 SSI P/N#: 24840-01 S/N#: 3933A26432	Manufacturer: TRIMBLE Model: Micro Centered L1/L2 P/N#: 33429-00 S/N#: 02201721 64	Manufacturer: SECO Model: 5115 Cable Length: 10 M	6 Sec PAC Station (4-Char ID): TORA

STOP AND GO DATA

	File Name: SA63-032-3	File Name: SA64-032-1
	Start Time: 1706	Start Time: 1820

4-Char ID: (Point ID)	Station Name:	Recorded Epochs				Antenna Heights (meters) Note Changes
		Stop & Go #3		Stop & Go #4		
R29L	TOA CL END RWY 29L	1	60	1	60	2.063
R11R	TOA CL END RWY 11R	2	60	2	60	2.063
TOAB	TOA AP STA B	3	120	3	120	2.063

PROFILE DATA

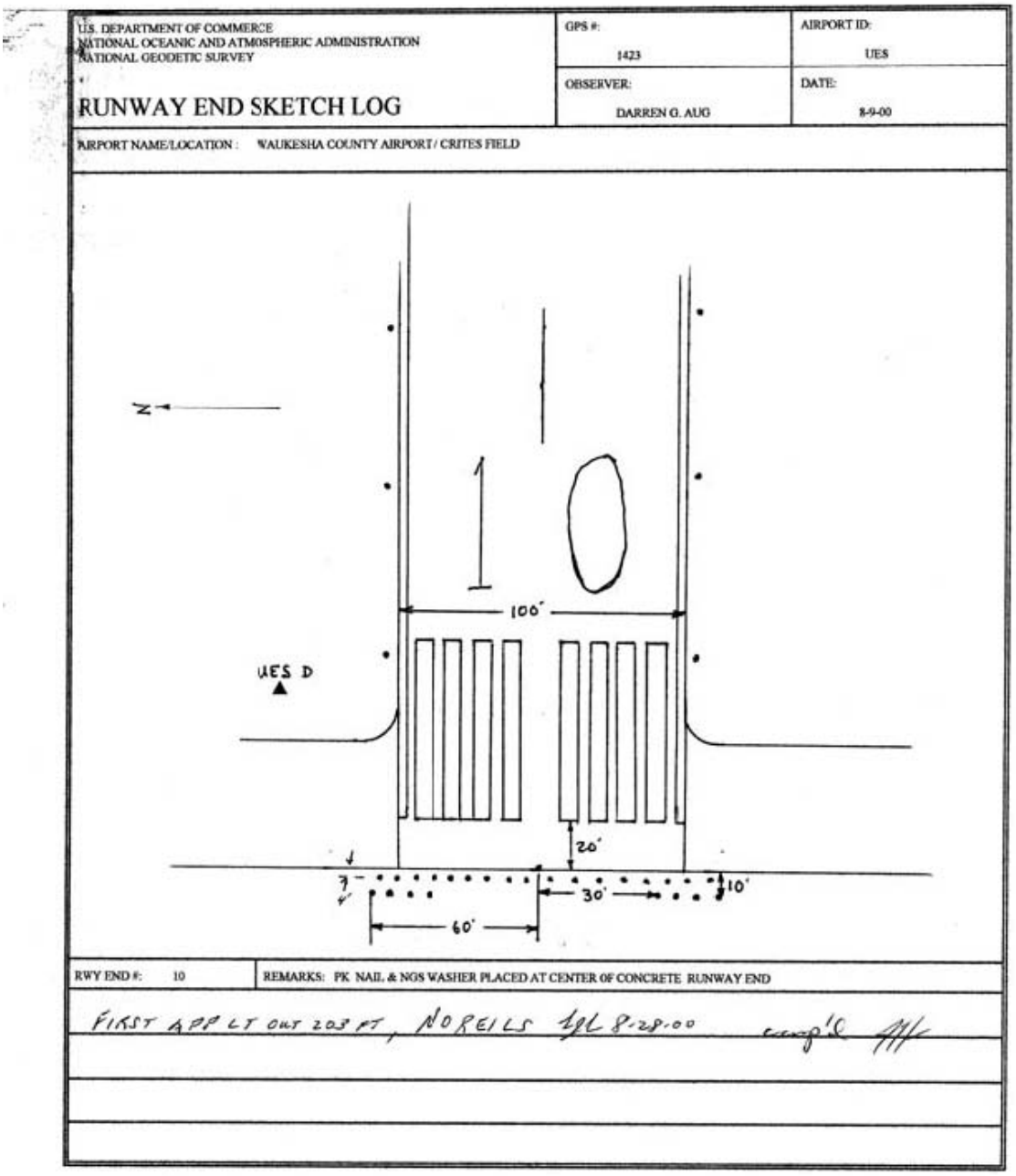
File Name:	Antenna Height (M)	Initialization Point	Initialization Location: Runway (R), Other (Explain)
P29L-032-1	2.565	INI3	(R)
P11R-032-1	2.565	INI4	(R)

REMARKS: Measurements required at beginning of each profile run. Note changes as needed. Use separate form for each day.
Antenna constants are 33001-00-R 33429-00 = 0.0625 14532-00 = 0.063

2.000
- .088
1.912

Pole height (- tip) 1.912 + Wheel height 0.590 + Antenna const 0.063 = Antenna height 2.565

Section 2-3: Sample Airport Sketches



U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

GPS #:	AIRPORT ID:
1423	UES
OBSERVER: DARREN G. AUG	DATE: 8-9-00

AIRPORT NAME/LOCATION : WAUKESHA COUNTY AIRPORT / CRITES FIELD

RWY END #: 10

REMARKS: PK NAIL & NGS WASHER PLACED AT CENTER OF CONCRETE RUNWAY END

FIRST APP LT OUT 203 FT, NO REILS tgl 8-28-00 comp'd

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

GPS #: 1201

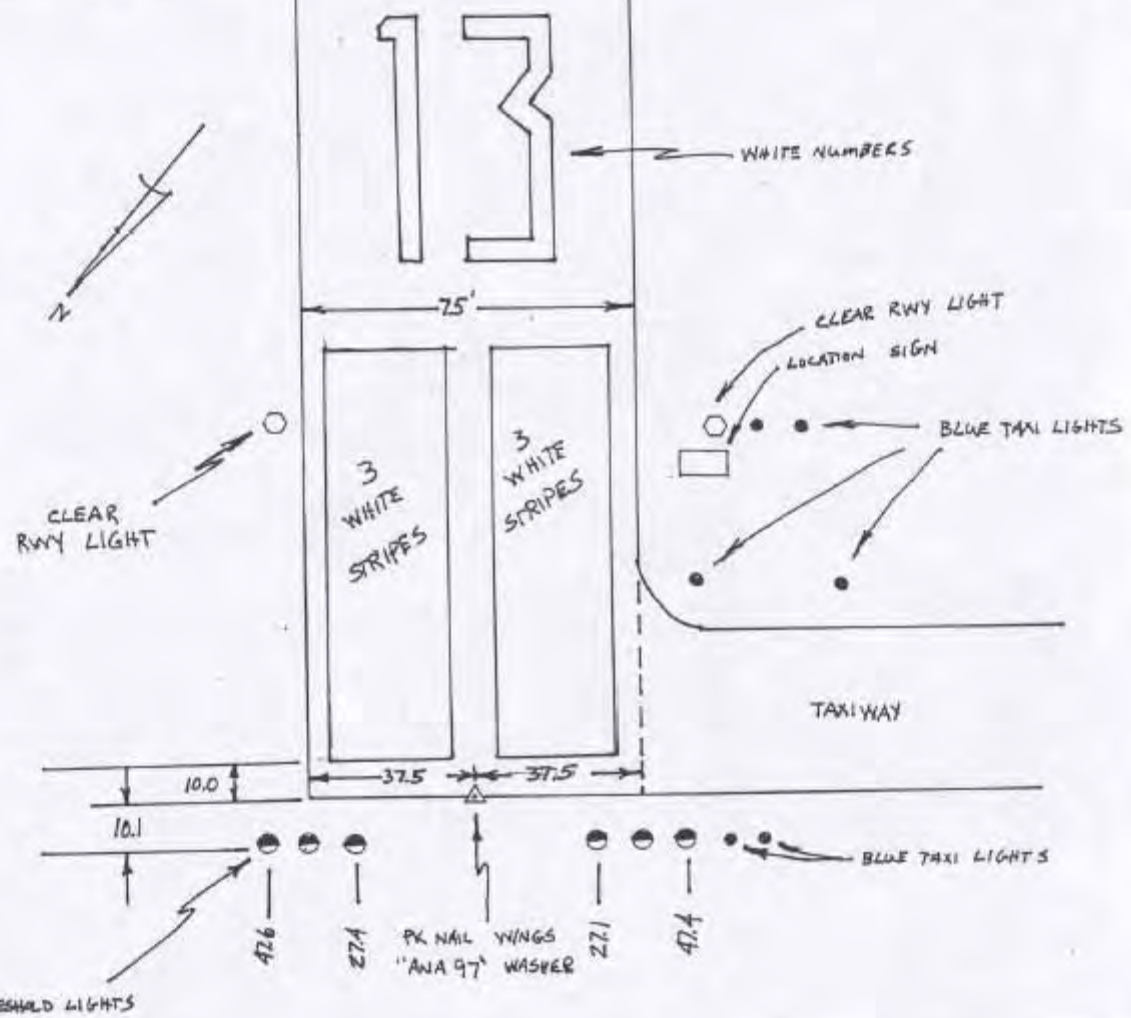
AIRPORT ID: EAR

OBSERVER: SML

DATE: 7-23-97

RUNWAY END SKETCH LOG

AIRPORT NAME/LOCATION: KEARNEY MUNICIPAL AIP
KEARNEY, NE.



RWY END #: 13

REMARKS: PK NAIL WITH NGS WASHER STAMPED "ANA 97" CEMENTED IN DRILL HOLE IN CONCRETE.

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

GPS #: 1170

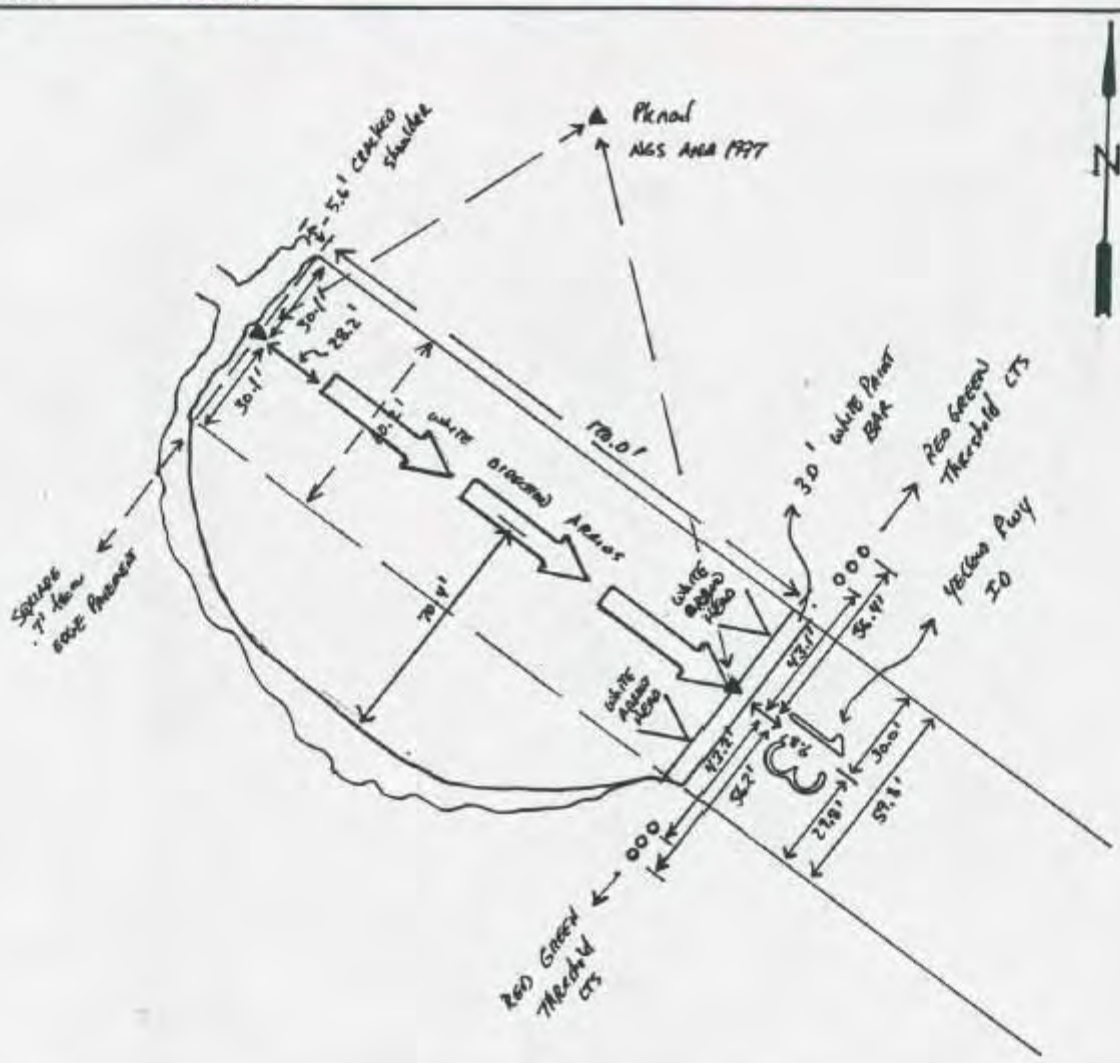
AIRPORT ID: 730

RUNWAY END SKETCH LOG

OBSERVER: E. Duvall

DATE: 14 MAR 97

AIRPORT NAME/LOCATION : Frio County Airport / McKinley Field, Pearsall, TX
TASK NUMBER : RK6C0400



RWY END #: 13

REMARKS: Pk nail with NGS washer Stamped AHA 1997

Asphalt Condition = Good

30 Ft' x 60'

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

GPS #: 1170

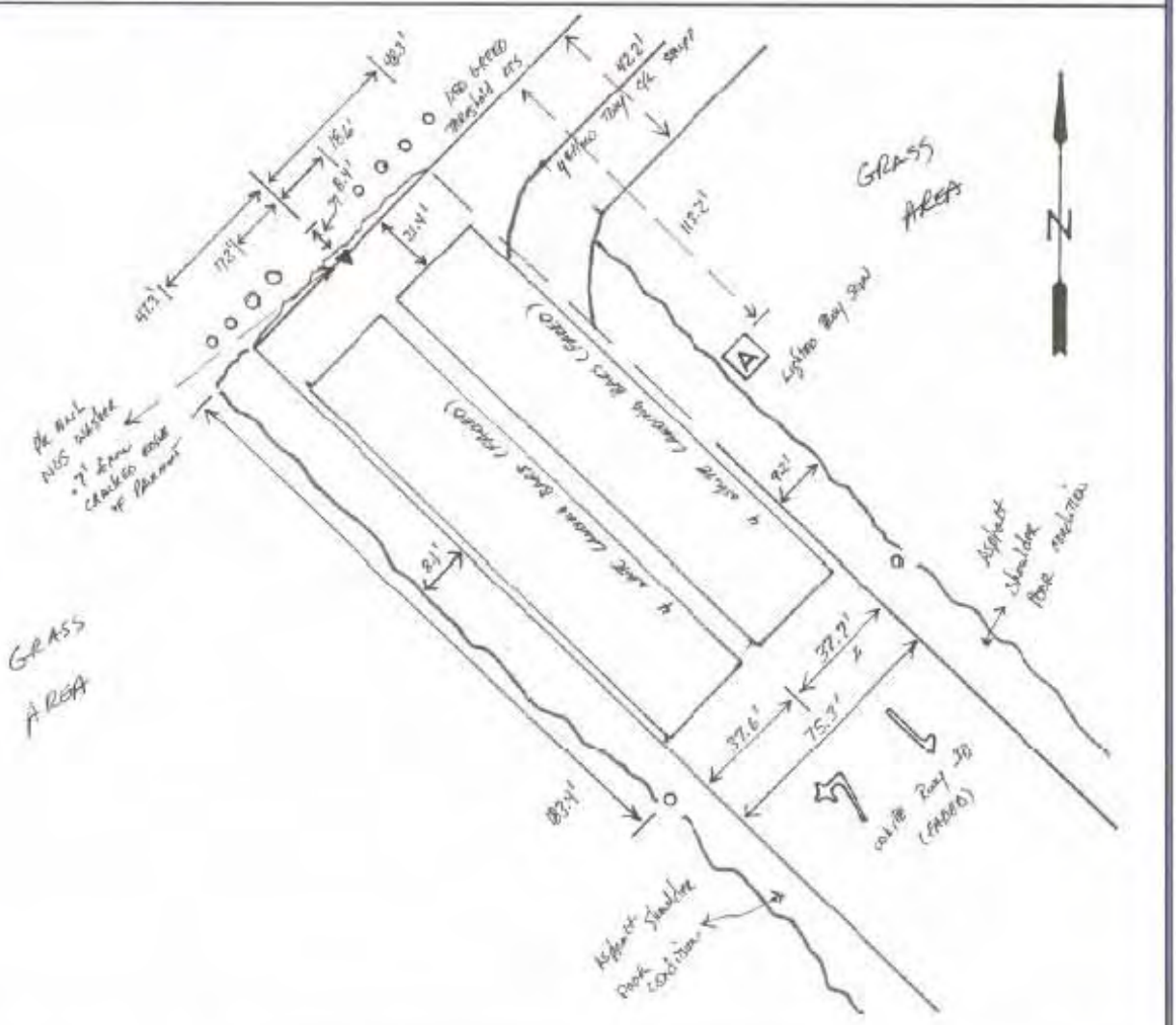
AIRPORT ID: T82

RUNWAY END SKETCH LOG

OBSERVER: E. Duvall

DATE: 14 MAR 97

AIRPORT NAME/LOCATION: FREDERICKSBURG / GILLESPIE County Airport, FREDERICKSBURG, TX
TASK NUMBER: RK6C0400



RWY END #: 14

REMARKS:

Pk Nail with NGS washer

Asphalt Runway in fair condition

4600' x 75'

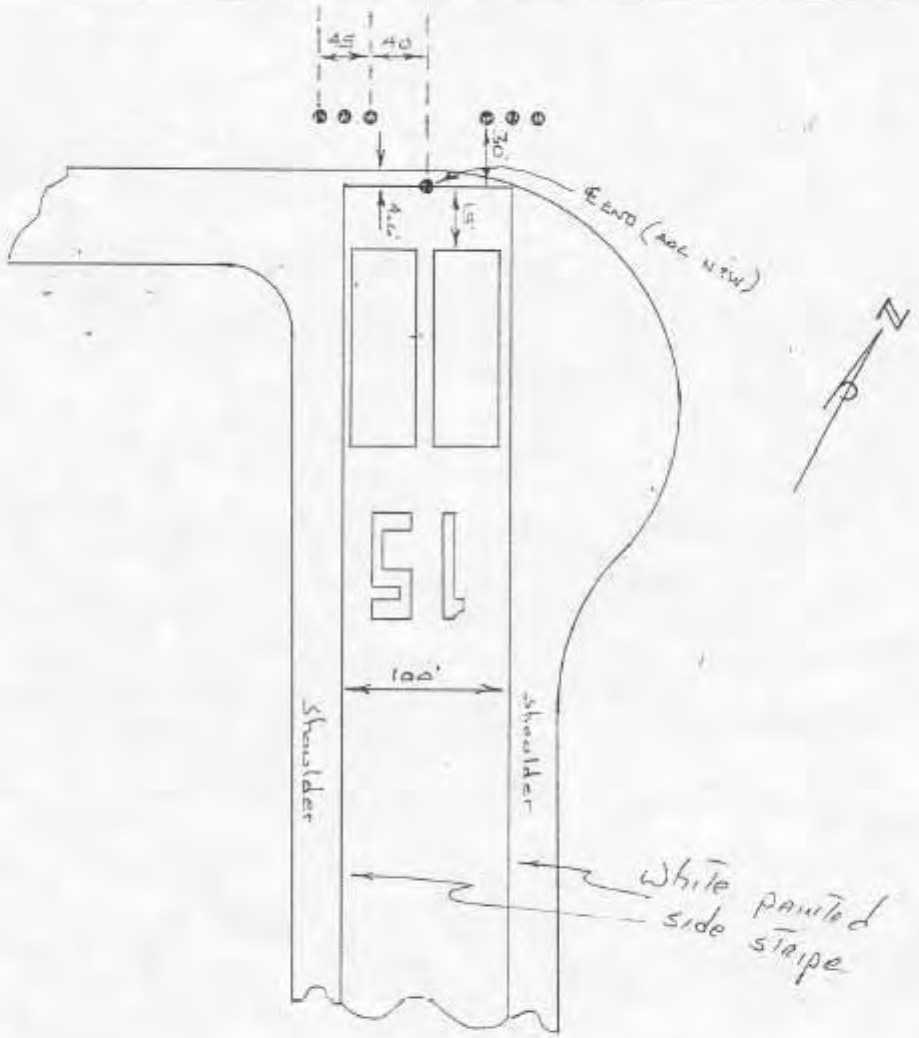
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

FILE / NUMBER: 448
PHOTO NUMBER:
PAGE OF
DATE: 2/98

FIELD SURVEY SKETCH

AIRPORT NAME: West Palm Beach County Park
STATE: FL

RUNWAY END 15

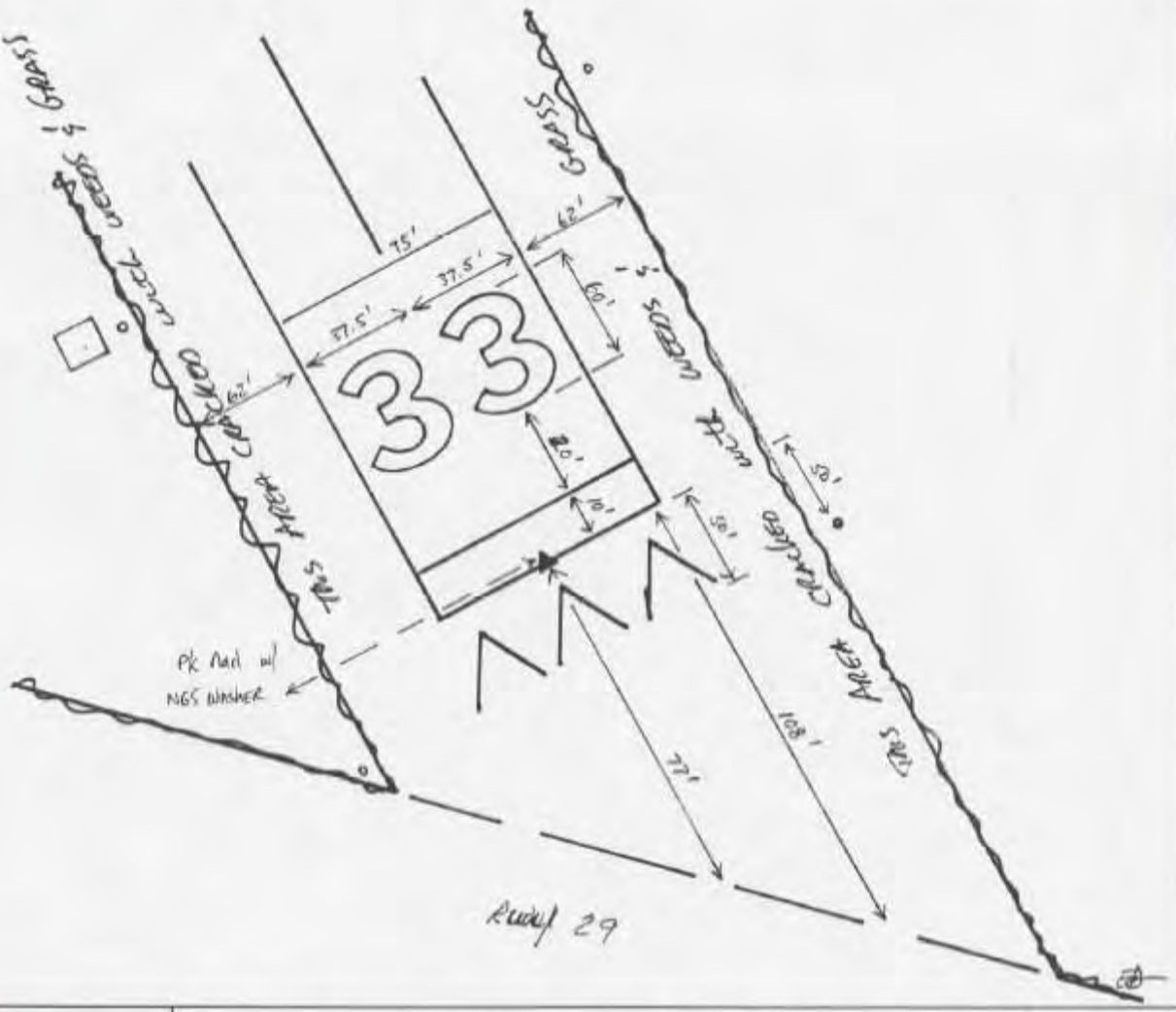


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

RUNWAY END SKETCH LOG

GPS #:	AIRPORT ID:
999	34J
OBSERVER: E. Duvall	DATE: 29 March 96

AIRPORT NAME/LOCATION: New Smyrna Beach Municipal Airport, New Smyrna Beach, Fla.



RWY END #: 33	REMARKS: The runway end is set on the centerline at the outboard edge of point bar.

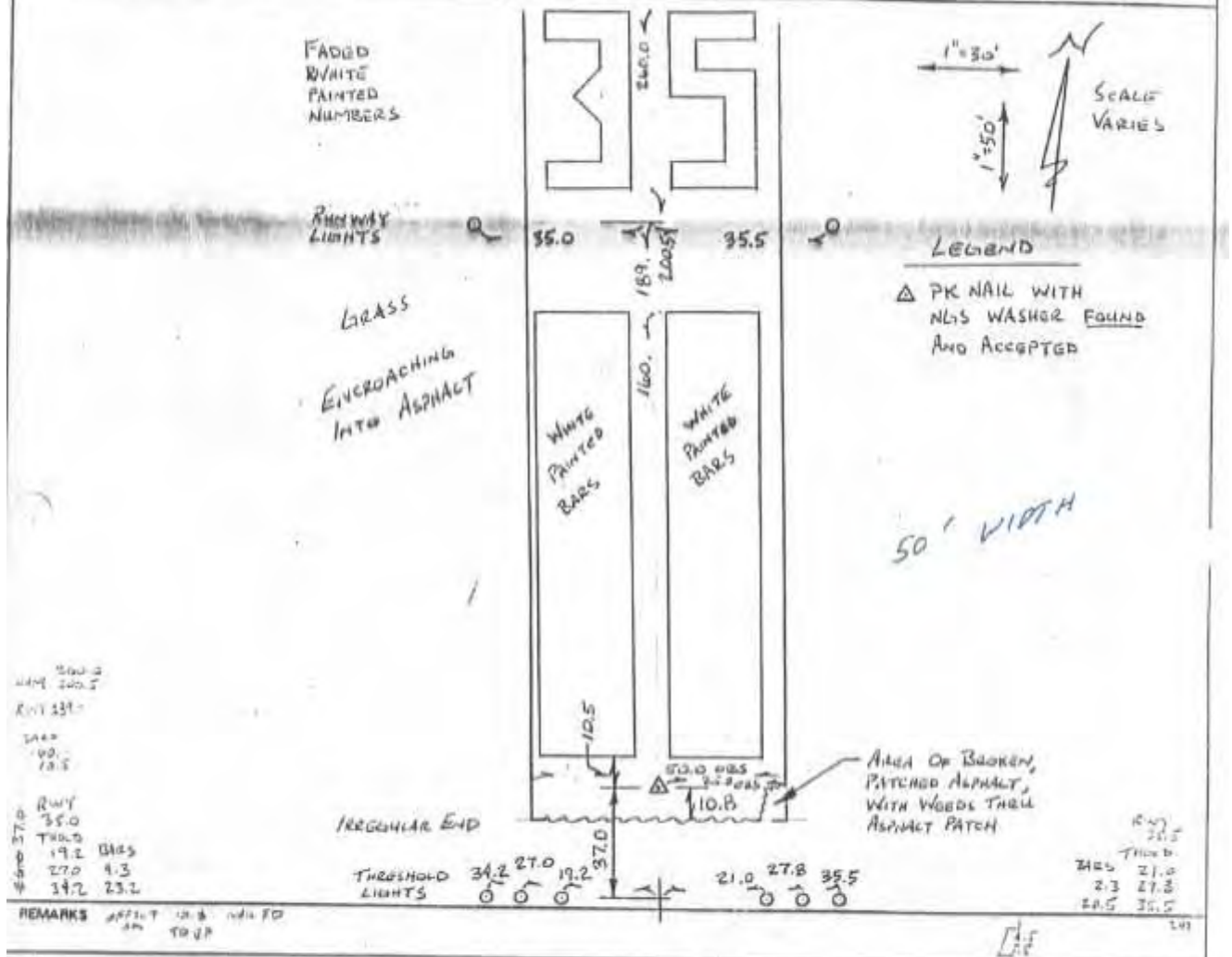
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

VOLUME/PAGE | OC | Page of
PHOTO | DATE MMDDYY 07-25-95

FIELD SURVEYS SKETCH

AIRPORT: DAN E. RICHARDS MUNICIPAL AIRPORT | STATE: TX

SUBJECT: TEXAS WAAS/AP's SURVEY DATUM TIES



REMARKS

SEE PROPOSED CONSTRUCTION NOTES FOR APPROACH 17

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

GPS #: 1170

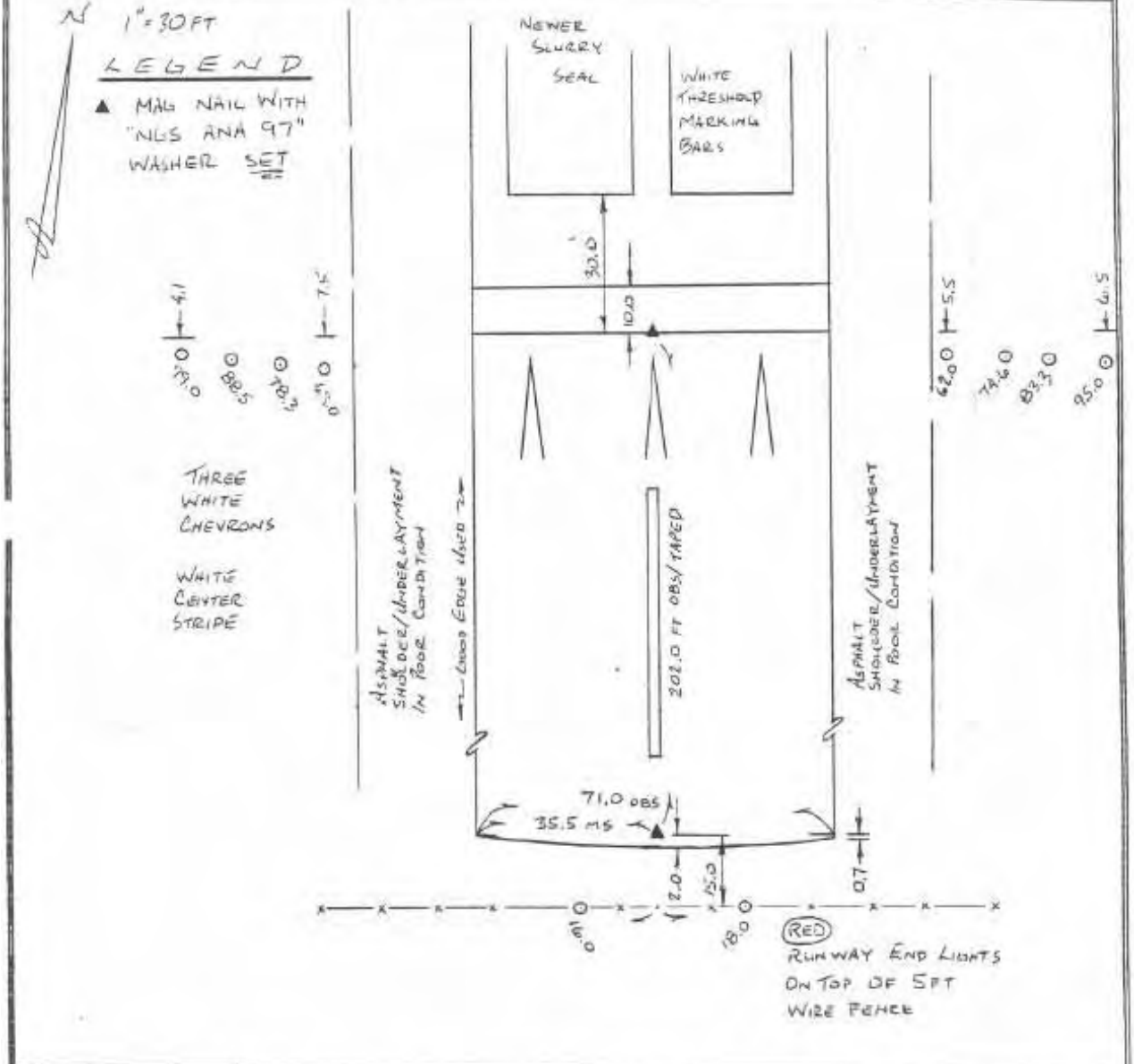
AIRPORT ID: MSA

OBSERVER: WC WAICKMAN

DATE: 04 MAR 97

RUNWAY END SKETCH LOG

AIRPORT NAME/LOCATION: MT PLEASANT MUNICIPAL AIRPORT, MT PLEASANT TX



RWY END #: 35

REMARKS: DISPLACED THRESHOLD LIGHTS OFFSET DIMENSIONED FROM CENTERLINE

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

GPS #: 1201

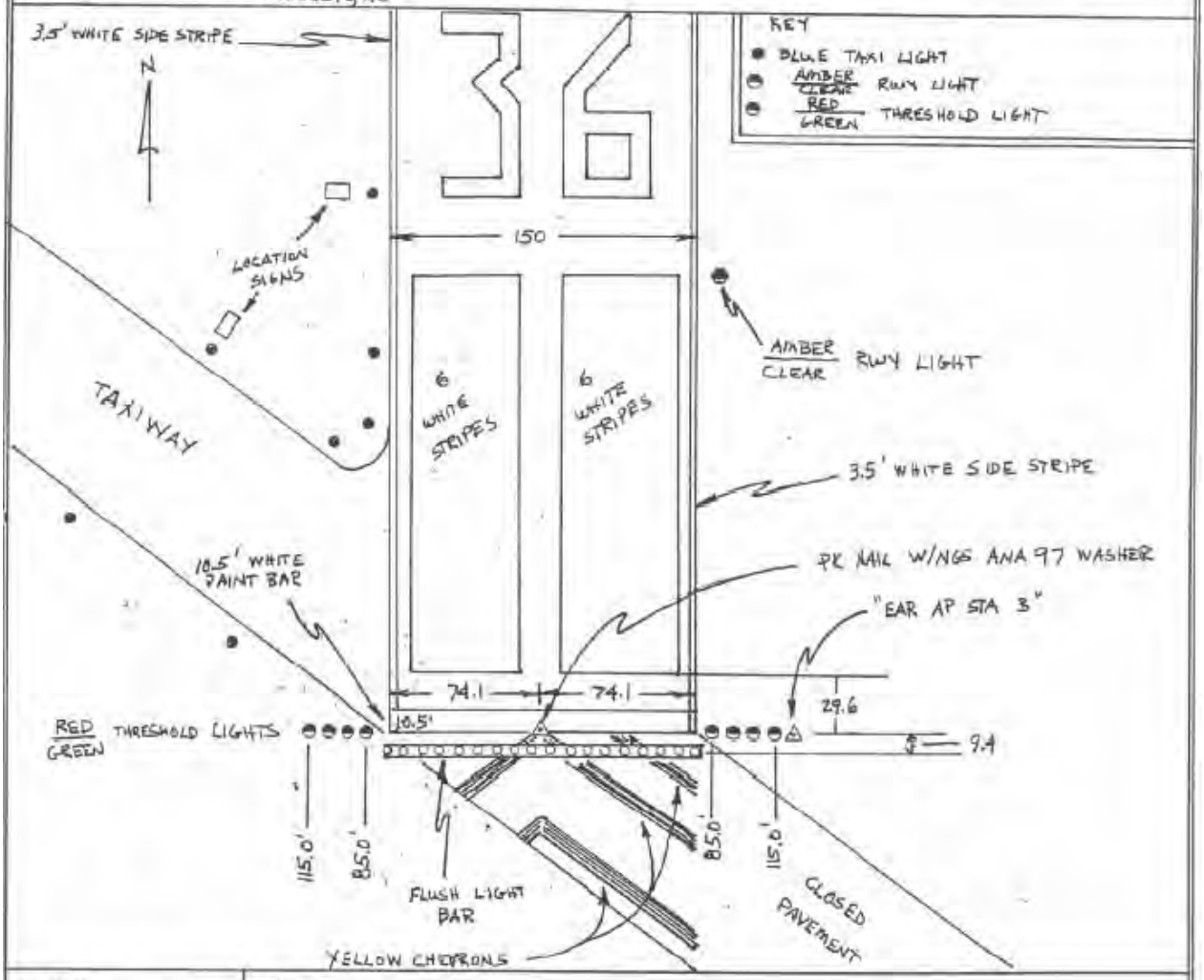
AIRPORT ID: EAR

OBSERVER: SML

DATE: 7-23-97

RUNWAY END SKETCH LOG

AIRPORT NAME/LOCATION: KEARNEY MUNICIPAL AIP
KEARNEY, NE



RWY END #: 36

REMARKS: ALL PAINT BARS, STRIPES & CHEVRONS ARE STRIATED. PAVEMENT EXTENDS 0.5'-1.0' PAST SIDE STRIPES & PAVEMENT IS 150' WIDE BUT ONLY 148' BETWEEN OUTSIDE EDGES OF SIDE STRIPES. PK NAIL IS SET INLINE WITH TRESHOLD LIGHTS AND O/A APPROACH SIDE OF 10.5' WIDE WHITE THRESHOLD BAR.

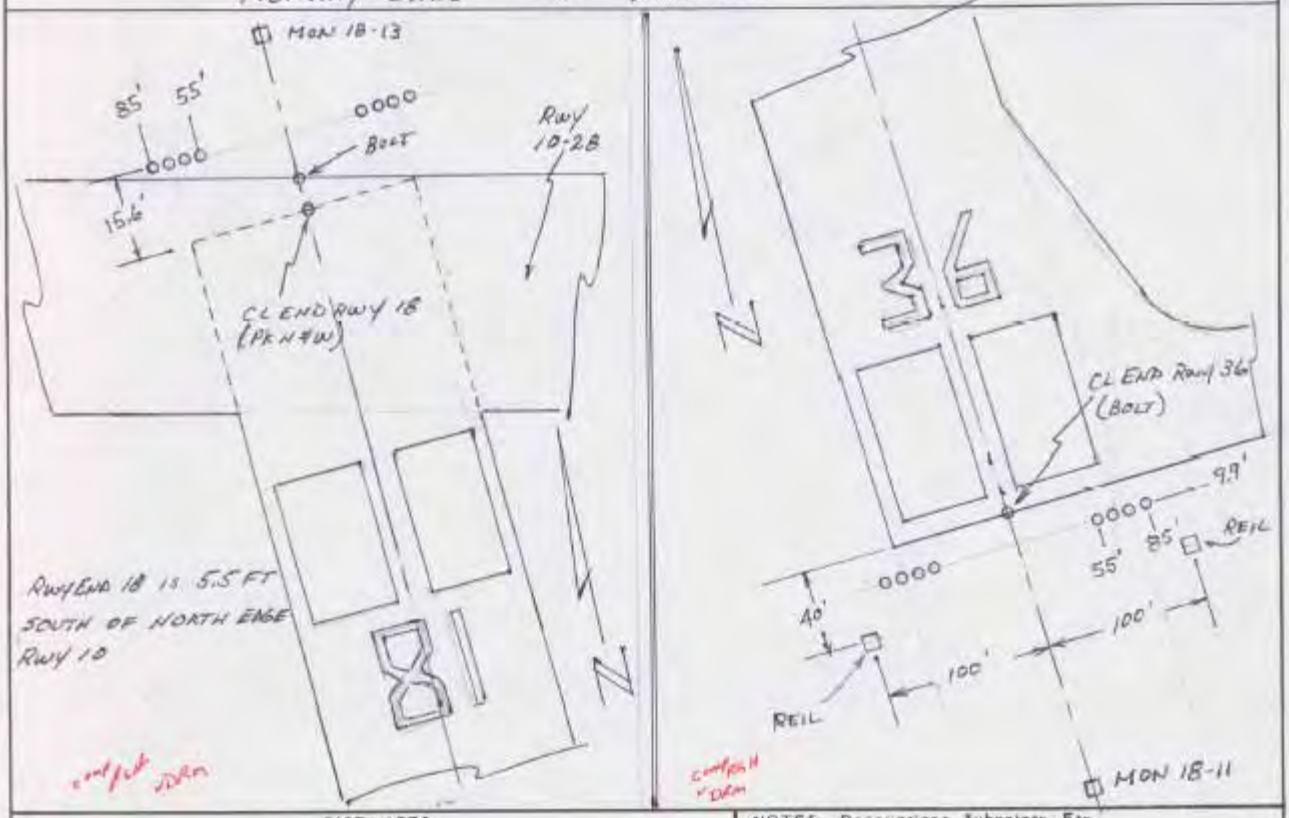
NOAA FORM 76-195 (5-79)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FIELD SURVEYS SKETCH

VOL./PAGE | OC 84 | PAGE OF
PHOTO | DATE AUG 1989
LOCALITY CLEVELAND - HOPKINS INT'L APT | STATE OHIO

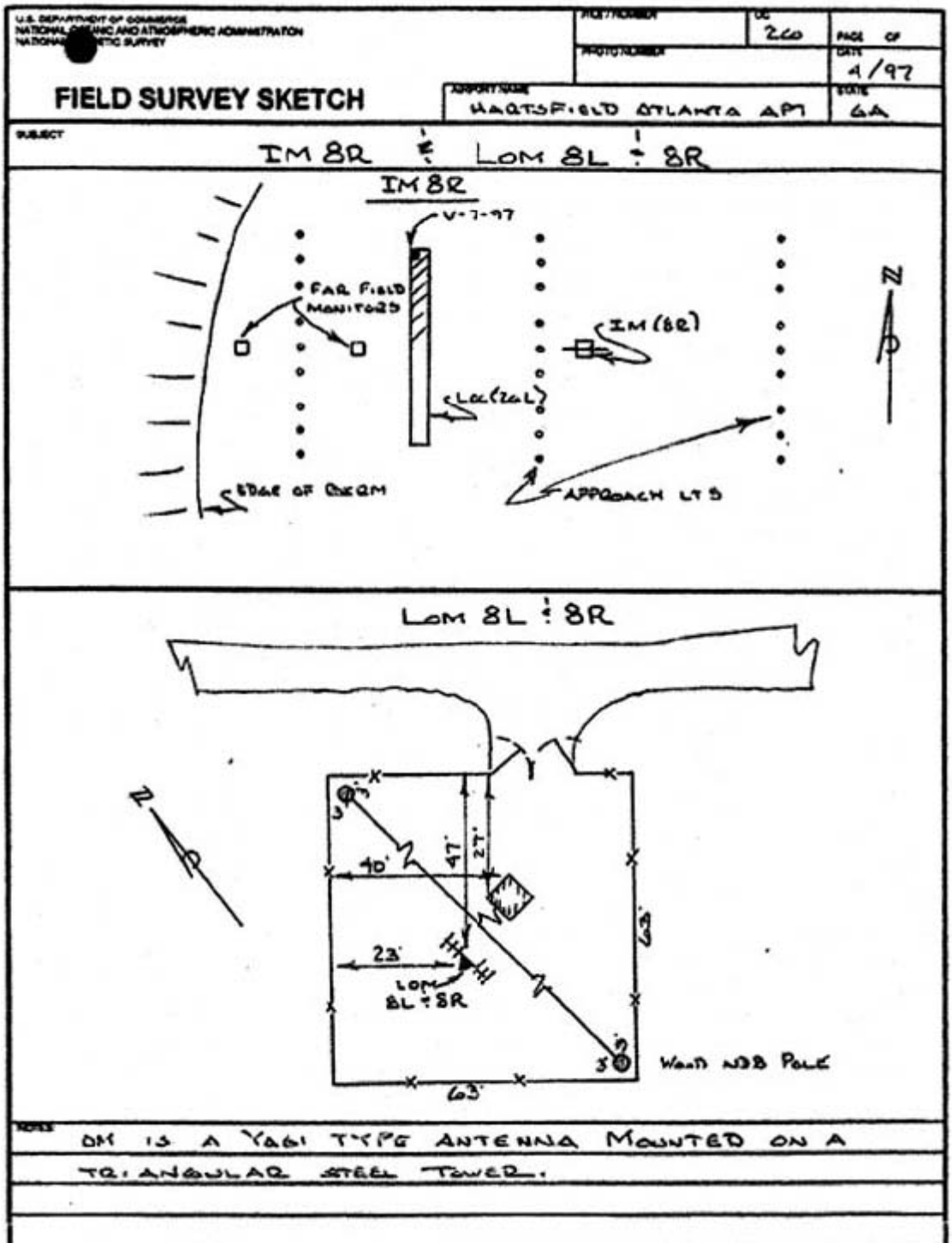
SUBJECT RUNWAY ENDS 18 AND 36



DISTANCES

FROM	MON 18-13		MON 18-11		
TO	CL END RWY 18		CL END RWY 36		
Press. / Temp.	29.1 / 27c		29.1 / 30c		
Tape No. / Atmos. Corr.	/ 18		/ 20		
V ∢ or D.E.	00 49 40		01 11 39		
Dist. Feet	204.54		200.10		
Dist. Feet	204.55		200.10		
Dist. Feet	204.55		200.10		
Dist. Meters	62.344		60.990		
Mean Slope Dist. Feet	204.55		200.10		
Tape Corr.	—		—		
Temp. Corr.	—		—		
Prism Corr.	—		—		
Slope Corr.	COS		COS		
Hor. Dist.	204.53		200.06		
Grid Dist.	204.51		200.04		

NOTES: Descriptions, Subpoints, Etc.


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY
FIELD SURVEY SKETCH
HARTSFIELD ATLANTA APT
GA
SUBJECT
IM 8R & LOM 8L & 8R
IM 8R
V-7-97
FAR FIELD MONITORS
IM (8R)
LOC (26L)
EDGE OF RUNWAY
APPROACH LTS
N
LOM 8L & 8R
N
40'
47'
27'
23'
63'
LOM 8L & 8R
WOOD NDB POLE
NOTES
OM IS A YAGI TYPE ANTENNA MOUNTED ON A
TRIANGULAR STEEL TOWER.

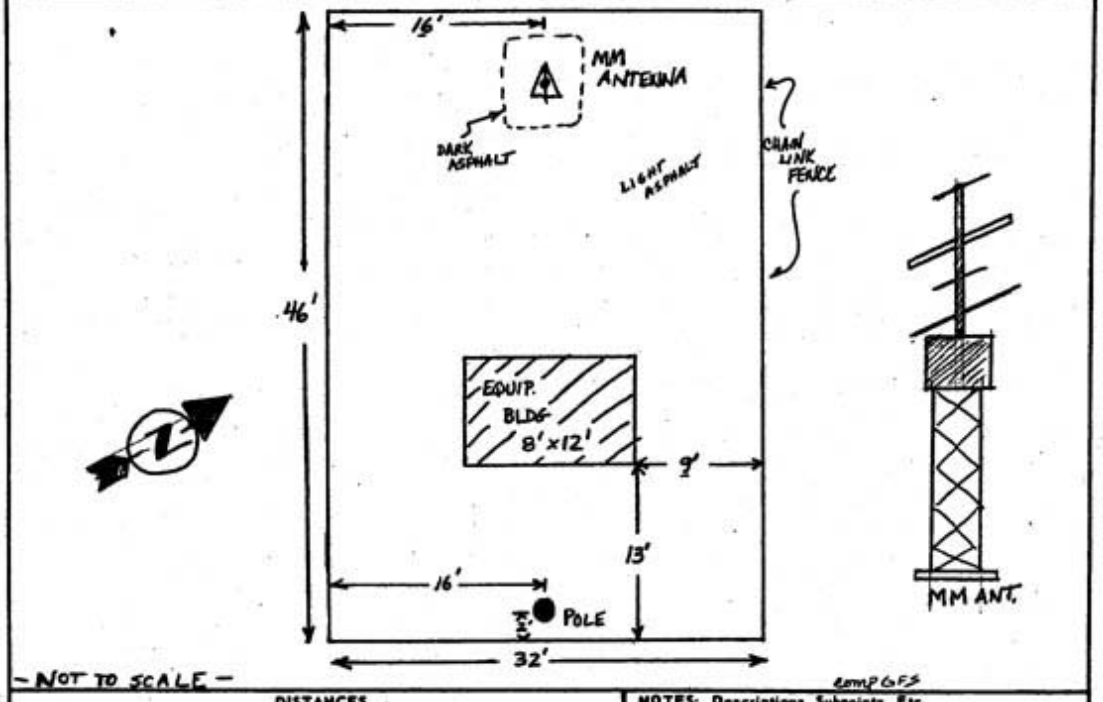
NOAA FORM 76-195 (5-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

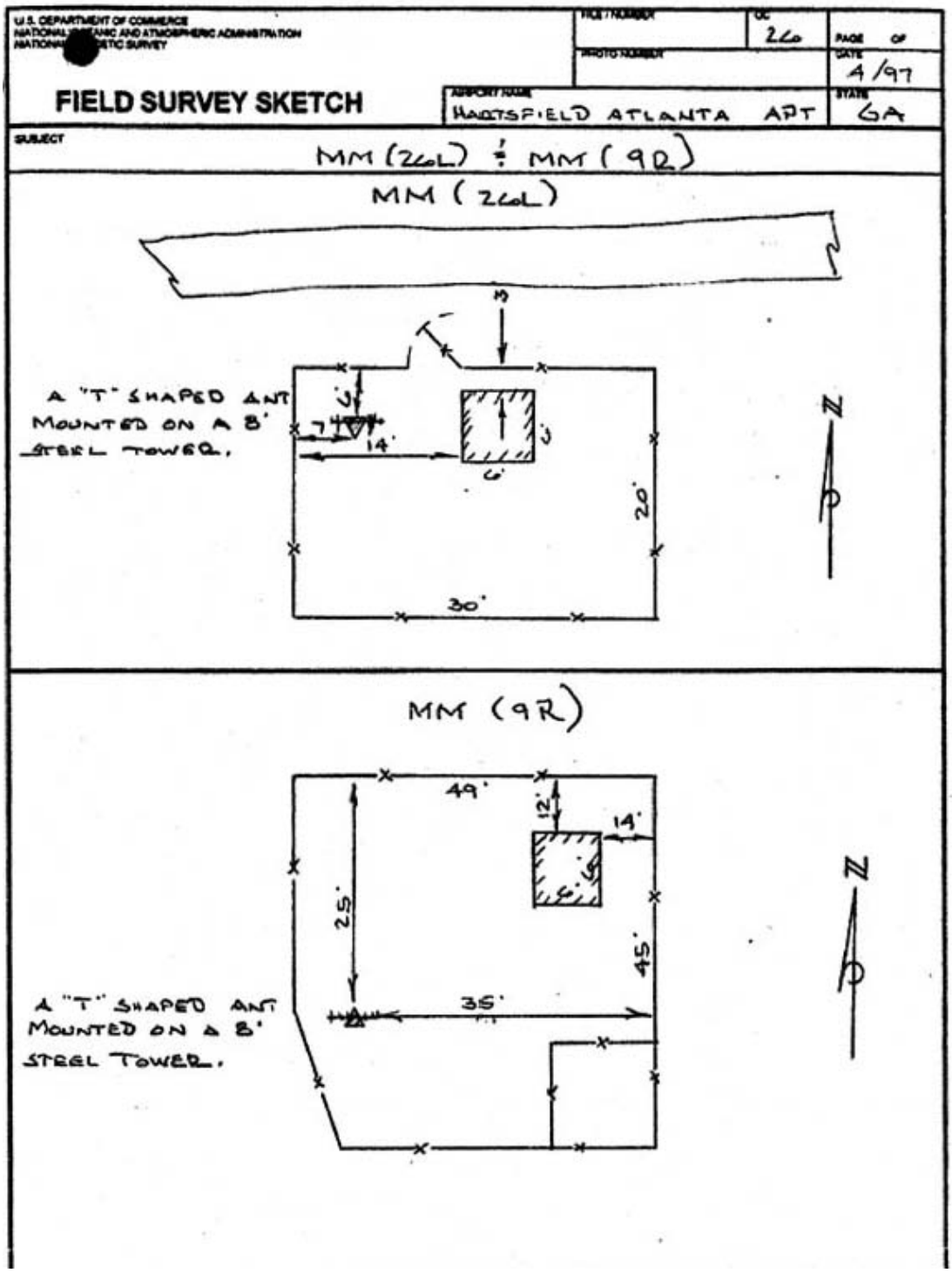
FIELD SURVEYS SKETCH

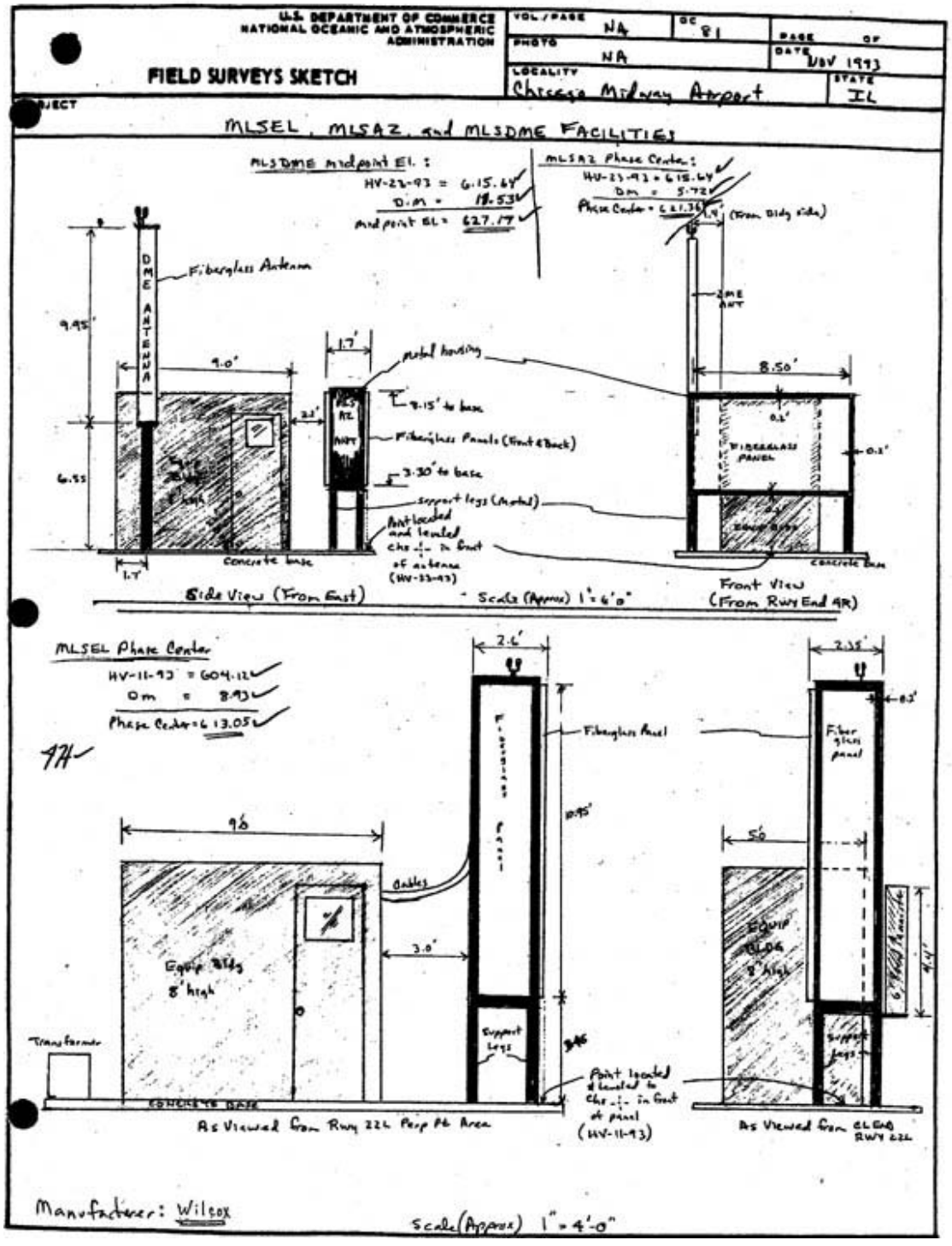
VOL./PAGE | GC 669 | PAGE 9 OF 10
PHOTO RATIO PHOTO 86BP176D | DATE MAY 1987
LOCALITY ATLANTIC CITY INT'L APT | STATE NJ

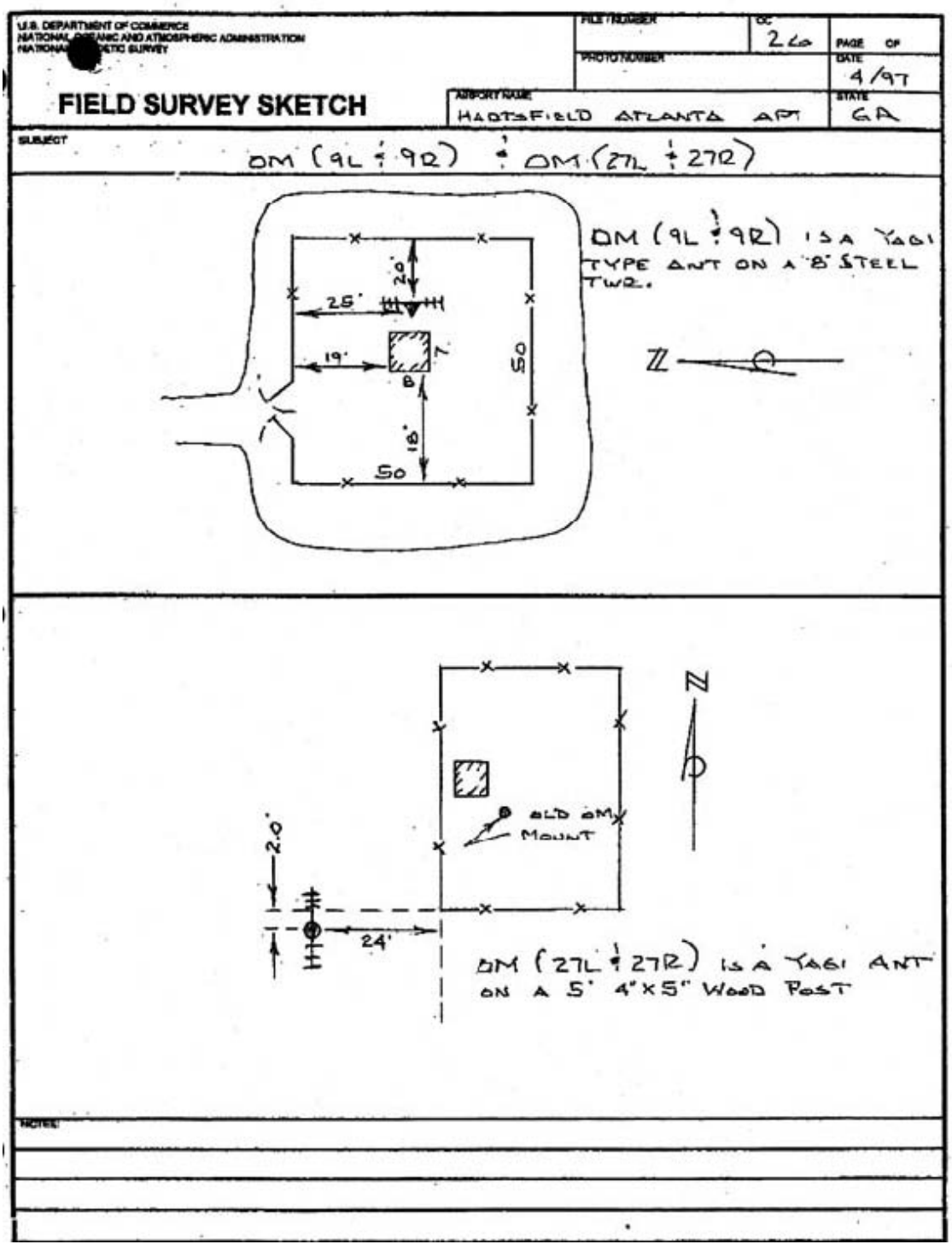
SUBJECT: MM (13)



DISTANCES						NOTES: Descriptions, Subpoints, Etc.
FROM						
TO						MM(13) RELOCATED ON SAME
Press. / Temp.						SITE SINCE 1977 GROUND
Tape No. / Atmos. Corr.						SURVEY LOCATION.
V∢ or D.E.						
Dist. Feet						MM ANTENNA LOCATED BY
Dist. Feet						SPUR TRAVERSE FROM FIX POINT A,
Dist. Feet						ANTENNA DIRECTLY PHOTOIDENTIFIED
Dist. Meters						TO AID FUTURE VERIFICATION.
Mean Slope Dist. Feet						
Tape Corr.						
Temp. Corr.						
Prism Corr.						
Slope Corr.						
Hor. Dist.						
Grid Dist.						


U.S. DEPARTMENT OF COMMERCE
FIELD SURVEY SKETCH
HARTSFIELD ATLANTA APT
GA
4/97
SUBJECT
MM (26L) & MM (9R)
MM (26L)
A "T" SHAPED ANT MOUNTED ON A 8' STEEL TOWER.
14'
20'
30'
N
MM (9R)
49'
12'
14'
25'
45'
35'
A "T" SHAPED ANT MOUNTED ON A 8' STEEL TOWER.
N


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
FIELD SURVEYS SKETCH
VOL./PAGE NA
OC 81
PHOTO NA
DATE NOV 1993
LOCALITY Chicago Midway Airport
STATE IL
PROJECT
MLSEL, MLSAZ, and MLSDME FACILITIES
MLSDME midpoint El. :
HV-22-93 = 615.64
D.M = 11.53
mid point EL = 627.17
MLSAZ Phase Center :
HV-23-93 = 615.64
Dm = 5.72
Phase Center = 621.36
(From Bldg side)
DME ANTENNA
Fiberglass Antenna
9.95'
9.0'
1.7'
metal housing
8.15' to base
Fiberglass Panels (Front & Back)
3.30' to base
support legs (Metal)
Ant located and leveled cht. ± in front of antenna (HV-22-93)
6.55'
2.1'
1.7'
concrete base
Side View (From East)
Scale (Approx) 1" = 6'-0"
8.50'
0.2'
FIBERGLASS PANEL
0.2'
concrete base
Front View (From Rwy End 9R)
MLSEL Phase Center
HV-11-93 = 604.12
Dm = 8.93
Phase Center = 613.05
9R
2.6'
Fiberglass Panel
9.95'
9.6'
Cables
3.0'
Equip Bldg 8' high
Transformer
Support Legs
3.45
Point located & leveled to cht. ± in front of panel (HV-11-93)
CONCRETE BASE
As Viewed From Rwy 22L Perp Pt Area
2.35'
0.2'
Fiber glass panel
5.6'
EQUIP BLDG 8' High
4.4'
6" THICK CONCRETE
Support legs
As Viewed From CLEAR RWY 22L
Manufacturer: Wilcox
Scale (Approx) 1" = 4'-0"

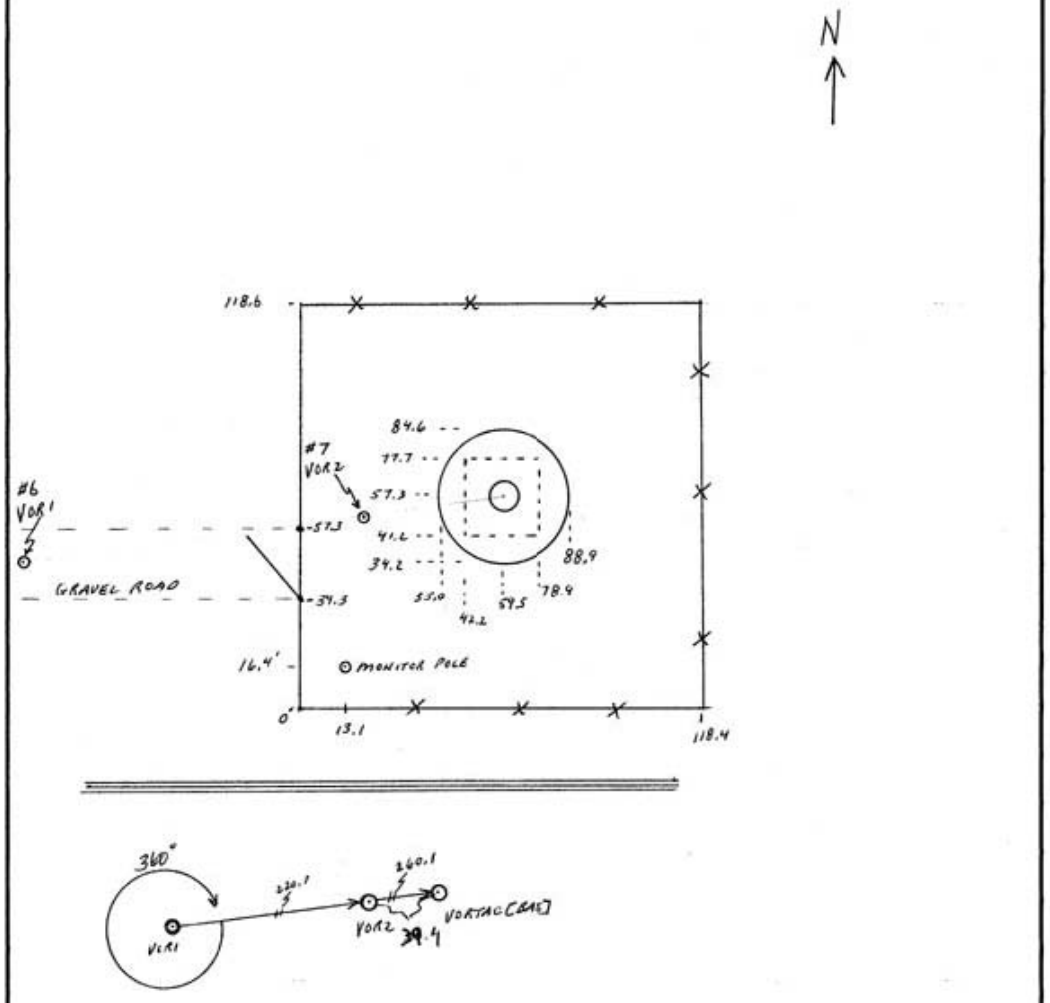

U.S. DEPARTMENT OF COMMERCE
FIELD SURVEY SKETCH
2 of 2
PAGE OF
DATE 4/97
AIRPORT NAME HARTSFIELD ATLANTA APT
STATE GA
SUBJECT
OM (9L & 9R) & OM (27L & 27R)
OM (9L & 9R) IS A YAGI TYPE ANT ON A 8' STEEL TWR.
N
20'
25'
19'
7'
8'
50'
18'
50
OLD OM MOUNT
2.0'
24'
OM (27L & 27R) IS A YAGI ANT ON A 5' 4"x5" WOOD POST
NOTES:

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY

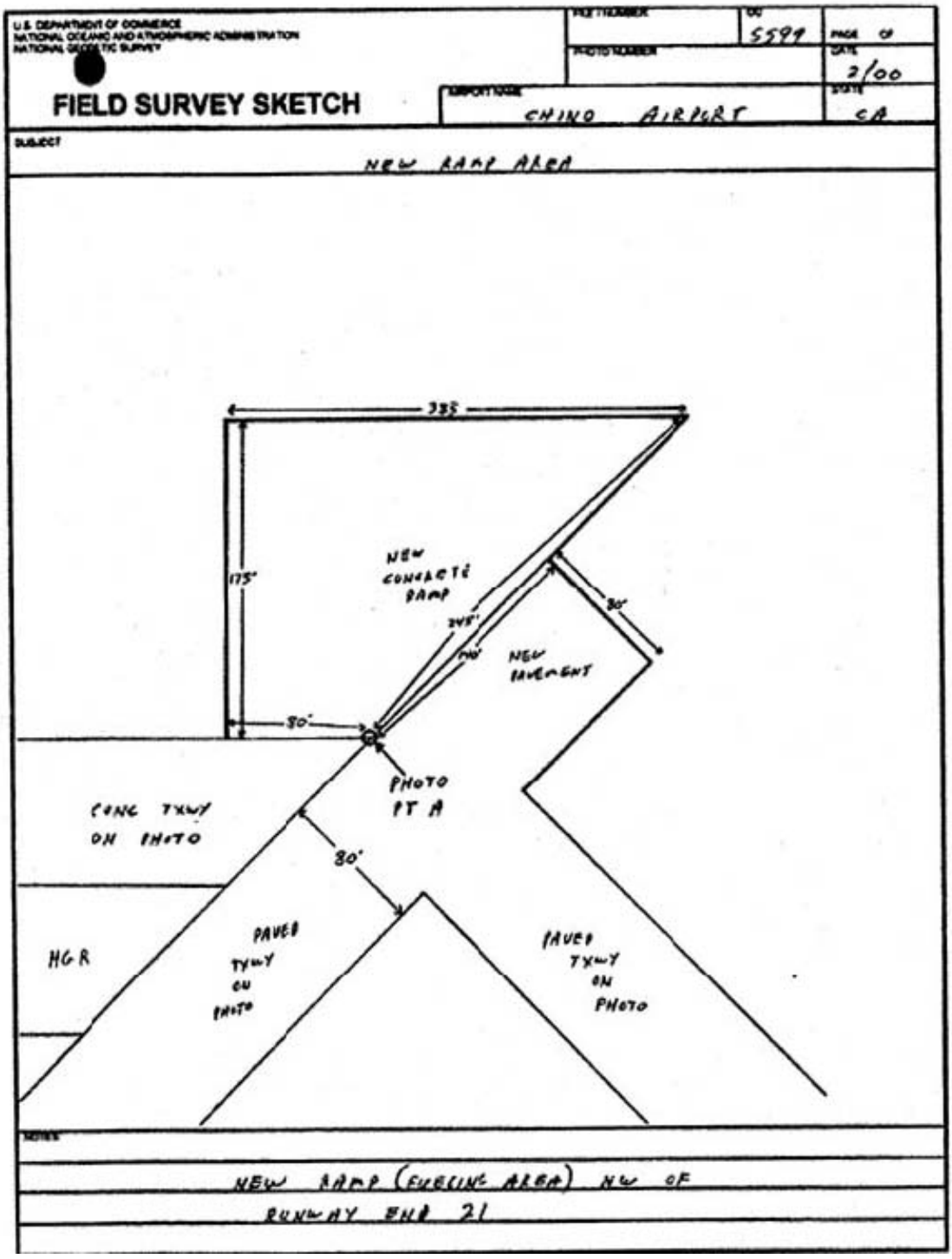
FILE / NUMBER: GPS 'ILES' | OC: 5078 | PAGE OF
PHOTO NUMBER: NA | DATE: 8-30-00
AIRPORT NAME: WAUKESHA COUNTY AIRPORT | STATE: WI

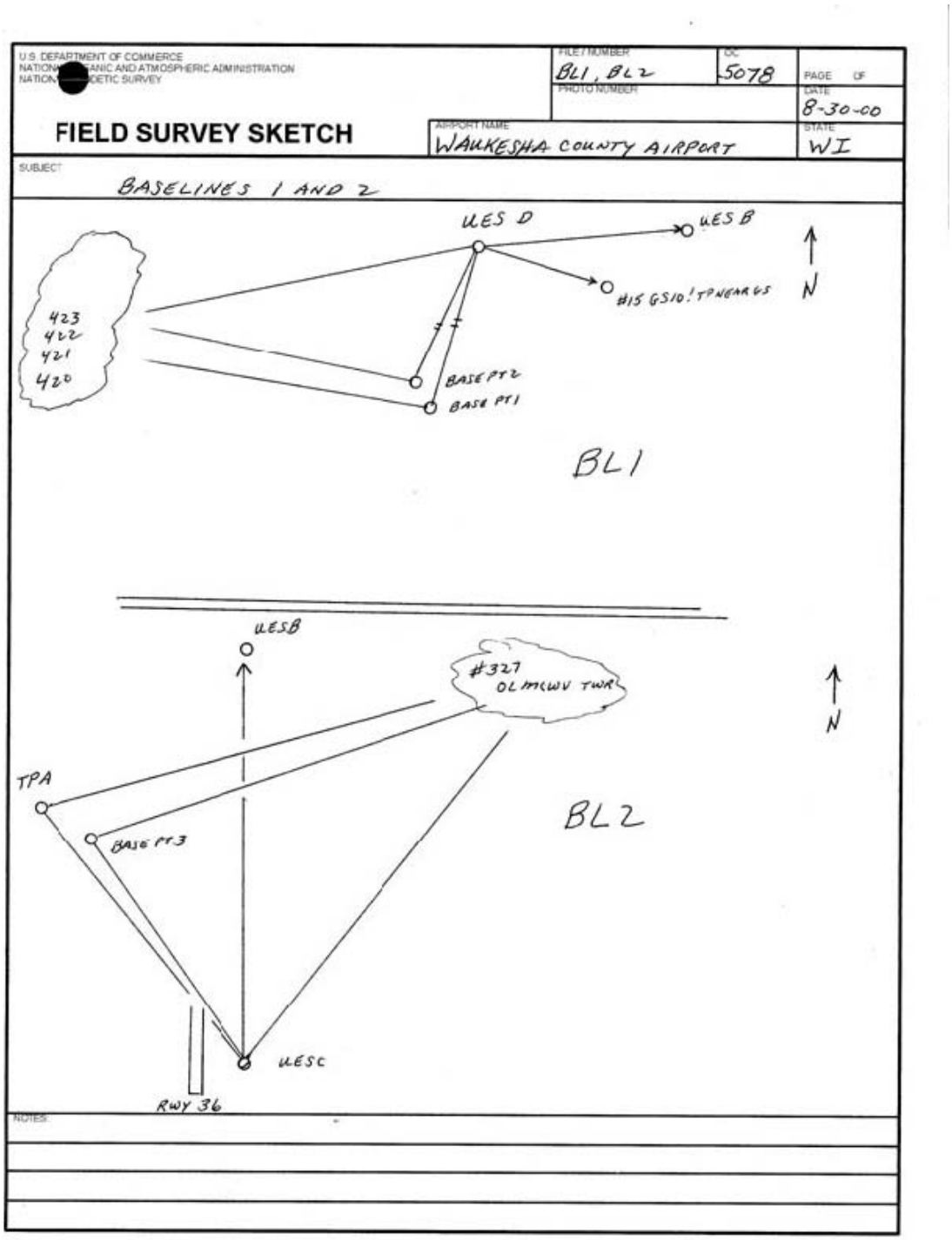
FIELD SURVEY SKETCH

SUBJECT: VORTAC [BAE]



NOTES:
VOR2 WAS SIGHTED ON LINE W/VORTAC FROM VOR1 USING TOPCON TOTAL STATION
VOR1 - VOR2 = 220.70 FT
VOR1 - VORTAC [BAE] = 260.1 FT


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY
FIELD SURVEY SKETCH
5599
2/00
CHINO AIRPORT
CA
SUBJECT
NEW RAMP AREA
335'
175'
NEW CONCRETE RAMP
245'
190'
30'
NEW PAVEMENT
30'
PHOTO PT A
CONC TXWY ON PHOTO
80'
HGR
PAVED TXWY ON PHOTO
PAVED TXWY ON PHOTO
NOTES
NEW RAMP (FUELING AREA) NW OF RUNWAY END 21


U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL GEODETIC SURVEY
FIELD SURVEY SKETCH
FILE/NUMBER
BL1, BL2
OC
5078
PHOTO NUMBER
PAGE OF
DATE
8-30-00
AIRPORT NAME
WAUKESHA COUNTY AIRPORT
STATE
WI
SUBJECT
BASELINES 1 AND 2
UES D
UES B
#15 GS10! TP NEAR GS
N
423
422
421
420
BASE PT 2
BASE PT 1
BL1
UESB
#327
OLMSTED TWR
N
TPA
BASE PT 3
BL2
UESC
RWY 36
NOTES:

Section 2-4: Runway, Stopway, and Displaced Threshold End Identification

1. PURPOSE

The purpose of this document is to provide field surveyors with guidelines for accomplishing runway/stopway surveys for the Federal Aviation Administration (FAA). These surveys, which furnish data critical to the operation of the National Airspace System, are accomplished in accordance with AC 150/5300-18, *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards.*

Included in this document are basic guidelines for:

a) Identifying the precise survey point (SP) for runway ends, displaced thresholds, and stopway ends
b) Resolving runway/stopway conflicts with airport authorities
c) Resolving runway/stopway conflicts with official U.S. Government aeronautical publications

2. BACKGROUND

Accurate runway/stopway surveys are critical to aircraft and airport operations. Fundamental to a good survey is the correct identification of runway ends, stopway ends, and displaced thresholds. In many cases, the location of these points is not intuitively obvious and the precise survey point selection may not be consistent among surveyors. Without basic guidelines, this inconsistency will likely continue.

The positions and elevations of runway/stopway points are used to determine runway length, Accelerate Stop Distance Available (ASDA), Takeoff Distance Available (TODA), Takeoff Run Available (TORA), Landing Distance Available (LDA), and runway gradient. In addition, runway end and threshold information is used to orient the Obstruction Identification Surfaces that define critical obstructions to navigation for arriving and departing aircraft.

Operational uses of runway/stopway data include determining maximum takeoff weights for civil aircraft, developing instrument arrival and departure procedures, certificating airports for certain operations, such as those conducted under Part 139, and updating official U.S. Government aeronautical publications and data bases.

Inaccurate data can result in unnecessary operational limitations or dangerous misassumptions. For example, a misidentified runway end that results in a surveyed length being shorter than the true length could cause unnecessary takeoff weight restrictions or could prevent certain aircraft from operating from a runway or airport entirely because of insurance requirements or other runway length related limitations. A misidentified runway end that results in a surveyed length

being longer than the true length could lead to the dangerous assumption that the ASDA, or other declared distance, is sufficient for safely conducting certain operations when it is not.

Incorrectly surveyed runways can also result in a runway not being identified during a computer search. In some cases, this situation could have safety implication. For example, a pilot with a low fuel state or other in-flight emergency may initiate a computer search for the nearest runway at least 5,000 feet long. If a nearby 5,000 foot runway was incorrectly surveyed and published at less than 5,000 feet, it would not be identified during the search and would remain unknown to the pilot.

The Federal Aviation Administration (FAA) has issued a series of Advisory Circulars (AC) establishing standards for construction, markings (painting), lighting, signage, and other items pertaining to runways/stopways. However, compliance with AC standards varies widely. For airports certificated under Federal Aviation Regulations Part 139, AC compliance is generally good. AC compliance is also generally good when it is required under terms of an FAA grant. In many other cases however, AC guidelines may be loosely followed or not followed at all.

Complicating this matter further are situations where runway/stopway changes have occurred, but repainting is delayed for some reason, leaving inappropriate painting in place at the time of the survey.

Other situations occur when AC compliance is intended, but the marking standard is misinterpreted or applied incorrectly. For example, a threshold bar may be incorrectly painted on a blast pad adjacent to a runway end instead of on the runway.

Hopefully, these guidelines will help surveyors correctly identify runway/stopway survey points, not only when standard markings exist, but also in the many cases where nonstandard situations are encountered.

3. TERMINOLOGY

The precise meaning of terms is always important for a clear understanding of spoken or written information. This understanding is especially critical in technical areas where safety is involved.

It is vital that the surveyor be familiar with runway/stopway terminology and that definitions be clearly understood. Certain terms and expressions used in this document have specific meanings that must not be misconstrued or applied incorrectly.

Refer to the Glossary for definitions used in this document. Many of these definitions have come from the “Aeronautical Information Manual,” or the FAA Advisory Circulars, both published by the Federal Aviation Administration. Other definitions are from the “Geodetic Glossary,” published by the National Geodetic Survey. When adequate definitions were not available from an official source, they were carefully developed as needed for this document.

Throughout this document reference is made to the “approach side” or “touchdown side” of a feature. For example, “Threshold lights show green from the approach side.” Correct understanding of these terms is extremely important. The “approach side” of a feature is the side occupied by a landing aircraft before the aircraft has passed the feature. The “touchdown side” of a feature is the side occupied by a landing aircraft after the aircraft has passed the feature. These terms are always referenced to a landing aircraft and the approach end, not the stop end, of the runway.

In addition to the word usage as defined in the glossary, the meanings of two other words must be understood when these words are used in relation to an action:

- the term "should" implies a first choice or preference but does not imply mandatory compliance.

- the term "must" means that compliance is mandatory.

4. FEATURES ASSOCIATED WITH RUNWAY/STOPWAY USAGE AND SURVEY POINT LOCATION

Runway/stopway usage, or intended usage, is usually indicated by one or more features existing on the airport. These features include surface markings, lights, signs, navigational aids, and physical construction.

A runway/stopway survey point (SP) is the intersection of the runway/stopway centerline and a feature that precisely defines the SP, such as the approach side of a threshold bar. The feature that precisely defines the SP is called the Survey Point Locator (SPL).

An SPL may be tangible, such as the approach side of a threshold bar, or intangible, such as an imaginary line constructed relative to a tangible feature or features like outboard (refer to Glossary) runway end lights.

A supporting feature is a feature that is associated with a runway/stopway SP but which does not precisely define the point, such as threshold lights located near a displaced threshold. There may be several supporting features for each SP. Supporting features provide confidence that the SP was correctly selected.

The most useful supporting features are usually one or more of the following:

- threshold bar and other threshold paintings
- runway number
- threshold and runway end lights
- runway edge lights.

Less useful features include:

- signs

- visual glideslope indicators
- electronic navigational aids
- taxiways.

Some features can be either an SPL or a supporting feature, depending on the situation. For example, when a threshold bar is located at a displaced threshold, the approach side of the bar defines the threshold. However, when a threshold bar is located near the end of pavement, the end of pavement usually defines the threshold and the bar is only a supporting feature that provides confidence that the threshold is located at the end and not at some other location on the runway.

Specific features that either define an SP or are useful in supporting SP selection are discussed in this section.

Because of the many nonstandard situations and configurations that may be encountered in the field, selecting the correct SP can be somewhat complex. When considering the features discussed below and their applicability to SP location, it may be useful to refer to Figures 1 through 8 in this section, as well as appropriate FAA Advisory Circulars.

a. LIMIT OF CONSTRUCTION

The limit of construction is usually the SPL for the ends of concrete runways when there is no aligned taxiway (AT). Runways and stopways are built to design criteria. There is an operational benefit to the airport sponsor and aircraft operators to have the maximum runway/stopway length possible. The limit of construction, or the runway end Trim Line (refer to section 4.2 below) usually provides this maximum. The limit of construction is indicated by a surface discontinuity. Be careful not to locate the runway end beyond this discontinuity and on a blast pad, stopway, or other non runway surface.

b. TRIM LINE

A Trim Line is an imaginary line, constructed perpendicular to the runway/stopway centerline, which establishes the location of a runway/stopway end or displaced threshold. A Trim Line is most frequently used to “square off” the ends of an Apparent Runway/Stopway Surface (ARS) (refer to Glossary) thereby establishing the runway/stopway ends. Most ARS’ that are not concrete, have ends that are not perpendicular to the runway/stopway centerline, are breaking up, or are otherwise unsuitable as a runway/stopway. Occasionally, the ARS may also narrow toward its end. This narrowing is most likely to occur on shorter runways at smaller airports. In all of these cases, a Trim Line must be constructed perpendicular to the runway/stopway centerline at “First Good Pavement (FGP)” (refer to attachment 7: Glossary). This Trim Line may be only a few inches or may be many feet from the ARS end. In practice, the surveyor is not qualified to accurately determine the load bearing integrity of a surface. So as a practical matter, the trim line should be established at a point on the ARS that is inside any disintegrating or otherwise

questionable surface that appears to be below the full load bearing capacity of the runway/stopway. Other uses of the Trim Line include:

- Establishing a runway end at outboard runway end lights when an AT exists and there is no threshold bar, or the approach side of the bar is located on the approach side of the runway end lights.
- Establishing a runway end at a location determined by operational requirements, such as defining a runway end short of a second runway when abutting surfaces exist.
- Defining a displaced threshold when there is no threshold bar, this may be the case with unpaved runways with outboard threshold lights.

c. SURFACE MARKINGS

1) **THRESHOLD BAR**

A threshold bar is used to delineate the beginning of the runway that is available for landing (threshold) when there is pavement aligned with the runway on the approach side of the threshold. This pavement may be runway, taxiway, or stopway or may be a non-usable surface, such as a blast pad. Threshold bars precisely delineate displaced thresholds, but in many cases do not precisely delineate runway ends even when a bar is located near the runway end. When a threshold bar does define a threshold or runway end, the approach side of the bar is the SPL, the bar being entirely on the landing surface. Threshold bars define runway ends on paved runways with an AT and no displaced threshold, provided the approach side of the bar is aligned with, or is on the touchdown side of the runway end lights. In no other case does the threshold bar precisely define the runway end. (refer to Threshold Lights and Runway End Lights in paragraph 4d) for the use of runway end lights in defining the runway end SP). The threshold bar is only a supporting feature for runway ends with no AT since these bars are often not painted precisely at the runway end (as defined by the limit of construction or a Trim Line). A threshold bar that is painted "close" to the end may be satisfactory for the painting contractor but is not sufficient for precisely defining a runway end. Occasionally, a threshold bar may even be painted on a blast pad or other non-runway surface. Because of the variability and unreliability of threshold bar locations at runway ends with no AT, the bars should not be used to define the runway end SP in these situations. It is important to remember that correct painting on runways is white, while correct painting on taxiways, stopways, or blast pads is yellow. If a displaced threshold exists on a runway with an AT, the runway end may be marked with a yellow demarcation bar. If painted correctly, this demarcation bar is not on the runway surface.

2) **RUNWAY NUMBERS**

The runway number is a supporting feature. Runway numbers are especially useful and reliable as supporting features since most paved runways, even if unlighted, are painted with runway numbers near the threshold. If a runway number is painted on the runway at a location other than near the apparent threshold, a serious conflict exists that must be resolved.

3) **OTHER SURFACE MARKINGS**

Other surface markings are supporting features. Many surface markings, such as threshold markings (specific markings other than the threshold bar), runway side stripes, displaced threshold arrows and arrowheads, the lines and arrowheads on taxiways aligned with runways, and the chevrons on stopways and blast pads are associated with runway/stopway ends and thresholds. While none of these markings precisely define runway/stopway SP's, many can be useful as supporting features that provide confidence in SP selection.

d. LIGHTS

Caution - when using lights for runway/stopway SP identification, verify that the lights are not out-of-service. Be especially vigilant for redundant lights or lights that seem to be out-of-place. Occasionally, a threshold or runway end may be moved and the original lights placed out-of-service but not physically removed. If this situation is not recognized, it could lead to confusion and incorrect SP location.

1) **THRESHOLD LIGHTS**

Threshold lights are fixed green lights arranged symmetrically left and right of the runway centerline and identify the approximate runway threshold (but not necessarily the runway end). These lights are frequently in multipurpose fixtures that show green from the approach side of the threshold and may show red, white, or amber, or may be obscured from the touchdown side of the threshold, depending on additional function. Threshold lights are usually supporting features for SP's on paved runways. However, they may define the SP for displaced thresholds when a threshold bar is missing, such as may occur on unpaved runways. (Displaced thresholds on unpaved runways are uncommon). Light characteristics can be useful in distinguishing between a displaced threshold and a runway end with an AT. The displaced threshold will include lights that show green from the approach side and white, amber, or obscured from the touchdown side. The runway end with an AT will include lights that show green from the approach side and red from the touchdown side. When threshold lights are located at the runway end, they are usually combined with runway end lights into one fixture. In these cases, threshold lights show green from the approach side, while the runway end lights show red from the touchdown side. Special lens or filters are used to give the desired coverage. In the rare case where the light units define a Trim Line for a displaced threshold SP (no threshold bar), the two units nearest to the runway (one on each side of the runway) will be used. The Trim Line must always be perpendicular to the runway centerline. If the Trim Line connecting the

lights (or markers if runway is unlighted) is not perpendicular to the runway centerline, then the line must be best fit to the defining lights or markers. When there is no displaced threshold or runway end with an AT, threshold and runway end lights are normally located across the runway end and about 10 feet on the approach side of the runway. When there is a displaced threshold or a runway end with an AT, these lights are normally located to the side of the runway but are often offset along the runway by 10 feet or more from the true threshold or runway end.

2) **RUNWAY END LIGHTS**

Runway end lights are fixed red lights arranged symmetrically left and right of the runway centerline and identify the approximate runway end, or in some cases, the precise runway end. They show red from the runway side and may show red from the approach side, as well if the runway end is not the threshold. If the runway end is also a threshold, the light unit will show green from the approach side. (refer to Threshold Lights in previous section). FAA guidelines or regulations do not authorize a runway to extend to the approach side of the runway end lights. Therefore, the runway end cannot be on the approach side of the runway end lights regardless of threshold bar or runway end light location. (Do not confuse these situations with that of threshold lights at a displaced threshold where the approach side of the threshold bar defines the threshold and the lights are only supporting features). In most cases where there is no AT, the limit of construction, or a Trim Line, on the touchdown side of the lights defines the runway end and the runway end lights are supporting features only. In some cases, however, runway end lights can define a runway end SP. For runways with an AT, runway end lights (which can be situated either outboard or flush mounted inboard) define the runway end SP if there is no threshold bar or if the approach side of the threshold bar is on the approach side of the lights. (If the bar is entirely on the touchdown side of the lights, the approach side of the bar defines the runway end SP). In the rare cases where there is no AT but the runway end lights are outboard and on the touchdown side of an apparent runway end, the lights define the runway end. The surface on the approach side of the lights is not runway.

3) **RUNWAY/STOPWAY EDGE LIGHTS**

Runway edge lights are white, except on instrument runways, where amber replaces white in the last 2,000 feet, or half the runway length, whichever is less, to form a caution zone for landing. Runway/stopway edge lights are supporting features and do not precisely define SP's. However, in some cases, their color characteristics may identify a section of pavement as either runway or taxiway. The edge lights for taxiways are blue, while the edge lights for runways are white or amber. Stopway lighting is inconsistent and unreliable in stopway SP identification.

4) **RUNWAY END IDENTIFIER LIGHTS**

Runway End Identifier Lights (REIL) consist of a pair of synchronized flashing lights located laterally on each side of the runway threshold but are typically not aligned precisely with the threshold. They may be either omnidirectional or unidirectional facing the approach area. REILs are supporting features and do not precisely identify SPs. REILs may be useful in determining runway usage since they are located near the threshold.

e. SIGNS

Signs are supporting features and do not precisely identify SPs. Occasionally, signs may be useful in indicating that a runway end, especially a runway end with an AT, is nearby. They can also indicate the direction to a runway end.

f. VISUAL GLIDESLOPE INDICATORS

Visual glideslope indicators are light sources that project directional light into the approach area, providing pilots with visual vertical guidance in the final approach phases of flight. The locations and characteristics of visual glideslope indicators vary depending on type. However, all are located beside the runway on the touchdown side of the threshold. Visual glideslope indicators are supporting features and do not precisely define SP's. Occasionally, these indicators may be useful in determining runway usage since they indicate the approximate touchdown area for landing aircraft.

g. ELECTRONIC NAVIGATIONAL AIDS (NAVAIDS)

The Instrument Landing System Glideslope (ILS-GS) antenna is the emission source for electronic signals, which provide pilots with electronic vertical guidance in the final approach phases of flight. ILS-GS antennas are typically located approximately 400 feet off the runway centerline and approximately 1,000 feet on the touchdown side of the threshold. However, most runways do not use this facility. Electronic navigational aids, including the ILS-GS, do not precisely identify SPs. Occasionally, the ILS-GS antenna may be useful in determining runway usage since most ILS-GS antennas are sited near the touchdown area for landing aircraft. The locations and use of most other NAVAIDS vary so greatly that they are virtually useless in SP identification.

h. TAXIWAYS

Taxiways are movement areas that provide access to runways from aircraft parking, maintenance, and other areas on the airport. Taxiways do not precisely identify SP's. However, since runway ends are usually accessed by adjacent taxiways, the location of a taxiway may suggest the proximity of a runway end. While many runway ends coincide with the extension of the taxiway edge onto the runway, this is not always the case. Often a runway extends slightly beyond the taxiway edge, making the SPL for the runway end the limit of physical construction, a Trim Line, or a threshold bar and not the taxiway extension onto the runway. It is not unusual to have a runway end

without direct taxiway access. One common case occurs when a runway has been extended, but the taxiway has not been extended to the new runway end. This situation is most likely to occur at smaller airports. While taxiway/runway intersections do not define runway points, unusual taxiway/runway configurations can alert the surveyor that an atypical situation may exist.

5. LOCATION OF SPECIFIC SURVEY POINTS

The location of the following runway/stopway Survey Points (SPs) is defined by the intersection of the runway/stopway centerline and one of the indicated Survey Point Locators. When the SP has been determined, it will always be verified by the presence of supporting features. Occasionally, a supporting feature will conflict with the selected SP or another supporting feature. For example, a runway number may be located near the end of pavement, but threshold lights and a threshold bar are located down the runway at an apparent displaced threshold. These conflicts should be resolved before leaving the airport. Discuss the conflict with airport authorities and, if necessary, contact the field supervisor for assistance. In the presentation that follows, reference is made to "inboard" or "outboard" threshold and runway end lights. These terms are defined in the attachment 7: Glossary. If light units are used to construct the Trim Line that defines an SP, as may be the case for the end of a runway with an aligned taxiway, the two units nearest to the runway (one light on each side of the runway) will be used. The Trim Line must always be perpendicular to the runway centerline. If a line connecting the lights (or markers if the runway is unlighted) is not perpendicular to the runway centerline, then the Trim Line must be best fit to the defining lights or markers. When using the following guidelines, select the first “Survey Point Locator” listed that is applicable. While all possible situations cannot be covered, these guidelines should lead to correct SP selection in most of the cases encountered in the field.

a. RUNWAY END: CONCRETE RUNWAY and NO ALIGNED TAXIWAY

1) **Survey Point Locator**

- Limit of construction, provided this line is not located on approach side of runway end lights
- Trim Line at First Good Pavement (FGP), provided this line is not located on approach side of runway end lights

2) **Supporting Features**

- Runway end lights near runway end
- Threshold bar near runway end (usually present only if non-runway pavement is aligned with runway)
- Threshold lights near runway end and usually in same fixture as runway end lights (if threshold not displaced)
- Runway number near runway end (if threshold not displaced)
- Runway edge lights (white or amber) extending to runway end

3) **Comments:** The limit of construction usually defines the SP for the ends of concrete runways. The limit of construction is indicated by a surface

discontinuity. Do not confuse the runway end with the end of a blast pad, stopway, or other non-runway surface. Refer to Figures 1 through 4 and Figure 8 for an example of this scenario.

b. RUNWAY END: PAVED/NONCONCRETE RWY and NO ALIGNED TAXIWAY

1) **Survey Point Locator**

- Limit of construction, provided this line is not located on approach side of runway end lights
- Trim Line at FGP, provided this line is not located on approach side of runway end lights

2) **Supporting Features**

- Runway end lights near runway end
- Threshold bar near runway end (usually present only if non-runway pavement is aligned with runway)
- Threshold lights near runway end and usually in same fixture as runway end lights (if threshold not displaced)
- Runway number near runway end (if threshold not displaced)
- Runway edge lights (white or amber) extending to runway end

3) **Comments:** While the limit of construction is the first choice, a trim line at FGP is usually required to define the ends of paved, non-concrete, runways since the ends of these surfaces are almost always crumbling and/or not orthogonal to the runway centerline to some degree. Refer to Figures 1 through 4 and Figure 8 for an example of this scenario.

c. RUNWAY END: UNPAVED RUNWAY and NO ALIGNED TAXIWAY

1) **Survey Point Locator**

- Trim Line 10 feet on touchdown side of inboard runway end lights
- Trim Line connecting outboard runway end lights
- Trim Line 10 feet on touchdown side of inboard runway end day markers
- Trim Line connecting outboard runway end day markers

2) **Supporting features**

- Threshold lights near threshold (if runway lighted and threshold not displaced)

3) **Comments:** If no lights or markers exist, the existence of a runway must be

questioned. By FAA definition, a runway is a defined area. Not all areas used for takeoff/landings are runways.

d. RUNWAY END: PAVED RUNWAY and ALIGNED TAXIWAY

1) **Survey Point Locator**

- Approach side of threshold bar provided this line is not located on approach side of runway end lights and threshold is not displaced
- Trim Line connecting outboard runway end lights
- Runway side of yellow demarcation bar provided this line is not located on approach side of runway end lights. (This bar usually occurs only if a displaced threshold and an AT both exist.)

2) **Supporting Features**

- Threshold lights near runway end and usually in same fixture as runway end lights (if threshold not displaced)
- Runway number near runway end (if threshold not displaced)
- Yellow AT painting on approach side of threshold bar
- Taxiway edge lights between runway end and taxiway end
- Absence of runway side stripes between runway end and end of pavement on Precision Instrument Runways

3) **Comments:** Use caution, especially on smaller, poorly marked airports, not to confuse a displaced threshold and a runway end for a runway with an AT. Refer to Figures 5 through 6 for an example of this scenario.

e. RUNWAY END: UNPAVED RUNWAY and ALIGNED TAXIWAY

1) **Survey Point Locator**

- Trim Line connecting outboard runway end lights
- Trim Line connecting outboard runway end day markers

2) **Supporting Features**

- Threshold lights near threshold (if threshold not displaced)
- Runway/taxiway edge lights (if runway lighted)

3) **Comments:** Unpaved runways with aligned taxiways are unusual. If this situation is suspected, verify that an area immediately adjacent to, and aligned with, the runway is used for taxi onto the runway and is marked appropriately for this purpose. Refer to Figures 5 through 6 for an example of this scenario.

f. DISPLACED THRESHOLD: PAVED RUNWAY

1) **Survey Point Locator**

- Approach side of threshold bar
- Trim Line connecting outboard threshold lights

2) **Supporting Features**

- Threshold lights near threshold
- Runway end lights sited at another location on approach side of threshold lights
- White or amber runway edge lights, not blue taxiway lights, between threshold and end of runway
- Runway number near threshold
- White displaced threshold markings on approach side of threshold bar
- Runway side stripe on Precision Instrument Runways

3) **Comments:** Use caution, especially on smaller, poorly marked airports, not to confuse a displaced threshold with the end of a runway with an aligned taxiway. Refer to Figure 7 for an example of this scenario.

g. DISPLACED THRESHOLD: UNPAVED RUNWAY

1) **Survey Point Locator**

- Trim Line connecting outboard threshold lights
- Trim Line connecting outboard threshold day markers

2) **Supporting features**

- Runway end lights sited at another location on approach side of threshold lights (if runway lighted)
- Runway end day markers located at another location on approach side of threshold (if runway unlighted)

3) **Comments:** Displaced thresholds on unpaved runways are unusual. If this situation is suspected, verify that the runway end is identifiable at another location on the approach side of the threshold.

h. STOPWAY END: CONCRETE STOPWAY

1) **Survey Point Locator**

- Limit of construction
- Trim Line

2) **Supporting Features**

- Stopway chevrons

3) **Comments:** The stopway end SP must be on the runway centerline extended. Stopways must be at least as wide as the runway but may be wider. Refer to Section 2: subsection 3, Runway and Stopway Points, for further discussion related to stopway surveys.

i. STOPWAY END: PAVED/NONCONCRETE STOPWAY

1) **Survey Point Locator**

- Limit of construction
- Trim Line at FGP

2) **Supporting Features**

- Stopway chevrons

3) **Comments:** The stopway end SP must be on the runway centerline extended. Stopways must be at least as wide as the runway but may be wider. Refer to Section 2: subsection 3, Runway and Stopway Points, for further discussion related to stopway surveys.

j. STOPWAY END: UNPAVED STOPWAY

1) **Survey Point Locator**

- Trim Line at ARS end

2) **Supporting Features**

- Usually none

3) **Comments:** The stopway end SP must be on the runway centerline extended. Stopways must be at least as wide as the runway but may be wider. Refer to Section 2: subsection 3, Runway and Stopway Points, for further discussion related to stopway surveys.

6. PRELIMINARY COMPUTATIONS AND DATA CONFLICTS

a. COMPUTATION METHODS

Before leaving the area, runway, displaced threshold, and stopway lengths should be computed using the new survey data. These lengths will be determined using a 3D geodetic inverse computation between end points. This computation corrects for the elevation of the points and difference in elevation between points. These lengths should be compared to the runway lengths published in the Airport/Facility Directory (A/FD) and the U.S. Terminal Procedures (TPP), both U.S Government Flight Information Publications, and the lengths provided by the airport authorities. The official runway, stopway, or displaced threshold length is the straight line distance between end points. This line does not account for surface undulations between points.

b. CONFLICTS WITH PUBLISHED DATA

Computed lengths seldom match published lengths exactly. Discrepancies are most likely caused by interpretation of runway/stopway SP location, remarking of thresholds, or less accurate published data. As the magnitude of discrepancies increases, the probability also increases that physical changes have occurred to the runways/stopways or that the thresholds have been moved. Differences with published data should be considered as an alert that there may be a problem in the survey. However, published lengths are often not as accurate as the new surveyed lengths and are occasionally obsolete or otherwise grossly erroneous. Therefore, the validity of the published data must always be questioned when comparing it with the new survey data, especially if the SP's have been selected correctly.

Even though published data is often incorrect or obsolete, new survey data should be carefully reexamined when discrepancies between published and surveyed data occur. The reasons for small discrepancies are often difficult or impossible to identify. As discrepancies become larger, the reasons typically become more apparent. Even though the source of the discrepancy may not be identified, the reexamination should be conducted to provide the highest level of confidence that accurate runway data has been provided. Stopway conflicts pose a special problem, largely because of issues related to the stopway definition and the protocols required by FAA in declaring a stopway.

If either of the following situations occurs, contact the FAA Airport Surveying–GIS Program Manager for assistance:

- The apparent stopway dimensions on the ground differ from the stopway dimensions as published in either the A/FD or TPP by more than 10 percent of the published dimensions.

- A published stopway does not appear to meet the definition of a stopway, including the requirement to support an aircraft during an aborted takeoff, without causing structural damage to the aircraft.

If the FAA Airport Surveying–GIS Program Manager or NGS staff personnel cannot resolve a situation, final resolution may ultimately require FAA intervention.

c. CONFLICTS WITH AIRPORT AUTHORITIES

Because of the importance of runway/stopway data, runway/stopway surveys should always be discussed with appropriate airport authorities. Conflicts that occur between the judgment of the surveyor and the opinions, understandings, or intentions of the airport authorities should be resolved. It may be necessary to revisit the field with airport personnel and explain the survey and SP selection. If a conflict with the airport authorities still cannot be resolved, assistance should be sought from the field survey supervisor. In some cases, final resolution may ultimately require FAA intervention. Stopway conflicts pose a special problem. Before an area can be officially declared a stopway and published in official U.S. Government documents, such as the A/FD and TPP, the request for a stopway must be filed by airport authorities with appropriate FAA offices. FAA will conduct an Airspace Review and approve or disapprove the request.

If either of the following situations occur, contact the field supervisor for assistance:

- Airport authorities request that an area be surveyed as a stopway but the stopway is not published in either the A/FD or TPP current at the time of the field survey.

- Airport authorities request a change to, or do not concur with, the published stopway data or data resulting from the new survey.

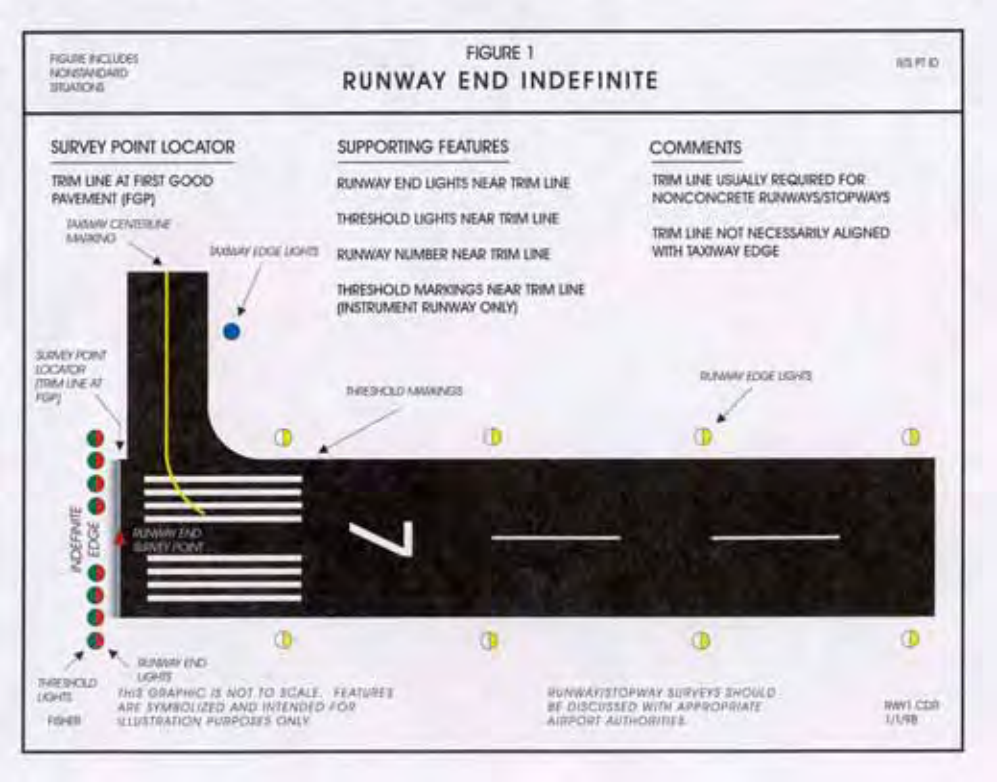
As with conflicts with published data, if the FAA Airport Surveying–GIS Program Manager or NGS staff personnel cannot resolve a situation, final resolution may ultimately require FAA intervention.

d. COMPARISON WITH CRITICAL RUNWAY LENGTH

Runway lengths that are whole thousands of feet (5,000, 8,000, etc.) or whole thousands of feet plus 500 feet (5,500, 8,500, etc.) often have special operational significance. For purposes of this document, these lengths are called critical lengths. Many aircraft operations require a minimum runway length, which is often a critical length, and many runways are built to these lengths. If a runway is incorrectly published shorter than a critical length, certain operations could be unnecessarily restricted. In addition to imposing unnecessary operational limitations, incorrectly surveyed runways may not be retrieved during a computer

search. This situation is especially likely to occur with critical length runways. In some cases, this failure could have safety implications. While all runway/stopway lengths should be accurate, even small errors in critical lengths could have significant and far reaching ramifications. Runway lengths that are determined to be less than, but within 20 feet of, a critical length should be carefully reexamined to provide the highest level of confidence that the survey is correct. This reexamination should include an inspection of the runway end SP's to ensure that the longest runway length possible was provided.

7. EXAMPLE FIGURES



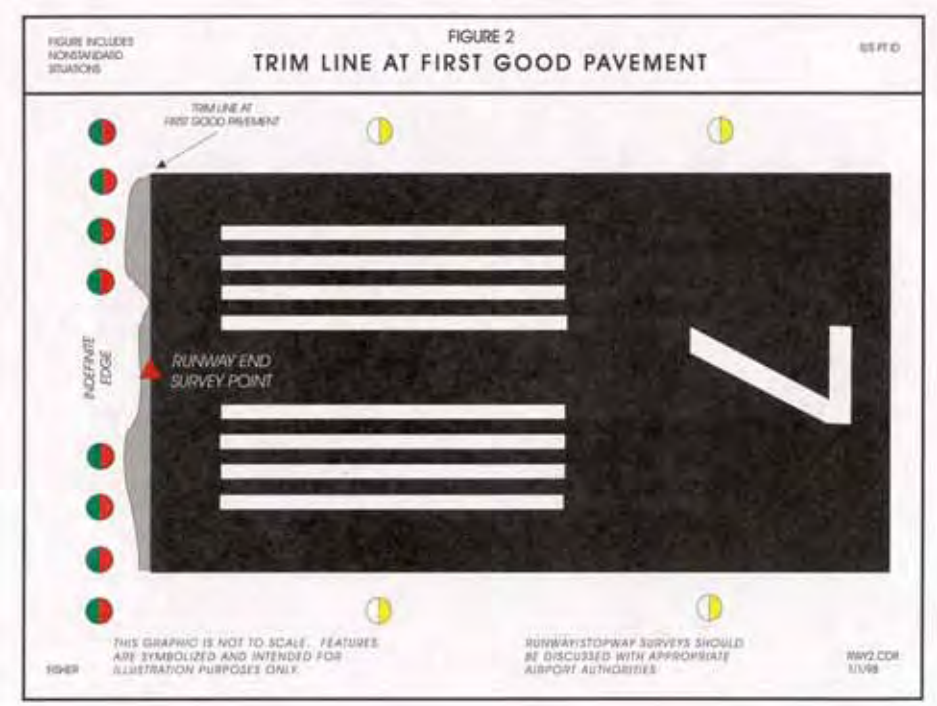


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 2
TRIM LINE AT FIRST GOOD PAVEMENT
TRIM LINE AT FIRST GOOD PAVEMENT
INDEFINITE EDGE
RUNWAY END SURVEY POINT
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES
FISHER
RWY2.CDR
1/1/98

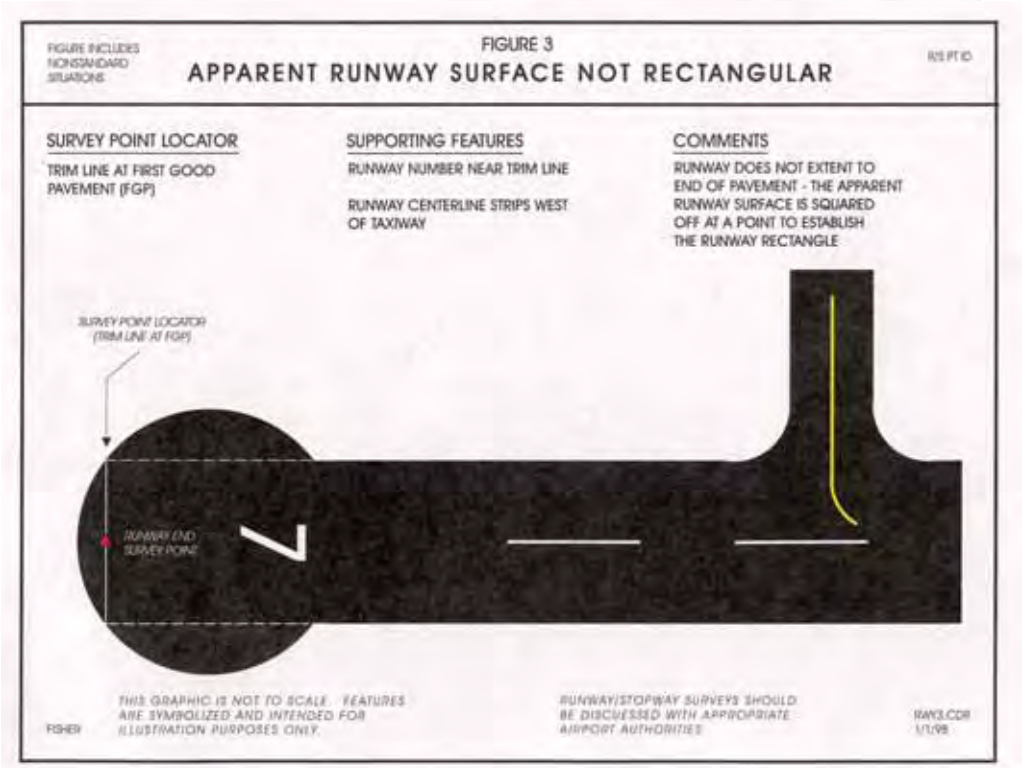


FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 3
APPARENT RUNWAY SURFACE NOT RECTANGULAR
SURVEY POINT LOCATOR
TRIM LINE AT FIRST GOOD PAVEMENT (FGP)
SUPPORTING FEATURES
RUNWAY NUMBER NEAR TRIM LINE
RUNWAY CENTERLINE STRIPS WEST OF TAXIWAY
COMMENTS
RUNWAY DOES NOT EXTENT TO END OF PAVEMENT - THE APPARENT RUNWAY SURFACE IS SQUARED OFF AT A POINT TO ESTABLISH THE RUNWAY RECTANGLE
SURVEY POINT LOCATOR (TRIM LINE AT FGP)
RUNWAY END SURVEY POINT
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES
FISHER
RWY3.CDR
1/1/98

FIGURE INCLUDES NONSTANDARD SITUATIONS

FIGURE 4

APPARENT RUNWAY SURFACE NOT RECTANGULAR

NS PT ID

SURVEY POINT LOCATOR	SUPPORTING FEATURES	COMMENTS
OPTION 1 - TRIM LINE AT FIRST GOOD PAVEMENT (FGP) THAT YIELDS MAXIMUM RUNWAY LENGTH OPTION 2 - TRIM LINE AT FIRST GOOD PAVEMENT (FGP) YIELDING SHORTER, WIDER RUNWAY	OPTION 1 RUNWAY NUMBER NEAR, AND ON TOUCHDOWN SIDE OF, TRIM LINE 1 OPTION 2 WIDEST RUNWAY AVAILABLE STARTS AT TRIM LINE 2, HOWEVER THIS OPTION MAY CONFLICT WITH EXISTING RUNWAY NUMBER LOCATION, AS IN CASE SHOWN.	OPTION 1 WILL MOVE RUNWAY CENTERLINE. EITHER OPTION MAY REQUIRE RUNWAY REPAINTING. DISCUSS OPTIONS WITH APPROPRIATE AIRPORT AUTHORITIES.

THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.

RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES.

FISHER

RWY4.CDR 1/1/98

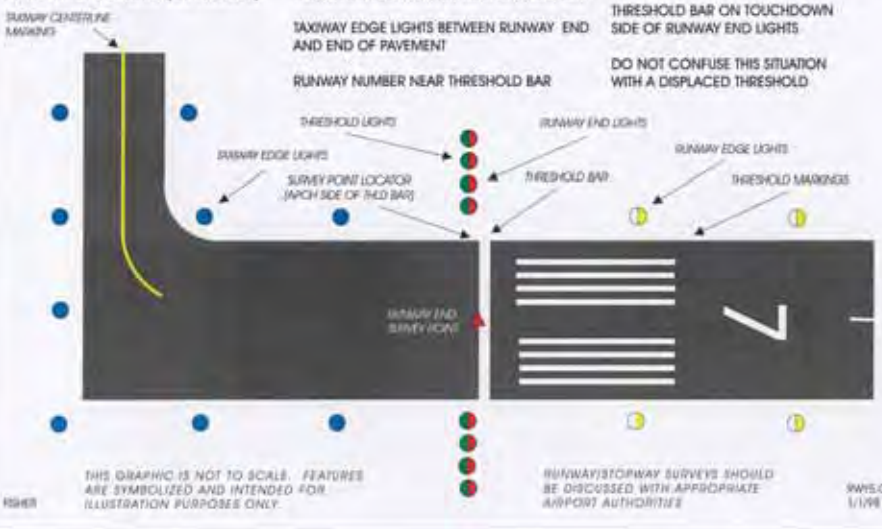
FIGURE INCLUDES NONSTANDARD SITUATIONS

FIGURE 5

RUNWAY END WITH ALIGNED TAXIWAY

NS PT ID

SURVEY POINT LOCATOR	SUPPORTING FEATURES	COMMENTS
APPROACH SIDE OF THRESHOLD BAR IF BAR IS ENTIRELY ON TOUCHDOWN SIDE OF RUNWAY END LIGHTS (SEE FIGURE 6)	RUNWAY END LIGHTS NEAR THRESHOLD BAR THRESHOLD MARKINGS NEAR THRESHOLD BAR TAXIWAY EDGE LIGHTS BETWEEN RUNWAY END AND END OF PAVEMENT RUNWAY NUMBER NEAR THRESHOLD BAR	NONSTANDARD MARKINGS FOR RUNWAY WITH ALIGNED TAXIWAY THRESHOLD BAR ON TOUCHDOWN SIDE OF RUNWAY END LIGHTS DO NOT CONFUSE THIS SITUATION WITH A DISPLACED THRESHOLD



THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.

RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES

FISHER

RWY5.CDR 1/1/98

FIGURE INCLUDES NONSTANDARD SITUATIONS

FIGURE 6

RUNWAY END WITH ALIGNED TAXIWAY

IVS PT ID

SURVEY POINT LOCATOR

TRIM LINE ALIGNED WITH OUTBOARD RUNWAY END LIGHTS IF NO THRESHOLD BAR OR IF APPROACH SIDE OF THRESHOLD BAR IS ON APPROACH SIDE OF RUNWAY END LIGHTS (SEE FIGURE 5)

SUPPORTING FEATURES

THRESHOLD BAR NEAR RUNWAY END LIGHTS

THRESHOLD MARKINGS NEAR RWY END LTS

TAXIWAY EDGE LIGHTS BETWEEN RUNWAY END AND END OF PAVEMENT

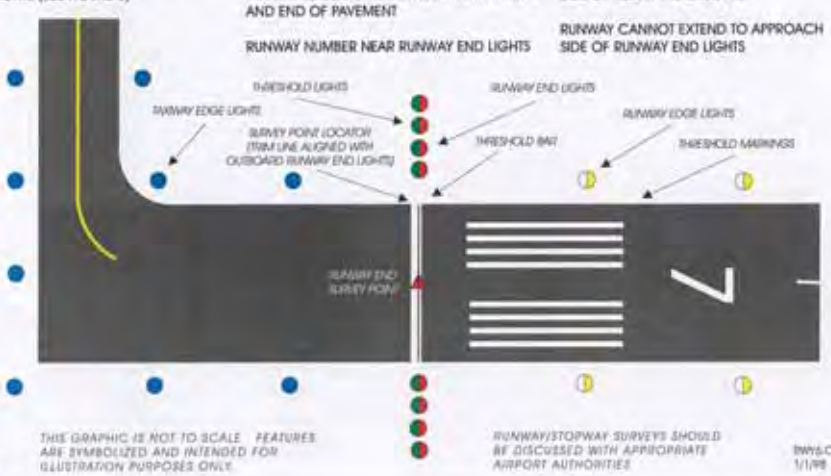
RUNWAY NUMBER NEAR RUNWAY END LIGHTS

COMMENTS

NONSTANDARD MARKINGS FOR RUNWAY WITH ALIGNED TAXIWAY

THRESHOLD BAR EXTENDS TO APPROACH SIDE OF RUNWAY END LIGHTS

RUNWAY CANNOT EXTEND TO APPROACH SIDE OF RUNWAY END LIGHTS



THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.

RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES

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FIGURE INCLUDES NONSTANDARD SITUATIONS

FIGURE 7

DISPLACED THRESHOLD

IVS PT ID

SURVEY POINT LOCATOR

APPROACH SIDE OF THRESHOLD BAR

SUPPORTING FEATURES

THRESHOLD LIGHTS NEAR THRESHOLD BAR

RUNWAY END LIGHTS NEAR END OF PAVEMENT

RUNWAY EDGE LIGHTS BETWEEN THRESHOLD AND END OF PAVEMENT

RUNWAY NUMBER AND THRESHOLD MARKINGS NEAR THRESHOLD BAR

COMMENTS

NONSTANDARD MARKINGS FOR DISPLACED THRESHOLD

THRESHOLD LIGHTS MAY NOT BE PRECISELY ALIGNED WITH APPROACH SIDE OF THRESHOLD BAR

DO NOT CONFUSE THIS SITUATION WITH A RUNWAY END AND ALIGNED TAXIWAY

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RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES

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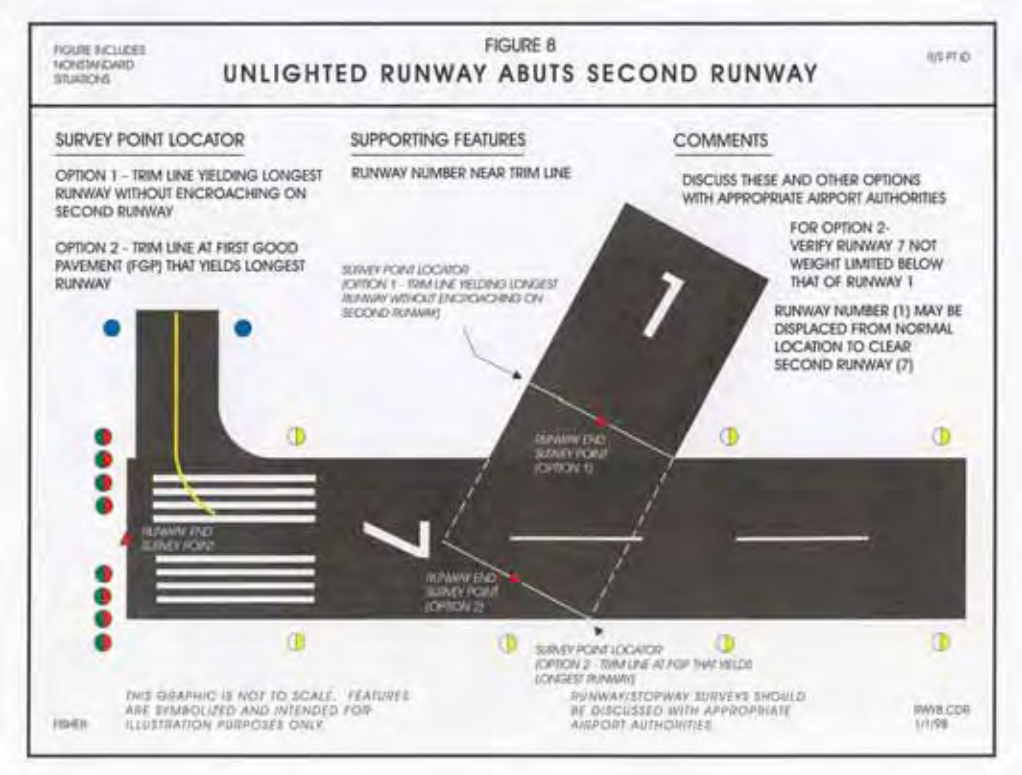
FIGURE INCLUDES NONSTANDARD SITUATIONS
FIGURE 8
UNLIGHTED RUNWAY ABUTS SECOND RUNWAY
SURVEY POINT LOCATOR
OPTION 1 - TRIM LINE YIELDING LONGEST RUNWAY WITHOUT ENCROACHING ON SECOND RUNWAY
OPTION 2 - TRIM LINE AT FIRST GOOD PAVEMENT (FGP) THAT YIELDS LONGEST RUNWAY
SUPPORTING FEATURES
RUNWAY NUMBER NEAR TRIM LINE
COMMENTS
DISCUSS THESE AND OTHER OPTIONS WITH APPROPRIATE AIRPORT AUTHORITIES
FOR OPTION 2- VERIFY RUNWAY 7 NOT WEIGHT LIMITED BELOW THAT OF RUNWAY 1
RUNWAY NUMBER (1) MAY BE DISPLACED FROM NORMAL LOCATION TO CLEAR SECOND RUNWAY (7)
SURVEY POINT LOCATOR (OPTION 1 - TRIM LINE YIELDING LONGEST RUNWAY WITHOUT ENCROACHING ON SECOND RUNWAY)
RUNWAY END SURVEY POINT (OPTION 1)
RUNWAY END SURVEY POINT
RUNWAY END SURVEY POINT (OPTION 2)
SURVEY POINT LOCATOR (OPTION 2 - TRIM LINE AT FGP THAT YIELDS LONGEST RUNWAY)
1
7
THIS GRAPHIC IS NOT TO SCALE. FEATURES ARE SYMBOLIZED AND INTENDED FOR ILLUSTRATION PURPOSES ONLY.
RUNWAY/STOPWAY SURVEYS SHOULD BE DISCUSSED WITH APPROPRIATE AIRPORT AUTHORITIES.
RWY8.CDR
1/1/98